Section 3

Project Description

PREAMBLE

This section provides an overview of the Project and approvals required. The Project Site, including the Mine Site, Rail Facility and transportation routes, is identified and infrastructure, services and site establishment activities are described. The proposed mining operation and sequence and processing activities are detailed, together with the planned product transportation and water and waste management. This section also describes the proposed hours of operation, employment and capital investment value and rehabilitation operations. Additional detail in relation to rehabilitation operations is presented in ***Appendix 3****.*

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

3.1 Introduction

3.1.1 Overview of the Project

Table 3.1.1 presents an overview of the Project and **Figures 3.1.1** to **3.1.3** present the proposed layout of the Project.

Table 3.1.1
Project Overview

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Project Element	Summary of the Project
Mining Method	• Dredge mining from an Extraction Area approximately 17km long and up to approximately 3.3km wide. • Mining would commence with a starter pond at the at the southeastern extent of the deposit. The starter pond would be extracted using conventional free dig, load and haul mining techniques. Extracted overburden, namely material located above the water table with no heavy mineral, would be used to construct infrastructure within the Mine Site or stockpiled for later use during rehabilitation operations. • Following establishment of the starter pond, the dredges would be installed, followed by the floating Wet Concentration Plant. • Interburden, namely material located below the water table with uneconomic heavy mineral, would be extracted using floating dredges. Interburden would initially be transferred to the Off Path Storage Facility. Once the dredge pond has achieved its full operational size, extracted interburden would be used to backfill completed sections of the Extraction Area. • Ore, namely material with sufficient heavy mineral to justify processing, would be extracted using a floating dredge. The ore would be transferred to the floating Wet Concentration Plant for processing. • Reject from the Wet Concentration Plant would initially be transferred to the Off Path Storage Facility. Once the dredge pond has achieved its full operational size, reject would be combined with the extracted interburden to backfill completed sections of the Extraction Area. • The placed reject and interburden would be covered by overburden and soil before being rehabilitated.
Mineral Resource	• Heavy mineral sand deposit approximately 23km long and up to 5km wide. • Indicated and Inferred JORC-compliant resource (September 2023) – 2.54Mt at 1.2% heavy mineral comprising ilmenite, leucoxene, rutile, zircon, monazite and xenotime.
Annual Production	• Ore .... up to approximately 27.7Mtpa • Interburden........ up to approximately 48.0Mtpa • Overburden .... up to approximately 28.2Mtpa
Mine Life	• Project life .... approximately 26 years, comprising – Construction .... approximately 2 years – Mining .... approximately 17 years – Post-mining Rehabilitation........ approximately 7 years post mining Note: Construction and mining operations would be partially undertaken concurrently
Total Resource Recovered	• Ore mined .... up to 406.4Mt
Disturbance Area	• Mine Site........ approximately 5,622ha • Site Access Road, transmission line, substation, and Anabranch Mail Road realignment .... approximately 352ha • Rail Facility (existing disturbance, nil additional)........ approximately 3.0ha

Table 3.1.1 (Cont'd)
Project Overview

Project Element	Summary of the Project
Processing	• Processing operations would involve the following. – Wet screening and gravity separation of up to approximately 27.7Mtpa of ore within the Wet Concentration Plant. – Dewatering and transfer of the Heavy Mineral Concentrate to the Rare Earth Concentrate Plant. – Washing, drying and separation within the Rare Earth Concentrate Plant to produce up to 511,000tpa of the following. ▪ A primary and secondary ilmenite product. ▪ A monazite product. ▪ A non-magnetic concentrate.
Management of Mining Waste	• Overburden – Extracted using dry mining techniques. – Initially used to construct infrastructure within the Mine Site or stockpiled for later use, after which it would be transferred directly to completed sections of the Extraction Area to reestablish the final landform. • Oversize – Screened and transferred directly to completed sections of the Extraction Area. • Interburden and Wet Concentration Plant reject and slimes – Initially transferred to the Off Path Storage Facility. Once the dredge pond has achieved its full operational size, reject would be combined with the extracted interburden to backfill completed sections of the Extraction Area. • Rare Earth Concentrate Plant reject. – Placed within completed sections of the Extraction Area. • General wastes and recyclables – Collected from site and transferred to a licenced waste management facility.
Transportation Operations	• Internal transportation – Mine Site Access Road (approximately 27km) – would be constructed from the realigned Anabranch Mail Road to the Infrastructure Area. – Other light and heavy vehicle internal roads would be constructed within the proposed area of disturbance and would be relocated as required. • Transportation routes. – Realigned Anabranch Mail Road (approximately 6.1km) – from the Site Access Road to the Silver City Highway – Transportation Route - North (to Broken Hill) – Silver City Highway, Patton, Comstock and Eyre Streets and Holton Drive. – Transportation Route - South (to Wentworth) – Silver City Highway. – Other routes – use of other routes would be prohibited for Applicant-controlled vehicles and discouraged for all other vehicles. • Public road upgrades to accommodate Project generated traffic. – Realigned and upgraded section of Anabranch Mail Road from the intersection with the Mine Site Access Road to the Silver City Highway (approximately 6.1km). – Upgraded intersection of Anabranch Mail Road and the Silver City Highway. – Upgraded intersection of Patton and Comstock Streets. – Upgraded intersection of Comstock and Eyre Streets. – Upgraded intersection of Holten Drive and the Rail Facility Access Road.

Table 3.1.1 (Cont'd)
Project Overview

Page 3 of 4

Project Element	Summary of the Project
Transportation Operations (Cont'd)	• Public road closure and realignment – Nulla Road between the "Huntingfield" homestead and the "Wenba" Station access road would be closed indicatively during Years 11, 12 and 13 when the Project would mine through the road. – The road would be reinstated in a realigned location as soon as practicable once mining has progressed through that section of the road. • Product/concentrate transportation – Route .... via Transport Route North to the Rail Facility – Vehicle type........ AB-triple (Type 1) or BAB-quad (Type 2) road trains – Material classification (under Australian Code for the Transport of Dangerous Goods by Road & Rail) ▪ Ilmenite products and non-magnetic concentrate .... Not classified ▪ Monazite product .... Class 7 (Radioactive Material) – Traffic level ▪ AB-triple (Type 1) road trains .... up to 16 laden movements per day ▪ BAB-quad (Type 2) road trains .... up to 12 laden movements per day – Onward transportation from Broken Hill (under separate approval) ▪ Ilmenite product and non-magnetic concentrate ....by rail ▪ Monazite product .... by road or rail Note: **BAB-quad** road trains would be used only once the required road permits have been obtained • All other deliveries/consumables – Route ▪ Transport Route South........ approximately 90% of movements ▪ Transportation Route North .... approximately 10% of movements – Vehicle type........up to B-double – Traffic level........ up to 11 laden movements per day
General Infrastructure	On-site infrastructure not addressed above would include the following. • Mine Camp associated infrastructure for up to 220 personnel. • A 66kV transmission line from the 220kV Buronga to Broken Hill transmission line. The transmission line would be located adjacent to the Mine Site Access Road. • Solar Farm and associated infrastructure. • A power station comprising modular, silenced, diesel generators and associated infrastructure for use during construction and for emergency power requirement during operations. • Offices and Administration Area. • Workshops, Stores and Laydown Areas.
Power	• Power for the Project would be provided by a combination of: – diesel generated power during construction operations; – solar power from an approximately 35MW solar farm (if required); and – mains power sourced via the above 66kV transmission line. • Power distribution infrastructure, including substations and overhead, buried and floating transmissions lines. • Once the 66kV transmission line is operational, a minimum 30% of the Project's power would be sourced from renewable sources. Once operational, the Applicant would review opportunities to increase the percentage of renewable power sourced for the Project.
Water Management	• Groundwater within the target Loxton Parilla Sands is highly saline, with limited to no beneficial use. • Dredging operations would be reliant on groundwater inflows to the Extraction Area to form the pond upon which the dredges and Wet Concentration Plant would be floated.

Table 3.1.1 (Cont'd)
Project Overview

Project Element	Summary of the Project		
Water Management (Cont'd)	• Production bores would be installed within the Loxton-Parilla Sands to provide water for initial construction operations and feed for one or more reverse osmosis plants. – Treated water would be used for camp amenities, concentrate washing, dust suppression (in conjunction with polymer-based dust suppressants) and other purposes as required. – Brine from the reverse osmosis plant would initially be placed within a pond within the Extraction Area footprint, after which it would be transferred to the dredge pond. • Production bores and the Water Storage Dam would be used to manage the water level within the Starter Pond to allow construction and floating of the dredges and Wet Concentration Plant. • Sediment laden (dirty) water would be retained on site and used for mining-related purposes. • Water from undisturbed sections of the Mine Site (clean water) would be prevented from entering disturbed sections of the Mine Site. Where clean water accumulates adjacent to the clean water exclusion bunds, that water would be used for mining-related purposes.		
Workforce	• Construction .... up to approximately 480 persons • Operations .... up to approximately 240 persons • Rehabilitation .... up to approximately 40 persons Note: Work and fatigue management rosters would result in not all personnel being on site at the same time		
Hours of Operation	**Activity**	**Proposed Days of Operation**	**Proposed Hours of Operation**
	Land preparation	7 days per week	7:00am to 6:00pm
	Construction operations • Road construction within Broken Hill LGA • All other construction	 7 days per week 7 days per week	 7:00am to 10:00pm 24 hours per day
	Mining operations	7 days per week	24 hours per day
	Processing operations	7 days per week	24 hours per day
	Transportation operations • Mine product transportation within Broken Hill LGA • All other transportation	 7 days per week 7 days per week	 7:00am to 10:00pm 24 hours per day
	Maintenance operations	7 days per week	24 hours per day
	Rehabilitation operations	7 days per week	7:00am to 10:00pm
Capital Investment Value	A$639 million		
Final Landform	• All infrastructure not required for the final land use removed or reduced in size. • A backfilled, shaped and revegetated Extraction Area with no final void. • Realigned Nulla Road. • Upgraded public infrastructure retained for public use.		
Final Land Use	• Native ecosystem, with active investigation of alternative post-mining land uses, including renewable energy generation.		
Rehabilitation	• Rehabilitation would occur progressively throughout the life of the Project, with the Extraction Area progressively backfilled, shaped and rehabilitated.		

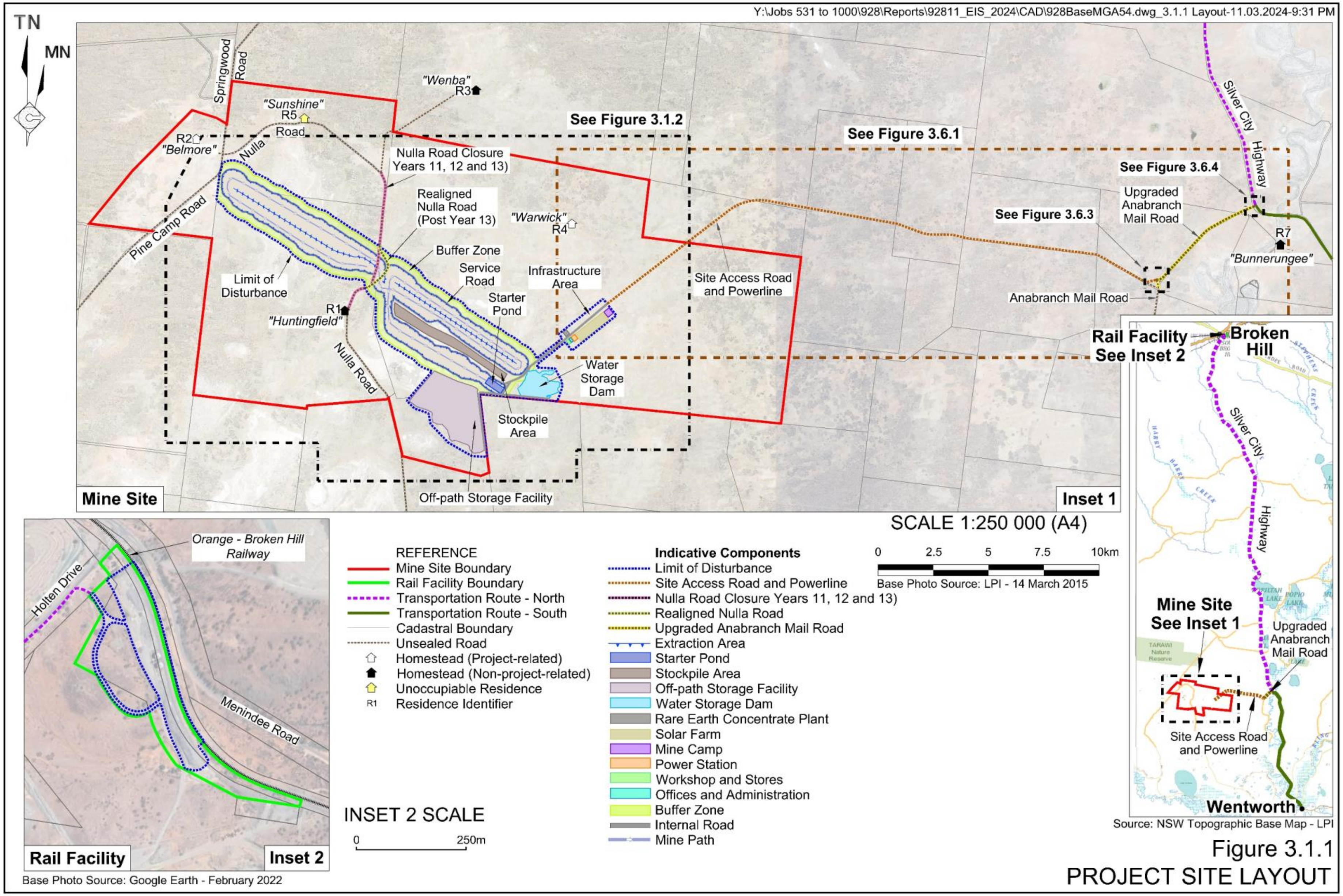


Figure 3.1.1
PROJECT SITE LAYOUT

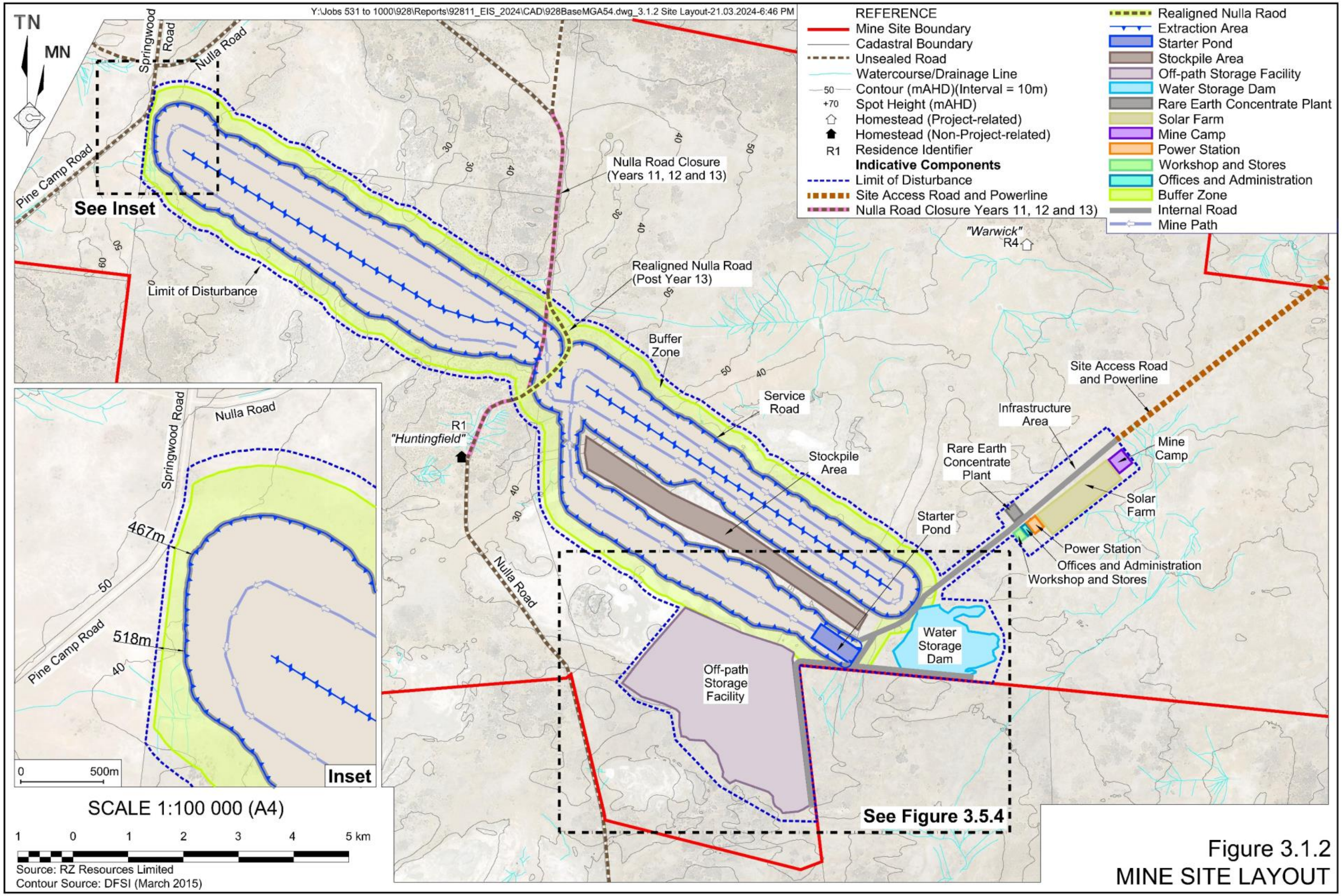


Figure 3.1.2
MINE SITE LAYOUT

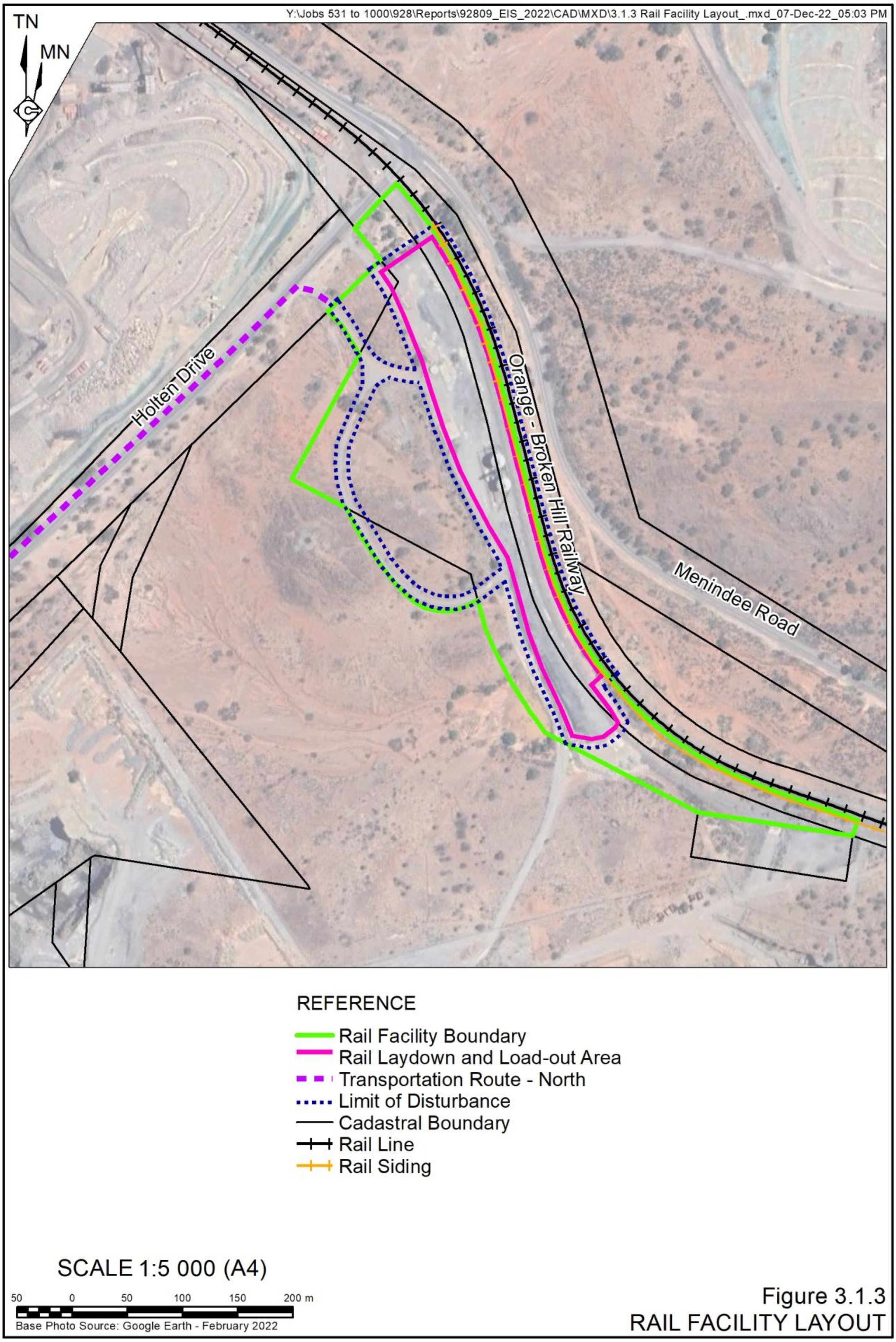


Figure 3.1.3
RAIL FACILITY LAYOUT

3.1.2 Approvals Required

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

- Mining Lease under the *Mining Act 1992*.

  One or more Mining Leases issued under Part 5 of the *Mining Act 1992* would be required to permit mining of minerals.

  - A Mining Lease Application (MLA629) has been submitted for those areas of the "Huntingfield/Sunshine" and "Warwick" properties within the Mine Site. (**Figure 1.1**).
  - The Applicant intends to reduce the area of MLA629 to the "Huntingfield/Sunshine" property only. A second MLA will be submitted for that section of the Mine Site within the "Warwick" and "Nulla" properties.

  No Mining Lease would be required for the Rail Facility as no minerals would be mined from that land. Similarly, the Rail Facility would not be considered an Ancillary Mining Activity as it is located approximately 180km from the Mine Site, would be operated by a third party and would be used by the Applicant as well as other non-mining users.

- Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*.

  An Environment Protection Licence to permit mining for minerals would be required as the Project would exceed the 4ha disturbance threshold under Clause 29(2) of Schedule 1 of the POEO Act.

- A consent under Section 138 of the *Roads Act 1993*.

  Permits (and an associated Works Authority Deed) would be required from Transport for NSW, Wentworth Shire and Broken Hill City Councils for works within the road reserves of Nulla Road, Anabranch Mail Road, Silver City Highway, Wentworth Road, Patton, Comstock and Eyre Streets and Holten Drive.

The following additional approvals would also be required.

- A range of approvals under the *Water Management Act 2000*, including the following.
  - Water Access Licence(s) – for groundwater that would flow into proposed Extraction Area and would evaporate or be otherwise lost and groundwater that would be sourced from the proposed production bore(s). Surface water harvested for mining-related purposes would not require licencing under the Applicant's harvestable right.
  - Bore licences – Licences for additional monitoring bores that have or would be constructed.

- A licence under Section 6 of the *Protection from Harmful Radiation Act 1990* for the storage of monazite product because that material would be classified as a radioactive substance.
- Driver and vehicles licences for transportation of monazite product, a material classified under the Australian Dangerous Good Code as Class 7 (Radioactive Material).
- All necessary approvals from Wentworth Shire Council for construction, erection and/or placement of buildings, structures and appropriate sewage treatment systems for the Project.
- Permits for the use of BAB quad (Type 2) road trains on the Transportation Route North.

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

- Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974.*
- Water use approval under Section 89, a water management works approval under Section 90 or an activity approval under Section 91 of the *Water Management Act 2000*.

As noted in Section 6.3.6.6, EnviroKey (2024) identified that an approval under the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* is unlikely to be required as the biodiversity assessment indicated that the Project would not result in significant adverse impacts to any Matter of National Environmental Significance.

Finally, a range of other agreements, licences and certificates, including Planning Agreements with Wentworth Shire Council and Broken Hill City Council, radiation licences (for density gauges) and construction and occupation certificates will be required.

3.2 Project Site

3.2.1 Land Titles

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

- the Mine Site;
- Site Access Road;
- the transportation routes; and
- the Rail Facility.

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

Table 3.2.1
Project Site Land Titles

Lot	Deposited Plan	Lot	Deposited Plan	Lot	Deposited Plan
Mine Site		Site Access Road		Rail Facility	
1	756199	4068	766543	1	1112089
1907	763791	4117	766622	1	1062254
1940	763792	3421	765710	7479	1200701
4068	766543	3422	765711		
4069	766544	3423	765712		
Road Reserve for Nulla, Springwood and Pine Camp Roads		1908	763764		
		1910	763766		
Transportation Routes					
C	377667[1]	Road reserves for Anabranch Mail Road, Silver City Highway, Wentworth Road, Patton, Comstock and Eyre Streets and Holten Drive			
Note 1: The use of an approximately $1.5m^2$ of Lot C, DP377667 is dependent on the final design for the intersection of Patton and Comstock Streets.					

3.2.2 Disturbance Area

Figure 3.2.1 presents the limit of land that would be disturbed by the Project. In summary the areas of disturbance would be as follows. All land to be disturbed within the Rail Facility has been previously disturbed.

- Mine Site (limit of disturbance)..approximately 5,622ha
- Site Access Road, transmission line, substation and Anabranch Mail Road realignment....................................... approximately 352ha[1]
- Rail Facility (existing disturbance, nil additional) ....approximately 3.0ha

[1] Comprising a corridor up to 90m wide, with wider sections where the road curves, and 33.1km long. Actual disturbance area for the Site Access Road and realigned Anabranch Mail Road (15m to 20m wide) and transmission line (5m to 10m wide) would be substantially less than the area of the corridor.

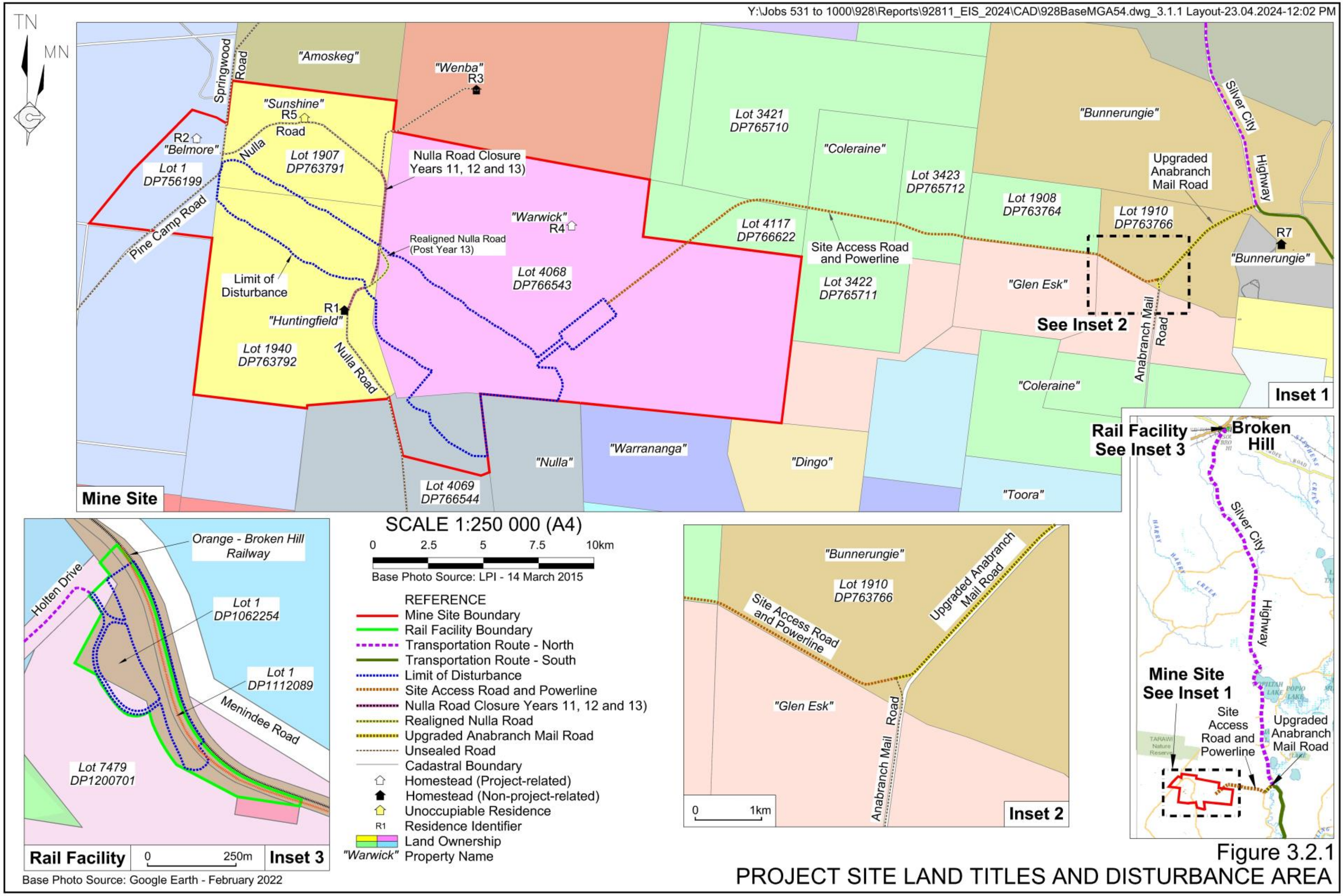


Figure 3.2.1
PROJECT SITE LAND TITLES AND DISTURBANCE AREA

3.2.3 Land with Environmental Constraints

Figure 3.2.2 presents land zoning and land with environmental constraints. In summary, the *Wentworth Local Environment Plan 2011* identifies that the Mine Site includes land with the following constraints.

- Wetlands associated with the Eastern Salt Pan.
- Terrestrial biodiversity.
- Heritage items.

No land within the Rail Facility is identified under the *Broken Hill Local Environment Plan 2013* as having environmental constraints.

Section 6 identifies land with environmental constraints identified by the specialist consultant team.

