



Section 3

Project Description

PREAMBLE

This section provides an overview of the Project and approvals required. The Project Site, including the Mine Site, Mine Camp and Concentrate Transport Route, is identified and infrastructure, services and site establishment activities are described. The proposed mining operation and sequence and processing activities are detailed, together with the planned management of water, waste rock and processing residues. This section also describes the proposed hours of operation, employment, capital investment value and rehabilitation operations.

The Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of the activities proposed, how and where the various activities would be undertaken and to enable an assessment of the potential impacts of the Project on the surrounding environment.



3.1 Introduction

3.1.1 Project Overview

Table 3.1.1 provides an overview of the Project with Figures 3.1.1 to 3.1.5 presenting the proposed layout of the Project including that of the Project Site in its entirety (Figure 3.1.1), the Mine Site (Figure 3.1.2) and the Mine Camp (Figure 3.1.3). Figure 3.1.4 and Figure 3.1.5 identify the alignment of Grampians Road and areas where nominal design upgrades are proposed to improve safety for all road users.

**Table 3.1.1
Project Overview**

Page 1 of 5

Project Element	Summary of the Project
Mining Method	<ul style="list-style-type: none"> • Conventional drill, blast, load and haul methods for the development of two separate open cut pits (Northern and Southern) that would be situated on Grampians Ridge. • Mining operations would commence with a starter pit in the central section of the Northern open cut pit with development of the Southern open cut commencing with a starter pit, also in its central section, approximately six months after that. • Both starter pits would then be progressively developed to the north, east, south and west until reaching full development, whereby: <ul style="list-style-type: none"> – the Northern open cut pit would be approximately 1,000m (northeast/southwest), 300m (northwest/southeast) and 190m deep; and – the Southern open cut pit would be approximately 1,250m (northeast/southwest), 360m (northwest/southeast) and 150m deep. • Mobile fleet would be utilised for the load and haul of blasted waste rock and run of mine (ROM) ore. • ROM ore would be hauled to the ROM pad for stockpiling or direct feed into the front-end crushing circuit. • Waste rock would be hauled for storage in either the Northern or Southern waste rock emplacements (WRE) that would be positioned immediately adjacent to the respective open cut pit. • Near surface material (i.e. soil, colluvium) would be removed using conventional free dig, load and haul techniques and stockpiled for use in rehabilitation activities. • Haulage of ROM ore and waste rock would initially occur via temporary haul roads at natural surface until the establishment of permanent haul roads as part of the progressive development of each open cut pit.
Mineral Resource	<ul style="list-style-type: none"> • Tin deposit comprising two separate zones along an approximately 2.6km long strike length and up to 260m wide. • Proved and Probable JORC-compliant Ore Reserve Estimate (March 2024) <ul style="list-style-type: none"> – 40 million tonnes (Mt) at 0.13% tin. • Measured, Indicated and Inferred JORC-compliant Mineral Resource (September 2023) <ul style="list-style-type: none"> – 133Mt at 0.10% tin.
Annual Production	<ul style="list-style-type: none"> • Up to 10 million tonnes per annum (Mtpa) comprising: <ul style="list-style-type: none"> – Up to 5.1Mtpa of ore in Year 2; and – Up to 5.8Mtpa of waste rock in Years 3 to 7.
Mine Life	<ul style="list-style-type: none"> • Project life approximately 21 years, comprising: <ul style="list-style-type: none"> – Site establishment and construction..... approximately 2 years – Mining and processing operations approximately 10 years – Decommissioning, landform establishment and revegetation approximately 2 years – Post-mining Rehabilitation monitoring..... approximately 7 years post mining <p>Note: Site establishment and mining operations would be partially undertaken concurrently</p>



**Table 3.1.1 (Cont'd)
Project Overview**

Project Element	Summary of the Project
Total Resource Recovered	<ul style="list-style-type: none"> • Ore mined..... up to 39.7Mt
Disturbance Area (total)	<ul style="list-style-type: none"> • Mine Siteapproximately 318.2ha • Grampians Road (upgrade areas, additional to existing disturbance) approximately 6.4ha • Mine Camp (existing approved disturbance area, nil additional)..... approximately 0.8ha
Processing	<ul style="list-style-type: none"> • Processing operations would involve the following. <ul style="list-style-type: none"> – Three stage (front-end) crushing and screening of up to 5.0Mtpa of ROM ore to produce crushed ore; – Pre-concentration via screening, vertical shaft impact crushing followed by density separation in jigs; – Concentration via ball milling, re-grind, screening and desliming with gravity separation using spirals and shaker tables to produce tin concentrate; – Batch dressing of tin concentrate via low intensity magnetic separation, sulfide flotation and final cleaning with shaker tables; and – Concentrate thickening, filtration and bagging to produce up to 7,300tpa of tin concentrate at +60% tin.
Management of Mining Waste and Processing Residues	<ul style="list-style-type: none"> • Waste Rock <ul style="list-style-type: none"> – Extracted using drill, blast, load and haul to produce up to 40.5Mt of waste rock, of which: <ul style="list-style-type: none"> ○ 74% (30.0Mt) is considered non-acid forming (NAF); ○ 20% (8.1Mt) is considered potentially acid forming (PAF); and ○ 6% (2.4Mt) is considered uncertain. – Where required, NAF waste rock would initially be used during site establishment to construct infrastructure within the Mine Site. – Subsequently, waste rock would be transported to either the: <ul style="list-style-type: none"> ○ Northern WRE for storage of NAF, PAF and uncertain material; or ○ Southern WRE for storage of NAF material. – Both the Northern and Southern WRE would remain in the final landform. • Processing Residues <ul style="list-style-type: none"> – Pre-concentration and concentration operations would produce up to (approximately): <ul style="list-style-type: none"> ○ 2.3Mtpa of coarse reject; ○ 1.3Mtpa of coarse tailings; and ○ 1.3Mtpa of fine tailings. – Coarse reject, dewatered coarse tailings and dewatered, thickened and filtered fine tailings would be mixed and transferred via overland conveyor for placement in the co-disposal area (CDA) that would be located immediately north of the processing plant. – The CDA would be progressively developed over the Project-life and remain in the final landform. – Flotation operations would produce up to (approximately) 30,000tpa of wet tailings that would be transferred (pumped) as a slurry to the residue storage facility (RSF). – The RSF would be located approximately 1.5km north-northwest of the processing plant. – Following the cessation of processing operations, material deposited in the RSF would be allowed to consolidate prior to rehabilitation and revegetation for retention in the final landform. • General waste and recyclables <ul style="list-style-type: none"> – Would be collected from the Mine Site and transferred to a licensed waste management facility.



**Table 3.1.1 (Cont'd)
Project Overview**

Project Element	Summary of the Project
Transportation Operations	<ul style="list-style-type: none"> • Internal transportation <ul style="list-style-type: none"> – Main access road (approximately 3.5km) – would be constructed from the terminus of Grampians Road at the Mine Site boundary to the processing plant. – Haul roads for mobile mining fleet to haul waste rock from the open cut pits to the waste rock emplacements and ROM ore to the ROM pad would be constructed within the proposed area of disturbance and relocated as required. – Other light and heavy vehicle internal roads would be constructed within the proposed area of disturbance and relocated as required. • Mine Site Access <ul style="list-style-type: none"> – Grampians Road and Gulf Road via Emmaville • Transportation routes <ul style="list-style-type: none"> – Concentrate Transport Route (to NSW/Queensland border then Port of Brisbane): Grampians Road, Gulf Road, Moore Street, Irby Street, Wellington Vale Road and the New England Highway. – Southern Route (to Glen Innes and Mine Camp): Grampians Road, Gulf Road, Moore Street and Emmaville Road. • Public road upgrades to accommodate Project generated traffic. <ul style="list-style-type: none"> – Upgraded sections of Grampians Road from the Mine Site boundary to the intersection of Gulf Road. – Upgraded Grampians Road crossing of Vegetable Creek. – Upgraded intersection of Schrodgers Road and Grampians Road. – Upgraded intersection of Gulf Road and Grampians Road. • Concentrate transportation <ul style="list-style-type: none"> – Method: Containerised (22t) for transport via road registered heavy vehicle. – Vehicle type: B-Double. – Traffic level: up to 2 laden vehicle movements per day. • All other deliveries/consumables <ul style="list-style-type: none"> – Route: Grampians Road and Gulf Road via Emmaville. – Vehicle type: up to B-double. – Traffic level up to 4 laden movements per day. • Personnel transportation (Company provided bus charter*). <ul style="list-style-type: none"> – Route: Grampians Road, Gulf Road and Emmaville Road (from Glen Innes). – Vehicle type: Bus. – Traffic level up to 6 movements per day.
Note *	<p>Whilst the Applicant would encourage use of provided buses, it is recognised that it may be impractical for some personnel who may elect to use their private vehicle for travel to the Mine Site.</p>
General Infrastructure	<ul style="list-style-type: none"> • On-site infrastructure not addressed above would include the following. <ul style="list-style-type: none"> – Offices and administration area. – Explosive magazines and Ammonium Nitrate (AN) storage facility. – Workshops, stores and laydown areas. • Off-site infrastructure not addressed above would include the following. <ul style="list-style-type: none"> – Mine Camp and associated infrastructure for up to 50 personnel located adjacent to Glen Innes Airport. – Exploration office and core-shed located in Emmaville. – Both the Mine Camp and Exploration office would be used as transportation hubs, with car parking, for pick-up / drop-off of personnel travelling to the Mine Site via bus.



**Table 3.1.1 (Cont'd)
Project Overview**

Project Element	Summary of the Project																																					
Power	<ul style="list-style-type: none"> • Power for the Mine Site would be provided by an onsite power generation facility with a combination of: <ul style="list-style-type: none"> – A 10 megawatt (MW) Solar Farm with inverter and 2MWh battery energy storage system (BESS). – Four 2MW capacity gas generators supported by three 30t capacity gas storage tanks. – One 2MW capacity diesel generator for back-up power supply. – Power distribution infrastructure, including substations and overhead or buried transmissions lines. 																																					
Water Management	<ul style="list-style-type: none"> • Mine-affected water, including runoff from the RSF, WRE, CDA, open cut pit sumps, ROM pad and Processing Plant areas would be captured and used for mining and processing operations. • Production bores, installed within the regional fractured rock groundwater system, would be used to provide water for site establishment and construction activities as well as make-up water for mining and processing operations. • Sediment-laden water, including runoff from areas of Project-related construction disturbance would be managed using temporary erosion and sediment measures and discharged. • Water from undisturbed sections of the Mine Site (clean water) would be prevented from entering disturbed sections of the Mine Site. This water would be either discharged or collected under the harvestable rights provisions of the <i>Water Management Act 2000</i> (WM Act) and used for Project-related activities. • Runoff collected from the Applicant’s landholding immediately adjacent to the Mine Site (clean water) would be collected under the harvestable rights provisions of the WM Act and used for site establishment and construction activities as well as make-up water for mining and processing operations. 																																					
Workforce	<ul style="list-style-type: none"> • Site establishment and construction stage – up to 150 personnel • Operations – approximately 129 personnel 																																					
Hours of Operation	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Activity</th> <th style="width: 20%;">Days</th> <th style="width: 20%;">Hours</th> </tr> </thead> <tbody> <tr> <td colspan="3">Pre-construction and Offsite Roadworks</td> </tr> <tr> <td rowspan="2">These activities are described in Section 3.2 and Section 3.3</td> <td>Monday to Friday¹</td> <td>7:00am to 6:00pm</td> </tr> <tr> <td>Saturday</td> <td>8:00am to 1:00pm</td> </tr> <tr> <td colspan="3">Site Establishment and Construction</td> </tr> <tr> <td rowspan="2">Noise generating (i.e. vegetation clearing, soil stripping and stockpiling, pre-strip, bulk earthworks, onsite construction, deliveries, offsite roadworks and intersection upgrades).</td> <td>Monday to Friday¹</td> <td>7:00am to 6:00pm</td> </tr> <tr> <td>Saturday</td> <td>8:00am to 1:00pm</td> </tr> <tr> <td>Low noise generating (i.e. electrical installation/wiring, plumbing, plant installation, assembly and commissioning).</td> <td>7 days¹</td> <td>24 hours</td> </tr> <tr> <td colspan="3">Operations</td> </tr> <tr> <td>Crushing (primary, secondary and tertiary)</td> <td>7 days</td> <td>6:00am to 6:00pm</td> </tr> <tr> <td>Blasting</td> <td>Monday to Saturday¹</td> <td>9:00am to 5:00pm</td> </tr> <tr> <td>All other</td> <td>7 days</td> <td>24 hours</td> </tr> <tr> <td colspan="3"><i>Note: 1 Public Holidays excluded.</i></td> </tr> </tbody> </table>	Activity	Days	Hours	Pre-construction and Offsite Roadworks			These activities are described in Section 3.2 and Section 3.3	Monday to Friday ¹	7:00am to 6:00pm	Saturday	8:00am to 1:00pm	Site Establishment and Construction			Noise generating (i.e. vegetation clearing, soil stripping and stockpiling, pre-strip, bulk earthworks, onsite construction, deliveries, offsite roadworks and intersection upgrades).	Monday to Friday ¹	7:00am to 6:00pm	Saturday	8:00am to 1:00pm	Low noise generating (i.e. electrical installation/wiring, plumbing, plant installation, assembly and commissioning).	7 days ¹	24 hours	Operations			Crushing (primary, secondary and tertiary)	7 days	6:00am to 6:00pm	Blasting	Monday to Saturday ¹	9:00am to 5:00pm	All other	7 days	24 hours	<i>Note: 1 Public Holidays excluded.</i>		
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Estimated Development Cost	A\$214 million																																					

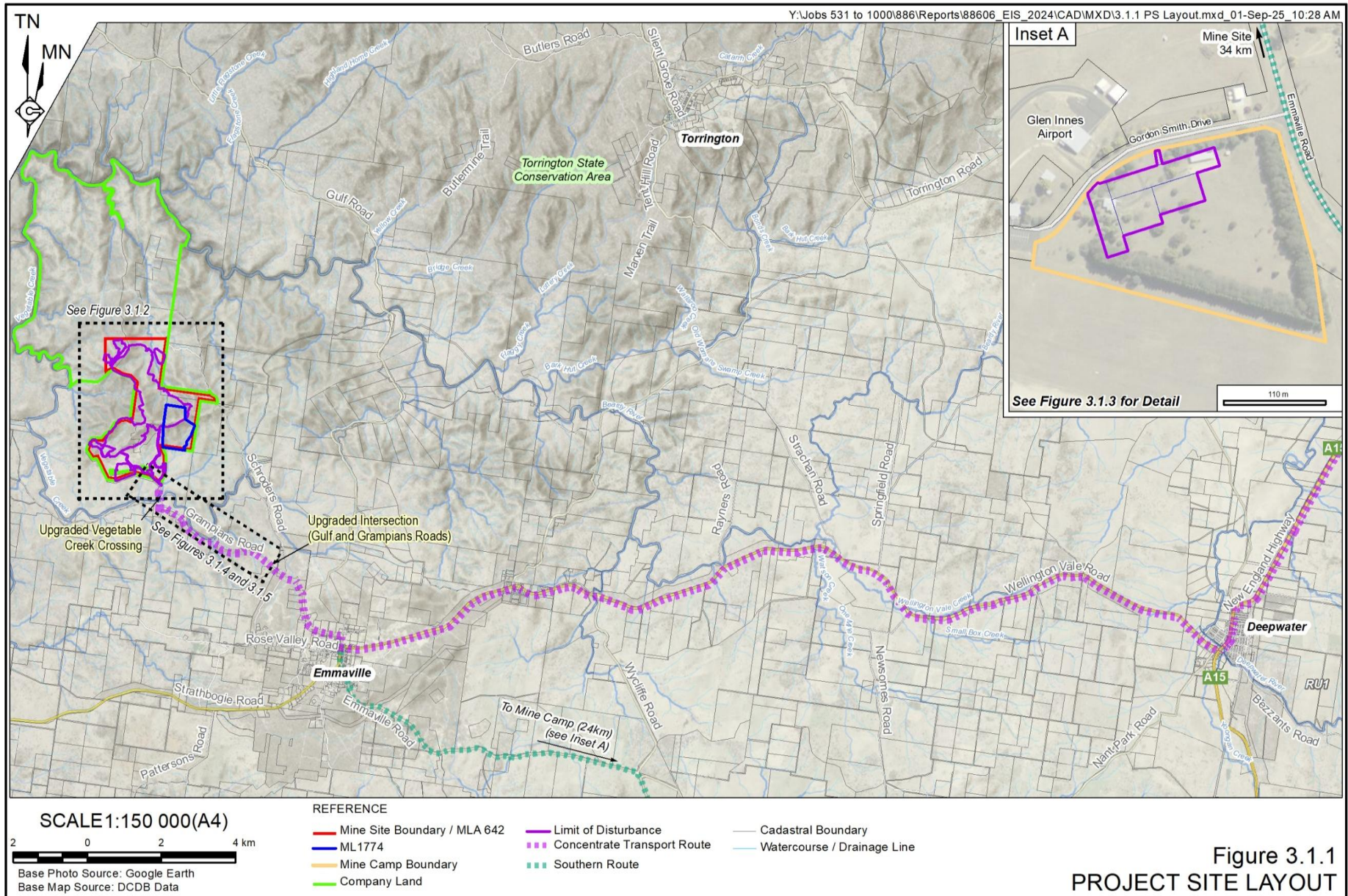
**Table 3.1.1 (Cont'd)**
Project Overview

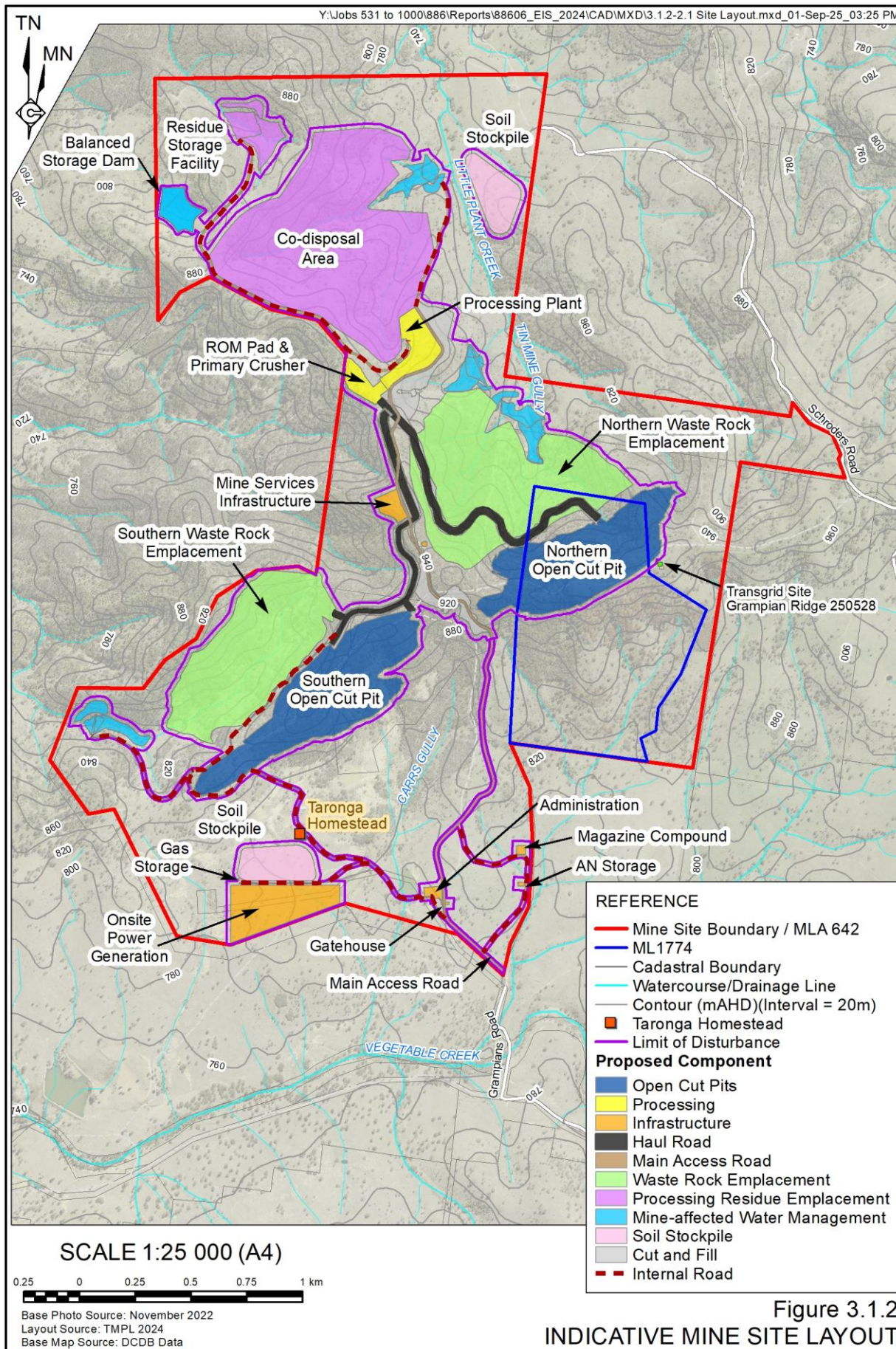
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Project Element	Summary of the Project
Final Landform	<ul style="list-style-type: none">• All infrastructure not required for the final land use would be removed and areas revegetated.• Stabilised, shaped, capped and revegetated WRE, CDA and RSF.• Two final voids.
Final Land Use	<ul style="list-style-type: none">• Mine Site<ul style="list-style-type: none">– Native ecosystem and low-intensity grazing with further investigation of alternative post-mining land uses, including renewable energy generation or industrial use.• Mine Camp<ul style="list-style-type: none">– All infrastructure and services either retained for handover, or removed, following the cessation of mining and processing operations and at the discretion of Glen Innes Severn Council (landowner).
Rehabilitation	<ul style="list-style-type: none">• Where practical, rehabilitation would occur progressively throughout the Project-life.



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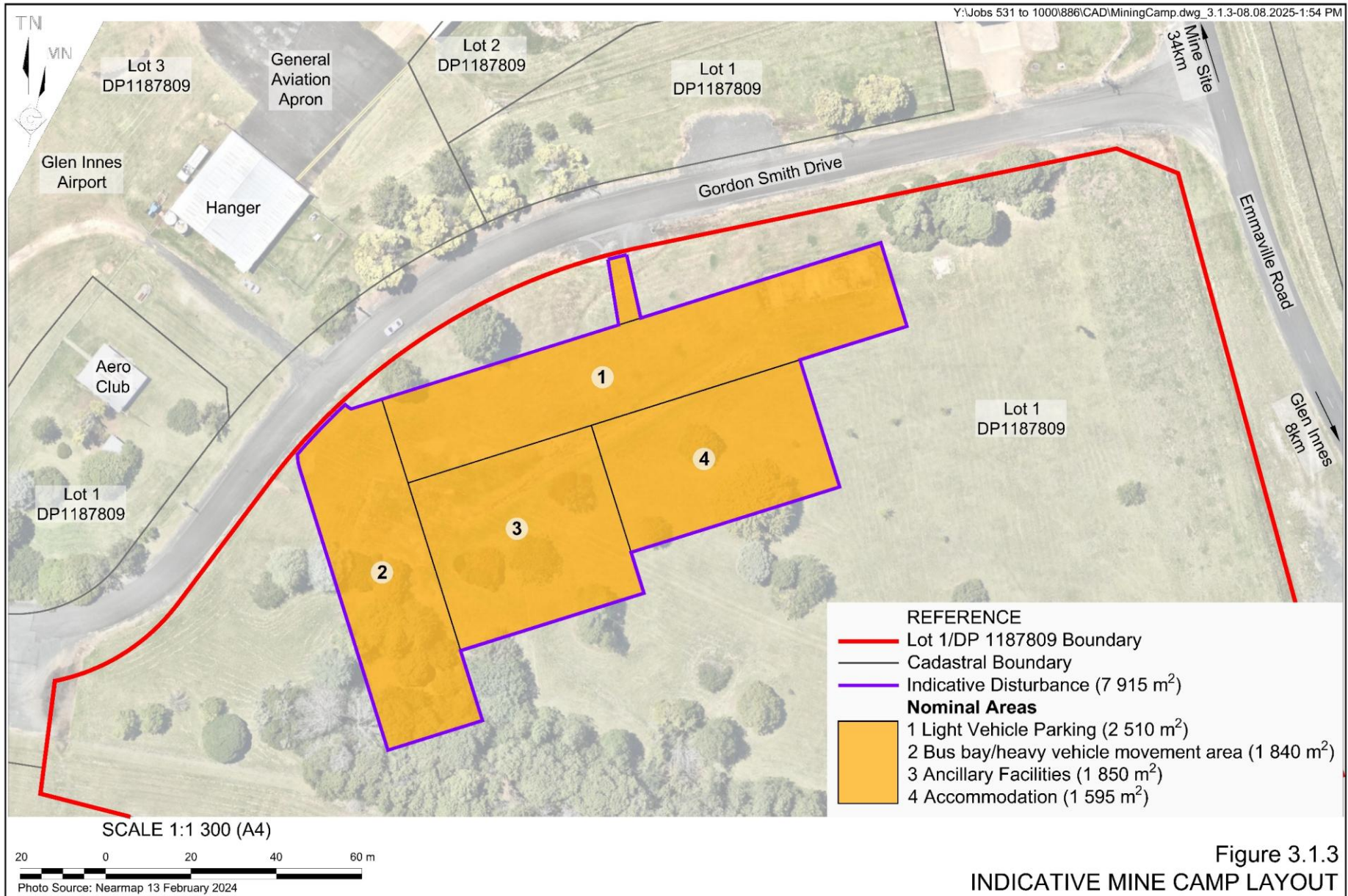
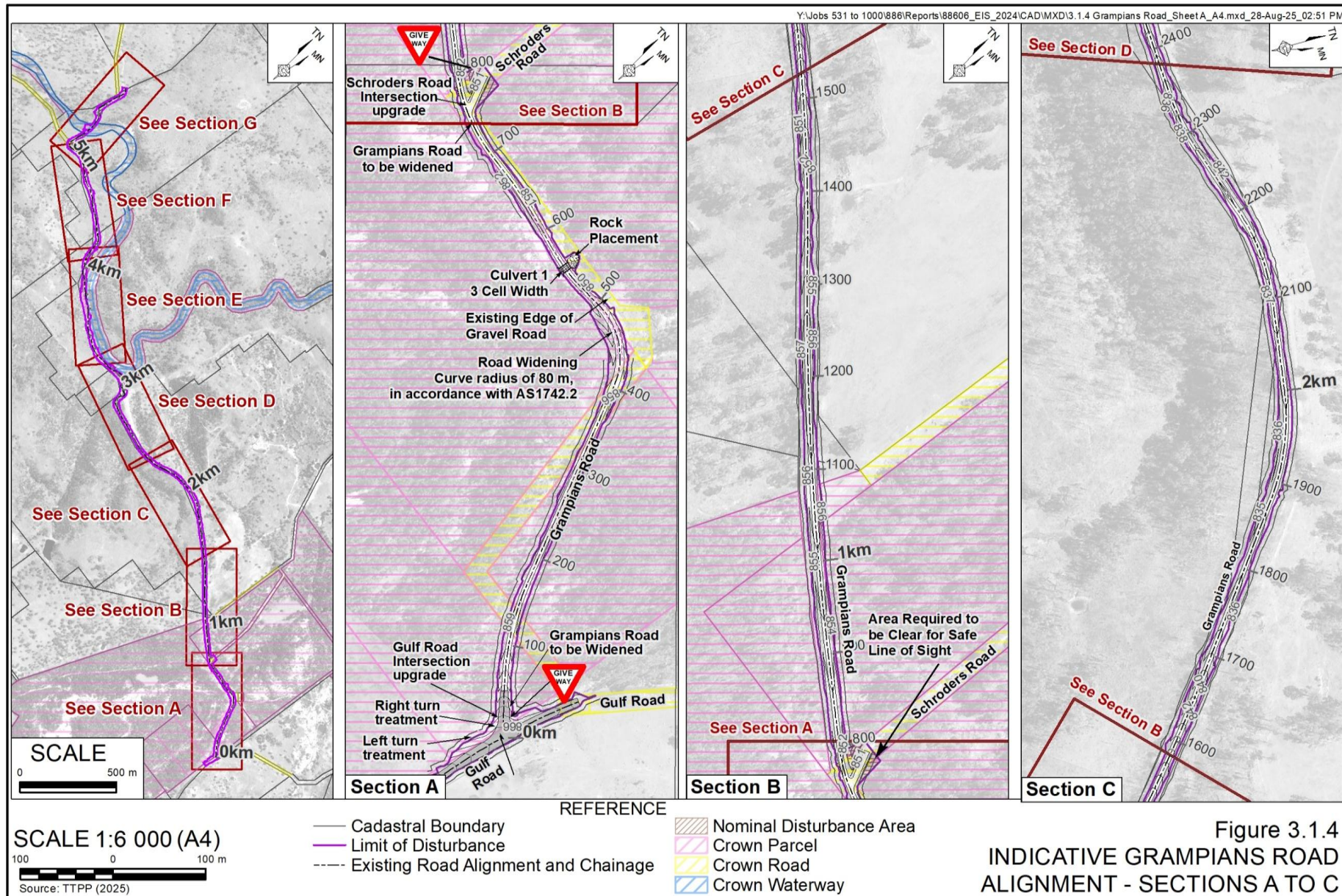
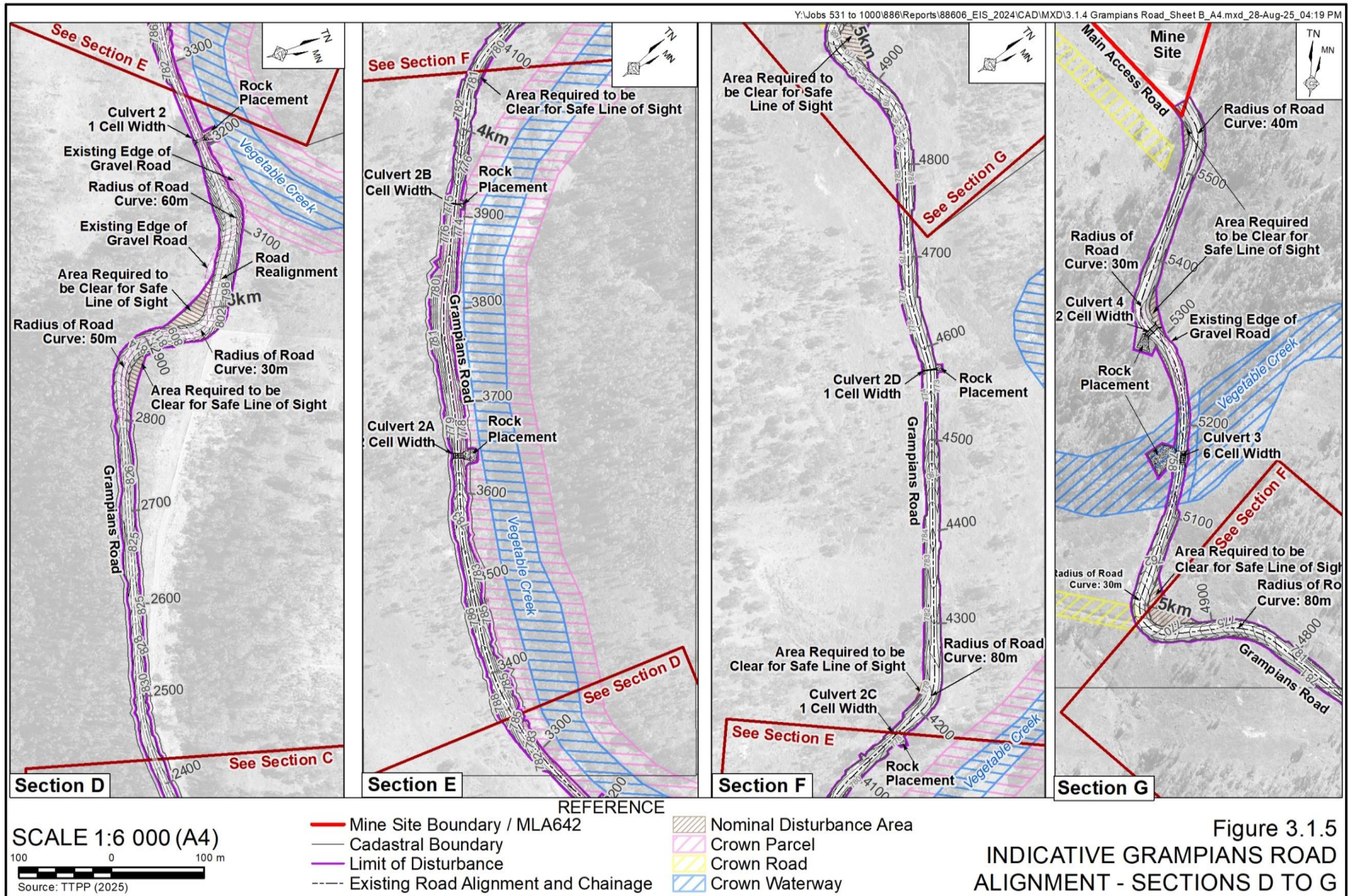


Figure 3.1.3
INDICATIVE MINE CAMP LAYOUT





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3.1.2 Approvals Required

In addition to development consent, the following approvals would be required for the Project. Consistent with Section 4.42 of the EP&A Act, once Development Consent has been received the following approvals cannot be refused and must be consistent with the development consent, as granted.

