

# **Appendix 1**

## **Amended Project Description**

(Total No. of pages including blank pages = 53)

# Section 3

# Amended Project Description

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## PREAMBLE

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*This amended description of the Albion Park Quarry Extraction Area Stage 7 Extension Project has been prepared as part of the Amendment Report for the “Amended Project”. The following is based on Section 3 of the Environmental Impact Statement (EIS) as exhibited. Changes to the description of the Project as exhibited in these are indicated in red underlined text.*

*This section outlines the plans for the proposed development and operation of the Amended 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 Amended Project Area is described, followed by sections on the layout and design, proposed activities, timing, staging and sequencing and proposed progressive rehabilitation.*

*The Amended 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 Amended Project on the surrounding environment.*

*Details of the safeguards, mitigation measures and operational procedures that Cleary Bros would implement to protect and manage the local environment are presented in Appendix 3 of this Amendment Report.*

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### 3.1 Introduction

#### 3.1.1 Objectives

The objectives in developing and operating the Amended 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. Project elements identified with “As currently approved” would be entirely consistent with elements approved under LEC Consent No. 10639 of 2005 for Stages 1 to 6.**

**Table 3.1**  
**Amended Project Overview**

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Element	Description
General Infrastructure	<ul style="list-style-type: none"> <li>• Internal access roads only. All other infrastructure is already in place/approved.</li> </ul>
<u>Amended</u> Project Area	<ul style="list-style-type: none"> <li>• Stages 1 to 6 of the current approved Extraction Area and <u>the amended</u> Stage 7 <u>Extraction Area</u>.</li> </ul>
Extension Disturbance Area – Stage 7	<ul style="list-style-type: none"> <li>• Approximately <u>16.1ha</u>.</li> </ul>
Total Disturbance Area – Stages 1 to 7	<ul style="list-style-type: none"> <li>• Approximately <u>34.1ha</u>.</li> </ul>
<u>Hard Rock Resource (March 2023)</u>	<ul style="list-style-type: none"> <li>• <u>Approximately 21.5 million tonnes (Mt), comprising the remaining resources within the approved Stages 1 to 6 Extraction Area and the proposed amended Stage 7 Extraction Area.</u></li> </ul>
Overburden	<ul style="list-style-type: none"> <li>• <u>Approximately 1.0 million bank cubic metres (M bcm) or 1.3 million loose cubic metres (M lcm).</u></li> </ul>
Extraction Method	<ul style="list-style-type: none"> <li>• Conventional drill, blast, load and haul (<u>as currently approved</u>).</li> </ul>
Processing	<ul style="list-style-type: none"> <li>• <u>The majority of</u> rock blasted within the <u>Amended</u> Project Area would be primary crushed and screened with mobile equipment <u>within the Amended Project Area</u>, the bulk of which would be transported <u>for further processing</u> by haul trucks to the already approved fixed processing plant on Cleary Bros’ property north of the <u>Amended</u> Project Area. <u>Additional further</u> processing of some of the primary crushed rock would also be undertaken within the <u>Amended</u> Project Area using smaller mobile crushing and screening equipment.</li> </ul>

**Table 3.1 (Cont'd)**  
**Amended Project Overview**

Element	Description
<u>Product Transportation</u>	<ul style="list-style-type: none"> <li>• <u>Not a component of the Amended Project – see Section 1.3.3 of the EIS.</u></li> </ul>
<u>Annual Production</u>	<ul style="list-style-type: none"> <li>• <u>Maximum - 900,000 tonnes per annum (tpa) (as currently approved).</u></li> <li>• <u>Average - 750,000tpa.</u></li> </ul>
Mitigation Elements	<ul style="list-style-type: none"> <li>• <u>Amenity barrier and tree screens</u></li> <li>• <u>Extraction staging, namely sequential extraction of Stages 7a to 7e.</u></li> <li>• <u>Establishment of 7m high and 10m wide benches on the visible northern and western terminal faces.</u></li> </ul>
Flexible Elements	<ul style="list-style-type: none"> <li>• Internal haul road locations.</li> <li>• Overburden emplacement.</li> <li>• Extraction sequencing, <u>allowing for overlap between Stages.</u></li> <li>• Plant species used in progressive rehabilitation.</li> <li>• Equipment fleet.</li> <li>• Personnel crib hut location.</li> </ul>
Hours of Operation	<ul style="list-style-type: none"> <li>• 7:00am to 5.30pm Monday to Friday (<u>as currently approved</u>).</li> <li>• 7:00am to 1:00pm Saturday (<u>as currently approved</u>), with operations in the Stage 7 Area on a maximum of 16 Saturdays per calendar year.</li> <li>• No operations on Sundays or Public Holidays (<u>as currently approved</u>).</li> </ul>
Project Duration	<ul style="list-style-type: none"> <li>• <u>30 years from determination, with an additional period required for final rehabilitation</u></li> </ul>
Operational Workforce	<ul style="list-style-type: none"> <li>• Approximately 27 employees and contractors would continue to be directly involved in extraction and processing operations at the Quarry.</li> </ul>
Water Management	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Mitigation measures would be used to ensure no pollution of surface water resources beyond the <u>Amended</u> Project Area.</li> <li>• <u>The final landform would include the passive discharge of surface water to local watercourses.</u></li> </ul>
Water Usage	<ul style="list-style-type: none"> <li>• 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 <u>sediment control</u> sump(s) within the Extraction Area.</li> </ul>
Rehabilitation	<ul style="list-style-type: none"> <li>• Rehabilitation would occur progressively throughout the <u>life of the Amended</u> Project. The final landform is already partly formed in Stages 1, 2 and 3.</li> <li>• Future rehabilitation would focus on initial stabilisation of the areas to be disturbed and <u>partial backfilling of the Stages 1 to 6 Extraction Area and southern section of the Stage 7 Extraction Area</u> with overburden and VENM/ENM during Stage 7.</li> <li>• Vegetation would also be progressively established on the <u>reshaped landform and</u> final or terminal extraction benches as they are completed.</li> </ul>
Capital Investment Value	<ul style="list-style-type: none"> <li>• \$31,837,881– accounts for development costs for the <u>removal</u> of the “Belmont” Main House and associated archaeological investigations, the construction of the amenity barriers and planting of the tree screens within the <u>Amended</u> Project Area and the cost of a crushing, screening and mobile plant including planned replacements of existing equipment over the life of the <u>Amended</u> Project, i.e. costs that would be incurred to extend the extraction operations into Stage 7.</li> </ul>

### 3.1.3 Approvals Required

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

- Development Consent from the Minister for Planning, their delegate, or the Independent Planning Commission as the Amended 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 original Project has been determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999*.
- 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 Amended Project, Cleary Bros would continue to operate the Quarry in conjunction with the following approvals (Table 1.1 of the EIS).

- 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 Amended Project Area to the fixed processing plant.
- DAM0008/2022 (as modified in 2019, 2020 and 2022) – Consolidation of DA 77/6, DA88/67 & DA195/64 and importation and reprocessing of VENM in Pit 2.

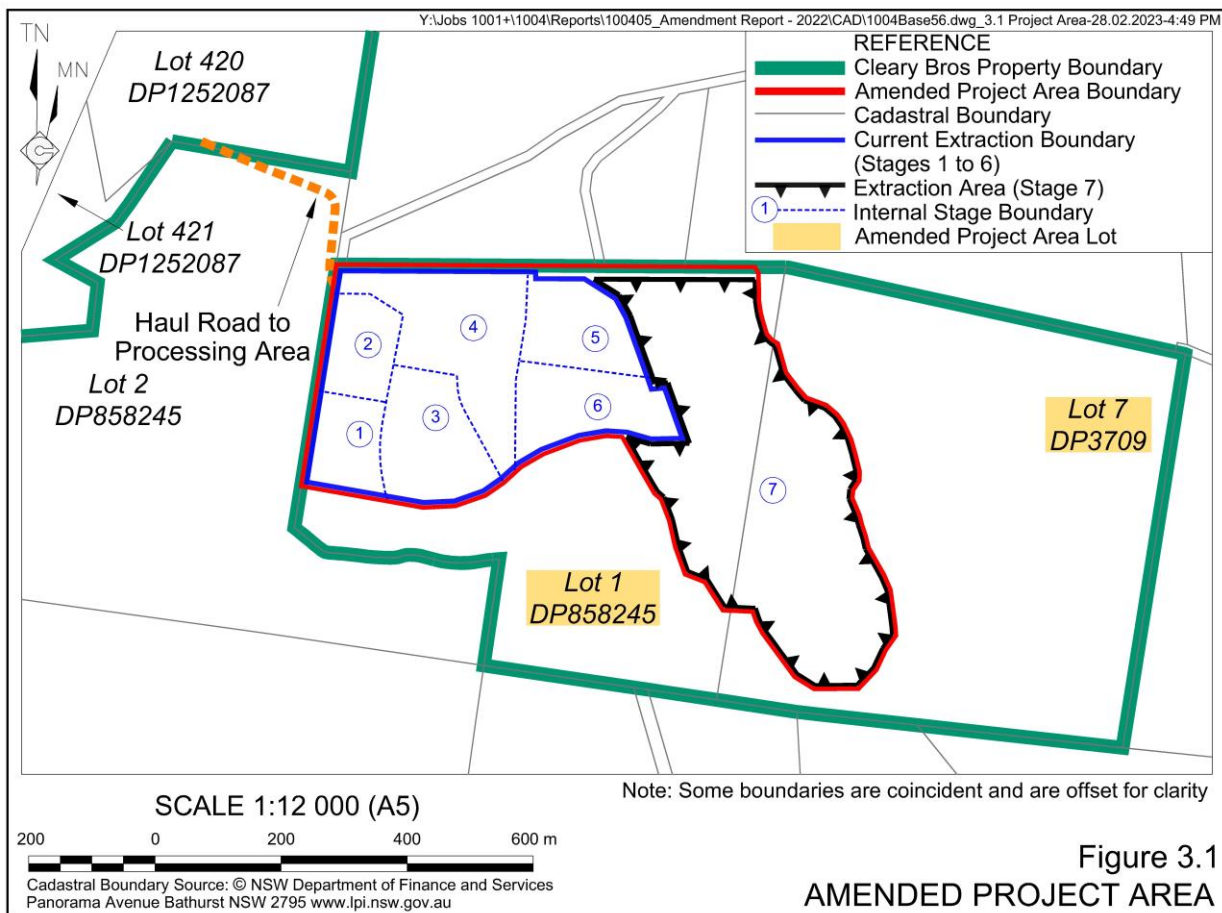
In the event development consent is granted for the Amended Project, Cleary Bros intends to undertake the following.

- 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 Amended Project Area and the fixed processing plant for the ongoing delivery of extracted rock from Stages 1 to 7 to the fixed processing plant for the term of the new development consent.

## 3.2 Amended Project Area

### 3.2.1 Definition

The Amended 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 Amended 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 2, 4, 5 and 6 concurrently with the rock extracted in Stage 7. Furthermore, some of the overburden and soil from Stage 7 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 Amended Project Area are owned by Bridon Pty Ltd, an associated entity of Cleary Bros (Bombo) Pty Ltd.

The western and northern boundaries of the Amended 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.

**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 18.0ha and with a further 16.1ha within the amended Stage 7.



**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). 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. The area of distribution of this species overlaps the area of distribution of *Melaleuca armillaris* Tall Shrubland within Plant Community Type (PCT) 720 (see Section 6.5.3.1 of the EIS), 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. The reduction in area of the southern portion of the Amended Project Area focussed upon minimising the impact to PCT 720. The reduction in area of Stage 7e to minimise visibility impacts of the Amended Project has also reduced the area of disturbance of PCT 1300.