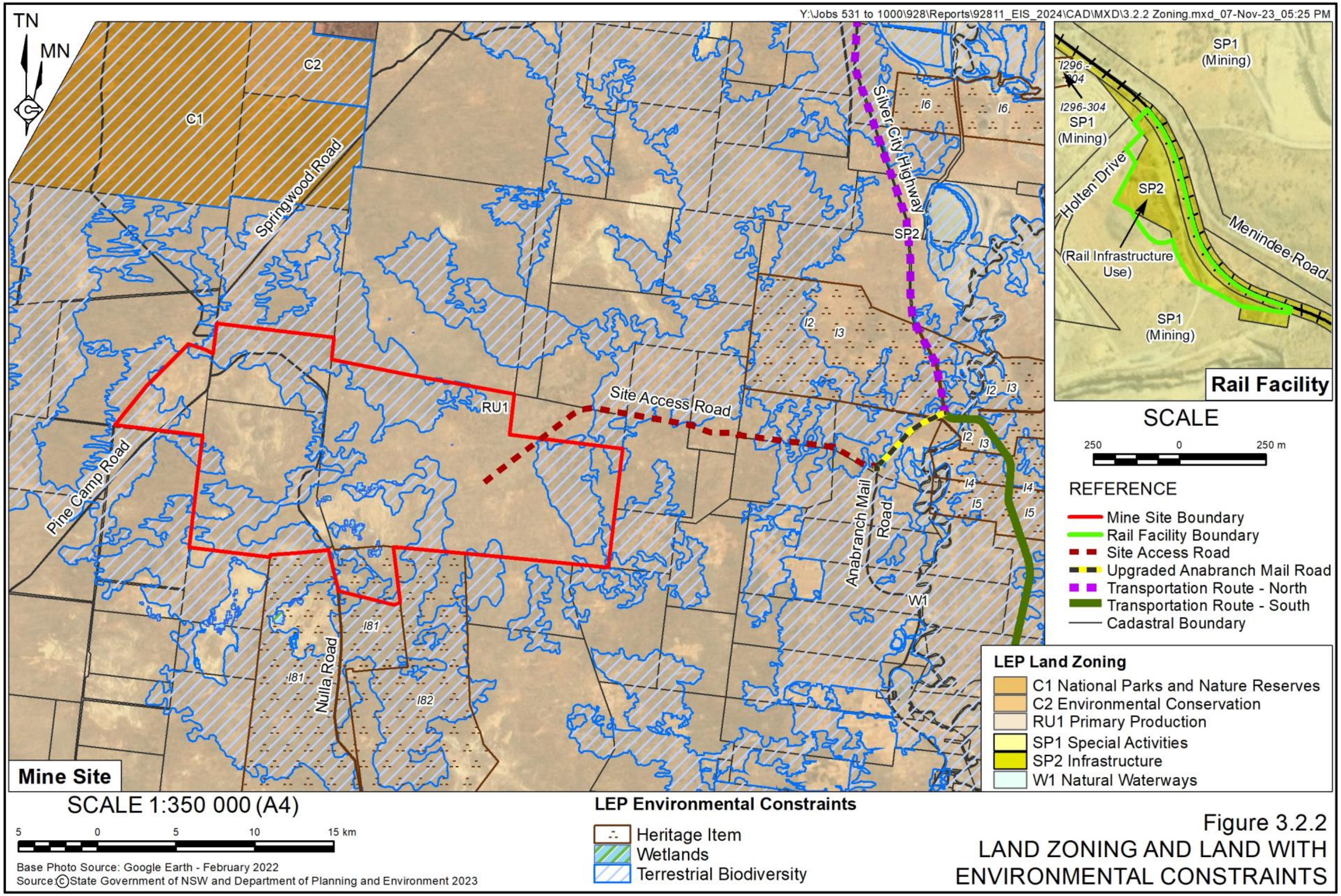


Figure 3.2.2
LAND ZONING AND LAND WITH ENVIRONMENTAL CONSTRAINTS

3.3 Infrastructure, Services and Site Establishment

3.3.1 Introduction

The following subsections present a description of Mine Site infrastructure and services that would be constructed to facilitate the Project. A description of the site preparation activities that would apply to all areas of proposed disturbance is also provided. Section 3.6 presents a description of the proposed realigned public roads and upgraded intersections and Section 3.7 presents a description of the infrastructure and activities associated with the Rail Facility.

3.3.2 Infrastructure

3.3.2.1 Construction and Mine Camp

During the initial site establishment phase of the Project a construction camp would be established, indicatively in the vicinity of the Mine Camp (**Figure 3.1.2**). The construction camp would comprise a series of transportable buildings, including accommodation, kitchen and self-contained ablutions facilities that would service the initial construction operations until the initial stages of the mine camp could be established. The capacity of the construction camp would be sufficient to house the initial construction workers and would be substantially smaller than the Mine Camp.

The Mine Camp would be located within the Infrastructure Area and would be established during the initial construction stages of the Project. The Mine Camp would provide accommodation for approximately 220 people, with the capacity to scale as required. **Figure 3.3.1** presents a conceptual layout of the camp, noting that the final design will be determined by the contractor appointed to supply and operate the camp. All buildings and structures would be constructed in accordance with the Building Code of Australia and appropriate construction and occupation certificates obtained. The Mine Camp would indicatively include the following.

- A range of transportable buildings, indicatively including the following.
  - Self-contained accommodation units, each equipped with a bed, ensuite, storage units, desk/table, chair(s) and television.
  - Kitchen, dining and recreation facilities.
  - Administration and first aid facilities.[2]
  - Meeting and training rooms.
  - Parking areas for light and heavy vehicles
- Landscaping, including grassed and vegetated area(s), undercover and open seating areas and covered paths.

[2] No allowance has been made for construction of an emergency airstrip for the evacuation of personnel. Reliance will be placed on an emergency airstrip operated by the Wentworth Pastoral Company in the vicinity of the "Warwick" homestead.

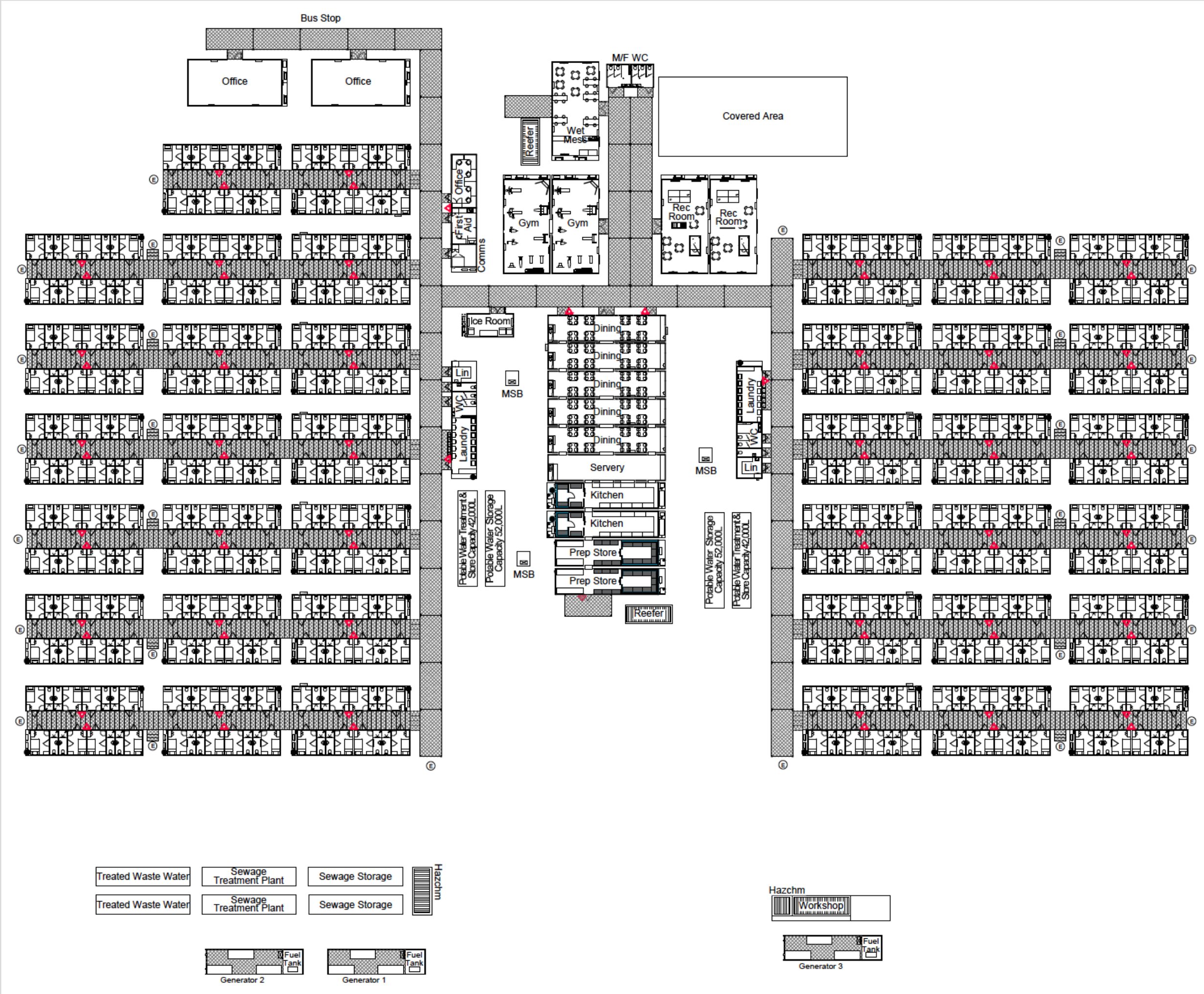


Figure 3.3.1
CONCEPTUAL MINE CAMP LAYOUT

Source: RZ Resources Limited

- A reverse osmosis plant to produce potable water for the Mine Camp and storage tanks to store treated water. Brine produced by the reverse osmosis plant would be transferred to the dredge pond.
- One or more wastewater treatment system(s) installed in accordance with the requirements of Wentworth Shire Council.
- Ancillary infrastructure, including water and power supply, internet/data connectivity, etc.

3.3.2.2 Construction Phase Power Station

Power for the operational phase of the Project would be provided via a proposed 66kV powerline from the 220kV Buronga to Broken Hill Transmission Line. However, until that is established, power for construction and other Project-related operations would be provided by modular silenced diesel-powered generators located within the Power Station Area.

The generators would have an maximum combined capacity of 30MW (likely substantially less) and would be located adjacent to suitably sized self-bunded diesel tanks. A suitable asset protection zone would be established around the generators and diesel storage facility to minimise bushfire related risks.

Following connection of the 66kV power line, the majority of diesel generators would be removed from site, with sufficient generation capacity retained for emergency operations only

Diesel for the power station would be sourced commercially and transported to site by road.

3.3.2.3 Solar Farm

The Applicant has committed to ensure that initially the Project would source a minimum of 30% of the electricity used within the Mine Site from renewable sources, with a view to increasing that proportion with time. Following connection to the 220kV Buronga to Broken Hill Transmission Line Buronga to Broken Hill Transmission Line, the Applicant would seek to contract the required renewably sourced power from third-party suppliers. In the event that suitable supply is not available or is not commercially viable at any stage of the Project, the Applicant would establish a solar farm within the Infrastructure Area. In the event that adequate renewable power is available, the solar farm would not be constructed.

In order to achieve the initially required 30% supply of renewable power for the Project, the solar farm would have an indicative capacity of 35MW and would comprise a fixed solar array, with solar panels mounted sufficiently far apart to enable vegetation growth between and below the panels to prevent wind erosion and dust generation. The Applicant is currently trialling utilising a range of salt bush species to stabilise the land surface under existing small-scale collections of solar panels. In the event that those trials are unsuccessful, the surface would be stabilised utilising other methods.

The construction phase power station and solar farm would feed into the power infrastructure described in Section 3.3.3.2.

3.3.2.4 Office and Administration Area

An Office and Administration Area would be established during the initial construction phase of the Project and would include a range of transportable buildings and structures to be constructed in accordance with the Building Code of Australia, including the following.

- Reception area.
- Meeting and training rooms.
- Offices for mine management, technical and administration staff.
- Crib rooms, change rooms and ablutions facilities.
- Light and heavy vehicle parking areas.
- Emergency response facilities.

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

3.3.2.5 Workshop and Stores Area

A Workshop and Stores Area would be established during the initial construction stages of the Project and would include the following (**Figure 3.1.2**).

- Offices, meeting rooms and amenity facilities comprising transportable buildings constructed in accordance with the Building Code of Australia with appropriate construction and occupation certificates obtained.
- A wastewater treatment system installed in accordance with the requirements of Wentworth Shire Council.
- A hardstand area suitable storing equipment required for site establishment and operations.
- Workshop(s) suitable for construction and maintenance of dredge and processing-related plant equipment and maintenance of light and heavy vehicles.
- Parking areas for mobile plant, including mining equipment.
- Hydrocarbon storage facilities constructed in accordance with Australian Standard *AS 1940-2017 - The Storage and Handling of Flammable and Combustible Liquids.*
- Stores facility(ies) for receipt and storage of consumables.
- A wash bay, including a concrete sealed washdown area equipped with a sump that would collect wash water. Accumulated water from the wash bay would be recycled or passed through an oil-water separator to ensure oily water is not permitted to be discharged from the Mine Site.

3.3.2.6 Flexible Elements – Infrastructure

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

Table 3.3.1
Flexible Elements – Infrastructure

Flexible Element	Limit on Flexibility	Justification
Location and size of proposed infrastructure	All infrastructure-related surface disturbance to be located within the proposed limit of disturbance. All buildings and structures to be constructed in accordance with the Building Code of Australia and appropriate construction and occupation certificates obtained.	Detailed design for aspects of the infrastructure required for the Project was ongoing at the time of finalisation of this document. As a result, it is possible that the location and size of infrastructure described in this subsection may vary from that described. Notwithstanding this, all infrastructure would be constructed within the approved limit of disturbance and in accordance with the relevant guidelines.
Solar farm	The solar farm as proposed may not be constructed or may be substantially smaller than described.	The solar farm as described may not be required to achieve the Applicant's commitment to use a minimum 30% renewable power. If so, the solar farm would not be constructed or would be smaller than described.

3.3.3 Services

3.3.3.1 Potable and Non-saline Water Supply

Potable water would be supplied via reverse osmosis water treatment systems and associated tanks located in the vicinity of the Mine Camp, Offices and Administration Area and Rare Earth Concentrate Plant. The potable water supply system would be capable of supporting all personnel on site. Raw water for the reverse osmosis plants would be supplied via production bores that would access the Loxton-Parilla Sands aquifer. Brine from each of the reverse osmosis plants would be transferred to the dredge pond which would contain a substantial volume of saline water.

The Applicant anticipates that the potable reverse osmosis water treatment systems would be subject to further approval from Wentworth Shire Council during the construction certificate stage of the Project and would comply with all required standards and guidelines.

3.3.3.2 Power

As described in Section 3.3.2.2, power for the construction phase of Project would be provided by silenced diesel-powered generators.

Power for the operational phase of the Project would be supplied via a 66kV transmission line from the 220kV Buronga to Broken Hill Transmission Line to a substation located within the Infrastructure Area. Infrastructure associated with the power supply would include the following.

- A 220kV/66kV transformer/switchyard located to the north of Anabranch Mail Road in the vicinity of where the 220kV Buronga to Broken Hill Transmission Line crosses that road.
- An approximately 35km long 66kV transmission line to be constructed within an easement located immediately to the north of realigned Anabranch Mail Road and the Site Access Road. The transmission line would utilise concrete or similar poles rather than steel tower structures to minimise disturbance footprint.
- A high voltage transformer/switchyard/substation located within the Infrastructure Area.

The Applicant has submitted a Connection Enquiry with TransGrid and its project delivery group, Lumea, and a formal response has been received. The Applicant anticipates that the 66kV transmission line would be designed, delivered and operated by Transgrid and Lumea, with constructed expected to be completed in time for commissioning of the dredges and Wet Concentration Plant.

Suitable power management and distribution infrastructure, including substations, transformers and above and below ground high and low voltage distribution networks would be installed to ensure that power can be safely and efficiently transferred to the Infrastructure Area and active mining areas.

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

As identified in Section 3.3.2.3, the Applicant has committed to sourcing a minimum of 30% of the power required for the Project from renewable sources once the transmission line is operational. The Applicant will review opportunities to increase the percentage of renewable power sourced for the Project in line with the targets identified in the *Climate Change (Net Zero Future) Act 2023* and State and Federal commitments in relation to emissions reduction targets.

The Applicant's preferred option would be to purchase power from certified renewable grid-connected power sources. However, potential exists that such a supply may not be available or may not be commercially viable. As a result, in order to ensure that this commitment can be achieved, the Applicant has made an allowance to constructed a 35MW solar farm within the Infrastructure Area (**Figure 3.1.2**). The solar generation capacity is anticipated to be adequate to achieve the stated initial 30% renewable power commitment.

3.3.3.3 Communications

The primary means of external telephone and data connection for the Mine Site would be provided by a satellite-based communications system. This would include a microwave distribution system and two-way repeater towers to create Wi-Fi communications zones enabling voice and data communications, and connectivity across the Mine Site. A site wide digital radio communications system would be installed to enable voice communication utilising one or more repeater towers.

Voice and data communications along the Transportation Route and within the Rail Facility would be provided by the mobile phone network, where available, and via UHF radios.

3.3.3.4 Flexible Elements – Services

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

Table 3.3.2
Flexible Elements - Services

Flexible Element	Limit on Flexibility	Justification
Location, size and nature of proposed services	All services-related surface disturbance to be located within the proposed limit of disturbance. All equipment and structures to be constructed in accordance with the Building Code of Australia or relevant guidelines/standards.	Detailed design for aspects of the services required for the Project was ongoing at the time of finalisation of this document. As a result, it is possible that the location, size and nature of services described in this subsection may vary from that described. Notwithstanding this, all services would be constructed within the approved limit of disturbance and in accordance with the relevant guidelines.

3.3.4 Site Establishment and Construction Activities

3.3.4.1 Introduction

The site establishment and construction activities for all key components for the Project would be sequenced to achieve the commencement of ore processing approximately 2 ½ years after the commencement of the site establishment and construction stage.

The following subsections provide a brief description of general preparatory activities for all components of the Project. The activities provided in the following subsections may be adjusted for particular infrastructure or locations as required.

3.3.4.2 Survey and Mark Out of Key Boundaries

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. Key boundaries and locations would be marked with painted pegs and recorded on relevant site construction plans and documents. To prevent inadvertent disturbance outside the approved area of disturbance, the proposed limit of disturbance would be permanently marked using regularly spaced, distinctively coloured, robust markers such as steel posts or similar, with these markers to remain in place for the life of the Project.

3.3.4.3 Fencing, Site Security and Communications

All existing pastoral station fencing associated with the Mine Site will be reviewed and upgraded if required to prevent stock / animals from entering the mining area. Site gates, secure fencing and monitoring cameras will be installed prior to clearing activities.

Basic site communications systems will be installed prior to earthworks on the site to ensure adequate communication systems are in place prior to construction activities. This will include two-way radio repeater system and telemetry systems for data transmission.

3.3.4.4 Installation of Erosion and Sediment Controls

A program of initial earthworks would be undertaken to establish erosion and sediment controls for each operational area in accordance with the *Erosion and Sediment Control Plan* to be prepared for the Project. The *Erosion and Sediment Control Plan* would include measures to ensure exclusion of all surface water flows from areas outside the active mining areas and containment of all incident rainfall within those areas.

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

3.3.4.5 Installation of Construction Infrastructure

All construction infrastructure would be established within the proposed limit of disturbance Infrastructure required for construction operations would be established initially, including the following.

- Access track between Anabranch Mail Road and the Infrastructure Area following the route of the Site Access Road. The access track would be sufficient to permit access for construction-related equipment and would be upgraded to the standard described in Section 3.6.1.2 during construction.
- Construction camp as described in Section 3.3.2.1.
- Construction staging areas, including laydown/hardstand areas, a range of transportable building, temporary workshops and materials management facilities.
- Power station to supply electricity for construction until the 66kV transmission line is established.
- Internal roads required for site establishment and construction activities.

3.3.4.6 Vegetation Clearing

Vegetation within the Project Site is typically limited to small trees and shrubs, with limited groundcover (see Section 6.3). Larger vegetation would be removed prior to soil stripping to permit the establishment of annual or groundcover species and setting of seed. Cleared vegetation would be mulched for later inclusion in stripped topsoil.

Groundcover vegetation would be removed with the topsoil to maximise the establishment of annual or groundcover species and associated development of a seed bank, to minimise opportunities for erosion and dust lift-off between removal of the larger vegetation and soil stripping.

3.3.4.7 Soil Stripping and Management

Introduction

Sustainable Soils Management Pty Ltd (SSM) undertook the Soils and Land Capability Assessment for the Project. The resulting report, referred to hereafter as SSM (2024), is presented as **Appendix 7** and is summarised in Section 6.4. The following sections identify the soil associations within and surrounding the Mine Site, the proposed maximum stripping depths, the volumes of soil that would be available for use during rehabilitation and the procedures that would be used during soil stripping and stockpiling operations.

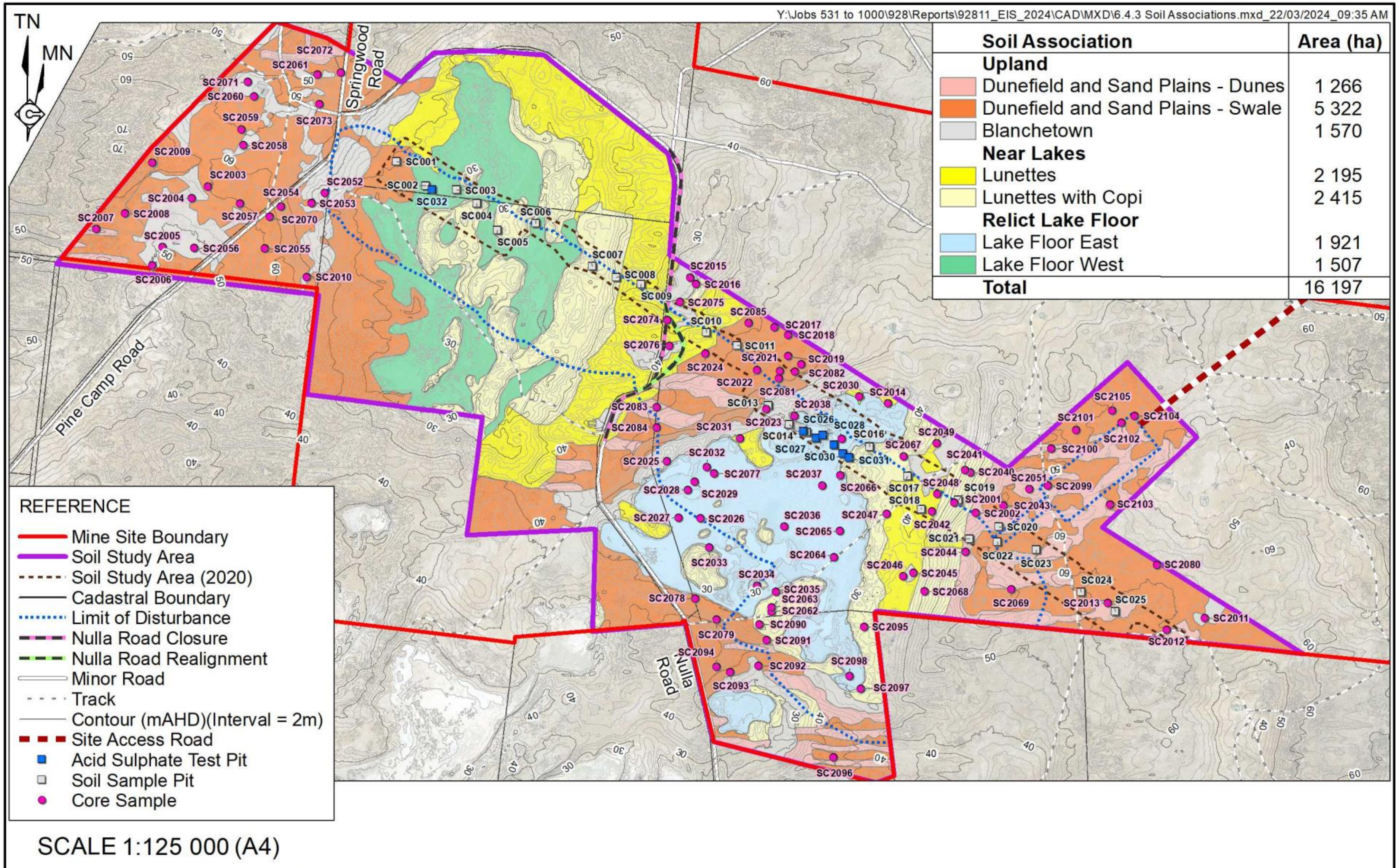
Soil Associations, Stripping Depths and Inventory

SSM (2024) identified six soil associations within the Mine Site as follows (**Figure 3.3.2**). A full description of all soil associations is presented in Section 6.4.

- Dunefield and Sand Plains – red sandy topsoil over sand to sandy clay loam subsoil. The landform ranges from undulating plains to dunes and swales. Soil profiles have low salinity with carbonate commo. SSM (2024) further subdivided this soil association into two phases as follows.
  - Swales – well drained, high carbonate soil.
  - Dunes – well drained, high carbonate soil, higher in the landscape with a sandier surface soil than the Swales Phase.
- Blanchetown Clay – occupies low lying areas in the western portion of the Soil Survey Area and on the western slope of the Eastern Salt Pan, as well as depressions elsewhere. This soil association has a sandy surface soil over moist, plastic clayey subsoil associated with moderate salinity.
- Lunettes – occur on the eastern side of the salt pans. SSM (2024) state that these lunettes are dominated by material that has been blown from the salt pans.
- Lunettes with Copi – occur either near or downwind of the salt pans, which are the likely source of the Copi or flour gypsum. This soil association contains a mixture of salts of carbonate, sulphate and chloride.
- Lake Floor East – occurs within the Eastern Salt Pan. The soil is clayey and soil salt chemistry appears to be dominated by chloride and sulphate.
- Lake Floor West – occurs in the Western Salt Pan. The soil is sandy and soil salt chemistry appears to be dominated by sulphate.

Soils within areas of proposed disturbance would be stripped and either directly used for rehabilitation or placed into stockpiles for subsequent use in rehabilitation as described in Section 6.4.5. SSM (2024) identified three classifications of "built" soils on the final landform as follows.

- Hydrosols – or "wet' soils. The Hydrosols would occupy the floor of the Eastern Salt Pan and the backfilled final void within the Year 17 mining area. These soils would be in close proximity to the regional water table.
- Rudosols – or "young" soils. The Rudosols would occupy the floor of the Western Salt Pan.
- Calcarosols – or soils containing calcium salts. The Calcarosols would occupy more elevated sections of the final landform and would comprise a loamy topsoil and a clayey subsoil.



Soil Association	Area (ha)
Upland	
Dunefield and Sand Plains - Dunes	1 266
Dunefield and Sand Plains - Swale	5 322
Blanchetown	1 570
Near Lakes	
Lunettes	2 195
Lunettes with Copi	2 415
Relict Lake Floor	
Lake Floor East	1 921
Lake Floor West	1 507
Total	16 197

Source: SSM (2024) - after Figure 6.1
Base Photo Source: LPI - 14 March 2015

Figure 3.3.2
SOIL ASSOCIATIONS

Table 3.3.3 presents the recommended soils stripping and placement depths as well as a life of Project soil balance. In summary, adequate soil resources are available over the life of the Project for rehabilitation operations. Section 6.4.5 presents a detailed annual soil balance for the Project, noting that availability of soil during the initial years of the Project would be limited and would require careful scheduling of rehabilitation operations.

Table 3.3.3
Indicative Life of Project Soil Balance

Page 1 of 2

Soil Association	Topsoil		Subsoil	
	Thickness (m)[1]	Volume (m^3)[2]	Thickness (m)[1]	Volume (m^3)[2]
Soil to be Stripped				
Blanchetown	0.2	529,469	Nil	-
Dunefield and Sand Plain-Dune	0.35	702,648	0.8	1,606,053
Dunefield and Sand Plain-Swale	0.2	916,916	0.8	3,667,664
Lake Floor East	Nil[3]	-	Nil[3]	-
Lake Floor West	0.3	1,212,949	0.3	1,212,949
Lunettes	0.4	1,714,632	0.6	2,571,948
Lunettes with Copi	0.3	2,951,089	0.7	6,885,874
Total		**8,027,703**		**15,944,487**
Soil Required for Rehabilitation				
Calcarosol	0.2	6,538,916	0.2	5,686,014
Hydrosol	Nil[4]	-	Nil[4]	-
Rudosol	0.2	1,368,061	0.2	1,189,618
Total		**7,906,976**		**6,875,632**

Note 1: Source – SSM (2024)
Note 2: Source – RZ Resources Limited
Note 3: The Lake Floor East soil association is toxic to plant like and is not recommended for stripping
Note 4: Hydrosols are expected to be saline and would not be subject to revegetation. As a result, that soil association does not require productive soils to be spread on the final landform

Section 6.4.5 presents the soil stripping, stockpiling and placement measures that would be implemented by the Applicant throughout the life of the Project.

3.4 Mining Operations

3.4.1 Introduction

Three classes of material would be extracted within the Mine Site as follows.

- Overburden – comprising material with insufficient heavy mineral to justify processing. Overburden occurs below the base of the soil to the water table and would generally have lower salt levels than interburden or ore which is located below the water table. Overburden thickness would vary depending on the elevation of the land surface, with a greater thickness in areas of elevated land.
- Interburden – comprising material from below the water table with insufficient heavy mineral to justify processing. Interburden would primarily occur above the ore zone, however, it may also occur between ore lenses.
- Ore – comprising material with sufficient heavy mineral to justify processing.

Overburden would be extracted using dry mining techniques to expose the interburden and allow the starter dredge to establish the dredge pond. Once the dredge pond has been established and the dredges and Wet Concentration Plant commissioned, the dredge pond would progressively move along the mine path, with overburden, interburden and ore extracted from the leading edge of the dredge pond. The trailing edge of the dredge pond would be backfilled with reject using floating reject and interburden stackers, with overburden placed over the placed reject and interburden to re-establish the final landform.

This subsection presents information relating to:

- the characteristics of the material to be extracted;
- the layout and design of the Extraction Area;
- the proposed mining operations;
- the mining sequence, schedule, scenarios and equipment.

This subsection concludes with a review of the flexible elements relevant to the proposed activities.

Section 3.5 presents an overview of the processing operations and reject and interburden placement operations.

3.4.2 Material Characteristics

3.4.2.1 Geochemistry

Section 1.5.2 presents a description of the Project’s geological setting. In summary, the ore is hosted by the Loxton-Parilla Sands which is unconformably overlain in places by the Blanchetown Clay and/or Woorinen Formation. The material to be extracted comprises unconsolidated gravels, coarse and fine sands, silts and clays. The Applicant engaged RGS Environmental Consultants Pty Ltd (RGS, 2023) to prepare a geochemistry assessment of the Loxton-Parilla Sands (overburden, interburden and ore), Geera Clay (underlying the ore) and reject. The results may be summarised as follows.

