Section 2
Description of the Project

PREAMBLE

This section presents the Proponent's objectives and plans to extend and operate the Oberon White Granite Quarry at the increased level of production. Details are presented outlining the extent of proposed extraction, processing, product transportation and waste management. Operational information and details of services and employment are also presented.

Details of the Proponent's plans to manage the various environmental issues identified, including proposed safeguards and mitigation measures, are presented in Section 4 of this document.

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2.1 PROJECT OUTLINE

2.1.1 Objectives

The Proponent's primary objectives for extending and increasing production at the Oberon White Granite Quarry are to:

- meet the identified supply demands of existing and potential markets;
- to secure an adequate resource volume for the long term operation of the quarry at increased production levels; and
- progressively rehabilitate the Project Site to provide for long-term nature conservation and agricultural activities following completion of operations.

These objectives would be achieved by:

- planning and extracting the resource in a manner that maximises the quality of materials removed and ensures efficient resource utilisation;
- undertaking all activities in an environmentally responsible manner that enables compliance with all relevant requirements;
- planning and undertaking activities in consultation with surrounding residents and relevant government agencies; and
- regular monitoring, reviewing and reporting on the environmental performance of the approved operations.

2.1.2 The Project Site and Site Access

The Project Site encompasses all of Lot 2, DP 1089826, covering an area of approximately 40ha. The Project Site is owned by Mudgee Stone Company Pty Ltd, however, a right of carriageway, approximately 20m wide and 660m long runs near or adjacent to the northwestern boundary (see **Figure 2.1**). There are no limitations or other non-standard requirements attached to the right of carriageway.

Access to the Project Site would continue via the approved transport route which incorporates Hampton Road and Ferndale Road, both public roads, and a small section of a right of carriageway between Ferndale Road and the Project Site. Within the Project Site, the existing site access road within the right of carriageway would continue to be utilised by product trucks, however, a new section of site access road would be constructed to provide access to the proposed office, amenities and weighbridge area and an internal access road through the product stockpiling area. An internal haul road between the proposed stockpiling area and the extraction area would also be constructed together with an internal access track adjacent the safety bund and channel (see **Figure 2.1**).

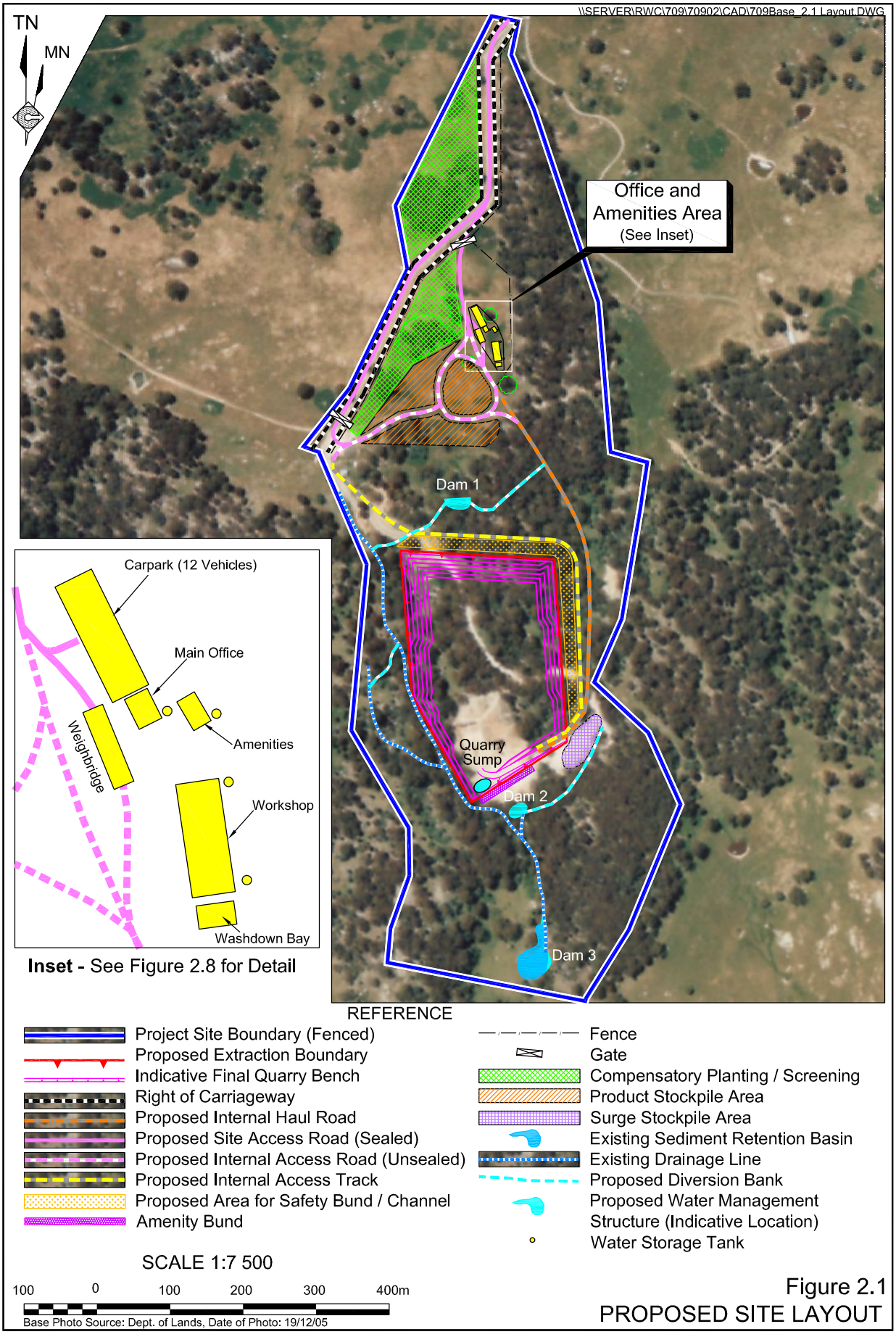


Figure 2.1
PROPOSED SITE LAYOUT

2.1.3 Project Overview

The Proponent proposes to continue to develop and operate the Oberon White Granite Quarry whilst progressively increasing production to a maximum level of 250 000tpa. The quarry would operate over a period of approximately 30 years recovering up to approximately 5 million tonnes of weathered and fresh granite.

The main Project components are as follows.

- Construction of a new site access road and internal haul road and access track, office, weighbridge, amenities, workshop and stockpiling areas.
- Extraction of weathered and fresh granite within an extraction area covering approximately 6ha and surrounded on its eastern and northern boundary by a safety bund and channel.
- On-site crushing within the extraction area to produce a range of products suitable for a range of uses.
- Transportation of products utilising road trucks via the site access road and approved transport route.
- A series of water management structures.
- Progressive rehabilitation of finalised benches.
- Final rehabilitation and landform creation.

Figure 2.1 displays the locations of the above components.

It is noted that it is the Proponent's intention to gradually ramp up production over a period of approximately 5 years after which annual extraction rates would average approximately 200 000tpa. However, for the purposes of this *Environmental Assessment*, potential impacts arising from the Project have been assessed based on the maximum production rate of 250 000tpa.

2.1.4 Approvals Required

It has been established during the preparation of this document that four approvals are required from the NSW Government for the Project to proceed.

1. Project Approval (Part 3A of the *Environmental Planning and Assessment Act 1979*): Approval Authority – Minister for Planning.
2. Environment Protection Licence (Section 48 of the *Protection of the Environment Operations Act 1997*): Issuing Authority – Department of Environment, Climate Change and Water (Environment Protection and Regulatory Authority) (DECCW (EP&RA)).
3. A Section 138 approval under the *Roads Act 1993* for minor improvement works at the intersection of Ferndale Road and Hampton Road.
4. A Part 5 Licence under the *Water Act 1912* for 'aquifer interference' as shallow perched aquifers may be encountered during extraction. No groundwater extraction or pumping is proposed.

Although the principal products would be extractive materials without any beneficiation to separate the mineral components, in recognition of the high feldspar levels within the alaskite

(see Section 2.2), a private mining agreement or lease would also be sought under the *Mining Act 1992*).

It is noted that, subject to the receipt of a satisfactory Project Approval encompassing the proposed activities, the Proponent would surrender Development Consent DA 126/03 issued for the existing quarry.

2.2 GEOLOGY, RESOURCES AND PRODUCTS

2.2.1 Geology

As discussed in Section 1.4, the Proponent undertook a program of exploration within the Project Site during 2003 building upon earlier exploration to further define the resource as both a construction material and a source of industrial materials. **Figure 2.2** provides a summary of geological mapping and exploration data recorded on the Project Site.

Geologically, the deposit consists of alaskite, a granite derivative, developed within the Rossdhu Granite, a small granite batholith of Carboniferous age (approximately 350 million years old). An alaskite is a type of granite practically devoid of dark-coloured minerals, comprising principally quartz, alkali feldspars and mica. The Rossdhu Granite outcrops across a surface area of approximately 10km^2 as shown on the Oberon 1:100 000 geological map (see **Figure 2.2**). Given the granitic origin of the rock, it is inferred that the alaskite extends for a considerable depth below the ground surface (i.e. at least 1km).

Throughout all other sections of this document, reference is made to the rock type being "granite", a rock type more commonly understood by the general public.

