Appendix 1

Amended Project Description

(Total No. of pages including blank pages = 96)

This page has intentionally been left blank

Section 2 Description of the Project

PREAMBLE

This document describes Bowdens Silver's plans for the proposed site establishment / construction, operation and rehabilitation of the Bowdens Silver Project ("the Project"). Bowdens Silver's objectives for the Project and a brief overview of the operation are provided as well as a description of the geological setting and the resource to be mined. The proposed site establishment and construction activities, mining operations and processing activities are outlined together with the management of the waste rock and tailings generated. This document also describes the proposed hours of operation, infrastructure and services, site security, water supply and management, waste management, transportation of mineral concentrates and rehabilitation activities. This document describes the proposed components of the Project including the proposed relocation of Maloneys Road.

This document has been updated following amendment to the Project since the Environmental Impact Statement (EIS) was submitted in May 2020 and is intended to be a 'working' document that would be updated and adapted as the Project proceeds. Any change to the Project description must be approved by the consent authority (or their delegate).

The Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of activities proposed and to enable an assessment of the potential impacts on the surrounding environment. A range of additional information outlining how each of the Project components would be undertaken is provided in Appendix 5 of the EIS.

Details of the safeguards and mitigation measures that Bowdens Silver would implement to protect and manage noise, air quality, visibility, surface water, groundwater, Aboriginal heritage, flora, fauna, soils and other components of the local environment are detailed in Section 4 of the EIS.

This page has intentionally been left blank

2.1 INTRODUCTION

2.1.1 Objectives

The principal objectives of the Bowdens Silver Project are to:

i) maximise the recovery of the silver, zinc and lead minerals from the defined ore reserves within the proposed open cut pits;

ii) undertake all activities in an environmentally and socially responsible manner to demonstrate compliance with relevant criteria and satisfy reasonable community expectations;

iii) ensure the health of its workforce and the surrounding community is not adversely affected;

iv) preserve the existing character of Lue;

v) maintain a positive relationship with the surrounding agricultural industry and maximise productivity on land retained for agricultural production;

vi) provide a stimulus for the Mudgee, Rylstone, Kandos and district economies; and

vii) achieve the above objectives in a cost-effective manner to ensure the Bowdens Silver Project is economically viable.

2.1.2 Overview of the Project

The seven principal components within the Mine Site are:

i) a main open cut pit and two satellite open cut pits, collectively covering approximately 52ha;

ii) a processing plant and related infrastructure covering approximately 22ha;

iii) a waste rock emplacement (WRE) covering approximately 77ha;

iv) a low grade ore stockpile covering approximately 14ha (9ha above WRE)[1];

v) an oxide ore stockpile covering approximately 8ha;

vi) a tailings storage facility (TSF) covering approximately 117ha; and

vii) the southern barrier to provide visual and acoustic protection to properties south of the Mine Site covering approximately 32ha.

The above components would be supported by a range of on-site and off-site infrastructure. The on-site infrastructure comprises a paste thickener, advanced dewatering production bores, haul roads, water management structures, power/water reticulation, workshops, stores, compounds and offices/amenities. The off-site infrastructure comprises a relocated section of Maloneys Road (including a new railway bridge crossing and new crossing of Lawsons Creek) and a 66kV power transmission line to the Mine Site. **Figure 2.1** displays the indicative locations of the principal mine components.

[1] The low grade ore stockpile would be constructed adjacent to but largely upon the northern sections of the WRE.

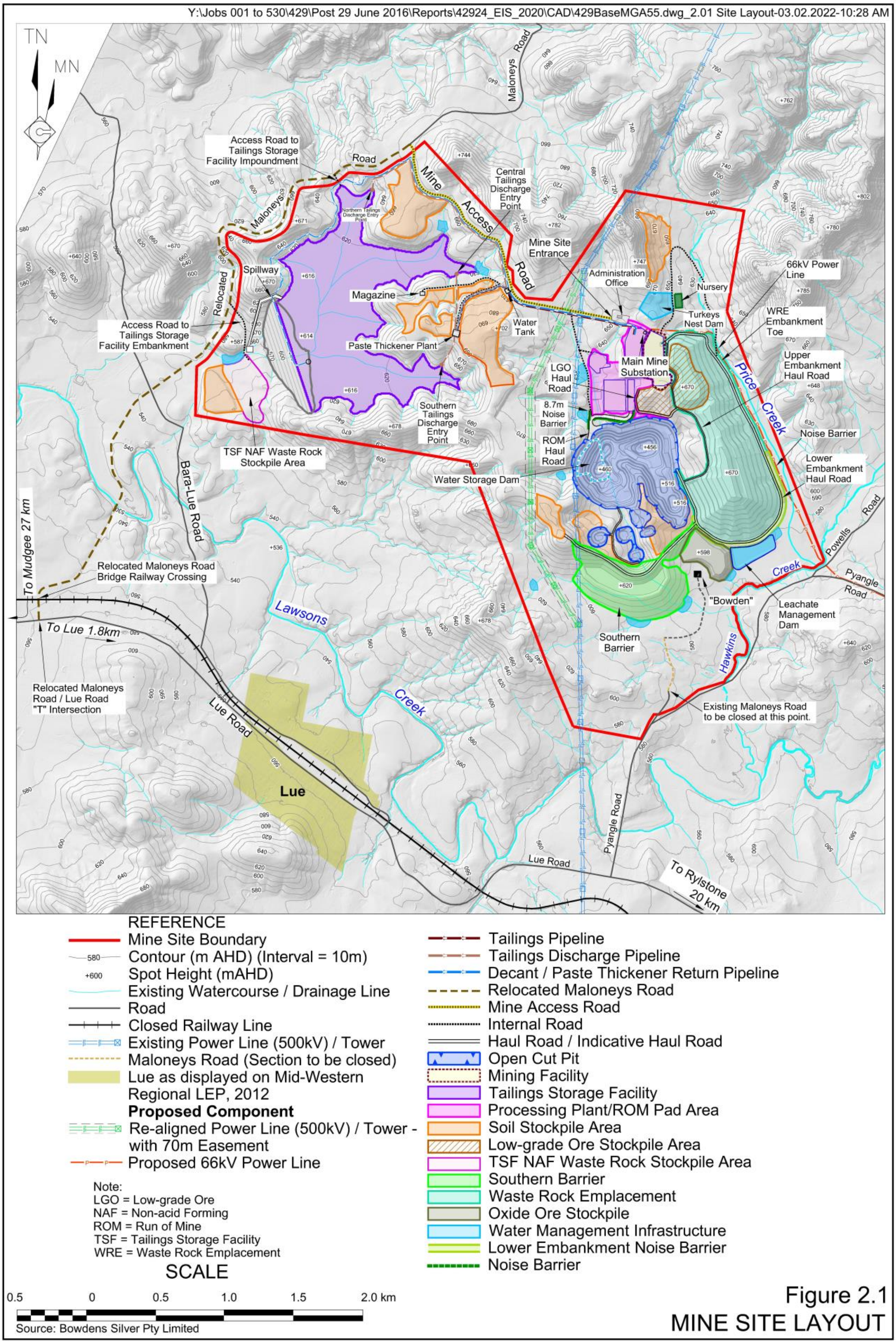


Figure 2.1
MINE SITE LAYOUT

The Project would incorporate conventional open cut pits (one main and two smaller, satellite pits), from which overburden/waste rock is removed from above and around the silver-zinc-lead ore and either used for on-site construction activities or placed in the out-of-pit WRE or the southern barrier. The mined ore would be transported by haul trucks to the on-site processing plant where it would be crushed, milled and processed to liberate the silver, zinc and lead minerals. These minerals would be collected by conventional froth flotation to produce two concentrates that would be dewatered and transported off site by truck. The residual materials from processing (tailings) would be pumped in the form of a slurry to a paste thickener that would remove water from the tailings material (and increase the solids content) before deposition into the TSF that would be located to the west of the main open cut pit.

The Project would require a site establishment and construction period of approximately 18 months during which the processing plant and all related infrastructure and the initial embankment of the TSF would be constructed. Once operational, Bowdens Silver anticipates the mine would produce concentrates for approximately 15 years. In total, it is proposed the mine life would be approximately 16.5 years, i.e. from the commencement of the site establishment and construction stage to the completion of concentrate production. It is envisaged rehabilitation activities would be completed over a period of approximately 7 years, i.e. from Year 16 to Year 23. **Figure 2.2** displays the duration of each of the main components throughout the mine life and Project life.

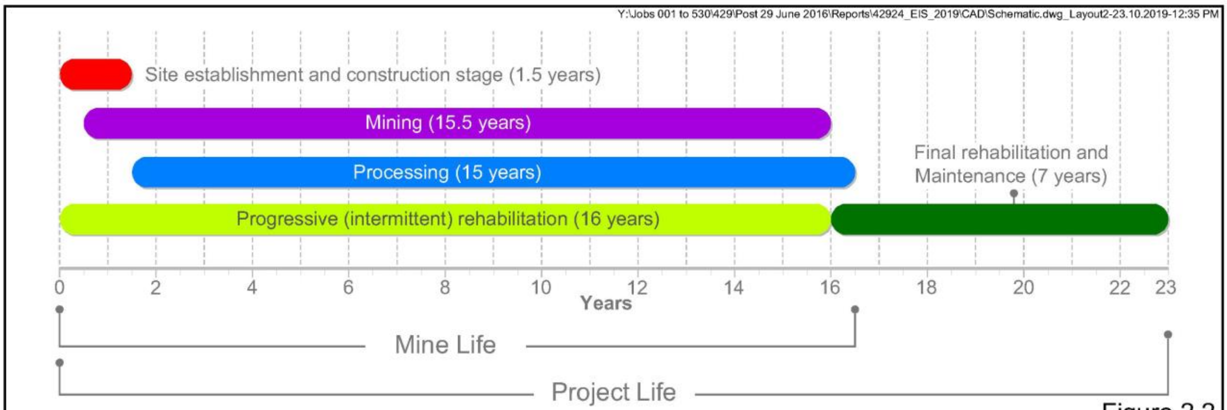


Figure 2.2
MINE LIFE AND PROJECT LIFE

2.1.3 Approvals Required

Based upon the design of the Project and understanding of relevant environmental issues, the Bowdens Silver Project would require the following approvals to proceed.

1. Development Consent granted under the *Environmental Planning and Assessment Act 1979* (EP&A Act) as the Project, being for the purposes of mining-related works with a capital investment value of greater than $30 million, is declared as a State Significant Development under the *State Environmental Planning Policy (State and Regional Development) 2011*, for which approval is required from the Minister for Planning or his/her delegate.
2. An approval from the Commonwealth Minister for the Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999 Cth* (EPBC Act) as the Project has been determined to be a controlled action under the EPBC Act.

3. A Mining Lease issued under the *Mining Act 1992* for the area referred to as the Mine Site[2]. The issuing authority would be the Minister responsible for the administration of the *Mining Act 1992* or his/her delegate.
4. An Environment Protection Licence issued under the *Protection of the Environment Operations Act 1997*. The issuing authority would be the Environment Protection Authority (EPA).
5. Several Water Access Licences to cover the amounts of groundwater and surface water intercepted and abstracted during mining operations, above that which is permitted under the maximum harvestable rights provisions of the *Water Management Act 2000*. The issuing authority would be the DPIE Water operating under the *Water Management Act 2000* and in accordance with:
   i. the *Water Sharing Plan for the Unregulated and Alluvial Water Sources 2012, Lawsons Creek Water Source;*
   ii. the *Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources Order 2020, Lachlan Fold Belt Groundwater Source; and*
   iii. the *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources Order 2020, Sydney Basin Groundwater Source.*
6. One or more consent(s) issued under the *Roads Act 1993* by Mid-Western Regional Council to:
   i. undertake intersection works on Lue Road; and
   ii. construct a new section of the road referred to as relocated Maloneys Road.
7. The necessary agreements with TransGrid (as the relevant network operator) for a network modification for the proposed re-alignment of the 500kV power transmission line including a Modification Processes Agreement and Offer to Modify.
8. Appropriate approvals and licences from SafeWork NSW for the on-site storage (detonators, boosters/primers only) and use of explosives and notification of dangerous goods stored and used on site.
9. All necessary approvals from Mid-Western Regional Council for construction, erection and/or placement of buildings, structures and appropriate sewage treatment systems for the Project.
10. All necessary approvals from the managing agent of the Country Regional Network (on behalf of Transport for NSW), with regard to the railway bridge for the relocated Maloneys Road.
11. One or more licences or leases required to occupy Crown Land for the relocated Maloneys Road.

[2] Bowdens Silver lodged mining lease application (MLA) 601 on 11 March 2021.

An approval to construct the required 66kV power transmission line to the Mine Site would be sought separately in accordance with Part 5 of the EP&A Act. Power supply requirements for the Project are discussed in more detail in Section 2.11.3. It should be noted that assessment of the power supply infrastructure and associated works is not included here but would be addressed in a future application to the relevant energy provider.

2.1.4 Other Agreements

Bowdens Silver is in the process of progressing a number of agreements in relation to the Project. While not formal approvals, and in some cases not strictly necessary for approval and commencement of the Project, these agreements would be subject to terms as agreed between the relevant parties.

The terms of the Planning Agreement have been agreed between Bowdens Silver and Mid-Western Regional Council (MWRC). Total contributions to MWRC would exceed $4.7 million over the duration of mining operations, comprising $3.0 million for community infrastructure and $1.7 million towards road maintenance. It is anticipated the terms of the Planning Agreement would be reflected in conditions of consent for the development.

Assessment for various stages of the development has identified that, despite the adoption of a comprehensive suite of feasible and reasonable mitigation measures, noise levels generated by the Project may be experienced at some residences at levels that exceed the applicable assessment criteria. Agreements with the owners of residences that would experience marginal/moderate exceedances would be required in accordance with the NSW Government's Voluntary Land Acquisition and Mitigation Policy (VLAMP). The mitigation offered to landowners under agreement is discussed in more detail in Section 4.2.2.6.

The current Biodiversity Offset Strategy is for Biodiversity Stewardship Agreements to be sought over land within the Mine Site and other properties to establish areas for in-perpetuity biodiversity conservation in order that the residual biodiversity impacts of the Project are offset. The biodiversity offset strategy is discussed in more detail in Section 2.17.

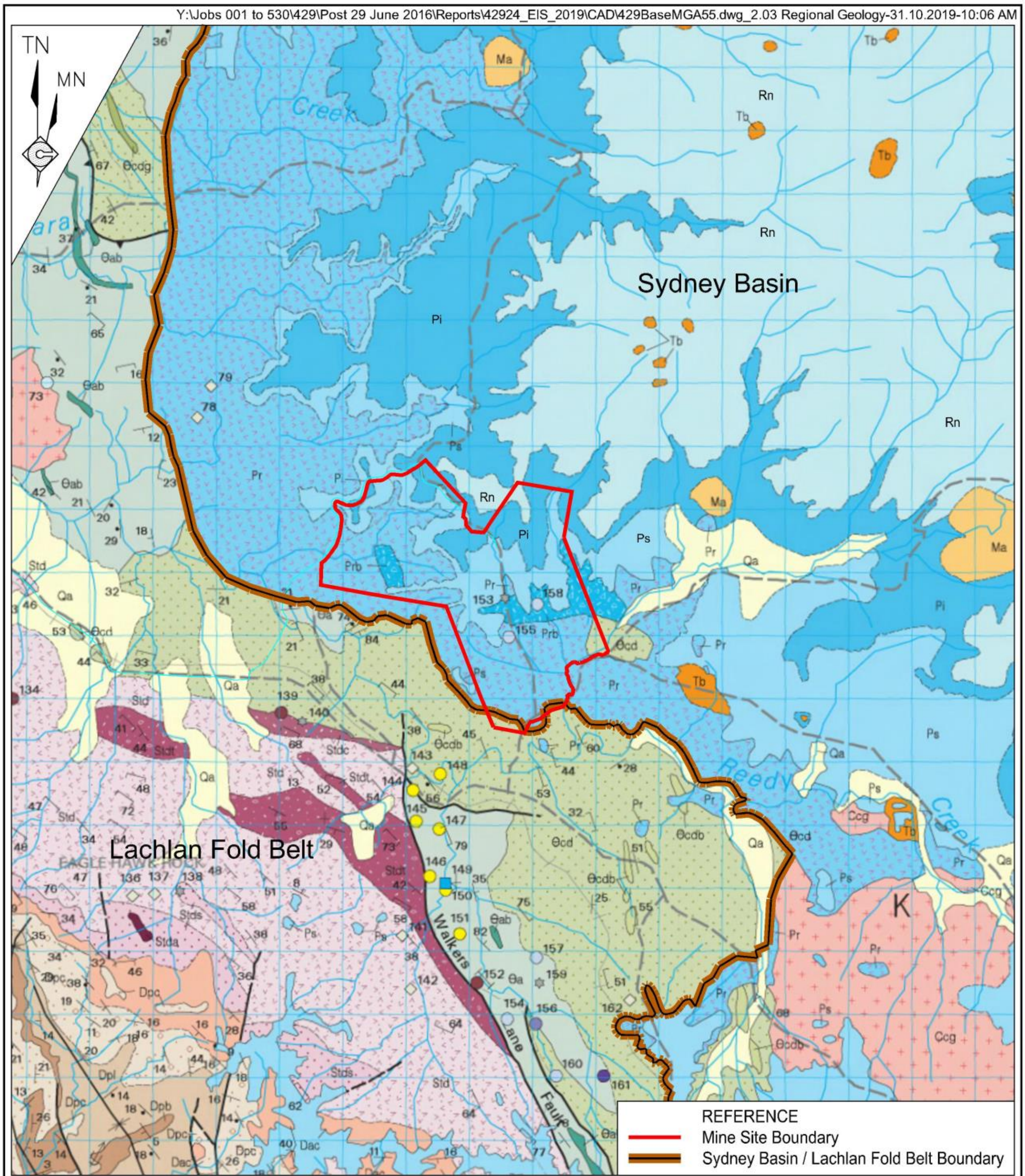
It is noted that Bowdens Silver has negotiated a range of agreements with landowners that would result in purchase or lease of properties should approval for the Project be granted. The details of these agreements are confidential, however where appropriate, any property over which there is such an agreement is included in the EIS and relevant technical assessments as Project-related. This designation takes into account the matters agreed between parties relating to environmental impacts when assessing the impacts of the Project.

2.2 GEOLOGICAL SETTING AND RESOURCES

2.2.1 Regional Geology

The Mine Site is situated near the northeastern margin of the Lachlan Fold Belt, one of the main components of the Tasman Fold Belt System, and the western edge of the Sydney Basin. **Figure 2.3** presents an extract of the geological map of the Mudgee to Rylstone district displaying the locations of the geological units of the Lachlan Fold Belt and the Sydney Basin together with more recent igneous rocks and Quaternary alluvium.[5]

5 It is noted that Bowdens Silver proposes to establish an explosives magazine on site for emergency use only, i.e. in the event any explosives, primers or detonators need to be stored overnight.



Geological Reference - Lue Area

CAINOZOIC UNITS	Qa	Quaternary Alluvium
	Tb	Tertiary Basalt
MESOZOIC IGNEOUS ROCKS	Ma	Mesozoic Igneous Rocks
SYDNEY BASIN	Rn	Narrabeen Group
	Pi	Illawarra Coal Measures
	Pr	Rylstone Volcanics
	Pr(b)	Rylstone Volcanics (volcanic breccia & conglomerate)
KANDOS GROUP	Ps	Shoalhaven Group
	Ccg	Pyangle Pass Granite
MOUNT KNOWLES GROUP	Dpb	Bumberra Formation
	Dpc	Buckaroo Conglomerate
	Dpl	Lawsons Creek Shale
TANNABUTTA GROUP	Std	Dungeree Volcanics
	Stdc	Dungeree Volcanics (polymictic conglomerate)
	Stdt	Dungeree Volcanics (volcanic conglomerate)
CABONNE GROUP	Øcd	Coomber Formation (mafic volcanic sandstone)
	Øcdg	Coomber Formation

SCALE

1 0 1 2 3 4 5 km

Source: Mudgee 1:100 000 Geological Map (2000)

Figure 2.3
REGIONAL GEOLOGICAL SETTING

2.2.2 Mine Site Geology

The Bowdens silver deposit is a carbonate-silver-base metal associated low-sulphidation epithermal deposit. The deposit is hosted principally within siliceous volcanic rocks of the early Permian Rylstone Volcanics (approximately 290 million years old) that unconformably overlie a sequence of Ordovician aged metasediments (approximately 460 million years old). The Rylstone Volcanics which range in thickness from 10m to >200m comprise mainly rhyolitic ignimbrites, tuffs and volcanic breccias and are partially overlain by the Snapper Point Formation of the Shoalhaven Group sediments of the Sydney Basin. **Figure 2.4** displays the surface geology within and adjacent to the Mine Site. **Plate 2.1** displays the colour and appearance of the various rock types defined within and immediately surrounding the Mine Site.

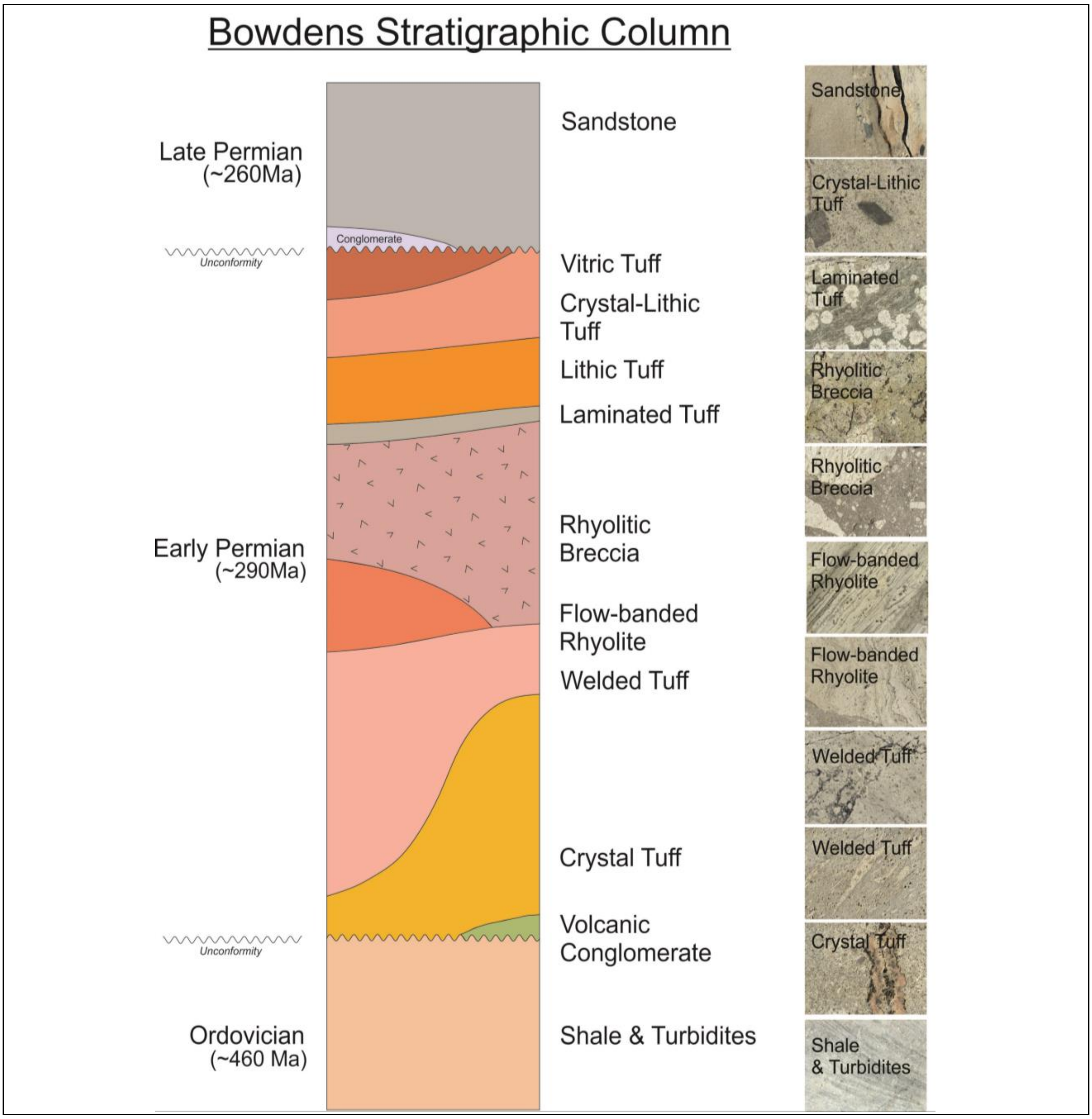


Plate 2.1 Bowdens Stratigraphic Column and Representative Rock Types

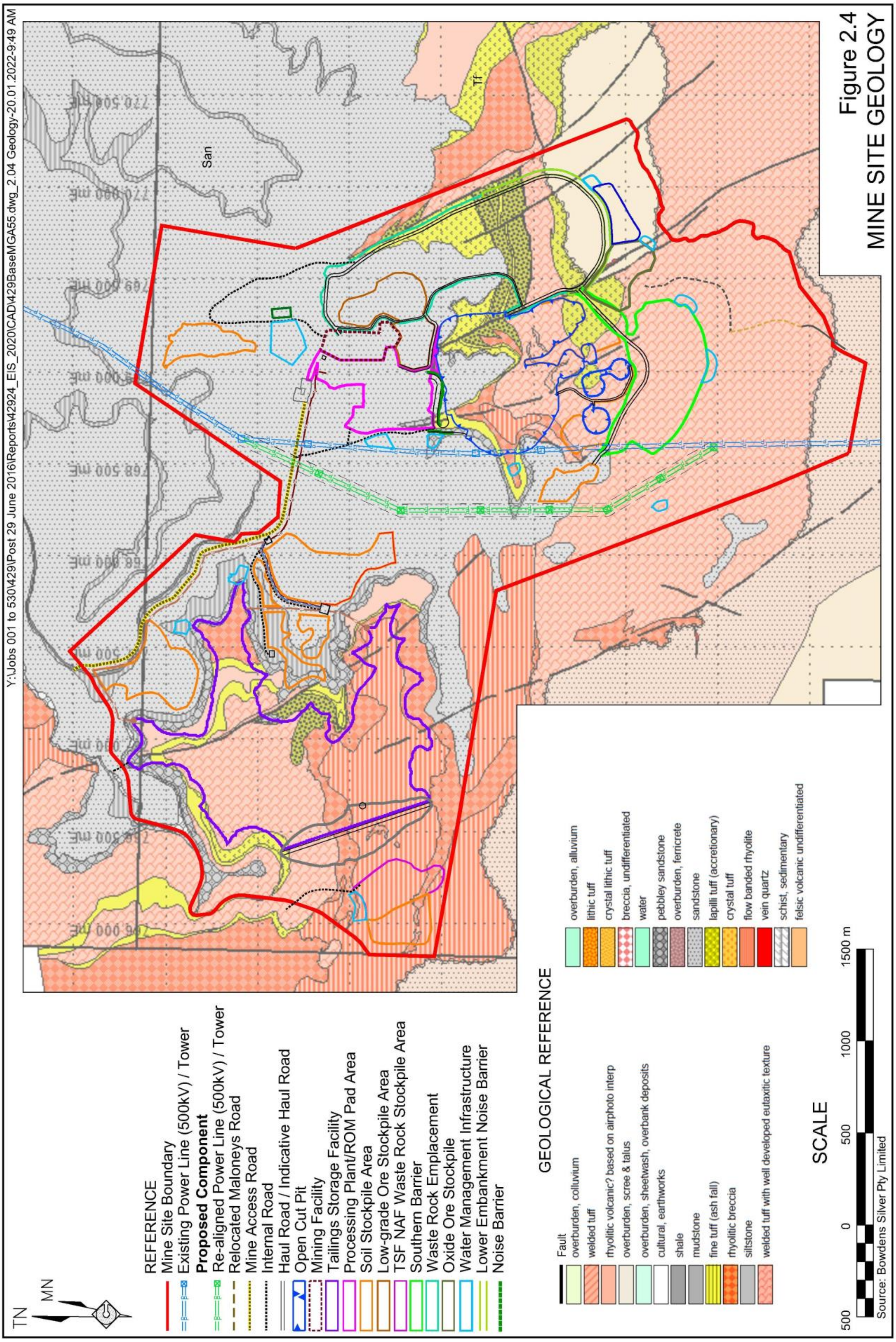


Figure 2.4
MINE SITE GEOLOGY

The bulk of the mineralisation within the proposed open cut pits occurs as a thick zone extending from surface, and near surface, to vertical depths of at least 180m. Drilling undertaken to date has identified mineralisation to depths of approximately 330m below the natural ground surface, i.e. below the proposed depth of the main open cut pit.

A proportion of the rocks within the proposed open cut pits display mineral alteration with an assemblage of clays (illite-smectite), sericite, silica, adularia and carbonate. **Plate 2.1** highlights that the bulk of the rock types to be extracted from the open cut pits are a light cream to light brown in colour, a factor that would potentially contribute to increased visibility of the extraction operations and the placement of the waste rock within the embankment of the TSF, WRE and the southern barrier.

The siliceous volcanic rocks comprising the ore and waste rock contain varying proportions of free silica. Laboratory testing of representative samples of each of the ore and waste rock established that the free silica concentration in the ore and waste rock is typically 47% and 64% respectively.

2.2.3 Ore Reserves

An Ore Reserve Statement, which complies with the JORC [6] standard, was completed for the Bowdens silver deposit in May 2018 by AMC Consultants Pty Ltd (see **Table 2.1**). The silver, zinc and lead grades are expressed in either grams per tonne (g/t) or percentage (%) in accordance with the conventions set out in the JORC standard.

