



Relentless Resources Limited

ABN: 23 160 863 892

Preliminary Environmental Assessment

for the

Copi Mineral Sands Project

Prepared by:



R.W. CORKERY & CO. PTY. LIMITED

August 2018

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Prepared for:

Relentless Resources Limited
ABN: 23 160 863 892
Level 12,
37 Bligh Street
SYDNEY NSW 2000

Telephone: 1300 735 368
Email: andrew.law@relentlessresources.com.au

Prepared by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:

1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Orange Office:

62 Hill Street
ORANGE NSW 2800

Brisbane Office:

Suite 5, Building 3
Pine Rivers Office Park
205 Leitchs Road
BRENDAL QLD 4500

Telephone: (02) 9985 8511
Email: brooklyn@rwcorkery.com

Telephone: (02) 6362 5411
Email: orange@rwcorkery.com

Telephone: (07) 3205 5400
Email: brisbane@rwcorkery.com

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LIST OF ACRONYMS

EEC	Endangered Ecological Community
GDEs	Groundwater Dependent Ecosystems
HMC	Heavy Mineral Concentrate
IPO	Initial Public Offering
JORC	Joint Ore Reserve Committee
LEP	Local Environmental Plan
LGA	Local Government Area
LPS	Loxton-Parilla Sands
RAPs	Registered Aboriginal Parties
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
THM	Total Heavy Mineral

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1. INTRODUCTION

This *Preliminary Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty Limited on behalf of Relentless Resources Limited (the Applicant) to describe the proposed Copi Mineral Sands Project (the Proposal), located approximately 75km northwest of Wentworth in the Murray Basin region of southwestern NSW within the Wentworth Local Government Area (LGA) (**Figure 1**).

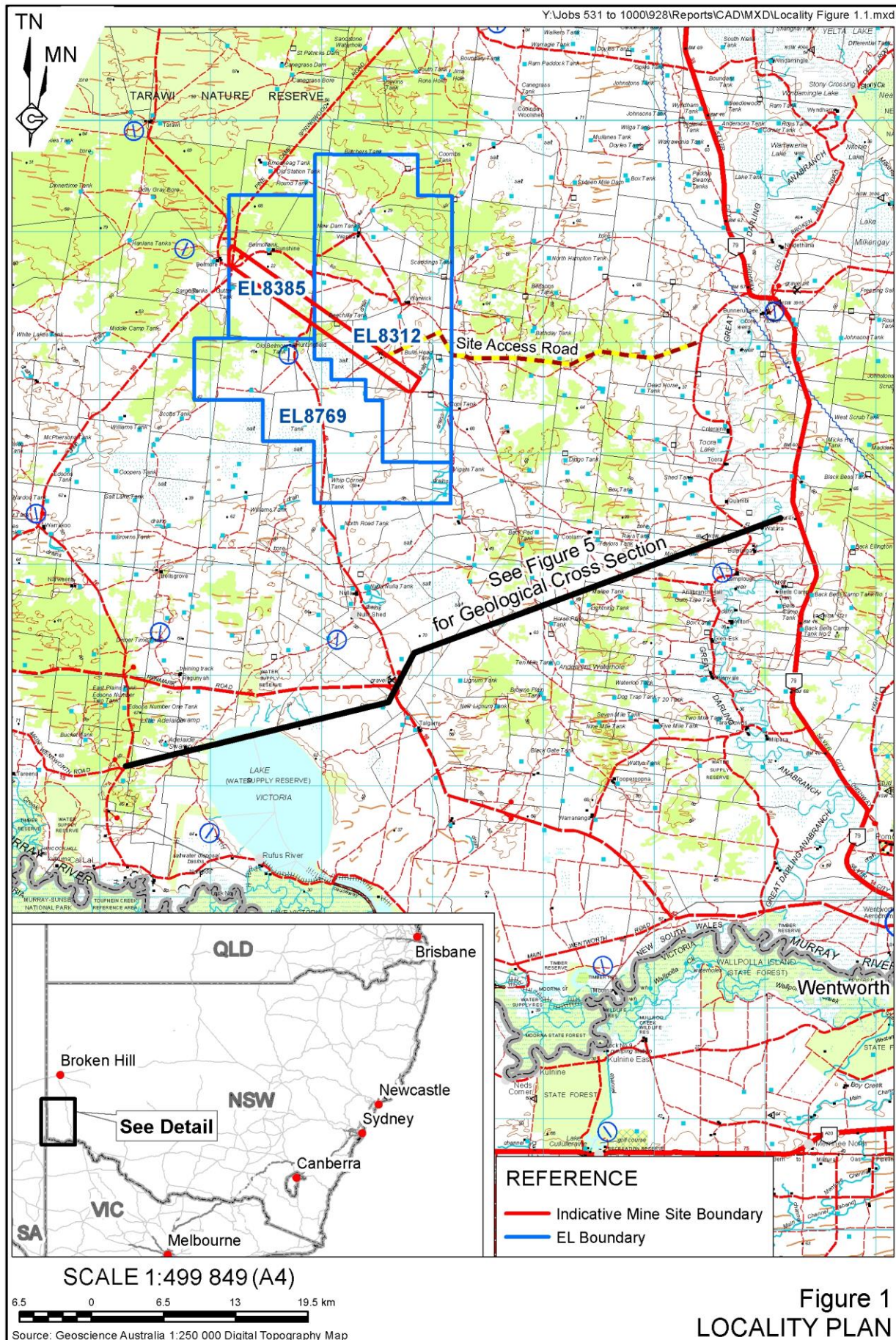
The Applicant is an unlisted Australian mining investment company focused on acquiring strategic stakes in globally significant mining assets. The Company is in the process of applying for an Initial Public Offering (IPO) for a listing on the Australian Stock Exchange.

The Copi Mineral Sands deposit (the “deposit”) comprises the Copi North, Sunshine and Sunshine Extension orebodies located within the Applicant’s exploration licences EL8312 and EL8385. The deposit is a high-grade, strandline-type, continuous mineral sand placer deposit with a northwest-orientated strike length of approximately 15km. The deposit width varies between 30m to 120m, with an average thickness of 2.5m and is overlain by approximately up to 20m of sediment cover. The mineral assemblage of the deposit is dominated (54%) by ilmenite (FeTiO_3) but also contains high value zircon (ZrSiO_4 , 11.3%), rutile (TiO_2 , 10.8%) and the alteration product leucoxene (10.0%).

A JORC-compliant Mineral Resource estimate for the deposit was undertaken by Optiro Pty Ltd in 2017 (Optiro, 2017). Optiro estimated that the deposit contained a total Mineral Resource of 18.6 Mt at 5.2% total heavy mineral (THM) above a 2.0% THM cut-off grade (Optiro, 2017). The deposit is characterised by low slimes (2.8%) and minimal oversize (2.4%).

Mining operations would involve:

- Conventional load and haul extraction (dry mining methods) from two open cut pits (Pit 1 and Pit 2) with a total annual extraction rate (ore and overburden) of between 6 million tonnes per annum (Mtpa) and 8Mtpa, including up to 1.5Mtpa of heavy mineral sand. Total production would be approximately 7.6Mt of mineral sand over a mine life of approximately 6 years.
- Processing of extracted ore using a Mobile Mining Unit located close to the active mining face that would wet screen the ore material, with the undersize material pumped to a Wet Concentrator Plant for conventional gravity separation and mineral concentration.
- Placement of overburden and tailings into a small out-of-pit emplacement, with the majority of waste material returned to the open cuts.
- Transportation of heavy mineral concentrate via road to Broken Hill for despatch to customers for further processing off site.
- Construction of ancillary infrastructure, including a Site Access Road, mine camp, reinjection borefield, electricity supply and distribution, fuel storage, small mine camp, administration, workshop, stores and amenities building, etc.



As a mineral sands mine, the Project is classified as a State Significant Development under Clause 5(1)(a) of Schedule 1 of the *State Environmental Planning Policy (SEPP) (State and Regional Development) 2011*. This schedule nominates that all mineral sands mines are classified as a State Significant Development irrespective of their Capital Investment Value.

The information presented in this document will ultimately be incorporated into, and expanded upon within a comprehensive *Environmental Impact Statement*, to be prepared in accordance with the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the SEARs to be provided.

This document has been prepared in accordance with the *Mine Application Guideline* dated October 2015 for circulation to the Department of Planning and Environment, other relevant State government agencies, the Wentworth Shire Council and the local and wider communities.



2. PROJECT SUMMARY

The Applicant is proposing to develop and operate an open cut mine approximately 75km northwest of Wentworth to extract and process heavy mineral ore and produce a heavy mineral concentrate. **Table 1** presents the status of the planning for the indicative key project components.

