



# Section 2

## Description of the Proposal

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### PREAMBLE

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*This section describes the proposed expanded operations at Dowe's 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;*
- a description of the proposed extraction and processing activities to be undertaken within the Quarry Site;*
- the proposed transportation regime for the delivery of fragmented and/or crushed quartzose rock from the Quarry to the New England Highway and destinations beyond, particularly to the Sunnyside Plant;*
- a description of the emplacement of the fines returned from the Sunnyside Plant and fines produced on site;*
- a description of infrastructure, utilities and services that would be located within the Quarry Site as well as proposed employment, hours of operation and Project life; and*
- a description of 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 Objectives of the Proposal

The Applicant's principal objective is to obtain development consent to enable the planned extension of operations at the Quarry. The Proposal would allow the Applicant to continue and extend operations to extract the recoverable quartzose rock to produce a range of ivory-coloured stone products used in the manufacture of decorative concrete and landscaping products and road pavement materials.

The Applicant would continue to operate the Quarry to meet the following objectives.

- To continue to provide a source of high-quality stone products to meet the needs of housing and construction markets in NSW and Queensland.
- To maximise the recovery of the natural resource.
- To develop and operate the Quarry in a manner that is environmentally responsible and complies with all statutory requirements and reasonable community expectations.
- To create a final landform that is safe, stable and provides for long-term nature conservation within the areas disturbed throughout the life of the Quarry.
- Achieve the above objectives in a cost-effective manner to ensure the Proposal is viable.

These broad objectives would be achieved by:

- i) planning and extracting the resource in a manner that maximises the quality and quantity of quartzose rock recovered;
- ii) undertaking all activities in an environmentally responsible manner that enables compliance with all relevant statutory requirements;
- iii) monitoring and reviewing the operational and environmental performance of all activities; and
- iv) implementing a state-of-the-art truck management system and code of conduct for drivers (**Appendix 5**).

## 2.2 Overview of the Proposal

### 2.2.1 Overview of Proposed Activities

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

- Ongoing extraction of quartzose rock within the existing extraction area and a 4.5ha extension of the extraction area, producing up to 230 000tpa.
- Campaign crushing and screening on site using mobile processing equipment. On-site processing would be undertaken in response to client requirements.



- Ongoing transportation of fragmented and crushed rock to the State road network, (i.e. the New England Highway), for delivery to the Sunnyside Plant, and other destinations. Material would also continue to be delivered locally within Tenterfield for Council-managed road and infrastructure activities and directly to the local community.
- Ongoing transportation of material directly to end points of use, where further processing at the Sunnyside Plant is not required.
- Ongoing backloading of clay fines and crusher fines from the Sunnyside Plant to the Quarry;
- Progressive emplacement of overburden and fines within and adjacent to the extraction area.
- Progressive and final rehabilitation of the Quarry to develop a landform suitable for native vegetation conservation.

## 2.3 Quarry Site Layout

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

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

- Extraction area (Stage 1 – 6.9ha, Stage 2 – 10.1ha, Stage 3 – 11.4ha<sup>1</sup>)  
The extraction area would be developed in three stages and would be centred on the quartzose material defined through the exploration drilling campaign undertaken by the Applicant.
- Processing area (1.7ha)  
The processing area would be located immediately to the northwest of the extraction area and would incorporate areas for the mobile crushing plant, raw feed stockpiles and product stockpiles.
- Bund (0.62ha)  
A bund would be constructed to the north and west of the processing area principally to mitigate potential noise and visual impacts generated by the mobile crushing plant. The bund would be constructed using overburden and topsoil stripped during the development of other Quarry components.

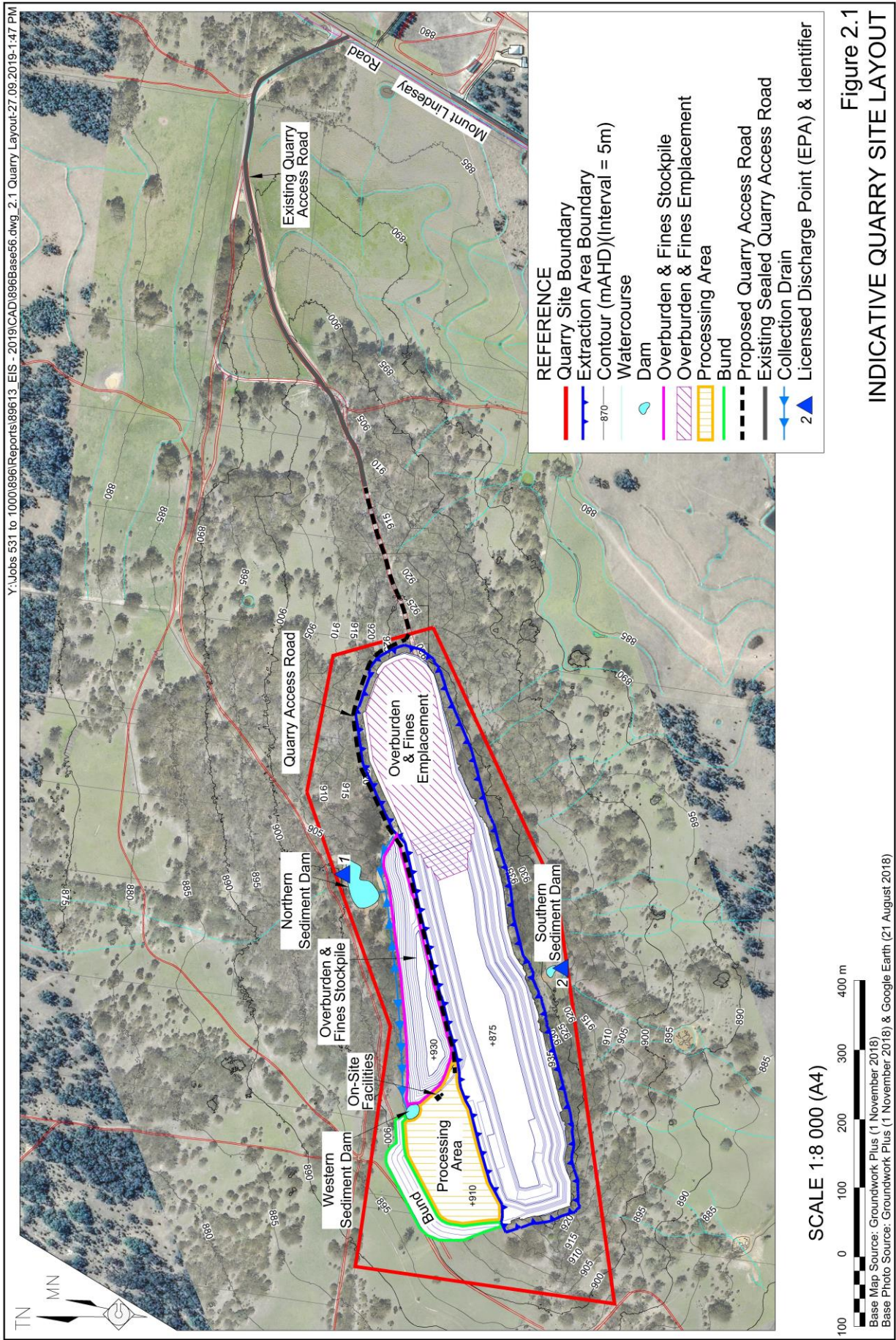
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<sup>1</sup> The nominated areas are the cumulative area of extraction at the end of each stage.





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- Overburden and fines stockpile (Stage 1 – 3.2ha, Stage 2 – 2.6ha, Stage 3 – 1.6ha)  
The overburden and fines stockpile would be progressively developed using overburden removed during extraction and fines backloaded from Sunnyside or produced on site. The overburden and fines stockpile would be located immediately to the north of the extraction area. No new material would be added to this area from midway through Stage 2 of operations. As the extraction area is developed to the north, material from the overburden and fines stockpile would be progressively relocated to the completed areas in the eastern section of the extraction area. This would allow for the extension of the extraction area to the north and west.
- Overburden and fines emplacement (Stage 2 – 1.9ha, Stage 3 – 2.9ha)  
The overburden and fines emplacement would be developed in the eastern section of the extraction area from midway through Stage 2 using material moved from the overburden and fines stockpile and overburden generated during the extension of the extraction area. It would be developed to an ultimate elevation of approximately 920m AHD (effectively ground level).
- Quarry access road (1.7km)  
The Quarry access road would provide long-term vehicular access to the processing area. Approximately 770m of the road would be sealed.
- Sediment dams (0.24ha)  
The northern sediment dam is located to the north of the overburden and fines stockpile and would contain all surface water runoff from the overburden and fines stockpile and other disturbed areas to the north of the extraction area.  
  
The southern sediment dam is located to the south of the extraction and would contain all surface water runoff from disturbed areas to the south of the extraction area.  
  
The western sediment dam would be constructed in the vicinity of the processing area to capture rainfall runoff from the western section of the overburden and fines stockpile.