2.2.2 On-site Resources

The quantity of alaskite within the proposed 6ha extraction area and to a depth of approximately 1 130m AHD or up to approximately 60m below the natural surface, is up to approximately 5 million tonnes. The weathered component generally extends to depths of between 1.3m and up to 9.1m within depressions / drainage lines and amounts to approximately 10% of the defined resource within the extraction area (assuming an average thickness of 3m). The weathered material is most suitable for road base and sub-base products. The remainder of the profile largely consists of fresh rock comprising (in descending proportions) white, pink or blue granite which is suitable for a range of products.

It is noted that National Ceramic Industries preferentially purchase white granite due to the low iron and albite feldspar content. Based upon the drilling results and the Proponent's experience to date, the Proponent estimates that at least 30% of material from production blasts is not suitable for use by National Ceramic Industries and is suited principally for use in roadbase products or aggregate. Notwithstanding, the preferential use of the white granite by National Ceramic Industries, the white granite is also suited to the production of roadbase products and decorative white landscaping products.

Effectively all on-site resources could be utilised and sold as products.

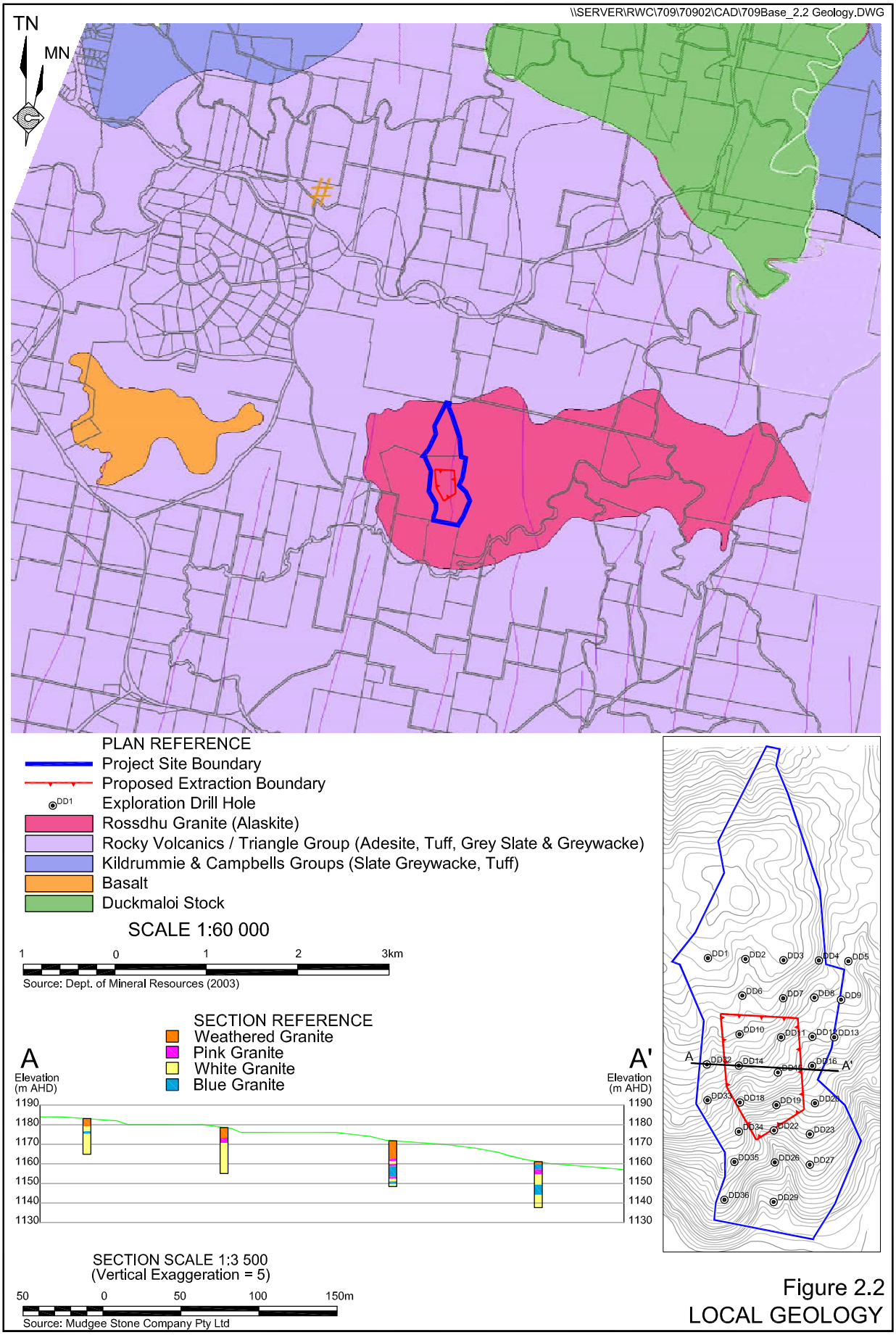


Figure 2.2
LOCAL GEOLOGY

2.2.3 Products

The Proponent proposes to produce a range of products derived from the weathered and fresh granite within the proposed extraction area including but not limited to the following.

- Roadbase products.
- Decorative gravels.
- Raw material for tile manufacture
- Concrete aggregate
- Anti-slip material.

Due to the favourable properties of the granite, the quarry currently produces, and would continue to produce, aggregates which meet RTA specifications for roadbase products and hence would provide a valuable source of roadbase for both RTA and Council road construction and maintenance. It is notable that, to the Proponent's knowledge, other than the Oberon White Granite Quarry, the closest commercial quarry to Oberon which produces roadbase aggregates meeting RTA standards is located at Capertee approximately 80km by road to the north.

Aggregates from the quarry are also utilised at the local concrete plant (Oberon Concrete) and produces a quality concrete product which meets required standards.

2.3 SITE ESTABLISHMENT AND CONSTRUCTION ACTIVITIES

2.3.1 Introduction

Although the Proponent would be effectively extending the existing extraction area, a period of site establishment and construction activities is proposed to establish the infrastructure required for the ongoing operation of the quarry at the scale proposed. Each of the site establishment and construction activities are identified on **Figure 2.3** and would include:

i) boundary definition and fencing;

ii) construction of the site access roads / tracks;

iii) creation of the product stockpiling area;

iv) construction of the weighbridge, office, amenities and workshop buildings; and

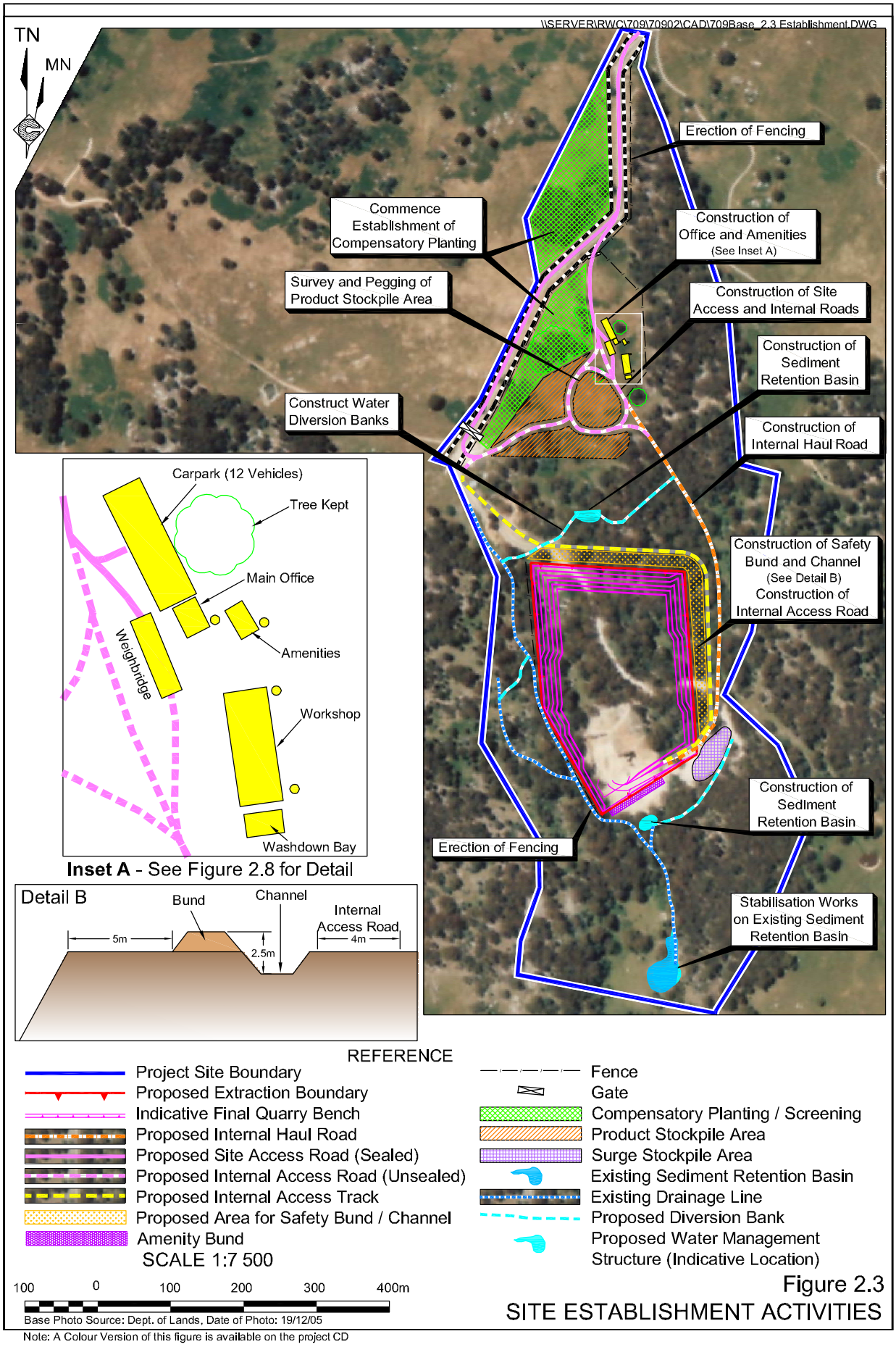
v) construction of site water management structures and safety bunding.