Table 1
Indicative Key Project Components

Project Component	Summary of the Project		
Mining Method	Open cut mining from two open cut pits		
Resource	Heavy mineral placer deposit approximately 15km long, between 30m and 120m width and average thickness of 2.5m		
Total Recoverable Resource	Approximately 18.6 million tonnes at 5.2% total heavy mineral (THM)		
Disturbance Area	Approximately 148ha		
Annual Production	Processing of up to 1.5Mtpa of ore material to produce an average 84,430 dry metric tonnes of heavy mineral concentrate (HMC) at 86.3% THM		
Mine Life	6 years		
Total Resource Recovered	Approximately 7.6Mt		
Beneficiation	Wet screening and gravity separation		
Management of Mining Waste	Overburden would initially be placed within a small out-of-pit Waste Rock Emplacement, with subsequent material placed within the open cut. Oversize material would be screened and stockpiled within the open cut. Slimes and tailings would be returned to the open cut void.		
General Infrastructure	A new 31km site access road would be constructed from the Anabranh Mail Road to the Mine Site. On-site infrastructure would include a reinjection borefield, electricity supply and distribution, fuel storage, small mine camp, administration, workshop, stores and amenities building.		
Product Transportation	HMC would be transported in sealed containers via road using AB-triple road trains to Broken Hill from where it would be despatched to customers for further processing.		
Water Management	Groundwater inflows to open cut pits would be removed via sump dewatering for use in processing operations. Surplus water would be reinjected to the host aquifer via a reinjection borefield.		
Operational Workforce	Construction: approximately 24 persons Operations: approximately 27 persons		
Hours of Operation	Activity	Proposed Days of Operation	Proposed Hours of Operation
	Land preparation	7 days per week on a campaign basis	7:00am to 6:00pm
	Construction operations	7 days per week	7:00am to 6:00pm
	Mining operations	7 days per week	24 hours per day
	Processing operations	7 days per week	24 hours per day
	Transportation operations	7 days per week	24 hours per day
	Maintenance operations	7 days per week	24 hours per day
	Rehabilitation operations	7 days per week	7:00am to 6:00pm
Capital Investment Value	Approximately \$25 million		

3. PROJECT DESCRIPTION

3.1 INTRODUCTION

This section provides an overview of the Project in sufficient detail to enable the reader to understand the type and scale of activities proposed. A more detailed description of the Project will be included in the EIS. It is noted that during the preparation of the EIS, further design work is proposed which will assist in the identification of the preferred design of specific components. This may result in minor modifications to the Mine Site layout and project components presented throughout this document.

3.2 THE MINE SITE

Table 2 lists the title details of all land within the Mine Site boundary, or the area over which any future development consent would apply. In addition, **Figure 2** presents the location of all titles listed on **Table 2**.

Table 2
Mine Site Land Titles

Lot	Deposited Plan
1907	763791
1940	763792
4068	766543
1	756199
Unnamed road reserves	

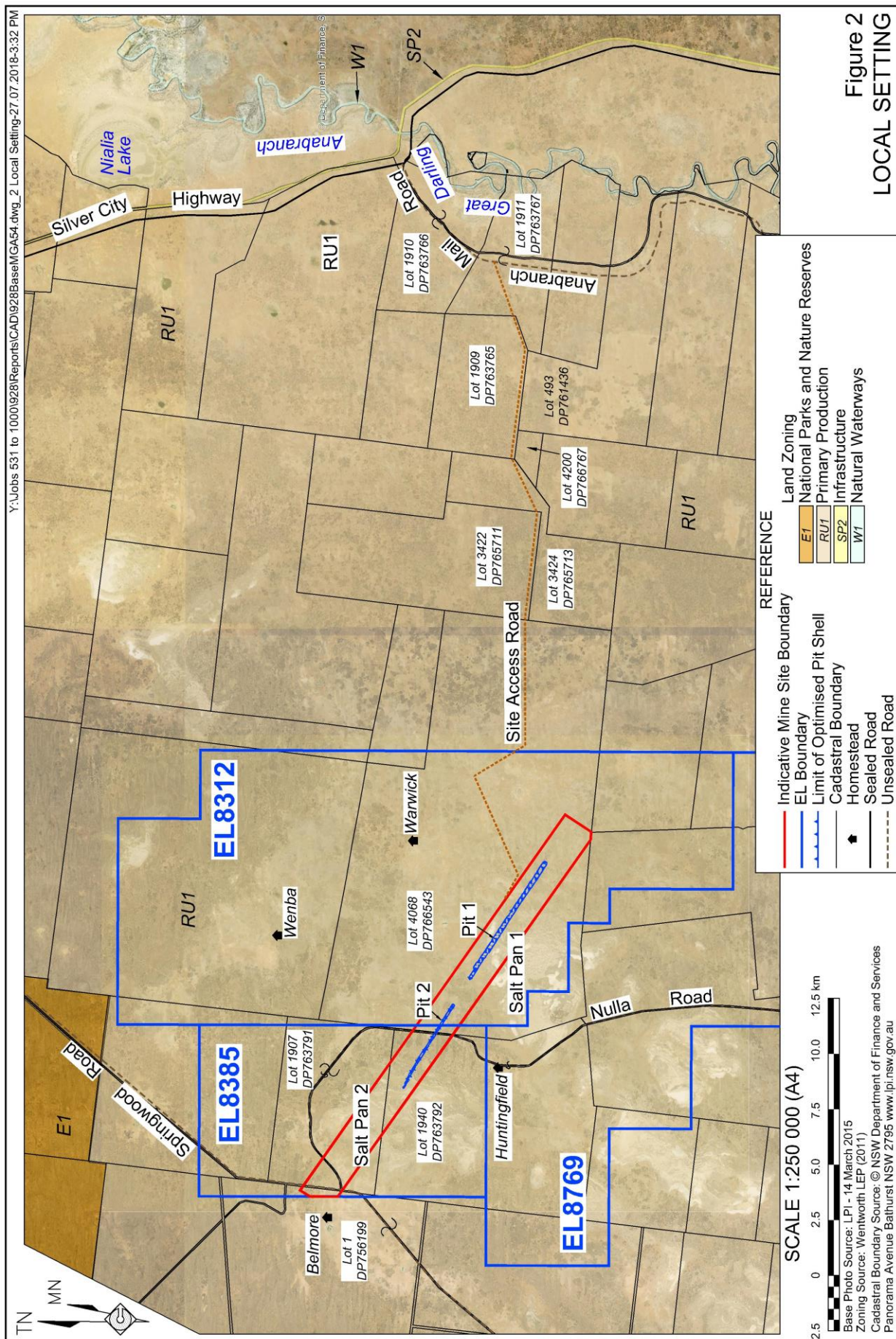
3.3 PROJECT DESCRIPTION

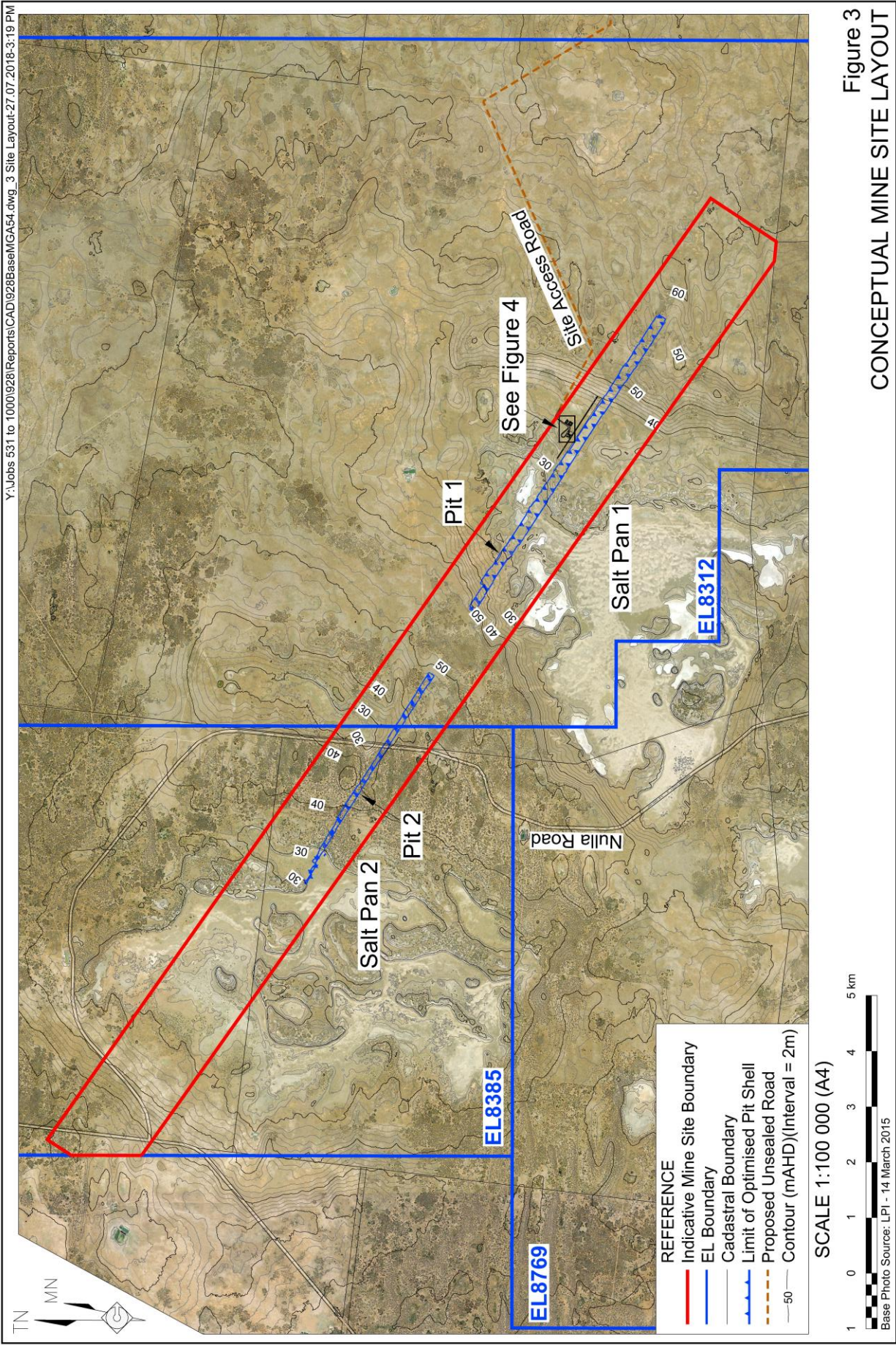
The Project would comprise the following components.