The total area to be designated as the Quarry Site would be approximately 26.8ha of which the maximum area of disturbance would be 16.4ha. Approximately 6.4ha of remnant native vegetation would be disturbed during the development of the Quarry Site.

## **2.4 Resources and Products**

### **2.4.1 Geology and Resources**

The resource being extracted has been identified as a wide (25m to 50m) quartzite lens striking east-west within undifferentiated granite or granodiorites. The lens typically dips at approximately between 65° to 80° to the north which provides for a near vertical resource (Groundwork Plus, 2018). The rocks within and surrounding the Quarry Site are Lower to Middle Permian in age (approximately 290 million years old).



Based on the outcomes of a comprehensive drilling program undertaken in July 2018, aimed at further defining the availability resource, the Applicant conservatively estimates approximately 4.8 million tonnes of quartzose rock could be recovered from within the existing and extended extraction area. **Figure 2.2** displays the resource targeted and the location of exploration drill holes within the Quarry Site as well as a typical cross section through the inferred quartzose lens.

### **2.4.2 Products**

The principal product produced at Dowe's Quarry is a graded fractured quartzose rock blend with all fragments typically less than 400mm. This blend is produced principally by blasting with a small proportion of blasted oversize rock reduced to less than 400mm through the use of a hydraulic hammer.

As part of this application, the Applicant proposes to increase the range of products produced from the quartzose material which would involve a proportion of the quartzose material being processed on site prior to despatch to the Sunnyside Plant or directly to customers. On-site processing would be undertaken using mobile crushing and screening plant to produce a range of 5mm – 24mm crushed rock products and crusher fines.

### **2.4.3 Production Rates**

Despatch of quartzose rock from the Quarry Site would not exceed 230 000tpa. This rate has been selected based on the inferred resource, anticipated demand and allows for peaks in some years.

Product despatch is described in more detail in Section 2.9, however it is noted that the Applicant is unlikely to reach this maximum limit until the currently approved transport route is approved for higher mass vehicles with performance based standard certification. The Applicant intends to work with Council on this process and progressively increase the truck capacity approved on the route. This would allow an increase in the material despatched from the Quarry without increasing traffic levels.

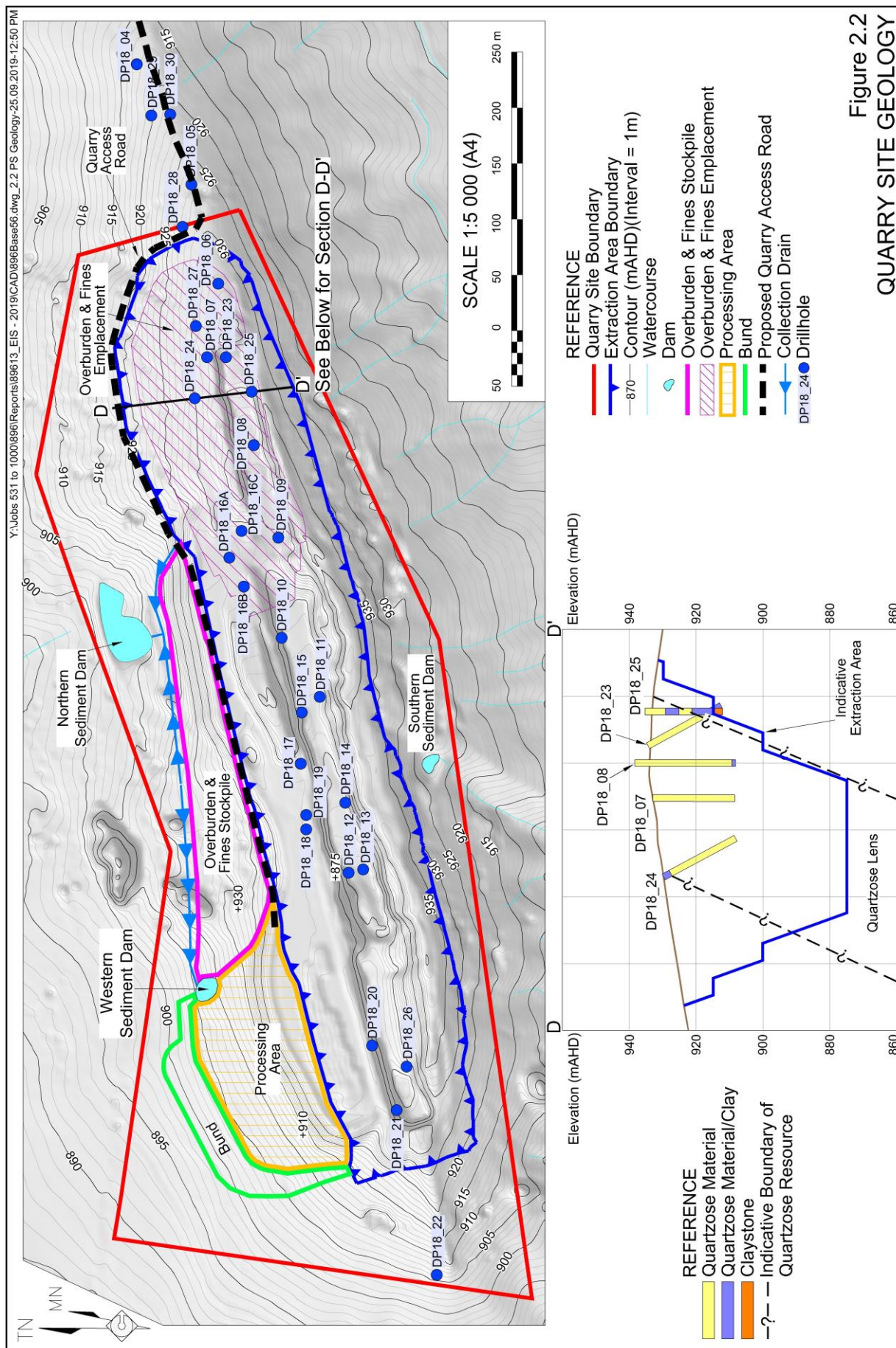
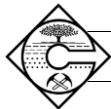
## **2.5 Site Establishment and Construction Activities**

### **2.5.1 Introduction**

A range of site establishment and construction activities would be undertaken within the Quarry Site to enable the development and expansion of the Quarry. The principal activities undertaken would be as follows.

1. The marking out of all component areas to be disturbed during the extension of the Quarry with highly visible permanent markers.
2. Progressive vegetation clearing and soil removal within the areas approved for disturbance.









3. Construction of the Quarry access road to provide access to the processing area.
4. Construction of the processing area pad and bund.

Each of these activities is described in more detail in the following sections.

### **2.5.2 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 using appropriately labelled and highly visible permanent survey markers. Survey markers would be positioned at the corners of all component areas and along boundaries at distances / spacing that allows visibility of the next marker.

### **2.5.3 Vegetation Clearing**

A total of 6.4ha of vegetation would be removed for the extension of the Quarry Site. All vegetation clearing would be undertaken in accordance with the existing Vegetation Clearing Protocol for the Quarry (see **Appendix 4**).

Vegetation would be cleared progressively within the defined areas of disturbance using an excavator. The few mature trees with tree hollows would be removed following the adoption of the measures nominated to avoid impacts to individual fauna species (see Section 5.5.5). Following the removal of the mature trees, selected timber may be made available for use by the landowner or sale for the purposes of building timber, fencing materials or firewood. The remainder would be stockpiled for rehabilitation activities or mulched for placement on terminal benches.

### **2.5.4 Soil Removal**

Any soil, where present and recoverable, would be stripped and either stockpiled for future use in rehabilitation activities or directly transferred to an area to be revegetated. The act of stripping the shallow, skeletal soil (where present), stockpiling and respreading would provide for adequate blending of the topsoil and subsoil recovered.

As far as practicable, soil stripping would be undertaken during periods to avoid forecast rainfall to potentially prevent higher levels of soil loss due to erosion. This would be particularly relevant for the period from December to February given the higher expected rainfall levels during that period (see Section 4.2.3). If clearing during these periods is unavoidable, additional practices would be undertaken to reduce the erosion risk, such as placement of silt-stop fencing at a location downslope that allows the installation of the fencing.

Soil that is not immediately applied to active rehabilitation areas would be stockpiled within the Quarry Site, most likely within safety bunding of the extraction area, from where it would be easily accessed, when required. Topsoil that needs to be stockpiled for more than one month would be seeded to establish a stabilising groundcover.



## 2.5.5 Construction of the Quarry Access Road

The Quarry access road would be constructed to provide long-term vehicular access to the processing area (**Figure 2.1**). The existing Quarry access road from the intersection with Mount Lindesay Road would be retained. Approximately 770m of this road is sealed to limit dust lift-off and noise generation. The Quarry access would follow the eastern and northern boundary of the extraction area for approximately 965m to the processing area. Within the Quarry Site, the access road would be an unsealed internal gravel road, constructed using appropriate pavement materials.

