Section 2

Description of the Proposal

PREAMBLE

This section describes the entire project incorporating the re-design of the existing quarry operations and describes the proposed modifications required to increase production of hard rock products from 200 000tpa to a maximum of 500 000tpa (average of 250 000tpa to 350 000tpa) and the placement and operation of a mobile asphalt plant and concrete batching plant within the Quarry Site.

The proposed production increase involves only minor changes to the existing operation, most notably the increase in extraction and processing rates which are all internal to the existing extraction area and increased truck movements to and from the Quarry.

The Project has been designed to ensure that all the elements of the hard rock extraction, processing and despatch, the placement and operation of a mobile asphalt plant and concrete batching plant avoid, minimise or mitigate all potential adverse impacts upon the surrounding residents, land uses and environment. Details of the Applicant's plans to manage surface water, air quality, noise, traffic and ecology are presented in Section 5 of this document.

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2.1 INTRODUCTION

2.1.1 Objectives

The principal objectives of the Applicant in proposing the increase in hard rock production and the placement and operation of a mobile asphalt plant and a concrete batching plant centre upon the following.

- To ensure the efficient and economically viable extraction and processing of hard rock products satisfies the increasing demand for a range of high quality products for road construction and maintenance, construction and pre-mixed concrete industries in the Yass district and the southern New South Wales and ACT region.
- To undertake the activities associated with hard rock extraction, processing, blending, transportation and rehabilitation operations in a manner that avoids or minimises the impact(s) of these activities upon the environment within and surrounding the Quarry Site.
- To operate the mobile plants efficiently ensuring that the blending and transportation of pre-mixed concrete and asphalt is undertaken with minimal impact, if any, to the surrounding environment and community.
- To undertake progressive rehabilitation of exhausted resource areas in line with the approved rehabilitation plan of disturbed areas to create a final landform which is of value to the ongoing grazing activities.
- To continue as a responsible corporate citizen supporting Yass and district community.

2.1.2 Overview of the Proposal

Under the existing Development Consent (DA 96/067B), the maximum approved production at the Quarry is currently limited to 200 000tpa. Due to expanding market opportunities, the Applicant is seeking to increase the maximum approved sales to 500 000tpa, and introduce campaign asphalt manufacture and concrete batching activities. In reality, the Applicant anticipates the average sales would vary from approximately 250 000tpa to 350 000tpa over the remaining life of the Quarry.

Increased production levels would be achieved by incorporating the following modifications and improvements to quarry operations.

- Ongoing implementation of the current quarry plans involving extraction from two to three active benches, reducing reliance on stockpiles of different quality raw feed and double handling.
- The more efficient use and progressive refurbishment of the existing crushing and screening plant and equipment.
- Increased transportation of quarry products through the engagement of additional Company-employed and sub-contracted product truck drivers.
- Adjustments to the hours of operation to better service the Applicant's customers.

It is noted that the modified Bogo Quarry operations would effectively retain a similar physical extraction limit as is currently approved under DA 96/067B. There would be a minor alteration to the alignment of the outer limit of the extraction area to better approximate the natural topography of the hill and the total area of extraction would remain similar (the realignment of the extraction area boundary would extend the limit slightly in some areas and reduce it in others).

The Applicant also proposes to import, place and operate a mobile asphalt plant and concrete batching plant on a campaign basis in conjunction with local / regional infrastructure / construction projects. When not required, the plant would either be stored/remain on the Quarry Site or transported off site for use elsewhere.

Figure 2.1 displays the proposed layout of the Quarry Site.

The principal components within the Quarry Site for the ongoing operation of the Bogo Quarry comprise the following.

- Quarry entrance[1].
- Internal road network.
- Extraction area.
- Processing plant[1].
- Pre-coat plant[1].
- Stockpiling areas[1].
- Office / weighbridge[1].
- Workshop & fuel store[1].
- Southern bund.
- Various water supply and sediment dams.
- Mobile asphalt plant pad[1].
- Mobile concrete batching plant pad.

2.1.3 Approvals Required

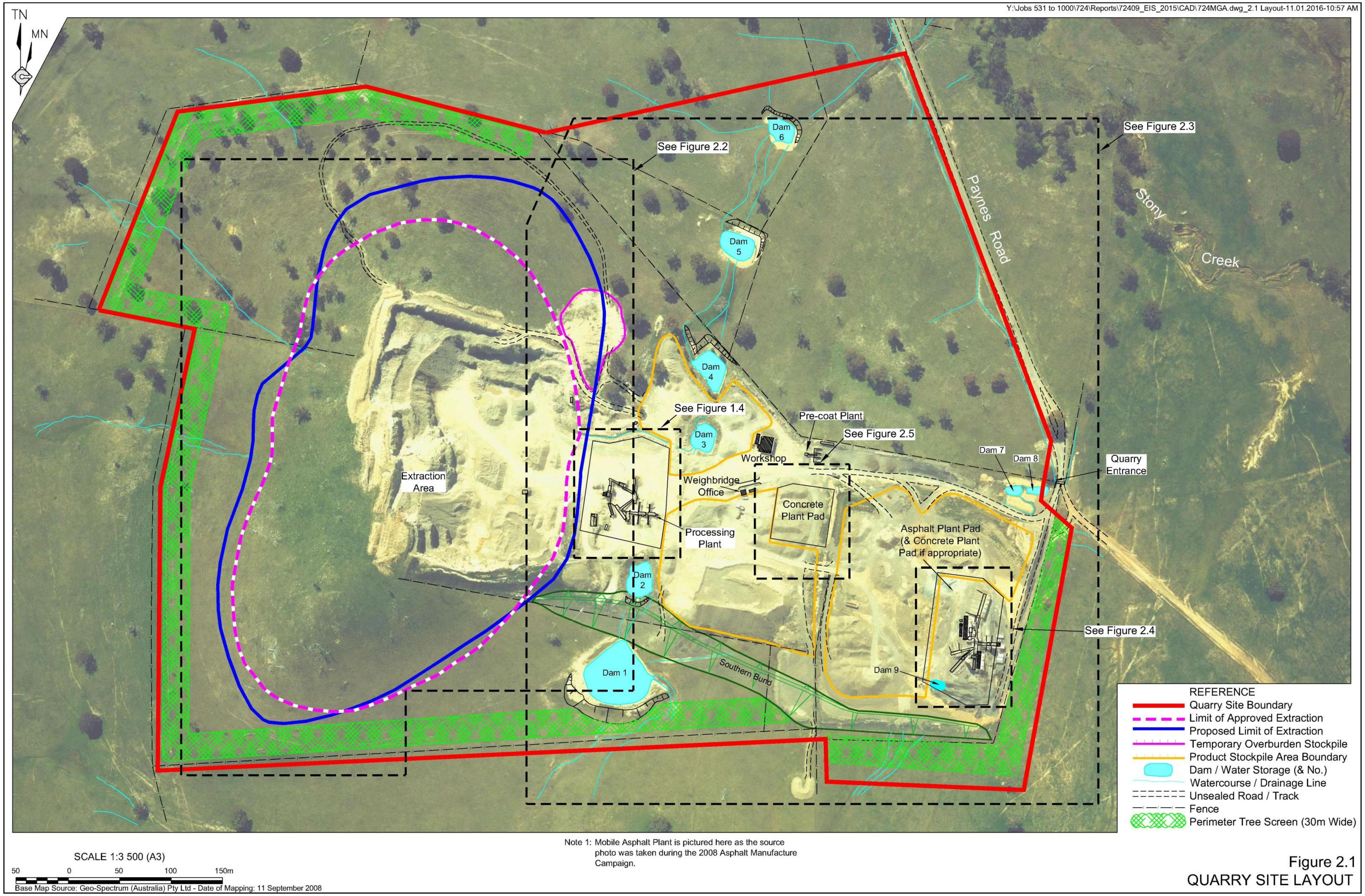
In order to increase production of hard rock products at the Bogo Quarry, the Applicant will require a new development consent issued by the Southern Joint Regional Planning Panel under Part 4 of the *Environmental Planning and Assessment Act 1979.*

The existing Environment Protection Licence (No. 4219) will require modification principally to record the proposed upper production level of 500 000tpa lies, i.e. the upper limit of the existing approved annual production range of 500 000tpa.

The Applicant will not require EPL 4219 to cover the proposed asphalt plant as the plant used would have a current Environment Protection Licence given its mobile status.

The use of mobile concrete batching plant on site will not require coverage in EPL 4219.

[1] Existing feature of the Bogo Quarry that would remain largely unchanged as a result of the Proposal.



Note 1: Mobile Asphalt Plant is pictured here as the source photo was taken during the 2008 Asphalt Manufacture Campaign.

Figure 2.1
QUARRY SITE LAYOUT

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2.2 PROPOSED EXTRACTION OPERATIONS

2.2.1 Introduction

The extraction area is operated with two main faces at three levels (i.e. the quarry floor and two benches at approximately 560m AHD and 575m AHD). Ultimately, a third bench / quarry floor would be created at 545m AHD. **Figure 2.2** illustrates the status of extraction operations, the proposed limit of extraction, estimates of extraction area progression after 5 and 15 years, and typical cross sections through the extraction area. The proposed limit of extraction is comparable to the current approved limit under Development Consent DA96/067B. The proposed limit of extraction was defined following the detailed geological assessment undertaken by Rangott Mineral Exploration (see **Appendix 3**).

2.2.2 Extraction Area Layout

The geological assessment undertaken by Rangott Mineral Exploration (2008) established the principal rock within the extraction area is volcanic ignimbrite. However, the rock is massive in some zones or domains and altered / weathered in others. Rangott Mineral Exploration (2008) recorded five rock domains comprising:

- massive hard ignimbrite in Domains 1, 3 and 5; and
- altered / weathered ignimbrite in Domains 2 and 4.