- Mining Lease under the *Mining Act 1992* (Mining Act).
A Mining Lease issued under Part 5 of the Mining Act would be required to permit mining of minerals.
 - A Mining Lease Application (MLA 642) has been submitted for the area which encompasses the proposed Mine Site and ML 1774, historic mining tenure held by the Applicant (**Figure 3.1.2**).
 - The Applicant intends to surrender ML 1774 once Development Consent has been received and MLA 642 is converted to a Mining Lease (**Figure 3.1.1**).

Whilst no Mining Lease would be required for the Mine Camp, as no minerals would be mined from that land, it would be considered an Ancillary Mining Activity that is required to support Project-related activities within the Mine Site.

- Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act).
An Environment Protection Licence to permit mining for minerals would be required as the Project would exceed the 4ha disturbance threshold under Clause 29(2) of Schedule 1 of the POEO Act.
- A consent under Section 138 of the *Roads Act 1993*.
Permits (and an associated Works Authority Deed) would be required from Glen Innes Severn Council for works within Council controlled road reserves (where required).

The following additional approvals would also be required.

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
The EPBC Act details the general obligations regarding the management of biodiversity and conservation under Commonwealth legislation.
The *Biodiversity Development Assessment Report* (BDAR) prepared by GeoLink (2025) indicates that the Project would require clearing of land containing threatened flora species (*Acacia pubifolia*) and threatened fauna species (*Uvidicolus sphyurus*). The Applicant submitted a referral on 21 July 2025 to determine whether the Project is a controlled action, thus requiring approval under the EPBC Act. The referral outcome, confirming that the Project is considered a controlled action, was provided on 4 September 2025 and the Project's assessment under the EPBC Act will proceed under the provisions of the Bilateral Agreement between NSW and the Commonwealth.



- *Water Management Act 2000 (WM Act)*
The WM Act provides arrangements for controlling land-based activities that affect the quality and quantity of water resources in NSW.
WM Act approvals required for the Project that are not otherwise exempted (see Section 4.2.3.2) include Water Access Licences issued under the Water Sharing Plan for the *NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*¹, and an aquifer interference approval under section 91 of the WM Act. These approvals would account for groundwater inflows to the open pit, associated losses (operations and evaporative) and groundwater extraction to support processing activities.
- *Crown Land Management Act 2016 (CLM Act)*
The CLM Act provides a framework for the care, control and management over Crown reserves within NSW. Section 5.3 of the CLM Act gives the Minister the power to enter into agreements, grant easements, rights of way, leases, licences or permits over Crown land.
Some sections of key Mine Site components, including the internal Mine Site access road, haul road, Southern open cut pit, Solar Farm and Administration Area are situated within Crown land (Lot 7001 DP92662). Therefore, under the powers provided by Section 5.3 of the CLM Act and, in accordance with Section 265 of the Mining Act, the Applicant has entered into a compensation agreement with the Minister for use of Lot 7001 DP92662.
- Construction Certificates, Occupation Certificates, etc.
All necessary approvals under Division 6.3 of the EP&A Act would be obtained from Glen Innes Severn Council for construction, erection and/or placement of buildings, structures and appropriate sewage treatment systems for the Project.

The following approvals would not be required because of the operation of Section 4.41 of the EP&A Act.

- Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974*.
- Water use approval under Section 89, a water management works approval under Section 90 or an activity approval (other than for aquifer interference) under Section 91 of the WM Act.

Finally, it is anticipated that a range of other approvals, agreements, leases, licences and certificates, including a Planning Agreement with Glen Innes Severn Council will be required for the Mine Site and Mine Camp.

¹ The Applicant holds Water Access Licence 44962 with a 636-unit share entitlement to the New England Fold Belt MDB Groundwater Source that is managed under this Water Sharing Plan. This volumetric entitlement accounts for the maximum predicted Project-related direct and indirect groundwater take.



3.2 Project Site

3.2.1 Project Site Land Titles

The Project Site is the land to which any development consent granted in relation to the Project would apply. As identified in Section 1.2, the Project Site comprises the combined areas of:

- the Mine Site;
- the Mine Camp; and
- the Concentrate Transport Route, including Grampians Road upgrade areas.

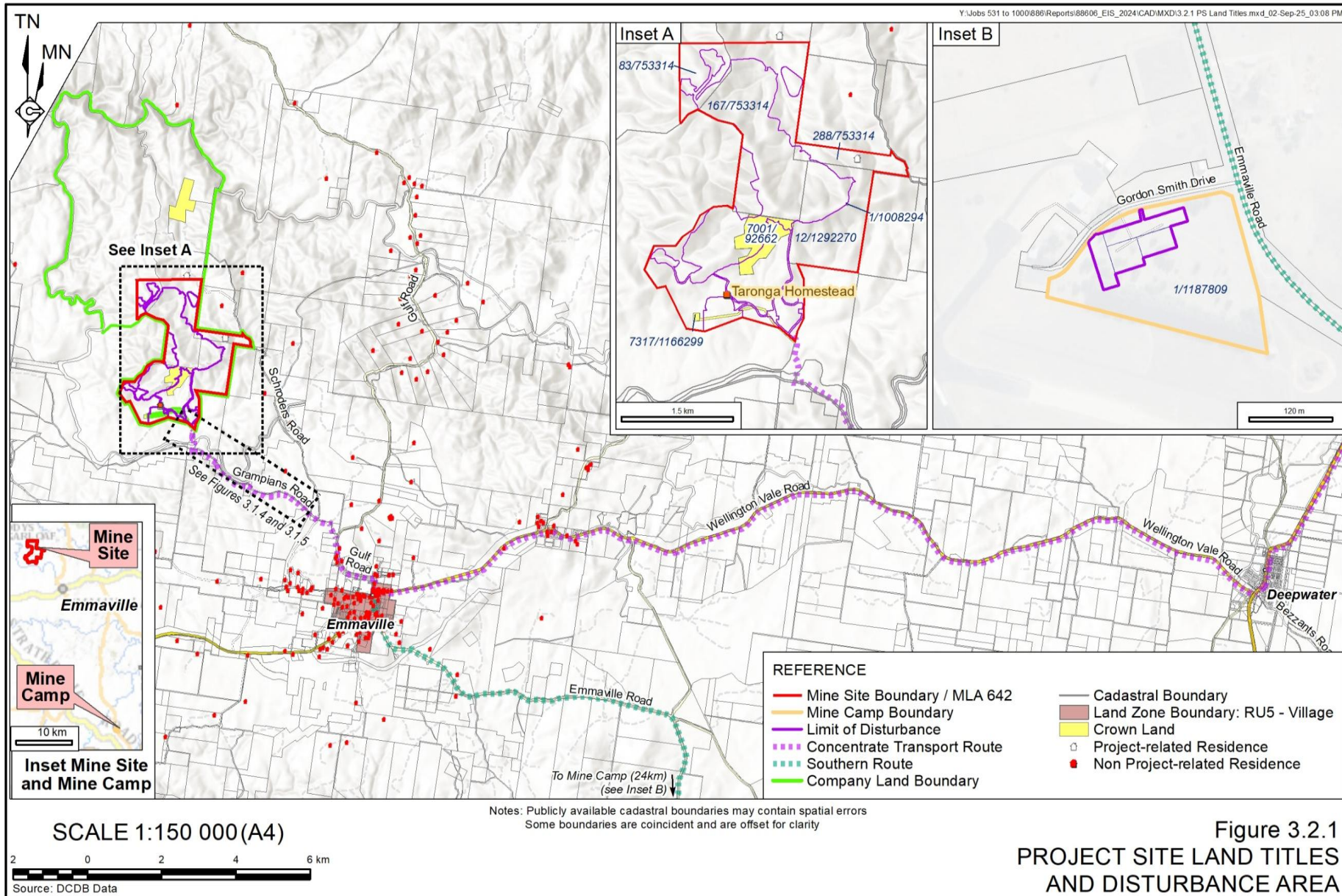
Table 3.2.1 and Figure 3.2.1 present the land titles within the Project Site.

Table 3.2.1
Project Site Land Titles

Project Component	Lot	Deposited Plan	Zoning
Principal			
Mine Site	83	753314	RU1 – Primary Production ¹
	167		
	288		
	12	1292270	
	1	1008294	
	7001	92662	
	7317	1166299	
		Crown Road Reserve	
Ancillary			
Mine Camp	1	1187809	RU1 – Primary Production ¹
Concentrate Transport Route			
Public Roads	Grampians Road Reserve		RU1 – Primary Production ²
			C3 – Environmental Management ²
	Gulf Road Reserve		RU1 – Primary Production ²
	Moore Street Road Reserve		RU1 – Primary Production ²
			RU5 – Village ¹
	Irby Street Road Reserve		RU5 – Village ¹
	Wellington Vale Road Reserve		C3 – Environmental Management ²
			RU1 – Primary Production ²
RU5 – Village ¹			
Note 1: Activity associated with component permissible with consent			
Note 2: Activity associated with component permissible without consent.			



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3.2.2 Disturbance Area

Figure 3.2.1 presents the limit of land within the Mine Site and Mine Camp that would be disturbed by the Project. All areas of disturbance for the proposed Mine Camp are within an area of historically approved disturbance.² All works associated with the proposed Grampians Road upgrades would be within the road reserve (**Figures 3.1.4** and **3.1.5**). The proposed areas of disturbance would be as follows.

- Mine Site (limit of disturbance) approximately 318.2ha
- Grampians Road (upgrade areas) approximately 6.4ha
- Mine Camp (historically approved disturbance) approximately 0.8ha

3.2.3 Land with Environmental Constraints

Figure 3.2.2 presents land zoning and land with environmental constraints. In summary, the *Glen Innes Severn Local Environment Plan 2012* (Glen Innes LEP) identifies that the Project Site includes land with the following constraints.

- Riparian Land associated with Little Plant Creek (Mine Site).
- Riparian Land associated with Vegetable Creek and its tributaries (Grampians Road upgrade area).
- Travelling Stock Route associated with Wellington Vale Road (Concentrate Transport Route).

As identified in **Figure 3.2.2**, no land within the Mine Camp is identified under the Glen Innes LEP as having environmental constraints.

² The proposed Mine Camp is situated on land approved for disturbance under DA 09/12-13 issued by the Northern Joint Regional Planning Panel on 18th December 2012. An approved component of DA 09/12-13 was the construction and operation of accommodation and ancillary facilities catering for up to 600 people. Whilst DA 09/12-13 was physically commenced, RWC understands that the original proponent, Australia Asia Flight Training Pty Ltd surrendered DA 09/12-13 to Council in 2018.



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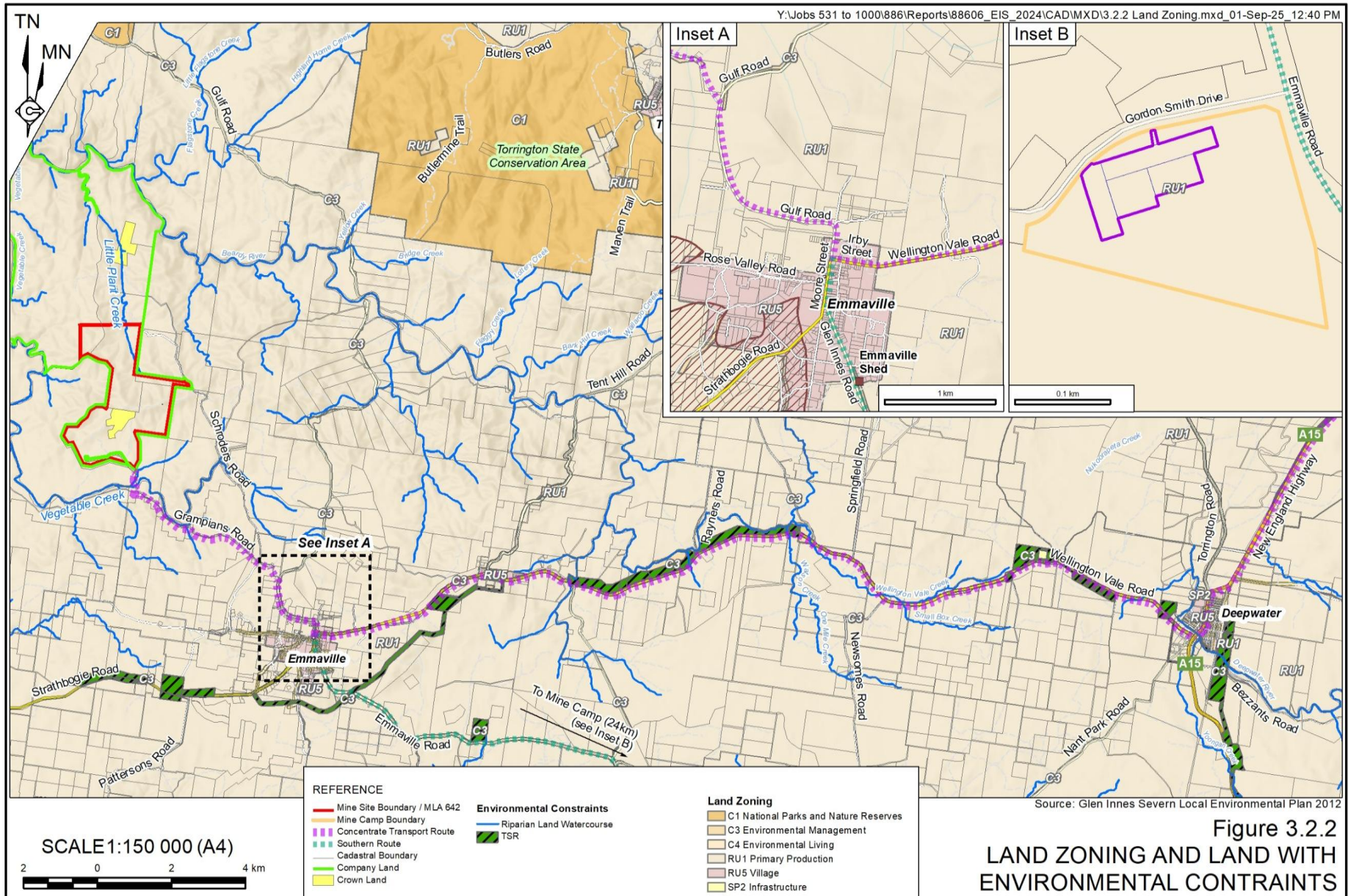


Figure 3.2.2
LAND ZONING AND LAND WITH ENVIRONMENTAL CONSTRAINTS



3.3 Infrastructure, Services and Site Establishment

3.3.1 Introduction

The following subsections present a description of Mine Site infrastructure and services that would be constructed to facilitate the Project (**Figure 3.1.2**). A description of the site preparation activities that would apply to all areas of proposed disturbance is also provided.

However, for completeness, and to avoid repetition.

- Section 3.5 presents a description of the emplacements that would be developed for the Project's proposed management of waste rock.
- Section 3.6 presents a description of the infrastructure and activities associated with the Project's proposed processing operations.
- Section 3.7 presents a description of the activities associated with the development of landforms and infrastructure for the Project's proposed management of processing residues.
- Section 3.8 presents a description of the Mine Site's internal road network and the proposed upgrades to public roads and intersections.
- Section 3.9 describes the activities, infrastructure and services associated with the proposed Mine Camp.

3.3.2 Infrastructure

3.3.2.1 Construction Offices, Amenities and Laydowns

During the Project's initial site establishment phase, a construction office would be established at the existing Taronga Homestead (**Figure 3.1.2**). The construction office would be supported by a series of transportable buildings, including change rooms, lunch facilities and self-contained (i.e. pump-out) ablutions facilities that would be located adjacent to the homestead.

Following completion of the site preparation and bulk earthworks activities, construction laydown areas would be established adjacent to major construction work areas such as the administration area, ROM pad, mine services infrastructure area, and the processing plant.

Additional transportable offices and amenities may also be located adjacent to construction laydown areas, if required, to support the construction of mining and processing infrastructure.

3.3.2.2 Administration Area

An administration area would be constructed during the Project's site establishment and construction phase. This area, comprising modular buildings and structures constructed in accordance with the *National Construction Code*, would include the following.

- Reception area
- Meeting and training rooms



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- Offices for mine management, technical and administration staff
- Crib rooms and ablutions facilities
- Light vehicle parking area (20 vehicles)
- Emergency response vehicle parking and medical facilities³
- Bus shelter
- Rainwater tanks
- Containerised, automated sewage treatment facility

Access for disabled persons to the Administration Area and associated ablutions facilities would be provided. Disabled access to other sections of the Mine Site would not generally be practicable, however, the Applicant would work with any person with a disability to ensure suitable access, as required.

3.3.2.3 Gatehouse

A security gatehouse would be constructed south of the administration area to control pedestrian and vehicle access to the Mine Site. This gatehouse would also include a transportable building with an office, security personnel station and visitor induction facility. Limited car parking facilities for light and heavy vehicles would be provided for visitors and deliveries awaiting entry to the Mine Site.

3.3.2.4 Mine Services Infrastructure Area

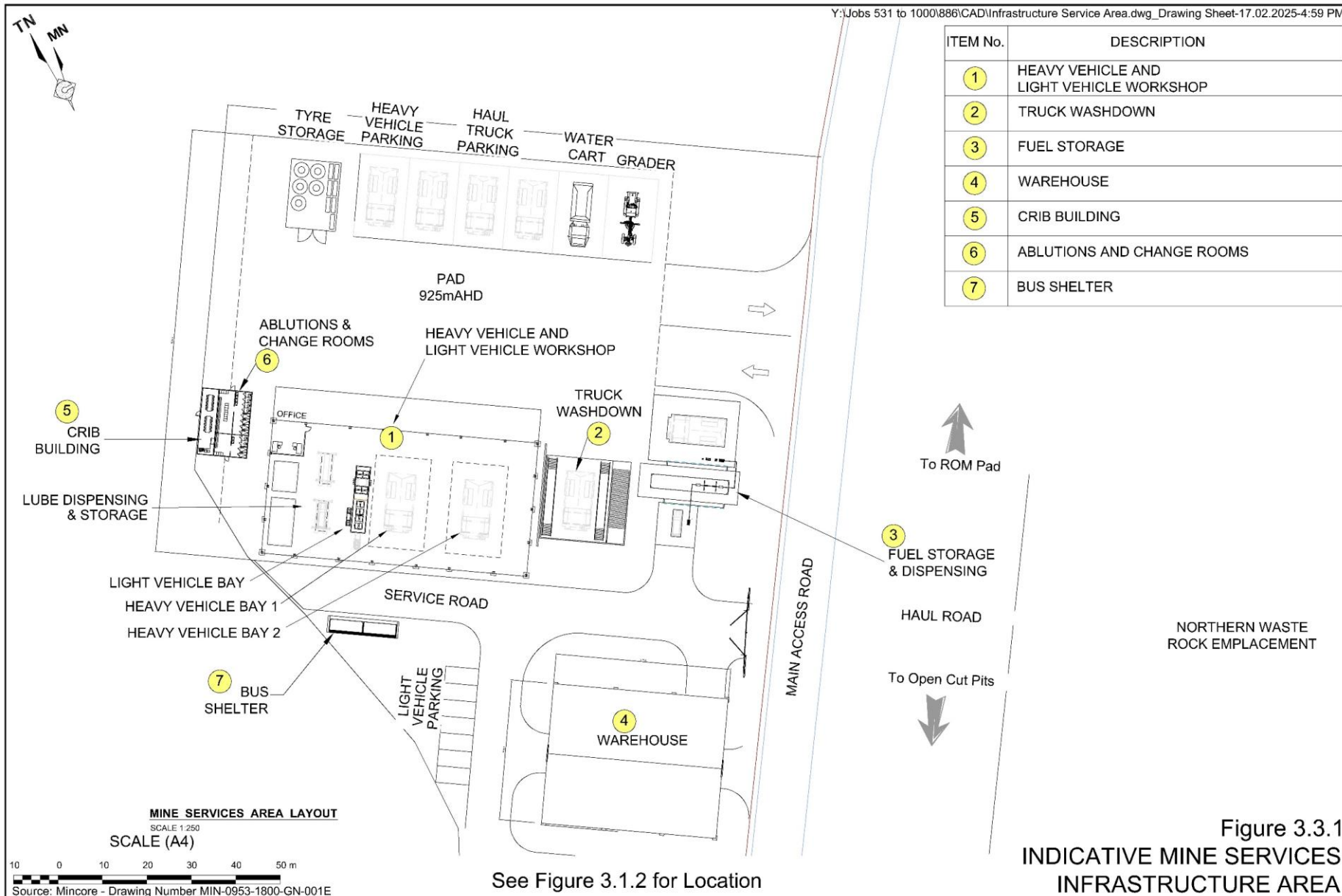
The mine services infrastructure area would be constructed in the central section of the Mine Site (**Figure 3.1.2**) adjacent to the main access road during the Project's site establishment and construction phase. This area would include the following (**Figure 3.3.1**).

- Modular crib room, change/shower rooms and ablutions facilities.
- Parking areas for mobile plant, including mining equipment.
- Tyre storage area.
- A hardstand area suitable for vehicle manoeuvring.
- Office and workshop including bays (with overhead crane) for light and heavy vehicle maintenance, tool room and storage/dispensing areas for maintenance consumables (parts and lubricants).
- A heavy vehicle washdown bay, including a concrete sealed washdown area equipped with splash walls and a sump to collect wash water for recycling.

³ An allowance has been made within the Mine Site for construction of an emergency helipad for the evacuation of personnel. However, the location of the helipad would be confirmed during detailed design.



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- A heavy and light vehicle refuelling area, including concrete pad, sumps and a 100 kilolitre (kL), self-bunded diesel storage tank constructed in accordance with Australian Standard *AS 1940-2017 - The Storage and Handling of Flammable and Combustible Liquids*.
- Warehouse building for receipt and storage of consumables.
- Light vehicle parking area.
- Bus shelter.

All modular buildings and structures within the Mine Services Infrastructure Area would be constructed in accordance with the *National Construction Code*.

3.3.2.5 Explosives Magazine and Ammonium Nitrate Storage

Mining operations would require the storage and use of Class 1.1B (non-electric detonators) and 1.1D (Types B and E blasting agents, boosters and cord detonators) explosives and ammonium nitrate prill (ANP). A mobile processing unit (MPU) would be used to mix the ANP with diesel (or emulsion) onsite to form ammonium nitrate fuel oil (ANFO) for direct placement into blast holes.

The Class 1.1B and 1.1D explosives would be separately stored in two explosives magazines, whilst the ANP would be kept in a standalone ammonium nitrate (AN) storage facility (**Figure 3.1.2**). Sufficient storage for four weeks of blasting operations would be provided.

The magazine compound's location provides for the minimum 270m separation distance to the closest onsite infrastructure, the administration area. The magazine compound would provide adequate space to meet the minimum 18m separation distance between the Class 1.1B detonators magazine and that for Class 1.1D explosives. The compound would also be securely fenced and include parking for the MPU. The explosive magazines would also provide contingency storage for small quantities of unused ANFO. However, with the proposed use of an MPU, the Applicant does not envisage a need for regular ANFO storage.

The AN storage facility would be a securely fenced shed for the receipt and storage of ANP in 1t bulk bags. Stored ANP would then be transferred to the MPU at the storage facility. The location of the AN storage facility would meet the respective minimum 35m and 120m separation distances from the explosive magazines and the closest Mine Site building (administration area).

3.3.2.6 Flexible Elements – Infrastructure

Table 3.3.1 presents the infrastructure-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.



Table 3.3.1
Flexible Elements – Infrastructure

Flexible Element	Limit on Flexibility	Justification
Location and size of proposed infrastructure	All infrastructure-related surface disturbance to be located within the proposed limit of disturbance. All buildings and structures to be constructed in accordance with the <i>National Construction Code</i> and appropriate construction and occupation certificates obtained.	Detailed design for aspects of Project-related infrastructure may result in some variation to that which is described in this document. Notwithstanding this, all infrastructure would be constructed within the approved limit of disturbance and in accordance with the relevant guidelines.

3.3.3 Services

3.3.3.1 Construction

Power

Power to support construction activities would be provided by portable silenced diesel generators that would be variously positioned on an “as needed” basis adjacent to the construction area and sized to support the requirements of the construction activity.

Water

Tanks, supplied via water cart drawing from existing farm dams within the Applicant’s landholding or from proposed production bores, would be used to provide water for construction-related purposes, including dust suppression, as required.

Sewage

As noted in Section 3.3.2, the site establishment and construction stage ablution facilities would be self-contained, pump-out units. These facilities would be supplied on a dry-hire basis with an agreed service contract in place for their maintenance, servicing and the collection, transport and disposal of waste at a licensed treatment facility.

3.3.3.2 On-site Power Generation (Mine Site)

The major equipment for processing operations, including crushing, would have an estimated power demand of 5.3 megawatts (MW) during daytime periods and 2.6MW at night. The Applicant anticipates that, on average, annual daytime energy demand would be approximately 19,500MW hours and 13,300MW hours at night.

The Applicant is proposing to construct and install onsite power generation infrastructure with sufficient capacity to meet the Mine Site’s energy demand (**Figure 3.1.2**). This infrastructure, shown on **Figure 3.3.2**, would be installed during the site establishment and construction stage and comprise the following.

- An approximately 8.2ha solar farm, with the capacity to generate up to 10MW of electricity and comprising:
 - ground mounted (fixed) photovoltaic panels;
 - skid mounted inverters;



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- a 2MWh battery energy storage system with inverter; and
- switchboard, switch gear and a microgrid control system.
- Four 2MW capacity gas generators supported by:
 - a liquefied natural gas (LNG) unloading facility;
 - three 30t LNG cryogenic storage tanks; and
 - evaporators (liquid to gas conversion).
- One 2MW diesel generator as backup power source.

The Applicant anticipates that the solar farm would generate up to 17,400MW hours of electricity to meet processing demand with the approximately 2,000MW hours annual deficit in daytime power supply being met by the gas generators. These gas generators would also be utilised to provide power for nighttime operations, any periods of low solar irradiance and/or high electricity demand. The Applicant anticipates that during nighttime operations, two gas generators would be operated below full generating capacity and, as demand increases at the start of the day shift, either the same two engines or another pair of engines would be utilised near their maximum generating capacity. The gas generators would be housed within a clad, steel-framed structure that would be fitted with air intake and mufflers to reduce noise emissions.

Suitable power management and distribution infrastructure, including substations, transformers and above and below ground high and low voltage distribution networks would be installed within the proposed disturbance area to ensure that power can be safely and efficiently transferred to the Processing Plant and all other relevant areas of the Mine Site.

In addition, the Applicant would make extensive use of solar powered units for remote locations such as the radio repeater station and mobile signal booster stations. Remote locations with higher power demand, such as the production bores and water pumps, may be serviced by silenced diesel-powered generators.

By installing onsite power generation with sufficient capacity to meet the energy demand of the Mine Site, the Applicant would remove the need for a connection to the existing electricity grid, thus reducing Project-related vegetation disturbance and, the Applicant anticipates, the Project's emissions by up to 15,924t of carbon dioxide equivalent (CO₂-e) per year.

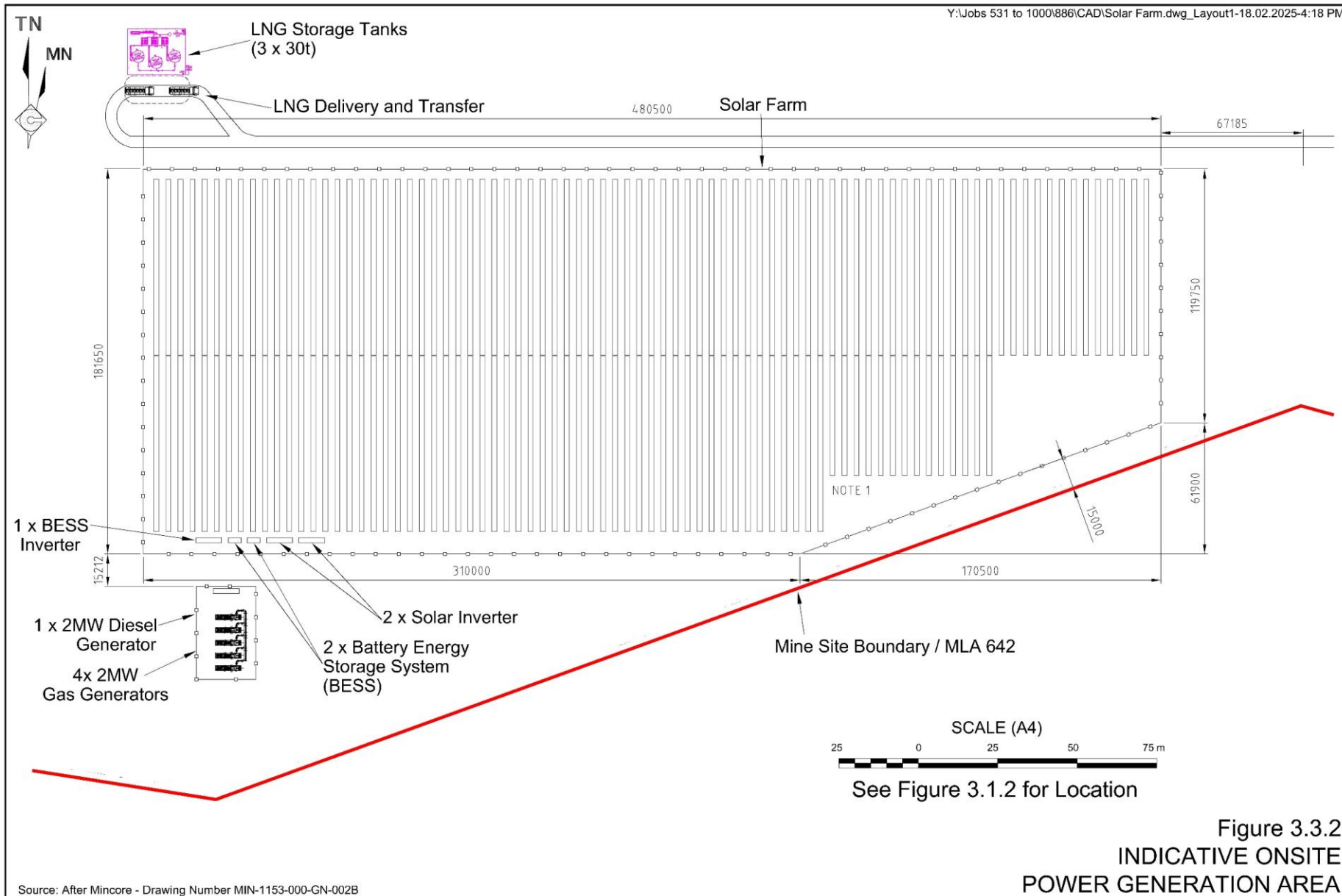
3.3.3.3 Potable and Raw Water Supply

The Project's water management strategy, described in Section 3.10 would be the principal basis for meeting processing demand.

However, raw water for dust suppression, processing make-up water or treated to generate potable water, would also be imported to the Mine Site via buried or above-ground pipelines. This water would be drawn from either the production bores or from harvestable rights dams situated on Applicant-owned land.



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Source: After Mincore - Drawing Number MIN-1153-000-GN-002B

Figure 3.3.2
INDICATIVE ONSITE
POWER GENERATION AREA



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Imported water would be held in either a 3ML raw water tank or a 1ML clean water tank that would be situated in the central section of the Mine Site and adjacent to the main access road. A containerised water treatment plant would be located adjacent to the raw water tank. This package treatment system would utilise filtration to produce up to 50 000L of potable water per day, which is equivalent to providing 150 persons with 340L of water per day. This water treatment capacity thus exceeds the requirements for the approximately 74 personnel that would be required at the Mine Site to support mining and processing operations over a given 24-hour period. Treated water would be distributed to either the Administration Area, Mine Services Infrastructure Area and the Processing Plant.

A water cart filling facility would be located adjacent to the 1ML water tank in the central area of the Mine Site.

Untreated raw water would also be used for crushing and screening, processing make-up water, fire water, general utility and vehicle washing.

3.3.3.4 Sewage

As noted in Sections 3.3.2.2 and 3.3.2.4, sewerage treatment facilities would be installed in the administration and mine services area, with an additional facility installed at the process plant area.

Each facility would be a fully automated, containerised treatment plant fitted inside a 20-foot container. Sewage treatment would consist of continuous aeration, primary and secondary clarification, with a chemical dosing and polishing system to produce treated effluents. Treated effluent would then be reused for toilet flushing or applied to non-food crops or areas revegetated as part of progressive rehabilitation activities.

The nominal capacities (equivalent persons) for each facility would be as follows.

- Administration Area: 30 equivalent persons
- Mine Services Infrastructure Area: 80 equivalent persons
- Processing Plant Facilities Area: 70 equivalent persons

The combined capacities of the proposed treatment facilities would be sufficient for the approximately 74 personnel required at the Mine Site to support mining and processing operations over any 24-hour period. These combined capacities would also account for any visitors to the Mine Site as well as any temporary personnel surges that may be periodically required for maintenance activities (i.e. shutdowns).

