# Section 2

# Description of the Proposal

## PREAMBLE

*This section describes the continued operations (and extension) 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 activities to be undertaken within the Project Site;*
- *the proposed ongoing transportation regime for the delivery of fragmented quartzose rock and fines from the Quarry to the New England Highway and destinations beyond, particularly to the Sunnyside Crushing and Screening Plant;*
- *a description of the emplacement of the clay fines returned from the Sunnyside Crushing and Screening Plant;*
- *the temporary storage of crusher fines generated at the Sunnyside Crushing and Screening Plant;*
- *a description of infrastructure, utilities and services that will be located within the Project 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 Project 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. It is noted that the boundaries and dimensions of the various components described throughout this section are indicative only.*

*Cont'd…*

*It is proposed that existing activities would continue to be undertaken in the same manner under the Proposal. As such, this section provides a detailed description of those activities previously summarised in Section 1.6, and adjusted to incorporate the activities within the proposed extended extraction area, overburden emplacement and continued emplacement of clay fines. Details of the safeguards and management measures that the Applicant proposes to implement to minimise or negate the potential impacts on components of the surrounding environment are provided in Section 4 of this document.*

# 2.1 OBJECTIVES OF THE PROPOSAL

The Applicant's principal objective is to obtain development consent to enable the planned ongoing operations at the quarry to proceed in accordance with the provisions of the EP&A Act. All relevant approvals/licences would allow the Applicant to continue to extract the recoverable quartzose rock, that being, 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 markets in NSW and QLD.
- 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; and

iii) monitoring and reviewing the operational and environmental performance of all activities.

# 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:

i) the ongoing extraction of quartzose rock within the existing extraction area and a 1.4ha extension of the extraction area, producing up to 100 000tpa;

ii) transportation of extracted rock to the State road network, i.e. the New England Highway for delivery principally to the Sunnyside Crushing and Screening Plant, 10km northwest of Tenterfield (see **Figure 1.1**);

iii) backloading of clay fines and crusher fines from the Sunnyside Plant to Dowe's Quarry;

iv) progressive emplacement of overburden and returned clay fines within and adjacent to the extraction area;

v) storage of surplus crusher fines from the Sunnyside Plant awaiting sale and despatch; and

vi) transportation of clay fines and crusher fines to customers in the New England region.

### 2.2.2 Need for the Proposal

The need for the Proposal has already been demonstrated by the Applicant through the markets established for the ivory-coloured products produced form the quartzose rock extracted from Dowe's Quarry. The ongoing operation (and extension) of Dowe's Quarry would enable the Applicant to continue to service the needs of its customers and their customers.

## 2.3 PROJECT SITE LAYOUT

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

The main components and the respective approximate area of disturbance within the Project Site are as follows.

- Area of existing disturbance including sediment dams (3.9ha)
- Area of proposed extension to extraction area (1.4ha)
- Area of additional internal roads (0.1ha)
- Additional area for clay fines storage (1.6ha)
- Area of remnant vegetation remaining within the Project Site (6.5ha)

The total area of the Project Site would be approximately 13.5ha of which the total disturbance area would be 7ha. Approximately 2.1ha of the 3.1ha yet to be disturbed by quarry-related activities contains remnant native vegetation.

**Figure 2.2** displays sections through the existing and proposed extraction area and overburden/fines emplacement.

## 2.4 RESOURCES AND PRODUCTS

### 2.4.1 Geology and Resources

The resource being quarried has been identified as an extremely wide (25m to 50m) quartzose intrusion located within undifferentiated granite or granodiorites. The intrusion typically dips at approximately 75º to the south which provide for more overburden materials to be retained within the southern side of the extraction area. The rocks within and surrounding the Project Site are Lower to Middle Permian in age (approximately 290 million years old).

The Applicant conservatively estimates approximately 1.3 million tonnes of quartzose rock could be recovered from within the existing and proposed extraction area.

