Section 2

Description of the Project

PREAMBLE

This section describes the Hera Project and includes:

- *the objectives of the Project;*
- *an overview of the Project and the approvals required;*
- *the infrastructure that would be established for the Project;*
- *the site preparation that would be undertaken;*
- *the proposed mining and processing operations, and the management of waste rock and tailings material;*
- *ancillary activities that would be undertaken;*
- *rehabilitation of areas that would be disturbed by the Project;*
- *the proposed Biodiversity Offset Strategy; and*
- *a description of feasible alternatives considered and rejected during design of the Project.*

This section provides an overall understanding of the nature and extent of the activities proposed, and the manner in which the various activities would be undertaken to enable an assessment of the potential impacts on the surrounding environment. Section 4 identifies a range of further management and mitigation measures that the Proponent would implement to manage particular environmental aspects of the Project.

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2.1 INTRODUCTION

2.1.1 Project Objectives and Outcomes

The Proponent's objectives for the Hera Project are as follows.

- Safely mine the identified reserves.
- Operate the Project in a manner that would minimise surface disturbance and impacts on surrounding residents and the local environment.
- Implement a level of management control and mitigation measures that ensures compliance with appropriate environmental criteria and reasonable community expectations.
- Develop and operate the Project in compliance with all relevant statutory requirements.
- Create a final landform that is suitable for a post-mining land use of agriculture or nature conservation and one that is acceptable to the surrounding community.
- Continue to maintain an open and honest relationship with the surrounding community.
- Establish a facility that can process additional mineral resources that may be identified within or in the vicinity of the Project Site, subject to further development consent or project approval.
- To achieve the above objectives in a cost-effective manner to ensure security of employment of the Proponent's employees and contractors and the continued economic viability of the Proponent.

The expected outcomes of the Project are as follows.

- Development of an operation that will contribute to the local, regional, State and national economies.
- Production of gold/silver doré and base metal (zinc and lead) concentrate to meet local and international demands.
- Rehabilitation of the Project Site to form a low maintenance, geotechnically stable, non-polluting and sustainable final landform that would blend with surrounding landforms and would be suitable for an end land use of agriculture or nature conservation.

2.1.2 Project Overview and Proposed Site Layout

As identified in Section 1.7, a number of components of the Hera Project have been previously approved. These include the following (**Figure 1.4**).

- Construction and use of infrastructure required for an underground mine including a box cut, portal and decline, magazine and ventilation rises.
- Construction and use an integrated ore stockpile area and temporary Waste Rock Emplacement.

- Installation and use of one or more diesel generators within the power station and the associated Fuel Storage and Recycling Area.
- Construction and use of site offices, ablutions facilities, vehicle parking, workshop, laydown area and associated infrastructure.
- Establishment of on-site communications facilities.
- Construction and use of water management structures.
- Construction and use of an access road (referred to in this document as the Light Vehicle Access Road). For the purposes of this application, the Light Vehicle Access Road would be used by light vehicles only.

The Project would include the following activities which would require approval (**Figures 2.1** and **2.2**).

- Road and the associated intersection to allow site access from Burthong Road Extraction of waste rock and ore material, using underground sublevel open-stope mining methods at the maximum rate of material would be approximately 350 000t per year for approximately 5.5 years.
- Construction and use of a Surface Facilities Area that would incorporate a range of approved infrastructure, including expanded site offices for the Proponent and Contractors, ablutions facilities, vehicle parking, power station, fuel storage, refuelling area, workshop and laydown areas.
- Construction and use of a Processing Plant within the Surface Facilities Area comprising crushing and grinding, gravity separation, flotation, leach and gold recovery circuits and ancillary infrastructure to produce approximately 33 000oz of gold, 74 000oz of silver, 10 000t of lead and 10 000t of zinc per year.
- Construction and use of a temporary Waste Rock Emplacement, incorporating an acid rock drainage encapsulation area and an associated Leachate Management Pond.
- Construction and use of a Tailings Storage Facility with the associated Seepage Collection Pond.
- Construction of a Mine Camp and Mine Camp Access Road for mine personnel.
- Construction and use of a surface water harvesting system, including expansion of Pete’s Tank and construction of Back Tank East and associated water reticulation system.
- Construction and use of the Main Site Access by light and heavy vehicles.
- Transportation of concentrate from the Project Site to the Proponent’s customers via public roads surrounding the Project Site.

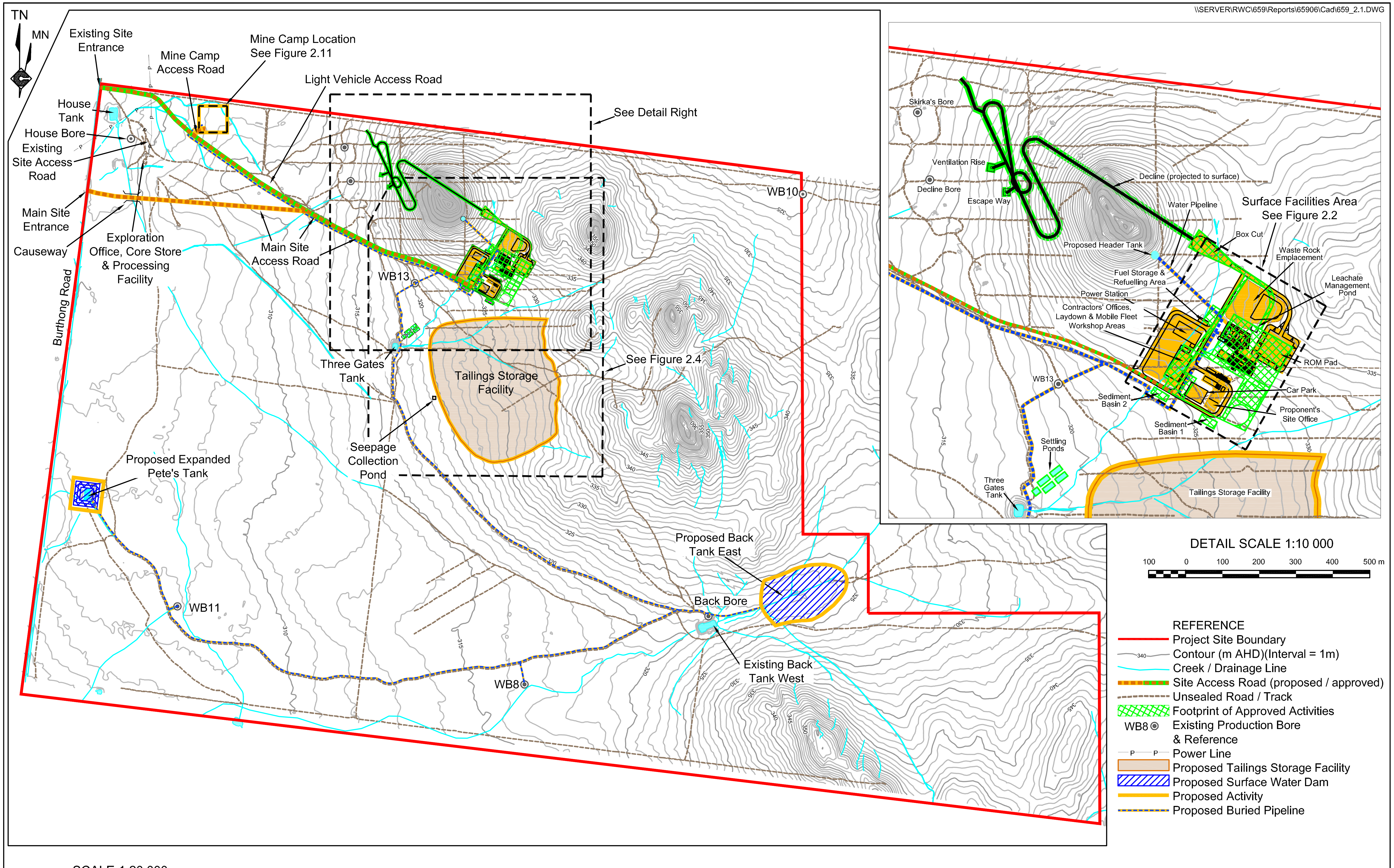

Figure 2.1
PROJECT SITE LAYOUT

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- Construction and use of ancillary infrastructure, including soil stockpiles, core storage yards, internal roads and tracks, and sediment and erosion management structures not already approved.
- Construction and rehabilitation of a final landform that would be geotechnically stable and suitable for an end land use of agriculture or nature conservation.

It is noted that throughout the life of the Project, the Proponent proposes to undertake additional exploration drilling to further define the mineralisation identified to date, and to identify any additional resources, both within and in the vicinity of the Project Site. Extraction of additional mineralisation does not form a part of this application, and would be the subject of a subsequent application.

2.1.3 Approvals Required

The Proponent anticipates that the following approvals will be required for the Hera Project.

- Project Approval – Minister for Planning or their delegate.

  Project approval will be required from the Minister for Planning or their delegate for the Project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), as the total cost of the Project has been estimated to be greater than $30 million.

  The Proponent notes that the existing approved activities described in Section 1.7 were approved under Part 5 of the EP&A Act. The Proponent anticipates that these activities would be incorporated under the project approval, should it be granted.
- Environment Protection Licence –Office of Environment and Heritage.

  An Environment Protection Licence, under Section 48 and Schedule 1(27), 1(29) of the *Protection of the Environment Operations Act 1997*, for underground mining operations, mineral processing operations and use of the Tailings Storage Facility will be required. It is anticipated that the licence will also identify licensed discharge points and discharge conditions.
- Mining Lease – Department of Trade and Investment, Regional Infrastructure and Services – Mineral Resources and Energy.

  The Proponent currently holds EL6162 over the Project Site (see Section 1.6.2). As a result, a mining lease covering the area of proposed mining operations will be required from Mineral Resources and Energy. An application for such a lease has not been submitted as yet.
- Water Licence/Water Access Licences – NSW Office of Water.

  The Proponent currently holds seven licences 85BL243254, 85BL256002, 85BL256001, 85BL256090, 85BL256091, 85BL256092 and 85BL256093 for the extraction of up to 243ML per year from seven locations.
- A Section 138 Permit –Cobar Shire Council.

  A permit or deed under Section 138 of the *Roads Act 1993* would be required for the construction of the intersection of the Main Site Access Road and Burthong Road and an upgrade of the existing site intersection.

- Dam Safety Approval – Dam Safety Committee.

  The Proponent anticipates that the Tailings Storage Facility will be a prescribed dam under Schedule 1 of the *Dam Safety Act 1978*. As a result an approval from the NSW Dams Safety Committee will be required for the design and construction of the Tailings Storage Facility.
- Explosives Storage and Use Licence – WorkCover Authority NSW.

  A licence issued by the WorkCover Authority of NSW for the storage and use of explosives. It is noted that such a licence will be granted only when Mineral Resources and Energy approves a Security Plan for the storage and handling of explosives (including explosive precursors).
- Dangerous Goods Storage and Use Licence – WorkCover Authority NSW

  A licence from WorkCover Authority NSW for storage and use of dangerous goods, namely sodium cyanide.

Following project approval, subsequent approvals in accordance with the *Mining Operations Plan* or *Rehabilitation and Environmental Management Plan* requirements of the *Mining Act 1992* and mining lease conditions, will be necessary.

The Proponent understands that further approval will not be required for the harvesting of surface water within the Project Site as the Proponent would ensure that all surface water harvesting structures are constructed on first or second order ephemeral streams.

2.2 INFRASTRUCTURE ESTABLISHMENT

2.2.1 Introduction

Infrastructure establishment would comprise installation and construction of the following prior to the commencement of mining and processing activities.

- Establishment of the fuel storage, refuelling area, and power station (Section 2.2.2.).
- Construction of the Main Site Access Road and a new intersection with Burthong Road (Section 2.2.3).
- Installation of sediment and erosion control structures (Section 2.2.4) and water harvesting structures (Section 2.2.5).
- Construction of a box cut and portal (Section 2.4.2) and associated decline and underground development (Section 2.4.3).
- Establishment of the Surface Facilities Area comprising:
  - ancillary facilities including Proponent and contractor offices, car park, ablution facilities, crib room, workshop facilities, store, hardstand and laydown area (Section 2.11.2) and services comprising electricity distribution network, communications, potable and operational water (Section 2.11.3);
  - Processing Plant Area (Section 2.5.2); and
  - Run-of-Mine (ROM) pad (Section 2.5.3).
- Establishment of the temporary Waste Rock Emplacement (Section 2.7);

- Construction of the Tailings Storage Facility (Section 2.6);
- Establishment and operation of the Mine Camp (Section 2.10).

2.2.2 Power Station, Fuel Tank and Refuelling Area

Electricity for the Project would be supplied by one or more diesel generators with an approximate capacity of 3.5 MW under a third party electricity agency agreement. The generator(s) would be located within an appropriately bunded area within the Surface Facilities Area (**Figure 2.2**). A separate diesel generator would be required for the Mine Camp as described in Section 2.10.4.1.

One or more bunded fuel tanks with a combined capacity of 200 000L of diesel, would be constructed adjacent to the power station. The fuel tank(s) would be used to provide diesel for both the diesel generators and the mobile fleet. A sealed refuelling area would be located adjacent to the fuel storage area. The majority of mobile equipment would be refuelled within this refuelling area, with less mobile equipment such as bulldozers, drill rigs and underground production equipment refuelled in their work areas using a dedicated service vehicle. The sealing of the refuelling area would mean that the potential for seepage of diesel into soils and shallow subsurface would be limited.

The power station and the refuelling area would be serviced by a suitable oil/water separator to collect stormwater runoff from within the Power Station, Fuel Tank and Refuelling Area to ensure that no potentially-contaminated water is released to natural drainage. The oil/water separator would be serviced on a regular basis by a contractor.

An air compressor would be located in the same area to supply compressed air for the underground operations.

Finally, while a power station, the fuel store and refuelling area have been approved under the Part 5 Approval (see Section 1.7), the capacity of the generators required for mining and processing operations in the current Project would be significantly greater than that required for the construction of an exploration decline. As a result, project approval for this component is sought.

2.2.3 Site Access Roads and Intersection

2.2.3.1 Light Vehicle Access Road and Intersection

The construction of a site access road to ‘The Peak’ property is an approved activity under the Part 5 Approval (see Section 1.7). That road, referred to in this document as the Light Vehicle Access Road, would utilise the Existing Site Entrance and associated intersection, and would be used primarily for light vehicle access to the Project Site and the Mine Camp (see **Figure 2.1**). A sign indicating that the existing site entrance and the Light Vehicle Access Road are only to be used by light vehicles would be erected in the vicinity of the existing intersection on Burthong Road.

The Existing Site Entrance would be upgraded in consultation with Cobar Shire Council to a standard suitable for light vehicle access to the Project Site.

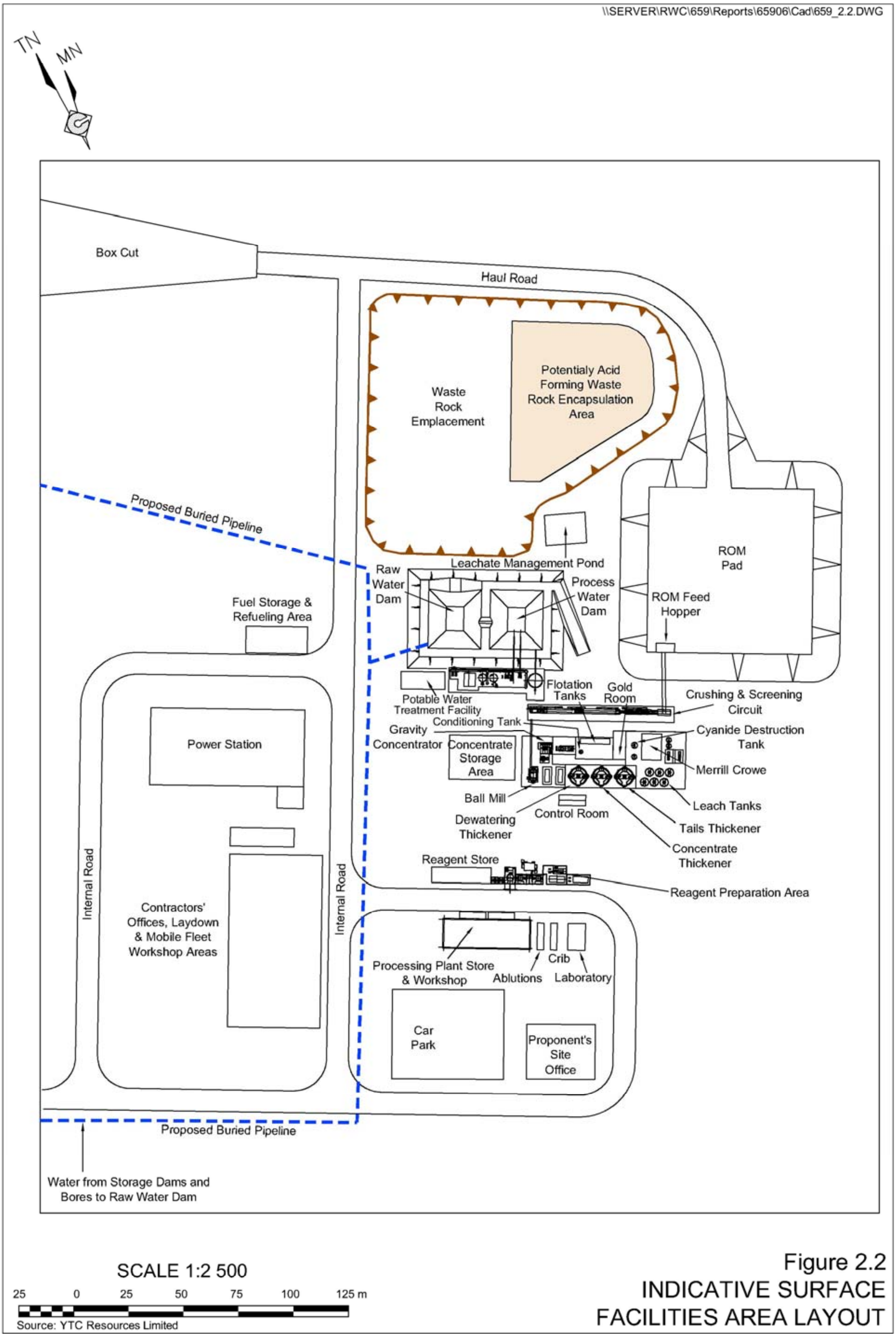

Figure 2.2
INDICATIVE SURFACE FACILITIES AREA LAYOUT

2.2.3.2 Main Site Access Road and Intersection

A second site entrance and access road, namely the Main Site Entrance and Main Site Access Road, would be constructed approximately 500m south of the Existing Site Entrance for use by both light and heavy vehicles.

The Main Site Access Road would consist of a new section of road from the intersection with Burthong Road for a distance of approximately 1 100m. From there, the Main Site Access Road would follow the route of the approved access road, i.e. Light Vehicle Access Road. The initial 100m of the Main Site Access Road, closest to Burthong Road, would be sealed to prevent tracking of mud and other material onto Burthong Road. The remainder would be an unsealed two-lane road suitable for use by light and heavy vehicles and would be sufficiently wide that two loaded semi-trailer trucks could pass safely.

The Main Site Access Road would be designed, constructed and/or maintained in accordance with the following.

- The road surface would be sheeted with suitable materials in order to maintain all weather access.
- A sealed causeway would be constructed where the where the road crosses a watercourse approximately 250m from the Main Site Entrance (see **Figure 2.1** and Section 4.4.4).
- The road would be routinely maintained and watered to suppress the generation of dust, including through the use of biodegradable dust suppressants.
- The road would be constructed to avoid excessive erosion during rain events.

Appropriate roadside drainage would be installed adjacent to all roads in accordance with the requirements of *Managing Urban Stormwater – Volume 2C Unsealed Roads* published by the then Department of Environment and Climate Change in January 2008.

The intersection of the Main Site Access Road and Burthong Road would be constructed to RTA standards, and in accordance with the *Austroads Guide to Road Design* (Austroads), for a Basic Rural intersection incorporating basic right turn (BAR) and left turn (BAL) treatments (**Figure 2.3**). The BAL and BAR treatments for the left and right turning vehicles at the intersection are based on RTA's warrants for Rural Turn Lanes (as defined by Austroads) and the traffic volumes that would use the intersection. The intersection would be able to accommodate articulated vehicles turning left into and right out of the Project Site.

The location of the proposed intersection would provide sight distances that would exceed the minimum safe intersection sight distance (SISD) requirements for the posted speed limit on Burthong Road of 100km/h. Notwithstanding this, the Proponent would undertake regular clearing of vegetation found in the vicinity of the proposed intersection to ensure that the SISD is maintained.

Construction works would be undertaken following consultation with the relevant road authority namely Cobar Shire Council. The Proponent would obtain the appropriate Section 138 permits/deeds under the *Road Act 1993* from Cobar Shire Council in relation to all activities within the Burthong Road reserve.

2.2.3.3 Internal Access Tracks

A range of internal light and heavy vehicle access tracks would be required for access to the Tailings Storage Facility, the magazine, the ventilation rises, and other areas within the Project Site. These roads would primarily use existing farm tracks, with construction of new tracks minimised to the greatest extent practicable. The tracks would be unsealed and would be constructed and maintained in accordance with their intended purpose. The maximum speed limit on these tracks would be 40km/h.

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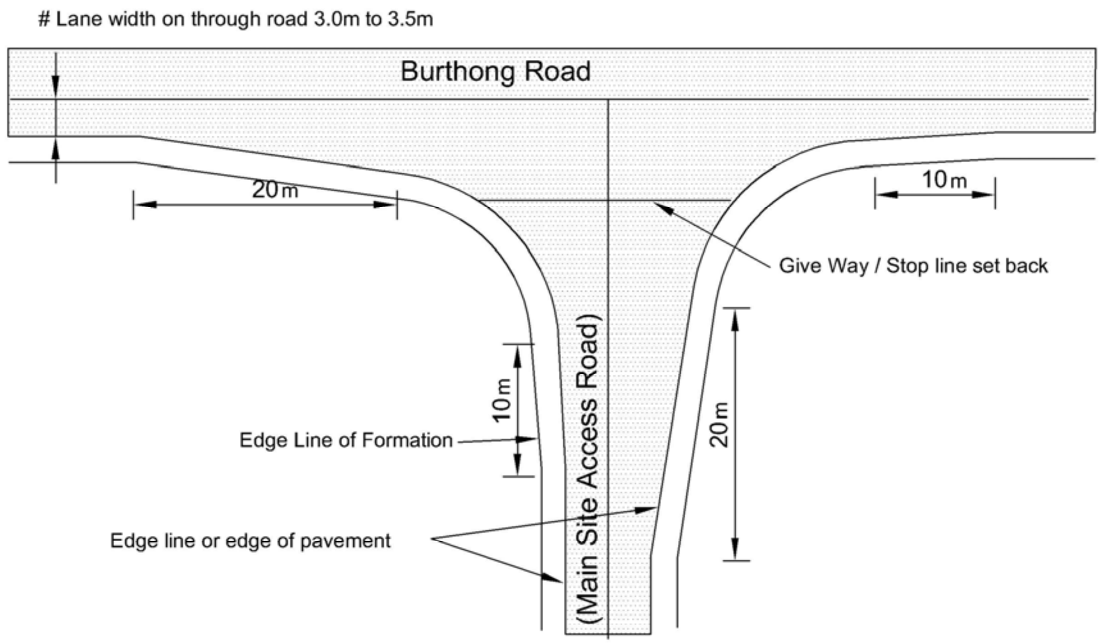

NOT TO SCALE

Source: Traffic Solutions (2011) - After Figure 6

Figure 2.3
INDICATIVE MAIN SITE ACCESS ROAD INTERSECTION

2.2.4 Sediment and Erosion Control Structures

The Proponent would construct appropriate sediment and erosion control structures to ensure that the Project would not adversely impact on the quality of water discharged from the Project Site. The structures would ensure that surface water run-off from undisturbed sections of the Project Site (clean water) would not mix with potentially sediment-laden (dirty) water from disturbed sections of the Project Site or potentially chemical-laden (contaminated) water.

Figure 2.4 shows the following principal water management structures proposed within the vicinity of the Surface Facilities Area and Tailings Storage Facility. A number these structures have been previously approved, as indicated below.

- Sediment Basins 1 and 2 (SB1, SB2) (approved).
- Clean water diversions (proposed).

- Collection Drain and Seepage Collection Pond (proposed).
- A Settling Pond complex comprising five separate ponds (approved).

In order to ensure separation of contaminated, dirty and clean water the Proponent would implement the following.

- Contaminated water.
  - Sections of the Processing Plant would be bunded as required and a number of sumps would be constructed to collect incident rainfall. Collected water would be pumped to the Process Water Dam for reuse in processing operations,
  - The Potentially Acid Forming Waste Rock Encapsulation Area would be bunded and all surface water and potentially acidic leachate would be directed to the Leachate Collection Pond and pumped to the Process Water Dam.
  - .The Tailings Storage Facility would be constructed as described in Section 2.6. This would include ensuring appropriate permeability in the floor and wall of the facility and construction of a Collection Drain and Seepage Collection Pond. Water collected within the collection pond would be returned to the Tailings Storage Facility.
- Dirty water.
  - Surface water runoff within non-bunded sections of the Surface Facilities Area would be diverted into the Sediment Basins (SB1 and SB2) and the Settling Ponds.
  - Surface water runoff within other disturbed sections of the Project Site would be managed in accordance with the relevant guidelines to ensure appropriate concentration of suspended sediment within water discharged from the Project Site.
- Clean water
  - Clean water diversions would be constructed to divert surface water runoff from undisturbed sections of the Project Site away from disturbed areas.

The Project Site's water management structures would be designed and constructed for rainfall events up to and including the 100-year ARI. All water management structures would be constructed to the specifications identified in Landcom (2004) and DECCW (2008).

2.2.5 Water Harvesting Structures

2.2.5.1 Water Requirements and Sources

The Project would require up to approximately 187ML of water per year for mining-related purposes, principally for processing (approximately 167ML/year) and dust suppression operations (approximately 20ML/year). Other mining-related water uses would include underground operations, equipment wash-down and the Mine Camp water requirements.