3.3.3.5 Communications

The primary means of external telephone and data connection for the Mine Site would be provided by a satellite-based communications system. This would include receiving equipment at key infrastructure, facilities and work areas (i.e. administration area, processing plant) to provide communications zones for voice and data communications.



A digital radio communications system would be utilised to enable voice communication around the Mine Site. Due to the topography, this system would require one repeater at an elevated location in the central section of the Mine Site.

Signal boosting using stationary repeaters and antennae within the Mine Site would also be used to enhance connection to the existing 4G mobile network.

3.3.3.6 Flexible Elements – Services

Table 3.3.2 presents the services-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.

Table 3.3.2
Flexible Elements – Services

Flexible Element	Limit on Flexibility	Justification
Location, alignment and size of proposed services	All services, including transmission and/or distribution infrastructure would be located within the proposed limit of disturbance.	Detailed design and construction of Project-related infrastructure may result in some variation to the arrangements for services as described in this document. Notwithstanding this, all services would be installed within the approved limit of disturbance and in accordance with the relevant guidelines.

3.3.4 Pre-construction, Site Establishment and Construction Activities

3.3.4.1 Introduction

The following subsections provide a brief description of general preparatory activities for all key components within the Mine Site. It is noted that these activities, and their sequencing in relation to individual mining components, infrastructure and/or locations, may be adjusted as required.

The pre-construction, site establishment and construction sequence would aim to complete these activities within approximately 2 years so that ore processing operations could commence. The indicative sequence of the key activities to be undertaken during the site establishment and construction stage are listed in Table 3.3.3, displaying an indicative construction schedule. For the purposes of the assessment of impacts during the site establishment and construction stage, distinction is made between the period from Months 1 to 6 and from Months 7 to 18.

Table 3.3.3
Indicative Site Establishment and Construction Schedule

Page 1 of 2

Activity	Quarter							
	1	2	3	4	5	6	7	8
Engineering and Procurement								
Engineering/detailed design	█	█	█	█				
Procurement	█	█	█	█	█	█		
Construction Management	█	█	█	█	█	█	█	█



Table 3.3.3 (Cont'd)
Indicative Site Establishment and Construction Schedule

Activity	Quarter							
	1	2	3	4	5	6	7	8
Offsite Road Network								
Survey and mark out key boundaries	■							
Install erosion and sediment controls, vegetation clearing and soil stripping	■							
Grampians Road upgrades	■	■						
Construct intersection upgrades	■							
Construct new crossing across Vegetable Creek		■						
Pre-construction								
Survey and mark out key boundaries	■							
Install erosion and sediment controls	■							
Construct internal roads	■							
Vegetation clearing, soil stripping and stockpiling	■	■	■	■	■	■	■	■
Site Earthworks and Infrastructure Construction, Assembly, Installation and Commissioning								
CDA		■	■	■	■	■		
RSF		■	■	■	■	■		
WRE		■	■	■	■	■		
Water Management Infrastructure		■	■	■	■	■		
Processing Plant, ROM Pad (bulk earthworks, construction)		■	■	■	■	■	■	
Mine Services Infrastructure Area (bulk earthworks, construction)		■	■	■	■	■	■	
Ancillary Facilities (construction, assembly, installation)		■	■	■	■	■	■	
Processing Infrastructure (assembly, installation and commissioning)			■	■	■	■	■	■
Onsite Power Generation Area		■	■	■	■	■	■	■
Source: Taronga Mines Pty Ltd								

During the initial 6 months, pre-construction activities would be confined to off-site road construction, land clearing, vegetation clearing, soil stripping and some initial earthworks within the Mine Site.

During the following 18-month period, between Months 7 and 18, the principal onsite activities, including bulk earthworks and infrastructure construction would be undertaken. These activities would involve considerably more earthmoving equipment and a greater area of disturbance. During this period, activities associated with bulk earthworks including drill, blast, cut and fill would be required to prepare suitable areas and pads for the construction, installation and operation of mining components. Whilst this period would also include activities associated with the delivery, assembly, installation and commissioning of fixed plant, the Applicant anticipates that these activities would continue during the final 6-month period along with the final construction of remaining infrastructure.

A description of the site establishment and construction components of the key infrastructure within the Mine Site is included in the description of that infrastructure in later subsections.



3.3.4.2 Pre-construction Activities

Survey and Marking of Key Boundaries

Pre-construction activities would include boundary survey of all areas to be disturbed during the site establishment and construction stage. These boundaries would be marked with painted pegs and recorded on relevant construction plans and documents. To prevent inadvertent disturbance beyond approved areas, the proposed limit of disturbance would be permanently marked using regularly spaced, distinctively coloured, robust markers such as steel posts or similar. These markers would remain in place for the Project-life.

Fencing, Site Security and Communications

All existing fencing associated with the Mine Site will be inspected and upgraded (if required) during pre-construction activities to prevent stock / animals from entering. Site gates, secure fencing and monitoring cameras would also be installed prior to vegetation clearing activities.

If required, mobile signal boosting or radio repeater equipment would be positioned prior to the commencement of bulk earthworks activities. This would ensure that adequate communication systems are in place prior to the commencement of site establishment and construction activities involving heavy mobile plant.

Investigative Drilling and Excavation

Pre-construction activities would include drilling and/or excavation (test pitting) to confirm, prior to the commencement of bulk earthworks, the geotechnical parameters adopted for detailed design of key mining components. Sterilisation and resource drilling may also occur during this period to inform any design updates. These areas of investigation would include the foundations and footprint areas of landforms required for component construction, water management, waste rock management and processing residue management.

Installation of Erosion and Sediment Controls

A program of initial earthworks would be undertaken to establish temporary erosion and sediment controls within areas of site establishment and construction activity related disturbance. These controls would be designed, installed and operated in accordance with a *Construction Erosion and Sediment Control Plan* that would be prepared for the Project. The *Construction Erosion and Sediment Control Plan* would document the measures to contain and manage runoff generated within a disturbance area, preventing the entry of runoff from undisturbed areas and suitable treatments for the stabilisation of surfaces following the cessation of site establishment and construction activities.

No substantial earthworks would commence until all required erosion and sediment controls are in place.

Vegetation Clearing

Vegetation clearing would initially be undertaken by either the Applicant or contractors from construction areas (i.e. CDA, RSF, WRE, Processing Plant etc) as well as internal roads. During all vegetation clearing, any available seed would be collected and felled timber set aside for onsite fencing, habitat relocation/reconstruction or offsite beneficial uses such as, saw logs, firewood or fencing. Where practical, felled timber would also be mulched for offsite and onsite beneficial



use. However, where such onsite or offsite beneficial uses are impractical, the Applicant would conduct managed burns of felled timber, in coordination with the Rural Fire Service, to reduce fuel loads and manage bushfire risk.

Offsite Roadworks

During the pre-construction period, the Applicant would undertake a program of offsite roadworks to upgrade Grampians Road and its respective intersections with Schrodgers Road and Gulf Road (see Section 3.8.3.2).

Soil Stripping and Management

Section 6.17 provides a full description of Mine Site soils, including nominal stripping depths and volumes, as well as management measures to ensure they remain suitable for rehabilitation. In summary, soil stripping operations would involve the:

- Clear delineation of areas to be stripped.
- Communicating the required topsoil and subsoil stripping depths to personnel.
- Maintaining soil material in a slightly moist condition during stripping. Material would not be stripped in either an excessively dry or wet condition.
- Pushing of soil into windrows using graders or dozers.
- Collecting pushed soils with a front-end loader and loading into trucks.
- Minimise handling and re-handling of soil to the greatest extent practicable.

Table 3.3.4 presents the soil mapping units, average recoverable depths and potential stripped material volumes that were identified by Landloch (2025a) as part of the Project's soil assessment. Stripped topsoil and subsoil would be stockpiled in the nominated soil stockpile locations (**Figure 3.1.2**) for use in rehabilitation activities (refer Section 3.14).

Table 3.3.4
Mine Site Soils: Mapping Units, Average Recoverable Depth and Material Volume

Soil Landscape/SMU	Layer ¹	Average Recoverable Depth (m)	Volume (m ³)
Conglomerate Soils – Gentle Slope	Topsoil	0.15	15,930
	Subsoil	-	-
Conglomerate Soils – Steep Slope	Topsoil	0.06	99,570
	Subsoil	-	-
Fine Sedimentary Loams	Topsoil	0.10	1,490
	Subsoil	0.30	4,480
Sedimentary Soils – Steep	Topsoil	0.10	50,090
	Subsoil	-	-
Volcanic Clays	Topsoil	0.20	33,440
	Subsoil	0.45	75,240
Volcanic Clays - Rocky phase	Topsoil	0.05	550
Total	-	-	280,790
Note 1: Topsoil = depth of O and A horizons; Subsoil = depth of B horizon			
Source: Landloch (2025a) – modified after Table 26			



3.3.5 Mineral Exploration Activities

The Applicant anticipates undertaking a range of exploration activities during the Project-life. These activities may include the following.

- Surface sampling using handheld equipment and mobile plant, including extraction of a bulk sample using surface extraction techniques.
- Drilling using diamond and percussion-based methods.
- Geophysical studies, including aerial, surface and down-hole methods.

Therefore, as part of this application, the Applicant is seeking development consent for mineral exploration, including surface disturbing activities, within the proposed Limit of Disturbance. Where the Applicant proposes to undertake mineral exploration activities outside the proposed Limit of Disturbance, or involving an exploration decline or bulk sampling from underground, it would seek a separate approval under Part 5 of the *Environmental Planning and Assessment Act 1979*.

3.3.5.1 Flexible Elements – Mobile Plant

Table 3.3.5 presents the construction-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. The Applicant has included these elements, mobile plant for the onsite manufacture of construction aggregates and concrete, in the assessment of potential air quality and noise impacts during this phase. These flexible elements have been considered as potential future mitigation of construction-related traffic impacts, and the onsite use of this mobile plant may not eventuate.

Table 3.3.5
Flexible Elements – Mobile Plant

Flexible Element	Limit on Flexibility	Justification
Mobile crusher to produce construction aggregates	All mobile plant would be located within the proposed limit of disturbance.	The construction of Project-related infrastructure may require intermittent periods of increased heavy-vehicle movements for the delivery of construction materials to meet the proposed construction schedule. Whilst the construction schedule does not require sustained periods, the Applicant may elect to manufacture these materials onsite to reduce impacts to other road users
Mobile concrete batching plant		



3.4 Mining Operations

3.4.1 Introduction

Mining operations would utilise conventional drill and blast, load and haul methods for the development of two separate open cut pits (Northern and Southern) (**Figure 3.1.2**). This would involve the sequential removal of vegetation followed by the removal of near surface material (i.e. soil and loose, weathered rock) using conventional free dig, load and haul techniques. Once more competent material is exposed, the removal/placement of waste rock and the recovery of ore would occur using conventional drill, blast, load and haul techniques.

This subsection presents information relating to:

- the layout and design of the open cut pits;
- the proposed mining operations;
- the mining sequence, schedule, scenarios and equipment.

This subsection concludes with a review of the flexible elements relevant to the proposed activities. Section 3.5 describes the proposed management of waste rock, including the material characteristics, material classification and quantities.

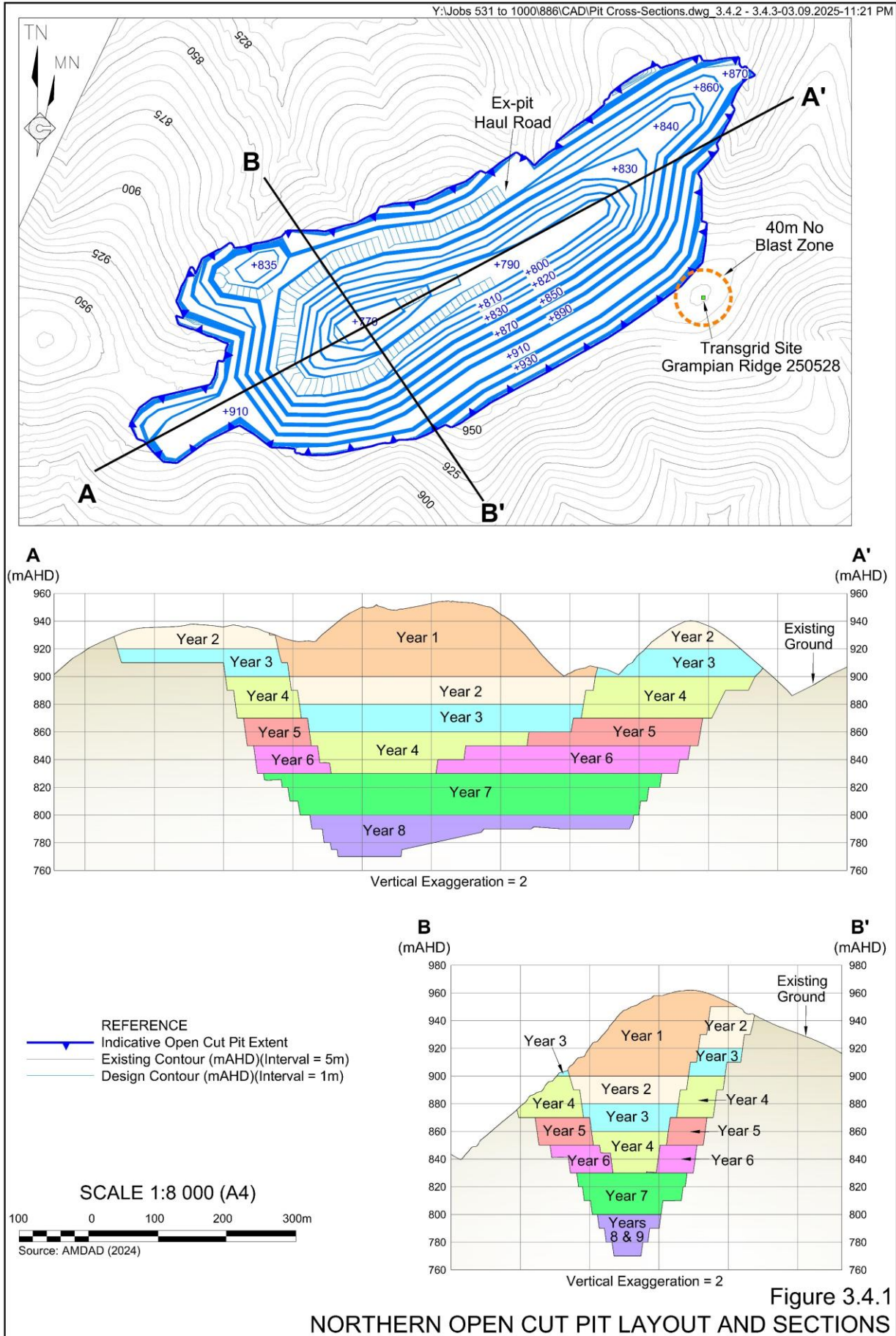
3.4.2 Open Cut Pit Design and Mining Sequence

Design of the Northern and Southern open cut pits has been undertaken through a series of pit optimisation realisations carried out by Australian Mine Design and Development Pty Ltd (AMDAD). **Figures 3.4.1** and **3.4.2** present the proposed layout, cross-sections and annualised development throughout the mine life of the Northern and Southern open cut pits respectively.

Mining operations would commence in the central section of the Northern open cut pit (**Figure 3.4.1**). This starter pit would initially be accessed via temporary haul roads at natural surface. Mining operations would progressively deepen the Northern open cut pit by approximately 166m to a floor depth of 770mAHD. The final 24.4-hectare (ha) pit footprint would be approximately 1,000m long and 300m across. A permanent pit entrance for the haulage of ROM ore and waste rock would be established on the pit's north wall at 870mAHD.

Development of the Southern open cut pit would commence approximately 6 months after commencement of the Northern open cut's starter pit. This would involve a starter pit in the northeast section of Southern open cut pit's overall footprint. Initial ore and waste rock haul would utilise temporary haul roads at natural surface. The Southern open cut pit would then be progressively deepened by approximately 120m until reaching its proposed floor of 775mAHD. The final 27.2ha pit footprint would be approximately 1,270m long and 330m across. A permanent pit entrance for the haulage of ROM ore and waste rock would be established on its northeastern boundary at 920mAHD.

Table 3.4.1 presents the indicative parameters adopted for the design of the Northern and Southern open cut pits. These indicative design parameters were developed by Pells Sullivan Meynink Pty Ltd (PSM) for the Project's Feasibility Study (TMPL, 2024). PSM identified these parameters following geotechnical assessment against a range of failure scenarios and identified they provided an overall slope stability with a Factor of Safety greater than 1.5.





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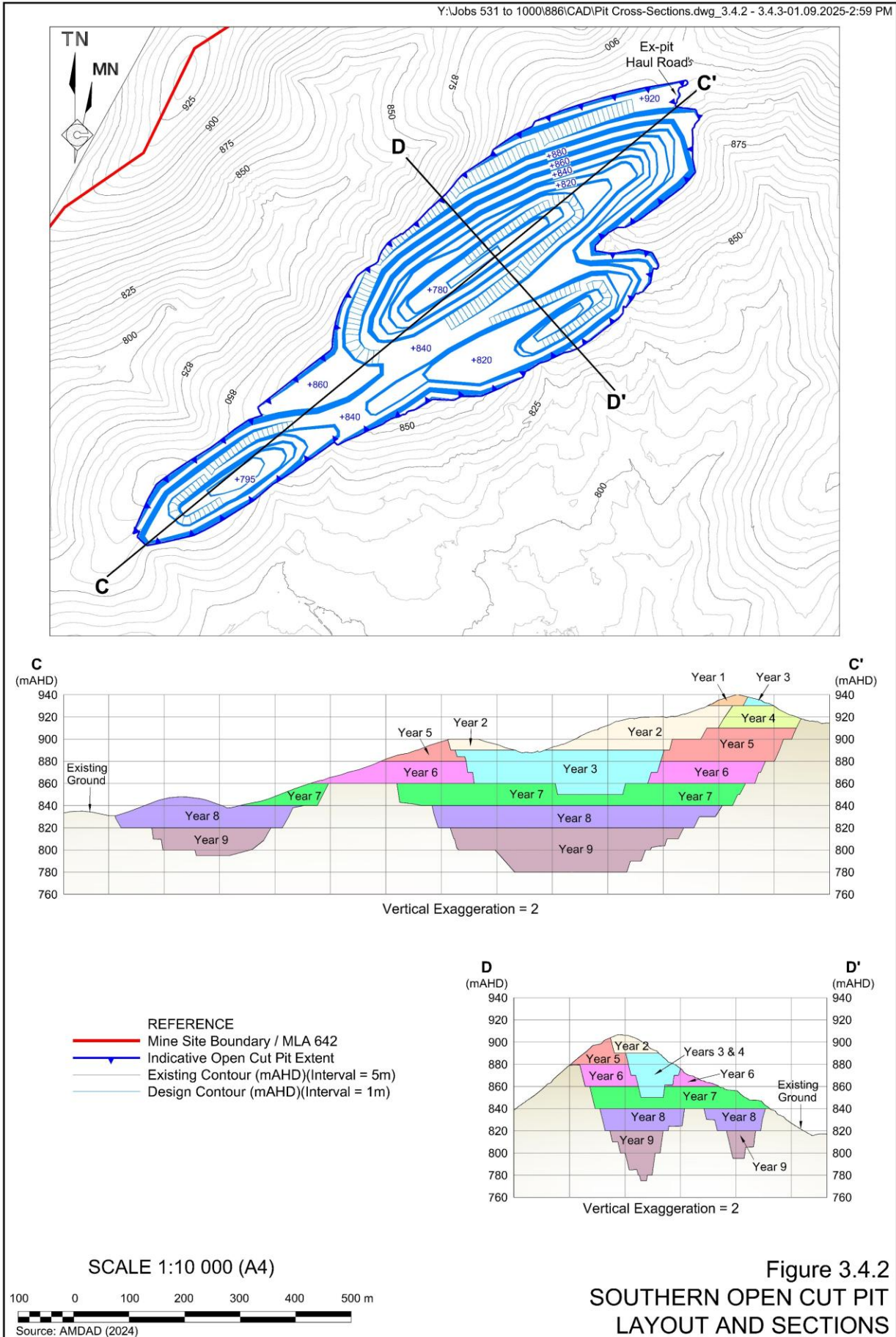




Table 3.4.1
Indicative Open Cut Pit Design Parameters

Parameter	Value
Extraction Floor Elevation(s)	770m AHD (Northern open cut pit) 775m AHD (Southern open cut pit)
Bench Face Angle(s)	60° (weathered material) 65° to 75° (unweathered material)
Bench Height	10m (weathered material) 20m (unweathered material)
Bench Width	8m (weathered material) 9m (unweathered material)
Maximum Haul Road Gradient	1:10
Haul Road/Ramp Width(s)	24m (permanent) 14m (temporary)
Source: TMPL	

3.4.3 Drill and Blast

Apart from the soils and a veneer of loose weathered rock, the remaining ore and waste rock would require blasting. A suitable blast pattern would be drilled and the material sampled using an onsite laboratory to determine tin grades or to classify waste rock (see Section 3.5.2).

Each blast would yield an average of 75,000t of fragmented rock with maximum yields up to approximately 100,000t. Drilling and blasting would be a regular activity within the open cut pits with blasts generally initiated 4 to 5 days per week from Monday to Saturday⁴.

Blast hole drilling would be undertaken to a depth of either 5m or 10m, with the burden and spacing for each blast adjusted to reflect the rock type and any inherent features present. **Table 3.4.2** presents the nominal blasthole design specifications for the Project's production blasts.

Table 3.4.2
Nominal Blasthole Design Specifications

Parameter	Bench Height (m)	
	5	10
Hole diameter (mm)	89	102
Sub drill (m)	1	1
Hole depth (m)	6	11
Face burden (m)	2.8	3.2
Inter-row burden (m)	2.6	2.8
Hole spacing (m)	2.7	3.0
Minimum stemming (m)	2.8	3.2
Maximum instantaneous charge (kg/delay)	16.6	50.7
Source: TMPL		

⁴ The frequency of blasting would largely depend upon the quantity of rock to be fragmented during each blast, i.e. if all blasts fragmented 75,000t per blast, there would be approximately 135 blasts per year, whereas if all blasts fragmented 100,000t per blast, there would be approximately 100 blasts per year. However, blasts less than 50,000t may also occur and this may require an increase in blast frequency.



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The ANP and diesel (or custom emulsion) would be transported in the MPU from the explosive magazines and AN storage facility on the day of each blast. Explosives would be mixed at the blast site and placed in the blasthole, together with the primers and detonators. The quantity of explosives required for each blast would vary between approximately 9t to 18t.

It is noted that the nominal blast parameters presented in **Table 3.4.2** would not initially be adopted within 40m of Transgrid Site Grampian Ridge 250528 (refer **Figure 3.4.1**). As noted in Section 6.5.6, this 40m setback would be initially observed as a “no blast zone” that would be reviewed and refined as blasting operations progress. This ongoing refinement process would be based on data collected at Transgrid Site Grampian Ridge 250528 during every blast. Collected data would then be used to refine site laws and blast design parameters when occurring in proximity to the facility. Details of this monitoring are provided in Section 6.5.8.

3.4.4 Load and Haul

Mobile fleet would be utilised for the load and haul of up to 10.2Mtpa of blasted waste rock and ROM ore. This fleet would comprise:

- rigid haul trucks;
- a 120t primary excavator; and
- a 90t secondary excavator (selective mining in narrower ore zones).

ROM ore would be hauled to the ROM pad (refer **Figure 3.1.2**) for stockpiling or direct feed into the crushing circuit. Waste rock would be hauled for storage in either the Northern or Southern WRE. Generally, waste rock extracted from the Northern open cut pit would be hauled to the Northern WRE whilst that from the Southern open cut pit would be hauled to the Southern WRE. PAF material from either open cut pit would be hauled to the Northern Waste Rock Emplacement.

Whilst the locations of temporary haul roads would change as mining operations progress, they would remain situated within the limit of disturbance. The permanent haul road locations are shown on **Figure 3.1.2**. Section 3.8.2.2 provides further detail on the construction and operation of haul roads.

3.4.5 Material Movement Schedule

Table 3.4.3 present the anticipated annual material movement schedule. The Applicant would continue to review and optimise the proposed schedule. As a result, actual material movements may vary from those presented in **Table 3.4.3**.

Table 3.4.3
Indicative Annual Material Movement Summary

Material Movement	Million tonnes (Mt)	Total	Mining Year									
			0	1	2	3	4	5	6	7	8	9
ROM Ore	Mt	39.7	0.2	3.8	5.1	5.0	4.9	5.1	4.9	5.0	3.9	1.8
Waste Rock	Mt	40.5	0.4	3.2	5.0	5.1	5.1	5.1	5.1	5.1	4.3	1.9
TOTAL ¹	Mt	80.2	0.6	7.0	10.1	10.1	10.1	10.2	10.0	10.1	8.2	3.7
Note 1: Totals may not match increment due to rounding.												
Source: TMPL												



3.4.6 Mining Scenarios

Figures 3.4.3 to 3.4.5 present the indicative development of the Mine Site at key stages of the Project. These layouts have been selected to represent periods of maximum operational intensity (refer Table 3.4.3) and when landforms and activity locations present the greatest potential noise or air quality impacts for surrounding residents, as follows.

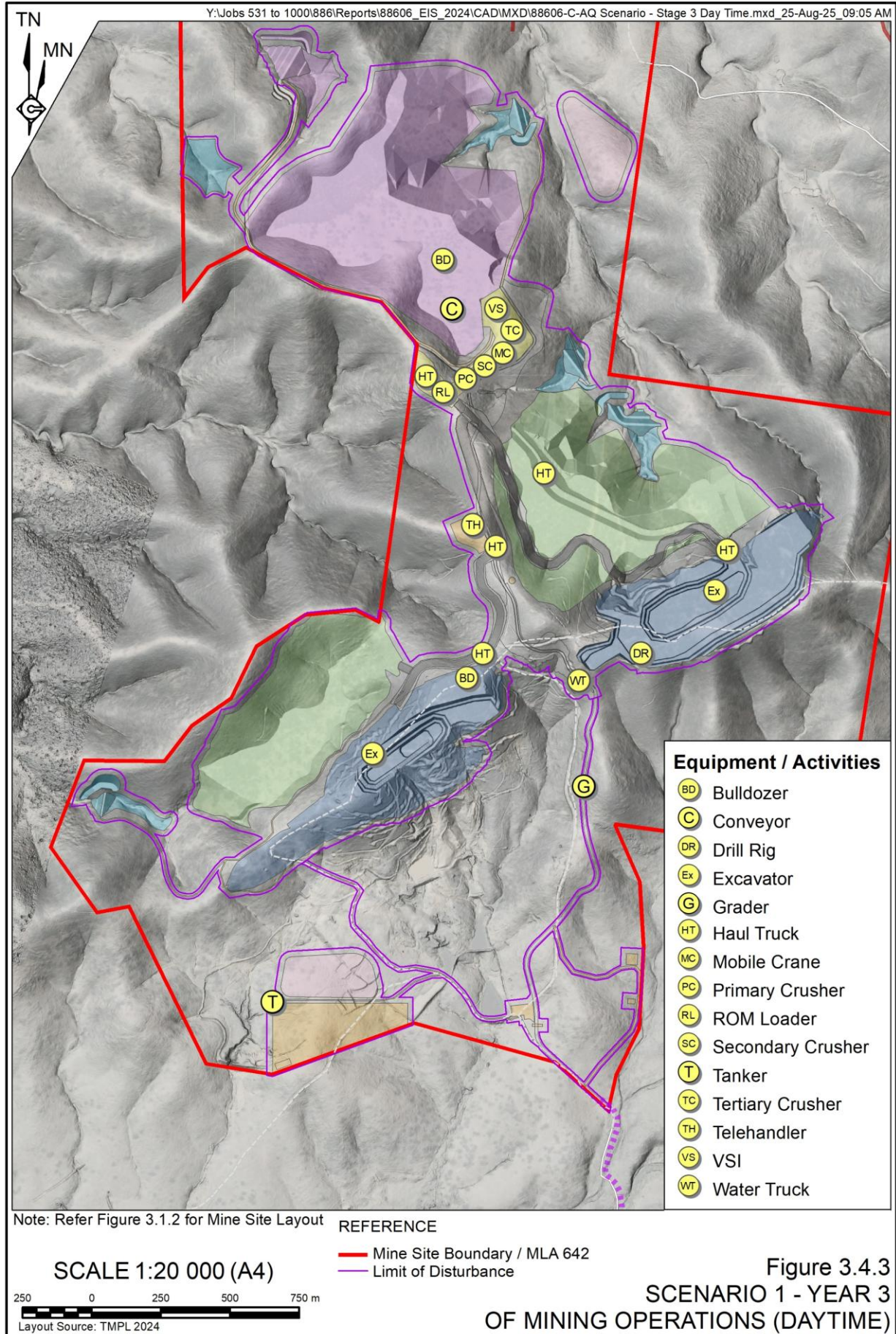
- Scenario 1 – Year 3, when mining operations are at exposed elevations of Grampians Ridge and the landforms of the WRE and CDA cover the full extent of their proposed footprint area.
- Scenario 2 – Year 5, when the Northern open cut pit is at full extent, the Southern open cut is at exposed elevations of Grampians Ridge and the surfaces of the WRE and CDA are at higher elevations.
- Scenario 3 – Year 7, when the Northern and Southern open cut pits are at full extent, and the surfaces of the WRE and CDA are at higher elevations.

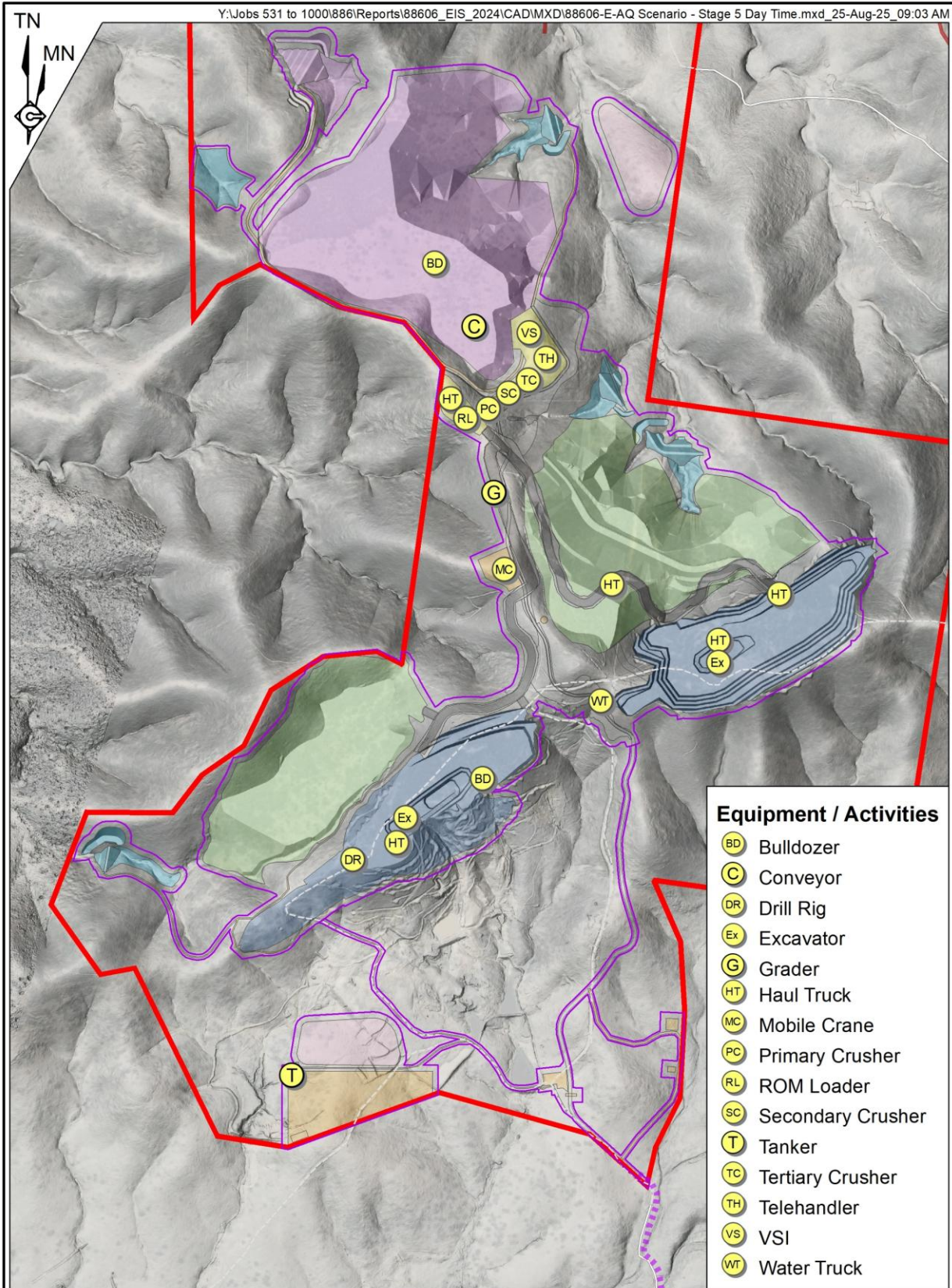
3.4.7 Mining Equipment

Table 3.4.4 presents the indicative mobile mining fleet. It is noted that the indicative mining fleet may vary depending on material movement requirements and the equipment.