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 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

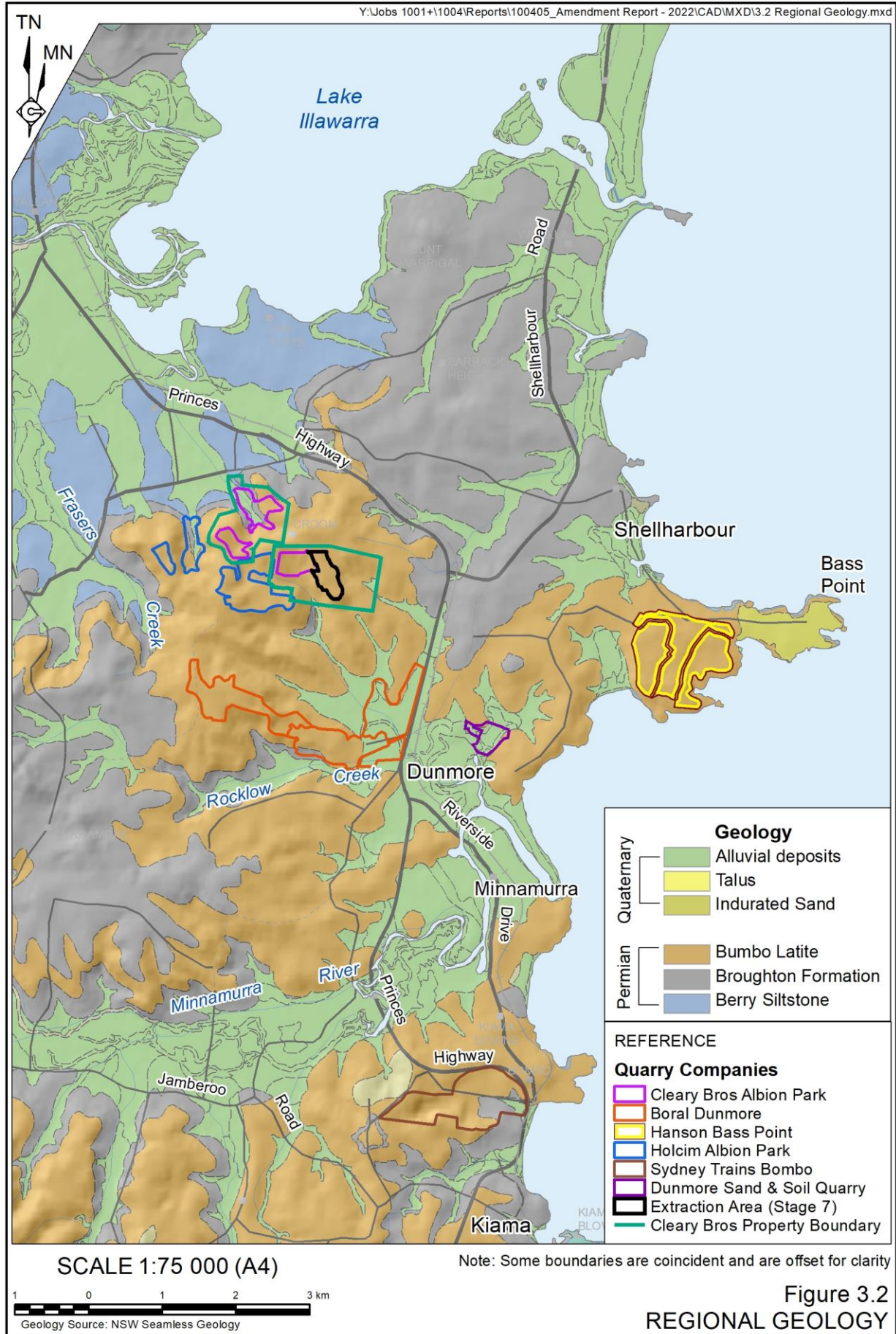
### 3.3.1 Regional Geology

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 Bumbo 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).

The base of the Lower Latite occurs at approximately 52m AHD to 17m AHD respectively within northern and southern ends of Stage 7. The Upper Latite is exposed in sections of the current Extraction Area and Stage 7.

	<p><b>Upper Latite</b></p>
	<p><b>Agglomerate</b></p>
	<p><b>Lower Latite</b></p>
<p><b>Plate 3.3 Albion Park Extraction Area Rock Types</b></p>	

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

A Resource Assessment for the Project was prepared by Graham Lee and Associates Pty Ltd, with the resulting report dated July 2019, and a subsequent revision dated November 2020 (Lee, 2020). The resource assessment is based on diamond drilling undertaken in 2018 (15 holes, 940.8m) and reverse circulation percussion drilling undertaken in 2019 (23 holes, 1,089m). 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% (Lee, 2020).

Lee (2020) estimated resources for four classes of materials as follows (Figure 3.4).

- Lower Latite, comprising the lower latite lava flow.
- Agglomerate, comprising volcanic breccia primarily occurring between the Upper and Lower Latite units.
- Upper Latite, comprising the upper latite lava flow.
- Overburden, comprising weathered material near the surface.

The majority of high value quarry products, including aggregates and speciality products, are and would continue to be sourced from the Upper and Lower Latite units. The Agglomerate is used to produce lower value quarry products, including road base and engineered fill. The overburden, as well as any unsuitable latite and agglomerate are and would continue to be used predominantly for backfilling completed sections of the Extraction Area.

Based on the above material classes, Lee (2020) established four wireframed domains. These domains were then cut using the Extraction Area design prepared by RPM Global and presented in the EIS. Subsequently, RPM Global revised the design of the Extraction Area within the Amended Project Area (see Section 3.4.3).

Table 3.2 presents a revised resource prepared based on the geological wireframed domains prepared by Lee (2020) and the amended Extraction Area design prepared by RPM Global. The estimated resource was then adjusted to account for production from the Stage 1 to 6 Extraction Area between May 2019 and March 2023 to arrive at a depleted resource. The depleted resource reflects the amount of material remaining within the combined Stage 1 to 6 and amended Stage 7 Extraction Areas. In summary, approximately 21.5Mt of latite and agglomerate remain within the Amended Project Area as of end March 2023.

Table 3.3 presents the estimated resource broken down by stage.

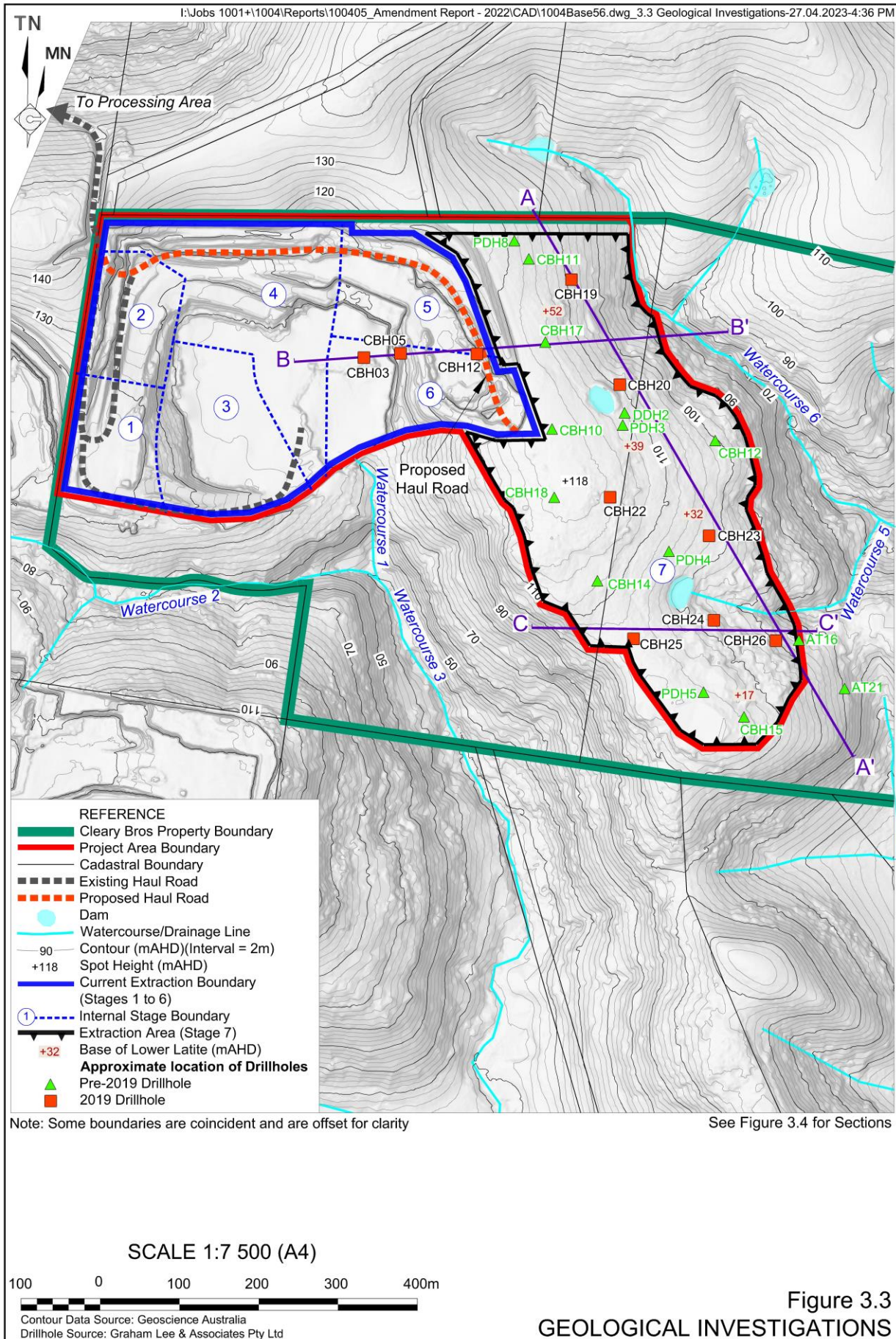


Figure 3.3  
**GEOLOGICAL INVESTIGATIONS**

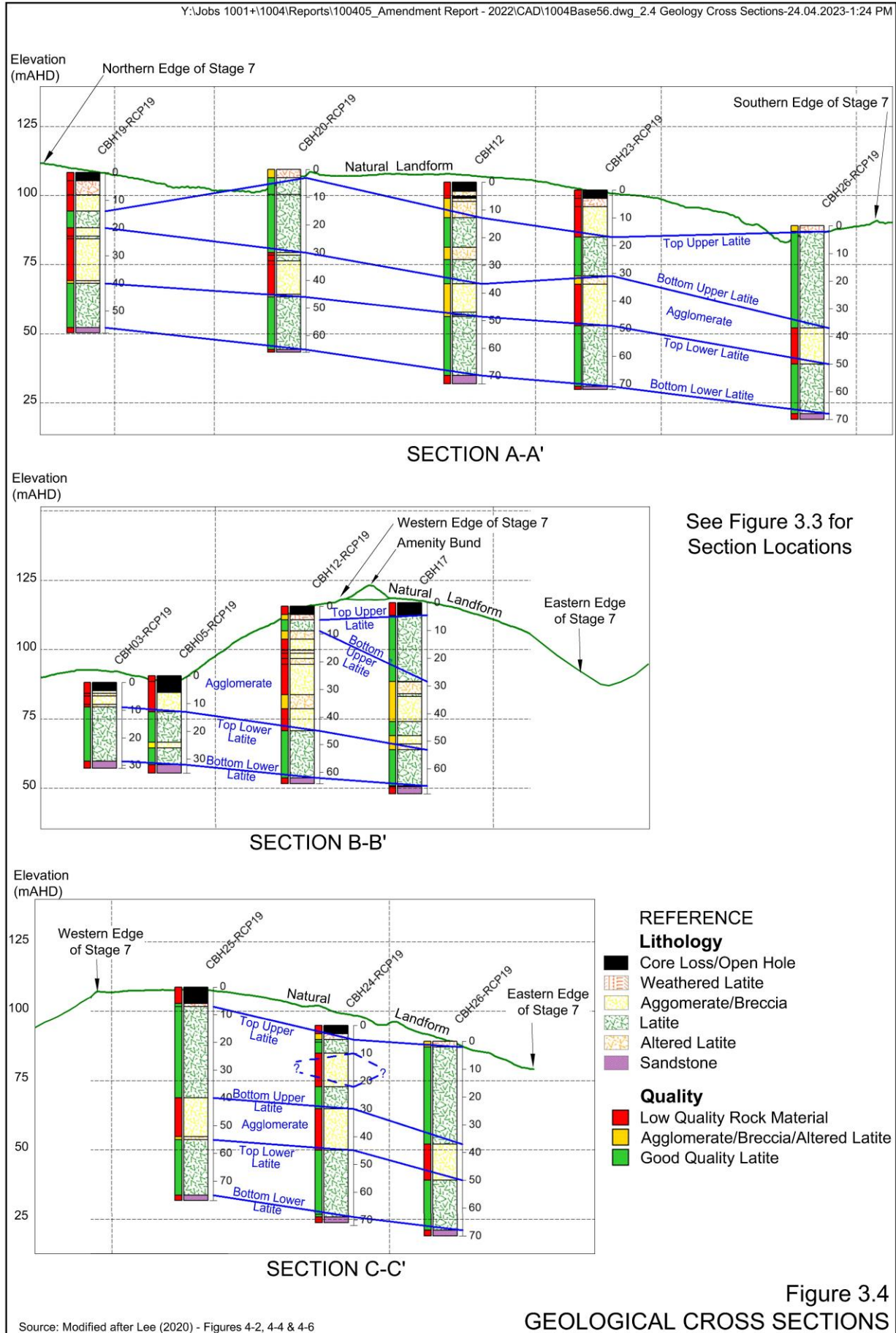


Table 3.2  
Amended Resource Volume and Tonnage Estimates

Design	Density (t/bcm)	Stages 4,5 and 6 (May 2019)		Stage 7 (Amended)		Total Resource (May 2019)		Production May 2019 to March 2023		Depleted Resource (March 2023)	
		Volume (bcm)	Tonnes	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes
Overburden	2.30	0.3 M	0.7 M	1.0 M	2.2 M	1.3 M	2.9 M	0.3 M	0.7 M	1.0 M	2.2 M
Upper Latite	2.65	0.5 M	1.3 M	3.3 M	8.7 M	3.8 M	10.0 M	0.4 M	0.9 M	3.4 M	9.1 M
Agglomerate	2.30	0.7 M	1.6 M	1.9 M	4.3 M	2.6 M	5.9 M	0.5 M	1.0 M	2.1 M	4.9 M
Lower Latite	2.65	1.1 M	2.9 M	2.2 M	5.8 M	3.3 M	8.6 M	0.5 M	1.1 M	2.7 M	7.6 M
<b>Total Latite</b>		<b>1.6 M</b>	<b>4.1 M</b>	<b>5.5 M</b>	<b>14.5 M</b>	<b>7.0 M</b>	<b>18.6 M</b>	<b>0.9 M</b>	<b>2.0 M</b>	<b>6.1 M</b>	<b>16.6 M</b>
<b>Total Latite + Agglomerate</b>		<b>2.3 M</b>	<b>5.8 M</b>	<b>7.3 M</b>	<b>18.8 M</b>	<b>9.6 M</b>	<b>24.5 M</b>	<b>1.4 M</b>	<b>3.0 M</b>	<b>8.2 M</b>	<b>21.5 M</b>
<b>Total Waste (Overburden &amp; Loss)</b>		<b>0.3 M</b>	<b>0.7 M</b>	<b>1.0 M</b>	<b>2.2 M</b>	<b>1.3 M</b>	<b>2.9 M</b>	<b>0.3 M</b>	<b>0.7 M</b>	<b>1.0 M</b>	<b>2.2 M</b>