Each of these domains are displayed on **Figure 2.2.** The estimated rock resources in each domain (to an elevation of approximately 545 AHD) are listed in **Table 2.1**. A total of approximately 5 million tonnes of rock remains within the defined extraction area with approximately 60% being massive hard ignimbrite. The exact boundaries between the domains and quality variations would be established through periodic quality control drilling and testing programs.

Table 2.1
Indicative Resources within the Bogo Quarry Extraction Area

Domain	1	2	3	4	5	Total
Fresh Ignimbrite	1 800 000	-	730 000	-	500 000	3 030 000
Altered Ignimbrite	-	1 150 000	-	800 000	-	1 950 000
					Total	**4 980 000**
Source: Bogo Operations Pty Limited						

It is recognised that predominantly fresh ignimbrite is present below 545m AHD which could be extracted, with a further development consent.

2.2.3 Extraction and Blasting Practices

Extraction operations would involve the continuation of the existing conventional extraction methods employed at the Quarry. This involves the progressive removal by excavator of the topsoil and a thin veneer of subsoil/overburden prior to the extraction of the underlying hard rock resource. Topsoil would be stockpiled within the current disturbance footprint of the

Quarry Site and would eventually be respread over the final landform as part of Quarry Site rehabilitation activities. The topsoil would be stored in windrow structures, no greater than 2m in height and with slopes of no greater than 2:1 (H:V) (26.5º). Silt-stop fencing would be installed down-slope of these topsoil stockpiles and these would be regularly inspected and repaired as required (see Section 5.2.3.4.5). Subsoil and overburden would continue to be pushed downslope to form bunding between the edge of the advancing extraction face and the distant Hume Highway. This would create a visual screen of the advancing extraction area to traffic on the Hume Highway (in particular, eastbound traffic).

A proportion of the overburden excavated from the advancing quarry face would be used to progressively construct the southern bund (see **Figure 2.1**). This mound of overburden (and imported VENM) would be approximately 8m high at its highest point and would ultimately provide a visual screen of the extraction and processing operations from vantage points on the "Bogo Cottage" property. The southern bund would be vegetated using pasture grasses and would be retained in the final landform (see Section 2.13.4).

The extraction of the hard rock resource would continue to be undertaken using drill and blast methods. Blasts would occur in the order of 12 times per year with each blast yielding between approximately 20 000t and 60 000t, depending upon the location within the extraction area. Blast design, loading and firing would be undertaken by the Applicant's contractor or by a suitably qualified and experienced blasting engineer holding a shot-firer's certificate issued by the Division of Resources and Energy (within NSW Department of Industry). Each blast would be designed to provide an adequate level of rock fragmentation with compliance with airblast and ground vibration criteria.

As is the current practice, all blast holes would be drilled into the rock in a designated and pre-determined pattern, angle, spacing and depth and initiated in a sequence to reduce ground vibration. The holes would be partially filled with explosives, comprising a primer at the base of each hole, followed by a bulk explosive which makes up the remainder of the charge. Stemming, which comprises of 10mm (or similar) aggregate, is placed into the top 3m of each hole above the bulk explosive to minimise airblast. **Table 2.2** summarises the current blasting practice that would continue at the Bogo Quarry**.**

Table 2.2
Current Blasting Practice

Criteria	**Dimension**
Hole diameter	102mm
Hole angle	80º
Burden	2.5m
Spacing	11m x 3.8m
Bench Height	15m (typically)
Subdrill	1m (approximately)
No. of rows	3 to 5
Initiation	Non Electric
Bulk Explosive	ANFO
Primer	H or P - Primer
Source: Bogo Operations Pty Limited	

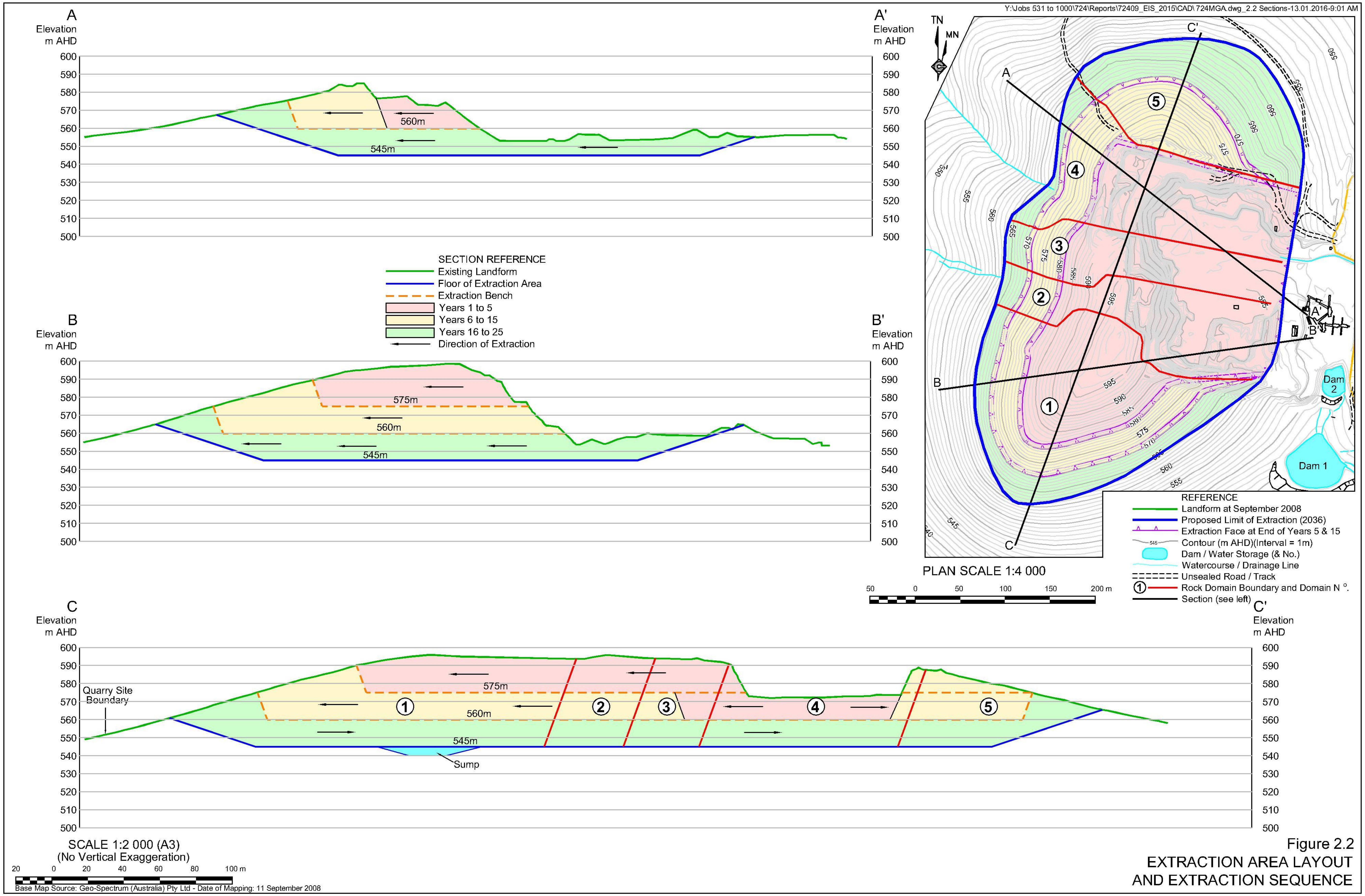


Figure 2.2
EXTRACTION AREA LAYOUT AND EXTRACTION SEQUENCE

The extraction area is sufficiently distant from surrounding residences and public roads such that fly rock is not an issue. The safeguards implemented to control air vibration (airblast overpressure) and ground vibration, noise and dust from blasting are presented in Sections 5.4.5 and 5.5.5.

Blasted rock on the quarry floor would continue to be pushed up into stockpiles by bulldozer before being transported by front-end loader to the processing plant(s). Blasted rock on the upper working benches would generally be pushed or thrown over the quarry face onto the quarry floor for stockpiling and transfer to the processing plants by earthmoving equipment.

2.2.4 Extraction Sequence

Figure 2.2 presents the proposed extraction sequence for the re-designed extraction area. This sequence of extraction provides for flexibility to produce the range of products required by the Applicant's customers. **Figure 2.2** identifies the proposed extent of extraction after 5 years, 15 years and at the end of the Proposal.

2.2.5 Extraction Equipment

The extraction and re-location of blasted raw material from the upper working benches to a lower bench or to the quarry floor would continue to be undertaken using an excavator or bulldozer. The blasted raw material is, and would continue to be, removed from the quarry floor by a front-end loader and transported in a haul truck to the processing plant. The increase in the rate of extraction would require the increased utilisation of the existing front-end loader. During periods of high demand, an additional front-end loader would assist in maintaining the processing throughput, stockpiling and loading of products.

Table 2.3 lists the major mobile and fixed plant and/or equipment that are used during on-site operations together with the estimated average usage during a short day (12 hours) or long day (17 hours). It is noted that not all equipment would be operating simultaneously. For some activities, e.g. blasted rock removal (from benches), either bulldozer or excavator would be used. Throughout the life of the Quarry, the subject equipment would be periodically replaced / upgraded with equipment of a similar size (and sound power level or better) to that listed in **Table 2.3**.

2.2.6 Production Rates

The rate of extraction would continue to be closely related to the sales for the various construction materials produced on site. In any one year, rock would be extracted to produce the range of aggregate and road pavement products required by customers.