Table 3.4.4
Indicative Mining Fleet

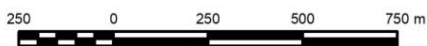
Equipment	Indicative Make and Model	Number
Mining – Extraction and Haulage		
Excavator (120t)	Hitachi EX 1200, or equivalent	1
Excavator (90t)	CAT 395, or equivalent	1
Bulldozer	CAT D9	1
Haul Truck	CAT 777	4-6
Drill		1
Processing and Disposal		
Wheel Loader	CAT 992G	1
Bulldozer (RTD)	CAT 854	1
Mining Support		
Grader	CAT 14M	1
Water Truck	Komatsu HM400-1	1
Telehandler (4t)	JCB	1
Mobile Crane (25t)	Franna	1
Tool Carrier	CAT T14B	1
Source: TMPL		





Note: Refer Figure 3.1.2 for Mine Site Layout

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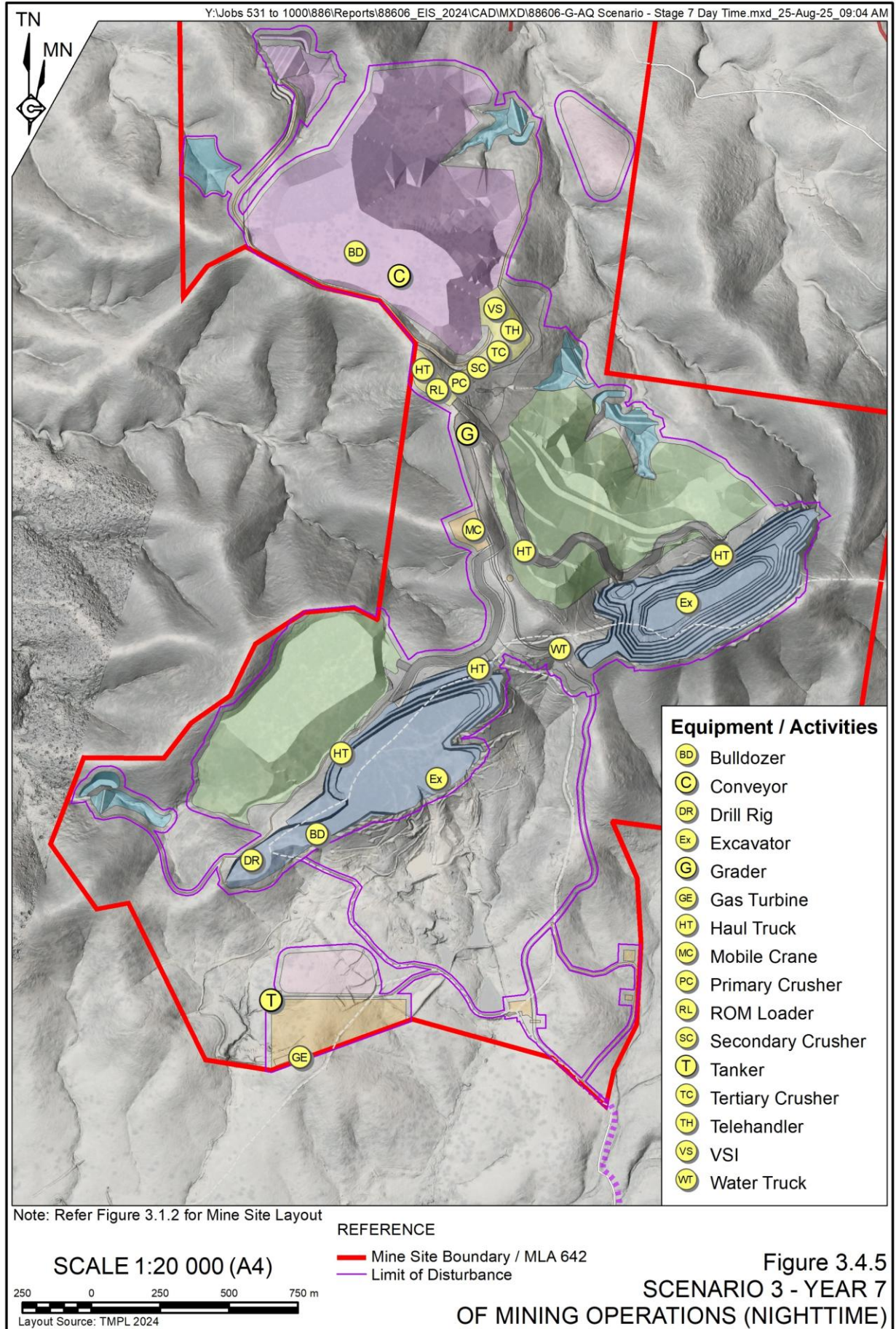


Layout Source: TMPL 2024

REFERENCE

- Mine Site Boundary / MLA 642
- Limit of Disturbance

Figure 3.4.4
SCENARIO 2 - YEAR 5
OF MINING OPERATIONS (DAYTIME)





3.4.8 Flexible Elements

Table 3.4.5 presents the mining-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.

Table 3.4.5
Flexible Elements – Mining Operations

Flexible Element	Limit on Flexibility	Justification
Mine sequence and schedule	End of mining – 10 years after commencement. Maximum annual rate of material extracted – 10.2Mt. Maximum life of Project ore extraction –39.7Mt.	The life-of-mine sequence and schedule has been prepared based on information available at the time of EIS preparation. It is possible that the actual material movements may vary from that proposed. Notwithstanding this, mining operations would, in the absence of further approval, cease 10 years after the commencement of mining operations and annual material extraction would be no greater than 10.2Mt in any one year. A maximum of 39.7Mt of ore would be extracted and processed.
Mining Equipment	Equipment to be used to be of equivalent capacity / productivity to that proposed, with combined noise or dust emissions no greater than the proposed equipment.	The identified equipment list has been assembled based on current equipment availability, costs and productivity. It is possible that alternate or additional equipment may be used. Notwithstanding this, the Applicant would ensure that the combined fleet noise or dust emissions are no greater than the proposed equipment.



3.5 Waste Rock Management

3.5.1 Introduction

During operations, extracted material containing insufficient quantities of tin to justify processing would be placed into either the Northern or Southern Waste Rock Emplacement, with all potentially acid forming (PAF) and uncertain (UNC) waste rock material encapsulated within the Northern WRE. Waste rock would be transported via the internal haul road network to the respective WRE for placement and, in the case of PAF and UNC waste rock, encapsulation.

This subsection describes the characteristics of the waste rock that would be generated throughout the Project-life, its management and uses including the design and development sequence of the Northern and Southern WRE.

3.5.2 Material Classification and Quantities

The Applicant commissioned RGS Environmental Consultants Pty Ltd (RGS) to undertake a program of geochemical characterisation on the Project's waste rock and processing residues. The report, hereafter referred to as RGS (2025), is provided as **Appendix 22** and fully describes the materials, methods and outcomes of the program.

In summary, some naturally occurring minerals in rocks contain sulfur in the form of sulfides. Certain sulfide minerals, in particular pyrite (FeS_2), can oxidise when exposed to air, producing sulfuric acid (H_2SO_4). Those rocks may or may not contain minerals that neutralise the produced acid, resulting in three classifications of these materials as follows.

- Potentially acid forming (PAF) – where the quantity of sulfuric acid produced is greater than the ability of the parent material to neutralise the acid. PAF materials may produce an acidic leachate that is required to be managed to prevent environment harm.
- Uncertain (UNC) – where the quantity of sulfuric acid produced may or may not be greater than the ability of the parent material to neutralise the acid. UNC materials are generally treated as PAF to prevent environmental harm.
- Non-acid forming (NAF) – where the quantity of sulfuric acid produced is nil (because there are no sulfide minerals present) or is less than the neutralising capacity of the parent material. In most cases, NAF materials do not require specific measures to prevent environmental harm.

The RGS program included static testing and acid base accounting to classify the material according to its nett acid producing potential (NAPP), expressed as kilograms of sulfuric acid per ton of material ($\text{kg H}_2\text{SO}_4/\text{t}$). RGS (2025) then prepared samples for a program of kinetic leach column (KLC) testing to understand the chemical evolution of these materials and any implications for drainage or seepage quality. RGS (2025) generally ceased individual KLC tests upon stabilisation of leachate parameters (i.e. pH).



RGS (2025), presents the results of the geochemical characterisation test work and discusses the implications for the management of the different waste rock classes. However, the static and kinetic testing program allowed for the classification of the waste rock within the proposed open cut pits based on total sulfur concentrations as follows.

- Potentially acid forming (PAF)⁵: total sulfur content > 0.6%.
- Uncertain (UNC): total sulfur content 0.4% to 0.6%.
- Non-acid forming (NAF): total sulfur content < 0.4%.

RGS (2025) also noted that:

- all waste rock samples from the Southern open cut pit had a negative or almost zero NAPP (median -17.1kg H₂SO₄/t);
- no waste rock samples from the Southern open cut pit were classed as UNC;
- 87.5% of Southern open cut pit waste rock samples had sufficiently low concentrations of total sulfur (i.e. < 0.1%) to be considered NAF (Barren);
- only a small proportion (17%) of waste rock samples were PAF, all of which originated from the Northern open cut pit; and
- 66% of samples of Northern open cut pit waste rock samples were NAF, half of which were considered NAF (Barren).

Table 3.5.1 presents a breakdown of the annual volumes of waste rock produced.

Table 3.5.1
Indicative Annual Waste Rock Movement Summary

Waste Rock Class	Million tonnes (Mt)	Total	Mining Year									
			0	1	2	3	4	5	6	7	8	9
PAF	Mt	8.1	0.3	1.6	2.3	1.5	1.4	0.4	0.4	0.1	0.1	-
NAF	Mt	30.0	0.1	1.5	2.5	3.0	3.2	4.3	4.4	4.8	4.1	1.9
UNC	Mt	2.4	-	0.1	0.2	0.5	0.6	0.4	0.3	0.2	0.1	-
TOTAL ¹	Mt	40.5	0.4	3.2	5.0	5.1	5.1	5.1	5.1	5.1	4.3	1.9

Note 1: Totals may not match increment due to rounding.
Source: TMPL

3.5.3 Waste Rock Emplacements

3.5.3.1 Design

The Applicant commissioned ATC Williams Pty Ltd (ATCW) to prepare nominal designs for the proposed WREs (Figure 3.1.2). Table 3.5.2 presents a summary of the nominal design parameters adopted for the proposed WREs and Figures 3.5.1, 3.5.2 and 3.5.4 present the proposed designs.

⁵ The waste rock classification scheme adopted for the mining schedule utilized total sulfur assay data obtained from exploration drilling to assign mining blocks. For conservatism, this schedule assumes that, where total sulfur assay data is unavailable, the mining block is PAF. Therefore, it is possible that the proportion of PAF is lower than estimated.



Table 3.5.2
Nominal Waste Rock Emplacement Design

Nominal Design Parameter	Waste Rock Emplacement	
	Northern	Southern
Storage Capacity (Mm ³) ¹	9.63	12.63
Embankment Profile	1V:3H	1V:3H
Area (ha)	39.6	30.7
Crest Elevation (m AHD)	965.0	918.6
Maximum Height (m)	160	122
Note 1: Assumes waste rock density of 2.75t/m ³ and 50% swell factor (for conservatism)		
Source: ATCW (2024)		

3.5.3.2 Initial Construction

Prior to the placement of waste rock, the footprint of each WRE would be cleared of vegetation and stripped to refusal (i.e. all loose and organic material is removed). To limit seepage from the WRE, the exposed *in situ* material would then be permeability tested to meet a maximum saturated hydraulic conductivity value of 5×10^{-8} metres per second. Where *in situ* material fails to meet this specification, low permeability material would be placed, compacted and permeability tested to confirm the specification has been met.

To limit any potential interaction with underlying groundwater, basal drains would then be installed to collect and convey seepage to runoff dams that would be constructed downslope of each WRE (refer Section 3.10.2.1). These basal drains would be located to utilise existing topography (gullies) graded as required. To facilitate drainage of percolated seepage, the basal drains would be constructed using slotted drainpipe, wrapped in geotextile and then be covered by 2m of suitably sized NAF material. All basal drains underlying the PAF cell section of the Northern WRE would be fitted with siphons or a U-bend at their outlet to prevent oxygen ingress into the overlying PAF material via the drain.

3.5.3.3 Development

The nominal WRE design incorporates the progressive development of each landform towards final closure. This means that during operations, the placement of waste rock would result in slope profiles suitable for post-closure stability and the proposed final land use (refer Section 3.14.5). Developing the WRE in this manner, removes the need for any significant bulk earthworks or reshaping as part of rehabilitation.

Potentially Acid Forming and Uncertain Waste Rock Material

The proposed Northern WRE would provide for the storage of PAF and UNC waste rock material (Figure 3.5.1). This section would be developed via “bottom-up” construction methods in short 10 metre lifts. Each lift would be compacted to limit oxygen ingress and then covered by a 2m advective barrier of compacted NAF waste rock material to limit further exposure, or material oxidation by encapsulating the placed PAF and UNC waste rock material until this WRE reaches full development (Figure 3.5.2). A nominal cross-section of this method is shown on Figure 3.5.3. Developing this section of the Northern WRE in this manner would also provide additional storage contingency for the overall requirements of this facility.

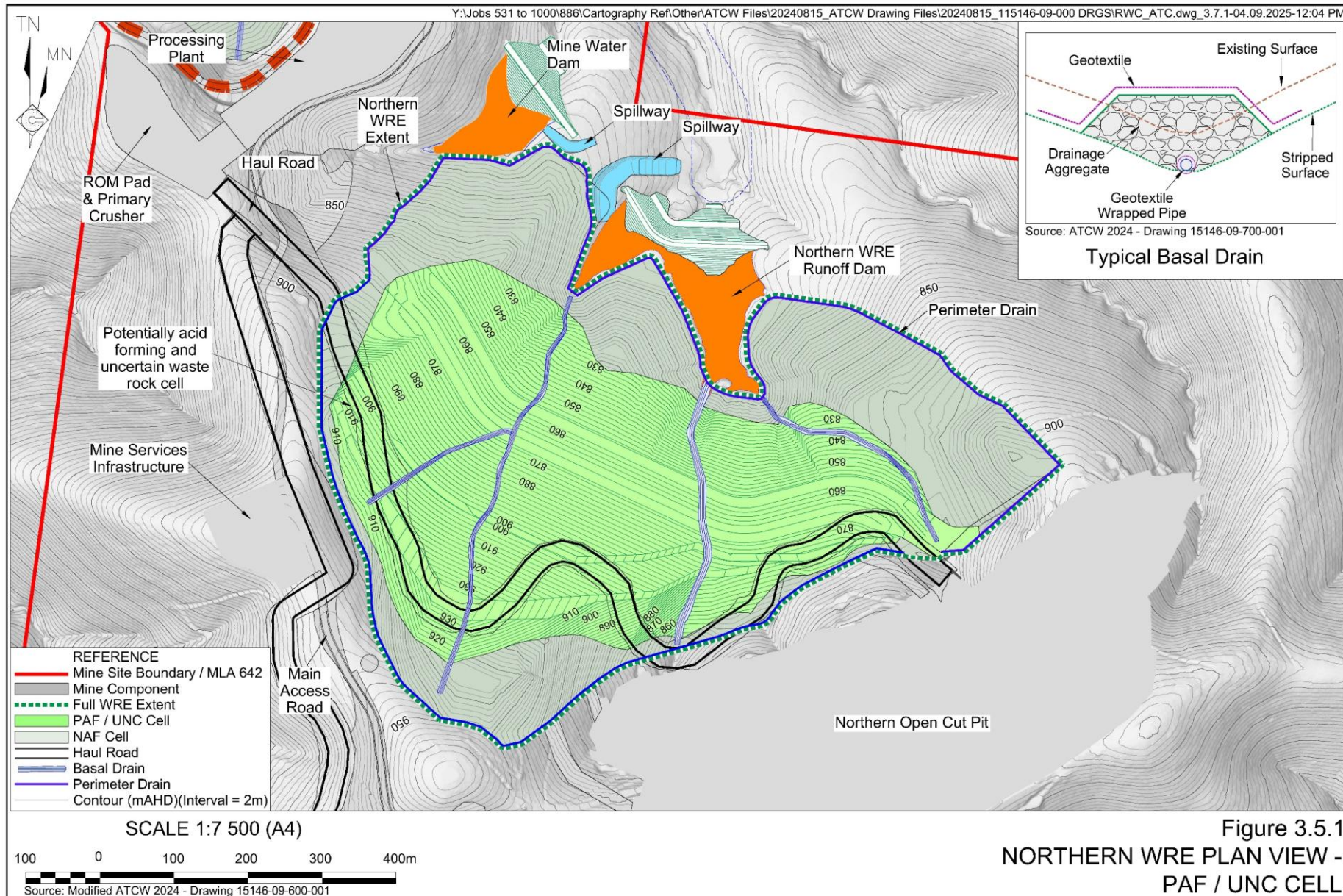
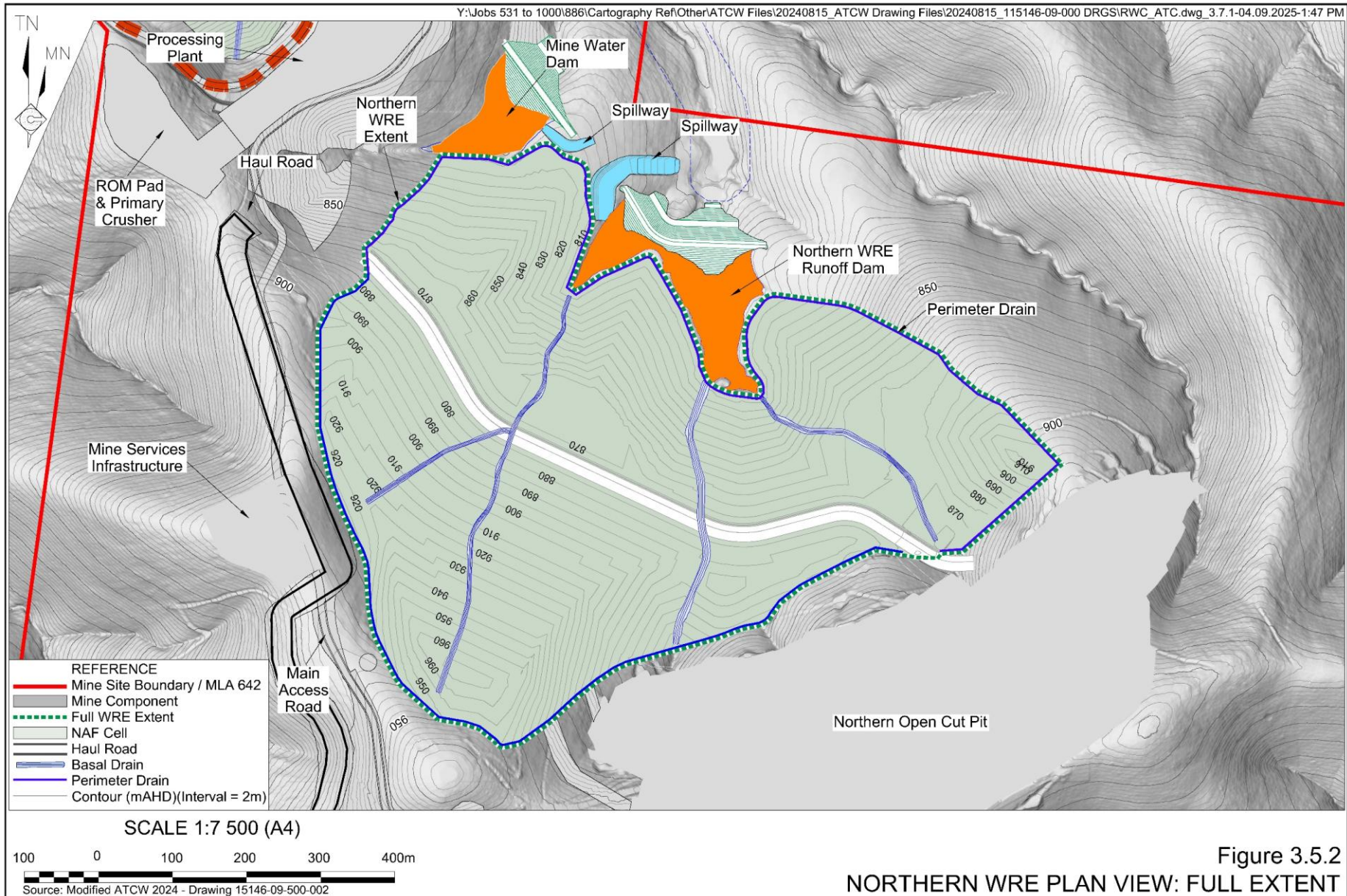


Figure 3.5.1
NORTHERN WRE PLAN VIEW -
PAF / UNC CELL

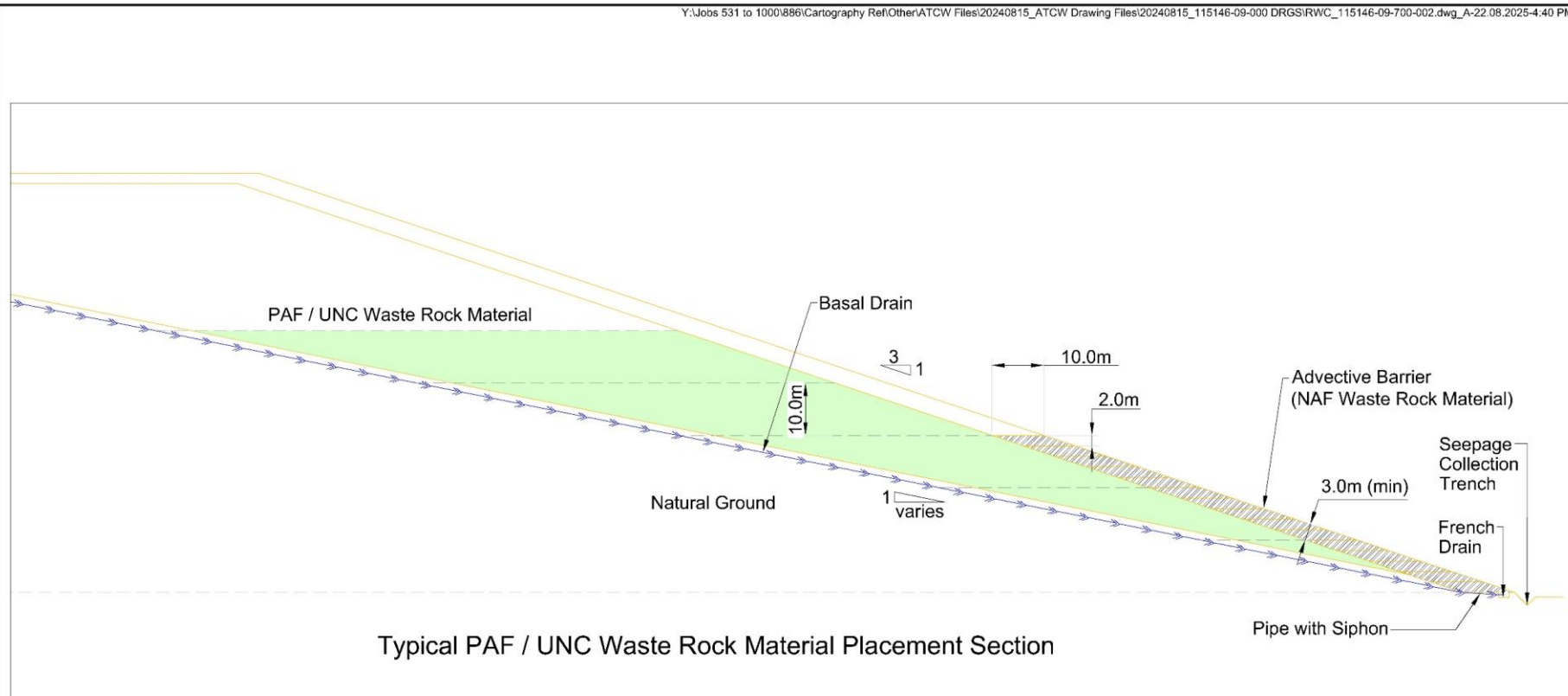


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Typical PAF / UNC Waste Rock Material Placement Section

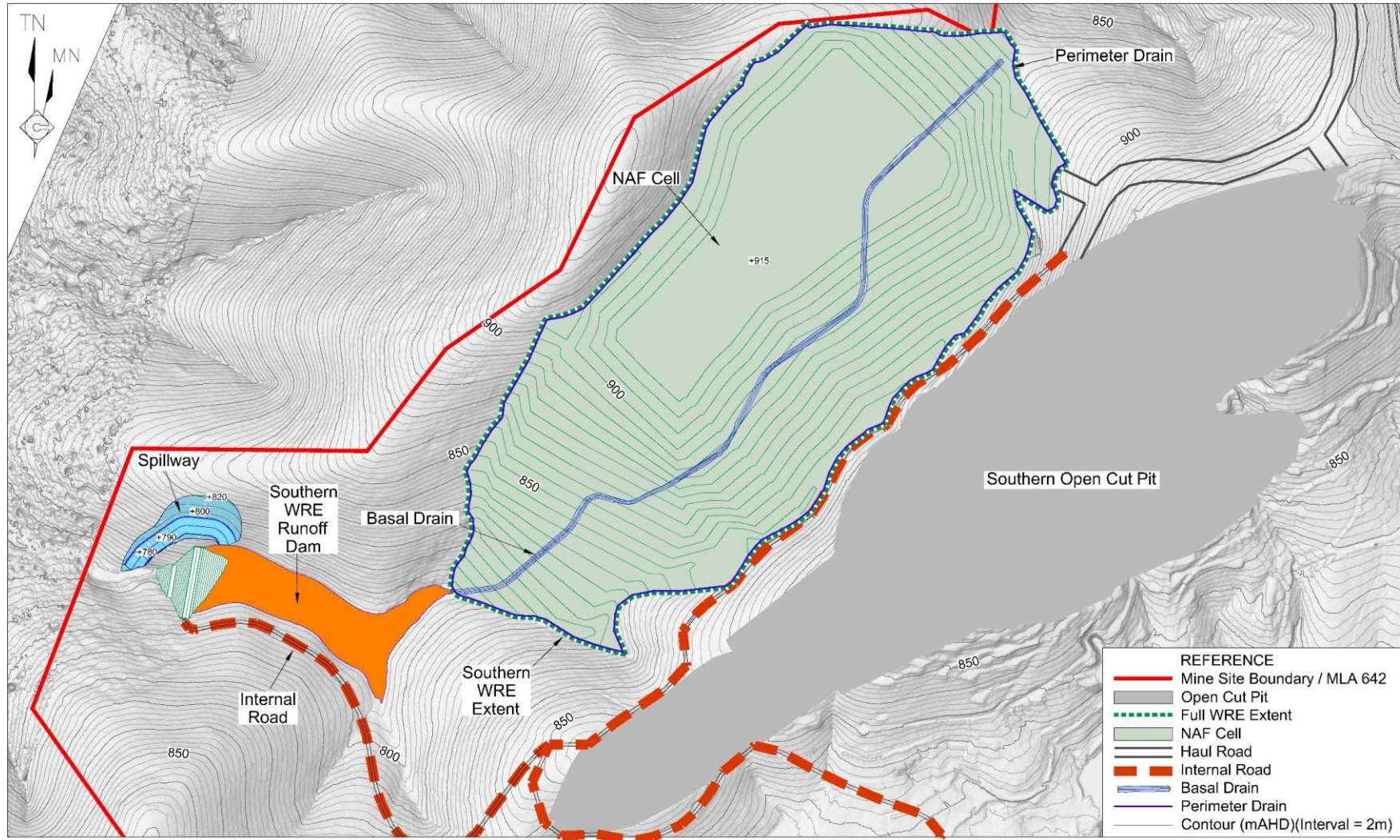
- REFERENCE
- PAF / UNC Waste Rock Material
 - Advective Barrier (NAF Waste Rock Material)
 - Basal Drain

Figure 3.5.3
PAF / UNC PLACEMENT SCHEMATIC

Source: ATCW 2024 - Drawing 15146-09-700-002



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100 0 100 200 300 400m

Source: Modified ATCW 2024 - Drawing 15146-09-600-001

Figure 3.5.4
SOUTHERN WRE PLAN VIEW



Non-acid Forming Waste Rock Material

All NAF material not required for encapsulating PAF and UNC in the Northern WRE would be end tipped and dozed downslope in 1m layers. This placement method would be adopted for the NAF section of the Northern WRE and for the full development of the Southern WRE (**Figure 3.5.4**). However, once the developed landform of the Southern WRE reaches the natural surface at the valley crest, the placement of NAF waste rock would occur in 10m lifts (i.e. bottom-up construction method).

3.5.3.4 Closure

As noted in Section 3.5.3.3, the nominal design and development sequence of the WRE would result in a geotechnically stable landform that is suitable for rehabilitation. Therefore, as the advective barrier of compacted NAF waste rock material is placed on a completed PAF/UNC lift, the outer slope of the lift would become available for the placement of the final cover system that would be designed to:

- limit oxygen ingress to the interred waste rock;
- limit water percolation to the interred waste rock;
- control and limit erosion; and
- support a vegetated Native ecosystem post-mining land use (refer Section 3.14.5).

Conceptually, the proposed cover system for both WRE would comprise:

- a 0.8m layer of crushed NAF mixed with subsoil / growth medium; and
- an equivalent layer of topsoil to that removed from the landform's footprint.

ATCW (2024) considered that the incorporation of a low-permeability layer into the cover would not be required as this function will be handled by the 2m advective barrier of compacted NAF waste rock material placed over the PAF / UNC waste rock material.

3.5.4 Flexible Elements

Table 3.5.3 presents the processing-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts than that proposed are not described.

Table 3.5.3
Flexible Elements – Waste Rock Management

Flexible Element	Limit on Flexibility	Justification
Volume of classified waste rock	No substantial additional areas of disturbance other than that described. No significant additional emissions of noise, dust, gases or odour.	Infill drilling and analysis of blasthole cuttings during operations may lead to the re-classification of waste rock material and alter the volumes and management techniques adopted for placement.



3.6 Processing Operations

3.6.1 Introduction

All ore extracted from the open cut pits would be processed onsite to produce a concentrate comprising up to approximately 60% tin. The processing circuit would principally rely on front-end crushing and gravity separation techniques to progressively increase tin concentrations. A minor component of the processing circuit, involving dressing and flotation, would require the addition of reagents and chemicals.

Based upon the processing of up to 39.7 million tonnes of ore, the Project would produce approximately 55,000t of dry tin concentrate throughout its operational life. Annual production of tin concentrate would be up to approximately 7,300t with the annual quantity reflecting the proportion of the recovered tin in the processed ore.

3.6.2 Processing Plant

The Applicant proposes to construct and operate a processing plant in the northern section of the Mine Site (**Figure 3.1.2**). This plant would have the capacity to process up to 5Mtpa of ROM ore to produce up to 7,300tpa of dry concentrate at approximately 60% tin via crushing, pre-concentration, gravity concentration and dressing circuits. Due to density difference between the ore and gangue materials, this method of processing and concentration predominantly utilises physical separation techniques. Therefore, the Project's production of tin concentrate requires only limited addition of chemical reagents during the final stages of concentration.

The general arrangement of the processing plant, including ROM pad and crushing circuit layout is provided as **Figure 3.6.1** whilst **Figure 3.6.2** presents the indicative process flow diagram.

The following subsections provide an overview of processing operations with reference made to items identified on **Figure 3.6.1**. For clarity, the following text limits reference to plant components of the front-end and pre-concentration circuits (i.e. with an alphabetic identifier). Whilst items with a numeric identifier are important for processing operations, for simplicity they are not cross-referenced as they are associated with belt conveyors transferring material between plant components.