Note: Apparent arithmetic inconsistencies are a result of rounding  
 Source: After Lee (2020), RPM Global and Cleary Bros

**Table 3.3**  
**Amended Resource Volume and Tonnage Estimates – By Stage**

Layer	Stages 4, 5 and 6				Stage 7a		Stage 7b	
	Volume (bcm)	Tonnes	Production May 2019 to March 2023	Remaining Tonnes	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes
Upper Latite	0.5 M	1.3 M	0.9 M	0.4 M	1.5 M	4.0 M	0.4 M	1.0 M
Agglomerate	0.7 M	1.6 M	1.0 M	0.6 M	0.5 M	1.2 M	0.2 M	0.4 M
Lower Latite	1.1 M	2.9 M	1.1 M	1.8 M	0.5 M	1.2 M	0.2 M	0.6 M
<b>Total Latite</b>	<b>1.6 M</b>	<b>4.1 M</b>		<b>2.2 M</b>	<b>2.0 M</b>	<b>5.2 M</b>	<b>0.6 M</b>	<b>1.6 M</b>
<b>Total Latite + Agglomerate</b>	<b>2.3 M</b>	<b>5.8 M</b>		<b>2.8 M</b>	<b>2.5 M</b>	<b>6.4 M</b>	<b>0.8 M</b>	<b>1.9 M</b>
<b>Cumulative Latite</b>				<b>2.2 M</b>		<b>7.4 M</b>		<b>9.0 M</b>
<b>Cumulative Latite + Agglomerate</b>				<b>2.8 M</b>		<b>9.2 M</b>		<b>11.1 M</b>
Layer	Stage 7c		Stage 7d		Stage 7e		Total	
	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes	Volume (bcm)	Tonnes	Tonnes	
Upper Latite	0.8 M	2.1 M	0.5 M	1.4 M	0.1 M	0.3 M	9.0 M	
Agglomerate	0.4 M	0.9 M	0.5 M	1.1 M	0.3 M	0.8 M	4.9 M	
Lower Latite	0.8 M	2.0 M	0.3 M	0.9 M	0.4 M	1.0 M	7.6 M	
<b>Total Latite</b>	<b>1.5 M</b>	<b>4.1 M</b>	<b>0.9 M</b>	<b>2.3 M</b>	<b>0.5 M</b>	<b>1.3 M</b>	<b>16.6 M</b>	
<b>Total Latite + Agglomerate</b>	<b>1.9 M</b>	<b>4.9 M</b>	<b>1.3 M</b>	<b>3.4 M</b>	<b>0.8 M</b>	<b>2.1 M</b>	<b>21.5 M</b>	
<b>Cumulative Latite</b>		<b>13.1 M</b>		<b>15.3 M</b>		<b>16.6 M</b>		
<b>Cumulative Latite + Agglomerate</b>		<b>16.1 M</b>		<b>19.5 M</b>		<b>21.5 M</b>		
Note: Apparent arithmetic inconsistencies are a result of rounding								
Source: After Lee (2020), RPM Global and Cleary Bros								

## 3.4 Layout and Design

### 3.4.1 Introduction

Figure 3.5 displays the layout of the Amended Project Area and the internal stage boundaries.

### 3.4.2 Buildings

The only Project-related building within the Amended Project Area is a portable crib hut (with two portable toilets) used by Quarry personnel. The location of the crib hut is likely to vary within the Amended Project Area throughout the life of the Amended Project.

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 Amended Project Area. The Stage 7 extension area has been designed with parameters comparable to those already adopted in Stages 1 to 6 together with specific design features for the terminal benches to ensure there is sufficient width to achieve an acceptable standard of rehabilitation to avoid adverse visual impacts. The key design parameters relied upon in the design of the Extraction Area are as follows.

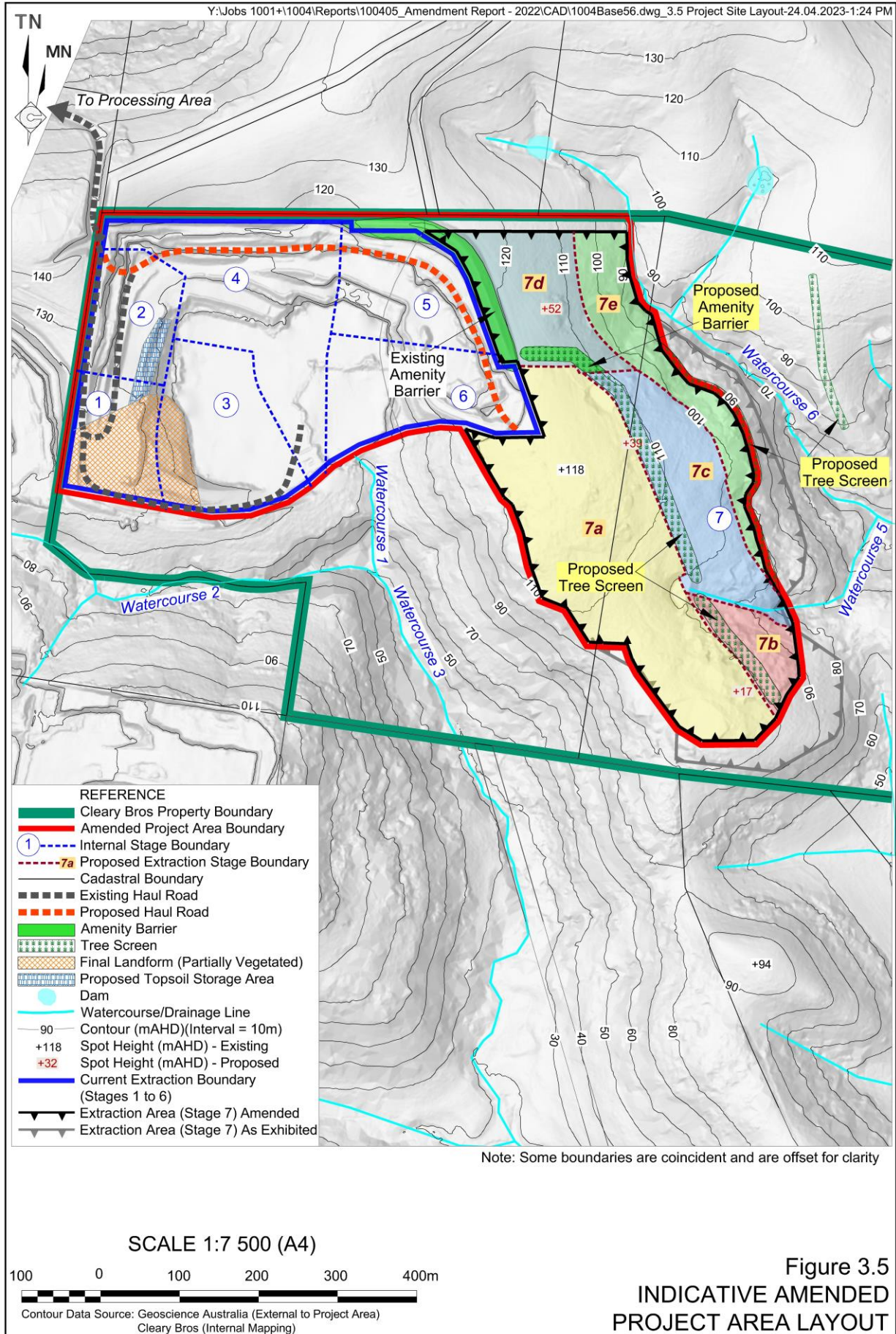
- The typical slope for all faces excavated in the friable overburden above the fresh rock would be approximately 45° from the horizontal.
- The typical slope for terminal faces within the fresh rock would be approximately 75° from the horizontal on the eastern extraction faces and up to 90° from the horizontal on all other faces<sup>2</sup>;
- For terminal faces that would be visible from the east and southeast at the end of Stage 7e, each bench would be 10m wide intersecting 7m high faces.
- For benches that would not be visible, each bench would be 14m high and 5m wide.

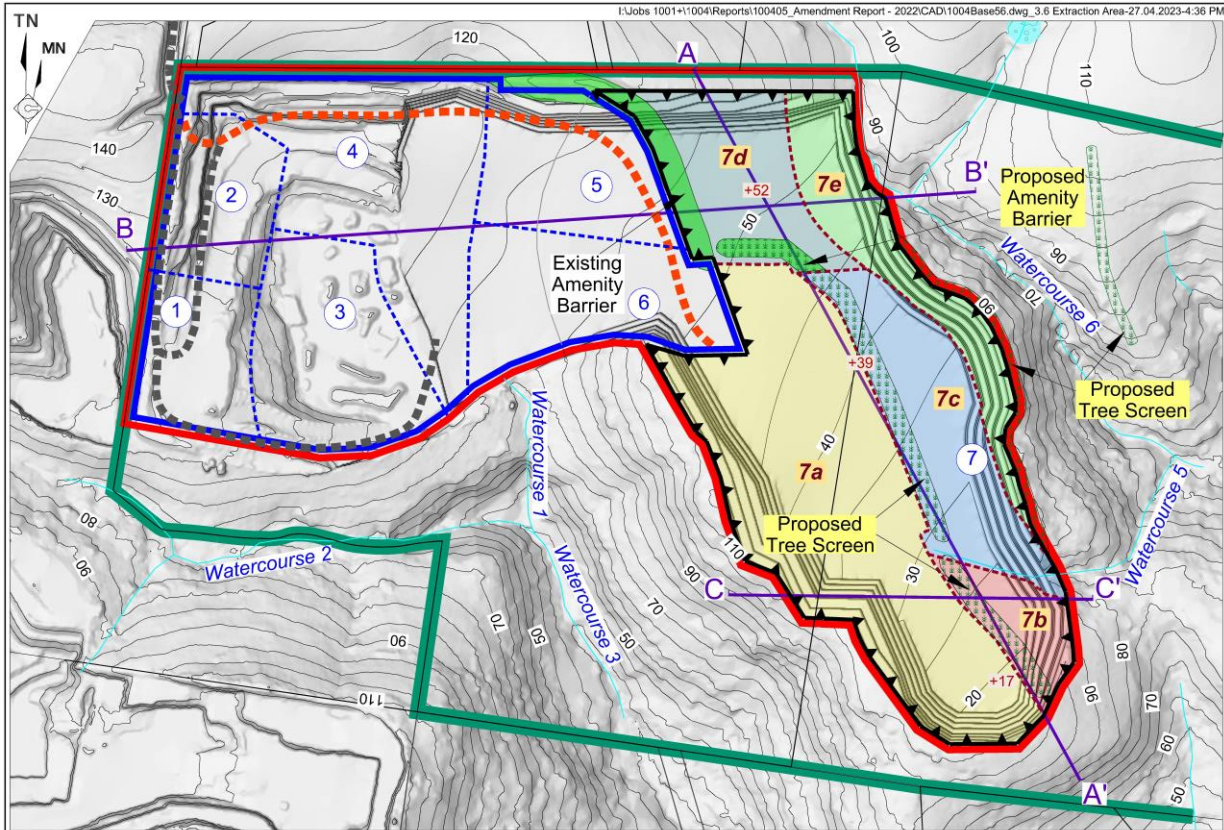
The methodology used to identify those benches that would be visible from the east and southeast is described in Section 8.2 and 8.3 of the Amended Visual Impact Assessment presented as Appendix 5 of the Amendment Report. Figure 3.6 displays the locations of the proposed 10m wide benches. In total, there would be between one and three 10m wide benches on the western terminal highwall and one and two 10m wide benches on the northern terminal highwall of the Stage 7 Extraction Area.

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<sup>2</sup> 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. The nominated slopes would be periodically reviewed by a suitably experienced and qualified geotechnical engineer throughout the life of the Project.