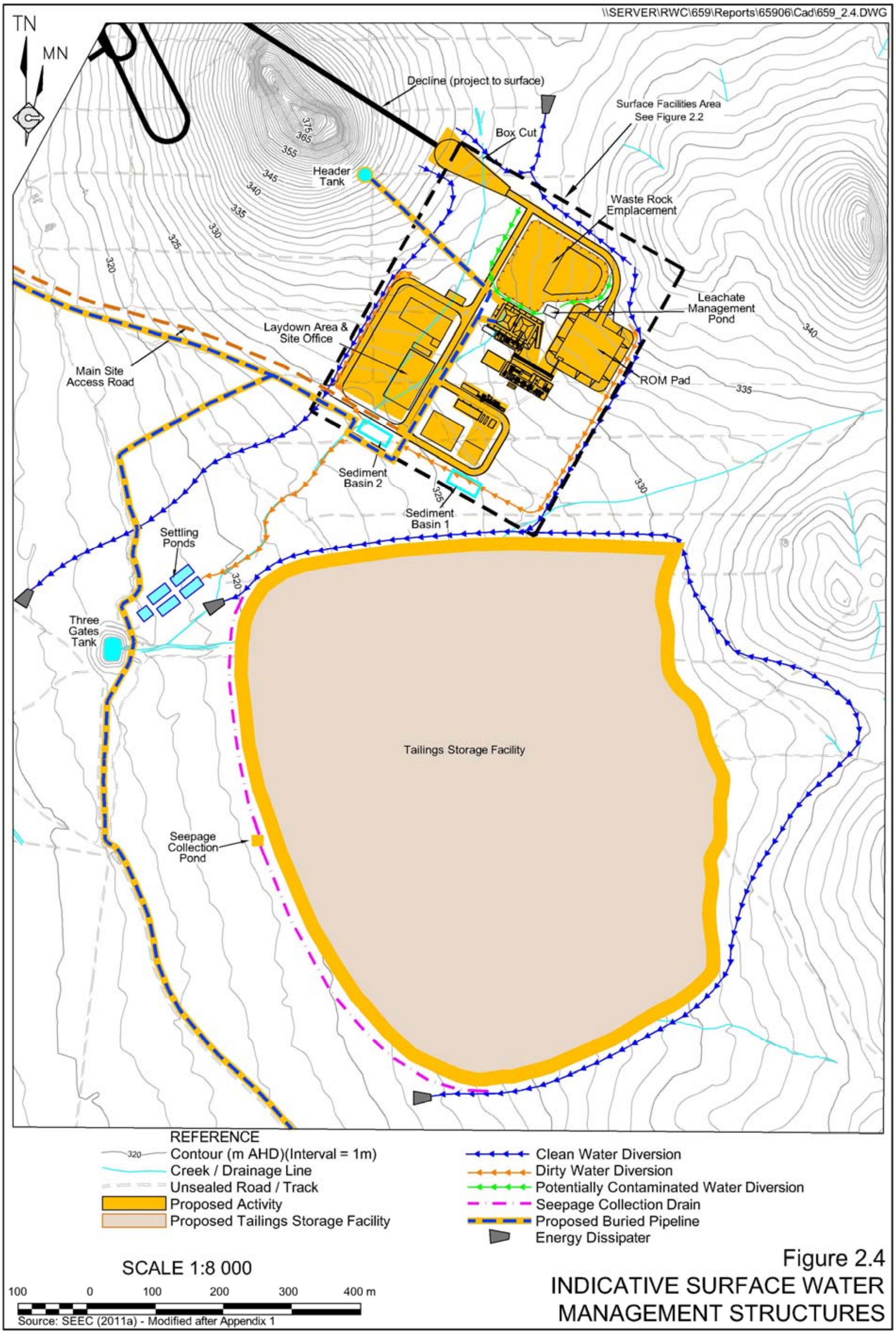

Figure 2.4
INDICATIVE SURFACE WATER MANAGEMENT STRUCTURES

This water would be obtained in priority order from the following sources (**Figure 2.1**).

i) Groundwater sourced from dewatering operations within the proposed mine and pumped to the Raw Water Dam.

ii) Stormwater runoff stored in the Three Gates Tank either following treatment in the settling ponds or captured directly.

iii) Stormwater run-off stored in the proposed expanded Pete's Tank or the proposed Back Tank East. These dams would store approximately 20ML and 90ML of water, respectively.

iv) Groundwater sourced primarily from four bores located within the Project Site namely, Back Bore and Bores WB8, WB11 and WB13.

It is likely that water from within the surface water storage dams would be available only intermittently. As a result, the Project would rely entirely on water sources i) and iv) for all operational water requirements during extended dry periods. However, when water from sources ii) and iii) is available, it would be used to allow the production bores and associated aquifers to be at least partially recharged.

2.2.5.2 Surface Water Harvesting Structures

The Proponent would expand one existing surface water dam, namely Pete's Tank, and construct a new dam, namely Back Tank East to permit harvesting of surface water within the Project Site (**Figure 2.1**). Water harvested within these dams and other sediment and erosion control structures including Three Gates Tank (see Section 2.2.5.1) would be used within the Project Site for operational requirements. It is noted that the NSW harvestable rights do not apply to rural landholders in the Western Division, and thus are not applicable to the Project Site.

Table 2.1 presents the indicative capacities of all surface water harvesting structures within the Project Site. The Proponent has ensured that these structures are either "off-line" or positioned on first- or second-order creeks, in accordance with Section 53 of the *Water Management Act 2000* (**Figure 2.1**).

The proposed structures would be constructed with appropriate spillways capable of withstanding a 1 in 100 year annual recurrence interval (ARI) rainfall event without significant erosion. The dams would also be fitted with appropriate water reticulation equipment, including pumps and underground pipelines (see **Figure 2.1**) to permit transfer of water from the dams to the proposed Header Tank and the Raw Water Dam located within the Processing Plant area (see **Figure 2.2** and Section 2.5.9).

Table 2.1
Indicative Surface Water Storage Volumes

Dam Identifier	**Indicative Volume (ML)**
Pete's Tank	20
Back Tank	90
Three Gates Tank	0.6
Sediment Basins	0.2
Settling Ponds	4
Total	114.8
Source: YTC Resources Pty Ltd	

2.2.5.3 Groundwater Harvesting Structures

As noted in Section 2.2.5.1, groundwater would be sourced principally from the proposed underground mine, with additional water sourced from the four production bores, namely Back Bore and Bores WB8, WB11 and WB13 (**Figure 2.1**).

Groundwater within the proposed underground mine would be pumped to the surface and stored within either the Header Tank or the Raw Water Dam (**Figures 2.1** and **2.2**). The daily rate of extraction would depend on the short-fall between the daily rate of extraction of groundwater from the underground workings and the daily Project water requirements.

A detailed groundwater assessment is provided in Part 2 of the Specialist Consultants Studies Compendium and is summarised in Section 4.3 of this document. In summary, however, that assessment determined that the underground mine and each of the production bores were likely to intersect water-filled fracture systems with limited extent. Following an initial period of high flow, production rates from each of the bores (and the proposed underground mine) is likely to decrease as the water-filled fractures are dewatered and production rates reflect the rate of recharge of those fractures. Notwithstanding this, however, Impax (2011) determined that the sustainable yield for the production bores is approximately 466ML/year.

In light of the above, the Proponent anticipates that sufficient groundwater resources exist within the Project Site for the proposed mining and ancillary operations.

2.2.5.4 Water Reticulation System

Groundwater and surface water for mining-related purposes would be pumped to the Raw Water Dam via a proposed pipeline (**Figure 2.1**). The proposed pipeline would be constructed of poly pipe and buried. The pipeline route would, wherever practicable, follow established tracks and would only be laid down within already disturbed areas. Where the proposed pipeline route cannot be located along existing tracks, care would be taken to ensure that no vegetation more than 3m high would be disturbed.

2.3 SITE ESTABLISHMENT

2.3.1 Introduction

This sub-section describes the activities that would be undertaken during site establishment operations. These activities would comprise removal of surface vegetation and soil stripping. Prior to the commencement of site establishment operations, all areas to be disturbed would be surveyed and clearly marked to ensure that areas not required for the operation of the Project are not disturbed.

Significant areas of native vegetation have previously been removed or disturbed within the Project Site as a result of grazing, clearance of vegetation for historic mining operations and/or subsequent exploration activities. **Table 2.2** presents approximate areas that have been previously disturbed and indicative areas that would be disturbed during site preparation operations.

Table 2.2
Indicative Disturbance Areas – Previous and Proposed

Infrastructure Area	Previously Approved (ha)[1]	Proposed Activities (ha)[2]	Total Area (ha)
Surface Facilities Area, Box cut, portal and ventilation rises, Internal Road	4.8	10.6	15.4
Tailings Storage Facility	0	43.8	43.8
Main Site, Light Vehicle and Mine Camp Access Roads	1.8	1.0	2.8
Expanded Pete's Tank and proposed Back Tank East[3]	0	13.0	13.0
Mine Camp	0	2.2	2.2

Note 1: Relates to activities previously approved under the Part 5 Approval (see Section 1.7 and **Figure 2.1**).
Note 2: Relates to activities for which project approval is sought..
Note 3: Disturbance would be limited to the embankment walls and borrow pits. However, as entire footprint would intermittently be inundated, entire footprint of these structures has been used when calculating anticipated area of disturbance.
Source: YTC Resources Limited

2.3.2 Vegetation Clearing

Section 4.2 presents an overview of the ecology assessment prepared for the Project. However, in summary native vegetation within the Project Site is not classified as an Endangered Ecological Community.

As there would be limited progressive establishment of the Project Site infrastructure, all vegetation clearing would occur in a single campaign. Prior to commencement of vegetation clearing, a pre-clearing fauna inspection would be undertaken by a suitably qualified and experienced expert to ensure that any roosting or nesting fauna are identified and relocated. Available seed from trees to be cleared would, wherever practicable, be harvested prior to their clearing.

Larger vegetation, if present, would be removed using a bulldozer with its blade positioned just above the surface so as not to disturb the groundcover and topsoil. Ground cover vegetation would be removed with the topsoil to maximise the retention of the seed bank and nutrients within the soil, as well as to minimise opportunities for erosion and dust lift-off between removal of the larger vegetation and soil stripping.

Vegetation would not be mulched but would be stored for use during rehabilitation activities. Felled trees would be track-rolled to break up the larger trunk sections, and all vegetation would be relocated to stockpile locations adjacent to each individual area of disturbance. The stockpiling of vegetation close to the source would provide for minimal handling and for easy access to it for rehabilitation purposes. Where practicable, the vegetation stockpile would be located on the down-slope side of the infrastructure area to act as a natural sediment trap.

2.3.3 Soil Stripping

2.3.3.1 Introduction

Soil materials within those sections of the Project Site that would be disturbed have been assessed by SEEC (2011b) (see Section 4.10 and Part 8 of the *Specialist Consultant Studies Compendium*).

This sub-section briefly describes the soil landscape units identified within the Project Site, the recommended maximum stripping depths and the volumes of soil that would be available for use during rehabilitation. Detailed soil management measures that would be implemented are presented in Section 4.10.3 of this document.

2.3.3.2 Soil Units, Stripping Depths and Inventory

Two soil landscape units, namely the Yackerboon Land System and Kopyje Land System have been identified within the Project Site. A third soil landscape unit, namely the Boppy Land System has been identified to occupy the northeast of the Project Site but would not be impacted by the Project. The Kopyje Land System occupies the southwestern-most section of the Project Site while the Yackerboon Land System occupies the remainder (**Figure 2.5**).

The stripping depths and approximate volumes of the soils that would be available for rehabilitation activities, based on recommendations provided in SEEC (2011b), are provided in **Table 2.3**.

Table 2.3
Soil Stripping Depths and Inventory

Infrastructure Area	Area to be disturbed (ha)	Topsoil		Subsoil[1]	
		Stripping Depth (cm)	Volume (m^3)	Stripping Depth (cm)[1]	Volume (m^3)
Surface Facilities Area Box cut, portal and ventilation rises, Internal Road	15.4	30	46 200	70	107 800
Tailings Storage Facility	43.8	30	131 400	70	306 600
Main Site, Light Vehicle and Mine Camp Access Roads	2.8	20	5 600	-	-
Expanded Pete's Tank and proposed Back Tank East[2]	13.0	30	39 000	70	91 000
Mine Camp	2.3	20	4 600	-	-
Total	**77.3**	-	**226 800**	**-**	**505 400**

Note 1: Below base of topsoil.
Note 2; Soil would be stripped within the footprint of the embankments only, assumed to be 15% of total footprint of surface water storages.
Source – After SEEC (2011b)

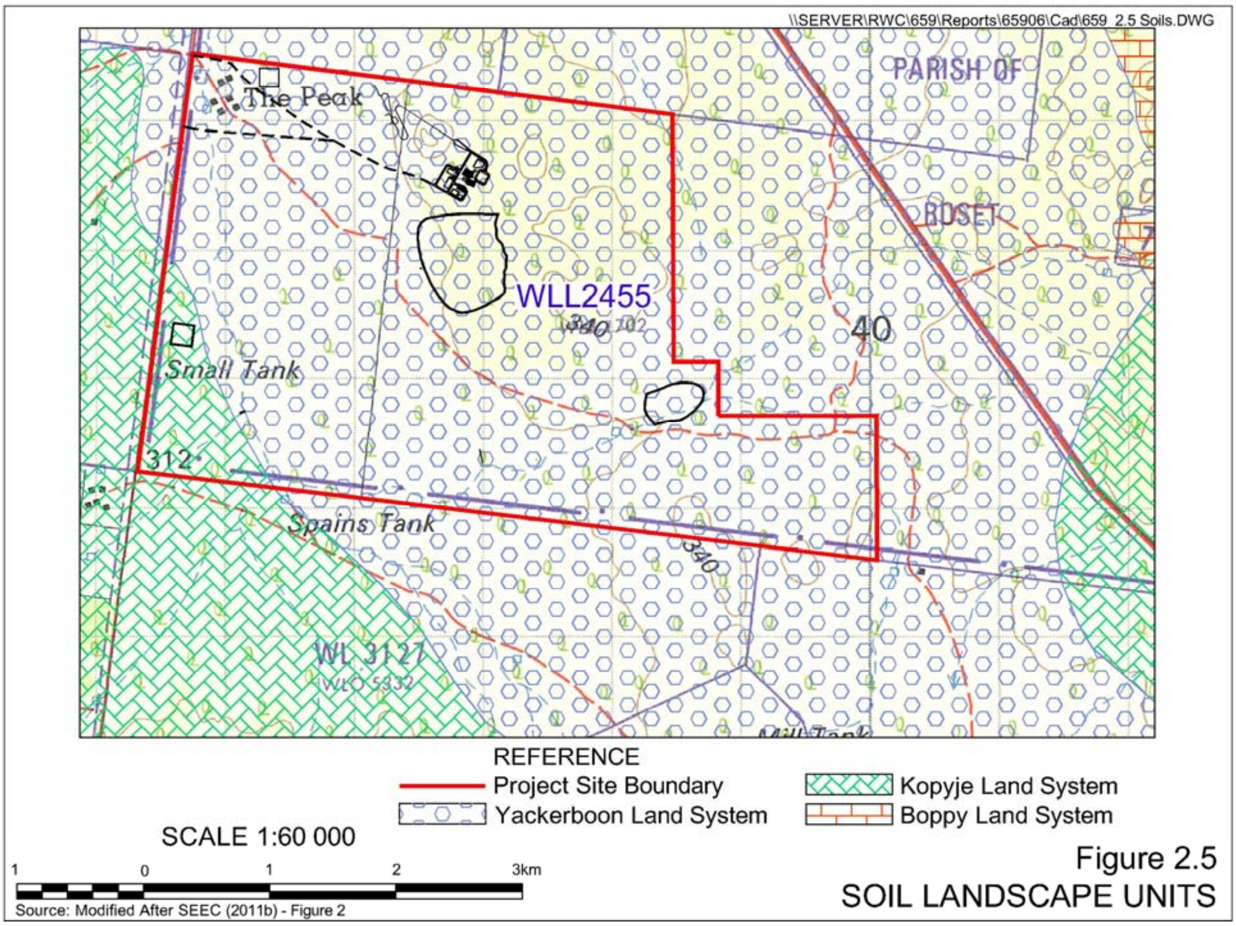

Figure 2.5
SOIL LANDSCAPE UNITS

Table 2.3 indicates that approximately 77ha of land would be disturbed for project-related activities, of which approximately 2ha is already cleared/grassland. Approximately 75ha of vegetation clearing would be required (see Sections 2.16.1 and 4.2.6.2; **Table 4.10**).

The volumes of soils excavated would be sufficient for all ongoing rehabilitation activities on site and no quantity of soils would be removed from the site as waste material.

2.3.3.3 Soil Stripping and Stockpiling Procedures

As indicated in Section 2.3.2, topsoil would be stripped with the groundcover to ensure the maximum seed bank is retained, provide structure to the soils within the soil stockpiles and provide the best opportunity for groundcover to re-establish over the soil stockpiles. The stripped topsoil and subsoil would be pushed up by bulldozer and either loaded into trucks for transportation to the stockpile location or alternatively directly placed into those stockpiles using a bulldozer.

- Soil stripping procedures and management measures to be implemented during site establishment would include the following.
- Strip soil material to the depths indicated in **Table 2.3**.
- Strip both topsoil and subsoil within the footprints of the box cut and Surface Facilities Area, and topsoil only in all other areas of proposed disturbance.
- Ensure that soil materials are not stripped when in either an excessively dry or wet condition.

- Grade or push soil into windrows using graders or bulldozers for later loading into trucks by front-end loaders to minimise compaction of soil materials.
- Use soil materials immediately in areas undergoing progressive rehabilitation, where practicable.
- Stockpile topsoil and subsoil separately in stockpiles as close as possible to the area of disturbance.
- Minimise, as far as practicable, the operation of machinery on soil stockpiles to minimise compaction.
- Ensure that topsoil and subsoil stockpiles have a maximum height of 2m and 3m, respectively.
- Leave the surface of the stockpiles with an even but roughened surface to assist in erosion control and seed germination and emergence.
- Establish a vegetative cover comprising endemic native species on all soil stockpiles to be retained for more than three months. If required, sterile cover species may be used to stabilise the stockpiles in the short term until the native species can become established.
- Ensure that appropriate surface water controls are implemented to prevent erosion of soil stockpiles.

2.4 MINING OPERATIONS

2.4.1 Introduction

This sub-section provides an overview of the construction of the box cut and portal, underground development and stoping operations, stope backfilling, the proposed mining rate and sequence, and mining equipment that would be used. While approval has already been granted for the construction of the box cut, portal decline and Waste Rock Emplacement (see Section 1.7) these components of the Project are described here for completeness.

2.4.2 Construction of the Box Cut and Portal

2.4.2.1 Introduction

This sub-section provides an overview of the construction of the box cut and portal establishment prior to commencement of underground development. A box cut is required to enable exposure of material with sufficient geotechnical competency to permit establishment of the portal and subsequently the decline.

2.4.2.2 Layout of the Box Cut

Figure 2.6 depicts an overview of the indicative layout of the box cut which, when constructed, would be approximately 90m long, up to 45m wide and would have an indicative gradient of 1:7 (V:H). The box cut would be constructed with side and end batters of 1:1 (V:H). The portal face would be approximately1:0.25 (V:H) or 72^{o}. The overall surface elevation of the box cut would be approximately 335m AHD.

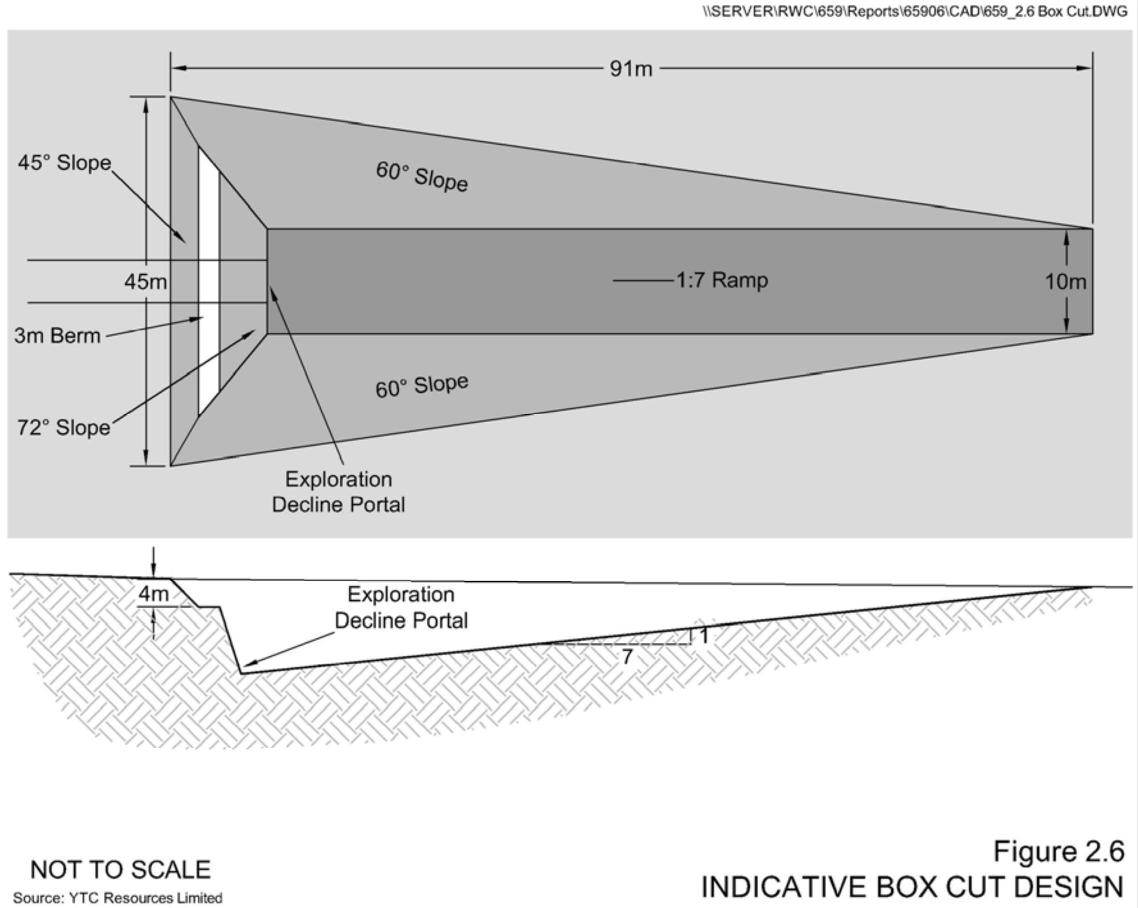

Figure 2.6
INDICATIVE BOX CUT DESIGN

2.4.2.3 Construction of the Box Cut

Once vegetation and soil material have been removed, (see Section 2.3), and surface water management structures have been constructed, the box cut would be excavated using conventional load and haul methods using an excavator or front-end loader and haul trucks. Where required, a bulldozer may be used to rip material that cannot be extracted using an excavator or front-end loader.

When the excavation has progressed to a point where material cannot be extracted using an excavator, front-end loader or bulldozer, the material would be fragmented using conventional drill and blast techniques. This would require drilling of holes using a hydraulic drill rig, loading of those holes with either pre-packaged or bulk explosives, boosters and detonators and fragmentation of the *in situ* material. Fragmented material would be removed using load and haul techniques. Management of waste rock material removed during construction of the box cut is described in Section 2.7.

Blasting operations would indicatively require a maximum instantaneous charge (MIC) of approximately 36kg for box cut, 22kg for decline development and 66kg for production stope activities. It is noted, however, that once blasting operations have commenced and monitoring results have been analysed for a range of blasts, a blasting site law would be established to accurately predict blasting-related impacts at surrounding residences. Once this has occurred, the Proponent may use an MIC greater than that indicated above, ensuring at all times that blasting-related impacts are less than the criteria identified in the Environment Protection Licence for the Project.

All blasts would be designed, supervised and initiated by a suitably licensed and experienced blasting engineer or shot firer. Each blast would be designed to achieve the following.

- Compliance with all blasting criteria at all surrounding residences.
- Suitable fragmentation.
- Preparation of suitable surfaces for the box cut walls, possibly including the use of pre-split blasting.
- Fragmented material resulting from blasting would be removed using conventional load and haul techniques.

It is anticipated that the box cut would take approximately three to four weeks to complete.

2.4.2.4 Formation of the Portal and Underground Infrastructure

Once the box cut has been excavated to the required dimensions and material of suitable competency has been exposed, the surrounding walls would be stabilised using a combination of rock bolts, cable bolts and shotcrete. The portal decline would then be constructed using methods similar to those described in the following sub-section. Additional roof and wall support, would be installed in the near surface sections of the decline. This would include combinations of either rock bolts, cable bolts, shotcrete or steel arch structures.

Following the establishment of the portal, infrastructure required for underground mining operations would be installed. This would indicatively include the following.

- Underground power, including a transformer to convert the voltage of the distributed electricity to 1 000V, suitable for use underground.
- Temporary ventilation, including one or more vent fans located within the box cut.
- Mine water supply for underground mining operations, including the Header Tank.
- A surface sump to allow water pumped from underground, as well as water collected within the box cut, to be collected and removed.
- A tag board and associated surface safety equipment and infrastructure.

Development of the portal using a single heading would be required initially. However, once portal development reaches the initial extraction level, development on multiple headings may be undertaken.

2.4.3 Underground Development

2.4.3.1 Introduction

This sub-section describes the underground development that would commence once the portal has been established and the required infrastructure installed. An overview of the proposed drill, blast, load and haul operations that would be undertaken, as well as the ventilation and emergency egress infrastructure proposed to be established, is also presented. It is noted that construction of the decline to the initial extraction level is an approved activity.

2.4.3.2 Decline and Development Design

Figure 2.6 presents a plan view of the proposed decline. The decline would include the following indicative design parameters.

- Height – approximately 5.5m.
- Width – approximately 5.0m.
- Gradient – approximately 1:7 (V:H).
- Final design length – approximately 3 500m.
- Maximum depth of development – approximately 500m below the surface.

Development headings and ore drives, being those drives that would permit access from the decline to individual mining areas, would have the following indicative design parameters.

- Height – approximately 4.5m.
- Width – approximately 4.5m.

2.4.3.3 Drill and Blast Operations

The decline and development headings would be developed using conventional underground drill and blast techniques. A jumbo, or an underground drill rig would drill a pattern of holes, the spacing and length of which would be determined by the blasting engineer or shot-firer. Once drilling has been completed, these holes would be loaded with bulk or pre-packaged explosives, boosters and detonators, and the material would be fragmented *in situ* by the blasting action.

Blasting would only be undertaken once the proposed mine has been evacuated, typically at meal breaks or shift change.

As noted in Section 2.4.2, the drill and blast operations, including those for underground stoping operations, would be designed in a manner that would ensure compliance with the criteria identified in the Environment Protection Licence for the Project.

2.4.3.4 Load and Haul Operations

Fragmented material would be extracted using an underground loader. The loader would be used to load underground haul trucks, and may be remotely operated, if required, due to ground stability or safety issues. Alternatively, the loader may be used to transport material to a loading bay for later reclamation.

Once loaded into haul trucks, fragmented material would be transported to the temporary Waste Rock Emplacement area (**Figure 2.2)**, or used for stope backfilling operations (see Section 2.4.4.3).

