



Section 3

Project Description

PREAMBLE

This section outlines the plans for the proposed development and operation of the Project within a structure broadly consistent with the draft guide for State Significant Development (DPIE, 2020). A Project Overview is provided in tabular form and the Project Area is described, followed by sections on the layout and design, proposed activities, timing, staging and sequencing and proposed progressive rehabilitation.

The Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of the activities proposed and to enable an assessment of the potential impacts of the Project on the surrounding environment.

Details of the safeguards, mitigation measures and operational procedures that Cleary Bros would implement to protect and manage noise, groundwater, surface water, flora, fauna, air quality, visibility, cultural and historic heritage, soils and other components of the local environment are presented in Section 6 of this document.



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3.1 Introduction

3.1.1 Objectives

The objectives in developing and operating the Project are to:

1. secure access to a long-term hard rock resource that would provide a range of high quality aggregates, armour rock, and pavement products for use in the Illawarra-Shoalhaven and Greater Sydney Regions;
2. produce up to 900 000 tonnes per annum (tpa) of aggregates, armour rock and pavement products and to meet the increasing supply demands of these markets over the next 30 years;
3. maximise resource recovery within the defined extended extraction area;
4. undertake activities in an environmentally responsible manner to meet all relevant criteria and satisfy reasonable community expectations;
5. ensure the Project's contribution to the cumulative impact of the quarries in the Dunmore-Shellharbour Hills area is proportionate to the overall impacts of all quarries;
6. maintain local employment levels; and
7. operate in a cost-efficient manner.

3.1.2 Project Overview

An overview of the key Project elements is provided in **Table 3.1**.

Table 3.1
Project Overview

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Project Element	Description
General Infrastructure	Internal access roads only. All other infrastructure is already in place/approved.
Project Area	Stages 1 to 6 of the current approved extraction area and Stage 7 of the proposed extraction area extension.
Extension Disturbance Area – Stage 7	Approximately 20ha (Figure 3.1)
Total Disturbance Area – Stages 1 to 7	Approximately 36ha (Figure 3.1)
Resource	The quantity of hard rock resources to be extracted in Stage 7 and remaining in Stages 1 to 6 is approximately 33 million tonnes.
Overburden	1.6 million loose cubic metres
Extraction Method	Conventional drill, blast, load and haul (No Change).
Processing	All rock blasted within the Project Area would be primary crushed and screened with mobile equipment, the bulk of which would be transported by haul trucks to the already approved fixed processing plant on Cleary Bros' property north of the Project Area. Processing of some of the primary crushed rock would also be undertaken within the Project Area using smaller mobile crushing and screening equipment.
Product Transportation	Not a component of the Project – already approved (see Section 1.3.3).
Annual Production	900 000t (maximum) (No Change).

Table 3.1 (Cont'd)
Project Overview

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Project Element	Description
Mitigation Elements	The existing amenity barrier north of Stage 5 would be extended to the east along the northern boundary of Stage 7, unless agreed otherwise with the owners of "Figtree Hill." A further amenity barrier would be constructed and tree screen planted to provide a noise and/or visual barrier for the occupants of the "Figtree Hill" residences and properties to the east of the Princes Highway in Shell Cove West during the first 10 to 15 years of operations in Stage 7. Extraction staging would assist to minimise views of the operational areas and final vegetated benches.
Flexible Elements	Internal haul road locations; overburden emplacement; extraction sequencing; plant species used in progressive rehabilitation; equipment fleet; and personnel crib hut location.
Hours of Operation	<ul style="list-style-type: none">7:00am to 5.30pm Monday to Friday (no change).7:00am to 1:00pm Saturday (no change), with operations in the Stage 7 Area on a maximum of 16 Saturdays per calendar year.No operations on Sundays or Public Holidays (no change).
Project Duration	30 years (an extension of 15 years beyond the current development consent)
Operational Workforce	Approximately 27 employees and contractors would continue to be directly involved in extraction and processing operations at the Quarry.
Water Management	Surface water would be managed through the construction of diversion banks to re-direct clean runoff away from the active extraction area and sumps within the active extraction area to control sediment-laden runoff. Mitigation measures would be used to ensure no pollution of surface water resources beyond the Project Area.
Water Usage	Expected maximum annual water usage for the Quarry would be 110ML principally for dust suppression. This water would be sourced from the Storage Dam and supplemented with water drawn from the sump(s) within the extraction area.
Rehabilitation	Rehabilitation would occur progressively throughout the Project life. The final landform is already partly formed in Stages 1, 2 and 3. Future rehabilitation would focus on initial stabilisation of the areas to be disturbed and backfilled with overburden and VENM / ENM during Stage 7. Vegetation would also be progressively established on the final or terminal extraction benches as they are completed.
Capital Investment Value	\$31,837,881 – accounts for development costs for the demolition of the Belmont Main House and associated archaeological investigations, the construction of the amenity barriers and planting of the tree screens within the Project Area and the cost of a crushing, screening and mobile plant including planned replacements of existing equipment over the life of the Project, i.e. costs that would be incurred to extend the extraction operations into Stage 7.

3.1.3 Approvals Required

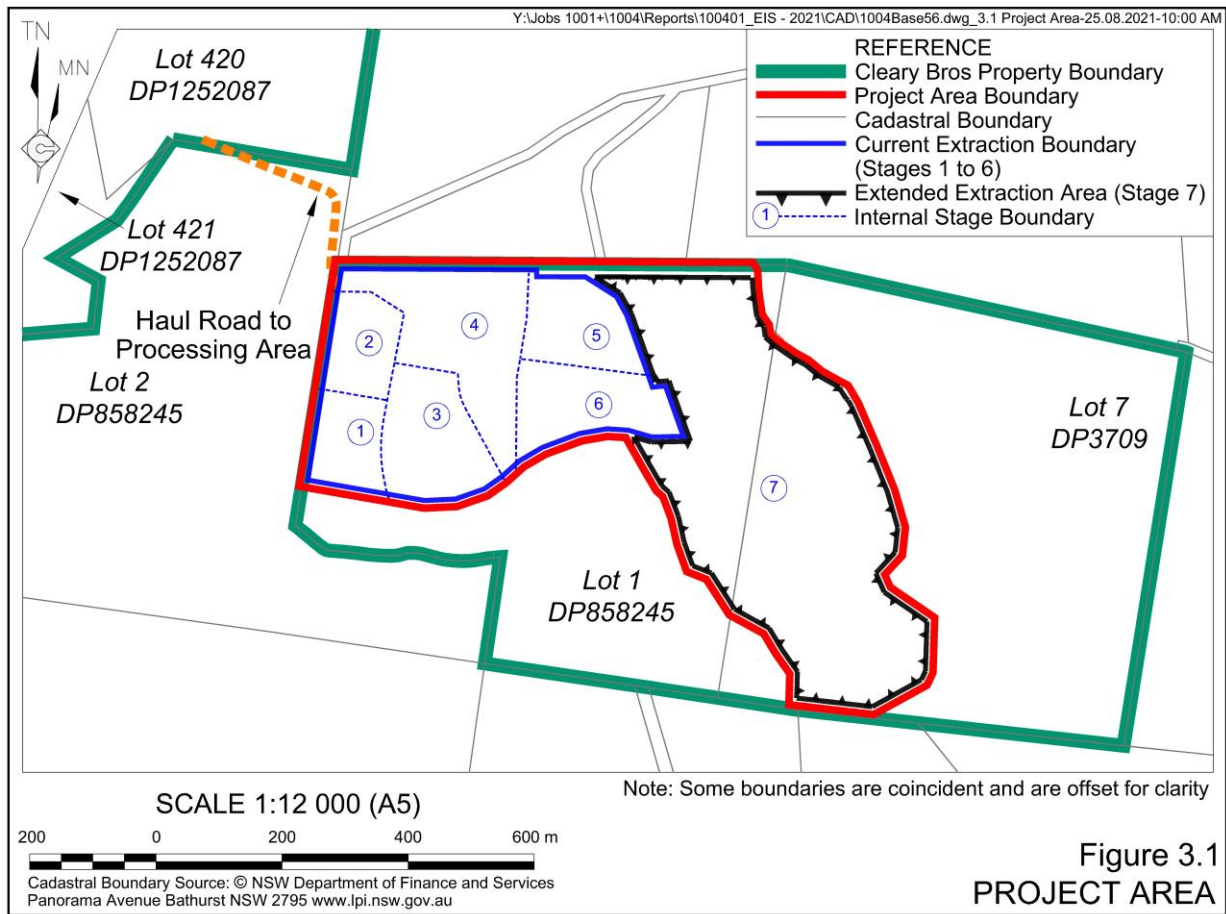
Based upon the current design of the Project and understanding of the relevant environmental issues, the Project would require the following approvals to proceed with extraction activities within Stage 7.

- Development Consent from the Minister for Planning, his or her delegate, or the Independent Planning Commission as the Project has been classified as a "State Significant Development" under Schedule 1 (7(a)) of the *State Environmental Planning Policy (State and Regional Development) 2011*.
- Approval from the Commonwealth Minister for the Environment given the Project has been determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*.



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- A variation from the Environment Protection Authority for Environment Protection Licence (EPL) 299 to cover the extended footprint of the extraction area.

In the event development consent is granted for the Project, Cleary Bros would continue to operate the Quarry in conjunction with the following approvals (**Table 1.1**).

- February 1963 Shellharbour Council Deed (as modified in 1964) – operation of the fixed processing plant, product stockpiles, product despatch, workshop, administration and ablutions and related activities/components.
- DA614/2006 – use of the haul road linking the Stages 1 to 7 extraction area to the processing area.
- DAM0136/2020 (as modified in 2019 and 2020) – Consolidation of DA 77/6, DA88/67 & DA195/64 and importation and reprocessing of VENM in Pit 2.

In the event development consent is granted for the Project, Cleary Bros intends to undertake the following.

- Surrender Development Consent LEC 10639 of 2005 (MOD 3) for the extraction operations covering Stages 1 to 6.
- Lodge an application with Shellharbour City Council to extend the term of DA 614/2006 for the ongoing use of the haul road between the Project Area and the fixed processing plant for the ongoing delivery of extracted rock from Stages 1 to 7 to the Processing Area for the term of the new development consent.



3.2 Project Area

3.2.1 Definition

The Project Area covers Stages 1 to 6 of the current approved extraction area and the proposed Stage 7 extension area – see **Figure 3.1**. Stages 1 to 6 are included in the Project Area as a quantity of rock remains to be extracted in these stages and greater efficiencies would be achieved by extracting the rock remaining in Stages 4, 5 and 6 concurrently with the rock extracted in Stage 7. Some recoverable rock also remains to be extracted in Stage 2. Furthermore, some of the overburden and soil from Stages 7a and 7b would be used for the rehabilitation of sections of Stages 1 to 4.

Stages 1 to 6 are located wholly within Lot 1 DP 858245. Stage 7 is located immediately east of Stages 1 to 6 and extends onto the adjoining Lot 7 DP 3709. Both lots covering the Project Area are owned by Bridon Pty Ltd, an associated entity of Cleary Bros (Bombo) Pty Ltd.

The western and northern boundaries of the Project Area are coincident with the boundary of Lot 1 DP 858245. The remaining boundaries are coincident with the currently approved southern boundary of Stages 1, 3, 4 and 6 together with the proposed boundary of Stage 7. The boundaries of Stage 7 are aligned as follows.

- The eastern boundary of Stage 7 is generally coincident with the boundary of the RU1 zone boundary with the exclusion of a 250m section of a first and second order watercourse (covering 0.8ha) that traverses that zone.
- The southeastern boundary has been adjusted to exclude a 0.15ha area of higher biodiversity value.
- The southern boundary is coincident with the southern boundary of Lot 7 DP3709 although the boundary of the extraction area is set back 10m from the Project Area boundary.
- The western boundary of Stage 7 follows the RU1 Zone boundary except for:
 - the inclusion of a 350m section (covering 1.25ha) currently zoned E2 where remnant native vegetation is largely absent; and
 - the exclusion of a 200m section (covering 1ha) currently zoned RU1 in the southwestern corner of the extraction area due to its higher biodiversity value.

The 250m internal haul road between the Project Area and the processing area is located in the northern part of Lot 2 DP 858245 (owned by Holcim (Australia) Pty Ltd) and is not within the Project Area.

Plates 3.1 and **3.2** display oblique aerial photographs to the north and south of the proposed Stage 7 extension area.

3.2.2 Disturbance Area

The area of overall disturbance would be confined to the current approved extraction area (Stages 1 to 6) and the proposed Stage 7, as shown in **Figure 3.1**. Disturbance areas associated with the ongoing activities within Stages 1 to 6 cover approximately 16ha and 20ha within Stage 7.



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Albion Park Quarry Extraction Area Stage 7 Extension



Plate 3.1 **Oblique aerial view to the south-southeast across Stage 7 and the current extraction area**
(Ref: CB-2.7)



Plate 3.2 **Oblique aerial view to the north-northwest across Stage 7 and the current extraction area**
(Ref: CB-2.9)



3.2.3 Land with Environmental Constraints

The southern, western and eastern sections of Stage 7 are classified as Environmentally Sensitive Land on the *Shellharbour Local Environmental Plan 2013* (Shellharbour LEP) – see Section 2.3.1. A known population of *Zieria granulata*, listed as endangered under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is also present within the southern section of Stage 7. A single individual of *Cynanchum elegans*, also listed as endangered under both the BC Act and EPBC Act, was identified in the area occupied by *Zieria granulata*. The area of distribution of these species overlaps the area of distribution of *Melaleuca armillaris* Tall Shrubland within Plant Community Type (PCT) 720 (see Section 3.3.1), which is listed as critically endangered under the BC Act.

The eastern extent of Stage 7 contains areas of Illawarra Subtropical Rainforest within PCT 1300, which is listed as endangered under the BC Act and critically endangered under the EPBC Act.

