



Section 2

Description of the Proposal

PREAMBLE

This section describes the proposed extension of operations at Strontian Quarry (“the Proposal”) including:

- *the objectives of the Proposal;*
- *an overview of proposed activities and the need for the Proposal;*
- *a review of local geology, resources and Quarry products;*
- *the proposed extraction and processing activities to be undertaken within the Quarry Site;*
- *the proposed transportation regime for the delivery of Quarry products;*
- *the proposed management of production by-products and non-production wastes;*
- *the proposed infrastructure, utilities and services that would be used within the Quarry Site as well as proposed employment, hours of operation and life of the Proposal; and*
- *the proposed rehabilitation of areas that would be disturbed within the Quarry Site throughout the life of the Proposal.*

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



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2.1 Introduction

2.1.1 Objectives of the Proposal

The Applicant's principal objective is to obtain development consent to enable the planned continued operation of the Strontian Quarry. The Applicant would continue to operate the Quarry to meet the following objectives.

1. To provide a source of high-quality Quarry products for use in the Narrandera Local Government Area (LGA) and the broader Riverina Region.
2. To maximise resource recovery within the defined extraction area.
3. To develop and operate the Quarry in an environmentally responsible manner to meet all relevant criteria and satisfy reasonable community expectations.
4. To create a final landform that is safe, stable and provides for passive biodiversity conservation and grazing.
5. To positively contribute to local employment and economic investment.
6. To achieve the above objectives in a cost-effective manner to ensure the Proposal is viable.

2.1.2 Overview of the Proposal

Extraction and processing operations would continue on a campaign basis with approximately four campaigns between 20 to 30 days in duration required per year. Product loading and transportation operations would occur year-round with peaks in activity driven by demand.

The activities for which the Applicant is seeking development consent would involve the following.

- Campaign extraction of material from within the proposed extraction area to produce up to 125 000tpa of Quarry products.
- Importation of up to 1 500tpa of concrete washout and other construction materials for recycling and incorporation in Quarry products.
- Crushing and screening of fragmented rock and imported materials on site using a mobile processing plant.
- Ongoing transportation of up to 125 000tpa of Quarry products to end points of use within the Narrandera LGA and the broader Riverina Region.
- Ongoing employment of local personnel.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for passive nature conservation and grazing.



2.1.3 Approvals Required

Based upon the current design and understanding of relevant environmental issues, the Proposal would require the following approvals.

1. Development consent in accordance with the provisions of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Proposal is classified as “Designated Development” given it is categorised as an “Extractive Industry” and the thresholds for annual extraction of 30 000m³/year and for land disturbance of 2ha described in Schedule 3(19) of the *Environmental Planning & Assessment Regulation 2000* (EP&A Reg), would be exceeded. As Designated Development for the purpose of extractive industry, the Proposal is also classified as “Regional Development” under Schedule 7(7) of the *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP) and therefore determination of the development application will be by the Western Regional Planning Panel (RPP). In order to obtain development consent, the development application needs to be accompanied by an EIS. This development consent would supersede Development Consent DA27/2011/12 which would be formally surrendered to Council upon commencement of activities proposed under a new development consent.

2. An Environment Protection Licence (EPL) would be required under the *Protection of the Environment Operations Act 2000* (POEO Act) for the scheduled activity ‘Extractive activities – extractive activity >30 000tpa’. The issuing authority would be the Environment Protection Authority (EPA).
3. A permit would be required under Section 138 of the *Roads Act 1993* (Roads Act) for the required road upgrades to Strontian Road and its intersection with the Quarry Access Road. As Strontian Road is a local road, this approval is being sought in conjunction with this development application.

The Proposal is also classified as “Integrated Development” under Section 4.46 of the EP&A Act because it would require an environment protection licence issued under the *Protection of the Environment Operations Act 1997* (POEO Act). As Strontian Road is a local road, the proposed upgrades do not require referral to Transport for NSW.

2.2 Quarry Site Layout

The Quarry Site layout displayed in **Figure 2.1** incorporates the existing and proposed components within the Quarry Site.

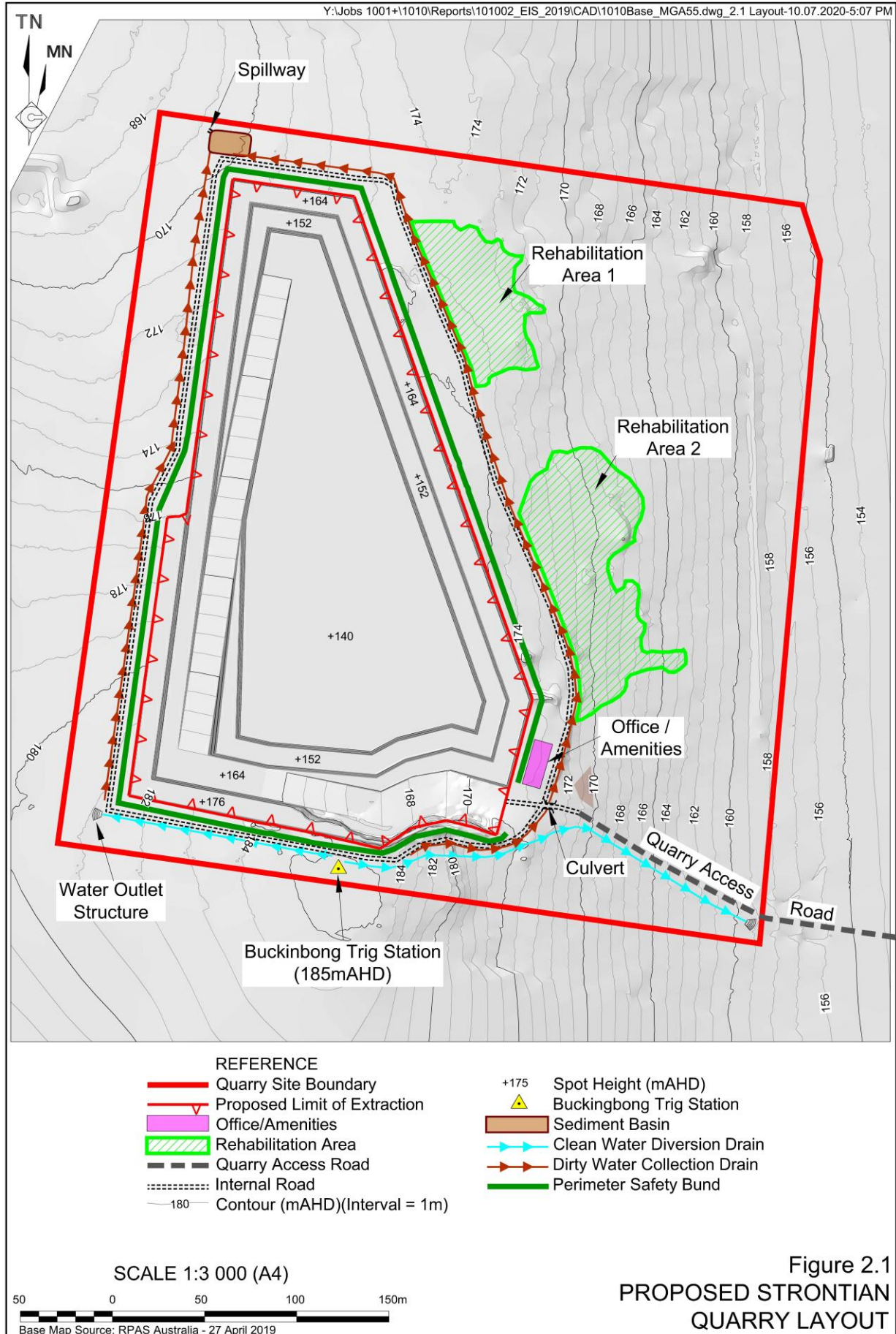


Figure 2.1
**PROPOSED STRONTIAN
QUARRY LAYOUT**



The principal components and their respective approximate area within the Quarry Site are as follows.