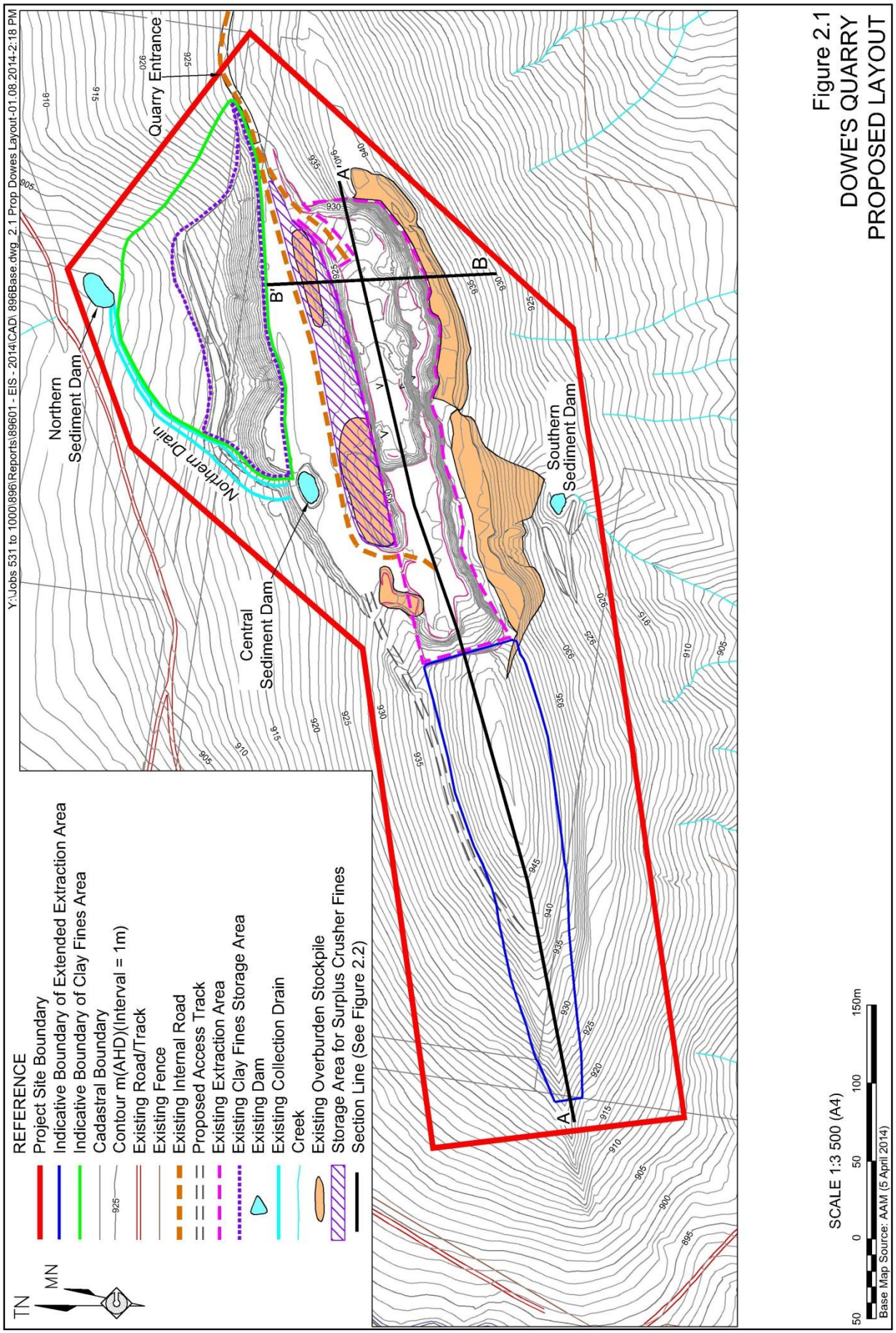
Figure 2.1
DOWE'S QUARRY
PROPOSED LAYOUT
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Quarry Entrance
Northern Sediment Dam
Northern Drain
Central Sediment Dam
Southern Sediment Dam
A
A'
B
B'
REFERENCE
Project Site Boundary
Indicative Boundary of Extended Extraction Area
Indicative Boundary of Clay Fines Area
Cadastral Boundary
Contour m(AHD)(Interval = 1m)
Existing Road/Track
Existing Fence
Existing Internal Road
Proposed Access Track
Existing Extraction Area
Existing Clay Fines Storage Area
Existing Dam
Existing Collection Drain
Creek
Existing Overburden Stockpile
Storage Area for Surplus Crusher Fines
Section Line (See Figure 2.2)
TN
MN
SCALE 1:3 500 (A4)
0
50
100
150m
Base Map Source: AAM (5 April 2014)