Salinity

RGS (2023) assessed overburden and interburden as a single unit and determined that of the 22 samples assessed, 13 had a moderate risk of generating saline drainage, with a further 8 samples having a high risk and one sample a low risk of generating saline drainage. Those samples with a high risk of generating a saline drainage were interburden from below the water table. During the initial phase of the Project, this material would be placed into the Off-path Storage Facility in a section of the Eastern Salt Pan, underlain by the Lake Floor East soil association, a highly saline soil toxic to most plant life (see Section 6.3). Once the dredge pond reaches its full operational size, that material would be placed into the dredge pond below the highly saline water table.

Overburden generally had a moderate risk of generating saline drainage. This material would generally be used to reestablish the final landform and would not be stored in an elevated location where saline drainage would be expected to flow from the base of the landform. The exception to this would be in the Eastern Salt Pan where saline drainage is already common.

Overburden, interburden and reject placed within the Off-path Storage Facility would be contained in an internally draining depression where saline drainage is already common.

Acid Generating Material

RGS (2023) tested samples of overburden, interburden, ore and the Geera Clay which under lies the ore. The results may be summarised as follows.

- Overburden and interburden

  Of the 18 samples tested, 15 were non acid forming. The remaining three samples were classified as potentially acid forming – low capacity, meaning that while these samples had the potential to form an acidic leachate if exposed to oxygen, the amount of acid that would be formed would be limited. Each of these three samples were located immediately above the ore and would be classified as interburden. During initial mining operations, both non-acid forming and potentially acid forming – low capacity interburden would be transferred to the Off-path Storage Facility where it would be mixed with rejects and capped with the Blanchtown Clay overburden. The mixing of the non-acid forming and potentially acid forming material would likely result in dilution of the contained pyrite to the point where all placed material would be classified as non-acid forming. The covering of the facility with clay would also exclude oxygen and thereby prevent oxidation and the generation of an acidic leachate. Finally, the Off-path Storage Facility would be located within an internally draining depression and in the unlikely event that an acidic leachate was generated, it would be contained within the Off-path Storage Facility footprint.

  Once the dredge pond reaches its full operational size, that material would be placed into the dredge pond below the water table.

- Ore, heavy mineral concentrate and reject

  RGS (2023) determined that the acid generation potential for the ore was "uncertain". As a result, ore is not expected to be potentially acid forming.

However, the Wet Concentration Plant would preferentially concentrate pyrite into the heavy mineral concentrate which would be further processed at the Rare Earth Concentrate Plant. That pyrite would preferentially report to the non-magnetic concentrate and would be removed from site in sealed shipping containers. Any pyrite that did report to the Rare Earth Concentrate Plant reject would be placed back under the water table in the dredge pond. The Rare Earth Concentrate Plant would be internally draining and all surface water collecting within the bunded area would be tested for pH and would be returned to the dredge pond or used for mining-related purposes.

RGS (2023) determined that the reject would be non-acid forming.

- Geera Clay

  RGS (2023) determined that the Geera Clay which underlies the ore may be classified as potentially acid forming – low capacity. This material would remain undisturbed and below the water table and would therefore not generate an acid leachate. Any Geera Clay that was inadvertently extracted with the ore would report to the reject and would be placed below the water table.

3.4.2.2 Acid Sulphate Soils

SSM (2024) undertook an assessment of the potential for acid sulphate soils in the lower sections of the Eastern Salt Pan in accordance with the *Acid Sulphate Soils Assessment Guidelines* (Ahern *et al.*, 1998) (see Section 6.4.4.3). In summary, the assessment determined that that there is a low risk of acid sulphate soils within the Mine Site. Notwithstanding this, should any potentially acid forming material be encountered, that material would be placed with reject into completed sections of the Extraction Area below the water table.

3.4.2.3 Radiation

As identified in Section 1.5.3, the heavy mineral assemblage associated with the Copi Deposit contains approximately 0.01% Monazite. Monazite is a phosphate mineral that contains rare earth elements as well as small amounts of uranium and thorium. The Applicant determined the uranium and thorium content of the ore using XRF methods as follows.

- Uranium... 2ppm or 0.0002%
- Thorium... 8ppm or 0.0008%

Clause 4 of the *Protection from Harmful Radiation Regulation 2013* identifies radioactive ore as a material with:

> "in the case of material that contains both uranium and thorium, a percentage by weight of uranium and thorium such that the following expression is true.

$$\frac{U\%\ by\ weight}{0.02} + \frac{Th\%\ by\ weight}{0.05} > 1$$

The following applies these values to the above equation.

$$\frac{0.0002}{0.02} + \frac{0.0008}{0.05} = 0.01 + 0.016 = 0.026$$

As the equation generates a value that is less than one, the Copi Deposit is not classified as radioactive ore and no particular measures are required to manage radiation-related risks.

3.4.3 Extraction Area Layout and Design

Figure 3.1.2 presents the layout of the Extraction Area. In summary, the Extraction Area comprises an area approximately 17km long and up to approximately 3.3km wide. The Extraction Area would be mined using a series of mine paths up to 1km wide that would double back on themselves throughout the life of the Project, with a total length of approximately 40km. Only a small section of the Extraction Area would be active at any one time, with vegetation cleared, soil stripped, overburden, interburden and ore progressively extracted, reject and interburden placed behind the dredge pond and the final landform rehabilitated progressively (see Section 3.4.3).

The Applicant engaged Mark Robertson of GEO-ENG Pty Ltd to provide geotechnical advice in relation to the proposed design of the proposed Extraction Area. In summary, design criteria determined by GEO-ENG are as follows.

- Above the water table
  - Clay and silty clay materials .... 60° from the horizontal
  - Sand and gravel materials .... 32° from the horizontal
- Below the water table
  - Dredge face and side walls .... 17° from the horizontal
  - Reject and interburden deposition slope .... 6° from the horizontal

In addition, a conservatively large buffer zone approximately 400m wide is proposed around the Extraction Area to account for construction of internal roads, pipelines, powerlines, stockpiles and other mining-related disturbance. The Applicant anticipates that not all land within the buffer zone would be disturbed. Finally, the Applicant would ensure that the western extent of the Extraction Area or associated buffer zone would not encroach on road reserve for Springwood or Pine Camp Road or onto the Belmore Station.

3.4.4 Proposed Mining Operations

Mining operations above the water table would be undertaken using conventional free dig, load and haul mining methods. Mining operations below the water table would be undertaken using conventional dredge mining methods. **Figure 3.4.1** presents a schematic long section illustrating the various phases of mining operations which may be summarised as follows.

Dry Mining Operations

Mining operations would commence with removal of vegetation (see Section 3.3.4.6) and soil (see Section 6.4.5.1). This would be followed by extraction of overburden using conventional free dig, load and haul open cut mining methods. The thickness of overburden to be removed using this method would vary depending on the depth from surface to the water table. Where required, multiple benches would be established to ensure safe operation of the mining plant. Extracted overburden would be used to cap the Off-path Storage Facility and construct the final landform.

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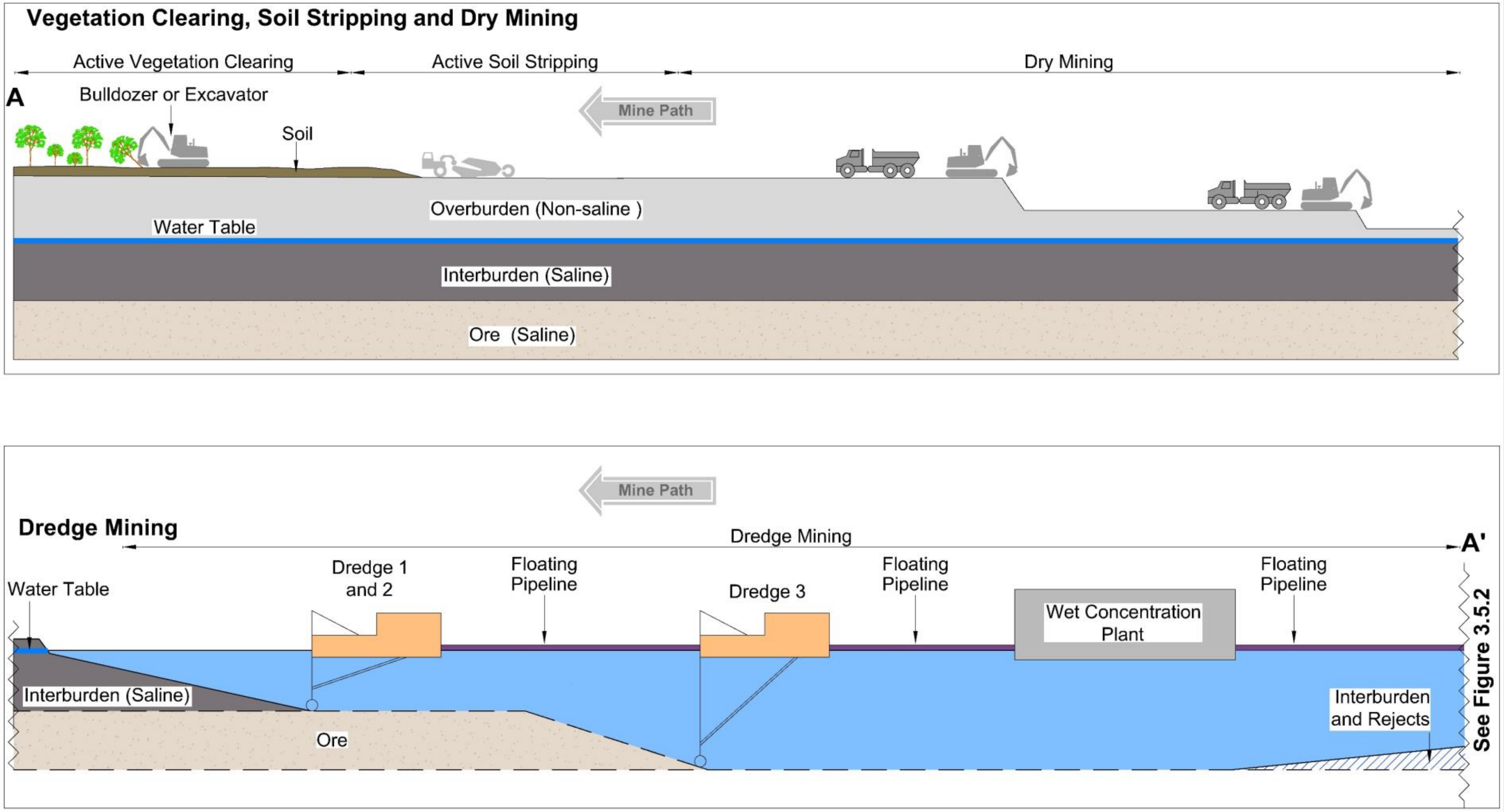

Not to Scale
Source: RZ Resources Limited

Figure 3.4.1
SCHEMATIC MINING OPERATIONS - LONG SECTION

Overburden placed in-pit would typically be placed close to the advancing face of the landform under construction before being pushed over the face using a bulldozer. Placed material would be compacted through the action of laden and unladen haul trucks passing and repassing over the placed material, as well as dozing. The overburden backfilling process may be carried out in benches to ensure geotechnical stability.

Dredge Mining Operations

Once the overburden has been extracted, dredge mining operations would extract interburden and ore. The Applicant anticipates commissioning and operating two jet suction dredges and one cutter suction dredge. These dredges would use high pressure water jets and a rotating cutter head to extract material which would then be removed using a suction pipe.

The Applicant would initially excavate a starter pond and would install a small, temporary dredge to deepen and enlarge the pond sufficiently to allow the first dredge to be launched.

During construction of the dredges and Wet Concentration Plant, water would be pumped from the starter pond to the Water Storage Dam. Once the first dredge has been assembled, stored water within the Water Storage Dam would be returned to the construction pond, flooding the construction pad and allowing the first dredge to be floated off. Once complete, the process would be repeated for the second and third dredges and the Wet Concentration Plant.

Typically, two dredges would extract interburden while one dredge would extract ore once the floating Wet Concentration Plant has been installed (see Section 3.5.2). Each dredge would extract material to be pumped to the Wet Concentration Plant, with material from the interburden dredges passing directly to the reject circuit.

3.4.5 Mining Schedule, Rate, Scenarios and Equipment

3.4.5.1 Mine Schedule

Figure 3.4.2 presents the anticipated mine schedule for the life of the Project. The schedule may be summarised as follows. It is noted that circumstances during the life of the Project may alter the mining schedule and the following description is indicative only.

- The construction pad and pond would be located in the southeastern section of the Extraction Area.
- Once the dredges and Wet Concentration Plant have been installed, mining during Years 1 to 4 would progress to the northwest.
- In Year 5, the mine path would be reorientated to the north before being reorientated to the southeast during Years 6 and 7 and turning back on itself in Years 8 to 10.
- At the end of Year 10, the mine path would cross an area previously mined in Year 5 and would continue to the northwest.
- In Year 11, mining would proceed through Nulla Road. Nulla Road, in consultation with Wentworth Shire Council and local residents, would be closed for a period of up to three years prior to and during mining of the road reserve and during landform reestablishment. The Applicant would restore the road in a realigned location to a standard better than its current condition and to the satisfaction of Wentworth Shire Council (see Section 3.6.2.3).

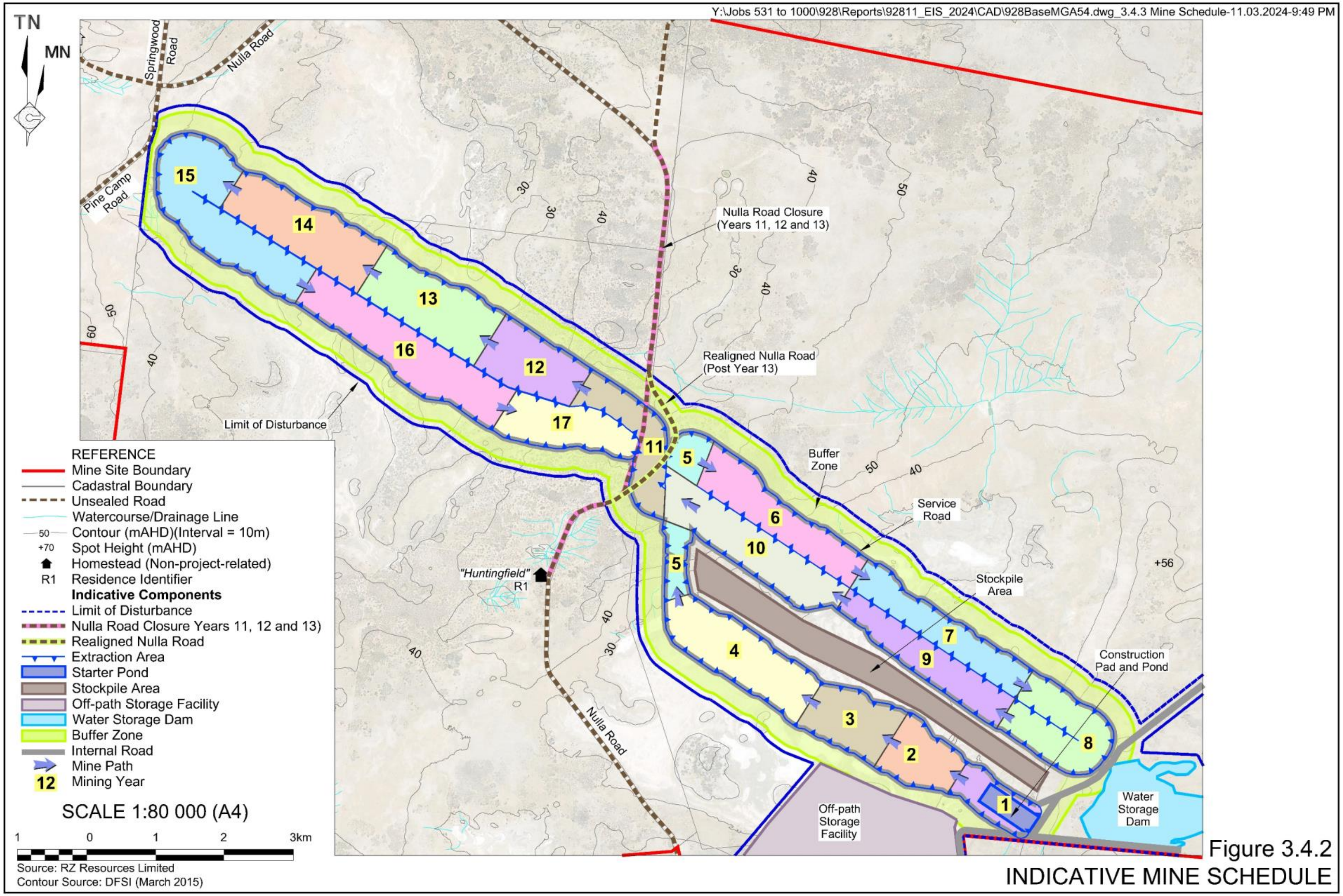

Figure 3.4.2
INDICATIVE MINE SCHEDULE

- From Year 11, mining operations would continue to the northwest until Year 15 when the mine path would be reorientated to the southeast.
- Mining would be completed in Year 17.

3.4.5.2 Material Movement Schedule

Table 3.4.1 and **Figure 3.4.3** present the anticipated material movement schedule for the life of the Project. The Applicant will continue to review and optimise the proposed schedule. As a result, actual material movements may vary from those presented in **Table 3.4.1**.

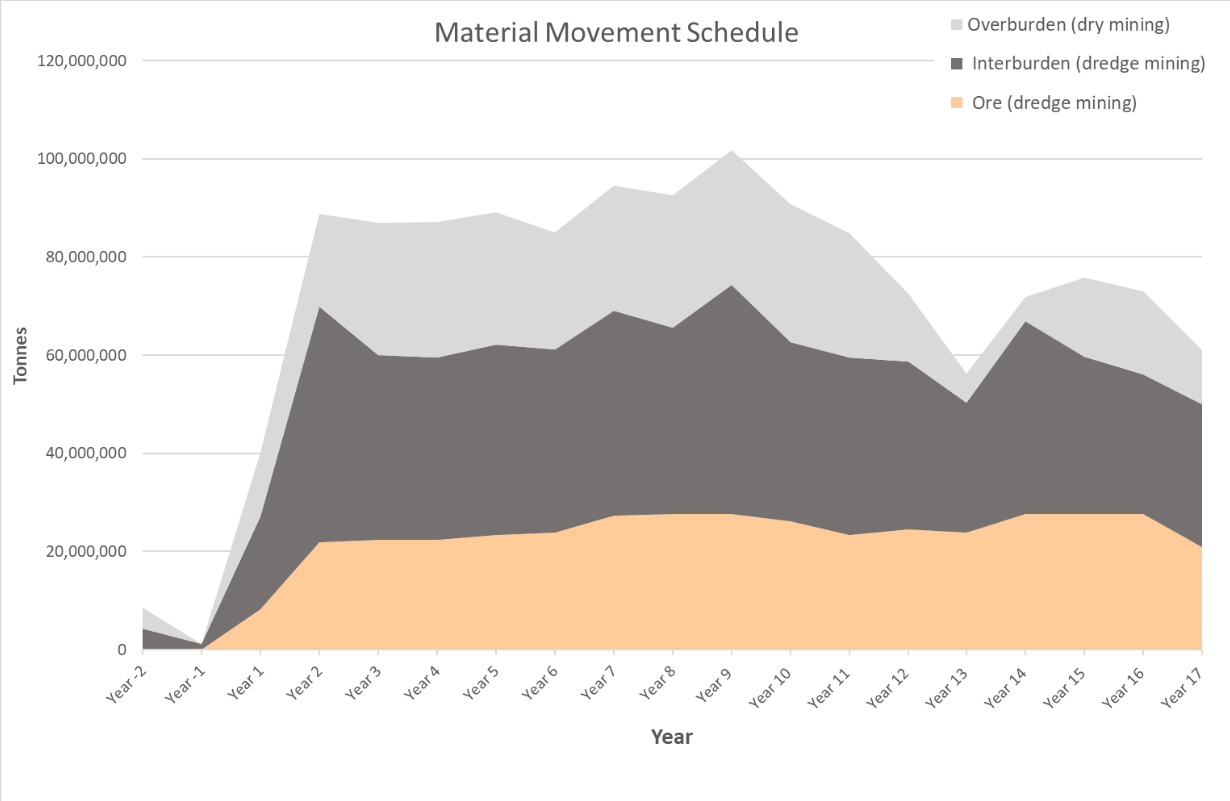

Figure 3.4.3
INDICATIVE MATERIAL MOVEMENT SCHEDULE

Source: RZ Resources Limited

3.4.5.3 Mining Scenarios

Figures 3.4.4 to **3.4.7** present the indicative layout of the Mine Site at key stages of the Project. These layouts have been selected to represent period of greatest potential noise or air quality impacts for surrounding residents as follows.

- During Years 5, 11 and 17 when mining operations would be closest to Residence R1.
- During Year 15 when mining operations would be closest to Residence R2.

Table 3.4.1
Indicative Material Movement Schedule

		Construction			Operation						
	Units	**Year -2**	**Year -1**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**
Overburden (dry mining)	t	4,200,000		12,900,000	18,900,000	27,000,000	27,600,000	27,100,000	23,800,000	25,500,000	27,000,000
Interburden (dredge mining)	t	4,300,000	1,100,000	18,900,000	48,000,000	37,600,000	37,200,000	38,700,000	37,400,000	41,800,000	38,000,000
Ore (dredge mining)	t			8,300,000	21,900,000	22,400,000	22,400,000	23,400,000	23,800,000	27,300,000	27,600,000
Total Material Movements	t	**8,500,000**	**1,100,000**	**40,100,000**	**88,800,000**	**87,000,000**	**87,200,000**	**89,200,000**	**85,000,000**	**94,600,000**	**92,600,000**
Mine Products Produced	t			165,000	460,000	492,000	496,000	446,000	511,000	467,000	438,000
		Operation									
		Year 9	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Total**
Overburden (dry mining)	t	27,400,000	28,200,000	25,300,000	13,800,000	6,000,000	5,000,000	16,100,000	16,900,000	11,000,000	**343,700,000**
Interburden (dredge mining)	t	46,800,000	36,400,000	36,200,000	34,200,000	26,500,000	39,200,000	32,100,000	28,500,000	29,100,000	**612,000,000**
Ore (dredge mining)	t	27,600,000	26,200,000	23,400,000	24,500,000	23,800,000	27,700,000	27,600,000	27,600,000	20,900,000	**406,400,000**
Total Material Movements	t	**101,800,000**	**90,800,000**	**84,900,000**	**72,500,000**	**56,300,000**	**71,900,000**	**75,800,000**	**73,000,000**	**61,000,000**	**1,362,100,000**
Mine Products Produced	t	402,000	425,000	464,000	478,000	464,000	447,000	385,000	395,000	338,000	**7,273,000**