It is proposed that these activities would be completed within a period of approximately 24 weeks (not including any constraints posed by poor weather conditions etc). These activities are further discussed in the following subsections.

2.3.2 Boundary Definition and Fencing

The boundary of each approved Project component would be surveyed to ensure the boundaries of extraction, stockpiling and site infrastructure are clearly marked at regular intervals to enable operators of earthmoving equipment to contain all disturbances within the approved boundaries.

The Proponent would erect fencing adjacent the western boundary of the extraction site and temporary fencing surrounding the northern and eastern faces of the extraction site for safety purposes. The Proponent would also erect standard rural fencing (and appropriate signage) on the eastern boundary of the right of carriageway following the construction of the long-term access road to prevent unauthorised vehicle access to the office, amenities and stockpiling areas.



Note: A Colour Version of this figure is available on the project CD

Figure 2.3
SITE ESTABLISHMENT ACTIVITIES

2.3.3 Office and Amenities

The construction of the office and amenities area would involve limited earthworks using a D8 dozer to create suitable earthen pads for the laying of concrete foundations followed by the delivery and placement of transportable office/amenities buildings and installation of the weighbridge. The workshop would be constructed using a steel frame and cladding.

2.3.4 Site Access

The new section of site access road between the existing road within the right of carriageway and the proposed weighbridge would have a 4m seal and be constructed to a similar standard as the existing site access road. The internal access road within the stockpiling area and the proposed internal haul road between the stockpiling area and extraction area would be unsealed 7m wide roads constructed to an all weather standard.

All vegetation clearing and required cut and fill operations within the alignment of the new sections of the site access road, internal access road and the internal haul road would be undertaken using a D8 dozer and 30t excavator. Materials to construct the roads would include a combination of on-site and imported materials.

An unsealed internal access track would also be constructed adjacent to the safety bund and channel during construction of the bund and channel (see Section 2.3.5). No significant cut and fill or other works would be required.

Section 2.7.2 provides further details relating to the design and construction of the site access and internal roads.

2.3.5 Surface Water Management Structures and Safety Bunding

Site water management structures, including clean water diversion banks and sediment basins, would be constructed during the initial site establishment period using the D8 dozer and 30t excavator. Additionally, upgrade works to the existing sediment retention basin and inlet channel located to the south of the extraction area would also be undertaken. Sections 2.4.8 and 4.2.4 provide further detail relating to the surface water management structures to be constructed.

The safety bund and channel would also be constructed adjacent the northern and eastern boundaries of the proposed extraction area in a similar manner as the clean water diversion banks.

2.4 EXTRACTION OPERATIONS

2.4.1 Introduction

Extraction operations would be undertaken in a similar manner to existing operations, i.e. using free dig and conventional drill and blast methods. This would involve the sequential removal of vegetation and soil and, where necessary, stockpiling for use in future rehabilitation. Following vegetation and soil removal, the weathered rock would be removed after which the fresh hard rock resource would be extracted. This sub section presents information relating to the proposed extended extraction operations including vegetation clearing, soil removal, overburden removal, extraction methods, rates and equipment.

2.4.2 Design of Extraction Area

The following design criteria for the extraction area would generally be adopted throughout the life of the quarry.

- Operational Face Height:..... 15m
- Final Face Height:..... 10m
- Operational Bench Width:..... 20m
- Final Bench Width:..... 5m
- Face Angle:.....max 90°
- Final Quarry Floor Elevation.....1 130m AHD

The proposed maximum 90° face angle would be subject to ongoing geotechnical investigation throughout the life of the Project to ensure a safe and stable landform is created on the final perimeter faces.

2.4.3 Vegetation Clearing

Vegetation clearing would be undertaken on a campaign basis to provide sufficient areas for approximately the subsequent 5 years of operation. Vegetation clearing would initially be undertaken during the site establishment period clearing an area of vegetation approximately 1.5ha in size including the safety bund and channel area and internal haul road. A further four vegetation clearing campaigns would then be undertaken during approximately Years 5, 10, 15 and 20 removing between approximately 0.7ha and 1.0ha per campaign. The entire extraction area would be cleared of vegetation by the fifth clearing campaign during Year 20. **Figure 2.4** displays the approximate extent of each clearing campaign.

Prior to each clearing campaign, the area of vegetation to be cleared would be clearly defined and all personnel involved in vegetation clearing made aware of the boundaries of the clearing. Large trees would be visually inspected for nests/hollows prior to clearing and in the event a threatened fauna species is identified, the tree would not be felled until the threatened fauna moves away or is relocated by an appropriately qualified or trained person. Wherever possible, clearing would also be restricted to the periods between February and August to avoid the breeding season of threatened species that may potentially occur within the Project Site and surrounds.

Prior to clearing, temporary upslope diversion banks and, where required, downslope sediment fencing and / or catch drains would be constructed / installed (see Section 4.2.4 for further detail). Clearing of the larger vegetation would then be undertaken using a D8 bulldozer pushing with the blade positioned just above the ground to minimise soil disturbance. The smaller vegetation, i.e. groundcover and/or shrubs, would be retained and collected with topsoil during soil stripping activities (see Section 2.4.4).

Small tree limbs and tree trunks would be set aside for use in habitat improvement on site, with any surplus tree limbs mulched and/or chipped and used for soil stabilisation in rehabilitated areas. Larger tree trunks not used for habitat improvement would be removed for fencing materials, firewood and/or stockpiled for use in subsequent rehabilitation activities.

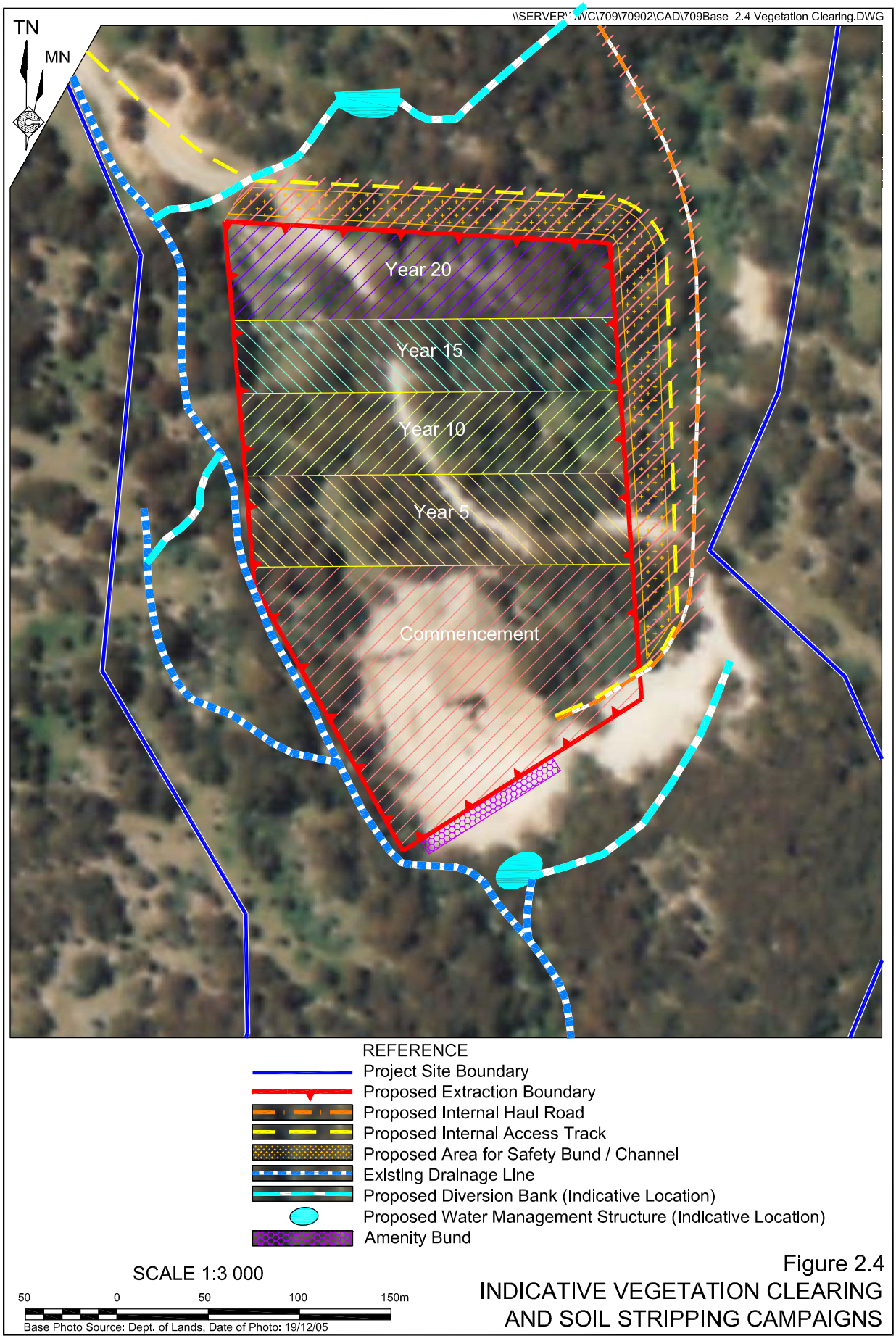


Figure 2.4
INDICATIVE VEGETATION CLEARING AND SOIL STRIPPING CAMPAIGNS

2.4.4 Soil Removal

2.4.4.1 Soil Stripping

Following removal of the larger vegetation, the upper 10cm to 20cm of topsoil would be stripped, together with the remaining smaller vegetation and groundcover. Topsoil would be stripped from all areas of disturbance given the valuable seed, organic matter and nutrient matter present in the topsoil.