## 2.5.6 Construction of the Processing Area Pad and Bund

The pad for the proposed processing area would comprise a total area of 1.8ha and would be constructed using both cut and fill to an elevation of approximately 910m AHD (**Figure 2.1**). Fill material would be sourced from existing overburden stockpiles.

A bund would be constructed through the placement of overburden to the north and west of the processing area to mitigate any potential noise and visual impacts generated by the operation of the mobile processing plant (**Figure 2.1**). The bund would be up to 10m high and would be constructed with slopes of approximately 1:1.5 (V:H). The bund would provide an effective barrier height of 5m above the floor of the processing area.

## 2.6 Extraction Operations

### 2.6.1 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.

### 2.6.2 Design Features

Although subject to modifications based on localised geological conditions or the optimal locations of Quarry ramps etc, the following general design criteria would be adopted for the Project.

- Operational Face Height: 15m
- Operational Bench Width: 20m to 100m (longitudinal i.e. east-west)
- Terminal Bench Width: 3m (approximate)
- Face Angle: 70° (approximate)

The proposed maximum 70° (approximate) face angle would be subject to further geotechnical investigation throughout the life of the Quarry to ensure safe and stable extraction slopes are achieved.



Access to the extraction area, including for road-registered trucks to access the blasted rock piles, would be provided by an access ramp from the processing area located to the northwest of the extraction area.

### **2.6.3 Extraction Sequence**

Extraction would be undertaken in a staged manner following the completion of site establishment and construction activities. **Figure 2.3** displays the indicative extraction sequence for the Proposal incorporating three stages. A series of three cross sections through the indicative extraction area is presented on **Figure 2.4**.

#### **Stage 1**

Stage 1 would include the progressive development of the extraction area to the east of the existing extraction area. Overburden would be removed using an excavator and hauled to the overburden and fines stockpile to the north of the extraction area. Quartzose material would then be extracted using drill and blast methods followed by load and haul to the processing area or direct loading into road registered vehicles.

The proposed Stage 1 extraction area covers approximately 6.9ha. Extraction during this stage is proposed to an elevation of approximately 905m AHD which is approximately 15m lower than the floor of the existing extraction area. Two operational benches would be developed during Stage 1 at approximately 935m AHD and 920m AHD.

Emphasis would be placed upon extracting all recoverable quartzose material from the eastern end of the extraction area during Stage 1 (and early stages of Stage 2) to enable the eastern end of the extraction area to be used for the emplacement of overburden and fines.

#### **Stage 2**

Stage 2 of operations would involve the lateral extension of the extraction area to a total area of 10.1ha. Overburden would continue to be hauled to the overburden and fines emplacement until approximately midway through Stage 2 after which it would be emplaced within the eastern section of the extraction area to form the overburden and fines emplacement. Overburden and fines would also be progressively moved from the overburden and fines stockpile to the overburden and fines emplacement from approximately midway through Stage 2 to allow for the extension of the extraction area without the need for additional disturbance and vegetation clearing.

Extraction within the eastern section of the extraction area is proposed to an elevation of approximately 875m AHD. Operational benches would be established at approximately 935m AHD, 920m AHD and 905m AHD.

#### **Stage 3**

Stage 3 of operations would involve the progressive lateral extension of the extraction area. This stage would involve the on-going relocation of material from the overburden and fines stockpile. Overburden and fines generated during Stage 3 operations would be emplaced within the overburden and fines emplacement (the terminal eastern area of the extraction area).



The extraction area in Stage 3 would reach a maximum area of approximately 11.4ha. The Stage 3 extraction area would extend to an elevation of approximately 875m AHD with operational benches established at approximately 935m AHD, 920m AHD, 905m AHD and 890m AHD.

#### **2.6.4 Extraction Method**

Drilling and blasting would continue to be used to extract the quartzose rock. Blasts would typically fragment approximately 20 000 to 50 000 tonnes per blast. The drilling of blast holes would typically be undertaken on a 3m x 3m pattern using 89mm drill holes to a depth of 14m with up to 1m of sub drill. Blasting would typically occur no more than once per month. However, in the interest of practical limits of ongoing operations, blasting of no more than once per week (excluding that required in the event of a misfire) is proposed.

Fragmented rock may be loaded directly into highway trucks for transportation to the Sunnyside Plant. Material that is to be proceed on-site would be hauled to the processing area for crushing prior to loading and despatch.

#### **2.6.5 Extraction Equipment**

Operations currently require the use of the following equipment.

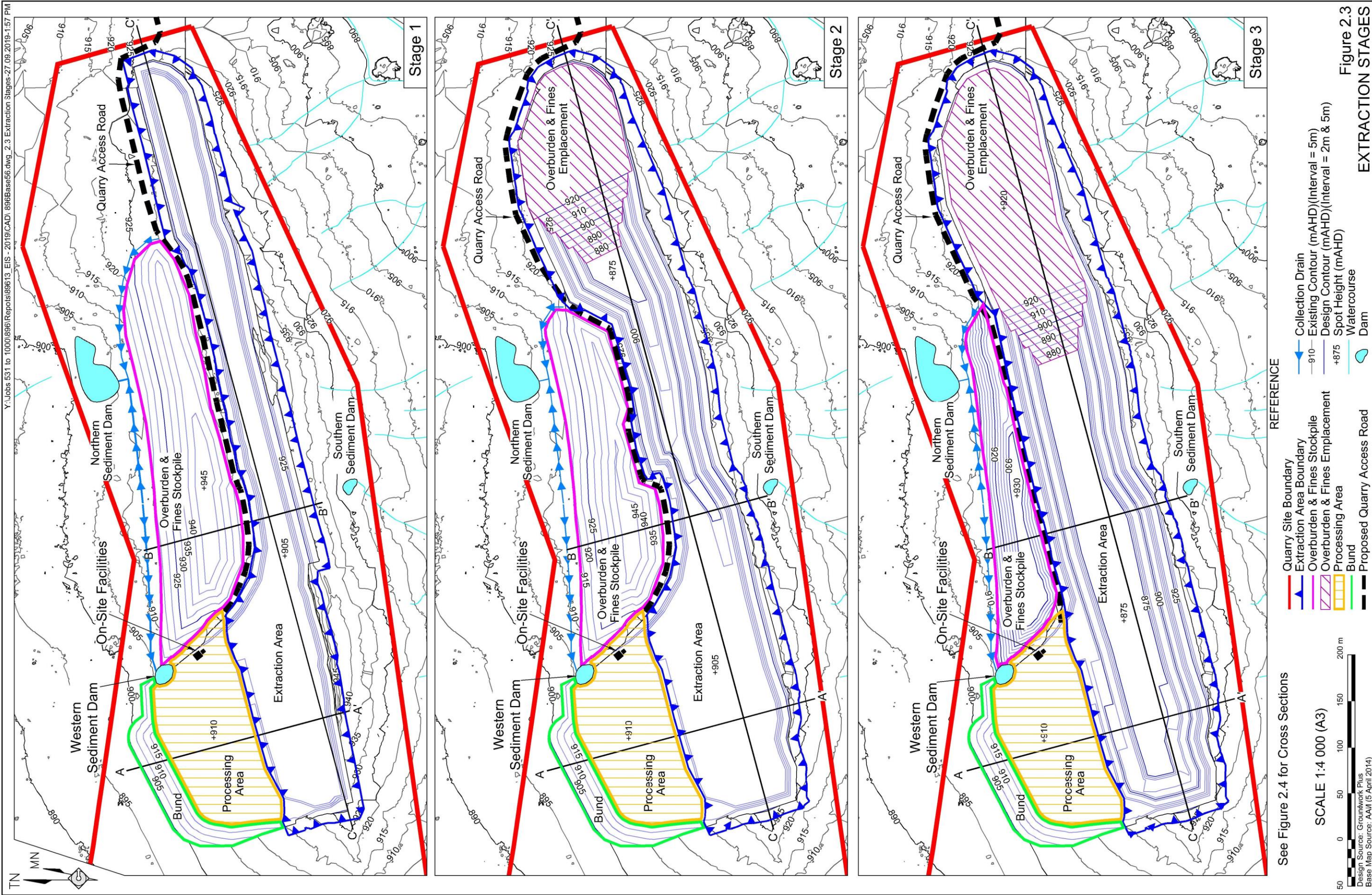
- 1 x Hydraulic Drill Rig (Atlas Copco T35) or equivalent – used typically one day per month for drilling blast holes.
- 2 x Excavator (Komatsu PC300) or equivalent – permanently on site and used for loading trucks, clearing vegetation, soil removal, excavation of overburden and secondary breakage of oversize blasted rock.
- 1 x Haul Truck (22m<sup>3</sup>/40t) or equivalent – used periodically on site for transfer of blasted rock, soil and overburden.