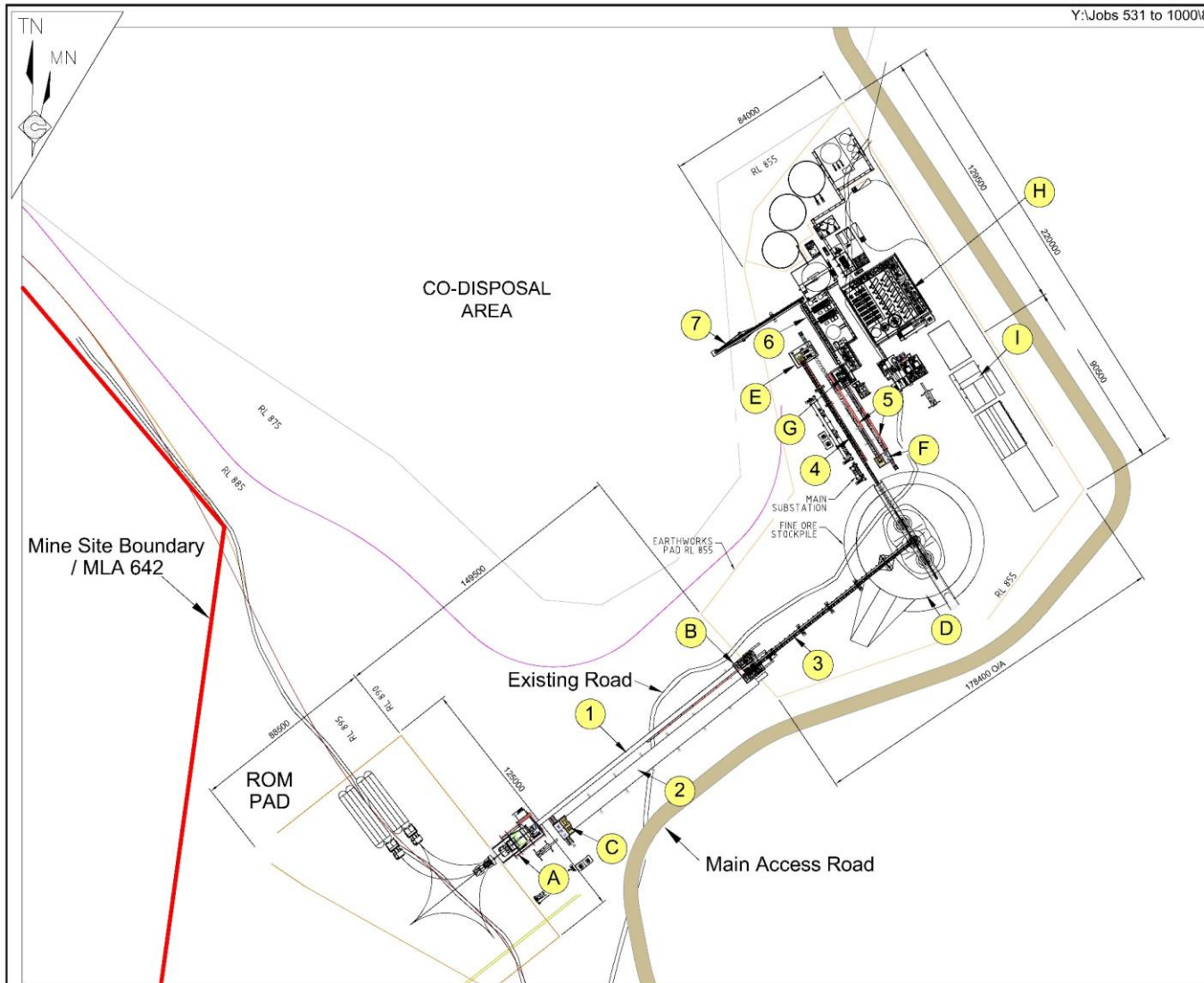
However, once material enters the concentration circuit within the processing plant (Item H of **Figure 3.6.1**), reference is made to **Figure 3.6.2**.

3.6.2.1 Front-end Crushing Circuit

Processing operations would commence via a three stage (front-end) crushing and screening circuit to produce crushed ore for subsequent processing. This front-end crushing circuit has been designed to maintain the maximum 24-hour processing plant throughput at 12 hours a day circuit utilisation (i.e. daytime operations). Front-end crushing and screening would reduce the size of the ore from 400mm to <12mm. Crushed ore would then be stockpiled for reclaim and entry to the pre-concentration circuit.



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PROCESS PLANT AREAS

ITEM	DESCRIPTION
A	PRIMARY CRUSHING
B	SECONDARY SCREENING
C	SECONDARY & TERTIARY CRUSHING
D	ORE STORAGE & RECLAIM
E	VSI SCREENING
F	VSI CRUSHING
G	VSI REJECTS SCREENING
H	PROCESSING PLANT
I	NON PROCESS BUILDINGS

BELT CONVEYORS

ITEM	DESCRIPTION
1	CRUSHER PRODUCT CONVEYOR
2	SIZING SCREEN FEED CONVEYOR
3	CRUSHED ORE STOCKPILE CONVEYOR
4	ORE RECLAIM CONVEYOR
5	VSI CIRCUIT CONVEYOR
6	COARSE REJECT CONVEYOR
7	CDA CONVEYOR

SCALE (A4)

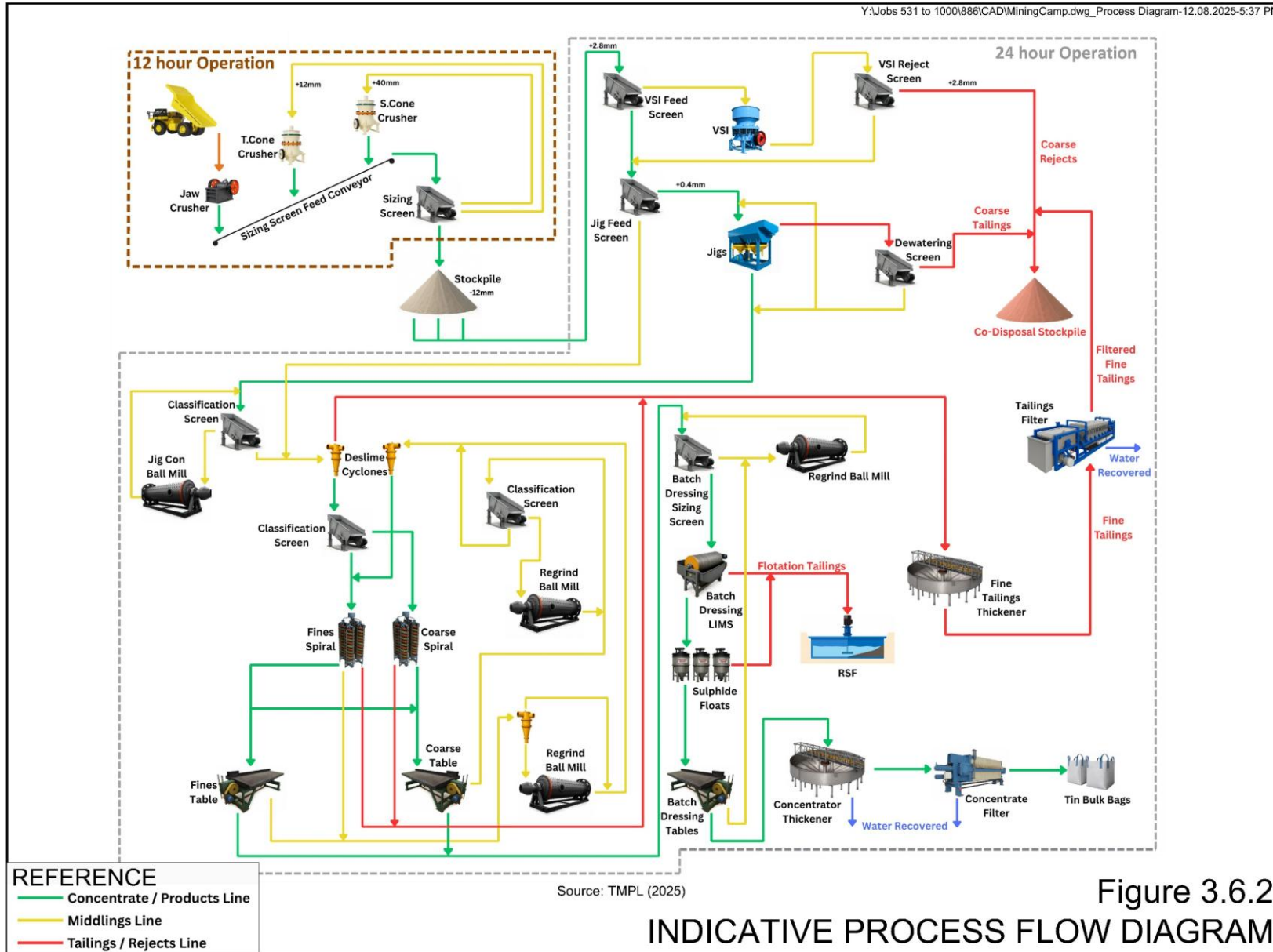


Source: Mincore - Drawing Number MIN-0953-3100-ME-001B

See Figure 3.1.2 for Location

INDICATIVE PROCESSING PLANT LAYOUT

Figure 3.6.1





ROM ore would either be tipped directly into the primary crusher (Item A on **Figure 3.6.1**) or stockpiled within the ROM pad for later feed via wheel loader. The Applicant anticipates that, to avoid rehandling, dust generation and to reduce vehicle emissions, 62% of ore would be directly tipped into the primary crusher with the remaining 38% stockpiled on the ROM pad.

The primary crusher and feed bin would be housed within a 3-sided enclosed building fitted with an automated fogging sprayer for dust management which would operate on day shift only. Oversize material would be managed via a vibrating (grizzly) feeder and rock breaker that would also be installed in the enclosure.

Primary crushed ore would then be transferred to the enclosed secondary screening plant (Item B) with screened feed returned via conveyor to the secondary crusher (Item C) that would be housed within an enclosed building. Secondary crushed material would then be transferred and screened before return to the tertiary crusher that would be located adjacent to the secondary crusher (Item C).

All crushed ore would then be transferred and placed via chute onto the crushed ore stockpile (Item D) which represents the terminal stage of the front-end crushing circuit.

3.6.2.2 Pre-concentration Circuit

The pre-concentration circuit, operating 24-hours per day, would commence with the reclaim of stockpiled crushed ore via feeders positioned underneath the stockpile (reclaim tunnel). Reclaimed ore material would then be transferred via conveyor for the screening of >2.8mm ore material (Item E). Once screened, all oversize material would be conveyed to three vertical shaft impact (VSI) crushers that would be housed within an enclosed building (Item F) for single pass crushing. This re-crushed ore material would then be re-screened (Item G) with all remaining oversize material (i.e. >2.8mm) classed as “coarse reject” and transferred via conveyor for mixing with coarse and fine tailings. This mixed material would then be transferred via conveyor for placement in the Co-disposal Area (CDA).

The Applicant anticipates that, at 5Mtpa, this coarse reject represents approximately 46% (2.31Mtpa) of all processing plant feed (throughput).

Re-crushed ore would be screened and material >0.4mm sent to jigs (refer **Figure 3.6.2**) for the second stage of pre-concentration. Approximately 27% (1.34Mtpa) of total throughput would be rejected at this stage as “coarse tailings” that would be dewatered prior to mixing with coarse reject and fine tailings before transfer and co-disposal in the CDA.

3.6.2.3 Concentration Circuit

Re-crushed ore passing the screens (i.e. <0.4mm) would then enter a gravity concentration circuit (refer **Figure 3.6.2**). Concentration within this circuit would involve spirals and shaker tables, supported by progressive grinding (ball milling, re-grind), screening and desliming cyclones. Slimes removed by the cyclones would be thickened, filtered to remove any remaining water, and sent for mixing with coarse reject and coarse tailings prior to transfer and placement in the CDA. These “fine tailings” would represent approximately 26% (1.31Mtpa) of total throughput.



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Gravity produced concentrate would then be batch dressed via low intensity magnetic separation (LIMS), upgraded using a sulfide flotation process and subjected to final cleaning (shaking tables). Once cleaned, concentrate would be thickened, filtered and bagged for containerised despatch via road to port for overseas export.

At 5Mtpa throughput, processing operations would produce up to 7 300tpa of dry concentrate at approximately 60% tin.

Approximately 30,000tpa of wet tailings generated from flotation would be pumped to a dedicated residue storage facility (RSF) for disposal.

3.6.3 Reagent Management

As identified in Section 3.6.1, processing operations primarily rely on physical (i.e. gravity) separation techniques, requiring only minor quantities of chemicals and reagents to recover contained tin. **Table 3.6.1** lists the chemicals and reagents that would be used together with their function, chemistry, storage, annual usage, quantities held onsite and fate. These chemicals would be stored and handled within the processing plant, in accordance with all relevant standards and protocols.

Table 3.6.1
Processing Plant Reagents

Reagent	Chemistry	Function	Storage	Usage (tpa)	Onsite Quantity	Fate
Flocculant	Anionic polyacrylamide	Flocculation	25kg bag (dry)	20	1.5t	Flotation tailings
Copper sulphate	CuSO ₄ .5H ₂ O	Activator	25kg bag (dry)	8.1	600kg	Flotation tailings
Sulfide collector	Potassium Amyl Xanthate	Sulfide collector	25kg bag (dry)	1.4	100kg	Flotation tailings
MIBC	Methyl Isobutyl Carbinol	Frother	1 000L IBC* (liquid)	0.730	1 000L	Flotation tailings
Note * IBC = Intermediate Bulk Container						
Source: TMPL						

3.6.4 Flexible Elements

Table 3.6.2 presents the processing-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts than that proposed are not described.



Table 3.6.2
Flexible Elements – Processing Operations

Flexible Element	Limit on Flexibility	Justification
Processing procedures, plant, equipment and reagents	No additional substantial plant or equipment other than that described. No significant additional emissions of noise, dust, gases or odour.	Processing methodology, equipment and techniques are continually evolving and being optimised to maximise recovery of contained heavy mineral or the efficiency of processing operations. Minor adjustments to the processing equipment or process flow sheet used may be identified and implemented throughout the Project-life.
Mass and ratio of processing residues		Processing methodology, mineralogy and ore grades will change as processing operations progress and may lead to changes in the respective mass and ratios of processing residues being placed.



3.7 Processing Residue Management

3.7.1 Material Classification

As noted in Section 3.5, the Applicant commissioned RGS Environmental Consultants Pty Ltd (RGS) to undertake a program of geochemical characterisation on the Project's waste rock and processing residues. The report prepared by RGS, hereafter referred to as RGS (2025), is provided as **Appendix 22** and fully describes the materials, methods and outcomes of the program.

RGS (2025) classified the process residues as follows.

Coarse Reject

The static testing program identified that, with 0.25% total sulfur concentration but, with an NAPP between -5 and 5kg H₂SO₄/t, some acid neutralising capacity to limit acidic drainage, RGS (2025) classed this material as "uncertain".

The KLC testing involved a 48-week program whereby pH stabilised after 24 weeks (\approx pH4.0) and with electrical conductivity (EC) of 306 μ S/cm at the program's end. Leachate analysis also identified elevated concentrations of some metals and metalloids.

Coarse and Fine Tailings

The static testing program identified that, with respective total sulfur concentrations of 0.8% and 0.9%, coarse tailings and fine tailings, with an NAPP between 5 and 10kg H₂SO₄/t, these materials were considered by RGS (2025) as potentially acid forming (PAF), albeit at low capacity.

The KLC testing of coarse tailings involved a 52-week program whereby pH was generally stable throughout (\approx pH4.5) and with an EC of 773 μ S/cm at the program's end. Leachate analysis also identified elevated concentrations of some metals and metalloids.

The KLC testing of fine tailings involved an initial 52-week program followed by reactivation after 80 weeks. At program's end the leachate pH was 4.8 and EC was 130 μ S/cm. Leachate analysis also identified elevated concentrations of some metals and metalloids.

Coarse Reject and Coarse Tailings

The static testing program identified that, with a total sulfur concentration of 0.85% and an NAPP between 5 and 10kg H₂SO₄/t, these materials in combination were considered by RGS (2025) as PAF (low capacity).

The KLC testing of coarse tailings involved a 52-week program whereby pH was generally stable throughout (\approx pH4.5) and with an EC of 773 μ S/cm at the program's end. Leachate analysis also identified elevated concentrations of some metals and metalloids.

The KLC testing of fine tailings involved an initial 52-week program followed by reactivation after 80 weeks. At program's end the leachate pH was 4.3 and EC was 412 μ S/cm. Leachate analysis also identified elevated concentrations of some metals and metalloids.



Flotation Tailings

The static testing program identified that, with a total sulfur concentration of 17.9% and an NAPP >10kg H₂SO₄/t, these materials were considered by RGS (2025) as PAF.

The KLC testing of flotation tailings involved a 48-week program whereby at program's end recorded pH was 2.7 with an EC of 1,860µS/cm. Leachate analysis also identified elevated concentrations of some metals and metalloids.

Summary

RGS (2025) considered that the outcomes of their static and kinetic testing program were consistent with materials derived from a mineralised terrain, with some elements occurring in concentrations exceeding median global crust abundances and associated (in part) with sulfide mineralogy. RGS (2025) also noted that combining coarse reject and coarse tailing materials appeared to have a stabilising effect on the pH, EC, and dissolved metal/metalloid concentrations when compared to individual processing residues. RGS (2025) also hypothesised that, by combining the coarse reject with the finer tailings, the rate of water and oxygen entry into the mixed material would be reduced. This would also increase the time for any generated acid to interact with acid buffering minerals.

In closing, RGS (2025) recommended that the Co-disposal Area (CDA) be constructed on a low permeability foundation with basal drains to capture and manage drainage. Given the higher risk of acid mine drainage from flotation tailings, RGS (2025) recommended lining the RSF with low permeability material (i.e. compacted clay or high-density polyethylene [HDPE]).

3.7.2 Residue Storage

3.7.2.1 Introduction

As part of its Feasibility Study (TMPL, 2024) and in conjunction with the testing program undertaken by RGS (2025), the Applicant commissioned ATC Williams Pty Ltd (ATCW, 2024) to prepare nominal designs for the proposed development of the CDA for the combined storage of coarse reject, coarse tailings and fine tailings and the RSF for the storage of flotation tailings. The CDA would be situated immediately adjacent to the processing plant whilst the RSF would be located northwest of the CDA (refer **Figure 3.1.2**). The general design objectives of these facilities are to provide for the safe, stable and non-polluting containment of the processing residues generated over the Project-life.

Further detail on the nominal design considerations, construction, operational development and final landform for the CDA and RSF is provided below.

3.7.2.2 Co-disposal Area (CDA)

Prior to the placement of coarse rejects, coarse tailings and fine tailings, the CDA footprint would be stripped to refusal (i.e. loose and organic material is removed). The exposed in situ material would then be permeability tested and, where required, low permeability material placed and compacted to limit seepage from the CDA. Basal drains, utilising existing topography (gullies) would be installed to intercept seepage. These basal drains would be fitted with siphons or U-



bends at their outlet to prevent oxygen ingress into the overlying material. Seepage and surface water runoff from the CDA would then be conveyed via toe and perimeter drains to a runoff dam that would be constructed downslope of the CDA (refer Section 3.10.2.1).

Coarse rejects, coarse tailings and fine tailings would be transferred from the processing plant to the CDA via a single “grasshopper” style conveyor and stockpiled using a stacker. The mixed material of the conveyor stockpile would then be pushed out from the stacker’s location by a rubber tyred bulldozer to form an approximately 1m thick layer. Once the layer has been formed over a given area (i.e. 500m²), the stacker would then be repositioned and the conveyor extended to allow progressive extension of the layer. Development of the CDA in this manner would provide adequate compaction of the placed material by vehicle pass. This would provide a twofold opportunity to limit water and oxygen ingress to placed material by reducing exposure timeframes and pore space of the placed material.

Once an area has reached its design elevation and profile, it would be rehabilitated with a final cover system whilst other areas remain operationally active. This cover system would incorporate growth medium to form a water shedding, store and release cover that would then be revegetated to achieve the post mining land use of “agricultural grazing-native pasture”.

The nominal geometry of the final CDA landform would be as follows.

- Maximum height: 110m.
- Average batter slope: 3H:1V.
- Footprint: 60ha.

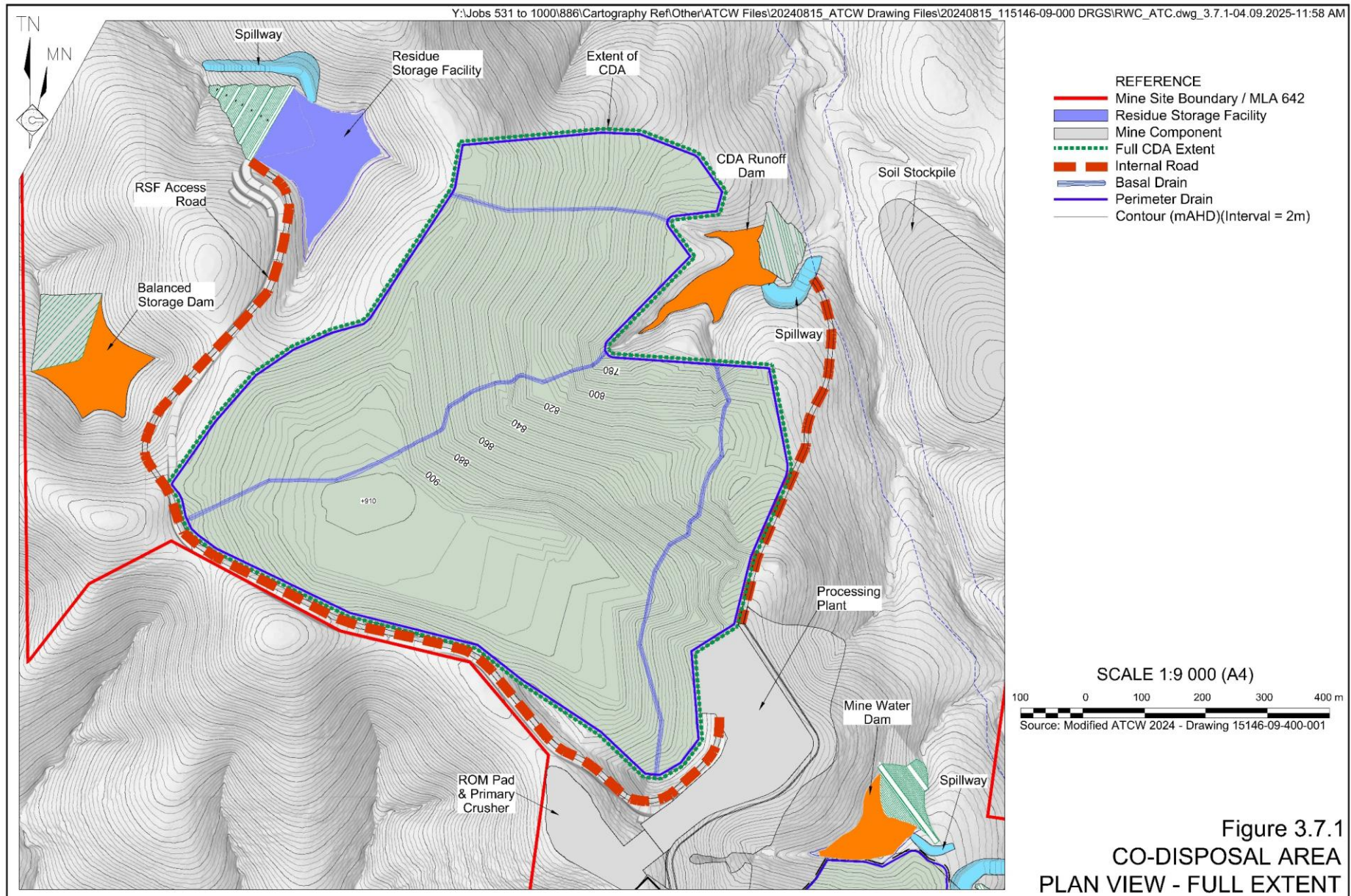
Figure 3.7.1 presents a plan view of the CDA at full extent whilst **Figure 3.7.2** presents a west to east cross section of the nominal CDA final landform and nominal basal drain arrangement.

3.7.2.3 Residue Storage Facility (RSF)

The RSF would comprise a cross-valley embankment (single raise), that would be located approximately 1.5km northwest of the processing plant (refer **Figure 3.1.2**). The upstream face of the embankment and entire tailings impoundment area would be underlain by a high-density polyethylene (HDPE) geomembrane liner that would be installed during construction. This liner would be 2mm thick and have a maximum hydraulic conductivity of 1×10^{-14} m/second.

Preliminary design of the RSF was undertaken by ATCW in accordance with the methodologies of Dam Safety NSW, the Australian National Council on Large Dams (ANCOLD, 2019) and the Global Industry Standard on Tailings Management (ICMM, 2020). This assessment identified the RSF would be a “Declared Dam” under the NSW *Dam Safety Act 2015* with design criteria informed by ANCOLD (2019).

Table 3.7.1 provides an overview of the preliminary design parameters for the proposed RSF whilst **Figure 3.7.3** presents a plan view of the RSF, including the embankment and the spillway at full extent. **Figure 3.7.4** presents a typical embankment cross-section for this facility.





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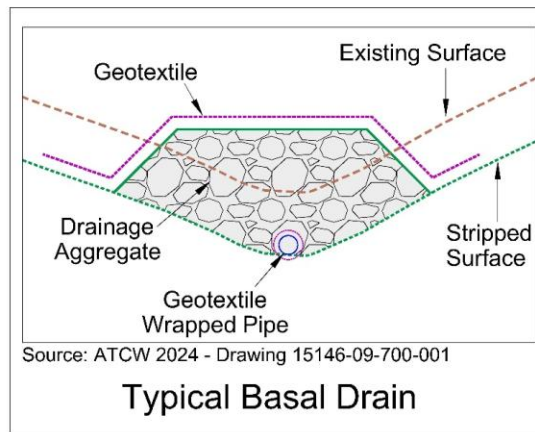
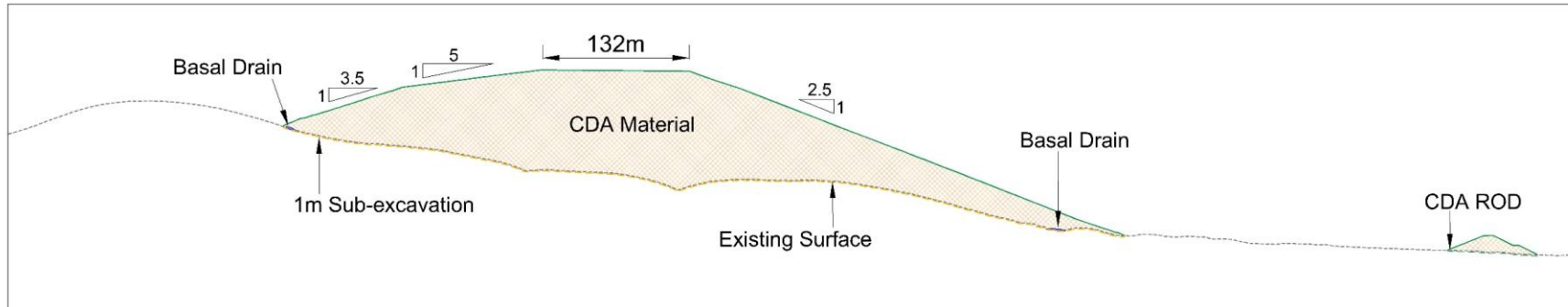
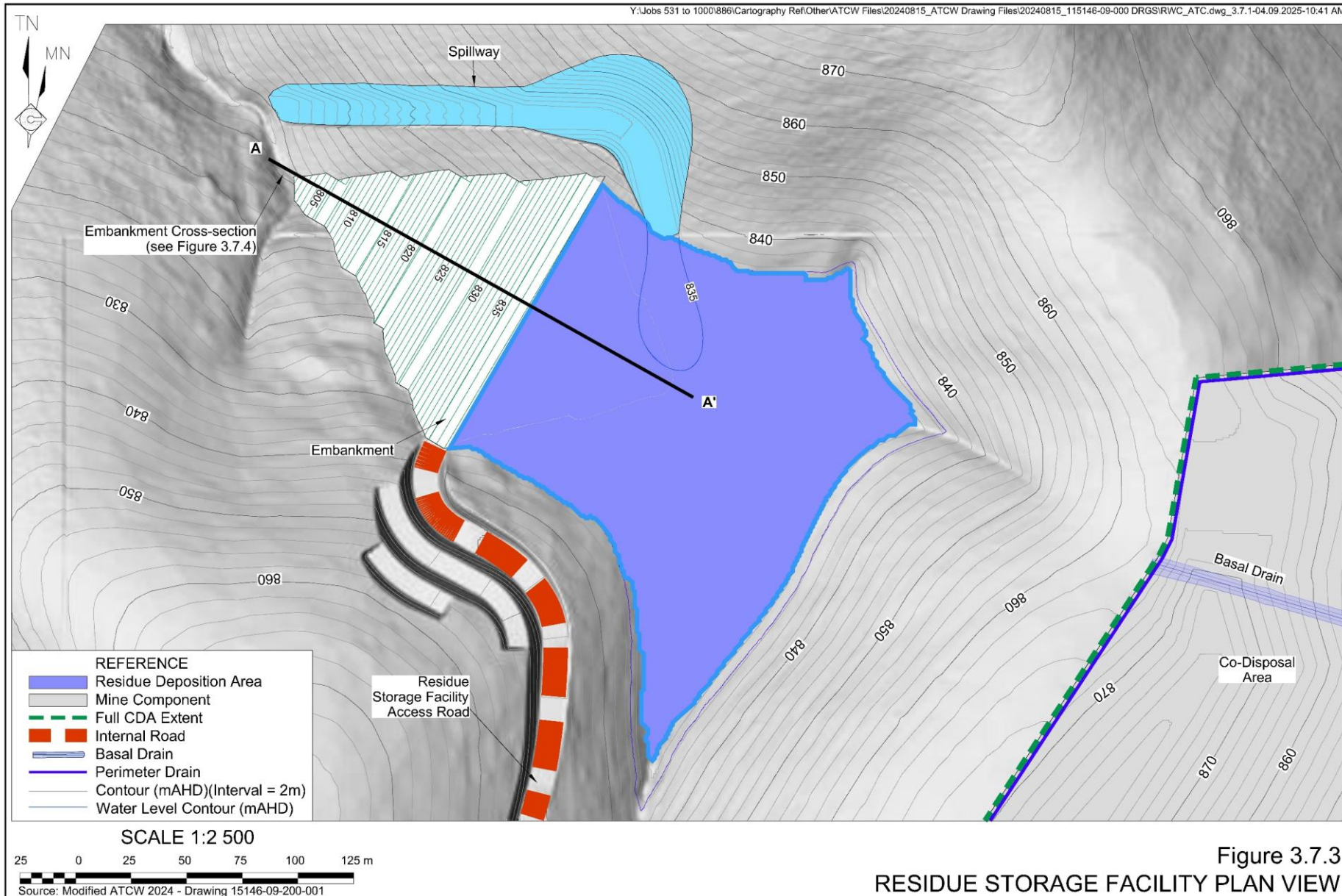


Figure 3.7.2
CO-DISPOSAL AREA: TYPICAL CROSS SECTION
(WEST TO EAST)

Source: Modified after ATCW 2024 - Drawing 15146-09-400-001





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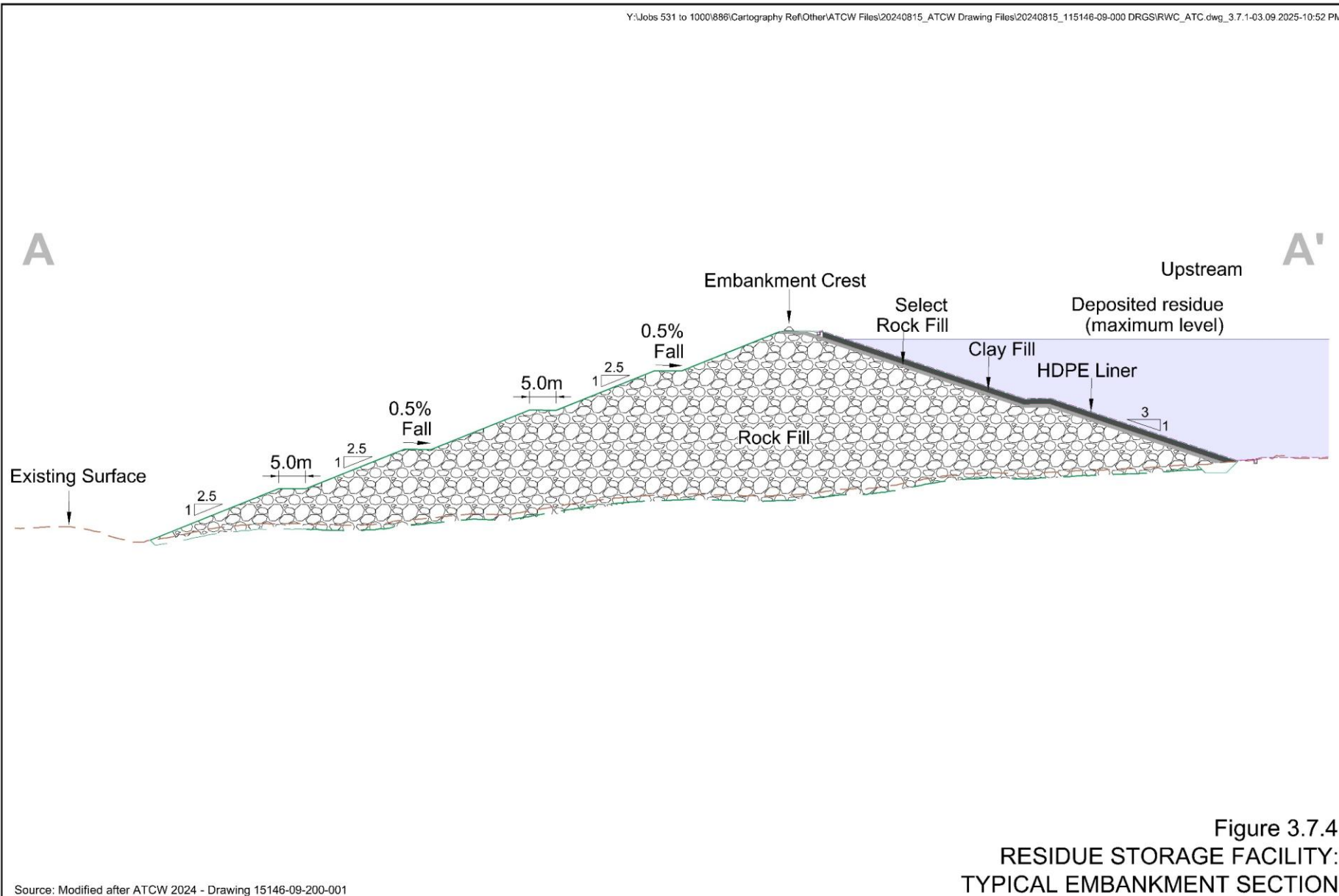


Figure 3.7.4
RESIDUE STORAGE FACILITY:
TYPICAL EMBANKMENT SECTION

Source: Modified after ATCW 2024 - Drawing 15146-09-200-001



**Table 3.7.1
Preliminary RSF Design Considerations**

Parameter	Design
Tailings Volume (total)	183,000m ³
Tailings Density	1.4t/m ³
Solids Content	34.5%
Embankment Crest Elevation	836.24mAHD
Storage Capacity (total)	203.5 megalitres
Embankment Height	34.5m
Liner (upstream embankment and tailings impoundment)	2mm HDPE
Source: ATCW (2024)	

Flotation tailings would be pumped from the processing plant via a pipeline running adjacent to the RSF access road for discharge via spigots positioned on the embankment. Any tailings bleed water (decant) accumulating at the base of the tailings beach would be pumped back to the processing plant for reuse. In later years of operations, the tailings would be placed in a manner that grades the beach to the northwest so that, following rehabilitation, the surface would drain towards the closure spillway.