Within the extraction area, subsoil would also be stripped from approximately 20cm in depth up to 100cm in depth, where possible, with the aim to strip an average thickness of approximately 50cm of subsoil to provide sufficient material to achieve successful rehabilitation of finalised benches. Stripping would cease where excessively coarse or stony material (i.e. weathered granite) is encountered.

2.4.4.2 Soil Stockpiling

During the first 5 years of operation until final benches are created, all topsoil and subsoil would be stockpiled within the surge stockpile area or the footprint of the extraction area.

Beyond approximately Year 5, stripped topsoil and subsoil would be directly transferred to finalised areas awaiting completion. Topsoil and subsoil unable to be directly placed would be temporarily stockpiled within the footprint of the extraction area for use in the progressive and final rehabilitation of the site.

When stockpiling is necessary, topsoil and subsoil would be stockpiled separately from each other and to heights no greater than 2m and 3m respectively. Stockpiles would be constructed with a slope no greater than 1:2 (V:H) and the surface left 'rough', in a micro sense, to assist in runoff control, seed retention and germination. Any stockpile that would be retained in excess of 3 months and has not naturally established a cover would be seeded using a non-persistent cover crop to reduce erosion potential and assist in the maintenance of the biological viability of the soil resource.

Care would also be taken to ensure that driving of machinery on the topsoil and subsoil stockpiles is kept to a minimum to maximise soil aggregation and prevent compaction, particularly when the stockpiles are moist.

2.4.5 Extraction Method and Extraction Sequence

Following vegetation clearing and soil stripping, weathered and partially weathered granite (generally the upper 6m of material) would be extracted, generally using a combination of free dig and drill and blast methods. The underlying unweathered or fresh hard rock resource would then be extracted using drill and blast methods. On average, each production blast would remove approximately 20 000t of material, resulting in approximately 12 production blasts per year. A number of smaller development blasts would also occur to restructure areas for rehabilitation or prepare areas for production blasts. Drilling would typically be undertaken for approximately 6 days per month and blasts would be undertaken by a licenced blasting contractor.

Blasts would be designed so as to place the majority of the broken rock on the floor of the extraction area to limit the need to push or otherwise transport broken rock from the benches. Blasts would be undertaken over an area of approximately 600m^2 with a drill hole spacing of generally 2.8m by 2.8m and up to a depth of approximately 15m with a Maximum Instantaneous Charge (MIC) of approximately 100kg.

In some instances, oversize material may be reduced through small charge popping. This would involve drilling holes within the oversize material and loading small volumes of explosives to further fragment the rock. The MIC during small charge popping would be significantly less than for production blasts, typically up to 5kg.

Extraction would continue from within the existing extraction area, initially extending to the east and then generally progressing to the north with benches on the eastern and western boundaries progressively finalised as extraction continues. **Figure 2.5** presents the indicative extraction sequencing throughout the life of the quarry.

2.4.6 Extraction Rates

Extraction rates would progressively ramp up over a period of approximately 5 years to a maximum of 250 000tpa. Following the initial ramp up period, it is expected that extraction rates over the remaining life of the quarry would average approximately 200 000tpa with annual variations reflecting natural market variations.

2.4.7 Extraction Equipment

Table 2.1 presents an indicative list of the typical types and numbers of items of mobile equipment which would be used throughout the life of the quarry. Any decommissioned equipment would be replaced with equipment of similar capacity.

2.4.8 Water Management

In order to manage sediment-laden water on site, it is proposed to construct a sump within the southern corner of the extraction area to capture all runoff from within the extraction area. A sediment retention basin (Dam 2) would also be constructed immediately south of the southern batter of the extraction area to provide 'overflow' storage capacity ensuring adequate retention time of sediment-laden water. A diversion bank south of the surge stockpile area would also divert any runoff from the stockpile into Dam 2. The existing sediment retention basin located near the southern boundary of the Project Site (Dam 3) would be retained and upgraded to provide a final capture and release system.

A diversion bank and sediment retention basin (Dam 1) would also be constructed south of the product stockpile area to capture any sediment laden runoff from that area. Dam 1 would act to reduce the volume of water flowing to the extraction area with any overflows reporting to a clean water diversion bank directing clean water runoff to the existing drainage line west of the extraction area (see **Figure 2.1**).

Water runoff within the channel associated with the safety bund would generally flow to the east and south. This runoff would then be directed into the extraction area at the point of access for the internal haul road and subsequently report to the quarry sump. Appropriate stabilisation would be provided within the channel to prevent scouring and erosion.

The diversion banks and sediment retention basins would be constructed in accordance with the specifications provided within the 'Blue Book' (Landcom, 2004). Further detail relating to water management and water management structures is presented in Section 4.2 and the Surface Water Assessment prepared by GSS Environmental (2010) (see Part 1 of the *Specialist Consultants Studies Compendium*).