Table 2.3
Fixed and Mobile Plant (Indicative Size and/or Model)

Equipment*	Function	Average Usage (hrs/day)		Fuel Consumption
		12hr day	17hr day	
Hydraulic Drill	Drilling blast holes	10	10	25 litres/hr
Bulldozer D7	Topsoil removal, general earthworks & moving blasted rock	2.4	3.4	56 litres/hr
Excavator (30t)	Overburden removal, loading or relocating blasted rock	2.4	3.4	25 litres/hr
Haul Truck (Cat 773 or Volvo A40)	Hauling blasted rock to plant	2.4	3.4	25 litres/hr
Cat 988B Front-end Loader	Loading raw feed into plant	7.2	10.2	50 litres/hr
Crushing & screening plant	Rock reduction and sizing	7.2	10.2	Genset 50 litres/hr
Hyundai HL770-7 Front-end Loader	Loading product trucks	10.2	14.45	20.25 litres/hr
Volvo BM L120 Front-end loader	Loading product trucks	10.2	14.45	20.25 litres/hr
Source: Bogo Operations Pty Limited				* Current size, brand and/or model

2.3 PROCESSING AND STOCKPILING OPERATIONS

2.3.1 Processing Operations

The processing of the blasted rock at the increased rate of production (500 000tpa) would be achieved principally through the existing fixed processing plant albeit with the some refurbishment to achieve a greater level of efficiency for some components. It is noted that maximum production may not be reached each year but the improved throughput would provide flexibility to meet expanding markets.

Section 1.6.4 describes in detail the existing fixed processing and stockpiling operations and **Figure 1.5** displays a schematic layout of the plant.

It is proposed that a mobile processing plant would be brought into the Quarry and operated generally within the proposed location shown on **Figure 2.3**, i.e. within the footprint of the proposed limit of extraction and shielded from view from the north, south and west, with only direct views possible from the east across the established fixed processing plant.

The mobile processing plant would be used during the refurbishment of the existing fixed processing plant and at times of peak demand and operate in conjunction with the fixed processing plant, as is common industry practice.

A stand-alone aggregate pre-coating plant is located adjacent to the Quarry workshop (**Figure 2.1**) to manufacture pre-coated sealing aggregates for RMS/Council road sealing programs. No alterations to the pre-coating plant or operation is proposed.

All blended products, e.g. road pavement products, are blended using one of the onsite-based front-end loaders.

2.3.2 Processing Rates

The current throughput of the fixed processing plant is between approximately 110t/hr to 160t/hr depending on the type of product being produced. Increases in average processing rates would be achieved through increased operating hours and increased efficiency through periodic refurbishments.

The aggregate pre-coating plant is, and would continue to be, operated at a rate of approximately 90t/hr.

2.3.3 Product Stockpiling

The sized, blended and pre-coated products would continue to be transported from the processing plant using front-end loaders and stockpiled within the Central, Northern and Eastern Stockpile Areas prior to despatch to customers. **Figure 2.3** shows the location of the three stockpiling areas on the Quarry Site. The layout of the three stockpiling areas represents a rationalisation of current stockpiling activities and would provide for the maintenance of larger product levels and the opportunity to create protected areas for loading. The proposed stockpiling areas would have sufficient capacity to accommodate the proposed increase in production, especially considering that a proportion of the increase in hard rock production would be utilised in the production of asphalt or by pre-mixed concrete which would not be stockpiled on the Quarry Site.

2.4 SOUTHERN BUND CONSTRUCTION AND VENM MANAGEMENT

In order to minimise the visibility of extraction and processing operations from vantage points to the south of the Quarry, it is proposed that an earthen bund wall be progressively constructed along the southern boundary of the Quarry Site. The proposed size and alignment of the southern bund, which would also ultimately offer sound attenuation of noise levels generated by operations within the Quarry Site, is illustrated on **Figure 2.1** and **Figure 2.3**. At the western end of the bund wall, it would approach 8m in height, however, as natural topography rises to the east along the southern Quarry Site boundary, the height of the bund wall would reduce to 5m. The batters of the bund wall would approximate 2H:1V and would be covered with available soil resources and sown with a cover crop to stabilise the surface and minimise the potential for erosion.

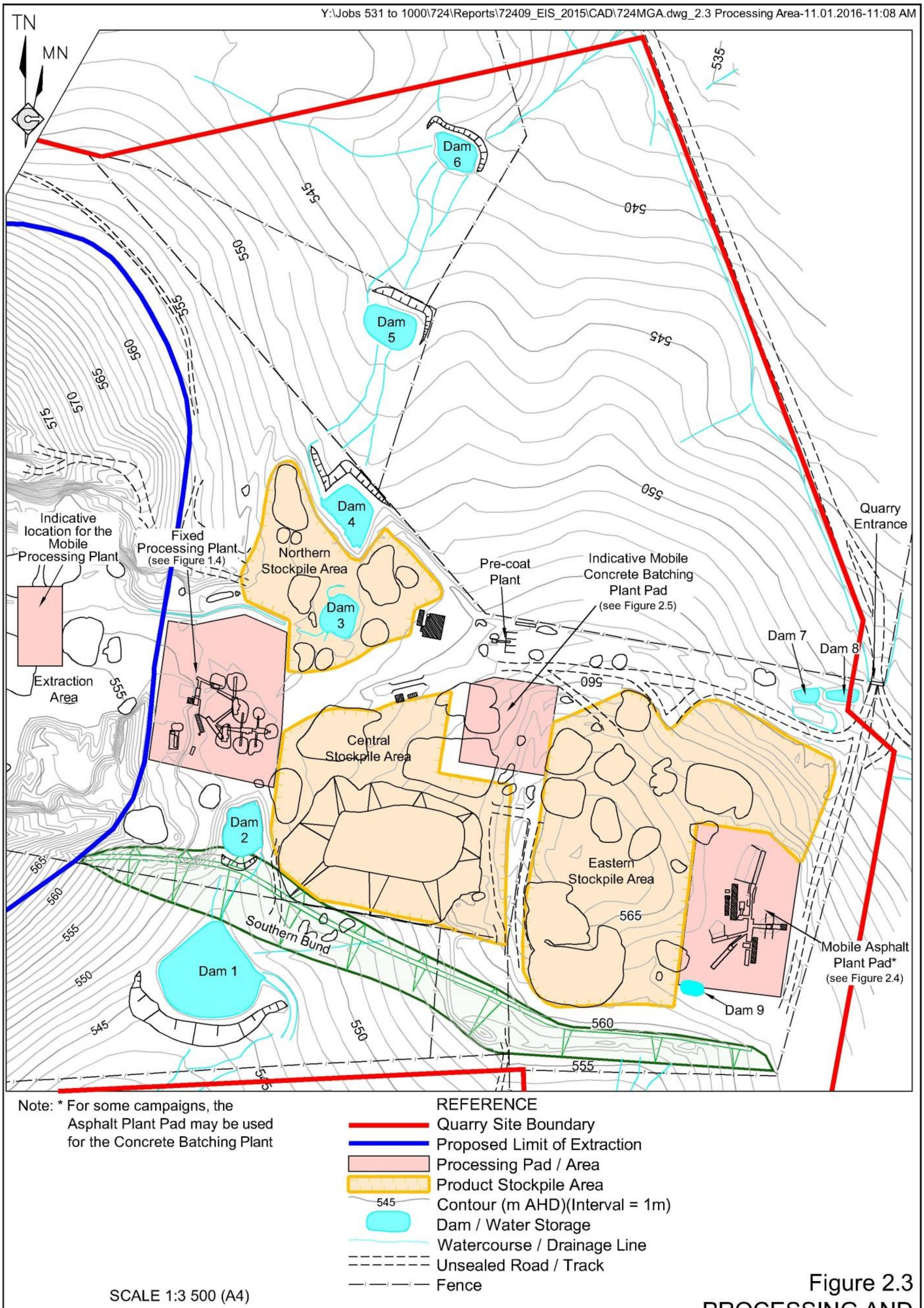


Figure 2.3
PROCESSING AND STOCKPILING AREA

The bund would be constructed progressively using overburden material as it becomes available from the advancing extraction area, supplemented by virgin excavated natural material (VENM) or excavated natural material (ENM) generated by earthworks projects within the local area or region. The periodical receipt of the VENM and recovery of overburden on site would result in the progressive construction of the southern bund. Overburden would be loaded into trucks, transferred to the southern bund site, tipped and profiled using the site bulldozer. VENM or ENM would be trucked to site, generally as a backload of product delivering trucks, tipped and profiled using the site bulldozer. Acceptance of the VENM or ENM to the site would be subject to the following management procedures.

- The Applicant would implement a chain of custody procedure whereby the source, type and quantity of material is recorded and a form signed by the material supplier and/or the driver. The form would require confirmation that the material being imported does not contain any contaminating or polluting substances, e.g. hydrocarbons, pesticides or asbestos.
- The driver would be directed to the active tipping location on site, which would also be recorded on the form and the Applicant's VENM/ENM management database.
- The contents of each load would be tipped and inspected by the quarry manager or nominated representative. Once satisfied that the material does not contain any polluting or contaminating substances, the material would be pushed and profiled to create the bund structure.
- At any time, the Quarry Manager or nominated representative may refuse the acceptance of the material if not satisfied that it is inert and free of contaminating material. Similarly, if on inspection there is a suspicion that the material may be contaminated; the Quarry Manager or nominated representative may order the excavation and re-loading to the truck.
- The Applicant would periodically (at least annually) collect a representative sample of the received and tipped material for laboratory analysis to confirm the inert nature of the VENM or ENM.