- Extraction area (5.2ha¹)
The extraction area would be developed in three stages with benches developed at approximately 176m AHD, 164m AHD, 152m AHD. The final floor of the extraction area would extend to approximately 140m AHD. It is noted that all processing, product stockpiling and product despatch activities would also be undertaken within the footprint of the extraction area.
- Office and Amenities Area (250m²)
The demountable office and portaloos would be relocated immediately to the east of the extraction area within the southeastern quadrant of the Quarry Site. A light vehicle parking area would also be incorporated within this area.
- Quarry Access Road (450m)
The existing Quarry Access Road which extends from Strontian Road to the office and amenities area would be retained with a sealed surface and would provide ongoing access to the Quarry Site for both heavy and light vehicles.
- Operational disturbance area (2.3ha)
A corridor would be cleared of vegetation around the extraction area to allow for the construction of a perimeter safety bund, internal roads and erosion and sediment control infrastructure. Soil and mulch would also be stockpiled within the operational disturbance area to the east of the extraction area.

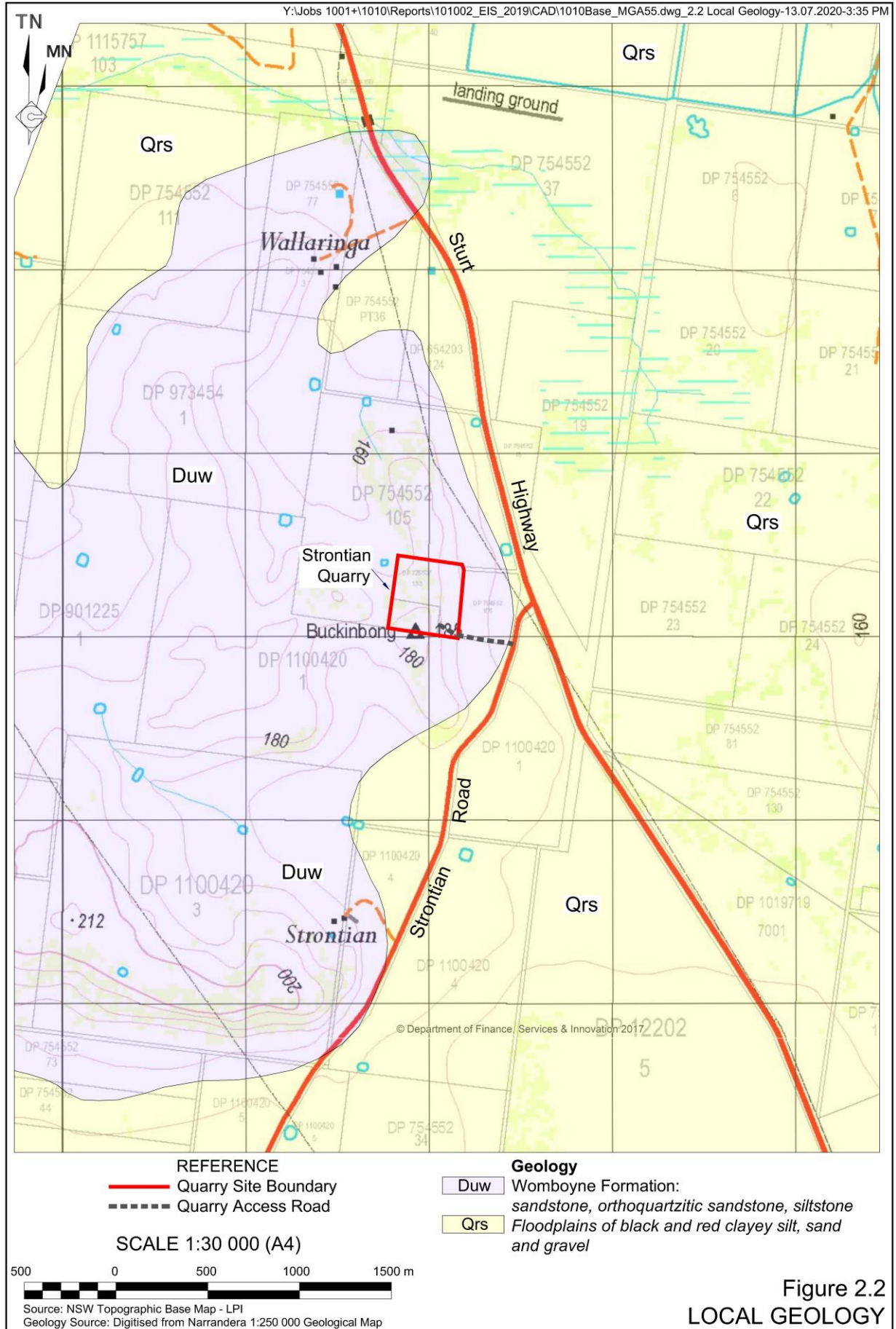
The total area to be designated as the Quarry Site would be approximately 15.0ha of which the maximum area of disturbance would be approximately 7.6ha. Approximately 3.93ha of remnant native vegetation would be disturbed during the development of the Quarry Site.

2.3 Resources and Products

2.3.1 Geology and Resource

The indurated sandstone resource beneath the Quarry Site is located within the Womboyne Formation, a unit deposited during the Late Devonian (416 million to 358 million years ago) (**Figure 2.2**). The Womboyne Formation principally comprises sandstone and orthoquartzitic sandstone interbedded with red siltstone. Petrographic analysis of the resource has identified signs of strain, mild recrystallisation and suturing which confirms that the targeted resource comprises sandstone which has been metamorphosed (Geochempet Services, 2018).

¹ The nominated area is cumulative and incorporates the 1.7ha footprint of the existing extraction area.





Extraction of material and exploration drilling has provided the Applicant with a thorough understanding of the targeted resource. The existing extraction area extends at depth to an elevation of 168m AHD, with extracted material comprising massive indurated sandstone with negligible interbedded clays. The Applicant has also drilled to a depth of between approximately 24m to 27m beneath the existing and proposed extraction areas which has confirmed the continuation of the resource. Given the uniformity of the targeted resource, and the mapped geology adjacent to the existing extraction area, the Applicant conservatively estimates that the expansion of the extraction area would provide for a further 2.97Mt of indurated sandstone material to be recovered during the life of the Quarry. It is noted that the targeted resource beyond the existing extraction area is overlain by approximately 0.3m of overburden which would result in the removal of approximately 30 000t (11 000m³) of overburden during Stage 1 of operations.