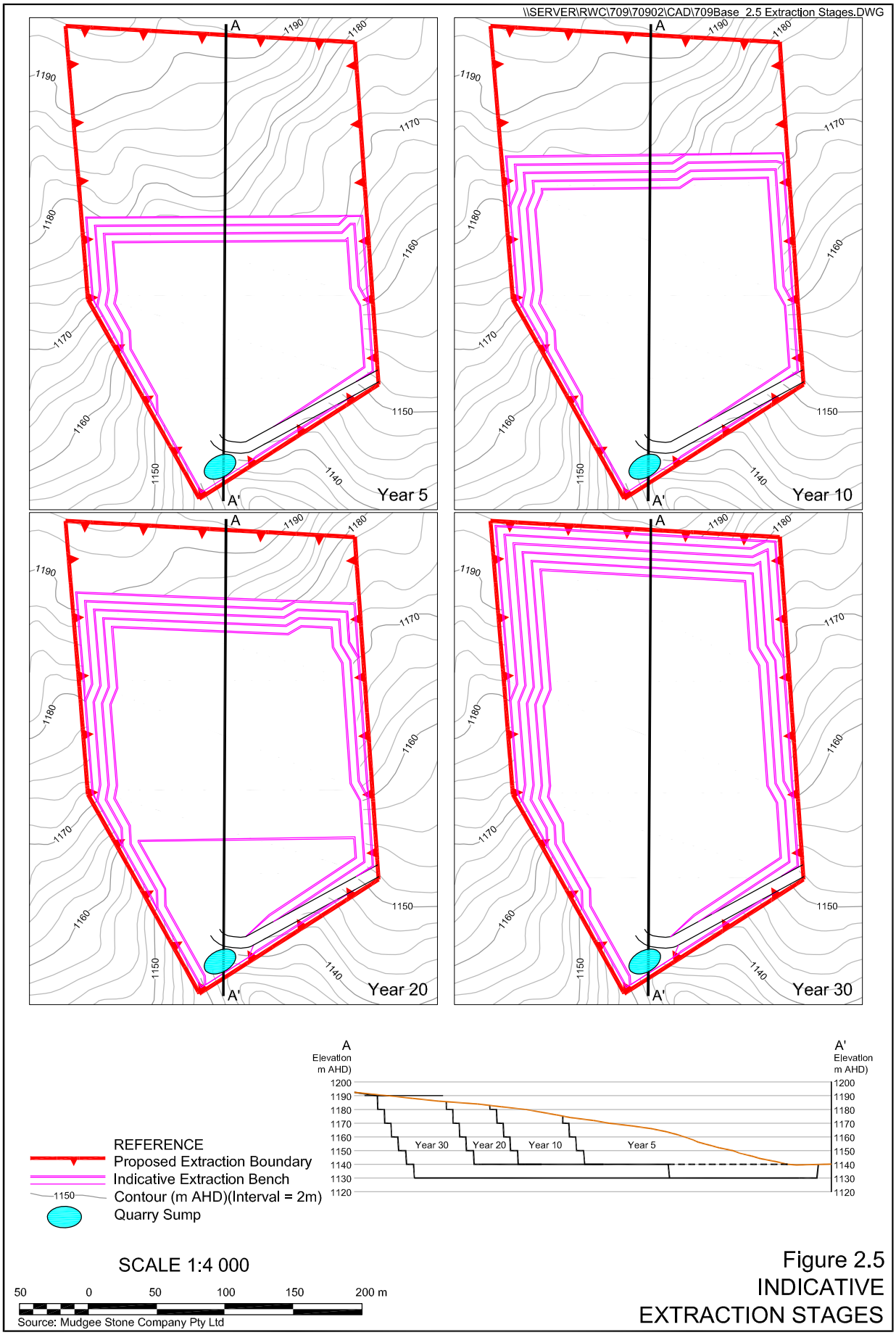


Figure 2.5
INDICATIVE
EXTRACTION STAGES

Table 2.1
Indicative Earthmoving and Mobile Equipment

Equipment	Number	Use	Duration/Frequency at Maximum Production
D8 Bulldozer	1	Earthworks. Clearing of vegetation.	During site establishment and vegetation clearing campaigns only (each of approximately 2 weeks duration).
Ingersoll Rand 660 Hydraulic Drill Rig	1	Drilling of granite for blasting.	Operational hours Mon to Fri. Average of approximately 6 days per month.
WA 500 or Cat 980 Front-end loader	1 - 2	Stockpile management and loading blasted rock. Loading product trucks.	Continuous during operational hours.
Hitachi 30t Excavator (with rock hammer attachment)	1	Removal of soil/overburden. Removal of weathered granite. Loading of blasted rock to mobile crusher. Reduction of oversize (with rock hammer).	Operational hours. Rock hammering – maximum of 16 hours per month.
Cat 769 30t Haul Truck	1	Transportation of products to stockpiles.	Operational hours.
Cat 12G Grader	1	Maintenance of internal haul road. Ancillary activities.	On a contract basis (less than 10% of operational hours).
10 000L Water truck	1	Dust suppression.	Operational hours – as required.
5 000L Mini tanker	1	Refuelling of mobile and fixed plant.	Operational hours – as required.

2.5 ON-SITE CRUSHING, SCREENING AND STOCKPILING OPERATIONS

Blasted rock would typically be less than approximately 750mm in diameter and, where possible, would be directly loaded into the mobile crusher using a 30t excavator. Where required, blasted rock may also be loaded into the 30t haul truck and either loaded into the hopper for the crusher or stockpiled adjacent the crusher.

Processing would be undertaken with a mobile crushing and screening plant with a throughput varying from 80 to 250 tonnes per hour depending on the type(s) of product produced with an average of approximately 100 tonnes per hour. The plant would consist of a primary jaw crusher and secondary cone crusher and multiple screens. A range of aggregate products would be produced generally ranging in size from <7mm to 100mm gabion.

All crushing and screening would initially be undertaken using mobile plant located on the floor of the extraction area. As the extraction faces progress northwards, the plant would also be relocated northwards but would remain on the floor of the extraction area. Consideration may be given to installation of a fixed processing plant pending investigations into the supply of mains power to the Project Site and to the extraction area. In the event that a fixed plant is installed, it would also be located on the floor of extraction area.

Any oversize rock not broken by small popping blasts or sold as armour stone would be reduced in size by a hydraulic hammer on the floor of the extraction area within 20m of the eastern or western extraction faces (for acoustic shielding purposes). The broken rock would then be transported by either front-end loader or haul truck to the crushing and screening plant.

Products would be stockpiled either separately within the extraction area or within the stockpile area adjacent the office and amenities area. Stockpiles would be managed using a front-end loader and 30t haul truck.

Generally up to 20 000t of products would be stockpiled at any one time to allow for periods of poor weather. Stockpiles would range in heights of up to 6m.

2.6 WASTE MANAGEMENT

No processing wastes would be produced from the operation with all extracted materials being sold as product or utilised for rehabilitation purposes.

All paper and general wastes originating from the office, amenities and weighbridge, together with routine maintenance consumables from the servicing of the processing equipment and mobile equipment, would be disposed of in appropriate containers, placed within the office and amenities area. Any waste oils would be appropriately stored within a bunded area. The waste containers would be collected by a licenced waste disposal contractor or removed to a licence disposal facility on an as-needs basis. All wastes capable of being recycled eg. paper/cardboard, oil, and metals would be separately stored and removed by a licenced contractor or removed to a licenced recycling facility.

2.7 PRODUCT TRANSPORTATION

2.7.1 Introduction

An important component of the Project would be the despatch of the products produced on site. This section reviews the proposed site access and product transport routes and the levels of product truck movements and other traffic likely to travel to and from the Project Site. Further discussions regarding controls relating to road transportation procedures are presented in Section 4.5.3.

2.7.2 Site Access and Product Transportation Routes

Access to the Project Site would continue via Hampton Road and Ferndale Road and the existing site access road within the right of carriageway. As discussed within Section 2.3.3, a new section of site access road would be constructed between the existing site access road within the right of carriageway and the proposed weighbridge (see **Figure 2.1**). This new section of site access road would be constructed to a similar standard as the existing site access road i.e. 5m wide compacted base and sub-base (130mm/170mm respectively) and 4m wide 2 coat bitumen seal. The internal access road within the stockpiling area would be an unsealed 7m wide compacted base and sub-base (100mm/200mm respectively) all weather standard road.

Product trucks entering the Project Site would travel along the site access road within the right of carriageway and enter the stockpiling area from the west. Following loading, product trucks would continue eastwards and then northwards to the weighbridge before exiting the Project Site. This would effectively provide a one-way loop for heavy vehicles except for the northern 300m of the site access road which would provide two-way access (see **Figure 2.6**).

An unsealed 7m wide, all weather standard, two-way internal haul road would also be constructed between the stockpiling and extraction area and would be constructed so as to achieve a maximum grade of 1:8 V:H. The internal haul road would primarily be used by the off-road haul truck to transport products to the stockpiling area and mobile extraction and processing equipment, however, the internal haul road would also be used by road registered trucks when products are loaded directly from the extraction area. Once additional stockpiling areas become available within the extraction area, it is expected that up to 50% of products may be loaded directly from the floor of the extraction area.

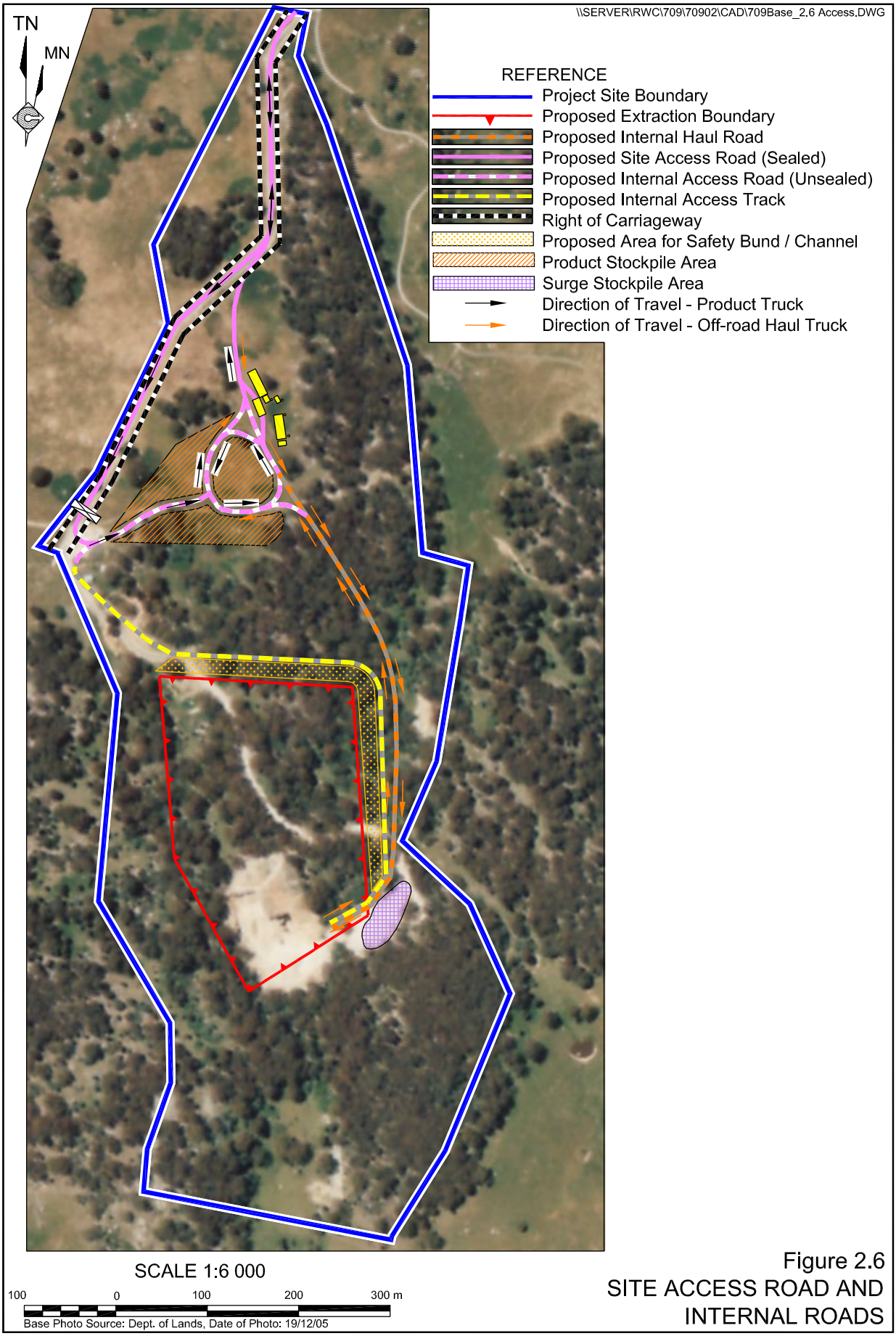


Figure 2.6
SITE ACCESS ROAD AND INTERNAL ROADS

In addition to the site access and internal link and haul roads, a 3m to 4m wide unsealed internal access road would be constructed and maintained adjacent the safety bund and channel and joining with the northern section of the existing site access road. The internal access road would provide ongoing access to the safety bund and channel for light vehicles and, if necessary, mobile equipment. The internal access road would not be used for the transportation of raw materials or products.