Once the southern bund is complete, and as sections of the extraction area are completed and available for rehabilitation, it is proposed to continue to import VENM and ENM to assist in the creation of the final landform (see Section 2.13). The same management procedures would be followed to minimise the potential for the importation of contaminated or polluted material. The Applicant anticipates that no more than approximately 50 000m^3 of VENM would be imported throughout the life of the Quarry.

2.5 PROPOSED MOBILE ASPHALT AND CONCRETE PLANTS

2.5.1 Introduction

The Applicant proposes to import, place and operate, through sub-contractors, a mobile asphalt plant and/or concrete batching plant and associated equipment on the site on a campaign basis in conjunction with local/regional infrastructure/construction projects. The placement and operation of the asphalt plant and the concrete batching plant within Bogo Quarry aims to:

- supply asphalt and pre-mixed concrete to the Southern NSW/ACT region; and
- value add to existing quarry products which are currently being sold.

Notably, three asphalt manufacturing campaigns have been conducted to supply asphalt to road works programs on the Hume Highway (mid 2008, mid 2009 and 2015). The location and operation of the mobile asphalt plant within the Quarry Site on both occasions was consistent with that proposed as part of the current Proposal (see **Figure 2.1**). The operation of the mobile asphalt plant on each occasion was the subject of a specific approval for each campaign. It is likely that there will continue to be a requirement for asphalt manufacture for road works on the Hume Highway (and other roads) on a similar campaign basis. It is therefore the objective of the Applicant to obtain approval to undertake campaign asphalt manufacture and concrete batching on the Quarry Site as demand arises throughout the life of the Proposal, i.e. without having to obtain individual approvals for each campaign.

Figure 2.1 displays the proposed separate locations for the mobile asphalt and concrete plants, however, for some campaigns, the concrete plant may also be located within the southwestern corner of the asphalt hardstand area.

It is also the Applicant’s objective to operate the two plants in an environmentally responsible manner, consistent with the management of the existing quarry. For the purposes of the impact assessment, it is highly unlikely that both plants would operate simultaneously.

2.5.2 Site Establishment

Figures 2.1 and **2.3** display the locations of the mobile plant pads within existing cleared areas of the Quarry Site. Therefore, no clearing of vegetation would be required. Site establishment activities would include:

- construction/excavation of a level hardstand area (this has already been completed for the mobile asphalt plant pad);
- formation and surfacing of the operational areas around each plant with compacted road base; and
- utilisation or modification to the existing drainage and sediment control infrastructure which involves the direction of water to the quarry sediment control system.

Equipment to be used during site establishment activities would include a bulldozer, excavator and grader, as is common industry practice i.e. typical earthmoving equipment already used at the Quarry (see **Table 2.3**). It is envisaged that it would take up to one week to erect and assemble the respective plants to operational status. As the plants would be mobile and operated on a campaign basis, the plants would either be stored/remain on site or dismantled and taken off site for use at another site. Campaigns could typically last between 1 and 6 months. It is noted that each plant may be stored/remain on site following each campaign, as was the case for the mobile asphalt plant in 2009.

2.5.3 The Asphalt Plant

2.5.3.1 Introduction

The asphalt plant would be a mobile plant designed in a manner consistent with industry practice to achieve efficient installation and operation. The layout of the plant itself, which is presented on **Figure 2.4**, generally incorporates:

- five x 10t capacity cold feed aggregate bins;
- a cold feed conveyor;
- a diesel burner;
- a rotary drum drier/mixer;
- a wet scrubber and water eliminator;
- an exhaust stack;
- cement / fly ash / lime /iron oxide silos;
- one or more bitumen storage tank(s);
- an output conveyor;
- baghouse;
- control house; and
- 80t capacity hot asphalt storage bin.

All equipment, including heated storage units, would be powered by an appropriately sized mobile generator, approximately 800-1000kVa. The hot asphalt storage bin would be elevated and positioned above a new loop road to be constructed from the existing access road. Materials would be transferred between the main plant components by conveyor.

In the future, the plant may also be used for recycling old asphalt removed from external roads throughout Yass Valley LGA and surrounding local government areas.

2.5.3.2 Raw Materials and Storage

Raw materials required for producing asphalt include coarse and fine aggregates, bitumen and fly-ash. The principal raw materials used in asphalt manufacture and the approximate quantity of each to manufacture asphalt are listed in **Table 2.4**. **Table 2.4** also identifies the approximate quantity of each raw material required over a 12 month period to produce, for example, 20 000t or 50 000t of asphalt. This latter amount is envisaged to approximate the maximum production level over a 12 month period.

Table 2.4
Indicative Raw Material Quantities for Asphalt Production

Raw Material	Quantity per 1t asphalt	Quantity per 20 000t asphalt	Quantity per 50 000t asphalt	Source
Coarse Aggregates#	830kg	16 600t	41 500t	On site
Fine Aggregate	100kg	2 000t	5 000t	Off site
Flyash	20kg	400t	1 000t	Off site
Bitumen	50kg	1000t	250t	Off site
* Supplied from Bogo Operations via Cowra				# (10/7mm and 20/14mm)

The coarse aggregates would be drawn from the existing on-site quarry stockpiles. The fine aggregate would be obtained from local sources. The fly-ash would be trucked to site by pneumatic tanker and stored in a 17m high silo near the wet scrubber. Bitumen would be stored in mobile bunded 72t and a 12t bitumen storage tank.

Diesel required to power the burner in the plant would be stored in a double skinned 38 000L diesel tank located adjacent to the plant (see **Figure 2.4**).

2.5.3.3 Operations

The stockpiled aggregates would be fed via individual weigh feeders from the cold feed aggregate bins onto a cold feed conveyor. The on-site front-end loader would normally be utilised for this task with an additional loader of similar size used if quarry production levels are high during the asphalt campaign. The cold aggregates would be conveyed into the drum drier/mixer, heated to 165ºC by a burner, where they would be dried and mixed. Bitumen would be added to the hot aggregates at the end of the mixing process to produce hot-mix asphalt. The hot-mix asphalt would then be conveyed into the overhead storage bin and discharged into highway trucks by bottom discharge.

2.5.3.4 Production Rates

The asphalt plant would be operated solely to meet the contractual requirements for RMS, Councils or other private operators as part of re-sealing projects on the Hume Highway, local roads and potentially roads within the ACT. Depending on the asphalt plant brought onto site, it would have the capacity to produce up to approximately 1 000t of asphalt per day. Generally, the plant would produce between approximately 300t and 500t of asphalt per day during road-sealing campaigns. These rates would vary depending upon the requirements of the client during a campaign and the capability of each plant.

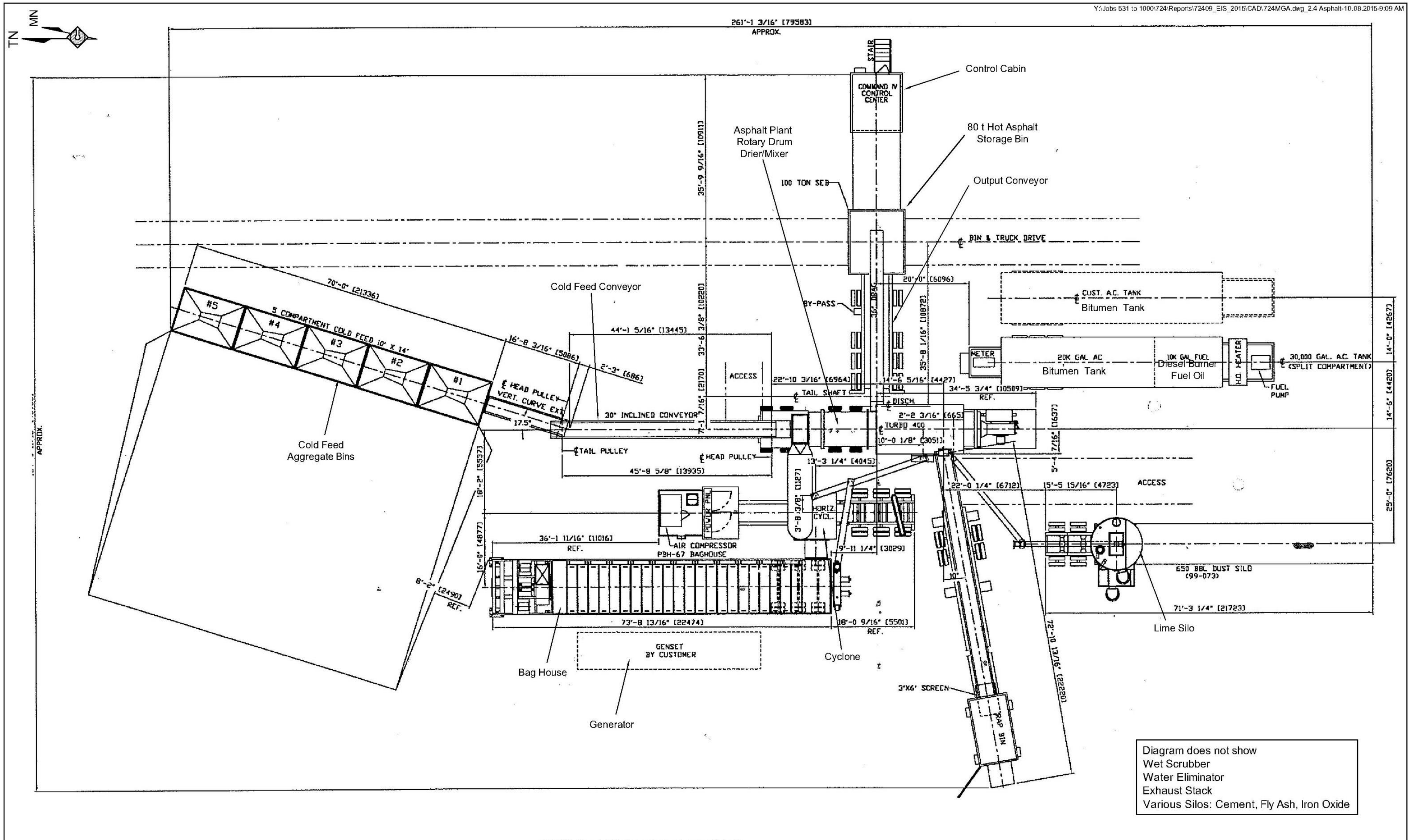
For the purpose of this document, an approximate maximum annual production of asphalt would be 50 000t. As the plant would essentially be a value adding process utilising existing quarry products, there would be virtually no change to aggregate production rates at the quarry itself.