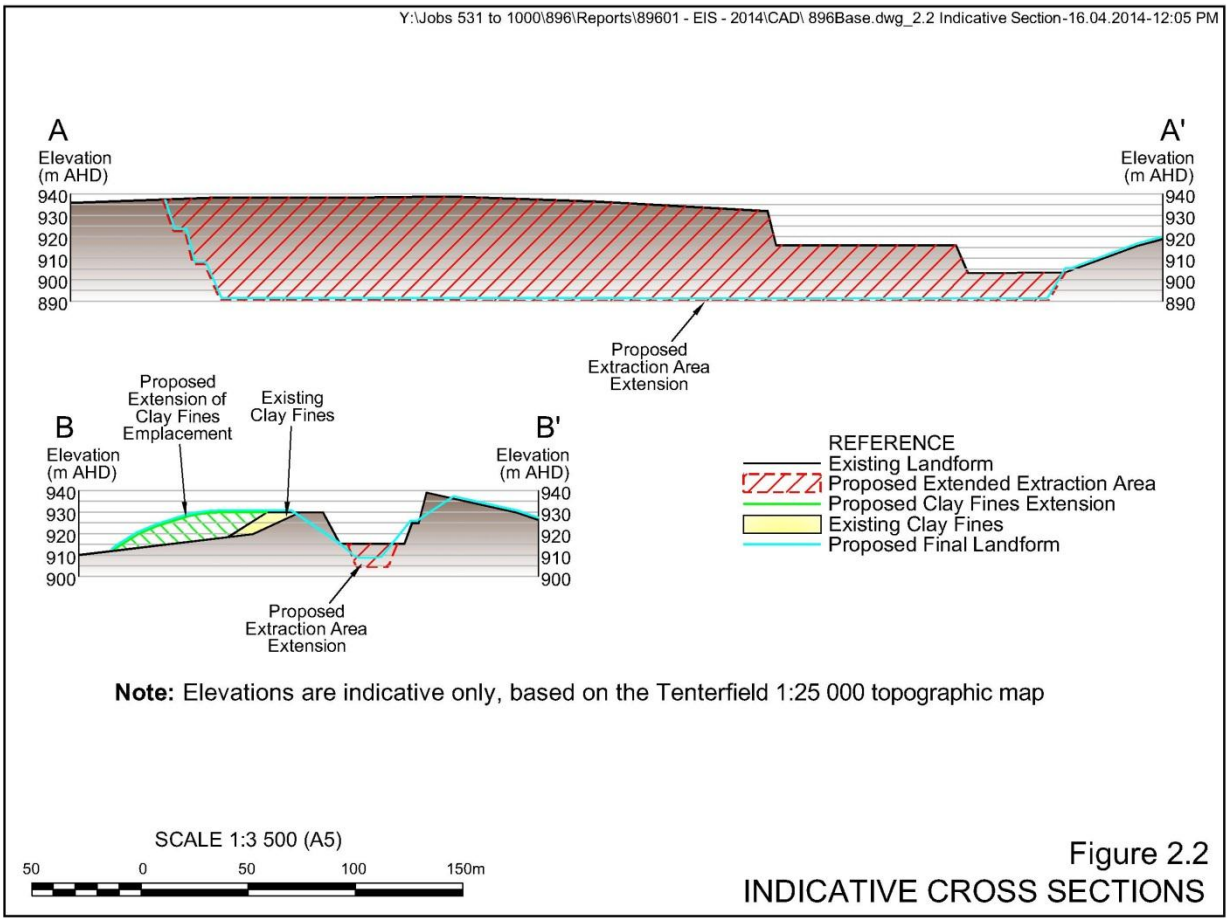



Figure 2.2
INDICATIVE CROSS SECTIONS

### 2.4.2 Products

The main 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.

## 2.5 EXTRACTION OPERATIONS

### 2.5.1 Introduction

The ongoing extraction operations would be undertaken in a similar manner to existing operations i.e. using conventional drill and blast methods. This would involve a sequence of activities commencing with vegetation clearing and soil removal (where practical), and where necessary stockpiling this for future rehabilitation, followed by overburden removal (where present) and finally extraction of the quartzose rock.

This subsection presents information relating to the proposed extraction operations including vegetation clearing, soil removal, overburden removal, extraction methods and the equipment used.

### 2.5.2 Design Features

The indicative extraction footprint for the Proposal i.e. both the existing and proposed extraction areas is presented on **Figure 2.1**. A cross-section through the existing and proposed extraction areas is presented on **Figure 2.2**. The proposed extraction area encompasses the existing extraction area which extends approximately 300m to the west. Extraction is proposed to a depth of approximately 890m AHD which is approximately 25m lower than the floor of the existing extraction area.

Although subject to modifications based on localised geological conditions or the optimal locations of quarry ramps or sumps, the following general design criteria of the existing and extended extraction areas would be adopted.

- Operational Face Height: 15m – Upper and Middle Benches.
  10m – Lower Bench.
- Operational Bench Width: 20m to 100m (longitudinal i.e. east-west).
- Terminal Bench Width: 3m to 5m (approximate).
- Face Angle: 70° to 75º (approximate).

The extended extraction area would ultimately be developed with three benches for much of its length. The proposed maximum 70° to 75º face angle would be subject to further geotechnical investigation throughout the life of the quarry to ensure a safe and stable extraction area is achieved.

Access to the operational sections of the extraction area, and for trucks to access the blasted rock piles, would be provided by a series of internal roads or tracks entering the extraction area from its northern side. Up to three entry points would be used from the northern side of the extraction area together with the existing entrance on the eastern end of the extraction area. **Figure 2.1** displays the alignment of a proposed track on the northern side of the proposed extraction area extension planned to provide access to the western section of the extraction area.

### 2.5.3 Extraction Method

#### 2.5.3.1 Vegetation Clearing

Vegetation would continue to be cleared progressively within the defined extended extraction area using the 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 4.7.6). Following the removal of the mature trees, selected timber may be made available for use by the landowner or sale for the purposes of fencing materials or firewood. The remainder would be stockpiled for rehabilitation activities or mulched for placement on terminal benches.

#### 2.5.3.2 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 October to March given the higher expected rainfall levels during that period (see Section 4.3). 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.