2.3.2 Products

The principal products produced at Strontian Quarry are 20mm and 40mm road base suitable for use in construction and infrastructure projects although a range of aggregates are produced. Road base products produced at the Quarry are typically well graded and consist of various sized aggregates containing coarse to fine particles to facilitate compaction. As the road base products produced are “all in” products, no blending is required and no production by-products (e.g. processing fines) are generated on site. It is noted that overburden not required for the construction of the perimeter safety bund or for progressive rehabilitation activities would also be incorporated in the road base products to achieve the required plasticity index. Imported materials would similarly be incorporated in the road base products to meet the required specifications.

2.4 Development Activities

2.4.1 Introduction

A range of activities would be undertaken concurrently with extraction operations to enable the progressive development of the Quarry. The principal activities would be as follows.

1. The marking out of all component areas to be disturbed or rehabilitated during the ongoing operation of the Quarry with highly visible permanent markers such as yellow painted concrete posts.
2. Construction of water management infrastructure including clean water diversion drains, dirty water collection drains and a sediment basin.
3. Vegetation clearing and soil removal within the areas approved for disturbance to enable the expansion of the extraction area.
4. Construction of the perimeter safety bund using overburden pushed up from within the expanded extraction area.
5. Relocation of the demountable office and portaloo to allow for more direct access to the extraction area.
6. Road works on Strontian Road and its intersection with the Quarry Access Road to improve road safety outcomes



2.4.2 Component Mark Out

Prior to the commencement of any vegetation clearing or earthworks, the Applicant would commission a surveyor to survey and physically mark out the approved areas of disturbance and rehabilitation using appropriately labelled and highly visible permanent survey markers such as yellow painted concrete posts. Survey markers would be positioned at the corners of key component areas and along boundaries at distances / spacing that allows visibility of the next marker. All Company personnel or contractors would be made aware of the approved areas of disturbance and the significance of not disturbing any area beyond the approved areas.

2.4.3 Construction of Water Management Infrastructure

Extraction Area – Sediment-laden Runoff

The extraction area would be internally draining with all runoff ultimately reporting to a sump located on the floor of the extraction area. This sump would receive runoff from the entire extraction area and ultimately any overburden and product stockpiles within the extraction area.

Areas of Operational Disturbance Area – Sediment-laden Runoff

During the early stages of development, a permanent sediment basin would be constructed to collect and manage sediment-laden runoff at the northwestern extent of the Quarry Site. The sediment basin would be constructed with a total capacity of approximately 495m³ comprising a sediment storage zone of approximately 264m³ and a water settlement zone of approximately 231m³. This would provide sufficient capacity to manage sediment-laden runoff from all areas of operational disturbance including internal roads, the Office and Amenities Area and areas cleared of vegetation within the footprint of the proposed extraction area prior to the progression of extraction in that area.

Two dirty water collection drains would be constructed to convey sediment-laden runoff from areas of operational disturbance to the sediment basin. These drains would be constructed around the perimeter of the operational area of disturbance to prevent sediment-laden runoff entering undisturbed areas. A culvert would also be constructed beneath the internal road providing access to the extraction area in order to convey water from the southeastern extent of the operational area of disturbance.

Undisturbed Areas – Clean Runoff

A clean water diversion would be constructed to direct runoff from the undisturbed areas upslope of the extraction area, away from disturbed areas. The diversion drain would be situated to the south of the extraction area and would convey runoff downslope to the west and east.

2.4.4 Vegetation Clearing

A total of approximately 3.93ha of native vegetation would be removed to permit the extension of the extraction area and associated areas of operational disturbance. All vegetation clearing would be undertaken in accordance with a Vegetation Clearing Protocol which would be included within the Environmental Management Strategy for the Quarry.



Vegetation would be cleared within the defined areas of disturbance using an excavator and/or bulldozer, as required. The bulk of the felled trees would either be removed for timber production or mulched with the mulch either stockpiled and used on site or removed from site. A number of larger tree trunks would be placed within the designated “rehabilitation areas” east of the extraction area for use in rehabilitation and habitat improvement.

2.4.5 Soil Removal

The soil in areas cleared of vegetation during the development of the Quarry would be stripped following removal of the larger vegetation. The Applicant would remove approximately 0.2m of topsoil, where present, focussing upon the recovery of seed-bearing material (if present). The topsoil recovered would be preferentially placed in the “rehabilitation areas” to the east of the extraction area and seeded with suitable cover crops. If excess topsoil and subsoil is recovered it would be temporarily stockpiled to the east of the proposed extraction area for use in progressive rehabilitation throughout the life of the Quarry.

As far as practicable, timing for soil stripping would avoid forecast rainfall to potentially prevent higher levels of soil loss due to erosion. If clearing during wet weather is unavoidable, additional practices would be undertaken to reduce erosion risk, such as placement of sediment controls at a location downslope.

2.4.6 Construction of the Perimeter Safety Bund

A safety bund would be progressively constructed around the perimeter of the proposed extraction area by pushing up overburden. The surface of completed sections of the bund would be stabilised to ensure a safe, secure and non-polluting final landform is achieved.

2.4.7 Relocation of Office and Amenities

The existing office and portaloos would be relocated to the north of their current locations to provide more direct access for vehicles accessing the extraction area from the Quarry Access Road. A dedicated light vehicle parking area would also be fenced off adjacent to the office to provide adequate parking for Quarry personnel and visitors to the site.

2.4.8 Roadworks

Upgrades to Strontian Road in the vicinity of the Quarry would be undertaken during the early stages of development, principally to widen and seal the road and minimise the risk of interactions between Quarry generated heavy vehicle traffic and other road users. It is proposed that Strontian Road would be upgraded from approximately 50m south of the intersection of the Quarry Access Road and Strontian Road to the intersection of Strontian Road and the Sturt Highway to include 8.0m of bitumen (2 x 3.5m lanes and 2 x 0.5m sealed shoulders) in addition to a 1.0m gravel shoulder on each side of the road. As Strontian Road is a designated school bus route, the proposed upgrades have been nominated to ensure that heavy vehicles can pass safely on that section of road. As part of the proposed upgrades, the intersection of Strontian Road and the Quarry Access Road would also be upgraded to provide for basic left turn (BAL) and right turn (BAR) treatments.



2.5 Extraction Operations

2.5.1 Introduction

Extraction operations would be undertaken in a similar manner to existing operations i.e. using conventional drill and blast methods. This subsection presents information relating to the proposed extraction operations including design features, extraction sequence, extraction methods, equipment used and extraction rates.

2.5.2 Design Features

The following indicative design features would continue to be adopted for the ongoing operation of the Quarry. It is noted that these parameters would be subject to modifications based on factors such as localised geological conditions and optimal ramp locations etc.