2.5.4 The Concrete Plant

2.5.4.1 Introduction

The main components of each mobile concrete batching plant brought to site would include the following.

- On-ground fine aggregate (sand) storage.
- Two x 50t overhead storage silos for cement and fly ash.
- Dust filter extraction unit.
- Weigh hopper.
- One transfer conveyor.



Note: This figure is indicative as it may not necessarily be the same mobile plant that is used on site during each campaign. The above configuration was that used for the asphalt plant recently operated on site. Suffice it to say, the general location of the main components of each plant will be comparable.

Source: ASTEC Industries Inc.

Figure 2.4
INDICATIVE PLANT LAYOUT

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- A batching room (elevated).
- Truck washout bay/wedge pit
- Bunded additive/chemical storage.
- Water pit.

Each of these components is displayed on **Figure 2.5**. Plant operators would use the amenities incorporated within the existing quarry buildings.

2.5.4.2 Raw Materials

The principal raw materials used in the manufacture of pre-mixed concrete and the approximate quantity of each to manufacture $1m^3$ of concrete are listed in **Table 2.5**. **Table 2.5** also identifies the approximate quantity of each raw material required over a 12 month period to produce for example $5\,000m^3$ or $20\,000m^3$ of concrete. This latter amount is envisaged to approximate the maximum production over a 12 month period[2].

Table 2.5
Indicative Raw Material Quantities for Concrete Production

Raw Material	Quantity for $1m^3$ concrete	Quantity for $5\,000m^3$ concrete	Quantity for $20\,000m^3$ concrete	Source
Coarse Aggregates[#]	1 000kg	5 000t	20 000t	On site
Fine Sand*	600kg	3 000t	12 000t	Off site
Manufactured Sand (<5mm)	300kg	1 500t	6 000t	On site
Cement / Flyash	250kg	1 250t	5 000t	Off site

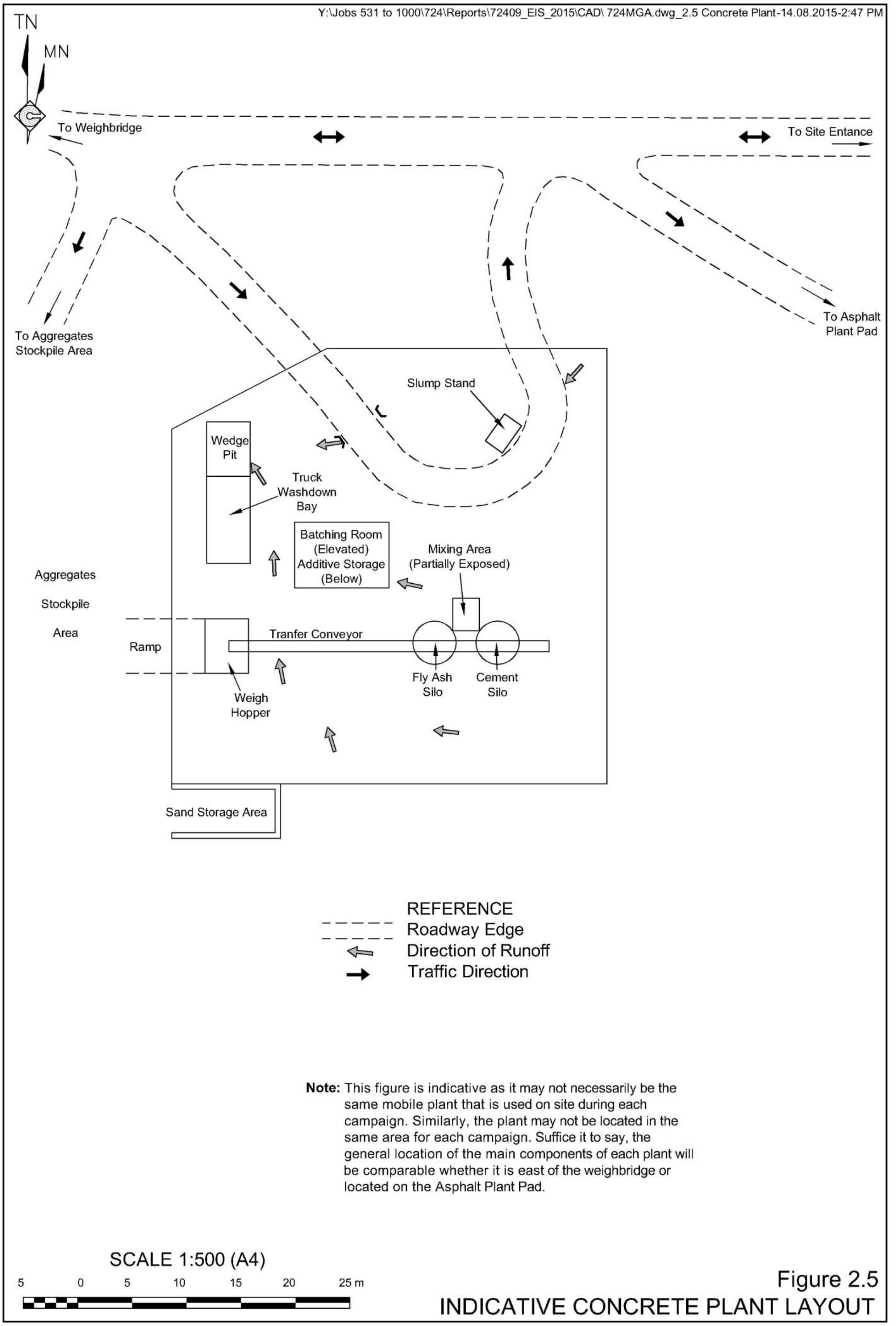
Depending on the intended use of the concrete, fly ash, a by-product of coal-fired power stations, may be used in lieu of a proportion of the cement. Minor variations to the composition of the concrete mix as identified in **Table 2.5** determine its strength and application and additives may be added to the concrete to accelerate or retard the reactions that "set" the concrete, to entrain air and thereby reduce concrete density, to provide fibre reinforcing in the concrete, or to impart colour.

The Applicant would source the cement and fly ash from the most competitive and reliable sources off site. These raw materials would be delivered to site in fully sealed pneumatic units via approved transport routes (see Section 2.6.1).

Aggregates

Coarse aggregates would be sourced from existing stockpiles within the Quarry. Fine sand would be stored within a storage area directly adjacent to the weigh hopper.

[2] The concrete batching operations will be operated subject to demand. It is possible that production levels in excess of $20\,000m^3$ per year could be undertaken, however, $20\,000m^3$ represents the currently anticipated maximum annual demand.



Note: This figure is indicative as it may not necessarily be the same mobile plant that is used on site during each campaign. Similarly, the plant may not be located in the same area for each campaign. Suffice it to say, the general location of the main components of each plant will be comparable whether it is east of the weighbridge or located on the Asphalt Plant Pad.

Figure 2.5
INDICATIVE CONCRETE PLANT LAYOUT

Cement and Fly Ash

Cement and fly ash would be stored in two overhead silos. Each silo would have a total storage capacity of approximately 50t, an actual storage capacity below the high level alarm of 45t, and be fitted with a reverse pulse filter. The top of the silos would be approximately 17m above ground level. The cement and fly ash would be pumped to the silos by pressurising the fully sealed delivery tankers.

Additives

The additives that would be used in the production of concrete, in line with customer requirements, would be stored on site in up to four x 1 000 litre capacity fibreglass containers in a bunded storage area. The bunded storage area would have a minimum capacity to retain 110% of the largest tank, i.e. minimum 1 000L capacity. The usage of additives would be small and it is intended that the replacement of the additives would occur once per week, i.e. a single load. The principal chemical additives that would be used for the manufacture of pre-mixed concrete are as follows.

- WRDA water reducing agent.
- Concrete Super-plasticizer high range water reducing agent.
- Accelerator.
- Retarder.
- Bag product fibre re-enforcing.

2.5.4.3 Process Outline

The manufacture of concrete would involve the batching and weighing of the various raw materials and conveying into the agitator bowl of a transit mixer for mixing. The individual component stages would involve:

- sequential retrieval of coarse and fine aggregates from the aggregate stockpiles by a front-end loader and "weigh-up" within the aggregate weigh hopper;
- automatic weighing of the required amount of cement (and fly ash if added) in the fully sealed weigh hopper;
- addition of a measured amount of water and any required additives into the agitator bowl of the transit mixer;
- simultaneous feeding of cement and coarse and fine aggregates into the mixer's agitator bowl of the transit mixer;
- washdown of the transit mixer fins into the mixer bowl to remove any cement dust or spilt aggregates; and
- mixing for a minimum of 3 minutes.

Once mixing is completed, the concrete is observed and checked from a slump stand prior to despatch from the site.

2.5.4.4 Production Rates

The concrete batching plant would typically manufacture approximately 20m^3 to 40m^3 per hour or up to 400m^3 of concrete per day. There will be numerous days when the Applicant would not be producing and/or despatching any pre-mixed concrete. As the plant would be mobile and operated on a campaign basis, it may be dismantled and taken off site, as and when required.