#### 2.5.3.3 Quartzose Rock Extraction

Drilling and blasting would continue to be used to extract the quartzose rock along the exposed intrusion. Blasts would typically fragment approximately 5 000 to 10 000 tonnes per blast. The drilling of blast holes would typically be undertaken on a 3m x 3m pattern using 89mm drill holes with up to 1m of sub drill. The drilling would typically occur on approximately 1 day per month.

Fragmented rock would be loaded into highway trucks for transportation off site (see Section 2.8).

### 2.5.4 Extraction Equipment

Operations within Dowe's Quarry currently require the use of the following equipment.

- 1 x Hydraulic Drill Rig (Atlas Copco T35) – used typically one day per month for drilling blast holes.
- 1 x Excavator (Komatsu PC300) – permanently on site and used for loading trucks.
- 1 x Haul Truck ($15m^3$) – used periodically on site for transfer of soil and overburden.
- 1 x Excavator (Komatsu PC300) – used periodically (10 to 15 days per year) on site for clearing vegetation, soil removal, excavation of overburden and secondary breakage of oversize blasted rock.

The Applicant intends to continue to use this equipment fleet throughout the remaining life of the Proposal with similar replacements, as required.

### 2.5.5 Annual Production Rate

Production of quartzose rock would not exceed 100 000tpa with the annual average production level expected to be approximately 60 000tpa.

The maximum production level would generate approximately 35 000tpa of by-product clay fines and crusher fines which would be emplaced or stored within the Project Site in the event that customer(s) can't be identified for these products. For the average production level, approximately 21 000tpa of by-products would be generated for emplacement or storage within the Project Site.

## 2.6 OVERBURDEN EMPLACEMENT

The thickness and quantity of overburden above the defined quartzose rock is variable. The overburden is invariably thicker on the southern side of the extraction area given the steep dip of the quartzose material to the south. For the purposes of planning, it is estimated that approximately 4 000$m^3$ of overburden is present per 100m of length within the extraction area, i.e. throughout the remaining quarry life approximately 12 000$m^3$ of overburden would need to be managed. The overburden remaining within the southern wall of the extraction area (adjacent to the upper bench) would be separately managed during the rehabilitation of the extraction area (see Section 2.13.2).

**Figure 2.1** displays the location of the existing overburden emplacement on the southern side of the extraction area. This emplacement will be finalised within the next 3 to 5 years of operations after which all overburden would be used in the rehabilitation of the clay fines emplacement (see Section 2.13.3). The existing overburden emplacement covers approximately 1.6ha and has been constructed with external slopes of between 1:3 (V:H) and 1:1.5 (V:H). Once all overburden has been emplaced in the area defined in **Figure 2.1**, the previously stripped and stockpiled topsoil would be spread over the surface of the final emplacement and stabilised.

## 2.7 ANCILLARY ACTIVITIES

### 2.7.1 Processing Operations

No processing is undertaken nor proposed within the Project Site. All quartzose rock extracted from Dowe's Quarry would continue to be transported to the New England Highway and then principally to the Sunnyside Crushing and Screening Plant or other destinations. The transportation of raw materials from the Project Site is discussed further in Section 2.8.

### 2.7.2 Emplacement of Back-Loaded Fines

Approximately 65% of the quartzose rock processed generates saleable products whilst the remaining 35% are effectively by-products suited for a range of other uses. The two by-products produced are clay fines and crusher fines, the latter being the more saleable product. 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 clay fines have been back-loaded from the Sunnyside Plant to Dowe's Quarry. The Applicant proposes to continue to backload all clay fines and a proportion of the crusher fines to Dowe's Quarry following the receipt of development consent.

The Applicant proposes to continue to emplace the clay fines in the emplacement on the northeastern side of the Project Site in the manner displayed on **Figure 2.3**. The materials will be unloaded over the active edge of the emplacement commencing at the eastern end (Stage 1). The final landform, as presented in Section 2.13, would be constructed progressively such that the outer face of the emplacement is finalised and revegetated. The emplacement would be constructed and progressively rehabilitated from Stage 1 to Stage 5 (**Figure 2.3**)

The Applicant also proposes to return the bulk of the crusher fines to Dowe's Quarry where they would be stored either on the area immediately north of the extraction area (see **Figure 2.1**) and then within the final extraction void as it is created. The crusher fines within the extraction void would be placed above the less-saleable clay fines to allow the future recovery of these materials as further markets are developed for these by-products.

## 2.8 RAW MATERIAL TRANSPORTATION

### 2.8.1 Introduction

The transportation of unprocessed quartzose rock would be undertaken in a manner consistent with current practices. All trucks would continue to access the Project Site from the intersection with the Mount Lindesay Road. The Proposal would continue to require the use of two to three road registered vehicles, currently a semi-trailer and two truck-and-dog units. Consistent with current operations, truck drivers would be responsible for loading their own vehicle within the active extraction area before exiting via the quarry access road and turning right onto the Mount Lindesay Road.