The preliminary design of the RSF is that of a “final closure” landform, its entire tailings surface would be active during operations. This means there would be limited opportunity for progressive rehabilitation during operations.

Following the cessation of processing operations, the deposited tailings would be allowed to consolidate prior to rehabilitation and revegetation. Rehabilitation activities would commence with the installation of a store and release cover system that would be revegetated to achieve the post mining land use of “agricultural grazing-native pasture”.

3.7.3 Flexible Elements

Table 3.7.2 presents the processing-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts than that proposed are not described.

**Table 3.7.2
Flexible Elements – Management of Processing Residues**

Flexible Element	Limit on Flexibility	Justification
Ratio, mix of processing residues for co-disposal	No substantial additional areas of disturbance other than that described. No significant additional emissions of noise, dust, gases or odour.	ROM ore characteristics, processing methodology, equipment and techniques are continually evolving and being optimised to maximise recovery of contained heavy mineral or the efficiency of processing operations. Minor adjustments to the processing equipment or process flow sheet used may be identified and implemented throughout the Project-life.



3.8 Transportation Operations

3.8.1 Introduction

The Project's transport operations would utilise roads both within, and external to, the Mine Site. Within the Mine Site, the Applicant would construct and maintain a network of private roads that would be (variously) used by mobile fleet for the haulage of ROM ore and waste rock, as well as those for use by other mining fleet, mobile plant or road registered light and heavy vehicles (refer **Figure 3.1.2**).

Transport operations external to the Mine Site during both the site establishment and operational stages would utilise the public road network for the:

- inbound movement of equipment, plant, material and consumables during site establishment and operations;
- access and egress of personnel, visitors and contractors during site establishment and operations; and
- outbound movement of produced tin concentrate via the proposed "Concentrate Transport Route" during operations (refer **Figure 3.8.1**).

In addition, the public road network would also provide access to the Mine Camp for personnel, contractors, visitors and the delivery of services, material and consumables to this ancillary component. The Mine Camp, and the Applicant's exploration office in Emmaville (Emmaville Shed – **Figure 3.2.2**) would be used as transport hubs for personnel to park personal vehicles and access buses for transportation to and from the Mine Site.

The following subsections describe the various internal and external elements of the Project's transport operations, including internal and external roads, proposed upgrades to the public road network, proposed vehicle types and traffic volumes.

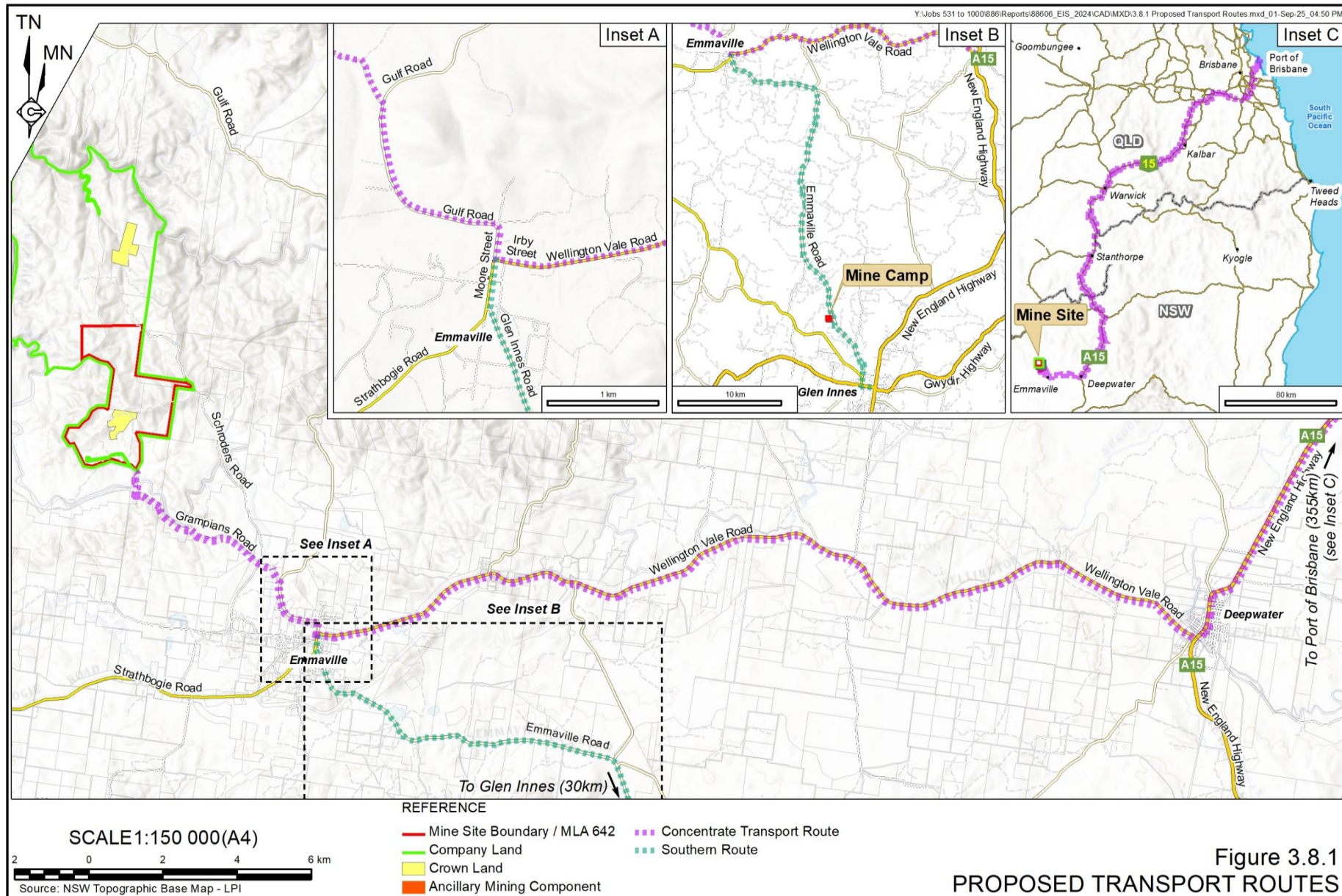
3.8.2 Mine Site Road Network

3.8.2.1 Main Access Road

The main access road (refer **Figure 3.1.2**) would be the principal internal route through the Mine Site for road registered vehicles. This approximately 3.5km road would commence at the southeastern boundary of the Mine Site and provide access to, and egress from, the onsite power generation area, administration area, mine infrastructure services area and processing plant. Use of the site access road beyond the gatehouse would be for authorised vehicles only.

The main access road would be constructed as an unsealed, all weather, two-way road for light and heavy vehicles, that would generally incorporate the following nominal design features.

- Two travel lanes and adjacent shoulders.
- Longitudinal V-drains (1V:2H, varying width, dependent on cut or fill section).
- Maximum 10% grade.
- Proposed maximum speed – 40km/hr.





Topographic constraints between the mine infrastructure services area and the processing plant requires the main access road to cross haul roads at specified intersections (refer **Figure 3.1.2**). Vehicle conflicts at these intersections would be managed through the use of radio communication and defined Give Way and Stop signs. Escorts would be provided to those vehicles that are not radio equipped.

3.8.2.2 Internal Roads

The internal road network, namely those roads within the Mine Site other than the main access road, would provide access for mobile mining fleet and light and heavy vehicles to the operational areas of the Mine Site. Internal roads would be classified as either:

- haul roads, suitable for use by the mine haulage fleet and other heavy vehicles: and
- light vehicle roads, suitable for use by the light vehicle fleet.

Internal roads would be constructed to provide linkages between the principal components of the Mine Site and therefore constructed and located as necessary.

In particular, the Applicant would construct a series of haul roads for the transport of waste rock from the open cut pits to the waste rock emplacements and ROM ore to the ROM pad by mobile mining fleet. Progressive development of the open cut pits would require construction and use of temporary haul roads that would be relocated as required to maintain minimum haul distances and optimum grades, whilst minimising potential noise impacts. Once the respective open cut pit has reached its full development extent, permanent pit entrances and haul roads would be established.

Haul roads within, and external to, the open cut pits would be nominally designed as follows.

- Single-lane haul roads: minimum 14.3m width.
- Dual lane haul roads: minimum 24m width.
- Safety berms.
- Unsealed pavement suitable for all weather heavy vehicle use.
- Longitudinal and cross drainage infrastructure as required.
- Maximum gradient of 10%.

Roads solely used for light vehicle access would typically be narrower than the proposed haul roads and their use would be restricted to this vehicle class.

Where practicable, the pavement of all internal roads would be constructed of low-silt materials to minimise dust lift off and the volume of water required for dust suppression. However, the Applicant may elect to apply water in combination with chemical suppressants and/or binding agents to minimise dust lift-off. Water for dust suppression would typically be sourced from clean water storages or groundwater although mine-affected water may also be used on internally draining Mine Site catchments.



Finally, all roads would be delineated using guideposts at suitable intervals and all vehicles would be required to remain on the marked roads or within defined work areas. This would limit the formation of unplanned and unnecessary tracks.

The Applicant would also apply a 40km per hour (km/h) maximum speed limit to all vehicles travelling on all internal roads.

Where roads are no longer required for an operational purpose, they would be barricaded to prevent vehicular access and, where practical, rehabilitated (see Section 3.14).

3.8.3 Offsite Transportation

3.8.3.1 Proposed Transportation Routes

Project-related heavy vehicle transport operations on the public road network would generally utilise two transportation routes as follows (**Figure 3.8.1**)

- Concentrate Transport Route – from the Mine Site via Grampians Road, to its intersection with Gulf Road and onto Moore Street / Emmaville Road. Outbound vehicles would then turn left onto Irby Street / Wellington Vale Road and travel approximately 27km along this regional road before turning left onto the State controlled New England Highway for the approximately 355km journey to the Port of Brisbane. Returning vehicles and those accessing the Mine Site from northern points of origin would utilise the same route.
- Southern Route – from the Mine Site via Grampians Road, to its intersection with Gulf Road and onto Moore Street / Emmaville Road. Vehicles travelling this route would remain on Emmaville Road for approximately 34km to the proposed Mine Camp or onward to Glen Innes. Vehicles travelling to locations beyond Glen Innes would typically continue along the New England Highway towards Armidale and Tamworth. Returning vehicles and those accessing the Mine Site from southern points of origin would utilise the same route.

The Applicant anticipates that during operations, traffic would approach the Mine Site using the following Transportation Routes.

- Produced tin concentrate vehicles – 100% via the Concentrate Transport Route.
- Heavy vehicles transporting materials, equipment and consumables (other than heavy mineral concentrate) – 75% via the Southern Route and 25% from the Concentrate Transport Route.
- Light vehicles personnel to and from the Mine Site – 60% via the Southern Route and 40% via the Concentrate Transport Route.
- Busses transporting personnel to and from the Mine Site and Mine Camp via the Emmaville Shed – 100% via the Southern Route.



3.8.3.2 Proposed Public Road Works

Introduction

To facilitate the safe access and egress of light and heavy vehicles from the Mine Site and to improve safety for all road users, the Applicant would upgrade sections of Grampians Road and its intersections with Schrodgers Road and Gulf Road. The need for, and nominal design of these upgrades, was informed by a Road Safety Audit that was commissioned by the Applicant and prepared by GeoLINK Consulting Pty Ltd (GeoLINK 2024a).

Based on the outcomes of GeoLINK (2024a), the Applicant appointed GeoLINK Consulting Pty Ltd to prepare concept designs for the proposed upgrades (GeoLINK 2024b). These concept designs, presented on **Figures 3.1.4** and **3.1.5**, have been prepared with reference to the requirements of the following.

- Australian Standards (AS) *1742 Manual of Uniform Traffic Control Devices*.
- Austroads (2021) *Guide to Road Design Part 3: Geometric Design*.
- Austroads (2023) *Guide to Road Design Part 4a: Unsignalised and Signalised Intersections*.
- Australian Road Research Board *Unsealed Roads Best Practice Guide (ARRB 2020)*.

All road and intersection upgrades, including any associated infrastructure would be constructed during the initial months of the site establishment phase. This would assist onsite construction activities and improve conditions for the movement of oversize/overmass (over size and over mass) vehicles delivering mobile and fixed plant. It is noted that works to facilitate road access to the Mine Camp are not required due to prior upgrades undertaken by Council at the intersection of Gordon Smith Drive and Emmaville Road⁶.

The following provides an overview of the proposed upgrades to Grampians Road and its intersections with Gulf and Schrodgers Roads with reference made to **Figures 3.1.4** and **3.1.5**. However, as finalising the design of any upgrades would be an iterative process, the Applicant anticipates Council's review and approval of detailed construction designs for the proposed public road upgrades before issuing the appropriate permits or works authority deed for the works.

Grampians Road Upgrades

The GeoLINK (2024b) concept designs for the proposed upgrades to Grampians Road adopt the parameters required for Class 4B unsealed roads in accordance with ARRB (2020) and Austroads (2021) and include the following.

- A B-double design vehicle configuration.
- A 6.0m carriageway width on straight sections.

⁶ The proposed Mine Camp is situated on land approved for disturbance under DA 09/12-13 that was issued by the Northern Joint Regional Planning Panel on 18th December 2012. This approval required upgrades to facilitate access to an approved component which was an accommodation facility for up to 600 people which is an order of magnitude greater than what the Applicant is proposing for the Project.



- A 1.5m shoulder width.
- Amended alignment, curve radii and widening on horizontal curves as required (refer **Figures 3.1.4** and **3.1.5**).
- Superelevation applied as necessary to horizontal curves.
- A road centreline that generally matches the existing alignment but which, in some instances diverts away from Vegetable Creek (refer **Figures 3.1.4** and **3.1.5**).
- Creating a centre crown and crossfall (4% to 6%) with table drains to allow adequate stormwater conveyance.
- Grading of the road verge so that vehicles can recover should they leave the carriageway.
- Clearing to improve sight distances (refer **Figures 3.1.4** and **3.1.5**).
- Upgrades to culverts and minor waterway crossings (refer **Figures 3.1.4** and **3.1.5**).
- A new waterway crossing of Vegetable Creek with improved conveyance (refer Section G of **Figure 3.1.5**).

Culvert Upgrades

The proposed Grampians Road upgrades include the replacement of existing culverts and causeways via the installation of cross drainage structures to improve road trafficability and serviceability. The concept design (GeoLINK 2024b) adopted a 10% Annual Exceedance Probability (AEP) design rainfall event for the sizing of these structures. Where required, the proposed cross drainage structures utilise box culverts for fish passage in watercourses mapped as Key Fish Habitat under the *Fisheries Management Act 1994*. **Table 3.8.1** presents the proposed culvert configurations and their respective locations, as shown on **Figure 3.1.4** and **Figure 3.1.5**.

Table 3.8.1
Proposed Upgraded Culvert Configurations and Locations

Culvert ID	Number	Dimension (mm)	Type	Reference
1	3	2,400 (W) x 1,200 (H)	RCBC ¹	Figure 3.1.4 (Section A)
2	1	2,400 (W) x 900 (H)	RCBC ¹	Figure 3.1.5 (Section D)
2A	1	2,400 (W) x 900 (H)	RCBC ¹	Figure 3.1.5 (Section E)
2B	1	900 (diameter)	RCP ²	Figure 3.1.5 (Section E)
2C	1	600 (diameter)	RCP ²	Figure 3.1.5 (Section E)
2D	1	750 (diameter)	RCP ²	Figure 3.1.5 (Section E)
3 ³	6	2,400 (W) x 1,200 (H)	RCBC ¹	Figure 3.1.5 (Section G)
4	2	2,400 (W) x 900 (H)	RCBC ¹	Figure 3.1.5 (Section G)
Note 1: Reinforced Concrete Box culvert				
Note 2: Reinforced Concrete Pipe				
Note 3: Proposed upgraded Vegetable Creek Crossing				
Source: GeoLINK (2024b)				



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Vegetable Creek Crossing

The proposed Grampians Road upgrades include the replacement of the existing concrete causeway crossing of Vegetable Creek that is approximately 400m from the Mine Site boundary (refer Section G of **Figure 3.1.5**). As shown on **Plate 3.8.1** the current causeway is comprised of solid concrete with low flow facilitated by a single 450mm RCP.



Source: RWC E886D_1877

Plate 3.8.1 Existing Vegetable Creek Causeway

To improve habitat connectivity for aquatic fauna and facilitate fish passage, the proposed upgraded crossing would be a floodway with a series of six 2,400mm x 1,200mm RCBC culverts to convey flow. The culverts would be designed to pass a lesser flood and sustain flows whilst the floodway would provide access during flood events up to a 10% AEP flood event. As the floodway would be overtopped by Vegetable Creek flows greater than the 10% AEP flood event, the roadway and pavement would be constructed to resist the damaging effects of any overtopping.

Based on hydraulic modelling and an assessment against the vehicle stability criteria presented in Table 6.7.2 of Australian Rainfall and Runoff (Book 6), ATCW (2025) assessed the upgraded crossing as being trafficable by large 4WD vehicles up to the 20% AEP flood event. However, the Applicant would typically close the road to vehicle access once the depth of flow over the floodway reaches 200mm. ATCW (2025) assessed the time of submergence and identified that the closure time would be between 2.2 hours (10% AEP) and 2.9 hours (5% AEP). This time of closure presents minimal disruption for any other road user as Grampians Road terminates approximately 400m north, at the Mine Site boundary.



Gulf Road Intersection

Gulf Road is a sealed local road extending from Moore Street, Emmaville. With no through connection to public roads other than Grampians Road, Gulf Road provides access to and from local properties. Grampians Road joins Gulf Road approximately 5.5km from its terminus at the Mine Site boundary and approximately 2km northwest of Emmaville.

GeoLINK (2024b) adopted a B-double as the design vehicle configuration and a prime mover with 10-axle trailer as the check vehicle (refer **Figure 3.8.2**). This 38m check vehicle is the largest over size and over mass vehicle expected to use Grampians Road.

In summary, the proposed upgraded intersection of Grampians and Gulf Roads would comprise the following.

- 9.2m carriageway width (2 x 3.6m lanes with 2 x 1.0m shoulders) on approaches (Grampians and Gulf Roads).
- An at-grade, rural basic left turn treatment⁷ for vehicles entering Grampians Road from Gulf Road.
- An at-grade, rural basic right turn treatment⁸ for vehicles entering Gulf Road from Grampians Road.
- Line marking and priority signage (give way) for vehicles exiting Grampians Road and entering Gulf Road.
- Warning signage on Gulf and Grampians Roads advising drivers of the intersection approach and the potential for slow moving vehicles entering Gulf Road.

As there is no posted speed limit for Gulf Road, GeoLINK (2024b) adopted a default 100km/h operating speed to inform the concept design and accounting for the relevant safe intersection, minimum and approach sight distance requirements of Austroads (2023).

Schroders Road Intersection

Schroders Road is an unsealed local road extending from Grampians Road with no through connection to other public roads, provides access to and from local properties. This road may be used as emergency Mine Site access for light vehicles only. No other Project-related use would be permitted. Schroders Road joins Grampians Road approximately 0.75km west of the Gulf Road intersection.

In summary, in addition to the proposed Grampians Road upgrades, improvements to the intersection of Schroders and Grampians Roads would comprise the following (refer Section A of **Figure 3.1.4**).

- Changes to vehicle priority whereby eastbound vehicles travelling on Grampians Road give way to vehicles entering from Schroders Road.
- Clearing to improve sight distances.
- Warning signage on Schroders and Grampians Roads advising drivers of the intersection approach and the potential for slow moving vehicles.

⁷ In accordance with Figure 8.2 of Austroads Guide to Road Design Part 4A

⁸ In accordance with Figure 7.1 of Austroads Guide to Road Design Part 4A

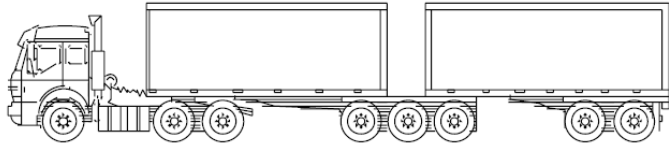
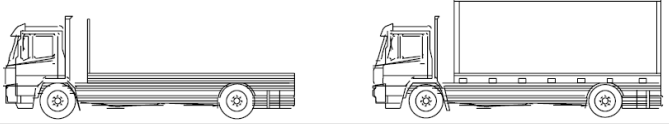
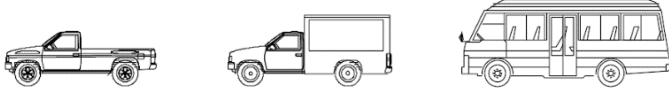




3.8.3.3 Vehicle Types

The Applicant anticipates that a variety of vehicle types would access the Mine Site throughout the Project-life. **Table 3.8.2** presents an overview of the anticipated classes of vehicles required for day-to-day Project-related transport operations and their purposes. The Applicant proposes to utilise B-doubles for the transportation of tin concentrate on the proposed Concentrate Transport Route. The Applicant would also utilise either large or small buses for personnel transport between the Mine Site, Emmaville shed and the Mine Camp

Table 3.8.2
Vehicle Types and Purposes

Vehicle Class	Description	Example	Purpose
10	B-double		Transport of produced tin concentrate from the Mine Site. Delivery of bulk consumables such as diesel and gas to the Mine Site
3 or 4	Light Truck or bus		Delivery of general goods to the Mine Site
1	Light vehicles, including large ¹ or small buses		Transportation of personnel to and from the Mine Site
Note 1: Image not shown			
Image Source – Austroads Vehicle Classification System: Asset and Network Information – January 2002			

In addition, during site establishment and construction phase a limited number of over size and over mass vehicles transporting mobile plant or other components and materials would access the Mine Site. These over size and over mass vehicle movements would be infrequent and the subject of advance planning to secure the necessary permits from the National Heavy Vehicle Regulator.

3.8.3.4 Traffic Volumes

Construction and operational traffic volumes would principally be related to transportation of plant and equipment, produced tin concentrate, consumables and personnel to and from the Mine Site, Mine Camp and Emmaville Shed transport hub. **Table 3.8.3** presents the anticipated maximum hourly vehicles and total daily movements throughout the Project-life.



Table 3.8.3
Proposed Traffic Volumes

Vehicle	Phase			
	Construction		Operational	
	Vehicles (per hour) ¹	Total Daily (movements) ²	Vehicles (per hour) ¹	Total Daily (movements) ²
Mine Site				
B-double/Semi Trailer/Other heavy vehicle	10 ³	20 ³	2	12
Light Vehicles	100 ⁴	208 ⁴	15 ⁵	38 ⁵
Bus ⁶	-	-	1	6
Mine Camp				
Light Vehicles	-	-	28 ⁷	56 ⁷
Bus ⁶	-	-	1	6
Emmaville Shed (transport hub)				
Light Vehicles	-	-	7	14
Bus ⁶	-	-	1	6
Note 1: Maximum inbound and/or outbound to component in a one-hour period Note 2: One return trip = 2 movements Note 3: 70% via Emmaville Road (from south) and 30% via Wellington Vale Road (from north) Note 4: 75% via Emmaville Road (from south) and 25% via Wellington Vale Road (from north) Note 5: 60% via Emmaville Road (from south) and 40% via Wellington Vale Road (from north) Note 6: 100% travelling via Emmaville Road Note 7: Includes daily personnel parking and using bus transport to Mine Site and those arriving at Mine Camp for swing start and Mine Camp personnel				
Source: TMPL				

3.8.4 Flexible Elements

Table 3.8.4 presents the public road-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts than that proposed are not described.

Table 3.8.4
Flexible Elements – Transport

Flexible Element	Limit on Flexibility	Justification
Detailed design of the public road network	The design of the proposed road and intersection upgrades as approved by the relevant roads authority.	The design process for the proposed public road upgrades requires consultation with the relevant roads authority and progression from concept to detailed designs. As a result, the proposed designs presented in this document may vary slightly in consultation with the relevant roads authority.



3.9 Mine Camp

3.9.1 Introduction

The Applicant would construct the Mine Camp during the Project's site establishment and construction phase in the location shown on **Figure 3.1.1**. The Mine Camp would provide accommodation for approximately 50 people. The proposed Mine Camp is situated within the footprint of land approved for disturbance under DA 09/12-13 for a 600-person accommodation facility.

The following subsections describe the approved accommodation facility and the proposed Mine Camp.

3.9.2 Approved Accommodation Facility

The Northern Joint Regional Planning Panel granted DA 09/12-13 on 18 December 2012 approving the staged construction and operation of an educational establishment comprising an aviation training college with accommodation, dining and recreation facilities on Lot 1 DP 1187809. Approved components of DA 09/12-13 included the following.

- Accommodation and ancillary facilities for up to 600 people.
- Educational facilities for pilot instruction (i.e. classrooms, simulators, etc).
- Intersection upgrades (including that of Gordon Smith Drive and Emmaville Road).
- Car parking for 207 light vehicles.
- Facilities for bus transportation.

Consultation with Council has identified that, whilst DA 09/12-13 was physically commenced via service connections, road and intersection upgrades, no approved structures have been constructed. RWC understands that Australia Asia Flight Training Pty Ltd, the original Proponent of DA 09/12-13 and lessee of Lot 1 DP 1187809 surrendered both the consent and lease to Council in 2018.

3.9.3 Proposed Mine Camp

Figure 3.1.3 presents a conceptual layout of the proposed Mine Camp, noting that the final design will be determined by the contractor appointed to supply and operate the camp. All buildings and structures would be constructed in accordance with the Building Code of Australia and appropriate construction and occupation certificates would be obtained.

The Mine Camp would indicatively include the following.

- A range of pier mounted demountable and transportable buildings, including the following in the nominal areas shown on **Figure 3.1.3**.
 - Self-contained accommodation units, each equipped with a bed, ensuite, storage units, desk/table, chair(s) and television.



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- Kitchen, dining, laundry and recreational facilities.
- Administration facilities.
- Meeting and training rooms.
- Landscaping, including grassed and vegetated area(s), undercover and open seating areas and covered paths.
- Light vehicle parking areas for Project-related personnel using the facility for either accommodation or bus transportation to and from the Mine Site.
- Additional parking and facilities for heavy vehicle movements (i.e. deliveries).
- Embarkation / disembarkation area for bus transport to and from the Mine Site

The nominal layout of the Mine Camp as shown on **Figure 3.1.3** has been developed to provide for the safe internal movement of Project-related traffic and to separate Mine Camp operation from that of Glen Innes Airport.

All Mine Camp components would be situated within the approved disturbance footprint of DA 09/12-13. The proposed Mine Camp would, however, accommodate less than 10% of the approved 600-person capacity of the approved facility.

Finally, building heights would be less than those approved under DA 09/12-13. Therefore, the Mine Camp would not interfere with the Obstacle Limitation Surface of Glen Innes Airport and the Applicant anticipates the Mine Camp would not affect the safe operation of that facility.

3.9.4 Services

The Mine Camp would utilise existing service connections including town water supply, town sewer and electricity. As noted in Section 3.8.3.2, the Mine Camp has direct access to the public road network which does not require any works to facilitate proposed traffic volumes.

3.9.5 Closure

Once the Mine Camp is no longer required to support the Project, it would either be decommissioned or retained, depending upon the requirements of the landowner, Glen Innes Severn Council. If required, decommissioning of the Mine Camp would be undertaken generally in accordance with the actions described for infrastructure areas, as identified in Section 3.14.8.3. The proposed final landform and land use for the Mine Camp would be to return the area to its existing/current use, namely a free draining paddock suitable for agricultural grazing.

3.9.6 Flexible Elements

Table 3.9.1 presents the services-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.



Table 3.9.1
Flexible Elements – Mine Camp

Flexible Element	Limit on Flexibility	Justification
Location, size and nature of proposed components	<p>All equipment and structures to be constructed in accordance with the Building Code of Australia or relevant guidelines/standards.</p> <p>All components to be constructed within the approved limits of DA 09/12-13 and would not interfere with the Glen Innes Airport Obstacle Limitation Surface</p>	<p>Detailed design for aspects of the services required for the Project was ongoing at the time of finalisation of this document. As a result, it is possible that the location, size and nature of infrastructure introduced in this subsection may vary from that described. Notwithstanding this, all infrastructure would be constructed within the approved limit of disturbance and in accordance with the relevant guidelines.</p>



3.10 Water Management

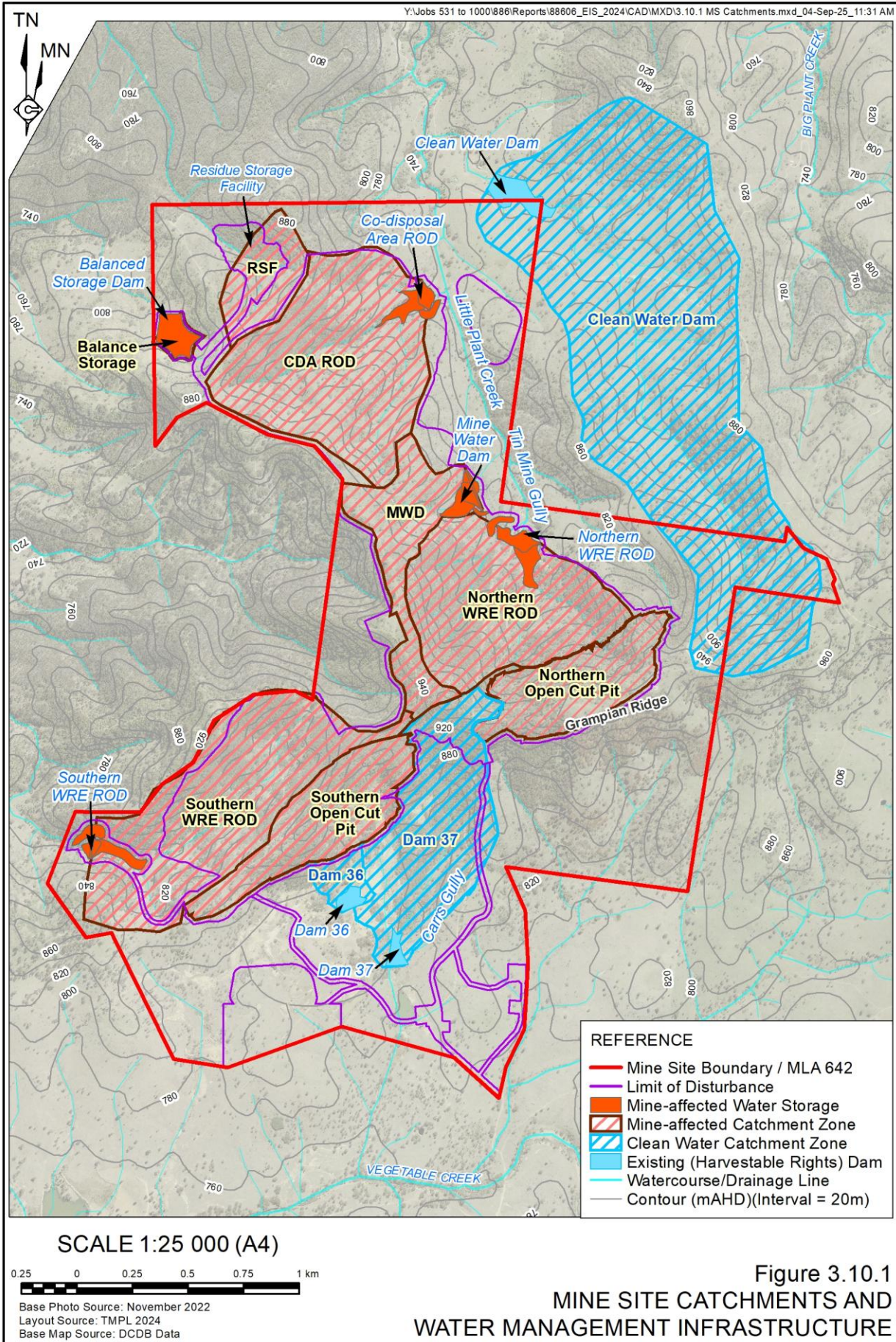
3.10.1 Introduction

Management of surface water and groundwater resources within, and external to, the Mine Site would be a critical component of the Project. The existing surface water and groundwater setting and how the potential Project-related impacts would be managed are (respectively) described in detail in Sections 6.6 and 6.7. In summary, the surface water and groundwater environment may be described as follows.