- Operational Face Height 6m to 14m
- Operational Bench Width Variable
- Terminal Bench Width 10m
- Face Angle 80°
- Haul Ramp Gradient 1 in 10 (10%)
- Haul Ramp Width 16m

2.5.3 Extraction Sequence

Figure 2.3 displays the indicative extraction sequence for the Quarry incorporating three stages. **Figure 2.4** presents two cross sections through the indicative extraction area. Whilst it is envisaged that extraction would proceed generally in accordance with the staging displayed on these figures, development of lower benches may in reality commence prior to the completion of each active stage i.e. Stage 2 extraction may commence prior to the completion of Stage 1 and Stage 3 extraction may commence prior to the completion of Stage 2. This flexibility is required to account for variations in geology whilst also allowing for the development of a sump to capture runoff from within the extraction area.

Stage 1

Stage 1 extraction operations would involve the progressive development across the entire footprint of the proposed extraction area to an elevation of 164m AHD. During Stage 1, overburden would be progressively pushed up to the edge of the active extraction area using a bulldozer or excavator to provide access to the targeted resource. Overburden would be used to progressively construct the perimeter safety bund around the edge of the active extraction area with excess overburden either transferred directly to terminal benches for rehabilitation purposes or stockpiled on the floor of the extraction area for later use in rehabilitation or road base production. Following the removal of overburden, indurated sandstone material would be extracted using drill and blast methods with fragmented rock either fed directly into the in-pit mobile processing plant prior to loading and despatch in road registered vehicles.

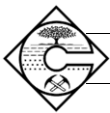
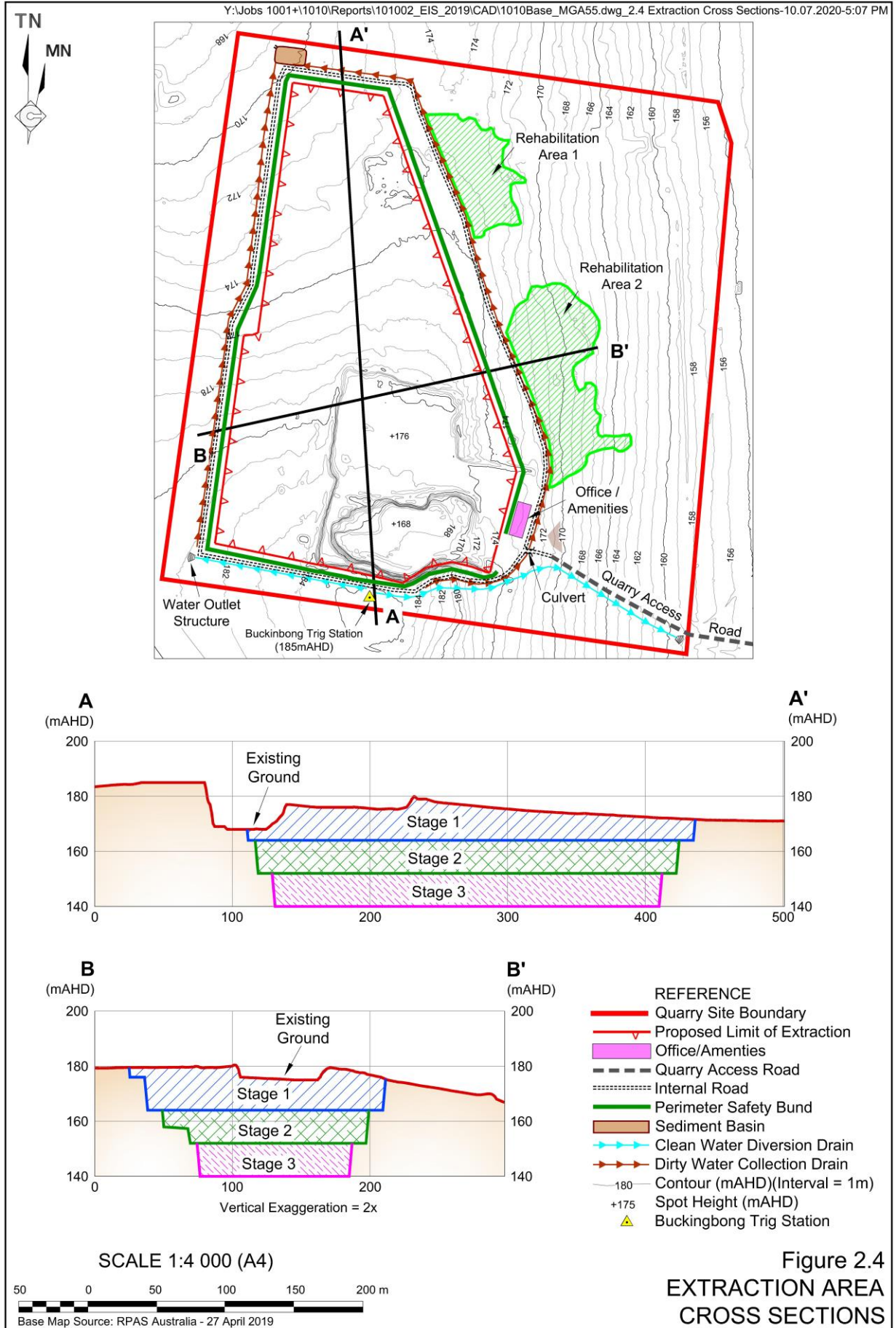


Figure 2.3
EXTRACTION SEQUENCE





The footprint of the extraction area would reach its full extent by the end of Stage 1 with no further lateral development of the extraction area proposed during Stages 2 and 3. Operational benches would be developed at 176m AHD and 164m AHD during Stage 1. This would effectively lower the floor of the existing extraction area by between 4m to 12m. It is envisaged that the 176m AHD bench would be progressively rehabilitated during Stage 1 following the completion of extraction.

Stage 2

Stage 2 extraction operations would involve the progressive development of the extraction area to an elevation of approximately 152m AHD with a single terminal bench maintained at 164m AHD i.e. the elevation of the Stage 1 extraction area floor. It is envisaged that the terminal bench at 164m AHD would be progressively rehabilitated during Stage 2, except where it is required for ongoing access.

Stage 3

Stage 3 extraction operations would involve the continued vertical development of the extraction area to an elevation of approximately 140m AHD. A terminal bench would be maintained at 152m AHD during Stage 3 extraction operations as the floor of the extraction area is progressively developed. It is expected that the 152m AHD bench would be progressively rehabilitated during Stage 3 operations.

2.5.4 Extraction Method

Drilling and blasting would continue to be used to extract indurated sandstone from within the extraction area. Blasts would typically be designed to fragment approximately 30 000t of material although it is noted that larger blasts, up to approximately 50 000t, may occasionally be undertaken. The design parameters for each blast are listed in **Table 2.1**. Blasting would typically occur between three to five times per year, however, given the need for flexibility for ongoing operations, blasting no more than once per month (excluding that required in the event of a misfire) is proposed.