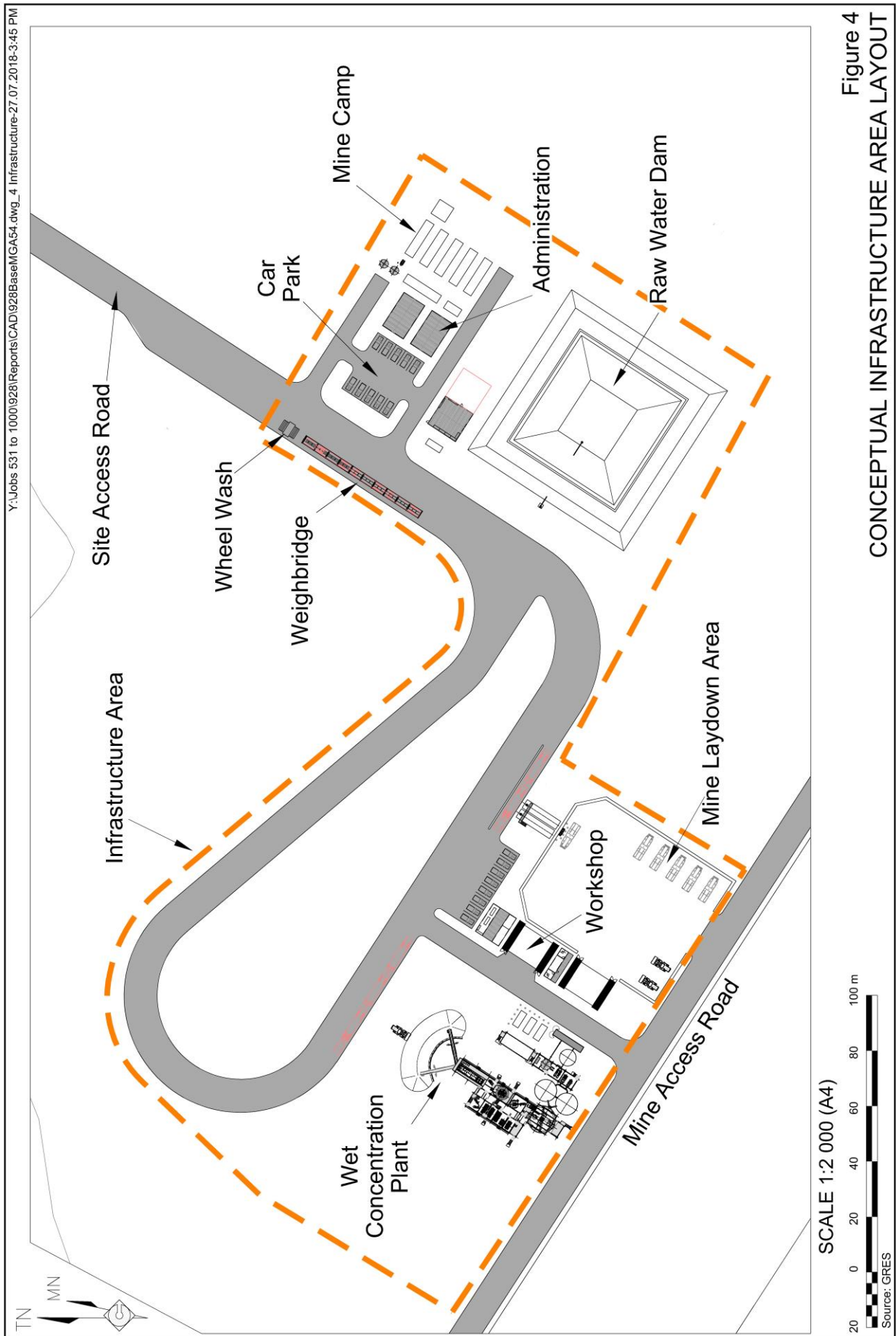
- two open cuts covering approximately 143ha (**Figure 3**); and
- an infrastructure area covering an area of approximately 5ha, including:
 - Wet Concentrator Plant
 - mine laydown area and workshop;
 - raw water dam;
 - administration, mine camp and par park (**Figure 4**).

The above components would be supported by a range of infrastructure including mine camp, site access road, internal roads, water management infrastructure, offices, workshops, laboratory, holding yard, weighbridge, amenities, raw water dam, power supply and a range of services. **Figure 4** displays the indicative location of the Wet Concentrator Plant, related infrastructure and the mine camp.

The location of the re-injection borefield has yet to be determined and will be dependent upon further investigations. These investigations will centre principally upon a range of technical aspects relating to the hydrogeological characteristics of the host aquifers.







The Applicant plans to undertake the development of the mine components in a manner that would be consistent with the long-term, post-mining landform, wherever possible. The final landform would incorporate a back-filled voids.

3.4 ANCILLARY COMPONENTS

The three key ancillary components for the proposed mine would include:

- a new 31km site access road from the Anabranh Mail Road to the Mine Site;
- a mine camp to manage risks associated with fatigue; and
- a reinjection borefield for the return of surplus groundwater inflows into the two open cuts to the host aquifer system.

It is proposed that approval for all ancillary components would be sought concurrently with that sought for the overall mine development.

3.5 DEVELOPMENT SCHEDULE

The Project would require approximately 12 months for site establishment and construction including:

- site access road construction and bulk earthworks;
- preparation of site buildings, mine camp and associated infrastructure areas;
- site building and mine camp installation;
- preparation of processing plant and associated infrastructure areas;
- initial pre-strip of the first mining block;
- process plant module installation; and
- process plant commissioning.

During the period in which site establishment and construction activities are being undertaken, the fabrication and assembly of the Mobile Mining Unit and the Wet Concentrator Plant as modular components would concurrently occur off site. These units would subsequently be transported to the Mine Site for installation and commissioning. The installation of all water management infrastructure would also occur during the site establishment and construction period.

Following completion of the site establishment and construction operations, mining would be undertaken for a period of approximately 6 years, followed by a period of up to 2 years to complete final rehabilitation operations.

3.6 MANAGEMENT COMMITMENTS

The indicative post-approval management commitments that the Applicant proposes to adopt to manage any adverse impacts upon the various components of the environment within and surrounding the Mine Site are set out in Section 6 of this document.



4. STRATEGIC CONTEXT

4.1 TARGET RESOURCE

4.1.1 Titles under the Mining Act

The Mine Site lies within EL8385 and EL8312 held by the Applicant (see **Figure 1**). The Applicant also holds EL8769, south of the Mine Site however, EL 8769 does not form part of the Project.

4.1.2 Regional Geology

The Mine Site is situated within the central Murray Basin. The Murray Basin is a 300 000km², Cainozoic, intracratonic, sedimentary (marine and terrestrial) basin with low relief.

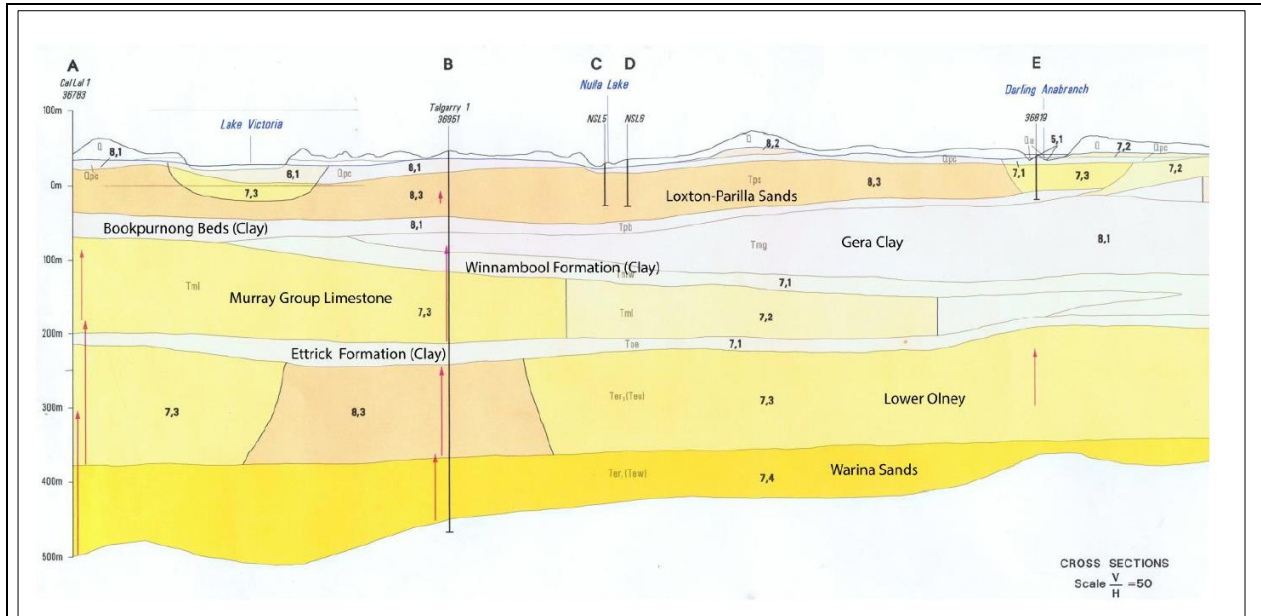
During the Tertiary period, up to 600m of sediments accumulated over the Palaeozoic to Mesozoic basement. The eastern portion of the basin contains the record of paleo-shorelines, extending in a south westerly direction from 500km inland to the present coast.