- Grampian Ridge forms the principal sub-catchment divide that directs drainage either south or west towards Vegetable Creek, or north to the Beardy River (via Little Plant Creek) (**Figure 3.10.1**).
- Most surface water drainage features within the Mine Site are indistinct, topographically controlled 1st and 2nd order watercourses associated with minor headwater sub-catchments (**Figure 3.10.1**).
- Mine Site watercourses are ephemerally discharging, typically conveying flows for short periods of time and only following rainfall of sufficient magnitude to generate runoff.
- The principal hydrogeological unit hosting groundwater within the Mine Site is the “Bondonga Beds” that is overlain by a surficial weathered zone.
- The Bondonga Beds are comprised of metamorphosed sedimentary sequences, minor basalt flows and intrusive igneous deposits with low primary porosity and most groundwater flow associated with secondary fractures.
- The ore body is hosted within the Bondonga Beds.
- The production borefield would extract groundwater from the Bondonga Beds.
- The groundwater levels within the Mine Site are typically 30 metres below ground level (mbgl) but this depth to groundwater increases in elevated areas (i.e. in the vicinity of Grampian Ridge).
- The groundwater levels within the Mine Site do not show a distinct rainfall response.

The Applicant’s objective in managing surface water and groundwater resources throughout the Project-life would be as follows.

- Ensure that all runoff from mine-affected catchments is captured for re-use in Project-related activities and managed in a way that would not result in the discharge of mine-affected water.
- Construct the production bores to exclude extraction from the weathered zone and target only the deeper, unweathered groundwater system of the Bondonga Beds.
- Ensure that surface water runoff from undisturbed areas is prevented from entering proposed disturbance areas.
- Ensure that adequate water is available for Project-related activities throughout the Project-life.





The following subsections describe management of surface water and groundwater within the Mine Site as well as the anticipated water balance for the Project.

3.10.2 Surface Water Management

The conceptual design of the Mine Site's water management system was developed by ATC Williams Pty Ltd (ATCW, 2025) to manage potential Project-related impacts to the downstream receiving environment within and around the Mine Site. The proposed strategy for the management of surface water within the Mine Site is based on the separation of water from different catchments based on anticipated water quality. The water management system zones, the site water types and their associated water management method(s) are as follows.

- Mine-affected Zone: This zone would contain mine-affected runoff collected within the Mine Site which would be re-used for Project-related activities, negating the need for its release to the receiving environment. This water type would include:
 - water from the open cut pits (i.e. both surface water and groundwater);
 - RSF decant water;
 - runoff from the processing plant area, ROM pad and mine services infrastructure area;
 - seepage and runoff from the Northern and Southern WRE; and
 - seepage and runoff from the CDA.
- Clean Water Zone: This zone would contain clean runoff from areas undisturbed by mining operations. This water type would be diverted away from areas disturbed by mining operations and allowed to discharge into the downstream receiving environment.

The Applicant notes that an Erosion and Sediment Control (ESC) Zone would not be required during operations. This is because development of the Mine Site, and the nature of its topography, mean that catchments of this class would not eventuate. However, this notwithstanding, as noted in Section 3.3.4.2, temporary erosion and sediment controls would be installed within the Project Site during the site establishment and construction phase to manage runoff generated from areas of construction-related surface disturbance and prior to stabilisation. Once the construction activity has ceased, and the surface stabilised, these temporary controls would be removed.

The locations of the two water management system zones, as shown on **Figure 3.10.1**, would essentially remain static throughout the Project's operational phase. A summary of the proposed water management infrastructure for each zone is provided in the following subsections.

3.10.2.1 Mine-affected Water Management Infrastructure

To ensure the appropriate management of mine-affected water, the Applicant commissioned ATC Williams Pty Ltd (ATCW 2024 and 2025) to prepare conceptual designs and sizing for the proposed mine-affected water management infrastructure. It is noted that, whilst included in the following subsections, the construction and operation of the RSF is described in Section 3.7.2.3.



As part of the mine-affected water management system, the Applicant would also construct a 161 megalitre (ML) Balance Storage Dam (**Figure 3.10.1**). This facility, located immediately northwest of the CDA would provide contingency storage for the management of mine-affected runoff and would not have its own contributing mine-affected catchment.

A summary of the mine-affected water management infrastructure, including the nominal storage capacities of each component is provided in **Table 3.10.1** noting that the volumes (and location) of open cut pit sumps would vary over the Project-life and are thus excluded from this summary.

Table 3.10.1
Mine-affected Water Management Infrastructure Components and Nominal Capacities

Storage	Nominal Storage Capacity (ML)
Mine Water Dam (MWD)	50.3
CDA Runoff Dam (CDA ROD)	143
Northern WRE Runoff Dam (Northern WRE ROD)	128
Southern WRE Runoff Dam (Southern WRE ROD)	127
Balance Storage Dam	161
RSF	149 ¹
Note 1: Internal storage capacity – volume available for water storage would reduce over time as residue deposition occurs	
Source: ATCW (2025) – modified after Table 3-2	

Prior to construction, the footprint of each component, including embankment and water storage area, would be stripped to refusal (i.e. loose and organic material is removed). Once this activity has been completed, the MWD and ROD components of the mine-affected water management system would be constructed with the following design elements that are also shown on **Figure 3.10.2**.

- A cross-valley type rock and earth fill embankment with foundation cut-off key.
- An engineered liner under the internal water storage area and on the upstream embankment face to limit seepage losses.
- An emergency spillway.
- Seepage collection sumps at the downstream toe of the embankment.

Whilst the Balance Storage would incorporate most of the design elements identified above, it is noted that, as a “turkeys nest” type water storage, this facility would require the construction of an embankment around its full perimeter. As the Balance Storage would not have a contributing catchment, its perimeter embankment would not incorporate an emergency spillway. A description of the RSF’s nominal design elements is provided in Section 3.7.2.3.

All mine-affected water storages would be hydraulically connected to allow for the management and re-distribution of stored volumes via pumped transfers to ensure that the respective freeboard of each may be maintained to prevent discharge.



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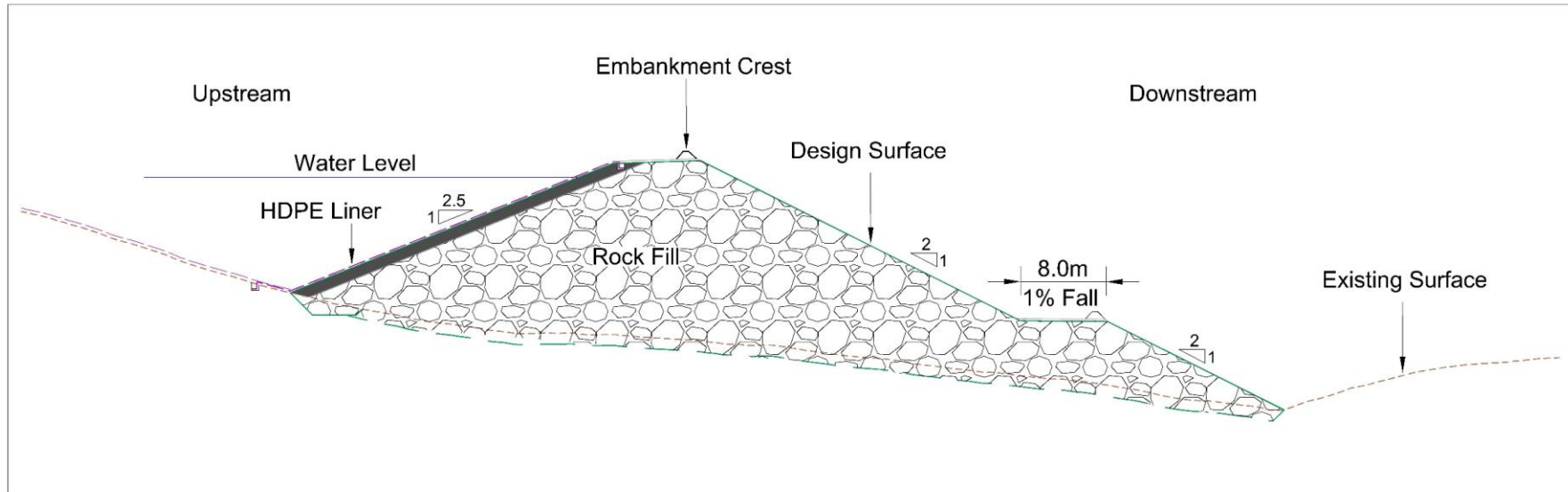


Figure 3.10.2
MINE AFFECTED WATER STORAGE:
TYPICAL EMBANKMENT SECTION

Source: Modified after ATCW 2024 - Drawing 15146-09-100-001



A summary of the Project's proposed mine-affected water management infrastructure and the relevant Mine Site components within the contributing catchment is provided below. **Figure 3.10.1** displays the location of each dam, the contributing mine-affected catchment and the Mine Site component of each.

Mine Water Dam (MWD)

The MWD would be constructed on a 1st order watercourse southeast of the processing plant for the capture of runoff from the ROM pad and processing plant areas. The MWD would, at times, receive pumped transfers from the open cut pit sumps, the Northern WRE ROD, Southern WRE ROD and CDA ROD. Constructed sections of the Main Access Road and haul roads from the open cut pits north of Grampian Ridge would also direct runoff to the MWD. It is noted that the mine services infrastructure area landform would be flat and rollover bunds would prevent runoff from leaving this area.

Co-disposal Area Runoff Dam (CDA ROD)

The CDA ROD would be located immediately east of the CDA on an unnamed 2nd order tributary of Little Plant Creek. The concept design of this dam maintains a 40m setback between the downstream toe of the embankment and Little Plant Creek. The CDA ROD would capture surface runoff and seepage from the CDA landform. The CDA ROD would not receive any pumped transfers from other mine-affected water storages, rather, collected runoff would be pumped either to the MWD or the Balance Storage Dam.

Northern Waste Rock Emplacement Runoff Dam (Northern WRE ROD)

The Northern WRE ROD would be located downslope of the Northern WRE on Tin Mine Gully, a 2nd order tributary of Little Plant Creek. The concept design of this dam maintains a 40m setback between the downstream toe of the embankment and Little Plant Creek. The Northern WRE ROD would capture surface runoff and seepage from the Northern WRE landform. Collected runoff and seepage would be pumped from the Northern WRE ROD to either to the MWD or the Balance Storage Dam. However, where required, and dependent on storage capacity, the Northern WRE ROD may, at times receive pumped transfer from the Northern open cut pit sump.

Southern Waste Rock Emplacement Runoff Dam (Southern WRE ROD)

The Southern WRE ROD would be located downslope of the Southern WRE on an unnamed 2nd order tributary of Vegetable Creek. The Southern WRE ROD would capture surface runoff and seepage from the Southern WRE landform. Collected runoff and seepage would be pumped from this dam to either the MWD or the Balance Storage. However, where required, and dependent on storage capacity, the Southern WRE ROD may, at times receive pumped transfer from the Southern open cut pit sump.

Balance Storage Dam

The Balance Storage Dam would be constructed as a "turkeys nest" style water storage with no contributing catchment. This facility would be constructed in the northwestern section of the Mine Site to provide contingency storage for the mine-affected water management system. The



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Taronga Tin Project

Balance Storage Dam would receive pumped transfers from the CDA ROD and each WRE ROD. The Balance Storage has been incorporated into the mine-affected water management system to reduce the risk of discharge from the Mine Site and to improve the Project's water supply reliability.

Open Cut Pit Sumps

Sumps of varying capacity would be developed within the excavated landforms of the open cut pits at different pit-floor locations as mining operations progress over the Project-life. These sumps would manage incident rainfall and runoff within the open cut pits as well as the minor groundwater inflows predicted. Water collected within these sumps would be managed via pumped transfer to either the MWD or reused for in-pit operations (i.e. dust suppression). Should the MWD have insufficient capacity to receive pumped transfer, collected water would be pumped to one of the WRE ROD (dependent on location). Where water storage capacity is not available in the MWD or WRE ROD, water would be allowed to accumulate in the open cut pits.

As progressive open cut pit development would result in landforms with significant volumetric capacity, the integration of the sumps into the mine-affected water management system would provide emergency contingency storage to receive water from other system components.

3.10.2.2 Clean Water Management Infrastructure

Where practical, clean water would be diverted around operational areas to avoid contact and mixing with mine-affected runoff. This would include bunds constructed around the open cut pit crests that would prevent clean runoff entering these areas whilst the Balance Storage Dam perimeter embankment would prevent clean runoff from entering this component. However, as the principal mine-affected catchments are typically defined by ridges, there is limited opportunity to construct clean water diversion drains. In addition, the steep nature of these ridgelines means that most areas where clean water diversion drains may be constructed are inaccessible for construction equipment.

As the Mine Site and the Applicant's adjacent landholding is within a harvestable rights area, the Applicant proposes to utilise some of its existing farm dams for the capture of clean runoff for use in Project-related activities. These dams, namely the Clean Water Dam, Dam 36 and Dam 37 (refer **Figure 3.10.1**) would be operated in accordance with Section 53 of the *Water Management Act 2000* (see Section 6.6.5.8).

3.10.2.3 Surface Water Licencing

All mine-affected water management infrastructure would be constructed on 1st or 2nd order watercourses for the capture, containment and recirculation of drainage, consistent with best practice management to prevent contamination of a water source. Therefore, in accordance with Clause 70, Schedule 4 of the *Water Management (General) Regulation 2025*, they are considered "excluded works". As such, collected surface water runoff that is taken from mine-affected water management infrastructure, and used for Project-related purposes, is exempt from requiring a water access licence under Clause 8, Schedule 4 of the *Water Management (General) Regulation 2025*.



Under Section 53 of the *Water Management Act 2000*, the Applicant is permitted to build storages up to a certain size on its landholding for the collection of runoff without requiring a water access licence or water supply work approval. This basic landholder right is also known as a ‘harvestable right’ and all water taken under this right may be used for any purpose, without the need for water use approval. The Applicant would operate the Clean Water Dam, Dam 36 and Dam 37 in accordance with its basic landholder rights under Section 53 of the *Water Management Act 2000*.

Therefore, the Applicant is lawfully permitted to construct and operate the mine-affected water management system and the clean water management system for the capture of runoff for use in Project-related activities without the need to acquire a water access licence.

3.10.3 Groundwater Management

3.10.3.1 Open Cut Pit Operations

As described in Section 3.4.1, mining operations would utilise conventional drill and blast, load and haul methods for the development of two separate open cut pits. Based on the proposed open cut pit development sequence (refer **Figures 3.4.1** and **3.4.2**), the Project’s *Groundwater Impact Assessment* (Hydrogeologist, 2025) predicts that groundwater inflows would commence in Year 6 and Year 9 for the Northern and Southern open cut pits respectively.

As noted in Section 3.10.3.1, groundwater inflows to each open cut pit would be managed via sumps that would be integrated into the mine-affected water management system. Hydrogeologist (2025) predicted that these groundwater inflows would not be significant at a maximum 16.1ML/year and 9.1ML/year for the Northern and Southern open cut pits respectively.

3.10.3.2 Production Bores

The Applicant proposes to utilise nine production bores to provide a supplementary groundwater supply for Project-related activities (**Figure 3.10.3**). Of these bores, two are existing and within the Mine Site (WB01A and WWB02), whilst another seven would be constructed and installed within the Applicant’s landholding north of the Mine Site, sections of which would be used to create the proposed Biodiversity Stewardship Site. All bores would be (or have been), constructed in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (NUDLC, 2020). Each bore would be constructed to ensure groundwater extraction from the unweathered lithology of the Bondonga Beds, with grout and bentonite sealing to exclude groundwater from the weathered zone of this unit entering the bore. The potential groundwater impacts of these bores, each at a nominal 0.5 litres per second (L/s) abstraction rate over the operational phase of the Project was assessed by Hydrogeologist (2025) with the results discussed in Section 6.7.5.4.

Extracted groundwater would be transferred via pipelines situated adjacent to access roads that would also be used for management activities associated with the proposed Biodiversity Stewardship Site. When required, pumping from an individual bore would be initiated remotely with each individual pump having its own power source (i.e. solar with battery or diesel).

A summary of the Project’s production bores, including nominal construction details is provided in **Table 3.10.2** with their respective locations shown on **Figure 3.10.3**.

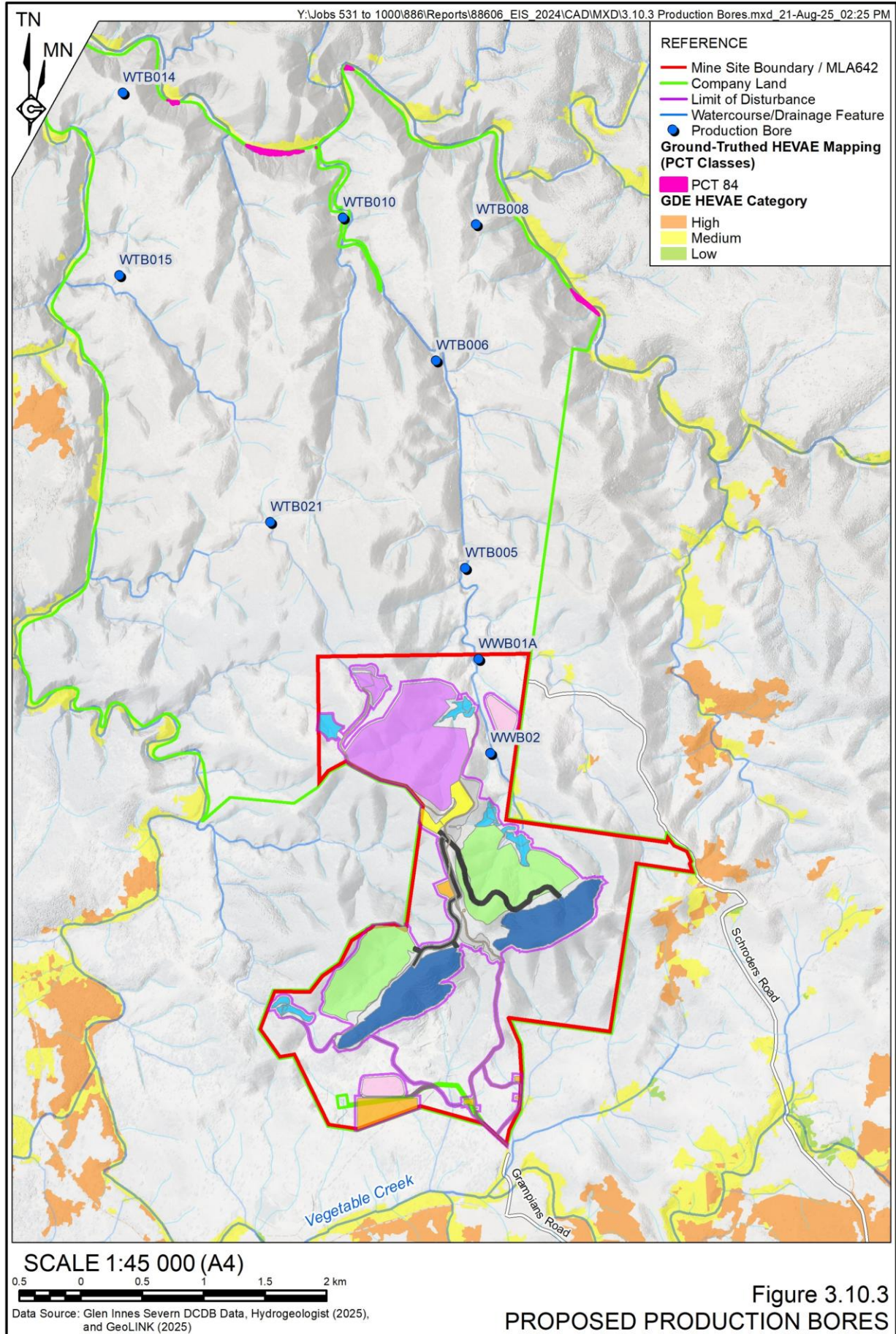




Table 3.10.2
Nominal Groundwater Production Bore Summary

Bore ID	Easting ¹	Northing ¹	Status	Nominal Construction				
				Diameter (m)	Total Depth (mbgl) ²	Grout (mbgl) ²	Bentonite Seal (m)	Screen (mbgl) ²
WTB005	358862	6751200	Proposed	0.22	100	0 to 20	1	21 to 100
WTB006	358626	6752889	Proposed	0.22	100	0 to 20	1	21 to 100
WTB008	358951	6753997	Proposed	0.22	100	0 to 20	1	21 to 100
WTB010	357868	6754052	Proposed	0.22	100	0 to 20	1	21 to 100
WTB014	356075	6755070	Proposed	0.22	100	0 to 20	1	21 to 100
WTB015	356047	6753584	Proposed	0.22	100	0 to 20	1	21 to 100
WTB021	357278	6751575	Proposed	0.22	100	0 to 20	1	21 to 100
WB01A	358565	6742444	Existing	0.175	100	0 to 20	1	21 to 100
WWB02	359065	6749689	Existing	0.175	85	0 to 20	1	21 to 100

Note 1: GDA 94 Zone 56
Note 2: metres below ground level

3.10.3.3 Groundwater Extraction and Licencing

The Project's groundwater licencing requirements are discussed in Section 6.7.6. However, in summary, Hydrogeologist (2025) predicted that up to 137ML/year of groundwater would either be directly extracted from the production bores or as the result of groundwater inflows to the open cut pits.

As noted in Sections 3.1.2 and 4.2.3.3, the Applicant holds Water Access Licence (WAL) 44962 authorising the annual extraction of up to 636 share components from the New England Fold Belt Groundwater Source that is managed under the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*. This volumetric entitlement is sufficient to account for the maximum predicted Project-related groundwater inflows and extraction.

3.10.4 Site Water Balance

3.10.4.1 Introduction

A site water balance is an important management tool used to predict water use constraints via a computer-based operational simulation model that can process a range of realisations to predict:

- the average inflows and outflows of the Mine Site's water management system;
- the quantity of water that would accumulate within the mine-affected water management system;
- the volumes of make-up water required to meet Project-related water demand;
- the risk of uncontrolled releases from the surface water storages to the downstream receiving environment.



ATCW developed a detailed site water balance model for the Project. Section 4 of ATCW (2025) provides details of how each of the inflows and outflows for the site water balance have been calculated and modelled.

3.10.4.2 Sources

Three classes of water are relevant to the Project's site water balance with water sourced for use in mining, processing make-up and other water use at the Mine Site via the following.

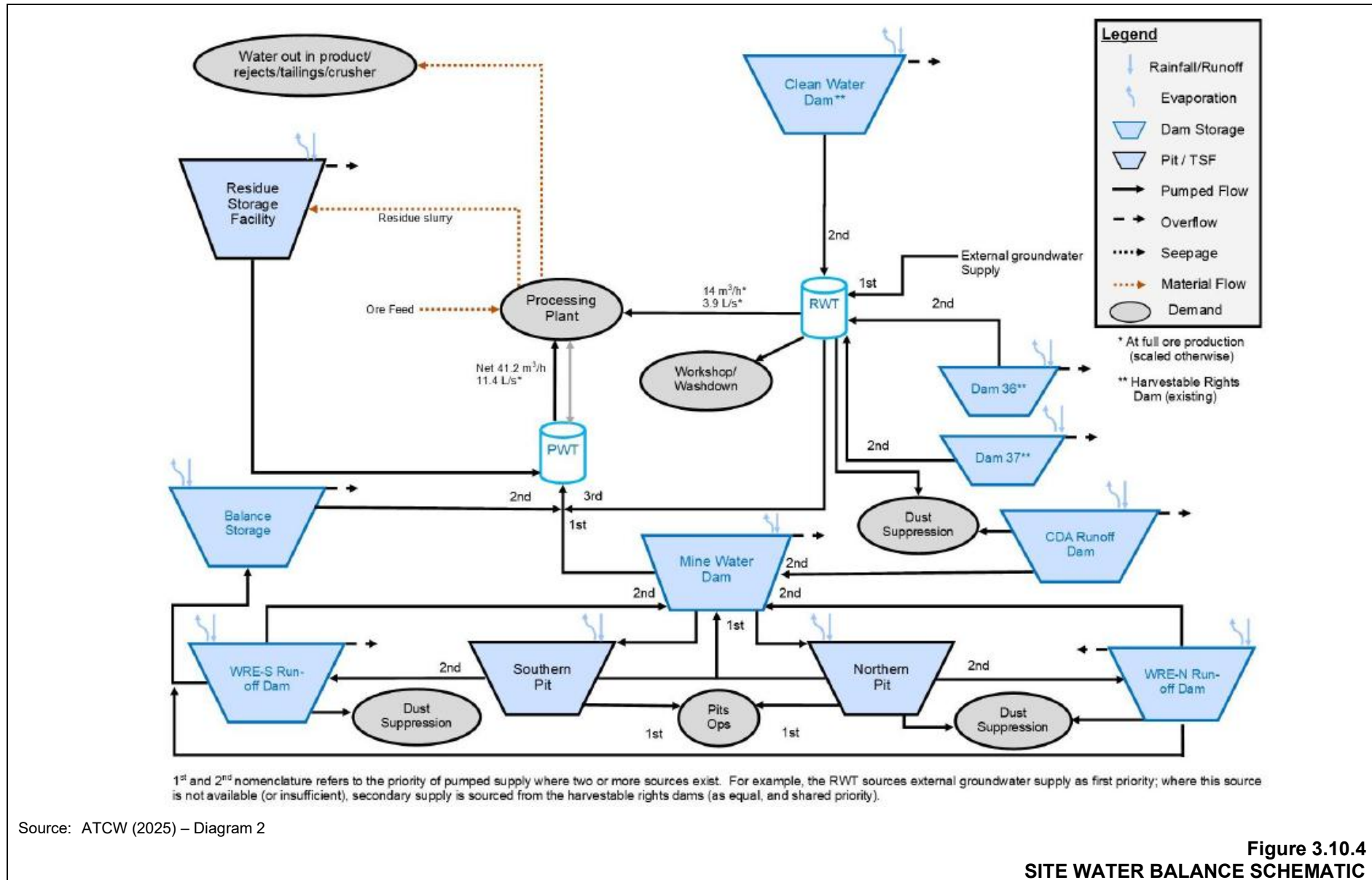
- Collection of mine-affected runoff.
- Collection of clean catchment water (in accordance with harvestable rights).
- Groundwater production bores.
- Decant return from the RSF.

A summary of the proposed Project-related uses of this water, according to class, is presented below, with a system schematic provided as **Figure 3.10.4**.

- Mine-affected water
This class of water would be pumped from the mine-affected water management system to the process water tank (PWT) that would be located adjacent to the processing plant. Mine-affected water would be drawn from the PWT for processing operations. However, this class of water may also be used for dust suppression on mine-affected catchments. Where water is used for this purpose, it would either be drawn from the PWT or directly from a mine-affected water storage.
- Clean water
This class of water would be drawn from clean water dams within the Applicant's landholding that would be collected and used under the Section 53 (harvestable rights provisions) of the *Water Management Act 2000*. Under this provision, all water taken from these dams would be exempt from water licensing requirements or the need for a water use approval. Clean water would be pumped to the raw water tanks (refer Section 3.3.3.3) and primarily used for potable water (once treated), vehicle washdown, raw water or dust suppression. However, clean water may also be used as processing make-up water.
- Groundwater
This class of water would be sourced from the proposed production bores (refer Section 3.10.3.2). Like clean water, extracted groundwater would be pumped to the raw water tanks (refer Section 3.3.3.3) and primarily used for potable water (once treated), vehicle washdown, raw water or dust suppression. However, groundwater may also be used as processing make-up water.

3.10.4.3 Configuration

The various components of the inputs to the Mine Site water balance have been introduced in preceding sections with the overall system schematic presented as **Figure 3.10.4**.



Source: ATCW (2025) – Diagram 2

Figure 3.10.4
SITE WATER BALANCE SCHEMATIC



3.10.4.4 Results

Table 3.10.3 lists the key simulated average annual inflows and outflows to the site water balance model, as calculated for all mining years.

Table 3.10.3
Average Annual Site Water Balance – Years 1 to 14

Item	Inflow ML/year	Outflow ML/year
Rainfall and runoff	551.9	
Groundwater supply	46.8 ¹	
RSF decant return	49.3	
Evaporation		70.4
RSF beach evaporation		6.5
Processing and operations		380.1
Dust suppression		120.1
Dam overflows – clean water		71.0
Dam overflows – mine-affected water		0
Total	648.0	648.1
Note 1: Hydrogeologist (2025) identifies sustainable groundwater extraction of 111.8ML/year		
Source: ATCW (2025) – modified after Table 4-9		

ATCW (2025) also tested the sensitivity of the Project's site water balance to changes in catchment response by altering model parameters, representing low and high runoff scenarios. The resultant average annual site water balances for these scenarios are summarised in Table 3.10.4 and Table 3.10.5 respectively.

Table 3.10.4
Average Annual Site Water Balance – Low Runoff Scenario

Item	Inflow ML/year	Outflow ML/year
Rainfall and runoff	507.9	
Groundwater supply	47.1 ¹	
RSF decant return	49.3	
Evaporation		63.5
RSF beach evaporation		6.6
Processing and operations		367.2
Dust suppression		114.5
Dam overflows – clean water		58.9
Dam overflows – mine-affected water		0
Total	604.3	610.7
Note 1: Hydrogeologist (2025) identifies sustainable groundwater extraction of 111.8ML/year		
Source: ATCW (2025) – modified after Table 4-13		



Table 3.10.5
Average Annual Site Water Balance – High Runoff Scenario

Item	Inflow ML/year	Outflow ML/year
Rainfall and runoff	603.9	
Groundwater supply	46.0 ¹	
RSF decant return	49.3	
Evaporation		79.4
RSF beach evaporation		6.5
Processing and operations		392.6
Dust suppression		125.8
Dam overflows – clean water		87.0
Dam overflows – mine-affected water		<0.1
Total	699.2	691.3
Note 1: Hydrogeologist (2025) identifies sustainable groundwater extraction of 111.8ML/year		
Source: ATCW (2025) – modified after Table 4-13		

The average annual water balance outcomes presented in **Tables 3.10.3** and **3.10.5** identify that the Project can meet its water supply requirements. It is noted that under the low runoff scenario (**Table 3.10.4**), the Project would, on average, experience a 6.4ML annual deficit. However, the assumed groundwater inflows to the water balance model for this scenario are less than half those predicted and assessed as sustainable by groundwater modelling and this available surplus could be utilised to make up any shortfall.

3.10.5 Flexible Elements

Table 3.10.6 presents the water-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.

Table 3.10.6
Flexible Elements – Water Management

Flexible Element	Limit on Flexibility	Justification
Location, size and nature of proposed water management system components	All surface disturbance to be located within the proposed limit of disturbance.	Detailed design for aspects of the water management system may increase final capacities of proposed storages. As a result, it is possible that the size of infrastructure introduced in this subsection may vary from that described. Notwithstanding this, all infrastructure would be constructed within the approved limit of disturbance and in accordance with the relevant guidelines.
Location, number and pumping rates of proposed water productions	All groundwater extraction to be within the approved WAL entitlement limit.	The Applicant may seek to increase the number of production bores to improve water supply reliability.



3.11 Non-production Waste Management

3.11.1 Introduction

The principal non-production wastes that would be generated during the Project-life would include the following.

- General solid waste and associated recyclables, including domestic waste from the Mine Camp.
- Scrap steel, hydrocarbons (including waste oil) and other wastes arising from equipment maintenance.
- Wastewater, including sewage and reverse osmosis brine generated on site from treatment for potable water.

3.11.2 General Solid Waste and Recyclables

General solid waste and associated recyclables such as paper, cardboard, plastics and metal would be generated within the Mine Site and Mine Camp.

Clearly marked bins and skips for general solid waste and recyclables would be located within all work and accommodation areas within both the Mine Site and Mine Camp. The contents of these bins and skips would be transferred off site to an appropriately licenced waste management facility, as required.

3.11.3 Maintenance Waste

Routine maintenance of mobile mining and earthmoving equipment would be undertaken within the mine services infrastructure area or, for larger and less mobile plant, in the field.