The Applicant intends to continue to use this equipment fleet throughout the remaining life of the Proposal. Other equipment may be used at the Quarry Site from time to time such as a grader to maintain roads and a water cart to reduce wind erosion from disturbed surfaces. Permanent equipment may also be replaced over the life of the Quarry. However, it is estimated that use of this equipment would not generate dust or noise that would exceed that applied for assessment in the presented operational scenarios.

### **2.7 Processing Operations**

Processing is not currently undertaken within the Quarry Site with all quartzose rock extracted from the Quarry transported to the New England Highway and then principally to the Sunnyside Plant or other destinations. The Applicant intends to increase the range of products produced from the quartzose material, which would also involve a proportion of the quartzose material being processed on site prior to its despatch to the Sunnyside Plant or directly to customers. On-site processing would produce a range of 5mm to 24mm crushed rock products and crusher fines for use in a variety of construction and infrastructure applications.







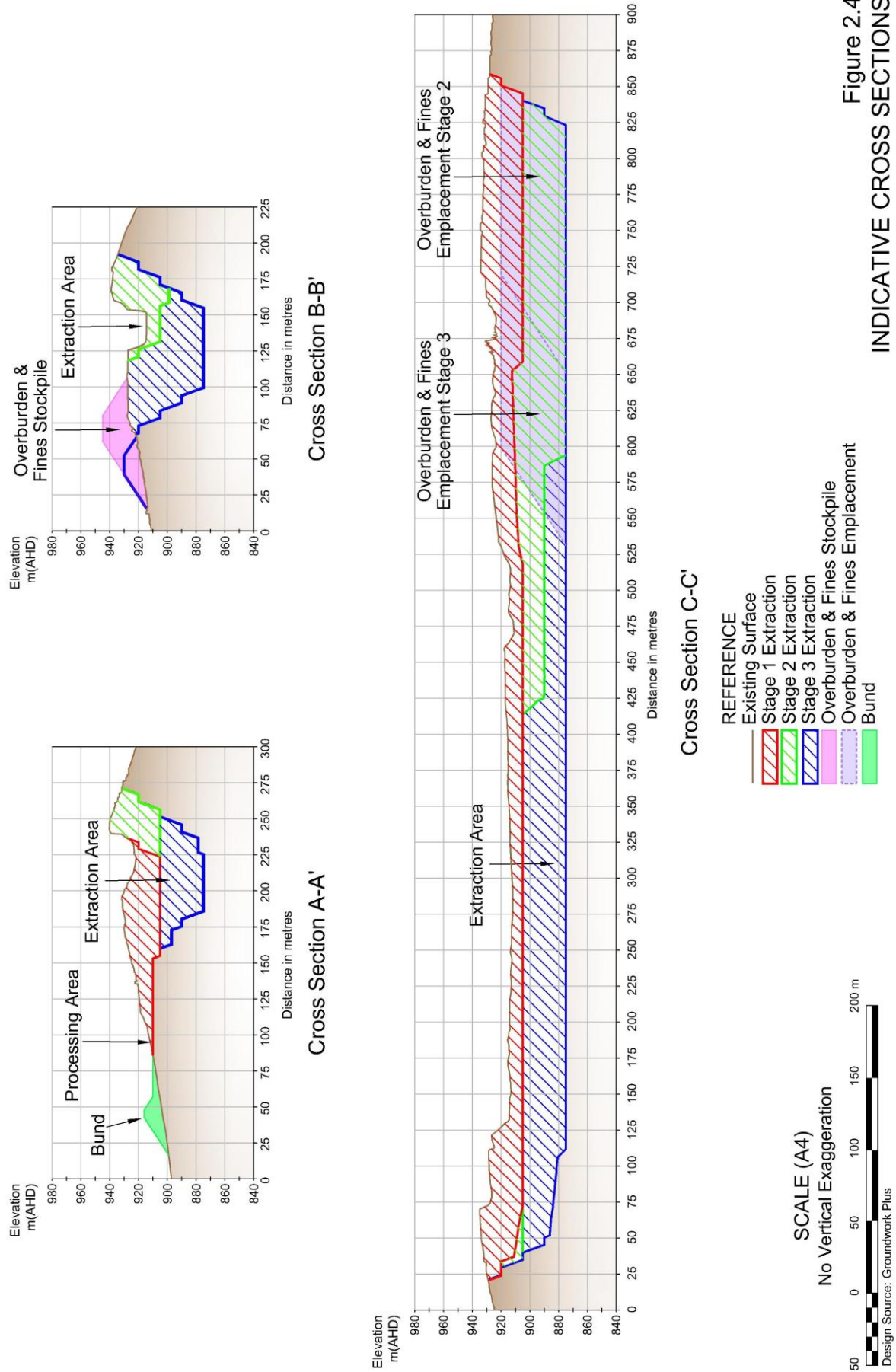
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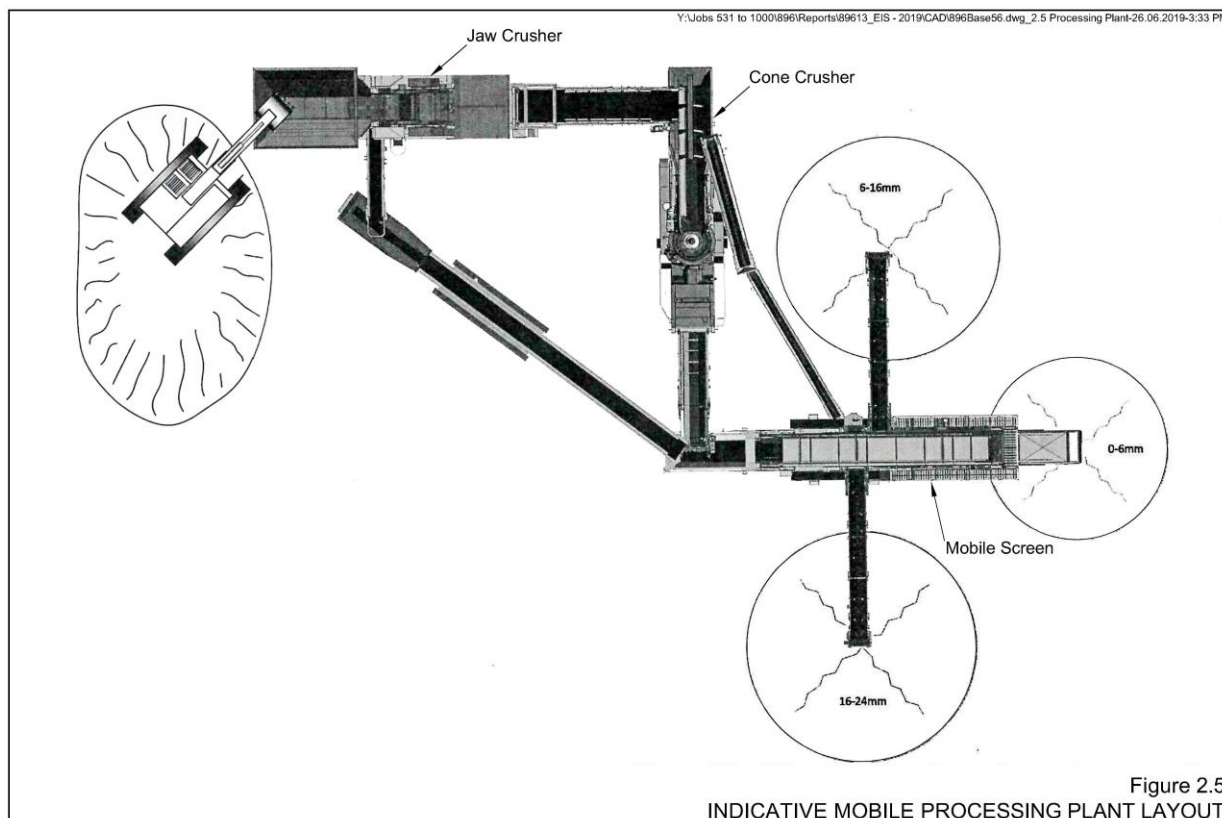
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The mobile crushing and screening equipment would include the following. Examples of each item of equipment are provided to indicate their size and capacity. **Figure 2.5** displays the indicative layout of the mobile crushing plant.

- 1 x Jaw Crusher e.g. Kleemann MC120Z PRO or equivalent.
- 1 x Cone Crusher e.g. Kleemann MC011 PRO or equivalent.
- 1 x Mobile Screen e.g. Kleemann MS 953 EVO or equivalent.



Once processed, the products would be temporarily stockpiled in the processing area prior to loading and product despatch. Stockpiles within the processing plant area would generally contain between 5 000t and 10 000t of products awaiting despatch.

## 2.8 Overburden and Fines Management

### 2.8.1 Overburden Management

The thickness and quantity of overburden above the defined quartzose rock is variable. The overburden is typically thicker on the northern side of the extraction area given the steep dip of the quartzose material to the north.