2.5.4.5 Equipment

No additional mobile equipment would be required to operate the concrete batching plant, though transit mixers would be required for product mixing and delivery. The number of transit mixers would depend on product demand, however, it is estimated that two or three transit mixers would be based at the batching plant whilst it is on site. Additional contract transit mixers may be brought to site on days when extra demand or large distances exceeds the capacity of the on-site trucks.

2.6 TRANSPORT OPERATIONS

2.6.1 External Transport Routes

All quarry products would be transported from the Quarry Site by road registered trucks following Paynes Road for approximately 1.4km to where it intersects with the Hume Highway. Product trucks would then travel either east or west on the highway depending on product destinations. The Applicant would continue to maintain Paynes Road as it has in the past and as is currently the case.

2.6.2 Internal Access

The existing internal road network would link in with the access roads required for each plant (**Figure 2.3**). Emphasis would be placed, wherever possible, upon the use of one-way/loop roads into each plant. Signs would be positioned to separate (as much as possible) asphalt and concrete trucks from all other on-site quarry traffic during the various campaign production periods.

2.6.3 Vehicle Types

The transportation of rock and asphalt products from the Quarry Site would continue to use truck configurations similar to those currently in use. Trucks utilised for the transportation of material include single-axle rigid, tri-axle articulated truck-trailer, truck and dog trailer, and B-Double configurations etc. resulting in an average load capacity of approximately 32t.

The asphalt would generally be despatched in 16t (approximate) asphalt trucks and 30t truck and dog vehicles although use of smaller rigid trucks could occur from time to time. Coarse aggregates from Bogo Quarry would be directed from the on-site aggregate stockpiles to the asphalt plant or concrete batching plant rather than being despatched separately.

Pre-mixed concrete would be transported by standard $5m^3$ to $9m^3$ capacity concrete transit agitators. For the purposes of calculating traffic levels, an average capacity of $6.5m^3$ is adopted.

2.6.4 Delivery of Raw Materials and VENM/ENM

Fine aggregates (sand) would be delivered by back loading the semi-tippers, truck and dogs that transport the quarry products off site. The fly ash and cement would be trucked to site in pneumatic tankers typically with a capacity of approximately 26t. Bitumen and diesel would be delivered in purpose-built, fully sealed, tankers typically with a capacity of approximately 24t. It is estimated that there would be an average of 6 to 12 raw material deliveries per week during operation of the mobile plants. The bulk of the aggregates used in asphalt/concrete production would be recovered from nearby stockpiles in the aggregate product stockpile areas within the existing quarry.

VENM and ENM imported to the Quarry would invariably be transported in trucks that would transport a load of quarry products from the Quarry. Therefore, for the purposes of assessing traffic movements, the backloading practices would not generate any additional levels of traffic as a result of VENM/ENM deliveries.

2.6.5 Operational Quarry Traffic Levels

As noted in Section 1.6.5, an average of 36 truck movements are currently generated by the Bogo Quarry each day, i.e. 18 trucks (unladen) arriving and 18 trucks (laden) departing the Quarry. **Table 2.6** lists the predicted traffic levels generated by the Proposal, i.e. at maximum levels for quarry products and considering those generated during the asphalt and concrete production campaigns.

Table 2.6
Proposed Traffic Levels*

Parameter	Aggregate/Road Pavement Products	Imported Concrete Raw Materials	Concrete	Imported Asphalt Raw Materials	Asphalt
Load Size	32t	30t	$6.5m^3$	24t – 32t	30t
Av Loads/yr	15 625	567	3 080	300	1 670
Av Loads/week (Range)	312 (30 – 600)	12 (0 – 20)	NA (0 – 300)	6 (0 – 20)	65 (0 – 250)
Av Loads/day (Range)	52 (10 – 100)	3 (0 – 4)	8 (0 – 60)	2 (0 – 8)	18 (0 – 60)
*Note: Nominated maximum or minimum traffic levels will not all occur on the one day.					

The Proposal would result in the number of truck despatches from the Quarry increasing to complement the increased production. Based on an average truck load of 32t, and the proposed maximum production level of 500 000tpa, the average number of truck movements would increase to approximately 104 movements (i.e. 52 loads) per day, i.e. if only quarry products were despatched.

It is noted that the existing quarry is approved to allow the despatch of up to eight truck loads per hour. This was the level required during peak production times associated with the construction of Bookham Bypass. The roads and the intersection were considered adequate by the RMS to accommodate this level of traffic. The increased production at Bogo Quarry is unlikely to substantially increase the maximum hourly truck movements to accommodate the increased production. Rather, the increased production would be achieved through traffic levels occurring over longer periods. The Applicant would continue to ensure that there are no more than a total of 8 laden vehicles leaving the Quarry during any hour.

For the purposes of assessing the traffic-related impacts, the following scenarios are proposed. It is noted that the above average production level (on a typical busy day) would equate to an approximate 85^{th} percentile traffic level.

Scenario 1: Transportation of Quarry Aggregates only – Average Day
52 loads / 104 truck movements per day
4 loads / 8 truck movements per hour
8 light vehicles movements per day

Scenario 2: Transportation of Quarry Aggregates only – Busy Day
100 loads / 200 truck movements per day
8 loads / 16 truck movements per hour
8 light vehicles movements per day

Scenario 3: Transport of Quarry Aggregates and Asphalt/Concrete – Average Day
70 loads / 140 truck movements per day
6 loads / 12 truck movements per hour
16 light vehicles movements per day

Scenario 4: Transport of Quarry Aggregates and Asphalt/Concrete – Busy Day
120 loads / 240 truck movements per day
8 loads / 16 truck movements per hour
20 light vehicles movements per day

2.7 HOURS OF OPERATION

It is noted that the proposed core hours of operation (see **Table 2.7**) are comparable to the existing approved hours of operations nominated in Section 1.6.6.

The increased hours of operations beyond those previously approved are sought given that the Applicant's discussions with road maintenance contractors and experience to date with respect to the amount of out-of-hours road maintenance and construction activities along the Hume Highway corridor and various infrastructure projects in the ACT. This applies particularly to the mobile asphalt plant and potentially the mobile concrete batching plant. It is important to note that the proposed hours of operation do not represent periods of continuous operations over the life of the Proposal, rather the period during which these operations would be approved to occur. For example, a 5:00am start and 10:00pm finish for a number of the site activities namely extraction and processing are only intended to be used during the occasional busy period.

Table 2.7
Proposed Hours of Operation

Activity	Monday – Friday	Saturday	Sunday
Extraction Operations – Drilling	7:00am – 6:00pm	7:00am – 6:00pm	-
Blasting	9:00am – 5:00pm	9:00am – 5:00pm	-
Extraction Activities	5:00am – 10:00pm[1]	5:00am – 10:00pm[1]	-
Processing	5:00am – 10:00pm[1]	5:00am – 10:00pm[1]	8:00am – 10:00pm
Asphalt Plant	5:00am – 10:00pm	5:00am – 10:00pm	5:00am – 10:00pm
Concrete Batching Plant	5:00am – 6:00pm	5:00am – 6:00pm	5:00am – 6:00pm
Product Transportation	24 hrs	24 hrs	24 hrs
Maintenance	24 hrs	24 hrs	24 hrs
Note 1: Noted activities restricted to 6:00am to 10:00pm between May and September			

2.8 INFRASTRUCTURE AND SERVICES

2.8.1 Introduction

The following subsections identify the infrastructure and services required for the operation of the asphalt plant and the concrete batching plant, most of which existing on the site.

2.8.2 Buildings

The existing site office and amenities located adjacent to the weighbridge would remain. No additional buildings other than those shown on the various figures in this section would be required for the operation of either the asphalt or concrete batching plant.

2.8.3 Water

The Applicant would continue to obtain its water requirements from the existing settlement pits and storage dams and there would be no change to existing infrastructure. Water use requirements would be as follows.

- Internal roads, hardstand and exposed areas
  5ha @ 1.5L/m^2 – 23.4ML

  (This rate of water application represents an average application rate and would vary depending on the area requiring application and meteorological conditions on any given day)

- Hard rock crushing and screening
  500 000t @ 1.5L/t processed – 0.75ML

- Concrete manufacture
  20 000m^3 @ 150L/m^3 – 3.0ML

Total water usage would be approximately 27ML per year.

Section 5.2.3.2 identifies the Maximum Harvestable Right Dam Capacity (MHRDC) for the Quarry Site and Section 5.2.3.5 provides a preliminary site water balance. The water balance indicates that sufficient water is likely to be supplied by the existing water storage infrastructure, however, should a water shortage occur (due to extreme low rainfall conditions) additional water requirements would be purchased off site and delivered to the site.

2.8.4 Sewerage

Existing pump out of the current septic system at the Quarry would be of sufficient capacity to accommodate the increased personnel levels on the Quarry Site during asphalt plant/concrete batching plant operating campaigns, therefore no additional sewerage infrastructure would be required.

2.8.5 Site Access and Parking

The existing sealed site access road onto the Quarry Site from the entry off Paynes Road for product trucks, agitators and private vehicles is shown on **Figure 2.1**. The existing internal access roads have been constructed with compacted quarry crushed rock. No upgrades of the existing internal road network would be required as a result of the installation and operation of the asphalt plant or concrete batching plant. All existing roads are maintained by the Applicant.

The existing parking area located adjacent to the Quarry Site office would be used by employees and visitors. Parking would be provided for the transit mixers on an unsealed hardstand area within the concrete batching plant pad.