Note: Some boundaries are coincident and are offset for clarity

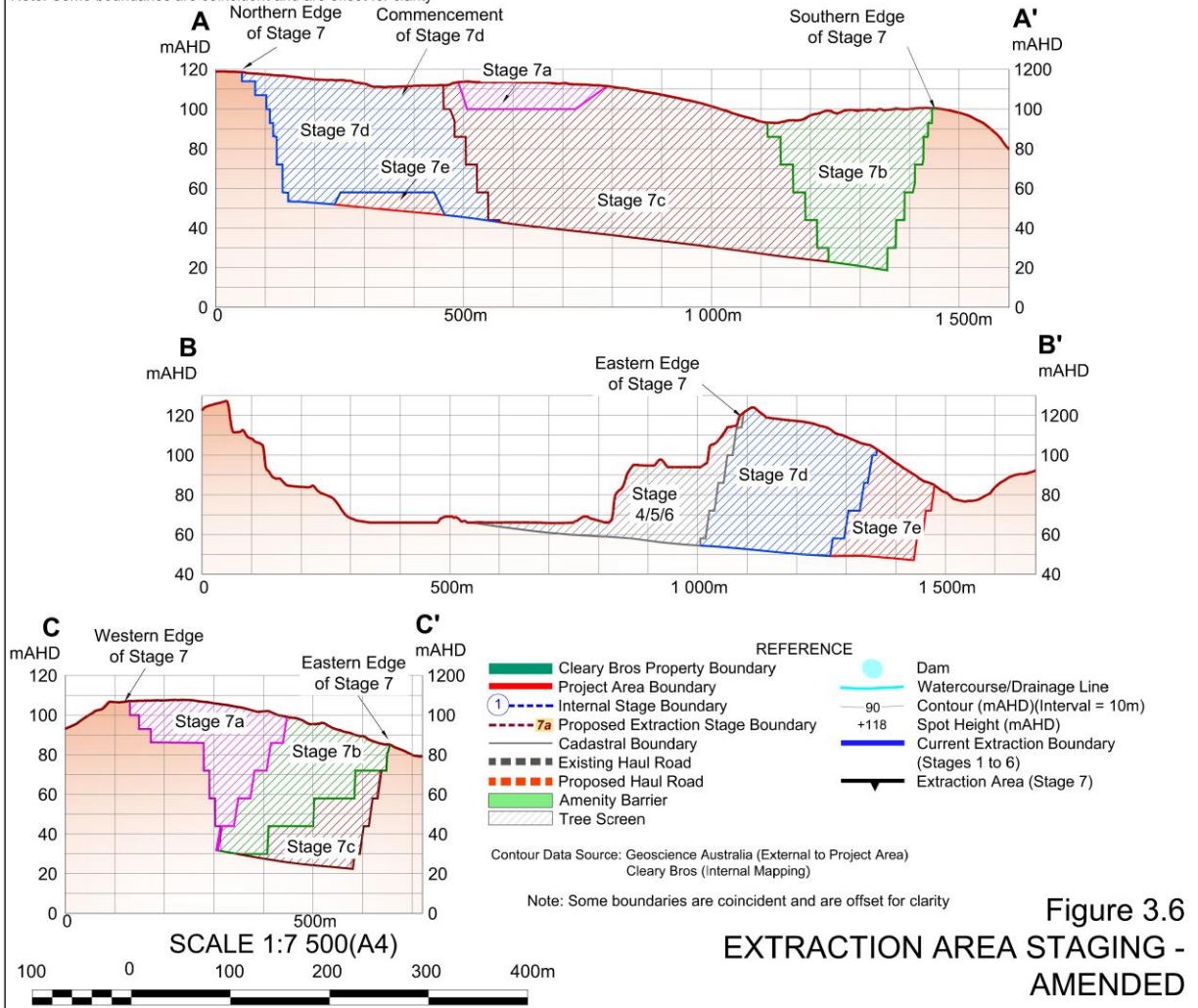


Figure 3.6  
 EXTRACTION AREA STAGING -  
 AMENDED

### 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 Amended 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 life of the Amended Project. 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 life of the Amended Project.

### 3.4.5 Mitigation Elements

The key design elements to mitigate the impacts of the Amended Project relate to the design and staging of the Extraction Area (see Section 3.6.2), the construction of an amenity barrier and planting of tree screens.

The Stage 7 Extraction Area has been designed and staged in a manner such that the extraction operations during the initial 12 years of the life of the Amended Project be restricted largely to the western side of the ridgeline within the Extraction Area. This would ensure that the maximum time is available between establishment of the 10m wide benches on the western terminal highwall and those benches becoming visible to observers to the east and southeast of the Amended Project Area. Stages 7b, 7c and 7d would then result in gradual exposure of those faces. It would not be until extraction of Stage 7d, approximately 20 years after the commencement of Stage 7a, that the full extent of the visible faces would be exposed.

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 R1 and R2 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 during extraction within Stage 7d.

An additional amenity barrier would 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 7d. The amenity barrier 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 the existing barrier. The proposed amenity barrier 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**.



**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)

Three tree screens would be established as follows to mitigate potential visual impacts of the Amended Project. Each tree screen would be established as soon as practicable following determination of the application and would be established using suitable species likely to attain a height of at least 10m. It is noted that many of the existing established trees and other vegetation achieve a 10m height already. **Figure 3.5** displays the locations of the tree screens.

- A tree screen approximately 460m long would 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.
- A tree screen approximately 360m long would be planted along the eastern boundary of Stage 7e. Substantial vegetation exists in this area already and the proposed tree screen would be established primarily through the use of infill planting. This tree screen would remain on the final landform.
- A tree screen approximately 200m long would be planted on a ridgeline to the east of Watercourse 6. This tree screen would remain on the final landform.

### 3.4.6 Flexible Elements

This subsection outlines the components of the Amended Project that would be refined throughout the life of the Amended Project without causing any substantial changes in environmental impacts. Changes in the components described below would be considered refinements<sup>3</sup> and therefore would not require further approval.

- Internal haul road locations  
Throughout the life of the Amended Project, the internal haul roads within the Amended 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 life of the Amended Project.
- 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. These variations would be minor but still within the overall concept presented in Section 3.6.2.3.

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<sup>3</sup> These refinements would be described in the relevant management plan(s).

- Western face of the Stage 1 to 6 Extraction Area  
The final configuration of the western face of the Amended 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 Amended Project Area would report to a sump within the active Extraction Area. The locations and footprint of the active sumps would vary throughout the life of the Amended Project.
- Equipment fleet  
The equipment fleet nominated in Section 3.7 reflects the current equipment suited to the extraction operations within the Amended Project Area. Throughout the life of the Amended Project, 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 generation or impacts to air quality.
- Mobile Crushing and Screening Plant  
Throughout the life of the Amended Project, 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 of the EIS, 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 of the EIS.

### 3.5 Services

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

All mobile plant and equipment within the Amended 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 Amended 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<sup>4</sup>) exceeds the current and projected annual quantity of water required for the Amended Project and the operations elsewhere within the Company's property beyond the Amended Project Area. Water demand for the original Project is discussed within Section 6.9.3.2 of the EIS and for the Amended Project within Section 4.2.5.1 of the Submissions Report. The estimated annual runoff collected in the Main Dam is presented in Section 4.2.4 of SEEC (2021). The recovery of the bulk of the water required for activities within the Amended Project Area from the Main Dam, provides Cleary Bros with the opportunity to maximise the release of water from the Amended Project Area, i.e. after the quality of the water is confirmed to meet the criteria nominated in EPL 299.

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

## 3.6 Uses and Activities

### 3.6.1 Land Uses within the Amended Project Area

The existing and proposed land uses within the Amended 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 life of the Amended Project albeit that the area for cattle grazing would be progressively reduced.

### 3.6.2 Extraction Operations

#### 3.6.2.1 Extraction Method

Extraction within Stage 7a 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 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. Section 6.8.6 of the EIS 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.

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<sup>4</sup> The 18ML Harvestable Right volume has been calculated using Water NSW's Harvestable Right Calculator based on capturing 10% of the average annual regional rainfall from the Company's landholding. Water captured under this arrangement may be used for any purpose. No reliance has been placed on the May 2022 amendments to the Harvestable Right which allows capturing up to 30% of average annual rainfall, noting that water captured under the higher limit may not be used for quarrying-related purposes.

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.

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 ([2022](#)).

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 with 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 and low-quality rock unsuitable for sale or incorporation into quarry products, and VENM/ENM imported to the Quarry 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 the final landform has been established in the current Extraction Area, overburden would be progressively placed as backfill into completed sections of Stage 7 to establish the final landform (see Section 3.12.5).



### 3.6.2.3 Extraction Staging

**Figure 3.6** displays the extraction stages within the current Extraction Area (Stages 1 to 6) and the five substages of extraction within Stage 7. Cleary Bros proposes to integrate the proposed extraction in Stage 7 with the remaining resources within Stages 1 to 6. As noted in Section 3.4.6, minor variations to internal stage boundaries and the sequencing of the extraction operations may occur during the life of the Amended Project.

The staging displayed in **Figure 3.6** 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 Extraction Area. This approach would enable the bulk of the initial extraction activities to be shielded visually from the east.

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) for surrounding residents.

2. Extraction would then progress northwards from Stage 7b to 7d to allow a period of sufficient length to enable the growth of vegetation on the upper benches on the western side of Stage 7a which would be visible in the later stages of the Amended Project.
3. Extraction within Stage 7e 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 7e and step northward. This would maximise the visual and acoustic shielding towards the residences on “Figtree Hill” to the north and to the more 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 Amended Project Area would retain the current approved maximum annual production level of 900,000tpa of hard rock material transported from the Amended Project Area. Annual production levels would vary and reflect market demands for the quarry products, however, for the purposes of estimating the duration of extraction, an average annual extraction rate of 750,000tpa is assumed. 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 3.6** displays the proposed sequence of extraction within the Amended Project Area. **Table 3.4** lists the indicative timing of the staged extraction operations, noting that each Stage would be completed generally in sequence, with some overlap to permit operational flexibility.

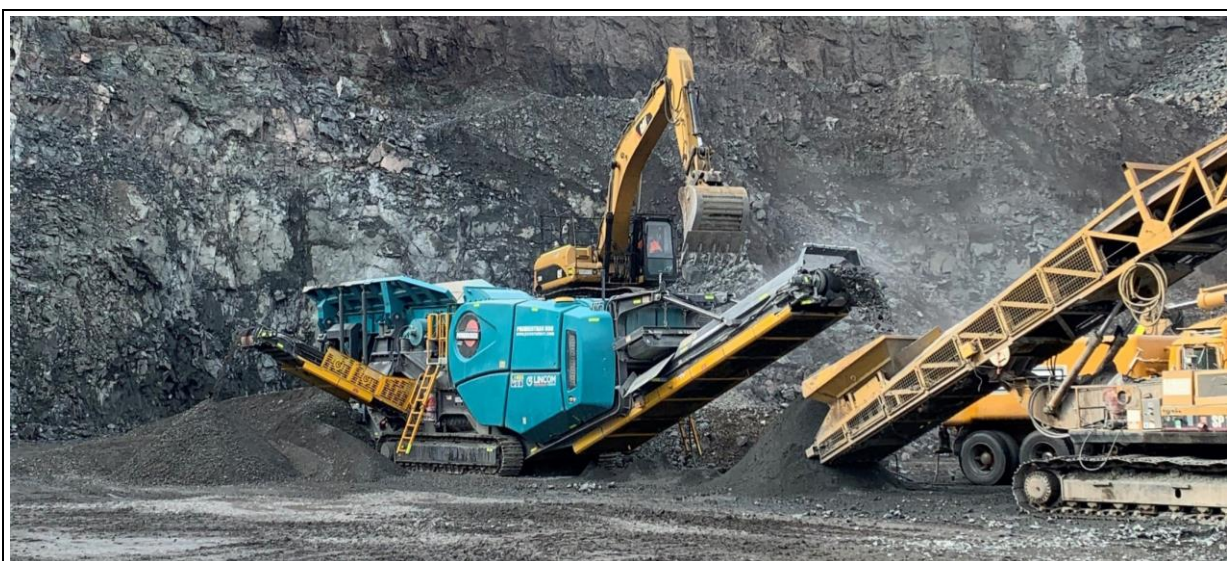
**Table 3.4**  
**Indicative Duration of Staged Extraction Operations**

<b>Stage</b>	<b>Indicative Resource (Mt)</b>	<b>Indicative Timing (years)</b>
<u>1 to 6</u>	<u>2.8</u>	<u>continuing to 2026</u>
7a	<u>6.4</u>	<u>2024 to 2037</u>
7b	<u>1.9</u>	<u>2035 to 2040</u>
7c	<u>4.9</u>	<u>2038 to 2046</u>
7d	<u>3.4</u>	<u>2044 to 2051</u>
<u>7e</u>	<u>2.1</u>	<u>2048 to 2053</u>

### 3.6.3 Mobile Processing Operations

Cleary Bros propose to introduce in-pit continuous primary crushing and screening for the majority of the blasted rock and to continue secondary crushing and screening from time to time within the Amended 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 Amended 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 likely be a Premiertrak 600 or similar equipment. The crusher would be fed with an excavator, typically the Hitachi EX1200. Cleary Bros proposes to use the primary crusher and screen throughout the Amended 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.



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

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.

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 Amended 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 Amended 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.

As identified in Section 1.3.3 and Table 1.1 [of the EIS](#), the transportation of quarry products from the Quarry would continue to operate under the Council approval for Lot 420 DP1252087 for the [life](#) of the [Amended](#) Project. 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 [for re-processing](#) 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 3.7](#)). 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 [Amended](#) Project would not result in any changes to the approved transportation routes.