Disturbance of those species and communities listed under the EPBC Act requires an assessment of significance under the BC Act, with determination of a significant impact requiring a Commonwealth referral for the Project and offsetting under the EPBC Act.

Proposed clearing of threatened ecological communities would also require offsetting under the BC Act. These matters are considered further in Section 3.13.

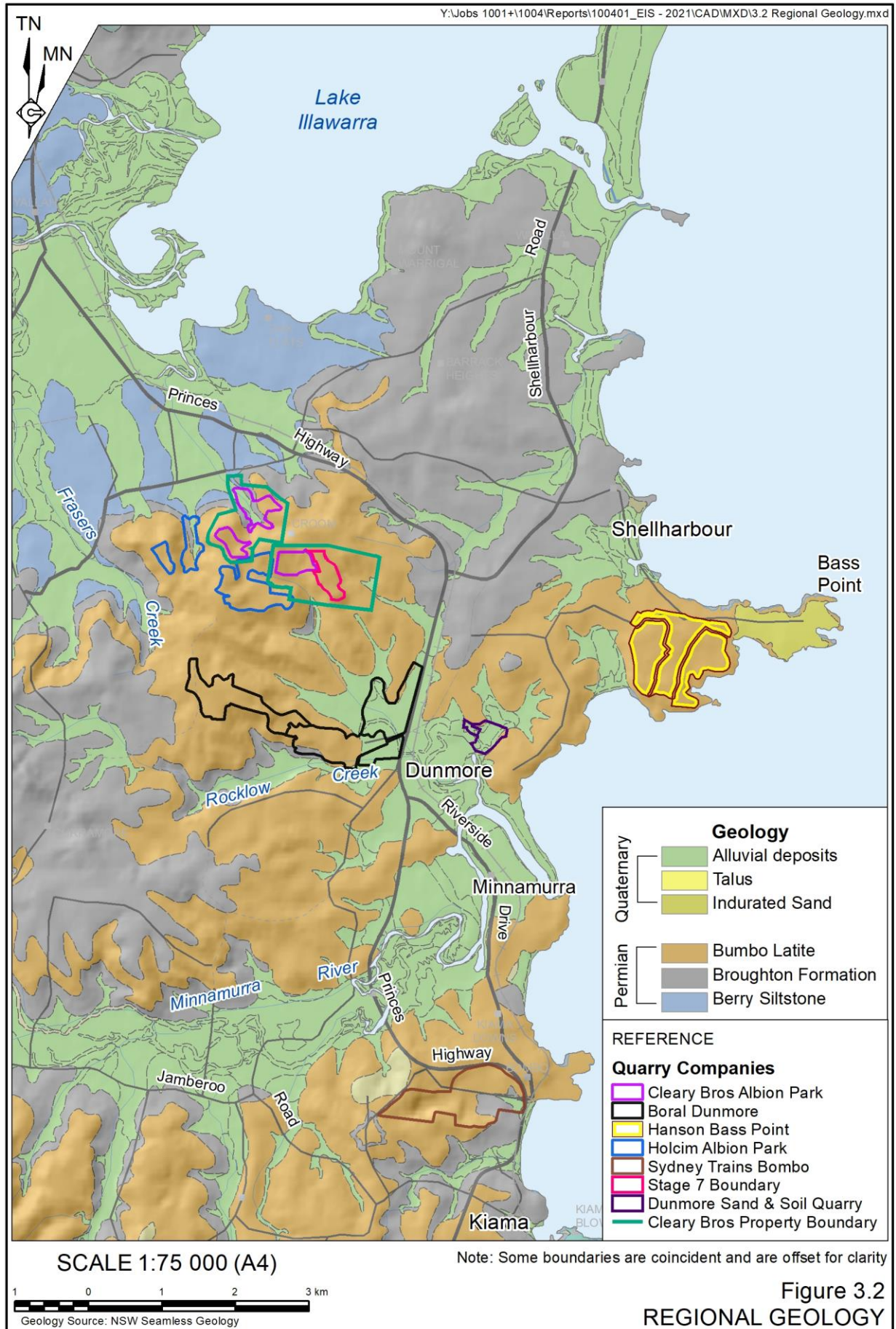
3.3 Geology and Resource Assessment

3.3.1 Regional Geology

The geology of the Illawarra area comprises a sequence of volcanic rocks and interbedded sedimentary rocks deposited during the Permian Period (approximately 300 to 250 million years ago), overlain in areas of low relief by alluvium, gravel, talus and sand deposited during the Quaternary Period (approximately 2.6 million years ago to present). The principal Permian geological units in the region are the Berry Siltstone and the overlying Broughton Formation which consists of multiple latite lava flows interbedded with sandstone (Bull & Cas, 1989). The Broughton Formation forms part of the Gerringong volcanic facies (Bowman, 1974).

The most regionally extensive of the latite flows is the Bumbo Latite, which extends from Albion Park and Shellharbour to Kiama and south towards Berry (Lee, 2020). The Bumbo Latite is the focus of quarrying activity in the district and hosts multiple hard rock quarries at Albion Park (Cleary Bros and Holcim), Bass Point (Hanson), Dunmore (Boral), and Bombo (Sydney Trains), as shown in **Figure 3.2**.

The maximum thickness of the Bumbo Latite is approximately 150m at Saddleback Mountain approximately 6km southwest of Kiama, however, its usual thickness is 60m or less (Campbell et al, 2001). It is a porphyritic basalt to latite, with phenocrysts of plagioclase and clinopyroxene in a fine-grained groundmass of feldspar, chlorite, and iron oxide. Columnar jointing is well developed, with zones of volcanic breccia occurring near the bottom of each unit and separating the individual flows (Lee, 2020).





3.3.2 Local Geology

Within the current extraction area (Stages 1 to 6) and Stage 7, the Bombo Latite comprises two flows referred to as the Upper Latite and the Lower Latite respectively (Lee, 2020). These units are separated by an interburden layer of agglomerate or volcanic breccia. **Plate 3.3** displays representative drill core of the Upper Latite, agglomerate and Lower Latite. The basement to the volcanic units is a finely bedded grey-green sandstone. Within Stage 7, the upper Latite is covered by topsoil/subsoil and overburden comprising clay and variably weathered latite collectively between 2m and 8m thick (Lee, 2020).

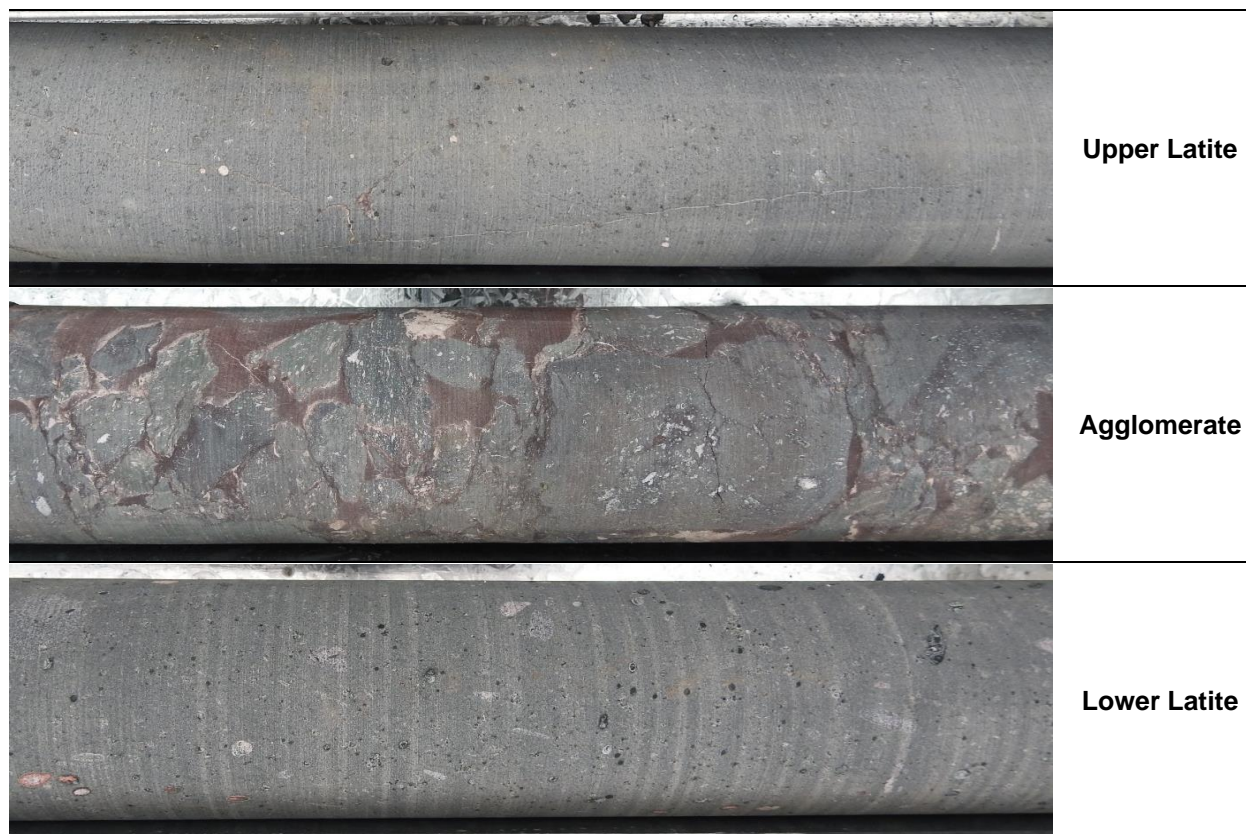


Plate 3.3 Albion Park Extraction Area Rock Types

The base of the Lower Latite occurs at approximately 52m AHD to 17m AHD respectively within northern and southern ends of Stage 7 (**Figure 3.3**). The Upper Latite is exposed in sections of the current extraction area and Stage 7.



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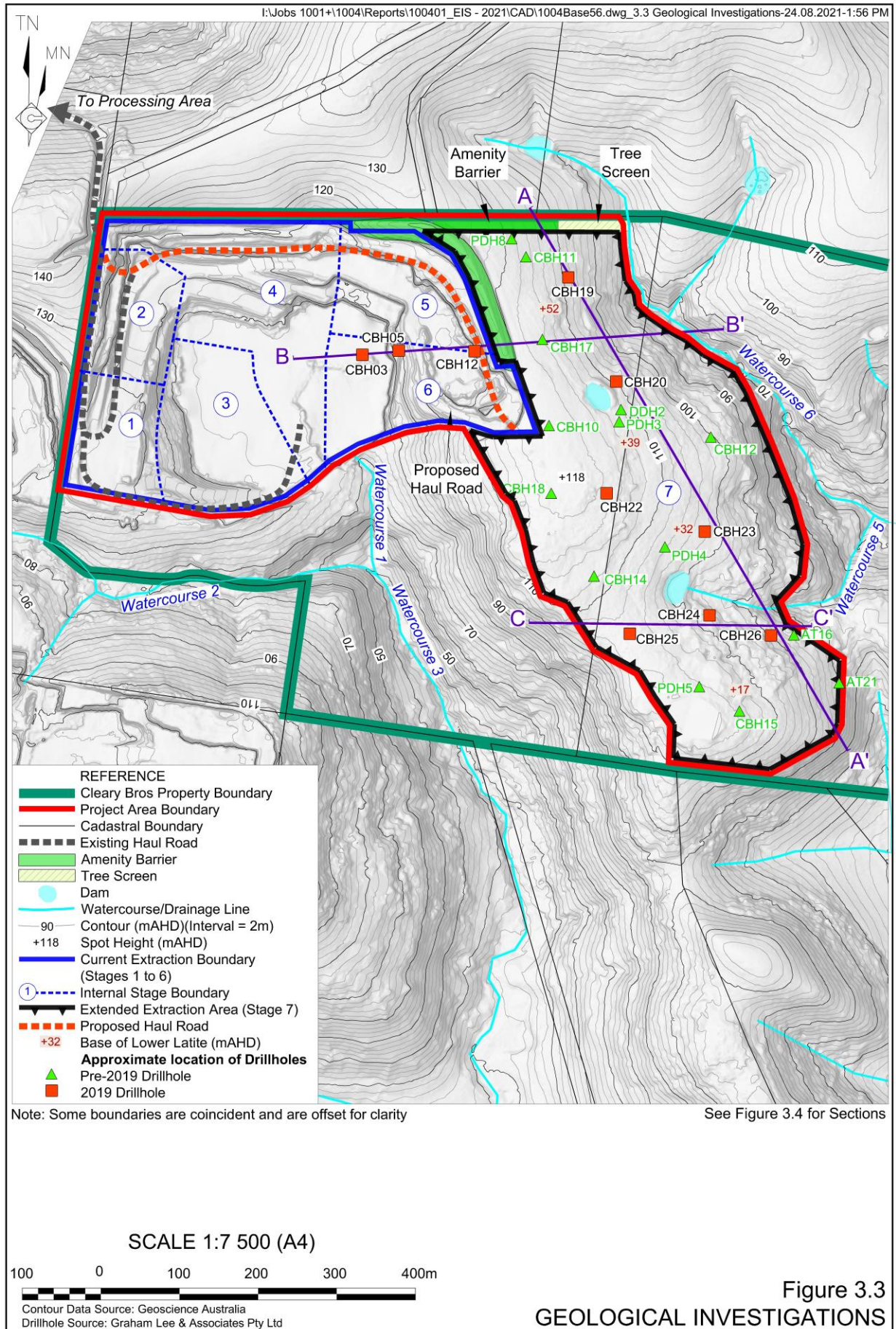


Figure 3.3
GEOLOGICAL INVESTIGATIONS



The latite flows are sub-horizontal with a southeasterly dip of between 3.3° and 5.6° (Lee, 2020). The agglomerate is generally concordant with the latite flows, however in some sections of Stages 1 to 6, it forms irregular, near vertical pipelike bodies through the latite flows. This feature appears to be more common in the Upper Latite, however, it has also been noted sporadically within the Lower Latite (Lee, 2020). Varying degrees of alteration are present in the latite and agglomerate. Unaltered latite is typically dark grey and represents the highest quality rock whereas altered latite has a distinct brown, red, pink or green hue. Rock quality is reduced significantly in the strong alteration zones. The alteration broadly consists of the following two assemblages.