Figure 5 presents an approximately southwest-northeast orientated cross section through the Murray Basin. The basal units of the Murray Basin are the Renmark Group. The earliest unit of the Renmark Group, the Warina Sand is overlain by the Olney Formation and deep marine limestone and marls of the Murray Group in the western part of the basin; shallow marine Gerra Clay in the central portion and shallow regressive sands of the Upper Renmark Group in the east. After an upper Miocene hiatus, periods of transgressive and progressive sedimentation formed the river and lake sands of the Calivil Formation in the east and the clays and marls of the Bookpurnong Formation in the centre and west of the basin. The economically significant unit of the Loxton-Parilla Sands (LPS) formed during the early Pliocene during a marine transgression and subsequent regression. Reworking of this material allowed for the concentration of coarse grained heavy minerals in beach strandlines and finer grained heavy minerals in deeper marine environments. The LPS are disconformably overlain by the non-marine Blanchetown Clay. Where the Blanchetown Clay is absent, the LPS is disconformably overlain by the Holocene aeolian Woorinen Formation which forms the red sand dunes on the surface that is characteristic of the present day Mallee landforms.

4.1.3 Mine Site Geology

Surface geology within the Mine Site is dominated by the aeolian sediments of the Woorinen Formation dunes, comprising a series of discontinuous, east-west orientated sand dunes separated by broad swales and sand plains.

Whilst a number of strandline type deposits are identified as being present within the LPS within the Mine Site, the target orebodies for the Project are the high-grade Copi North, Sunshine and Sunshine Extension strandlines, which form an ilmenite-rutile-zircon-leucoxene (titanium, zirconium) placer deposit within the LPS. The mineralised portion of the deposit strikes consistently at approximately 303°. Whilst the deposit has varying width and thickness the maximum width is approximately 120m and the maximum thickness is approximately 10m (average 2.5m).



Source: Jacobs (2018) – After Figure 3 Section location see Figure 1

Figure 5
Hydro-stratigraphic units in the vicinity of the Mine Site

Mineralisation generally occurs as stacked lenses of heavy minerals which are interpreted as having been concentrated during storm events and associated wave action. However, mineralisation also occurs as thin extensions to the stacked lenses, potentially from continuous regression or storm over throw and aeolian ablation, as compared to the high grade strands developed from periodic regression.

4.1.4 Mineral Resources and Reserves

The Copi North, Sunshine and Sunshine Extension orebodies are the principal focus of the Project, with further resource and mine design work to be completed on the Copi South orebody. Should that work be completed prior to completion of the EIS, mining of the Copi South orebody will be included with the application for development consent.

Table 3 presents a Joint Ore Reserve Committee (JORC) compliant Mineral Resource for the Copi North, Sunshine, Sunshine Extension and Copi South orebodies.

This resource dataset is based on data from approximately 16,300m of drilling in 547 vertical, reverse circulation drill holes undertaken by previous holders of the exploration titles, Iluka Resources Limited and Broken Hill Minerals Pty Ltd. Additional exploration drilling, being undertaken by the Applicant, is proposed and is aimed at increasing the confidence in the definition of the two strandline deposits and increasing the confidence level of the resource from the Inferred category to Indicated and Measured categories.

Table 3
JORC Compliant Mineral Resource

Classification	Orebody	Million Tonnes	THM ¹ (%)	Slimes (%)	Oversize (%)	% of total heavy mineral			
						Ilmenite	Rutile	Zircon	Leucosene
Indicated	Copi North and Sunshine	13.6	5.6	2.7	2.4	54	11	11	10
	Sunshine Extension	0.2	3.7	4.4	2.3	30	13	5	7
	Total	13.8	5.5	2.8	2.4	54	11	11	10
Inferred	Copi North and Sunshine	3.6	6.3	2.8	1.7	54	11	11	10
	Sunshine Extension	1.2	2.8	4.8	3.8	29	13	5	7
	Copi South ²	2.5	2.6	6.1	0.5	60	11	11	-
	Total	7.3	4.5	4.3	1.6	53	11	10	8
Total		21.1	5.2	3.3	2.2	54	11	11	9
Note 1: THM = Total Heavy Mineral									
2: Copi South orebody not included in this application									
Source: Relentless Resources Limited									

The open cut optimisation studies completed to date indicate the mineable ore within the preliminary open cut pit is estimated to be approximately 18.6 million tonnes although this quantity has the potential to increase as a result of the proposed exploration studies.

4.1.5 Sterilisation of Resources

The Applicant contends that as no known economic resource exists below the known deposits, the Project would not result in sterilisation of any resources.

4.1.6 Interaction with Existing Mines

The target resource is not related to any existing mine operations and, to date, no component of the identified resource has been excluded due to impacts on sensitive areas with the economic ore to be recovered to the greatest extent possible.

Whilst development of the Mine is expected to provide substantial benefits to local businesses that support the mining industry, no other industries or projects are considered to be dependent on the development of the target resource.

4.2 REGIONAL CONTEXT

A summary of the principal local and regional sensitivities / constraints is provided as follows. A full review of the local and regional context and constraints will be provided in the EIS.

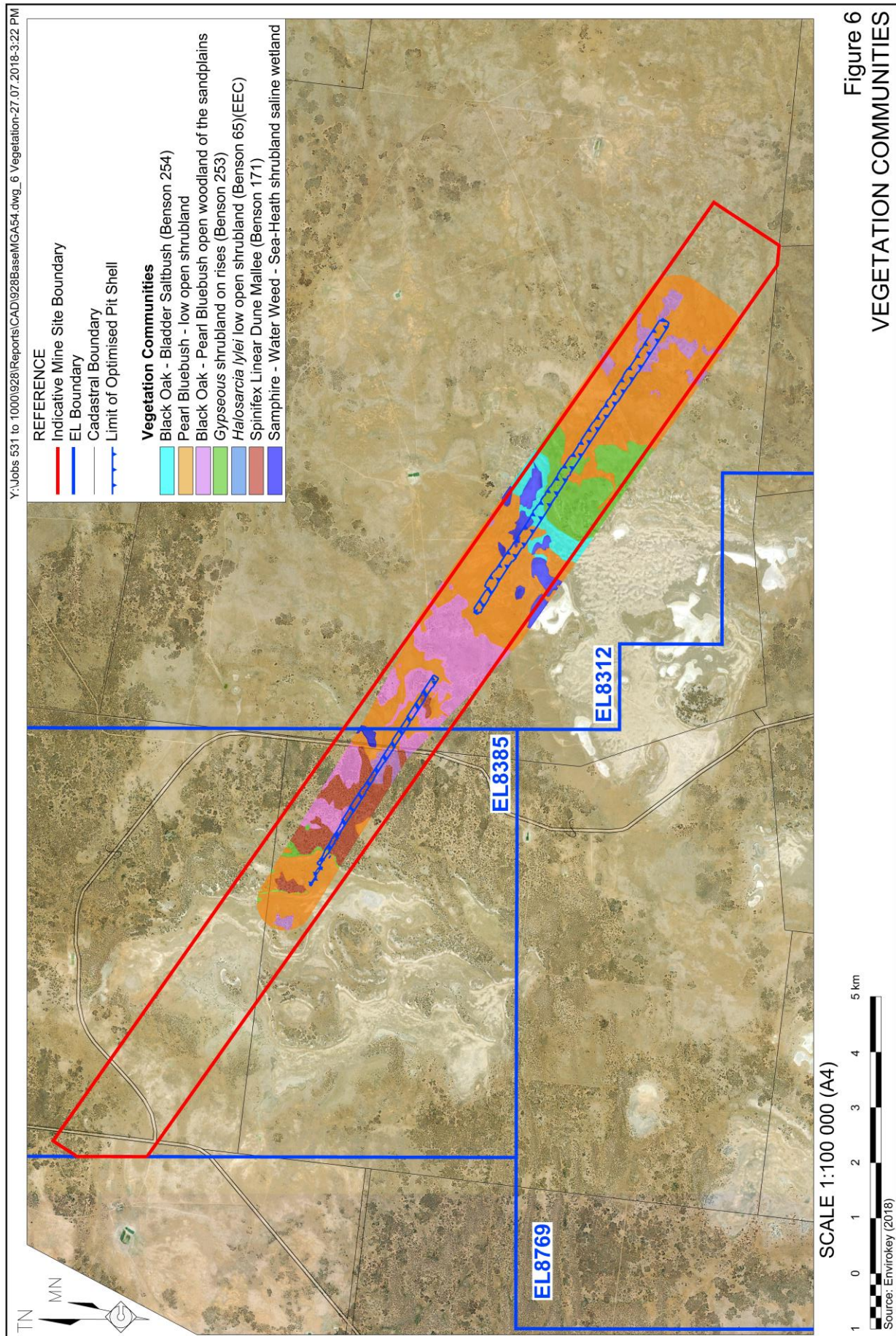
Land Use Constraints

- Within the Mine Site, the land has previously been used (and is still being used) for low-intensity grazing at very low stocking rates.
- Whilst the Mine Site is surrounded by rural land uses, no specific sensitive land uses have been identified to date that are likely to pose a constraint.
- Further assessment of surface water and groundwater interception, storage, and usage will be undertaken as part of the EIS, however, there are currently no significant practical water constraints identified.