Table 2.1
Ore Reserve Statement – 18 May 2018

Reserve Category	Tonnes (Mt)	Reserve Grades			Contained Metal		
		Ag (g/t)	Zn (%)	Pb (%)	Ag (Moz)	Zn (kt)	Pb (kt)
Proved	28.6	69.75	0.44	0.32	64.05	125.11	91.43
Probable	1.3	53.15	0.43	0.29	2.27	5.74	3.91
Total	**29.9**	**69.01**	**0.44**	**0.32**	**66.32**	**130.84**	**95.33**
Mt = million tonnes		g/t = grams per tonne			Moz = million ounces		kt = thousands of tonnes
Source: AMC Consultants Pty Ltd							

The Ore Reserve Statement presented in **Table 2.1** is based on data from approximately 83 500m of drilling in 653 drill holes that comprise reverse circulation holes (80%) and diamond drill holes (20%). This information has been sourced from recent drilling by Bowdens Silver and previous drilling undertaken by Kingsgate Consolidated Limited, Silver Standard Australia Pty Limited, GSM Exploration Pty Limited and CRA Exploration Pty Limited. The ore reserves listed in **Table 2.1** have been calculated following the design of the open cut pits in which the recovery of silver, zinc and lead minerals has been optimised, i.e. with respect to the quantity of recoverable ore and its ratio to the quantity of overburden extracted to recover the defined ore.

[6] 2012 Joint Ore Reserves Committee, i.e. the "Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves".

For the purposes of the EIS, Bowdens Silver has defined three types of recoverable ore.

i) Primary Ore: Unweathered silver, zinc and lead sulphide minerals within the host rock with a silver grade exceeding a nominated cut-off grade of 30g/t.

ii) Low Grade Ore: Unweathered silver, zinc and lead sulphide minerals within the host rock with a silver grade marginally below the nominated cut-off grade of 30g/t.

iii) Oxide Ore: Weathered silver, zinc and lead minerals within the host rock with a silver grade exceeding a nominated cut-off grade[7].

Bowdens Silver proposes to extract and process all primary ore and extract and stockpile all low grade ore. The low grade ore would be processed subject to prevailing silver prices and potentially blended with the primary ore. The oxide ore would not be able to be processed within the processing plant on site however, it would be separately stockpiled adjacent to the southwestern side of the WRE for processing should this become feasible in the future, either on or off site.

Based upon the studies to optimise the recovery of the defined ore from the open cut pits and ultimate design of the open cut pits, the recoverable primary and low grade ore within the proposed open cut pits is estimated to be approximately 29.9 million tonnes at an average grade of 69g/t silver, 0.44% zinc and 0.32% lead. This corresponds to total in situ quantities of approximately 66.3 million ounces of silver, 130 000 tonnes of zinc and 95 000 tonnes of lead.

The recoverable primary and low grade ore would be mined in conjunction with approximately 1.8 million tonnes of oxide ore and 46.3 million tonnes of waste rock. The stripping ratio of waste rock to ore would be approximately 1.6:1.

2.2.4 Further Resource, Grade Control and Infill Drilling Operations

Bowdens Silver intends to undertake further exploration beyond the current projected base of the main open cut pit and the western boundary of the main open cut pit to establish whether any ore is recoverable either by open cut or underground mining method, from those areas.

Grade control and infill drilling operations would be routinely undertaken in conjunction with the blast hole drilling program to identify and delineate ore and waste rock mining blocks. All grade control samples would be analysed within an on-site laboratory, whilst infill samples would be analysed to establish total carbonate concentration and thus sub-classify the waste rock to be mined.

2.3 SITE ESTABLISHMENT AND CONSTRUCTION ACTIVITIES

2.3.1 Introduction

The site establishment and construction activities for all key components within the Mine Site would be sequenced to achieve the commencement of concentrate production approximately 18 months after the commencement of the site establishment and construction stage. The

[7] It is not proposed to process the oxide ore recovered from the open cut pit – see further discussion in Section 2.6.2.

locations of the key activities to be undertaken during the site establishment and construction stage are presented in **Figure 2.5** and listed in **Table 2.2**, 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.

During the initial 6 months, 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 12 month period between Months 7 and 18, the bulk of the on-site activities would be undertaken (including the commencement of the mining pre-strip) involving considerably more earthmoving equipment and a greater area of disturbance.

A brief description of general preparatory activities and the proposed hours of operation during this period is provided in the following subsections. 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. Details of the number and type of equipment to be used during this stage is presented in Section A5.2 of Appendix 5 of the EIS.

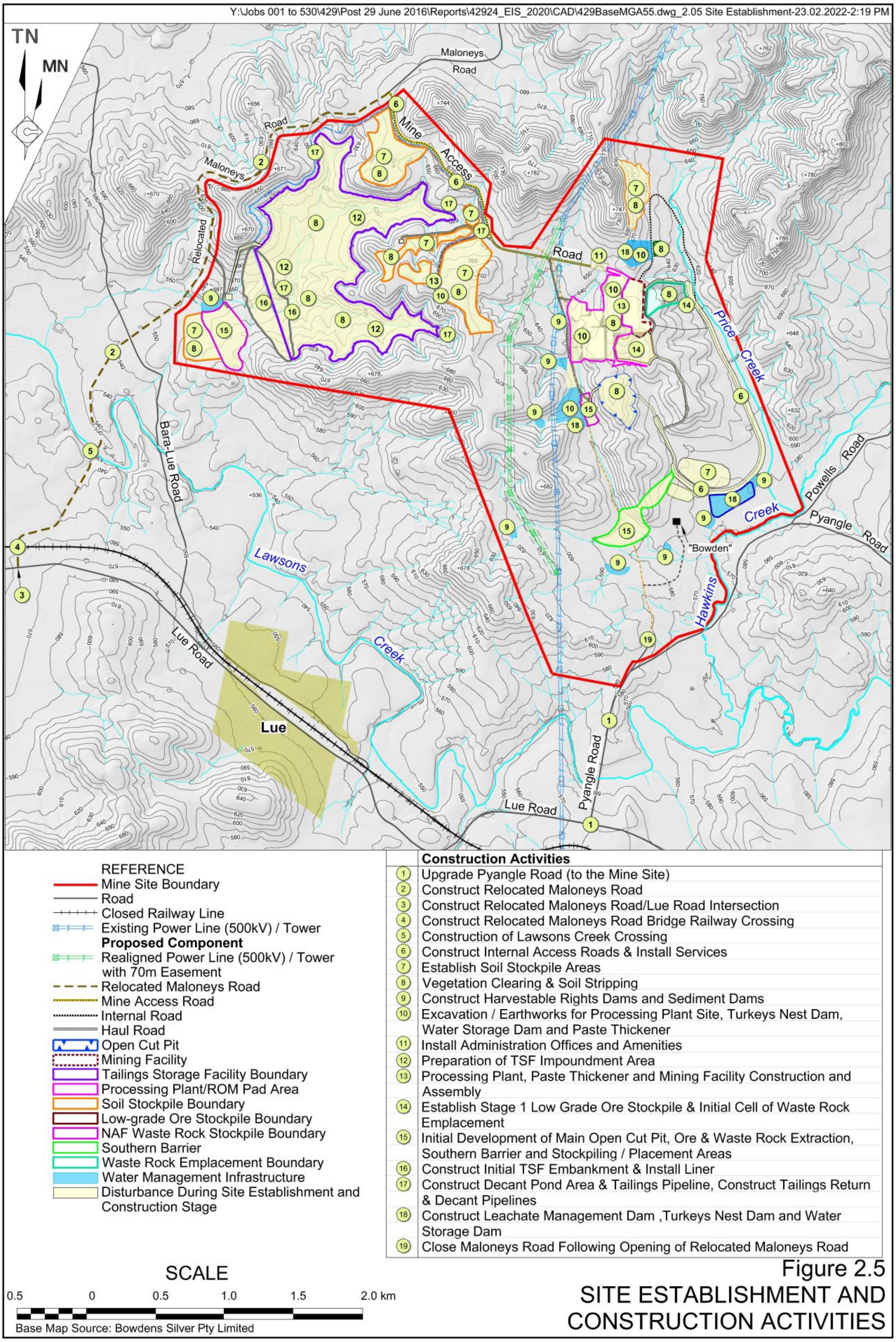
2.3.2 Preparatory Activities

The boundaries of all areas to be disturbed during the site establishment and construction stage would be surveyed and marked out prior to the commencement of disturbance in the respective operational areas. Key boundaries and locations would be marked with painted posts and recorded on relevant site construction plans and documents (e.g. Rehabilitation Management Plan and/or Environmental Management Strategy or Sub-plans).

Where necessary, the existing fencing within the operational areas would also be removed, with suitable materials salvaged for use elsewhere within Bowdens Silver’s landholdings or recycled. The existing 11kV power transmission lines (and poles) within the Mine Site would be removed by or on behalf of the distribution network service provider. Residences and related farm buildings within the proposed disturbed areas within the Mine Site would either be relocated for use as offices or demolished, with the useful building materials recycled.

A program of initial earthworks would be undertaken firstly to establish the surface water management system (erosion and sediment control) and secondly, to develop the required operational areas. No substantial earthworks would commence in each operational area until sign-off confirming that all required erosion and sediment controls are in place.

Vegetation clearing would be undertaken initially by one or more firewood and mulching contractors who would remove the vegetation only in areas for approved mine components. During all vegetation clearing, any available seed would be collected and timber either mulched or set aside for fencing, habitat relocation/reconstruction or off-site beneficial uses such as saw logs, firewood or fencing.



	Construction Activities
1	Upgrade Pyangle Road (to the Mine Site)
2	Construct Relocated Maloneys Road
3	Construct Relocated Maloneys Road/Lue Road Intersection
4	Construct Relocated Maloneys Road Bridge Railway Crossing
5	Construction of Lawsons Creek Crossing
6	Construct Internal Access Roads & Install Services
7	Establish Soil Stockpile Areas
8	Vegetation Clearing & Soil Stripping
9	Construct Harvestable Rights Dams and Sediment Dams
10	Excavation / Earthworks for Processing Plant Site, Turkeys Nest Dam, Water Storage Dam and Paste Thickener
11	Install Administration Offices and Amenities
12	Preparation of TSF Impoundment Area
13	Processing Plant, Paste Thickener and Mining Facility Construction and Assembly
14	Establish Stage 1 Low Grade Ore Stockpile & Initial Cell of Waste Rock Emplacement
15	Initial Development of Main Open Cut Pit, Ore & Waste Rock Extraction, Southern Barrier and Stockpiling / Placement Areas
16	Construct Initial TSF Embankment & Install Liner
17	Construct Decant Pond Area & Tailings Pipeline, Construct Tailings Return & Decant Pipelines
18	Construct Leachate Management Dam ,Turkeys Nest Dam and Water Storage Dam
19	Close Maloneys Road Following Opening of Relocated Maloneys Road

Figure 2.5
SITE ESTABLISHMENT AND CONSTRUCTION ACTIVITIES

Table 2.2
Indicative Site Establishment and Construction Schedule

Construction Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Approvals, Engineering and Procurement																		
Secondary approvals	■	■	■															
Engineering/detailed design	■	■	■	■	■	■	■	■	■									
Procurement	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Off-site Road Network																		
Survey and mark out key boundaries			■															
Install erosion and sediment controls, vegetation clearing and soil stripping			■	■	■													
Construct relocated Maloneys Road			■	■	■	■												
Construct relocated Maloneys Road/Lue Road Intersection			■															
Construct new crossing across Lawsons Creek				■	■													
Construct relocated Maloneys Road Rail Bridge				■	■													
Site Earthworks and Infrastructure																		
Survey and mark out key boundaries				■														
Install erosion and sediment controls				■	■													
Vegetation clearing, soil stripping and stockpiling				■	■													
Construct internal roads, culverts, drains and underground services				■	■	■												
Construct water storage infrastructure.				■	■	■												
Establish low grade ore stockpile area 1 and WRE Cells 1 and 2					■	■												
Construct/install administration offices/amenities, etc.													■	■	■	■		
Processing Plant and Mining Facility																		
Earthworks/footings						■	■	■	■	■	■	■	■					
Plant construction/assembly/installation								■	■	■	■	■	■	■	■	■	■	
Piping/Electricals									■	■	■	■	■	■	■	■	■	■
Instrumentation												■	■	■	■	■	■	■
Paste thickener construction/assembly/installation															■	■	■	■
Commissioning															■	■	■	■
Open Cut Pit Development																		
Vegetation clearing					■													
Soil Stripping						■												
Ore and waste rock extraction							■	■	■	■	■	■	■	■	■	■	■	■
Tailings Storage Facility and Pipelines																		
Vegetation clearing, soil stripping and ripping						■	■	■	■									
Construct interception dams						■	■	■	■									
Tailings impoundment area preparation							■	■	■	■	■	■	■					
Delivery of NAF Waste Rock and Crushing							■	■	■	■	■	■	■	■	■	■	■	
Construct Initial Embankment											■	■	■	■	■	■	■	
Lining of TSF															■	■	■	
Install pond return and monitoring infrastructure																	■	
Install Tailings, Paste Thickener Plant and Pond Return Pipelines																	■	■
Power Transmission Lines																		
Construct 66kV Power Transmission Line						■	■	■	■	■	■	■	■	■				
Source: Bowdens Silver Pty Limited																		

Topsoil and subsoil removed during the site establishment and construction stage would either be re-used as part of the initial stabilisation / rehabilitation activities or stockpiled in nominated soil stockpile locations (see Section 2.16.4 and Section 4.13 with additional information presented in Section A5.3.2.2). The soil stockpile areas displayed on **Figure 2.5** would not be fully cleared during the site establishment and construction stage. Some stockpile areas or parts thereof would be cleared progressively prior to topsoil and subsoil removal throughout the early years of operation.

A construction office comprising transportable buildings would be established in the vicinity of the proposed administration offices and all necessary communications and other services installed. The construction contractor would also install temporary workshop and materials management facilities and construct internal roads required for site establishment and construction activities generally within the areas or alignments of the long term mine components.

2.3.3 Site Establishment and Construction Hours

Table 2.3 lists the proposed hours of operation during the site establishment and construction stage. No activities would be undertaken on Sundays.

Table 2.3
Site Establishment and Construction Hours

Construction Activity	Monday to Friday	Saturday
Site Earthworks and Infrastructure (and within main open cut pit)	7:00am – 10:00pm[1]	7:00am – 1:00pm
Processing Plant	7:00am – 10:00pm[2]	7:00am – 1:00pm
Tailings Storage Facility	7:00am – 6:00pm[3]	7:00am – 1:00pm
Off-site Road Construction	7:00am – 6:00pm[3]	8:00am – 1:00pm
Transmission Line Installation	7:00am – 8:00pm[3]	8:00am – 1:00pm

1. Subject to demonstrating noise limits can be satisfied during this period
2. Only low-noise/inaudible activities would be undertaken beyond 6:00pm during the latter stages of construction and commissioning
3. Further limited to daylight hours only.

2.4 MINING OPERATIONS

2.4.1 Introduction

Mining operations would effectively commence in Month 7 of the site establishment and construction stage with the main open cut pit pre-strip. Mining would be undertaken using conventional open cut drill and blast, load and haul mining methods. This would involve the sequential removal/storage or mulching of vegetation, the stockpiling of topsoil and subsoil (where recoverable), the removal/placement or stockpiling of waste rock and the recovery of ore.

This subsection presents information relating to the mining operations from the site establishment construction stage to the end of mining including the design of the open cut pits, mining methods and mine sequencing. **Appendix 5** (Section A5.3) includes details of the proposed vegetation clearing, soil stripping and annual production rates together with indicative mobile equipment list.

2.4.2 Open Cut Pit Design and Mining Sequence

The design of the main open cut pit and the two satellite pits has been undertaken through a series of pit optimisation realisations carried out by AMC Consultants Pty Ltd (AMC) using Whittle Four-X pit optimisation software. **Figure 2.6** presents the conceptual final layout and cross-sections of the main open cut pit and the two satellite pits highlighting the relative depths of extraction at various years throughout the mine life. The rim of the main open cut pit varies from 597m AHD within the current alignment of Blackmans Gully to 652m AHD on its northeastern edge. The deepest section of the main open cut pit of 456m AHD, approximately 180m below natural ground level, would be reached in about Year 9 of the Project. The open cut pits have been designed using the following parameters.

- Operational bench height: 5m
- Maximum terminal bench height: 25m
- Maximum face angle: 65º
- Berm width: 9m
- Nominal ramp width: between 15m and 25m
- Ramp gradient: 1 in 10 (10%)

Development of the main open cut pit would commence in about Month 7 of the site establishment and construction stage with vegetation clearing, followed by the stripping and stockpiling of topsoil and subsoil. This stage is referred to as the open cut pit pre-strip. Emphasis would be placed in this stage upon the recovery of sufficient non-acid forming (NAF) waste rock for the construction of the initial TSF embankment and the accumulation of sufficient ore on the ROM pad to enable the processing plant to be commissioned. Any low grade ore recovered during this stage would be transported by haul truck to the first stage of the low grade ore stockpile area east of the ROM pad. During the main open cut pit pre-strip, all potentially-acid forming (PAF) waste rock would be recovered and transported by haul truck and placed in Cell 1 of the WRE, i.e. to the east of the mining facility (see **Figure 2.1**). All oxide ore extracted during the development of the open cut pits would be transported to the oxide ore stockpile area southwest of the WRE (see **Figure 2.1**).

Figure 2.7 displays the indicative mining sequence from the end of the site establishment and construction stage to Year 15. Mining activities would be concentrated in the eastern side of the main open cut pit until about Year 8 after which mining activities would extend to the western limit of the main open cut pit. Beyond Year 10, extraction would be confined to the main open cut pit increasing in depth as displayed in the cross-sections in **Figure 2.6**.

Dual lane (25m wide) and single lane (15m wide) ramps would provide for operations with roadside drainage and safety bunds. Horizontal switchbacks would also provide flat turning surfaces to reduce wear and tear to the haul trucks. All ramps would be positioned to achieve the shortest possible distance from the limits of the open cut pits to the ROM pad, low grade ore stockpile, oxide ore stockpile and the WRE. Two entry/exit ramps would be included in the design of the main open cut pit, namely one to the north (mainly for transportation of ore or waste rock of an evening and ore during the night-time) and one to the east (mainly for waste rock and oxide ore for waste rock during the day). The northern exit ramp from the main open cut pit would not be developed until about Year 3 of operations. Access and egress from the two satellite pits would occur via a single ramp for each pit.

These design features would be reviewed and optimised following further geotechnical investigations to establish open cut pit wall stability and extraction requirements.

2.4.3 Mining Operations

2.4.3.1 Extraction of Friable Material

Following removal of vegetation and soil materials, mining would commence with the removal of any friable weathered materials. Where present, these materials would be directly extracted using an excavator or ripped and pushed up using a bulldozer and loaded into haul trucks using an excavator or front-end loader. Extracted material would be loaded into haul trucks for transportation to the WRE, low grade ore stockpile or other locations where waste rock is being used for construction of infrastructure (e.g. TSF embankment). Exploration to date indicates friable weathered material occurs from the base of the subsoil to depths of between approximately 20m and 30m.

2.4.3.2 Drill and Blast

The bulk of the ore and waste rock would require blasting following removal of the friable weathered materials, principally to achieve the required level of fragmentation to enable the ore to be processed. Drilling would be undertaken typically 2 to 3 days in advance of each blast to allow the drill cuttings to be analysed for metal grades and to sub-classify any waste rock present into the respective category (see Section 2.5.2) so as to inform the planning undertaken following the routine infill drilling (see Section 2.2.4). Each blast would yield an average of 25 000t of fragmented rock with maximum yields up to approximately 60 000t. Drilling and blasting would be a regular activity within the open cut pits with blasts generally initiated 3 to 5 days per week from Monday to Saturday[8].

The emphasis in blasting would be upon fragmentation of the rock in situ rather than heaving it away from a defined face. This approach would ensure the reliability of metal grades identified during the drilling of the blast holes to assist to identify whether the fragmented rock is ore, low grade ore, oxide ore, NAF waste rock or PAF waste rock.

Blast hole drilling would be undertaken by up to two production drills. Drill and blast production would be carried out on a bench with a height of approximately 5m (5.5m with sub-drill). The burden and spacing for each blast would be adjusted to reflect the rock type to be blasted and any inherent features present. An indicative pattern of drill holes in the waste rock would be 4.6m x 4.9m with a blasthole diameter of 152mm and 0.48kg of explosives per bank cubic metre. An indicative pattern of drill holes in the ore would typically be 3.3m x 3.6m with a hole diameter of 127mm and 0.65kg of explosives per bank cubic metre. The drill pattern used would depend upon the type of explosive used and reflect observations about the extent of fragmentation achieved. Drill patterns would be regularly reviewed to ensure fragmentation is being optimised. The explosives, together with the primers and detonators used for each blast would be transported by the blasting contractor to the Mine Site on the day of each blast. The quantity of explosives transported to the Mine Site on the day of each blast would vary from approximately 5 tonnes to 16 tonnes thereby requiring either one mobile manufacturing unit (up to 9t of explosives) or one unit with a trailer (up to a total of 18t of explosives). It is noted that Bowdens Silver proposes to establish a transportable explosives magazine on site for emergency use only, i.e. in the event any explosives, primers or detonators need to be stored overnight.

[8] The frequency of blasting would largely depend upon the quantity of rock to be fragmented during each blast, i.e. if all blasts fragmented 25 000t per blast, there would be approximately 240 blasts per year, whereas if all blasts fragmented 60 000t per blast, there would be approximately 100 blasts per year.

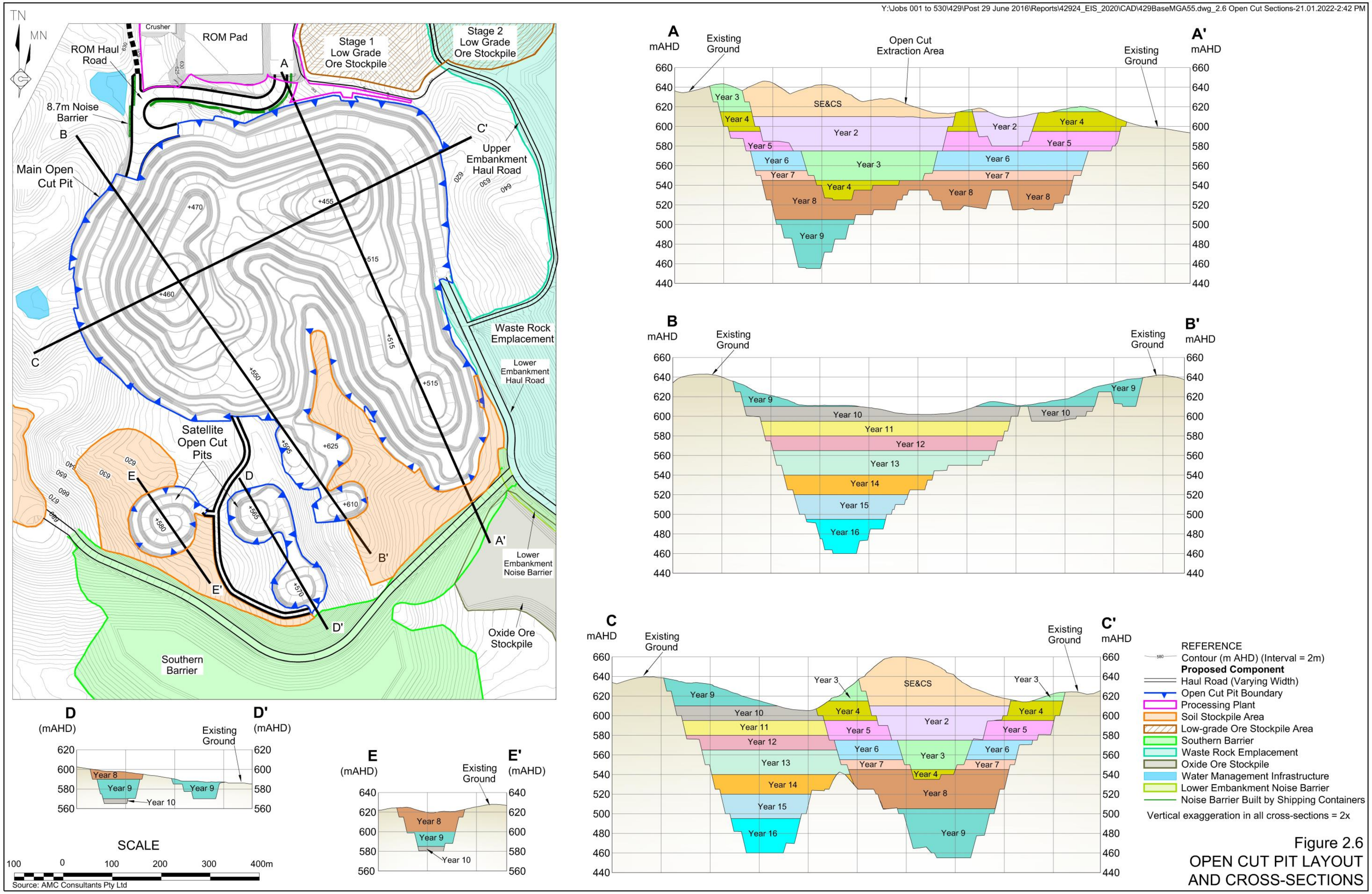


Figure 2.6
OPEN CUT PIT LAYOUT AND CROSS-SECTIONS

This page has intentionally been left blank

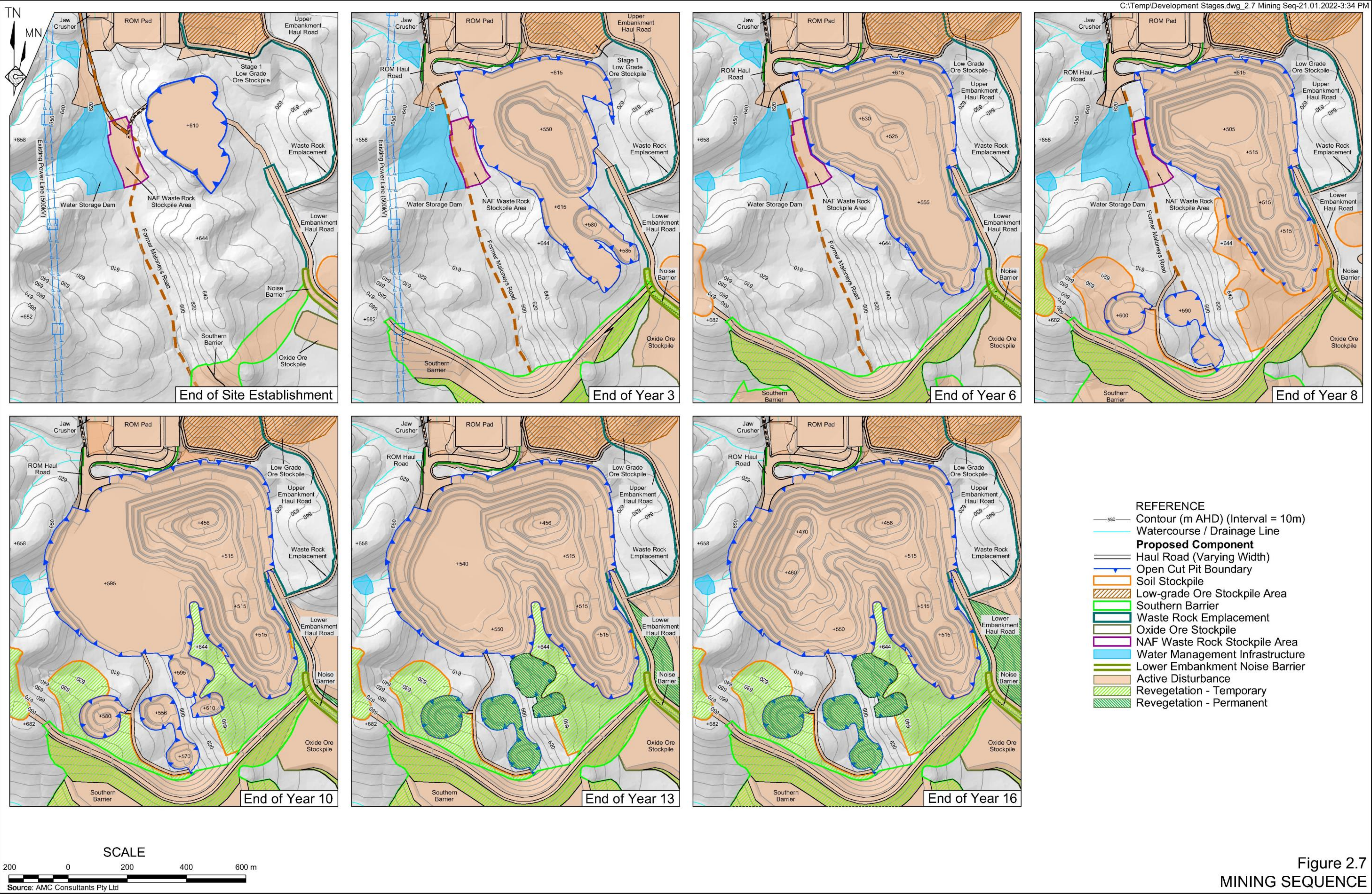


Figure 2.7
MINING SEQUENCE

This page has intentionally been left blank
This page has intentionally been left blank

The typical maximum instantaneous charge (MIC) for a blast would be in the order of 216kg in waste rock and 117kg in ore, although the MIC would be varied in line with on-site experience and Bowdens Silver's commitment to satisfy all blast limits at all privately-owned residences unless subject to negotiated agreements with these residents throughout the mine life. While production blasting would take place in 5m benches, a flitch height of 2.5m would be used in excavating and loading ore and waste rock.

Pre-split blasting would be adopted to achieve the required stability of the final or terminal open cut pit walls, particularly in the fresh rock zones.

Bulk ammonium nitrate emulsion or ammonium nitrate/fuel oil (ANFO) would be used in production blasting. The selection of the type of explosive used would reflect a range of parameters including the presence or absence of water within each bench to be blasted. All drill and blast operations would be supervised by a suitably qualified and experienced blasting engineer or shot-firer.