1. Hematite, calcite, zeolite, sericite and minor chlorite – generally red, brown or pink colouration.
2. Chlorite, sericite and clay – generally green colouration.

Figure 3.3 displays the extent of drilling undertaken in Stage 7 during the geological investigations in 2019 as well as earlier drilling, and **Figure 3.4** displays three typical cross-sections through and across the ridge that traverses Stage 7.

3.3.3 Resource Assessment

The estimated recoverable quantity of latite and agglomerate resources within the Project Area is approximately 33Mt comprising approximately 32Mt defined by Lee (2020) in Stages 4¹, 5, 6 and 7 and approximately 1Mt remaining in Stage 2 and the northwestern corner of Stage 4.

The resource assessment for Stages 4, 5, 6 and 7 is based on diamond drilling undertaken in 2018 (15 holes, 940.8m) and reverse circulation percussion drilling undertaken in 2019 (23 holes, 1 089m). Whilst the drilling has identified a considerable quantity of high quality rock, it has also defined variable thicknesses of overburden and unsuitable rock which would need to be placed as backfill in the completed areas of Stages 1 to 7. Whilst the agglomerate is unsuitable for use in high quality aggregates due to the presence of clay, calcite and zeolites, this material is used to produce a range of other products such as road base, drainage aggregates, and specific pavement materials.

All holes were geologically logged and magnetic susceptibility was recorded for each 1m interval. Magnetic susceptibility is a proxy for rock quality, with good quality rock having a magnetic susceptibility of approximately double that of lower quality rock.

Petrographic assessment of the latite resource identified the rock to be suitable for concrete aggregate and rock armour, which has been confirmed through further testing of material properties. The free silica content of the latite (total free quartz and quartz within aggregates) was estimated to be less than 1% (Appendix 3 of Lee (2020)).

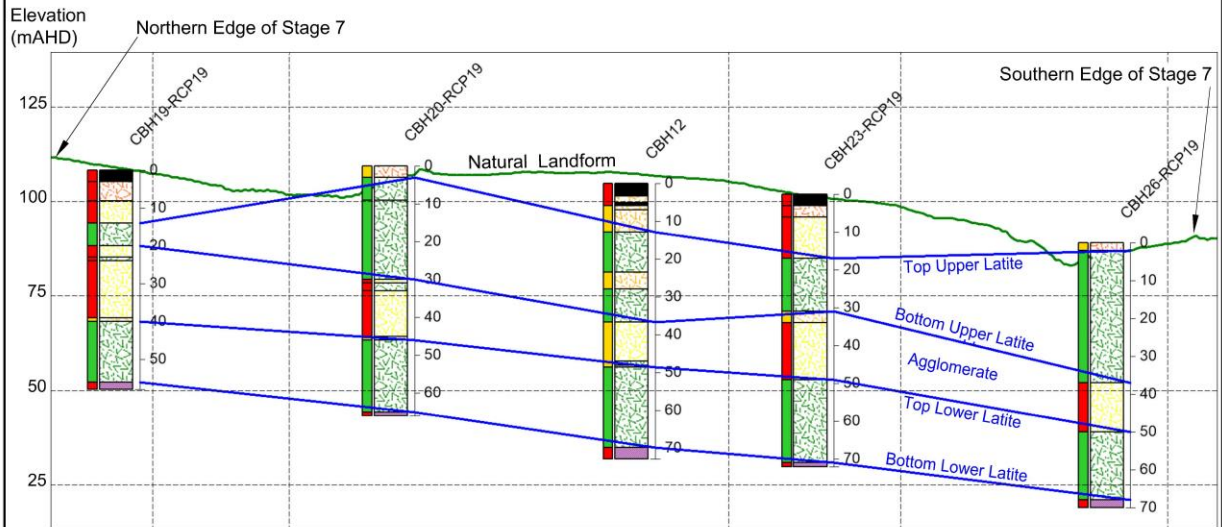
The resource assessment methodology for the resources within Stage 7 (and the remaining resources within the adjoining Stages 4, 5 and 6) is set out in Section 6 of Lee (2020). The total latite resource within Stages 4 to 7 is approximately 24Mt comprising both the Upper and Lower Latite units. Most of this rock would be suitable for feed to the fixed or mobile crushing and screening plants less a small quantity that would result from extraction losses. The total quantity of agglomerate within Stages 4 to 7 is approximately 8.1Mt (**Table 3.2**).

¹ Relates to the eastern side of Stage 4 adjacent to Stages 5 and 6.

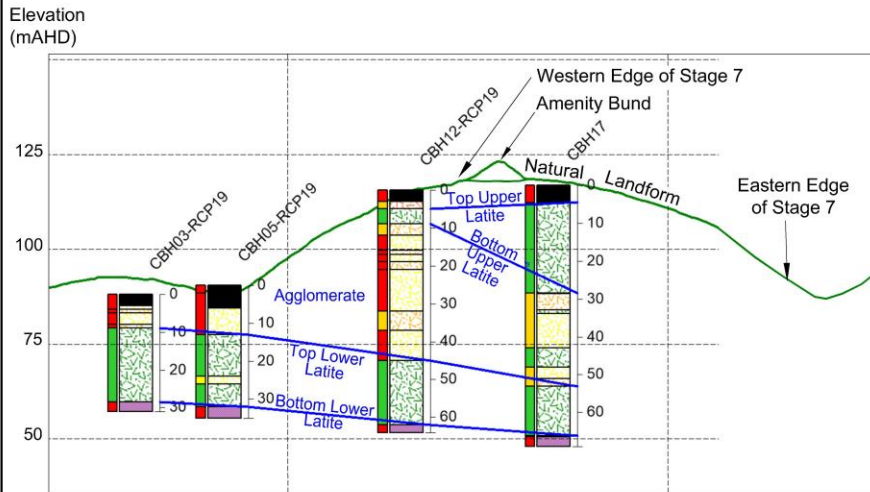


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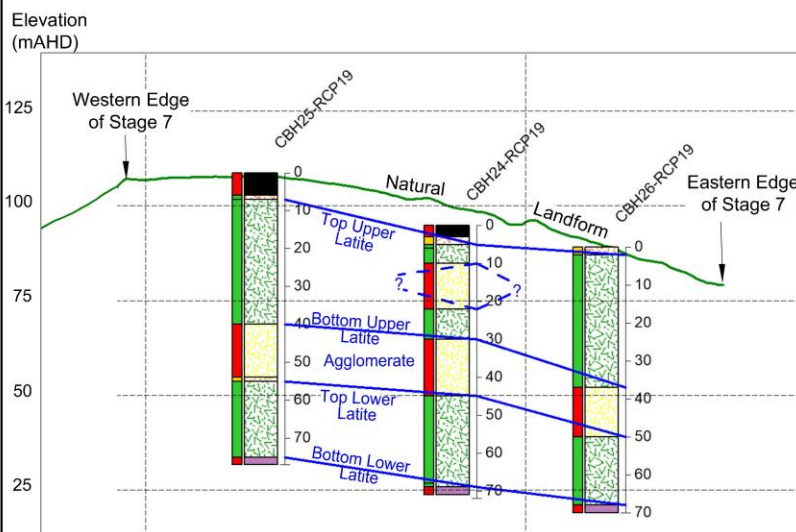


SECTION A-A'



See Figure 3.3 for Section Locations

SECTION B-B'



REFERENCE

Lithology

- Core Loss/Open Hole
- Weathered Latite
- Agglomerate/Breccia
- Latite
- Altered Latite
- Sandstone

Quality

- Low Quality Rock Material
- Agglomerate/Breccia/Altered Latite
- Good Quality Latite

SECTION C-C'

Figure 3.4
 GEOLOGICAL CROSS SECTIONS

Source: Modified after Graham Lee & Associates Pty Ltd - Figures 4-2, 4-4 & 4-6



Table 3.2
Resource Volume and Tonnage Estimates¹ – Stages 4 to 7

Rock Type	Project Area ⁴	
	Volume (m ³)	Tonnes
Upper Latite ²	4 800 000	12 800 000
Lower Latite ²	4 200 000	11 100 000
Agglomerate ³	3 500 000	8 100 000
Total Rock	12 500 000	32 000 000
Note 1: Rounded to nearest 100 000 units		
Note 2: Density = 2.65t/m ³		
Note 3: Density = 2.3t/m ³		
Note 4: The nominated volumes and tonnes reflect the topography within Stages 4 (Eastern side), 5 and 6 as at May 2019 and the resource in Stage 7.		
Source: Lee (2020) – Modified after Table 6.2		

Lee (2020) also calculated that approximately 1.3Mm³ of overburden is present in situ within the Project Area. This volume equates to approximately 1.6M loose m³ once extracted, i.e. assuming a 20% swell factor.

3.4 Layout and Design

3.4.1 Introduction

Figure 3.5 displays the layout of the Project Area and the internal stage boundaries with the key components being the long-term and interim amenity barriers, tree screens, internal roads, initial mobile processing area, the existing area already completed as part of the final landform together with the topsoil, subsoil and overburden stockpile areas within the current extraction area.

3.4.2 Buildings

The only Project-related building within the Project Area is a portable crib hut (with two portable toilets) used by Quarry personnel, which is currently located in the southwestern corner of the current extraction area within Stage 1. The location of the crib hut is likely to vary within the Project Area throughout the Project life although it is anticipated that it would remain within Stages 1 to 6.

Reliance would continue to be placed upon the administration, workshop and ablutions buildings located adjacent to the main processing area.

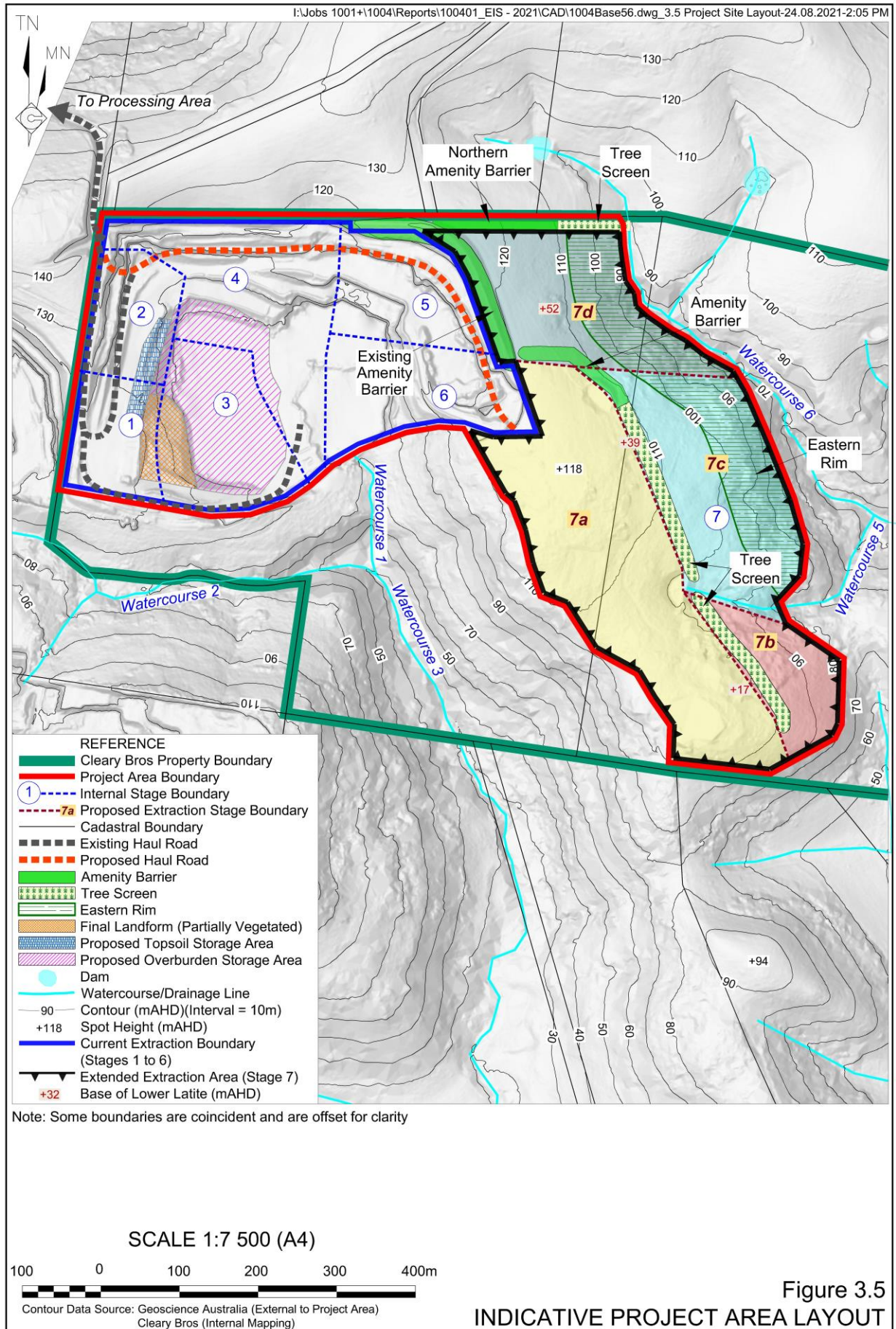
3.4.3 Extraction Area Design

Figure 3.6 displays the design of the ultimate extraction area within the Project Area. The Stage 7 extension area has been designed with parameters comparable to those already adopted in Stages 1 to 6, namely:

- typical extraction face = 45° from the horizontal for all faces excavated in the friable overburden above the fresh rock;



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- typical extraction face within the fresh rock = 75° from the horizontal on the eastern extraction faces and up to 90° from the horizontal on all other faces²;
- bench heights = 14m;
- operational (temporary) bench widths = approximately 25m; and
- terminal bench widths = approximately 5m.