### 2.8.2 Transport Route

Laden trucks transporting the quartzose rock from Dowe's Quarry would continue to travel along the 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 onto the New England Highway. The bulk of the trucks would then travel northwards for approximately 8.3km to the Sunnyside Plant. This route is displayed on **Figure 2.4**. Occasionally, some trucks may turn left to other destinations.

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 2.4**.

The routes taken for the laden and un-laden/back-loading trucks between Dowe's Quarry and the Sunnyside Crushing and Screening Plant have been in use for in excess of 25 years with typically two or three trucks undertaking approximately six to seven return trips daily. Whilst it would be the Applicant's preference to avoid travelling through the edge of the built up area in Tenterfield, it is necessary to follow this route as there is insufficient visibility for trucks to safely turn right or northwards from Old Ballandean Road onto the New England Highway.

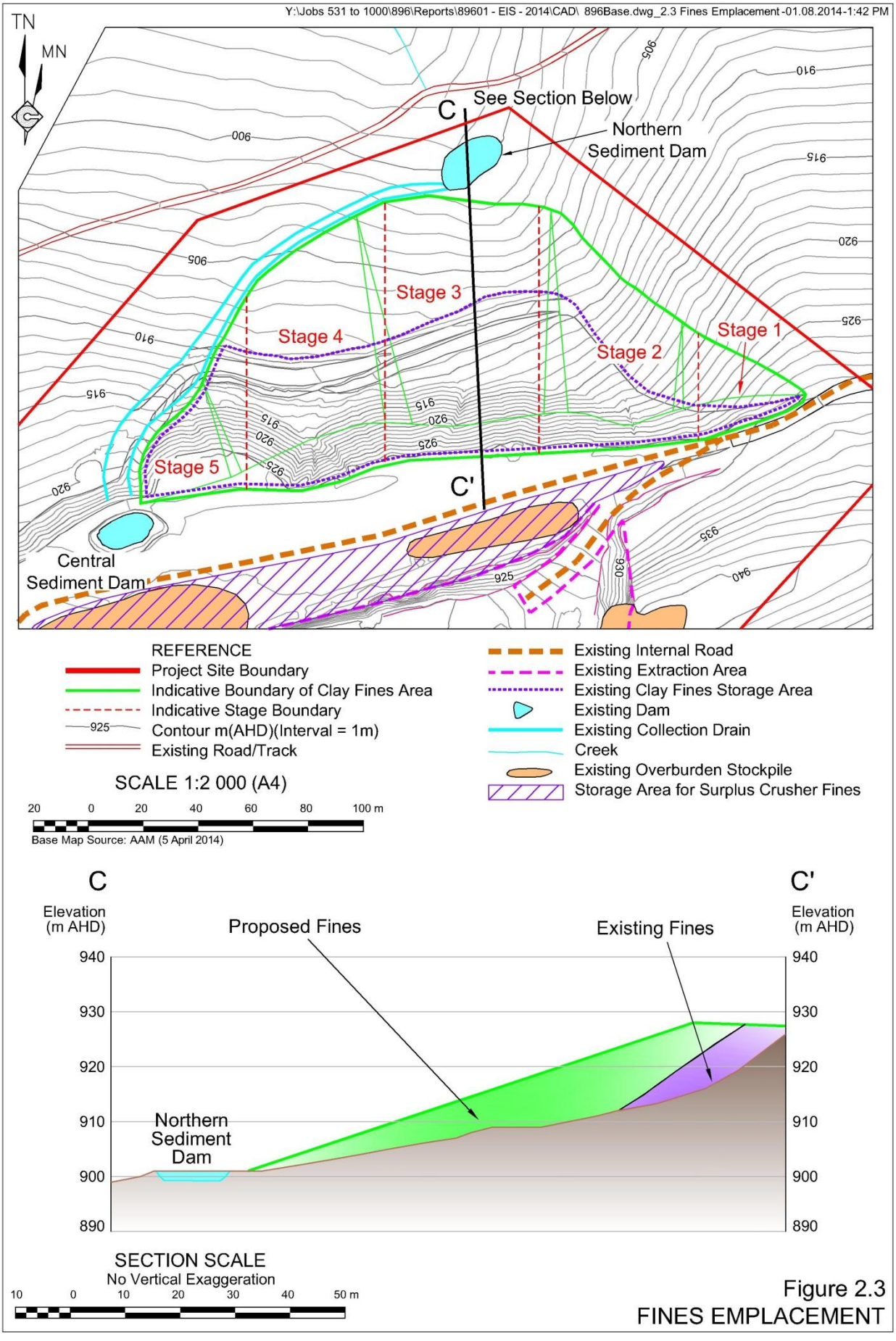



Figure 2.3
FINES EMPLACEMENT

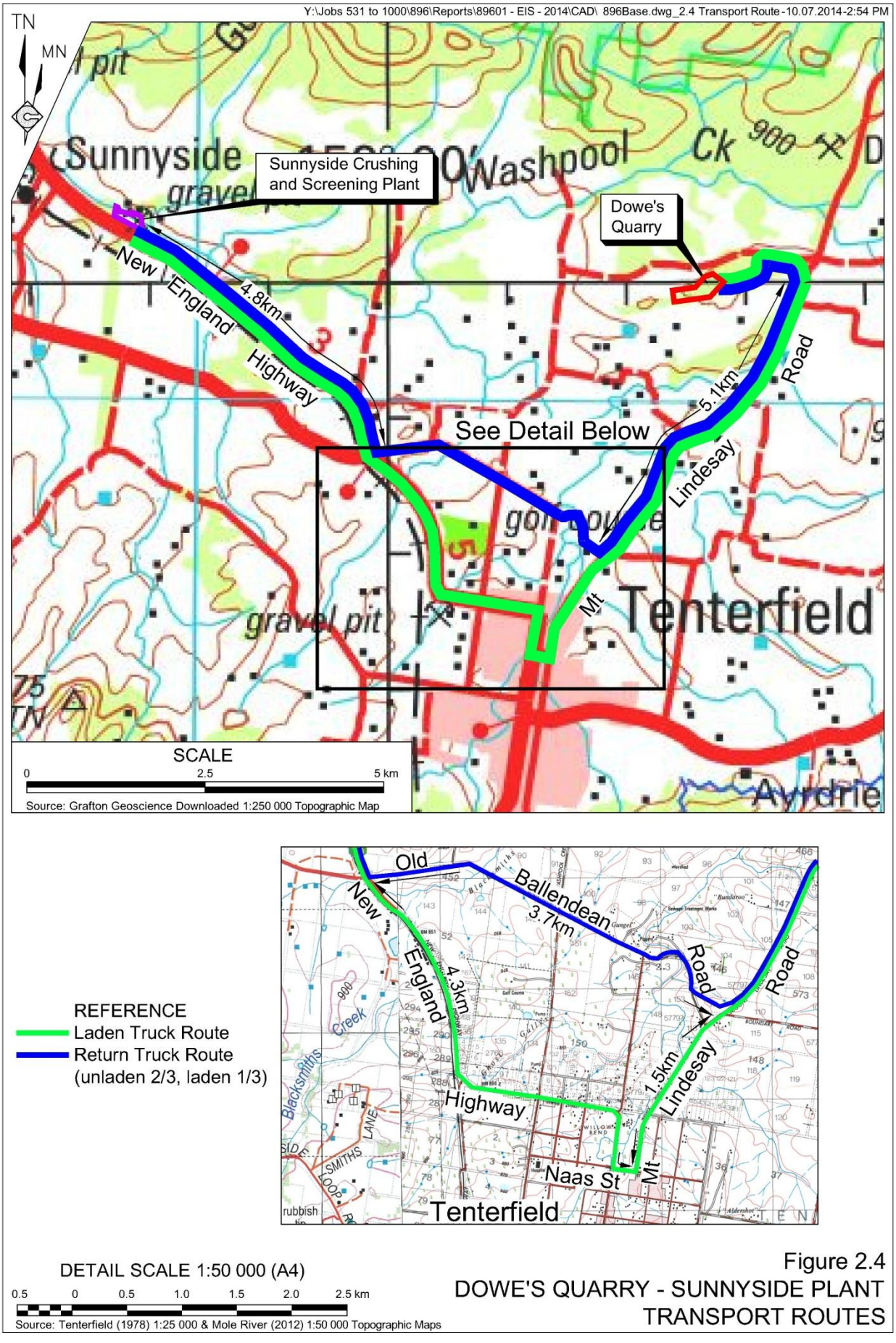



Figure 2.4
DOWE'S QUARRY - SUNNYSIDE PLANT
TRANSPORT ROUTES

It is noted that NSW Roads and Maritime Services (RMS) is in the process of planning a heavy vehicle bypass of Tenterfield for the New England Highway (RMS, 2013). RMS is currently in the process of assessing the preferred routes for the bypass. Several options for the bypass route would intersect with the Mount Lindesay Road and could potentially provide an alternate transportation route between Dowe's Quarry and the Sunnyside Crushing and Screening Plant. A decision on the preferred route for the bypass is expected in mid-2014.

On occasions when a customer requires delivery of clay fines or crusher fines that have been stored at Dowe's Quarry, transport of these products 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.

### 2.8.3 Traffic Levels

When operating at the average annual production level (60 000tpa), an average of ten truck loads of quartzose material are transported daily to the Sunnyside Crushing and Screening Plant. This quantity of rock invariably involves the use of two trucks, typically about four days per week. The number of loads transported daily between Dowe's Quarry and the Sunnyside Crushing and Screening Plant typically varies from 0 to 20 generating up to 40 truck movements per day. The higher level of loads invariably occur during periods of high demand for the ivory products or following prolonged periods of wet weather when few or no truck movements occur. The Applicant anticipates that the maximum daily number of loads transported from Dowe's Quarry when operating at the maximum production level of 100 000tpa would be comparable to the existing daily maximum number of loads, i.e. 20 loads generating 40 movements per day. In reality, transportation of quartzose rock would occur more consistently throughout the year i.e. up to five days per week with up to three trucks operating daily.