Biophysical, Environmental, and Heritage Constraints

- Ecological surveys completed to date indicate the presence of the endangered *Austrostipa nullanulla*, a native grass species listed as endangered in the NSW *Biodiversity Conservation Act 2016* (BC Act). Surveys also identified the Endangered Ecological Community, *Halosarcia lylei low open shrubland*. The preliminary results of terrestrial ecology surveys to date are shown on **Figure 6**. Additional surveys will be undertaken during the Spring of 2018. Five threatened and one migratory fauna species were also recorded, namely:
 - Little Eagle;
 - Rainbow Bee-eater (migratory);
 - Redthroat;
 - Hooded Robin;
 - Little Pied Bat; and
 - Inland Forest Bat.
- No protected areas or other areas of high environmental value have been identified to date.
- Heritage surveys undertaken in 2015 identified the following:
 - No archaeological material was present on the surface nor is likely to be buried beneath the soil.
 - Landforms such as lunettes or source-bordering sand dunes that might contain sensitive sub-surface archaeological material such as burials do not occur in the proposed drilling areas.
 - Modified trees were not identified because no River Red Gum or Black Box, the most commonly scarred species of tree, grow in the proposed activity areas.

A detailed heritage survey is to be completed in Spring of 2018.



Economic Considerations

- The Mine Site is located in an area that is reasonably close to Wentworth and Broken Hill to benefit from (and contribute to) the local economies.

These potential constraints will be further considered within the EIS which will outline appropriate management and mitigation measures to avoid or minimise the potential for impacts.

4.3 PERMISSIBILITY AND STRATEGIC PLANNING

4.3.1 Permissibility

Within the *Wentworth Local Environmental Plan 2011* (LEP), the Mine Site is located within Zone RU1 – Primary Production (refer **Figure 2**) with ‘open cut mining’ permissible with consent within this zone.

4.3.2 State Planning Matters

A range of State legislation, regulation and policies apply to the Project. The following presents a brief overview of the principal State planning matters relevant to the Project.

State Environmental Planning Policy (State and Regional Development) 2011

This SEPP was gazetted on 28 September 2011 and applies to all projects satisfying nominated criteria made following that date. The purpose of this SEPP is to define those projects of State Significance or proposed on State Significant Sites and therefore requiring Ministerial approval under the provisions of the EP&A Act 1979.

As the Project is a mineral sands development, as nominated in Clause 5(1)(a) within Schedule 1 of the SEPP, the Project is a State significant development. Therefore, Part 4, Division 4.7 of the EP&A Act applies.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP was gazetted on 17 February 2007 in recognition of the importance to NSW of mining, petroleum production and extractive industries.

The SEPP specifies matters requiring consideration in the assessment of any mining development including:

- compatibility of the proposed mine with other land uses;
- compatibility of the proposed mine with other mining, petroleum, or extractive industries;
- natural resource management and environmental management;
- resource recovery;
- transportation; and
- rehabilitation.

Whilst these matters have been considered during the preliminary assessment stages, the EIS will provide a full assessment of all matters identified under the SEPP, including those identified in Parts 1 and 3 of the SEPP.

State legislation and other SEPPs to be addressed in the EIS includes the following.

- *Environmental Planning and Assessment Act 1979.*
- *Mining Act 1992.*
- *Protection of the Environment Operations Act 1997.*
- *Water Act 1912.*
- *Water Management Act 2000.*
- *Roads Act 1993.*
- *Heritage Act 1977.*
- *Biodiversity Conservation Act 2016.*
- *State Environmental Planning Policy (Infrastructure) 2007.*
- *State Environmental Planning Policy No. 55 – Remediation of Land.*

4.3.3 Commonwealth Planning Matters

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) covers ‘matters of national environmental significance’, which among other things, includes listed threatened species and communities. The Applicant will submit a referral to the Commonwealth Department of the Environment and Energy if required.

The Project does not trigger the water trigger under the EPBC Act as it is neither a coal seam gas nor a large coal mine.

5. PROJECT RATIONALE

5.1 INTRODUCTION

Planning for the development of the Project focused initially upon identifying the extent of strandline deposit that could be economically mined and processed to yield heavy mineral concentrates. Mining can only proceed in the area where the defined ore body occurs. The Applicant has a very good understanding of the extent of the strandline deposit through the previous drilling programs.

5.2 MINING METHODOLOGY

Mining operations would involve conventional load and haul extraction (dry mining methods) from two open cut pits, Pits 1 and 2. Whilst dredge (wet) mining represents a lower operating cost, the Applicant proposes to use open cut pit mining methods due to this method's improved ability to facilitate selective mining. The adopted mining method would utilise the following steps:

1. Excavation and stockpiling of overburden using mobile plant to expose the top of the orebody.
2. Mining of the ore material using loaders and placement of ore material in the Mobile Mining Unit for screening, mixing with water and pumping to the Wet Concentrator Plant for processing via gravity separation.
3. Stockpiled overburden and tailings would be returned to the open cut pit void.

The use of dry mining methods avoids the higher slimes levels that would result from dredging of the overburden. Dry mining conditions are proposed to be achieved via sump dewatering with groundwater inflow to the open cuts being utilised for process water. Surplus groundwater would be returned to the host aquifer system via the use of reinjection wells.

No drilling or blasting is required to facilitate mining.

5.3 ORE PROCESSING

The processing plant for the Copi North Mineral Sands Project is designed to process 1.5Mtpa of ore to recover heavy minerals and produce a heavy mineral concentrate whilst rejecting gangue minerals and returning them to the mining void. With the knowledge of the defined limits of mineralisation, the planning for the remainder of the mine focused on the other two main components that would be utilised for the processing of the extracted ore material, namely:

- the Mobile Mining Unit; and
- the Wet Concentrator Plant.

The rationale behind the planning and operation of each of these components is as follows.

5.3.1 Mobile Mining Unit

The Mobile Mining Unit would be comprised of two modular skid mounted components connected by a mobile conveyor. The first modular unit would incorporate the feed bin and feeder with the second modular unit incorporating the wet screen, discharge pumps, switchroom and miscellaneous services. Use of modular skid mounted units is proposed so that the Mobile Mining Unit can be relocated and positioned in close proximity to the mining face throughout the life of mining.

During the development of Pit 1, the Mobile Mining Unit would be situated within the mining void created by the mining operation and fed directly using a front-end loader. Due to the narrow nature of Pit 2, placement of the Mobile Mining Unit proximal to the mining face during the development of Pit 2 would necessitate up to five relocations per month. Subsequently, during the development of Pit 2, the Mobile Mining Unit would be placed in a fixed location and modified to directly receive ore fed by 40t mining trucks.

5.3.2 Wet Concentrator Plant

The Wet Concentrator Plant would be comprised of four modular units which would incorporate the following:

- Spirals module incorporating all of the gravity separation spirals and associated pumps;
- Heavy Mineral Concentrate (HMC) handling module, incorporating the constant density tank, spirals feed pump and HMC product filter;
- Tailings module, incorporating the deslime cyclone feed pump, tailings thickener and associated equipment; and
- Water module, incorporating the process water pumps, fire water pumps and the potable water tank and pumps.

The Wet Concentrator Plant location was selected due to its proximity to the deposit, thus optimising the pumping distances from the Mobile Mining Unit to the Wet Concentrator Plant during mining operations. In addition, the Wet Concentrator Plant location was selected in order to minimise the bulk earthworks that would be required to establish the site.

The Wet Concentrator Plant has been located and laid out in a manner which minimises the overall Project foot print and to facilitate the flow of the processing stream. A specific focus has been placed on a modular plant configuration to minimise on-site construction requirements and also to allow for efficient removal of the Wet Concentrator Plant and related infrastructure during the rehabilitation of the Mine Site.

5.3.3 Other Components

Other project components such as the raw water dam, Mine Camp and power generation facilities would be positioned adjacent to the Wet Concentrator Plant within the Mine Site.

Overburden stockpiles would be positioned adjacent to either Pit 1 or Pit 2 for use as rehabilitation material. Whilst the reinjection borefield would be positioned in a suitable location that would be selected once further groundwater investigations and aquifer performance testing has been undertaken.

6. PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT

Figures 2 and 3 display an aerial photographs of the Mine Site within its local setting. Reference data relied upon for the environmental impact assessment for the Project includes details of surrounding land ownership and residences (**Figure 7**) and local topography and drainage (**Figure 8**).