It is also proposed to introduce two 7m benches on parts of the upper sections of the Stage 7 extraction area to enable trees to be planted on the top two benches to reduce the visual impacts of the southern and western extraction faces in Stage 7 (see Section 6.4.4).

3.4.4 Internal Roads

No changes are proposed to product loading, product despatch or the number and frequency of off-road or product truck vehicle movements within the Quarry. All products would continue to be despatched from the Quarry in accordance with the Shellharbour Council Deed dated February 1963 (as amended on 19 March 1964). As a result, the Project does not require the construction of any new roads beyond the current extraction area and Stage 7 for the despatch of products. The existing internal haul road between the current extraction area and the processing area displayed on **Figure 3.1** would continue to be used throughout the Project life. This haul road enters the current extraction area from the northwest and descends southwards along the toe of the western face of Stages 1 and 2. The existing internal road through Stages 5 and 6 would be relocated as required and would ultimately extend into Stage 7. **Figure 3.5** conceptually displays the general alignment of the existing and proposed internal haul roads through Stages 1 to 6. Section 3.6.2.3 discusses the alignment of the internal roads throughout the Project life.

3.4.5 Mitigation Elements

The key design elements to mitigate the impacts of the Project relate to the design and staging of the extraction area (see Section 3.6.2), the construction of a series of amenity barriers and the planting of tree screens.

The existing amenity barrier was constructed in 2008 along the northern and eastern side of the Stage 5 and part of Stage 6 extraction areas as a condition of consent for DA 10639 of 2005. The existing amenity barrier was constructed to provide a visual screen and noise barrier for areas northeast of Stages 5 and 6 and for the occupants of the residences “The Cottage” and “The Hill” within the adjoining “Figtree Hill” property. The existing amenity barrier is approximately 350m long, 4m to 5m high, 21m wide at its base and 3m wide at its crest with batters at a gradient of approximately 1:3 (V:H). The barrier was planted in late 2008 with trees to increase the effective height of the visual screen. The trees on the barrier now range in height from approximately 4m to approximately 6m. Consequently, the effective height of the amenity barrier is currently approximately 8m to 10m. **Plates 3.4** and **3.5** display the current state of the existing amenity barrier. Sections of this barrier would be removed immediately prior to the commencement of extraction from each of Stages 7a and 7d.

² The nominated slopes for the final extraction faces were established during a detailed geotechnical assessment of the faces exposed in the current extraction area in 2017 by Cardno.

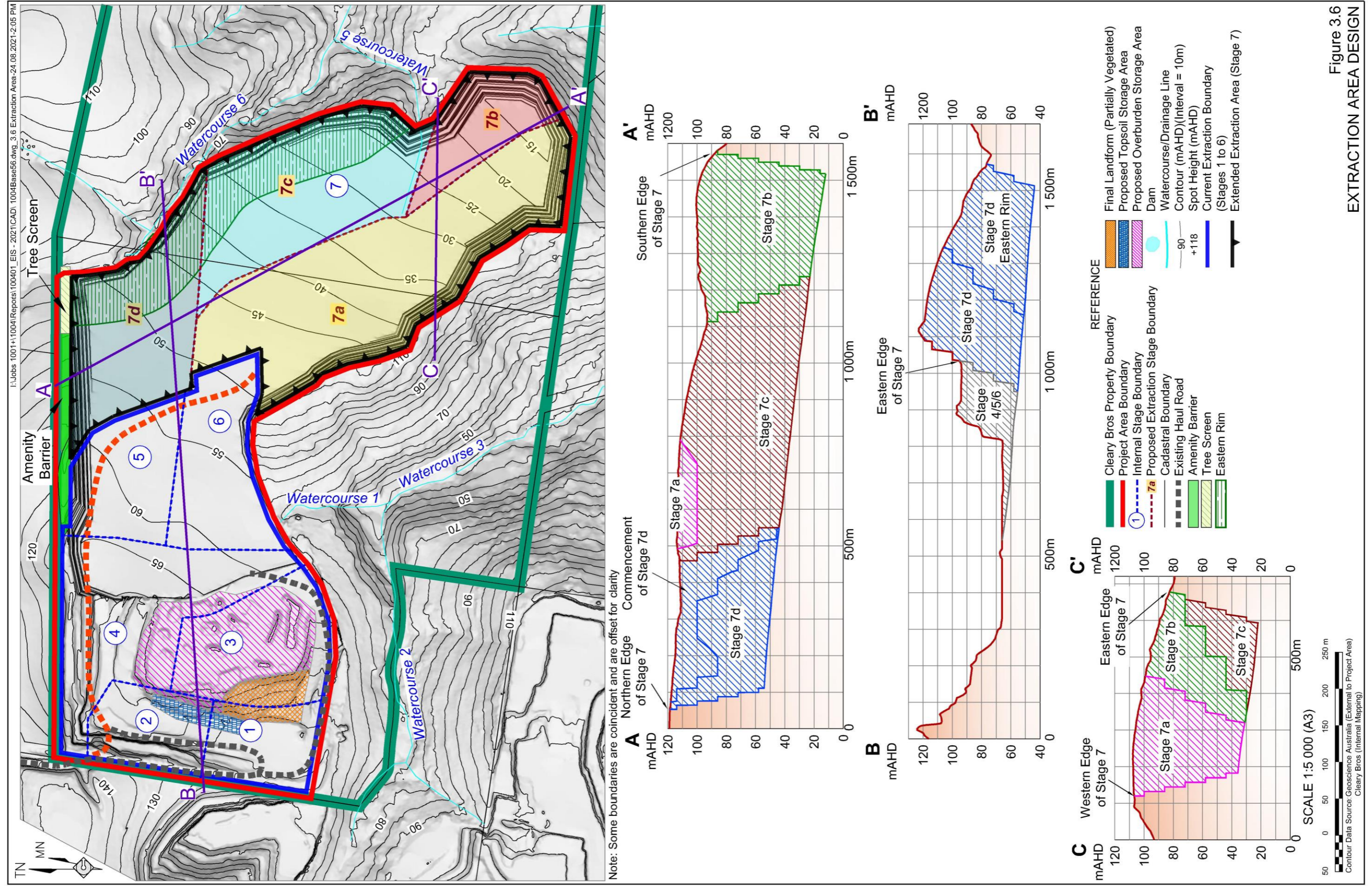
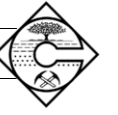


Figure 3.6
EXTRACTION AREA DESIGN

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Plate 3.4 View to the south along the western side of the amenity barrier east of Stage 5 with shrubs and trees (RWC E1004D_035)



Plate 3.5 Tree growth on the eastern slopes of the existing amenity barrier (RWC E1004C_025)



The existing amenity barrier footprint along the northern boundary of Stage 5 would be extended to the east for approximately 150m, unless agreed otherwise with the owners of “Figtree Hill.” An additional amenity barrier would also be constructed along the northeastern boundary of Stage 7a to provide an interim noise/visual barrier towards “Figtree Hill”. This section of barrier adjacent to the northeastern section of Stage 7a would be removed later in Stage 7c of the extraction operations. The amenity barrier(s) would be constructed during the initial stages of extraction in Stage 7a with soil and overburden used to form the proposed barrier with its height dimensions similar to or marginally higher than the existing barrier. The proposed amenity barrier(s) would be revegetated with fast growing native species to establish a vegetation screen. The location of the existing and proposed amenity barriers are displayed in **Figure 3.5**.

A tree screen approximately 90m long would be planted to the east of the northern amenity barrier in the area where the landform falls away to the east, unless agreed otherwise with the owners of “Figtree Hill.” A tree screen approximately 460m long would also be planted along most of the eastern boundary of Stage 7a to provide a barrier to views of the upper western extraction faces. That tree screen would be progressively removed later in Stages 7b and 7c of the extraction operations. **Figure 3.5** displays the locations of both tree screens.

The Eastern Rim forms the eastern half of Stages 7c and 7d and would be the final area to be extracted within Stage 7. This approach would enable the extraction activities in the western half of Stages 7c and 7d to be shielded visually from the east. **Figure 3.5** displays the location of the Eastern Rim.

3.4.6 Flexible Elements

This subsection outlines the components of the Project that would be refined throughout the Project life without causing any substantial changes in environmental impacts. Changes in the components described below would be considered refinements³ and therefore would not require further approval.

- Internal haul road locations
Throughout the Project life, the internal haul roads within the Project Area would be periodically relocated in order to satisfy safety requirements, preferred lower road gradients and the staged development of the extraction area.
- Overburden emplacement
The placement of overburden (including soil) is an activity that would rely upon areas being available at the time when the overburden is being removed. Minor variations may be necessary to accommodate the overburden extracted throughout the Project life.
- Extraction sequencing and staging
The nominated extraction staging in Section 3.6.2.3 reflects the current projected mix of products anticipated to be produced from the Quarry. In the event that the mix of products varies from that planned, minor variations to the internal stage boundaries and the sequencing of the extraction operations may need to occur. However, these variations would be minor but still within the overall concept presented in Section 3.6.2.3.

³ These refinements would be described in the relevant management plan(s) submitted to DPIE.

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- **Western face of the Project Area**
The final configuration of the western face of the Project Area in the vicinity of Stages 2 and 4 is still to be determined as it is subject to negotiations with the adjoining property owner.
- **Extraction Area Sumps**
All runoff within the Project Area would report to a sump within the active extraction area. The locations and footprint of the active sumps would vary throughout the Project life. Whilst the location and footprint of the Western Sump is well understood, the exact location and footprint of the remaining sumps in Stage 7 would be determined by the Quarry Manager as the extraction area develops. Given the southeasterly slope of the extraction floor within Stage 7, the Southern Sump would be located generally against the southern extraction face.
- **Equipment fleet**
The equipment fleet nominated in Section 3.7 reflects the current equipment suited to the extraction operations within the Project Area. Throughout the Project life, Cleary Bros intends to progressively upgrade and / or refurbish the equipment fleet to more modern equipment or equipment able to undertake the same tasks with similar or reduced levels of noise or dust generation.
- **Mobile Crushing and Screening Plant**
Throughout the Project life, Cleary Bros would rely upon both primary and secondary mobile crushing and screening equipment to process the blasted rock. For the purposes of the impact assessments in Section 6, reliance is placed upon assessing the mobile primary crushing and screening plant on either the first bench (or approximately 18m below the adjoining ground level) or lower benches in order to satisfy the Project Noise Trigger Levels for continuous operations at the residences on “Figtree Hill”. Whilst detailed computer modelling has been carried out by SLR (2022a), flexibility would be needed in the placement of the primary crushing and screening plant, as described in Section 6.3.6.1.

3.5 Services

The extraction operations within the Project Area would continue to operate with limited services.

All mobile plant and equipment within the Project Area would be diesel powered, with power for the operation of the crib hut and other minor ancillary needs produced by diesel-fuelled generators.

The annual water requirement for dust suppression within the Project Area would vary from approximately 110ML in Stages 7a and 7b reducing to 102.6ML in Stage 7c and 100ML in Stage 7d. The bulk of this water would continue to be drawn from the Main Dam near the fixed processing plant with some sediment-laden water recovered from the sumps within the extraction area. It is noted that the estimated annual runoff collected within the Main Dam (with a harvestable rights dam capacity of 18ML) exceeds the current and projected annual quantity of water required for the Project and the operations elsewhere within the Company’s property



beyond the Project Area. Water demand for the Project is discussed in Section 6.9.3.2 and the estimated annual runoff collected in the Main Dam is presented in Section 4.2.4 of SEEC (2022). The recovery of the bulk of the water required for activities within the Project Area from the Main Dam, provides Cleary Bros with the opportunity to maximise the release of water from the Project Area, i.e. after the quality of the water is confirmed to meet the criteria nominated in EPL 299.

All communications within the Project Area are undertaken with mobile phones and VHF radios as there are no fixed telephone lines within the Project Area.

3.6 Uses and Activities

3.6.1 Land Uses within the Project Area

The existing and proposed land uses within the Project Area comprise hard rock extraction, processing, product stockpiling and despatch, receipt of Virgin Excavated Natural Material (VENM) for landform reconstruction and cattle grazing. The bulk of the cattle grazing is undertaken within the cleared eastern areas of Lot 7 DP3709 and periodic grazing is also undertaken in the remnant bushland areas within the property. It is intended that each of these land uses would continue throughout the Project life albeit that the area for cattle grazing would be progressively reduced throughout the Project life.

3.6.2 Extraction Operations

3.6.2.1 Extraction Method

Extraction would be undertaken in a staged manner commencing with the removal of services, fences, buildings and internal stone walls after which vegetation, topsoil, and subsoil would be removed. All vegetation removed would be mulched or retained as logs or branches for rehabilitation purposes. Topsoil and subsoil stripping would be undertaken periodically on a campaign basis in advance of extraction operations. The area stripped in each campaign would typically vary between approximately 0.5ha to 2ha. Topsoil and subsoil would either be stockpiled principally within the completed sections of the Stages 1 to 4 extraction area not yet reprofiled and/or rehabilitated, and within Stage 7 in later years of the development. During the initial stages of extraction in Stage 7, a proportion of the topsoil and subsoil would be utilised to form the proposed extended amenity barrier(s). Section 6.8.6 provides further details regarding the soil stripping, stockpiling and use of the topsoil and subsoil resources in the interim and long-term site rehabilitation activities.