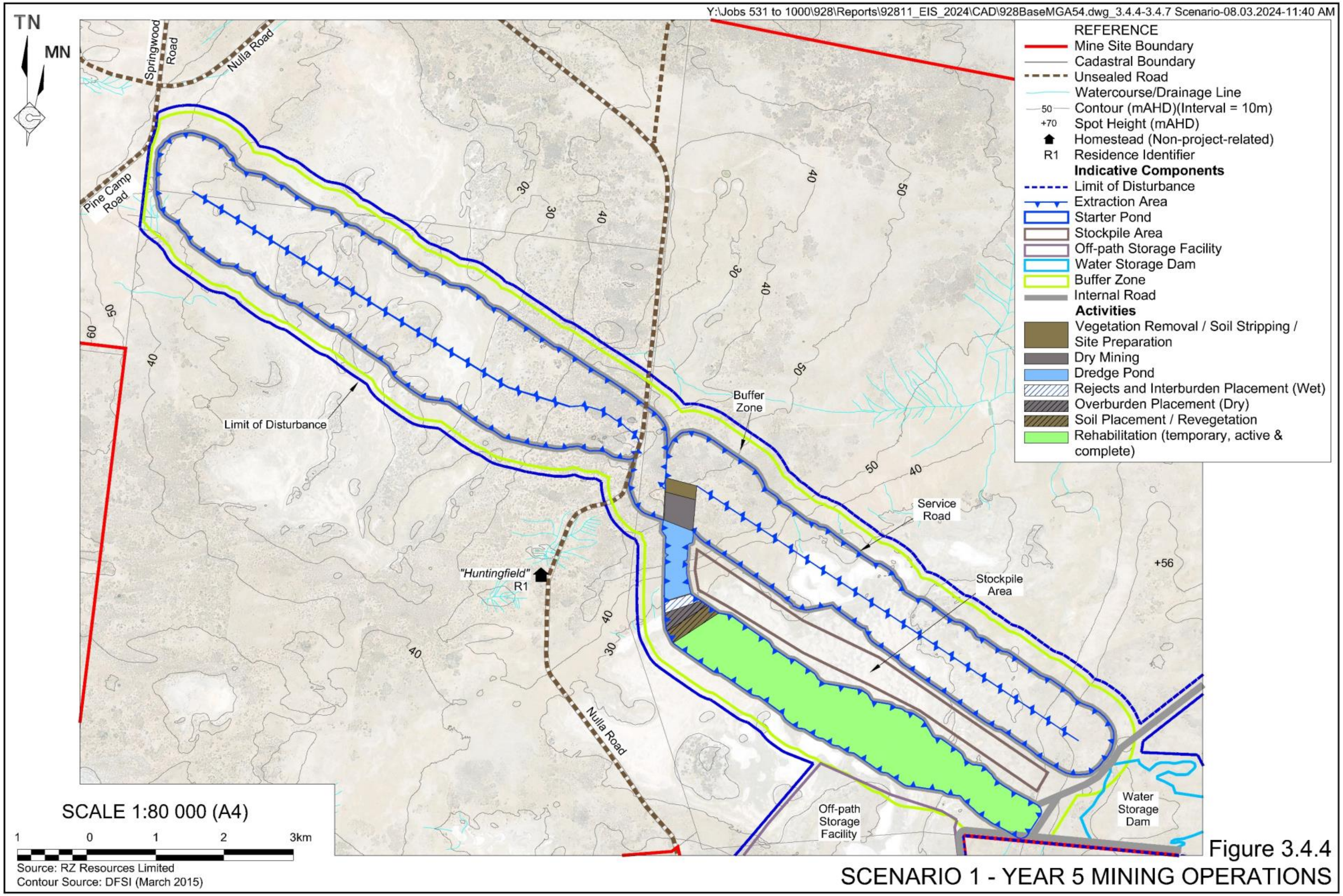

Figure 3.4.4
SCENARIO 1 - YEAR 5 MINING OPERATIONS

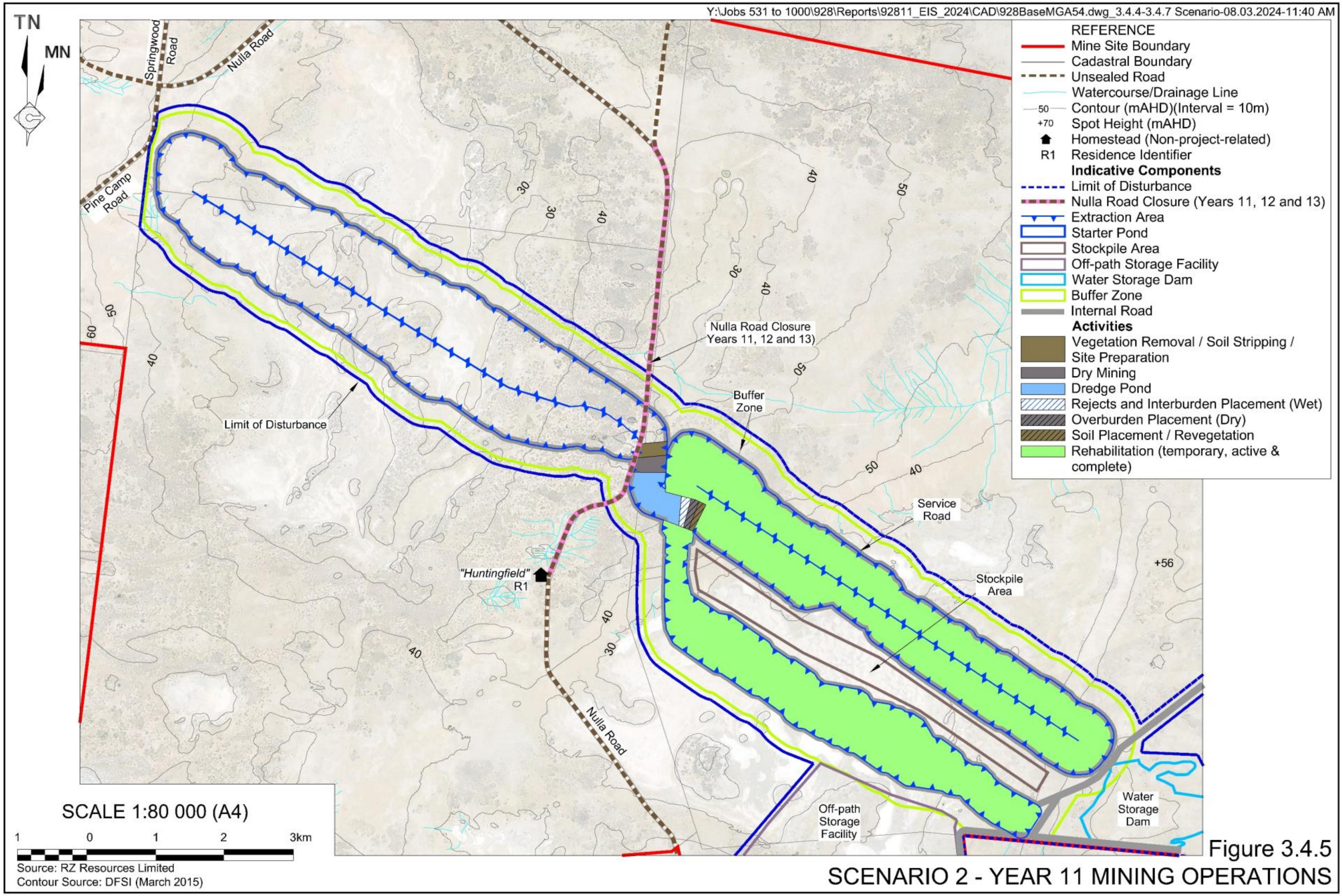

Figure 3.4.5
SCENARIO 2 - YEAR 11 MINING OPERATIONS

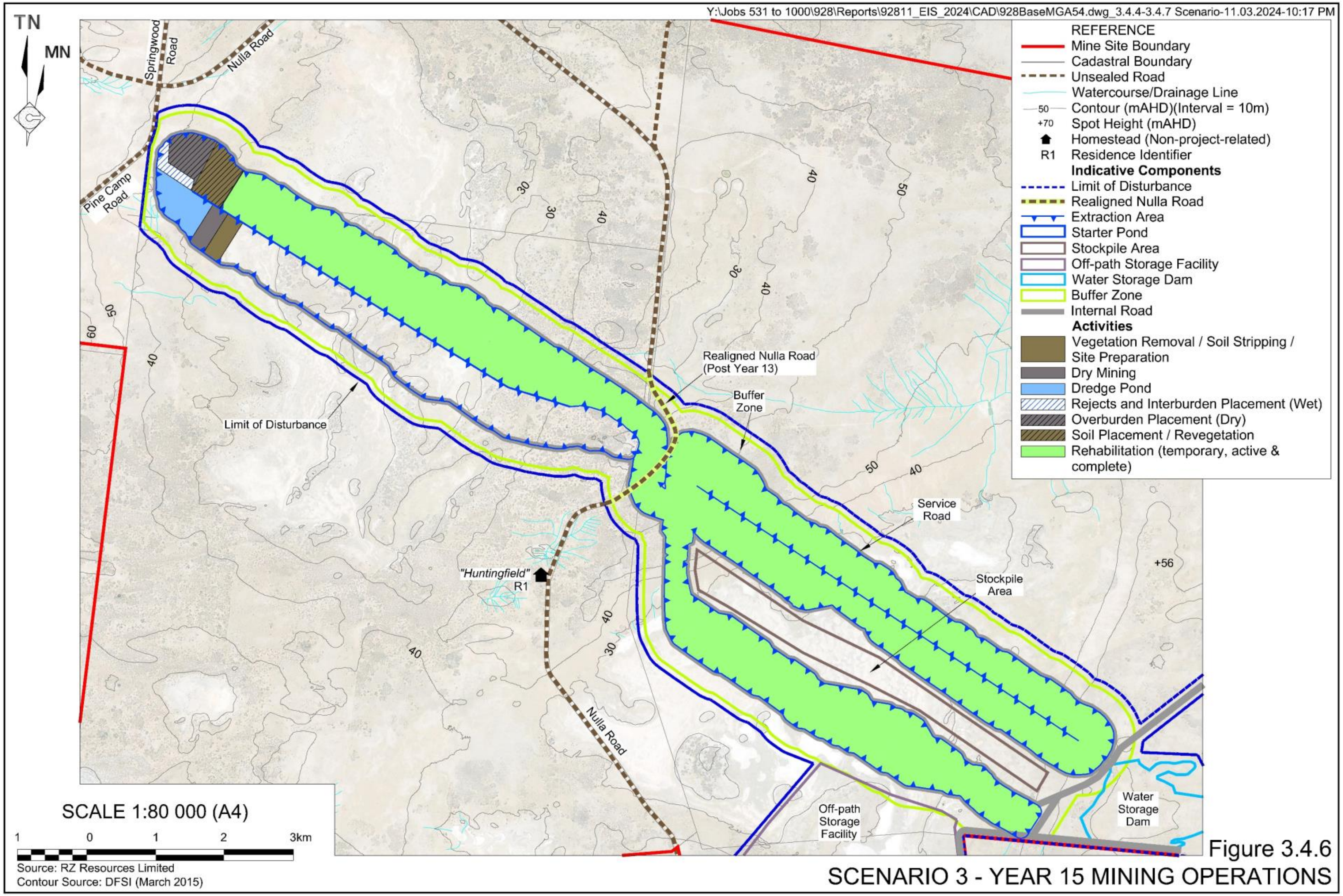

Figure 3.4.6
SCENARIO 3 - YEAR 15 MINING OPERATIONS

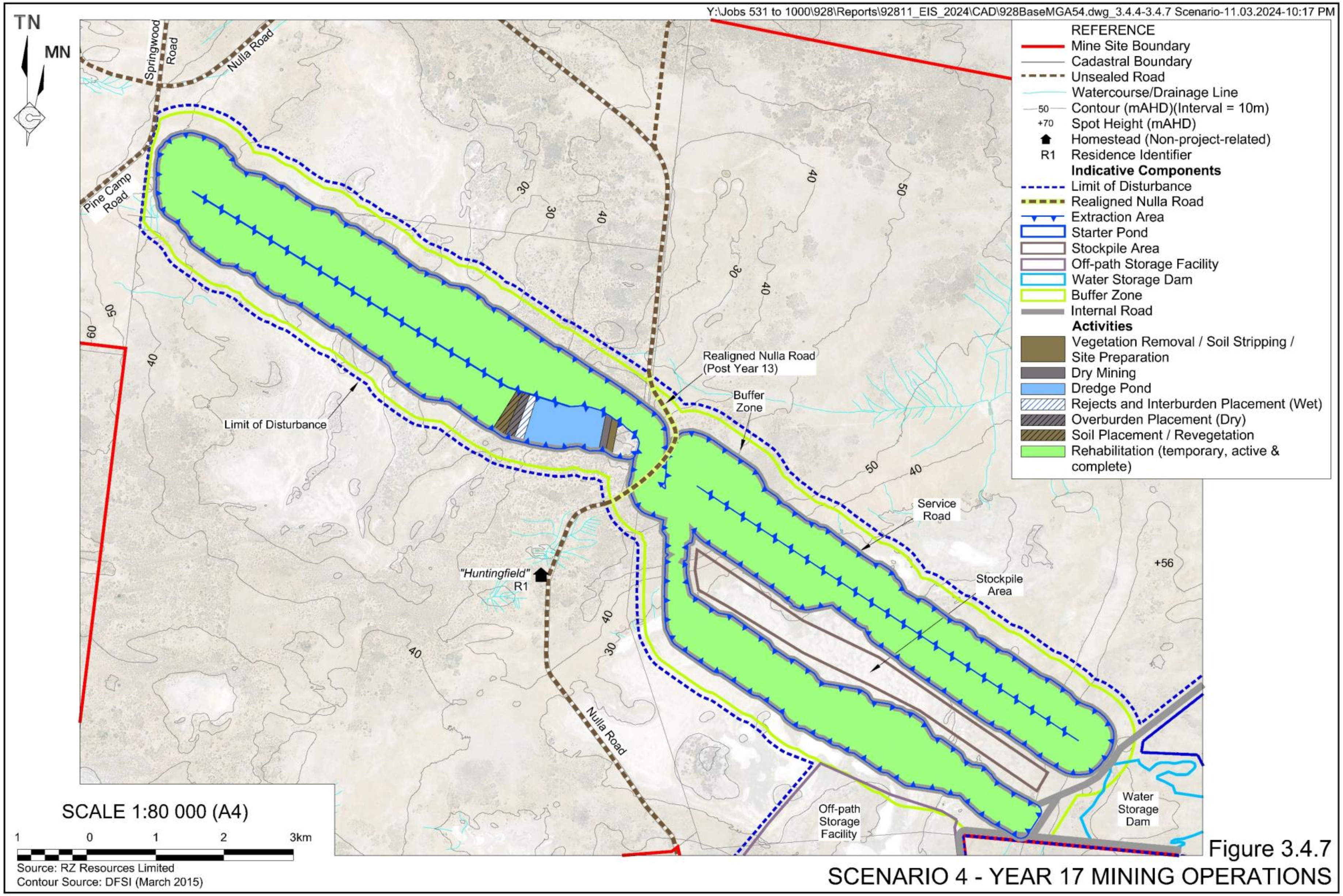

Figure 3.4.7
SCENARIO 4 - YEAR 17 MINING OPERATIONS

3.4.5.4 Mining Equipment

Table 3.4.2 presents the indicative mobile mining fleet. It is noted that the indicative mining fleet may vary depending on material movement requirements and the equipment operated by the relevant mining contractor.

Table 3.4.2
Indicative Mining Fleet

Equipment	Indicative Make and Model	Number
Concentrate Management		
Excavator	Komatsu PC300, or equivalent	2
Bulldozer	CAT D9	1
Haul Truck	CAT 745 or equivalent	3
Wheel Loader	CAT 966 or equivalent	1
Overburden Management		
Excavator	EX2600	1 to 3
Haul Truck	CAT785	3 to 8
Bulldozer	CAT D10	1 to 3
Grader	CAT 16K	1 to 2
Water Cart	CAT777 WC	1
Bulldozer	CAT D9	1 to 2
Scraper	CAT Scraper	2
Excavator	CAT390	1
Excavator	CAT349	1
Excavator	CAT336	1
Wheel Loader	CAT992G	1
Wheel Loader	CAT980K	1
Articulated Haul Truck	Volvo A60H	2 to 3
Articulated Haul Truck	Bell Moxy B50D	2 to 3
Grader	CAT14M Grader	1 to 2
Water Truck	CAT773 Water truck	1
Water Cart	Moxi Watercart	1
Source: RZ Resources Limited		

3.4.6 Flexible Elements

Table 3.4.3 presents the mining-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or have lesser impacts than that proposed are not described.

Table 3.4.3
Flexible Elements – Services

Flexible Element	Limit on Flexibility	Justification
Outer limit of the Extraction Area	All disturbance to remain within the proposed limit of disturbance.	GEO-ENG Pty Ltd identified the recommended design criteria for the Extraction Area. It is possible that lower wall angles would be required or that the bank of the dredge pond may slump. The proposed limit of disturbance has been offset to allow for slight lateral expansion of the Extraction Area, as well as mine-related infrastructure adjacent to the Extraction Area.
Mine sequence and schedule	End of mining – 17 years after commencement. Maximum annual rate of overburden, interburden and ore extracted – 102Mtpa. Maximum life of Project ore extraction –407Mt.	The life-of-mine sequence and schedule has been prepared based on information available at the time of preparation of this document. It is possible that the actual material movements may vary from that proposed. Notwithstanding this, mining operations would, in the absence of further approval, cease 17 years after the commencement of mining operations and annual production (overburden, interburden and ore) would be no greater than 102Mt in any one year. A maximum of 407Mt of ore would be extracted and processed.
Mining Equipment	Equipment to be used to be of equivalent capacity / productivity to that proposed, with combined noise or dust emissions no greater than the proposed equipment.	The identified equipment list has been assembled based on current equipment availability, costs and productivity. It is possible that alternate equipment may be used. Notwithstanding this, the Applicant would ensure that the combined fleet noise or dust emissions are no greater than the proposed equipment.

3.5 Processing and Reject Management Operations

3.5.1 Introduction

Material extracted during dredging operations would be pumped from each dredge via floating pipelines to a floating Wet Concentration Plant within the dredge pond. Material from the interburden dredges would be passed directly to the reject circuit. Material from the ore dredge would be processed using the Wet Concentration Plant to separate heavy mineral from gangue (non-mineralised sand) to produce a heavy mineral concentrate and reject. The heavy mineral concentrate would be further processed using the Rare Earth Concentrate Plant to produce a range of products.

This sub-section presents information relating to:

- the operation of the Wet Concentration and Rare Earth Concentrate Plants;
- management of reject (including interburden); and
- management of heavy mineral concentrate and related products, including preparation for transportation.

Sections 3.6 and 3.7 present an overview of off-site transportation of heavy mineral concentrate on the public road and rail network.

3.5.2 Wet Concentration Plant

3.5.2.1 Plant Components

The Wet Concentration Plant would be established on a floating platform located within the dredge pond. The Plant would include the following circuits (**Figure 3.5.1**).

- A feed preparation circuit.
- A spiral circuit.
- A reject circuit.

All infrastructure would be modular and manufactured off-site, before being bought to site and assembled. The following subsections describe the operation of each of the above circuits.

3.5.2.2 Feed Preparation Circuit

Feed from the ore dredge would be pumped to a rotating trommel. The trommel would progressively separate sand from oversize material greater that 2mm in size, with the oversize material placed directly back into the dredge pond.

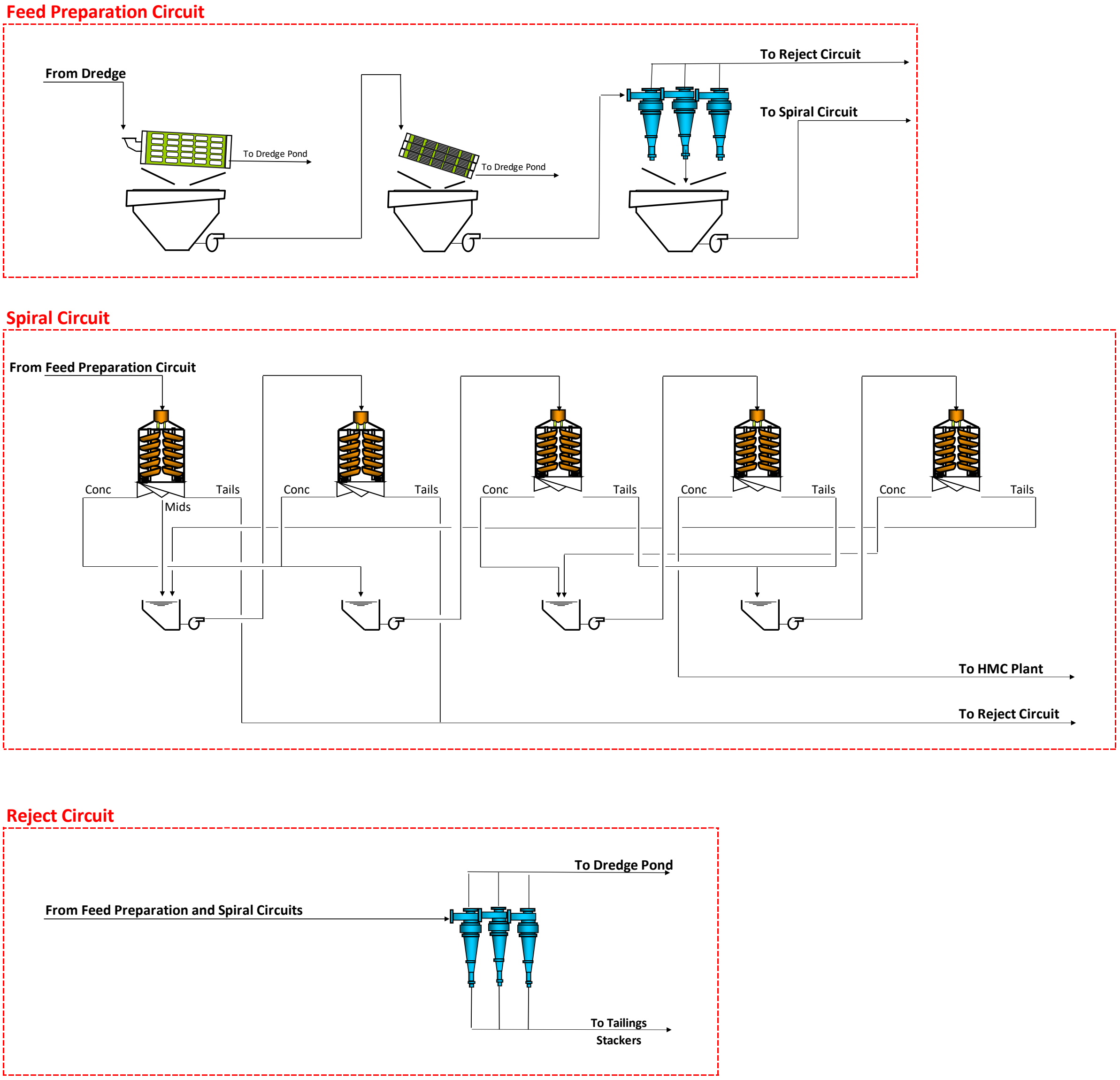

Figure 3.5.1
PROPOSED WET CONCENTRATOR PROCESS FLOW CHART

Source: RZ Resources Limited

Undersize material would then pass through a series of cyclones that would separate the sand from the very fine material, or slimes, less than 53µm in size. The coarser material, or cyclone underflow, would be pumped to the spiral circuit, while the finer material or cyclone overflow would be treated with flocculant and settled within a thickener. Thickened fines would be transferred to the reject circuit, with recovered water reporting into the dredge pond.

3.5.2.3 Spiral Circuit

Following removal of oversize and slimes, the ore would be passed to the spiral circuit where it would be processed through a series of spiral separators and fine screens to separate the denser heavy mineral, namely ilmenite, zircon, rutile, leucoxene, monazite and xenotime, from the less dense gangue or quartz and aluminium silicate minerals. The material would be processed in stages, with a series of recycle loops consisting of roughing, middlings, fine screening, cleaning, scavenging and recleaning stages to maximise the heavy mineral concentration within the concentrate while minimising loss of heavy mineral to rejects.

Heavy mineral concentrate from the spiral circuit would be transferred to a land-based dewatering cyclone which would dewater the concentrate. The concentrate would then be transferred as a damp concentrate to the Rare Earth Concentrate Plant and the water would be returned to the dredge pond.

3.5.2.4 Reject Circuit and In-pond Placement Operations

Reject (including thickened slimes) from the feed preparation and spiral circuits and interburden from the interburden dredges would be pumped to a rejects circuit. Flocculant will be added to the rejects and thickened slimes, before being co-disposed sub-aquas. Interburden will be disposed sub-aquas without any treatment. Land based stackers or cyclones could also be used if and when required to dispose of the interburden.

The reject and interburden would comprise primarily coarse to fine sand. This material would settle relatively quickly, with the water component returning to the dredge pond. The reject and interburden would naturally consolidate to form a beach, with an underwater face that would slope back into the dredge pond. Once sufficiently consolidated and stabilised, overburden would be placed over the reject and interburden to further promote consolidation and compaction of the material prior to shaping the final landform and rehabilitation (**Figure 3.5.2**).

3.5.2.5 Reagents

No reagents would be used during processing operations and processing would largely rely on physical processes to separate the heavy mineral from the gangue. The Applicant anticipates using small quantities of EPA-approved biodegradable flocculant to facilitate settling of finer material within the thickener and for co-disposal of the fines and rejects below the water level.

3.5.3 Off Path Storage Facility

Following the commencement of dredge mining, there would be a period during which the dredge pond would not have sufficient capacity to accept rejects and interburden. Until sufficient capacity has been established, rejects and interburden would be placed into the Off Path Storage Facility (**Figure 3.5.3**).

The final design of the Off Path Storage Facility would be prepared by a suitably qualified and experienced engineering consultancy. Indicatively, the Facility would have the following design and operational criteria.

- Embankment height .... approximately 8m
- Embankment slope - Outer face ....approximately 1:10 (V:H).
- Liner...unlined

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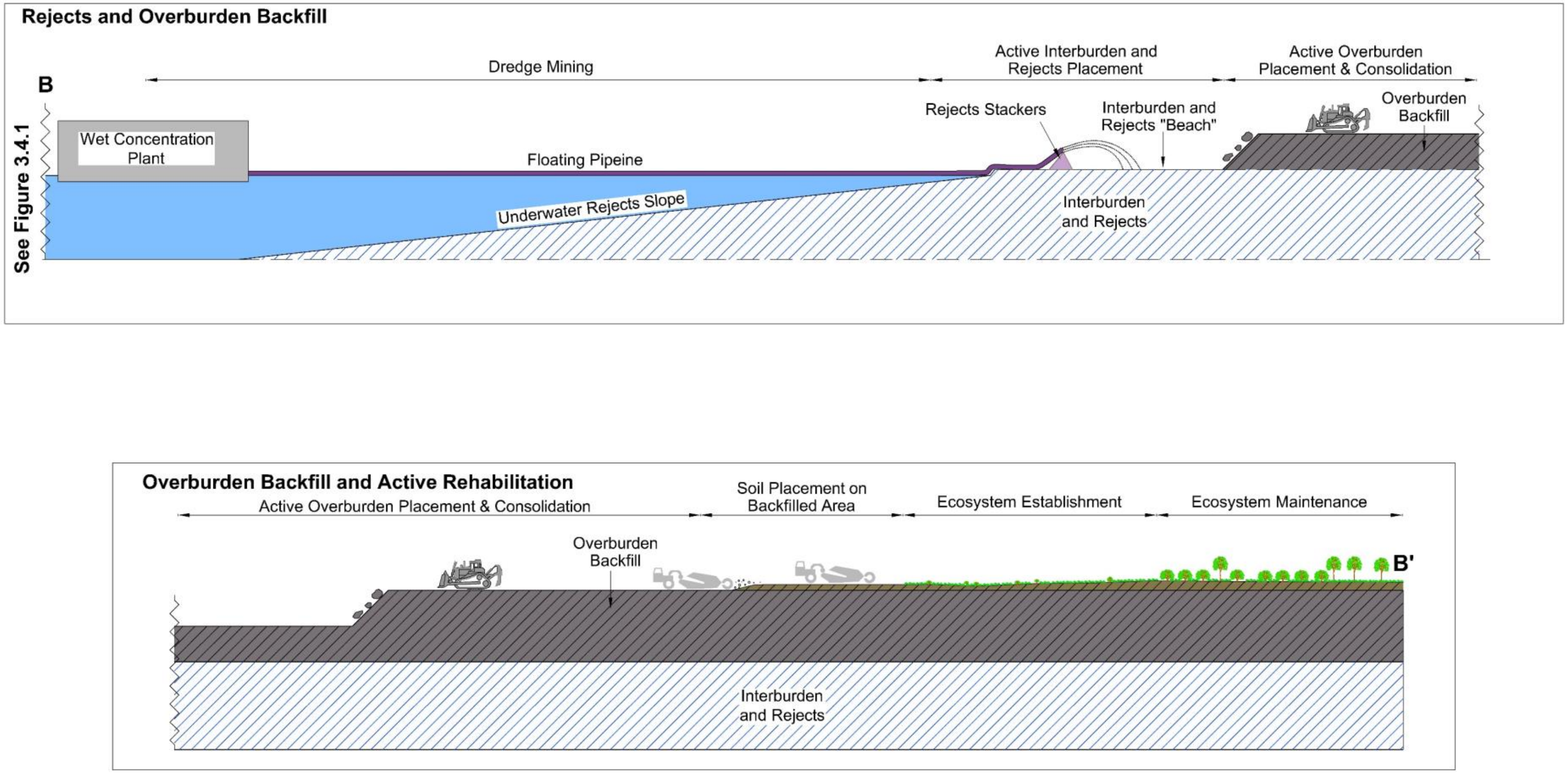


Not to Scale
Source: RZ Resources Limited

Figure 3.5.2
SCHEMATIC REJECTS MANAGEMENT OPERATIONS - LONG SECTION

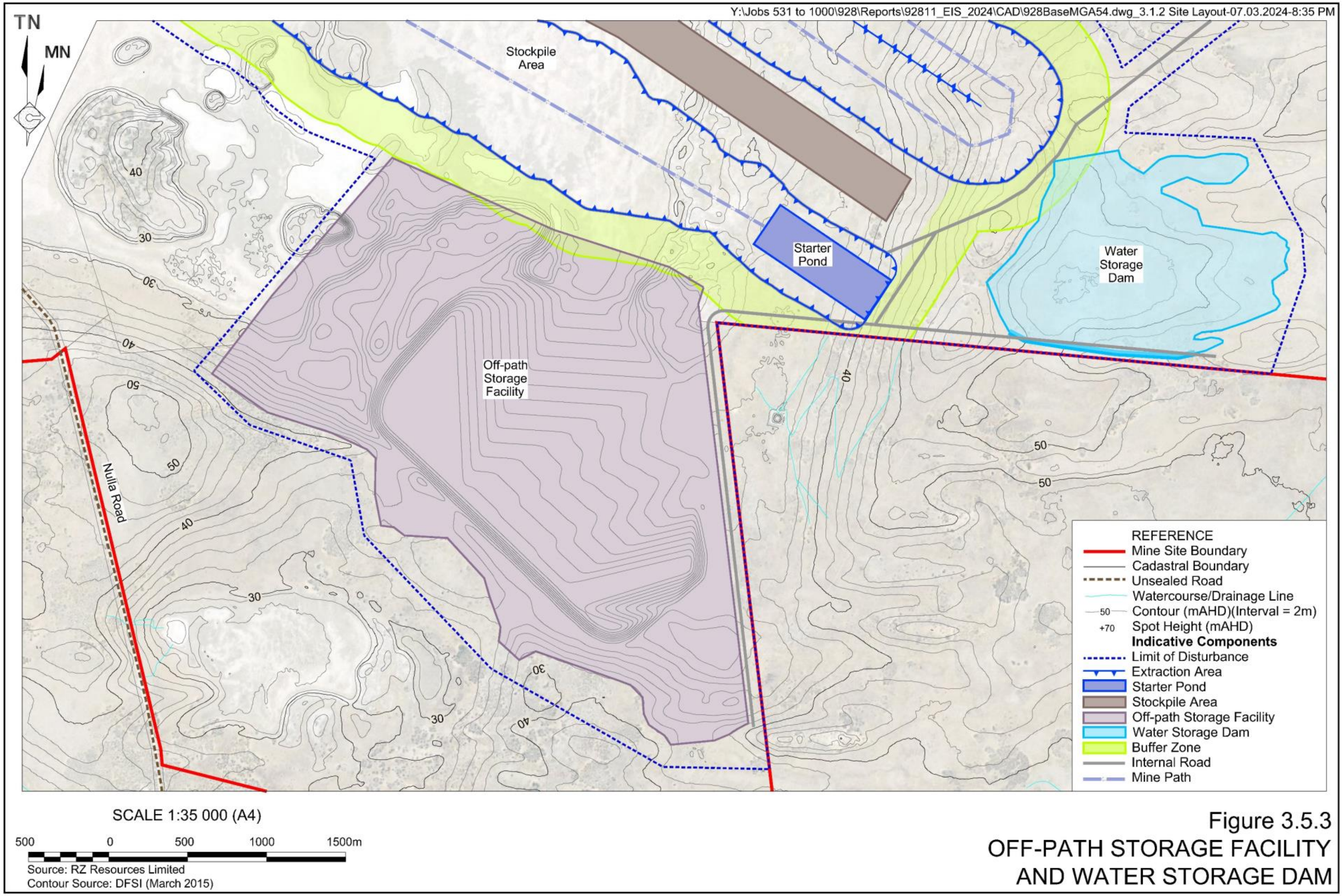


Figure 3.5.3
OFF-PATH STORAGE FACILITY AND WATER STORAGE DAM

Following commencement of dredge mining, reject and interburden would be pumped to the Facility and discharged via the perimeter discharge infrastructure on the southern and western embankment, with the location of discharge varied regularly to maximise settling of material to achieve the greatest possible density. Supernatant water would initially be permitted to flow to a decant location, from where it would be pumped back to the dredge pond. Once sufficient material has been placed with in the Facility, supernatant water would flow naturally back to the dredge pond.

No liner is proposed for the Off Path Storage Facility for the following reasons.

- Any water placed in the Off Path Storage Facility would comprise water drawn from the Loxton-Parilla Sands upper aquifer. Processing operations would not utilise reagents other than small quantities of potable water grade biodegradable flocculant. As a result, water placed into the Off Path Storage Facility would have a composition consistent with water within the underlying aquifer.
- Any water that seeps through the walls of the Facility or reports to the outer toe of the embankment would be collected and pumped back onto to the Facility or to the dredge pond.
- The quality of water within the underlying aquifer is poor, with a calculated average total dissolved solids concentration of 61,000mg/L (Geo- Eng, 2024). As such the underlying groundwater has no beneficial use and seepage of water from the Facility would not adversely impact on beneficial use of that water (see Section 6.2).
- The Off Path Storage Facility would be capped with overburden and rehabilitated. Success of the rehabilitation and stability of the created landform would be undermined by any physical liner as the Facility is designed to become a functioning ecosystem post mining.

The Applicant contends that the Environment Protection Authority's *Tailings Liner Policy* does not apply to the Project for the following reasons.

- The material to be placed into the Off Path Storage Facility would be classified as Virgin Excavated Natural Material (VENM) in accordance with Section 50 of the *Protection of the Environment Operations Act 1997* for the following reasons.
  - The material would comprise sand, silt and clay.
  - The material would not be contaminated with manufactured chemicals or with process residues generated as a result of the proposed mining operations.
  - The interburden that will be disposed in the Facility does contain sulfidic ores and will be covered by sufficient overburden and soils to remove the potential for any reactivity.
- VENM may be applied to land without the need to line the placement area.
- The proposed reject and interburden placement operations are similar in nature to settling ponds utilised by sand quarries. Such operations extract and wash sand to remove unwanted materials, typically silts and clays, without the use of reagents or

chemicals. The resulting slurry or rejects are typically passed to an unlined settling pond where the solid component is permitted to settle, and the supernatant water is recovered for reuse within processing operations.

- Reject and interburden placed within the proposed dredge pond would be placed within an unlined void. To require the Off Path Storage Facility to be lined when the dredge pond would not be lined would be an inconsistent application of the *Tailings Liner Policy*.

In addition, the Applicant anticipates that the Off Path Storage Facility would not be a declared dam under the *Dams Safety Act 2015* for the following reasons.

- The embankment wall would be less than 15m high.
- The Off Path Storage Facility would be unlikely to cause a major or catastrophic level of severity of damage or loss or endanger the life of a person in the event of failure.

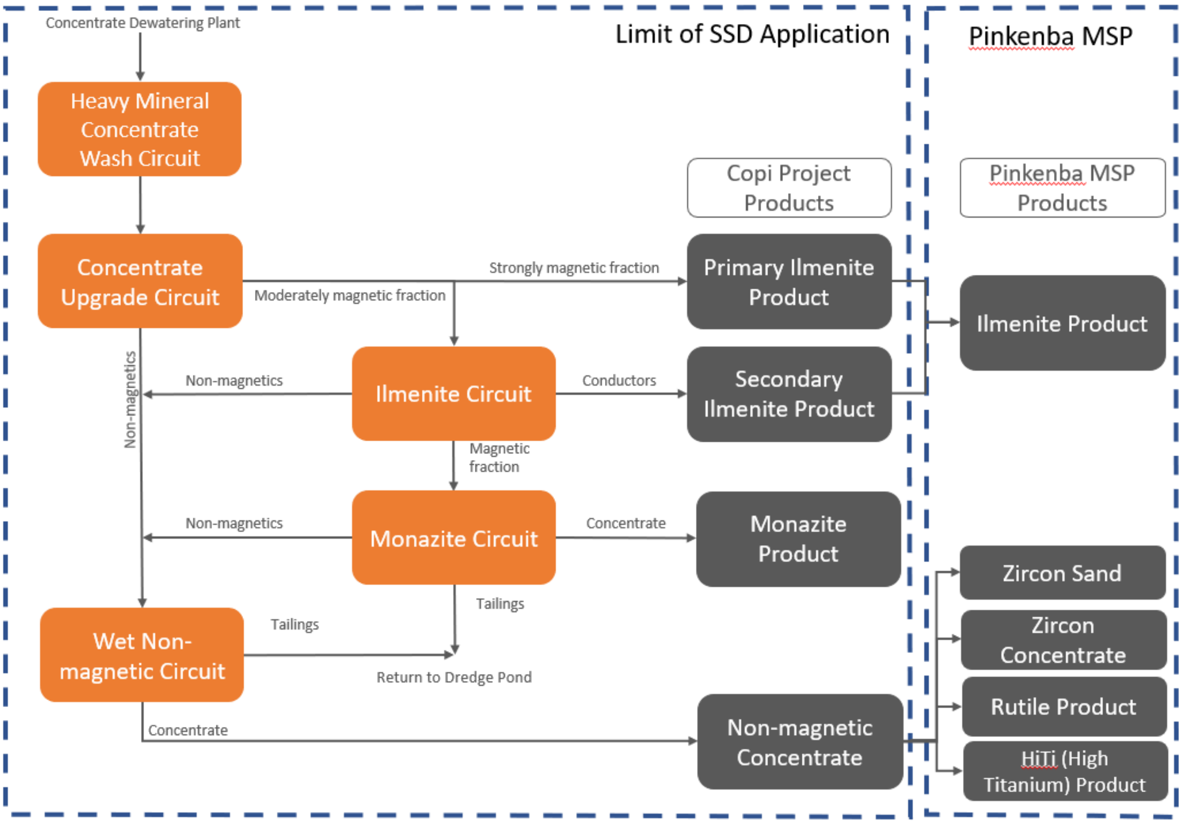
Following commencement of material placement into the dredge pond, placement of interburden and reject material into the Off Path Storage Facility would cease and the Applicant would complete the landform with overburden material, capping the wet placed material. The resultant landform would then be contoured to design, topsoil placed and rehabilitated as described in Section 3.12.2.1.