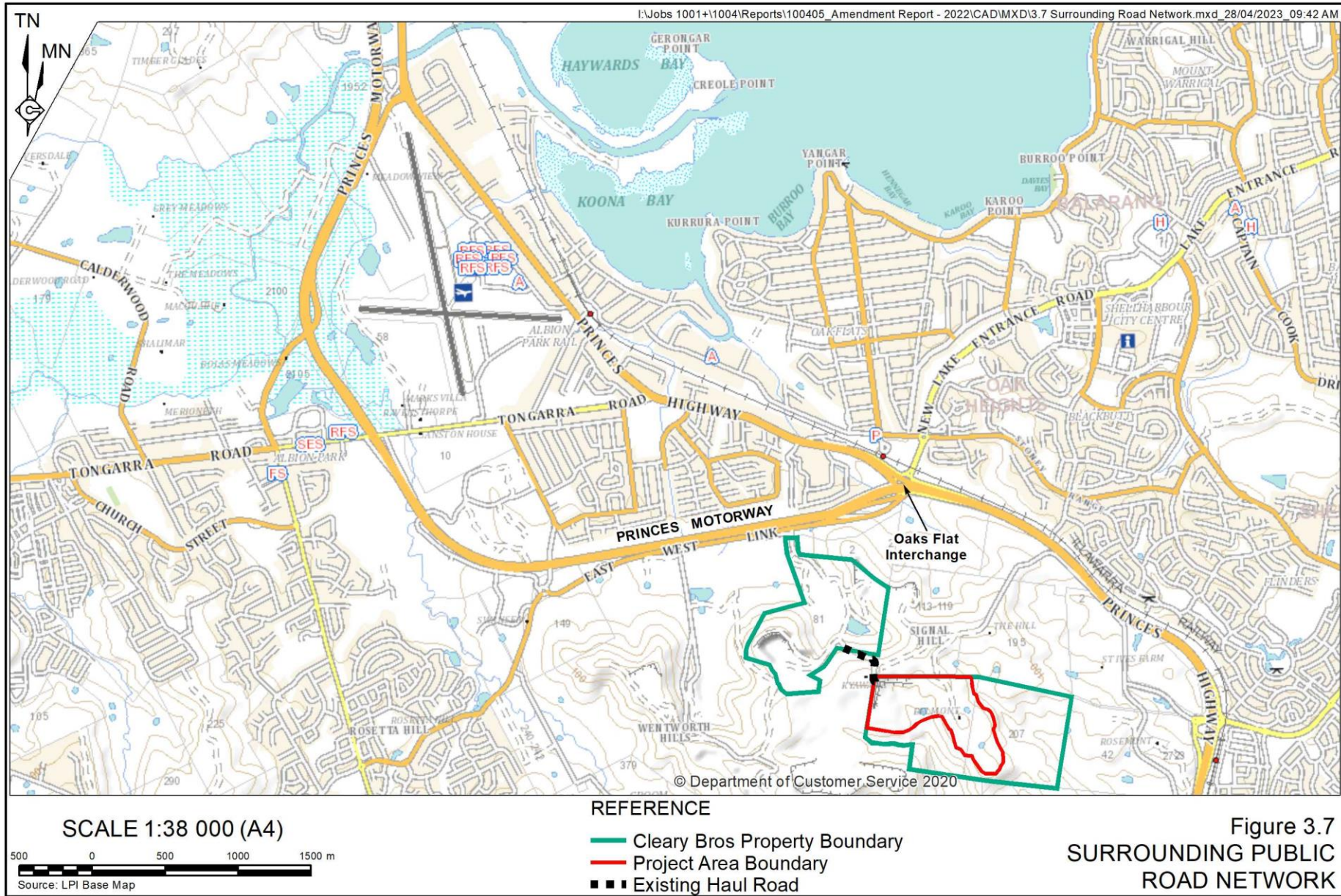
#### Vehicle Types

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.<sup>5</sup> 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 [Amended](#) Project would not result in any changes to the approved transportation routes.

The [Amended](#) Project would not result in any changes to the vehicle types currently transporting quarry products.

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<sup>5</sup> 3-axle prime mover / A-double (2-2-2).



## 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 Amended 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.

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 MOD 2 of LEC Consent No. 10639 of 2005 prepared by GTA Consultants (GTA, 2012) which identified up to just under 200 laden movements per day.

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 Amended Project.

### 3.6.5 Waste, Hydrocarbon and Chemical Management

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

Non-production wastes generated within the Amended 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 Amended Project Area) for removal (when required) and delivery to appropriately licenced facilities for reuse, recycling or disposal. Cleary Bros estimate that the annual quantity of non-production wastes generated within the Amended Project Area and sent to landfill would typically be less than 100t.

The overburden materials extracted during exposure of the hard rock resource and not suitable for sale or incorporation into Quarry products 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 Amended Project Area.

The Amended 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 Amended Project Area.

### 3.6.6 Dangerous Goods Management

The only dangerous goods managed within the Amended Project Area would be explosives and related materials brought to the Amended Project Area only on the days when blasts are initiated. The explosives would be transported to the Amended 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 3.5** 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 3.5**  
**Equipment Fleet Operating within the Amended Project Area**

Page 1 of 2

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 <sup>1</sup>	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

**Table 3.5 (Cont'd)**  
**Equipment Fleet Operating within the Amended Project Area**

Page 2 of 2

Equipment Type	Make and Model	Main Function	No.	Average Weekly Usage (hours)	
				Individual	Combined
Dozer <sup>2</sup>	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 Amended 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.

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 or for 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 Life of the Amended Project

Table 3.2 identifies that the available hard rock resource within the existing and approved Extraction Area as of March 2023 is approximately 21.5Mt. Allowing for the estimated annual average production rate of 750,000tpa, the life of the Amended Project would be 29 years. In



order to account for the possibility that annual production is less than the estimated average annual of 750,000tpa, development consent for a period of 30 years from the date of determination of the Project is sought, indicatively to 31 December 2053.

Following completion of extraction operations, rehabilitation operations would be ongoing until such time as the rehabilitation completion criteria have been achieved. As a result, consistent with other quarrying and mining-related State Significant Development consents, approval is sought to undertake rehabilitation operations within the Amended Project Area after the proposed date for completion of extraction operations.

Finally, an application to extend the term of the haul road consent (DA 614/2006) from the current expiry date of 21 February 2036 would be submitted to Shellharbour City Council following receipt of development consent for the Amended Project. If that application is not successful and an alternative assess arrangement is not approved, Cleary Bros would cease extraction and rehabilitate the Amended Project Area at that time.

### 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 Amended 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:

- archaeological investigations and removal of the “Belmont” Main House and associated structures;
- construction of the planned amenity barrier and planting of tree screens; 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 Amended Project.

### 3.12 Rehabilitation Strategy

#### 3.12.1 Introduction

Rehabilitation activities within the Amended Project Area would be managed generally in accordance with the procedures described in the Quarry’s *Rehabilitation Management Plan (RMP)*. The current version of the RMP would be updated to reflect the conditional requirements of the development consent for the Amended Project, in the event it is granted, and the proposed activities and commitments presented in this document. The RMP would describe the short, medium and long-term rehabilitation objectives for the Quarry, sets achievable completion

criteria related to its rehabilitation and describes the proposed post-quarrying land use. The approach to the design of the rehabilitation for the Amended Project has been based upon a strategy that has adopted the relevant objectives of the Strategic Framework for Mine Closure (ANZMEC, 2000).

The consideration of rehabilitation has also been undertaken with reference to 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 Compliance with Strategic Framework for Mine Closure Objectives**

#### **3.12.2.1 Introduction**

This subsection identifies how Cleary Bros has and/or will address each of the six key objectives set out in ANZMEC (2000), each of which are presented in *italics* at the start of each subsection.

#### **3.12.2.2 Stakeholder Involvement**

To enable all stakeholders to have their interests considered during the quarry closure process.

Key stakeholders for the Stage 7 extension to include the local community, Shellharbour City Council (SCC) and relevant Government Agencies.

Cleary Bros has particularly maintained open dialogue with the owners of “Figtree Hill” who would be the most impacted by the Amended Project, including rehabilitation of the Amended Project Area. That consultation has been led by the owners of “Figtree Hill” and focussed principally upon the extent and type of vegetation on the final landform rather than the final landform itself.

Similarly, Cleary Bros has communicated regularly with the Community Consultative Committee (CCC) to ensure representatives of the local community and SCC have been engaged on Project design and impacts, providing opportunities for two-way dialogue regarding plans for the rehabilitation and post-quarrying land uses of the site. Rehabilitation activities and progress have been a standing agenda item at CCC meetings for the past decade, with the development of and threats to rehabilitation a regular feature of Committee discussions.

Ongoing consultation with the local community regarding the rehabilitation of the Amended Project Area throughout the life of the Project would continue to occur primarily via the CCC and generally in accordance with Section 5.3 of the EIS. Specifically, Cleary Bros personnel would consult with the CCC and SCC during any updates of the RMP. If appropriate at the time of consultation, Cleary Bros would invite these stakeholders to the site to view the rehabilitation progress within the Amended Project Area and to discuss future plans.

Relevant Government Agencies would also be consulted regarding the planned updates of the RMP.

Finally, Cleary Bros would initiate specific discussions with the owners of “Figtree Hill,” SCC, the CCC and relevant Government Agencies at least 5 years prior to the completion of extraction operations within the Amended Project Area, to provide input and commentary regarding the post-quarrying land uses. In particular, Cleary Bros would seek input on alternate final land uses.

### **3.12.2.3 Rehabilitation Planning**

*To ensure the process of closure occurs in an orderly, cost-effective and timely manner.*

Throughout the preparation of the EIS, emphasis has been placed upon developing the Extraction Area in a manner that enables the progressive rehabilitation of completed areas. Emphasis has been placed upon considering all existing and proposed disturbed areas within the Amended Project Area in order to integrate all rehabilitation components.

When planning the rehabilitation of the Amended Project Area, reliance has been placed upon the experience gained from the rehabilitation of the numerous historical and operational quarries in the Kiama and Shellharbour areas and the need to achieve a high standard of revegetation, particularly on the visible final benches within the Extraction Area. This requirement is essential to substantially reduce the visual impacts of those extraction faces that would be visible from distant locations to the east and southeast of the Amended Project Area.

When planning rehabilitation of the Amended Project Area, it was recognised that the final landform would incorporate a range of domains, each requiring consideration of slope, types and thicknesses of substrates, drainage and vegetation. The domain with the greatest challenge to achieve the high standard of rehabilitation required was the final extraction benches or terrace domain.

The key factors considered during rehabilitation planning of the final extraction benches that would influence their rehabilitation successes related to:

- i) the thickness and type of overburden used as a substrate on the final extraction benches;
- ii) the availability of high quality locally sourced topsoil; and
- iii) the width and aspect of the final extraction benches.

It is Cleary Bros’ intention to rehabilitate the final extraction benches immediately following extraction of the material above the bench, and prior to the extraction of the material below the adjoining highwall. This early and progressive rehabilitation throughout the life of the Quarry would enable an early assessment of rehabilitation success to ensure the visible final landform blends well with the surrounding landscape before it becomes visible to receivers to the east.

Cleary Bros would review the Quarry’s RMP at key hold points throughout the life of the Project.

#### **3.12.2.4 Financial Provisions**

To ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability.

Cleary Bros has undertaken extensive rehabilitation activities at company owned quarries, including the Gerroa Sand Quarry where over 29ha of cleared farmland has been restored adjoining the remnant endangered ecological communities on the property. With this experience, Cleary Bros has a good understanding of the unit costs to undertake the planned rehabilitation as they relate to earthmoving, final shaping, planting tubestock, direct seeding, use of fertiliser and other soil ameliorants, mulching, watering, and monitoring.

Cleary Bros has provided rehabilitation bonds to the Department in accordance with Consent conditions for the existing quarries, and in the case of the Gerroa Sand Quarry, the liability has decreased in recent years as a result of the success of rehabilitation efforts. Similarly, successful rehabilitation of the existing amenity bund and revegetation areas south of the Stages 1 to 6 have led to the Department accepting a reduction in the rehabilitation liability for these areas in the most recent review.

Cleary Bros expects the value of the rehabilitation bond required for the Project would increase due to the expanded footprint, which would provide a financial incentive to demonstrate successful rehabilitation of disturbed areas. Cleary Bros would incorporate the cost of the rehabilitation activities into the overall production costs for the Quarry, whereby a liability is incurred for each tonne of rock sold to ensure adequate provision for completion of rehabilitation. This approach also incentivises the early rehabilitation of areas as they become available.

#### **3.12.2.5 Implementation of Planned Rehabilitation**

To ensure there is clear accountability, adequate resources, for the implementation of the quarry closure program.

Cleary Bros would implement the planned rehabilitation through integrating the various rehabilitation activities with extraction activities. The resources required for rehabilitation, i.e. both equipment and personnel would be programmed around the extraction operations, with emphasis placed upon avoiding double-handling of materials whenever possible.

The implementation of the RMP would require consideration of preferable weather conditions for earthmoving activities, soil placement and plant growth. A key factor in the rehabilitation of the terrace domain or extraction benches would be the placement and shaping of overburden on the final benches prior to the final blast for that bench. This practice would become standard practice throughout the life of the Project.

Finally, an important component of the implementation of the planned rehabilitation would be the regular monitoring of substrate stability, plant health, weed growth, etc. and periodic maintenance programs. The monitoring and conduct of these programs would be seasonally based, with additional monitoring in response to unusual weather event, e.g. a major wind or rain storms. Details of the regular monitoring and maintenance programs for the Quarry would be incorporated within the Quarry's RMP.

### **3.12.2.6 Rehabilitation Standards**

*To establish a set of indicators which will demonstrate the successful completion of the closure process.*

*Achieving the standard of rehabilitation proposed in the EIS would need to be measured and compared with a set of completion criteria for each rehabilitation domain within the Quarry. The approach to setting the rehabilitation completion criteria have been set in 3.12.1 and would be specified within the Quarry's RMP.*

### **3.12.2.7 Achievement of Acceptable Rehabilitation**

*To reach a point where the company has met agreed completion criteria to the satisfaction of the responsible authority.*

*The Department of Planning and Environment would be the authority responsible for determining whether the rehabilitation within the Quarry has met the completion criteria and that the conditional requirements relating to rehabilitation for the Quarry have been satisfied. To support the Department with their determination, Cleary Bros would engage a suitably qualified and independent consultant to assess the performance of the rehabilitation against the completion criteria and the relevant conditional requirements.*

## **3.12.3 Final Land Use Objectives**

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

- the interim 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 Amended 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.