Bowdens Silver would establish a protocol to inform interested surrounding landowners and residents about the timetable for blasts. Whenever possible, blasts would be initiated generally at a similar time of day. Further information on the management of blasts and the proposed design and operational safeguards is provided in Section 4.3.

2.4.3.3 Load and Haul

Following completion of each blast, boundaries between ore and each type of waste rock would, if required, be identified and marked out on the fragmented materials using paint, tape or similar materials. Fragmented material would then be loaded into haul trucks using a hydraulic excavator and transported to the ROM pad, WRE, the southern barrier or any infrastructure component being constructed using NAF waste rock.

At the commencement of mine production, one excavator, used in backhoe configuration, would be matched with a fleet of three off-road 90t capacity haul trucks. The trucking requirements would increase over time as the open cut pits deepen and haul distances increase. The initial strategy for the placement of waste rock would involve its placement in such a manner that the placed material provides a noise barrier for subsequent deliveries of waste rock to the WRE or the southern barrier. It is anticipated an additional 90t capacity haul truck would be required at around Year 3 of the mine's operation.

2.5 WASTE ROCK MANAGEMENT

2.5.1 Introduction

During mining operations, material containing insufficient quantities of silver, zinc and/or lead to justify processing would be identified as part of infill drilling and potentially during the analysis of blast hole cuttings. The WRE would be the sole repository for all PAF waste rock extracted from the open cut pits which would be transported via the internal haul road network to the WRE for placement and encapsulation. All NAF waste rock would be transported via the internal road network (and a 1.4km section of the relocated Maloneys Road) to its point of use for on-site construction activities such as the staged development of the TSF embankment, backfilling of satellite pits east and west, placement in the southern barrier for subsequent retrieval and for rehabilitation activities.

This subsection describes the characteristics of the waste rock that would be generated throughout the mine life, its management and uses including the design and development sequence of the WRE and the use of waste rock in the development of the southern barrier. The use of waste rock for the construction of the TSF embankment is discussed in Section 2.8. Section A5.4 of Appendix 5 of the EIS provides further information regarding the waste rock characterisation, quantities and the design/construction of the WRE.

2.5.2 Waste Rock Characterisation and Quantities

Static and kinetic testing of a representative set of waste rock samples by Graeme Campbell and Associates (GCA) has enabled the waste rock within the proposed open cut pits to be classified according to the total sulphur content within either the weathered or primary (unweathered or fresh) zones.

- Weathered Zone
  - WZ1: Total Sulphur content < 0.3% (NAF)
  - WZ2: Total Sulphur content ≥ 0.3% (PAF)
- Primary (Unweathered or fresh) Zone
  - PZ1: Total Sulphur content < 0.1% (NAF)
  - PZ2: Total Sulphur content 0.1% to < 0.3% (NAF)
  - PZ3: Total Sulphur content ≥ 0.3% (PAF)

The detailed results of the testing and the implications upon the management of the different types of waste rock are presented in GCA (2020).

The two waste rock types classified as PAF (WZ2 and PZ3) would account for approximately 26.6 million tonnes (or 57% of the total volume of waste rock to be generated throughout the mine life). The quantity of each PAF waste rock classification and their approximate percentage of the total volume of PAF waste rock is as follows.

- WZ2: 4.1 million tonnes (9%)
- PZ3: 22.5 million tonnes (91%)

The three waste rock types classified as NAF (WZ1, PZ1 and PZ2) would account for approximately 19.8 million tonnes (or 43% of the total volume of waste rock to be generated throughout the mine life). The quantity of each NAF waste rock sub-classification and its approximate percentage of the total volume of NAF waste rock is as follows.

- WZ1: 10 million tonnes (50%)
- PZ1: 3.5 million tonnes (18%)
- PZ2: 6.3 million tonnes (32%)

A breakdown of the anticipated annual volumes of waste rock that would be produced is presented in Appendix 5 of the EIS.

2.5.3 Waste Rock Storage and Encapsulation

Bowdens Silver proposes to utilise and/or store the 19.8 million tonnes of NAF waste rock recovered during the mining operations as a construction material within the following.

- WRE: (progressive construction of the lower and upper embankments, haul road, flood protection bund, noise barrier and cover and capping to produce the final landform at the end of the Project life).
  - 0.6 million tonnes for WRE construction.
  - 2.5 million tonnes for WRE cover and capping.
- TSF: (staged construction and retained landform at the end of the Project life).
  - Up to 7.3 million tonnes for construction (Stage 1 = 2.0Mt; Stage 2 = 2.2Mt; Stage 3 = 3.1Mt).
  - 5.7 million tonnes for TSF capping.
- Southern Barrier: stockpile landform removed at the end of the Project life.
  - Initial Barrier (approximately 4.9 million tonnes): comprising the initial Stage 1 development of the southern barrier, constructed by end of Year 6 and retained until the end of the mine life when the materials would be progressively removed and utilised for rehabilitation across the Mine Site.
  - Extended southern barrier (maximum of approximately 3.9 million tonnes): progressively developed in stages over the mine life and utilised for the stockpiling of construction material for the staged development of the TSF embankment raises or the closure and capping of the WRE and TSF. The southern face of this temporary landform would be retained over the mine life.
- Satellite pits east and west and the southern sections of the main open cut pit: backfilling upon completion.
  - Up to 1.9 million tonnes.

The WRE would be designed and constructed to encapsulate the 26.6 million tonnes of PAF waste rock that would be generated throughout the mine life.

Table A5.9 within Appendix 5 of the EIS provides an annual summary of NAF waste rock generation, storage and utilisation. It is anticipated that the Southern Barrier would progressively be removed as the stored material is used for rehabilitation activities with an estimated surplus of 1.8 Mt of NAF waste rock available for additional rehabilitation works.

2.5.4 Waste Rock Emplacement

2.5.4.1 Design

The proposed layout of the WRE is presented in **Figure 2.8** and has been designed to provide for the long term storage and encapsulation of compacted PAF waste rock in a constructed landform that would be developed via a sequence of seven cells. The WRE would effectively form an integrated landform between the ridge immediately east of the main open cut pit and Price Creek. The indicative design criteria for the WRE are as follows.

- Area – 77ha
- Maximum elevation – 670m AHD
- Height of each lift – 10m
- Width of construction berms – 4m
- Slope of final external faces – 1:3 (V:H)

The WRE would also include the following design elements that have been included for the purpose of waste rock management and access and environmental management.

- Internal drainage system and leachate management dam.
- A 1.5mm low permeability HDPE liner.
- Upper, lower and intercell embankments.
- WRE lower embankment haul road.
- A flood protection bund.
- A noise barrier.

Further details of the design elements of the WRE and its construction are presented in Section A5.4.4 of Appendix 5 of the EIS.

2.5.4.2 Development

The construction of the WRE would commence in the north of the Mine Site with vegetation clearing, topsoil and subsoil removal and storage and the excavation of the required area for waste rock placement in WRE Cell 1 and WRE Cell 2. Following vegetation clearing and soil removal, construction of the WRE design components would commence with the construction of the lower embankment and haul road (including flood bund and noise barrier) along the entire downstream perimeter of the WRE. As well the construction of the upper embankment and two intercell embankments (Cell 1 and Cell 2) that would provide the anchor points for the 1.5mm HDPE liner would be installed to underlie the emplaced PAF waste rock and intercept seepage. Excavated material from within the footprint of the WRE, as well as NAF waste rock from the open cut pits, would be utilised for the construction of the WRE embankments.

The leachate management dam, adjacent to a southern section of the lower embankment, would be constructed as part of the site establishment and construction activities and would involve the excavation of the dam area, construction of the dam embankment using the excavated material, and installation of a 1.5mm thick HDPE liner. Once constructed, the dam would be connected to the leachate sump within the active WRE cell via HDPE pipe.

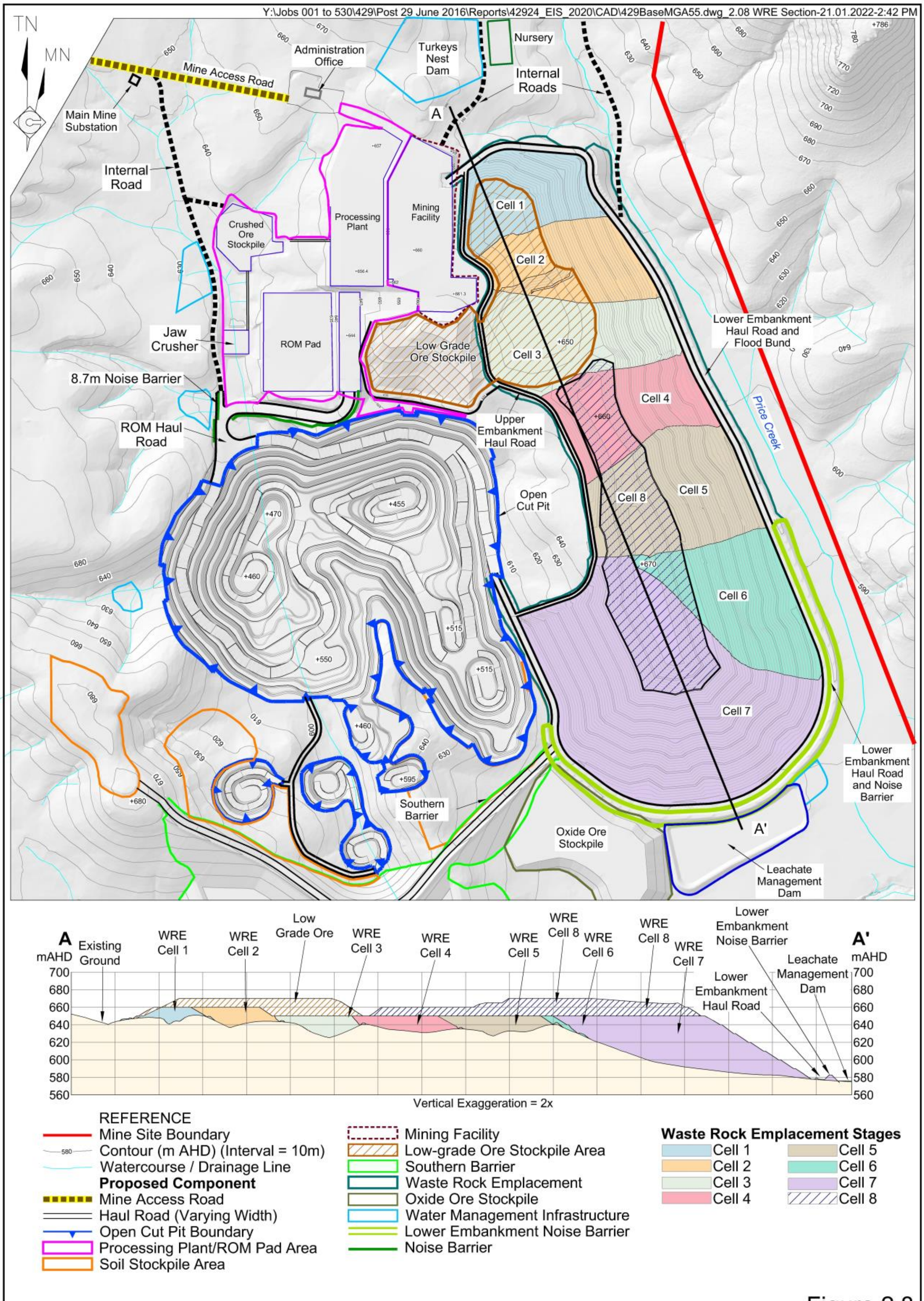


Figure 2.8
WASTE ROCK EMPLACEMENT LAYOUT AND SECTION

Once the construction of WRE Cell 1 and Cell 2 and the leachate management dam has been completed, it would be feasible to begin placing the PAF waste rock within Cell 1.

During mining operations, each of the WRE cells would be developed in sequential lifts (approximately 10m high). Typically, this would occur from the lower embankment of the respective cell, up and west towards the main open cut pit. This would enable the construction of a series of noise bunds, typically 5m higher than the lift level, that would be constructed along the outer perimeter of the respective lift and relied upon during the progressive development of the WRE. The PAF waste rock would then be placed in the respective cell in horizontal layers of approximately 2m depth, spread and compacted using a bulldozer to achieve a density of approximately 2t/m^3 so as to achieve a stable, level and compacted surface. PAF waste rock would be transported from the open cut pits using haul trucks which would transport the material to the respective cell and lift via the lower embankment haul road. As the incremental 10m lifts increase the height of the cell being developed, some of the PAF waste rock may be transported from the open cut pits via the haul road on the upper embankment.

2.5.4.3 Development Sequence

Figure 2.9 displays the sequential development of the WRE from north to south. The indicative operational years for each of the cells are as follows.

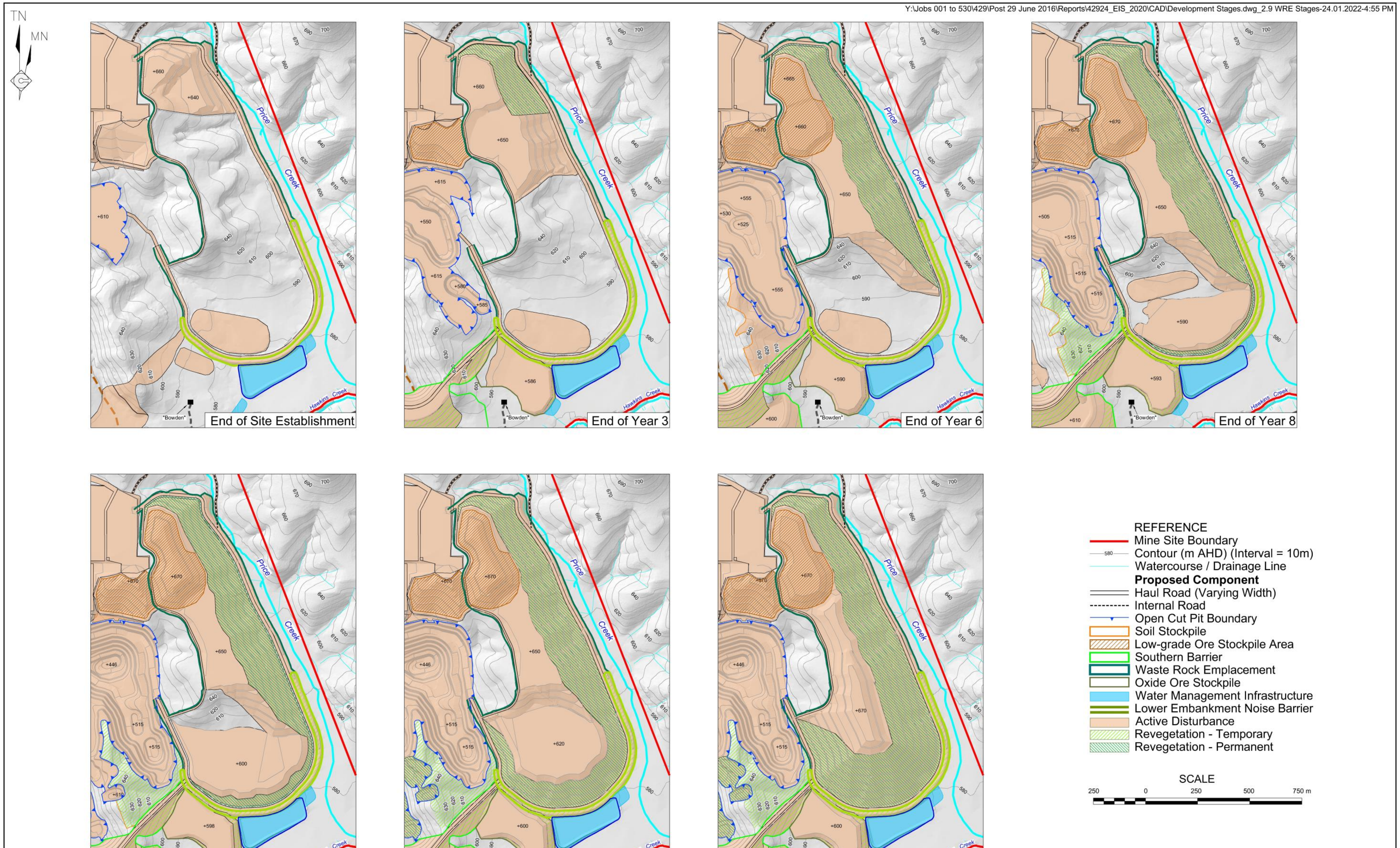
- Cell 1: site establishment and construction stage – Year 1
- Cell 2: Year 1
- Cell 3: Year 1 – Year 2
- Cell 4: Year 2 – Year 3
- Cell 5: Year 3 – Year 4
- Cell 6: Year 4 – Year 5
- Cell 7: Year 6 – Year 15

Following the completion of each lift, the PAF waste rock would be capped and covered with compacted, clayey material that would be obtained either during the development of the WRE cells or from the stockpiled subsoil material that would be stripped from the disturbed areas of the Mine Site during the site establishment and construction stage.

2.5.5 Southern Barrier

The southern barrier would be the repository for all excess NAF waste rock not required for the on-site construction activities. The southern barrier would be developed across Blackmans Gully, directly south of the open cut pits for the purpose of stockpiling NAF waste rock that would subsequently be utilised for closure and rehabilitation activities. In addition to being proximal to the open cut pits, thus resulting in shorter haul distances for waste rock, the principal selection criterion for the location of the southern barrier was to provide for a noise and visual barrier that would shield the open cut pits, ROM pad, processing plant and associated mining infrastructure from points to the south of the Mine Site.

The southern barrier would comprise an initial barrier which would incorporate a 15m wide haul road with a 5m high noise barrier along the crest and an extended barrier (see **Figure 2.10**). Apart from the NAF waste rock that would be required to construct components such as the WRE embankments, lower embankment haul road and bunds as well as the TSF embankment, the southern barrier would be the principal destination for all NAF waste rock generated during mining operations.



Source: Modified after Advisian

Figure 2.9
WASTE ROCK EMPLACEMENT
DEVELOPMENT SEQUENCE

This page has intentionally been left blank

This page has intentionally been left blank

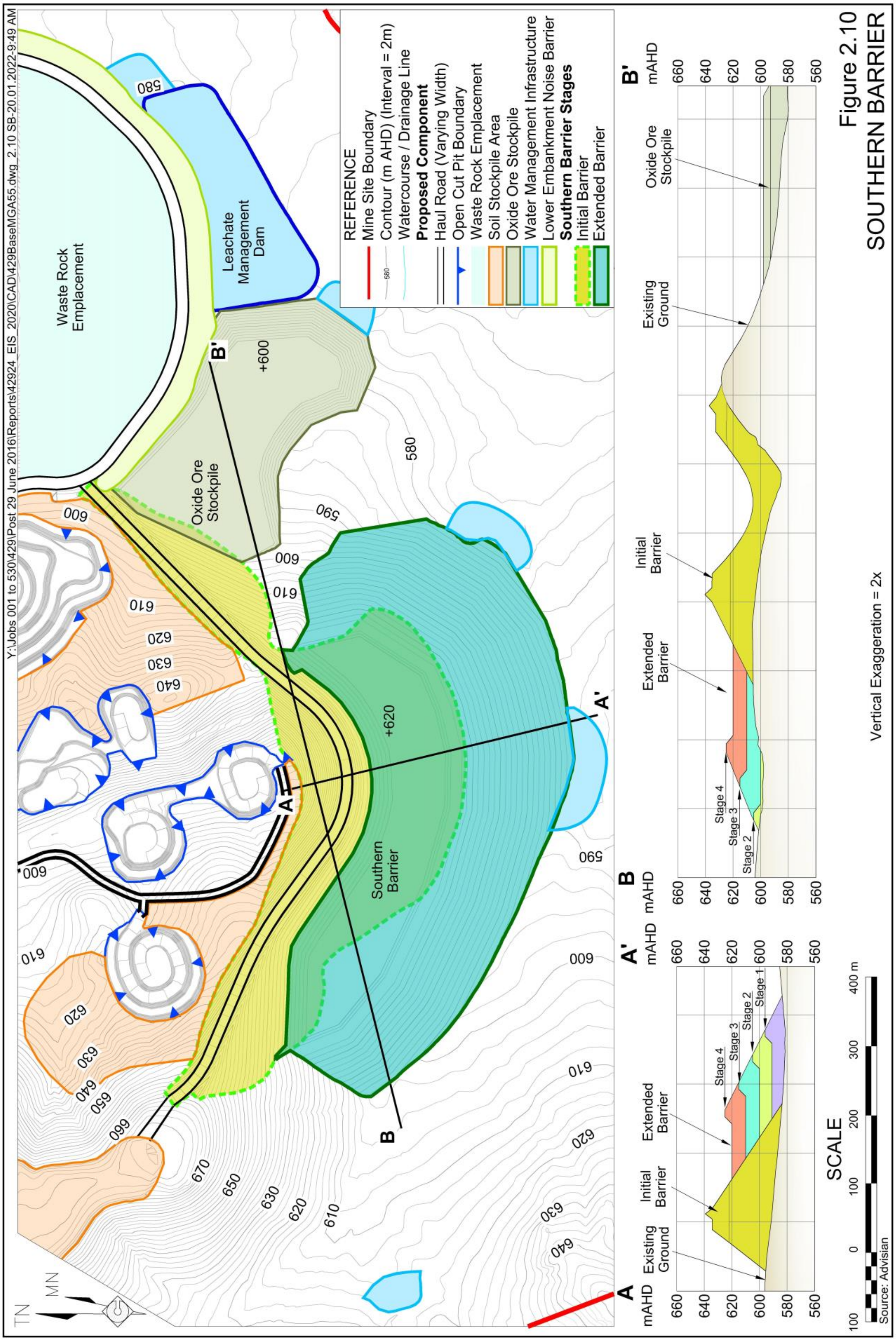


Figure 2.10
SOUTHERN BARRIER

Figure 2.10 presents the overall footprint of the southern barrier, including cross-sections through the initial barrier and the extended barrier. The indicative elements of the southern barrier are as follows.

- Area - 32ha
- Key elevations
  - Initial barrier (including access road acoustic barrier), Blackmans Gully - 640m AHD
  - Extended barrier, maximum elevation - 625m AHD
- Height of each lift - 10m
- Slope of final faces
  - Initial barrier - 1 :3 (V:H)
  - Extended barrier - 1:4 (V:H)
- Maximum volume of stockpiled NAF waste rock - 8.8 million tonnes (Year 12)

Section A5.4.5 of Appendix 5 of the EIS provides information on the staged construction of the southern barrier.

2.6 LOW GRADE AND OXIDE ORE STOCKPILES

Low grade ore and oxide ore generated by the mining operations would be stockpiled throughout the mine life. Processing of these materials would be dependent upon either the economic conditions (low grade ore) or treatment (processing) requirements (oxide ore). In the event they are not processed, quantities of the low grade ore and oxide ore may remain in part, or in full at the end of the Project life.

2.6.1 Low Grade Ore

2.6.1.1 Introduction

Geological investigations established that, of the 29.9 million tonnes of recoverable ore, approximately 6.1 million tonnes contains silver equivalent grades that are less than but approaching 30g/t and which are considered uneconomic at current or projected silver prices and therefore considered as low grade ore. Bowdens Silver proposes to make provision to stockpile up to 2.7 million tonnes of low grade ore adjacent to and above the three northern cells of the WRE to allow for the selective processing of this material should either economic conditions support its processing or to manage process grade control. Given the capacity of the processing plant would be approximately 2 million tonnes per year and the quantity of primary ore extracted in a number of years would not approach 2 million tonnes, it is likely that a considerable proportion of the low grade ore would be processed during most years of operation.

2.6.1.2 Characterisation

Static and kinetic testing of a representative set of waste rock samples by Graeme Campbell and Associates (GCA, 2020) has enabled the low grade ore to be classified according to the total sulphur content within either the weathered or primary (unweathered) zones of the Bowdens silver deposit. As a consequence of the testing, the low grade ore is anticipated to exhibit similar variation in geochemical behaviour to that of the waste rock sub-classifications described in Section 2.5.2. However, given there would be no segregation of the low grade ore based upon its acid-forming potential, all low grade ore would be treated as PAF.

2.6.1.3 Low Grade Ore Stockpile Design

Figure 2.11 displays the layout of the low grade ore stockpile and the sections through the eastern and western sections of the stockpile. The low grade ore stockpile would be developed in two distinct sections with the western section (5ha) located east of the ROM pad, whilst the eastern section (9ha) would be placed on the initial three completed cells of the WRE from 650m AHD. The key design features of the low grade ore stockpile are as follows.

- Total design capacity: 1.3Mm^3 (2.6 million tonnes)
  - Western section – 0.4Mm^3 (0.8 million tonnes)
  - Eastern section – 0.9Mm^3 (1.9 million tonnes)
- Maximum elevation: 670m AHD (western section)
- Width of construction berms: 4m
- Slope of final faces: 1:3 (V:H)

It is noted that any low grade ore stockpiled within the low grade stockpile area that is not processed at the end of the mine life would be capped and covered as part of the WRE closure and rehabilitation activities and shaped to produce the final WRE landform (see Section A5.10.5 of Appendix 5 of the EIS).

2.6.2 Oxide Ore

Geological investigations have established that approximately 1.8 million tonnes of oxidised rock mined would have sufficient silver, zinc and lead grades to warrant processing. However, processing of this ore would not be possible in the on-site processing plant as the plant is designed to solely process sulphide ores. Rather than mixing the oxide ore with the benign waste rock within the WRE, Bowdens Silver proposes to establish a dedicated stockpile area adjacent to the southwestern corner of the WRE for oxide ore. Its separate storage would provide the opportunity at some future date for the ore to be processed on site or at another location in conjunction with other similar ore.

Figure 2.11 displays the location of the oxide ore stockpile, covering an area of 8ha with a maximum elevation of approximately 600m AHD. Further details of the construction of the oxide ore stockpile is presented in Section A5.5.2 of Appendix 5 of the EIS. This location would enable the ultimate integration of the oxide ore stockpile into the final WRE landform should the processing of this material prove uneconomic.

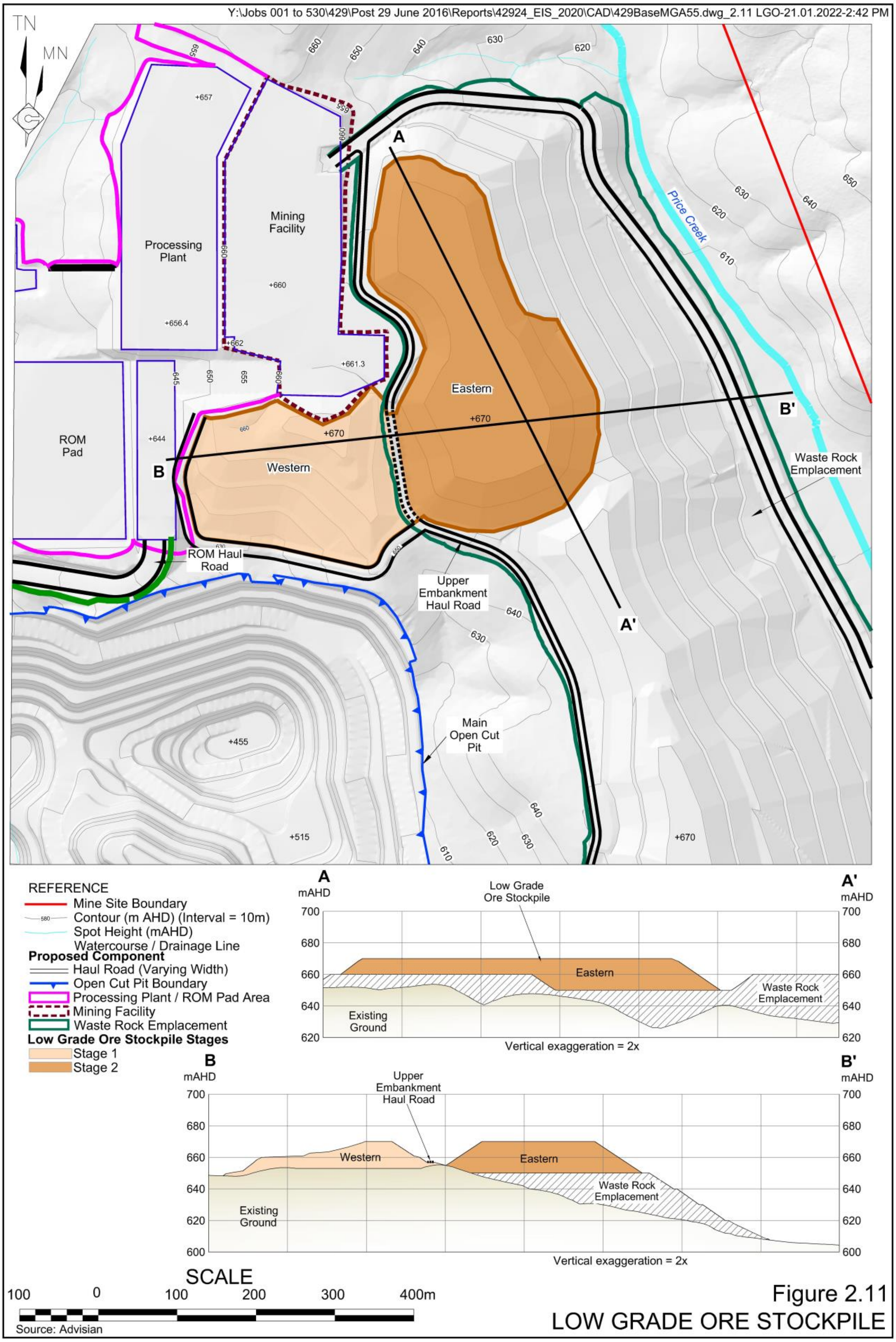


Figure 2.11
LOW GRADE ORE STOCKPILE

The key design features of the oxide ore stockpile are as follows.

- Design capacity: 0.9Mm^3 (1.8 million tonnes).
- Maximum elevation: 600m AHD.
- Width of construction berms: 4m.
- Slope of final faces: 1:3 (V:H).