Table 2.1
Indicative Blast Design Parameters

Parameter	30 000t Blast	50 000t Blast
Surface Area	1 000m ²	1 538m ²
Drill hole Diameter	89mm	89mm
Depth	12.5m	12.5m
Sub-drill	0.5m	0.5m
Stemming	2m	2m
Burden	2.5m	2.5m
Spacing	2.5m	2.5m
Maximum Instantaneous Charge	168kg	168kg



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2.5.5 Extraction Rate

Despatch of Quarry products from the Quarry Site would not exceed 125 000t per annum. This rate has been selected based on the inferred resource, anticipated demand and allows for peaks in some years. It is anticipated that an average of 100 000t per annum would be produced and despatched throughout the life of the Quarry.

2.5.6 Mobile Equipment

Table 2.2 lists the range of equipment currently used at the Strontian Quarry. The Applicant intends to continue to use this equipment throughout the remaining life of the Quarry noting that equipment may be replaced with similar models, as required. It is conservatively estimated that the mobile equipment would use up to approximately 100 000L of diesel per annum.

Table 2.2
Mobile Equipment Fleet

Equipment*	Number	Use/Activity
Hydraulic Drill Rig (Atlas Copco 35t)	1	Drilling blast holes (typically used for between seven to ten days prior to blasting).
Excavator (Volvo 38T-50T)	1	Resource extraction, loading jaw crusher and impact crusher, vegetation clearing (daily use during campaigns).
Front-end Loader (Cat 966)	1	Loading jaw crusher and impact crusher, product truck loading, stockpile management (daily use during campaigns and as required for product loading during non-campaign periods).
Front-end Loader (Cat 980 or equivalent)	1	Loading jaw crusher and impact crusher, product truck loading, stockpile management (daily use during campaigns and as required for product loading during non-campaign periods).
Bulldozer (Cat D10)	1	Earthmoving / vegetation clearing / construction of perimeter safety bund (once every six months).
Water Cart (15 000L or 30 000L) ¹	1	Dust suppression activities (daily use during campaigns).

Note 1: The Applicant currently operates two water carts for sites with mobile processing equipment.

2.6 Processing Operations

2.6.1 Processing Plant Layout

The Applicant would continue to utilise the existing mobile processing plant which would be transported to the Quarry Site for extraction campaigns, as required. The mobile processing plant would comprise the following key equipment, or equivalent.

- 1 x Jaw Crusher
- 1 x Cone Crusher
- 1 x Screen (triple deck)
- 1 x Horizontal Shaft Impactor (HSI) Crusher²

² The HSI would typically be used in isolation with a screen during low production periods although it may also occasionally be used with a screen in line with the main mobile processing plant or concurrently with the mobile processing plant.

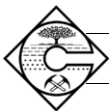
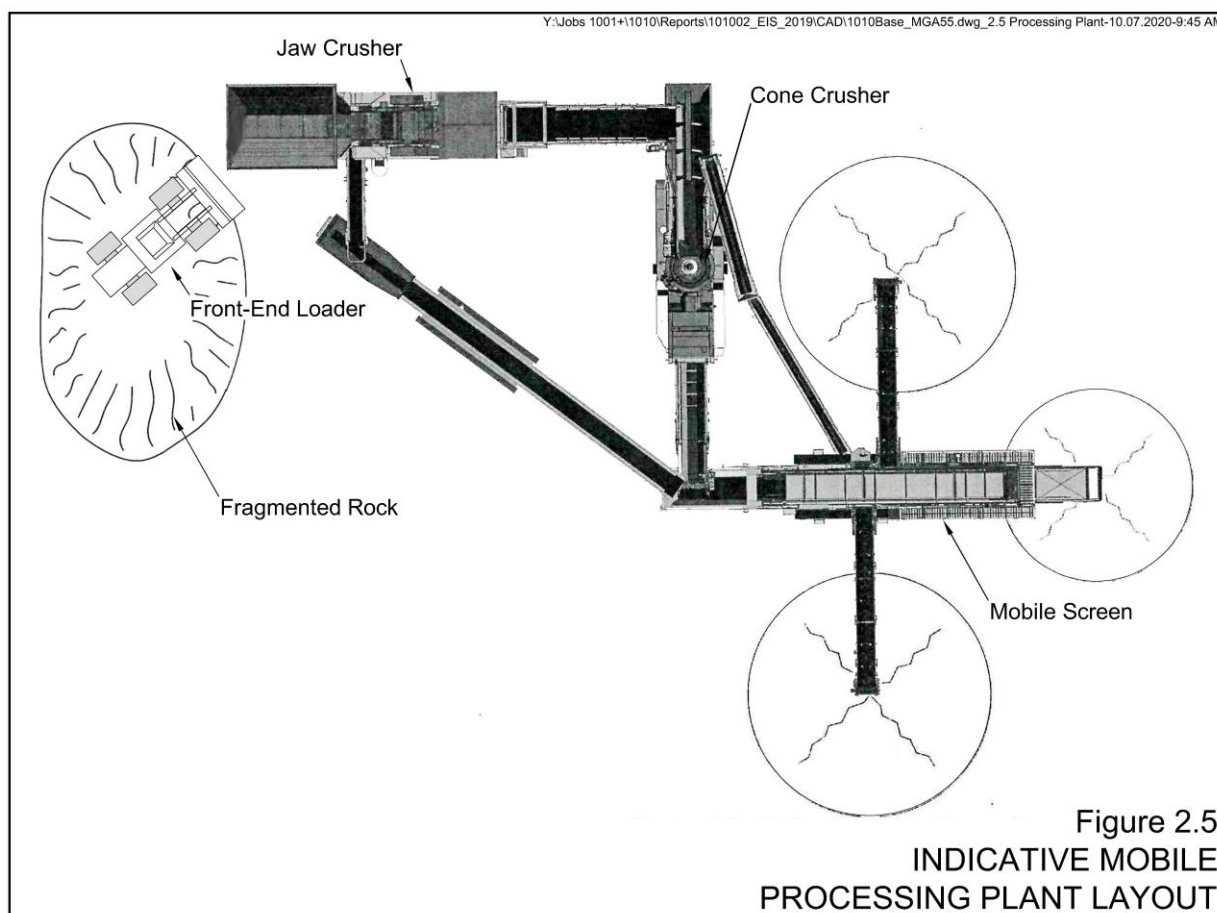


Figure 2.5 displays the indicative layout of the mobile crushing plant. It is conservatively estimated that the mobile processing plant would utilise up to 165 000L of diesel per annum.



2.6.2 Imported Materials

It is anticipated that up to approximately 125t of concrete washout and other construction materials (principally bricks) would be imported to the Quarry Site per month (up to 1 500t per annum). No more than 2 500t of imported material would be stored at the Quarry at any one time. This imported material would be temporarily stockpiled on the floor of the extraction area prior to its incorporation into the road base products. It is noted that contaminated construction materials (i.e. construction materials containing plastic and metal etc.) would not be imported to site.

2.6.3 Processing Operations

Fragmented rock and imported materials would be loaded directly into the feeder bin of the jaw crusher and would progress through the sequence of equipment to produce the Quarry products outlined in Section 2.3.2.



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2.6.4 Operating Capacity and Rates

The mobile processing plant would have a maximum capacity of approximately 200t of product per hour depending on the type(s) of products being produced. For the purposes of this assessment, a maximum daily production rate of 2 400t³ has been assumed. However, it is anticipated that average daily production rates during campaigns would be approximately 1 500t⁴.