2.8.6 Electrical Power

The electrical power for all permanent on-site activities is currently drawn from a single 500kVA diesel-powered generator. The Applicant intends to install a 100kVA generator to allow certain components, e.g. workshop and pre-coat plant to operate from their own power source. Ultimately, the weighbridge would also operate with its own 2kVA generator to provide for night-time loading without the need to start the larger generators.

On-site generated electricity would be required to operate the asphalt plant and its heated storage tanks. The plant and equipment would require 415V three phase electricity, which would be supplied from a stand-alone diesel generator with a capacity of up to 50kVA.

2.8.7 Fuel

Diesel fuel for the operation of the mobile equipment would be supplied from the existing on-site tanks. Diesel for operation of the mobile asphalt plant burner would be stored in a double-skinned tank with a capacity of 38 000L located adjacent to the mobile plant.

2.8.8 Communications

Existing communication services and mobile phones would be used. Therefore, no additional communication services would be required.

2.9 SAFETY/SECURITY

2.9.1 Introduction

The Applicant has a policy of providing a safe working environment for all employees, and ensuring the safety of clients, employees, their subcontractors and general public. In line with this, all workers, visitors and associated sub-contractors are inducted in line with industry best practices. Accordingly, the Applicant would ensure the staff operating the asphalt plant and the concrete batching plant adopts the following procedures with regard to access, equipment safety, signage and employee safety.

2.9.2 Access

Access to the Quarry Site would be via the existing quarry entrance off Paynes Road. Access is limited to employees, authorised personnel and authorised vehicles. The quarry entrance gates are locked outside of approved working hours.

2.9.3 Equipment Safety

All plant and equipment is required to meet the required standards of the *Occupational Health and Safety Act 2000 and Regulation 2001.*

Additionally, the bitumen heating system would be automatically thermostatically controlled and would not have sufficient capacity to raise the temperature of the bitumen to flash point. Notwithstanding this design feature, appropriate fire control equipment would also be located near the burner in the plant.

2.9.4 Employee Safety

The Applicant has a policy of educating and training all employees in accident prevention and the inclusion of safe working practices into day to day operations. This is an integral part of quarry operations. Additionally, the use of personal protective equipment including high visibility clothing/vests, safety boots, safety gloves, hearing protection and safety glasses would be required to be worn at all time on site.. Signs displaying the specific safety requirements would be installed around the proposed asphalt plant and concrete plant, when in operation.

2.10 WASTE PRODUCTION AND DISPOSAL

2.10.1 Extraction and Aggregate Processing Operation Waste

2.10.1.1 Introduction

Wastes requiring management can be sub-divided into production and non-production wastes. The nature of the wastes and the proposed management systems to be employed are as follows.

2.10.1.2 Production Wastes

The Applicant would generate very little production wastes during either extraction or processing activities. During extraction operations, all materials removed would have a use, i.e. either for the production of products or stockpiled to be sold or used for rehabilitation purposes.

2.10.1.3 Non-production Wastes

Oil and grease collected from routine maintenance of mobile plant, the processing plant and power generating equipment would be stored in leak proof containers in the existing workshop to await collection by a licenced recycling contractor.

All paper, food wastes and general wastes, together with maintenance consumables such as grease cartridges would be collected in appropriate containers for delivery to the Murrumbateman waste facility. All recyclable materials would be placed in separate containers for delivery/collection to appropriate facilities.

All products produced through the processing plant would be sold although some products may be more saleable than others at any one time. It is noted that in recent months, materials sometimes considered as "waste", namely <5mm fines and scalps, have used/sold in quantities in excess of their production rate, i.e. they are being drawn from accumulated stockpiles of these materials.

2.10.2 Asphalt Plant Waste

2.10.2.1 Production Wastes

Disposal of Waste Bitumen

Generally, there would be no waste bitumen. Any spilled bitumen would be allowed to cool and then collected and returned to the plant feed. Any waste asphalt generated during plant commissioning or daily operation would be used to seal selected areas around the Quarry Site and maintenance of site internal and access roads.

Facilities for Pre-spraying and Washing out Trucks

Trucks would be pre-sprayed and washed out using citrus-based non-toxic slip agents which would be applied with an automatic sprayer operated by an electric pump. All spraying and washing out activities would be carried out within the nominated pad area, where potential runoff water would drain into the existing drainage and sediment control network.

The use of a citrus-based slip agent would remove the need to use, store or recycle solvents.

Plant and Truck Cleaning Waste

All plant and truck cleaning would occur in the mobile asphalt plant pad area and any runoff water from cleaning would drain into the existing drainage and sediment control network (**Figure 2.1**).

Waste Water Management

All runoff water from the plant area would be directed to the existing drainage and sediment control network.

All waste water solids would be recycled within quarry materials as is common industry practice.

2.10.2.2 Non-production Wastes

Routine Maintenance Consumables and General Wastes

Oil and grease collected from routine maintenance of the mobile plants would be stored in leak-proof containers within the existing workshop to await collection by a licensed recycling contractor. All hydrocarbon storages would be regularly visually inspected for spilled materials and cleaned, as necessary.

All paper and general wastes, together with maintenance consumables such as grease cartridges, would be collected in appropriate containers for disposal with the waste stream generated within the Quarry.

2.10.3 Concrete Batching Plant Waste

2.10.3.1 Production Wastes

Production wastes would comprise both solid and liquid wastes mainly from the manufacture of concrete.

Solid Wastes

Solid waste from the manufacture of pre-mixed concrete would comprise predominantly coarse and fine aggregates and cement from daily truck washouts, together with minor amounts of accumulated solidified concrete removed from the inside of the transit mixers resulting from the raw materials delivery or batching processes.

For any water runoff occurring at the batch plant, a wedge pit would be constructed whereby all spill materials could be directed and cleaned out regularly. The hardstand area would be formed so that washed down spillage could be directed to the wedge pit. The solids would be picked up from the pit by a front-end loader and deposited on the floor of the extraction area where the solids can drain free. The area for the placement of the materials accumulating in the wedge pit would be periodically relocated as the extraction area is developed.

Solid wastes from truck washouts would also be placed onto an area at the face of the extraction area. Any solids from both the wedge pit and truck washouts would then be picked up and blended with blasted rock and then introduced back to the crushing plant for recycling and incorporation into crushed rock and road base products.

Liquid Wastes

Liquid wastes would comprise primarily inert aggregate particles together with cementitious materials in aqueous suspension from the washout operations. Liquids from truck washouts would be directed into the wedge pit and ultimately recycled into saleable quarry products.

Liquids from the wedge pit would also be directed to either the quarry sump or Dam 2 via a connection to existing drainage work associated with the processing plant. The liquids would drain by gravity, however, the pit could also be pumped dry, if necessary.

2.10.3.2 Non-production Wastes

Non-production wastes would comprise paper and general waste originating from the office, lunchroom and amenities, packaging from bagged or boxed concrete additives and routine equipment and vehicle maintenance consumables.

With the exception of sewage, oils and grease, all non-production wastes would be placed in appropriate containers for collection by licensed waste disposal contractors for disposal at the Murrumbateman waste facility or delivery to a recycling/waste transfer facility. Sewage disposal would continue to be through a pump-out septic system and disposal by a licenced contractor. Oils and grease would be stored in leak-proof containers within the existing designated bunded area within the workshop to await collection by a licenced re-cycling contractor.

2.11 EMPLOYMENT

Currently, the Quarry has five full time employees undertaking all quarry-related operations and between approximately 5 to 10 full time equivalent persons, principally for the delivery of the quarry products. As the Bogo Quarry approaches maximum production, employment would be provided for up to four additional persons full time on site, with a further six employed on a campaign basis when the concrete batching and asphalt manufacture plants operate. A range of other contractors would also be engaged from time to time and truck drivers would be indirectly employed for delivering the quarry products. The increased provision of full time employment opportunities would stimulate employment in ancillary businesses, as well as those benefiting from the increased economic activities within the towns.

2.12 PROJECT LIFE

Based on the estimated quantity of remaining resource and the proposed increased maximum extraction rate of 500 000tpa and average production level of between 250 000tpa to 350 000tpa, the remaining life of the Quarry would be approximately 30 years.

2.13 REHABILITATION

2.13.1 Objectives

In the short term, the Applicant's objective is to undertake site improvements and landscaping, as has been conducted to date. Tree and shrub planting has been undertaken around the boundary of the Quarry Site to provide both visual screening during the operational life of the Quarry and for long term amenity.

The principal long term objective for rehabilitation of the Quarry is the creation of a landform that is aesthetically pleasing and provides grazing land typical of the local area and equivalent to that of the pre-quarrying environment in line with the existing plan. The planned rehabilitation would be carried out as terminal quarry faces are completed and no longer required for access.

2.13.2 Decommissioning Activities

The various mobile plants would be decommissioned and removed following the cessation of each campaign. On some occasions, the equipment may remain "stored" on site until the next project location is secured. At the end of the Proposal life, the processing plant would be dismantled and removed off site. The rehabilitation of the respective plant footprints would ultimately be incorporated into the rehabilitation of the overall quarry.

2.13.3 Perimeter Tree Screen

The Applicant proposes to continue an infill planting program of native vegetation around sections of the Quarry Site boundary to form a vegetative screen in the locations displayed on **Figure 2.1**. **Table 2.8** lists the variety of native trees and shrubs. The Applicant would continue to plant in a random pattern around the perimeter of the Quarry Site. Greening Australia, who has managed the plantings to date, would be retained to complete the tree screen planting over a 3 to 5 year period.