2.7 PROCESSING OPERATIONS

2.7.1 Introduction

Bowdens Silver proposes to process all ore extracted from the open cut pits within an on-site processing plant to produce two mineral concentrates, namely:

- a silver/lead concentrate; and
- a zinc concentrate (with a small content of silver).

Based upon the processing of the defined 29.9 million tonnes of ore, Bowdens Silver would produce approximately 310 000t of mineral concentrates throughout the mine life, approximately 60% of which would be zinc concentrate and approximately 40% silver/lead concentrate. The bulk of the silver recovered would be within the silver/lead concentrate. Annual production of mineral concentrates would vary from approximately 20 000t to 30 000t with the quantity and proportion varying annually and reflecting the proportion of the recovered minerals in the ore extracted.

2.7.2 Processing Plant Design and Process Flowchart

The processing plant has been designed to process approximately 2 million tonnes per annum of ROM ore to produce silver/lead and zinc concentrates using sequential flotation. The processing plant includes the following principal components.

- A single stage primary jaw crusher.
- A crushed ore stockpile and reclaim.
- A semi-autogenous grinding (SAG) mill, ball mill and pebble crusher.
- Reagent mixing and distribution.
- A silver/lead flotation circuit comprising roughers, rougher concentrate re-grind and cleaners.
- Silver/lead concentrate thickening and filtration.
- A zinc flotation circuit comprising roughers, rougher concentrate re-grind and cleaners.
- Zinc concentrate thickening and filtration.
- Concentrate bagging/containerisation facilities and storage.
- Tailings thickening and pumping.

Figure 2.12 displays the conceptual layout of the processing plant whilst a simplified overall process flowsheet for the plant is shown in **Figure 2.13**. The components of the processing plant that would be enclosed are highlighted on **Figure 2.12**. The design maximises the use of gravity flow although some pumping would be required. **Figure 2.14** displays a perspective sketch of the main components of the processing plant.

2.7.3 Reagent Management

Table 2.4 lists the reagents that would be used within the processing plant in order of expected annual consumption together with their function, chemistry, storage, quantities, the maximum quantity held on site at any time, annual usage and fate of each reagent. Section 4.16.1.3 discusses the on-site management and use of sodium cyanide in the context of the potential hazard created by this chemical.

Table 2.4
Processing Plant Reagents

Reagent	Chemistry	Function	Form / Container	Annual Usage (tpa)	Maximum Quantity on Site	Fate of Reagents
Hydrated lime/ soda ash	$CaOH/Na_2CO_3$	pH Adjustment	Powder / 60t silo	1 236	60t	Tailings
Zinc sulphate	$ZnSO_4.7H_2O$	Zinc Depressant	Powder / 1t bulk bag	610	50t	Tailings
Copper sulphate	$CuSO_4.5H_2O$	Activator	Powder / 1t bulk bag	450	40t	Tailings
MIBC	Methyl Isobutyl Carbinol	Frother	Liquid / 800kg IBC	222	20t	Tailings / Decomposed
Sodium cyanide#	NaCN	Zinc Depressant	Pellets / Isotainer	190	20t	Tailings / Decomposed
Flocculant	Anionic polyacrylamide	Flocculation	Powder / 0.8t bulk bag	139	12t	Tailings
Lead collector	Na - diisobutyl dithiophosphinate	Lead Collector	Liquid / 1000L IBC	24	4t	Most to Concentrate / Balance to Tailings
Zinc collector	Na isobutyl dithophosphate	Zinc Collector	Liquid / 1000L IBC	22	4t	Most to Concentrate / Balance to Tailings
Caustic Soda	NaOH	pH Adjustment	Flake / 25kg bag	2.5	1t	Tailings
Antiscalant	Polycarboxylic acid or similar	Antiscalant	1000L IBC	20	4t	Tailings

* IBC = Intermediate Bulk Container
# NaCN would be added with a concentration of 66mg/L

Details of the initial development of the processing plant and mining facility as well as individual processing components and the management of the mineral concentrates, process water and reagents is presented in Section A5.6 of Appendix 5 of the EIS.

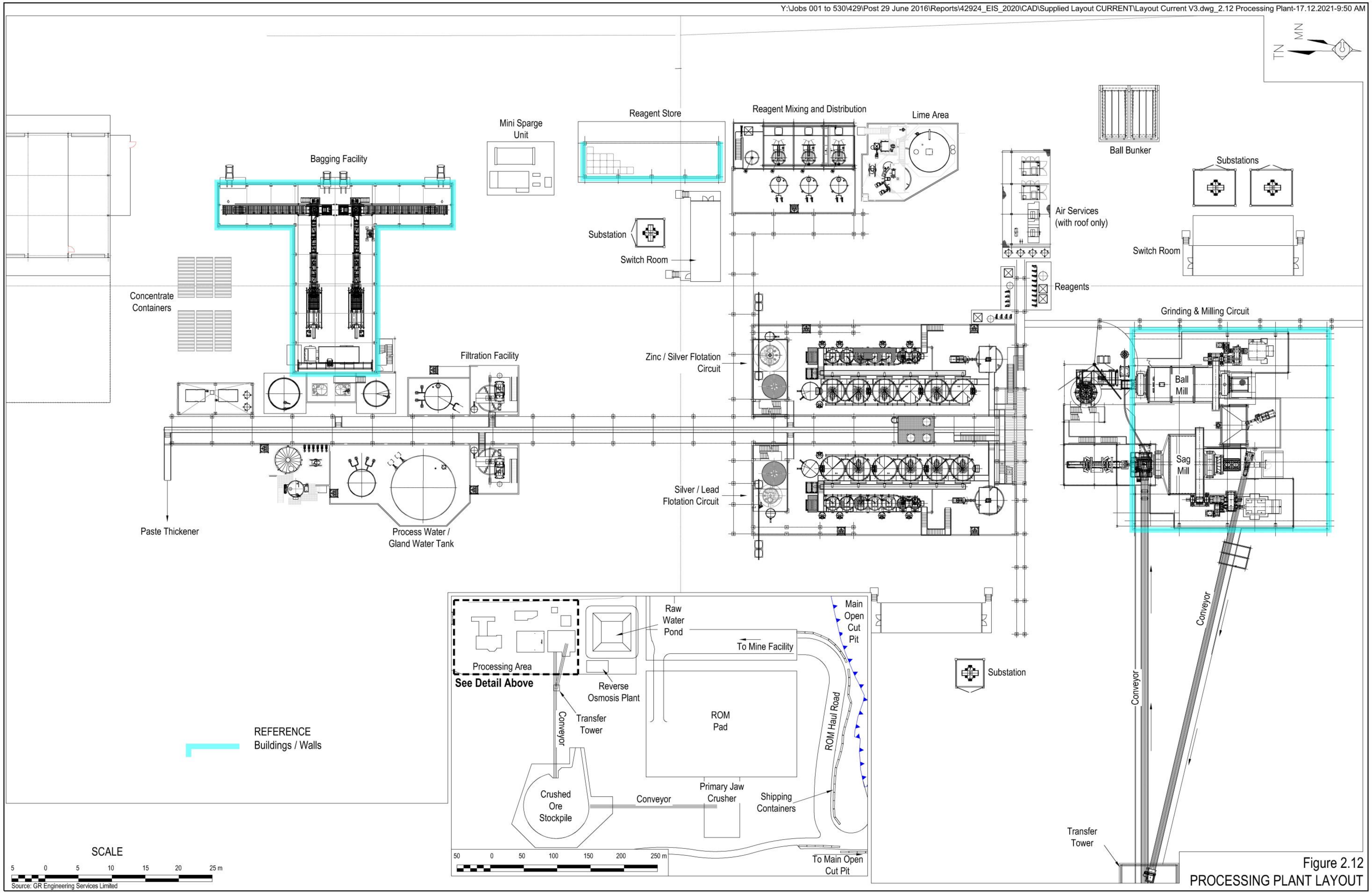
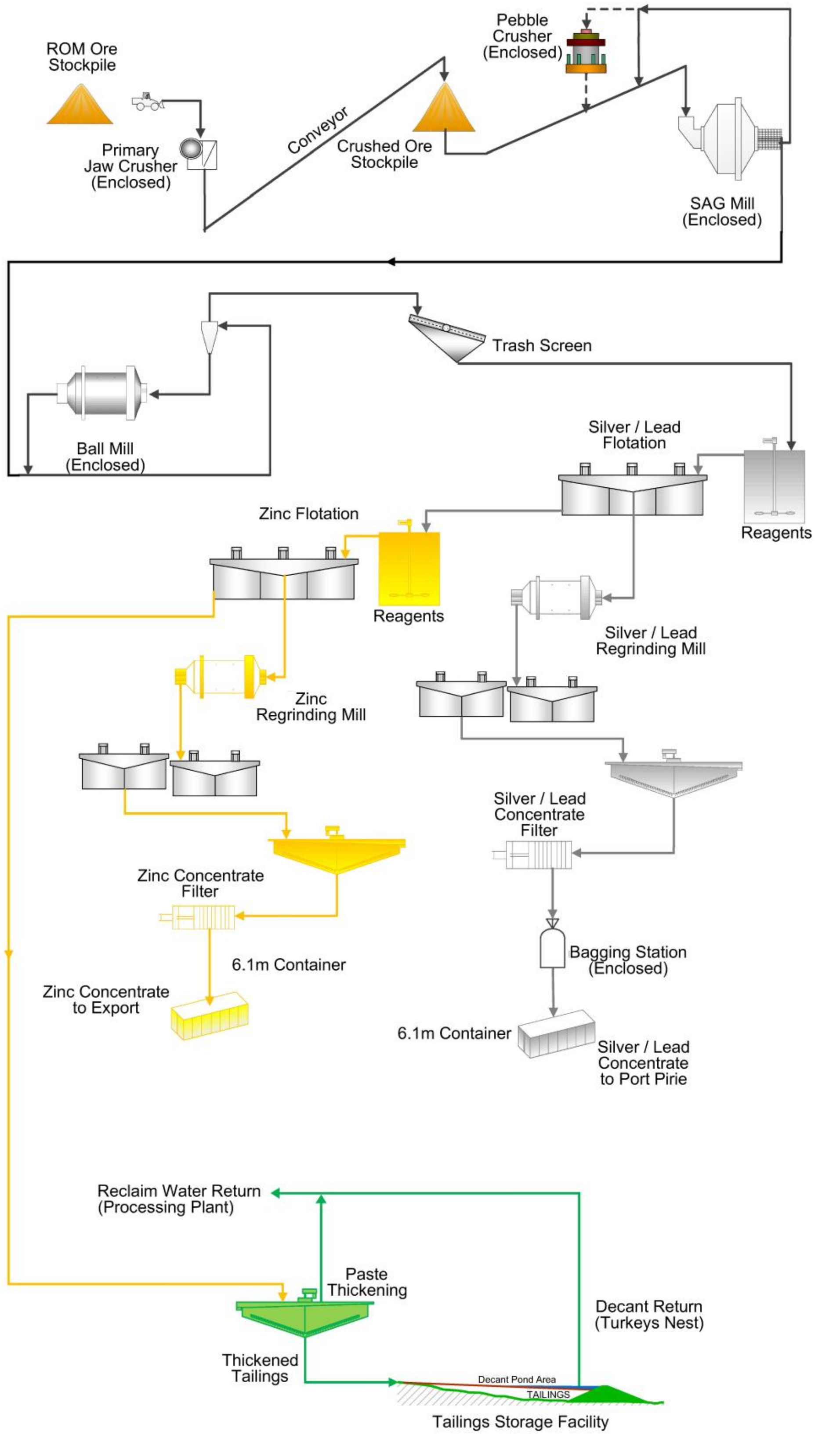


Figure 2.12
PROCESSING PLANT LAYOUT

This page has intentionally been left blank

This page has intentionally been left blank

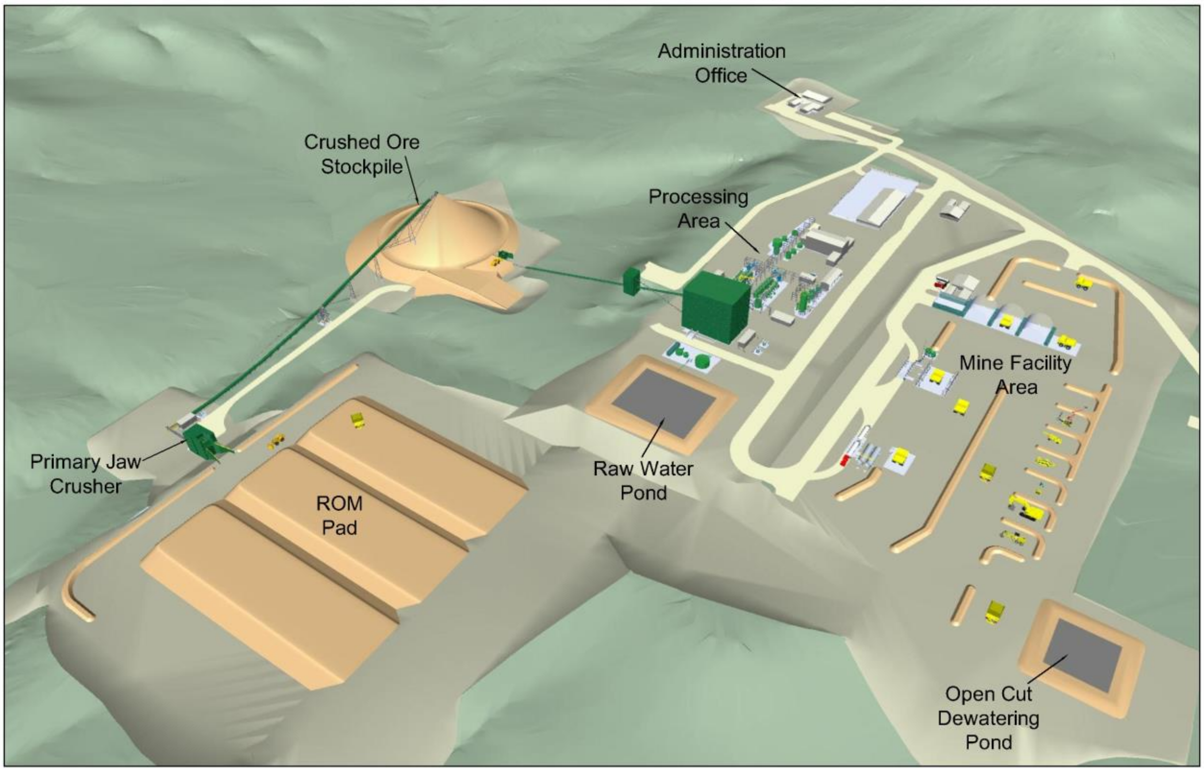
Y:\Jobs 001 to 530\429\Post 29 June 2016\Reports\42924_EIS_2020\CAD\429BaseMGA55.dwg_2.13 Processing Plant Flow Sheet-17.12.2021-9:41 AM

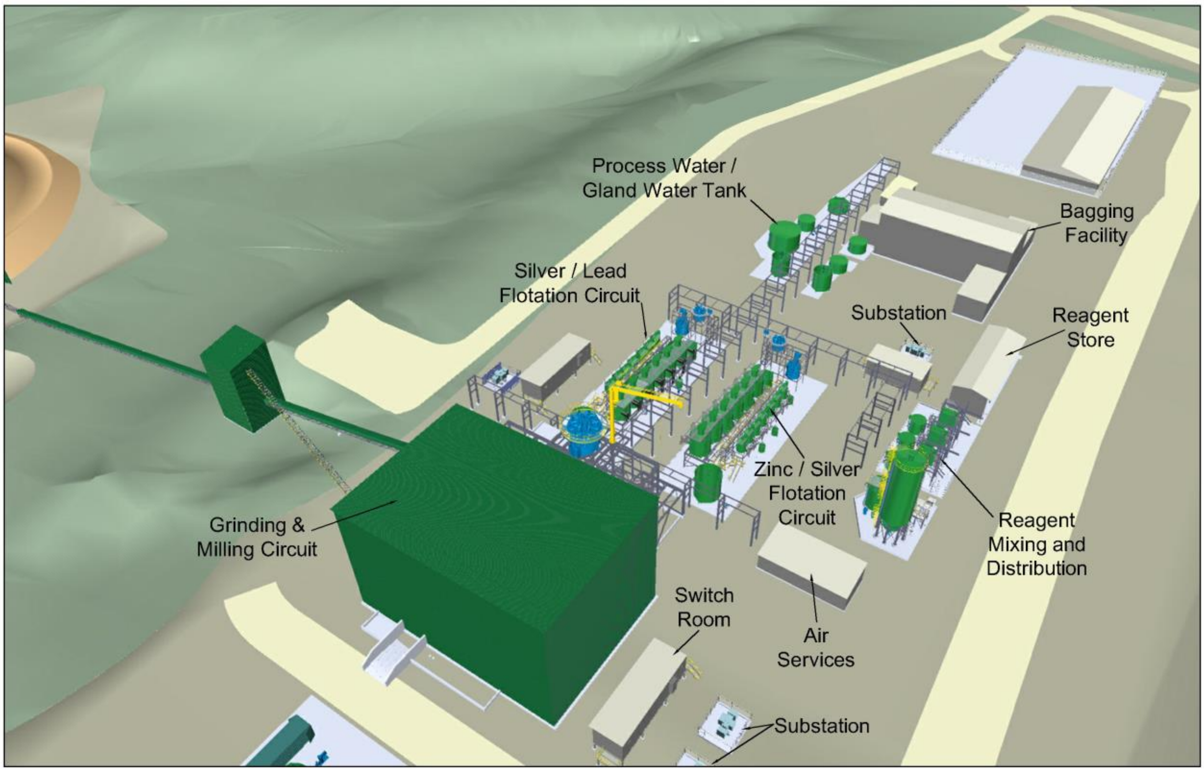


Source: GR Engineering Services Limited

Figure 2.13
PROCESSING PLANT FLOWSHEET

Y:\Jobs 001 to 530\429\Post 29 June 2016\Reports\42924_EIS_2020\CAD\429BaseMGA55.dwg_2.14 Processing Plant-24.01.2022-12:43 PM





Source: GR Engineering Services Ltd

Figure 2.14
PROCESSING PLANT
PERSPECTIVE SKETCH

2.8 TAILINGS MANAGEMENT

2.8.1 Introduction

As part of the processing operation, a thickened tailings slurry (from which the majority of the silver, zinc and lead minerals would be removed) would be pumped to the paste thickener. The paste thickener, positioned on the ridge in the central section of the Mine Site (see **Figure 2.15**), would reclaim process water from the tailings slurry for return and re-use in processing operations. Paste thickened tailings (approximately 63% w/w solids) would then be discharged into the tailings storage facility (TSF) situated in the western section of the Mine Site, in the valley of Walkers Creek (see **Figure 2.15**). The preliminary design of the TSF has been undertaken by ATC Williams Pty Ltd, engineers specialising tailings management. The report describing the preliminary design of the TSF is reproduced as Part 16A of the *Specialist Consultant Studies Compendium*.

The TSF would comprise an embankment which would be constructed in three stages and an area behind the embankment referred to as the impoundment area in which to store the tailings and water released from the tailings. The TSF embankment would be constructed with its raises progressing downstream, as opposed to the upstream tailings dam raise method that has been associated with recent overseas tailings dam failures. Since the tailings decant pond would sit against the TSF embankment, the embankment has been designed as a conventional water retaining embankment with a bituminous liner.

A NAF waste rock stockpile area covering approximately 10ha would be established immediately downstream from the TSF embankment for the storage of NAF waste rock transported from the main open cut pit until it is used in the construction of each raise for the TSF embankment. A mobile crushing and screening plant would be positioned within the TSF NAF waste rock stockpile area to produce the required crushed products for the construction of the TSF embankment. During the early stage of each crushing campaign, a barrier built from shipping containers would be positioned to mitigate noise generated by the plant in the event insufficient waste rock is available for use as an acoustic barrier.

Appendix 5 (Section A5.7) provides an overview of the characteristics of the tailings, details of the TSF components and the construction and operation of the TSF.

2.8.2 Tailings Storage Facility Design

2.8.2.1 Design Objectives

The tailings impoundment area would be contained by an embankment across the upper section of the valley of Walkers Creek. A plan showing the TSF layout is shown in **Figure 2.15**. The key design objectives of the TSF are as follows.

- To minimise water losses through seepage through the embankment and floor of the impoundment.
- To provide tailings, decant and rainfall storage capacity with sufficient freeboard to prevent overtopping of the TSF embankment.

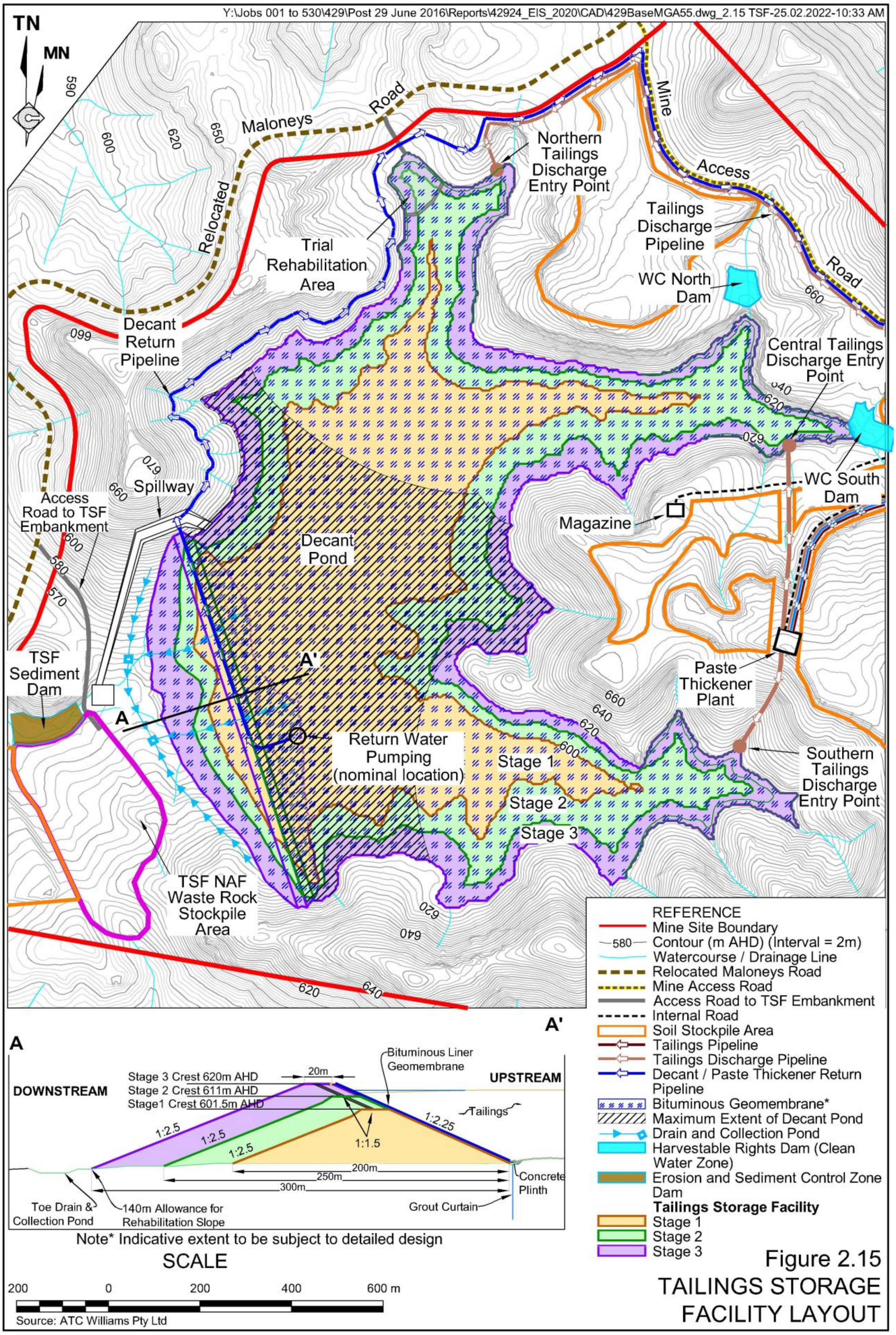


Figure 2.15
TAILINGS STORAGE FACILITY LAYOUT

- To provide a robust and serviceable structure, in particular the embankment, under operational and earthquake loadings.
- To provide capacity for the controlled discharge via an emergency spillway in rare and extreme rainfall events whilst maintaining the structural integrity of the TSF embankment[9].
- To manage the available storage volume effectively to maximise the return of decant water to the processing plant for recycling and reuse.
- To maximise the utilisation of construction materials drawn from the main open cut pit.

2.8.2.2 Design Criteria

The TSF would be designed, constructed and operated in accordance with the Australia National Council on Large Dams (ANCOLD) 2012 Guidelines on Tailings Dams under the supervision of Dams Safety NSW (DS NSW) for the provision of secure and safe tailings storage and to meet the design objectives outlined above. The overarching intent of these guidelines is for the TSF to have minimal impact on the existing surrounding environment.

The design criteria for a given dam are based on the "Consequence Category" for the structure that is determined through the evaluation of the potential consequences should water and tailings be released from the TSF as a result of dam failure.

The design criteria for the TSF are based on a High C Consequence Category that is required by the DS NSW for a TSF which impounds PAF waste rock in a rural environment. The key elements of the design criteria adopted from the ANCOLD guidance are as follows.

- Design Storage Allowance: 72-hour 1% AEP[10] (1 in 100 year) rainfall event, i.e. 100 year ARI[11].
- Contingency Freeboard (to dam embankment crest): 0.5m.
- Wave Run-up (to spillway invert): 0.5m.
- Emergency Spillway Capacity: 0.00001% AEP (100 000 year) rainfall event, i.e. 100 000 year ARI.
- Seismic Event (embankment stability):
  - Operating Basis Earthquake: 0.001% AEP (1 000 year ARI); and
  - Maximum Design Earthquake: 0.0001% AEP (10 000 year ARI).

[9] All tailings storage facilities must be designed and operated at all times with a minimum freeboard (capacity) to retain design floods without the need to discharge. Subsequently, whilst no operational discharge from the TSF is proposed, ANCOLD and NSW DSC require the TSF design considers safe discharge during a rainfall event which exceeds the TSF design flood so as to maintain the structural integrity of the TSF. This is achieved via an emergency spillway that can pass higher floods in a controlled fashion and safely direct flows away from the embankment.

[10] AEP = Annual Exceedance Probability

[11] ARI = Average Recurrence Interval

Key design features of the TSF are as follows.

- Embankment footprint area = 16ha
- Impoundment surface area = 103ha
- Total area of disturbance – approximately 117ha.
- Development stages (embankment raises) – three.
- Method of embankment raise – downstream type.
- Maximum crest of embankment:
  - Stage 1 – 601.5m AHD (38m above the lowest natural ground level).
  - Stage 2 – 611m AHD (47m above the lowest natural ground level).
  - Stage 3 – 620m AHD (56m above the lowest natural ground level).
- Maximum capacity:
  - Stage 1 – 6 million tonnes
  - Stage 2 – 10 million tonnes (cumulative, 16 million tonnes).
  - Stage 3 – 14 million tonnes (cumulative, 30 million tonnes).
- Embankment crest widths – 12m to 20m and embankment base widths – 200m (Stage 1), 250m (Stage 2), 300m (Stage 3).
- Method of tailings deposition – down valley discharge from three locations (northern, central and southern tailings discharge points) connected to tailings pipeline.
- Method of water and decant management – collected and pumped from a fixed point in the decant pond for return via pipeline for reuse in the process circuit.
- Embankment construction – zoned rockfill with low permeability geomembrane / clay zone on the upstream face, a bituminous geomembrane (BGM) liner, curtain grouting along upstream toe, with connection of the BGM and grout curtain via a concrete plinth along the upstream toe.
- Indicative plans are to install a BGM liner (in addition to surface preparation) over the entire impoundment area, where feasible, to mitigate seepage potential. However, the maximum extent of the BGM would be refined through technical assessment during detailed design of the TSF and may be reduced, provided environmental impacts are not exacerbated.
- Embankment construction material – benign, NAF waste rock from the open cut pits as well as material stripped from within the TSF footprint.
- The perimeter of the impoundment area would be marked by a track retained for access, when required.

2.8.2.3 Geotechnical Considerations

A program of field investigation was conducted by ATC Williams Pty Ltd in May and June 2017 involving borehole drilling, test pit excavation and in-situ permeability tests to establish the condition and type of foundation materials, estimate the permeability of the foundation material and to identify any high permeability zones in the foundation material.

Foundation material samples were also collected during the investigation to identify the properties of the foundation materials and the potential for construction materials within the TSF footprint.

The investigation identified the following.

- Foundation material:
  - Depth to rock: 0.55m to 6.8m
  - Rock strength:
    - Valley west – moderate to very high
    - Valley east – weak to moderate
- Foundation permeability: 6.9 x 10^{-6}m/s to 1.6 x 10^{-10}m/s
- Site construction materials:
  - High plasticity clay
  - Medium to low plasticity clay
  - Sandy clay
  - Gravelly clay
  - Clayey sand
  - Clayey gravel

2.9 ROAD TRAFFIC AND TRANSPORTATION

2.9.1 Access to the Mine Site

Access to the Mine Site is currently provided via Lue Road, Pyangle Road and Maloneys Road (**Figure 2.16**). Lue Road is the main road between Mudgee and Rylstone whilst Pyangle Road and Maloneys Road are local roads.

Access to the Mine Site during the early stages of the site establishment and construction stage (until approximately the end of Month 6) would be provided by the existing road network, i.e. principally using Pyangle Road (from Lue Road) and Maloneys Road. Although warranted under existing traffic conditions, Bowdens Silver would widen the road shoulder on the southern side of Lue Road at the intersection of Lue Road and Pyangle Road to safely accept traffic generated for the Project.