3.5.4 Rare Earth Concentrate Plant

3.5.4.1 Plant Components

The Rare Earth Concentrate Plant would be established within the Infrastructure Area (**Figure 3.1.2**). The Plant would include the following circuits (**Figure 3.5.4**).

- Heavy Mineral Concentrate Washing Circuit.
- Concentrate Upgrade Circuit.
- Ilmenite Circuit.
- Monazite Circuit.
- Wet Non-magnetic Circuit.



Source: RZ Resources Limited

Figure 3.5.4
Rare Earth Concentrate Plant and Products

3.5.4.2 Heavy Mineral Concentrate Washing Circuit

The dewatered heavy mineral concentrate would be transported to the washing circuit by truck. The concentrate would then be washed with low salinity water from the reverse osmosis plant to remove salts. The concentrate would then be dewatered and transferred to the Concentrate Upgrade Circuit. Washing water would be recycled to the extent practicable before being transferred to the dredge pond.

3.5.4.3 Concentrate Upgrade Circuit

The concentrate would be dried and transferred to a low intensity magnetic separator (LIMS) to separate the highly magnetic susceptible fraction from the less magnetically susceptible fraction.

The less magnetically susceptible fraction would then be passed to a Rare Earth Drum Magnetic Separator (REMDS) which would separate the material into the following fractions.

- Magnetic fraction – this material, together with the highly magnetically susceptible material from the LIMS would be transferred to the Primary Ilmenite Product hopper for containerising and transportation off site.
- Moderately magnetic fraction – would be transferred to the Ilmenite Circuit.
- Non-magnetic fraction – would be transferred to the Wet Non-magnetic Circuit.

3.5.4.4 Ilmenite Circuit

The moderately magnetic fraction from the Concentrate Upgrade Circuit would be heated to between 80ºC and 100ºC and transferred to a high tension roll electrostatic separator (HTR) which would separate the material into those minerals that conduct electricity and those that do not. The conductors would be transferred to the Secondary Ilmenite Product hopper for containerising and transportation off site.

The non-conductors from the HRT would be transferred to a rare earth roll magnetic separator (RERMS) which would separate the material into the following fractions.

- Magnetic fraction – which would be transferred to the Monazite Circuit.
- Non-magnetic fractions – would be transferred to the Wet Non-magnetic Circuit.

3.5.4.5 Monazite Circuit

The magnetic fraction from the RERMS would be processed using an induced disk magnetic separator which would separate the material into the following fractions.

- Magnetic Fraction 1 (the most magnetically susceptible) – which would be transferred as reject to the dredge pond or active rejects area at the rear of the dredge pond.
- Magnetic Fractions 2 and 3 – which would transferred to a series of shaking tables, with the more dense fraction transferred to the Monazite Product hopper before drying and packaging into 1t bulk bags or 200L steel drums prior to containerisation and transfer from site.
- Magnetic Fraction 4 (the least magnetically susceptible) – which would be transferred to the Wet Non-magnetic Circuit.

3.5.4.6 Wet Non-Magnetic Circuit

The non-magnetic fractions from the Concentrate Upgrade Circuit and the Ilmenite Circuit would be passed through a series of spirals, with the more dense material reporting to the Non-magnetic Concentrate stockpile for containerising and transportation off site. Reject material would be transferred to the dredge pond or active rejects area at the rear of the dredge pond.

3.5.4.7 Ancillary Infrastructure

The Rare Earth Concentrate Plant would include the following ancillary infrastructure to facilitate operation of the Plant.

- A reverse osmosis plant as described in Section 3.3.3.1.
- A series of gas-fired driers and heaters, including associated LNG or LPG storage facilities.
- Container laydown and storage areas and associated vehicle loading, unloading and weighing facilities.

3.5.5 Products and Product Classification

Figure 3.5.3 presents the products to be produced by the Project. Each of these products would be transported by road to the Rail Facility from where they would be transferred to rail and transported under separate approval either direct to port facilities in Adelaide or to the Applicant's Pinkenba Mineral Separation Plant for further processing and onward transportation to the end users. **Figure 3.5.3** also presents the products that would be produced at the Pinkenba Mineral Separation Plant. The Monazite Product, however, may also be transported directly from the Rail Facility to port under separate approval (if required), either via rail or road or a combination of both.

Safety data sheets for each of the products to be produced are available on the Applicant's website.[3] **Table 3.5.1** presents the hazardous and dangerous goods classification for each of those products.

Table 3.5.1
Product Classification

Product	Hazardous Goods Classification[1]	Dangerous Goods Classification[2]
Ilmenite Product	Non-hazardous	Non-dangerous
Zircon Product		
Zircon Concentrate		
Rutile Product		
HiTi Product		
Monazite Product	Hazardous	Class 7 (Radioactive Material)

Note 1: Classification in accordance SafeWork Australia and the *Global Harmonised System of classification and labelling of chemicals*

Note 2: Classification in accordance with the *Australian Code for the Transport of Dangerous Goods by road and rail*, *International Air Transport Association Dangerous Goods Regulations* and the *International Maritime Dangerous Goods Code.*

Source: RZ Resources Limited

The mineral Monazite contains naturally occurring radioactive elements of the uranium and thorium series. As a result, the Monazite Product has the following classifications under the *Global Harmonised System of classification and labelling of chemicals.*

- Acute Toxicity: Oral: Category 5

  Category 5 substances are those which are of relatively low acute toxicity hazard but which, under certain circumstances may present a danger to vulnerable populations.

- Carcinogenicity: Category 1B

  Category 1B substances are presumed based on indirect or limited evidence to have carcinogenic potential for humans.

A hazards assessment related to the handling, storage and transportation of Monazite Product is presented in Section 6.11.

[3] https://rzresources.com/products-and-applications/safety-data-sheets/

3.5.6 Flexible Elements

Table 3.5.2 presents the processing-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts than that proposed are not described.

Table 3.5.2
Flexible Elements – Processing Operations

Flexible Element	Limit on Flexibility	Justification
Processing procedures, plant, equipment and reagents	No additional substantial plant or equipment other than that described. No significant additional emissions of noise, dust, gases or odour.	Processing methodology, equipment and techniques are continually evolving and being optimised to maximise recovery of contained heavy mineral or the efficiency of processing operations. Minor adjustments to the processing equipment or process flow sheet used may be identified and implemented throughout the life of the Project.
Final product transport outside of NSW	Approval is sought for transportation to the Rail Facility in Broken Hill. For to commercial reasons or unforeseen disruption to the rail transport network, products may be transported by rail (or for the Monazite Product – by road) from the Rail Facility to port or customers outside of NSW. All approvals to do so would be obtained from the relevant state or federal authority	Commercial or business continuity reasons may dictate the final product transport route from Broken Hill. All efforts have been made to anticipate the final product route but circumstances may change to events or commercial reality,

3.6 Transportation Operations

3.6.1 Mine Site Transportation

3.6.1.1 Mine Site Road Network

The internal road network, namely those roads inside the security gate that would not be publicly accessible, would provide access for light and heavy vehicles to the operational areas of the Mine Site. These roads may be classified as:

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

Internal roads would be constructed adjacent to the proposed Extraction Area and would be relocated and reconstructed as necessary. Heavy vehicle roads would generally have the following design criteria.

- A width sufficient to allow two laden haul trucks to pass.
- An unsealed pavement suitable for all weather heavy vehicle use.
- Culverts and under road and roadside drainage as required.

Light vehicle roads would typically be narrower than the proposed heavy vehicle roads and their use would be restricted to particular classes of vehicles.

Where practicable, the pavement of internal roads would be constructed of low-silt materials to minimise dust lift off and the volume of water required for dust suppression. Polymer-based dust suppressants may be used to minimise dust lift-off. Water for mixing the dust suppressants would typically be sourced from sediment basins and clean water storage facilities. When water from those sources is not available, low salinity treated groundwater would be used for dust suppression. Untreated groundwater with elevated salt levels would only be used in exceptional circumstances. This would minimise the potential for salt accumulation in soils underlying or adjacent to the internal roads.

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

Where roads are no longer required for an operational purpose, they would be barricaded to prevent vehicular access and rehabilitated during progressive rehabilitation (see Section 3.12.5).

3.6.1.2 Site Access Road

Access to the Infrastructure Area from Anabranch Mail Road would be provided by the proposed Site Access Road which would be approximately 27km in length (**Figure 3.6.1**). The road alignment generally follows the alignment of existing tracks and fence lines and has been designed in consultation with the relevant landholders. In principle agreement for an easement for use of the road corridor has been negotiated with the owners of "Coleraine" and "Bunarungie". The Applicant would ensure that the owners of "Coleraine" and "Bunarungie" are able to utilise the Site Access Road to access their properties.

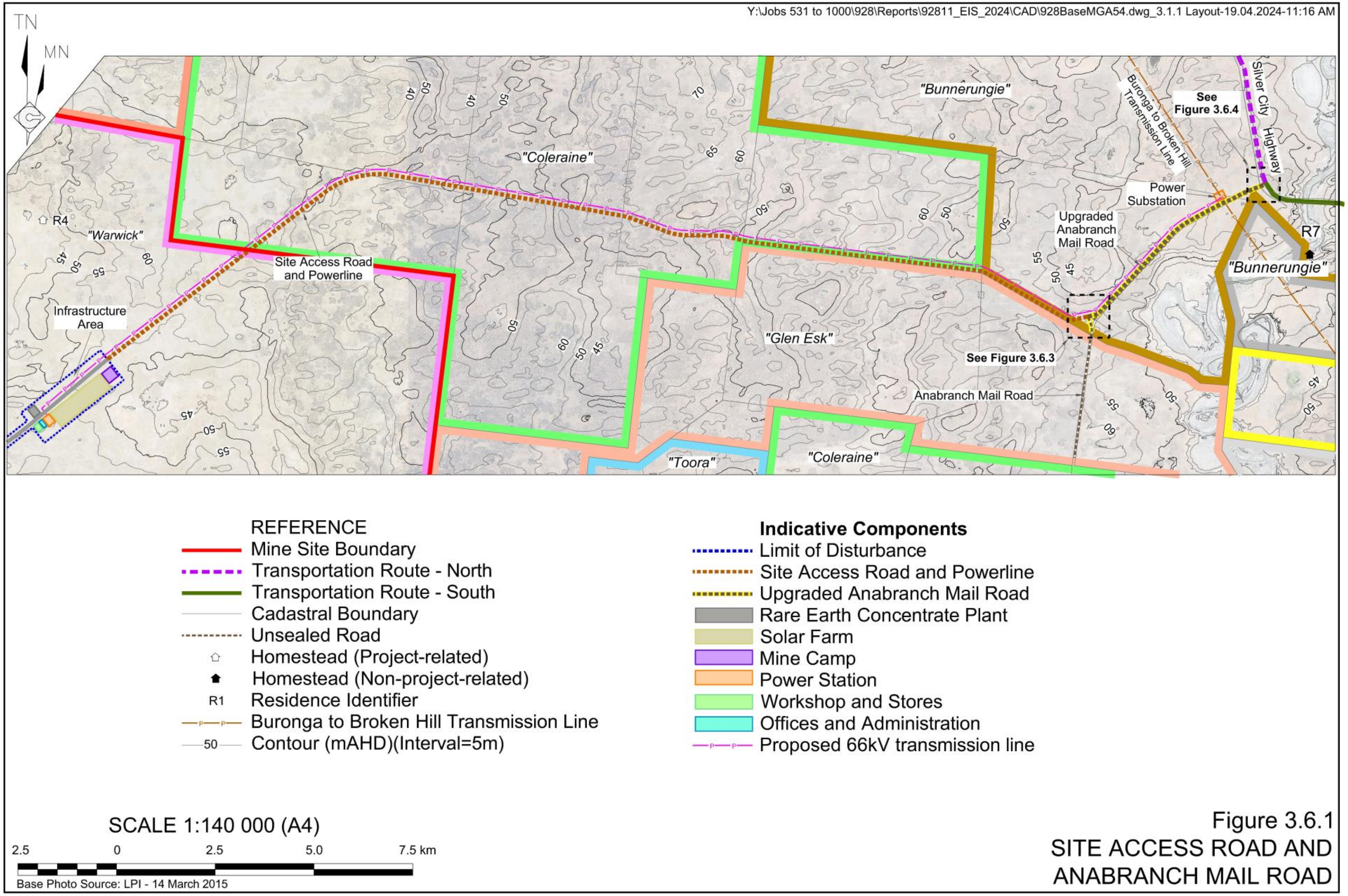


Figure 3.6.1
SITE ACCESS ROAD AND ANABRANCH MAIL ROAD

The design criteria for the Site Access Road would be as follows.

- Pavement .... Unsealed, all weather gravel road
- Design Speed 90km/h
- Sign posted speed 80km/h
- Carriageway width approximately10m
- Design vehicle ....BAB-quad (Type 2) Road Train
- Curve radii: ....minimum 600m with 4% superelevation
- Culverts ....suitable for a 1 in 20-year rainfall event
- Fencing .... as required by the landholder
- Access to private land ....to be maintained via gates and stop signs
- Security...lockable gates and security cameras at each end

3.6.2 Offsite Transportation

3.6.2.1 Proposed Transportation Routes

Figure 3.6.2 presents the proposed transportation routes for the Project. In summary, access to the Mine Site would be via the Silver City Highway, Anabranch Mail Road and the Site Access Road. Access to the Mine Site from Nulla Road would not generally be available except in exceptional circumstances or for environmental monitoring purposes.

Two transportation routes are proposed as follows.

- Transportation Route – North – from the intersection of Anabranch Mail Road and the Silver City Highway to the Rail Facility in Broken Hill, a distance of approximately 197km by road. Heavy vehicles travelling from the Mine Site to Rail Facility would enter Broken Hill via Wentworth Road/Patton Street, turn left into Comstock Street and right into Eyre Street/Holten Drive before turning right into the Rail Facility. Returning vehicles would utilise the same route.
- Transportation Route – South – from the intersection of Anabranch Mail Road and the Silver City Highway to Wentworth, a distance of approximately 69km by road. Vehicles travelling from the Mine Site to locations to beyond Wentworth would typically continue on the Silver City Highway towards Dareton and Mildura.

Use of other local roads, including Anabranch Mail Road south of the Site Access Road or Renmark Road west of the Silver City Highway would be actively discouraged and would be for local traffic or residents only.

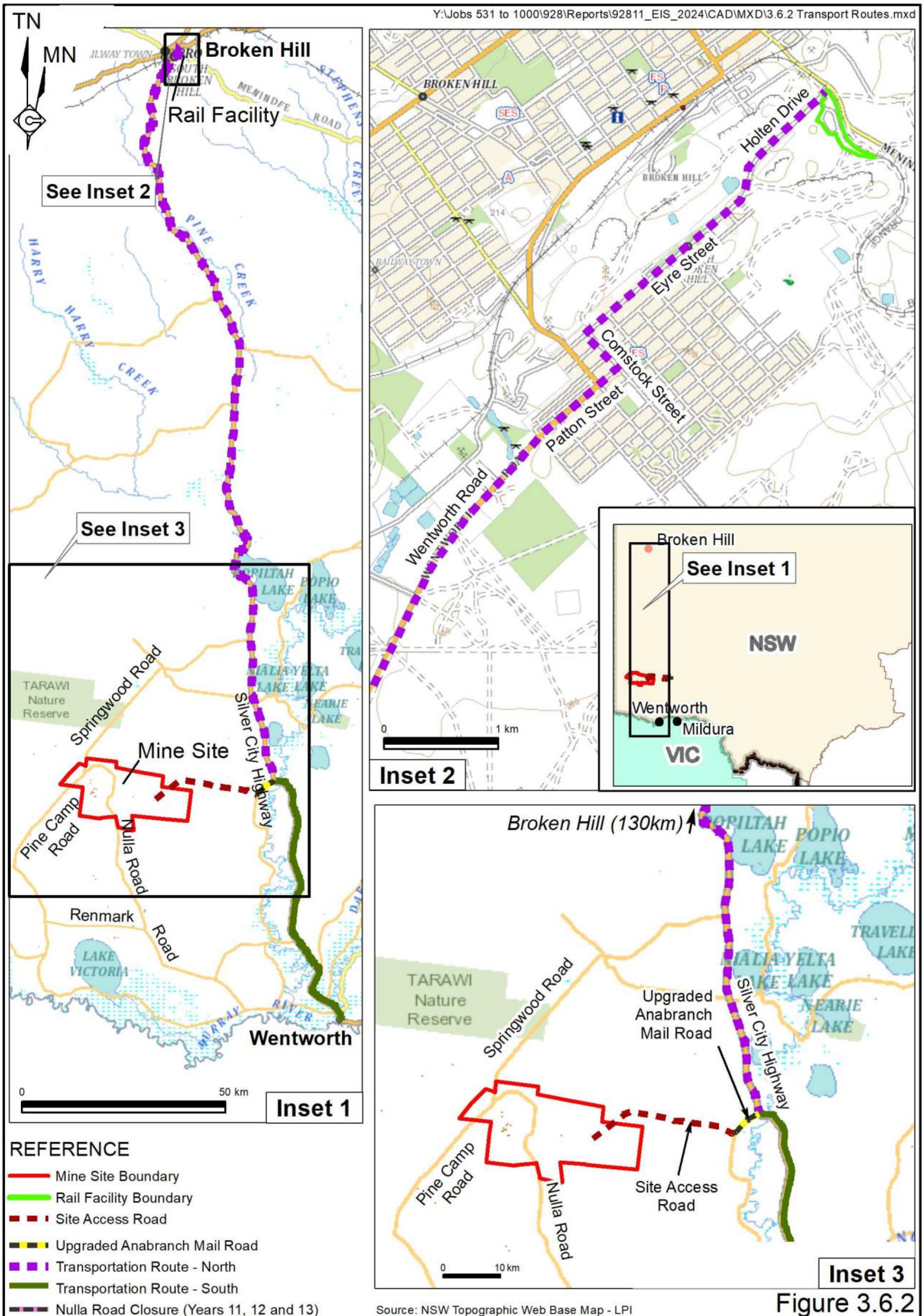


Figure 3.6.2
PROPOSED
TRANSPORTATION ROUTES

The Applicant anticipates traffic would approach the Mine Site from the following directions.

- Heavy mineral concentrate vehicles – 100% from the north.
- Heavy vehicles materials other than heavy mineral concentrate – 90% from the south and 10% from the north.
- Light vehicles and busses transporting personnel to and from the Mine Site – 90% from the south and 10% from the north.

3.6.2.2 Proposed Public Road Works

Introduction

In order to cater for the proposed Project-related traffic levels and vehicle types (see Sections 3.6.2.6 and 3.6.2.7) a range of public road and intersection upgrades are proposed. This subsection presents a brief description of the proposed public road upgrades. The Applicant has appointed Tonkin Consulting Pty Ltd (Tonkin, 2024) to prepare designs for the proposed upgrades. Those designs have been prepared in consultation with Transport for NSW, Wentworth Shire Council and Broken Hill City Council and with reference to the requirements provided by Transport for NSW. The designs have been prepared in accordance with the *Austroads Guide to Road Design.* Tonkin (2024) determined that no works are required for the intersection of Patton and Bonanza Streets in Broken Hill.

The road design process is an iterative one, and the Applicant anticipates that each of the relevant road's authorities would be required to review and approve detailed construction designs for the proposed public road upgrades before issuing the appropriate permits or works authority deed for the works.

Finally, the Applicant would prepare a *Public Road Construction Environmental Management Plan* that would address all relevant construction-related environmental management measures to be implemented during construction of the upgraded roads and intersections. That Plan would be prepared in consultation with the relevant roads authority and would reflect the following.

- Transport for NSW QA Specification G36 – Environmental Protection.
- any conditional requirements of any development consent that may be issued for the Project.

Anabranch Mail Road Intersection Layout and Design

The Site Access Road would join Anabranch Mail Road approximately 6.1km from its intersection with the Silver City Highway. The Anabranch Mail Road is currently an unsealed local road between approximately 6.5m and 7.5m wide with the travel width reduced to approximately 4.0m in places. The surface is described by Tonkin (2024) as “satisfactory,” however, the sheeting is missing and the subgrade is exposed on sections of the road. Two cattle grids are present on the section of the road between the Silver City Highway and the Site Access Road, each with a width of 3.6m. Tonkin (2024) states that whilst no speed limit is posted, the road would be unlikely to support 100km/h operating speeds and that curve radii are generally inadequate for such a speed limit.

Tonkin (2024) consulted extensively with Council to confirm the required design criteria for the intersection with the Site Access Road, as well as the upgrades required for the section of Anabranch Mail Road between the Site Access Road and the Silver City Highway. **Figure 3.6.3** presents the conceptual layout of the Site Access Road and Anabranch Mail Road Intersection. In summary, Anabranch Mail Road would be realigned to provide priority to vehicles accessing the Mine Site. Tonkin (2024) identifies the following design criteria for the through road.

- Pavement..Unsealed, all weather gravel road
- Design Speed 90km/h
- Signposted speed 80km/h
- Carriageway width approximately10m
- Design vehicle .... BAB-quad (Type 2) Road Train
- Curve radii: .... minimum 800m with 4% superelevation
- Culverts... suitable for a 1 in 20-year rainfall event.

Anabranch Mail Road south of the Site Access Road would be realigned to intersect the newly constructed through road. The realigned intersection would be a Basic Auxiliary Right / Basic Auxiliary Left (BAL/BAR) alignment in accordance with the *Austroads Guide to Road Design*, with a widened section of road to allow east-bound traffic to pass vehicles turning into the realigned Anabranch Mail Road. The intersection would be protected by a give way sign for vehicles approaching from the south on Anabranch Mail Road.

Anabranch Mail Road Layout and Design

Anabranch Mail Road would be upgraded to comply with the following design criteria agreed between Tonkin and Wentworth Shire Council.

- Alignment ....as per current alignment
- Pavement..Unsealed, all weather gravel road
- Design Speed 110km/h
- Signposted speed 100km/h
- Carriageway width approximately10m
- Design vehicle .... BAB-quad (Type 2) Road Train
- Culverts... suitable for a 1 in 20-year rainfall event.

In addition, the following additional measures would be implemented.

- Replacement of existing cattle grids, where required, with double lane cattle grids suitable for the proposed design speed and vehicle type.
- Installation of roadside fencing in consultation with adjoining landholders.
- Installation of guideposts as require meeting the relevant standard.
- Installation of speed, distance and warning signage as required.
- Modification of private access roads that intersect the existing road to ensure continue access for adjoining landholders.

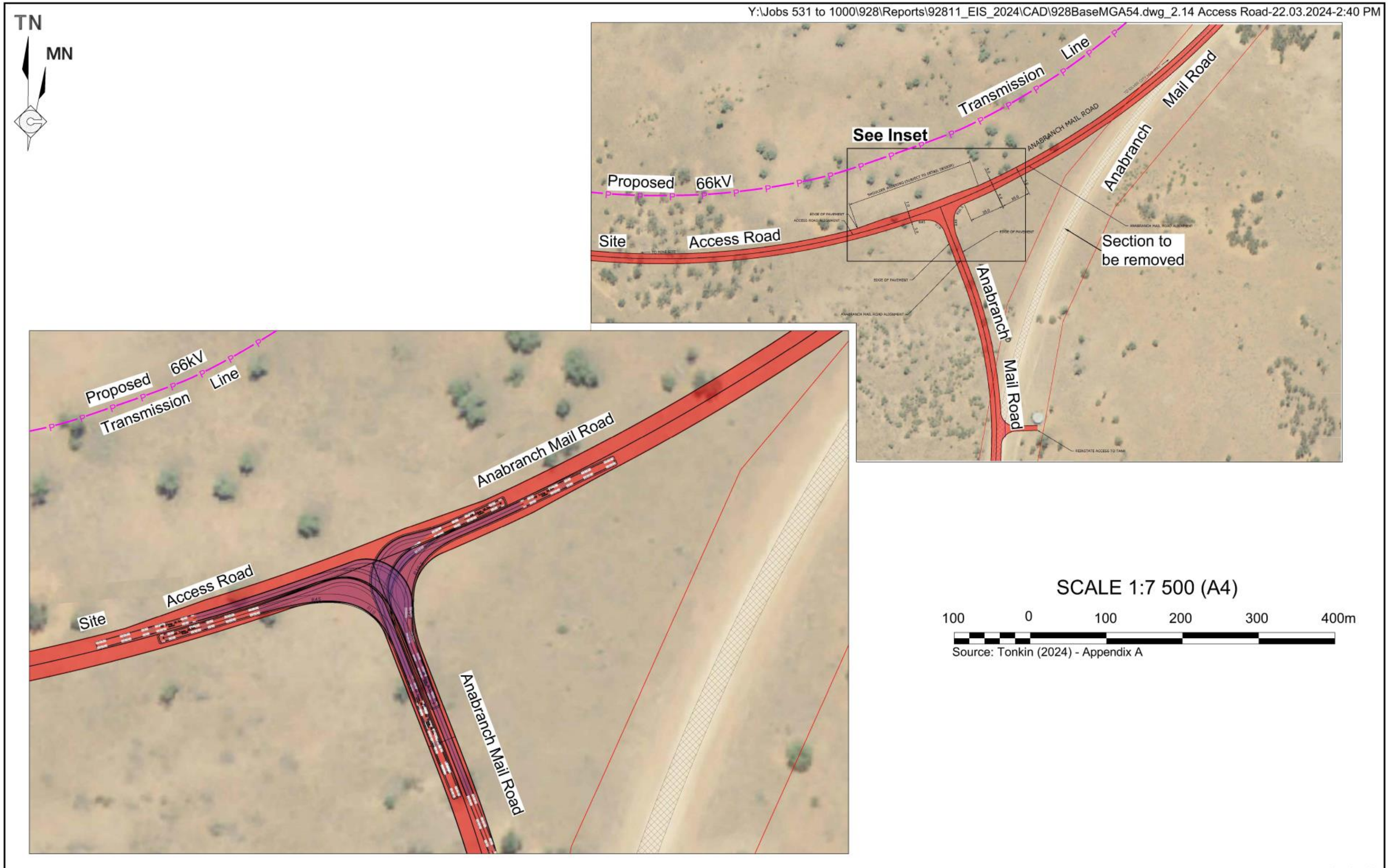


Figure 3.6.3
SITE ACCESS ROAD AND ANABRANCH MAIL ROAD INTERSECTION

Tonkin originally met with representatives of Wentworth Shire Council in around 2019 and presented the proposed intersection and road realignment works. In summary, Council indicated that they were generally in agreement with the proposed realignment of Anabranch Mail Road. Council indicated that detailed design would need to be provided at a later date, together with the results of consultation with adjoining landholders. Wentworth Shire Council and the Applicant have agreed to work together to identify and if necessary obtain approvals for a suitable source of road sheeting material.

Anabranch Mail Road and Silver City Highway Intersection Layout and Design

Anabranch Mail Road currently intersects with the Highway approximately 1.1km west of the Darling Anabranch Bridge. The intersection is a T-intersection controlled by a give way sign on Anabranch Mail Road and painted white lines.

An approximately 50m section of Anabranch Mail Road from the Highway is sealed. Tonkin (2024) states that works associated with the Broken Hill Water pipeline have damaged Anabranch Mail Road in the vicinity of the intersection.

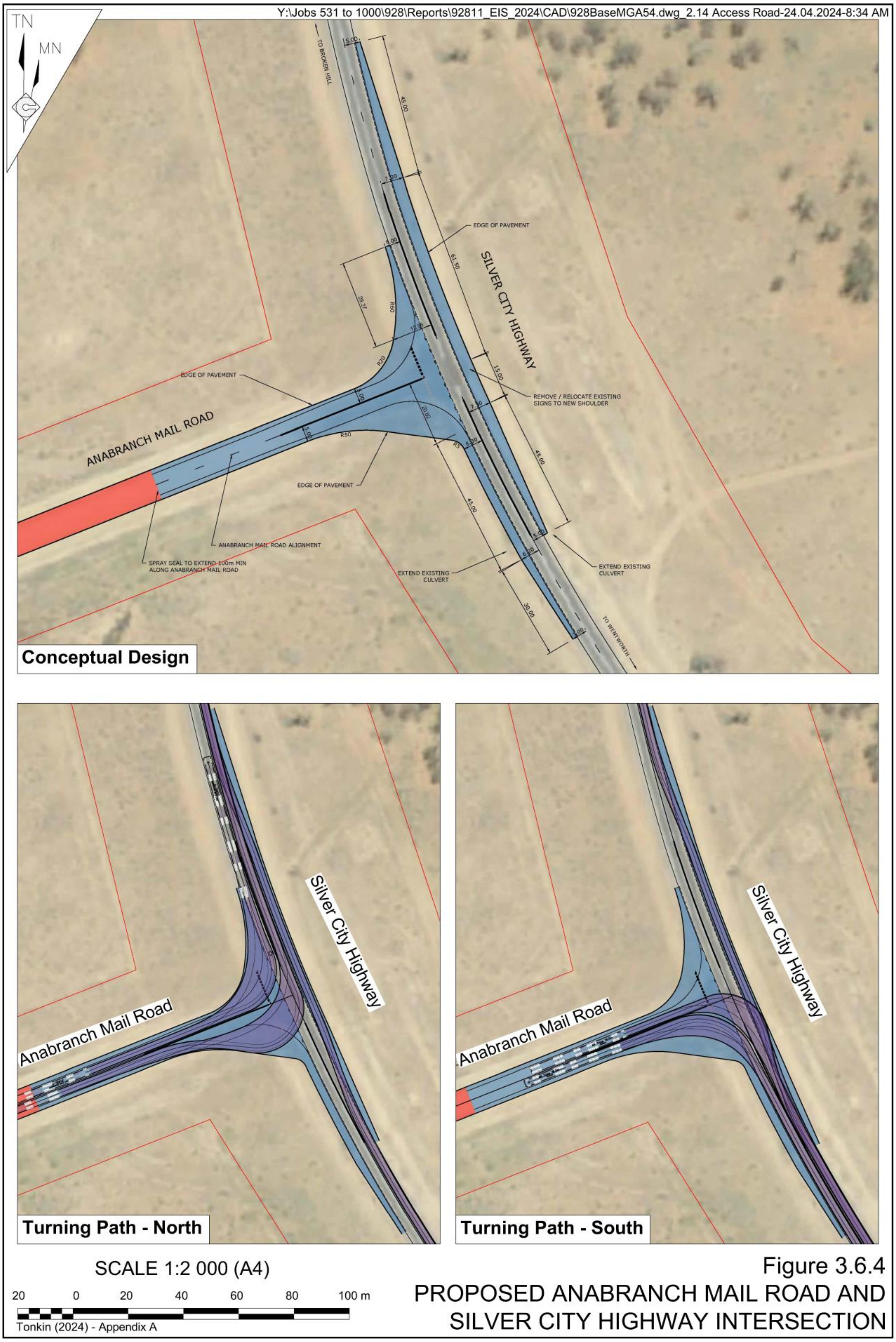
Silver City Highway in the vicinity of the intersection is a sealed, two lane, State Road. The road has a sign posted speed limit of 110km/h.