Table 4 presents a summary of the existing environment within and surrounding the Mine Site, management commitments that would be implemented, potential Project-related impacts and the proposed assessment approach to that which has been or will be implemented.

An understanding of the existing environment has been developed via a number of studies commissioned by Broken Hill Minerals and the Applicant. The Applicant proposes to utilise these studies and collected data to facilitate and inform further studies and assessments throughout the preparation of the EIS.

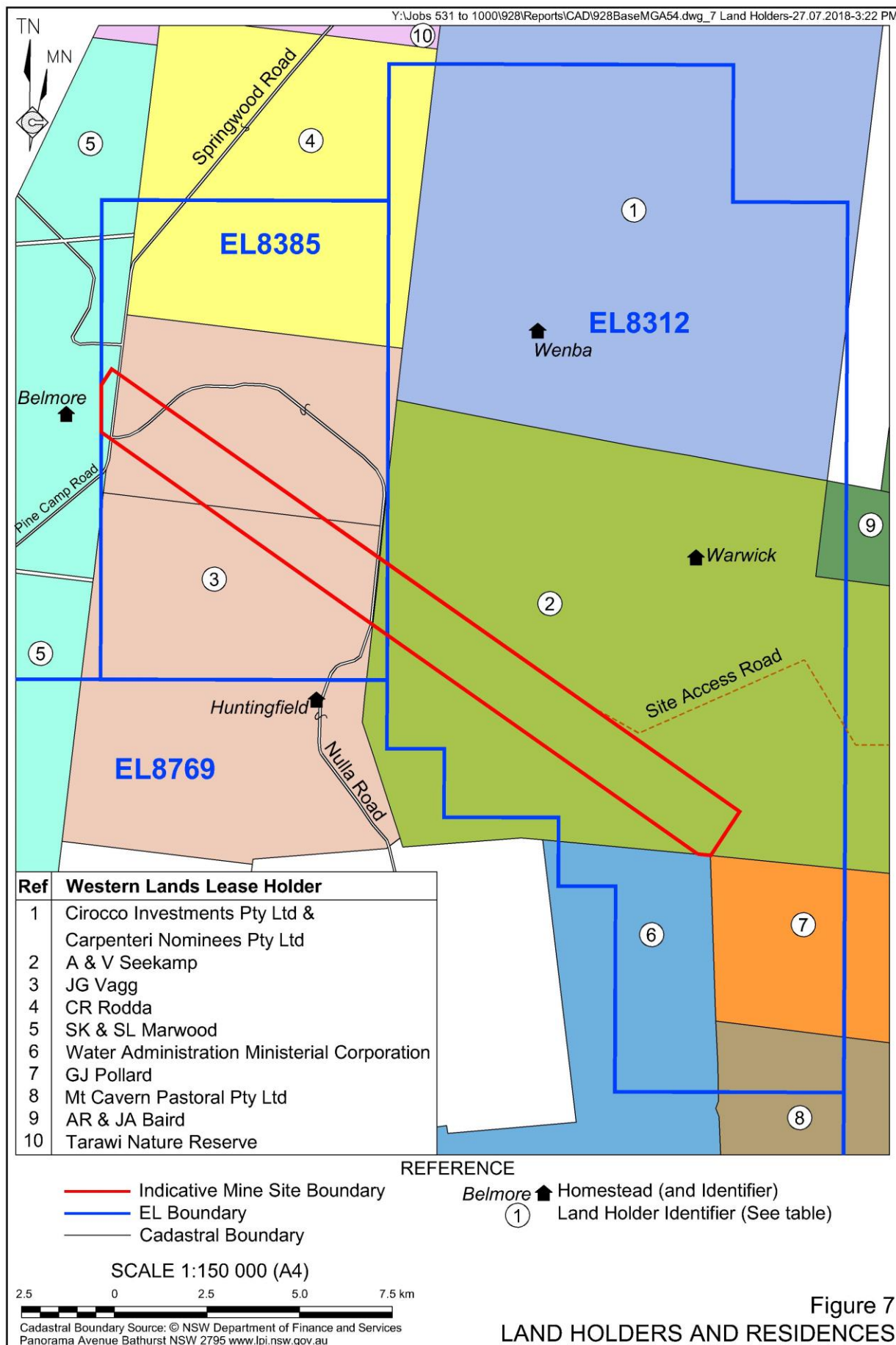


Figure 7
LAND HOLDERS AND RESIDENCES

Table 4
Preliminary Environmental Impact Identification and Management Commitments

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Issue	Existing Environment	Further Investigations	Potential Impacts	Management Commitments (post approval)	Proposed Assessment
Aboriginal Cultural and Historic Heritage	Dr Matt Cupper of Landskape Natural and Cultural Heritage Management undertook a due diligence assessment for exploration-related activities in 2015. The resulting report noted the following: <ul style="list-style-type: none"> No archaeological material was present on the surface nor is likely to be buried beneath the soil. Landforms such as lunettes or source-bordering sand dunes that might contain sensitive sub-surface archaeological material such as burials do not occur in the proposed drilling areas. Modified trees were not identified because no River Red Gum or Black Box, the most commonly scarred species of tree, grow in the proposed activity areas 	A cultural heritage field survey of the Project Site will be undertaken by a heritage consultancy in consultation with Registered Aboriginal Parties (RAPs), for the purpose of compiling an inventory of observed and likely cultural heritage artefacts or sites, and reporting on the location and condition of any sites identified.	The approach to the management of any identified cultural heritage sites would be developed in consultation with RAPs.	<ul style="list-style-type: none"> Ensure that the outer limit of the proposed disturbance areas are accurately marked on the ground. Ensure that all surface disturbing activities are undertaken within the marked disturbance footprint or previously disturbed areas only. Where feasible, implement mitigation measures and/or management techniques, developed in consultation with RAPs, during construction and operation of the Proposal to avoid impacts to identified artefacts or sites. Where this is not feasible, arrange for the salvage of any identified artefacts in accordance with an approved Aboriginal Cultural Heritage Management Plan prepared in consultation with RAPs. 	A detailed cultural heritage assessment of the proposed disturbance footprint will be undertaken, and the significance of any identified objects will be assessed in accordance with the relevant guidelines. The approach to the salvage and curation of any identified artefacts or sites within areas to be disturbed would be discussed with all RAPs.
Transportation	The Mine Site would be accessed via: <ul style="list-style-type: none"> the Silver City Highway, a two lane, sealed state road; a modified intersection constructed by the Applicant approximately 700m north of the Bunnerungee Bridge on the Silver City Highway; Anabranh Mail Road, an unsealed local road that would be upgraded by the Applicant; and an unsealed, Site Access Road that would be constructed by the Applicant. Sight distances on all intersections are likely to be well excess of that required for safe operation.	Further assessment of the local road network including a site inspection will be undertaken by a traffic and transport consultancy to assess the current traffic arrangements, pavement conditions, efficiency and constraints of the local road transport network and identify the necessary treatments required to facilitate the Project. These investigations would also establish existing traffic levels and predict future traffic growth.	Inadequate road conditions, and poor driver fatigue management, could potentially result in an increased risk of traffic-related accident, injury or fatality. Increased road traffic levels could potentially result in increased road maintenance costs, and could affect the capacity, efficiency and safety of the existing road network.	<ul style="list-style-type: none"> Upgrade the intersection of the Silver City Highway and Anabranh Mail Road to meet the relevant <i>Austroads</i> design standards for AB-triple road trains. Upgrade the section of the Anabranh Mail Road to be used for site access to meet the relevant <i>Austroads</i> standards for AB-triple road trains. Design and construct the Site Access Road to meet the <i>Austroads</i> design standards for AB-triple road trains. Implement proactive policies and strategies to actively manage and avoid driver fatigue. Negotiate a Voluntary Planning Agreement with Wentworth Shire Council addressing both the upgrade and maintenance works required for local roads. 	A traffic assessment will be undertaken to assess the proposed Project-related road transport infrastructure in relation to existing transport infrastructure and traffic conditions. The design of the construction and upgrading works would be developed in consultation with Wentworth Shire Council and RMS. Indicative layouts of the Site Access Road and upgrading works will be included in the EIS.
Noise	The noise environment surrounding the Mine Site is likely to be typical of a remote rural environment, with very limited noise emissions. Noise enhancing meteorological conditions such as temperature inversions, are likely to be a feature of the environment.	A acoustic consultancy will review relevant background documents and the on-site meteorological station data, and undertake an assessment of existing noise levels at the Mine Site and surrounding residences in preparation for noise modelling.	Construction and operational activities within the Mine Site, and heavy vehicle traffic along the proposed transport route, may result in increased received noise levels at some surrounding residences. It is likely that activities within the Mine Site would be audible at various locations within surrounding areas under certain meteorological conditions, particularly temperature inversions. However, the Applicant would design the Project to ensure noise levels are compliant with applicable noise criteria.	<ul style="list-style-type: none"> Regularly service all on-site equipment to ensure sound power levels of each item remains at or below the nominated values relied upon in noise modelling. Install frequency modulated reversing alarms to all mobile equipment. Ensure all truck drivers comply with a Drivers Code of Conduct which outlines procedures for reducing noise impacts during transportation on and off site. Maintain an open dialogue with the surrounding community and neighbours to address any concerns over noise. Implement additional noise mitigation measures as determined through noise modelling. 	A noise assessment will be undertaken to predict the received noise levels under different operational scenarios and under predominant meteorological conditions. A range of design and operational safeguards will be incorporated into the Project in order to achieve compliance with applicable noise criteria.