Access to the Mine Site during the latter stages of the site establishment and construction stage (from about Month 7) and the entire operational stage would be via Lue Road, relocated Maloneys Road and the mine access road.

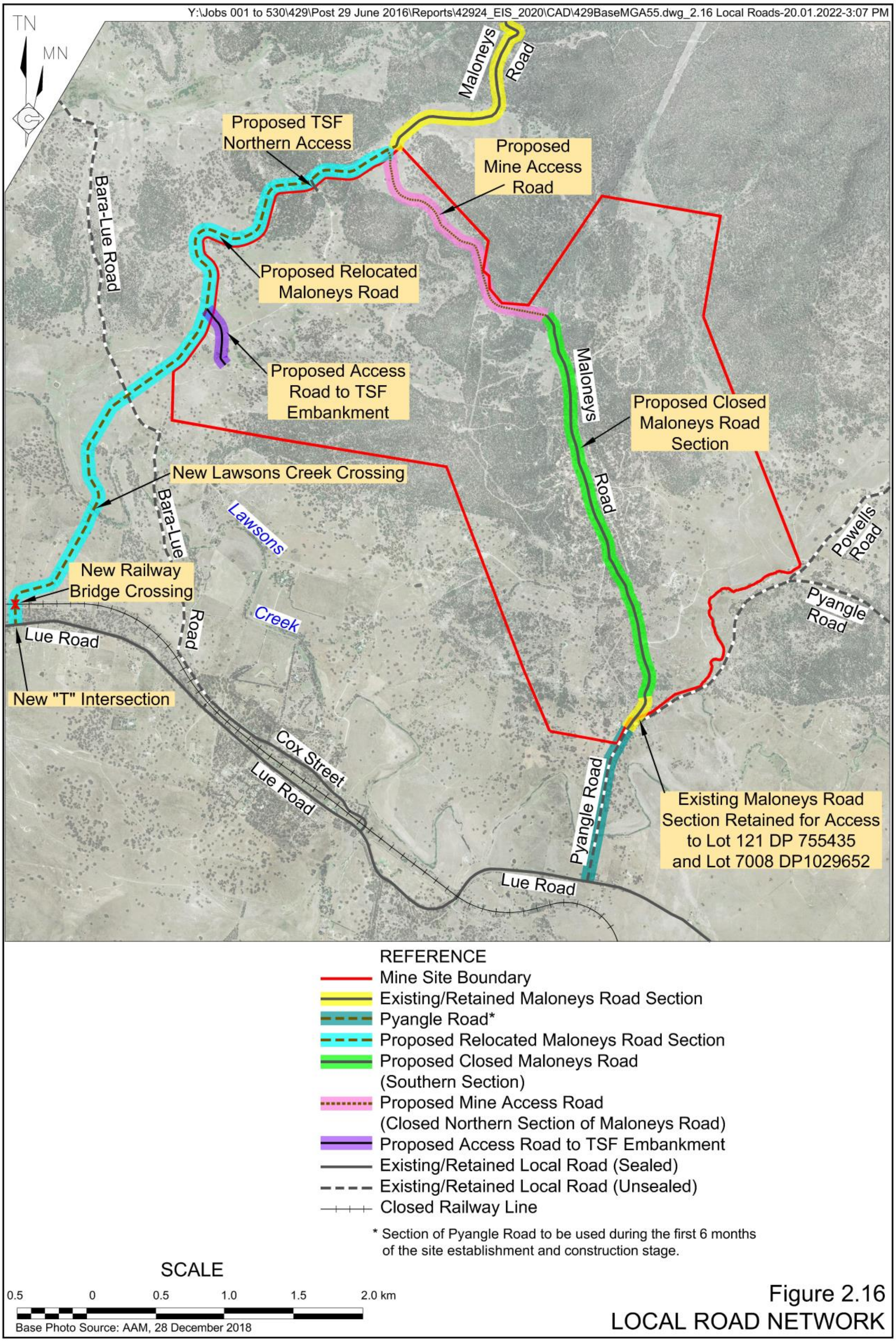


Figure 2.16
LOCAL ROAD NETWORK

Whilst it would be necessary for some heavy vehicles accessing the Mine Site during the initial 6 months of the site establishment and construction stage to transit through Lue, it is envisaged that by establishing access to the Mine Site from Lue Road to the west of Lue early in the development of the Project, very few heavy vehicles delivering components and consumables would pass through Lue in order to gain access to the Mine Site.

2.9.2 Relocated Maloneys Road

A 4.5km section of the existing Maloneys Road traverses the Mine Site. Consequently, Bowdens Silver proposes to permanently close that section of road and relocate it to a new location west of its current alignment (see **Figure 2.17**), forming a new section of public road. The relocated section of Maloneys Road would link the retained northern section of Maloneys Road with Lue Road and include a newly constructed "T-intersection" 1.8km west of Lue (see Section 2.9.2.1), a new railway bridge crossing (see Section 2.9.2.2) and a new crossing of Lawsons Creek (see Section 2.9.2.3). The section of road which is to be closed and relocated would require closure pursuant to the relevant provisions of the *Roads Act 1993*.

Once the relocated Maloneys Road is opened to traffic and the section of road through the Mine Site is formally closed by Mid-Western Regional Council, Bowdens Silver would place a gate at the southern end of the section of the former Maloneys Road that is closed and removed from public use. A 350m section of the former Maloneys Road would be maintained to provide access to Lot 121 DP 755435 and Lot 7008 DP 1029652. Bowdens Silver would continue to use the southern section of the former Maloneys Road (principally with light vehicles) to access the existing Bowdens exploration office and core library facilities. **Figure 2.17** displays the indicative alignment of the relocated Maloneys Road and the extent of cut and fill. The road would be constructed beyond the western boundary of the Mine Site to minimise the visibility of the activities within the Mine Site to motorists travelling along the road.

The full 5.2km length of the relocated Maloneys Road, from Lue Road to its connection with the retained Maloneys Road north of the Mine Site would be progressively sealed to achieve a Type 4 class road suitable for B-double vehicles. The section of Maloneys Road from the north beyond the intersection with the mine access road would be retained in its current form. Following the grant of development consent, details of the road alignment and associated infrastructure would be prepared in consultation with Council, DPIE Water and Transport for NSW's managing agent for the Country Regional Network (rail).

Details regarding the construction of the relocated Maloneys Road are presented in Section A5.8 (Appendix 5). All sections of road and associated infrastructure would be constructed during Months 3 to 6 of the Site Establishment and Construction Schedule (see **Table 2.2**) and would be completed in its final form prior to closure to the public of the section of Maloneys Road within the Mine Site.

The key design parameters of the relocated road are as follows.

- Total width – up to 11m, comprising.
  - 2 x lane widths of 3.5m;
  - 2 x shoulder widths of 1.0m; and
  - V drains up to 2.0m wide.
- Proposed maximum speed – 100km/hr (Note: This is the same speed limit posted on the existing Maloneys Road).

Further details regarding the additional infrastructure proposed for the relocated Maloneys Road are presented in the following subsections.

2.9.2.1 Relocated Maloneys Road/Lue Road T-Intersection

The relocated Maloneys Road/Lue Road T-intersection (see **Figure 2.17**) would be designed in accordance with Austroads design guidance and would comprise the following elements.

- An at-grade, 95m long single deceleration lane, left turn in for eastbound vehicles entering the relocated Maloneys Road from Lue Road.
- An at-grade, left turn out and 108m long single acceleration lane with merge for vehicles exiting the relocated Maloneys Road, entering Lue Road and travelling east towards Lue.
- A 108m long centre deceleration lane on Lue Road for westbound vehicles undertaking a right turn into the relocated Maloneys Road.

These lanes would be created by local widening, sealing and line marking of Lue Road.

The construction of the intersection would be undertaken in Months 3 and 4 to enable vehicular access to the proposed new railway bridge crossing.

2.9.2.2 Relocated Maloneys Road Railway Crossing

A new railway crossing would be constructed across the closed Wallerawang-Gwabegar Railway Line (see **Figure 2.18**). The crossing would involve the design and construction of a bridge in accordance with the Australian Standard, AS 5100:2017 (Bridge Design) and Country Rail Network construction standards. The bridge would be a dual lane concrete structure constructed with pre-cast concrete piles, headstocks, deck planks and retaining walls together with appropriate approach earthworks. The bridge would be completed with steel guardrails.

2.9.2.3 Lawsons Creek Crossing

The relocated Maloneys Road would cross Lawsons Creek via a new crossing that would be constructed approximately 1.2km downstream of the current Bara-Lue Road crossing of Lawsons Creek.

The proposed crossing would be designed to allow conveyance of bankfull discharge[12] within Lawsons Creek. Hydraulic modelling undertaken by WRM Water and Environment (WRM, 2022) identified bankfull discharge as generally corresponding with the 5% Annual Exceedance Probability, or 20-year average recurrence interval rainfall event. Conveyance of bankfull discharge would maintain habitat connectivity for aquatic fauna.

[12] Bankfull discharge is the flow at which water just fills a channel without overtopping the banks. For Lawsons Creek main channel, this would be approximately 430m^3/second with a water level of 529.7m AHD.

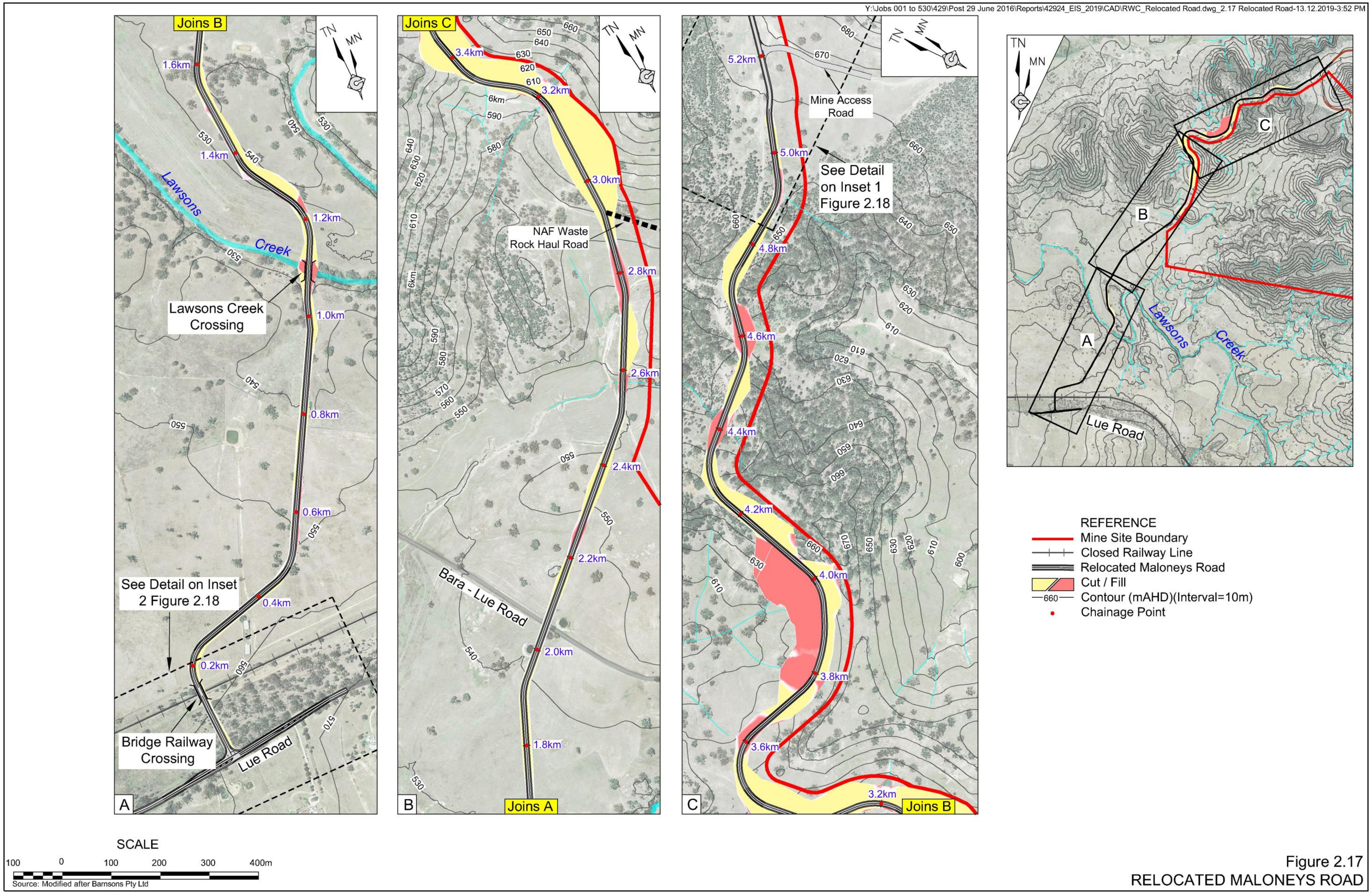


Figure 2.17
RELOCATED MALONEYS ROAD

This page has intentionally been left blank

This page has intentionally been left blank

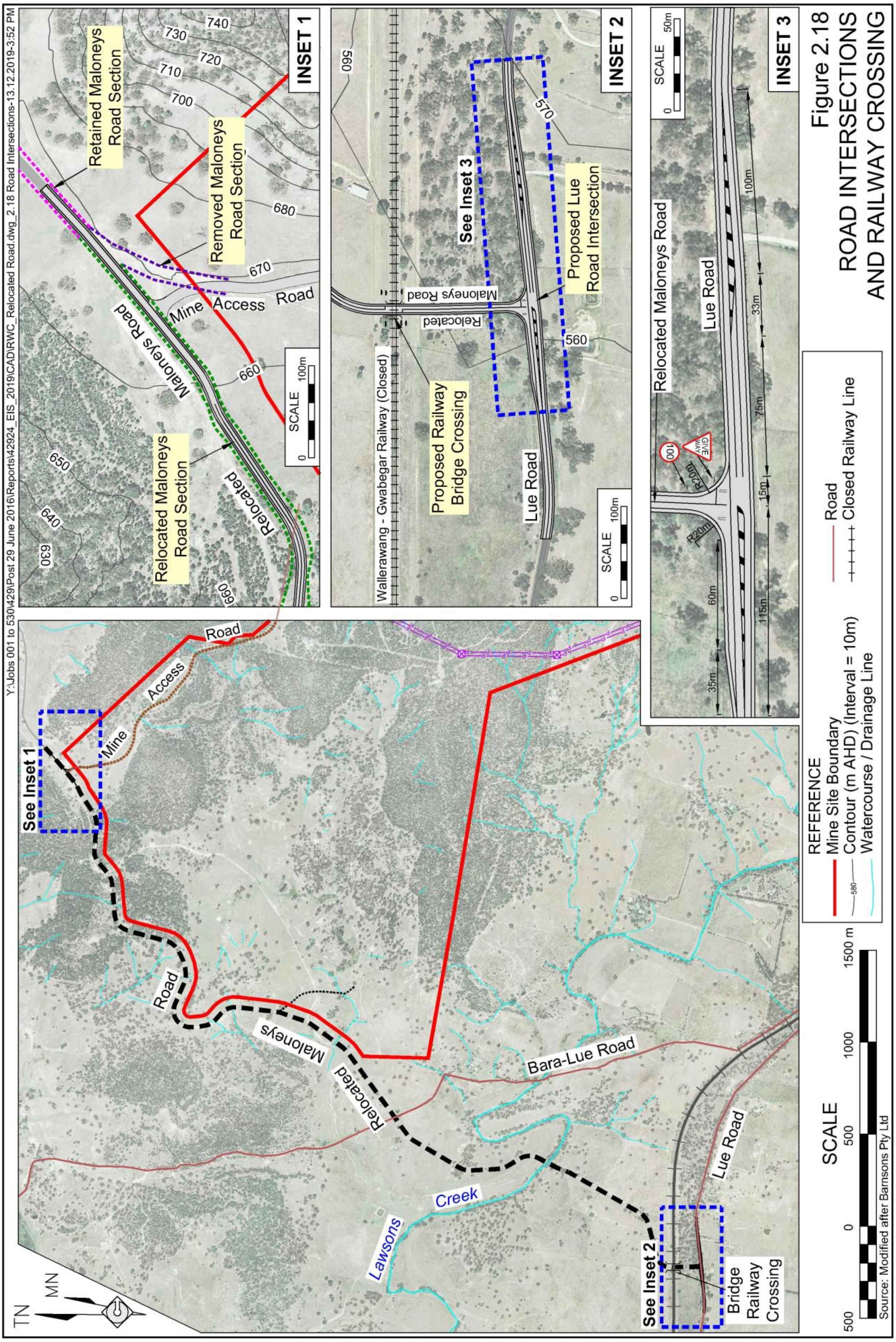


Figure 2.18
ROAD INTERSECTIONS AND RAILWAY CROSSING

The northern approach to the crossing would be constructed with a series of reinforced concrete box culverts, whereby the culverts would be designed to pass flows on the floodplain should a flood event rarer than 5% (1 in 20) AEP occur.

Figure 2.19 presents the indicative design elements of the floodway crossing and the location of the proposed Lawsons Creek crossing.

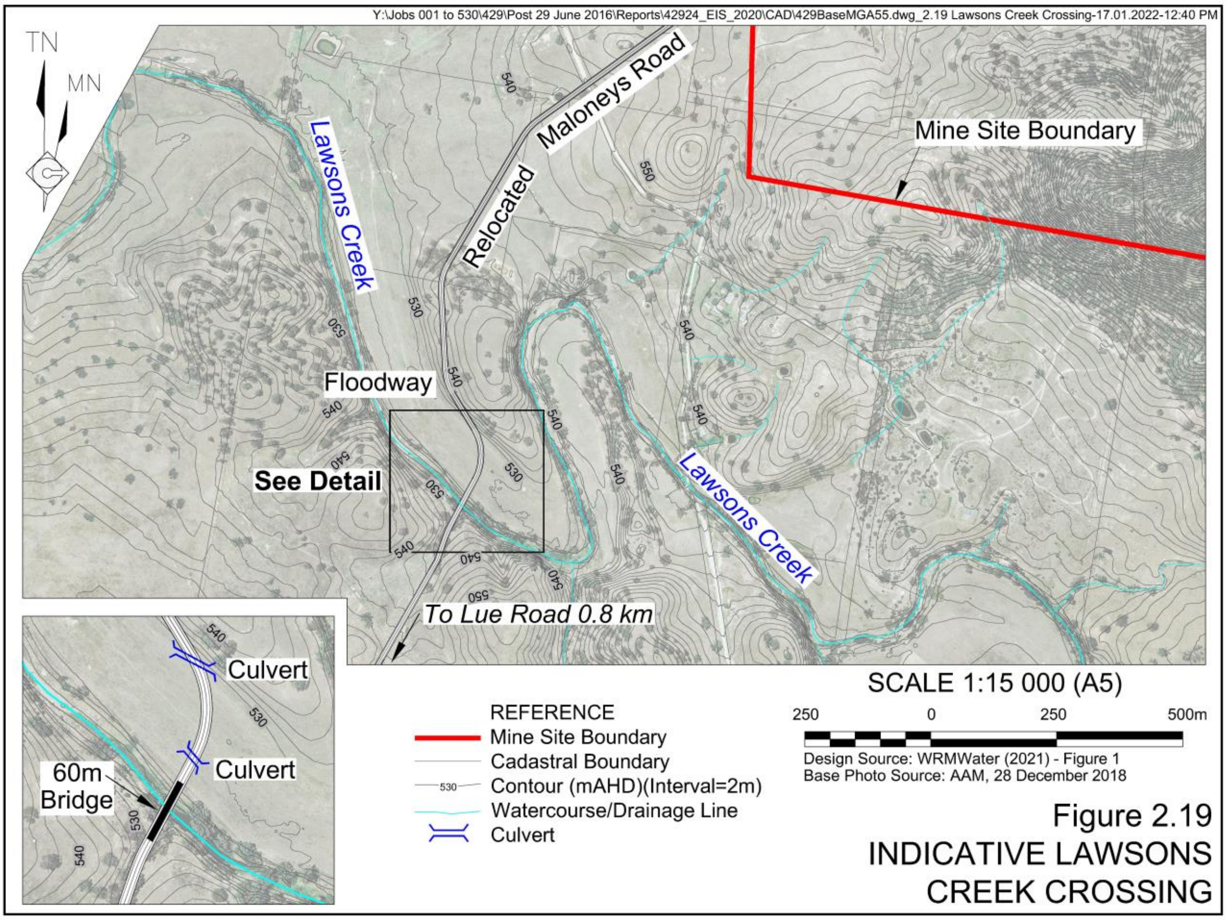


Figure 2.19
INDICATIVE LAWSONS CREEK CROSSING

2.9.3 Site Establishment and Construction Traffic

2.9.3.1 Mine Site and Relocated Maloneys Road

Table 2.5 lists the range of light vehicles, buses and heavy vehicles that Bowdens Silver anticipates would travel to and from the Mine Site on a daily basis throughout the site establishment and construction stage. Distinction is made between the traffic movements prior to and after the construction of the relocated Maloneys Road, i.e. the long-term access to the Mine Site.

It is anticipated that the level of heavy vehicle traffic would be limited during the initial 4 to 6 months period. The bulk of the heavy vehicle traffic would be related to the transportation of heavy machinery to the Mine Site for initial construction activities including the construction of the relocated Maloneys Road.

Table 2.5
Daily Traffic Movements During Site Establishment and Construction Stage

	Light Vehicles	Buses	Heavy Vehicles	Oversize Vehicles	TSF Haulage	Total
Month 6 with Existing Road Network						
Lue Road east of Pyangle Road	42	4	10	4	0	**60**
Lue Road through Lue	78	4	32	4	0	**118**
Pyangle Road Lue Road to Maloneys Road	120	8	42	8	0	**178**
Maloneys Road Pyangle Road to Secondary mine access road	120	8	42	8	0	**178**
Month 13 With Relocated Maloneys Road						
Lue Road east of Pyangle Road	70	4	10	4	0	**88**
Pyangle Road Lue Road to Maloneys Road	40*	0	0	0	0	**40**
Maloneys Road Pyangle Road to Secondary mine access road	40*	0	0	0	0	**40**
Secondary mine access road	40*	0	0	0	0	**40**
Lue Road through Lue	82	4	10	4	0	**100**
Lue Road west of Relocated Maloneys Road	130	4	32	4	0	**118**
Relocated Maloneys Road Lue Road to TSF Embankment	160	8	42	8	0	**218**
Relocated Maloneys Road Mine Access Road to TSF Embankment	160	8	42	8	266	**484**
New mine access road	160	8	42	8	266	**484**

* Comprises light vehicle trips for exploration personnel travelling to and from the Bowdens office and core library

Bowdens Silver has programmed the delivery of the bulk of the mobile equipment to be used in the open cut pit development and the delivery of processing plant components until after the relocated Maloneys Road and mine access road are constructed.

From about Month 7 until the end of the site establishment and construction stage, approximately 2.04 million tonnes of NAF waste rock would be transported from the main open cut pit to the footprint of the TSF starter embankment (or TSF Stage 1). A fleet of B-double trucks capable of transferring approximately 50t of NAF waste rock per load would be used during this 12 month period. Approximately 41 000 truck loads would be transported from the NAF waste rock stockpile adjacent to the main open cut pit (see **Figure 2.1**) via:

- an upgraded section of the former Maloneys Road within the Mine Site;
- the mine access road; and

- a 1.4km section of the relocated Maloneys Road, i.e. from the intersection of the mine access road and relocated Maloneys Road and the entrance to the TSF embankment site.

The 41 000 truck loads would require six B-doubles each undertaking approximately 20 loads per day between 7:00am and 6:00pm or an average of 11 return trips per hour, Monday to Sunday, public holidays excluded, thereby generating an average of 22 movements per hour. Additional periods of heavy vehicle traffic would be experienced during the construction / installation of the processing plant (Months 8 to 14).

Light vehicle traffic would largely comprise passenger vehicles with a small proportion of light trucks. It is envisaged that some personnel accommodated within Mudgee would travel daily to the Mine Site by bus at the start and finish of each day. In the event that a substantial number of personnel are domiciled in Rylstone and/or Kandos, an additional bus service would also be provided. Whilst the majority of light vehicle traffic would utilise the relocated Maloneys Road and mine access road, a small number of light vehicles, used by exploration personnel would continue to use Pyangle Road and the existing Maloneys Road to access the Bowdens exploration office and core library throughout the Project life.

Heavy vehicles would include rigid trucks, semi-trailers, tankers and B-doubles delivering equipment and plant items, consumables, processing reagents and other supplies.

A total of approximately 95 oversized loads, principally low loaders, would be required to deliver processing plant components and mobile equipment. In addition, approximately 45 oversized loads (>2.5m wide but <3.4m wide) would be delivered to the Mine Site, predominantly for site transportable buildings. These loads would be delivered principally from Month 13 of the site establishment and construction stage (see **Table 2.2**).

Bowdens Silver would ensure that all oversize and overweight vehicles have the appropriate permits and approvals and would be appropriately escorted, when required. It is noted that the required permits and approvals would be obtained by the road transportation contractors.

2.9.4 Operational Traffic

Table 2.6 lists the range of light vehicles, buses and heavy vehicles Bowdens Silver anticipates would travel to and from the Mine Site throughout the operational Project life. Each vehicle travelling to the Mine Site would generate two vehicle movements (vehicle in/vehicle out).

Operational traffic movements would principally be generated by mine and exploration personnel attending or departing the Mine Site for work. In order to limit traffic generation at key shift changeover, Bowdens Silver proposes to offer bus transportation to employees, in addition to adopting staggered shifts times across the administration, mining, processing and maintenance functions.

Table 2.6
Daily Traffic Movements Throughout the Life of the Operations

	Light Vehicles	Buses	Heavy Vehicles	TSF Haulage[A]	Mineral Concentrate	Total
Lue Road east of Pyangle Road	58	12	2	0	0	**72**
Pyangle Road Lue Road to Maloneys Road	40	0	0	0	0	**40**
Maloneys Road Pyangle Road to Secondary mine access	40	0	0	0	0	**40**
Secondary mine access road	40	0	0	0	0	**40**
Lue Road Pyangle Road to Relocated Maloneys Road	70	12	2	0	0	**84**
Lue Road west of Relocated Maloneys Road	98	16	8	0	6	**128**
Relocated Maloneys Road Lue Road to TSF Embankment	116	28	10	0	6	**160**
Relocated Maloneys Road TSF Embankment to mine access road	116	28	10	102[B]	6	**262**
Mine access road	116	28	10	102[B]	6	**262**

[A] Occurs during Years 1 to 8 of operations only
[B] Years 1 to 3 (Stage 2) reducing to 86 trips per day in Years 4 to 8 (Stage 3)

Due to the staggering of shifts and the use of a bus service to transport personnel during the peak shift changeover periods, the anticipated peak light vehicle and bus movements would occur as follows.

- Morning peak (between 5:30am and 8:00am Monday to Friday) - approximately 95 light vehicle movements (i.e. 80 inbound and 15 outbound) and 4 bus movements (i.e. 2 inbound and 2 outbound).
- Afternoon shift change (between 1:30pm and 3:00pm) - approximately 8 light vehicle movements (i.e. 4 inbound and 4 outbound).
- Day shift end (between 4:00pm and 4:30pm Monday to Friday only) - approximately 40 light vehicle movements (outbound only) and 2 bus movements (i.e. 1 inbound and 1 outbound).
- Evening peak (between 5:30pm and 7:30pm) - approximately 50 light vehicle movements (i.e. 15 inbound and 35 outbound) and 2 bus movements (i.e. 1 inbound and 1 outbound).
- Evening shift end (between 10:00pm and 10:30pm) – approximately 4 light vehicle movements (outbound only).

Details of light and heavy vehicles movements during each hour are presented in the Traffic and Transport Assessment (SCSC Part 11) (TTPP, 2020).

Additional light vehicle movements would also occur throughout the day as a result of visits by equipment/supply representatives, consultants and government agency representatives. It is expected that, on average, this would result in a further five light vehicle trips (10 movements) per day.

In addition to trucks transporting concentrates, it is anticipated that, on average, one to two heavy loads vehicle trips (two to four movements) would occur daily for delivery of fuel, explosives and other consumables.

Between Years 2 and 8 of the mine life, for the construction of the second and third raises of the TSF, Bowdens Silver would continue to utilise the fleet of three B-double trucks capable of transporting approximately 50t of NAF waste rock per load from the main open cut pit or satellite pits to the TSF embankment via a 1.4km section of the relocated Maloneys Road to the TSF embankment site. Approximately 2.3 million tonnes and 3.2 million tonnes of waste rock would be transported respectively for the second and third raises of the TSF embankment requiring approximately 46 000 truck loads over a period of approximately 36 months to complete the Stage 2 TSF embankment raise and approximately 64 000 truck loads over a period of approximately 60 months to complete the Stage 3 TSF embankment raise. During Years 1, 2 and 3, this would result in approximately 51 loads (102 truck movements per day) (7:00am to 6:00pm) or approximately five loads per hour (10 movements). During Years 4 to 8, approximately 43 loads would be transported daily to the TSF embankment area and generating approximately 86 truck movements or approximately four loads per hour. Between Years 1 and 8 of the mine life, it is anticipated that the transportation of NAF waste rock would be confined to Monday to Saturday, i.e. six days per week, public holidays excluded.