Figure 3.6.4 presents the conceptual layout of the Anabranch Mail Road and Silver City Highway intersection. Tonkin (2024) identifies that the reconstructed intersection would be a BAL/BAR intersection with the following.

- Widened pavement to permit southbound traffic to pass vehicles turning right into Anabranch Mail Road.
- Widened pavement to permit north-bound traffic to decelerate prior to turning left into Anabranch Mail Road.
- Suitable curve radii for BAB-quad (Type 2) road trains to turn left out of Anabranch Mail Road.

Tonkin (2024) identifies the following additional design criteria for the proposed intersection.

- Pavement...............................Anabranch Mail Road sealed for a minimum of 50m
- Design Speed 120km/h
- Signposted speed 110km/h
- Design vehicle .... BAB-quad (Type 2) Road Train



Tonkin (2024) - Appendix A

Figure 3.6.4
PROPOSED ANABRANCH MAIL ROAD AND SILVER CITY HIGHWAY INTERSECTION

Patton Street and Comstock Street Intersection

The intersection of Patton and Comstock Streets is located within the urban area of Broken Hill. The intersection is an identified route for Type 1 road trains. However, the intersection is in an area with pedestrian and other traffic and the following community facilities.

- A row of local retail shops on the northern side of Patton Street east of the intersection with Comstock Street.
- A pre-school and library located on the eastern corner of the intersection, with a bus stop located on Patton Street outside the library.
- A drive-through bottle shop located on the western corner of the intersection, with driveway access from both Patton and Comstock Streets.

The intersection is a concrete sealed, four-way intersection, with Patton Street the priority road. A Give Way sign and hold line located approximately 2m back from the kerb line in Patton Street is present on Comstock Street.

The intersection is proposed to be upgraded in consultation with Broken Hill City Council as presented in **Figure 3.6.5** to include the following.

- A widened pavement area on the western corner of the intersection to accommodate the swept path of north-bound BAB-quad (Type 2) road trains.
- A widened pavement on the southern corner of the intersection to accommodate the swept path of south-bound BAB-quad (Type 2) road trains.
- Relocation of under-road drainage and pedestrian infrastructure to accommodate the above pavement widening.
- Installation of relocated Give Way signs and hold line on Comstock Street.
- Removal of a limited number of parking on spaces on Comstock and Patton Streets.

The Applicant would consult with Broken Hill City Council and would implement the agreed works in relation to modified pedestrian access and infrastructure as well as parking arrangements to ensure safe and appropriate access to the existing shops, library and pre-school, taking into account the fact that users of those facilities are likely to include both young children and elderly persons.

Comstock Street and Eyre Street

The intersection of Comstock and Eyre Streets is located within the urban area of Broken Hill. The Comstock Street and the southern side of Eyre Street is residential, while the northern side of the street is occupied by the Rasp Mine, owned and operated CBH Resources.

The intersection is an identified route for Type 1 road trains. The intersection is a concrete sealed, T-intersection, with Eyre Street the priority road. There is no Give Way sign or hold line.

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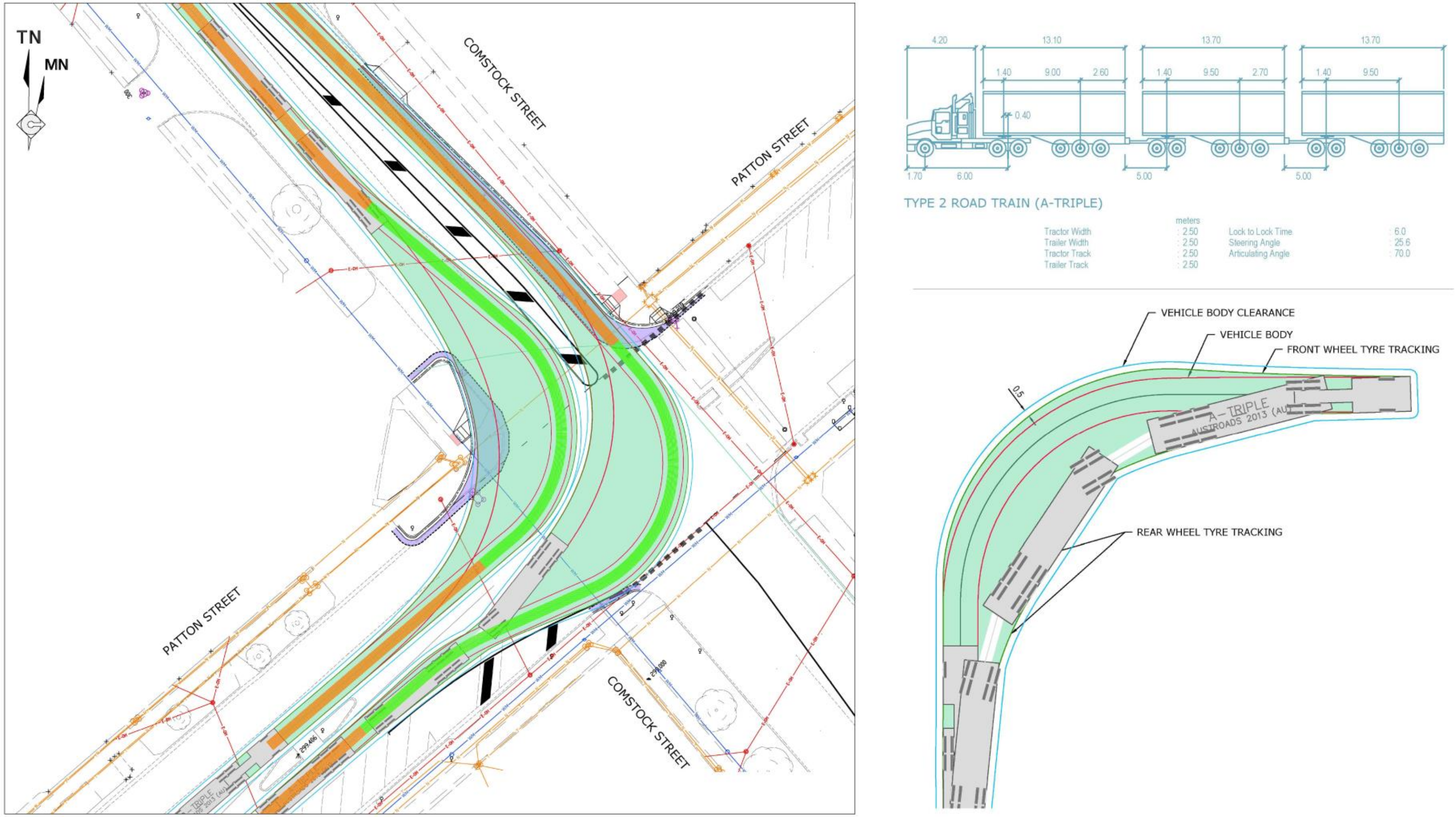


REFERENCE	Speed Limits	
Cadastral Boundary		1-15km/h
New Kerb & Gutter		15-25km/h
New Sealed Pavement		>25km/h

SCALE 1:750 (A4)

10 0 10 20 30m

Tonkin (2024) - Appendix B

Figure 3.6.5
PROPOSED INTERSECTION LAYOUT -
PATTON STREET AND COMSTOCK STREET

The intersection is proposed to be upgraded in consultation with Broken Hill City Council as presented in **Figure 3.6.6** to include the following.

- A widened pavement area on the northern side of the intersection in Eyre Street to accommodate the swept path of south-bound Type 2 road trains.
- A widened pavement on the eastern corner of the intersection to accommodate the swept path of south-bound Type 2 road trains.
- Relocation of electrical infrastructure, including a single power pole.
- Installation of Give Way signs and a hold line on Comstock Street.
- Removal of a limited number of parking on spaces on Comstock Street.

Eyre Street and Holten Drive

The current width of seal on Eyre Street and Holten Drive is adequate for use by Type 2 road trains, with the exception of that section of road with an on-road bike path. During consultation with Broken Hill City Council in April 2024 it was agreed that the Applicant would assist Council to establish an off-road bike path, thereby improving access for cyclists and providing sufficient road width for Type 2 road trains.

Rail Facility Access Road Intersection

The Rail Facility would be accessed via an existing unsealed access track. The Applicant proposes to upgrade the intersection to comply with the following design criteria in consultation with Broken Hill City Council (**Figure 3.6.7**).

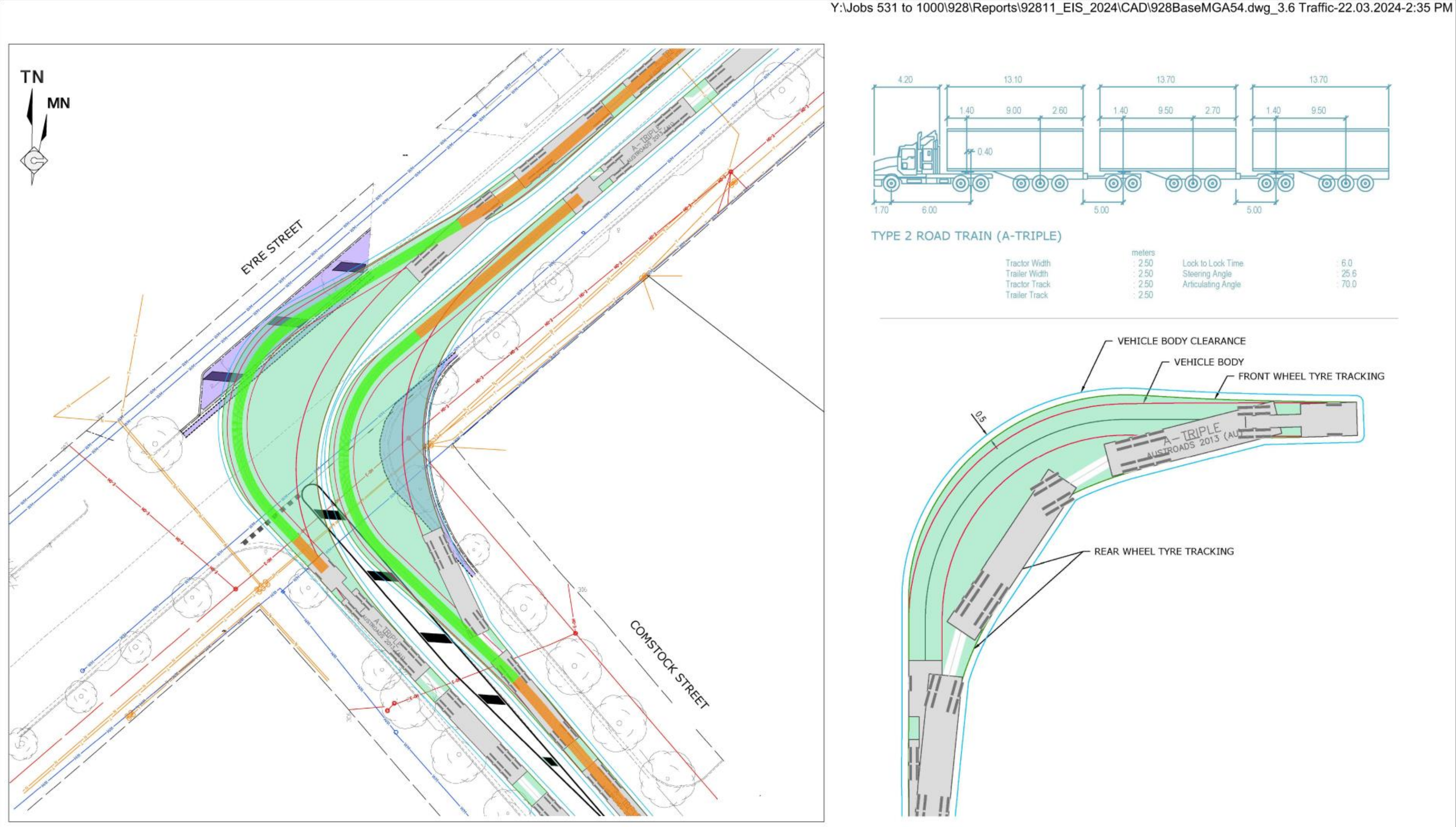
- Turn treatment ....BAL and BAR
- Design vehicle .... BAB-quad (Type 2) Road Train
- Design speed.. 60km/h
- Sight distance... minimum 124m in each direction
- Surface ....sealed
- Priority road... Holton Drive
- Signage .... Give Way signs, hold line and sight board

3.6.2.3 Public Road Construction

Construction operations within the public road reserves would be undertaken on behalf of and in accordance with permits and/or works authority deeds with the relevant roads authority. The following public road upgrades would be completed prior to the following project milestones.

- Commencement of importation of major Project-related infrastructure to the Mine Site, principally dredge components.
  - Intersection of Anabranch Mail Road and the Silver City Highway.
  - Section of Anabranch Mail Road between the Silver City Highway and the Site Access Road

  Earthworks or construction of infrastructure, including a construction mine camp and preparatory earthworks would commence prior to completion of the above works.



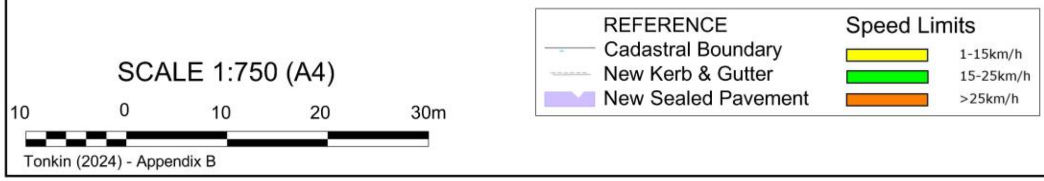


Figure 3.6.6
PROPOSED INTERSECTION LAYOUT -
EYRE STREET AND COMSTOCK STREET

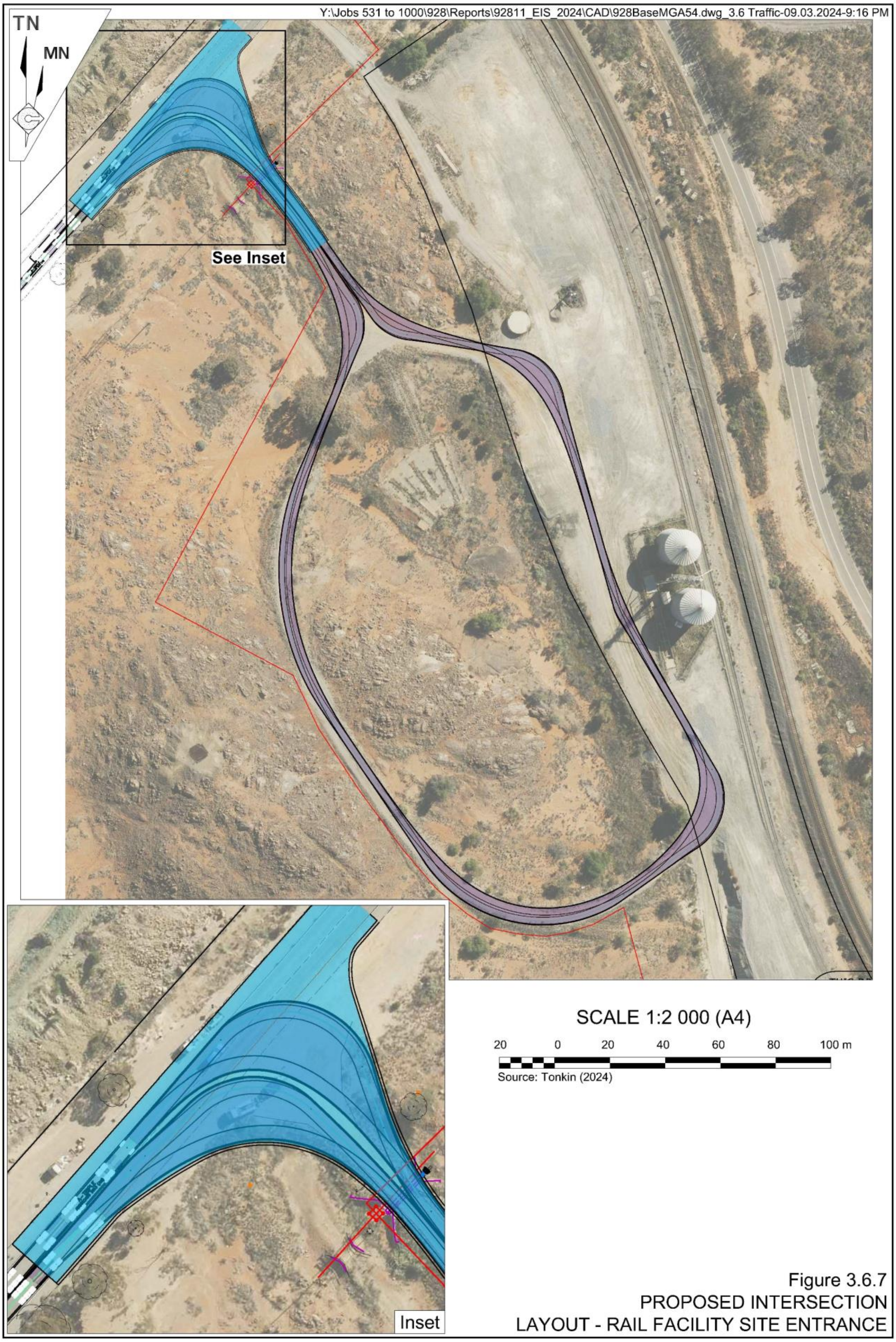


Figure 3.6.7
PROPOSED INTERSECTION
LAYOUT - RAIL FACILITY SITE ENTRANCE

- Commencement of transportation of heavy mineral concentrate from the Mine Site.
  - Site Access Road.
  - Intersection of Patton and Comstock Streets.
  - Intersection of Comstock and Eyre Streets.
  - Intersection of Holton Drive and the Rail Facility access road.

Construction materials would be sourced from existing road-side gravel pits (subject to landholder approval) or third-party providers and all works would be subject to stringent supervision and signoff from a suitably qualified and experienced roads engineer.

Public road upgrade operations would be undertaken at the Applicant's expense.

3.6.2.4 Public Road Operation and Maintenance

Anabranch Mail Road and the Site Access Road would be constructed as an unsealed all-weather road. As a result, the Applicant anticipates the road would not be subject to road closure orders issued by Council. The Applicant would manage dust emissions from Anabranch Mail Road and the Site Access Road with low salinity water and/or polymer-based dust suppressants, as required.

The Applicant anticipates that maintenance of that section of Anabranch Mail Road between the Silver City Highway and the Site Access Road would be the subject of a Planning Agreement with Wentworth Shire Council. In summary, the Applicant anticipates that it would maintain that section of road for the life of the Project. Following the Project, the Applicant would restore Anabranch Mail Road to its original alignment and return the road to Council in a condition equal or better than the current condition.

Similarly, following completion of the required intersection upgrades within the Broken Hill urban area and the Applicant's expense, the Applicant anticipates that a contribution to the ongoing maintenance of those roads would be the subject of a Planning Agreement with Broken Hill City Council.

As a State road, the Applicant anticipates that there would be no contribution required for the maintenance of the Silver City Highway.

3.6.2.5 Closure and Re-establishment of Nulla Road

Closure of Nulla Road

As identified in Section 3.4.5.1, mining operations would remove a section of Nulla Road in approximately Year 11. As a result, the Applicant proposes to close Nulla Road for a period of approximately 3 years from Year 11 to Year 13. The section of road to be closed would be approximately 7km in length from the access road to the "Huntingfield" homestead to the access road to the "Wenba" property.

The Applicant has consulted with the majority of landholders who may use that section of Nulla Road and received the following feedback.

- "Huntingfield" – no consultation was possible and no feedback has been received

- "Wenba" – the access to "Wenba" station is north of the proposed mining area. The Owner of "Wenba" station indicated they could use an alternative route if required and it wouldn't interfere with their existing use of the property.
- "Nulla" – The landholder uses the section of Nulla Road through the Mine Site to access properties located to the east of the Mine Site. The Applicant has committed to providing access to Anabranch Mail Road via internal roads and the Site Access Road, subject to conditions relating to safe access and compliance with site road rules.
- Other properties who may use Nulla Road, including "Belmore," "Amoskeg". The Applicant has committed to providing access through the Mine Site during the period when Nulla Road is closed. Alternatively, the Applicant may provide compensation for additional travel time and distance at the discretion of the landholder.

The Applicant also consulted with Wentworth Shire Council in relation to the proposed closure and would implement the following measures to minimise adverse impacts associated with the proposed closure.

- Install a turnaround area on Nulla Road at each closure point.
- Install advanced warning signage in consultation with Wentworth Shire Council indicating the closure of the road and providing alternate directions for motorists.

Realigned Nulla Road

The Applicant would, in consultation with Wentworth Shire Council, reinstate that section of Nulla Road along a realigned alignment within 3 years of closure to a standard that is better than the current standard (**Figure 3.6.8**). The detailed design for the realigned road would be prepared immediately prior to closure, however, the following indicative design criteria would be implemented.

- Alignment .... as per **Figure 3.6.8**
- Pavement.. Unsealed
- Design Speed 110km/h
- Signposted speed 100km/h
- Carriageway width approximately10m
- Design vehicle .... AB-triple (Type 1) Road Train
- Culverts.. suitable for a 1 in 20-year rainfall event.

The realigned Nulla Road would be constructed fully within the proposed limit of disturbance. Where the realigned road is not within the existing road reserve, it would be located on land that forms part of "Warwick" and "Huntingfield" stations. The Applicant would ensure that a suitable road reserve is set aside for the realigned road, with suitable compensation to be provided to the owner of the "Huntingfield" station as part of a commercial agreement required before mining can progress through Nulla Road.

The Applicant would provide a suitable warranty for the operation of the realigned Nulla Road, noting that construction operations would likely be undertaken in Years 12 and 13, four years prior to the proposed end of mining operations.

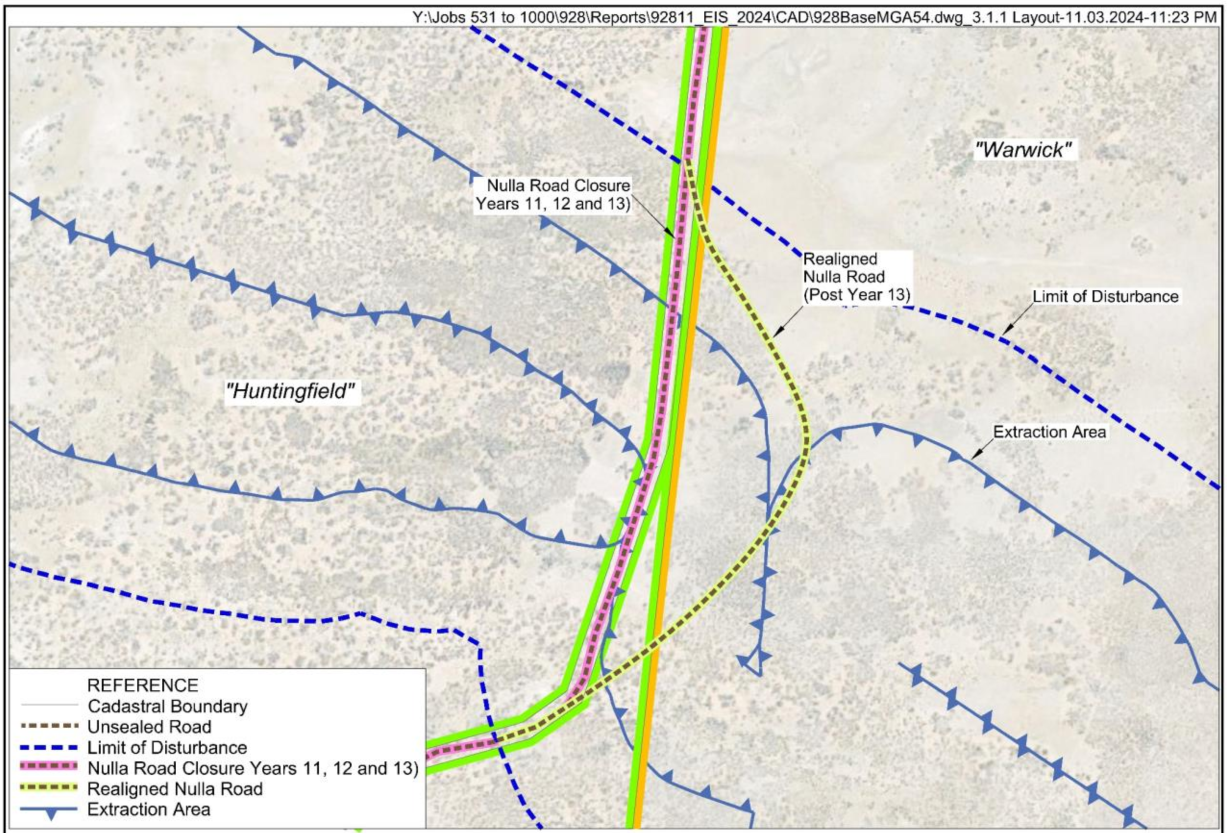
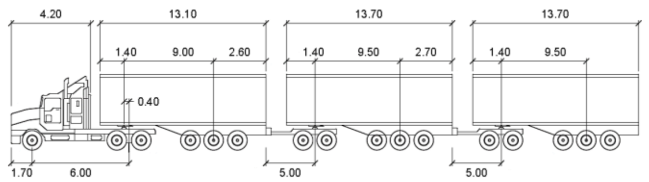
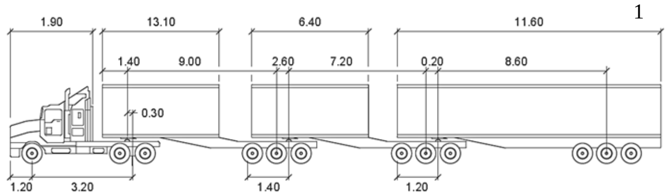
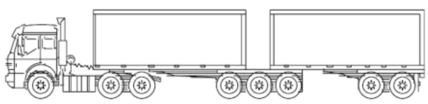


Figure 3.6.8
REALIGNED NULLA ROAD

3.6.2.6 Vehicle Types

The Applicant anticipates that a variety of vehicle types would access the Mine Site throughout the life of the Project. **Table 3.6.1** presents an overview of the anticipated classes of vehicles and their purposes. The Applicant proposes to utilise Type 2 road trains for transportation of heavy mineral concentrate from the Mine Site to the Rail Facility. It is noted that that the proposed Transportation Route – North (see Section 3.6.2.1) is approved for Type 1 road trains only. However, Tronox has sought and obtained approval for the use of Type 2 road trains on the public-road section its haul route from the Snapper and Ginko Mines to its Mineral Separation Plant in Broken Hill. The Applicant would seek similar approval for use of Type 2 road trains on the Transportation Route – North. Notwithstanding, until that approval has been obtained, Type 1 road trains would be the largest vehicles used.

Table 3.6.1
Vehicle Types and Purposes

Vehicle Class	Description	Example	Purpose
Type 2 road train	BAB-quad or A-triple		Transporting heavy mineral concentrate from the Mine Site to the Rail Facility (once approved).
Type 1 road trains	AB-triple or A-double	 1	Transporting heavy mineral concentrate from the Mine Site to the Rail Facility (prior to approval of Type 2 road trains)
10	B-double		Delivery of bulk consumables such as diesel and gas to the Mine Site
3 or 4	Light Truck or large bus		Delivery of general goods to the Mine Site
1	Light vehicles, including small buses		Transportation of personnel to and from the Mine Site
Note 1: Image Source – Tonkin (2024) and AustRoads Vehicle Classification System: Asset and Network Information – January 2002			
Source: RZ Resources Limited			

In addition, during construction and at the commencement and completion of mining or processing, a limited number of low loaders, oversize and overweight vehicles transporting mobile plant, dredge components and materials would access the Mine Site. Any over size or overweight vehicles would be required to obtain appropriate permits or approvals prior to being transported on the public road network.

3.6.2.7 Traffic Volumes

Construction and operational traffic volumes would principally be related to transportation of materials and personnel to and from the Mine Site. **Table 3.6.2** presents the anticipated average and peak vehicle movements throughout the life of the Project. Allowance has been made for the use of either Type 1 (AB Triple) road trains or Type 2 (BAB quad) road trains. Until such time as approval for Type 2 road trains has been obtained, Type 1 road trains would be used, requiring a higher number of individual vehicles movements than for Type 2 road trains.

Table 3.6.2
Proposed Traffic Volumes

	Phase								
	Construction				Operational				Rehabilitation
	Average Movements[1]		Peak Movements[1]		Average Movements[1]		Peak Movements[1]		Average Movements[1]
Vehicle	Daily	Peak Hour	Daily	Peak Hour	Daily	Peak Hour	Daily	Peak Hour	Daily
Type 2 / Type 1 Road Train[2, 3]	-	-	-	-	20/26	6/6	24/32	6/6	-
B-double / Semi Trailer Truck / Other heavy vehicle[4]	12[2]	4	22	6	8	2	14	4	10 to 22
Light Vehicle[4]	42	12	84	22	56	14	84	22	
Bus[5]	2	2	4	2	2	2	4	2	
Total Movements (Type 2 / Type 1 Road Train)	**56**	18	**110**	30	**86/92**	24	**126/132**	34	

Note 1: One return trip = 2 movements
Note 2: 100% via the Transportation Route – North
Note 3: Type 1 road trains to be used until approval for Type 2 road trains provided
Note 4: 90% via the Transportation Route – South and 10% via the Transportation Route - North
Note 5: 100% via the Transportation Route - South
Source: RZ Resources Limited

3.6.3 Flexible Elements

Table 3.6.3 presents the public road-related flexible elements that cannot be described with certainty at this stage of the Project, together with clear limits on the flexibility sought and a justification of each element. Elements that may be smaller or with lesser impacts with lesser impacts than that proposed are not described.