All Project-related vehicles would exit the Project Site onto Ferndale Road and travel northwards to the intersection with Hampton Road. Approximately 20% of product trucks would turn left and travel westwards along Hampton Road towards Oberon and 80% would turn right and travel eastwards along Hampton Road towards Sydney. The proportions outlined relate to the expected annual distribution whereas the daily or weekly proportion may change reflecting prevailing market destinations.

Based on an assessment of the existing Ferndale Road / Hampton Road intersection by Barnson Pty Ltd (2010) (see Part 7 of the *Specialist Consultant Studied Compendium)*, the following additional works would be undertaken on the intersection to ensure safe ingress/egress of all vehicles.

- Painting of give way lines and markings on Ferndale Road.
- Installation of a give way sign on Ferndale Road.
- Installation of reflective marker posts on Hampton Road for the assessment of visibility during poor weather conditions (eg. fog).

Figure 2.7 shows the existing intersection and proposed additional works.

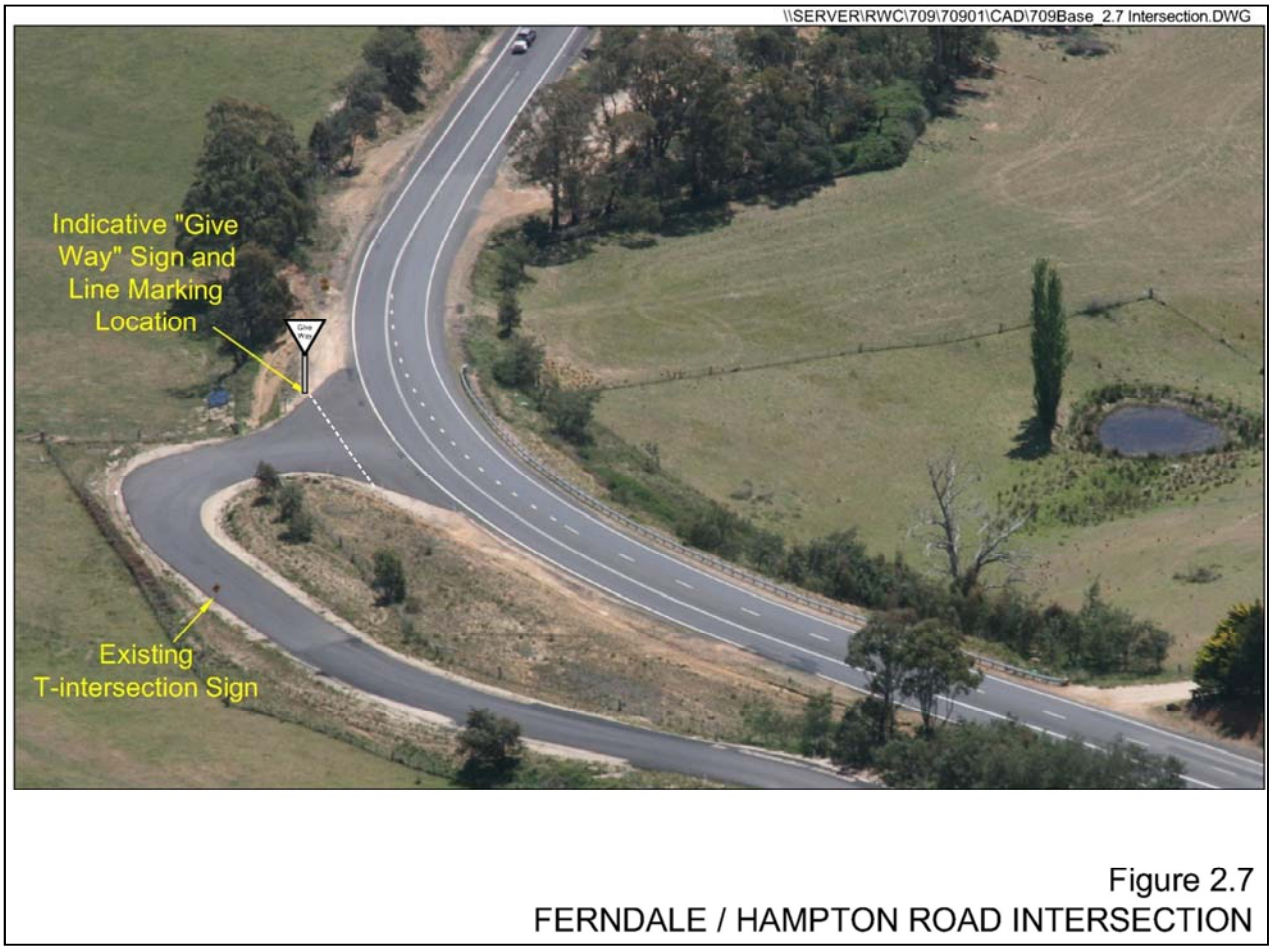


Figure 2.7
FERNDALE / HAMPTON ROAD INTERSECTION

2.7.3 Traffic Types and Levels

Product trucks would typically range from 2 axle rigid trucks, truck and dog trailers and 6 axle semi-trailers. The average pay load capacity would be approximately 30t resulting in, at maximum production, an average of 27 truck loads despatched daily (54 movements) between Monday and Saturday. As sales and product despatch would vary from day to day, the 85th percentile number of truck loads on any day would be approximately 34 loads (68 movements).

On a daily basis, peak truck movements would generally occur between 6:00am and 8:00am and 2:00pm and 4:00pm Monday to Friday. It is estimated that up to 12 truck loads (24 movements) or 6 loads per hour would occur between 6:00am and 8:00am and 6 truck loads (12 movements) or 3 loads per hour between 2:00pm and 4:00pm. During the remaining transportation hours, there would be an average of 1 truck load (2 movements) per hour.

As a contingency, the ability to transport a maximum of 3 loads (6 movements) per day would also be retained on Sundays (consistent with the existing development consent). To date, products have only been required to be transported from the existing quarry on Sundays on an irregular basis.

Other vehicles travelling to and from the Project Site would include delivery trucks (e.g. fuel and supplies) estimated at up to 2 truck movements per day (once every 2 to 3 weeks) and employee's light vehicles estimated to amount to 12 to 20 light vehicle movements per day at full production. Some loads may be oversize loads, particularly during site establishment and prior to clearing campaigns, when mobile equipment is floated to and from site. No oversize loads requiring vehicle escorts are considered likely to be required at any time throughout the Project life.

2.8 HOURS OF OPERATIONS AND PROJECT LIFE

2.8.1 Hours of Operation

Table 2.2 records the proposed hours of operation for all activities. It is noted that non-audible maintenance activities may need to be undertaken outside the nominated hours, 7 days per week. The proposed hours of operation effectively provide for transportation to commence 1 hour earlier and transportation and processing to cease 1 hour later than the currently approved hours (refer to Section 1.5.6). However, the proposed hours also provide a greater restriction on other activities (including drilling and blasting) during weekends which are currently approved under the existing development consent.

2.8.2 Project Life

Taking into account a ramp-up period of approximately 5 years, a subsequent average annual extraction rate of 200 000tpa and anticipated 5Mt resource, the overall Project life would be approximately 30 years. It is noted that the principal activities within approximately the final 1 to 2 years would involve final rehabilitation works with ongoing care and maintenance.

Table 2.2
Proposed Hours of Operation

Activity	Monday to Friday[1]	Saturday[1]	Sunday[1]
Site Establishment (excluding Dozer operation)	7:00am to 5:00pm	-	-
Vegetation Clearing Campaigns and Dozer operation	9:00am to 5:00pm	-	-
Drilling[2]	7:00am to 5:00pm	-	-
Blasting, small charge popping	9:00am to 5:00pm	-	-
Rock hammering[3]	9:00am to 3:30pm	-	-
Processing	7:00am to 6:00pm	8:00am to 6:00pm	-
Transportation	6:00am to 6:00pm	8:00am to 6:00pm	8:00am to 6:00pm[4]

Notes: 1. Excludes public holidays.
2. During early morning temperature inversions which could potentially lead to a noise exceedance, drilling would be suspended until the temperature inversion clears (see Section 4.6 for further discussion).
3. Rock hammering would only be undertaken up to 16 hours per month.
4. A maximum of three loads of material would be transported on Sundays.