**Figure 2.3** displays the location of the overburden and fines stockpile on the northern side of the extraction area. The overburden and fines stockpile would be constructed with slopes of approximately 1:1.5 (V:H). It is proposed that a proportion of overburden and fines from the





overburden and fines stockpile would be progressively backfilled within the eastern section of the extraction area from approximately midway through Stage 2 to allow for the expansion of the extraction area to the north. Overburden and fines from the stockpile would be loaded and hauled to the extraction area via the ramp from the extraction area to the processing area. Overburden removed during extraction operations and fines backloaded and/or generated on site from midway through Stage 2 would also be directly emplaced within the overburden and fines emplacement within the depleted section of the extraction area. The overburden and fines emplacement within the extraction area would ultimately cover approximately 2.9ha at the end of Stage 3, although it is noted that the exact area would depend on the quantities of overburden removed during extraction operations.

The Applicant has elected to double handle overburden and backfill the extraction area in order to limit the need for further vegetation clearing and development and to improve the function of the final landform through partial backfilling of extracted areas.

## **2.8.2 Fines Management**

Approximately 85% of the quartzose rock processed generates saleable products whilst the remaining 15% are effectively by-products suited for a range of other uses. The main by-product produced is crusher fines with some low grade road base materials also likely to be produced. Both materials may be suitable for sale, depending on demand, but are expected to be stockpiled at least temporarily. It is acknowledged that the quantity of by-products produced currently exceeds the available markets for these by-products. At present, a proportion of the fines have been back-loaded from the Sunnyside Plant to Dowe's Quarry. The Applicant proposes to continue to backload fines to Dowe's Quarry following the receipt of development consent. Fines would be emplaced in the overburden and fines emplacement area to the north of the extraction area and then within the eastern section of the final extraction void as it is created (**Figure 2.3**).

The Applicant proposes to emplace all fines produced during on-site processing operations in a manner consistent with the emplacement and storage of backloaded fines. Where feasible, fines material would be encased in overburden during emplacement to provide stable landforms.

## **2.9 Access, Traffic and Material Transportation**

### **2.9.1 Access**

All trucks would continue to access the Quarry Site from the intersection of the Quarry access road with Mount Lindesay Road. It is noted that the Quarry access road would follow the eastern and northern boundary of the extraction area to provide direct access to the processing area pad (**Figure 2.1**) while limiting the need for vegetation clearing.

The alignment of the Quarry access road in the vicinity of Mount Lindesay Road crosses Crown Reserve 1149 (Lot 245 DP 751540). The access road was constructed for the original operation of the Quarry which commenced in 1987. The alignment of the road was chosen as it was considered to provide the safest access to Mount Lindesay Road. Access via this lot is permitted in accordance with Section 75 of the *Local Land Services Act 2013*. It remains a matter for Council and the Department of Planning, Industry and Environment – Crown Lands to clarify the legal status of the road corridor in this location.



## 2.9.2 Transport Routes

The existing transport route used to transport blasted rock to the Sunnyside Plant and to back load fines would continue to be used under the Proposal. Laden trucks transporting the quartzose rock from Dowe's Quarry would continue to travel along Mount Lindesay Road for a distance of approximately 6.6km into Tenterfield, turning right at Naas Street and travelling for a distance of approximately 0.25km before turning right onto the New England Highway. Trucks travelling to the Sunnyside Plant would then travel northwards for approximately 8.3km. This route is displayed on **Figure 2.6**.

Un-laden or back-loading trucks travel from the Sunnyside Plant for a distance of 4.8km along the New England Highway before turning left into Old Ballandean Road and travelling for a distance of 3.7km and then turning left onto the Mount Lindesay Road to return to Dowe's Quarry. This route is also displayed on **Figure 2.6**.

The routes taken for the laden and un-laden/back-loading trucks between Dowe's Quarry and the Sunnyside Plant have been in use for in excess of 30 years with typically two or three trucks undertaking approximately six to seven return trips daily.

On occasions when a customer requires delivery of material that has been processed on site, transport is likely to occur directly from Dowe's Quarry to the final destination. It is anticipated that these products would most likely be delivered within the New England region, but may require transportation to more distant destinations. In these instances, trucks transporting products would either follow the proposed transport route to the New England Highway or Bruxner Highway and destinations to the north or west of Tenterfield or would turn left at Naas Street onto Rouse Street to access the New England Highway or Bruxner Highway and destinations to the south or east of Tenterfield. These routes are also presented in **Figure 2.6**.

## 2.9.3 Traffic Types and Levels

Whilst an increase in the annual extraction rate (from 150 000tpa to 230 000tpa) is proposed, the Applicant intends to maintain the same maximum number of daily truck loads through the progressive introduction of a fleet of high mass limit trucks with performance base standards certification, able to transport up to approximately 50 tonnes of material in each truck. This increase in truck capacity would result in up to 230 000tpa of materials being transported from the Quarry without any increase in the currently approved daily truck movements.

It is noted that the majority of the transport route is approved for 25m/26m B-Double use with only the section of Mount Lindesay Road between Old Ballandean Road and the Quarry not currently approved for this configuration<sup>2</sup>. The Applicant has approval for higher mass limit transportation on the transport route for a similar truck configuration as the existing operations (that is truck and quad dog) that permits a gross combined mass of 57.45 tonne (load of 40t). It is not currently anticipated that B-Double trucks would be utilised for the transport operations. Should this be required in the future, an application to Tenterfield Shire Council would be made and, if necessary, the development consent for the operation modified to permit their use.

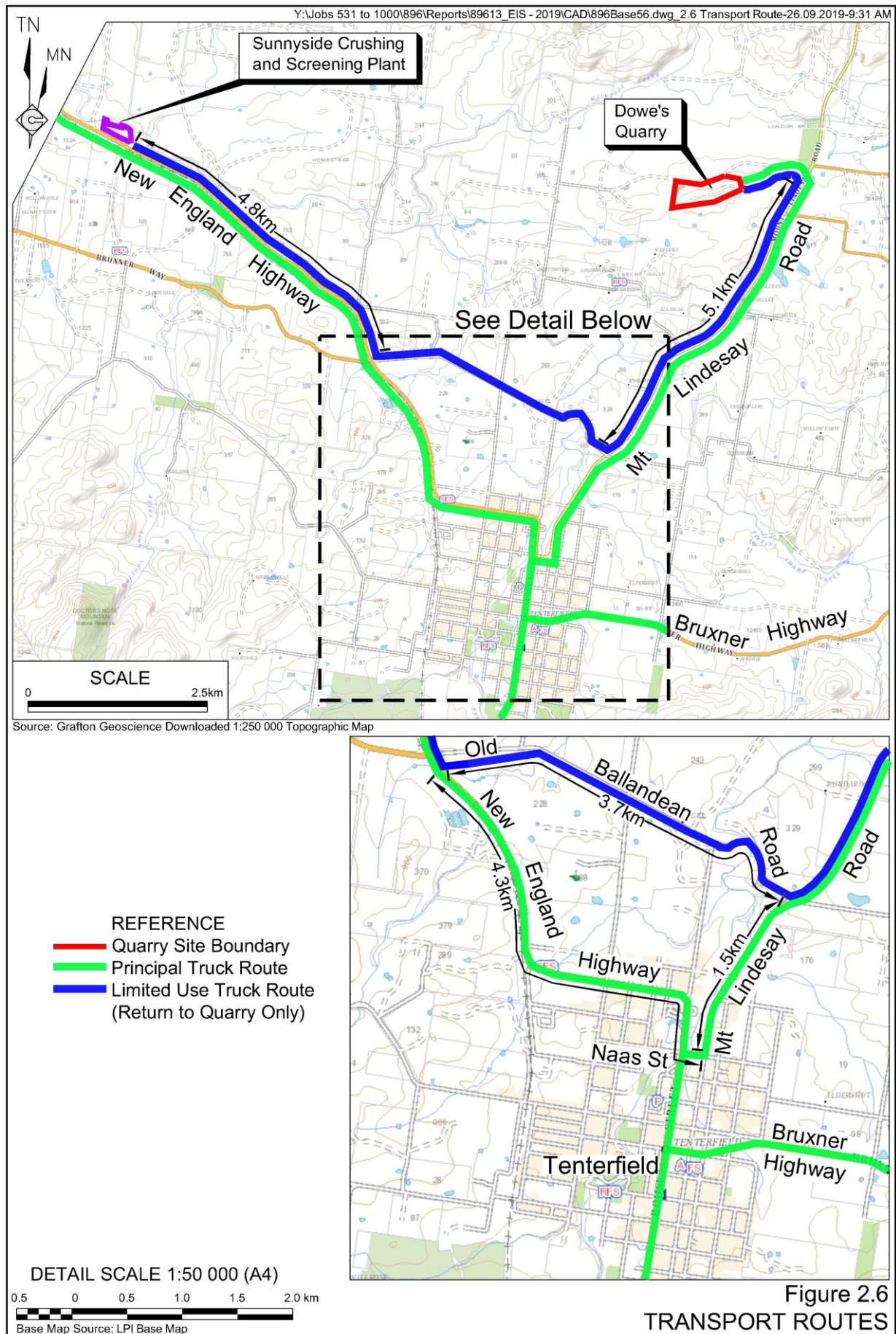
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<sup>2</sup> See the RMS Restricted Access Vehicle (RAV) maps <https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html>



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The number of daily laden trucks would vary from 0 to 28 generating up to 56 truck movements per day. It is proposed that the existing weekly limit of a maximum of 120 laden trucks (240 movements) per week would be retained. However, in order to account for weather affected periods (with little operation), it is proposed that the limit be applied as an average over a four-week period. This would be required to meet market demands. The daily limit of 28 trucks per day would restrict the maximum daily truck movements and is the level assessed in this document.