Table 3.6.3
Flexible Elements – Mining Operations

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

3.7 Rail Facility Operations

3.7.1 Introduction

The Rail Facility is controlled by ARTC and is operated by a third-party service provider. The Facility is utilised by a range of Aurizon's clients, including the adjacent Mawsons Broken Hill Quarry. However, development consent for the importation, storage and loading of heavy mineral concentrate onto rail does not exist for the site. As a result, operation of the Rail Facility for the purposes of the Project is included within this application. Operation of the Rail Facility for purposes other than those associated with the Project does not form a component of this application.

3.7.2 Rail Facility Layout

Figure 3.1.3 presents the existing layout of the Rail Facility. In summary, the Rail Facility includes or would include the following components. The Applicant does not propose to disturb additional land within the Rail Facility.

- An unsealed Rail Facility access road. As described in Section 3.6.2.2. the entrance to the Rail Facility from Holten Drive would be upgraded to a standard suitable for Type 2 road trains. Existing internal roads are suitable for such vehicles and no further upgraded to the internal road network is required.
- A rail laydown and load-out area with sufficient storage for approximately 300 half height shipping containers and adequate area for forklifts to manage and load those containers onto trains. A separate, secure storage area for shipping containers with Monazite Product would be established.
- A demountable building, including an office and amenities/crib room with chemical or pump out toilets.
- Appropriate lighting for low visibility conditions.
- The existing rail siding adjacent to the main Orange – Broken Hill Railway.

Two existing silos and associated steel work may be demolished and removed from site by the operator under separate approval. Demolition works would be undertaken in accordance with Australian Standard *AS 2601-2001 The Demolition of Structures.*

The main Orange – Broken Hill Railway is not included within the Rail Facility and this application explicitly excludes land occupied by the main line.

3.7.3 Rail Facility Operation

The Rail Facility would be operated by a third-party service provider who would be responsible for managing operations within the Rail Facility and coordination with the rail operator.

Vehicles transporting heavy mineral concentrate would enter the Rail Facility via the upgraded site entrance (see Section 3.6.2.2). Full shipping containers would be unloaded from the trucks and stockpiled using a forklift. The road trains would then be loaded with empty shipping containers for return to the Mine Site.

During train loading and unloading, a train would be pushed into the siding using a locomotive.. One or more forklifts would be utilised to transfer full, sealed shipping containers from the stockpile area to the train and empty shipping containers from the train to the stockpile area. The locomotive would then be utilised to push the train from the siding. The Applicant and its preferred supplier are investigating the use of diesel/electric locomotives with battery storage, in which case the locomotive would be electrically operated during operations within the Rail Facility, thereby minimising noise emissions from the Rail Facility.

Train loading and unloading operations would be undertaken 24-hours per day, 7 days per week as required by the operator of the rail line.

Finally, containers of Monazite Product may be unloaded within the Rail Facility pending reloading onto road trucks for transportation from the Rail Facility direct to port for export under separate approval. Alternatively, road trucks may transport Monazite Product direct from the Mine Site to port via the existing approved heavy vehicle routes through Broken Hill.

3.8 Water Management

3.8.1 Introduction

Management of groundwater and surface water within the Mine Site would be a critical component of the Project. The groundwater and surface water environment within and surrounding the Mine Site is described in detail in Sections 6.2 and 6.7 respectively. In summary, the groundwater and surface water environment may be described as follows.

- The Mine Site is located in an arid environment that experiences a significant water deficit with annual average rainfall of 235mm and annual average pan evaporation of approximately 2,073mm.
- The natural land surface is highly porous, with estimated runoff coefficient of 0.05. As a result, a significant rainfall event is required to generate surface runoff.
- Surface water drainage features within the Mine Site are indistinct, ephemerally discharging either to the internally draining Eastern or Western Salt Pans or smaller surface depressions (**Figure 3.8.1**).
- Neither the salt pans or smaller depressions are permanent water bodies, typically holding surface water for short periods of time and only following rainfall of sufficient magnitude to generate runoff.
- The floors of the small depressions and salt pans (in particular) are dominated by highly saline soils, with the soils within the Eastern Salt Pan being toxic to plants.
- The ore body is situated within the principal aquifer in the vicinity of the Mine Site, the hyper-saline Upper Aquifer.
- The Upper Aquifer is underlain by the Middle and Lower Aquifers that are below the base of proposed extraction and hydraulically disconnected from the Upper Aquifer by thick aquitards.
- The groundwater level within the Mine Site is highly consistent, with an elevation of between 24.2m AHD and 24.8m AHD, indicating very a flat hydraulic gradient.
- Groundwater quality of the Upper Aquifer is very poor, with a calculated average total dissolved solids concentration of 61,000mg/L or just under twice the concentration of seawater.

The Applicant's objective in managing water throughout the life of the Project would be as follows.

- Operate the dredges and Wet Concentration Plant wholly within the Upper Aquifer.
- Ensure that extracted groundwater is either used for mining-related purposes or reverse osmosis.
- Ensure that disturbed sections of the Mine Site are managed in a way that would result in no discharge of sediment, salt, hydrocarbon or chemical -laden water.

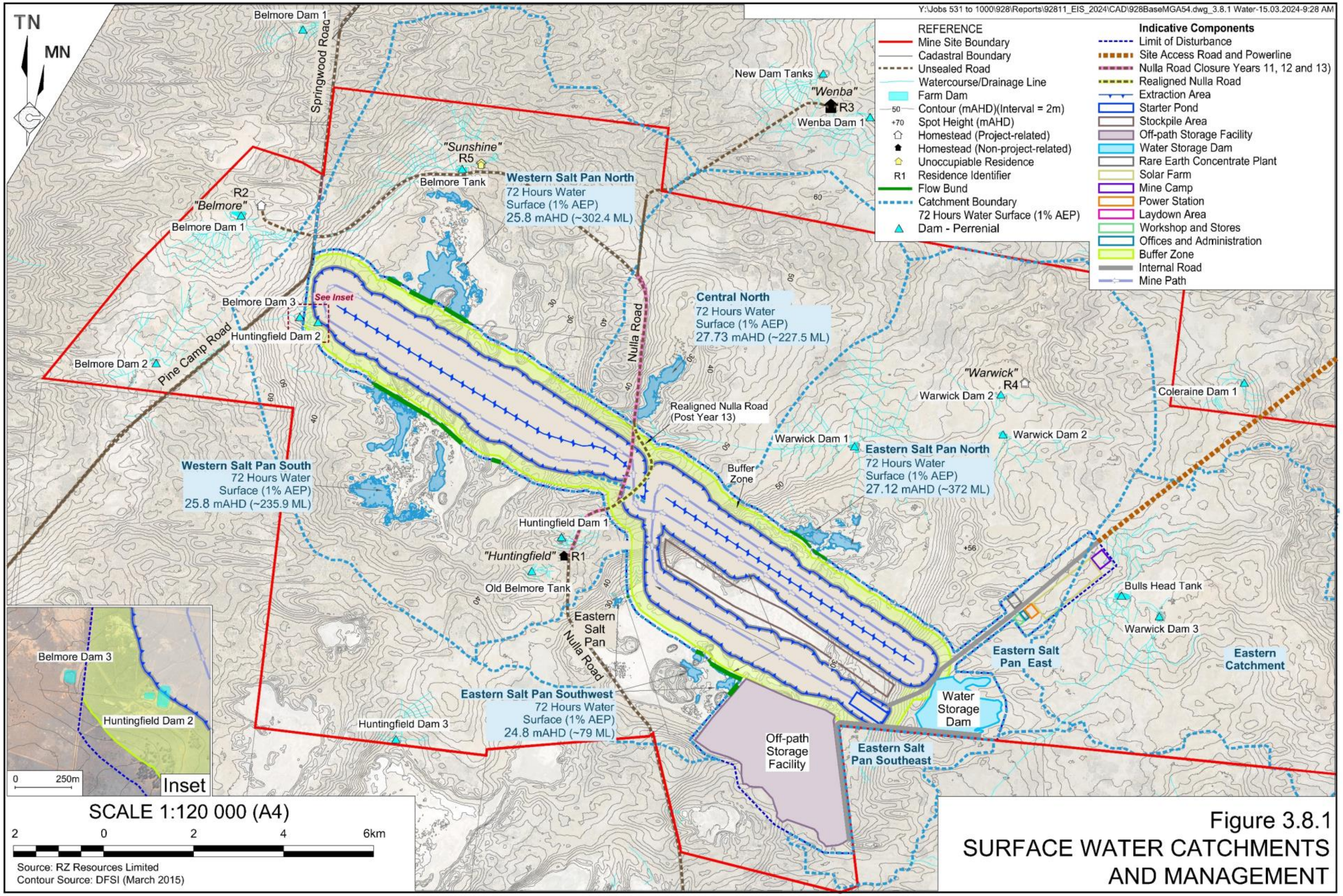


Figure 3.8.1
SURFACE WATER CATCHMENTS AND MANAGEMENT

- Ensure that surface water flows from undisturbed areas are prevented from entering proposed disturbance areas.
- Ensure that adequate water is available for mining-related activities throughout the life of the Project.

The following subsections present an overview of the proposed management of groundwater, surface water and mine water within the Mine Site, as well as a water balance for the Project.

3.8.2 Mine Site Groundwater Management

3.8.2.1 Dredging Operations

As described in Section 3.4.4, mining operations would be undertaken using conventional dredge mining methods, with overburden above the water table extracted using conventional free dig, load and haul mining methods. The proposed dredges and Wet Concentration Plant would be constructed on a construction pad, with the pad then flooded using water previously pumped to the Water Storage Dam. Once the dredges and Wet Concentration Plant have been constructed, the water level within the dredge pond would typically not require active management.

3.8.2.2 Production Bores

Two production bores would be constructed and operated within the Mine Site, one in the vicinity of the Mine Camp and the others in the vicinity of the Starter Pond. All bores would be constructed within the Upper Aquifer in accordance with the guideline *Minimum Construction Requirements for Water Bores in Australia*. The production bores would be used to provide raw water for the proposed reverse osmosis plants to generate potable and low-salinity water for use for drinking, ablutions and other mine-related purposes. Raffinate from the reverse osmosis plants would initially be stored within dedicated storage ponds prior to transfer to the dredge pond.

3.8.2.3 Groundwater Extraction and Licencing

Groundwater licencing requirements are discussed in Section 6.2.5. However, in summary, GEO-ENG (2024) anticipates that up to 9.6GLpa of highly saline water would be extracted from the Upper Aquifer during Year 1 mining operations when the water level within the starter pond would be managed to facilitate construction of the dredges and Wet Concentration Plant. Extraction is expected to reduce to between 3.3GLpa and 5.4GLpa between Years 3 and 16.

The Western Murray Porous Rock Water Source under the *Water Sharing Plan for the NSW Murray Darling Basin (MDB) Porous Rock Groundwater Sources Order 2020* identifies an available allocation of 163.3GLpa. The Applicant has sought to obtain WALs and adequate allocation to account for the maximum direct and indirect take of groundwater from the Upper Aquifer, with discussions with DCCEEW ongoing at the time of finalisation of this document.

3.8.3 Mine Site Surface Water Management

3.8.3.1 Exclusion of Surface Water Flows

As indicated in Section 3.8.1, the Mine Site is located within an arid environment with evaporation substantially exceeding rainfall and a very low surface runoff coefficient. Notwithstanding this, intense rainfall events which generate runoff may occur. Any runoff from undisturbed catchments would be excluded from the Mine Site using bunds. Internal runoff within disturbance areas would be directed to the dredge pond or retained on site and allowed to infiltrate the natural surface. Section 6.7 presents an assessment of the surface water impacts associated with the Project.

The following information provides a summary of the existing surface water environment in the vicinity of the Project and the proposed measures to manage surface water.

- Six catchments are situated within the Mine Site, namely the Northwestern, Southwestern, Western Salt Pan, Central, Eastern Salt Pan and Eastern catchments (See Section 6.1.2.2 and **Figure 6.1.2**).
- All catchments are characterised by low slopes (typically <1% with localised areas of up to 5%) and undulating terrain with multiple minor and internally draining depressions.
- Surface water runoff within and surrounding the Mine Site is relatively uncommon, with most surface water infiltrating the sandy soil. When surface water runoff does occur, individual watercourses and drainage lines are typically indistinct, internally draining and terminating in dams.
- Annual catchment yields for the undisturbed areas are presented in **Table 3.8.1**. These yields have been calculated across a range of annual exceedance probability (AEP) for the 72-hour duration rainfall depth, estimated using:
  - BoM Intensity, Frequency and Duration data; and
  - the 0.05 runoff coefficient for the Lake Victoria catchment presented in the document *Climate Change Impacts on Surface Runoff and Recharge to Groundwater* (OEH, 2015).

Table 3.8.1
Estimated 72-hour Rainfall Catchment Yields – Undisturbed

Catchment	Area (km^2)	Annual Yield (ML)				
		99% AEP	50% AEP	20% AEP	10% AEP	1% AEP
Eastern Salt Pan	105.5	381	1,183	1,630	1,893	2,584
Western Salt Pan	91.5	330	1,025	1,412	1,641	2,239
Central	36.0	130	404	557	647	883
Eastern	41.9	151	470	647	752	1,026
Source: RWC (2024) – Table 6						

- The Western and Eastern Salt Pans, as well as the central depression of the Central Catchment are the ultimate destinations for most surface water flows within the limit of disturbance. As all Mine Site catchments are internally draining, thus lacking any connection to a downstream catchment, there is no possibility of surface water leaving the Mine Site and ultimately entering Lake Victoria or the Murray/Darling River system.

Project-related disturbance would only impact the Western Salt Pan, Eastern Salt Pan and the Central Catchments (**Figure 3.8.1**). The Western Salt Pan and Eastern Salt Pan catchments would be divided by Project-related activities into North and South sub-catchments. In each case, clean water diversion bunds would be constructed at the limit of disturbance to prevent inflow of clean surface water into disturbed sections of the Mine Site, as well as to prevent dirty water flowing to undisturbed sections of the catchments.

The Central Catchment would be reduced in size, with only the southern section of the catchment within the limit of disturbance. A dirty water retention bund would be constructed at the limit of disturbance to prevent dirty water flowing to undisturbed sections of the catchments.

Table 3.8.2 presents peak discharge for the disturbed catchments for a range of AEP rainfall events derived using the Bureau of Meteorology (BoM) Intensity Frequency and Duration data and the flood estimation methodology presented in Zaman *et al* (2012).

Table 3.8.2
Peak Flow Estimates

Catchment	Sub-catchment (see **Figure 3.8.1**)	Area (km^2)	Peak Flow Estimate (m^3/sec)			
			10% AEP	5% AEP	2% AEP	1% AEP
Eastern Salt Pan	North	51.4	6.7	9.5	15.2	21.5
	East	2.5	1.9	2.7	4.3	6.1
	Southeast	7.2	2.9	4.2	6.7	9.4
	Southwest	10.9	3.5	5.0	7.9	11.2
	Disturbed	33.4	5.6	7.9	12.7	18.0
Western Salt Pan	North	41.8	6.1	8.7	13.9	19.7
	South	32.6	5.5	7.9	12.5	17.8
	Disturbed	17.1	4.2	6.0	9.6	13.5
Central	North	31.0	5.4	7.7	12.4	17.5
	Disturbed	5.0	2.5	3.6	5.8	8.2

Source: RWC (2024) – Table 7

To ensure that the proposed dredge pond is not inundated and to prevent runoff from undisturbed sub-catchments entering disturbance areas, the Applicant would construct a series of clean water exclusion bunds to exclude surface water flows. Any water captured by the bunds would be used for a mining-related purpose, permitted to infiltrate through the surface or evaporate.

The proposed clean water exclusion bunds would have the following design criteria.

- Design rainfall event .... 1% AEP 72-hour (144mm)
- Maximum side slopes .... 7:1 (H:V)
- Minimum crest width.. 1m
- Minimum crest elevation .... 1% AEP 72-hour water level plus 1m freeboard

Figure 3.8.1 presents the estimated water levels that would accumulate during a 1% AEP 72-hour rainfall event. As a result, the following presents the proposed crest elevation of each of the clean water exclusion bunds.

- Western Salt Pan – North .... 25.8m AHD
- Western Salt Pan – South .... 25.8m AHD
- Eastern Salt Pan – North .... 27.1m AHD
- Eastern Salt Pan – South .... 25.3m AHD

Following completion of progressive rehabilitation and the bunds are no longer required, they would be removed and the existing hydrological condition re-instated.

3.8.3.2 Erosion and Sediment Control

To prevent sediment-laden runoff entering receiving environment, bunds and/or roads would be progressively constructed at the perimeter of the disturbance area. Where installed, these bunds would be a minimum 1m high whilst roads would be constructed with a cross-fall towards the disturbance area. These roads would also be constructed with safety berms that would also act as bunds to prevent sediment-laden runoff from entering the receiving surface water environment.

As these measures would result in a closed water management system with the dredge pond receiving runoff from the disturbance area, no measures for the treatment and discharge of sediment-laden runoff are proposed.

3.8.3.3 Mine Water Management

The dredge pond would be progressively developed with a geometry that would create an internally draining, partially filled void. Water levels within the dredge pond would be at or below the local groundwater level of approximately 24.6mAHD (GEO-ENG, 2024). Dredge pond geometry, coupled with perimeter roads would ensure saline groundwater inflows remain within the dredge pond, with no discharge of mine water to the receiving surface water environment.

Saline water, primarily groundwater with elevated concentrations of salt, and mine water, namely saline water that has been used for mining-related purposes, would be managed in a way that would ensure that it would not be discharged to land or natural drainage. In summary, the following management measures would be implemented.

- Pumps and pipes would be fitted with leak detection equipment to ensure that should a leak or pipe failure occur, pumps would automatically cease to pump, thereby limiting the volume of potentially saline water that would be discharged.
- Water used for dust suppression purposes would be the minimum volume required to achieve the required level of dust suppression. In order to minimise the use of Mine Water for dust suppression, binding agents and low silt sheeting material would be utilised where possible.

3.8.3.4 Seepage of Groundwater

As identified in Section 6.2.4.5, water seeping from the Off Path Storage Facility is expected to form a mound under the Facility. While that groundwater mound is not expected to intersect the natural surface, the Applicant would monitor groundwater levels around the perimeter of the Facility. In the event that groundwater levels approach the natural surface, a line of shallow bores would be installed to pump groundwater to the dredge pond to limit the potential for unplanned seepage of groundwater.

3.8.3.5 Surface Water Licencing

Surface water licencing requirements are discussed in Section 6.7.4.1. In summary, all collected surface runoff would be harvested under the Western Division harvestable rights order area which permits harvesting of 100% of accumulated surface water.

3.8.4 Mine Site Water Balance

Three classes of water are relevant to the water balance as follows.

- Clean/non-saline water

  This class of water includes water that would be sourced from the reverse osmosis plants, but also opportunistically from surface water storages within the Mine Site following rainfall events. Clean/non-saline water would primarily be used for the washing of heavy mineral concentrate, potable water and ablutions within the Mine Site. Water from surface water storages, or if that source is not available, water from reverse osmosis plants, may also be used for applying with polymer-based dust suppressants and on unvegetated soil stockpiles and areas undergoing rehabilitation.

- Groundwater

  This class of water would be sourced from the proposed production bores that would be screened in the Upper Aquifer and would contain elevated salt concentrations. During construction and Year 1 mining operations when the bores would be used to manage water levels within the starter pond, groundwater would be pumped at a rate of up to 2,877ML/y. This would be reduced to approximately 832ML/y from Year 2 onwards. GEO-ENG (2023) identifies that a significant proportion of this water would be returned to the dredge pond.

- Mine water

  This class of water would be used for mining-related purposes, primarily for fluidizing the extracted interburden and ore and within the proposed Wet Concentration Plant. Mine water would be deposited with the interburden and reject material, either within either the Off Path Storage Facility or completed sections of the dredge pond. With the exception of water lost to evaporation, this water would be returned to the dredge pond.

Table 3.8.3 and **Figure 3.8.2** presents a typical annual water balance for the Project during and following Year 2. It is noted that no allowance has been made for harvesting of surface water resulting from rainfall events. Should surface water accumulate within bunded areas upstream of the disturbance area, it may be pumped for use in mining-related purposes. Any water that is pumped would be taken under the Section 53 (harvestable rights provisions) of the *Water Management Act 2000* and would be exempt from water licensing requirements or water use approval.

In summary, the water balance indicates that adequate water is available for operational requirements for all stages of the Project, pending receipt of adequate allocation for extraction of groundwater from the Upper Aquifer.

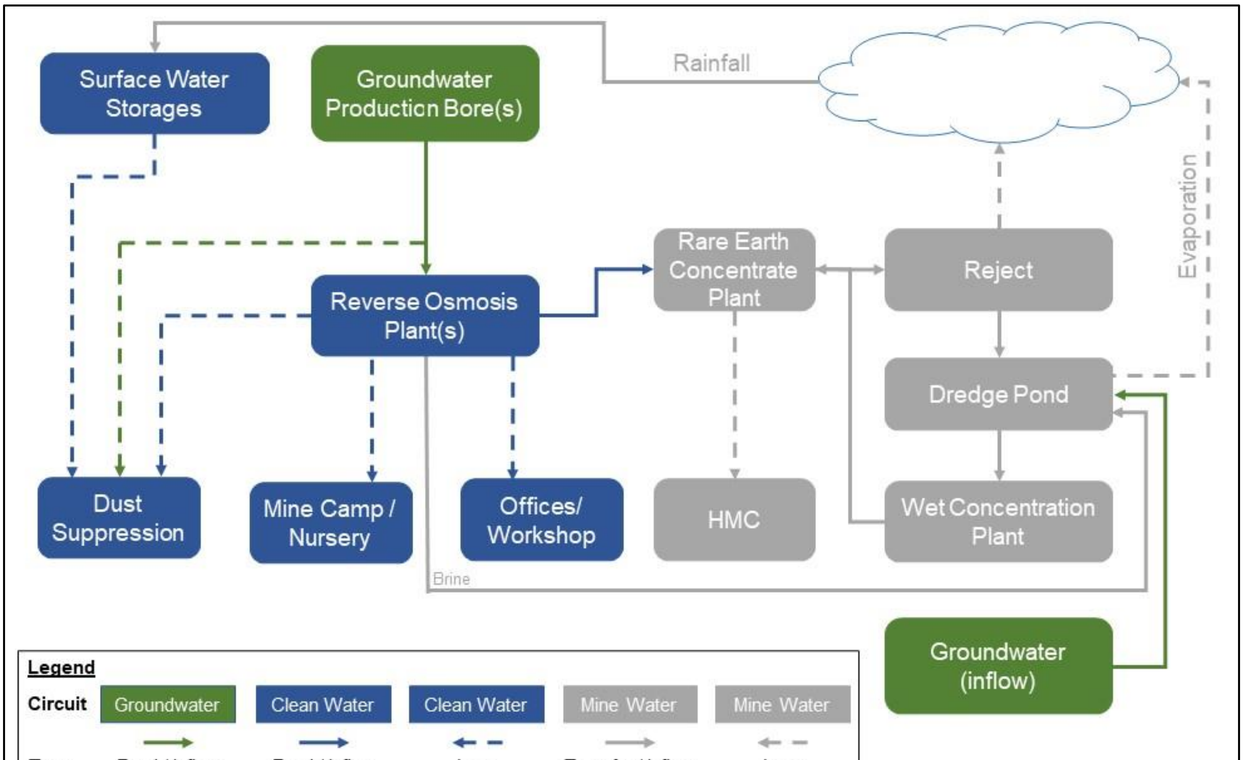


Figure 3.8.2
SCHEMATIC WATER BALANCE

Table 3.8.3
Indicative Annual Water Balance

Page 1 of 2

Component	Inflow (ML/year)[1]	Internal Transfer (ML/year)[2] In	Internal Transfer (ML/year)[2] Out	Outflow (ML/year)[2]
Groundwater Circuit				
Production Bores	832			
Clean Water Circuit Feed			727	
Mine Water Circuit Feed			105	
Clean Water Circuit				
Groundwater Circuit Feed		727		
Dredge Pond Return			429	
Mine Camp and Nursery				35
HMC Plant			105	
Offices/Workshop				44
Dust Suppression				114

Table 3.8.3 (Cont'd)
Indicative Annual Water Balance

Page 2 of 2

Component	Inflow (ML/year)[1]	Internal Transfer (ML/year)[2]		Outflow (ML/year)[2]
		In	Out	
Mine Water Circuit				
Groundwater Feed		105		
Clean Water Circuit Feed		105		
Wet Concentrator Feed		534		
Concentrate Moisture to Stockpile				48
Dredge Pond Return			696	
Dredge Pond				
Wet Concentrator Return			534	
Clean Water Circuit Return		429		
Mine Water Circuit Return		696		
Groundwater Inflow (nett)	62			
Evaporation				653
Total	**894**	**2597**	**2597**	**894**

Note 1: Source – GEO-ENG (2024)
Note 2: Source – RZ Resources Limited

3.8.5 Rail Facility Water Management

The Rail Facility would be managed by a third party, however, the Applicant would ensure that the following general surface water management principles are applied.

- Surface water from undisturbed sections of the Rail Facility would be diverted around existing areas of disturbance.
- Surface water from hardstand and other disturbed sections of the Rail Facility would be captured within sediment basins designed and operated in accordance with *Managing Urban Storm Water* (Landcom, 2004).
- Any chemicals or hydrocarbons to be stored within the Rail Facility would be stored within bunded storage areas or in self-bunded tanks.

3.9 Non-production Waste Management

3.9.1 Introduction

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

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

3.9.2 General Solid Waste and Recyclables

General solid waste and associated recyclables such as paper, cardboard, plastics and metal would be generated within the mine camp, offices and administration areas, workshops and elsewhere.

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

3.9.3 Maintenance Waste

Routine maintenance of mobile mining and earthmoving equipment would be undertaken within the on-site workshop or, for larger and less mobile plant, in the field.

Scrap steel and other maintenance waste would be stored in the vicinity of the workshop area and would be collected and transferred from site for recycling, as required.

Waste oil would be stored in a covered and bunded storage area in the vicinity of the workshop from where it would be collected and removed by an appropriately licensed waste recycler or recycled onsite where possible. An oil and water separation facility would be installed, with the separated hydrocarbons treated as waste oil and the treated water used for mining-related purposes.

3.9.4 Wastewater

Wastewater would be generated primarily within the Office and Administration Area and Mine Camp, with additional ablution facilities located within the Workshop and Stores Area. This water would be treated using suitably sized wastewater treatment plants installed in compliance with Wentworth Shire Council's requirements. The plants would be serviced and maintained by a suitably licenced and experienced contractor and any solid waste to be removed from site would be managed accordingly. Treated wastewater would be used to irrigate land in the immediate vicinity of the plant. Ablution facilities not serviced by the wastewater treatment plants, including the Rail Facility, would be serviced by pump out or chemical toilet facilities.

Brine from the reverse osmosis plants would initially be transferred to purpose-built storage ponds and then to the dredge pond as described in Section 3.3.3.1.

3.10 Hours of Operation and Life of the Project

3.10.1 Hours of Operation

Table 3.10.1 presents the proposed hours of operation.

Table 3.10.1
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation
Land preparation	7 days per week	Daylight hours
Construction operations		
• Road construction within Broken Hill LGA	7 days per week[1]	7:00am to 10:00pm[1]
• All other construction	7 days per week	24 hours per day
Mining operations	7 days per week	24 hours per day
Processing operations	7 days per week	24 hours per day
Transportation operations		
• Mine Product transportation within Broken Hill LGA	7 days per week	7:00am to 10:00pm
• All other transportation	7 days per week	24 hours per day
Maintenance operations	7 days per week	24 hours per day
Rehabilitation operations	7 days per week	Daylight hours
Note 1: Or as instructed by the relevant road authority		
Source: RZ Resources Pty Limited		

3.10.2 Life of the Project

The Applicant anticipates that after an initial construction phase of approximately 2 years, mining operations would require approximately 17 years to complete. Construction operations would be ongoing during the initial year of mining operations.

Progressive rehabilitation would be undertaken throughout the life of the Project. However, following completion of mining operations, a period of rehabilitation would be required, including shaping and rehabilitation of the final disturbance areas. Final rehabilitation operations are expected to take approximately 7 years due to the time needed to establish vegetation on the final landform and monitor it for a sufficient period to determine that the rehabilitation completion criteria have been or will be achieved.

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

3.11 Employment, Economic Contribution and Capital Investment Value

3.11.1 Employment

The following presents the anticipated direct full-time equivalent employment during construction, operation and decommissioning of the Project.

- Construction...approximately 480 positions
- Operations...approximately 240 positions
- Rehabilitation..approximately 40 positions

All on-site positions would be drive-in/drive-out, typically on 7 days on/7 days off roster, with busses provided from Wentworth and Mildura. Individual workers, particularly those located in Broken Hill or elsewhere, may elect to drive to and from the Mine Site using private vehicles, however, the Applicant would actively discourage the use of private vehicles and would implement a fatigue management system for those driving themselves to limit the potential for fatigue-related motor vehicle accidents on the way to or from the Mine Site. It is intended to have the majority of employees, meet at Wentworth and then be bused to site.

The *Economic Impact Assessment* (Synergies, 2024), presented as **Appendix 15**, determined that "a moderate proportion" assumed to be 50% of workers may need to be employed from outside Wentworth LGA, with the remaining 50% employed from within the LGA. The population of each of these Wentworth and Mildura Regional LGAs at the 2021 Census was 7,453 and 56,972 people respectively. In addition, the Applicant notes that the Snapper and Ginkgo Mineral Sands Mine will be coming to the end of their approved lives in 2026 and 2025 respectively, with workers from those operations likely to have skills that would be highly transferable to the Project. As a result, the Applicant is confident that the required employees can be sourced primarily from existing residential population within the Wentworth LGA or immediately surrounding LGAs, with the remainder to be sourced from elsewhere in NSW and Australia.

3.11.2 Economic Contribution

An *Economic Impact Assessment* has been prepared by Synergies (2024) and is presented as **Appendix 15**. That assessment is also summarised in Section 6.15. In brief, the Project is expected to generate the following economic benefits.

- A positive net present value of $1,052 million over the life of the Project
- A net benefit to NSW of $481 million, with an associated net cost for road maintenance and greenhouse gas emissions of $149 million.