2.4.3.5 Ventilation and Emergency Egress

Initially, supply of fresh air underground would be provided using a ventilation fan located at the portal. Air would be pumped to the face of decline using air bags. Return air would flow back up the decline. As decline construction progresses, the ventilation infrastructure would be advanced to sub-surface levels to ensure adequate ventilation exists in all sections of the advancing decline.

When the decline has been advanced sufficiently, two ventilation rises would be installed to ensure the supply of fresh air to underground (**Figure 2.1**). To facilitate construction of the ventilation rises, a horizontal ventilation drive would be established first followed by the establishment of the ventilation rise by using up-hole boring, however, the technique involves drilling a hole from surface to intersect the ventilation drive. The hole is then reamed out to the required diameter from the bottom up using a series of progressively larger diameter drill heads. Drill spoil is permitted to fall to the bottom of the vent rise and is removed, as described in Section 2.4.3.4.

One ventilation rise with an associated fan with a nominal capacity of $180m^3/s$ installed on the surface, would act as an exhaust vent for return air while the decline would act as one air intake into the underground mine. The second ventilation rise would act as another air intake. It would also be equipped as an escape way (i.e. fitted with ladders) to permit emergency egress. Other mine services such as power and water may also be installed within this second ventilation rise.

As development of the mine progresses, additional ventilation drives and rises would be constructed every 20m to 25m vertically and connected to the established ventilation rises.

Ventilation of the development drives would be achieved with secondary fans positioned at the fresh air source at the decline, with vent ducts to the face. At the first level ducted ventilation would be required for stope production but once two sublevels are open, air could be extracted through the upper level creating through flow of air from the bottom of the stope to the top.

An escape way, fitted with ladders, would be the emergency egress infrastructure.

2.4.4 Underground Stoping Operations

2.4.4.1 Open-Stope Mining Method

This sub-section provides an overview of the stope design and proposed sublevel open stoping mining method that would be used for the extraction of the ore material.

Stoping is to be undertaken using conventional sublevel open stoping mining techniques.

Indicatively, 76mm blast holes would be utilised. These holes would be loaded with bulk or pre-packaged explosives, boosters and detonators and the material fragmented *in situ,* as described in Section 2.4.3.3. This method recovers ore from elongate vertical stopes. Unmined material would left between the vertical stopes and pillars and horizontal sills would be provided support and prevent ground collapse. Drilling and analyses to date of the drilled core suggest that the mineralisation and the host rocks appear to be competent and would be able to support significant openings.

Figure 2.7 presents a schematic overview of the proposed mining method. The sublevel open stoping mining method entails developing an ore drive along the mineralisation to the limits of the ore where a slot rise is mined. A production drill is then used to drill rings of holes back along the ore drive. Once the slot is extracted at the end of the ore body, the rings of drill holes are progressively blasted and the stope is retreated back to the decline.

Pillars would be left every approximately 30m along strike, with the final distance adjusted to ensure that the actual position of the pillar coincides with the lower grade ore. Sub-levels would be established approximately every 25m.

Following the formation of a pillar, a new slot and rise would be formed prior to recommencing stoping. In areas where the ore thickness is greater than 5m, the ore drive may be silled out to a maximum of 6m. Some cable support may be required where the ore drive is significantly widened. For zones of significant width two ore drives may be developed.

Geotechnical conditions may dictate the need to backfill stopes, and this would be done following completion of mining within each stope (see Section 2.4.4.3).

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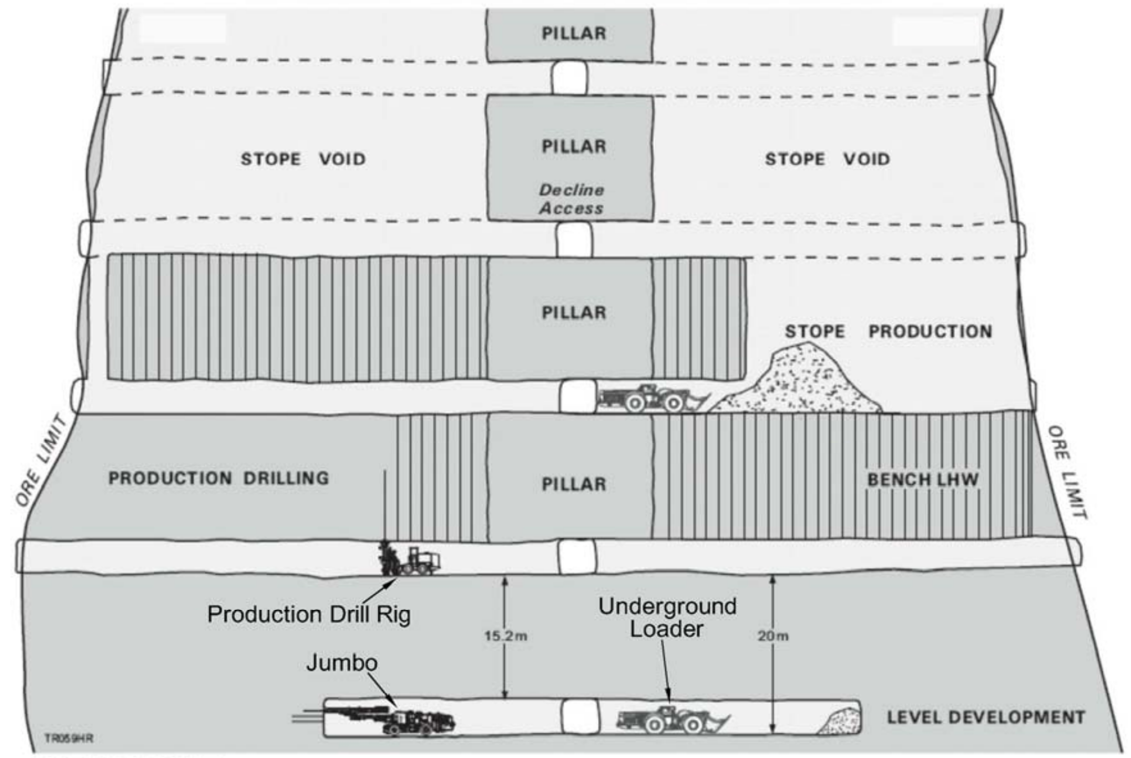

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Source: YTC Resources Limited

Figure 2.7
SCHEMATIC SUB-LEVEL OPEN STOPING MINING METHOD

2.4.4.2 Open-Stope Design

The Proponent would develop a range of stope designs to permit extraction of the ore material. The detailed design of each stope would be determined following completion of additional drilling during development operations to better define the boundary between classes of material as well as the geotechnical characteristics of the material to be mined. The mine design would be developed to ensure that there would be no surface subsidence within the Project Site.

2.4.4.3 Stope Backfilling Operations

Backfilling of underground stope voids with waste rock would be undertaken, to provide for local mine stability and to allow extraction of higher grade resources in localised areas. The Proponent estimates that approximately 25% of the stopes that would be created would be backfilled with waste rock, either directly or with material stockpiled temporarily at the surface.

The back-filling would use waste rock material sourced preferentially from concurrent underground development, with additional waste rock material transported from the temporary Waste Rock Emplacement on the surface, if required. **Figure 2.8** shows a typical schematic of bench mining and stope back-filling with waste rock.

The back-fill material would be transported to a drive in the vicinity of the stope top using an underground haul truck. The material would be stockpiled in the drive and then pushed or tipped into the stope using an underground loader. During such operations, the loader may, where required, be operated remotely. Sections of some stopes may be cement stabilised.

The advantage of backfilling the stopes would be to reduce the quantity of waste rock transported to the surface, increase the geotechnical stability of the mined stopes and maximise the recovery of ore material, with resulting reduced environmental impacts and mining costs.

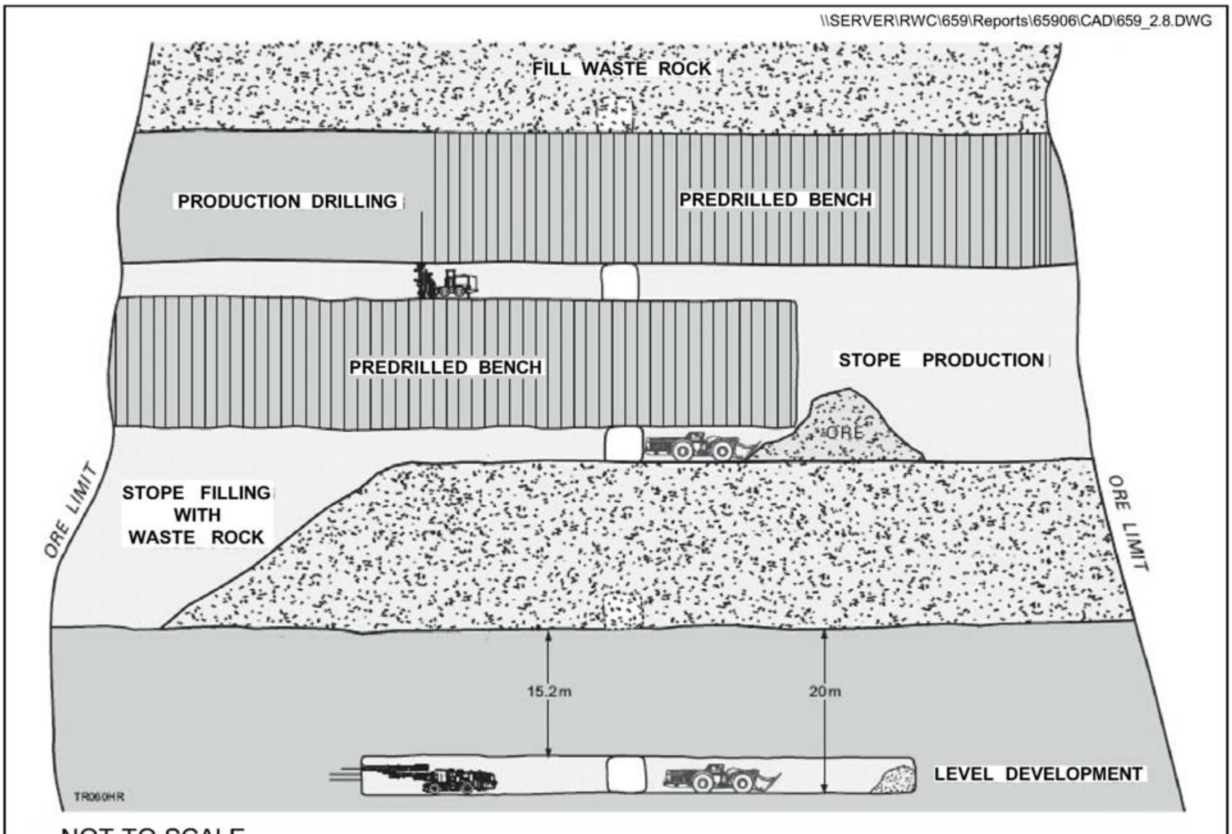

Figure 2.8
SCHEMATIC BENCHING AND STOPE FILLING

Source: YTC Resources Limited

2.4.5 Mining Rate

The indicative maximum mining rate would be approximately 350 000t per year of run-of-mine (ROM) ore, which equates to approximately 85m vertical advance per year. The production rate would vary depending on the number of development headings and stopes available at any one time and is expected to increase progressively as the mine is developed and would decrease towards the end of the life of the Project as stopes are gradually completed.

Table 2.4 provides an indicative mining rate for the life of the Project, and shows ore extraction would occur over five and half years commencing in Year 2.

Table 2.4
Indicative Mining Rate

Year	Tonnes		
	Ore	Waste Rock	Total
1	0	171 000	171 000
2	190 458	166 000	356 485
3	332 033	108 250	440 283
4	327 783	49 750	377 533
5	322 735	0	322 735
6	352 539	0	352 539
7	350 371	0	350 371
Total	**1 875 918**	**495 000**	**2 370 918**

Source: YTC Resources Limited

2.4.6 Mining Equipment

Table 2.5 presents the mobile mining equipment that would be required during the life of the Project. A number of light and heavy vehicles and ancillary equipment, such as lighting plants and service vehicles, would also be required.

Table 2.5
Proposed Mining Equipment

Equipment	Indicative Number Required	Hours of Operation
Box Cut Establishment		
Pneumatic drill and compressor.	1	7 am to 10 pm, 7 days per week
Excavator	1	
Haul trucks (50 tonne)	2	
Site Establishment and Surface Operations		
Front-end loader (Cat 998)	2	7 am to 10 pm, 7 days per week
Bulldozer (Cat D10)	1	
Grader (Cat 14H)	1	
Road Train and haul trucks	1 or 2	
Establishment and Underground Mining Operations		
Jumbos drill rigs	1 or 2	24 hours per day; 7 days per week
Underground Load-Haul-Dump unit (bogger)	1 or 2	
Underground Haul trucks	2	
Tool Carrier	1	
Power Generator		
Diesel Generators 800 kVA (Cummins)	6	24 hours per day; 7 days per week

Source: YTC Resources Limited

2.5 PROCESSING OPERATIONS

2.5.1 Introduction

This sub-section provides a description of the proposed processing operations, including the layout of the Processing Plant and crushing, grinding, flotation, leaching and gold room operations.

In summary, the Processing Plant would process mined ore material to produce gold-silver doré (unrefined gold-silver bar), a bulk lead and zinc concentrate and tailings. The Plant would be designed to operate at a nominal rate of approximately 50t per hour for approximately 350 000t per year.

2.5.2 Processing Plant Layout and Overview

The Processing Plant layout would reflect the sequential nature of the processing operations with a ROM pad for ore receival at one end of the facility and concentrate storage and loading facilities at the other end. The proposed layout of the Processing Plant is provided in **Figure 2.2**. It is noted that sections of the Processing Plant would be bunded to prevent potentially contaminated water from entering natural drainage as described in Section 2.2.4.

Processing operations would, in summary, comprise the following (**Figure 2.9)**.

- Stockpiling of ore material on the ROM pad.
- A mobile jaw crusher located on the ROM pad would be used to reduce the ore material to less than 200mm.
- Two stage crushing and screening to reduce ore material to a nominal 80% passing 36mm.
- Grinding in a single stage ball mill to a nominal 80% passing 0.25mm.
- Gravity separation of gold using an inline pressure jig and batch centrifugal concentrators.
- Intensive cyanide leaching and electrowinning of the gravity concentrate to produce gold-silver doré.
- Bulk flotation to produce a bulk lead – zinc flotation concentrate.
- Regrinding and tank cyanide leaching of the bulk flotation concentrate followed by Merrill Crowe treatment to produce gold-silver doré.
- Filtration of the tailings from the tank leach to recover cyanide species, and to produce a final mixed bulk lead-zinc concentrate with gold and silver credits.
- Thickening of the flotation tails for water recovery.

The following sub-sections present a more detailed description of the proposed processing operations.

2.5.3 Ore Stockpiling and Crushing Operations

Ore material would be transported from the underground mine to the ROM pad by haul trucks. This material would be stockpiled within the ROM pad according to the material's characteristics.

The ore would be fed into a track mounted primary jaw-crusher located on the ROM pad using a front-end loader. Once crushed the material would be fed to the primary crushing circuit via the ROM feed hopper from where it would be conveyed to a grizzly feeder with oversized material crushed via jaw crusher. The undersize material from the grizzly feeder and jaw crusher product would report to the primary screen where would be screened to 25mm. Material greater than this size would be returned to the jaw crusher, while undersize material would be further reduced by a secondary vertical shaft impact crusher. The secondary crusher would reduce material to a nominal 2.36mm or smaller, with oversize material being directed back through the crusher.

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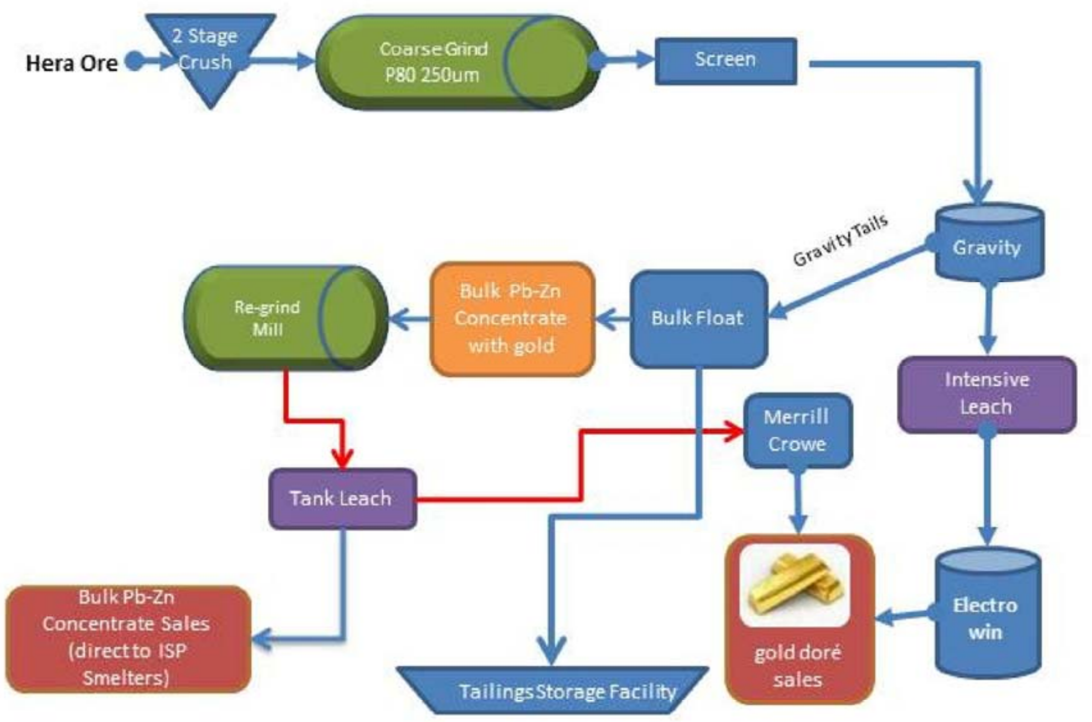

NOT TO SCALE

Source: YTC Resources Limited

Figure 2.9
SCHEMATIC OF ORE PROCESSING OPERATIONS

During all crushing operations, wet screening and water sprays would be used to manage dust generation.

2.5.4 Gravity Processing and Grinding Operations

Material from the secondary crusher would be pumped initially to an in-line pressure jig or an in-line spinner for initial gravity separation of the heavy minerals, including gold.

Tailings from the initial gravity separation would then be pumped to a ball mill for further reduction in grain size. This material would then be pumped a batch centrifugal concentrator to further recover gravity gold.

The tailings from this process would then be pumped to a tertiary screening circuit which would separate material with a size greater than 0.35mm. The oversize material would be passed back to the ball mill, while the undersize material would be passed to the flotation circuit.

Gravity concentrates would be processed using intensive cyanidation to leach the gold (see Section 2.5.6) and the washed tailings pumped to the regrind mill (see Section 2.5.5).

2.5.5 Flotation and Regrind

Undersize material from the tertiary screen have a portion of the water removed and would then be mixed with flotation reagents, which would include copper sulphate and potassium amyl xanthate or similar. This material would then be passed to a series of flotation cells where air would be blown through the slurry. The flotation reagents cause the metal-bearing sulfide minerals to stick to the bubbles and float to the surface where they can be skimmed off. This flotation process would be undertaken a number of times to maximise the recovery of metalliferous minerals and minimise the amount of non-metalliferous minerals within the concentrate.

Tailings from flotation circuit would be passed to a tailings thickener to recover as much water as possible, prior to the slurry being pumped to the Tailings Storage Facility.

The concentrate from the flotation circuit would be passed to a regrind mill where the material would be further reduced in size in preparation for tank leaching.

2.5.6 Concentrate Leaching and Gold Recovery

Once reground, the concentrate would be thickened then passed to the tank leaching circuit where it would be mixed with lead nitrate, sodium cyanide, sodium hydroxide and oxygen. The tank leach circuit would consist of mechanically agitated tanks in series which provide up to 24 hours residence time for the slurry. During this time, remaining gold and some of the silver would be dissolved into solution and the pregnant solution (and gold) would be separated from the solids using a filter press.

The dissolved gold/silver would be recovered from the gold/silver-bearing solution using the Merrill Crowe process. This process entails addition of lead nitrate and zinc dust to the solution for the zinc dust to precipitate out the gold/silver. The solution is then pumped through precipitation filters and the filtered liquid, with its high cyanide content, is reused in the leach circuit while the precipitate containing the gold is transferred to the gold room.

The filtered leach residue would be re-pulped with water, mixed with flotation reagents and floated to recover a copper-lead-zinc concentrate. The flotation tails would report to the main flotation circuit (Section 2.5.5) whereas the flotation concentrate would be filtered and transferred to the concentrate storage area. Any cyanide-containing liquid that would not be reused within the plant would be passed to a cyanide destruction tank where hydrogen peroxide and copper sulphate would be added to the solution to reduce the weak acid dissociable (WAD) cyanide to less than 10ppm. This solution would be further diluted with the flotation tailings slurry before being pumped to the Tailings Storage Facility via buried pipes (see Section 2.5.11 for further details). According to the document *Priority Existing Chemical Assessment Report No 31 – Sodium Cyanide* published by the Commonwealth Department of Health and Ageing (NICNAS, 2010), this classifies the Tailings Storage Facility as a Category 1 facility, or one that requires no cyanide-specific management measures.

2.5.7 Bulk Concentrate Management

This final concentrate is expected to be produced at an average annual rate of approximately 40 000 dry tonnes per year. The anticipated bulk concentrate composition is presented in **Table 2.6.**

Table 2.6
Anticipated Bulk Concentrate Composition

Element	Quantity	Element	Quantity
Ag	72ppm	Hg	1.92ppm
As	580ppm	Mo	5ppm
Ba	30ppm	Na	0.01%
Bi	6ppm	Ni	82ppm
Cd	1 100ppm	P	60ppm
Cl	0.01%	Pb	23.9%
Co	47ppm	S	22%
Cr	114ppm	Sb	267ppm
Cu	7 590ppm	Sr	33ppm
F	200ppm	V	5ppm
		Zn	26.1%

Source: YTC Resources Limited

The bulk concentrate would have a total sulphur concentration greater than 10% and most of this would occur as metal sulfides. The material would have the potential to form acid leachate under certain conditions. To manage this issue bulk concentrate material would be stored under cover and on a concrete-sealed surface within a shed. All water draining from the concentrate stockpiles would be directed to a sump and ultimately returned to the Process Water Dam for reuse in ore processing operations.

The bulk concentrate material would be loaded into open-topped containers using a front-end loader. The containers would then be sealed using a steel cover and transported to the Proponent's customers by road using semi-trailers or B-double trucks (see Section 2.9.3.2).

2.5.8 Gold Room Operations

The solids from the electrowinning process (see Section 2.5.4) and the precipitate from the Merrill Crowe process (see Section 2.5.6) would be calcined within the secure gold room. Calcination would be undertaken in a small electric oven and would involve heating of the material to remove volatile components. Following addition of fluxes to the calcined products the mixture would be fired in a small gas-fired furnace to form gold-silver doré and slag. The slag would be returned to the primary milling circuit. The gold-silver doré would be stored on site until such time that a sufficient quantity has been produced for periodic secure shipment, using security vehicles, to a suitable gold refinery. .

The Proponent anticipates that the following average hours of operation would be required.

- Electrowinning circuit – 16 hours/day.
- Calcining – 8 hours/day.
- Gas-fired furnace – 8 to 16 hours per week to process an estimated 200kg/week of calcined precipitate and electrowinning solids.

Gases given off from the calcining and firing processes would be captured in a wet scrubber to remove dust and gaseous chemical pollutants, prior to release into the atmosphere via an exhaust vent.

2.5.9 Process Water Storage and Use

Water for operational requirements would be stored in two dams within the Surface Facilities Area, namely the Raw Water Dam and Process Water Dam. (see **Figure 2.2**). Water from dewatering of the underground workings, groundwater bores and surface storage dams would be pumped directly to the Raw Water Dam. Water recycles within the Processing Plant or collected from bunded sections of the plant area would be pumped to the Process Water Dam.

Water for processing operations would be principally drawn from the Process Water Dam, with additional water requirements drawn from the Raw Water dam. Water from the Process or Raw Water Dams would not be permitted to flow to natural drainage and the Proponent would ensure that these dams would be isolated from overland flows and that water within the dams is not permitted to flow to natural drainage.

The Process and Raw Water Dams would be appropriately lined to prevent loss of water or contamination of groundwater via seepage. The dams would be regularly serviced to remove the accumulated sediment, if any. That sediment would be returned to the Processing Plant.

2.5.10 Chemicals Management and Risk

Table 2.7 provides a list and classification of chemicals that would be used and stored on site for the ore processing and mining operations.

Hazardous and non-hazardous chemicals to be used within the Project Site would be managed in accordance with the specifications of the Material and Safety Data Sheets and *Hydrocarbon, Chemical and Reagent Management Plan*. All toxic chemicals would be handled and stored in accordance Australian Standard AS 4452 *The Storage and Handling of Toxic Substances.*

A risk screening in accordance with the requirements of *State Environmental Planning Policy 33 – Hazardous and Offensive Development* (SEPP 33) has been undertaken for the hazardous chemicals to be used within the Project Site. These are discussed in Section 3.3.2.6 and **Appendix 4**.

The following general measures would be implemented to prevent adverse environmental impacts associated with storage and use of all reagents and chemicals within the Project Site.

- All chemicals would be stored in appropriate containers in bunded areas within the Surface Facilities Area (see **Figure 2.2**) and used in accordance with the manufacturer's instructions and the relevant Material Safety Data Sheets.
- All liquid chemicals would be stored within an impermeable bunded area with a capacity of at least 110% of the capacity of the largest container.
- Chemicals with the potential to react with each other would not be stored in the same area to prevent any reactions between them in the event of a spill.
- Only the minimum volume of chemicals required for the ongoing operation of the Project would be stored within the Project.