The HSI crusher has a capacity of 300t of product per hour depending on the type(s) of products being produced. However, for the purposes of this assessment a maximum daily production rate of 2 700t (i.e. 75% capacity) has been assumed to account for mechanical down time and variability in feed material etc.

2.6.5 Product Stockpiling

Once processed, Quarry products would be stockpiled within the extraction area or loaded directly to product trucks for despatch. Each product stockpile would typically average approximately 4 000t.

2.7 Access, Traffic and Material Transportation

2.7.1 Access

Access for all vehicles to the Quarry Site would be via the Quarry Access Road which provides vehicular access from Strontian Road. Entrance to the Quarry is gated for security.

2.7.2 Transport Routes

Figure 2.6 displays the proposed transport routes which would be used to transport Quarry products from Strontian Quarry.

2.7.3 Traffic Types and Levels

The bulk of the Quarry products would be despatched from the Quarry Site using the Applicant's fleet of truck and dog trailers with a maximum capacity of 38t (average load would be approximately 30t). It is noted that smaller quantities of Quarry products would periodically be despatched using other heavy vehicles configurations, however, for the purposes of this assessment, truck and dog trailers are relied upon.

³ Based on a throughput of 200t per hour and a 12-hour workday i.e. from 6am to 6pm.

⁴ It is noted that this would require a total of approximately 83 campaign days to produce 125 000tpa or approximately 67 campaign days to produce 100 000tpa.

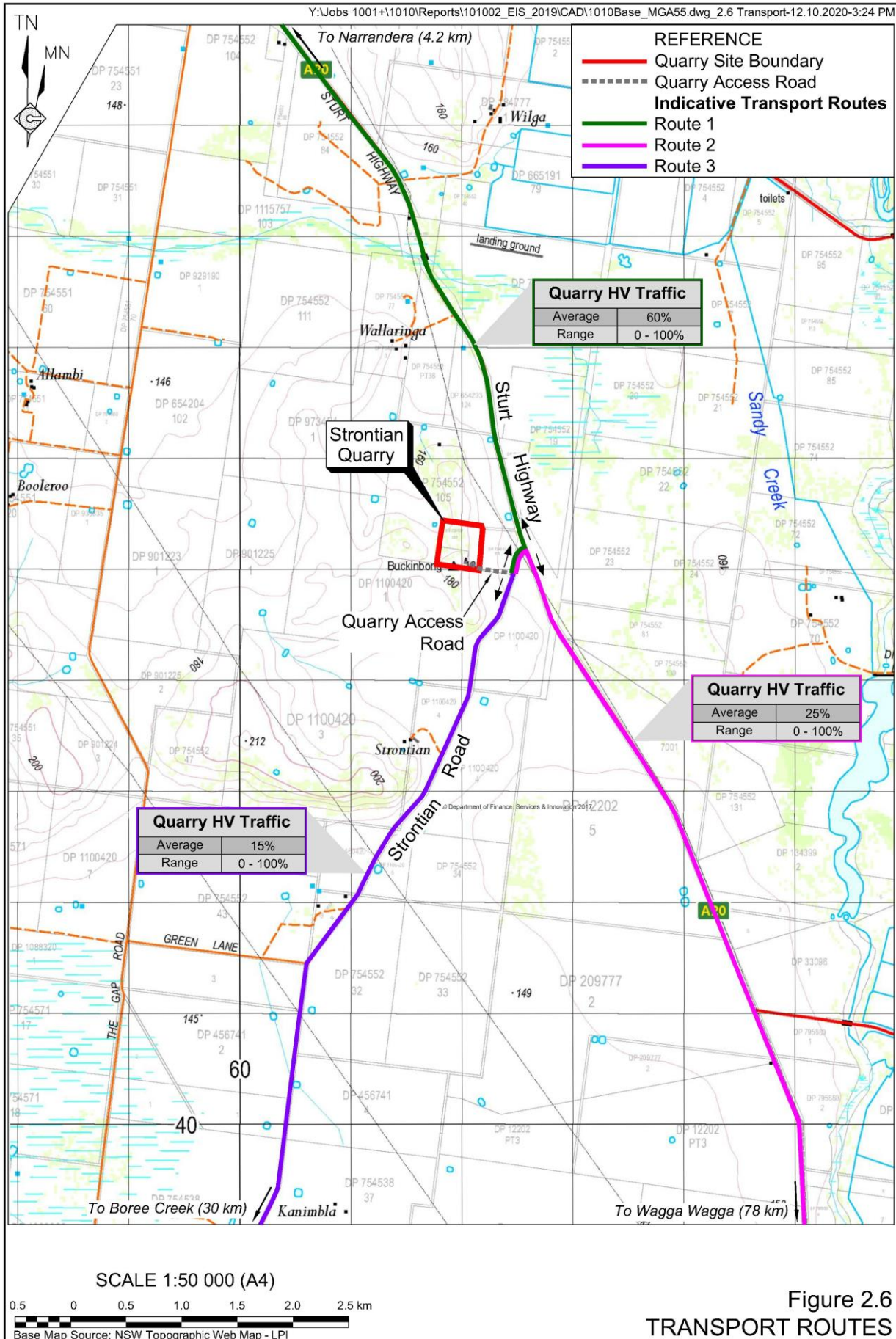


Figure 2.6
TRANSPORT ROUTES



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It is anticipated that, on an annual basis, approximately 85% of laden trucks departing the Quarry Site would turn left at the intersection of the Quarry Access Road and Strontian Road towards the Sturt Highway. Approximately 70% of these laden trucks would turn left to travel northwards on the Sturt Highway to end points of use with the remaining 30% of laden trucks turning right to travel southwards. On an annual basis, approximately 15% of laden trucks would turn right onto Strontian Road from the Quarry Access Road from where they would travel directly to end points of use within the Narrandera and Federation LGAs. These trucks would principally service Council roadwork projects with end points of use dependent on the project that is being supplied.

Traffic levels would vary substantially on a daily basis throughout the life of the Quarry based on market demands acknowledging that, whilst extraction and production would be undertaken on a campaign basis, transportation of product would be undertaken year-round. It is noted that up to 100% of laden trucks may utilise a particular route on a given day to meet demand. **Table 2.3** presents the anticipated laden heavy vehicle movements generated by the Quarry.

Table 2.3
Laden Heavy Vehicle Movements

Annual Production Rate	Daily Laden HV Movements		Maximum Hourly Laden HV Movements	Annual Laden HV Movements
	Average ¹	Range		
100 000tpa	12	0 - 48	12	3 333 ²
125 000tpa	14	0 - 48	12	4 167 ³
Note 1: Heavy vehicle movements have been rounded up for conservatism. Actual daily averages based on 100 000tpa and 125 000tpa would be 11.11 and 13.89 laden HV movements, respectively. Note 2: Based on 11.11 loads per day, 300 operating days per year and an average payload of 30t. Note 3: Based on 13.89 loads per day, 300 operating days per year and an average payload of 30t.				