It is noted that a higher level of traffic is likely to occur during periods of high demand for the ivory products or following prolonged periods of wet weather when few or no truck movements occur. In reality, transportation of quartzose rock would occur consistently throughout the year with only minor peaks and troughs as described above.

## **2.10 Waste Management**

### **2.10.1 Introduction**

The SEARs identify “*waste management*” as a key issue for assessment in the EIS including the importation of any waste material to the Quarry Site. 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 subsection provides an overview of waste streams that would be generated by the Proposal, approximate volumes and methods of disposal or management.

### **2.10.2 Production Wastes**

Production wastes generated within the Quarry would include overburden and clay crusher fines. Management of these materials is described in Section 2.8.

### **2.10.3 Non-Production Wastes**

Non-production wastes generated through the proposed operational activities would be negligible, with any wastes removed to the Sunnyside Plant for appropriate disposal. This would include any general solid wastes and scrap metal.

All machinery servicing would continue to be undertaken at the Sunnyside Plant, and all waste oils removed at this time and disposed of appropriately.

The Quarry Site does not contain any amenities or access to reticulated water or sewerage services.





## 2.11 Infrastructure, Utilities and Services

There are currently no infrastructure, utilities or services located at the Quarry Site. No amenities are regularly kept on site. As required, a portaloos is brought to site during periods of continued activity involving one or more personnel being on site for a number of days. Truck drivers make use of the amenities at the Sunnyside Plant, as required.

The Applicant intends to utilise a demountable office and crib room which would be located within the processing area. A small diesel tank would be maintained at the Quarry Site with material stored in a self-bunded container and in accordance with *AS 1940 – 2017 The Storage and Handling of Flammable and Combustible Liquids*.

## 2.12 Employment

The Applicant employs a Quarry Manager full time to manage the operations within Dowe's Quarry. The manager undertakes a wide range of tasks including supervision of drilling, overburden removal and management, surface water management and related duties. Two to three truck drivers are employed on a full-time basis to transport the quartzose rock. In total, it is expected that approximately eight full-time equivalent positions would be generated by the Quarry (including drivers).

## 2.13 Hours of Operation and Project Life

**Table 2.1** lists the proposed hours of operation for the range of activities that would be undertaken at the Quarry Site throughout the life of the Proposal.

**Table 2.1**  
**Proposed Hours of Operation**

Activity	Monday to Friday	Saturdays	Sundays or Public Holidays
Site establishment and construction	7:00am – 5:00pm	7:00am – 5:00pm	Nil
Extraction operations	7:00am – 5:00pm	7:00am – 5:00pm	Nil
Blasting operations	10:00am – 3:00pm	10:00am – 3:00pm	Nil
Processing operations	7:00am – 5:00pm	7:00am – 5:00pm	Nil
Product despatch	7:00am – 5:00pm	7:00am – 5:00pm (as required)	Nil
Maintenance	24 hours / day	24 hours / day	Nil

It is anticipated that the Quarry would operate for until 25 March 2045 consistent with the existing development consent. Development consent would therefore be sought for approximately 25 years.



## 2.14 Rehabilitation

### 2.14.1 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. The specific objectives for the long-term rehabilitation program are to:

- provide a low maintenance, geotechnically stable and safe landform with minimal erosion; and
- blend the created landforms and vegetation established with that of the surrounding topography, as much as practicable.

Emphasis would be placed upon progressive rehabilitation of completed areas within the Quarry Site.

**Figure 2.7** displays the indicative final landform for Dowe's Quarry with typical sections on the eastern, central and western ends of the extraction area.

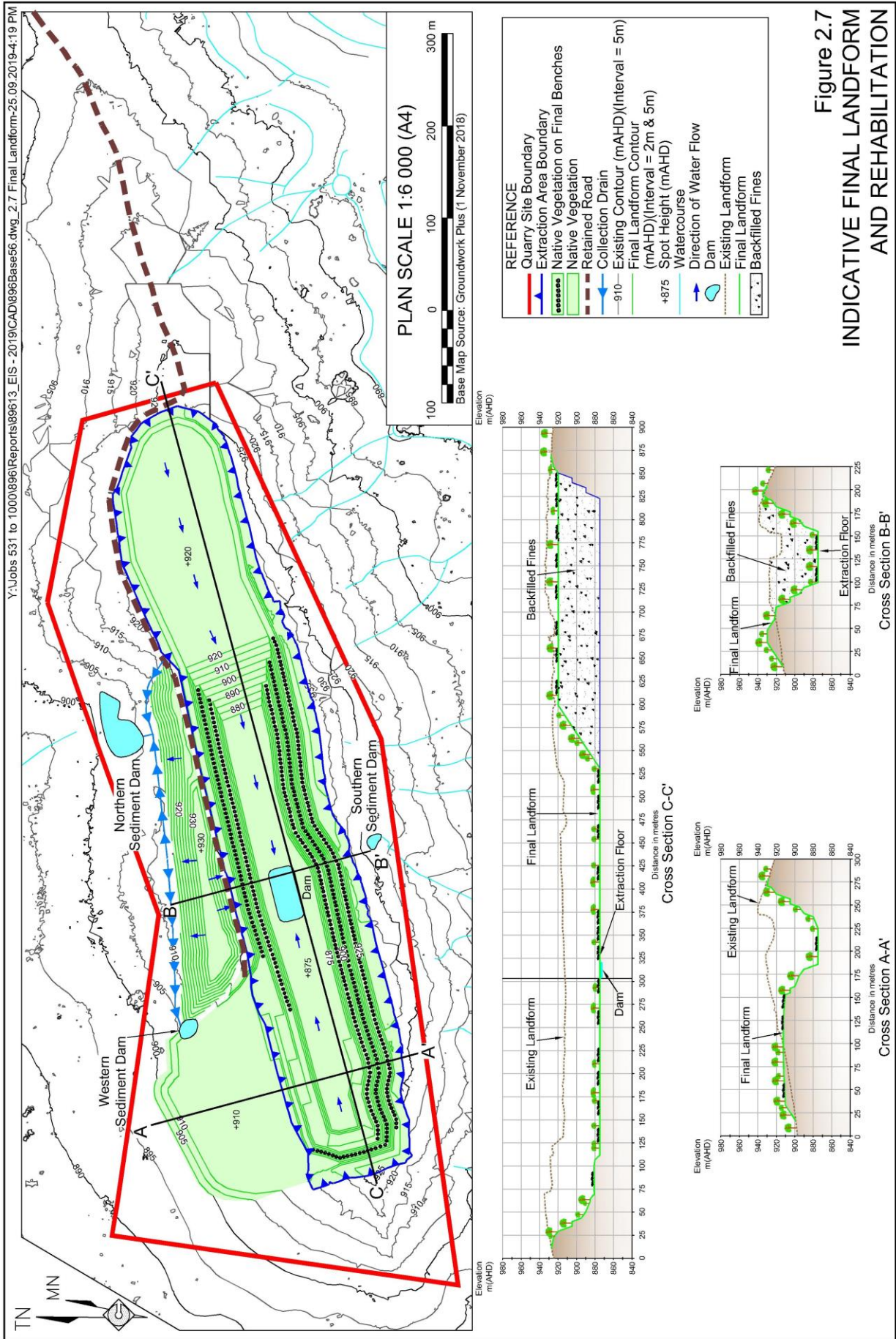
### 2.14.2 Progressive Rehabilitation

An integrated approach would be adopted for rehabilitation of all areas to be disturbed within the Quarry Site. Progressive rehabilitation would be undertaken principally to stabilise disturbed areas and minimise sediment-laden runoff. The key Quarry components that would be progressively rehabilitated are as follows.

- **Bund**  
The bund would be constructed from overburden with a veneer of topsoil during the site establishment and construction stage and would be shaped and revegetated using native species endemic to the area immediately following construction.
- **Overburden and Fines Stockpile**  
The final northern face of the overburden and fines stockpile would be progressively shaped with the surface ripped approximately parallel to contour levels. Available soil would be recovered and spread over the profiled slopes. The final slopes would be direct seeded with a locally endemic native seed mix and allowed to revegetate.
- **Terminal Benches**  
Terminal benches within the extraction area would be progressively rehabilitated as described in Section 2.14.3.