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

- provide a low maintenance, free draining, non-polluting, geotechnically stable and safe landform with minimal erosion that would be suited for the proposed subsequent land uses;

- ensure that the visible upper benches within the western and northern sections of the Extraction Area are well vegetated to minimise visual contrasts and the visibility of the benches from surrounding visual catchments; and
- provide for a mixed final land use of agriculture and nature conservation.

### 3.12.4 Rehabilitation Resources

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

1. Approximately 45,000 loose m<sup>3</sup> of topsoil and 105,000 loose m<sup>3</sup> of subsoil.
2. Seedbanks of native tree, shrub and grass species within the topsoil.
3. Approximately 1.0M bcm (1.3 million loose m<sup>3</sup>) of overburden and low-quality rock comprising clay and weathered latite and agglomerate.
4. Up to approximately 1.5M loose m<sup>3</sup> of VENM/ENM<sup>7</sup>.
5. Stockpiled and mulched vegetation salvaged or produced during vegetation clearing programs.
6. Seed and tubestock for the growth of cover grasses, shrubs and trees.
7. Selected soil ameliorants and fertilisers to assist with vegetation growth and select herbicides to restrict unwanted species.
8. Fencing materials and/or guards to protect emerging tree, shrub and grass species from native animals and grazing stock.

### 3.12.5 Short- and Medium-Term Rehabilitation

Short- and medium-term rehabilitation measures that would be implemented during the first 10 to 15 years of the Amended Project would 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 Stages 1 to 4.
- Profiling of placed overburden and VENM/ENM to achieve the design contours of the final landform in completed sections.
- Placement of overburden and soil and establishment of vegetation on the visible western terminal extraction benches of Stage 7a.
- Erosion and sediment control works in rehabilitated areas.

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<sup>7</sup> Allowing for up to 100,000tpa of imported VENM/ENM for 30 years at an assumed density of 2t/m<sup>3</sup>.

### 3.12.6 Final Landform Design and Rehabilitation Domains

#### 3.12.6.1 2053 Final Landform

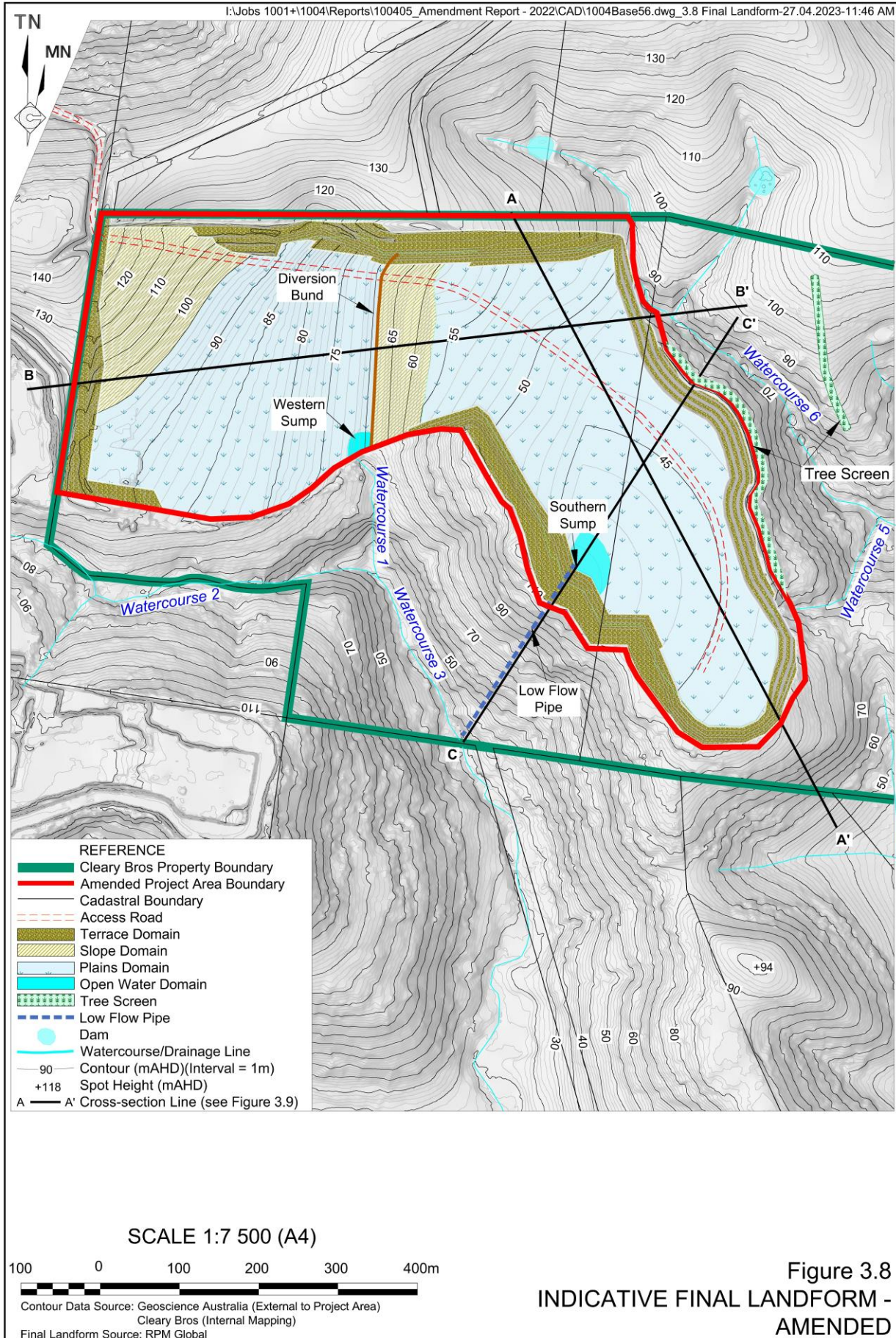
Figures 3.8 and 3.9 display the proposed indicative final landform and proposed rehabilitation domains as follows.

- Terrace Domain – steep terminal faces of the Extraction Area with 7m or 14m faces, and 5m or 10m wide benches with face angles of between 75° and 90°. Overburden and subsoil/topsoil would be placed on all benches to provide a substrate/growth medium 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, VENM/ENM or other suitable backfill materials, with subsoil/topsoil spread on the shaped landform. The domain would be revegetated with trees, shrubs and grass/pasture species. Pasture species would be preferentially established on the lower, more gentle slopes grading to the Plains Domain.
- Plains Domain – a flat to gently sloping domain with slopes of less than 5° formed from overburden, VENM/ENM or other suitable backfill, with subsoil/topsoil spread on the shaped landform. The domain would be revegetated primarily with grass/pasture species with scattered with trees and shrubs.
- Water Management Structures – the final landform would incorporate two small sediment containment basins/sumps. Each of the sumps would be of sufficient volume to allow any accumulated sediment to settle prior to discharge. The Western Sump would be constructed in a manner that would permit passive discharge of water via a spillway to Watercourse 1. The Southern Sump would incorporate infrastructure that would permit passive discharge of water to Watercourse 3 via a cased pipeline.

#### 3.12.6.2 2036 Final Landform

As identified in Section 3.6.4.2, DA614/2006 is currently relied upon for transportation of quarry materials from the Amended Project Area. That development consent expires on 21 February 2036. Cleary Bros would seek a modification of that consent, or a new consent, to permit continued use of the existing haul road from the Amended Project Area to the fixed processing plant after 21 February 2036. Alternatively, Cleary Bros may seek development consent to transport material from the Amended Project Area via an alternate route after that date.

In the event that DA614/2006 is not extended or replaced by 21 February 2036, extraction operations within the Amended Project Area would cease at that time. Based on the information presented in Table 3.4, Cleary Bros anticipates that Stages 4/5/6 and 7a would be largely complete by 2036, and Stage 7b would be in progress. Figure 3.10 presents the indicative final landform should extraction operations cease in 2036.





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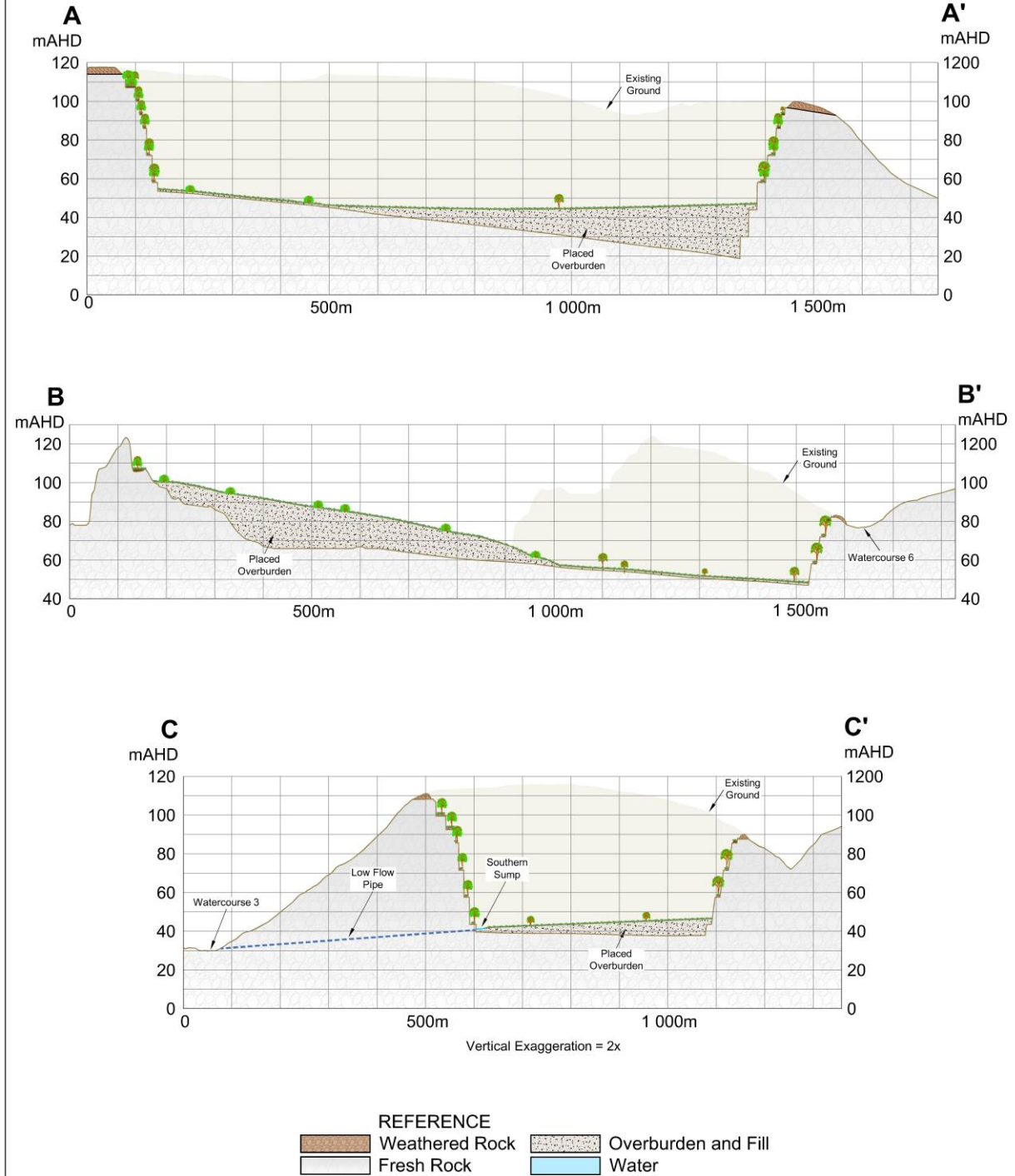
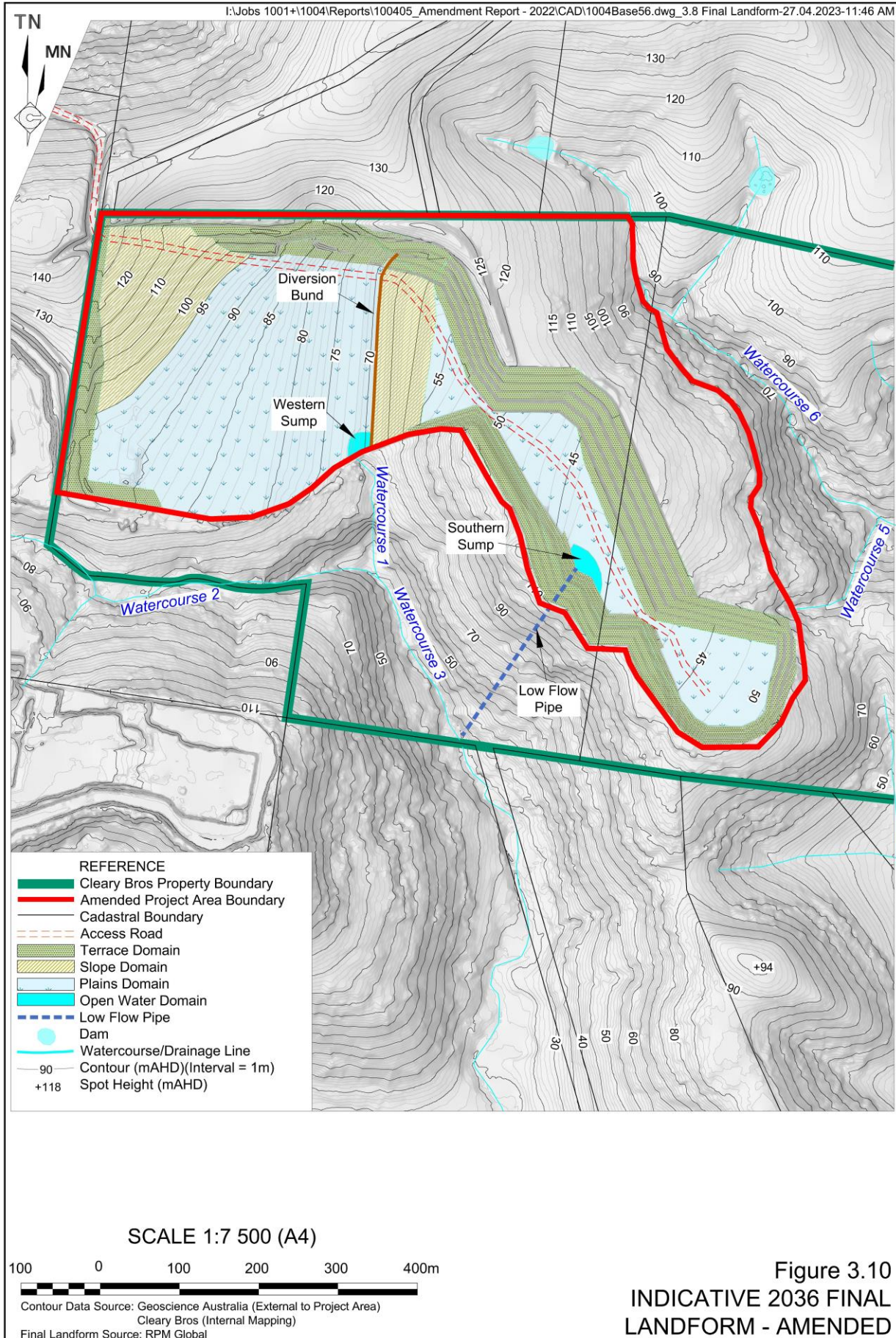