2.9 INFRASTRUCTURE AND SERVICES

2.9.1 Buildings

The Proponent proposes to install / construct the following infrastructure in a designated area approximately 160m north of the proposed extraction area (**Figure 2.8**).

- Workshop (30m x 10m x 8m)
- Demountable Office (11m x 7m)
- Demountable Lunchroom / Washrooms building (11m x 4m)
- Wash down bay.
- Water storage tanks.
- Oil store (bunded area within the workshop).

A defined parking area adjacent the Lunchroom / Washrooms would provide parking for 12 light vehicles with heavy vehicles parked either within the extraction area or adjacent the workshop thereby maintaining a separation between quarry vehicles and off site vehicles. A weighbridge would also be installed adjacent the main office connecting with the approved transport route via a short road loop (see **Figure 2.8**).

The existing storage sheds to the southeast of the office, amenities and stockpiling area would be retained for sample storage etc.

2.9.2 Services

2.9.2.1 Power

Electrical power for the office / amenities and workshop would initially be supplied using a 100kVA diesel generator, however, the Proponent will further investigate potential upgrades to the mains power to supply the site, particularly once production levels exceed 150 000tpa.

2.9.2.2 Water

Potable water would be supplied from four 5 000L rainwater storage tanks collecting water from the office, amenities and workshop buildings and, when required, would be supplemented with water trucked to site. Based on an on-site workforce of up to 10 people, it is estimated that approximately 350kL of potable water would be required for the office and amenities each year.

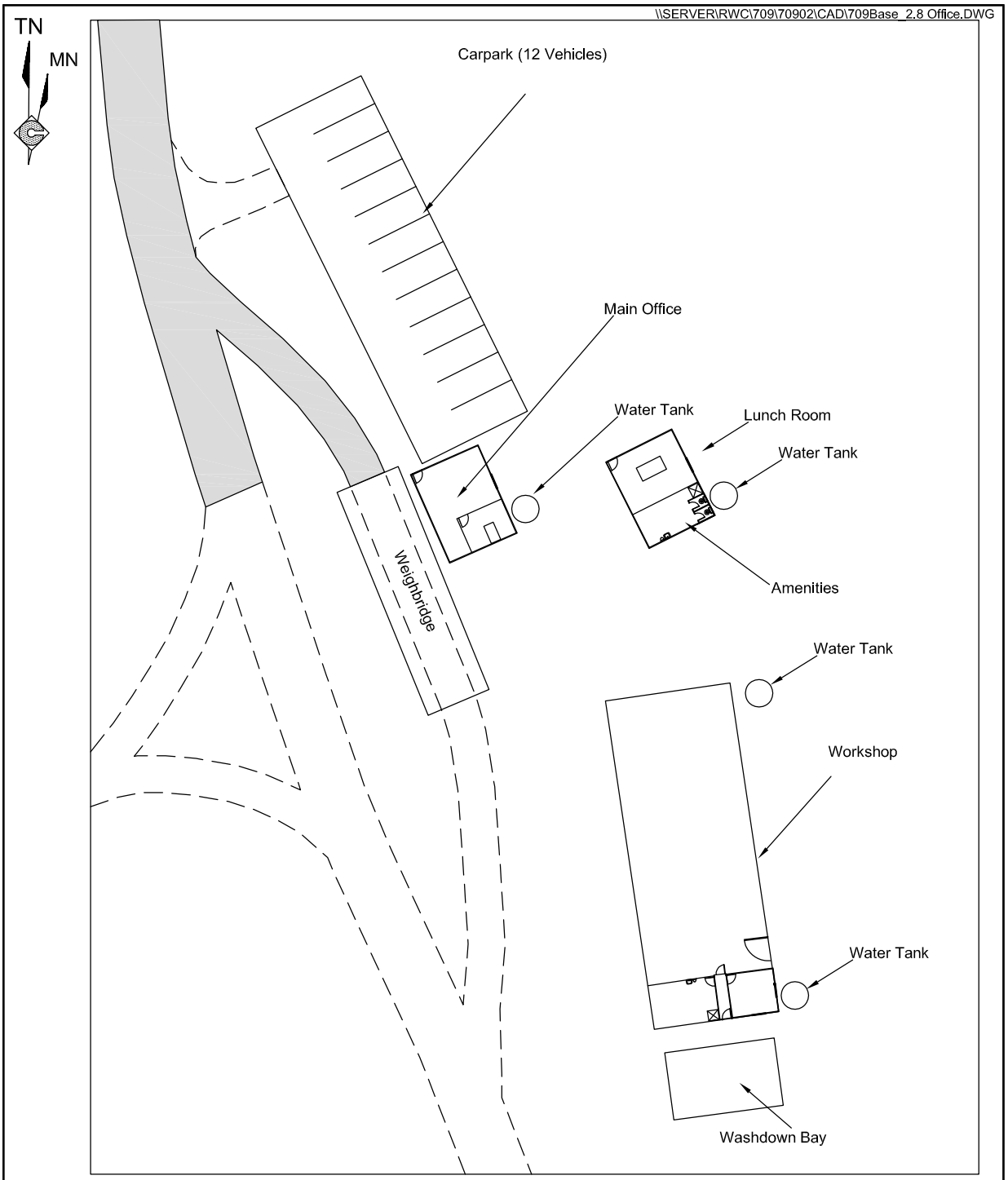


Figure 2.8
OFFICE AND AMENITIES

At maximum production, approximately 2ML of water would be used annually for dust suppression from crushing and screening operations. Additionally, approximately 13ML of water would be used annually for dust suppression on internal roads and around the active crushing plant site. Water required for dust suppression would be drawn from either the sediment retention basins or sump within the extraction area.

In total, the net annual water requirement would be in the order of 15ML.

2.9.2.3 Sewage

A Council-approved biocycle treatment system would be installed adjacent to the amenities / facilities buildings for use by all site personnel and truck drivers. The system would provide water for a landscaped area around the office and amenities / facilities buildings.

2.9.2.4 Communications

Telephone cables for telephone, facsimile and internet services would be required for the site office. A total of four lines would be required. On-site communications would also utilise mobile phone and 2-way radio.

2.9.2.5 Fuel

Without the use of mains power, it is estimated that up to 100 000L of diesel would be required per year at full production to generate the power to operate the crushing and screening plant and to operate the mobile equipment. It is proposed that a 5 000L mini tanker would service the mobile equipment and generators on an as needs basis. Whilst not in use, the mini tanker would be parked adjacent the workshop.

In the event mains power is used to operate the crushing and screening plant, annual fuel usage would drop to approximately 30 000L.

2.9.2.6 Explosives

ANFO / Gel-based bulk explosives would be used within the extraction area with non-electric or electronic delay detonators used for blast initiation. Bulk explosives and detonators would not be stored on site but rather brought on site by the blast contractor immediately prior to each blast.

2.9.2.7 Consumables

A number of maintenance products, such as air and oil filters, would be stored within the workshop for servicing mobile equipment and plant.

2.10 EMPLOYMENT

It is expected that up to ten tradesmen, labourers and engineers would be employed during the site establishment period. Once fully operational and at full production, the operation would employ between six and ten full time persons on site, preferentially sourced from the local labour force (see **Table 2.3**). A range of other contractors would also be engaged from time to time.

Table 2.3
Indicative Direct Employment

Position/Function	No. Employed
Production Manager	1
Loader Operators	1 to 2
Drill Operator	1
Processing Plant, Excavator and Haul Truck Operators	1 to 4
Office/Administration	1
Mechanic/Fitter/Maintenance	1
Total	**6 to 10**

Additionally, the operation would provide employment for approximately 15 to 20 contract truck drivers for transportation of quarry products.

2.11 SAFETY AND SECURITY

The Proponent would erect a standard rural fence along the eastern side of the right of carriageway (complementing the existing fence on the western boundary) and lockable gates to the office, amenities and stockpiling area and on the southern boundary of the carriageway to prevent unauthorised access. Appropriate signage would also be placed at the entrance to, and along, the right of carriageway providing information on authorised entry and clearly directing quarry-related vehicles entering the Project Site and any private vehicles utilising the right of carriageway.

The northern and eastern perimeter of the extraction area would be surrounded by a 1.5m high safety bund and 1m deep channel to provide a substantial physical barrier to prevent inadvertent / accidental vehicular access over the extraction face. The inside toe of the safety bund would be located approximately 5m from the boundary of the final extraction area. Temporary safety fencing would be used in the interim until the bund is constructed. The safety bund would be constructed around the perimeter of the extraction area at the earliest practical time following receipt of project approval. The bund would be constructed using existing oversize material located in the southern part of the approved extraction area and overburden. The western perimeter of the extraction area, being adjacent a natural gully would be fenced with a substantial rural style fence. Appropriate warning signs such as “Deep Excavation” satisfying the requirements of I&I NSW would also be installed around the perimeter of the extraction area.

All required safety and operational procedures and documentation would be prepared / reviewed in accordance with relevant legislation and guidelines prior to commencement of operations. All personnel would be appropriately trained and only trained and competent shot firers would conduct the blasting operations. It is considered the proposed hour for blasting (see **Table 2.2**) are sufficient within which to safely conduct the required works to set and fire the shot.