Table 2.7
Chemicals Register

Reagent	Purpose	Delivery Method	Reagent Form	Maximum Storage	DG Class[1,6]	Packing Group[2]	Comment
Copper sulfate pentahydrate	Flotation activator/deto x reagent	1 000kg bulk bags	Blue crystals or powder	6t	9	III	Not hazardous[4]
Potassium amyl xanthate[5]	Flotation Collector	200L drum pellets	Grey-yellow hygroscopic pellets Clear solution	10t (solid) & 2 400L of 20% solution	4.2 (solid) & 8 (solution)	II (solid) & III (solution)	Hazardous
Sodium cyanide[5]	Merrill-Crowe reagent	IBC[2]– 10 000L direct truck transfer	Solution (30% w/w)	20t	6.1	I	Hazardous
MIBC[5] (methyl isobutyl carbinol) or equivalent	Flotation frother	IBC[2]–1 000L	Yellow liquid	3 000 L (2.4t)	3	III	Hazardous
Magnafloc 10	Flocculant	25kg bags	White powder	100kg	N/A	N/A	Not hazardous[4]
Nitric acid[5]	Concentrate filter cleaning	IBC[2]– 1 000 L	Liquid	2 000L	8	II	Hazardous
Sodium hydroxide[5]	pH controller	IBC[2]– 1 000L	Solution (50% w/w)	10 000L (16t)	8	II	Hazardous
Diesel[5]	Fuel	Direct delivery	Liquid	250 000L	1	N/A	Not hazardous[4]
LPG[5]	Gold room furnace	1t storage vessel (Elgas)	Liquefied gas	7.5m[3] storage vessel (Elgas)	2.1	N/A	Not hazardous[4]
Lubricating oils / greases	Mobile plant and generators	1 000L	Liquid /solid	1 000L	2.2	N/A	Not hazardous[4]
Oxygen	Oxidising agent	VIE45000 vessel	Compressed gas	8 – 9t	2.2	N/A	Not hazardous[4]
Hydrogen peroxide[5]	Oxidising agent	IBC[2] – 1 000L containers	Solution (50% w/w)	20 000L (24t)	5.1	II	Hazardous
ANFO[5]	Explosive	500kg bulk bags	Off-white solid prills	15t	1.5	II	Hazardous
Zinc dust[5]	Merrill-Crowe reagent	50kg drums	Grey powder	1t	9	III	Not hazardous[4]
Lead nitrate[5]	Leaching aid	50kg bags	Powder	12t	5.1 / 6.1	II	Hazardous
Bulk Concentrate	Product	Sealed containers – 27t	Filter cake	10 000t	9	III	Not hazardous[4]
Soda ash	Furnace flux	25kg bags	Powder	1 000kg	N/A	N/A	No hazardous[4]
Borax	Reagent	25kg bags	Powder	1 000kg	N/A	N/A	Not hazardous[4]
Potassium nitrate[5]	Furnace Flux	25kg Bags	Powder	1t	5.1	III	Hazardous

Note 1: Identify Source
Note 2: IBC = integrated bulk container
Note 3: The composition of the bulk concentrate is given in Table 2.6; the DG class and Packing Group has been noted for lead sulfide
Note 4: Although not hazardous this chemical will require management.
Note 5: Hazardous material subjected to risk screening in accordance with SEPP 33 (see Appendix 4).
Note 6: Classes 1.5, 2.2 and 9 are excluded from risk screening in accordance with Applying SEPP 33 _ Hazardous and Offensive Development Application Guidelines (DoP, 2011)

Source: YTC Resources Limited

- Material Safety Data Sheets and appropriate spill management equipment would be kept in appropriate locations within the Project Site, including the vicinity of all chemical storage locations (see **Figure 2.2**).
- A *Hydrocarbon, Chemical and Reagent Management Plan*, including emergency management procedures, would be developed and implemented throughout the life of the Project.
- Personnel who will use chemicals would be provided with the appropriate training in the proper handling techniques.

Additional operational safeguards would be incorporated for the storage and use of sodium cyanide within the leach circuits for gold recovery. These are discussed in detail in Section 2.5.11.

2.5.11 Cyanide Management and Risk

A risk assessment undertaken for the transportation of sodium cyanide to the Project Site, its onsite storage and use in the ore processing operations is presented in **Appendix 4**. Hazard management and treatment measures have been proposed for the transport, storage and handling of sodium cyanide (see **Table A4.7** in **Appendix 4**) which, when implemented, would reduce the level of risk of the Project from 'potentially hazardous' to 'tolerable' level.

In addition, a *Hydrocarbon and Chemical Management Plan* would be prepared to describe in detail the storage, handling, use and management of sodium cyanide, including management of emergencies and spills. The following provides a brief overview of the measures that would be implemented.

Sodium cyanide, in the form 30% solution, would be transported from the manufacturing facility and received and stored within the Project Site in isotainers or containers designed specifically for the transportation and storage of hazardous materials. The sodium cyanide solution would be used directly from these isotainers for ore processing activities (see Sections 2.5.4 – 2.5.6). The risks associated with manual handling of sodium cyanide solution, including the risks associated with spills, would be significantly reduced through the purchase of sodium cyanide solution in the concentration required for ore processing, removing the requirement to prepare the solution on site from solid sodium cyanide.

All areas within the Processing Plant where cyanide solution would be stored or used would be appropriately bunded.

As noted in Section 2.5.6, the Proponent would ensure the concentration of WAD cyanide in tailings would be less than 10ppm. The document *Priority Existing Chemical Assessment Report No 31 – Sodium Cyanide* published by the Commonwealth Department of Health and Ageing (NICNAS, 2010) states that WAD cyanide concentrations of less than 10ppm in waters exposed to avifauna and terrestrial wildlife would not result in acute mortalities. That document classifies tailings storage facilities with less than 10ppm WAD cyanide concentrations as Category 1 facilities, where Category 1 represents the category with the lowest risk to the wildlife. NICNAS (2010) identifies that no cyanide-specific management or contingency measures are required. Notwithstanding this, the Proponent would regularly monitor levels of WAD cyanide at the point of discharge to the Tailings Storage Facility to ensure the commitments included in this document are achieved.

Destruction of WAD Cyanide would be achieved through the use of hydrogen peroxide. That reaction produces insoluble, non-biologically available cyanide complexes, water and oxygen during the destruction process. As a result, there would be no adverse environmental impacts associated with the cyanide destruction process.

Additional cyanide-related management controls would include the following.

- WAD cyanide concentrations within tailings on discharge to the Tailings Storage Facility, as well as within the decant pond, would be regularly monitored to ensure that WAD cyanide concentrations are at all times below 10ppm. Should the WAD cyanide concentration not be able to be maintained at 10ppm or less, the Proponent would cease mineral processing operations with cyanide until an effective management plan is developed and implemented.
- All pipes transferring tailing to the Tailings Storage Facility and supernatant water from the facility would be bunded to prevent discharge of cyanide-contaminated water to natural drainage..
- Seepage, if any, from the Tailings Storage Facility would be collected within the Seepage Collection Pond (see **Figure 2.4**) and pumped to the Tailings Storage Facility. The volume and composition of that water would be monitored and reported in the Project's Annual Environmental Management Report.
- The surface and groundwater monitoring programs would target cyanide species concentrations to detect seepage or discharge to natural drainage and appropriate contingency and management measures would be implemented to manage any unplanned discharges.

Finally, all cyanide management measures would be implemented prior to or at commencement of mineral processing operations.

2.6 TAILINGS MANAGEMENT

2.6.1 Introduction

This sub-section provides an overview of the proposed design of the Tailings Storage Facility and the procedures that would be used during tailings placement to ensure appropriate densities and compaction are achieved within the facility.

2.6.2 Tailings Storage Facility

2.6.2.1 Introduction

Ground ore material from which the metalliferous minerals have been removed (referred to as tailings), would be passed through a thickener to remove excess water from the material for reuse within the Processing Plant. The Proponent estimates that the remaining tailings slurry, which would be approximately 60% solids by weight, would be pumped into the Tailings Storage Facility.

The location of the Tailings Storage Facility is shown on **Figure 2.1.** The Proponent anticipates that the Tailings Storage Facility would be a "prescribed" dam and would be listed in Schedule 1 of the *Dams Safety Act 1978*. As a result, the facility would be constructed in accordance with the requirements of the NSW Dams Safety Committee.

2.6.2.2 Geotechnical Considerations, Design and Construction

The indicative design criteria for the facility are as follows.

- Maximum area of disturbance – approximately 43.8ha.
- Maximum embankment height – approximately 9m above the natural surface.
- Slope of outer face of the embankment – 1:3 (V:H).

Coffey Mining Limited has undertaken a preliminary geotechnical study for the Tailings Storage Facility, the resulting report is referred to hereafter as Coffey (2010). The study assessed the soil, rock and near-surface groundwater conditions within the Tailings Storage Facility, and included falling head permeability testing in five boreholes within the footprint.

Recommendations made as part of the geotechnical assessment would be implemented as described below.

- **Source of Construction Material**. Coffey (2010) estimate approximately 190 000m^3 of fill material would be available from within the Tailings Storage Facility footprint. The natural gravelly sandy clays available from within the Tailings Storage Facility footprint have been determined to be suitable for embankment construction, and as capping material for the facility during rehabilitation activities.
- **Embankment Construction**. The following would be implemented during embankment construction.
  - The construction works would use clayey materials from within the Tailings Storage Facility footprint. Adjustments of the moisture content of the materials would be made on a regular basis to maintain the optimal moisture content required to achieve the desired compaction level.
  - Embankment fill would be placed on the prepared surfaces in loose lift thicknesses not exceeding 300mm. The material would be placed such that the moisture content is within ±2% of the optimal moisture content in accordance with Australian Standard AS1289 – *Methods of testing soils for engineering purposes - General requirements and list of methods*.
  - Each layer within a lift would be compacted to a minimum of 95% of maximum dry density using standard compaction techniques in accordance with the above standard.
  - The *in situ* clay material would be used to line the floor and the embankment of the Tailings Storage Facility to ensure that no escape of the leachate into the groundwater occurs. Permeability testing of the *in situ* clay material from the proposed location the Tailings Storage Facility indicates extremely low *in situ* permeability in the order of $2x10^{-9}$ to $3x10^{-9}$m/s. The clay material would be left in place to a minimum depth of 1.0m to act as a natural liner for the Tailings Storage Facility.
  - Pipelines connecting the Tailings Storage Facility to the Processing Plant would be bunded to prevent discharge of tailings in the event of a burst pipe or similar.

- **Earthworks.** Earthworks quality assurance and quality control would be carried out in accordance with the following principles set out within Australian Standard AS3798-1966 (*Guidelines on Earthworks for Commercial and Residential Developments*).
  - The earthworks, including site preparation and seepage cut-off trench construction, would be supervised by a suitably qualified Geotechnical Engineer;
  - In order to reduce seepage losses, a cut-off trench would be excavated down to the weathered bedrock (approximately 0.8 to 1.5m below ground level) under the perimeter embankment. This cut-off trench would be back-filled with moisture-conditioned compacted clayey material as described previously.
- **Mitigation Measures and Environmental Monitoring**. Clean water diversion structures would be constructed up-slope of the facility to ensure that clean water does not flow onto the Tailings Storage Facility (see **Figure 2.4**). A Seepage Collection Pond and Collection Drain with an associated automated pumping system would be established down-slope of the Tailings Storage Facility. These structures, as well as the Tailings Storage Facility itself, would be constructed to capture and retain potentially contaminated water or divert clean water up to a 1 in 100 year rainfall event.
  - A series of monitoring piezometers would be installed at strategic locations in the vicinity of the facility to enable monitoring of the quality of the groundwater in the vicinity of the facility (see Section 2.5.11).

2.6.2.3 Staging of Construction

Construction of the Tailings Storage Facility would be staged. The following represents the capacity that would be achieved in three stages.

- Stage 1: 473 000m^3 (nominal. 2-year capacity).
- Stage 2: 584 000m^3 (nominal 2.5-year capacity).
- Stage 3: 635 000m^3 (nominal. 2.7-year capacity).

As noted above, the construction materials, where possible, would be sourced from within the Tailings Storage Facility footprint.

2.6.3 Tailings Volume

Stages 1 to 3 of the proposed Tailings Storage Facility have a combined maximum storage capacity of approximately 1.63 million cubic meters of material. The proposed Tailings Storage Facility would cater for all tailings material produced during the life of the Project.

2.6.4 Tailings Material Characteristics

Tailings material would comprise ground ore material with the majority of metalliferous minerals removed. The ore material would be ground to a nominal 80% passing 0.25mm particle size. The tailings material, therefore, would be relatively coarse grained and free draining.

Table 2.8 presents the results of chemical analyses of tailings generated from the metallurgical testing program. That data may be summarised as follows.

Tin is the only element that shows any significant enrichment in the tailings with a geochemical abundance index of 4. However, this is not considered to be an environmental risk as tin is a stable element.

Arsenic, lead and antimony contents in the tailings slurry showed moderate enrichment within the tailings with a geochemical abundance index of 3. This, however, is common for tailings material from polymetallic deposits and, given the proposed tailings management measures, is not considered to be an environmental risk.

Table 2.9 presents the results of test work for acid forming potential of the tailings. The results of that work may be summarised as follows

An acid forming potential value of 1.24 signals high potential for acid formation. However, the sulfide concentration of the tailings 0.28% is very low. As a result, the risk of significant acid generation from the Tailings Storage Facility is considered negligible.

The Net Acid Producing Potential (NAPP) of – 2.0kg H_2SO_4 per tonne of ore indicates the tailings would possess an excess buffering capacity which would mitigate any acid formation.

Finally, the tailings material, including the supernatant solution, is expected to have a weak acid dissociable (WAD) cyanide concentration of less than 10ppm. This cyanide concentration would afford a high level of protection to avifauna and terrestrial wildlife and would classify the proposed Tailings Storage Facility as Category 1, the lowest risk category under NICNAS (2010) (see Section 2.5.11)..

2.6.5 Operation of the Tailings Storage Facility

Tailings material, in the form of thickened slurry, would be pumped from the Processing Plant and discharged to the Tailings Storage Facility from a series of raised spigots or outlets along the western margin of each stage of the facility. The tailings solids would settle from the thickened slurry and a proportion of the water would flow to a decant pond in the western section of the facility from where it would be collected and returned to the Processing Plant for reuse.

This placement procedure also allows for an appropriate tailings density to be established, ensuring the ongoing stability of the Tailings Storage Facility, as well as construction of a water shedding landform without the requirement for major earthworks at the end of the life of the Project.

Table 2.8
Tailings Composition

Element	Element Content	Average Crustal Abundance	Geochemical Abundance Index (GAI)[1]
Aluminium (%)	4.20	8.20	0
Calcium (%)	0.25	4.10	0
Iron (%)	2.27	4.10	0
Potassium (%)	1.83	2.10	0
Magnesium (%)	1.03	2.30	0
Sodium (%)	0.01	2.30	0
Molybdenum (ppm)	10	1.5	2
Arsenic (ppm)	20	1.5	3
Lead (ppm)	235	14	3
Radium (ppm)	0.00	0	0
Antimony (ppm)	3.20	0.2	3
Selenium (ppm)	<5	0.05	0
Tin (ppm)	100	2.2	4
Boron (ppm)	44	10	1
Barium (ppm)	290	500	0
Bismuth (ppm)	<10	0.048	0
Cadmium (ppm)	<5	0.11	0
Cobalt (ppm)	5	20	0
Chromium (ppm)	210	100	0
Copper (ppm)	38	50	0
Fluorine (ppm)	670	950	0
Mercury (ppm)	0.2	0.05	1
Manganese (ppm)	1000	950	0
Molybdenum (ppm)	10	1.5	0
Nickel (ppm)	65	80	0
Phosphorus (ppm)	400	1000	0
Selenium (ppm)	3.2	0.05	0
Strontium (ppm)	100	370	0
Thorium (ppm)	20	12	0
Titanium (ppm)	6.9	0.6	0
Uranium (ppm)	0	2.4	0
Vanadium (ppm)	2	160	0
Zinc (ppm)	50	75	0

Note 1: Provides a measure of the sample element content compared with the average crustal abundance.

Source: Coffey Geotechnics

Table 2.9
Results for Acid Formation Potential

Parameter	Quantity
Sulfide sulfur content	0.28%
Maximum Potential Acidity (MPA)	8.54kg H_2SO_4 / t ore
Acid Neutralisation Capacity (ANC)	10.6kg H_2SO_4 / tore
Net Acid Producing Potential (NAPP)	–2.06kg H_2SO_4 / tore
Net Acid Generating (NAG)	6.32kg H_2SO_4 / t ore
Acid Forming Potential (ANC to MPA ratio)	1.24

Source: YTC Resources Limited

2.6.6 Monitoring of the Tailings Storage Facility

The Proponent would implement surface water management measures and surface water and groundwater monitoring program during the operation of the Tailings Storage Facility and until rehabilitation of the facility has been completed. Indicatively this would include the following (**Figure 2.4**).

- Diversion of surface water flows around the facility to separate clean and contaminated water.
- Collection of any seepage using a seepage collection drain, to be located to the west of, and down-slope of the facility. This structure would be excavated to an appropriate depth to ensure that any seepage from beneath the perimeter embankment is captured within the drain and transferred to the Seepage Collection Pond.
- Pumping of any collected seepage back into the facility using an automated pump.
- Monitoring of water collected within the Seepage Collection Pond to determine the quality of that water.
- Monitoring of a range of piezometers that would be constructed to the west of the seepage collection drain to detect any seepage from the facility into shallow ground water.

The results of that monitoring program would be analysed as they are received and contingency plans would be implemented to manage any seepage from the facility to ensure that there is no adverse environmental impacts associated with the facility. The results of that monitoring program would also be presented annually in the AEMR for the Project.

2.7 WASTE ROCK MANAGEMENT

2.7.1 Introduction

This sub-section provides an overview of the characteristics of the waste rock material, the design of the Waste Rock Emplacement and the procedures that would be implemented during placement operations.

During initial mining operations, material that contains insufficient metalliferous minerals to justify processing would be extracted and placed within the temporary Waste Rock Emplacement or, for non-acid generating material, used during site establishment operations (**Figure 2.1**).Once mining operations have progressed sufficiently, waste rock material would typically be placed within completed stopes underground and would not be bought to the surface. In addition, waste rock material stockpiled within the temporary Waste Rock Emplacement would be transported back underground and placed within completed stopes.

2.7.2 Waste Rock Characteristics

Rock and samples from drill core in the vicinity of the proposed exploration decline, box cut, ventilation rise and the ore body have been analysed and characterised for acid rock drainage (ARD) potential, specifically to determine the Net Acid Production Potential (NAPP) and Net Acid Generation (NAG) characteristic (GeoTerra (2006); RWC (2006)).

Conclusions reached on the acid rock generation characteristics from the assessments conducted are as follows.

- Samples tested showed low acid neutralisation potential.
- Waste rock from the box cut, ventilation rises and exploration decline, being predominantly unweathered siltstone, have low NAPP and NAG values and have been characterised as non-acid forming to uncertain.
- The ore body samples or samples acquired close to the ore body are potentially acid forming due to the sulfide contents of these samples.

Using the ARD assessment of all samples analysed it was conservatively estimated (Triako Resources Limited 2006) that approximately 30% of the waste rock recovered during various activities would be Potentially Acid Forming and the remaining approximately 70% would be non-acid forming.

2.7.3 Waste Rock Emplacement Design and Leachate Management

The temporary Waste Rock Emplacement would have the following indicative design components (**Figure 2.2**).

- Area – approximately 2.6ha.
- Capacity – approximately 100 000m^3.
- Maximum elevation –approximately 10m higher than the existing surface.
- Outer slope – approximately 1:4 (V:H) or 14°.

In order to firstly avoid the generation of any acidic leachate from the stockpiled waste rock and secondly to manage any such leachate generated, the following management measures would be implemented.

- All waste rock material would be classified as non-acid forming or potentially acid forming prior to extraction and transportation to the surface.
- The temporary Waste Rock Emplacement would be constructed in two cells. One cell would be for non-acid forming waste rock, while the second would be for potentially acid forming waste rock.
- The potentially acid-forming waste rock encapsulation area would be constructed in a manner that would prevent potentially acidic leachate from being discharged. In summary this would include the following design parameters.
  - The footprint of the cell would either be extracted to bedrock or lined with material established through testing to be acid neutralising.
  - A bund would be constructed around the perimeter of the cell to capture and divert any potentially acidic leachate to the Leachate Management Pond and to divert any other surface water away from the cell. These structures would be designed to cater for a 1 in 100 year rainfall event.
  - Any water that collects within the Leachate Management Pond would be pumped to the Process Water Dam for use within the Processing Plant.

- Potentially acid forming waste rock would preferentially be transported underground for placement within stopes (see Section 2.4.4.3). Potentially acid forming waste rock placed on the surface would not be encapsulated because it would be stockpiled on surface for a short period only and clay material used for encapsulation would have adverse impacts during stope backfilling operations. Once placed within completed stopes, the potential for further generation of acidic leachate would be limited as a result of the limited availability of oxygen for oxidation reactions.
- Water quality monitoring and visual inspections of the Leachate Management Pond would be undertaken regularly during the life of the emplacement to identify any issues with the proposed management measures.

2.7.4 Waste Rock Emplacement, Processing and Reclamation Procedures

Waste rock material excavated placed within the temporary Waste Rock Emplacement would initially be ‘paddock dumped’ in the appropriate cells in layers of approximately 3m high. Once the initial waste rock material has been emplaced, further material would be emplaced using either ‘paddock dumping’ or ‘face tipping’ methods.

The upper edges or crest of the Waste Rock Emplacement would be bunded throughout its construction, with a bund at least half the height of the wheel of the largest piece of mobile equipment, in accordance with applicable safety requirements and standards.

Where appropriate, non-acid forming waste rock material would be transported directly to other sections of the Project Site for use during infrastructure establishment, principally for construction of the Tailings Storage Facility embankment. The waste rock could also be used during construction of other infrastructure, including the site access roads, and other tracks and the proposed hardstand areas.

Non-acid forming waste rock material may be crushed further using a mobile crushing plant, possibly including screening facilities, brought to the Project Site on a campaign basis, prior to its use in site infrastructure establishment. The crushing plant would be located within the footprint of the temporary Waste Rock Emplacement. Alternatively, this material may be crushed using the proposed crushing facilities within the Processing Plant, once constructed.

Finally, waste rock material not used to establish surface infrastructure would be reclaimed and transported back underground using an excavator and / or front-end loader and underground haul trucks and used during backfilling operations as described in Section 2.4.4.3. Once all waste rock has been removed, the footprint of the temporary Waste Rock Emplacement would be rehabilitated as described in Section 2.15.

2.7.5 Waste Rock Balance

The waste rock balance during the life of the Project is presented in **Table 2.10**. The Proponent anticipates that approximately 280 000m^3 of waste rock would be generated during the life of the Project. Approximately 140 000m^3 of waste rock material would be used during site establishment operations and a further 100 000m^3 of waste rock would be used during stope backfilling operations. The remaining 40 000m^3 would be used for the construction of site access roads (30 000m^3) and the Tailings Storage Facility (10 000m^3). As a result, there would be no waste rock surplus during the life of the Project and no waste rock material would remain on the surface at the completion of mining operations.

Table 2.10
Waste Rock Balance

Item	Volume (m^3)	
	Source	Sink[1]
Box cut, Portal and Decline	50 000	–
Laydown Area	30 000	–
Underground Operational Waste Rock	200 000	–
Site Access Roads	–	30 000
ROM Pad	–	100 000
Tailings Storage Facility	–	10 000
Stope Backfill	–	140 000
Total	**280 000**	**280 000**

Note 1: Material used for construction of site infrastructure would be non-acid forming.

Source: YTC Resources Limited

2.8 NON-PRODUCTION WASTE MANAGEMENT

Non-production waste would be managed in accordance with Clause 46K(1) of the *Protection of the Environment Operations (Waste) Regulation 2005* and the *NSW Waste Avoidance and Resource Recovery Strategy 2007* which was prepared with regard to the *Waste Avoidance and Resource Recovery Act 2001*. The underlying principle for all waste management would be to minimise waste generation, to recover, reuse and to recycle waste materials as much as possible, and to reduce environmental harm in accordance with the principles of ecologically sustainable development.

Estimates of the non-production wastes that would be generated per year during the life of the Project, as well as descriptions of how that waste would be stored, managed and subsequently removed from the Project Site are provided in **Table 2.11**.

In addition, the Proponent would implement a purchasing policy that would take into account waste management and would, where practicable, purchase products that would result in the least waste generation. The Proponent would also ensure that all recyclable materials would, where practicable, be recycled on site or would be transported to an appropriate recycling facility.

Table 2.11
Non-Production Waste Management

Waste Type	Anticipated Maximum Quantity Generated/year	Storage	Removal Method
General solid waste (putrescible), including food scraps and inert materials	20t	Covered bins located within lunch rooms, offices, the camp site and elsewhere as required. Where these bins would be located in open areas, they would be fitted with animal-proof lids.	Collected on a regular basis by licensed waste contractor and transported to a licensed waste disposal facility.
Waste oils and greases	6t	Placed within bunded tank(s) within the workshop area.	Collected on a regular basis by a licensed waste contractor and transported to an appropriately licensed facility.
Batteries and tyres	40t	Batteries would be placed within a covered and marked used battery storage area until removed from site. Tyres would be placed within a marked used tyre storage area until removed from site or used for another purpose.	Batteries would be collected on a regular basis by a licensed disposal contractor and recycled. Tyres would be reused on site for construction of retaining walls, erosion protection, traffic control or would be removed from site for reuse elsewhere or recycling.
Scrap Steel /Metal	10t	Stored in a specified areas within the workshop area or elsewhere such as the laydown area, as required.	Collected on a regular basis by a scrap metal recycler.
General Recyclables	5t	Covered bins located within lunch rooms, offices, camp site and elsewhere as required. Where these bins are located outside a closed building they would be fitted with animal-proof lids.	Collected on a regular basis by a licensed recycling contractor and transported to an appropriate recycling facility.
Waste water	5ML	Waste water from ablutions facilities within the Surface Facilities Area would be treated within a 'biocycle' treatment facility and the treated water would be used for suppression of dust in areas undergoing rehabilitation within the Project Site. Treatment of waste water within the Mine Camp is presented in Section 2.10.4.5.	
Source: YTC Resources Limited			

2.9 TRANSPORTATION

2.9.1 Project Site Transportation

2.9.1.1 Internal Road Network

The Existing Site Entrance and Light Vehicle Access Road are proposed to be used principally for light vehicle and light truck access to the Project Site, mainly to the Mine Camp. A sign, indicating that the Existing Site Entrance and the Light Vehicle Access Road are only to be used by light vehicles would be erected in the vicinity of the intersection on Burthong Road.

The Main Site Entrance and Main Site Access Road would be used by both light and heavy vehicles for access to all areas of the Project Site. Construction of the Main Site Entrance and Main Site Access Road is presented in Section 2.2.3.

A range of existing internal road network and other roads would continue to be utilised or would be upgraded or constructed during and following site establishment, and would comprise the following.

- Unsealed haul roads, including a haul road from the box cut to the ROM pad; and
- Various unsealed access tracks to permit access to other sections of the Project Site, including the temporary Waste Rock Emplacement, Tailings Storage Facility, the magazine, workshop and surface water dams.

The unsealed haul roads would cater for both light and heavy vehicles while other roads would principally cater for light vehicle traffic.