Scrap steel and other maintenance waste would be stored in the mine services infrastructure area for collection and transfer from the Mine Site for recycling, as required.

Waste oil would be stored in a covered and bunded storage area in the mine services infrastructure area from where it would be collected and removed by an appropriately licensed waste recycler or recycled onsite where possible.

3.11.4 Wastewater

As described in Section 3.3.3.4, the Applicant would install three containerised treatment plants at the Mine Site. Each plant would be fitted inside a 20-foot container. Sewage treatment would consist of continuous aeration, primary and secondary clarification, with a chemical dosing and polishing system to produce treated effluents. Treated effluent would then be reused for toilet flushing or applied to non-food crops, tubestock and/or areas revegetated as part of progressive rehabilitation activities. Where required, any solid waste residues generated by these facilities would be collected and removed from the Mine Site by a suitably licenced and experienced contractor.

Spent filtration media from the water treatment plant described in Section 3.3.3.3 be collected and removed from the Mine Site by a suitably licenced and experienced contractor.

Waste water from the Mine Camp would be managed via the existing town sewer system.



3.12 Hours of Operation and Project Life

3.12.1 Hours of Operation

Table 3.12.1 presents the Project's proposed hours of operation.

Table 3.12.1
Proposed Hours of Operation

Activity	Days	Hours
Pre-construction and Offsite Roadworks		
These activities are described in Section 3.2 and Section 3.3	Monday to Friday ¹	7:00am to 6:00pm
	Saturday	8:00am to 1:00pm
Site Establishment and Construction		
Noise generating (i.e. vegetation clearing, soil stripping and stockpiling, pre-strip, bulk earthworks, onsite construction, deliveries, offsite roadworks and intersection upgrades)	Monday to Friday ¹	7:00am to 6:00pm
	Saturday	8:00am to 1:00pm
Low noise generating (i.e. electrical installation/wiring, plumbing, plant installation, assembly and commissioning)	7 days ¹	24 hours
Operations		
Crushing (primary, secondary and tertiary)	7 days	6:00am to 6:00pm
Blasting	Monday to Saturday ¹	9:00am to 5:00pm
All other	7 days	24 hours
Note 1: Public Holidays excluded		

3.12.2 Project Life

The Applicant anticipates that the Project life would be 21 years, comprising:

- an initial pre-construction and site establishment and construction phase of approximately 2 years;
- mining operations phase of approximately 10 years;
- a decommissioning landform ecosystem and revegetation phase of approximately 2 years; and
- an ecosystem development phase of approximately 7 years.

Notwithstanding the above, the Applicant anticipates identifying additional tin resources within, or surrounding the Mine Site, during the Project-life. Should such additional resources be identified, the Applicant would apply to extend the Project-life.



3.13 Employment, Economic Contributions and Capital Investment Value

3.13.1 Employment

The following presents the anticipated direct full-time equivalent employment during the Project's construction and operational phases.

- Construction..... up to 150 positions
- Operations..... approximately 129 positions

All on-site positions would be typically on either a 5 days on/2 days off or 7 days on/7 days off roster, with busses provided from the Mine Camp and Emmaville. Individual workers, particularly those on a 7 days on/7 days off roster and located further afield, may elect to drive to and from the Mine Camp using private vehicles and reside at this facility for the duration of their rostered swing. These personnel would use the busses provided from the Mine Camp to the Mine Site.

It is the Applicant's intention to have the majority of locally resident employees park at either the Mine Camp or Emmaville Shed before being bused to the Mine Site. Whilst the Applicant would actively discourage the use of private vehicles to access the Mine Site, it recognises that this may be the most feasible option for some. For such instances, the Applicant would implement a fatigue management system for those driving themselves to limit the potential for fatigue-related motor vehicle accidents on the way to or from the Mine Site or to or from the Mine Camp at the end of their 7 day swings.

The *Economic Assessment* (Gillespie, 2025), presented as **Appendix 19**, assumed that 50% of workers may need to be employed from outside Glen Innes LGA, with the remaining 50% employed from within this LGA. The population of the Glen Innes LGA at the 2021 Census was 8,931. In addition, the Applicant is aware through its community consultation program of a number of residents and former residents of the LGA who currently travel interstate to fulfill roles at mining operations, with these workers likely to have skills that would be highly transferable to the Project. As a result, the Applicant is confident that the required operational workforce can be sourced primarily from the existing resident population of the Glen Innes LGA or immediately surrounding LGAs, with the remainder to be sourced from elsewhere in NSW and Australia.

3.13.2 Economic Contributions

An *Economic Assessment* has been prepared by Gillespie (2025) and is presented as **Appendix 19** and is summarised in Section 6.15. In brief, the Project is expected to generate the following economic benefits.

- A positive net production benefit to NSW and Australia of \$109 million over the Project-life
- A net benefit to NSW of \$35 million.



Finally, **Table 3.13.1** presents a summary of the Project’s gross annual effects on the regional economy during construction and operations. **Table 3.13.1** presents not only the Project’s direct impact on gross regional output, employment, income and the value that it would add to the regional economy but also the flow-on effects of its stimulus.

Table 3.13.1
Summary of Gross Annual Direct and Indirect Impacts on the Regional Economy

Indicator	Direct Impact	Flow-on Impact			Total Impact
		Production Induced	Consumption Induced	Total	
Construction Phase					
Employment (No.)	90	29	18	47	137
Gross Regional Output (\$M)	39	15	4	19	58
Value Added (\$M)	14	4	2	6	20
Income (\$M)	10	3	1	4	13
Operational Phase					
Employment (No.)	129	63	50	113	242
Gross Regional Output (\$M)	116	18	11	29	144
Value Added (\$M)	80	8	7	15	94
Income (\$M)	19	6	3	9	28

Source: Gillespie (2025) – modified after Tables 6.2 and 6.3

3.13.3 Estimated Development Cost

Mersa Pty Ltd (Mersa) prepared an Estimated Development Cost Report for the Project in accordance with the NSW Government’s *Standard Form of Estimated Development Cost Report (State significant projects)* dated October 2024. The report was prepared and reviewed by a registered Quantity Surveyor who is a member of the Australian Institute of Quantity Surveyors.

Table 3.13.2 presents an overview of the results of that assessment. In summary, Mersa anticipates that the Estimated Development Cost would be approximately \$214 million.

Table 3.13.2
Summary Capital Investment Value Estimate

Item	Value (A\$ million)
Construction and Equipment	
1. Site Preparation Works	\$4,854,841
2. New Construction Works -Mine Site Infrastructure	\$70,805,941
3. Mining	\$4,986,349
4. Processing	\$59,510,786
5. New Construction Works -Off Site Infrastructure	\$5,496,962
6. Rehabilitation Works	\$9,420,242
\$155,075,121 Total Construction and Equipment Cost	\$155,075,121

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Table 3.13.2 (Cont'd)
Summary Capital Investment Value Estimate

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Item	Value (A\$ million)
Licensing and Fees	
7. Authority Fees	\$998,065
8. Consultants Fees	\$13,127,053
On-Going Costs	
9. On-going Costs	\$4,610,000
<i>Estimated Capital Investment Value (excl. Contingencies and GST)</i>	<i>\$173,810,239</i>
10. Contingencies (20%)	\$40,311,326
Estimated Capital Investment Value (excl. GST)	\$214,121,565
Source: Mersa Pty Ltd	



3.14 Mine Closure and Rehabilitation Strategy

3.14.1 Introduction

Planning for mine closure is critical for the implementation of mining projects in NSW. For the Project, strategic planning for mine closure has been designed with reference to the following documentation.

- *Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth Government, 2016a).
- *Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth Government, 2016b).
- *Strategic Framework for Mine Closure* (ANZMEC, 2000).
- *Integrated Mine Closure: Good Practice Guide* (ICMM, 2019).
- *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure – Revision 1* (ANCOLD, July 2019)
- *Safety Bund Walls around Abandoned Open Pit Mines* (WA Department of Industry and Resources, 1997).
- *Form and Way: Rehabilitation Management Plan for Large Mines.*
- *Form and Way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines.*
- *Guideline: Achieving rehabilitation completion (sign-off).*
- *Guideline: Rehabilitation controls.*
- *Guideline: Rehabilitation objectives and rehabilitation completion criteria.*
- *Guideline: Rehabilitation Records.*
- *Guideline: Rehabilitation Risk Assessment.*

In addition to the above, the following regional and local strategic documents were reviewed during strategic planning for mine closure.

- *20-Year Economic Vision for Regional NSW.*
- *New England North West Regional Plan 2041.*
- *Glen Innes Severn Council Strategic Planning Statement.*
- *Glen Innes Severn Local Environmental Plan 2012.*

Section 2.1 of the EIS presents a detailed discussion of how the Project has been designed to meet the objectives of these documents. Broadly, however, these documents emphasise the importance of balancing land uses within the Region to minimise potential land use conflicts and maximise the efficient and sustainable use of resources to provide the maximum support for local residents and the economy. The importance of agriculture, the natural environment and industry (including mining) are recognised in each of these documents. These objectives are reflected in the proposed final land uses and rehabilitation objectives of the Project.



The following subsections outline the preliminary objectives and final landform plan for the Project.

3.14.2 Rehabilitation Consultation

Successful rehabilitation of mining-related disturbance is best achieved with ongoing consultation with the surrounding community and relevant government agencies and structured rehabilitation planning. Section 5 presents an overview of consultation undertaken, including matters relating to the proposed final landform and land use for the Mine Site.

As part of the most recent in-person community consultation sessions held between 3 and 6 July 2025, the proposed final landform, including the final voids, and proposed final land use for the Mine Site was raised for comment. No objections were made by any members of the community.

3.14.3 Final Land Use Options Assessment

In assessing options for the proposed final land use of the Mine Site, the Applicant took into account the following.

- Land uses permissible without development consent within Zone RU1 of the Glen Innes LEP.
- Feedback during community consultation as described in Section 5.
- Existing land uses surrounding the Mine Site as described in Section 2.2.3.

Feasible options for post-mining land uses of the Mine Site include the following.

- Agriculture – consistent with surrounding land uses within and surrounding the Mine Site.
- Native ecosystem – sections of the Mine Site are currently vegetated with native vegetation.
- Industrial – the Mine Site development would create areas serviced by a range of infrastructure that could potentially be re-purposed for non-mining purposes, including:
 - electricity generation;
 - water supply and storage infrastructure;
 - large areas of hardstand; and
 - buildings, sheds, workshops and associated infrastructure.

Potential industrial uses could include intensive agriculture, manufacturing, or renewable power generation.

- Water storage area (in support of other post-mining land uses) – including large dams and partially water-filled final voids.
- Final voids – two final voids would be retained post-mining, namely the Northern and Southern open cut pits.



The final land use options assessment determined that each of the proposed final land use options were feasible. However, the exception was an industrial land use, which would require rezoning of the land and further development consent.

3.14.4 Final Landform and Infrastructure to be Retained

3.14.4.1 Mine Site

Figure 3.14.1 presents the proposed final landform following at the end of the Project's life. In summary, the proposed final landform would include the following.

- Two bunded and fenced final voids, the Northern and Southern open cut pits.
- Shaped and rehabilitated landforms of the Northern and Southern WRE
- Capped, shaped and rehabilitated landforms of the CDA and the RSF.
- Rehabilitated landforms largely consistent with the existing topography associated with the proposed soil stockpiling, processing and infrastructure areas.
- Water management structures (where required).
- Internal access roads reduced in width to that required for the proposed final land uses.

All infrastructure not required for the final land use would be removed or reduced in size. Indicatively, the following would occur.

- Haul roads and other internal roads would be reduced in width and converted to access roads to facilitate ongoing management of the land post-mining.
- The main access road would be converted to an internal access road to facilitate ongoing management of the land post-mining.
- The administration area would be largely removed, with those structures suitable for the final land use retained. This may include sheds and limited hardstand areas.
- The on-site power generation area, explosive magazines compound, AN storage facility, mine infrastructure area, processing plant and other infrastructure would all be removed.

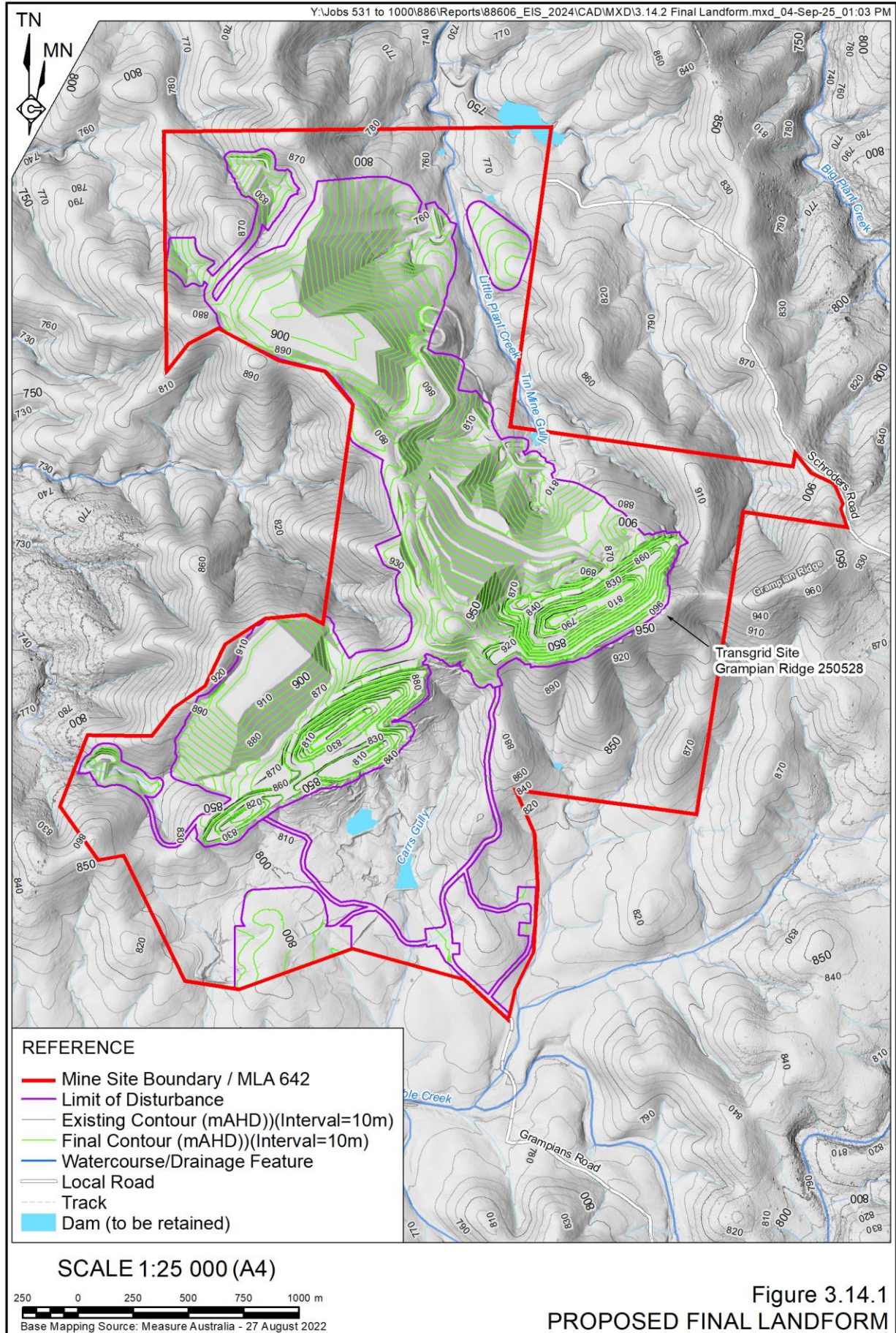
3.14.4.2 Mine Camp

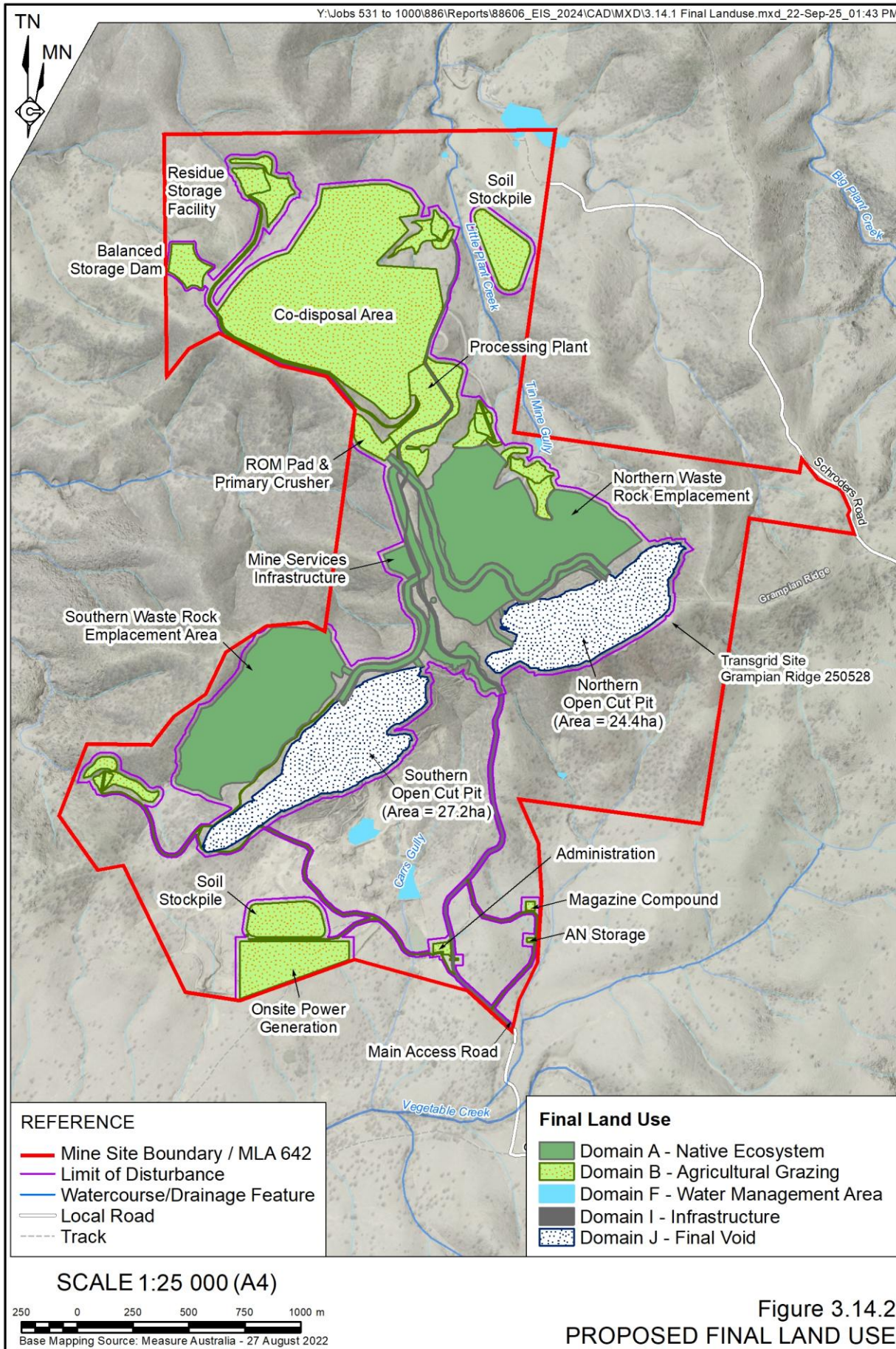
The final landform for the Mine Camp would remain as per the existing landform.

3.14.5 Proposed Final Land Use Domains

3.14.5.1 Mine Site

The following presents a description of each proposed final land uses and domains within the Mine Site (Figure 3.14.2).







Domain A – Native Ecosystem Areas

Located on moderately sloping, rehabilitated Northern and Southern WRE areas, land use within this domain would consist of native vegetation suitable for nature conservation. This land use would also be applied to some ancillary infrastructure areas (**Figure 3.14.2**). Native ecosystem areas would comprise vegetation consistent with Plant Community Type (PCT) 3722.

Domain B – Agricultural Grazing

Land use within this domain would consist of intermittent grazing. This domain would comprise the moderately sloping, rehabilitated landforms for the interment of processing residues, namely the RSF and CDA. This land use would also be applied to decommissioned areas associated with water management, soil stockpiles and some ancillary infrastructure areas (**Figure 3.14.2**). A primary consideration for land managers would be the maintenance of vegetative cover and prevention of soil erosion, particularly during the initial years following completion of rehabilitation operations.

Domain I – Infrastructure Area

Comprising those items of infrastructure that would remain following mine closure for a lawful final land use. In the absence of further approvals, this would indicatively include the main access road and internal roads reduced in width, with some sheds or other buildings provided that a clear purpose ancillary to the ongoing management of the land post-mining.

Domain J – Final Void

Two final voids would be retained, namely the Northern and Southern open cut pits. These voids would be fenced and would have a suitable bund with warning signs constructed around the perimeter.

Access to the final voids would be blocked, either through the placement of a suitable quantity of material across the entrance to the ex-pit haul roads and/or installation of a lockable gate.

3.14.5.2 Mine Camp

All infrastructure and services within the Mine Camp would either be retained for a subsequent use or removed, following the cessation of mining and processing operations and at the discretion of Glen Innes Severn Council (landowner).

3.14.6 Rehabilitation Risk Assessment

A rehabilitation risk assessment was conducted internally by the Applicant in accordance with procedures identified by the document *Guideline: Rehabilitation Risk Assessment* published by the Resources Regulator in July 2021. **Table 3.14.1** presents an overview of the key risks for each rehabilitation phase identified as having a risk rating as ‘HIGH’ or ‘MODERATE’ and associated control measures which would be implemented. The complete rehabilitation risk assessment is provided as **Appendix 3**.



Table 3.14.1
Rehabilitation Risk Assessment

Rehabilitation Phase	Key Risk	Risk Rating	Controls Measures
General	Insufficient funding for or prioritisation of rehabilitation activities.	High	<ul style="list-style-type: none"> Ensure rehabilitation security is adequately prepared and regularly reviewed
Active Mining Phase of Rehabilitation	Inappropriate biological resource (e.g. subsoil, topsoil, vegetative material, seedbank, rocks, habitat resources) through clearing, salvage, and handling practices.	High	<ul style="list-style-type: none"> Soils assessment Management plans QAQC for material stripping and handling practices TARPs with clear reporting guidelines and obligations Operational testing protocols and sampling programs
	Limited pre-existing biological resources for use (e.g. topsoil, woody debris).	High	
	Adverse meteorological conditions during salvage of biological resources.	Moderate	
Landform Establishment Phase of Rehabilitation	Unstable landform due to erosion and/or mass movement issues associated with inappropriate design and/or quality assurance during landform construction.	Moderate	<ul style="list-style-type: none"> Engineer designed final landforms QAQC Temporary sediment erosion controls as per ESCP Geochemical testing survey program, emplacement of adverse material
	Exposure or release of geochemical and/or geotechnically adverse material associated with containment design and construction, including capping/cover system.	Moderate	
Growth Medium Development Phase of Rehabilitation	Inappropriate physical and structural properties of substrate.	Moderate	<ul style="list-style-type: none"> Material balance and soils assessment Management plans to outline monitoring and management practices
	Subsoil and topsoil deficit for rehabilitation activities.	Moderate	
	Substrate inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).	Moderate	



Table 3.14.1 (Cont'd)
Rehabilitation Risk Assessment

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Rehabilitation Phase	Key Risk	Risk Rating	Controls Measures
Ecosystem and Land Use Establishment Phase of Rehabilitation	Weed infestation associated with both introduction and control (or lack thereof).	Moderate	<ul style="list-style-type: none"> Engaging suitably qualified and experienced persons to instruct rehabilitation Monitoring
	Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Moderate	
Ecosystem and Land Use Development Phase of Rehabilitation	Substrate inadequate to support revegetation or agricultural land capacity.	Moderate	<ul style="list-style-type: none"> Material balance and soils assessment Management plans to outline monitoring and management practices Engineer designed final landforms and water management infrastructure RCE and financial provisioning maintained Ensure rehabilitation security is adequately prepared and regularly reviewed
	Erosion and failure of landform, drainage and water management/storage structures.	Moderate	
	Lack of infrastructure to support intended final land use (e.g. bunding, fences).	Moderate	
	Lack of resources for rehabilitation maintenance.	High	

3.14.7 Rehabilitation Objectives and Completion Criteria

Rehabilitation objectives for the Mine Site have been developed in consideration of the document *Guideline: Rehabilitation Objectives and Rehabilitation Completion Criteria* published by the Resources Regulator in July 2021.

The Applicant's rehabilitation objectives and completion for the Project at the end of mining operations are as follows. Detailed rehabilitation objectives and completion criteria would be presented in the *Rehabilitation Management Plan* to be prepared for the Project.

- The rehabilitated landform is safe, stable and non-polluting and is commensurate with surrounding natural landform and where appropriate, incorporates geomorphic design principles.
- A geotechnical assessment of the final voids confirms that the voids comply with the requirements of the latest version of the *Guideline: Rehabilitation objectives and rehabilitation completion criteria*.
- All infrastructure that is not to be used as part of the final land use is removed to ensure the Mine Site is safe and free of hazardous materials.



- All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community, is reduced in size to that required for the proposed use and benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
- There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
- Residual waste materials stored on site (e.g. processing residues and waste rock) will be appropriately contained / encapsulated so they does not pose any hazards or constraints for intended final land use.
- The risk of bushfire and related impacts to the community, environment and infrastructure are no greater than for surrounding areas.
- Runoff water quality from the Mine Site is within the range established by pre-mining ambient downstream monitoring.
- Structures that take or divert water such as final voids, are appropriately licensed (e.g. under the *Water Management Act 2000*) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.
- Groundwater quality surrounding the Mine Site is within the range established by pre-mining ambient monitoring.
- The vegetation composition of the rehabilitation is generally consistent with the target vegetation community (PCT 3722).
- Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable and requires maintenance that is consistent with the intended final land use.
- Land use capability can support the target agricultural land use

3.14.8 Proposed Progressive and Final Rehabilitation

3.14.8.1 Introduction

The following subsections present a brief overview of the progressive, temporary and final rehabilitation implementation to be undertaken throughout the Project-life.

3.14.8.2 Progressive and Temporary Rehabilitation

Due to the tightly constrained layout of the Mine Site, and the proposed sequencing of the emplacement of waste rock, and mining within the open cut pits, opportunities for progressive rehabilitation of the Mine Site are likely to be limited. The Applicant anticipates that the principal areas for progressive rehabilitation would include the outer batters of the Northern WRE (PAF cells) and CDA as each lift is progressively completed and where safe access for rehabilitation activities is made available.



3.14.8.3 Final Rehabilitation

The proposed rehabilitation phases, and the activities associated with each, include the following. It is noted that as some rehabilitation would be undertaken progressively, these rehabilitation phases would not be undertaken sequentially in all areas. The *Rehabilitation Management Plan* would provide additional guidance in relation to rehabilitation implementation.

Phase 1 – Decommissioning

- Remove all consumables, equipment, stores and other materials not required for rehabilitation operations.
- Remove all buildings, plant (including concrete foundations), infrastructure, and water storages not required for the final land use.
- Undertake a contamination assessment and treat or remove any contaminated material.
- Undertake an assessment of all structures, infrastructure and landforms to be retained.

Phase 2 – Landform Establishment

- Remove or reduce in size stockpile/hardstand areas and roads not required for the final land use, including the haul road(s) and main access road. Use extracted material for rehabilitation operations.
- Install temporary surface water controls, as required based on site area and seasonal risk.
- Progressively shape the final landform, as required, in a manner that is generally consistent with that described in Section 3.14.4 and shown in **Figure 3.14.1**. The *Rehabilitation Management Plan* would provide additional detail in relation to the final landform design based on final material volumes close to the end of the Project-life.
- Undertake assessment of the RSF and CDA landforms and establish suitable capping of the upper surface of each facility, surface water drainage, including engineered drop structures if required, and buttressing, if required
- Cap the RSF and CDA to ensure encapsulation of contained materials and a free draining landform.
- Undertake a geotechnical assessment of the final voids and establish relinquishment bunds with signage at a suitable distance from the voids.

Phase 3 – Growth Medium Development

- Develop and implement a testing and amelioration program prior to placement of soils.
- Install temporary erosion and sediment controls as required based on site area and seasonal risk.



- Place friable material, where available, on the upper surface of the final landform and deep rip prior to placement of soils.
- Place subsoil and topsoil at required depths.
- Preserve the structure of placed soils to ensure that subsoil and topsoil are moist to just moist when spreading, not dry or excessively wet.
- Apply temporary soil stabilisation products such as polymer-based sprays to stabilise the final landform if a vegetation cover of 70% coverage will not be established within 3 months of soil placement.

Phase 4 – Ecosystem and Land Use Establishment

- Revegetate the final landform using propagation materials collected within or surrounding the Mine Site. The species to be used during rehabilitation would be consistent with the target vegetation communities adjacent to the areas under rehabilitation, namely that of PCT 3722.
- Undertake revegetation operations using site-appropriate techniques, including mechanical or direct seeding techniques, and the use of mulches or stabilising agents as required.
- Undertake weed and pest management, as required, until relinquishment.

Phase 5 – Ecosystem and Land Use Development

- Monitor the rehabilitated landform to determine initial germination success / plant survivability and success of other measures, including soil ameliorants, erosion controls, weed and grazing management.
- Undertake remediation as required, including:
 - reseeding, including with alternate species or using alternate methods, if required;
 - using additional or alternative ameliorants;
 - undertaking weed and grazing control; and
 - implement repairs to erosion controls.

3.14.9 Rehabilitation Quality Assurance and Monitoring

Section 3.14.7 presents conceptual rehabilitation completion objectives for the Project. In order to achieve those objectives, the following quality assurance measures would be implemented.

- Identify key roles and responsibilities for rehabilitation and mine closure and include relevant performance indicators in position descriptions. Broadly, the following responsibilities would apply.
 - The General Manager – ensure that appropriate resources are available to site management and personnel to enable the implementation of the mine closure and rehabilitation measures identified in the Rehabilitation Management Plan.



- The Environment and Community Manager – ensure that the activities identified in the Rehabilitation Management Plan are fully implemented and a Rehabilitation Quality Assurance Register is maintained.
- All Mine Personnel – follow direction provided by the Environment and Community Manager.
- Develop a Rehabilitation Quality Assurance Register of all commitments included in the *Rehabilitation Management Plan*. The register would include checklists for site personnel undertaking rehabilitation activities and a compliance register.
- Report annually on the progress of rehabilitation within the Mine Site.

Rehabilitation monitoring would consist of multiple strategies depending on the stage of rehabilitation and indicatively as follows.

- Semi-regular visual monitoring of stockpiled rehabilitation materials such as subsoils, topsoils, and other resources such as large woody debris. The monitoring would be undertaken as part of regular site environmental inspections by the Mine's environmental team. Information would be recorded internally; however reporting would be restricted to confirmation of inspections unless potential risks to rehabilitation are identified.
- Quality Assurance and Quality Control (QAQC) records would be relied on to monitor the development of landforms and growth medium.
- Regular and/or ad hoc visual inspections of newly revegetated areas to identify potential or actual incidences of plant damage / failure / loss.
- Formal monitoring programs undertaken by suitably qualified persons for analogue and rehabilitated areas located within the Mine Site. The formal monitoring program would be accompanied by a report, and the results of the monitoring programs would be included in the annual reporting for the Mine.

3.14.10 Rehabilitation Research and Trials

No formal trials are anticipated to be required to guide rehabilitation practices within the Mine Site. Rather information gathered from the progressive rehabilitation of areas of the Mine Site will be used to inform wider and/or later rehabilitation activities. Furthermore, monitoring of analogue sites would be used to progressively develop rehabilitation completion criteria in accordance with the requirements of the *Mining Regulation 2021*.

Informal trial sites would be established within areas undergoing progressive rehabilitation. A range of rehabilitation methodologies would be tested in consultation with a person suitably experienced in landform establishment and rehabilitation. A range of parameters may be tested to determine the optimum combination of rehabilitation techniques and procedures. These may include the following.

- Final landform preparation, including nature and preparation of the substrate and preferred microrelief.



- Soil depth and preferred ameliorants.
- Vegetation methodology and preferred seed mix, fertiliser and stabiliser.

Monitoring and reporting of these trials would be undertaken as required.

3.14.11 Justification of Design

In the strategic planning of the final landforms and land uses, alternatives were considered as outlined in Section 3.14.3. Ultimately, the indicative final landform and land use as displayed in **Figures 3.14.1** and **3.14.2** and described in Section 3.14.5 were determined the most viable option. The Project is faced with multiple constraints, as identified in the rehabilitation risk assessment in Section 3.14.6, including but not limited to soil availability for rehabilitation purposes. Additionally, the proposed final landform and land uses generally reflects the existing environment of the Mine Site which largely consists of low-capability agricultural land and native ecosystems. It is therefore considered that the rehabilitation design of Project at this stage is suitable and sustainable. However, should the Project be approved, the rehabilitation strategy may be amended throughout the Project-life dependant on the outcomes of the rehabilitation monitoring.