The weathered rock (overburden) would then be removed using an excavator to extract as much of the friable overburden as possible until the rock becomes competent. The overburden would either be sold as low-grade fill, incorporated within road pavement products, or incorporated within the final landform.

Following the removal of the overburden, the hard rock would be extracted using drill and blast methods. This would typically occur between approximately 2m and 8m below the natural land surface.

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Stage 7 would be developed in conjunction with the ongoing extraction in Stages 4, 5 and 6. Some limited extraction also remains to be completed in Stage 2. The drilling and blasting process would commence in Stage 7 with typical blasts yielding approximately 10 000t to 100 000t. Blasting in Stage 7 would be undertaken in the same manner as Stages 5 and 6, which involves best practice design and comprehensive risk assessments in accordance with the *Albion Park Quarry Environmental Management Plan*. Blasts would occur at a frequency of no more than one per week.

Blasting would involve:

- drilling of a pattern of regularly spaced holes using a hydraulic drill rig fitted with dust suppression equipment;
- placement of detonators, boosters and bulk explosives into all holes with crushed rock (stemming) in the top 3m of each hole; and
- initiating the blast to fragment the in-situ rock.

Further details of the blast design and management are provided in Section 8.5 of SLR (2022a).

Extraction within Stage 7 would proceed in a sequential manner with the objective of ultimately operating three active extraction areas/benches for the Upper Latite, Agglomerate and Lower Latite.

Once the overburden is removed in the initial area within Stage 7a, resource recovery would commence in the extraction of the Upper Latite after which, the agglomerate would be removed and incorporated principally in road pavement and drainage aggregate products. Any agglomerate unsuitable for these purposes would be placed as backfill in completed stages. Following the removal of the agglomerate, the Lower Latite would be extracted. Operational benches in each rock type would be maintained and progressively advance through the extraction area.

3.6.2.2 Backfill Management

Overburden extracted from Stages 7a and 7b, VENM/ENM imported to the Quarry and low quality rock unsuitable for use in the production of quarry products would be placed within the current extraction area and either profiled to form part of the final landform or stockpiled and reclaimed for sale, when required. Once extraction is underway in Stage 7c, overburden would be progressively placed as backfill into sections of Stages 7a and 7b where extraction has been completed to establish the final landform (see Section 3.12.5). Overburden from Stage 7d would be placed within the floor of Stages 7a, 7b and 7c.

3.6.2.3 Extraction Staging

Figure 3.7 displays the extraction stages within the current extraction area (Stages 1 to 6) and the four substages of extraction within Stage 7. Cleary Bros proposes to integrate the proposed extraction in Stage 7 with the remaining resources within Stages 4, 5 and 6. The extraction of remaining resources within Stage 2 would occur throughout the Project life at a time determined by the Quarry Manager. As noted in Section 3.4.6, minor variations to internal stage boundaries and the sequencing of the extraction operations may occur during the Project life.



The staging displayed in **Figure 3.7** has been designed to reflect the following approach and objectives.

1. Initial extraction in Stage 7 is planned to commence in an easterly direction largely through Stage 6 and then progress southwards on the western side of the Stage 7 area. This approach would enable the bulk of the initial extraction activities to be shielded visually from the east.
2. The emphasis upon reaching the southern part of Stage 7a is proposed to enable the remainder of the extraction to then proceed in a northerly direction and thereby provide maximum shielding (both visually and acoustically) towards the two existing residences on “Figtree Hill”.
3. The northerly progression in Stage 7b and 7c would occur following a period of sufficient length to enable the growth of vegetation on the upper benches on the western side of Stage 7a, designed to soften any distant views from the east of the exposed overburden and upper benches during Stages 7b and 7c.
4. The Eastern Rim forms the eastern half of Stages 7c and 7d and would be retained during extraction operations in the remainder of Stages 7c and 7d, and Stages 4, 5 and 6. This approach would enable the extraction activities in these areas to be shielded visually and acoustically from the east.
5. The Eastern Rim would be the final area extracted in Stage 7. Extraction would proceed from west to east within extraction cells with a nominal dimension of 50m north-south and 25m east-west. Extraction would commence in the southern part of Stage 7c and step northward as each cell is extracted. This would maximise the visual and acoustic shielding towards the residences on “Figtree Hill” to the north and to distant residences to the east.

The main internal haul road would be progressively extended as the extraction stages are developed.

3.6.2.4 Extraction Rate

The ongoing operation of the extraction area within the Project Area would retain the current approved maximum annual production level of 900 000tpa although for planning purposes, an annual average extraction rate of 750 000tpa is assumed. Annual production levels would vary and reflect market demands for the quarry products. No changes are proposed to the rates of processing, product loading or product despatch. Rather, the rates of these activities would closely match the proposed extraction rates.

Figure 3.7 displays the proposed sequence of extraction within the Project Area. **Table 3.3** lists the indicative duration of the staged extraction operations based upon the average annual extraction rate of approximately 750 000t.

Table 3.3
Indicative Duration of Staged Extraction Operations

Stage	Area (ha)	Extraction Duration (years)
7a	10.5	12
7b	2.0	5
7c	5.0	10
4/5/6/7d	9.1	15



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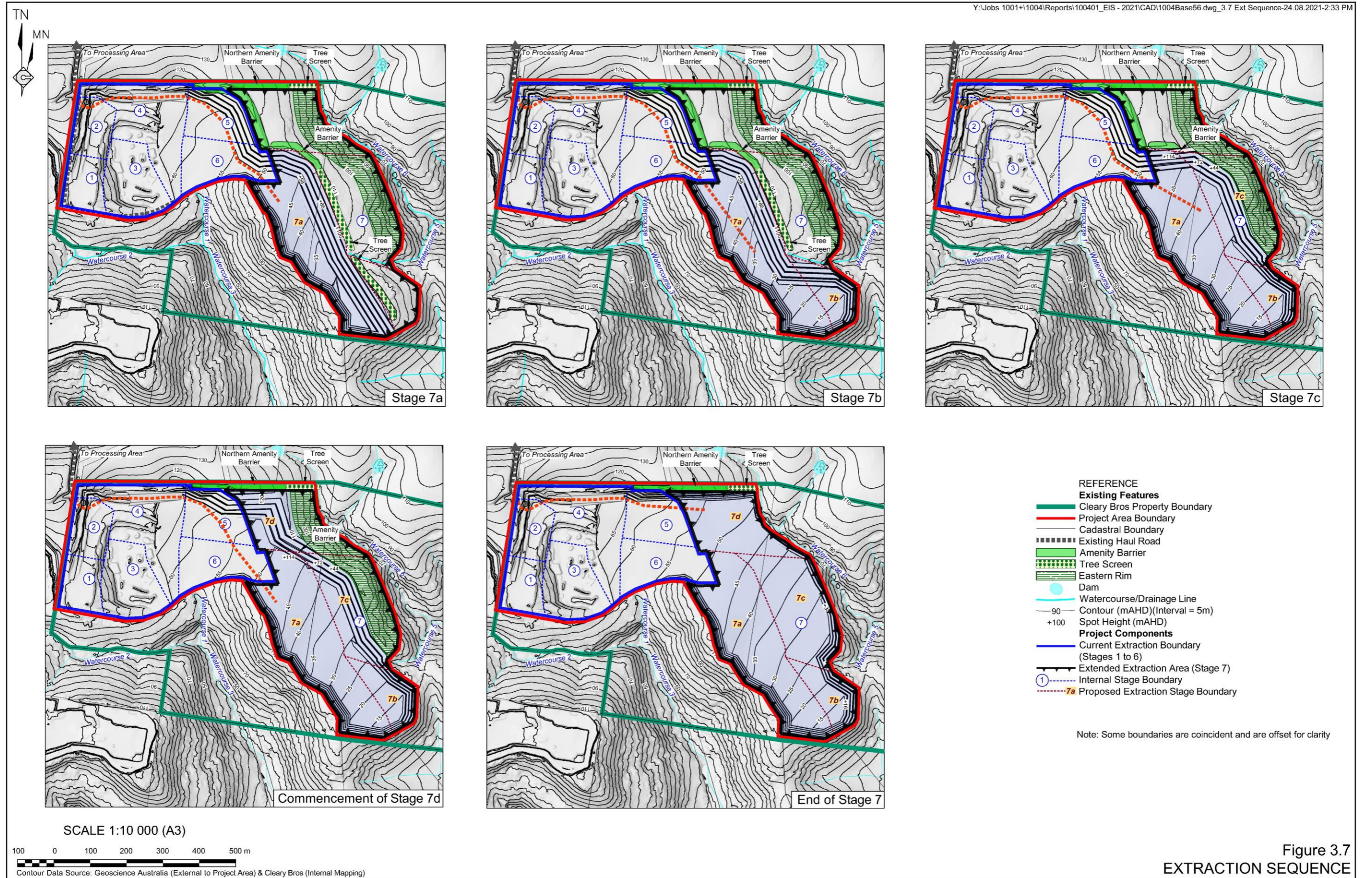


Figure 3.7
EXTRACTION SEQUENCE

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3.6.3 Mobile Processing Operations

Cleary Bros propose to introduce in-pit continuous primary crushing and screening and to continue secondary crushing and screening from time to time within the Project Area. The primary crushing and screening would reduce the blasted rock to a size suitable for additional processing within the fixed processing plant northwest of the Project Area or within the secondary crushing and screening plant. The secondary plant would continue to produce a range of customised products many of which are more suited for production from this plant rather than within the fixed processing plant.

The mobile primary crusher and screen would be a Premiertrak 600. The crusher would be fed with an excavator, typically the Hitachi EX1200. Cleary Bros proposes to use the primary crusher and screen throughout the Project Area on the bench below each blasted bench commencing on the first bench, approximately 18m below the natural ground surface. The primary crusher and screen would be in position to process the blasted rock and then be relocated away from the next blast after which it would be repositioned. The crusher would be positioned near the pile of blasted rock and as close as possible to the extraction face to achieve the required noise shielding. **Plate 3.6** displays a Premiertrak 600 crusher and screening plant being fed by an excavator.



**Plate 3.6 Premiertrak 600 Crusher and Screening plant being fed by an excavator
(Ref: CB-3.4)**

The mobile secondary crusher and screening plant would most likely be a Maxtrak 1400 and Warrior Screen or similar equipment. This plant would be positioned on the floor of the extraction area and fed by an excavator, typically a Kobelco 260B. The plant would be used to manufacture small sized rock products, gabion stone and rail ballast. The use of the secondary crusher and screening plant would be intermittent and reflect the customer's orders. Based upon typical sales of products produced by the secondary plant, typical operating periods vary from two to four weeks. **Plate 3.7** displays the secondary crusher and Warrior screen mobile plant operating within Stage 4.

A mobile trommel screen or contract plant would periodically be used (for several weeks at a time) typically for specific orders to manufacture larger armour rock such as that used for breakwaters and revetment walls in the coastal environment.



Plate 3.7 **Jaw Crusher and Warrior Screen Mobile Plant (Ref: CB-2.10)**

For the purposes of the noise and air quality assessments, it is assumed that the secondary mobile plant would be operational on the operational floor of the active extraction area.

Small stockpiles of products produced within the mobile plants would be established surrounding each mobile plant before they are either transported by haul truck to the main stockpile area near the processing area or transported directly from the extraction area using highway trucks.

3.6.4 **Transportation**

3.6.4.1 **Transportation within the Quarry**

Primary crushed rock to be processed within the fixed processing plant would be transported from the Project Area to the plant using off-road haul trucks via the route nominated in Development Consent DA614/2006 (see **Figure 3.1**).

Light vehicle movements within the Project Area would be confined to:

- light vehicles delivering employees from the main carpark near the Quarry Office to either the equipment parking area near the crib hut or the active work areas;
- light vehicles, e.g. utilities, driven to the active work areas by contractors, e.g. mechanics / repair personnel; and
- other light vehicles driven by supervisory personnel or other contractors to undertake inspections or supporting work.

3.6.4.2 **Approved Off-site Product Transportation**

Introduction

All processed quarry products would continue to be stockpiled adjacent to the fixed processing plant and within the product stockpile area for loading from the product stockpiles and delivery to customers/projects using either Cleary Bros-owned highway trucks, subcontractor trucks or trucks owned by self-haul customers.

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As identified in Section 1.3.3 and **Table 1.1**, the transportation of quarry products from the Quarry would continue to operate under the Council approval for Lot 420 DP1252087 for the duration of the Project life. Notwithstanding this, off-site transportation operations were described in the context of the increase in the approved extraction limit from 600 000tpa to 900 000tpa under MOD2 to LEC Consent No. 10639 of 2005. In the interests of consistency, the following subsections provide a description of the approved off-site product transportation.

Transportation operations associated with importation of VENM and dispatch of concrete products approved under separate development consents would continue.

Transportation Routes

Quarry products transported from the processing plant exit the site via a dedicated site access road to the East West Link (**Figure 3.8**). The vast majority of vehicles transporting quarry products travel east on the East West Link and enter the Princes Highway / Princes Motorway (a State Road) at the Oaks Flat Interchange. Once on the State Road network, vehicles transporting quarry products travel either to the south or the west/north on the Princes Highway / Princes Motorway. A small proportion of vehicles transporting quarry products for local customers may travel to the west on the East West Link or on other Local and Regional roads.

The Project would not result in any changes to the approved transportation routes.

Vehicle Types

Currently, the largest vehicle approved for transporting quarry products on the public road network in the vicinity of the Quarry is a 26m A-double truck.⁴ Cleary Bros currently uses such vehicles and would continue to preferentially utilise the largest available and permissible vehicle for transportation of quarry products in order to reduce the number of vehicle movements and maximise the efficiency of transportation operations. Quarry products are also transported using smaller vehicles, including semi-trailers, truck and dog combinations and rigid trucks. The Project would not result in any changes to the approved transportation routes.