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### **2.14.3 Extraction Area**

All final or terminal benches within the extraction area would be progressively revegetated to provide for the long-term establishment of a range of native vegetation. Weathered overburden materials would be placed on the completed benches with an emphasis on creating a roughened surface to contain the bulk of rain falling on the benches. Overburden would be placed on each bench once extraction and haulage activities cease in that area but immediately prior to the commencement of drilling for the last blast to create the terminal extraction face.. The overburden would form a substrate which would be covered with topsoil for the subsequent growth of trees and shrubs which would be planted either through direct seeding or tubestock. Terminal faces within the extraction area would be retained at approximately 70° but 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.

A suitable ramp would be retained between the final floor of the extraction area and the processing area to provide ongoing access.

### **2.14.4 Overburden Emplacement**

The Applicant proposes to backfill the eastern section of the extraction area with fines and overburden to approximately 920m AHD. Overburden and fines would be progressively emplaced within the extraction area from approximately midway through Stage 2. The western batter of the overburden and fines emplacement would be created with a slope of approximately 1:1.5 (V:H). The surface of the overburden and fines emplacement would be covered with available topsoil and revegetated using native vegetation endemic to the area.

### **2.14.5 Processing Plant Area**

The processing area would be revegetated using native vegetation endemic to the area, however, an internal road would be retained for access. The extraction floor would be revegetated and would slope gently towards the quarry sump in the central section of the extraction area which would be created by contouring the overburden placed on the final extraction floor.

All processing equipment would be mobile and removed at the end of the Quarry life for use at other operations. All waste material, infrastructure and vehicles not required for rehabilitation operations would also be removed from the processing plant area.

The bund to the north of the processing area may be removed during rehabilitation of the processing area to provide topsoil for use in rehabilitation. Overburden from the bund would be emplaced in the overburden and fines emplacement or on the floor of extraction area. Should vegetation on this component be well established and a growth medium available from elsewhere this component may be retained.

### **2.14.6 Roads and Ramps**

Internal roads and ramps would be retained following the cessation of operations to provide ongoing access to the extraction area.





## 2.14.7 Overburden and Fines Stockpile

The outer batters of the overburden and fines stockpile would be progressively profiled to create slopes of approximately 1:1.5V:H) (~34°). Available soil would be recovered from stockpiles or directly transferred from areas being cleared and spread over the profiled slopes. The final slopes would be direct seeded with a locally endemic native seed mix and allowed to revegetate.

## 2.14.8 Final Land Uses

It is intended that the Quarry Site would be retained principally for biodiversity conservation. All rehabilitation would be undertaken in consultation with the landowner. The success of rehabilitation and revegetation would also be reviewed progressively with the landowner, with additional soil, seed or tube stock added where revegetation is less successful.

## 2.15 Biodiversity Offset Strategy

### 2.15.1 Introduction

The SEARs issued for the Proposal identified that EIS should demonstrate whether the proposed development exceeds the Biodiversity Offset Scheme threshold specified in Clause 7.23 of the *Biodiversity Conservation Regulation 2017* and if so, prepare a Biodiversity Development Assessment Report.

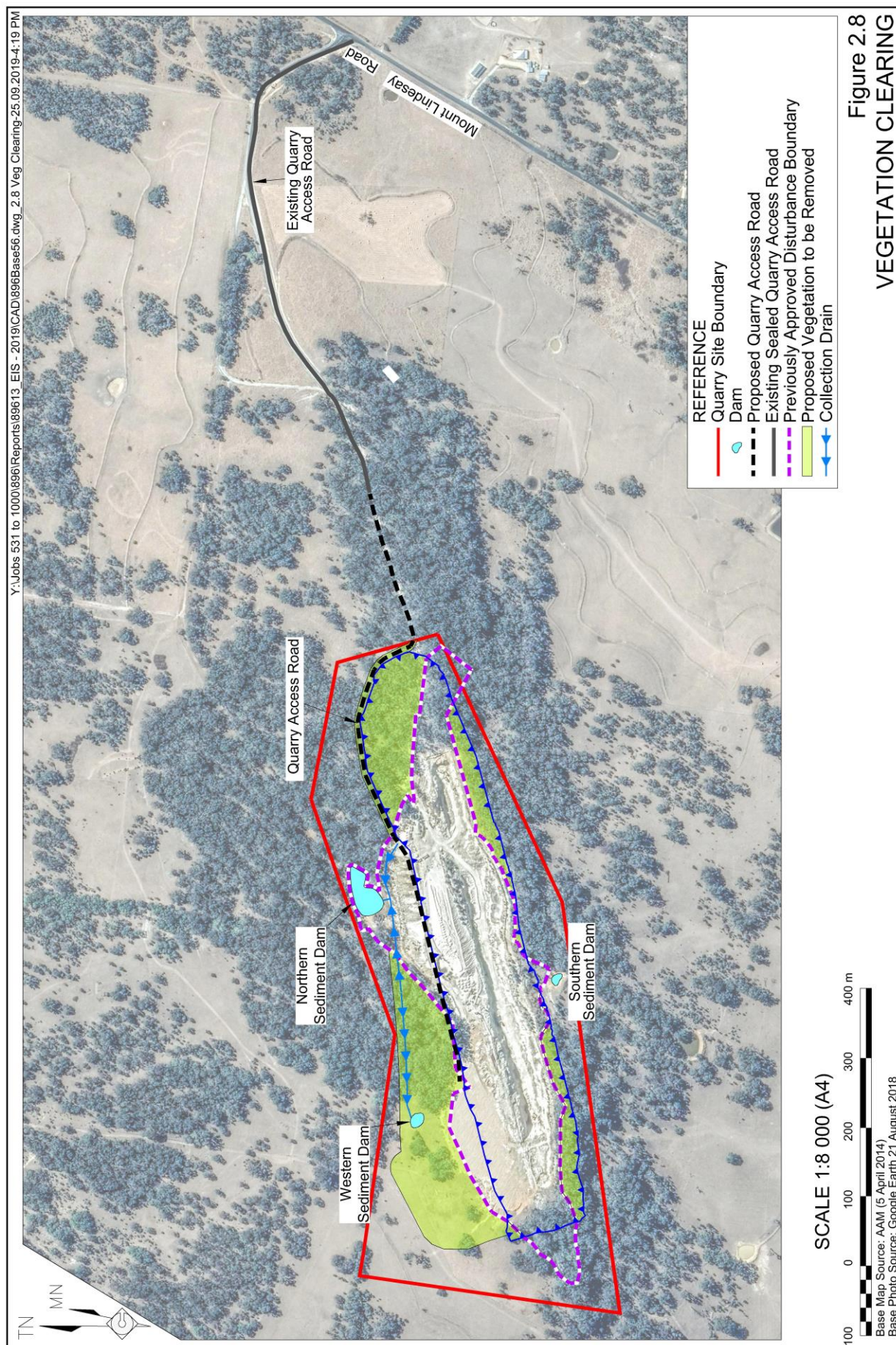
The Applicant has followed the hierarchy of avoid, mitigate, offset in considering impacts to native vegetation. The Proposal has been designed so that extraction would initially focus on the eastern end of the extraction area with placement of overburden and fines in the completed pit during later stages. In addition, it has been decided that the internal haul road would be located adjacent to and between site components to limit vegetation clearing for its progressive development. This approach limits the area of vegetation clearing required for the Proposal.

As the Proposal involves the removal of approximately 6.4ha of native vegetation and land zoning for the property requires a minimum lot size of 100ha the Biodiversity Offset Scheme is triggered. The Quarry Site is not located on land mapped as having high biodiversity value as indicated on the Biodiversity Values Map<sup>3</sup>. A Biodiversity Development Assessment Report (BDAR) has been prepared by EcoLogical Australia Pty Ltd (ELA) and is included as **Appendix 10**. The following subsections describe the Biodiversity Offset Strategy for the Proposal with further assessment of biodiversity values provided in Section 5.5.

### 2.15.2 Impacts Requiring Offsetting

**Figure 2.8** presents the areas of proposed native vegetation clearing for the Proposal. It is noted that the area that is currently approved for disturbance under DA 2014.078/1 is not included in this figure as this area has already been subject to assessment and approval. **Table 2.2** presents the outcomes of vegetation mapping and survey of the Quarry Site undertaken on 22 to 26 April 2019.

<sup>3</sup> <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>





**Table 2.2**  
**Plant Community Types of the Quarry Site**

Plant Community Type	Vegetation Class/Formation	Area	Condition	Vegetation Integrity Score
568 - Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	New England Dry Sclerophyll Forests / Dry Sclerophyll Forest (Shrub/grass sub-formation)	4.63ha	Good	66.4
568 - Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	New England Dry Sclerophyll Forests / Dry Sclerophyll Forest (Shrub/grass sub-formation)	1.78ha	Poor	3

Source: Modified after ELA (2019) – Table 7 and Table 8

Only the 4.63ha area of Plant Community Type (PCT) 568 mapped as being in good condition is required to be offset and the vegetation integrity score for the poor condition vegetation does not trigger offsetting.