2.9.1.2 Separation of Mine and Non-mine Traffic

The Proponent would ensure adequate separation of all mine and non-mine traffic through the use of measures including a security gate and fencing in the vicinity of the Proponent's site office. Access to active sections of the Project Site would be restricted to approved vehicles and drivers.

All non-mine traffic would be required to report to the Proponent's site office and register with the Proponent prior to proceeding to other sections of the Project Site. Non-approved vehicles or drivers requiring access to the Project Site would be escorted by Project personnel or persons approved by the Proponent.

2.9.2 External Transportation

2.9.2.1 External Road Network

The Proponent anticipates that there would be three principal transportation routes to access the Project Site as follows (**Figure 2.10**).

- From the northwest, or southwest via Kidman Way, Priory Tank Road and Burthong Road.
- From the southeast via Nymagee-Condobolin Road, Milford Street, Harwood Street and Burthong Road.
- From the northeast via the Barrier Highway, Hermidale – Nymagee Road, Milford Street, Harwood Street and Burthong Road.

In addition, the Proponent notes that limited numbers of local traffic may approach the Project Site from the south via Burthong Road.

The Proponent anticipates that 90% of light vehicles and all heavy vehicles accessing the Project Site would do so from the north and west via Kidman Way, Priory Tank Road and Burthong Road. The Proponent would actively discourage any heavy vehicles from using other roads, through contractual arrangements and a Driver's Code of Conduct.

Finally, the Proponent would require that all persons accessing the Project Site to comply with restrictions on use of the Hermidale – Nymagee Road imposed by Cobar Shire Council.

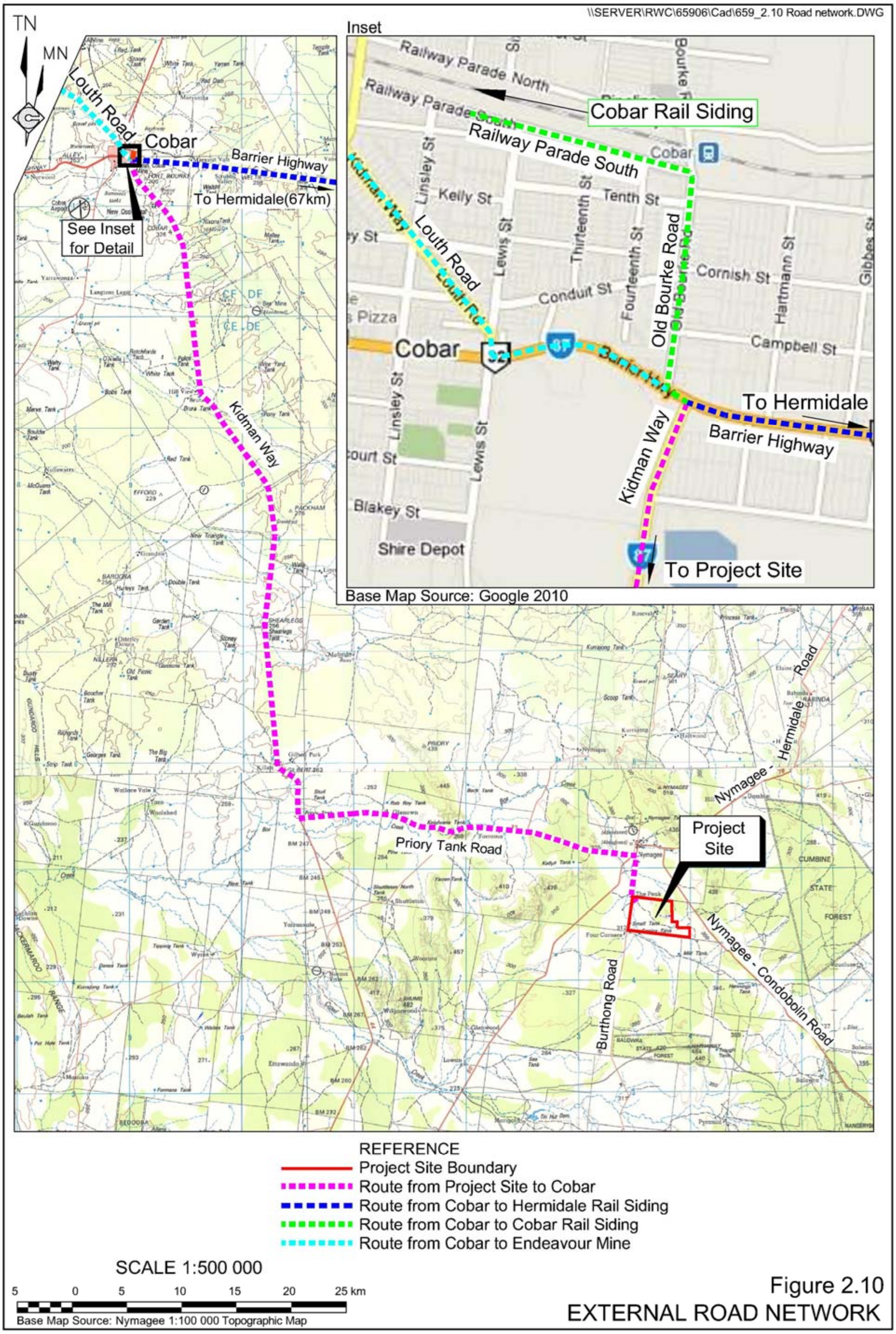

Figure 2.10
EXTERNAL ROAD NETWORK

2.9.2.2 Product Transportation Routes

Figure 2.10 presents the proposed heavy vehicle transportation route. In summary, the route would utilise the Burthong and Priory Tank Roads and the Kidman Way between the Project Site and Cobar. The Proponent understands that Burthong and Priory Tank Roads are local roads and that the Kidman Way is a State road, funded by the RTA.

The Proponent would ensure that all heavy vehicles accessing the Project Site, including those transporting concentrate, would use the proposed heavy vehicle assess route. An assessment of the proposed heavy vehicle transportation route is provided in Section 4.9.

From Cobar, the transportation route for concentrate will depend on the final market for that concentrate. However, it is likely that final markets would be overseas smelters. As a result, concentrate product would most likely be exported from the port of Newcastle. Concentrate product would be transported to the port via rail, with the material loaded onto rail at one of the following locations. The road transportation route from Cobar is indicated in parenthesis.

- Endeavour Mine (via the Louth Road).
- Hermidale Siding (via the Barrier Highway)
- Cobar siding (via Old Bourke Road and Railway Parade South).

In the event that rail transportation is not practicable, the bulk concentrate would be transported via the State Highway network.

For the purposes of the traffic assessment, Traffic Solutions (2011) have assessed transportation to Cobar. The Proponent notes that transportation to Endeavor Mine and Hermidale from Cobar is via the State highway network.

2.9.3 Traffic Types and Levels

Traffic types associated with the Project would include the following.

- Light vehicles – including passenger vehicles and light trucks and buses. It is noted that limited numbers of light vehicles would be required to transport Project-related employees because the majority would be accommodated within the Mine Camp.
- Heavy vehicles – including rigid trucks, semi-trailers and B-Doubles delivering consumables and supplies to the Project Site and transporting concentrate to the Proponent's customers.
- Oversize and overweight vehicles – delivering components of the Processing Plant and mobile fleet, primarily during construction operations. The Proponent would ensure that all oversize and overweight vehicles would have the appropriate permits and approvals and would be appropriately escorted, when required.

Table 2.12 presents the anticipated vehicle movements during the construction and operation stages of the Project.

Table 2.12
Anticipated Vehicle Movements

Vehicle Type	Anticipated 85th Percentile Daily Movements[1]
Construction Phase	
Light Vehicles	40
Heavy Vehicles[2]	10
Oversize/Overweight Vehicles[3]	2
Operational Phase	
Light Vehicles	30
Heavy Vehicles[2]	6
Oversize/Overweight Vehicles[3]	nil
Note 1: One return trip = two movements Note 2: Includes semi-trailers and B-Double trucks and road trains Note 3: The Proponent would ensure that oversize and overweight vehicles would have the appropriate permits and approvals and would be appropriately escorted, when required	
Source: YTC Resources Limited	

2.10 MINE CAMP ESTABLISHMENT AND OPERATION

2.10.1 Introduction

This sub-section provides an overview of the establishment and operation of the Mine Camp that would accommodate the Proponent's employees and contractors during the site establishment and operational phases of the Project. All components of the Mine Camp will be demountable and transportable structures that will be removed from the Project Site on completion of the Project.

The Proponent currently accommodates personnel involved in the exploration activities in 'The Peak' homestead. This existing facility would continue to be used for temporary accommodation for a limited number of personnel.

The Proponent proposes to provide onsite accommodation for Project-related personnel on a drive-in/drive-out basis. It is anticipated that these personnel would work on a two weeks on and one week off roster, or similar.

2.10.2 Accommodation Facilities

The Mine Camp would have a total capacity to accommodate approximately 72 persons. This would comprise accommodation for 60 full-time mine personnel, plus an overflow accommodation provision for 12 persons. The accommodation has been designed around a central open space area.

The Mine Camp would primarily be used by mine personnel during their rostered work periods, as well as for other personnel as required. The Mine Camp would also be available for all personnel to rest prior to travelling back to their homes.

A layout for the Mine Camp is presented in **Figure 2.11** and may be summarised as follows.

- Thirty two two-bed cabins for fulltime mine personnel and three four-bed overflow cabins that would provide temporary accommodation to visitors, contractors etc.
- A water treatment facility such as a reverse osmosis plant for treatment of groundwater for use as potable water.
- Ablutions facilities within each cabin serviced by appropriately sized rainwater tanks and a communal biocycle or similar waste water management system.
- A Mess Hall containing a commercial kitchen and dining area.
- A Communal Room and outside grassed area for recreation.
- Additional toilet facilities in the vicinity of the Mess Hall and the Communal Room.
- Facilities for laundering (both personal and communal).
- A communal car park.

Wherever practicable vegetation will be retained during construction of the Mine Camp to provide shade to the cabins and other buildings within the Mine Camp, and generally afford a scenic character overall to the Mine Camp.

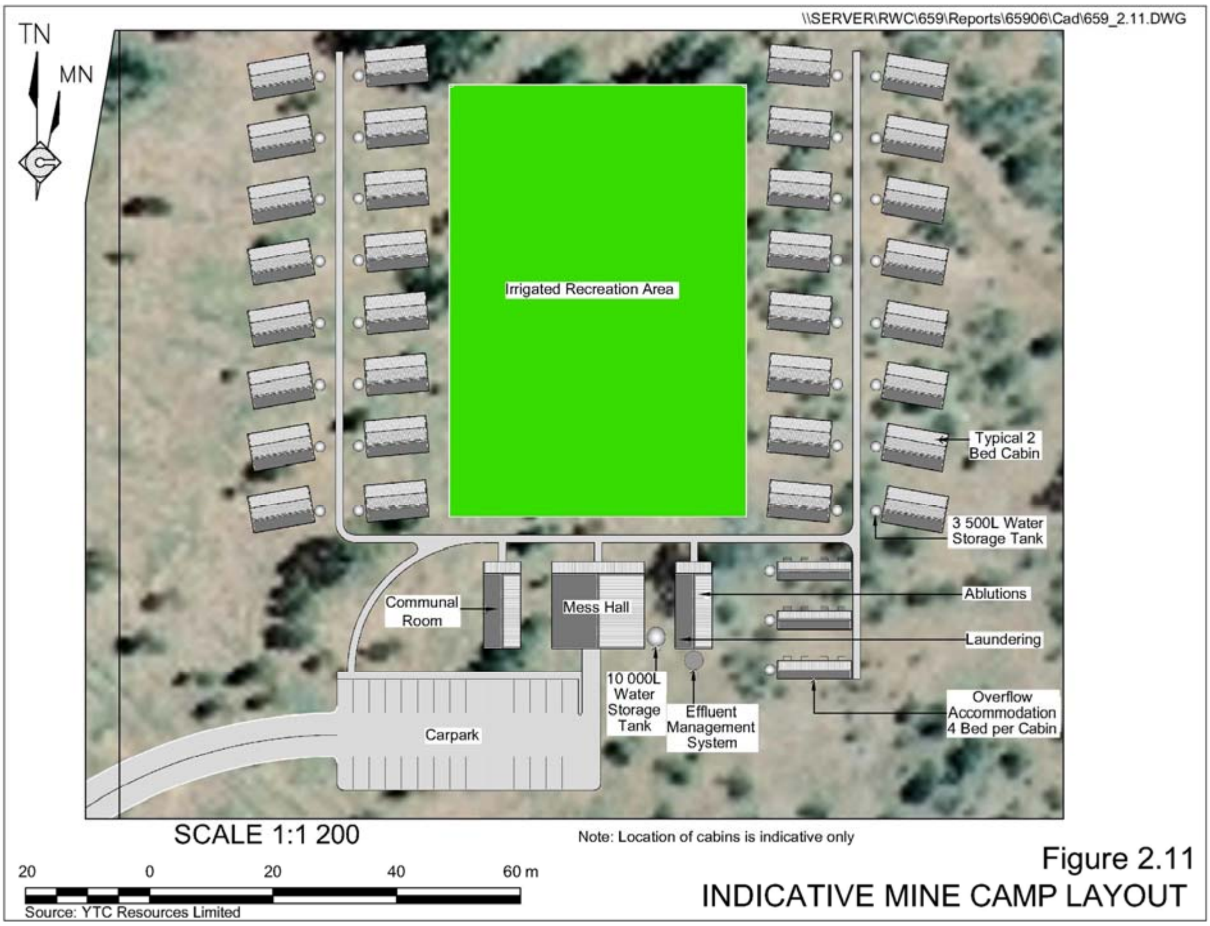

Figure 2.11
INDICATIVE MINE CAMP LAYOUT

2.10.3 Mine Camp Site Access and Personnel Transportation

Access to the Mine Camp site would be via the Light Vehicle Access Road and the Mine Camp Access Road (see **Figure 2.1**).

It is envisaged that between 50% and 80% of the mine personnel would be accommodated within the Mine Camp and would use their own private vehicles to access the Project Site at the start and finish of each rotation, with the remaining using the minibus service that would be organised by the Proponent between the Project Site and Cobar.

2.10.4 Mine Camp Services

2.10.4.1 Electricity

A dedicated diesel generator with a nominal capacity of 22kVA would be installed in the vicinity of the Mine Camp to supply power to the entire Mine Camp for lighting, heating and cooling.

2.10.4.2 Gas

LPG gas would be used for cooking within the Mess Hall. LPG cylinders would be located in the vicinity of the Mess Hall and would be transported to the Project Site as required.

2.10.4.3 Potable Water

The Proponent estimates that total potable water requirements for the Mine Camp would be as follows.

- Approximately 0.63ML/year for use in the kitchen.
- Approximately 55kL/year per person for ablutions, washing and other personal use. This would equate to an annual use of approximately 4ML/year should the Mine Camp be fully occupied for the entire year.

This water would be obtained from two sources, namely rainwater tanks connected to each cabin and groundwater, the latter would be stored in a 10 000L Water Storage Tank (see **Figure 2.11**). Geolyse, who undertook the preliminary design for the Mine Camp, established that on average, approximately 0.6ML of water per year would be able to be collected and stored from the roofs of structures within the Mine Camp. This water would be used in preference to treated groundwater. Groundwater would be treated using a reverse osmosis plant located within the surface facilities area before use.. Treated water would be transferred to the Mine Camp via buried pipeline.

2.10.4.4 Communications

Communications within the Mine Camp and between the Mine Camp areas outside the Project Site would be via mobile phones and land lines.

2.10.4.5 Waste Water

It is estimated that the Mine Camp would generate up to approximately 4.6ML of waste water per year. An onsite aerated 'biocycle' wastewater treatment system would be installed within the Mine Camp. The resulting treated water would be used to irrigate the central grassed recreation area. Geolyse state that the proposed area of the recreation area is sufficiently large to enable adequate management of the anticipated waste water.

2.10.4.6 Solid Waste

Solid waste generated within the Mine Camp would comprise the following.

- Putrescible Waste, namely food waste and screenings from the sewage treatment plant;
- Non-putrescible waste, namely paper or cardboard, glass, rubber, etc.

This material would be collected as required by a suitably licenced contractor and transported to a licenced facility in Cobar. Recyclable material would be recycled where appropriate facilities exist in Cobar to accept that material.

2.10.4.7 Fire Safeguards

Geolyse advise that fire protection Mine Camp would comprise fire alarms, hydrants and fire extinguishers and that sprinklers and other fire fighting infrastructure would net be required.

2.11 FACILITIES AND SERVICES

2.11.1 Introduction

This sub-section describes facilities and services that the Proponent would establish within the Project Site to support the proposed mining and processing operations (**Figures 2.1** and **2.2**). Facilities and services that would be constructed to support the Mine Camp are described in Section 2.10.

2.11.2 Facilities

2.11.2.1 Introduction

The Proponent would establish the following facilities within the Project Site.

- Proponent's site office and car park.
- Contractors Office, Laydown area and workshop.
- Reagent Store, plant workshop, ablutions facilities, crib room, hardstand and laydown areas.
- A concentrate storage shed.
- An explosives magazine.

These facilities are described in detail below.

The Proponent would continue to utilise the existing exploration office and core store and processing facility. These facilities may be expanded through construction of further core processing or storage facilities. .

2.11.2.2 Proponent's Site Office and Car Park

The office and car park would be constructed during the initial stage of the Project, and would comprise the following components.

- A series of demountable buildings that would comprise the Proponent's site offices, including an engineering office, a geology office, first aid room, security and meeting rooms.
- An unsealed car park.

The Proponent's site office area would be located adjacent to the site access road and all visitors to the Project Site would be required to report to the office and register with the Proponent prior to being permitted to access the active sections of the Project Site.

2.11.2.3 Contractor's Office, Laydown Area and Workshop

The Proponent or a mining contractor would construct an office, laydown area and mobile fleet workshop during the initial stages of the Project. This would comprise the following components.

- A series of demountable buildings that would form the contractor's offices.
- A colour bond shed or similar on an appropriately sized concrete slab that would be used as the contractor's mobile fleet workshop. The shed would be equipped with appropriate bunded areas for the storage of hydrocarbons and all surface water runoff, including from aprons surrounding the building, would be directed to an oil/water separator.
- A laydown hardstand area for mobile equipment.
- A vehicle wash-down area.

2.11.2.4 Reagent Store, Plant Workshop and Associated Facilities

The Proponent would establish a workshop and laydown area comprising the following components.

- One or more workshop buildings, including a concrete sealed floor. The shed would be equipped with appropriate bunded areas for the storage of hydrocarbons and all surface water runoff, including from aprons surrounding the building, would be directed to an oil/water separator. The workshop would principally be used for maintenance of Processing Plant equipment and stores.
- A reagent store, incorporating a building with a concrete sealed floor and bunded as described previously. The reagent store would include separate bunded areas for liquid reagents and all reagents would be stored in a manner that is consistent with the MSDS for each chemical.
- An ablutions facility providing toilet and washing facilities.
- A crib or lunch room for meal breaks and tool box meetings.
- A laboratory for ore and other analyses etc.
- A laydown area for storage of excess equipment awaiting use or removal from site, or parking of mobile equipment.

2.11.2.5 Concentrate Storage Area

The Proponent would construct a concentrate storage area adjacent to the Processing Plant comprising the following components.

- A covered, concrete-sealed storage area.
- Surface water controls to ensure complete containment of all surface water within the storage area for reuse within the Processing Plant.
- A loading area and weighbridge for loading of concentrate into road trucks for transportation to the Proponent's customers.

2.11.2.6 Explosives Magazine

The Proponent would construct an Explosives Magazine. The location of the explosives magazine is not identified in the Project Site layout at the request of the Department of Planning and Infrastructure.

The explosives magazine would comprise one or more transportable structures and would comply with all required standards and guidelines. Earthen bunds between the magazines would be constructed using material stripped from the footprint of the magazine during site preparation. The magazines would be securely fenced and locked to meet all relevant standards.

A WorkCover licence would be obtained for the storage of explosives within the magazines, and the magazines and their contents would be managed in strict accordance with the requirements of that licence, including the minimisation of fire risk through bunding and clearing of vegetation in the immediate vicinity of the magazines.

The safety and security issues associated with the proposed explosives storage area are discussed in Section 2.14.

2.11.3 Services

2.11.3.1 Introduction

The Proponent would establish the following services within the Project Site to support the proposed mining and processing operations.

- Electricity distribution network.
- Communications infrastructure.
- Hydrocarbon storage infrastructure.
- Potable, waste water and operational water infrastructure.

These services are described in more detail below.

2.11.3.2 Electricity Distribution Network

Power for the Processing Plant, the various buildings and communication system within the Project Site, underground infrastructure including dewatering pumps, ventilation fans, and other infrastructure would be provided by two diesel-powered generators with a combined capacity of 3.5MW. A series of distribution systems including substations, transformers and transmission lines, would be installed to distribute the electricity within the Surface Facilities Area. The electrical generation and distribution equipment would be managed by an appropriately qualified, licensed and experienced electrical engineer.

2.11.3.3 Communications

The Proponent's office, Processing Plant, underground mine and contractors' offices would be serviced by telephone and data lines. These services may be provided via a satellite or wireless link. In addition, surface communications within the remainder of the Project Site would be via two-way radio and/or mobile phones. Underground communications would be via a digital radio network.

2.11.3.4 Hydrocarbons

All diesel fuel for the generators and mobile equipment would be stored in tanks with a total indicative capacity of approximately 110 000L within a concrete-sealed and bunded Fuel Storage and Refuelling Area (**Figure 2.2**). Bunding would be sized to meet the relevant containment requirements and Australian Standard AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*, namely the bunded areas would have a capacity of 110% of the volume of the largest tank.

A sealed refuelling area would be located adjacent to the fuel tanks with all drainage directed to an oil/water separator. All haul trucks and other mobile equipment that would regularly access the Surface Facilities Area would utilise the refuelling area while the jumbos, underground loaders, pumps and other less mobile equipment would be refuelled at locations using a mobile fuel tanker or tray-mounted fuel tanks.

Any bulk oils, greases and waste oils would be stored within the Refuelling Area. In addition, smaller bunded areas would be maintained within the workshop areas for the storage of hydrocarbons or waste oils to be used or generated during servicing operations.

Appropriate hydrocarbon spill kits would be located in the vicinity of all hydrocarbon storage areas and the Proponent would ensure that all contractors and employees are appropriately trained in their use.

2.11.3.5 Potable Water

Potable water is currently collected from all available roof surfaces into rainwater tanks, and this arrangement would continue during the life of the Project. All new buildings with suitable roof surfaces would be fitted with guttering and rainwater tanks as additional potable water sources.

Potable water for use within the Mine Camp and elsewhere within the Project Site would be sourced from rainwater tanks (see Section 2.10.4.3). Given the highly variable rainfall patterns within the Project Site, the Proponent would construct a potable water treatment facility for the treatment of groundwater capable of providing the entire potable water requirements for the Project Site. This treatment facility would be established within the Surface Facilities Area (**Figure 2.2**). Power for the treatment facility would be provided by the generators located within the Surface Facilities Area, and the brine produced by the treatment facility would be transferred to the Process Water Dam for use within the processing operations.

Potable water from the potable water treatment facility would be transferred to the Mine Camp and elsewhere within the Project Site via a buried pipeline. Additional potable water may be transported in bulk to the Project Site, if required. Operational Water

2.11.3.6 Operational Water

Operational water requirements comprising water for processing, dust suppression, underground mining operations and workshop wash down purposes are estimated to be up to approximately 187ML per year.

This water would be obtained in priority order from the following sources (**Figure 2.1**).

- Groundwater sourced from dewatering operations within the proposed mine.
- Stormwater run-off stored in the Three Gates Tank either following treatment in the settling ponds or captured directly.
- Stormwater run-off stored in the proposed expanded Pete's Tank or the proposed Back Tank East. These dams would store approximately 20ML and 90ML of water, respectively.
- Groundwater sourced primarily from four bores located within the Project Site namely, Back Bore and Bores WB8, WB11 and WB13.

Additional information on the sourcing of water to meet operational water supply requirements including groundwater extraction is presented in Section 2.2.5.

2.11.3.7 Ablutions Water

Water for ablutions purposes such as flushing of toilets would be sourced from the Three Gates Tank or the Raw Water Dam.

2.11.3.8 Onsite Waste Water Treatment

Two separate waste water treatment systems would be installed within the Project Site, one within the Mine Camp (see Section 2.10.4.5) and another smaller facility within the Surface Facilities Area. In both cases waste water treatment would use suitably designed and certified aerated 'biocycle' wastewater systems. The treated water from the Mine Camp facility would be used for irrigation of the Mine Camp's central grassed recreation area, and treated water from the Surface Facilities Area treatment facility would be used for irrigation of landscaped areas within the Surface Facilities Area.

2.11.3.9 Dust Suppression Water

Water required for dust suppression would be sourced from the Raw Water Dam located within the Surface Facilities Area.

2.12 PROJECT LIFE AND HOURS OF OPERATION

2.12.1 Project Life

The Proponent anticipates that site establishment, including establishment of the box cut and decline and completion of resource definition drilling operations from the decline, would take up to two years. Ore mining operations would commence in the second year of the Project and would require approximately five and half years to complete (see **Table 2.4**), with a further two years required for site decommissioning and rehabilitation. As a result, the proposed Project life would be nine years.

The Proponent, however, notes that throughout the life of the Project, the Company would continue to explore for possible extensions to the known mineralisation and for new areas of mineralisation within its mineral authorities. Further, ore reserves indicated in this Project may extend the Project life, in which case separate applications for approval to extract that material would be made at that time.

2.12.2 Hours of Operation

The proposed hours of operation for each of the relevant components of the Project are given in **Table 2.13**.

Table 2.13
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation[1]
Vegetation clearing and topsoil stripping	7 days a week, during each campaign	7:00 am to 6.00 pm
Construction operations – Box cut	7 days a week	7:00 am to 6.00 pm
Construction operations – Remainder	7 days a week	24 hours per day
Underground mining operations	7 days a week	24 hours per day
Maintenance operations	7 days a week	24 hours per day
Processing operations	7 days a week	24 hours per day
Transportation operations	7 days a week	7:00 am to 10.00 pm
Rehabilitation operations	7 days a week	7:00 am to 6.00 pm
Source: YTC Resources Limited		

2.13 EMPLOYMENT, CAPITAL COST AND ECONOMIC CONTRIBUTIONS

The Proponent estimates that the Project would make the following employment and economic contributions to the surrounding communities.