2.9.5 Concentrate Despatch

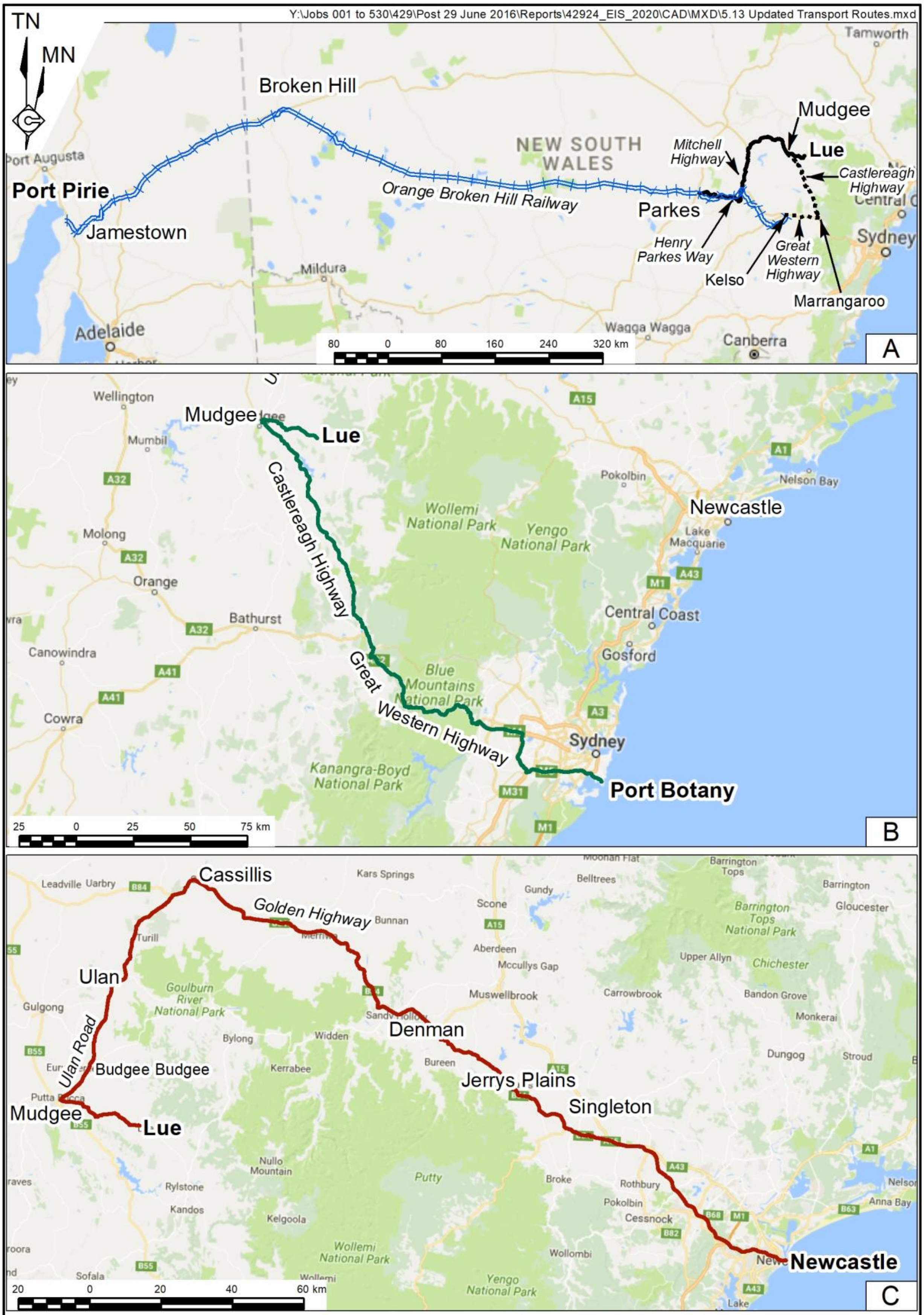
Based on the annual production of between 20 000t and 30 000t of mineral concentrates, average daily product despatches would be approximately one to three truckloads generating two to six heavy vehicle movements Monday to Saturday, public holidays excluded. B-double trucks would be used to transport the concentrate containers in order to maximise the load carried and minimise the number of truck movements.

The silver/lead concentrate would be transported in 2t capacity sealed bulk bags that would be loaded by forklift into 6.1m shipping containers for despatch to the lead smelter in Port Pirie in South Australia, approximately 1 350 km from the Mine Site. Each shipping container destined for Port Pirie would be loaded with approximately 22t of concentrate and each truck carrying silver/lead concentrate would carry two shipping containers, i.e. approximately 44t of concentrate per load. Shipping containers bound for Port Pirie would be transported by road from the Mine Site to either Parkes or Kelso (near Bathurst) and from either Parkes or Kelso by rail to Port Pirie. In total, between approximately 200 and 290 loads of silver/lead concentrate would be despatched annually or one to two loads per day (based on transportation activities generally occurring Monday to Saturday).

The zinc concentrate would be transported by road in sealed containers to either the Port of Newcastle or Port Botany for shipment to an overseas zinc refinery. The number of loads of zinc concentrate despatched would be between approximately 280 and 410 per year or one to two loads per day (based on transportation activities generally occurring Monday to Saturday).

Figure 2.20 displays the proposed transport routes to Port Pirie, Port of Newcastle and Port Botany. All routes involve a common route from the Mine Site to Mudgee via Lue Road beyond which trucks travelling to Port Pirie travel westward. Those trucks destined for the Port of Newcastle travel northward then eastward whilst those destined for Port Botany would travel southward and then eastward.

Figure 2.21 displays the transport routes to be used by trucks travelling through Mudgee.



Base Map Source: Google Map

Figure 2.20
CONCENTRATE TRANSPORT ROUTES

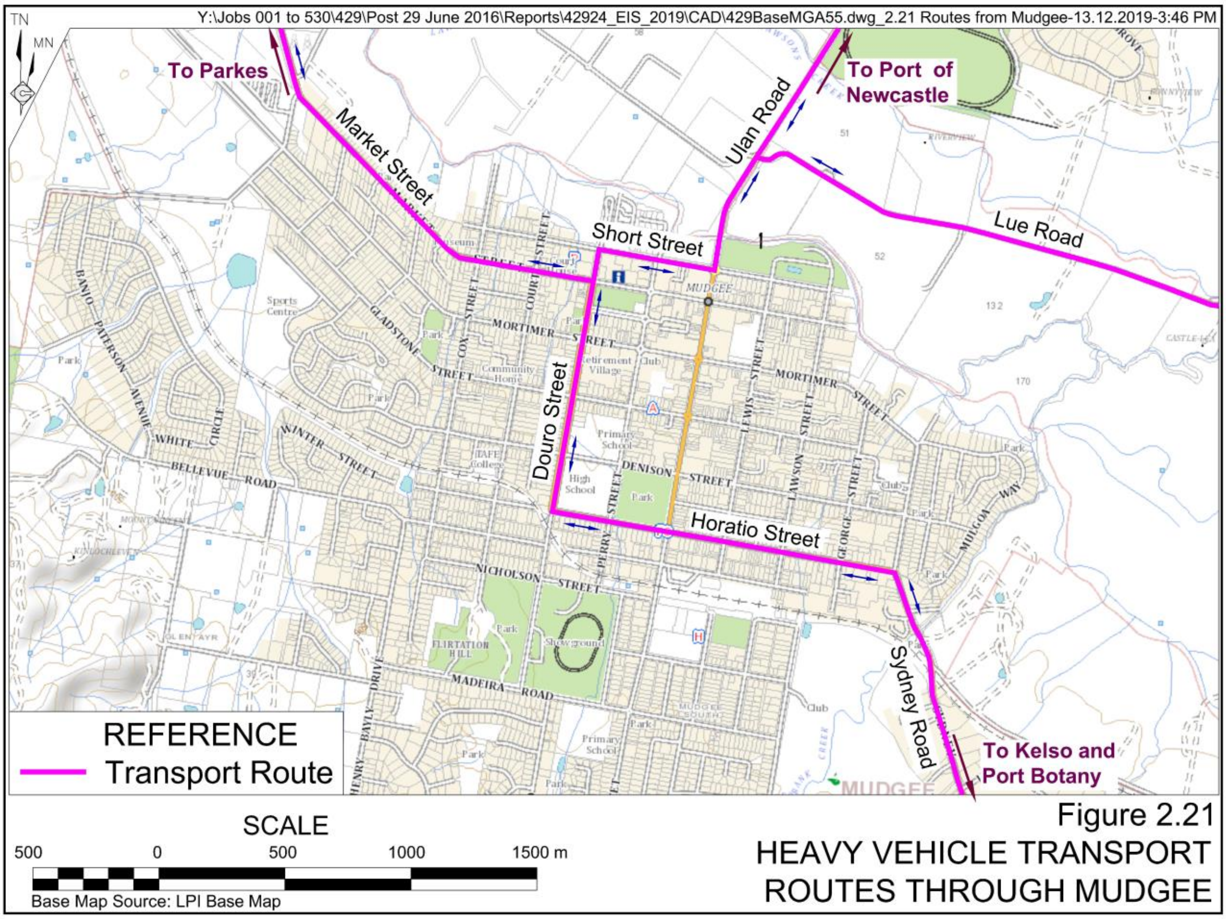


Figure 2.21
HEAVY VEHICLE TRANSPORT ROUTES THROUGH MUDGEE

The routes used by trucks transporting the concentrate to Parkes or Kelso, from where they would be transferred to rail and transported to Port Pirie, are as follows.

Silver/Lead Concentrate to Parkes

Silver/lead concentrate would be transported to Parkes by road, a distance of 242km through Wellington and Parkes on B-double trucks along the following route (as displayed on **Figure 2.20A**).

- Relocated Maloneys Road, Lue Road, Ulan Road, Short Street to Douro Street (Castlereagh Highway (B55)) and Goolma Road to Wellington (130km); and
- Mitchell Highway, through Molong to The Escort Way via Peabody Road, before turning towards Parkes via Henry Parkes Way to Parkes (154km).

It is anticipated that one return trip (two movements) involving loading the containers, transportation to Parkes, unloading the containers and the return trip to the Mine Site would take approximately 9 hours.

Silver/Lead Concentrate to Kelso

Silver/lead concentrate would be transported to Kelso, a distance of 205km, along the following route (as displayed on **Figure 2.20A**).

- Relocated Maloneys Road, Lue Road, Ulan Road, Short Street to Douro Street (Castlereagh Highway (B55)) (33km);

- Castlereagh Highway (B55) to Great Western Highway (118km); and
- Great Western Highway to Kelso (54km).

It is anticipated that one return trip (two movements) involving loading the containers, transportation to Mudgee, unloading the containers and the return trip to the Mine Site would take approximately 6 hours.

Zinc Concentrate to Port Botany

In the event zinc concentrate is transported to Port Botany, a distance of 327km, it would be transported via Mudgee on B-double trucks along the following route (as displayed on **Figure 2.20B**).

- Relocated Maloneys Road, Lue Road, Ulan Road, Short Street to Douro Street (Castlereagh Highway (B55)) (33km);
- Castlereagh Highway (B55) to Great Western Highway (A32) (118km); and
- Great Western Highway (A32), M4, M7 and M5 to Port Botany (176 km).

It is anticipated that one return trip (two movements) involving loading the containers, transportation to Port Botany, unloading the containers and the return trip to the Mine Site would take approximately 10 hours.

Zinc Concentrate to Port of Newcastle

In the event the zinc concentrate is transported to the Port of Newcastle, a distance of 334km, it would be transported on B-double trucks via Mudgee and Ulan along the following route (as displayed on **Figure 2.20C**).

- Relocated Maloneys Road and Lue Road to Ulan Road (31 km);
- Ulan Road to Golden Highway (71 km); and
- Golden Highway, New England Highway, M15, John Renshaw Drive (B68), Maitland Road, Industrial Drive (232 km).

It is anticipated that one return trip (two movements) involving loading concentrate, transportation to the Port of Newcastle, unloading and the return trip to the Mine Site would take approximately 9 hours.

2.10 WATER SUPPLY

2.10.1 Water Sources

During the site establishment and construction stage, water would be drawn from on-site advanced dewatering bores and harvestable rights water storages (farm dams) within Bowdens Silver's landholding.

Once operations commence, water would be required principally for the processing of ore extracted from the open cut pits with lesser quantities required for dust suppression on the crushing and screening equipment and haul roads within the Mine Site. During operations, water for the Project would be drawn from the following sources which are listed preferentially in order and type of use.

1. Surface water collected under harvestable rights entitlements within Bowdens Silver's landholdings for use in dust suppression activities.
2. Paste thickener reclaim water for recycling and reuse in processing operations.
3. Surface water collected within the leachate management dam for recycling and reuse in processing operations.
4. Surface water and decant collected within the TSF for recycling and reuse in processing operations.
5. Groundwater and surface water accumulating within the open cut pit for recycling and reuse in processing operations and for dust suppression within the open cut pit.
6. Surface water collected within the sediment / containment dams (but unsuitable for release).
7. Groundwater abstracted from advanced dewatering (production) bores for use in processing and / or dust suppression activities.

Bowdens Silver intends to optimise the collection, recovery and re-use of water for processing operations. These measures have been designed to increase security of water supply by reducing the Project's water demand whilst limiting evaporative loss from water storages.

This would occur via the implementation of the following measures:

- Reducing Project water demand via the reclaim of process water during paste thickening to achieve a 63% tailings w/w solids content and the return of this water to processing operations.
- Reducing evaporative loss from various on-site water storages through construction and operation of a 130ML lined turkeys nest dam that would receive:
  - TSF decant pumped to maintain a minimum 0.5m pond water level in order to reduce the pond surface area and seepage potential;
  - water collected in the leachate management dam;
  - runoff collected in the various containment dams; and
  - groundwater collected in the open cut pit sumps.

Runoff generated within undisturbed catchments across the Mine Site and captured in dams would be the primary source of water for dust suppression activities. As the Mine Site is within a harvestable rights area, these dams would be sized, constructed and operated in accordance with Section 53 of the *Water Management Act 2000*. Bowdens Silver proposes to construct six such dams within the Mine Site with details provided in **Table 2.7** and locations presented in **Figure 2.22**.

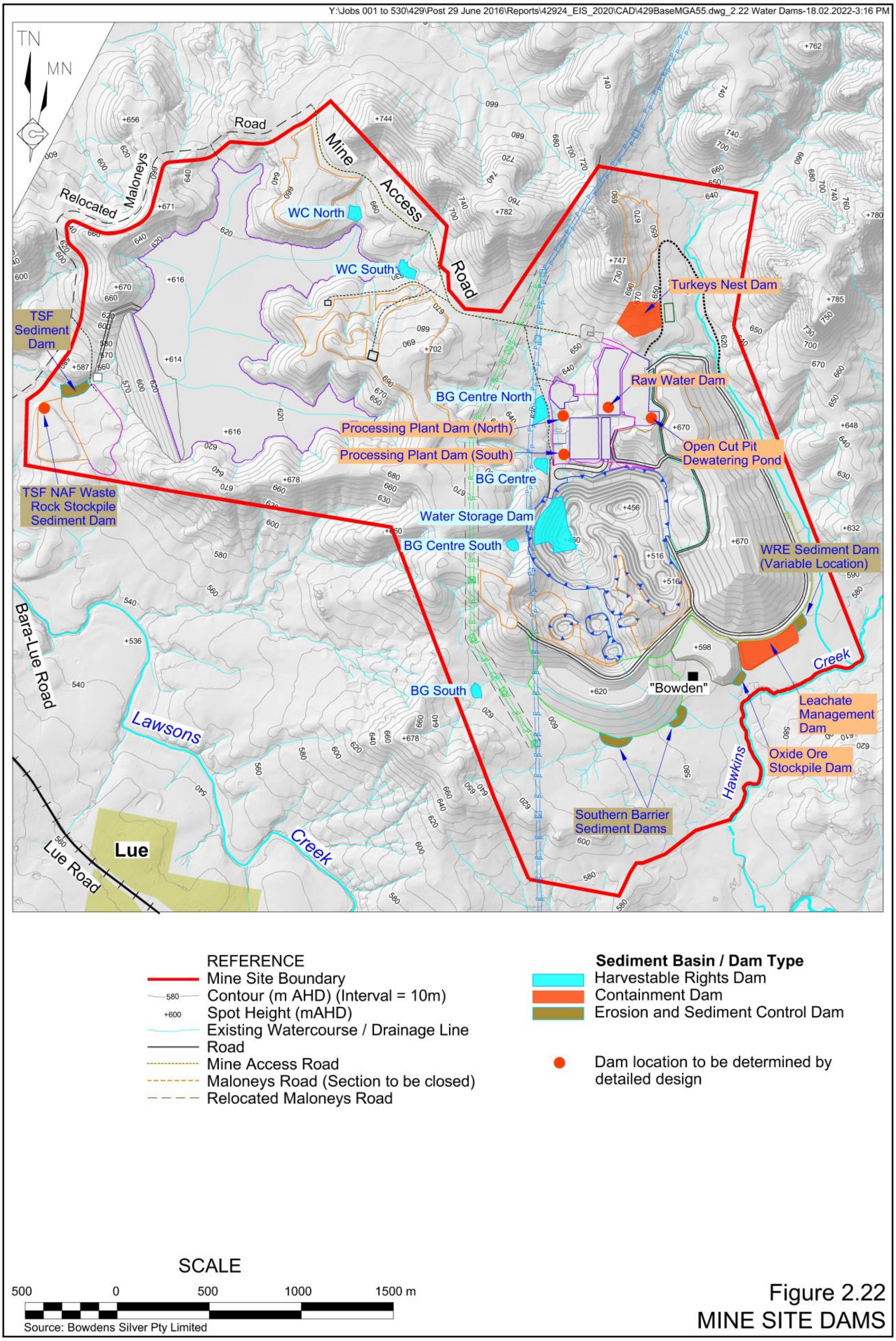


Figure 2.22
MINE SITE DAMS

Table 2.7
Harvestable Rights Dams

Dam	Location	Catchment	Capacity (ML)
WC North	Upstream of TSF	Walkers Creek	2.2
WC Northeast	Upstream of TSF	Walkers Creek	2.4
BG Centre (North)	West of processing plant	Blackmans Gully	4.3
BG Centre	West of haul road	Blackmans Gully	3.0
BG Centre (South)	West of main open cut pit	Blackmans Gully	1.3
BG South	West of southern barrier	Blackmans Gully	1.6

Water within these harvestable rights dams would either be pumped directly to a standpipe for water cart filling or to the 130ML Water Storage Dam until the end of Year 8 when the area where the dam is located would be removed for expansion of the open cut pit. From Year 9 this water would be directed to the BG Centre and BG Centre (north) dams. As the Water Storage Dam would receive water collected in harvestable rights dams, it too would be considered under Bowdens Silver's maximum harvestable rights entitlement of 180.6ML that is based on a contiguous landholding of 2 580ha.

Water sourced via the advanced dewatering (production) bores would essentially be make-up water supplying any shortfall after water from all on-site sources is used. Groundwater would be abstracted from two advance dewatering (production) bores to ensure water is always available for processing and dust suppression. Investigations have identified zones of enhanced permeability and yields in the vicinity of major geological structures within and adjacent to the main open cut pit. These advanced dewatering (production) bores would target major geological structures at depth adjacent to the northern perimeter of the open cut pit and thus within the pit's zone of groundwater influence.

Deeper exploration drilling within the Mine Site, and beyond 600m in depth, has confirmed large regional structures with significant porosity that also have the potential to accommodate productive aquifers. There is also the potential for supplementary water supplies sourced from similar hydrogeological environments within land surrounding the Mine Site. Should these water sources be needed, access would need to be secured under a separate water supply approval.

2.10.2 Projected Usage

During the site establishment and construction stage, approximately 0.5 to 1.0ML per day of water would be required principally for dust suppression and achieving the optimum moisture content in those components or areas where compaction is required.

Following the commencement of mining operations, water would principally be required for the processing of ore extracted with lesser quantities required for dust suppression on the crushing and screening equipment and haul roads throughout the Mine Site. Average daily water use would require up to approximately 5.0ML of water for both processing and dust suppression (Year 8).

On average, approximately 2.8ML would be recycled daily from the paste thickener and TSF. Other sources of make-up water for processing and dust suppression would include surface water (2.1ML/day on average) and groundwater (1.75ML/day)[13] drawn from the main open cut pit. It

[13] This quantity assumes approximately 20% of inflows evaporate on the open cut pit faces.

is noted that each of these daily estimates represent average values and would fluctuate on a daily basis. The leachate originating from the WRE and captured in the leachate management dam would also be used in processing (without treatment), however, no specific reliance would be placed on this water until later in the Project life when consistent volumes would accumulate.

Average annual predictions of water use for dust suppression throughout the Mine Site indicate that between 0.42ML and 0.87ML of water would be required daily.

Water sourced via the advanced dewatering bores would essentially be make-up water supplying shortfall after water from all on-site sources is used. These production bores would be used to supply up to 1ML of water per day. It is noted that Bowdens Silver has access to approximately 1 700ML of groundwater entitlements that can be used to account for peak groundwater inflow and groundwater abstracted by the production bores.

Potable water requirements during construction would be delivered to the Mine Site by water tanker until such time as a reverse osmosis (RO) plant is installed on site. The RO plant would be used during operations to treat a combination of groundwater, surface water and mine water to produce up to 37 500 litres of potable water daily or approximately 14ML/year.

It is acknowledged that, should water sources that rely on rainfall (within the Mine Site or elsewhere) be constrained, Bowdens Silver would need to adjust the rate of production within the Processing Plant in accordance with the water available. However, this constraint is the same experienced across all metalliferous mines throughout NSW and Australia in these conditions and demonstrates the Project's reliance on the supply of water. Water balance modelling undertaken by WRM (2022) identifies that the Project's proposed integrated water management and supply strategy would maintain the viability of the operation even during periods of low rainfall.

2.10.3 Water Licensing

The predicted maximum annual water access licence requirement from the respective water sources during mining would be as follows.

- *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources Order, 2020* – Sydney Basin Murray Darling Basin Groundwater Source – 232.5ML.
- *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order, 2020* – Lachlan Fold Belt Murray Darling Basin Groundwater Source - (Other) Management Zone – 1 040ML.
- *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Source 2012* – Lawsons Creek Water Source – 137ML.

These licence requirements include groundwater use (inflows to the open cut pit and advanced dewatering), surface water captured due to the construction of the TSF on a third order stream and the predicted baseflow reduction to Lawsons Creek and Hawkins Creek. Bowdens Silver would secure sufficient allocation to account for peak groundwater inflows during mining at the time of their predicted occurrence and has secured the necessary surface water licence allocation.

2.11 SITE INFRASTRUCTURE AND SERVICES

2.11.1 On-site Road Network

Bowdens Silver would maintain a network of internal light vehicle and off-road haul roads to provide access between the main open cut pit, processing plant and other operational areas throughout the Mine Site.

A series of haul roads would be constructed to enable haul trucks to transport waste rock from the open cut pits to the WRE and ROM ore to the ROM pad (see **Figure 2.8**). It is anticipated that the WRE upper and lower embankment haul roads from the eastern side of the main open cut pit, would be in use for the life of the mine whereas the northern ROM haul road would be in use from about Year 3 of operations.

It is proposed to upgrade a section of the existing Maloneys Road between the main open cut pit and the mine access road to provide access for the B-double trucks transporting NAF waste rock to the TSF embankment from the site establishment and construction stage until about Year 8.

Other internal haul roads may be semi-permanent and relocated as required to maintain minimum haul distances and optimum grades, whilst minimising potential noise impacts. Roads located in the open cut pits would be designed and constructed to a maximum gradient of 10%, with all two-way traffic roads designated for use by mining equipment formed to a minimum width of three times the maximum width of the largest vehicle, plus berms and drainage features. All haul roads would be all-weather roads.

The light vehicle road network would comprise all remaining roads within the Mine Site that would not accommodate off-road vehicles and include access roads to the mining facility, TSF, magazine, primary jaw crusher, processing plant and other minor roads. The main internal road from the main security gate to the processing plant and mining facility would be approximately 9m wide. This road would be the principal route within the Mine Site for the delivery of processing consumables and fuel. All other internal roads on the Mine Site would typically be 4m to 5m wide.

2.11.2 Buildings

Bowdens Silver would establish the administration buildings, site offices and amenities block close to the entrance gate north of the proposed processing plant (see **Figure 2.1**). A car park would also be constructed adjacent to the administration buildings to provide parking for the mine workforce and visitors. The site buildings and their indicative dimensions would include the following.

- Gatehouse (3.3 m x 12 m);
- Safety and ERT complex (10m x 14m);
- Main administration building (14m x 20m);
- Training facility (6m x 12m);
- Processing plant office (12m x 14m);
- Change rooms (16m x 12m);

- Processing plant control room within processing plant (3m x 12m);
- Milling control room (3m x 6m);
- Mining office (15m x 14.4m);
- Analytical laboratory (33m x 14m);
- Mining warehouse and light vehicle workshop facility (18m x 36m);
- Mining heavy vehicle and light vehicle workshop facility (65m x 18m);
- Product packaging shed (6m x 35m);
- Reagents storage shed (30m x 6m); and
- Processing plant workshop/warehouse facility (4m x 18m).

The final locations and dimensions of these building s would be subject to detailed design of the Mine Site.

2.11.3 Power

2.11.3.1 Mine Site Power Supply

Bowdens Silver estimates that the annual power consumption would be approximately 84 000 MW hours, with the total power consumption through the mine life in the order of 1 510GW hours.

As noted in Section 2.1.3, approval for the construction and use of the necessary power supply infrastructure to supply the Project is not being sought at this time. A separate application in accordance with Part 5 of the EP&A Act would be sought from the relevant energy provider.

A range of options for reliable supply of electricity have been identified, each with its own requirements for augmentation or upgrade of facilities in order for reliable supply to be possible. However, preliminary technical enquiries have been sent to both TransGrid and Endeavour Energy who have identified the viability of reliable supply. A summary of the seven options considered and the feedback from the relevant energy provider to date is provided in Appendix 9 of the EIS.

Electricity would be supplied via a 66kV transmission line that would terminate at the Mine Site's Main Mine Substation (see **Figure 2.1**) that includes a 66kV/11kV transformer in which the voltage would be reduced to 11kV before being distributed throughout the Mine Site from the main 11kV switchboard. It is expected that within the Mine Site electricity would be distributed via underground cables. All site components, including all crushing, grinding, flotation activities as well as power for the administration areas would operate from mains power. The only main component that would not be powered from mains power is the TSF decant pump which would be powered by an independent diesel generator.

In the event of a power outage or failure, Bowdens Silver would utilise an 800kW emergency diesel generator connected to the power system to allow plant lighting to function normally and selected machinery within the processing plant to operate. It is envisaged that no more than 0.5 MW would be required for emergency power. Emergency generators would also be retained on site for the key pumps used to transfer water to the raw water dam.

2.11.3.2 Re-alignment of 500kV Power Transmission Line

The Mine Site is traversed by the existing No. 5A3 Bayswater to Mt Piper and 5A5 Wollar – Mt Piper 500kV power transmission line. The quad bundle conductor double circuit 500kV power transmission line would be re-aligned to allow the open cut mining operation to proceed towards the western boundary of the main open cut pit. **Figure 2.1** displays an indicative alignment of the existing 500kV power transmission line and the proposed re-aligned section of the line.

The exact location of the re-aligned section of the line may need to be modified in consultation with TransGrid and DPIE following the completion of three stages of investigation.

Stage 1: A desktop investigation incorporating a review of the available environmental information (principally from the EIS and supporting assessments), a review of the indicative route and development of a concept design route and transmission line profiles (to ensure sufficient ground clearance exists) and the development of a construction program, including the ability to minimise power outages when the new line is commissioned.

Stage 2: A scoping study including on-site investigations such as geotechnical studies.

Stage 3: A detailed design stage for all of the work involved in the construction, connection of the new transmission line and dismantling of the existing transmission line.

Whilst detailed staged investigations would not commence until the commencement of the Project, TransGrid has advised Bowdens Silver that "*there is no engineering reason for the line realignment to be unfeasible and that network outages, constructability and design can all be managed*". A Modification Processes Agreement would be entered into with TransGrid to facilitate Stage 1 to 3 and a Relocation Agreement would be required for the procurement and construction activities. It is estimated that the re-aligned line would be constructed during Year 3 of operations.

The proposed re-aligned power transmission line would be approximately 3km in length comprising 10 to 14 new steel towers, each approximately 45m to 60m high, i.e. comparable to the existing towers. The re-aligned section of line would be located wholly within the Mine Site on land owned by Bowdens Silver.

Overall, it is estimated the construction and dismantling of the line would take approximately 6 to 10 months. All works would be undertaken during the site establishment and construction stage within the proposed hours of operation listed in **Table 2.3**, i.e. consistent with construction activities for infrastructure projects. Between 20 to 30 persons would be employed by a contractor to construct and dismantle the relevant power transmission line.

2.11.4 Fuel

The mining equipment fleet would be diesel-fuelled with bulk diesel stored adjacent to the workshop in self-bunded above-ground tanks with a total capacity of approximately 220 000L. The more mobile equipment such as the haul trucks would be refuelled adjacent to the on-site tanks within a bunded refuelling pad while the less mobile equipment such as the bulldozers, excavators and drills would be refuelled in pit using a mobile service truck.

Annual average diesel fuel usage for the mobile equipment operating within the Mine Site is estimated to be approximately 7.8ML/year. The trucks transporting the NAF waste rock during the construction of the initial TSF embankment would use approximately 1.2ML, whilst the transport of NAF waste rock to the TSF in the subsequent years would use between approximately 0.5ML and 0.8ML annually. In total, the annual average diesel fuel usage would be approximately 8.0ML until about Year 9 after which it would revert to 6.2ML/year. The fuel consumption would vary across the life of the mine in accordance with the destinations for the waste rock around the Mine Site.

Fuel would be delivered in B-double tankers at a rate of approximately two loads per week.

2.11.5 Consumables Storage and Maintenance

The workshop and warehouse facilities would incorporate storage areas for all mine consumables and would have properly designed and constructed drainage systems incorporating adequate hydrocarbon management and storage facilities designed in accordance with relevant Australian Standards (AS 1940:2017 – the Storage and Handling of Flammable and Combustible Liquids), including an oily water separation facility and waste oil storage areas.

Appropriate spill response measures and equipment would be maintained for hydrocarbons and any chemical storage.