Table 2.8
Tree and Shrub Species for Perimeter Tree Screen

Species	Common Name
Eucalyptus melliodora	Yellow Box
Eucalyptus polyanthemos	Red Box
Eucalyptus albens	White Box
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus microcarpa	Grey Box
Eucalyptus macrorhyncha	Red stringy bark
Eucalyptus bridgesiana	Apple Box
Eucalyptus goniocalyx	Long-leaf Box
Eucalyptus mannifera	Brittle Gum
Acacia dealbata	Silver Wattle
Acacia implexa	Lightwood
Acacia mearnsii	Black Wattle
Acacia decurrens	Early Black Wattle
Acacia rubida	Red-stemmed Wattle
Acacia buxifolia	Box-leaf Wattle
Acacia vestita	Hairy Wattle
Acacia verniciflua	Varnish Wattle
Hardenbergia violaceae	Sarsparilla
Indigofera australia	Austral Indigo
Dodonea cuneata	Hop Bush
Callistemon pallidus	Lemon Bottlebrush
Melaleuca parvistaminea	Swamp paperbark
Allocasuarina erticillata	Dropping she-oak

2.13.4 Proposed Quarry Rehabilitation Activities

Figure 2.6 displays the proposed final landform and revegetation which would be very similar to that currently approved. In summary, the final site rehabilitation would involve three main elements, namely rehabilitation of:

1. the extraction faces and benches;
2. the floor of the extraction area; and
3. stockpile areas and plant footprints outside the extraction area.

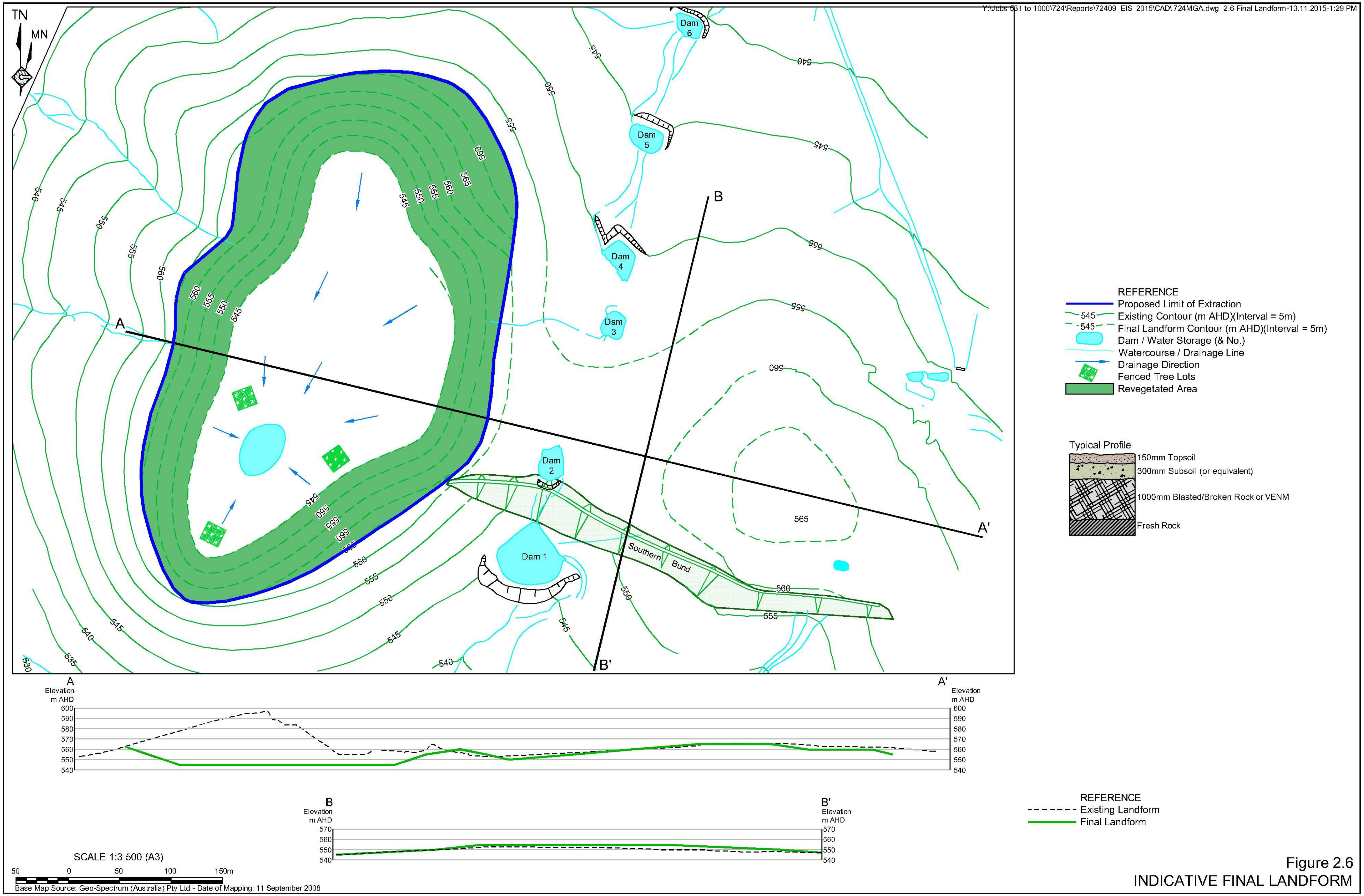


Figure 2.6
INDICATIVE FINAL LANDFORM

Extraction Faces and Benches

The Applicant proposes to adjust its blast design when approaching the final perimeter of the extraction area to create a final slope with an average gradient of approximately 1:3 (V:H). The final perimeter would be created with variable elevations to create a natural, non-geometric or flat landform when viewed from vantage points external to the extraction area. When viewed internally, the final extraction area would resemble an oval basin. The perimeter slopes would be achieved either through restoration blasting or placement of imported VENM/ENM (or a combination of the two methods). A description of both methods is as follows.

- Restoration Blasting. The terminal faces would be blasted to leave approximately 0.5m of blasted rock over the final slope. A slope gradient of approximately 1:3 (V:H) (18º) would be created by varying the drill depths prior to blasting of terminal faces. The blasted rock would be shaped using the site bulldozer after which subsoil and topsoil material would then be placed over the slope and the area sown to pasture.
- VENM/ENM/overburden placement. As each face becomes terminal, imported VENM/ENM may be placed against, or tipped over the terminal face. The placed VENM/ENM would be profiled using the site bulldozer to create a gradient of approximately 18º after which subsoil and topsoil material would then be placed over the slope and the area sown to pasture. The same procedures for ensuring the VENM is free of contaminants or pollutants would be implemented as described in Section 2.4.

Extraction Area Floor

The floor within the extraction area would be created at an elevation of approximately 545m AHD with a gentle fall to the south to the final extraction area sump. The resultant dam would be created with gentle side slopes to allow stock safe access to the water within the dam.

The final floor of the extraction area would also retain approximately 0.5m of blasted rock to enhance water infiltration where required. The substrata above the blasted rock for the final vegetation would comprise approximately 0.3m of subsoil/overburden material and 0.15m of topsoil. The subsoil material would be progressively recovered from the southern bund and any other stockpiled overburden/process fines whilst the topsoil would be recovered from topsoil storage areas. If necessary, some VENM/ENM may be imported to create a suitable substrate on the extraction floor.

The final floor would be sown to pasture and selected tree lots planted around the final dam.

Processing Plant Footprints and Stockpiling Areas

All plant, equipment and footings from each of the plant sites, if not suitable for future agricultural purposes/uses would be removed from site. All remaining product stockpiles would be sold, the areas graded to provide appropriate drainage and ripped before spreading of subsoil and topsoil material. An appropriate pasture mix would be sown with occasional tree lots planted.

Depending on the future intended agricultural use, some or all of the sedimentation ponds on site would be retained as stock dams together with selected internal sheds, hardstands and access roads.

2.13.5 Rehabilitation Maintenance

The Applicant proposes to review the status of all rehabilitation progress on an annual basis to identify the need to undertake any remedial work due to above normal erosion levels, sub-standard growth or loss of plants.

2.13.6 Rehabilitation Provisions

The Applicant has established an internal accounts provision whereby $0.20 per tonne is being set aside to fund the intermediate and long term rehabilitation activities. The Applicant will review the quantum of the provision throughout the life of the Quarry and establish whether the provision needs to be varied.

2.14 DEVELOPMENT ALTERNATIVES

2.14.1 Introduction

Schedule 2(3) of the *Environmental Planning and Assessment Regulation 2000*, requires that any feasible alternative to carrying out the proposed development be addressed, including the consequences of not carrying out the development.

2.14.2 Alternative Plant Sites

The existing quarry provides an ideal location for the proposed location of the mobile asphalt plant, as previously conducted and concrete batching plant (adjacent to the majority of the raw materials required for asphalt and concrete manufacturing) and therefore no alternative locations were considered. The asphalt and concrete batching plants would also utilise existing infrastructure and services on the Quarry Site, along with the close proximity to the raw materials allows the Proposal to be economically viable. Alternative location of the mobile plants off the Quarry Site would be too far removed from the raw materials to make the campaign approach to manufacture economically viable.

2.14.3 Alternative Transport Routes

There are no feasible alternative transport routes for raw materials deliveries to the proposed plant site. The transport routes used to despatch the products to the market place are determined by the location of each construction site. In general, the product trucks use the most direct route from the Quarry Site to the receiving destination.

2.14.4 Consequences of Not Carrying Out the Proposal

The consequences of not increasing the life of the Quarry and its annual production level or the installation and operation of the proposed mobile asphalt plant and mobile concrete batching plant would include:

- the loss of economic benefits to the Applicant and the future workforce;
- lost opportunity to value add to the existing quarry products;
- lost opportunity to supply asphalt and pre-mixed concrete to meet local market demands;
- lost opportunity to increase the supply base for the expanding construction industry in the Yass local area; and
- A loss of healthy competition to the local market which can have the effect of increased housing and associated infrastructure costs.

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