It is noted that up to approximately five loads of concrete washout and bricks would be imported to the site per month. Given that these materials would be backloaded wherever practicable, no additional traffic movements are anticipated

2.8 Waste Management

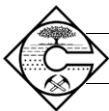
2.8.1 Introduction

The SEARs identify “*waste management*” as a key issue for assessment in the EIS. The EPA also request that all potential waste streams are identified and management arrangements described. The SEARs and the requirements of relevant government agencies are included in full as **Appendix 2**.

The following subsections provide an overview of waste streams that would be generated within the Quarry, approximate volumes and methods of disposal or management.

2.8.2 Production By-products

It is anticipated that the Proposal would involve the removal of approximately 30 000t (11 000m³) of overburden. Overburden would be used to construct the perimeter safety bund and for the progressive rehabilitation of terminal benches. As the Quarry would produce “all in” road base products, any additional overburden and all production fines, would be incorporated within the road base products produced.



2.8.3 Non-Production Wastes

Non-production wastes generated through the proposed operational activities would be negligible, with any wastes stored in lidded bins on site and periodically removed to the Company's head office near Leeton for appropriate disposal. This would include any general solid wastes, recycling and scrap metal.

The bulk of equipment maintenance would be carried out at the Company's head office near Leeton prior to the commencement of each extraction or processing campaign. Any waste oils and tyres generated during operations and machinery servicing on site would be removed from site and disposed of appropriately.

2.9 Infrastructure, Utilities and Services

The Applicant would continue to utilise the existing demountable office and portaloos located on site. It is noted that these facilities would be relocated to the north of their existing location to allow for more direct access from the Quarry Access Road to the extraction area.

There are currently no utilities or services located at the Quarry Site.

A self-bunded trailer would be used to transport diesel to the Quarry Site, as required. No diesel would be stored permanently on site.

Equipment servicing would be undertaken predominately off-site outside of campaign periods, however minor servicing requirements would be undertaken on-site with precaution taken to prevent spills of waste oils.

2.10 Employment

During extraction and processing campaigns, it is anticipated that three to five personnel would be employed at the Quarry Site, as follows.

- 1 x supervisor
- 1 x excavator operator
- 1 to 2 x loader operators
- 1 x driller / shotfirer (typically on site for between seven to ten days prior to each blast)

During non-campaign periods, it is anticipated that between one to two loader operators would be employed at the Quarry Site to manage stockpiles and load product transport trucks, depending on demand.

The Quarry would also provide employment for between four to ten truck drivers depending on demand. It is anticipated that an average of five truck drivers would be employed throughout the life of the Quarry.



2.11 Hours of Operation and Quarry Life

Table 2.4 lists the proposed hours of operation for the range of activities that would be undertaken at the Quarry Site throughout the life of the Quarry.

Table 2.4
Proposed Hours of Operation

Activity	Monday to Friday	Saturdays	Sundays or Public Holidays
Site development and construction	6:00am – 6:00pm	8:00am – 5:00pm	Nil
Extraction operations	6:00am – 6:00pm	8:00am – 5:00pm	Nil
Blasting operations	10:00am – 3:00pm	Nil	Nil
Processing operations	6:00am – 6:00pm	8:00am – 5:00pm	Nil
Product despatch	6:00am – 6:00pm	8:00am – 5:00pm	Nil
Maintenance	24 hours / day	24 hours / day	Nil

It is anticipated that the Quarry would operate for approximately 30 years from the commencement of operations under the new consent.

2.12 Rehabilitation

2.12.1 Introduction

The Applicant's objectives for rehabilitation are centred on creating a final landform that is safe, secure, non-polluting, stable and suitable for biodiversity conservation and grazing. The specific objectives for the long-term rehabilitation program are to:

- provide a low-maintenance, geotechnically stable and safe landform with minimal erosion; and
- establish native vegetation similar to that currently within and surrounding the Quarry Site, as much as practicable.

Emphasis would be placed upon progressive rehabilitation of completed areas within the Quarry Site, including in those areas previously disturbed and no longer required.

Figure 2.7 displays the indicative final landform for Strontian Quarry.

2.12.2 Designated Rehabilitation Areas

Rehabilitation activities within the designated rehabilitation areas (i.e. Rehabilitation Areas 1 and 2) to the east of the extraction area would be undertaken progressively throughout Stage 1 of the Proposal. These activities would involve the following.

- Installation of silt-stop fencing downslope of each rehabilitation area. If surface water runoff causes the erosion of material from within the rehabilitation areas, the material would be salvaged and respread in the rehabilitation areas as soon as practicable.



- Creation of contour rows (aligning ridges and furrows at approximately 2m intervals parallel to topographic contours) or deep ripping to slow surface water flow and increase infiltration to reduce erosion.
- Progressive emplacement of soil to a depth of approximately 0.2m progressing from downslope to upslope to prevent the compaction of soils by heavy machinery.
- Progressive emplacement of large tree trunks removed during vegetation clearing activities progressing from downslope to upslope immediately following the emplacement of soil.
- Seeding of rehabilitation areas with a suitable cover crop endemic to the area. Rehabilitation areas would be watered periodically to ensure the successful establishment of vegetation cover. Direct seeding would be supplemented by tube stock, as required.

2.12.3 Extraction Area

All final or terminal benches within the extraction area would be progressively revegetated to provide for the establishment of a range of native vegetation. Where available, overburden material would be placed on benches with an emphasis on creating a roughened surface to contain the bulk of rain falling on the benches and to provide a suitable substrate for the growth of native vegetation. Overburden and/or selected fragmented rock would be progressively placed on each bench activities cease in that area. The overburden or fragmented rock would form a substrate, for the subsequent growth of trees and shrubs which would be planted either through direct seeding or tubestock. Terminal faces would be partly covered with material pushed from above the upper bench or retained on the benches towards the end of extraction of each bench.

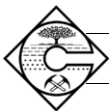
It is anticipated that rehabilitation of the floor of the extraction area would occur towards the end of the life of the Proposal. Each blast undertaken during the development of the 140m AHD bench would be designed to fragment approximately 1m of rock below the floor of the extraction area which would be retained to provide a suitable substrate for vegetation in later rehabilitation. Fragmented material would be covered with topsoil and/or soil, where available and seeded and/or planted with endemic vegetation species.

Internal roads and ramps leading to the extraction area would be retained following the cessation of operations to provide ongoing access for rehabilitation and maintenance activities.

2.12.4 Operational Disturbance Area

Following the cessation of extraction and processing, all infrastructure, including the demountable office and portaloos, would be removed from the Quarry Site. It is proposed that areas of operational disturbance would be revegetated using native vegetation endemic to the area with any compacted areas ripped prior to being covered with soil and/or overburden, where available, and seeded and/or planted. It is proposed that internal roads would be retained following the life of the Proposal to provide ongoing access around the perimeter of the extraction area.





2.12.5 Final Land Uses

It is intended that the Quarry Site would be retained principally for biodiversity conservation and grazing. The success of rehabilitation and revegetation would be reviewed for a period of two years following completion with additional soil, seed or tube stock added where revegetation is less successful.

It is noted that preferences for land use change over time and it is therefore acknowledged that as the Quarry approaches closure, the final land use would be resolved in consultation with Crown Lands and Council.