Figure 3.9  
 FINAL LANDFORM  
 CROSS-SECTIONS

Source: RPM Global



### 3.12.7 Rehabilitation Methods

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

#### 3.12.7.1 Short- and Medium-Term Rehabilitation

##### Amenity Barrier

Consistent with current onsite practices, approximately 0.5m of topsoil would be placed on the outer face and on top of the barrier and the area revegetated by hydroseeding with the proposed seed mix, fertiliser and binders. Tubestock may also be used to supplement the hydroseed application.

##### Soil Stockpiles

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.

##### Upper Slopes in Overburden

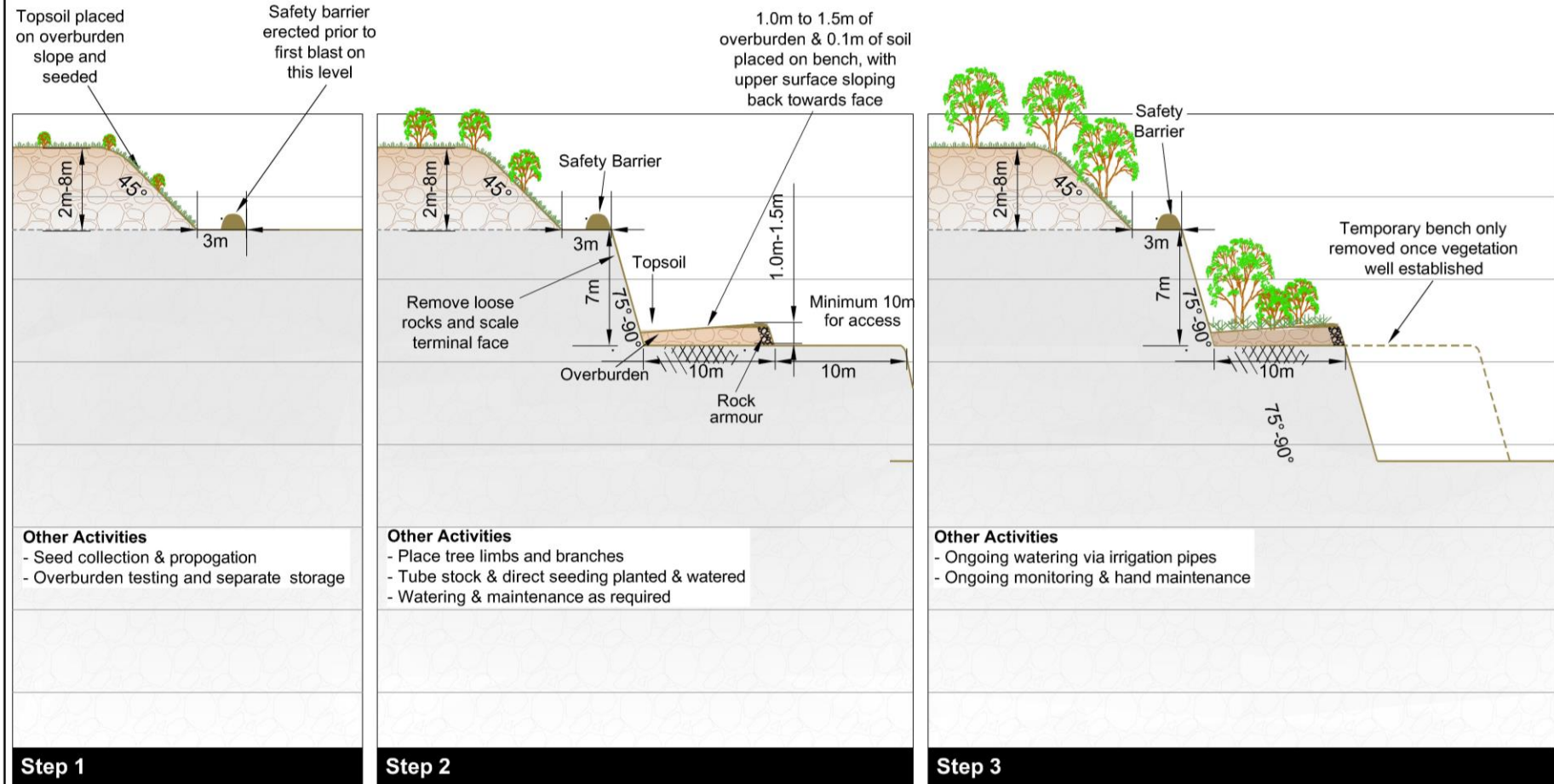
Once excavated to the required slope (approximately 45°), the overburden (which varies from 2m to 8m in thickness) would be covered with up to 0.5m of soil (topsoil and/or subsoil) and hydroseeded with the proposed seed mix, fertiliser and binders. Tubestock may also be planted to boost shrub establishment.

##### Visible Benches

The Applicant would create the visible western and northern terminal faces of the Stage 7 Extraction Area with 10m wide benches intersecting 7m high faces. These benches would be rehabilitated as follows. Figure 3.11 presents a schematic overview of each of the identified steps.

1. The final blast to create the terminal face would be undertaken with approximately 1m of sub-drill at the back of the bench. The fragmented rock would be retained to support root growth and water retention.
2. Once a final face is created and before the next bench is blasted, Cleary Bros would implement the following.
  - Scale the terminal face to remove loose rocks and material that may adversely impact on rehabilitation or the ability of personnel to access the bench.
  - Place a bund of hard, non-erodible rock a minimum of 2.0m high at the outer limit of the 10m wide bench to provide a safety bund for the final landform and prevent erosion of the outer edge of the rehabilitated landform. This will ensure a minimum 0.5m bund remains following placement of overburden material.
  - Select overburden with the appropriate characteristics for use as substrate, i.e. a well-graded material with a moderate quantity of clayey materials.

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Step 1

Step 2

Step 3

Not to Scale

Figure 3.11  
 SCHEMATIC QUARRY BENCH REVEGETATION PROCEDURE

- Place overburden to a depth of between 1.0m (at the back of the bench) and 1.5m (at outer limit of the bench). The upper surface of the placed overburden would be roughened and sloped towards the back of the bench to retain rainfall.
  - Place topsoil to a minimum depth of 0.1m on the shaped bench.
  - Place available tree limbs or branches on the upper surface of the overburden.
  - Revegetate the final landform using a combination of hydro mulching and tube stock (as appropriate).
  - Implement a program of initial watering using a water truck and or irrigation system, if required.
5. Where required, inter-bench ramps would be constructed to permit access between benches.
  6. Retain vehicular access for maintenance until vegetation is well established.
  7. The growth of the planted trees and shrubs would be monitored on a quarterly basis for the first year and biannually thereafter. Weed and pest control programs would be undertaken, as required.

### **Non-visible Benches**

Non-visible benches would indicatively be 5m wide intersecting 14m high faces. Rehabilitation of these benches would be undertaken in a manner similar to the visible benches, with the thickness of placed materials to be adjusted to reflect the narrower bench widths. As these benches would not be visible for observers located to the east and southeast of the Amended Project Area, no specific completion criteria are proposed other than the requirement for commensurate growth rates for the respective tree and shrub species.

### **3.12.7.2 Long-term Rehabilitation**

The following presents rehabilitation methods for the final landform domains that would occupy the floor of the existing and proposed Extraction Area. While sections of the Extraction Area would be available for rehabilitation during the life of the Project, in particular within Stages 1 to 6, much of the floor of the Extraction Area would be used for operational purposes until quarrying operations are complete. Notwithstanding, Cleary Bros would commence rehabilitation operations as soon as practicable once backfilling and shaping of completed sections of the Extraction Area have been completed.

### **Slope and Plains Domains**

Throughout the life of the Amended Project, surplus overburden together with any incoming VENM/ENM would be transported to and placed within completed sections of the existing and proposed Extraction Area to establish the final landform presented in **Figure 3.9**. This would initially involve placement of material into the western section of the existing Extraction Area. During Stages 7c, 7d and 7e, overburden and VENM/ENM would be placed in completed sections of Stage 7 as areas become available. Sufficient material would be stockpiled to permit backfilling of the final areas of Stage 7e towards the end of the life of the Amended Project.

Rehabilitation of the shaped final landform would be undertaken as follows.

- At least 2m of overburden and/or VENM/ENM would be placed on the floor of the Amended Project Area to provide a suitable substrate for vegetation.
- At least 0.2m of soil (topsoil and/or subsoil) would be placed on shaped final landform and ameliorants would be applied as required.
- Surface water controls would be established. In particular, a bund or swale drain would be established in the western section of the Stages 1 to 6 Extraction Area to ensure that all surface water from that section of the Extraction Area reports to the Western Sump.
- Available tree limbs or branches would be placed on the shaped surface.
- The prepared area would then be seeded mechanically with the nominated seed mix and fertiliser (if required). Tubestock may also be used to supplement tree growth.

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.

### **Water Management Structures**

The final landform would incorporate two sumps referred to as the Western and Southern Sumps (Figure 3.8). 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 each sump.

The Western Sump would receive water from the western section of the Stages 1 to 6 Extraction Area and would discharge to Watercourse 1 via a stabilised spillway at the current licenced discharge point (Figure 3.8).

Runoff in the eastern section of the Extraction Area would report to the Southern Sump which would be located adjacent to the western face of the Stage 7 Extraction Area. The Sump would discharge via an engineered pipeline, with an inlet located at an elevation of approximately 42m AHD and an outlet on Cleary Bros-owned land adjacent to Watercourse 3 at an elevation of approximately 32m AHD.

The discharge system for the Southern Sump would be required to achieve the following objectives.

- Safely and passively discharge water from the Southern Sump to Watercourse 3 at non-erosive velocities.
- Require maintenance no greater than that required for similar civil drainage systems on public and private land such as culverts and Pollution Control Devices.

In order to achieve the above objectives, Cleary Bros has sought preliminary advice in relation to the design of the discharge system. That advice, prepared by SEEC, included details relating to possible pipe diameters and gradients, inlet and outlet designs, possible pipe blockages, maintenance and residual risks. Key aspects of the discharge system could include the following which would be refined by engineering advice and hydraulic modelling prior to installation.

- A cased and inclined borehole 450mm in diameter with an inclination of 4%.
- A protected inlet that would prevent both coarse sediment and floating material such as leaves and sticks from entering and potentially blocking the pipe.
- A pipeline casing that would ensure the structural integrity of the pipeline in the long term.
- An engineered outlet within Cleary Bros-owned land that would prevent erosion or scouring of Watercourse 3. The pipe outlet would be positioned to direct flow at an angle of 45° to 60° degrees to the main channel of Watercourse 3 and would be set back from the bank of the watercourse. Scour protection would be installed at the outlet and within Watercourse 3 as required.

The borehole would be constructed using standard horizontal drilling techniques. Cleary Bros have sought the advice of a range of specialist drilling contractors who indicate that drilling and casing an approximately 250m pipeline through latite material is not a novel task and one that is well within the capability of existing equipment.

Similarly, SEEC advise that design and construction of inlet and outlet infrastructure suitable for the proposed Southern Sump is similarly not novel and is commonly implemented within the civil construction industry.