Finally, **Table 3.11.1** presents the economic impacts associated with the Project on the NSW and Wentworth economies.

Table 3.11.1
Economic Impacts

Metric	Unit	Construction Phase Benefits (3 years)	Operational Phase Benefits (17 years)	Total Benefits (20 years)
NSW Economic Impacts				
Total output	$million	$1,860	$12,160	$14,020
Gross State Product	$million	$718	$4,600	$5,318
Labour income	$million	$351	$1,700	$2,051
Employment supported	FTEs (peak year)	1,465	1,133	
Wentworth LGA Economic Impact				
Total output	$million	$1,280	$10,690	$11,970
Gross Regional Product	$million	$339	$1,560	$1,899
Labour income	$million	$308	$848	$1,156
Employment supported	FTEs (peak year)	754	580	

Note 1: Includes up-front capital expenditure and sustaining capital expenditure to be incurred throughout the operational period of the project

Source: Synergies (2024)

3.11.3 Capital Investment Value

The Altus Group prepared a Quantity Surveyor's Report on the Capital Investment Value for the Project in accordance with the *Planning Circular No. PS 21-020 - Calculation of capital investment value* dated 2 December 2021. It is noted that as the Project had been submitted on the NSW Planning Portal prior to 4 March 2024, that the subsequent *Planning Circular PS 24-002 – Changes to how development costs are calculated for planning purposes* dated 27 February 2024 does not apply.

The report was prepared and reviewed by registered Quantity Surveyors who are members of the Australian Institute of Quantity Surveyors.

Table 3.11.2 presents an overview of the results of that assessment. In summary, Altus Group anticipates that the Capital Investment Value would be approximately $639 million.

Table 3.11.2
Summary Capital Investment Value Estimate

Item	Value (A$ million)
Construction and Equipment	
1. Site Preparation Works	$1,270,403
2. New Construction Works -Mine Site Infrastructure	$74,045,552
3. Mining And Dredging	$110,732,597
4. Processing	$286,000,000
5. New Construction Works -Off Site Infrastructure	$18,554,132
6. Rehabilitation Works	$1,645,500
7. Owner's Plant and Equipment	$5,108,250
Total Construction and Equipment Cost	*$497,356,434*
Licensing and Fees	
8. Authority Fees	$5,561,000
9. Consultants Fees	$24,000,000
On-Going Costs	
10. On-going Costs	$5,460,000
Estimated Capital Investment Value (excl. Contingencies and GST)	*$532,377,434*
11. Contingencies (20%)	$106,475,500
Estimated Capital Investment Value (excl. GST)	**$638,852,934**
Source: Altus Group	

3.12 Mine Closure and Rehabilitation Strategy

3.12.1 Introduction

Rehabilitation of all areas disturbed by mining-related activities would be an integral part of the Project.

As the Rail Facility would continue to be used for transfer of materials between the road and rail network following the completion of the Project, rehabilitation of that component of the Project Site has not been considered further. Similarly, the upgraded public road network would continue to be managed by the relevant road authority following completion of the Project. As a result, no removal or rehabilitation of the upgraded road network is proposed. As a result, this subsection focuses on rehabilitation of the Mine Site only.

Given the nature of the mining operations, emphasis would be placed upon progressively rehabilitating and backfilling the dredge pond and creating final landforms using reject material and overburden. Similarly, the Off Path Storage Facility and Water Storage Dam would not be required once in-pit placement of reject material commences. As a result, rehabilitation of those areas would also be undertaken early in the life of the Project. By contrast, other sections of the Mine Site, including the Infrastructure Area, Site Access Road and internal roads would not be available for rehabilitation until completion of mining operations.

Rehabilitation activities within the Mine Site would be planned and undertaken in accordance with a *Rehabilitation Management Plan* to be prepared following receipt 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 address in detail all rehabilitation-related requirements nominated in the development consent.

The proposed mine closure and 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, 2016a).
- *Towards Closure – Mine Rehabilitation in the Australian Minerals Industry* (MCA, 2015).
- *Strategic Framework for Mine Closure* (ANZMEC, 2000).

In addition, reference has been made to the following journal articles related to rehabilitation of mineral sand mines in south-eastern Australia.

- *Spinifex–mallee revegetation: implications for restoration after mineral-sands mining in the Murray–Darling Basin* published in *the Australian Journal of Botany* (Sluiter *et al*,2016).
- *Leading practice waste dump rehabilitation at the Ginkgo mineral sands mine* published in *Mine Closure 2012* (Squires *et al*, 2012).

Finally, the proposed mine closure and rehabilitation strategy has drawn upon the expertise of the following individual subject matter experts.

- Mr Paul Smith of RZ Resources Limited. Mr Smith has almost 30 years' experience managing mineral sand mining operations in Queensland, NSW and Western Australia, including the successful rehabilitation of the Bayside, Gordon, Yarraman and Enterprise Mineral Sand Mine sites on North Stradbroke Island. Mr Smith received the inaugural Queensland Premier's Award for Sustainability for excellence in rehabilitation in 2008. Mr Smith has also undertaken rehabilitation programs in Bauxite and Silica sands mines across Queensland.
- Mr Tim Zwierson and Ms Alice Quarmby of Swainsona Environmental Services (SES), a company that specialises in bulk seed collection and large-scale revegetation projects throughout South Australia, New South Wales and Victoria. Mr Zwierson has 20 years' experience with rehabilitation across NSW, South Australia, Victoria, and Western Australia. Mr Zwierson was previously responsible for rehabilitation at the nearby Snapper and Ginkgo Mineral Sands Mine and was instrumental in refining the rehabilitation process at that site. Ms Quarmby has over 20 years' experience with rehabilitation across NSW, South Australia, Northern Territory, and Western Australia. Swainsona Environmental Services prepared the document *Copi Mineral Sands Mine Rehabilitation Plan Technical Supplement* presented as **Appendix 4** and referred to hereafter as SES (2022).

This subsection draws extensively on SES (2022) presented in **Appendix 4**. Readers seeking additional detail in relation to the proposed mine closure and rehabilitation strategy are referred to that document.

3.12.2 Final Landform, Land Use and Rehabilitation Domains

3.12.2.1 Final Landform

Figure 3.12.1 presents the proposed final landform at the end of the life of the Project. The key features of the final landform would be as follows.

- The Infrastructure Area would have all plant and infrastructure not required for the final land use removed and the original surface topography re-established.
- The Extraction Area would be backfilled with the pre-mining landforms largely reestablished, with the exception of the following (**Figure 3.12.1**).
  - Sections of the completed Extraction Area would be higher than pre-mining landforms to accommodate for the fact that the extracted material will "swell" and occupy a larger volume than the *in-situ* material, as well as scheduling of overburden and interburden extraction. The built-up sections of the final landform would incorporate the following design criteria.
    - Maximum slope..up to 6° or 1:10 (V:H)
    - Upper surfaces..internally draining

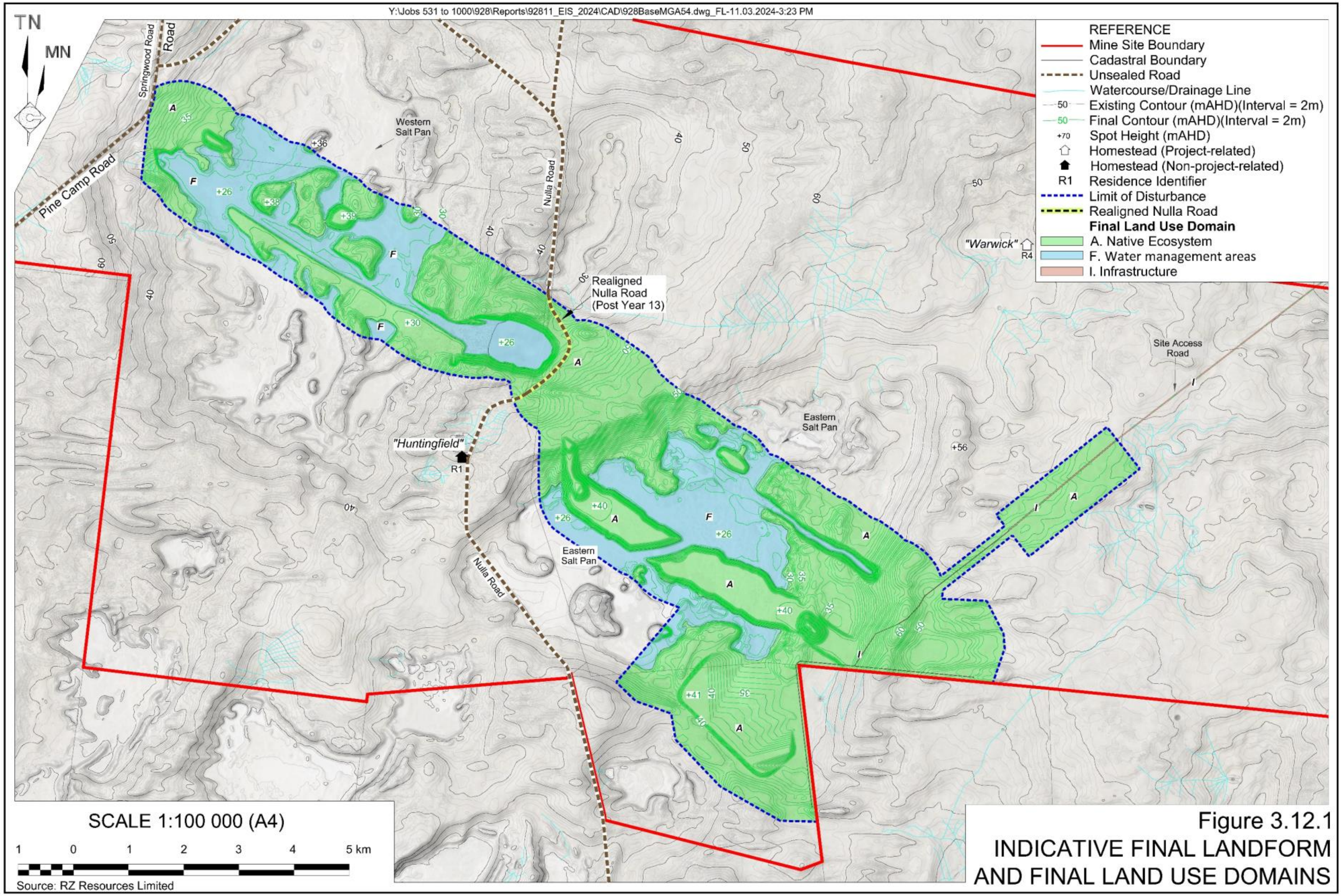


Figure 3.12.1
INDICATIVE FINAL LANDFORM AND FINAL LAND USE DOMAINS

- The final dredge pond would be backfilled using stockpiled material to a suitable height above the natural groundwater table to limit any on-going evaporative water take from the aquifer.
- The Off Path Storage Facility would be capped with clay-rich overburden and revegetated with a free draining, gently northeast sloping upper surface.
- The Water Storage Dam would be reshaped and the original surface topography re-established.
- All other disturbed areas would have the original surface topography re-established.
- The Site Access Road and other internal roads required for the final land use would be retained, with the width of those roads reduced to that required for the proposed final land use.
- A reinstated and realigned Nulla Road suitable for post-mining use by surrounding residents and management by Wentworth Shire Council.

The Applicant contends that the final landform would be geotechnically stable because all slopes would be 6° or 1:10 (V:H) or less, consistent with slopes adopted for surrounding mining operations where those slopes have proven to be stable.

3.12.2.2 Final Land Use

The Applicant assessed potential final land use options for the Mine Site, including the following.

- Agriculture – the Mine Site is currently used for low intensity grazing, including for sheep and goats (including harvesting of feral goats). Consideration was given to re-establishing such a land use on the final landform. However, this option was rejected for the following reasons.
  - Respread soil would lack the naturally occurring cryptograms or fungal crust that assists to stabilise fragile soils in naturally occurring landscapes within the Mine Site. While the soil would be protected with grazing excluded until naturally occurring cryptograms can be re-established, hard-hooved animals such as sheep and goats would limit the success of re-establishment of that process, resulting in turn in increased susceptibility of the soils to erosion by wind and water and reduced rehabilitation success.
  - Agricultural operations within and surrounding the Mine Site typically generate a limited economic return and, indeed, a greater economic benefit may be obtained through non-agricultural land uses, including nature conservation.

As a result, an agricultural final land use is not proposed.

- Nature conservation – The Mine Site is dominated by a range of native vegetation communities that have been degraded as a result of grazing by non-native and over abundant native fauna and other land management practices (see Section 6.3). A final land use of nature conservation has the greatest potential to result in a final landform that is stable and non-polluting. Potential also exists for the final landform to be suitable for generation of biodiversity offset and carbon credits post-mining.

As a result, a final land use of nature conservation is proposed for the majority of the Mine Site.

- Infrastructure or industrial use – The Mine Site at the end of the life of the Project, would include a range of infrastructure items such as the proposed 66kV transmission line, roads, the Mine Camp and other buildings, the solar farm (if constructed) and power distribution infrastructure. There is potential for this infrastructure to have a post-mining economic use. Such a use would require further development consent. As the viability of this option cannot be assessed at this time, this final land use option is not proposed.

3.12.2.3 Rehabilitation Domains

Figure 3.12.1 also presents indicative rehabilitation domains for the final landform prepared generally in accordance with the document *Form and Way - Rehabilitation Management Plan for Large Mines*. These domains would include the following.

- Domain A – Native Ecosystem Areas

  This domain would include the majority of the disturbed sections of the Mine Site and would comprise areas of native vegetation suitable for nature conservation.

- Domain F – Water Management Area

  This domain would include areas of lower topography associated with existing salt pans. Typically, vegetation does not grow in the salt pans, with the surface protected by a salt-rich crust. These areas would be subjected to occasional inundation as a result of surface water flows or rising groundwater.

- Domain I – Infrastructure Area

  Comprising those items of infrastructure that would remain following mine closure for a lawful final land use. In the absence of further approvals, this would indicatively include the Site Assess Road and Nulla Road only, with some sheds or other buildings provided that a clear purpose ancillary to Nature Conservation can be demonstrated.

3.12.3 Rehabilitation Risk Assessment

A rehabilitation risk assessment was conducted internally by the Applicant, utilising the above subject matter experts, as well as a formal review by senior management. Key risks identified were as follows.

- Extremely poor soils. SSM (2024) note that the soils within the Mine Site are typically sandy, with poor structure, low fertility and are prone to wind erosion unless protected by vegetation and/or cryptogram crusts. Indeed, one soil association, the Eastern Lake Floor Soil Association is toxic to plant life.
- Substantial moisture deficit. Average annual rainfall within the Mine Site is 235mm per year, with a mean annual pan evaporation of 2,073mm per year.

- Saline soils and groundwater. Groundwater in the vicinity of the Mine Site is extremely saline and, in places is very close to the surface. As a result, soils in areas of lower elevation tend to be more saline than soils in more elevated areas. As a result, the saline nature of soils and groundwater pose a substantial risk to rehabilitation.
- Grazing by non-native or over abundant native fauna. Feral goats in particular occur in abundant numbers within and surrounding the Mine Site. Uncontrolled grazing poses a substantial risk to rehabilitation.
- Mining operations during Years 2 to 4 would primarily be undertaken with the Eastern Salt Pan. SSM (2024) determined that soils within the Eastern Salt Pan are toxic to plant life and recommended that those soils not be stripped. The final landform within the Year 2 to 4 Extraction Area would comprise an elevated landform, requiring spreading of soil that may not be available until Year 5 when mining would progress to the west of the Eastern Salt Pan. As a result, the timing of soil stripping and rehabilitation operations poses a substantial risk to rehabilitation.

3.12.4 Rehabilitation Objectives and Completion Criteria

The Applicant recognises that progressive rehabilitation of the areas disturbed throughout the life of the Project is an integral component of the Project. Progressive rehabilitation is recognised as being consistent with best practice mine rehabilitation and maximises the chances of rehabilitation success.

In the short term, the Applicant's rehabilitation objectives would be as follows.

- Progressively backfill, compact and shape sections of the dredge pond as soon as practicable.
- Directly place stripped soil on the shaped final landform where practicable.
- Stabilise the shaped landform and establish vegetation to minimise the potential for wind or water erosion.
- Continually review and update rehabilitation practices based on site specific knowledge, experience at other sites, specialist research and monitoring.

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

- The rehabilitated landform is safe, stable and non-polluting.
- All infrastructure and services not suitable for a lawful final land use to be removed.
- Infrastructure to be retained limited to that required for a lawful final land use.
- The reinstated Nulla Road complies with the requirements of Wentworth Shire Council.

- All roads and hardstand areas to be retained for a lawful final land use reduced in width to that suitable for final land use.
- Testing confirms no residual soil contamination associated with hydrocarbons or other materials.
- The elevated shaped landform conforms to the approved design and;
  - has flat areas that are internally draining, with a design that would result in surface water ponding on and infiltrating the surface;
  - has slopes of less than 6º or 1:10 (V:H);
  - is not subject to continued settling;
  - is suitable to support the nominated final land use and vegetation community(ies); and
  - is contoured to design, deep ripped and soil spread in accordance with the approved design.
- The final void conforms to the approved design and;
  - has internal slopes of less than 6º or 1:10 (V:H);
  - in not subject to slumping or outward expansion, including towards or into the Nulla Road road reserve
- Rehabilitated surface within the Native Ecosystem domain is seeded and stabilised (if soil conditions require).
- Rehabilitated surface within the Water Management Area is stabilised to establish a salt-rich crust to protect the surface.
- Vegetation within the Native Ecosystem domain contains a diversity of species and is comparable to that of the local remnant vegetation.
- Land capability and productivity similar to existing land capability

3.12.5 Rehabilitation Implementation

Progressive rehabilitation of an active mine such as the proposed Copi Mineral Sands Project requires a methodical, stepwise process to be followed to ensure the Project meets the objectives and criteria for each of the domains described above. Each of these phases would build on experience gained at other similar mining operations (as detailed in **Appendix 4**) and during rehabilitation trials and early-stage rehabilitation undertaken within the Mine Site.

Rehabilitation phases are best grouped into stages that align operationally with clear definable activities on site. Staging rehabilitation operationally allows for:

- clear internal goal setting for operations personnel;
- a set point for accurate cost assessment of the process; and
- the setting of measurable targets that align internally and externally for reporting purposes.

Considering the staged approach and building on the local area experiences outlined in Squires *et al* (2012) and Sluiter *et al* (2016), the Applicant has developed a preliminary schedule for progressive final rehabilitation of the Extraction Area, namely shaping of the final landform, spreading of growth medium and revegetation (**Figure 3.12.2**). The rehabilitation schedule has been developed in consideration of the annual soil stripping (see Section 6.4.5) and material movement schedules (see Section 3.4.5.2). In particular, the availability of soil during Years 2 to 4 of the Project would be limited because mining operations would be undertaken in the Eastern Salt Pan. SSM (2024) has determined that soils of the Eastern Salt Pan are toxic to plant life and should not be used for rehabilitation where a vegetated outcome is required. As a result, sections of the Extraction Area that would be mined in Years 2 to 4 would be temporarily stabilised using suitable polymer-based products or similar to prevent wind erosion. These areas would then be progressively shaped during Years 5 to 11 when additional soil resources become available.

Further detailed description of the proposed progressive rehabilitation, including staging, will be included in the *Rehabilitation Management Plan* to be prepared for the Project.

The proposed rehabilitation phases, and the activities associated with each, include the following. It is noted that as rehabilitation would be undertaken progressively, these rehabilitation phases would not be undertaken sequentially in all areas. Rather, rehabilitation of individual areas would be undertaken indicatively as shown in **Figure 3.12.2**. As a result, Phase 1 – Decommissioning of the Infrastructure Area would be undertaken many years after Phase 5 – Ecosystem and Land Use Sustainability has been achieved in the Year 1 mining area.

Phase 1 – Decommissioning

- Remove all infrastructure and mining equipment not required for the approved final land use, including:
  - mobile plant, floating infrastructure and vehicles;
  - roads and hardstand areas, with the exception of those required for the final land use;
  - structures and buildings;
  - pipework and associated pumps and infrastructure; and
  - electrical transmission equipment, including the 66kV transmission line.
- Decommission any dewatering infrastructure not required for post-mining monitoring operations, cut all collars off below surface and bury.
- Test for and remove or treat any contaminated material. In particular, test for and remove salt-contaminated material and place into the final void.

Phase 2 – Landform Establishment

- Progressively place reject and interburden in pit using reject stackers as described in Section 3.5.2.4.
- Progressively use overburden to cover the placed reject material and interburden and construct the approved final landform as presented in Section 3.12.2.1 and **Figure 3.12.1**.

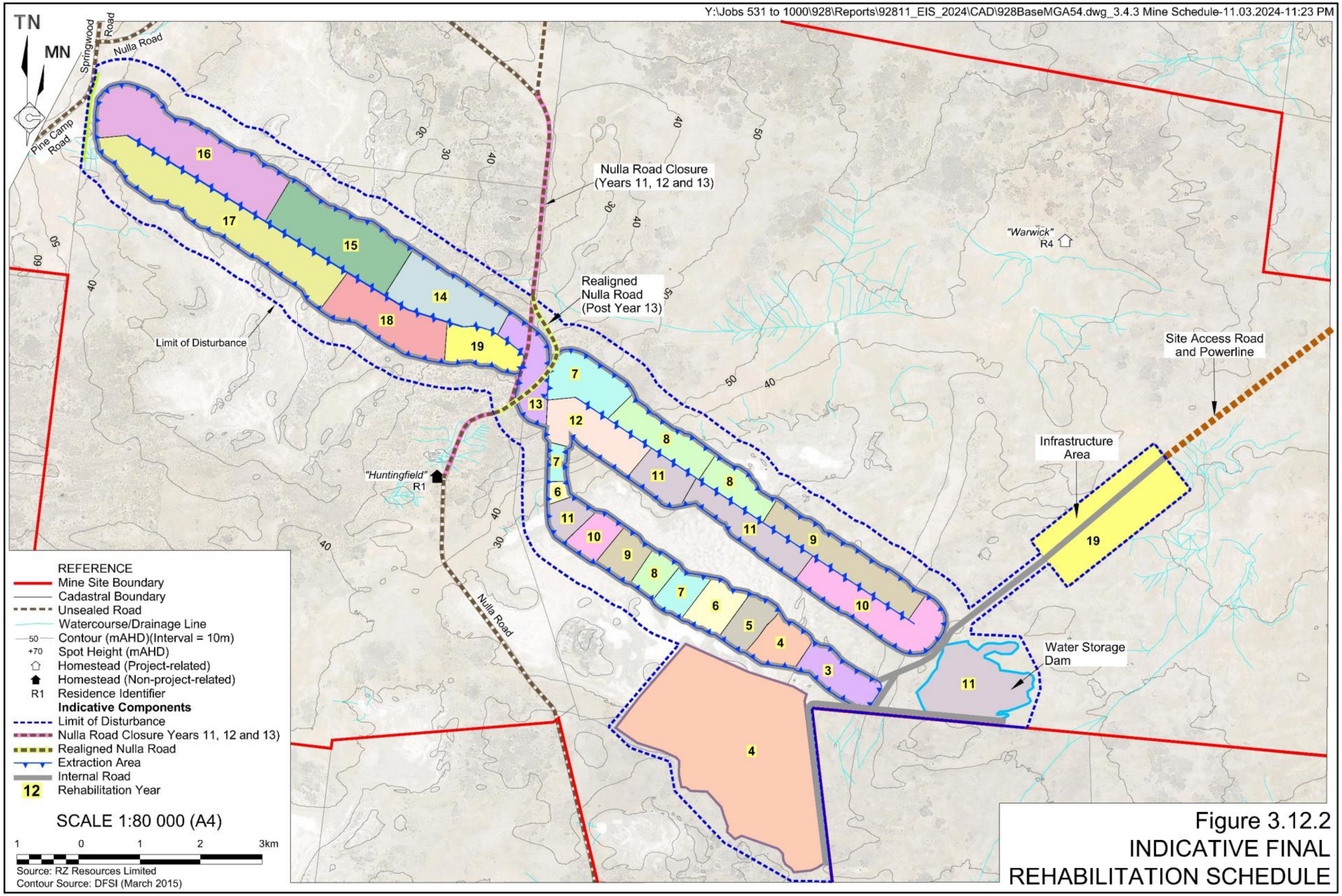


Figure 3.12.2
INDICATIVE FINAL REHABILITATION SCHEDULE

- Install surface water controls including:
  - establishing containment and infiltration cells or "paddies" as per *Squires et al* (2012)) which would be internally draining to prevent run off accumulation; and
  - shaping sloped area to direct run off to containment and infiltration cells rather than downslope.

Phase 3 – Growth Medium Development

- Place soils generally in accordance with the procedures described in Section 6.4.5.2.
- Test soils prior to placement and apply suitable ameliorants in accordance with the recommendations of a suitably experienced soil expert.
- Place subsoil and then topsoil on the final landform to the depths identified by SSM (2024), namely a minimum of 20cm of subsoil and 20cm of topsoil.
- Ensure that growth medium is handled when conditions are favourable for both soil stripping and spreading. Preference is to relocate soils when the material is moist to just moist and not excessively dry or wet as this would preserve soil structure. Soil movements may be campaigned to take advantage of favourable seasons and weather conditions.
- Install sediment and erosion control as required to prevent erosion of the final landform, including by wind, prior to establishment of vegetation cover, noting that the final landform would be constructed to limit surface water runoff and encourage infiltration.

Phase 4 – Ecosystem and Land Use Establishment

- Revegetate the final landform using direct seeding or sowing of tube stock sourced from seed collected within or surrounding the Mine Site. The species to be used during rehabilitation would be consistent with the vegetation communities adjacent to the areas under rehabilitation.
- Undertake revegetation using the following procedure (see **Appendix 4** for more information).
  - Scarify the soil surface using a short tined scarifier.
  - Use a drum or air seeder to spread locally collected seed of the target species.
  - Where appropriate roll the scarified and seeded soil surface using a textured roller (otherwise known as a padfoot imprinter) to press the seed into the soil surface and create internally ponded microtopography for water collection and wind protection.
  - Where required spray (in sandy soils or poor seasonal conditions) the imprinted surface with a stabiliser to prevent soil loss through wind or water erosion and encourage water infiltration.

- Fence the revegetated area with a fence suitable of excluding goats and other undesirable fauna and maintain the fence until the vegetation has become sufficiently established to withstand grazing pressure.

Phase 5 – Ecosystem and Land Use Sustainability

- Monitor the rehabilitated landform to determine initial germination success and success of other measures, including soil ameliorants, erosion controls, weed and grazing management.
- Undertake weed and pest management as required, including removing any watering points for feral pest species and harvesting or culling as required.
- Ensure the area is well fenced to exclude grazing by feral pests, particularly goats.
- Undertake remediation as required, including:
  - reseeding, including with alternate species or using alternate methods, if required;
  - using additional or alternative ameliorants;
  - undertaking weed and grazing control; and
  - implement repairs to erosion controls.

Phase 6 –Relinquishment

The Applicant anticipates that applications for further development consent for potential future mining areas will be submitted during the life of the Project. As a result, the Applicant does not anticipate relinquishing Project-related Mining Leases at the end of the life of the Project. Notwithstanding this, the Applicant would implement the following throughout the life of the Project to ensure that rehabilitated lands are suitable for relinquishment and return of security as soon as practicable after they are no longer required for mining purposes.

- Undertake continued monitoring to track progress towards the relinquishment criteria identified in the *Rehabilitation Management Plan*, including monitoring of:
  - erosion of rehabilitated lands; and
  - the success (or otherwise) of the vegetation communities established on the final landform, including measuring of key metrics against selected analogue sites.
- Undertake remediation, as required, to ensure continued tracking towards the relinquishment criteria identified in the Rehabilitation Management Plan.
- Annual reporting on the status of rehabilitation within the Mine Site, including, where appropriate, progress towards the identified relinquishment criteria.

3.12.6 Rehabilitation Monitoring and Quality Assurance

The Applicant would develop a rehabilitation monitoring program as part of the *Rehabilitation Management Plan* to measure the success of progressive and final rehabilitation against the identified rehabilitation criteria. That program would include:

- monitoring of final landform construction, growth medium placement and ecosystem establishment to ensure compliance with design and rehabilitation criteria; and
- establishment of analogue and rehabilitation monitoring sites to record progress of rehabilitated lands towards identified rehabilitation criteria and triggers for remedial action if required.

The results of the proposed monitoring program would be reported in the *Annual Review* required for the Project, including an analysis of the success or otherwise of the rehabilitation undertaken and remedial action completed or required.

In the event that remedial action is required, it would be completed within the following reporting period and the subsequent Annual Report would describe the success or otherwise of the remedial action and provide recommendations for future rehabilitation operations.

3.12.7 Rehabilitation Research and Trials

The Applicant would establish rehabilitation trials within the initial areas to be rehabilitated, building on work already completed for the Applicant's exploration program within the Mine Site. The aims of the rehabilitation trials would be as follows.

- Confirm the preferred rehabilitation methodologies and that the selected rehabilitation practices are suitable.
- Update the seed bank and seed collection methodologies already in use for the exploration rehabilitation and scale these up to suit the Project.
- Demonstrate continuous improvement in the rehabilitation procedures throughout the life of the Project.
- Adapt to any unforeseen challenges identified from the monitoring results.

The Applicant has been conducting drilling activities across the Project area for a number of years and the rehabilitation program for drill holes has been constantly revised and modified as the results for rehabilitated drill pads is reviewed.

The exploration rehabilitation program has been audited and inspected by both the Resources Regulator and third parties and has been constantly updated and improved.

The *Rehabilitation Management Plan* would provide a detailed description of the proposed rehabilitation trials. However, in summary, the trials would be designed to determine and/or confirm the following.

- Preferred final landform, including confirmation that the proposed final slopes of 1:10 (V:H) is the most appropriate slope.

- Preferred surface stabiliser selection, ensuring the best fit for site conditions.
- Preferred soil management measures, including soil thickness, amelioration measures and soil spreading and stabilisation methodologies.
- Preferred species mix(es), including whether re-establishing the pre-mining vegetation community is the most appropriate approach, or whether alternate species, such as Old Man Salt Bush *(Atriplex nummularia*) (see Squires *et al* (2012)), may be better suited to stabilising the final landform.
- Re-introduction of native pasture to the area and listed grass species such as *A. nullanulla*.
- Whether the land is suitable for an alternative future use to grazing, such as sustainable power generation.

These trials would be used to guide rehabilitation practices on site and give direct feedback to the Applicant to ensure the success of the rehabilitation.

3.12.8 Post-closure Maintenance

Post-closure maintenance is expected to include the following.

- Maintenance of fences and infrastructure to exclude feral pest species, including continued removal of watering points.
- Continued pest and weed management programs.
- Continued monitoring to track progress of sections of the Mine Site towards relinquishment criteria.