2.13 Biodiversity Offset Strategy

2.13.1 Introduction

The Proposal would involve the removal of approximately 3.93ha of native vegetation and would trigger the entry requirements for the Biodiversity Offset Scheme. As such, a Biodiversity Development Assessment Report (BDAR) has been prepared by OzArk Environment and Heritage (OzArk) and is included as **Appendix 8**. The following subsections describe the Biodiversity Offset Strategy for the Proposal with further assessment of biodiversity values provided in Section 5.5.

2.13.2 Impacts Requiring Offsetting

OzArk (2021) has identified that impacts to native vegetation would be expected through the direct clearing of approximately 3.93ha of native vegetation. The direct clearing and subsequent development of the proposed area of disturbance would represent a permanent impact, or loss, of this native vegetation and habitat.

2.13.3 Impacts Not Requiring Offsetting

Impacts to those areas identified as “cleared land” would not require offsetting.

2.13.4 Credit Calculations

Following the implementation of all practical measures to avoid or mitigate impacts to native vegetation, it is estimated that the Proposal would result in the removal of approximately 3.93ha of native vegetation which is considered a residual impact of the Project. The ecosystem credits required to offset the residual impacts of the Project are provided in **Table 2.5** and the species credits are provided in **Table 2.6**.



Table 2.5
Ecosystem Credits Required for Biodiversity Offset

Plant Community Type	Condition	Area Disturbed (ha)	Credits Required
PCT 70 - White Cypress Pine woodland on sandy loams in central NSW wheatbelt	Moderate	0.04	1
PCT 80 - Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate	0.27	9
PCT 80 - Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion	Poor	2.64	0
PCT 185 - Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South Western Slopes Bioregion	Moderate	0.98	16
Total			26

Source: OzArk (2021) – Modified after Table 7-2

Table 2.6
Species Credits Required for Biodiversity Offset

Species	Credits Required
<i>Austrostipa metatoris</i> / A spear-grass	1
<i>Austrostipa wakoolica</i> / A spear-grass	23
<i>Cerartetus nanus</i> / Eastern Pygmy-possum	21
<i>Diuris</i> sp. (Oaklands, D. L. Jones 5380) / Oaklands Diuris	32
<i>Lepidium monoplocides</i> / Winged Peppercross	22
<i>Petaurus norfolcensis</i> / Squirrel Glider	15
<i>Tylophora linearis</i> / Tylophora linearis	1
Total	115

Source: OzArk (2021) – Modified after Table 7-3

2.13.5 Securing Biodiversity Credits

The Applicant has committed to establishing a Biodiversity Stewardship Site (BSS) at their “Colinroobie” property located approximately 10km northeast of Leeton (**Figure 2.8**). This property has a total area of approximately 434ha and would generate sufficient credits to offset the majority of impacts to biodiversity values under the Proposal. It is currently envisaged that all ecosystem credits associated with the Proposal would be offset by entering into a Biodiversity Stewardship Agreement (BSA), however, the Applicant may also choose to offset credits through payment into the Biodiversity Conservation Fund (BCF) or by purchasing credits on the open market. Several species credit species would also need to be offset by entering into a BSA, payment into the BCF or by purchasing credits on the open market.

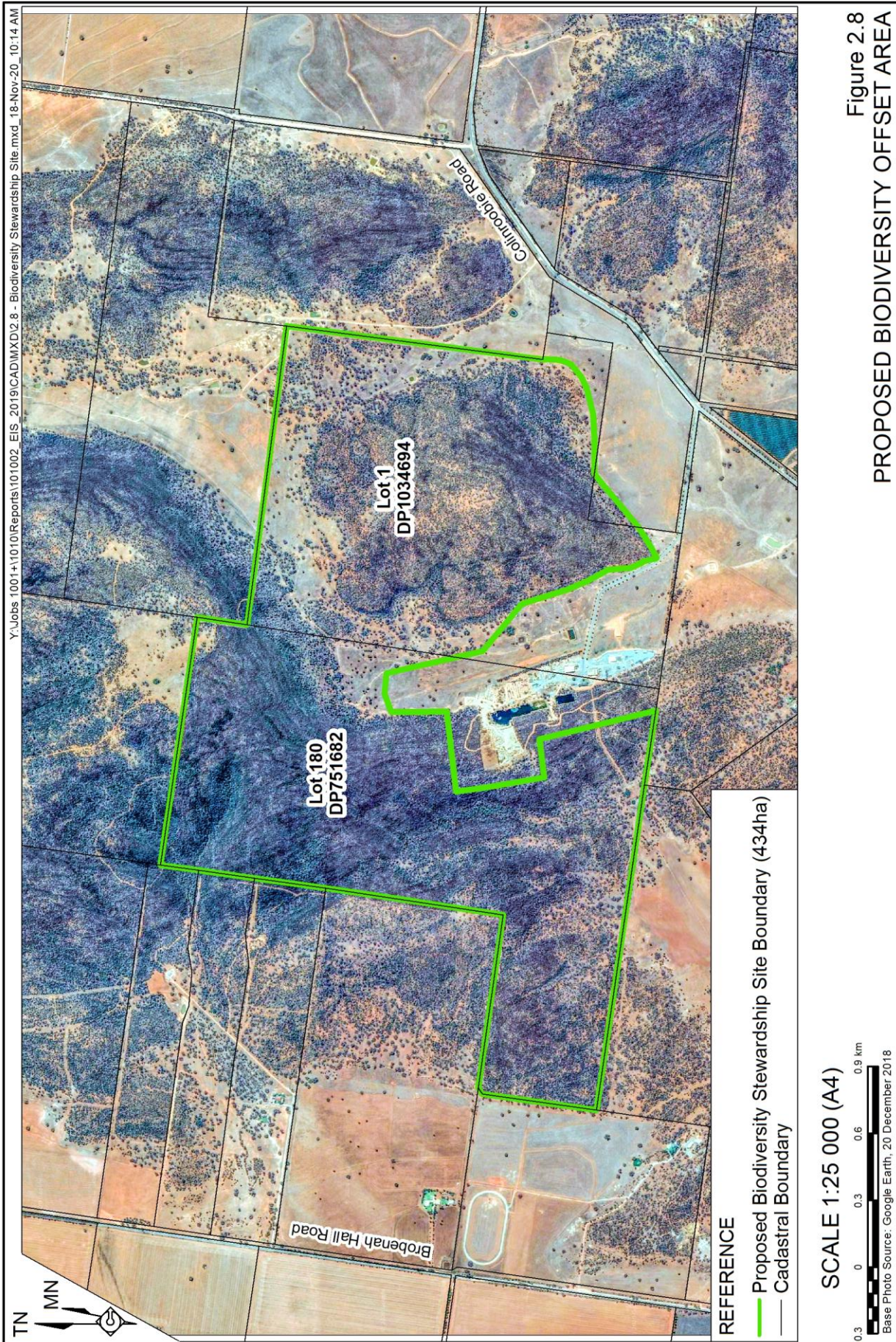


Figure 2.8
PROPOSED BIODIVERSITY OFFSET AREA