2.11.6 Explosives

As discussed in Section 2.4.3.2, ANFO-based bulk explosives or customised emulsions would be used within the open cut pits to fracture the overburden and ore with NONEL or electronic detonators and boosters used for blast initiation. The ammonium nitrate prill, emulsion, diesel and other blasting products would be transported to the Mine Site as required by a licensed contractor on the day of each blast where the blasting products would be mixed as required, loaded into the pre-drilled holes and initiated.

A transportable magazine would be placed within a fenced compound in a location approved by the Resources Regulator. An indicative location for the transportable magazine is displayed on **Figure 2.1**.

2.11.7 Other Chemicals/Hazardous Materials

Table 2.4 lists the suite of chemicals and reagents to be used within the Mine Site.

2.11.8 Communications

Telephone, internet and data transfer requirements would be provided to the offices and amenities area, workshops and processing plant through a microwave radio network linking the Mine Site to the existing mobile telephone network as the Mine Site does not currently have access to fibre optic cables. Should fibre optic technology become available during the mine life, this would be investigated and potentially installed. Alternatively, a sole purpose wireless relay station could be set up to link into the national broadband network in Mudgee. Mobile phones and 2-way radio would also be used.

2.12 EMPLOYMENT

2.12.1 Site Establishment and Construction Stage

It is estimated that a workforce of up to 320 personnel would be required throughout the 18 month site establishment and construction stage. It is noted that the total number of personnel includes 74 persons from head offices involved with management, procurement, engineering, drafting, administration etc. The number of personnel on site would vary throughout this stage with the average full-time equivalent employment of 131 persons during the 18 month period.

Bowdens Silver anticipates the site establishment and construction workforce would comprise persons engaged under the following employment arrangements.

- Employed by the contractor appointed to construct the processing plant (likely to be based either in Sydney, Newcastle, Wollongong or interstate).
- Employed by local contractors or service providers either employed directly or sub-contracted to undertake specific tasks, e.g. site earthworks, crushing and screening construction materials, cleaning and rubbish removal.
- Employed directly by Bowdens Silver and drawn from local towns, villages and surrounds.

During the 6 to 8 month period when the 500kV power transmission line would be re-aligned (prior to Year 4), approximately 30 personnel would be employed by the contractor undertaking this activity.

Bowdens Silver proposes that all construction personnel engaged from outside the surrounding communities would rely upon temporary accommodation in the Mudgee / Rylstone / Kandos area.

2.12.2 Operations

The operations workforce is expected to vary between approximately 190 and 228 personnel. **Table 2.8** presents the summary of daily and total employment level throughout the mine life with a distinction made between the periods when mining is undertaken during the day only, of a day-time and evening and 24 hours per day. The variation is attributed to the variation in the number of mining shifts per day. When mining is undertaken during the day only, a total of 46 persons would be employed, i.e. on the basis of 7 days on and 7 days off whereas when mining is undertaken during the day and evening or 24 hours per day, a further 24 persons would be employed.

Whilst the bulk of the jobs associated with the Project would be full-time, Bowdens Silver would be supportive, where practical, to offer a range of part-time jobs that would be suited to a number of workers, e.g. off surrounding properties to earn an off-farm income.

Table 2.8
Summary of Daily and Weekly Employment

Personnel	Weekday	Weekend	Total Weekly
Mining - Day Only			
Administration, Technical and Professional	42	nil	42
Mining (7 days on / 7 days off) (1 x 12hr shift)	23	23	46
Processing Plant, Maintenance and Technical (4 days on / 4 days off)	42	42	84
Exploration	20	nil	20
Total	**127**	**65**	**192**
Mining – Day / Evening			
Administration, Technical and Professional	42	nil	42
Mining (7 days on / 7 days off) (2 x 8hr shift)	35	35	70
Processing Plant, Maintenance and Technical (4 days on / 4 days off)	48	48	96
Exploration	20	nil	20
Total	**145**	**83**	**228**
Mining – Day / Evening / Night			
Administration, Technical and Professional	42	nil	42
Mining (7 days on / 7 days off) (2 x 12hr shift)	35	35	70
Processing Plant, Maintenance and Technical (4 days on / 4 days off)	48	48	96
Exploration	20	nil	20
Total	**145**	**83**	**228**

The personnel listed in **Table 2.8** would be employed directly by Bowdens Silver or through the mining contractor or other contractors employed on site. The bulk of the operations workforce would be sourced from either Mudgee or Rylstone, Kandos and Lue and nearby smaller towns and villages. Bowdens Silver has estimated that at least 40% of the on-site workforce would be drawn from the Rylstone/Kandos area. Many of the workforce from the former Kandos Cement Works have expressed their interest in working at the Mine Site, rather than travel considerable distances to the various coal mines north of Mudgee at which they have worked since the Kandos Cement Works ceased operations.

Bowdens Silver does not plan to build any housing in Mudgee, Rylstone, Kandos or Lue.

2.13 HOURS OF OPERATION, SHIFTS AND PROJECT LIFE

2.13.1 Hours of Operation

Table 2.9 displays the proposed hours of operation for the key operational activities within the Mine Site. Site establishment and construction hours have previously been outlined in **Table 2.3**.

Table 2.9
Hours of Operation

Activity	Days	Hours
Clearing / topsoil and subsoil removal	Monday to Saturday[1]	7:00am to 6:00pm[2]
Blasting	Monday to Saturday[1]	10:00am to 4:00pm
Mining	7 days	7:00am to 6:00pm 7:00am to 10:00pm[3] 24hrs[4]
NAF waste rock transfer to the TSF embankment	Monday to Saturday[1]	7:00am to 6:00pm
Processing	7 days	24hrs
Concentrate Despatch	Monday to Saturday[1]	7:00am to 6:00pm[5]
Maintenance	7 days	24hrs
Rehabilitation	Monday to Saturday[1]	7:00am to 6:00pm[2]

Notes: 1 Public Holidays excluded.
2 Daylight hours only.
3 Commencing from Year 2 and subject to ongoing compliance with noise limits during the evening period.
4 Commencing from Year 3 and subject to ongoing compliance with noise limits during the evening and night-time periods.
5 Excluding 7:30am to 8:30am and 3:30pm to 4:30pm (School bus period) – when Project-related heavy vehicles (other than buses) must not travel on Lue Road.

During the early stages of mining, after the site establishment and construction stage, operational hours would continue to be confined to day-time only. Bowdens Silver proposes to progressively extend mining operations into the evening and ultimately 24 hours per day subject to ongoing compliance with the relevant noise limits during those periods. Based upon the outcomes from the noise assessment it is anticipated that evening and night-time mining operations would commence in Year 2 and Year 3 respectively.

Section 4.2.2.5 of the EIS includes discussions on how Bowdens Silver intends to manage its evening and night-time mining operations in order to satisfy the relevant noise limits. A noise compliance monitoring campaign would be undertaken within one month of the commencement of any change to mining operating hours (indicatively Year 2 - Evening and Year 3 – Evening and Night). It is noted that there may be some occasions throughout the mine life when it would be necessary to revert to day/evening or only day mining operations in order to satisfy the noise criteria nominated in the development consent and the environment protection licence for the Project.

2.13.2 Workforce Shifts

Operations would be undertaken in staggered shifts across the administration, mining, processing, maintenance and exploration functions.

- Administration, Technical, Professional and Exploration Personnel – 8 hour shift, five days (Monday to Friday) with two days off (Saturday and Sunday).
- Mining Personnel – the number of shifts per day would vary throughout the mine life depending upon the restrictions relating to noise compliance. Mining personnel would work 7 days on / 7 days off. Typical shift arrangements would be as follows.
  - Day only: one x 11 hour shift from 7:00am to 6:00pm

  - Day / Evening: two x 8 hour shifts from 6:30am to 2:30pm and 2:00pm to 10:00pm
  - Day / Evening / Night: two x 12 hour shifts from 7:00am to 7:00pm and 7:00pm to 7:00am.
- Processing Plant & Maintenance Personnel – varied shifts per day working 4 days on / 4 days off rotation, with typical shift arrangements as follows.
  - Day only: one x 12 hour shift from 6:00am to 6:00pm
  - Day / Evening: two x 8 hour shifts from 6:00am to 2:00pm and 2:00pm to 10:00pm
  - Day / Evening / Night: two x 12 hour shifts from 6:00am to 6:00pm and 6:00pm to 6:00am.

Table 2.10 lists the planned number of personnel per shift for the administration, technical and professional roles; mining; and processing plant, maintenance and technical roles and the respective shift times.

Table 2.10
Workforce Shift Arrangements and Total Employment

Personnel	Days	Shift Arrangements		Workforce per Shift	Workforce Total
Administration, Technical and Professional	Monday to Friday	8:00 am to 4:00 pm 5 days on/2 days off		42	42
Exploration				20	20
Mining	7 days	7 days on/7 days off			
		Day only	6:30am to 6:30pm	23	46
		Day / evening	6:30am to 2:30pm	23	70
			2:00pm to 10:00pm	12	
		Day / evening / night	7:00am to 7:00pm	23	70
			2:00pm to 10:00pm	3	
			7:00pm to 7:00am	9	
Processing Plant, Maintenance and Technical	7 days	4 days on/4 days off 4 nights on/4 nights off			
		Day only*	6:00am to 6:00pm	37	84
			6:00pm to 6:00am	5	
		Day / evening*	6:00am to 6:00pm	37	96
			2:00pm to 10:00pm	1	
			6:00pm to 6:00am	10	
		Day / evening / night*	6:00am to 6:00pm	37	96
			2:00pm to 10:00pm	1	
			6:00pm to 6:00am	10	

* Shift configurations dependent upon mining shift arrangements

2.13.3 Mine Life and Project Life

For the purposes of this document, the mine life refers to the period of the 18 month site establishment and construction stage and the 15 year period of processing and concentrate manufacture, i.e. the mine life would be 16.5 years.

The Project life refers to the mine life and the estimated 7 year final rehabilitation and maintenance period (commencing 0.5 years before the end of processing), i.e. a total of 23 years. **Figure 2.2** displays schematically the duration of each of the key components of the Project.

It is anticipated that the completion of the rehabilitation of the surface of the TSF would take the longest period of time, i.e. in the order of 4 years. A 3-year period of maintenance is proposed, although greater clarity on the duration of the maintenance period would be determined during the post operational period. Bowdens Silver is committed to maintaining the revegetation and water management processes, particularly with respect to the leachate reporting to the leachate management dam. Over time the quantity of leachate would reduce until leachate generation ceases. Relinquishment of the mining lease over the entire Mine Site would only occur once all revegetation satisfies the requirements of the Resources Regulator and leachate generation from the WRE ceases. It may be feasible to progressively relinquish the section of the mining lease where all rehabilitation constructions have been satisfied.

The Project life may be extended depending on the results of future exploration and drilling activities, particularly at depth beneath the main open cut pit. That said, the Feasibility Study for the Project indicates that the previously defined mineral resources beneath the main open cut pit do not contain sufficient mineral grades to warrant their extraction.

2.14 GENERAL WASTE MANAGEMENT

2.14.1 Introduction

The principal non-production wastes that would be generated during the proposed site establishment and construction stage and subsequent operations would include the following.

- Residual materials remaining after the demolition of the four residences, farm buildings and fencing within the active area of the Mine Site.
- General domestic type wastes from the on-site offices, shower blocks, workshop and processing facilities and routine maintenance consumables.
- Scrap steel, hydrocarbons including waste oil and other wastes remaining from equipment maintenance.
- Sewage.
- Reverse osmosis brine generated on site from treatment for potable water.

2.14.2 Demolition Materials

All efforts would be taken to re-use any suitable building materials recovered during the demolition of the four residences. All unusable materials would be disposed of at either the Mudgee Waste Depot or Kandos Waste Transfer Station. Any asbestos waste would be fully wrapped to meet Council's requirements for acceptance at Council's waste facilities or another suitably licensed facility.

Suitable fencing materials recovered would be re-used on Bowdens Silver's properties retained for ongoing agricultural uses and any unusable fencing wire and metal posts would be set aside for metal recycling.

2.14.3 Domestic Type Waste

Domestic type wastes would be treated as general waste. Two collection streams would be provided with recyclables separated and placed in bins or collection skips fitted with lids or covers. The principal recyclables collected would be steel, aluminium, glass, paper and cardboard. Bins and/or collection skips would be located in areas or adjacent to buildings in which the wastes are generated and collected on an as needs basis by Council or licensed waste contractors. The maximum quantity of wastes stored would not exceed the maximum quantity nominated by the EPA and the contents disposed of at either the Mudgee Waste Depot or Kandos Waste Transfer Station.

Bowdens Silver estimates approximately 450m^3 of domestic mixed solid waste and 280m^3 of recyclables would be produced annually. Mid-Western Regional Council has advised Bowdens Silver that Council would be prepared to accept this quantity of wastes.

2.14.4 Maintenance Waste

Routine maintenance of mobile mining and earthmoving equipment would be undertaken within the on-site workshop or, in the case of any major refurbishment activities which cannot be undertaken on site, at equipment maintenance facilities away from the Site.

Waste oil would be stored in a 5 000L self-bunded waste oil tank within the mining facility from where it would be collected and removed from site for disposal/reuse by an appropriately licensed waste recycler. All other waste hydrocarbons associated with equipment maintenance would be stored in a concrete bunded area, designed in accordance with relevant Australian Standards (AS 1940:2017 – the Storage and Handling of Flammable and Combustible Liquids), to await collection. An oily water separation facility would be installed, with the separated hydrocarbons sent to the recycling tank and the treated water reporting to the process water tank.

All routine maintenance consumables and non-hazardous solid wastes would be treated as general mixed solid waste. Separate bins or collection skips would be maintained at the workshops for cardboard and metals.

2.14.5 Sewage

All sewage generated during site establishment and construction would be managed through temporary systems. These systems would likely be pump-out systems and would be maintained by a licensed contractor.

For the operational period, it is proposed to construct and operate an appropriately sized sewage management system within the footprint of the processing plant, capable of managing sewage from up to 150 persons per day. All water treated through the system would either be irrigated or used as process water (treated waste water discharged to the TSF for recycling to the process plant.). Any waste water used for irrigation from the systems would be undertaken in compliance with the EPA's guidelines "*The Use of Effluent by Irrigation*" with the remaining water treated in compliance with Australian Standard AS/NZS 1547:2012 "*On-site Domestic Wastewater Management*".

2.14.6 Reverse Osmosis Brine

All saline brine generated by the on-site potable water reverse osmosis plant would be pumped to the process water tank for entry into the process water circuit.

2.15 SAFETY/SECURITY MANAGEMENT

2.15.1 Public and Employee Safety

It is Bowdens Silver's policy that each person working on or visiting the Mine Site would be provided with a safe and healthy environment and that facilities and equipment would be kept secure from unauthorised access. In order to achieve this, Bowdens Silver would implement recruitment, induction and training programs to achieve the following objectives.

- Comply with statutory regulations and maintain constant awareness of new and changing regulations;
- Eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety in the mining industry;
- Ensure the suitability of prospective employees through a structured recruitment procedure;
- Provide relevant occupational health and safety information and training to all personnel;
- Develop and constantly review safe working practices and job training;
- Conduct regular safety meetings and provide an open forum for input from all employees;
- Provide effective emergency arrangements for all employees, visitors and general public protection;
- Maintain good morale and safety awareness through regular employee assessment and counselling;
- Collaborate with local emergency services in training and security initiatives;
- Ensure all contractors adopt and maintain Bowden Silver's policy objectives and safety standards at all times; and
- Undertake regular drug and alcohol testing in accordance with Bowdens Silver's Fitness for Work Policy.

Further to the above, the following operational safety controls would be installed within the Mine Site.

- A safety bund wall approximately 2m high would be constructed around the perimeter of the main open cut pit. This bund would be constructed at the time when mining operations are being undertaken close to the boundary of the main open cut pit.

- Signs identifying blasting times would be installed adjacent to the entrance of the Mine Site from the relocated Maloneys Road and in Lue. The issue of blast notification would be the subject of ongoing discussions with the community.
- Where internal roads are adjacent to steep slopes, windrows along the down-slope margins of those haul roads would be constructed to a minimum of half the wheel height of the largest item of mobile equipment on site.
- The blasting engineer or shotfirer would use appropriate blasting procedures to contain all fly rock within the design blast envelope and minimise the generation of excessive ground and air vibrations.
- All earthmoving equipment would be fitted with appropriate safety equipment in accordance with the Guideline for Mobile and Transportable Equipment for Use in Mines (MDG 15) published by the NSW Resources Regulator (January 2018).

Central to all aspects of public and employee safety would be the adoption of a pro-active approach to workplace safety, the preparation of a Work Health and Safety Policy to cover all activities at the Mine Site and strict compliance at all times with the requirements of the relevant regulations, Acts and Australian Standards (including AS 1470-1986 Health and Safety at Work – Principles and Practices).

Bowdens Silver is committed to ensuring the safety of all visitors and the general public and would adopt a set of procedures when members of the general public visit the Mine Site. A number of the security measures outlined in Section 2.15.2 would assist in achieving the safety of the general public at all times, including the period following the cessation of mining and processing, when final rehabilitation is underway.

2.15.2 Mine Site Security

Bowdens Silver recognises that the proximity of the Mine Site to Lue and the relocated Maloneys Road would necessitate the implementation of procedures and controls to protect the safety of the public. In order to ensure that access to the Mine Site is restricted to authorised personnel only, the following items would be implemented to ensure that members of the public do not access the Mine Site at any time, unless authorised.

- Installation of a security fence around the perimeter of the key operational areas within the Mine Site, with the exception of areas where rugged topography naturally restricts access. The security fence would consist of a combination of a cyclone fence and a five strand barbed wire rural fence.
- A security gate would be installed in the vicinity of the mine entrance. This would be the only vehicular access point to the operational sections of the Mine Site. Visitor and non-authorised vehicles would be required to report to the gate house before being permitted to enter the operational sections of the Mine Site.
- Security/warning signs would be positioned at strategic locations around or within the Mine Site indicating the presence of earthmoving and mining equipment, deep excavations and steep slopes. The signs would be positioned as appropriate to the location of the mining activities at any given time.
- Signs identifying blasting procedures and times would also be installed at the mine entrance.

2.16 REHABILITATION, MINE CLOSURE AND FINAL LAND USES

2.16.1 Introduction

Rehabilitation of all areas disturbed by mining-related activities would be an integral part of the Project to be undertaken by and paid for by Bowdens Silver. Emphasis would be placed upon progressively creating final landforms, wherever practicable, and re-establishing soil profiles and vegetation essential to achieving the preferred final land use(s) during and following the cessation of operations. The nature of the Project dictates, however, that the disturbed areas associated with the main open cut pit, processing area and TSF would remain active throughout the mine life and as a consequence, the opportunity to undertake progressive rehabilitation of these components would be minimal.

Rehabilitation activities within the Mine Site would be planned and undertaken in accordance with a Rehabilitation Management Plan to be submitted to the Resources Regulator and approved following the issue of development consent and grant of the mining lease for the Project, and prior to the commencement of any mining-related activities within the Mine Site. The Plan would also address all rehabilitation-related requirements nominated in the development consent for the Project.

The proposed rehabilitation strategy for the Project has been designed with reference to the following documentation.

- Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth Government, 2016).
- Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth Government, 2016).
- Towards Closure – Mine Rehabilitation in the Australian Minerals Industry (MCA, 2015).
- Strategic Framework for Mine Closure (ANZMEC, 2000).
- Safety Bund Walls around Abandoned Open Pit Mines (WA Department of Industry and Resources, 1997).

This subsection focusses upon outlining rehabilitation activities planned within the Mine Site and during the construction of the relocated Maloneys Road between the Mine Site and Lue Road. The rehabilitation activities are addressed for the site establishment and construction stage and for each of the key domains within the Mine Site. For each domain within the Mine Site, the specific rehabilitation objectives are defined together with relevant design information, rehabilitation procedures and specific success criteria. Details of how each rehabilitation component would be undertaken is presented in Appendix 5 of the EIS.

This subsection concludes with an overview of the sequence of rehabilitation activities across the entire Mine Site throughout the Project life and Bowdens Silver's plan for rehabilitation monitoring and maintenance and ultimately mine closure together with discussions regarding interim and final land uses.

2.16.2 Rehabilitation Objectives

Bowdens Silver recognises that the rehabilitation of the areas disturbed throughout the mine life is an integral component of the Company's development strategy. Bowdens Silver is committed to the integration of sustainable development principles in all components of the Project, particularly for rehabilitation and mine closure, as the ongoing productivity of much of the Mine Site is important for future generations. In this regard, Bowdens Silver recognises that, given the nature of some of the Project components, there would be a need for some different land uses within parts of the Mine Site and variations to species composition from those within the existing ecosystems in other parts of the Mine Site.

In the short term, Bowdens Silver's objectives would be to commence rehabilitation as soon as practical in areas no longer required for mining in order to improve long-term outcomes and to temporarily rehabilitate areas not required in the short term (but that may be disturbed later) in order to stabilise disturbance and, by doing so, minimise visual impacts, dust generation and erosional sedimentation until further mining-related disturbance is required.

Bowdens Silver's longer term rehabilitation objectives are that:

- the rehabilitated landform is safe, stable and sustainable particularly with regards to soils and hydrology;
- components of the final landform, including diversion channels, are re-instated or stabilised with native vegetation to specifically provide fauna habitat and corridors;
- the surrounding environment is not polluted by any mine-related activity during the mine life or following mine closure;
- the contaminated areas remaining on site, namely the WRE and TSF are appropriately covered and vegetated to ensure the materials in both component areas does not contribute to any off-site pollution;
- the rehabilitated final landform requires low levels of maintenance;
- the approach to rehabilitation is continually reviewed based on site specific knowledge, research and monitoring; and
- the mining lease over the rehabilitated landforms can be progressively relinquished and the security returned progressively within a reasonable timeframe after the successful completion of rehabilitation activities.

2.16.3 Planning

Successful rehabilitation of mining-related disturbance can only be achieved with diligent and structured planning, a practice implemented for the Bowdens Silver Project. The elements of the rehabilitation for the Project relied upon in planning involved the following.

1. Baseline Data Collection

The key data collected has included the following.

- Climate Data
  - long term daily average rainfall, rainfall intensity, temperature and evaporation – this data is summarised in Section 4.1.2.

- Soils Data from Soil Management Designs
  - this data is summarised in Section 4.13 and focusses upon the chemical and physical properties of the soils within the Mine Site that influence erosion potential and their value as a growth medium.
- Vegetation and Ecosystems Data
  - vegetation communities, threatened species, canopy cover and rooting depths – this data is summarised in Section 4.10.
- Fauna presence and populations
  - known fauna habitat, existing fauna corridors, threatened species.
- Topography and Drainage Data
  - detailed contours (from LIDAR mapping), defined major and minor watercourses.

2. Waste Rock Characterisation

Considerable emphasis has been placed upon the characterisation of the waste rock to be extracted from the open cut pits. Details of the characterisation studies are provided in the Materials Characterisation Assessment (Part 3 of the SCSC) with a summary included in EIS Sections 2.5.2 and Section A5.4.2 of Appendix 5 of the EIS. This information has assisted to identify what quantities and types of NAF waste rock would be produced and during which stages of the mining operation. Importantly, this information is required principally for the covers to be constructed on the final landform surfaces of the WRE and TSF.

3. Landform Design

All of the key components of the Mine Site have been designed initially as functional operational components with emphasis placed, wherever possible, upon minimising the disturbance footprint yet achieving a stable and safe structure that reflects best practice for each component. Upon completion of the preliminary design of each component, the approach to the final landform design commenced, (such as the WRE and TSF), where emphasis was placed on the design of a long-term cover. For the processing area and mining facility, emphasis was placed upon re-profiling the area to blend the final landform into the surrounding natural topography.

4. Surface Water Management

Each of the final landforms for each domain would provide for the long-term management of surface water with consideration of diversion, collection and discharge, if appropriate.

5. Seed and Fertiliser Selection

The stabilisation of disturbed areas around the Mine Site and long term growth of vegetation for habitat development would be achieved through the growth of a range of trees, shrubs and ground covers. In order to temporarily stabilise disturbed areas, particularly slopes, emphasis would be placed upon the use of exotic grasses suited to the planting season. Details of the seed and fertiliser selection are provided in Section A5.10.2.2 of Appendix 5 of the EIS.

6. Defining Success Criteria

Bowdens Silver has defined the success criteria for each component of the Mine Site to be rehabilitated focussing on key long term objectives outlined in Section 2.16.2. Individual performance and completion criteria would be established for each component and presented in the Rehabilitation Management Plan for the Project following the receipt of development consent and prior to the initial disturbance for the Project.

7. Stakeholder Consultation

During the community consultation program undertaken by Bowdens Silver, a number of aspects relating to the rehabilitation and final use of the Mine Site were raised, particularly with respect to stability of the final slopes, water quality runoff and weed management.

The community open day held on 15 June 2019 provided an opportunity for interested persons to provide comments on the final landform, planned revegetation strategies and long term land uses. Feedback received on the open day related to the following.

- *The water quality within the final lake.*
- *The extent of native vegetation on the final landform.*
- *Will Bowdens Silver continue to own the land on which the main open cut pit, TSF and WRE are located?*
- *When will Bowdens Silver sell the areas of land currently owned after the completion of the Project?*
- *The proportion of revegetated areas within the Mine Site returned to grazing.*

The 3D interactive model presented to the community at the open day on 15 June 2019 provided interested persons with the opportunity to comment on the final landform and extent of progressive revegetation.

Once sufficient detail was available on each Project component and the possible approach to their rehabilitation established, discussions were sought with two local Landcare Groups, namely Bingman Landcare (based in Lue) and Watershed Landcare (based in Mudgee), and the Aboriginal stakeholders involved in the cultural heritage assessment for the Project.

Both Landcare groups chose not to provide input to the rehabilitation design component of the Project as they claimed they had no knowledge of the overall project and the type of disturbance requiring rehabilitation. Bingman Landcare, a group that formed the Lue Action Group, has formally recorded that the group opposes the Project as the environmental impacts, that they assume would occur as a result of the Project, are “directly at odds” with their key values and primary focus to look after their local environment. Watershed Landcare, a group which is related to the Bingman Landcare with a number of common members, expressed similar sentiments to those of Bingman Landcare that their “input was only being sought on a very narrow subject” given their group had a range of core interests such as water quality, soil health, biodiversity, impacts on agriculture and other socio-economic issues.

Discussions held with the Aboriginal stakeholders regarding the final landform established that, whilst they did not endorse the configuration of the final landforms, there was support for the replacement of the artefacts salvaged during the mine life on those parts of the final landform that would be stable long term, preferably near where they were originally located.

2.16.4 Rehabilitation Domains

Rehabilitation domains refer to areas of related disturbance based on similar activities and/or use prior to rehabilitation and for which rehabilitation and decommissioning activities would be similar. **Figure 2.23** displays the boundaries of eight domains within the Mine Site and a description of each domain is as follows.

Domain 1 – Open Cut Pits

This domain would include the main open cut pit and the two satellite pits together with a setback of approximately 50m from the boundary of the main open cut pit to provide for safety bunding required during the mine life and beyond. The two long term accesses to the main open cut pit would also be included in this domain.

Domain 2 – Southern Barrier

This domain includes the entire footprint of the southern barrier and a 25m setback from its boundary to accommodate activities on the edge of the domain.

Domain 3 – Waste Rock Emplacement

This domain includes the entire footprint of the WRE together with the low grade ore stockpiles, lower embankment haul road, lower embankment noise barrier, the oxide ore stockpile and the leachate management dam. This domain also includes a 25m setback from its boundary to accommodate activities on the edge of the emplacement.

Domain 4 – Processing Area and Mining Facility

This domain includes the entire area where processing activities would be undertaken including the ROM pad, primary jaw crusher, crushed ore stockpile, processing plant and mining facility together with the various dams and ponds, and the internal roads / tracks leading to and within the processing area. This domain also includes a 25m setback from its boundary to accommodate activities on the edge of the emplacement.

Domain 5 – Tailings Storage Facility

This domain includes the TSF embankment and the entire impoundment together with the closure spillway and a 25m setback to accommodate a range of activities on the edge of the facility.

Domain 6 – Stockpile Areas

This domain includes all soil stockpile areas outside the key component areas within the Mine Site that would be used to stockpile topsoil and subsoil recovered during the mine life and used for long term rehabilitation of the Mine Site. A total of nine soil stockpile areas would be created within the Mine Site(referenced as Domain 6 on **Figure 2.23**). The NAF waste rock stockpile area located adjacent to the TSF embankment is also included in this domain.

Domain 7 – Water Management Structures

This domain includes all dams outside the key component areas used to manage sediment-laden water across the Mine Site together with the turkeys nest dam and leachate management dam.