Field surveys of the Quarry Site did not identify any threatened species that would require offsetting as species credits. However, the timing of surveys did not align with the required survey period for some species. Therefore, for the purpose of assessment, it has been assumed that the species presented in **Table 2.3** may occur within the Quarry Site. Additional targeted survey for these species will occur in November 2019 to confirm the presence/absence of these species (in accordance with survey requirements for these species). Potential habitat for these species has been separated into the good and poor condition vegetation within the Quarry Site in recognition that the better-quality habitat is more likely to be used for foraging or nesting.

**Table 2.3**  
**Threatened Fauna Species Requiring Offset**

Species	Common Name	Area (ha)	
		Good Condition Vegetation	Poor Condition Vegetation
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	4.63	-
<i>Ninox connivens</i> (breeding)	Barking Owl	3.60	1.09
<i>Ninox strenua</i> (breeding)	Powerful Owl	3.60	1.09
<i>Tyto novaehollandiae</i> (breeding)	Masked Owl	3.60	1.09
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	4.63	-

Source: Modified after ELA (2019) – Table 13

Several threatened species that were identified during field surveys, or that may have the potential to occur within the Quarry Site, are considered as ecosystem credit species under the Biodiversity Assessment Method (BAM) and therefore satisfactory offset of the ecosystem credits is considered to provide a satisfactory offset for these species.

### 2.15.3 Impacts Not Requiring Offsetting

Approximately 1.78ha of PCT 568 that would be cleared for the Proposal is in poor condition due to previous clearing for agricultural activities and the presence of the weed African Love Grass (*Eragrostis curvula*). ELA (2019) assessed that this vegetation has a vegetation integrity score of 3 which does not require offsetting.





Regardless, this area may be foraging habitat for a range of threatened species and therefore requires assessment of offsetting for species credit generation (see **Table 2.3**).

## 2.15.4 Credit Calculations

### 2.15.4.1 Ecosystem Credits

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 4.63ha of native vegetation that requires offset. The ecosystem credits required to offset the residual impacts of the Project are provided in **Table 2.4**.

**Table 2.4**  
**Ecosystem Credits Required**

Plant Community Type	Area	Credits Required
568 - Broad-leaved Stringybark shrub/grass open forest of the New England Tableland Bioregion	4.63ha	134
Source: Modified after ELA (2019) – Table 30		

### 2.15.4.2 Species Credits

The species credits required to offset potential impacts to threatened fauna species requiring species credit offsets are presented in **Table 2.5**. However, it is noted that this assessment is preliminary as the presence/absence of these species will be confirmed following targeted survey in November 2019.

**Table 2.5**  
**Species Credits Required**

Species Credit Type	Credits Required
Eastern Pygmy Possum ( <i>Cercartetus nanus</i> )	154
Barking Owl - breeding ( <i>Ninox connivens</i> )	121
Powerful Owl - breeding ( <i>Ninox strenua</i> )	121
Masked Owl - breeding ( <i>Tyto novaehollandiae</i> )	121
Eastern Cave Bat ( <i>Vespadelus troughtoni</i> )	230
Source: Modified after ELA (2019) – Table 31	

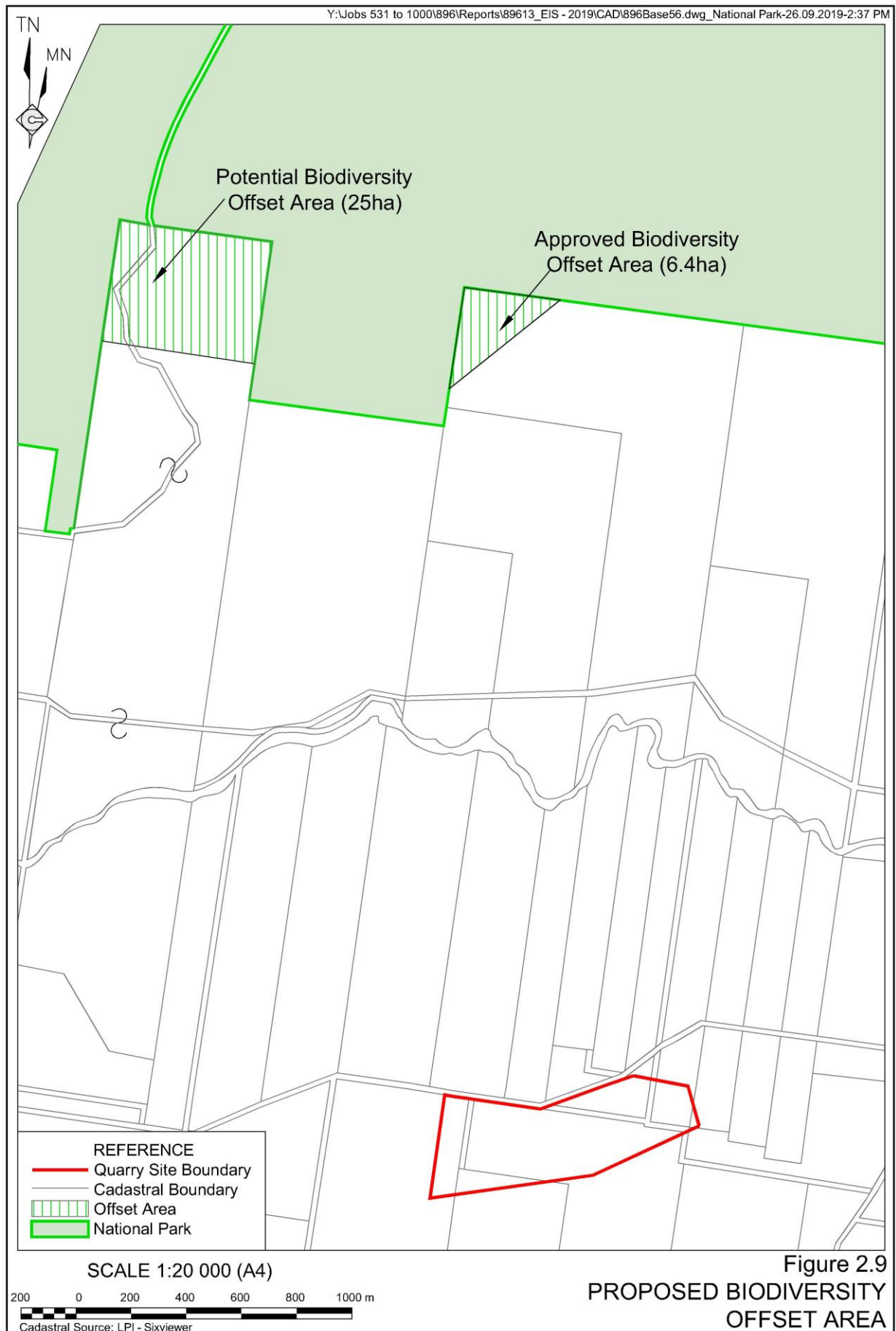
## 2.15.5 Securing Biodiversity Credits

The Applicant has previously committed to securing a 6.4ha offset area to the north of the Quarry Site under existing operations that are subject to DA 2014.078/1. It is proposed that in addition to this, an area of approximately 25ha would be considered as an offset area for the ongoing operations. The indicative offset areas are presented in **Figure 2.9**. This land is adjacent to Bald Rock National Park and, subject to the agreement of National Parks and Wildlife Service (NPWS), would be dedicated to the National Park. The Applicant would continue to manage the land in accordance with a Biodiversity and Rehabilitation Management Plan over the life of the Quarry, after which time the land would be managed by NPWS.

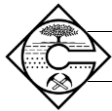


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A preliminary assessment of the land that would be subject to offset indicates that it is of a suitable vegetation community type (like-for-like), condition and size to satisfy the ecosystem credit obligations of the Proposal. The presence/absence of threatened species in the offset areas is yet to be confirmed.

It is proposed that the necessary assessments would be undertaken, and the offset area secured under agreement with NPWS within 24 months of the date of consent for the Proposal.

Should the proposed offset area not be suitable or sufficient to satisfy all offsetting obligations of the Proposal, the Applicant would seek to satisfy the offsetting obligations of the Proposal using one or more of the following options

- Securing an offset area on alternative land.
- Purchasing the necessary credits from the market.
- Payment into the Biodiversity Conservation Fund.

As the Proposal does not include any species credits for species that require referral to the Commonwealth Department of the Environment and Energy, payments into the Biodiversity Conservation Fund are permissible. Initial assessment of the cost associated with payment to the Biodiversity Conservation Fund using the Biodiversity Offset Payment Calculator<sup>4</sup> indicates that a payment of \$1.4 million would be required to offset all obligations of the Proposal using this option.

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<sup>4</sup> <https://www.lmbc.nsw.gov.au/offsetpaycalc>