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Table 4 (Cont'd)
Preliminary Environmental Impact Identification and Management Commitments

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Issue	Existing Environment	Further Investigations	Potential Impacts	Management Commitments (post approval)	Proposed Assessment
Air Quality	The air quality environment surrounding the Mine Site is likely to be typical of a rural environment, with dust the principal air quality-related pollutant.	A program of monthly deposited dust monitoring at four locations surrounding the Mine Site will be undertaken during the preparation of the EIS to establish the existing air quality in the vicinity of the Mine Site.	The Project could potentially result in an increase in received particulates and emissions in areas surrounding the Mine Site.	<ul style="list-style-type: none"> Clear vegetation and topsoil progressively to provide sufficient areas for the next 12 months of operation only. Apply water to roads and trafficked areas using water trucks to minimise the generation of dust. Undertake regular monitoring of deposited dust. Progressively rehabilitate interim or final landforms or disturbed areas no longer required. 	Given the distance to surrounding residences, no formal air quality impact assessment is proposed. Deposited dust would be monitored throughout the Project Life to ensure that dust deposition rates do not increase by more than 2g/m ² /month above background levels.
Hazardous Materials	The environment within and surrounding the Mine Site has low exposure to hazardous materials. The only materials would include agricultural chemicals.	A comprehensive list of all potential hazardous materials that would be used on site throughout the life of the Mine would be assembled for consideration in the EIS.	Emphasis will be placed upon avoiding any impacts of hazardous materials on the workforce and persons living/travelling in the vicinity of the Project Site. All chemicals would be transported, stored and used in accordance with manufacturers' specifications.	<ul style="list-style-type: none"> Store all potentially hazardous materials in accordance with Australian Standards and the manufacturer's instructions 	An assessment of hazardous material will be included within the EIS.
Visual Amenity	Within the areas surrounding the Mine Site, the existing visual setting is primarily associated with its remote and arid nature, and includes salt pans and expanses of flat, low open shrubland.	Further observations are planned to assess potential viewing locations.	It is unlikely that the Project would potentially impact on the visual character of the landscape and the visual amenity of surrounding residents.	<ul style="list-style-type: none"> Paint all potentially visible items of fixed plant and equipment in a colour that minimises contrast with the surrounding landscape. Lighting configurations would be carefully selected and positioned to limit light spill from the Mine Site 	<p>Given the distances to surrounding residences, no formal visibility assessment is proposed.</p> <p>An assessment of sight lines from the nearest residences would be undertaken and figures prepared for the EIS.</p>
Surface Water	<p>The topography surrounding the Mine Site is generally flat to very gently sloping with drainage lines in the area typically draining into slight depressions or salt pans.</p> <p>Surface water drainage in the vicinity of the proposed pits typically flows southwest towards internally draining salt pans that receive overland surface water flows only immediately following intense rainfall events.</p> <p>Rainfall in the area is low, with an annual median rainfall of 251mm being recorded at the Wentworth (Toora) weather station (BoM Id 47099) that is approximately 36km east of the Mine Site. Evaporation exceeds average rainfall in all months.</p>	Given the nature of the existing surface water environment, no further investigations are proposed.	Following a high rainfall event, substantial surface water flows could move from the northeast to southwest towards the salt pan located immediately southwest of the proposed Pit 1. This may result in flooding of the pit or substantial disruption of surface water flows.	<ul style="list-style-type: none"> Clear vegetation and topsoil progressively to provide sufficient areas for the next 12 months of operation only. Ensure that all water management infrastructure is designed, constructed, managed and maintained in accordance with all design standards and hydraulic performance criteria. Implement tailings management measures to minimise the potential for tailings discharge onto land or drainage features. Implement mitigation measures to manage flooding risk in Pit 1, including the following. <ul style="list-style-type: none"> Excavating a section of Pit 1 within the salt pan, then backfilling it prior to excavation of remaining section, to allow surface water to flow around the active extraction area. Pumping of accumulated water from the northeastern side of Pit 1 to the southwestern side in a rare or infrequent rainfall event. Installing a suitably engineered flood levee to prevent surface waters entering Pit 1 following a rare or infrequent rainfall event. 	A detailed Water Management Plan that would include an Erosion and Sediment Control Plan would be prepared and implemented.

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Table 4 (Cont'd)
Preliminary Environmental Impact Identification and Management Commitments

Page 3 of 4

Issue	Existing Environment	Further Investigations	Potential Impacts	Management Commitments (post approval)	Proposed Assessment
Groundwater	<p>The Mine Site is located within the central Murray Basin. The principal aquifers in the vicinity of the Mine Site include:</p> <ul style="list-style-type: none"> Loxton-Parilla Sands, a moderate yielding, locally confined to unconfined aquifer; Murray Group Limestone, a low to moderate yielding, confined aquifer; and Lower Olney and Warina Sands, a moderate to high yielding, confined aquifer. <p>Six bores have been constructed by the Applicant within the Loxton-Parilla Sands, and indicate that standing water levels are typically between 24m AHD and 25m AHD, or 2m to 24m below surface.</p> <p>Groundwater is typically highly saline and near neutral.</p> <p>Groundwater dependent ecosystems (GDEs) have a low to moderate potential to occur in the vicinity of the Mine Site, and are most likely to occur near shallow, unconfined, unconsolidated material on Blanchetown Clay where water with lower salinity is likely to occur.</p> <p>There are nine registered groundwater users within a 10km radius of the Mine Site.</p>	<p>The Applicant would commission field investigations involving installation of monitoring bores, and pump testing and injection trials in relevant geological strata. The site specific data generated from the field investigations would be utilised to inform a numerical groundwater modelling assessment of the potential impacts to the local and regional groundwater system as a result of the open cut pit development and reinjection of surplus groundwater inflows.</p>	<p>Potential exists for drawdown of standing water levels within the Loxton-Parilla Sands, which would adversely impact on surrounding water users or groundwater dependent ecosystems.</p> <p>Changes to groundwater chemistry during storage prior to reinjection could result in reduced groundwater quality.</p> <p>The Applicant may potentially be unable to obtain the required water access licences, or to obtain approval to reinject extracted groundwater.</p>	<ul style="list-style-type: none"> Reinject excess water into the Loxton-Parilla Sands aquifer, proximal to the proposed open cut pits. This water would be treated to prevent biological, chemical or physical pollution of the aquifer. The reinjection process would be managed to prevent surficial discharges. Ensure that water to be reinjected remains separate from process water streams and chemicals and hydrocarbons would not be permitted to mix with the water. Obtain required licences and approvals for the volume of water to be extracted (and reinjected). Implement a Water Management Plan would be implemented including ongoing monitoring, data collection and reporting of groundwater quality, standing levels and flow conditions at the monitoring bores. 	<p>A Groundwater Impact Assessment will be undertaken that would, include the development of a Peer Reviewed groundwater model. The assessment would also include an assessment of potential impacts on local and regional groundwater resources throughout the life of the Project recommended impact mitigation measures and management techniques, and an appropriate monitoring program.</p>
Terrestrial Ecology	<p>Biodiversity surveys undertaken in 2015 and 2018 recorded the following.</p> <ul style="list-style-type: none"> Seven vegetation communities, including 'Halosarcia lylei low open shrubland' which is listed as an Endangered Ecological Community (EEC) under the <i>NSW Biodiversity Conservation Act 2016</i>. Five threatened fauna species and one migratory fauna species, namely: <ul style="list-style-type: none"> Little Eagle; Rainbow Bee-eater (migratory); Redthroat; Hooded Robin; Little Pied Bat; and Inland Forest Bat. Austrostipa nullanulla, a grass listed under the <i>NSW Biodiversity Conservation Act 2016</i>. 	<p>A follow-up spring ecological survey is proposed for September 2018. This additional survey would include vegetation surveys, targeted threatened flora surveys, fauna surveys including targeted threatened fauna, and survey of the proposed Site Access Road route.</p>	<p>The Project may have impacts on native vegetation and threatened species, principally as a result of clearing and removal of habitat area. The potential significance of these impacts is yet to be determined.</p> <p>The Project will be referred to the Commonwealth Department of Environment and Energy to determine whether the Project will require formal assessment under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) and whether EPBC Act Offsets apply.</p> <p>As there is currently no bilateral arrangement between the NSW and Commonwealth Governments regarding the Biodiversity Offsets Scheme of the <i>NSW Biodiversity Conservation Act 2016</i>, the approvals process with respect to potential biodiversity offsets for the Project may be delayed.</p>	<p>Throughout the life of the Project, measures to be adopted would include:</p> <ul style="list-style-type: none"> progressive clearing to provide sufficient areas for the next 12 months of operation; implementation of pre-clearance inspections; progressive rehabilitation; and ongoing weed management and control. <p>The principal long-term management measure would be the development of a biodiversity offset strategy to secure in perpetuity areas around the Mine Site with similar vegetation to that which would be cleared within the Mine Site.</p>	<p>A comprehensive Biodiversity Impact Assessment is being undertaken to identify the presence and status of the EECs and individual species within the area to be disturbed. Appropriate design and operational safeguards will also be investigated.</p>