- Approximately 100 full-time equivalent positions during the construction phase of the Project. It is noted that with the proposed drive-in/drive-out roster, that not all employees or contractors would be on site at the same time.
- Up to approximately 100 full-time equivalent positions during the operational phase. This would be divided between employees of the Proponent (approximately 40 full-time equivalent) and approximately 60 mining personnel. The Proponent envisages that mine personnel would typically work on two shifts starting and finishing at 7:00am and 7:00pm on a one week on, one week off (or similar) roster. Other personnel would work dayshift only, with some personnel working Monday to Friday.
- The capital cost of the Project is anticipated to be approximately $80 million.
- The Project would contribute approximately $15 million per year to the local and regional economy through wages and purchases of local goods and services.

- The Project would contribute approximately $25 million per year to the State and national economy through purchases of goods and services within NSW and Australia.
- The Project would contribute approximately $3 million per year to the local, State and national governments through the payment of rates, taxes and royalties.

2.14 SAFETY AND SECURITY

2.14.1 Public and Employee Safety

The Proponent recognises the proximity of the Project Site to the township of Nymagee and accordingly would implement procedures and controls to protect the safety of the public. Measures would be implemented at all times to ensure the safety of visitors, contractors and employees present within the Project Site. Unauthorised access to facilities and equipment would be in force at all times.

It is the Proponent's policy that each person employed within, or visiting the Project Site would be provided with a safe and healthy working environment and accordingly, the Proponent would implement a recruitment, induction and training program to achieve the following objectives.

- To ensure compliance with statutory regulations and maintain constant awareness of new and changing regulations.
- To eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety in the mining industry.
- To ensure the suitability of prospective employees through a structured recruitment procedure.
- To provide relevant occupational health and safety information and training to all personnel.
- To develop and constantly review safe working practices and job training.
- To conduct regular safety meetings and provide an open forum for input from all employees.
- To provide effective emergency arrangements for all employees, visitors and general public protection.
- To maintain good morale and safety awareness through regular employee assessment and counselling.
- To ensure all contractors adopt and maintain Proponent's policy objectives and safety standards at all times.

Central to all aspects of public and employee safety would be the following.

- The adoption of a pro-active approach to employee and public safety.
- Strict compliance at all times with the requirements of the following.
  – *Mine Health and Safety Act 2004.*
  – *Mine Health and Safety Regulation 2007.*

  - *Occupational Health and Safety Act 2000*.
  - *Occupational Health and Safety Regulation 2001*.
  - *Occupational Health and Safety (Dangerous Goods) Act 2003*.
  - *Explosives Act 2003*.
  - *Explosives Regulation 2005.*
  - *Dams Safety Act 1978.*
  - All other relevant legislation and Australian Standards.
- Development of an *Occupational Health and Safety Policy* to cover all component activities at the mine.

Specifically, the following safety and security measures would be implemented.

- A Mine Safety Management Plan, including a Contractor Safety Management Plan, would be prepared in accordance with the requirements of the *Mines Health and Safety Act 2004*.
- The existing fence around the Project Site would be maintained and signage erected to prevent inadvertent access to the Project Site. Additional fences would be erected around the operational sections of the Project Site as required.
- A safety bund approximately 0.5m high would be constructed around the perimeter of the box cut. On completion of mining-related activities the box cut area would be fenced off and the 0.5m safety bund would remain in place for purposes of water management.
- A security gate would be installed in the vicinity of the Mine Site Office Area. This would be the only vehicular access point to the operational sections of the Project Site. This system would allow access, after recording identities, to individuals who are permitted to access the operational section of the Project Site. The system would restrict access to individuals who do not have permission to enter the Project Site. All non-Project related vehicles would be required to report to the site office before being permitted to enter the operational sections of the Project Site.
- Security/warning signs would be positioned at strategic locations around and within the Project Site alerting the presence of earthmoving and mining equipment, deep excavations and steep slopes. The positioning of signs would depend on the location of the mining activities at any one time.
- Signs identifying blasting procedures and times would also be installed adjacent to the approached to the box cut.
- Employee and contractor inductions would include safe working practices and regular follow-up safety meetings and reviews.
- Toolbox meetings would be held regularly and would include a review of safety-related matters.
- Regular drug and alcohol testing would be undertaken in accordance with the Proponent's Drug and Alcohol Policy.

- Where internal roads are adjacent to steep slopes, windrows along the down-slope margins of those haul roads would be constructed to a minimum of half the wheel height of the largest item of mobile equipment onsite.
- Appropriate controls with respect to the use of explosives such as an *Explosives Safety and Security Plan* for storage and handling of explosives would be implemented to ensure compliance with statutory requirements at all times.
- The blasting engineer or the shot-firer would use appropriate blasting procedures to contain all fly rock within the design blast envelope and minimise the generation of excessive ground and air vibrations.
- All earthmoving equipment would be fitted with appropriate safety equipment in accordance with the *Guideline for Mobile and Transportable Equipment for Use in Mines* (MDG 15) published by I&I NSW.

2.14.2 Explosive Storage

Detonators, boosters and packaged explosives would be stored within magazines within the explosives storage area. This area has not been shown in **Figure 2.1** at the request of Department of Planning and Infrastructure. The magazine area would be secured in accordance with the relevant statutory requirements, and would be the subject of regular inspection by security personnel working for, or contracted by the Proponent. The magazines would likely be transportable structures, which would be constructed, secured, maintained and permitted in accordance with the relevant guidelines.

2.15 DECOMMISSIONING AND SITE REHABILITATION

2.15.1 Introduction

The following sub-sections describe the Proponent's proposed approach to site decommissioning and rehabilitation, and:

- outline the rehabilitation objectives and expected outcomes with respect to the rehabilitation of the Project Site (Section 2.15.2);
- describe the proposed end land use and final landform (Sections 2.15.3);
- provide an overview of the strategic management of rehabilitation, including the categorisation of rehabilitation domains, establishment of a rehabilitation hierarchy, and establishment of completion criteria, performance indicators and monitoring programs (Section 2.15.4);
- describe the procedures to be applied to each component of the mine, water management structures and other areas of disturbance associated with the mining and processing operations (Section 2.15.5); and
- describe the proposed rehabilitation maintenance procedures and post-mining management including noxious weed and pest management (Sections 2.15.6);

Refinements to the proposed rehabilitation activities presented in the following sub-sections would be provided in the *Mining Operations Plan* (MOP) to be prepared for the Project following project approval and then, if required, would be undertaken on the basis of operational experience gained by the Proponent, or by others at similar operations. These refinements would be reported in the relevant *Annual Environmental Management Report* (AEMR) and/or any amended MOP(s) produced by the Proponent throughout the life of the Project.

2.15.2 Rehabilitation Objectives and Expected Outcomes

The Proponent's rehabilitation objectives are divided into four specific categories as follows:

- decommissioning
- landform establishment (final landform);
- growth media development (revegetation); and
- ecosystem development (end land use).

The specific objectives associated with each category are as follows.

Decommissioning

- To remove all items of infrastructure, including buildings, pipelines, roads and tracks (including reducing the width of the roads where required) and other infrastructure.

Landform Establishment (Final Landform)

- To stabilise all disturbed areas and minimise erosion and dust generation.
- To blend the created final landform with the surrounding topography.
- To provide a low maintenance, geotechnically stable and safe, non-polluting landform which blends with surrounding landforms and provides land suitable for the end land use of nature conservation and agriculture.

Growth Media Development (Revegetation)

- To achieve a soil profile capable of sustaining the specified end land use.
- To establish native vegetation with the species diversity commensurate to the relevant ecological community.

Ecosystem Development (End Land Use)

- To re-instate ecological communities commensurate with the remnant vegetation disturbed by Project activities appropriate for the end land use.
- To protect and enhance those sections of the Project Site with remaining vegetation.

The expected outcomes of the rehabilitation activities are as follows.

- A safe, stable, non-polluting and sustainable landform with free-flowing and natural drainage lines.
- Successful revegetation of disturbed areas.
- Successful integration of the rehabilitated areas with adjacent areas of existing native vegetation, grazing and other land uses.

- Preservation of downstream water quality.
- Rehabilitation of the disturbed areas to an acceptable post disturbance land use capability/suitability similar to that prior to disturbance.
- A self-sustaining final landform with maintenance requirements consistent with the agreed post-mining end land use.

2.15.3 End Land Use and Final Landform

2.15.3.1 Final Landform

The final landform proposed is presented in **Figure 2.12.** It would include the following components.

- A bunded and fenced box cut with the portal sealed and backfilled in a manner that would allow re-opening, in the event that mining operations re-commence in the future. The slopes of the walls of the box cut would be reduced to approximately 1:3 (V:H) through backfilling of the box cut or blast profiling of the walls.
- Two sealed ventilation rises. The ventilation rises would be capped with a suitably designed and engineered cap that would permit reopening of the shaft at a later time if required.
- An appropriately covered and dome-shaped, free draining Tailings Storage Facility and embankment slopes of approximately 1:3 (V:H) or less. A shaped, covered and revegetated Surface Facilities Area and Mine Camp with all infrastructure removed.

All other infrastructure, including the existing house, exploration office, core store and processing facility, Back Tank East and expanded Pete's Tank, water reticulation system and the existing internal roads, including the access roads, would be retained. The access roads would be reduced in width through ripping, spreading of soil and revegetation to a width suitable for the end land use of agriculture and nature conservation. Where a track would not be required for the end land use, it would be removed completely and rehabilitated in a similar manner.

Water management structures up slope of the Tailings Storage Facility would remain, following completion of the life of the Project. These structures would deflect upslope water away from the former Tailings Storage Facility, and would be designed to be stable in a 1 in 100 year ARI storm event. The shallow domed profile of the rehabilitated facility would allow water to be shed from its surface as sheet flow without concentration. Some of that flow would be towards the Tailings Storage Facility embankment. A number of engineered, wide, drop structures, installed on the embankment, would safely transfer that water down to original ground level. Bunds along the top of the dam wall would direct the flow into the structures. Having many of these structures would reduce the volume of water each has to take and so reduce the risk of erosion at each one. The exact details of the drop structures would be the subject of a future engineering design.

2.15.3.2 End Land Use

In proposing an end land use for the Project Site, the Proponent has considered the current land use on 'The Peak' and surrounding properties, the infrastructure that would be developed with the Project Site and the proximity of the Project Site to other industry.

End land uses considered included:

- the development of another industry;
- a return to agricultural end land use; and
- the conservation of biodiversity.

In considering an end land use of another industry, the Proponent noted that the Project would result in construction of a number of items of infrastructure that may potentially be amenable to other industrial land uses. These include the Surface Facilities Area, groundwater bores and water reticulation system, office areas and workshops, and the Mine Camp. However, limiting the potential for future industrial use of the Project Site is the fact that there is no mains power supply and the distance from the Project Site to major population centres.

In considering an end land use of agriculture, the Proponent noted that 'The Peak' property has previously been used and that surrounding properties are still used, for agricultural purposes. However, the property has only been highly productive intermittently when climatic conditions have been good. The Proponent notes that the rehabilitated landform will have soils that may, despite the best endeavours of the Proponent, be more susceptible to erosion or damage than undisturbed soils.

In considering an end land use of nature conservation, the Proponent noted that sections of the Project Site, as well as large areas surrounding the Project Site, have been extensively disturbed by prior agricultural and other activities, including wood gathering for the Nymagee Copper Mine in the late 19th and early 20th Centuries. There exists an opportunity for the Project Site to result in additional areas of land that would be used for the conservation of native habitat. This would also complement the Biodiversity Offset Strategy described in Section 2.16. However, the Proponent also notes that land set aside for nature conservation is unlikely to generate sufficient income to pay for the required land management activities such as fencing and weed and pest control.

In light of the above, the Proponent proposes that the end land use would be a combination of agriculture and nature conservation, with areas set aside for nature conservation located particularly in the vicinity and to the east of the Surface Facilities Area and the Tailings Storage Facility. This would provide areas native vegetation to the west of the proposed Biodiversity Offset Area and would complement the Biodiversity Offset Strategy.

The remainder of the Project Site, comprising the western and southern sections of the Project Site, would continue to be used for agricultural activities.

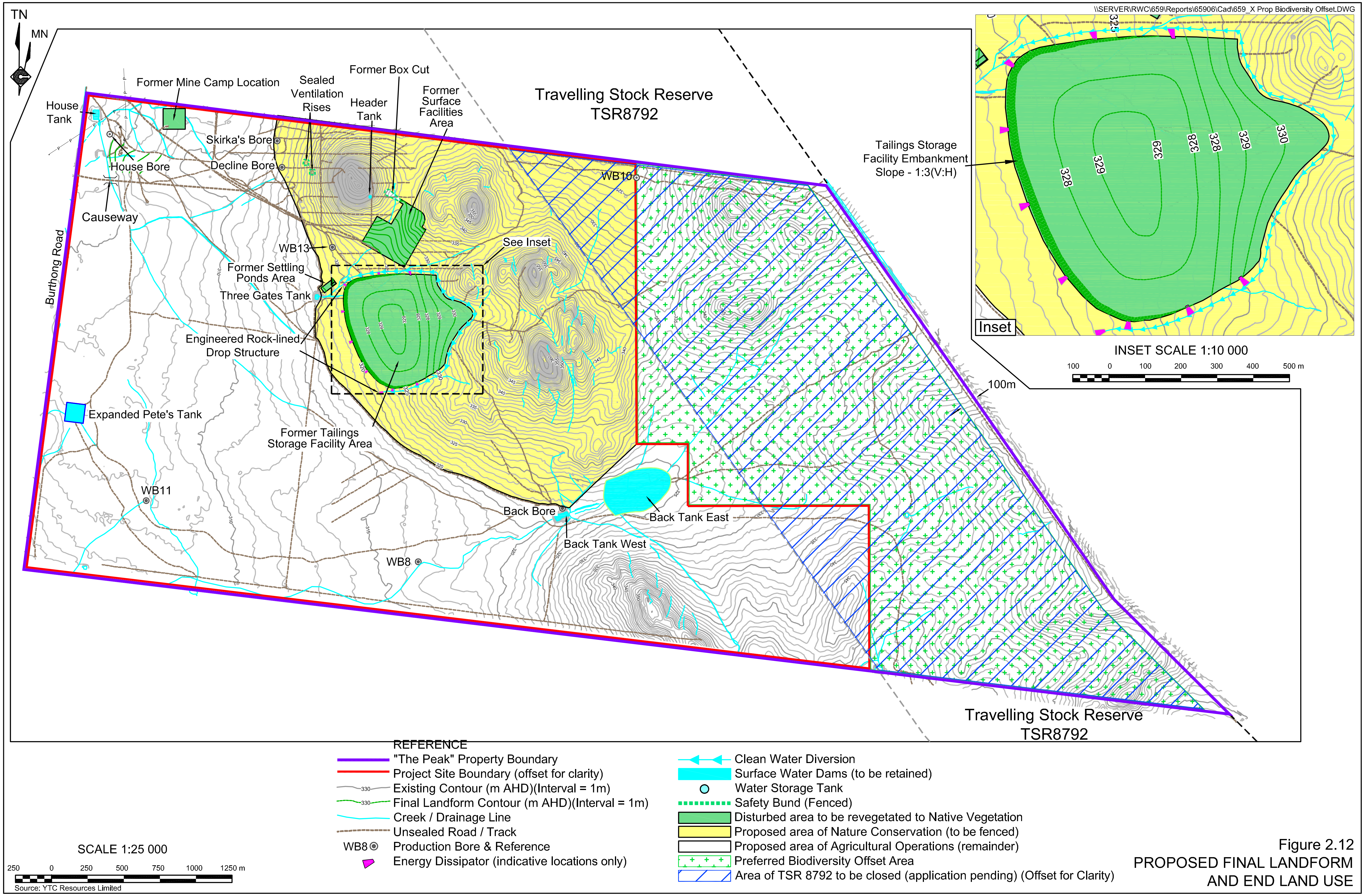

Figure 2.12
PROPOSED FINAL LANDFORM AND END LAND USE

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2.15.4 Strategic Rehabilitation Management

2.15.4.1 Introduction

In accordance with the requirements of the former Industry and Investment NSW (see **Appendix 2**) the following sub-section presents an overview of the proposed strategic rehabilitation management, including proposed rehabilitation domains, rehabilitation hierarchy, and indicative rehabilitation completion criteria.

2.15.4.2 Rehabilitation Domains

Rehabilitation domains refer to areas of related disturbance based on processes and use prior to rehabilitation and for which decommissioning and rehabilitation activities would be similar. **Figure 2.13** presents an overview of the anticipated domains and a description of each is given below.

Domain 1 – Surface Facilities Area.

This domain would include the temporary Waste Rock Emplacement, the ROM pad, Processing Plant, offices and workshop, Fuel Storage and Refuelling Area, haul road and hardstand areas.

Domain 2 – Box Cut, Portal and Ventilation Rises.

This domain would include all infrastructure for the underground mining operations, including the box cut, portal and ventilation rises.

Domain 3 – Tailings Storage Facility.

This domain would include the Tailings Storage Facility and all associated infrastructure, including surface water structures.

Domain 4 – Mine Camp.

This domain would include the Mine Camp and all associated infrastructure, including the car park and water treatment facility.

Domain 6 – Storage Dams, Internal Road Network and Remaining Infrastructure

This domain would include all infrastructure that would be retained, including the existing house, Exploration Office, Core Store and Processing Facility, Back Tank East and expanded Pete’s Tank, water reticulation system and the existing internal roads, including the access roads. The access roads would be reduced to a width suitable for the end land use of agriculture and nature conservation

2.15.4.3 Rehabilitation Hierarchy

The rehabilitation hierarchy for the Project follows a modified rehabilitation hierarchy based on the model of the former Industry and Investment NSW. The hierarchy is discussed below and has been aligned to the rehabilitation objectives in Section 2.15.2.

Decommissioning – Specific details of decommissioning completion criteria would be covered in a *Mine Closure Plan* to be prepared closer to completion of mining activities. In general, however, the decommissioning phase of the rehabilitation hierarchy involves the cessation of usage of infrastructure, as well as its demolition, removal and any remediation of the land that may be required. Specific decommissioning activities that relate to completion criteria at this stage in the rehabilitation hierarchy are outlined in Section 2.15.5.

Landform Establishment (Final Landform) – The landform establishment phase involves the earthworks required to cover and/or profile all or part of relevant domains to create a landform suitable for the proposed end land use and which blends with the adjacent topography. This stage would also include the construction of any additional drainage structures needed for the area. Specific procedures relating to landform establishment that relate to completion criteria at this stage of the rehabilitation hierarchy are outlined in Section 2.15.5.

Growth Media Development (Revegetation) – The growth media development phase of the rehabilitation hierarchy involves the replacement of soil over disturbed areas and preparation of the soil for revegetation including fertiliser or ameliorant application and ripping or scarifying the soil. The Ecosystem Establishment phase includes the revegetation of the rehabilitated landform and biodiversity offset areas with native species commensurate with the targeted end land use. Specific procedures relating to growth media development and ecosystem establishment are outlined in Section 2.15.5.

Ecosystem Development (End Land Use) – The ecosystem development of the rehabilitation hierarchy occurs once monitoring shows that there is adequate vegetation over the area. During this stage, the area would continue to be monitored and would not reach its nominated sustainable end land use until monitoring determines that the completion criteria have been achieved.

2.15.4.4 Strategic Rehabilitation Completion Criteria, Associated Performance Indicators and Monitoring Strategy

The strategic rehabilitation completion criteria, associated performance indicators and monitoring strategy for the Project are summarised in **Table 2.14**. While the rehabilitation criteria are based on the former Industry and Investment NSW model, it has been modified to align with the rehabilitation objectives outlined in Section 2.15.2 and the rehabilitation hierarchy discussed in 2.15.4.2.

The proposed rehabilitation criteria would aim to achieve the following.

- The ongoing refinement of completion criteria and monitoring programs that would facilitate lease relinquishment following mine closure.
- Alignment with rehabilitation and biodiversity offset area objectives.
- The facilitation of continuous improvement in restoration management practices of the rehabilitation and biodiversity offset areas.

Specific rehabilitation criteria and a monitoring program would be outlined in a relevant management plan to be submitted and approved after project approval. The rehabilitation criteria would be continually refined through monitoring and revised through updated and approved management plans.

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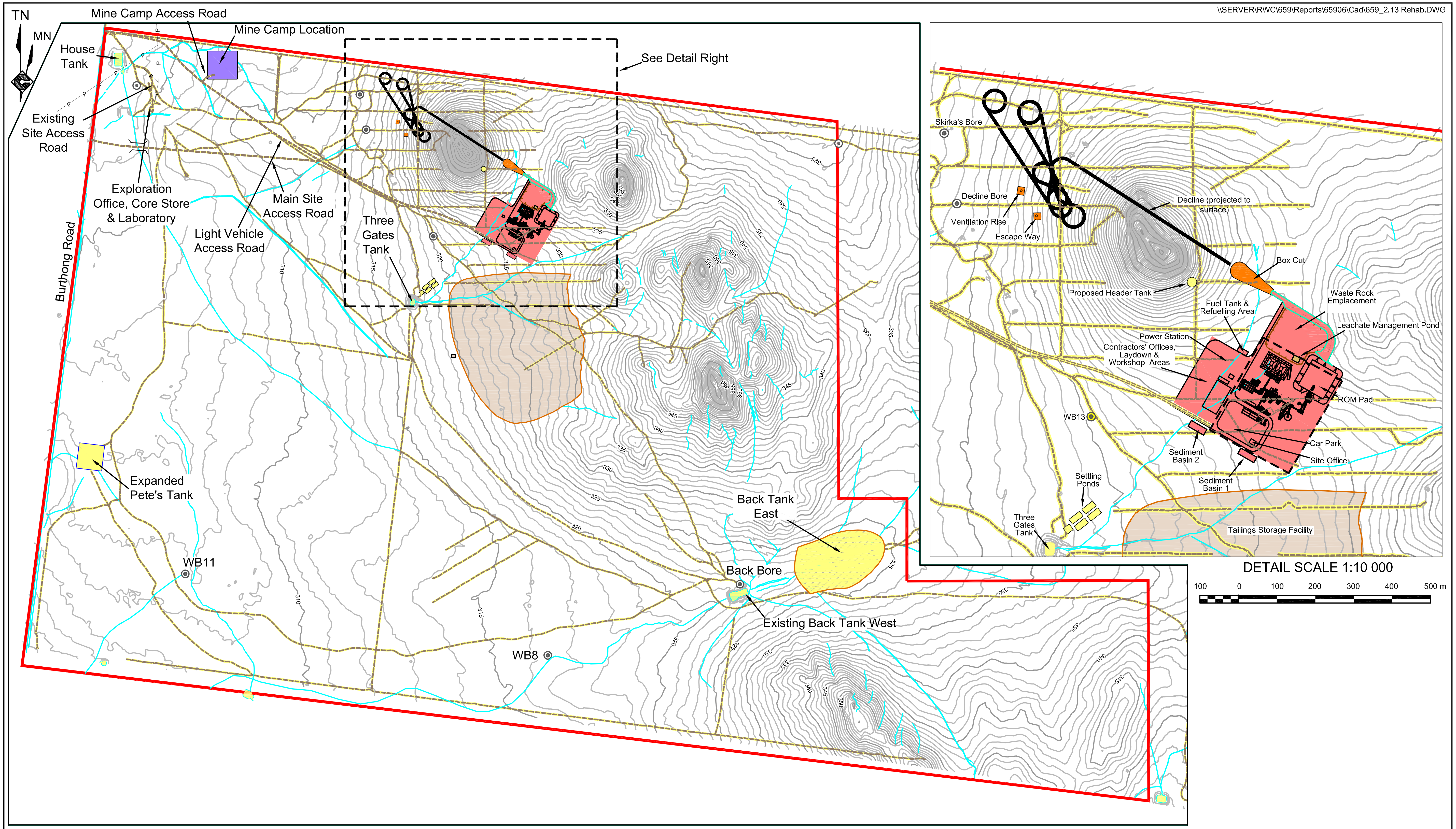

REFERENCE
- Project Site Boundary
- Contour (m AHD)(Interval = 1m)
- Creek / Drainage Line
- Unsealed Road / Track
- Bore & Reference

Domains
- Domain 1 - Surface Facilities Area
- Domain 2 - Box Cut, Portal & Ventilation Rises
- Domain 3 - Tailings Storage Facility
- Domain 4 - Mine Camp
- Domain 5 - Storage Dams, Internal Road Network & Remaining Infrastructure

SCALE 1:20 000
200 0 200 400 600 800 1000 m

Source: YTC Resources Limited

Figure 2.13
REHABILITATION DOMAINS

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Table 2.14
Strategic Rehabilitation Completion Criteria

Page 1 of 2

<table>
<tr><th>Rehabilitation Objective</th><th>Completion Criteria</th><th>Performance Indicator</th><th>Monitoring Strategy</th></tr>
<tr><td>Decommissioning</td><td colspan="2">All relevant infrastructure has been removed from the Project Site and remaining infrastructure has been made safe and fit for post-mining purpose.</td><td>AEMR includes photographic evidence.</td></tr>
<tr><td rowspan="2">Landform Establishment</td><td>The landform morphology fits in with the surrounding landscape.</td><td>Shaped slopes are at or less than 1:3 (V:H) (18º).</td><td>AEMR includes up to date survey of final landforms.</td></tr>
<tr><td>The rehabilitated area does not represent an erosion hazard.</td><td>Erosion does not exceed 0.3m (gully) deep.</td><td>Quarterly visual inspection by appropriately trained personnel.</td></tr>
<tr><td rowspan="4">Growth Media Development and Ecosystem Establishment – Nature Conservation areas</td><td>Appropriate native plant species richness is present for the restored ecological community.</td><td rowspan="4">To be determined.</td><td rowspan="4">Vegetation monitoring (Ecosystem Function Analysis score) by ecologist to determine native plant species richness (prior to lease relinquishment).</td></tr>
<tr><td>Appropriate density/structure of native over-storey species is present.</td></tr>
<tr><td>Appropriate density/structure of native mid storey species is present.</td></tr>
<tr><td>Appropriate endemic native groundcover is present.</td></tr>
<tr><td>Growth Media Development – Agricultural Land</td><td>Areas retained for future agricultural activities.</td><td>Nominated areas of the Project Site with suitable grass cover and free weed species.</td><td>Annual monitoring for weed species to be reported in AEMR.</td></tr>
<tr><td rowspan="3">Ecosystem Development (Final Land Use)</td><td>The area and its sustainability is consistent with the intended land use.</td><td>Establish areas of rehabilitation consistent approval conditions.</td><td>AEMR to quantify areas.</td></tr>
<tr><td>There are no potential hazards inconsistent with the intended land use.</td><td>The site is free of safety or environmental hazards including:
• holes, tunnels or unstable areas;
• mining infrastructure or debris; or
• hazardous materials.</td><td>Quarterly visual inspection by appropriately trained personnel.</td></tr>
<tr><td>The soil pH is representative of the intended land use.</td><td>pH levels are within the range generally acceptable for plant growth (5.0 to 8.5) until data from analogue sites is available.</td><td>Annual soil analyses by appropriately trained personnel.</td></tr>
</table>

Table 2.14 (cont'd)
Strategic Rehabilitation Completion Criteria, Associated Performance Indicators and Monitoring Strategy

Page 2 of 2

Rehabilitation Objective	Completion Criteria	Performance Indicator	Monitoring Strategy
Ecosystem Development (Final Land Use) (Cont'd)	Exotic and noxious weeds or vegetation is not competing or impacting on the intended end land use.	Noxious weeds are not present within rehabilitation or biodiversity offset areas until data from analogue sites is available.	Annual visual inspection by appropriately trained personnel.
	Feral pests are not impacting on the intended land use.	Feral pests are not present within rehabilitation or biodiversity offset areas until data from analogue sites is available.	Annual visual inspection by appropriately trained personnel.