The Project would not result in any changes to the vehicle types currently transporting quarry products.

Rate of Transportation

The existing rate of transportation of quarry products via the public road network is limited by the approved extraction rate under LEC Consent No. 10639 of 2005. The Project would not result in an increase to the approved rate of extraction, namely 900 000tpa. As a result, the rate of transportation of quarry products via the public road network would remain unchanged.

Notwithstanding this, Cleary Bros analysed the number of laden heavy vehicles departing via the Site Access Road during calendar year 2021. In summary, a total of approximately 35 500 laden heavy vehicles departed the site, over 294 days for an average of approximately 110 laden vehicles per working day. The busiest day resulted in 207 laden vehicles departing the site. This is generally consistent with the Traffic Impact Assessment undertaken for MOD2 of LEC Consent No. 10639 of 2005 prepared by GTA Consultants (GTA, 2012) which identified up to just under 200 laden movements per day.

⁴ 3-axle prime mover / A-double (2-2-2).

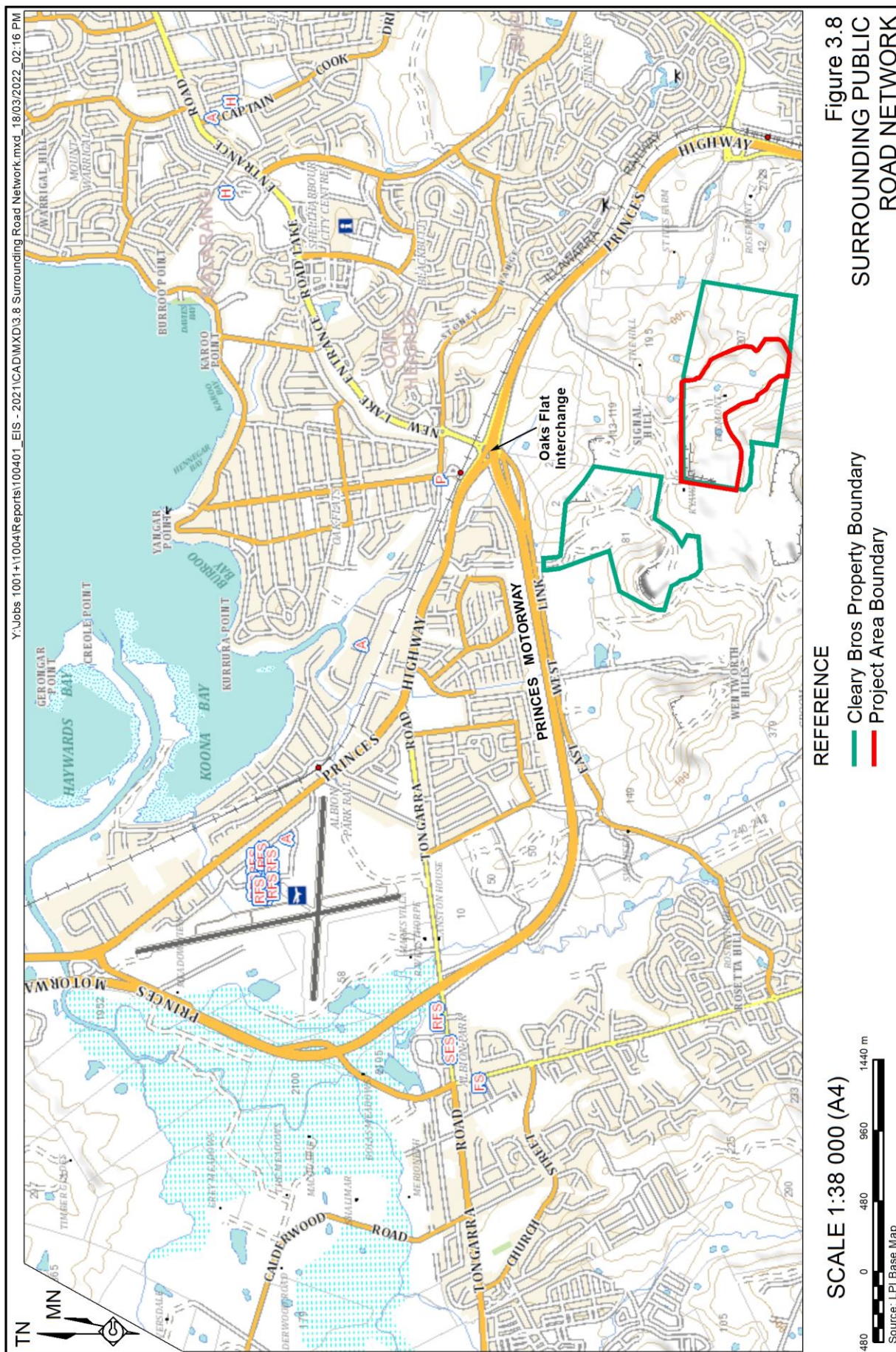
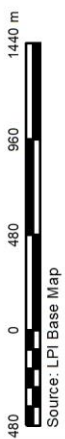


Figure 3.8
SURROUNDING PUBLIC
ROAD NETWORK

REFERENCE
— Cleary Bros Property Boundary
— Project Area Boundary

SCALE 1:38 000 (A4)



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Peak hour movements to and from the Quarry were identified by GTA (2012) as being up to 61 movements per hour. Cleary Bros anticipates that this would remain unchanged as a result of the Project.

3.6.5 Waste, Hydrocarbon and Chemical Management

General waste management activities within the Project Area would continue in accordance with the *Quarry Environmental Management Plan (QEMP)*, which would be updated should the Project be approved.

Non-production wastes generated within the Project Area would comprise: replaced equipment parts e.g. conveyor belts, broken excavator teeth; consumables containers including air and oil filters; together with hydraulic oils and cooling fluids. These wastes together with the wastes generated within the crib hut would be taken on a daily basis and placed in the relevant waste receptacle in the area adjacent to the workshop or fixed processing plant (on Lot 420 DP1252087 outside of the Project Area) for removal (when required) and delivery to appropriately licenced facilities for reuse, recycling or disposal. Cleary Bros estimates that the annual quantity of non-production wastes generated within the Project Area and sent to landfill would typically be less than 100t.

The overburden materials extracted during exposure of the hard rock resource are not considered as a waste product. Rather, the overburden materials would be managed in the manner outlined in Section 3.6.2.2 for the creation of the final landform within the Project Area.

The Project Area does not contain contaminated land and there would be no hydrocarbon or chemical storage within the area. Handling of hydrocarbon and chemicals would continue to be managed in accordance with the existing QEMP and all such activities would be undertaken in designated areas of the workshop and fixed processing plant northwest of the Project Area.

3.6.6 Dangerous Goods Management

The only dangerous goods managed within the Project Area would be explosives and related materials brought to the Project Area only on the days when blasts are initiated. The explosives would be transported to the Project Area in specialised mobile manufacturing units by licenced contractors in accordance with well recognised safety protocols. Once on site, the explosives and related materials would be loaded into the previously drilled blast holes and initiated on the day of delivery. The practices adopted on site would be consistent with those adopted for many years during which there have been no safety incidents in relation to dangerous good management.

3.7 Equipment Fleet

Table 3.4 lists the current mobile fleet used for extraction, load and haul, processing and road maintenance operations within the extraction area. Details are provided on the number of each item of equipment, their main function and frequency of use. This presents a general equipment list only, and other similar equipment may be used at times, or the existing equipment may be used for other purposes, as required to meet operational requirements.



Table 3.4
Equipment Fleet Operating within the Project Area

Equipment Type	Make and Model	Main Function	No.	Average Weekly Usage (hours)	
				Individual	Combined
Excavator	Hitachi EX1200	In pit material extraction	1	45	45
Haul truck	CAT 777D	Material haulage	1	40	40
Haul trucks	CAT 773D & 773E	Material haulage	4	31	125
Water truck	CAT 773B	Dust suppression	1	25	25
Excavator and Hammer	CAT 330	In pit material extraction and reduction of oversize fragmented rock	1	20	20
Loader #1	CAT 992K	In pit material movement	1	40	40
Loader #9	CAT 980C	In pit feeding mobile crusher	1	35	35
Mulching Unit ¹	Vermeer BC 1800XL	Mulching vegetation	1	35	35
Blasthole Drill Rig	Furukawa HCR1500-EDII	Blast hole drilling	1	40	40
Grader	CAT 16G	Road maintenance	1	4	4
Excavator	Komatsu PC800	Material extraction	1	35	35
Dewatering Pump	8" pump	Water pumping	1	Rare	Rare
Excavator	Kobelco 260B	In pit loading mobile crusher	1	35	35
Mobile crusher/screen	Premiertrak 600 jaw crusher and/or Maxtrak 1400 cone crusher and Warrior 2400 screen	In pit crushing and screening	1	30	30
Articulated haul trucks	CAT 740 Moxy	Soil/overburden stripping	2	2.5	5
Scraper	CAT 637E	Soil/overburden stripping	2	2.5	5
Dozer ²	CAT D11	Soil/overburden stripping	1	20	20
Dozer	CAT D8	In pit material movement and soil/overburden stripping	1	20	20
Service truck	On road truck	Equipment servicing	1	3	3
Refueller	Mack On-road truck	Equipment refuelling	1	3	3
Light Vehicles	Various	Personnel movement	5	1	5

Note 1: Mulching unit used only for short periods during vegetation clearing campaigns
Note 2: Dozers are rarely used concurrently

3.8 Hours of Operation

The proposed hours of operation within the Project Area are:

- 7:00am to 5:30pm Monday to Friday; and
- 7:00am to 1:00pm Saturday.

These hours of operation are consistent with the current approved hours of operation.

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Notwithstanding the above, operations in the Stage 7 Area would occur on a maximum of 16 Saturdays per calendar year from 7:00am to 1:00pm.

Blasting operations would only be undertaken between 9:00am and 5:00pm, Monday to Friday inclusive, or at other times as approved by the EPA. These hours are consistent with current approvals. A maximum of one blast would be undertaken per week.

Transportation of quarry products via the public road network would continue to be undertaken 24-hours per day, 7 days per week under the existing Council approval for Lot 420 DP1252087.

The following activities may be conducted outside of the above hours.

- The delivery of materials as requested by Police or other authorities for safety reasons. Emergency work to avoid the loss of lives, property and/or prevent environmental harm.
- Any maintenance work on mobile equipment that is inaudible at the nearest affected receiver.

3.9 Project Life

The extraction of the defined 33Mt of latite and agglomerate resources within the Project Area and the completion of rehabilitation activities would occur over a period of approximately 45 years, assuming an average extraction rate of 750 000tpa. This extension would effectively be approximately 30 years beyond the current expiry date of 21 February 2036. It is the preference of Cleary Bros that a development consent is granted for the extraction of all recoverable resources within the Project Area, i.e. for a period ending 31 December 2066. However, in the event a development consent is only granted for 30 years, a limit commonly applied to State Significant Development applications, Cleary Bros would request that the development consent is extended for a further 15 years to allow the remaining resource to be fully recovered. Cleary Bros acknowledges that the requested extension would be subject to the company demonstrating an acceptable environmental performance and the updating of all management plans to cover the remaining years of operation.

An application to extend the term of the haul road consent (DA 614/2006) for the ongoing use of the haul road between the extraction area and the processing plant would be made with Shellharbour City Council in the event development consent is granted for the Project.

Cleary Bros considers it is important for the Cleary Bros Group's overall business, which is underpinned by the quarry products produced at the Albion Park Quarry, that it fully identifies the quantity of resources that can be extracted in an environmentally responsible manner from the Project Area.

3.10 Operational Workforce

Approximately 27 employees and contractors are directly involved in extraction and processing operations at the Quarry and a larger number of employees within the broader Cleary Bros Group are reliant upon ongoing production of a range of quarry products at the Quarry.



3.11 Capital Investment Value

The capital investment value of the Project has been calculated at \$31,837,881 based upon the costs that would be incurred by Cleary Bros to extend the extraction operations into Stage 7, namely:

- demolition of the Belmont Main House and associated structures;
- construction of the planned amenity barriers and planting of tree screens;
- archaeological investigations associated with the Belmont Main House demolition; and
- the purchase of a mobile crushing, screening plant and mobile plant, including planned and expected replacements of existing equipment over the life of the Project.

3.12 Rehabilitation

3.12.1 Introduction

Rehabilitation activities would be managed generally in accordance with the procedures described in the Quarry's *Rehabilitation Management Plan* (Cleary Bros, 2017). The *Rehabilitation Management Plan* (RMP) describes the short, medium and long-term rehabilitation objectives for the Quarry, sets achievable targets related to its rehabilitation and describes the proposed post-quarrying land use. The RMP would be updated to include the proposed Stage 7 rehabilitation activities described in this subsection, in the event development consent is granted.

The consideration of rehabilitation of the Project Area has been undertaken with reference to the relevant sections of the following documents.

- Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth Government, 2016a).
- Mine Closure – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth Government, 2016b).

3.12.2 Final Land Use Objectives

The objectives for rehabilitation of the disturbed areas within the Project Area are centred upon:

- the initial stabilisation of the areas to be disturbed during Stage 7 establishment; and
- the progressive shaping and revegetation of the final or terminal extraction benches and floor as they are completed.

Cleary Bros would implement a program of interim rehabilitation of disturbed areas in order to:

- conserve all topsoil and as much subsoil as possible for use in long-term rehabilitation of the final landform within the Project Area;
- minimise the areas of exposed surfaces that would otherwise be potential sources of sediment-laden runoff into the surrounding watercourses; and
- ensure all interim slopes are stable.

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The specific objectives for the long-term rehabilitation of the Project Area are to:

- provide a low maintenance, geotechnically stable and safe landform with minimal erosion that would be suited for the proposed subsequent land uses; and
- ensure that the upper benches within the extraction area are well vegetated to minimise visual contrasts and the visibility of the benches from surrounding residences, particularly from vantage points to the east and north.