The proposed borehole would be constructed towards the end of the life of the Project and would be undertaken in accordance with relevant guidelines applicable at the time. Construction of the outlet within Watercourse 3, in particular would be undertaken without construction of an access track, with personnel, materials and equipment transported to the discharge point on foot or by helicopter. Anticipated disturbance associated with the discharge location would be expected to be less than 100m<sup>2</sup>, with no clearing of native trees or shrubs required.

The Western and Southern Sumps would initially be operated as sediment basins in accordance with the requirements of *Managing Urban Stormwater* or its equivalent at the time. In summary, sufficient storage capacity would be maintained within each sump to accommodate the required rainfall event without discharge. Following a rainfall event, water within each sump would be tested and, if of appropriate quality, would be discharged in a controlled manner to restore the required available storage capacity within the required timeframe. Only once monitoring has confirmed that rehabilitation has sufficiently stabilised the final landform and that water within the Western and Southern Sumps is routinely of suitable quality, would passive discharge from the Sumps be permitted.

### 3.12.8 Rehabilitation Completion Criteria

Each domain within the Amended 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 at surrounding analogue sites.
- The average interval between individual trees along each final extraction bench is no greater than 7m, with an average plant height no less than 2m below the top of the bench above for visible benches.
- The average interval between individual shrubs along the bench is no greater than 3.5m, with an average height of no less than 1m.
- Water accumulating within the Western and Southern Sumps satisfies the water quality criteria for discharge in EPL 299 without further treatment or settling.
- The rehabilitated areas are free of significant weed or feral animal issues, consistent with the surrounding areas.

### 3.12.9 Monitoring and Maintenance

Cleary Bros' commitment to effective and sustainable rehabilitation would involve an ongoing monitoring and maintenance program throughout and beyond the life of the Amended Project. 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.



### 3.12.10 Final Land Uses

The final land uses within the Amended Project Area would comprise agricultural activities on the Slopes and Plains Domains and nature conservation on the Terrace Domain (see **Figure 3.9**). The Water Management Structures would complement the agricultural activities undertaken within the Amended Project Area. 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.

## 3.13 Biodiversity Offsets

### 3.13.1 Introduction

The SEARs issued for the original 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 original 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 was included as Part 3 of the *Specialist Consultant Studies Compendium* and referred to as Niche (2022). Niche has subsequently updated the BDAR to reflect the reduction in the proposed area of disturbance for the Stage 7 extension. The updated BDAR is referred to as Niche (2023) and is presented as Appendix 7 of the Amendment Report. The following subsections provide an updated summary of the biodiversity offsetting requirements and strategy for the Amended Project.

### 3.13.2 Residual Biodiversity Impacts

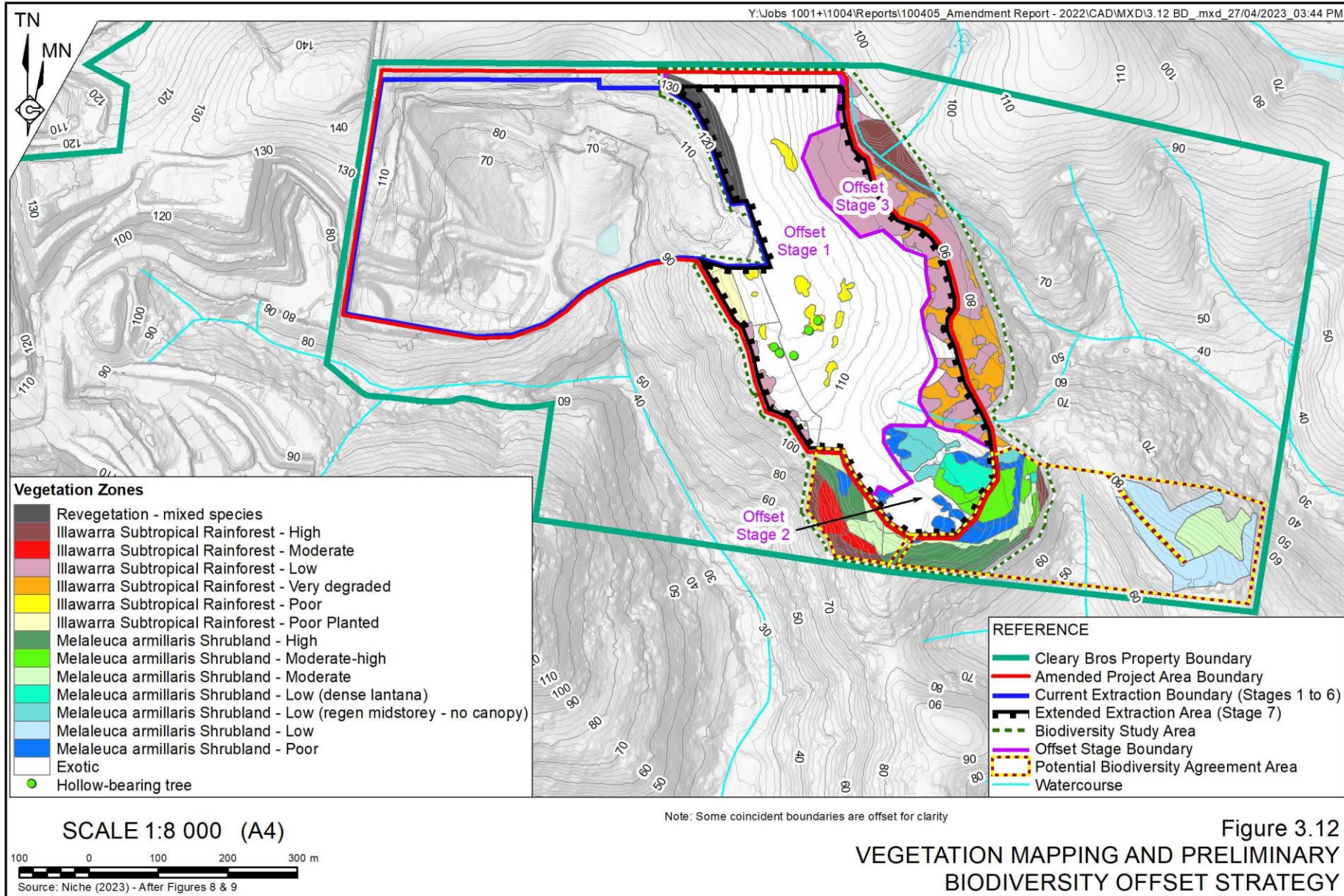
The Amended Project would involve the direct clearing of a total of 4.37ha of native vegetation within the Amended Project Area, including:

- 3.18ha of Plant Community Type (PCT) 1300 – Whalebone Tree – Native Quince Dry Subtropical Rainforest; and
- 1.19ha of PCT 720 – *Melaleuca armillaris* Tall Shrubland (**Figure 3.12**).

The Amended Project would also result in the direct clearing of an estimated 1,037 mature *Zieria granulata* individuals.

### 3.13.3 Credit Calculations

**Table 3.6** summarises the ecosystem credit requirements calculated for the Amended Project using the Biodiversity Assessment Method (BAM) Calculator. In summary, impacts to native vegetation communities associated with the Amended Project would require 52 PCT 1300 ecosystem credits and 9 PCT 720 ecosystem credits. Credit requirements for ecosystem credit species would be covered by these ecosystem credits.



**Table 3.6**  
**Ecosystem Credit Requirements**

Vegetation zone	PCT <u>abbreviated name</u>	Area (ha)	Impact Area (ha)	Vegetation Integrity Loss	Biodiversity risk weighting	Required credits	Total credits
1300_ <u>Low</u>	Whalebone Tree - Native Quince dry subtropical rainforest	<u>2.13</u>	<u>3.18</u>	44.9	2	<u>48</u>	<u>52</u>
1300_ <u>Poor</u>		<u>0.36</u>		<u>21.2</u>	2	<u>4</u>	
1300_ <u>Poor</u> <u>Planted</u>		<u>0.24</u>		<u>6</u>	2	<u>0</u>	
1300_ <u>Very Degraded</u>		<u>0.45</u>		9.1	2	0	
720_ <u>Mod</u> -High	<u>Melaleuca armillaris Tall Shrubland</u>	<u>0.19</u>	<u>1.19</u>	<u>24.5</u>	2.5	<u>3</u>	<u>9</u>
720_ <u>Low</u> Lant		<u>0.28</u>		10.2	2.5	0	
720_ <u>Low</u> <u>NoCanop</u>		<u>0.37</u>		25.4	2.5	<u>6</u>	
720_ <u>Poor</u>		<u>0.35</u>		10.3	2.5	0	
<b>Total</b>	<b>-</b>	<b><u>4.37</u></b>	<b>-</b>	<b>-</b>	<b>-</b>	<b><u>61</u></b>	

Source: Niche (2023) – Table 17

**Table 3.7** summarises the species credit requirements calculated for the Amended Project using the Biodiversity Assessment Method (BAM) Calculator.

**Table 3.7**  
**Species Credits Requirements**

Threatened Species	Area / Count	Habitat (ha) or Number of Individuals Impacted	Credits Required
<i>Zieria granulata</i> (Illawarra Zieria)	Count	<u>1,037</u>	<u>2,074</u>

Source: Niche (2023) – after Table 18

### 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 3.8** and **Figure 3.12** to structure the retirement of credits (see also Section 4.4 and Figure 9 of Niche (2023)). All offset credit requirements would be satisfied prior to disturbing any vegetation within the relevant stage, under the staged offset proposal.

**Table 3.8**  
**Staged Credit Requirements for the Amended Project**

Proposed <u>Offset Stage</u>	Vegetation Zone Impacted	<u>Proposed Staged PCT Credits for Stage 7</u>	<u>Proposed Staged Offset Credit for <i>Zieria granulata</i></u>
<u>1</u>	1300 - Illawarra Subtropical Rainforest	<u>8</u>	0
<u>2</u>	720 - Melaleuca armillaris <u>Tall</u> Shrubland	<u>9</u>	<u>2,074</u>
<u>3</u>	1300 - Illawarra Subtropical Rainforest	<u>44</u>	0
<b>Total</b>		<b><u>61</u></b>	<b><u>2,074</u></b>

Source: Niche (2023) – modified Table 20

### 3.13.5 Preliminary Biodiversity Offsetting Strategy

Cleary Bros proposes to offset biodiversity-related impacts from the Amended Project in accordance with the requirements of the Biodiversity Conservation Act 2016. This may include:

- 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.

In light of the limited distribution of the PCT720 *Melaleuca armillaris* Tall Shrubland and in order to demonstrate that adequate biodiversity offset credits would be available for this community, Cleary Bros have identified a potential Biodiversity Stewardship Agreement (BSA) Area on Cleary Bros' land (Figure 3.12). Niche (2023) undertook a preliminary, rapid assessment of the potential biodiversity offset credits available for the PCT720 *Melaleuca armillaris* Tall Shrubland within the BSA Area. Table 3.9 presents the results of that assessment. In summary, the potential BSA Area would likely generate 11 credits, compared with the 9 credits required for the Amended Project.

In the event the potential BSA area shown in Figure 3.12 does not generate the minimum credits of PCT720 *Melaleuca armillaris* Tall Shrubland required to offset those lost as part of the Amended Project, Cleary Bros would secure the residual credits required through one of the alternative options available under the Biodiversity Conservation Act 2016.

No assessment was undertaken for the Illawarra Subtropical Rainforest as that community is comparatively abundant in the region and it is expected that adequate biodiversity offset credits for this community could be secured.

**Table 3.9**  
**Preliminary Assessment of the Potential BSA Area - *Melaleuca armillaris* Tall Shrubland**

<u>Vegetation Zone</u>	<u>Impact Area</u>		<u>Potential BSA Area</u>	
	<u>(ha)</u>	<u>Credits Required</u>	<u>(ha)</u>	<u>Credits Generated<sup>1</sup></u>
<u>Low (dense Lantana)</u>	<u>0.28</u>	<u>0</u>	<u>0.01</u>	<u>1</u>
<u>Low (regen midstorey - no canopy)</u>	<u>0.37</u>	<u>6</u>	<u>1.26</u>	<u>6</u>
<u>Moderate</u>	<u>0.00</u>	<u>0</u>	<u>0.47</u>	<u>1</u>
<u>Moderate-high</u>	<u>0.19</u>	<u>3</u>	<u>0.89</u>	<u>1</u>
<u>Poor</u>	<u>0.35</u>	<u>0</u>	<u>0.42</u>	<u>1</u>
<u>High</u>	<u>0.00</u>	<u>0</u>	<u>0.38</u>	<u>1</u>
<b><u>Total</u></b>	<b><u>1.19</u></b>	<b><u>9</u></b>	<b><u>3.43</u></b>	<b><u>11</u></b>
<u>Note 1: The credits generated are estimates only.</u>				
<u>Source: Niche (2023) – After Table 19</u>				

As part of the rapid assessment Niche (2023) identified areas within land owned by Cleary Bros which could be revegetated to increase the mapped distribution of the PCT720 *Melaleuca armillaris* Tall Shrubland community. These areas would be included within the potential BSA area, and through active management, ensure that the overall condition of the PCT720 *Melaleuca armillaris* Tall Shrubland community is relatively unchanged as a result of the Amended Project.

As a result, Cleary Bros contends that:

- impacts attributable to the Amended Project on PCT720 *Melaleuca armillaris* Tall Shrubland are likely to be adequately offset via an onsite BSA Area; and
- measures could be implemented to revegetate areas within the former distribution of the PCT720 *Melaleuca armillaris* Tall Shrubland community that are currently not recognised as part of this community, that would ensure that the total mapped area of the community would not be significantly changed as a result of the Amended Project.