2.12 REHABILITATION AND DECOMMISSIONING

2.12.1 Introduction

The Proponent would adopt a progressive approach to rehabilitation to ensure that, whenever possible, disturbed areas are either temporarily or permanently stabilised to limit potential erosion and adverse visual impacts. The following subsections describe:

- the Proponent's rehabilitation objectives for each phase of rehabilitation including site establishment;
- the rehabilitation procedures to be adopted throughout the life of the quarry;
- the components involved in site decommissioning;
- the final landform that would be progressively formed throughout the Project life; and
- the planned long term uses of the rehabilitated landform.

The proposed rehabilitation procedures have been developed with the assistance of GSS Environmental (for surface water and erosion) and Gingra Ecological Surveys (for flora species). The procedures adopted would be regularly reviewed throughout the life of the Project and modified if appropriate, to reflect the operational experience gained.

2.12.2 Rehabilitation Objectives

In the short term, the Proponent's objectives would be to stabilise all earthworks, drainage lines and disturbed areas no longer required for quarry-related activities in order to minimise erosion and sedimentation.

It would also be the Proponent's short term objective to establish the Compensatory Planting areas adjacent the right of carriageway together with a protected offset area within the Project Site in consultation with the DECCW. Further details regarding the proposed offset are discussed in Section 4.4.5.2.

In the longer term, the Proponent's rehabilitation objectives are as follows.

- To provide a low maintenance, geotechnically stable and safe landform which is commensurate with the nature conservation and grazing surrounding the Project Site.
- To revegetate with native tree, shrub and grass species comparable with the existing vegetation communities on the Project Site and in the local area. Particular emphasis would be placed on the use of species common to the existing open woodland vegetation community.
- To re-instate native vegetation communities in areas of disturbance.

2.12.3 Rehabilitation Procedures

2.12.3.1 Site Establishment

The site establishment and construction phase would result in the disturbance of a number of areas on the Project Site including areas adjacent to the internal roads, the safety bund and channel and water management structures. Rehabilitation during and immediately following site establishment would include stabilisation of disturbed areas involving a combination of a native grass seed mix and a fast-growing non-persistent cover crop. Where appropriate, native shrub and tree species would also be established.

Following construction of the sediment retention basin adjacent to the southern toe of the existing 6m bund along the southern boundary of the extraction area, rehabilitation works, including the establishment of native grass, shrub and tree species, would be undertaken to stabilise the southern batter of the bund. Additionally, stabilisation and rehabilitation works as recommended by GSS Environmental (2010) would also be undertaken within the inlet channel to the existing sediment retention basin near the southern boundary of the Project Site. These works would involve the following.

- Stripping of existing topsoil from the drainage line and the side batters.
- Shaping of the side walls and inlet channel to the extent of existing erosion.
- Re-spreading of topsoil over the area.
- Sowing of the inlet channel and the side walls with an appropriate grass mix.
- Securing jute mesh and bitumen to the original extent of the erosion in the drainage line.

2.12.3.2 Progressive Rehabilitation

An important component of the rehabilitation of the Project Site would be the progressive rehabilitation of finalised benches. Drilling of final benches would be undertaken to provide a slight infall back towards the face to aid in the retention of soil and water. Subsoil and topsoil would then be placed to a depth of approximately 0.5m and 0.15m respectively and approximately 5m wide prior to the final blast reducing the final bench to approximately 5m width (see **Figure 2.9**).

Whenever possible, subsoil and topsoil would be directly transferred to finalised benches during vegetation and soil stripping campaigns in order to preserve the native seed bank and as much organic material as possible. The final surface of topsoil would be direct seeded with a range of endemic native tree and shrub species. If necessary, supplementary tube stock planting would be undertaken to ensure adequate vegetation establishment and species diversity is achieved.

2.12.4 Site Decommissioning and Final Landform

The Proponent intends to remove all buildings and structures off site at the end of the quarry life unless the buildings are of use to the subsequent land use. Any concrete footings from removed buildings would be ripped up and removed off site for recycling. All internal roads not required for the subsequent land use(s) would be cross-ripped, topsoiled and seeded. The water management structures and safety bund and channel would be retained following completion of quarrying.

Any areas where there have been fuel spillages etc would be remediated either on site or the affected material removed from site.

It is intended that the final landform of the extraction area would be a large open amphitheatre with vegetated stepped sides with the sump retained as a water storage. **Figure 2.9** presents the indicative final landform.

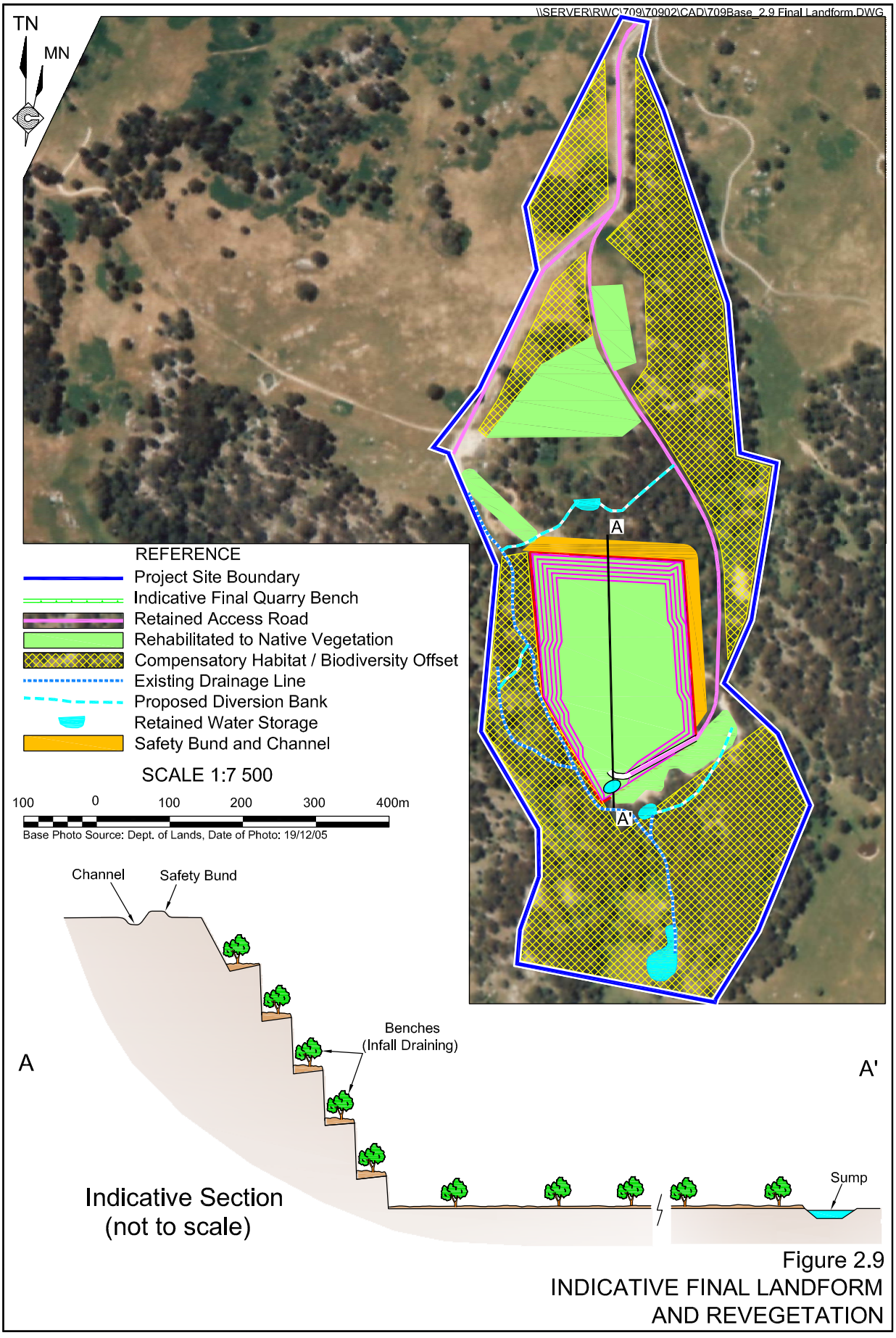


Figure 2.9
INDICATIVE FINAL LANDFORM
AND REVEGETATION

2.12.5 Final Land Uses

It is expected that the final land use would be a combination of long-term nature conservation and grazing, particularly within the flatter grassland areas within the northern parts of the Project Site.

2.13 PROJECT ALTERNATIVES

The Project has been designed to optimise the following.

1. Extraction area design and location.
2. Location of the processing plant.
3. Location of the long-term access road.

It is considered that there are no other practicable or reasonable alternatives to points 1 to 3 with alternative locations likely to result in operational difficulties or increased potential for environmental impacts.

It is accepted that alternative sources of alaskite would be available elsewhere within the Rossdhu Granite outcrop, which covers a surface area of approximately 10km^2 (see **Figure 2.2**). However, there are currently no known proposed extraction operations within the Rossdhu Granite, despite a long history of exploration and investigation (see Section 1.4). In order to further develop this resource, the only feasible option to the Proponent is to extend their current extraction operations.

Consideration has also been given to the optimum production rate and it is considered that, although average production rates would likely be in the order of 200 000tpa, based on current and predicted market demand, the proposed maximum production rate of 250 000tpa would be adequate to supply peaks in market demands during the Project life.