The objective of the monitoring program would be to evaluate the progress of the mine rehabilitation towards fulfilling ecological community end land use objectives and closure criteria. The purpose of monitoring activities would be to ensure the sustainable re-colonisation and ongoing management of native flora and fauna, and to guide continual improvement of rehabilitation practises.

2.15.5 Rehabilitation Methods and Procedures

2.15.5.1 Introduction

Following receipt of project approval, and as a component of a *Mining Operations Plan*, the Proponent would prepare a detailed rehabilitation plan for the Project. This would provide the agreed final landform and end land uses, detailed progressive rehabilitation schedule and specific revegetation species mix to be used during rehabilitation operations.

The following sub-sections provide a summary of the methods that the Proponent would adopt for each of the identified rehabilitation domains to meet the objectives described in Section 2.15.2, to achieve the conceptual final landform described in Section 2.15.3.1, and identify the principal end land uses described in Section 2.15.3.2 (see **Figure 2.12**).

2.15.5.2 Decommissioning

Following completion of mining-related operations, and assuming that no further mining operations are proposed, the Proponent would demolish and remove from the Project Site infrastructure and services specifically established to service the mining operations and would no longer be required for the proposed end land use of nature conservation and grazing. This would include (across all domains):

- the Processing Plant;
- offices and workshops within the Surface Facilities Area;
- Power station, fuel storage and refuelling areas;
- ablutions and water treatment facilities; and
- buildings associated with the Mine Camp.

All concrete footings, foundations and slabs would be broken up and removed from site or used within the Project Site during rehabilitation operations.

Items of infrastructure that would remain would include:

- the existing house;
- Exploration Office, Core Store and Processing Facility;
- Back Tank East and the expanded Pete's Tank;
- water reticulation system; and
- the existing internal roads, including the access roads.

2.15.5.3 Domain 1 – Surface Facilities Area

Once infrastructure decommissioning has been completed, the Surface Facilities Area would be rehabilitated as follows.

- The ROM pad would be removed and the excavated material either used during rehabilitation of the Surface Facilities Area or the box cut or transported underground. Any potentially acid forming material would be transported underground.
- The temporary Waste Rock Emplacement would be removed during the life of the Project as waste rock material is transported back underground for use during stope backfilling operations. The footprints of the Waste Rock Emplacement area and the ROM pad would be ripped and re-profiled to create a landform consistent with the completion criteria.
- The Leachate Management Pond, Seepage Collection Pond, Process Water and Raw Water Dams (**Figure 2.2**), would be decommissioned. Liners and the accumulated sediment contained within these structures would be removed. Material from within the footprint of each area would be tested and any contaminated material identified would be removed from the Project Site for treatment and disposal by a suitably licensed contractor. Non-contaminated material would be used for onsite rehabilitation activities..
- Any internal haul roads and other access tracks or hardstand areas not required for the future management of the domain areas would be ripped and shaped.
- All areas of disturbance would be covered with previously stockpiled topsoil and seeded with locally occurring tree, shrub or grass species (see Section 2.15.4.3).
- Appropriate drainage controls would be installed.

2.15.5.4 Domain 2 – Box Cut, Portal and Ventilation Rises

Once infrastructure decommissioning has been completed, the box cut, portal and ventilation rises would be rehabilitated as follows.

- All surface infrastructure associated with the underground mining operations, including ventilation fans, compressed air facilities, communications, power and water reticulation infrastructure, would be decommissioned and removed from the Project Site.

- The box cut would be bunded and fenced during the life of the Project. Following completion of mining operations, the portal would be sealed and backfilled in a manner that would allow re-opening, in the event that mining operations re-commence in the future. The slopes of the walls of the box cut would be reduced to approximately 1:3 (V:H) through backfilling of the box cut or blast profiling of the walls. The box cut would be covered with previously stockpiled topsoil and seeded with locally occurring tree, shrub or grass species comprising endemic native species (see Section 2.15.4.3).
- The ventilation rises would be capped with a suitable cover and fenced. The capping of the ventilation rises (and sealing of the portal) would be undertaken in accordance with the requirements of the relevant guidelines applicable at the time and would be designed to effectively seal the ventilation rises in the long-term without precluding their use for a subsequent mining operation. In summary, the rise would be capped with an engineered concrete slab designed and installed in consultation with DTIRIS.

2.15.5.5 Domain 3 – Tailings Storage Facility

Once mining-related operations have been completed, the Tailings Storage Facility would be rehabilitated as follows.

The Tailings Storage Facility would be allowed to dry out and settle. During that period, surface water diversions and surface water and groundwater monitoring would continue as described in Section 2.6.6 would continue.

Once the Tailings Storage Facility has settled sufficiently and water quality is confirmed as acceptable, the decant infrastructure would be removed and the facility would be capped with a layer of clay and waste rock material to form an impermeable free draining, water shedding landform. Appropriate drainage would be installed to divert water from upslope of the facility around the facility and incident rainfall within the facility to one or more drop-down structures (**Figure 2.12)**. All structure would be designed to convey a 100-year ARI rainfall event without eroding.

The facility, including the external embankment, would then be covered with previously stockpiled topsoil and seeded with locally occurring tree, shrub or grass species (see Section 2.15.4.3).

2.15.5.6 Domain 4 – Mine Camp

Once mining-related operations have been completed and the Mine Camp is no longer required, it would be rehabilitated as follows.

- All building and infrastructure such as water tanks, awnings, etc. would be removed from site, indicatively for reuse elsewhere.
- The waste water treatment facility would be removed and any concrete tanks broken up and buried or removed.
- All concrete footings, foundations and slabs would be broken up and removed from site or used elsewhere within the Project Site during rehabilitation operations.

- Hardstand areas such as the car park would be ripped and shaped as required.
- Sections of the domain would then be covered with previously stockpiled topsoil and seeded with locally occurring tree, shrub or grass species (see Section 2.15.4.3).

2.15.5.7 Domain 5 – Storage Dams, Internal Road Network and Remaining Infrastructure

The majority of infrastructure within this domain would be required for the final land use and would be retained. Infrastructure that would be retained include the following.

- Pete's Tank and Back Tank East.
- Groundwater supply bores.
- Tracks and roads, with the width of roads reduced to widths appropriate for future land management operations for agricultural and nature conservation purposes.
- Existing infrastructure, including houses and sheds required for the final land use

Where required, access tracks would be reduced in width through ripping, spreading of soil and revegetation to a width suitable for the end land use of agriculture and nature conservation. Where a track would not be required for the final land use, it would be removed completely and rehabilitated in a similar manner.

2.15.5.8 Indicative Growth Media Development and Ecosystem Establishment

Following the completion landform establishment and shaping operations, topsoils and subsoils stockpiled during site establishment activities (see section 2.3.3.3) would be spread to create growth media on the shaped landform. The subsoils would be placed first followed by top soil. The thickness of the each layer would be determined based on the volume of subsoil and topsoil available. Indicatively, however, the Proponent anticipates that the recreated soil profile would be broadly similar to the existing soil profile, namely between 200mm and 300mm of topsoil and up to 700m of subsoil.

If not already established, surface water controls would be established during placement of soil material. A mixture of native and sterile introduced species of grasses and legumes would be used for rapid stabilisation of the growth media. For the long term these areas would be seeded with a native species mix containing tree, shrub and grass species representative of the vegetation communities within the Project Site. It is, however, recognised that the exact species to be used during rehabilitation operations may vary dependent on final landform and function. More specific detail on the exact species mix to be used, and the planting techniques to be implemented, will be provided as the Rehabilitation Management Plan component of the *Mining Operations Plan* to be prepared following receipt of project approval.

2.15.6 Rehabilitation Monitoring and Remediation

2.15.6.1 Rehabilitation Monitoring

The Proponent's commitment to successful rehabilitation within the Project Site would involve an ongoing monitoring and maintenance program following completion of mining-related operations. Areas being rehabilitated would be regularly inspected, including during site visits during the preparation of the AEMRs.. During these inspections the following would be noted.

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

2.15.6.2 Rehabilitation Remediation

Post-mining rehabilitation, remediation and enhancement activities would include but not be limited to the following.

Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding and where necessary, re-topsoiling and/or the application of specialised treatments.

If drainage controls are found to be inadequate for their intended purpose, or compromised by wildlife or native vegetation, these would be replaced.

Temporary fences would be installed to exclude native fauna, if grazing appears to be excessive.

In the event areas of excessive erosion and sedimentation are identified, remedial works such as importation of additional fill, subsoil or topsoil material for respreading would occur. Redesigning of water management structures would be undertaken if necessary.

Appropriate noxious weed control, or eradication methods and programs, would be undertaken in consultation with the Department of Primary Industries and/or the local Noxious Weeds Inspector.

2.16 BIODIVERSITY OFFSET STRATEGY

2.16.1 Introduction

The requirements for the Project issued on 3 November 2010 by the then Department of Environment, Climate Change and Water require that:

> *"where the EA finds that a loss of native vegetation will occur as a result of the proposal and biodiversity impacts cannot be avoided or mitigated against, an acceptable biodiversity offset will be an important component of the Project."*

The Project would disturb 77.3ha of land within the Project. **Figure 2.14** presents an overview of the vegetation communities within the Project Site (see Section 4.2.4.2 for further information). **Table 2.15** presents the vegetation communities that would be impacted by the Project. Of the 77.3ha to be disturbed, 2.1ha has already been cleared and, as a result, 75.2ha of native vegetation would be removed. **Table 2.15** also presents the proportion of these vegetation communities to be removed relative to the Project Site area (1 532ha) and 'The Peak' property area (2 128ha) area.

Table 2.15
Direct Impacts on Vegetation Communities

Vegetation Community	Area to be disturbed (ha)	Percentage Project Site to be disturbed	Percentage 'The Peak' property to be disturbed
Benson 103 - Poplar Box – Gum – barked Coolibah -- White Cypress Pine	58.4	3.8%	2.74%
Benson 103 – Bimble Box dominated	10.2	0.66%	0.48%
Benson 103 – White Cypress Pine dominated	1.7	0.11%	0.08%
Bothriochloa Biloba (part of cleared/grassland)	0	0%	0%
Benson 103 – *Eremophila* and hopbush regrowth	1.6	0.11%	0.08%
Benson 103 – Yarren (*Acacia hemaphylia*)	3.2	0.21%	0.15%
Benson 174 – Mallee – Smooth-barked Coolibah	0.1	0.01%	0.01%
Benson 180 - Grey Mallee – White Cypress Pine	0	0%	0%
Cleared/grassland area	2.1	0.13%	0.10%
TOTAL	**77.3**	5.0%	3.6%
Source: OzArk (2011a) - modified from Table 14			

The Proponent acknowledges the requirement for the Project to include a Biodiversity Offset Strategy for the Project to offset the unavoidable disturbance to 75.2ha of native vegetation. The Proponent would, following receipt of project approval prepare a detailed *Biodiversity Management Plan* in consultation with relevant stakeholders, including Department of Planning and Infrastructure, Office of Environment and Heritage, Cobar Shire Council and neighbouring landholders. The *Biodiversity Management Plan* would provide further details on the implementation of the strategy. It is envisaged that the strategy would be implemented within 12 months of receipt of project approval.

This sub-section provides an indicative description of the proposed Biodiversity Offset Strategy for the Project.

2.16.2 Biodiversity Offset Requirements

The then Department of Environment, Climate Change and Water issued an interim policy on assessing and offsetting biodiversity impacts for Part 3A projects (DECCW, 2010). While it is acknowledged that the interim policy expired on 30 June 2011, reliance has been placed on the policy because there has not been a replacement of final policy issued. The interim policy seeks to provide a consistent and transparent approach to impact assessment and offsetting for projects assessed under Part 3A of the EP&A Act. That interim policy also provides the basis for aligning NSW and Commonwealth assessment and offsetting processes by providing an assessment pathway that is likely to satisfy both NSW and Commonwealth requirements.

Under this policy, the Proponent is required to:

- describe, quantify and categorise the biodiversity values and impacts of a proposal;
- identify, for benchmarking purposes, the offsetting that would be required to meet the improve or maintain standard; and
- provide the information for calculating offsets under this policy.

The interim policy relies on the use of the Biobanking Assessment Methodology (BBAM) for the purpose of quantifying and categorising the biodiversity values and impacts of Part 3A proposals. The Proponent would, as agreed with OEH, use the BBAM methodology to determine the offset requirements for the Project. Under the BBAM methodology, the proposed offset strategy is considered against benchmark requirements for the level of disturbance proposed (generated by BBAM) to determine whether it meets one of the following biodiversity outcomes.

- Tier 1 - improve or maintain – the benchmark offsets nominated by BBAM are achieved.
- Tier 2 - no net loss – with the exception that 'red flag' areas, e.g. EECs or threatened flora, are not protected, the benchmark offsets nominated by BBAM are achieved
- Tier 3 - mitigated net loss – the nominated offset does achieve the benchmark nominated by BBAM, however, a lesser quantum is justified on the basis of other factors.

The Proponent has committed to achieving a Tier 2 biodiversity outcome, as a minimum. If, however, no red flag issues are identified during the assessment, the Proponent would seek to achieve a Tier 1 biodiversity outcome.

The interim policy acknowledges that it may not be feasible or appropriate to apply the BBAM in all cases. In such cases, the DECCW interim policy states that "*offsets are to be negotiated on a case by case basis and in accordance with DECCW's offsetting principles*". The referenced "DECCW offsetting principles" are those provided in the *Principles for the use of Biodiversity Offsets in NSW* presented as Appendix II of the *Guidelines for Biodiversity Certification of Environmental Planning Instruments – Working Draft* published by the then Department of Environment and Climate Change. For the purposes of background information, that document requires that, in order to adequately compensate for the disturbance, the offset must:

1. address impacts remaining after mitigation or prevention measures have been undertaken;
2. meet all regulatory requirements;
3. never reward ongoing poor performance;
4. complement other government programs such as national parks and reserves;
5. be underpinned by sound ecological principles;
6. aim to result in a net improvement in biodiversity over time;

7. be enduring, i.e. they must offset the impact of the development for the period that the impact occurs;
8. be agreed upon prior to the impact occurring;
9. be quantifiable, i.e. the impacts and benefits must be reliably estimated;
10. be targeted, i.e. they must offset the impacts on a "like for like or better" basis;
11. be located appropriately, i.e. they must offset the impact in the same region;
12. be supplementary, i.e. beyond existing requirements and not already funded by another scheme; and
13. be enforceable, i.e. through development consent conditions, licence conditions, covenants or a contract.

An assessment of the Project against the identified principles is provided in Section 4.2.6.7.

Also considered are the guiding principles of the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities which require that the offset should meet the following principles (DEWHA, 2007).

1. Environmental offsets should be targeted to the matter protected by the EPBC Act that is being impacted.
2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.
3. Environmental offsets should deliver a real conservation outcome.
4. Environmental offsets should be developed as a package of actions - which may include both direct and indirect offsets.
5. Environmental offsets should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'.
6. Environmental offsets should be located within the same general area as the development activity.
7. Environmental offsets should be delivered in a timely manner and be long lasting.
8. Environmental offsets should be enforceable, monitored and audited.

An assessment of the Project against the identified principles is provided in Section 4.2.6.7.

2.16.3 Proposed Biodiversity Offset Strategy

2.16.3.1 Introduction

The Proponent proposes to adopt a Biodiversity Offset Strategy that focuses on the provision of an appropriately-sized offset to achieve Tier 1, if possible, or Tier 2 as a minimum biodiversity outcome under the Biobanking Assessment Methodology (see Section 2.17.2). To achieve that outcome, the Proponent proposes to set aside approximately 628ha of land within one of two proposed Biodiversity Offset Areas. This sub-section provides an overview of the proposed Biodiversity Offset Areas, the methodology that would be used to assess and secure the final Biodiversity Offset Strategy and the biodiversity management measures that would be implemented as a minimum within the final Biodiversity Offset Area.

It is noted that as identified in Section 3.2.3.3, representatives of the Proponent, OzArk Environmental and Heritage Management Pty Ltd (OzArk) and RW Corkery & Co Pty Limited (RWC) met with officers of the Office of Environment and Heritage (OEH) on 8 August 2011 to discuss the proposed Biodiversity Offset Strategy. In addition, subsequent consultation has been undertaken by RWC and OzArk in relation to this issue and the information presented in this sub-section reflects the outcomes of that consultation.

2.16.3.2 Proposed Biodiversity Offset Areas

The Proponent proposes to secure an area of approximately 628ha in the eastern section of "the Peak" property for the purposes of the proposed Biodiversity Offset Strategy (**Figure 2.14**). As indicated in Section 1.4 and on **Figure 2.14**, the eastern section of the Project Site, within the proposed Biodiversity Offset Area, is the subject of a Travelling Stock Reserve (TSR8792). That reserve requires the holder of WLL2455 to permit the lawful use of the reserve for the purposes of moving stock through the eastern section of "The Peak". That requirement is not consistent with the use of the land as a biodiversity offset. As a result, OEH have indicated that that section of TSR8792 within the proposed Biodiversity Offset Area would need to be cancelled to enable implementation of the proposed Biodiversity Offset Strategy. The area that would be required to be cancelled is indicated on **Figure 2.14**.

The Proponent has contacted Department of Primary Industries - Crowns Lands Division West (DPI) with a view to making an application to close the required section of TSR8792, leaving a 100m wide strip adjacent to the eastern margin of the "The Peak" property to permit movement of stock past the closed section. DPI has indicated that it would consider such an application once concurrence has been received from the Darling Livestock Health and Pest Authority (DLHPA).

The Proponent has sought the concurrence the DLPHA for the closure of TSR8792. At the time of finalisation of this document, the DLHPA have indicated that they do not support closure of the identified section of TSR8792. It is the Proponent's intention to continue to examine avenues to effect a change in the status of the TSR and should circumstances change, the proposed Biodiversity Offset Area would be the Proponent's first choice. As a result, the proposed Biodiversity Offset Area, for the purposes of this document is referred to as the <u>Preferred Biodiversity Offset Area.</u>

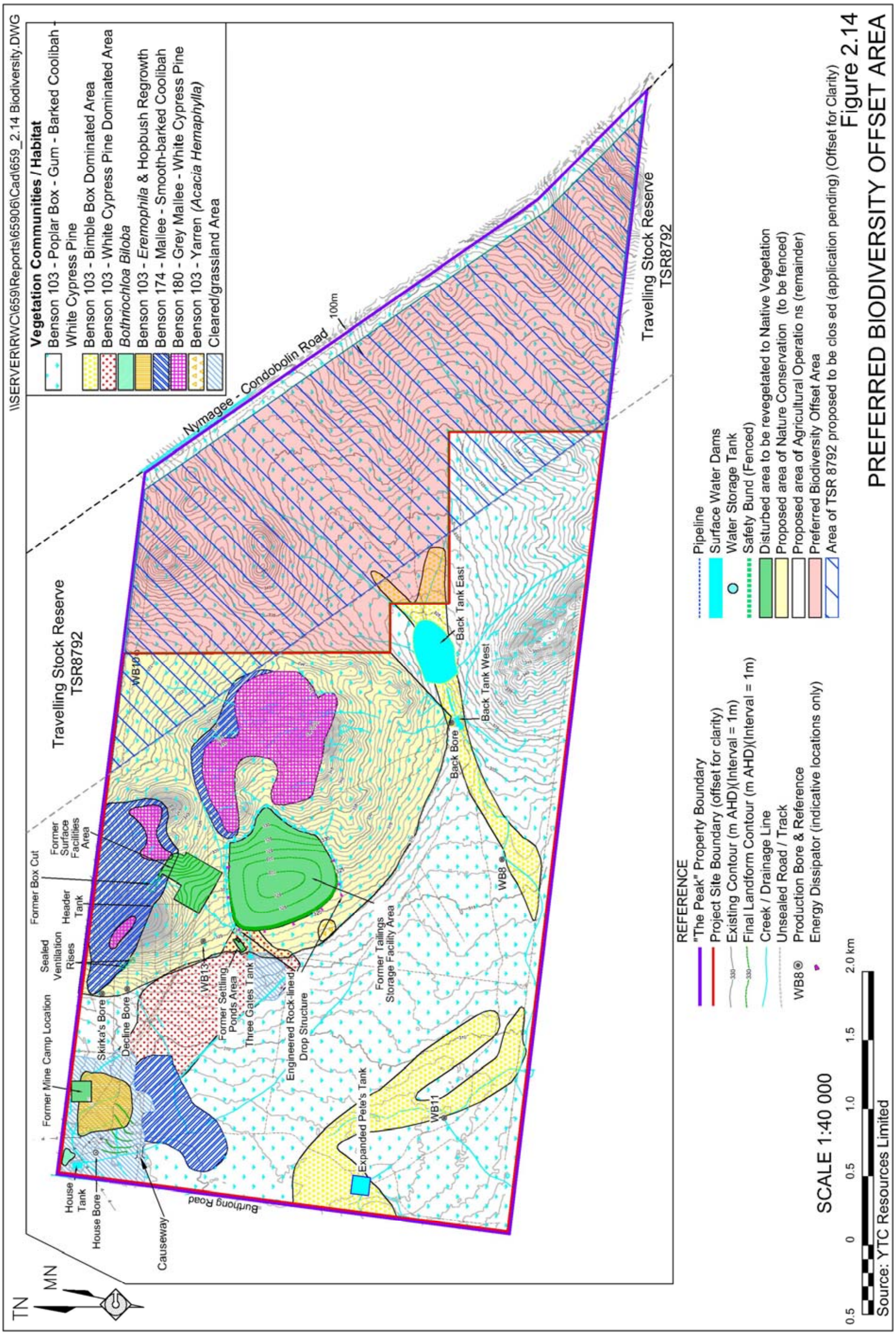

Figure 2.14
PREFERRED BIODIVERSITY OFFSET AREA

In light of the immediate inability to change the status of the TSR, the Proponent has identified an Alternative Biodiversity Offset Area as indicated on **Figure 2.15**. The Alternative Biodiversity Offset Area is located approximately 25km to the southeast of the Project Site and occupies the eastern section of the "Chelsea" property (Western Lands Lease (WLL) 3881). The Proponent has entered into an option arrangement to purchase the "Chelsea" property should the Preferred Biodiversity Offset Area not be feasible and the Project receive project approval. The Proponent is not aware of any travelling stock reserve or similar encumbrances on WLL3881.

The proposed Alternative Biodiversity Offset Area is approximately 628ha in size and is immediately adjacent to the Nangerybone State Forest.

2.16.3.3 Restrictions on the Use of WLL2455 and WLL3881

In order to adequately determine the quantum of "benefit" to be achieved by the proposed Biodiversity Offset Strategy, OEH has advised that it is necessary to identify the permitted existing uses within both the areas of proposed disturbance and proposed Biodiversity Offset Areas.

Both the proposed areas of disturbance and the Preferred Biodiversity Offset Area are located with WLL2455. The relevant conditions of that lease require may be summarised as follows.

- Timber may be removed for the reasonable use of the lessee.
- The Commissioner may authorise another person to remove timber from the lease.
- A lessee shall not overstock the lease area.
- The lessee shall not erect a building without the prior approval of the Commissioner.
- The lessee shall manage pests and noxious weeds as directed by the Commissioner.

RWC has been advised by Department of Primary Industries (Crown Lands) (Shaun Barker, *pers comm* 2/11/11) that TSR8972 imposes no further land management or conservation requirements on the holder of WLL2455, other than to permit the lawful use of the reserve for the purposes of moving stock.

Restrictions on the use of WLL3881 are similar to WLL2455. As identified in Section 2.16.3.2, the Proponent is not aware of any travelling stock reserve or similar encumbrances on WLL3881.

2.16.3.4 Securing the Biodiversity Offset Strategy

Following determination of the viability of the Preferred Biodiversity Offset Area and receipt of project approval, the Proponent would implement the following to secure the Biodiversity Offset Strategy.

- Make formal application to close the identified section of TSR8972 should the concurrence of the DLPHA be recieved.