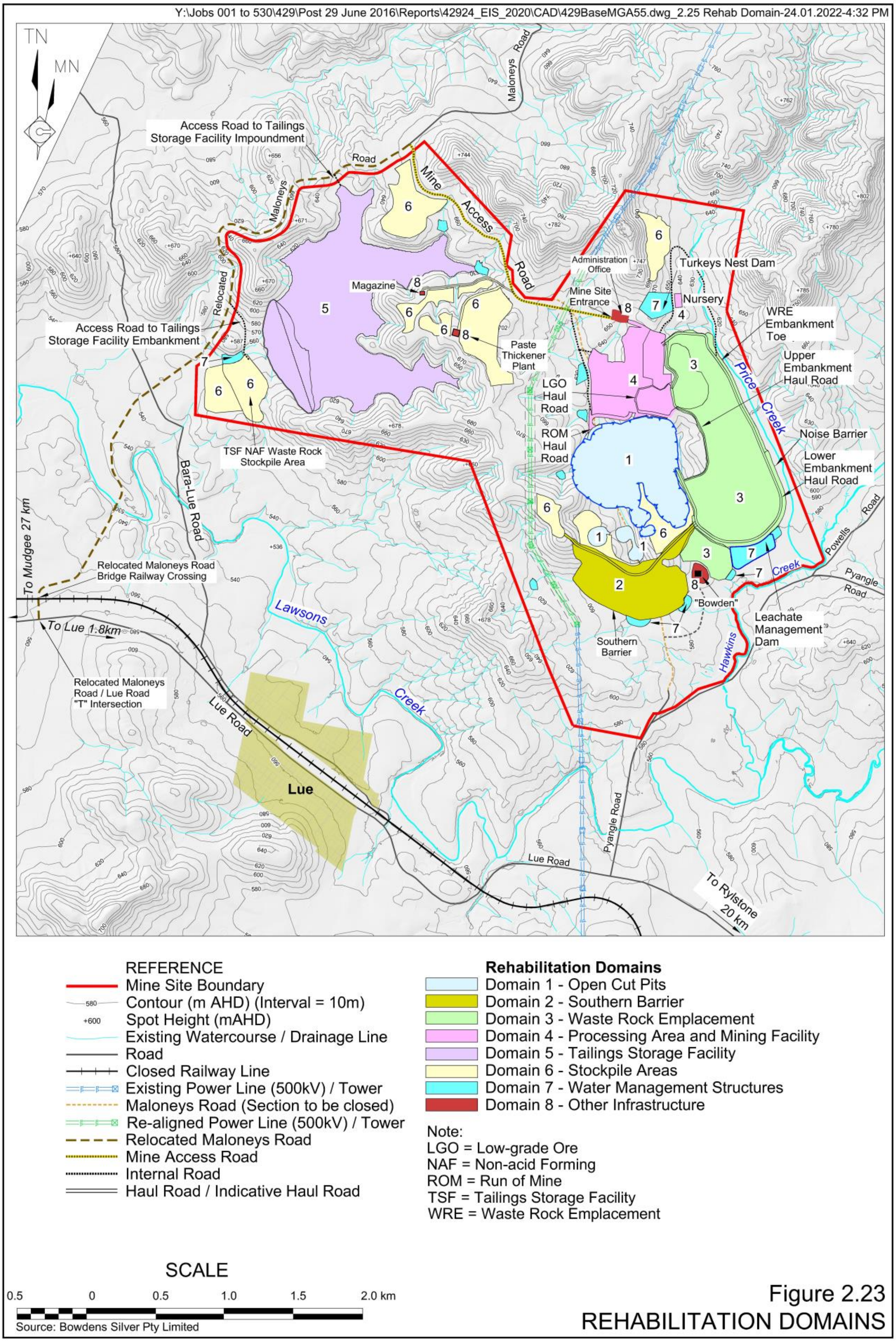


Figure 2.23
REHABILITATION DOMAINS

Domain 8 – Other Infrastructure

The domain includes the remaining buildings on the Mine Site including the administration building and amenities, the Bowdens exploration office and core library, the explosives magazine and the remaining tracks and internal roads across the Mine Site.

2.16.5 Final Landform

Figure 2.24 displays the final landform across the Mine Site at the end of the Project life. The key features of the final landform would be as follows.

1. The main open cut pit would be left as a void covering approximately 53ha and allowed to progressively fill largely with groundwater as most surface water would be diverted around the void.
2. The two small satellite open cut pits would be fully backfilled and their surfaces returned to pre-mining levels.
3. The WRE would remain as a north-south oriented ridge similar in elevation to surrounding ridges. The leachate management dam would be retained until leachate is no longer being generated. The dam would be removed and the former landform established in this area.
4. The TSF would remain as a self-draining landform with the upper surface shaped to direct all runoff to the closure spillway on the northwestern side of the former embankment. The oxide ore stockpile would remain integrated with the southwestern side of the WRE.
5. The area formerly occupied by the processing plant and mining facility would be recontoured to create an undulating landform.
6. The area formerly occupied by the southern barrier would be recontoured to a landform similar in form to the pre-Project landform.
7. All soil stockpile areas would be re-established to their pre-Project landform.

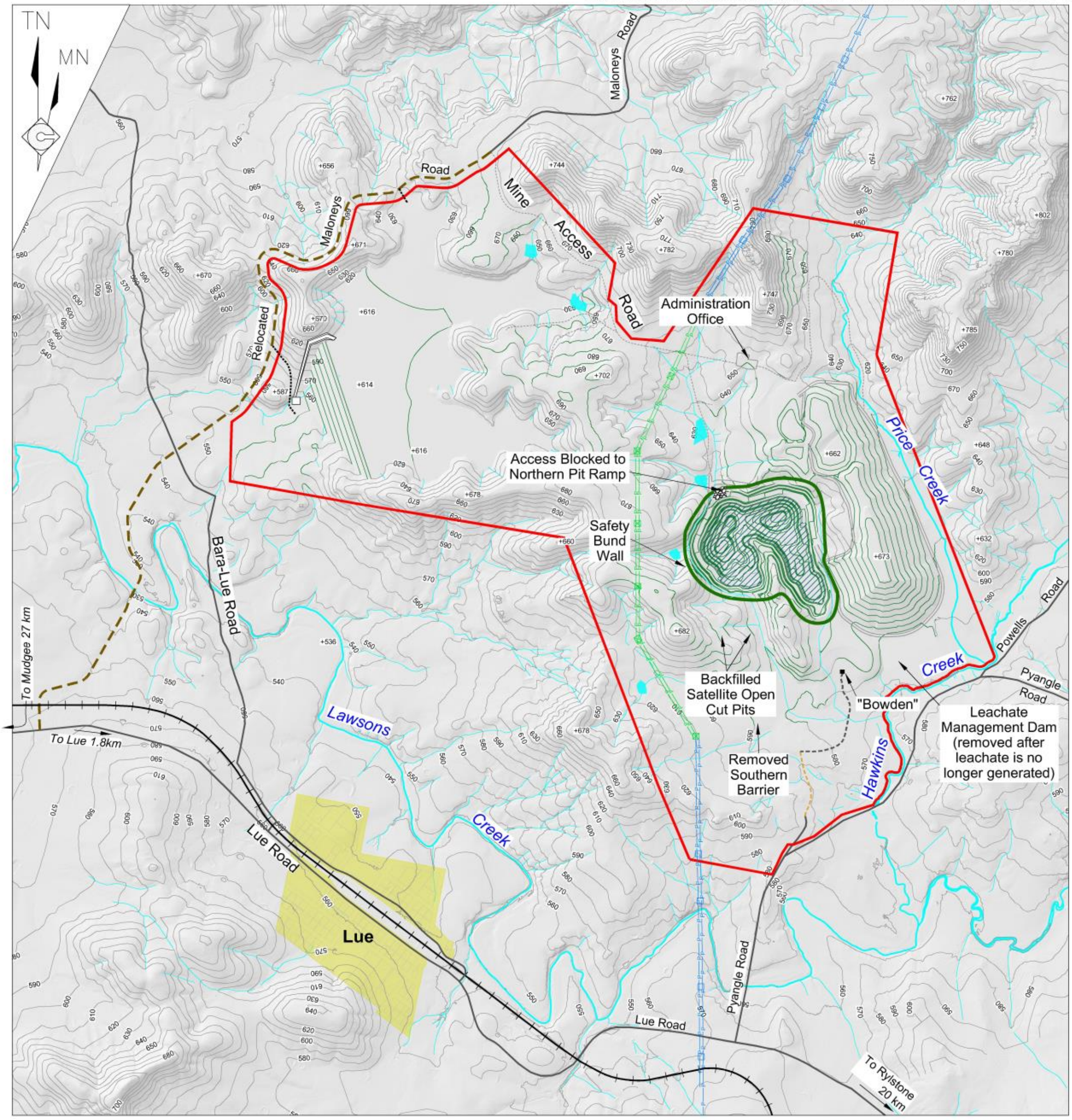
Further information on the landforms for the above component areas of the Mine Site are provided in Appendix 5 of the EIS.

Appendix 5 of the EIS also presents details of the rehabilitation procedures and relevant success criterion to be adopted throughout the site establishment and construction stage and for all key components within the Mine Site.

2.16.6 Revegetation Planning and Progressive Revegetation Sequence

As discussed in Section 2.16.1, a number of Project components would remain active throughout the mine life without the opportunity to progressively rehabilitate the areas of disturbance. However, wherever possible for other Project components, progressive rehabilitation would be implemented.

C:\Temp\Development Stages.dwg_2.24 Final Landforms-24.01.2022-4:25 PM



REFERENCE
- Mine Site Boundary
- Existing Contour (m AHD) (Interval = 10m)
- Proposed Contour (m AHD) (Interval = 10m)
- +600 Spot Height (mAHD)
- Watercourse / Drainage Line
- Harvestable Rights Dam
- Road
- Closed Railway Line
- Existing Power Line (500kV) / Tower
- Re-aligned Power Line (500kV) / Tower
- Relocated Maloneys Road
- Mine Components
- Safety Bund Wall (Nominal Location)
- Final Water Surface

SCALE

0.5 0 0.5 1.0 1.5 2.0 km

Source: Bowdens Silver Pty Limited

Figure 2.24
MINE SITE FINAL LANDFORM

Figure 2.25 displays the areas within the Mine Site that would be the subject of either temporary or permanent revegetation for a number of representative years throughout the mine life. The temporary revegetation would occur on:

- all soil stockpiles; and
- the southern faces of the southern barrier and WRE.

Permanent revegetation would commence on the WRE in Year 2, the TSF embankment and TSF NAF stockpile area in about Year 9, the satellite open cut pits in about Year 12, and two areas of the TSF impoundment during Year 16.

Following the completion of the final landform, all disturbed areas, with the exception of the open cut pit, would be revegetated in the manner described in the previous subsections.

Overall, it is anticipated the full range of rehabilitation activities would be completed within approximately 7 years of the completion of mining.

2.16.7 Rehabilitation Monitoring and Maintenance

Bowdens Silver's commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program following both the progressive and end-of-Project operations. Monitoring throughout the Project life would involve the following.

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover.
- Success of initial cover crop or grass cover establishment.
- Success of tree and shrub plantings.
- Natural regeneration of native species.
- Adequacy of drainage controls.
- General stability of the rehabilitated areas.
- Evidence of any acidic runoff.

Should any of the above identify a sub-optimal performance, remediation and enhancement activities would include but not be limited to the following.

- Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding and where necessary, re-topsoiling and/or the application of specialised treatments.
- If drainage controls are found to be inadequate for their intended purpose, or compromised by wildlife or vegetation, these would be replaced.
- Temporary fences would be installed to exclude native fauna, if grazing appears to be excessive.
- In the event areas of excessive erosion and sedimentation are identified, remedial works such as importation of additional rocky fill, subsoil or topsoil, or re-designing of water management structures would be undertaken.

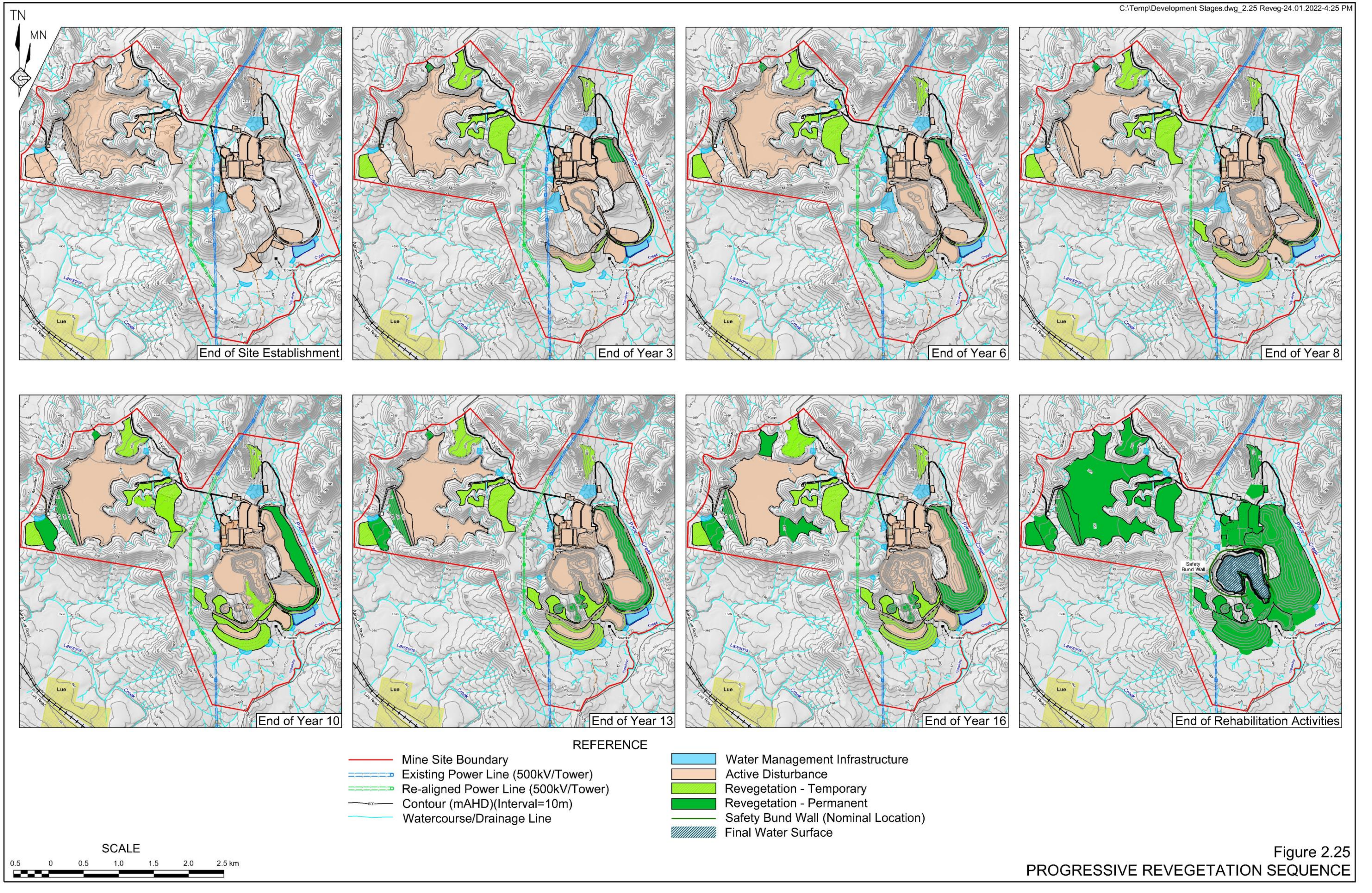


Figure 2.25
PROGRESSIVE REVEGETATION SEQUENCE

This page has intentionally been left blank
This page has intentionally been left blank

- Appropriate noxious weed control or eradication methods and programs would be undertaken in consultation with the Department of Primary Industries – NSW Agriculture (DPI-Ag) and/or the local Noxious Weeds Inspector.

No time limit would be placed on post-mining rehabilitation monitoring and maintenance. Rather, maintenance would continue until such time as the objectives outlined in Section 2.16.2 are achieved to the satisfaction of the relevant government agencies.

2.16.8 Interim and Final Land Uses

A range of regional and local strategic documents were reviewed during the design process to identify suitable post-rehabilitation land uses. The key documents which were considered include the following.

- *Central West and Orana Regional Plan 2036*
- *Mid-Western Regional Local Environmental Plan 2012*
- *Mid-Western Region Towards 2030 Community Plan*
- *The Mid-Western Regional Comprehensive Land Use Strategy 2010*

Sections 3.2.3.5 and 3.2.3.6 present 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. The importance of agriculture, the natural environment and industry (including mining) are recognised in each of these documents. These objectives are reflected in the rehabilitation objectives of the Project and the proposed final land uses within the Mine Site which principally comprise land for grazing and nature conservation.

Interim Land Uses

Undisturbed land within the Mine Site would principally be used for nature conservation throughout the mine life and would comprise approximately 356ha of land used for passive nature conservation and 199ha which would form part of the Project's biodiversity offset area. Grazing would not be undertaken within the biodiversity offset area, however, controlled grazing would be undertaken periodically on land used for passive nature conservation to reduce bush fire fuel loads to acceptable levels. A total of 35ha of land within and 547ha immediately surrounding the Mine would be retained for agricultural purposes throughout the mine life on land owned by Bowdens Silver. The majority of this land would comprise modified pasture suitable for improvement and/or cropping thus ensuring stocking rates are maintained or improved, wherever possible. A single lifestyle lot (18ha) would be maintained within the southeastern quadrant of the Mine Site throughout the mine life.

A more detailed analysis of the changes in pre-Project and interim land uses is provided in Section 4.18.6 of the EIS.

Final Land Uses

Beyond the end of the Project life, it is anticipated that approximately 699ha of land within the Mine Site would be returned to agricultural production with approximately 252ha permanently removed from production. The land within the Mine Site to be permanently removed from production would include the void left by the main open cut pit (53ha) and the on-site biodiversity offset area (199ha). A single lifestyle lot (49ha) would be located in the southeastern quadrant of the Mine Site.

A more detailed analysis of the changes in pre- and post-Project land uses is provided in Section 4.18.6 of the EIS.

2.16.9 Mine Closure

2.16.9.1 Introduction

This subsection provides an overview of Bowdens Silver's approach towards mine closure, however, preparation for mine closure is a substantial commitment and would be reviewed and upgraded progressively throughout the life of the mine.

2.16.9.2 Mine Closure Completion Criteria

The individual rehabilitated areas would be monitored against the following broad completion criteria throughout the Project life, i.e. both during and following the period of mining operations, with the performance against each considered by the Resource Regulator when assessing any subsequent application for the relinquishment of the mining lease (or parts thereof) covering the Mine Site.

- The rehabilitated landform is clean and tidy, and free of rubbish, metal and derelict equipment/structures.
- Areas of the rehabilitated landform nominated for agricultural production are progressively returned for that use as soon as practicable. All sediment dams would be retained as farm dams within the future Bowdens farm.
- The rehabilitated landform is suitable for the proposed subsequent agricultural land use(s) and is compatible (as far as possible) with the surrounding land fabric and land use requirements.
- The uses of the rehabilitated landform are consistent with the capability of that landform.
- The rehabilitated landform is sustainable in terms of the intended land use(s), i.e. is stable and the maintenance needs are no greater than those of similar surrounding lands unaffected by mining activities.
- The rehabilitated landform integrates areas of re-established native vegetation and undisturbed native vegetation specifically to maintain or improve wildlife corridors.
- The rehabilitated landform provides for fauna habitat in nominated areas.
- The rehabilitated landform does not cause unacceptable air or water pollution, or other adverse environmental effects.

Success criteria for each of these broad completion criteria would be detailed within the MOP or Rehabilitation Management Plan (whichever applies at the time) for the Project.

Site specific criteria for each of the rehabilitation domains would be detailed in a Mine Closure Plan prepared at least 5 years prior to the cessation of approved activities.

2.16.9.3 Timetable

As discussed in Section 2.13.3, Bowdens Silver proposes that the final rehabilitation activities would be undertaken over a period of approximately 7 years. Beyond that time it is envisaged some minor maintenance may be required. The completion of the mine closure program would occur when there is no further seepage from both the TSF and WRE and the respective collection dams can be removed.

2.16.9.4 Rehabilitation Security

The Division of Mining, Exploration and Geoscience (MEG) will require Bowdens Silver to lodge a bank guarantee to cover the cost of rehabilitation of the activities/land disturbance undertaken throughout the mine life in the event the Company defaults on its rehabilitation responsibilities. The quantum of the rehabilitation security would be calculated through the use of the MEG's Rehabilitation Calculation Tool and revised either annually or biennially to ensure the security is appropriate for the extent of rehabilitation required. The progressive rehabilitation undertaken would be taken into account when rehabilitation security is calculated.

2.17 BIODIVERSITY OFFSET STRATEGY

2.17.1 Introduction

For State significant development in NSW, residual impacts to biodiversity values must be offset in accordance with the relevant policies, guidelines and legislation. Niche (2022) were commissioned to review the outcomes of the assessments undertaken by EnviroKey (2022) and prepare a Biodiversity Offset Strategy for the Project.

In accordance with the SEARs provided by DPIE (Appendix 2 of the EIS), the Project is a "pending or interim planning application" under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* and the environmental assessment may be undertaken under former legislation including the *Threatened Species Conservation Act 1995* and former Section 5A of the EP&A Act. The transitional arrangements are designed to permit applications that were formally in progress at the time of legislation changes to be completed under that legislation. This approach does not provide any advantage in approach other than the benefit of saving time and cost in repeating assessment work that was already underway. Accordingly, EnviroKey (2022) and Niche (2022) addressed the requirements of the *Framework for Biodiversity Assessment* (FBA) (OEH, 2014a) in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014b).

2.17.2 Biodiversity Offset Requirements of the Project

An update to the BAR presented with the EIS was provided with the *Water Supply Amendment Report* and includes an assessment of biodiversity-related impacts that incorporate the proposed final mining disturbance area and the relocated Maloneys road. Using the OEH Biobanking Calculator (version 4.0), EnviroKey (2022) has determined the biodiversity offset requirements for the Project as outlined in **Tables 2.11** (ecosystem credits) and **Table 2.12** (species credits).

Table 2.11
Ecosystem Credits Required for Biodiversity Offset

Biometric Vegetation Type	Area Impacted (ha)	Ecosystem Credits Required
CW112 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	22.97	1 250.2
CW263 Inland Scribbly Gum grassy open forest on hills in the Mudgee Region, NSW central western slopes	58.69	4 150.0
CW270 Mugga Ironbark – Red Box – White Box – Black Cypress Pine tall woodland on rises and hills in the northern NSW, South Western Slopes Bioregion	0.71	42.0
CW291 Red Stringybark – Inland Scribbly Gum open forest on steep hills in the Mudgee – northern section of the NSW South Western Slopes Bioregion	119.56	6 959.0
CW111 Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	157.20	10 118.4
CW217 White Box shrubby open forest on fine grained sediments on steep slopes in the Mudgee region of the central western slopes of NSW	22.04	1 360.0
Total	**381.17**	**23 880**
Source: EnviroKey (2022) – Annexure 7		

Table 2.12
Species Credits Required for Biodiversity Offset

Species		Impact	Species Credits Required
Common Name	**Scientific Name**		
Koala	*Phascolarctos cinereus*	381.17ha[1]	9 910
Squirrel Glider	*Petaurus norfolcensis*	381.17ha[1]	8 386
Regent Honeyeater	*Anthochaera phrygia*	381.17ha[1]	29 350
Silky Swainson-pea	*Swainsona sericea*	54 individuals	972
Small Purple-pea	*Swainsona recta*	4 individuals	104
Large-eared Pied Bat	*Chalinolobus dwyeri*	337.80ha	4 391
1. Entire disturbance area considered for impact based on potential for these species to occur. These species were not identified in field survey but are known to occur from other records or habitat indicators.			
Source: EnviroKey (2022) – Annexure 7			

2.17.3 Biodiversity Offset Strategy

It is proposed that the required offsets would be met in a staged manner as outlined in **Table 2.13**. A staged approach to offsetting has been implemented for several State significant developments and requires that the biodiversity offset requirements for each stage be satisfied prior to vegetation clearing for that stage, or where a Biodiversity Stewardship Agreement is proposed (as would be the most likely outcomes for the Project), within 12 months of commencement of clearing. It is noted that the Biodiversity Offset Strategy must be approved by DPIE prior to vegetation clearing commencing.

Table 2.13
Staged Offset Requirement

Offset Stage	Year from commencement	Clearing area (native vegetation only)	Proportion of overall clearing/ offset requirement (approx.)
Stage 1*	0-1	233.03ha	61.14%
Stage 2	3-4	77.53ha	20.34%
Stage 3	6-12	70.61ha	18.52%

* Includes clearing associated with the relocated Maloneys Road.

A detailed summary of the biodiversity credits required for each offset stage is presented graphically in **Figure 2.26**. Calculations of the offsetting obligations in each offset stage would be presented in an updated Biodiversity Offset Strategy that would be prepared in accordance with development consent conditions and in consultation with the Biodiversity Conservation and Sciences Directorate and DPIE.

In order to satisfy the Project's offset requirements, Bowdens Silver proposes to establish or facilitate the establishment of Biodiversity Offset Sites using Biodiversity Stewardship Agreements. It is noted that this is the preferred/optimum option for offsetting by DPIE. The Biodiversity Offset Sites would be established either on land within or adjacent to the Mine Site (on-site offsets) or on other freehold land within the region where offsets can be sourced under the FBA rules (off-site offsets).

The proposed on-site offsets would be established on land owned by Bowdens Silver and are currently estimated to cover a combined area of 795ha. A preliminary investigation has estimated that the on-site offsets would generate approximately 9 848 credits, meeting 41% of the Project's overall ecosystem credit offset requirement and 65% of the Stage 1 requirements. Additional land owned by the Company but not subject to preliminary assessment may also be included in the on-site offset. An area of 640ha has been identified that may be subject to a Biodiversity Stewardship Agreement pending the outcomes of ecological field survey and assessment.

The locations for prospective off-site offset sites have been determined following a desktop assessment that included analysis of existing vegetation mapping and species records with particular emphasis on areas mapped as BGW and proximity to previous Regent Honeyeater, Koala and Squirrel Glider records. A short-list of ten properties were identified with each landholder subsequently contacted with an expression of interest. To date no off-site offset sites have been finalised, however of the ten properties identified, seven landholders have so far expressed interest in the creation of a biodiversity stewardship site (which would be facilitated by Bowdens Silver).

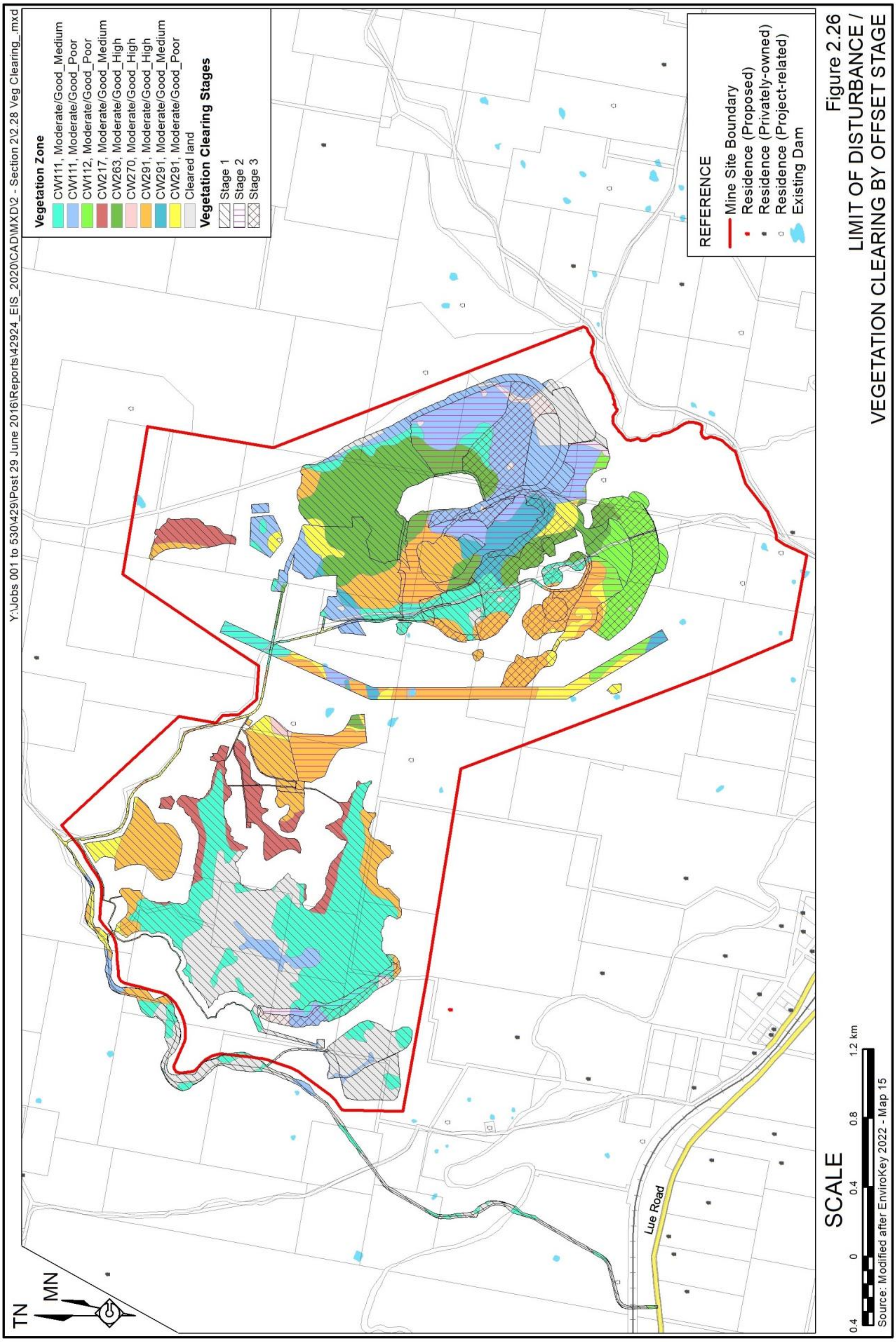


Figure 2.26
LIMIT OF DISTURBANCE /
VEGETATION CLEARING BY OFFSET STAGE

Given the extent of native vegetation within the identified properties it is likely that the residual offset obligation would be met through establishment of one or two of the ten candidate properties. Bowdens Silver is therefore confident that the offsetting obligations for the Project would be satisfied by this approach. Upon confirmation of the available off-site offset areas, further fieldwork would be undertaken to determine the ecosystem and species credits that would be generated at these sites and confirm that the generated biodiversity credits would satisfy the offsetting requirements of the Project.

If necessary, any residual offset requirements would be satisfied by purchasing available credits from the market, through payment into the NSW Biodiversity Conservation Trust Fund, or other supplementary measures, subject to agreement. Niche (2022) placed the credits required for the Project onto the Biobanking credit register with several parties already expressing interest in selling ecosystem and species credits. This indicates that suitable credits are available on the market. This option would be investigated further should the proposed strategy not be achievable. However, as noted above, this is considered unlikely.

The Biodiversity Offset Strategy would be approved by DPIE prior to commencement of any vegetation clearing.

This page has intentionally been left blank