## 2.9 WASTE MANAGEMENT

### 2.9.1 Introduction

The EARs identify "*waste management*" as a key issue for assessment in the EIS including the importation of any waste material to the Project Site. The EPA also request that all potential waste streams are identified and management arrangements described. The EARs 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.

### 2.9.2 Production Wastes

#### Overburden

As noted in Section 2.6 approximately 4 000m$^3$ of overburden would need to be managed throughout the life of the Proposal. Applying a swell factor of 1.3, this equates to 5 200m$^3$ requiring stockpiling within the proposed overburden emplacement areas. It is proposed that the overburden would eventually be utilised in the rehabilitation of the extraction area and the clay and crusher fines stockpile area.

#### Process By-Products

Processing activities carried out at the Sunnyside Crushing and Screening Plant produces clay fines and crusher fines as by-products of the preparation of saleable products. These are proposed to be back-loaded and stored at the Project Site (see Section 2.7.2). The clay fines are proposed to be stored permanently on site and eventually included in rehabilitation of the extraction areas while the crusher fines would be managed such that they would be accessible should a market become available for them.

### 2.9.3 Non-Production Wastes

Non-production wastes generated through the proposed operational activities would be negligible, with any wastes removed to the Sunnyside Crushing and Screening 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 Crushing and Screening Plant, and all waste oils removed at this time and disposed of appropriately.

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

## 2.10 INFRASTRUCTURE, UTILITIES AND SERVICES

There are currently no infrastructure, utilities or services located at the Project Site. No amenities are regularly kept on site. As required, a portaloo 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 Crushing and Screening Plant, as required.

The Applicant does not maintain any fuel storage within the quarry. Rather, fuel for the equipment used on site is brought to the quarry, as required.

## 2.11 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 from Dowe's Quarry to the Sunnyside Crushing and Screening Plant. Each truck driver loads their own truck within the quarry.

## 2.12 HOURS OF OPERATION AND PROJECT LIFE

Extraction and related activities would occur between the following hours.

- Monday to Saturday – 7:00am to 5:00pm.
- No work is proposed on Sundays or public holidays.

Blasting typically occurs between 10:00am and 3:00pm, Monday to Saturday.

All transportation of quartzose material to the Sunnyside Crushing and Screening Plant would continue to be undertaken Monday to Friday as required, public holidays excluded.

Maintenance activities would continue to be undertaken during the above operational hours, however, for the purposes of the application for development consent, approval is sought to undertake maintenance within 24 hours per day/7 days per week to ensure all plant and equipment is maintained in a proper and efficient manner. All maintenance-related noise generated beyond the above hours of operation would not be audible at any surrounding non project-related residence outside the hours of operation nominated above.

Based upon the average production rate of approximately 60 000tpa and the estimated resource of approximately 1.3 million tonnes (Section 2.4.1), it is anticipated that the quarry would operate for at least 25 years. Given the 1.3 million tonnes of quartzose rock is considered conservative, it is therefore proposed to seek development consent for 30 years.

## 2.13 REHABILITATION

### 2.13.1 Introduction

The Applicant's objectives for rehabilitation are centred on creating a final landform that is stable and suitable for biodiversity conservation and a stock shelter for the landowner's use during periods of inclement weather. The specific objectives for the long term rehabilitation program are to:

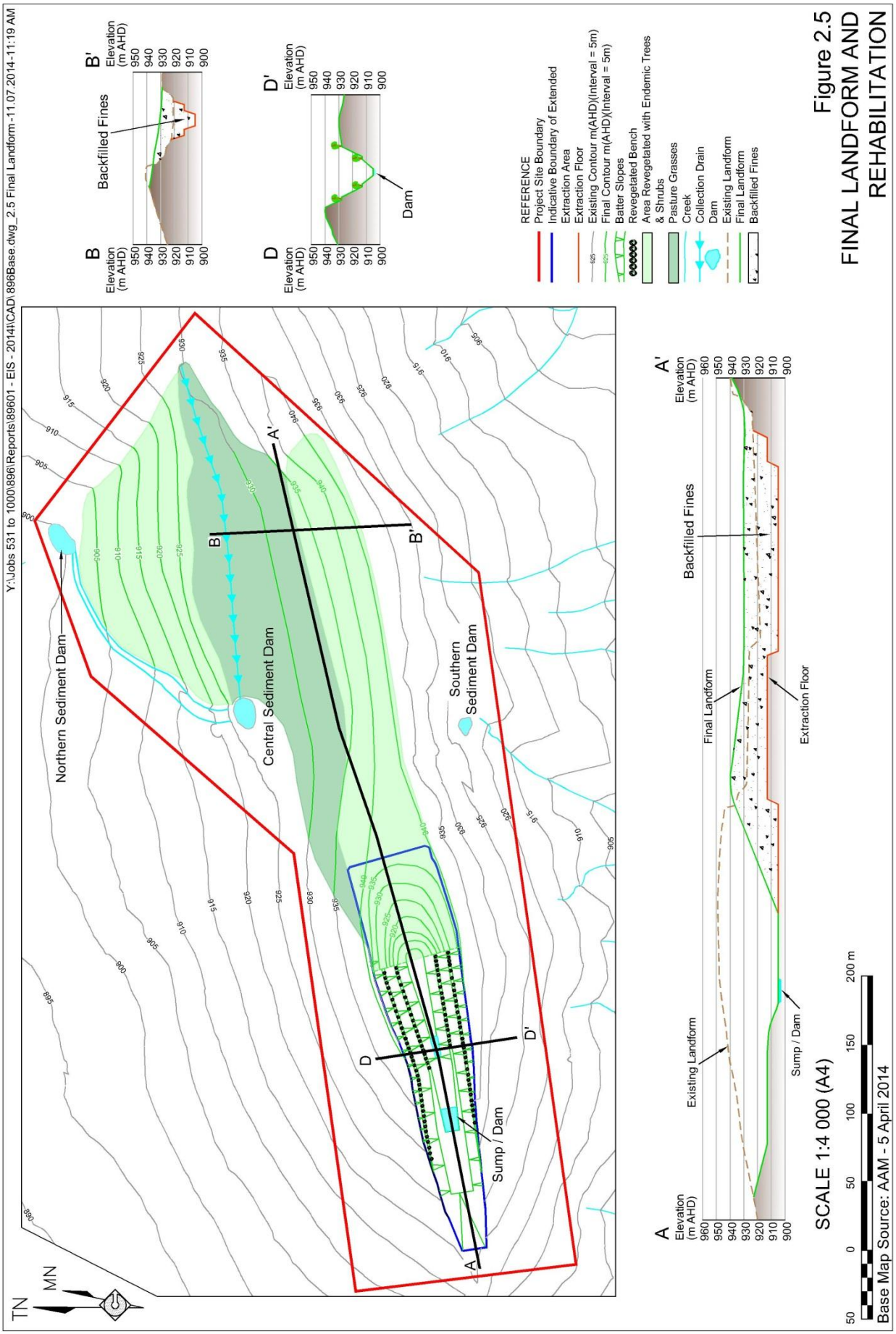
- provide a low maintenance, geotechnically stable and safe landform with minimal erosion; and
- blend the created landforms and vegetation established with that of the surrounding topography, as much as practicable.

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

**Figure 2.5** displays the indicative final landform for Dowe's Quarry with typical sections on the eastern and western ends of the extraction area.

### 2.13.2 Extraction Area

The Applicant proposes to backfill the eastern section of the extraction area with clay fines to approximately 925m AHD.


Y:\Jobs 531 to 1000\896\Reports\89601 - EIS - 2014\\CAD\ 896Base.dwg_2.5 Final Landform -11.07.2014-11:19 AM
Figure 2.5
FINAL LANDFORM AND REHABILITATION
REFERENCE
Project Site Boundary
Indicative Boundary of Extended Extraction Area
Extraction Floor
Existing Contour m(AHD)(Interval = 5m)
Final Contour m(AHD)(Interval = 5m)
Batter Slopes
Revegetated Bench
Area Revegetated with Endemic Trees & Shrubs
Pasture Grasses
Creek
Collection Drain
Dam
Existing Landform
Final Landform
Backfilled Fines
Northern Sediment Dam
Central Sediment Dam
Southern Sediment Dam
Sump / Dam
Backfilled Fines
Final Landform
Extraction Floor
Existing Landform
Sump / Dam
Elevation (m AHD)
SCALE 1:4 000 (A4)
Base Map Source: AAM - 5 April 2014
TN
MN

It is then proposed to push the weathered overburden materials over the final slopes or benches to create lower slopes within the completed extraction area – as displayed in **Figure 2.5**. The two lower terminal faces within the western section of the extraction area would be retained at approximately 75° but would be partly covered with material pushed from above the upper bench or retained on the benches towards the end of extraction. Locally endemic trees and shrubs would be established on these benches.

A layer of clay fines would be placed within the sump on the final floor to create a water holding substrate, with any available soil spread over the weathered material to create a growth medium for vegetation. A seed mix of locally endemic native grasses would be sown and selected locally endemic trees and shrubs established. The trees and shrubs would be grown either from direct seeding or tubestock grown from seed collected within or near the Project Site.

### 2.13.3 Clay Fines and Overburden Emplacements

The outer batters of the clay fines emplacement would be progressively profiled to create slopes of approximately 1:3(V:H) (~18°) with the surface ripped approximately parallel to contour levels to allow for the keying of the overburden spread over the final slopes. 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.

It is intended that the Project Site would be retained principally for biodiversity conservation with selected areas suitable as stock shelters. 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.

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