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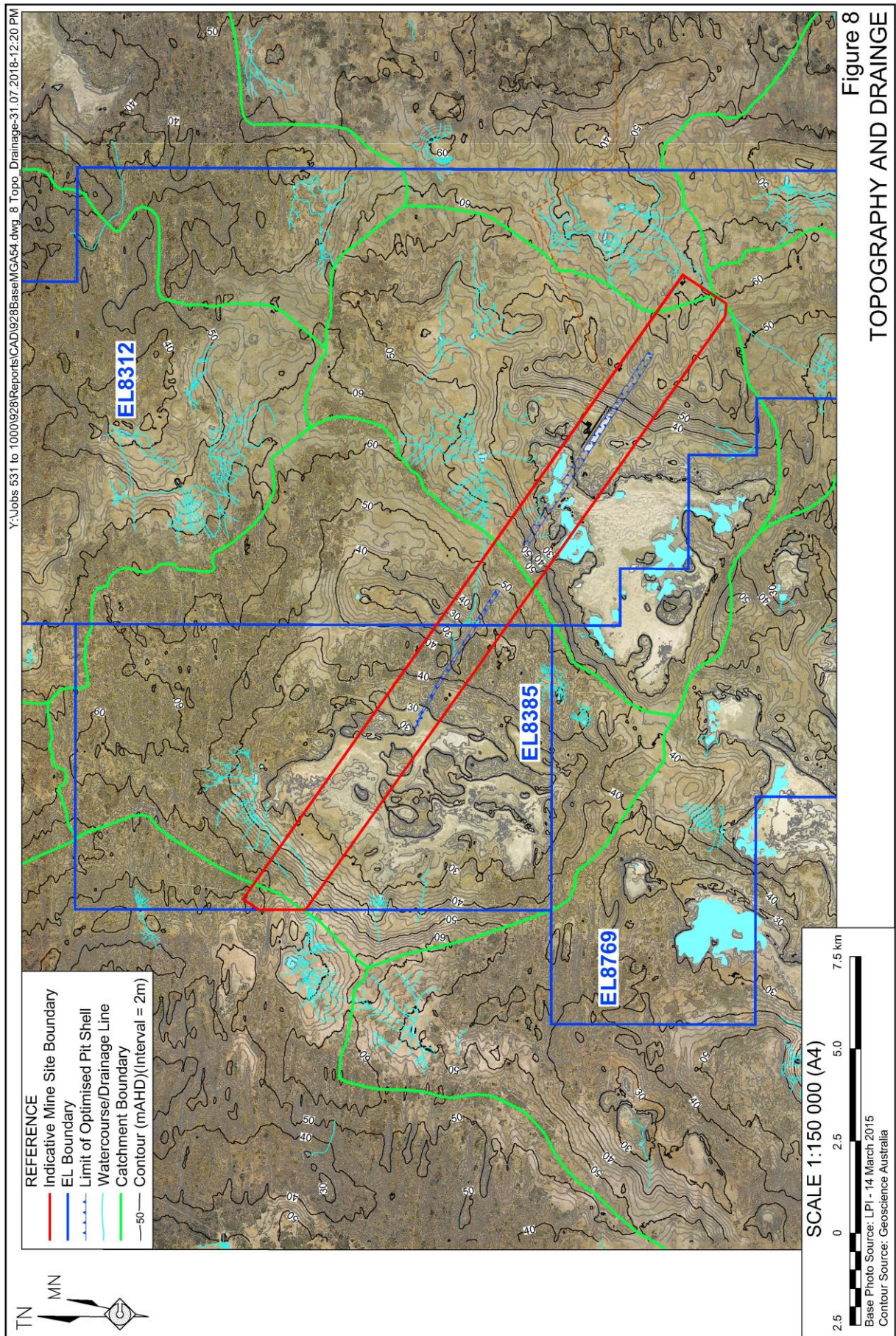
Table 4 (Cont'd)
Preliminary Environmental Impact Identification and Management Commitments

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Issue	Existing Environment	Further Investigations	Potential Impacts	Management Commitments (post approval)	Proposed Assessment
Land and Soils Capability	<p>Review of the NSW OEH Soils and Land Capability mapping for the Mine Site Area has identified that the bulk of the Mine Site is underlain by soils with extreme land and soil capability (Class 8 soils). A small section of the Mine Site is underlain by Class 4 soils with moderate to severe limitations to its land and soil capability.</p> <p>Review of access to sources of reliable water identifies that the Mine Site soils cannot be classified as Biophysical Strategic Agricultural Land.</p>	<p>Given the nature of the existing soils and land capability of the Mine Site and the proposed rehabilitation strategy, no further investigations are proposed.</p>	<p>The proposed mining operations would involve the progressive removal and stockpiling of topsoil and subsoil material (where present) from areas proposed for the open cut pits. Progressive and final rehabilitation would be undertaken wherever possible using the stockpiled topsoil and subsoil.</p>	<ul style="list-style-type: none"> Minimise land and soil degradation through the implementation of appropriate soil management measures. Implement a Mining Operations Plan that establishes timing and final land use objectives of the progressive rehabilitation activities during the operational life of the Project and post closure. 	<p>A detailed Mining Operations Plan, including the progressive rehabilitation of disturbed areas would be prepared for approval by the Division of Resources and Geoscience.</p> <p>In addition, a Water Management Plan that would include an Erosion and Sediment Control Plan would be prepared and implemented.</p>
Social Impacts	<p>The area surrounding the Mine Site is sparsely populated, with the 2016 Census recording 18 people in the Pine Camp state suburb, encompassing an area of 1,855km². The area is located within the Wentworth Local Government Area (LGA), which had a population of 6 794 at the time of the 2016 Census. The proportion of males as a percentage of the total population is higher than the NSW average.</p>	<p>A detailed social impact assessment will be undertaken in accordance with the <i>Social Impact Assessment Guideline 2017</i>.</p>	<p>The Project could potentially result in unacceptably high demand for accommodation, services and facilities.</p>	<p>Given the remote location of the Mine Site, the Applicant would construct a Mine Camp to provide accommodation for employees to minimise risks associated with fatigue. As a result, accommodation, services and facilities in nearby towns would not be significantly impacted as employees would return to their usual residences when not rostered on.</p> <p>Workers would be sourced from a variety of locations, including locally should suitable candidates make application.</p> <p>Given the relatively small scale and remote location of the Project, it would be unlikely to negatively impact the social fabric of the surrounding community .</p> <p>The Applicant would contribute to the enhancement of the Wentworth LGA through targeted programs developed with the community.</p> <p>The Applicant would maintain a proactive role as a good corporate citizen within the Wentworth LGA.</p>	<p>RWC will undertake a Social Impact Assessment in accordance with the Social Impact Assessment Guideline 2017 to ascertain the social characteristics and views of the local community, and will recommend measures for the Applicant to adopt.</p>
Economic Impacts	<p>Employment rates in the Wentworth LGA are similar to the NSW average, indicating that the high levels of unemployment that characterise some regional centres are not a factor there. Median weekly incomes are between 15% and 30% lower than the NSW average, however, other costs, particularly housing, are likely to be substantially lower as well.</p>	<p>A detailed economic impact assessment will be undertaken in accordance with Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals 2015.</p>	<p>The Project may cause an increased demand for labour, increasing the cost or reducing the availability for other industries</p> <p>Potential exists for the economic benefits of the Project to be distributed widely, whilst adverse Project-related impacts would be limited to the adjacent locality.</p>	<p>The Project would likely result in increased economic activity from supply of services and goods to the Project from nearby centres, however it is likely that adequate capacity currently exists to meet the Project's needs.</p> <p>It is unlikely that the Project would increase demand for local employment to the extent that other industries would be adversely impacted, particularly considering the additional economic activity that the Project would generate.</p> <p>The economic benefits of the Project, even with a substantial proportion of the workforce not living locally, are likely to substantially exceed any costs or adverse impacts.</p>	<p>RWC will undertake an Economic Impact Assessment in accordance with the <i>Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals 2015</i> to understand the characteristics of the local economy, and will recommend measures for the Applicant to adopt.</p>

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7. CONSULTATION

7.1 GOVERNMENT AGENCIES

Consultation with relevant government agencies has been ongoing since the circulation of a Briefing Paper and initial Interagency Meeting on 25 May 2018. An onsite Planning Focus Meeting and is to be held on 23 August 2018 to support a request Secretary's Environmental Assessment Requirements (SEARs) for the EIS. Further consultation is planned throughout preparation of the EIS with all agencies to inform and discuss the Applicant's plans for the Project.

7.2 LOCAL COMMUNITY

The Applicant will develop a Community Engagement Strategy with the objectives of establishing and maintaining the Applicant's social licence to operate through:

- identifying, building and maintaining effective relationships with stakeholders;
- engaging with the local community; and
- communicating and consulting with identified community members and groups.

The strategy will outline engagement activities, timing of consultation events and responsibilities and will be tailored to reflect the interest of the local community to the Project. The strategy will be used to inform the Social Impact Assessment to be prepared for the application for Development Consent.