3.12.3 Rehabilitation Resources

The rehabilitation of the final landform would be achieved with the following resources, the bulk of which are currently located within the Project Area.

1. Approximately 55 000 loose m³ of topsoil and 130 000 loose m³ of subsoil.
2. Seedbanks of native tree, shrub and grass species within the topsoil.
3. Approximately 1.6M loose m³ of overburden comprising clay and weathered latite and agglomerate.
4. Up to approximately 1.0M loose m³ of VENM and/or ENM⁵.
5. Approximately 0.1M loose m³ of low quality rock unsuitable for production of quarry products.
6. Stockpiled and mulched vegetation salvaged or produced during vegetation clearing programs.
7. Seed and tubestock for the growth of cover grasses, shrubs and trees.
8. Selected soil ameliorants and fertilisers to assist with vegetation growth, and select herbicides to restrict unwanted species.
9. Fencing materials and/or guards to protect emerging tree, shrub and grass species from native animals and grazing stock.

3.12.4 Short and Medium Term Rehabilitation

Short and medium term rehabilitation measures that would be implemented during the first 10 to 15 years of the extended extraction area operations include the following, a number of which would be incorporated within the final landform (see Section 3.12.5).

- Revegetation of topsoil and subsoil stockpiled within the nominated stockpile areas within Stages 1 to 4.
- Profiling to achieve the design contours of the final landform in completed sections.
- Establishment of vegetation on the upper east-facing terminal benches of Stage 7a following placement of overburden as a growth medium.
- Erosion and sediment control works in rehabilitated areas.

⁵ Up to approximately 1.5Mt or 1.0M loose m³ of VENM / ENM would be imported throughout the Project life with annual quantities varying from 0t to 100 000t. The imported VENM and ENM would be consistent with the definitions of these products as described in the *Protection of the Environment Operations Waste Regulation 2014* and/or the EPA's current Waste Classification Guidelines, and would be sourced as and when they become commercially available and transported by truck to the Project Area for incorporation within the final landform.



It is recognised that the areas within Stages 1 to 4 would remain as a storage area for many of the rehabilitation resources until the final decade of the activities within the Project Area.

3.12.5 Final Landform Design

Figures 3.9 and 3.10 display the proposed indicative final landform and a schematic section across the Project Area displaying the proposed five rehabilitation domains.

- Terrace Domain – steep terminal faces of the extraction area with 7m or 14m benches, 3m to 5m berms and face angles of between 75° and 90°. Overburden and other suitable materials would be placed on the berms to provide a growth medium with water holding capacity for trees and shrubs.
- Slope Domain – the intermediate slope between the Terrace and Plain Domains with variable slopes of between 5° and 18° formed from overburden or other suitable backfill materials, subsoil and topsoil. Final slopes would be revegetated with trees and shrubs. Pasture species would be established on the lower, more gentle slopes grading to the Plains Domain.
- Plains Domain – overburden or other suitable backfill, subsoil and topsoil would be placed on the floor of the extraction area to a variable depth with a gentle slope.
- Open Water Domain – the final landform would incorporate up to three sumps which would effectively act as dams for stock watering and potentially other final land uses.
- Foreshore Domain – the area between the Plains Domain and the Open Water Domain would be a low-gradient transitional area comprising wetland and water-tolerant vegetation.

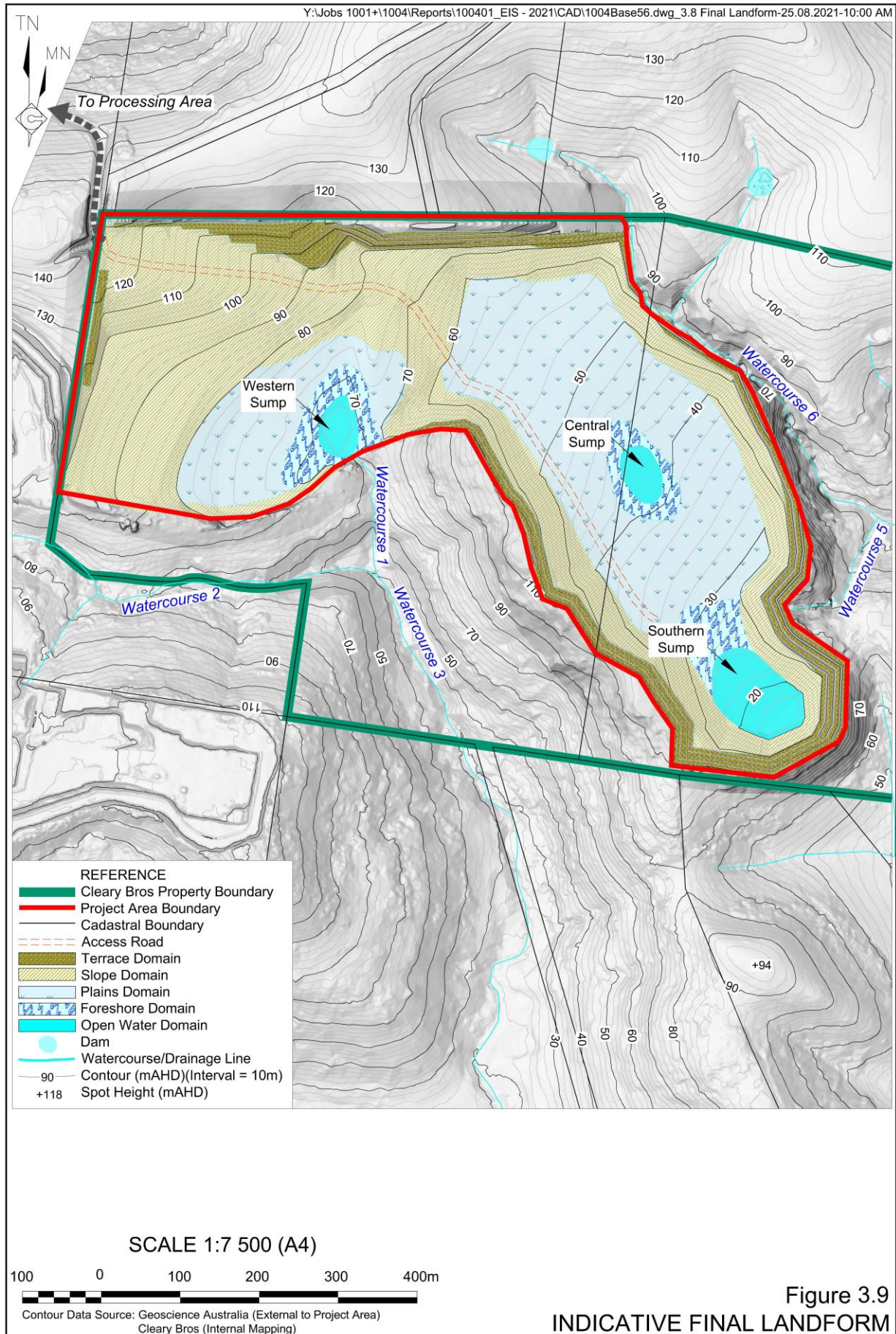
It is noted that the indicative final landform within the area incorporating Stages 1 to 6 differs slightly to that presented in Figure 2 of the current Rehabilitation Plan. The key differences relate to the presence of a greater proportion of the Slope Domain compared with the Plains Domain, principally because of the additional overburden that would be placed within Stages 1 to 6 from Stages 7a and 7b. The Terrace Domain and the Western Sump would be comparable with the current Rehabilitation Plan, although it is noted that the alignment of the final access road across Stages 1 to 6 has been modified to reflect the changed access to Stage 7.

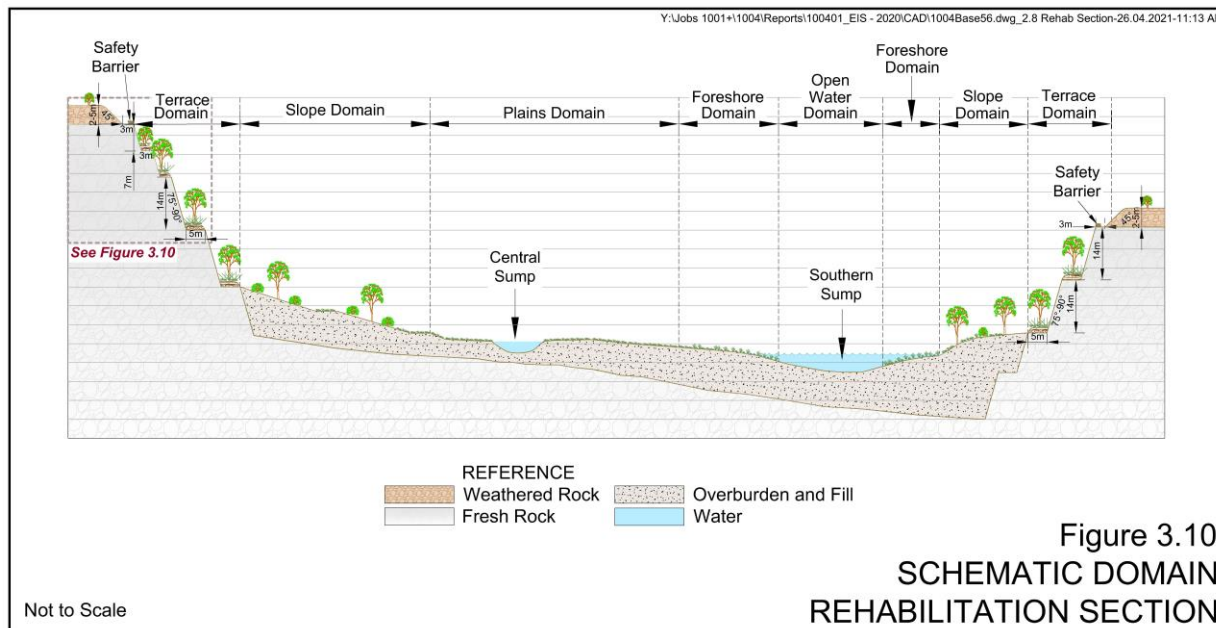
3.12.6 Rehabilitation Methods

An overview of the rehabilitation methods are provided in this subsection. Further details would be incorporated in the Rehabilitation Management Plan proposed for the Project Area should the Project be approved.



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3.12.6.1 Short and Medium Term Rehabilitation

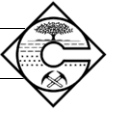
Cleary Bros would adopt the methods previously used to undertake the rehabilitation of the existing amenity barrier for the proposed amenity barrier. This would involve the placement of approximately 0.5m of topsoil on the outer face and top of the barrier and the immediate stabilisation of these areas by hydroseeding with the proposed seed mix, fertiliser and binders. Tubestock may also be used to supplement the hydroseed application.

All topsoil stockpiles would be stabilised and revegetated within one month of their construction to maintain their viability. The subsoil stockpiles to be retained long term would be ameliorated or covered with 0.3m of topsoil and revegetated in the same manner as the topsoil stockpiles.

An important component of the short and medium term rehabilitation would be the establishment of vegetation on the 45° near-surface slope within the overburden and two 7m benches on the western side of Stage 7a.

Once excavated to the required slope, the overburden would be covered with up to 0.5m of soil (topsoil and/or subsoil) and hydroseeded with the proposed seed mix, fertiliser and binders. Tubestock may also be planted to boost tree establishment.

The rehabilitation of the two upper Stage 7a benches on the western and southern sides of the Project Area would involve the placement of overburden in conjunction with some of the residual fragmented rock on the initial 3m bench prior to the removal of the remainder of the fragmented rock below the bench level. **Figure 3.11** displays the staged rehabilitation of the upper final benches. The overburden and fragmented rock would be roughened and profiled so that rainfall is retained on the bench and/or directed to the back of the bench to assist with vegetation growth.