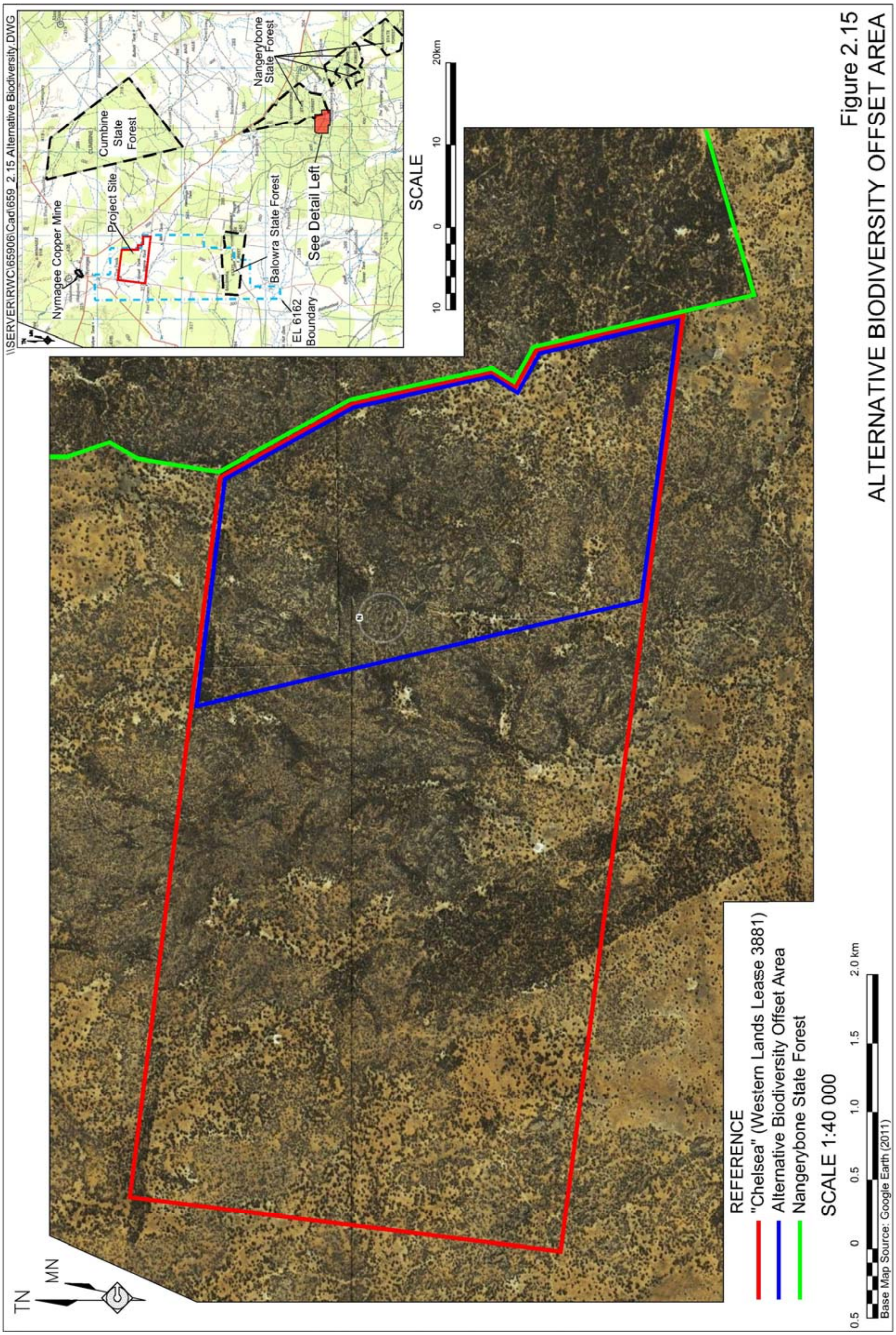

Figure 2.15
ALTERNATIVE BIODIVERSITY OFFSET AREA

- Prepare a *Biodiversity Management Plan* in consultation with relevant stakeholders, including the Office of Environment and Heritage, Department of Planning and Infrastructure, Western Catchment Management Authority, Department of Primary Industries (Crown Lands) and the surrounding community.
- Make formal application to amend the conditions associated with WLL2455 (assuming that the identified section of TSR8792 can be cancelled) or WLL3881 to identify the permitted land used from "grazing" to "grazing and conservation", with conservation being the only permitted land use within the final Biodiversity Offset Area.

2.16.3.5 Assessing the Biodiversity Offset Strategy

Overview

A detailed assessment of the proposed biodiversity offset strategy is presented in Section 4.2.6.7. However, in summary, OzArk has undertaken an inspection of both the Preferred and Alternative Biodiversity Offset Areas and note that the vegetation communities and habitat values on both the Preferred and Alternative Biodiversity Offset Areas are similar to the areas of proposed disturbance. Additionally, in relation to the Alternative Biodiversity Offset Area, OzArk notes that the offset area:

- is immediately adjacent to the Nangerybone State Forest;
- includes the headwater of Nangerybone Creek, a substantive waterway in the locality;
- includes rocky habitat; and
- known population of Kultarr, Hooded Robins and Grey-crowned Babblers and breeding populations of Superb Parrot, all species listed under the *Threatened Species Conservation Act 1995.*

The Alternative Biodiversity Offset Area is, however, located within the Central West (Nymagee-Rankins Springs) Catchment, whereas the area of proposed disturbance is within the Western (Nymagee-Rankins Springs) Catchment. However, as both areas are within 5km of the catchment boundary, OzArk advise that this is unlikely to be a significant constraint when assessing the adequacy of the Alternative Biodiversity Offset Area, if required.

Formal Assessment

A formal assessment of the proposed Biodiversity Offset Strategy will be undertaken. In assessing the Biodiversity Offset Strategy, the Proponent would undertake the assessment in a manner that is consistent with the Biobanking Assessment Methodology (BBAM). Initially the assessment would determine the biobanking credits that will be required to compensate for the proposed disturbance of 75.2ha of native vegetation and the number of credits that will be available within the Alternative Biodiversity Offset Area. Should the status of TSR8792 be resolved to permit the use of the Preferred Biodiversity Offset Area, a formal assessment of the number of credits available will also be made. The results of the assessment will be provided to the relevant government agencies as soon as they are available.

The Proponent notes that there are no NSW or Commonwealth-listed endangered ecological communities or NSW-listed threatened flora species identified within the area of proposed disturbance. In addition, the identified NSW or Commonwealth-listed threatened fauna species are all mobile and capable of moving out of areas of proposed disturbance. As a result, the Proponent does not anticipate that any ‘red flags’ will be identified within the proposed area of disturbance during the BBAM assessment. It is noted that the initial field surveys for OzArk (2011) was undertaken outside the flowering period for the Cobar Greenhood Orchid, the presence or absence of this species could not be confirmed. However, a subsequent inspection of the proposed areas of disturbance during the flowering period did not identify the species.

As a result, the Proponent anticipates that the Biodiversity Offset Strategy may achieve a Tier 1 outcome under BBAM. Alternatively, a Tier 2 outcome would be achieved as a minimum.

At this stage OzArk anticipates that either of the proposed Biodiversity Offset Areas may provide sufficient Biobanking credits to adequately compensate for the proposed areas of vegetation to be disturbed. In the event that additional credits are available, the Proponent intends to only retire those credits required for the Project. The remaining credits would be retained for a future offset, should they be required.

2.16.3.6 Biodiversity Offset Management Measures

The Proponent would prepare, in consultation with the Department of Planning and Infrastructure, Office of Environment and Heritage, Cobar Shire Council, Department of Primary Industries (Crown Lands) and neighbouring landholders, a *Biodiversity Management Plan* as part of the application to amend the conditions of WLL2455 or WL8331 to secure the Biodiversity Offset Strategy. That plan would be prepared prior to the commencement of ground disturbing activities that are not already approved.

The plan would describe the Biodiversity Offset Area and the objectives of Biodiversity Offset Strategy, as well as the measures that would be implemented to achieve those objectives. The Plan would also identify biodiversity management measures within other sections of the Project Site. Indicatively the Proponent would implement the following biodiversity management measures.

- Fencing of the entire Biodiversity Offset Area with a fence suitable to exclude pest animals, in particular goats. In addition, there would be no grazing of stock within the Biodiversity Offset Area, except where required for biodiversity purposes, for example to control weeds or reduce fire risk..
- Implementation of a weed and pest animal control program within the fenced Biodiversity Offset Area.
- Amelioration where required to re-establish pre-existing vegetation communities. In other areas where amelioration is not required, natural regeneration would be relied upon.
- Regular monitoring of the Biodiversity Offset Area, including fixed quadrats and/or transects, to track changes in biodiversity with time.

2.17 ALTERNATIVES CONSIDERED AND REJECTED

2.17.1 Introduction

The Director-General's requirements for the Project require that the *Environmental Assessment* include a description of the *alternatives considered, including a detailed justification for the proposed mine plan*. Furthermore, the during a meeting with the Department of Planning and Infrastructure on 7 June 2011 it was highlighted that a detailed justification of the location of mine infrastructure was required

This sub-section identifies the feasible alternative Project design options considered and rejected during the design and planning phase of the Project. A number of alternatives for each infrastructure component, listed below, were considered.. Sections 2.17.2 to 2.17.9 describe the alternatives considered and provide justification of why the proposed alternative was selected.

- Alternative location for the box cut and portal (Section 2.17.2).
- Alternative location for the Surface Facilities Area (Section 2.17.3).
- Alternative location for the Tailings Storage Facility (Section 2.17.4).
- Alternative locations for the water storage facilities (Section 2.17.5).
- Alternative location for the Mine Camp (Section 2.17.6).
- No Main Site Access Road (Section 2.17.7).
- Alternative processing options (Section 2.17.8).
- Alternative water supply options (Section 2.17.9).

The alternative of not developing the proposed open cut is considered in Section 6.2.5.

2.17.2 Alternative Location for the Box Cut and Portal

The Proponent investigated a range of alternative locations for the box cut and portal. In summary, box cuts are most efficiently constructed into the side of a hill as this minimises the area of disturbance and volume of material that is required to be extracted to construct the box cut.

Given the location of the Hear Deposit underlying 'The Peak' and a requirement for the purposes of ventilation to have a spiral decline, the only feasible location for the box cut is to construct it into the lower slopes of 'The Peak'. In light of this, the box cut could potentially be constructed in any location around 'The Peak'.

The Proponent notes that the proposed location takes advantage of 'The Peak' to shield the box cut from residences located to the west and north of the Project Site. The proposed location also permits easy access to the location of the proposed Surface Facilities Area (see Section 2.17.3). Finally, the proposed location is the same that that approved under the Part 5 approval for the exploration decline.

Alternative locations would not provide shielding to residences to the west and north of the Project Site to the same degree, nor would alternative locations provide easy access to the location of the proposed Surface Facilities Area.

2.17.3 Alternative Location for the Surface Facilities Area

The Proponent investigated a number of alternative locations for the Surface Facilities Area. These are indicatively shown on **Figure 2.16.** The proposed location has the following advantages.

- It is close to the proposed location for the box cut and Tailings Storage Facility.
- It is shielded from residences to the northwest, northeast and southeast by hills.
- It is located in the uppermost section a surface water catchment, resulting in limited requirements to manage significant surface water flows.
- The proposed location has been partially disturbed by prior exploration-related activities.

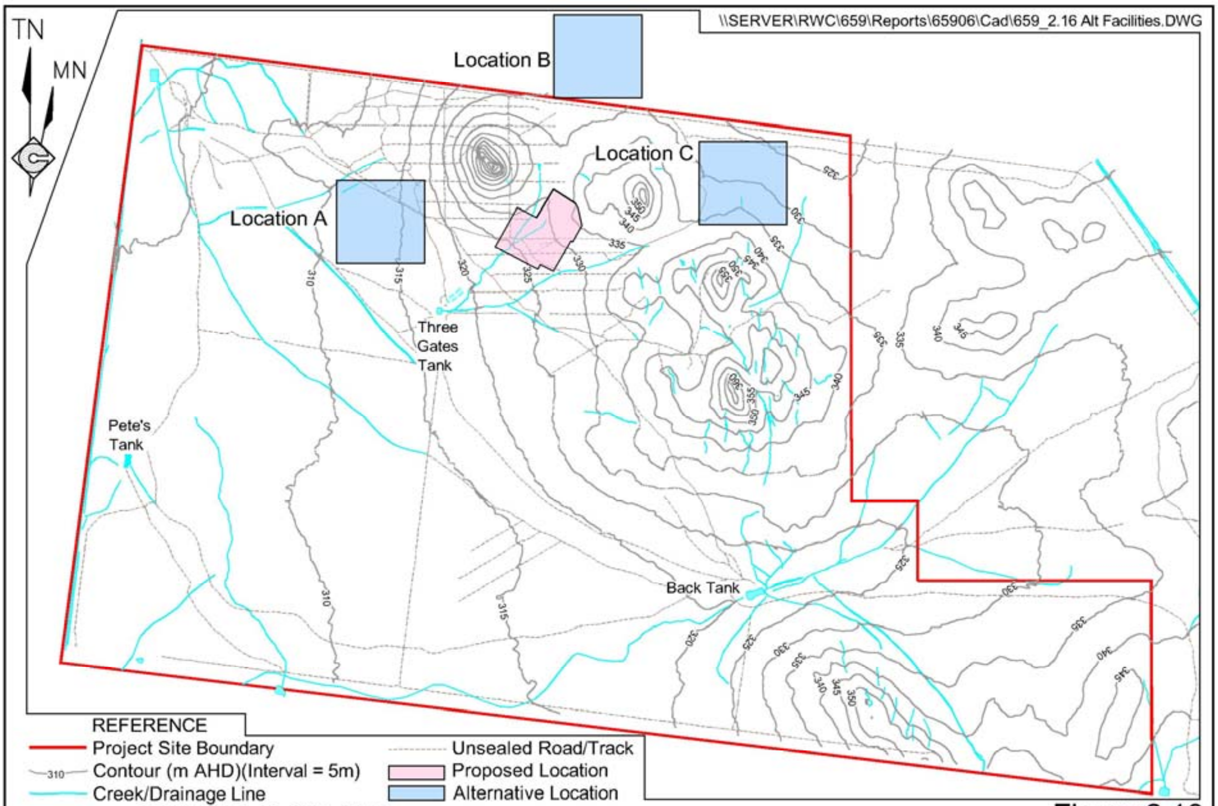

Figure 2.16
ALTERNATIVE SURFACE FACILITIES AREA LOCATIONS

In relation to the alternatives considered the Proponent notes the following.

- Location A – this location has the advantage of being located on flatter ground than the proposed location and in an area of regenerating white cypress pine (see Section 4.2). However, disadvantages associated with Location A include the following.
  - Greater distance to the preferred box cut location.
  - Reduced shielding to residences to the west and north.
  - Closer to Residence R3 (see Section 4.5).
  - Greater potential for surface water run-on.

- Location B - this location also has the advantage of being located on flatter ground than the proposed location. However, similar disadvantages to those noted for Location A apply. In addition, Location B is not located within land owned by the Proponent.
- Location C – This location has the advantage of being further from the closest residence, namely Residence R3. However, the location has the following disadvantages:
  - Greater distance to the preferred box cut location.
  - Less shielding from residences to the north and northeast.
  - Located in a different, north-flowing surface water catchment, requiring additional surface water management.
  - Located in an area between existing areas of vegetation within the Project Site and the proposed Biodiversity Offset Area, potentially adversely impacting on the connectivity of the Biodiversity Offset Area and the hills in the eastern section of the Project Site.

2.17.4 Alternative Location for the Tailings Storage Facility

The Proponent examined a range of alternative locations for the Tailings Storage Facility (**Figure 2.17**). The proposed location of the facility has the following advantages.

- Close to the preferred location for the Surface Facilities Area.

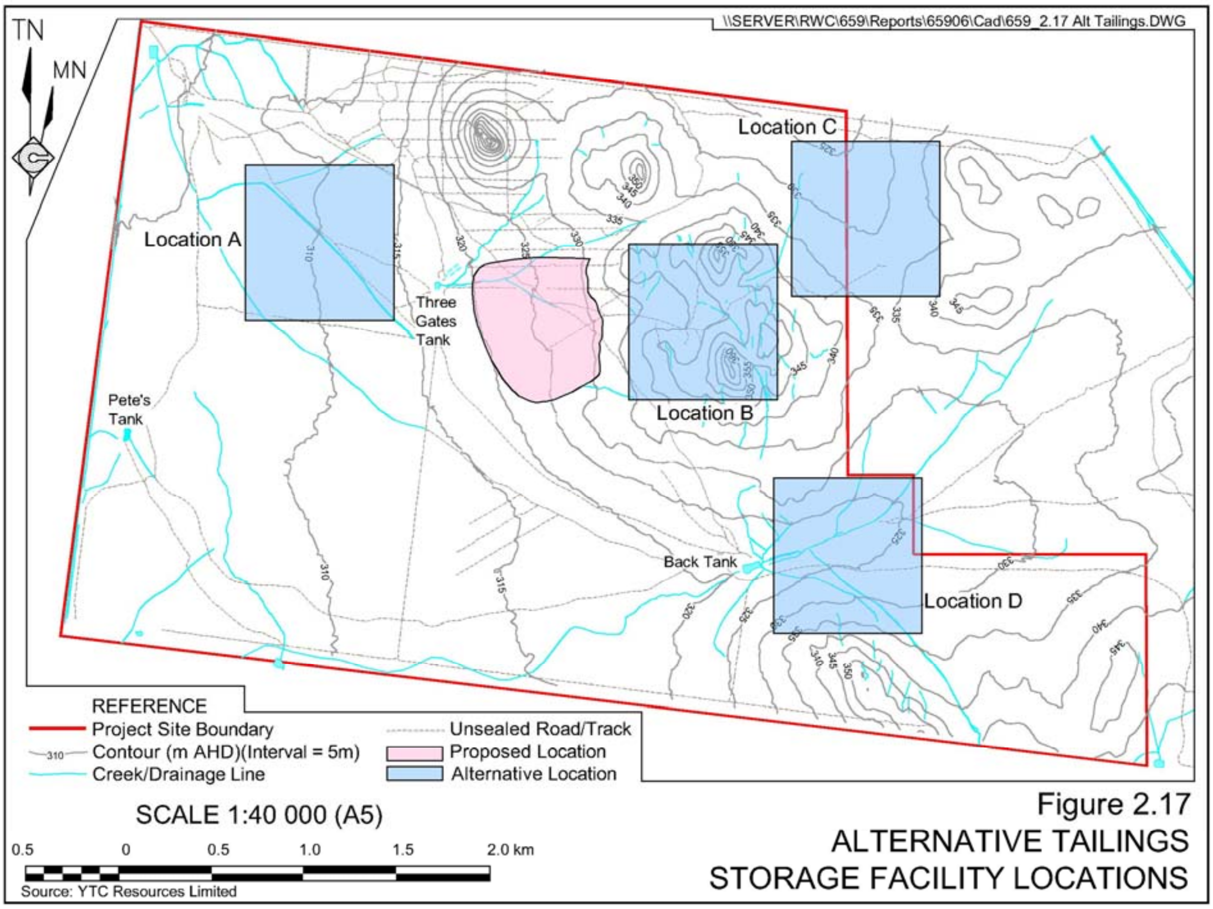

Figure 2.17
ALTERNATIVE TAILINGS STORAGE FACILITY LOCATIONS

- Located in an area of moderate relief which would enable less complex impoundment design.
- Located in an area of Benson 103 vegetation community (see Section 4.2) for which there is abundant other areas within 'The Peak' available as a biodiversity offset.

In relation to the alternatives considered the Proponent notes the following.

- Location A – this location has the advantage of being located within an area of regenerating white cypress pine (see Section 4.2). However, it also has a number of disadvantages when compared with the proposed location, as follows.
  - Located further from the preferred location for the Surface Facilities Area.
  - Located in an area of low relief, requiring more complex impoundment design, namely a turkey's nest design, with the associated additional costs and greater risk of seepage or leakage.
  - Located in an area of potential flooding or intermittent inundation.
- Location B – This location has the advantage of being located in an area of high relief which would permit the use of the existing topography to impound the tailings. However, it also has a number of disadvantages when compared with the proposed location, as follows.
  - The volume of tailings that could be stored within the alternative location would not be sufficient for the Project.
  - There would be limited capacity to expand the facility in the future if required.
  - The embankments would be likely to be highly visible from areas surrounding the Project Site.
  - The alternative location includes Benson 180 and Benson 174 vegetation communities (see Section 4.2) for which there is limited other areas within 'The Peak' available as a biodiversity offset.
- Location C – This location has the advantage of being located in a valley, enabling a valley-fill style of Tailings Storage Facility. However, the location also has a number of disadvantages when compared with the proposed location, as follows.
  - Located further from the preferred location for the Surface Facilities Area.
  - Located in a different, north-flowing surface water catchment, requiring additional surface water management.
- Location D – This location has the advantage of being able to take advantage of a gap between two hills to create a tailings embankment, with significant cost savings. However, it also has a number of disadvantages when compared with the proposed location, as follows.
  - Located further from the preferred location for the Surface Facilities Area.
  - Located in an area with significant upslope catchment, requiring significant surface water diversion structures.

- Located in an area of low relief which would result in a facility that would disturb significantly more area than the proposed facility.
- Located in the preferred location for the Back Tank East (see Section 2.17.5).

2.17.5 Alternative Locations for the Water Storage Facilities

The proposed locations for the water storages have the following advantages.

The expanded Pete's Tank would merely enlarge an existing storage, with the associated benefits of being able to continue to use the existing water harvesting structures.

The proposed location for Bank Tank East would enable the Proponent to take advantage of a gap between two hills to create the dam wall, minimising the area of land to be disturbed and, as a result, cost of construction.

The Proponent notes that there is no feasible alternative location for the expanded Pete's Tank. However, one alternative location for Back Tank East was considered (**Figure 2.18**). That location, however, would have required a significantly larger dam wall than the proposed location, with the associated environmental and cost impacts.

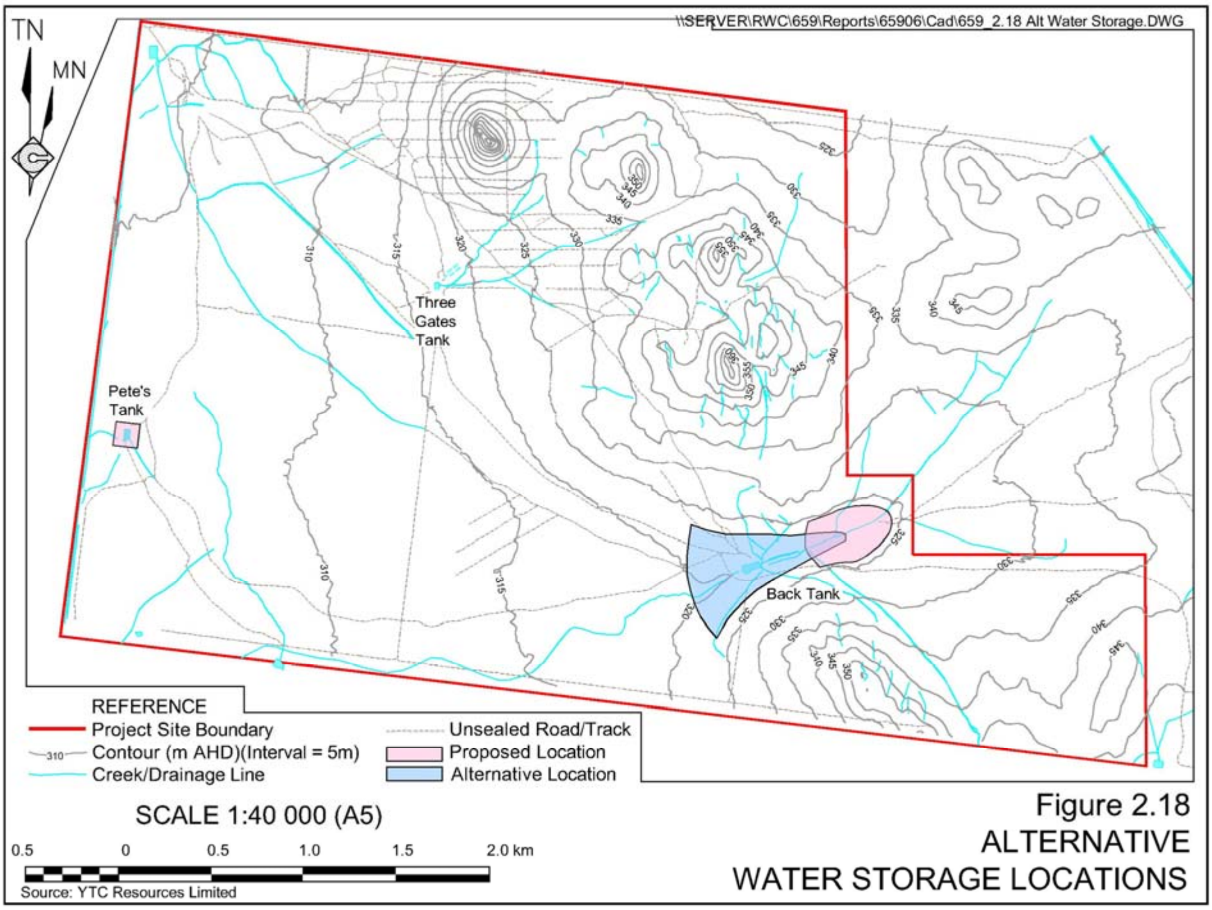

Figure 2.18
ALTERNATIVE WATER STORAGE LOCATIONS

2.17.6 Alternative Location for the Mine Camp

In selecting the location for the Mine Camp, the Proponent took into account the following requirements for a camp.

- Close to the public road network to allow easy access without passing through operational sections of the Project Site.
- Relatively low relief.
- Sufficiently removed from the Surface Facilities Area to ensure noise, dust and other impacts would not adversely impact on residents.

In light of these requirements, the Proponent identified four potential locations for the camp. The proposed location had the following advantages over the other alternative locations.

- Unlikely to be subject to surface inundation when compared to Locations A and B.
- Located close to existing and proposed infrastructure when compared with Locations B and C.
- Shielded from the Surface Facilities Area when compared with Location B.
- Located close to a sealed access road when compared with Location C.

2.17.7 No Main Site Access Road

The Proponent originally considered relying solely on the Light Vehicle Access Road for access to the Project Site. However, this would require all Project-related traffic to access the Project Site by driving past the Mine Camp. As a result, the Proponent elected to include a second site access road, namely the Main Site Access Road. The location of that road and associated intersection was determined to ensure:

- safe access to and from the Project Site onto Burthong Road; and
- the minimum length of road to be constructed.

2.17.8 Alternative Processing Options

2.17.8.1 Introduction

The Proponent considered a range of alternative processing options. These included direct shipping of ore material from the Project Site, construction of a larger plant and construction of a plant capable of producing separate copper, lead and zinc concentrates. Each of these alternatives are discussed below.

2.17.8.2 Direct Shipping of Ore

The Proponent considered direct shipping of ore, with or without preliminary crushing, for toll treatment at or sale to surrounding mining operations. While this alternative would have the advantage of negating the requirement to construct a Processing Plant, it was deemed to be less attractive than the proposed processing option for the following reasons.

- Significant transportation distances and volumes, with resulting traffic, greenhouse gas and cost implications.
- Lower value for the treated or sold product, reducing the financial viability of the Project.

2.17.8.3 Construction of a Larger Processing Plant

The Proponent considered constructing a Processing Plant capable of processing significantly more than 350 000t/year. However, the proposed plant would have required disturbance of a larger area and a greater capital expenditure. As a result, the Proponent has designed a plant that is capable to processing the maximum amount of ore that would be produced by the Project, while still being capable of being upgraded if required.

2.17.8.4 Production of a Copper, Lead and Zinc Concentrate

The Proponent proposed to produce separate concentrates of copper, lead and zinc. The alternative of producing separate concentrates was considered. However, this was rejected because the additional cost of separating the three metals could not be justified. There would be no environmental advantages or disadvantages for either approach.

2.17.9 Alternative Water Supply Options

During the initial planning stages for the Project, the Proponent investigated the following water supply options. Disadvantages for each when compared with the proposed water supply option are as follows.

- Supply of water from Cobar Water Board Pipeline at Canbelego.
  – This option would require construction of a pipeline from Canbelego to the Project Site, a distance of approximately 64km. This option would also require negotiation with the Cobar Water Board for access to the existing Nyngan to Cobar pipeline and purchase of the required water licences.
- Supply of water solely from surface water within and surrounding the Project Site.
  – This option would require construction of a number of very large dams within and surrounding the Project Site, with the associated significant area of disturbance. In addition, given the intermittent nature of rainfall and high rates of evaporation in the vicinity of the Project Site, this option would not provide sufficient water security to ensure uninterrupted water supply for mining purposes.