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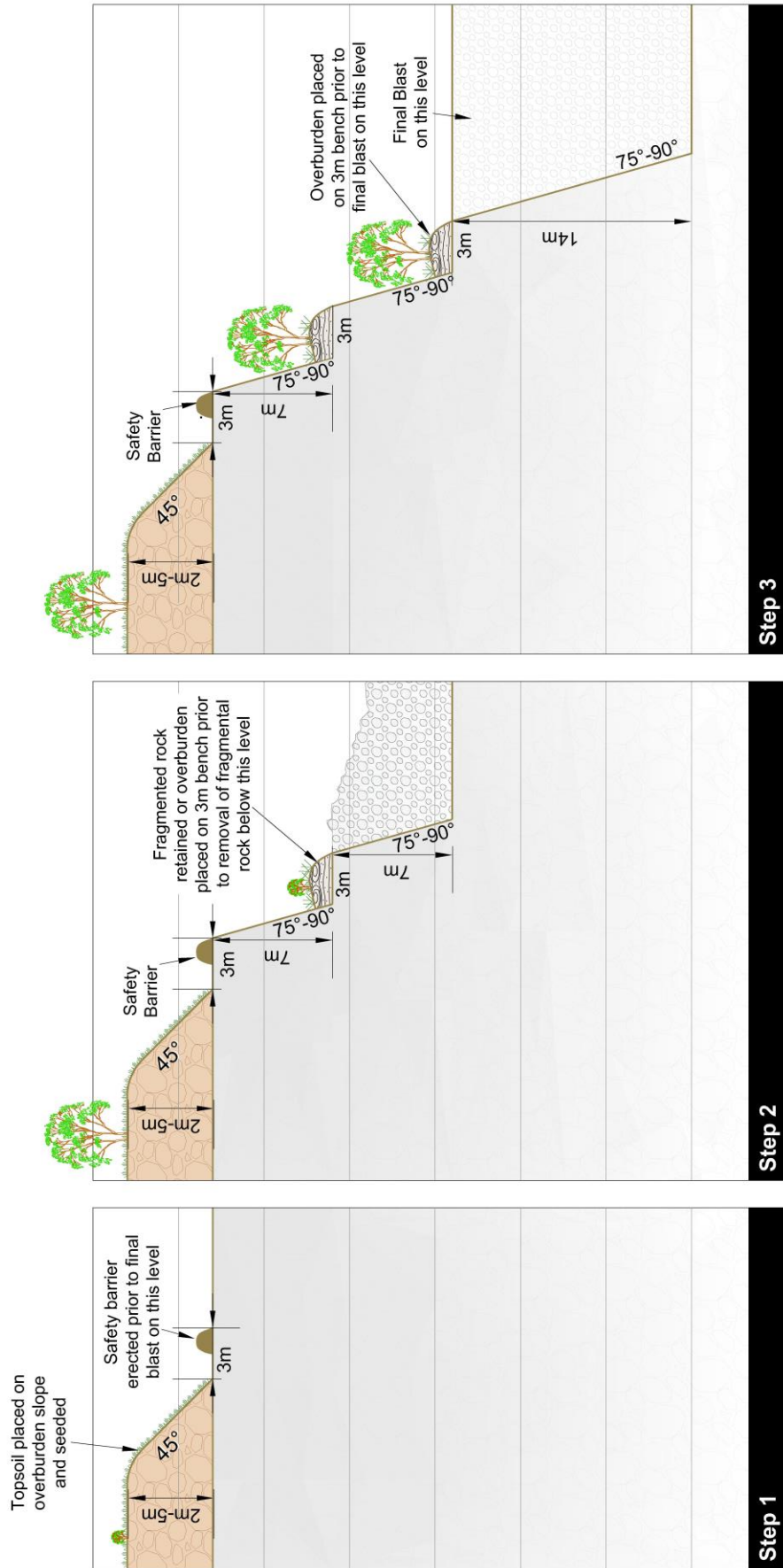


Figure 3.11
 SCHEMATIC TERRACE
 DOMAIN REHABILITATION

Not to Scale



Once profiled, the area would be vegetated through a combination of direct seeding and planting of tubestock for the proposed shrub and tree species. A mulch would be applied to assist in moisture retention, particularly during the early years of growth. Supplementary watering would be undertaken using a water truck, if necessary.

During Stages 7a and 7b, surplus overburden would be transported to, and placed within, Stages 1 to 4 together with any incoming VENM/ENM. In those areas where the contours of the final landform (**Figure 3.9**) are reached, 0.5m of soil (topsoil and/or subsoil) would be placed on the contoured surface. The completed surface would be vegetated principally through mechanical seeding/fertilising and the use of tubestock for the planned tree species.

The areas likely to reach the required contour level during each overburden removal campaign would typically be <0.5ha. These areas would be manageable and provide the opportunity for supplementary watering, if required.

All vegetated areas would be regularly weeded and monitored for consistent coverage. Supplementary soil placement and/or replanting would be undertaken, if required.

3.12.6.2 Long-term Rehabilitation

The long-term rehabilitation would involve the ongoing establishment of vegetation on the final 14m benches below the 7m benches. **Figure 3.11** shows a similar approach to the rehabilitation of the 14m benches to the 7m benches above. Emphasis would be placed upon the placement and profiling of overburden on each bench together with direct seeding/tubestock planting prior to the final blast on the level below. This approach would enable easy and safe access for overburden placement and revegetation activities.

The construction of the final landform on the floor of the extraction area, particularly after the conclusion of extraction in Stages 7a and 7b, would involve the placement of overburden from Stages 7c and 7d, together with incoming VENM and ENM in sufficient thicknesses to achieve the indicative final landform. The sloping nature of the extraction floor (to the south) would enable considerable quantities of overburden and VENM/ENM to be placed in the southern part of the Project Area. The overburden/VENM/ENM would be placed around the margins of the extraction floor to achieve slopes within the Slopes Domain between 1:3(V:H) and 1:5(V:H). At least 2m of overburden/VENM/ENM would be placed on the final extracted floor of the Project Area to provide a suitable substrate within the Plains Domain for the ongoing agricultural use of the rehabilitated landform.

As each area is profiled to the required contour, at least 0.5m of soil (topsoil and/or subsoil) would be placed on both the Slopes and Plains Domains. Each area would then be seeded mechanically with the nominated seed mix and fertiliser. Tubestock may also be used to supplement tree growth on the Slopes Domain. The final landform would incorporate three sumps referred to as the Western, Central and Southern Sumps (**Figure 3.9**). Once the area around each sump is profiled and covered with subsoil and topsoil, a range of suitable native water tolerant plants would be planted around the edge of the projected average water level.

The final landform in the western section of the extraction area (Stages 1 to 6) would recreate the catchment of the pre-extraction drainage line with runoff reporting to the Western Sump adjacent to the existing licensed discharge point. The final landform elevation in this area would allow

**Cleary Bros (Bombo) Pty Ltd***Albion Park Quarry Extraction Area Stage 7 Extension*

free draining discharge from the Western Sump into the natural drainage of Watercourse 1 to the south, thus restoring natural downstream flow (**Figure 3.9**). Runoff in the northeastern section of Stage 7 would report to the Central Sump, and from there to the Southern Sump.

At the end of extraction operations, the haul road would be partially ripped with a 5m wide access road retained along the former alignment to provide long-term access to the floor of the extraction area. The ripped area adjacent to the access road would be covered with subsoil and topsoil and incorporated into either the Slope or Plains Domain.

Cleary Bros would undertake regular monitoring programs as part of the progressive rehabilitation to ensure the relevant success targets are achieved. Where necessary, weed control and replacement of subsoil, topsoil and/or vegetation would be undertaken.

3.12.7 Rehabilitation Completion Criteria

Each domain within the Project Area would be assessed, where appropriate, against the following completion criteria, which are drawn from the existing Rehabilitation Management Plan, and adjusted, as appropriate, to reflect the enlarged footprint.

- Each domain is left clean and tidy and free of rubbish.
- For the Plains Domain, the areas stabilised with hydromulch and grasses have a 70% grass coverage within 3 months.
- The annual growth of trees and shrubs in the Terrace and Slope Domains are commensurate with growth rates for the respective species.
- Water quality accumulating within the final landform is acceptable for discharge i.e. satisfying the criteria in EPL 299 i.e.:
 - total suspended solids <50mg/L or an equivalent turbidity as approved by the EPA; and
 - pH = to 6.5-8.5.
- The rehabilitated areas are free of significant weed or feral animal issues, consistent with the surrounding areas.

3.12.8 Monitoring and Maintenance

Cleary Bros.' commitment to effective and sustainable rehabilitation would involve an ongoing monitoring and maintenance program throughout and beyond the project life. Monitoring would involve:

- identifying any erosion or sedimentation from areas with establishing vegetation cover;
- documenting the success of hydroseeding and seeding undertaken;
- documenting the success of tree and shrub planting;
- evaluating the adequacy of drainage controls; and
- reviewing the extent of weed growth within revegetated areas.



Where rehabilitation success appears to be sub-optimal, maintenance activities would be initiated including reseeded and, where necessary, re-topsoiling and/or the application of specialised treatments. Any drainage controls not functioning correctly would be repaired or remedial action undertaken. Appropriate noxious weed control or eradication would be undertaken.

3.12.9 Final Land Uses

The final land uses within the Project Area would comprise agricultural activities on the Slopes and Plains Domains and nature conservation on the Terrace Domain (see **Figure 3.9**). The Open Water and Foreshore Domains would complement the agricultural activities undertaken within the Project Area. The types of agricultural activities undertaken could include grazing, selected vegetable crops and related activities, which are consistent with the surrounding land uses of grazing in native vegetation or modified pastures. Cleary Bros would also review the potential for integrating the final land use strategy for the Quarry with other relevant strategies that may be applicable in the region at the time.

The consideration of relevant current strategies is of little importance at present given little strategic land use planning is currently in place regarding the agricultural land uses in the Dunmore Hills area. Rather, continued emphasis is placed upon the value to the region and the greater Sydney Region of the extractive materials in this area together with the specific biodiversity attributes of the area. The Illawarra/Shoalhaven Regional Plan 2041 discusses the promotion of agricultural innovation. Whilst the rehabilitated land within the Project Area would not be considered “important agricultural land”, the microclimate created by the final landform, the replaced soil resources and the water availability is likely to provide an opportunity for a sustainable agricultural venture in those areas of the Quarry designated for agricultural use.

From a cumulative perspective, the ongoing extraction operations within the Project Area and the Holcim Albion Park Quarry and Boral Dunmore Quarry would not generate any further impacts upon the surrounding land uses to those currently experienced.

From a strategic perspective, it is likely that later this century, as hard rock resources in the Dunmore Hills are depleted, planners will consider the most appropriate and sustainable land uses for this area, much in the same way as the Illawarra/Shoalhaven Regional Plan 2041 is currently considering for the Bombo Quarry lands.

3.13 Biodiversity Offsets

3.13.1 Introduction

The SEARs issued for the Project identified that the EIS must include “*a strategy to offset any residual impacts of the development in accordance with the Biodiversity Offsets Scheme.*”

A biodiversity development assessment report (BDAR) for the Project, including an assessment of impacts to biodiversity values and the associated biodiversity offsetting requirements, was undertaken by Niche Environment and Heritage Pty Ltd (Niche). The resulting report is presented as Part 3 of the *Specialist Consultant Studies Compendium* and is hereafter referred to as Niche (2022). Biodiversity impacts associated with the Project are discussed in Section 6.4. The following subsections provide a summary of the biodiversity offsetting requirements and strategy for the Project.



3.13.2 Residual Biodiversity Impacts

The Project would involve the direct clearing of a total of 7.61ha of native vegetation within the Project Area, including 4.69ha of Plant Community Type (PCT) 1300 – Whalebone Tree – Native Quince Dry Subtropical Rainforest and 2.92ha of PCT 720 – *Melaleuca armillaris* Tall Shrubland.

The Project would also result in the direct clearing of an estimated 2 170 mature *Zieria granulata* individuals and one *Cynanchum elegans* individual in addition to a modelled area of potential habitat for *C. elegans* equivalent to 0.15ha.

3.13.3 Credit Calculations

Table 3.5 summarises the ecosystem credit requirements calculated for the Project using the Biodiversity Assessment Method (BAM) Calculator. In summary, impacts to native vegetation communities associated with the Project would require 74 PCT 1300 ecosystem credits and 27 PCT 720 ecosystem credits. Credit requirements for ecosystem credit species would be covered by these ecosystem credits.

Table 3.5
Ecosystem Credit Requirements

Vegetation Zone	PCT	Impact Area (ha)	PCT Impact Area (ha)	Vegetation Integrity Score Loss	Biodiversity Risk Weighting	Required Credits	Total Credits Required
1300 – High	Whalebone Tree – Native Quince dry subtropical rainforest	0.01	4.69	63.6	2	1	74
1300 – Low		3.14		44.9	2	70	
1300 – Poor		0.30		21.2	2	3	
1300 – Very Degraded		1.24		9.1	2	0	
720 – High	<i>Melaleuca armillaris</i> tall shrubland	0.38	2.92	23.3	2.5	6	27
720 – Mod–High		0.58		24.5	2.5	9	
720 – Moderate		0.47		15.9	2.5	5	
720 – Low_Lant		0.29		10.2	2.5	0	
720 – Low_no canopy)		0.43		25.4	2.5	7	
720 – Poor		0.77		10.3	2.5	0	
Total		7.61		-	-	-	101

Source: Niche (2022) – Table 15

Table 3.6 summarises the species credit requirements calculated for the Project using the Biodiversity Assessment Method (BAM) Calculator. Threatened species identified or assumed to be present within the Project Area and likely to be impacted by the Project generate a requirement for two species credit species.

Table 3.6
Species Credits Requirements

Threatened Species	Area / Count	Habitat (ha) or Number of Individuals Impacted	Credits Required
<i>Cynanchum elegans</i> (White-flowered wax plant)	Area	0.15	4
<i>Zieria granulata</i> (Illawarra Zieria)	Count	2 172	4 344

Source: Niche (2022) – after Table 15



3.13.4 Staged Credit Retirement

The impacts on threatened species that require offsetting under the BAM would occur over an approximate 30-year period. As a result, Cleary Bros proposes to retire credits in stages that are commensurate with the timing of those impacts. Three impact stages are proposed in **Table 3.7** to structure the retirement of credits (see also Section 4.1.4 and Figure 11 of Niche (2022)). All offset credit requirements would be satisfied prior to disturbing any vegetation within the relevant stage, under the staged offset proposal.

Table 3.7
Staged Credit Requirements

Proposed Stage	Vegetation Zone Impacted	PCT Offset for Stage 7	Staged Offset Credit	
			<i>Zieria granulata</i>	<i>Cynanchum elegans</i>
One (0-5 years)	1300 - Illawarra Subtropical Rainforest - Poor	3	0	0
Two (5-15 years)	1300 - Illawarra Subtropical Rainforest - Various	3	4 344	4
	720 - Melaleuca armillaris Shrubland - Various	27		
Three (15-30 years)	1300 - Illawarra Subtropical Rainforest - Various	68	0	0
Total		101	4 344	4

Source: Niche (2022) – modified Table 17

3.13.5 Preliminary Biodiversity Offsetting Strategy

Cleary Bros proposes to offset impacts from the Project in accordance with the credit requirements outlined in **Tables 3.5** and **3.6** through the options available under the NSW Government's Biodiversity Offset Scheme including:

- retiring credits based on the like-for-like rules via either;
 - establishment of a Stewardship Site; or
 - facilitating the establishment of a Stewardship Site; or
- making a payment to the Biodiversity Conservation Fund calculated using the offset payments calculator.

Cleary Bros does not intend to apply to vary the credit requirement or depart from a like-for-like credit obligation using the ancillary rules.