

Albion Park Quarry

Rehabilitation Strategy

Version 1 | Revision 4

Issued – March 2024





ACKNOWLEDGEMENT

Cleary Bros acknowledge and pay our respects to the Traditional Custodians of the lands in NSW and Australia on which our projects are located. We value the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

Contents

1.	Introduction.....	5
1.1	Scope.....	5
1.2	Consultation	5
1.3	Document Preparation.....	17
2.	Legal and Other Requirements.....	18
2.1	Development Consent.....	18
2.2	Principles of the Strategic Framework for Mine Closure	23
3.	Approved Activities.....	26
3.1	Overview	26
3.2	Approved Final Landform and Land Uses.....	26
4.	Rehabilitation Domains and Objectives	31
4.1	Rehabilitation Domains	31
4.2	Rehabilitation Objectives	34
5.	Rehabilitation Risk Assessment	36
5.1	Scope	36
5.2	Methodology	36
5.3	Rehabilitation Risk Assessment	39
6.	Quarry Closure Planning and Refinement.....	44
6.1	Indicative Rehabilitation Scheduling.....	44
6.2	Quarry Closure Stakeholder Engagement Plan.....	44
6.3	Integration of Rehabilitation and Quarry Planning.....	51
6.4	Final Landform and Land Use Optimisation	52
7.	Rehabilitation and Visual Mitigation Measures	54
7.1	Introduction and Background.....	54
7.2	Amenity Barrier and Tree Screen Establishment and Maintenance.....	57
7.3	Rehabilitation and Maintenance of Visible Terminal Benches	61
7.4	Rehabilitation and Maintenance of Visible Sections of Stages 1 to 6.....	63
7.5	Target Soil Criteria, Vegetation Communities and Species	64
8.	Incident Management, Reporting Publishing, Review and Continual Improvement	68
8.1	Incident and Non-compliance Identification and Management.....	68
8.2	Reporting and Publishing	68
8.3	Plan Review	69
8.4	Independent Environmental Audit	70

Figures

Figure 1 – Locality Plan	15
Figure 2 – Key Environmental Management Documents	16
Figure 3 – Approved Quarry Site Layout.....	27
Figure 4 – Approved Final Landform.....	28
Figure 5 – Final Landform Cross-sections	29
Figure 6 – Final Landform Conceptual Hydrological Model.....	30

Figure 7 – Active Quarry Domains	32
Figure 8 – Final Land Use Domains	33
Figure 9 – Rehabilitation Schedule – end Stage 7a.....	45
Figure 10 – Rehabilitation Schedule – end Stage 7b	46
Figure 11 – Rehabilitation Schedule – end Stage 7c.....	47
Figure 12 – Rehabilitation Schedule – end Stage 7d	48
Figure 13 – Rehabilitation Schedule – end Stage 7e.....	49
Figure 14 – Visual Catchments	55
Figure 15 – Extent of Visible Terminal Faces.....	58
Figure 16 – Conceptual Tree Screen Planting Arrangement	60
Figure 17 – Schematic Quarry Bench Revegetation Procedure	62

Tables

Table 1 – Summary of Consultation – Rehabilitation Strategy.....	6
Table 2 – Development Consent Conditions (SSD 10369) – Rehabilitation	18
Table 3 – Strategic Framework for Mine Closure Principles	23
Table 4 – Rehabilitation Objectives	34
Table 5 – Risk Assessment Participants	37
Table 6 – Qualitative Consequence Rating	37
Table 7 – Qualitative Likelihood Rating	38
Table 8 – Qualitative Risk Rating	38
Table 9 – Rehabilitation Risk Assessment – Version 1.....	39
Table 10 – Quarry Closure Stakeholder Engagement Plan	50
Table 11 – Target Soil Criteria for Native Ecosystem and Agricultural – Grazing domains.....	64
Table 12 – Target Vegetation Species.....	65

Document Control

Version	Date	Reason	Reviewed	Approved
V1.1	5/2/2024	Initial draft for Cleary Bros review	MH	
V1.2	6/2/2024	Preliminary draft for stakeholder consultation	MH	
V1.3	13/3/2024	Submission for approval following stakeholder consultation	MH	
V1.4	26/3/2024	Updated following comments from DPHI	MH	DPE

1. Introduction

1.1 Scope

Cleary Bros (Bombo) Pty Ltd (Cleary Bros) received State Significant Development consent (SSD) 10369 on 29 September 2023 to extend the existing hard rock extraction area within the Albion Park Quarry (the Quarry). The Quarry is located in the local suburb of Croom, approximately 20km south-southwest of Wollongong and approximately 4km west of Shellharbour (**Figure 1**). Three other operational quarries are present in this area, as shown in **Figure 1**.

The Quarry involves extraction of latite and agglomerate for the production of a range of high-quality aggregates, armour rock, and pavement products for use in the Illawarra-Shoalhaven and Greater Sydney Regions. The approved Quarry operations are fully described in the publicly available documents available on Cleary Bros website (www.clearybros.com.au/albion-park/).

This Rehabilitation Strategy provides a strategic overview of Quarry rehabilitation and has been prepared in accordance with the requirements of Condition B71 of SSD 10369 and in consideration of the principles of the *Strategic Framework for Mine Closure* (AMZMEC and MCA, 2000). Detailed Quarry rehabilitation measures, including for progressive rehabilitation, are presented in the *Rehabilitation Management Plan* (RMP). The Rehabilitation Strategy provides for the rehabilitation of the entire site approved under SSD 10369, including the areas previously quarried in Stages 1 – 6 of the Albion Park Quarry.

A range of other Management Plans and Strategies exist for the Quarry. **Figure 2** illustrates the strategic relationship, and inter-relationship, of this Plan to the Environmental Management Strategy (EMS) and other key environmental management documents.

Quarrying activities will not commence in Stage 7 until this Strategy has been approved by the Planning Secretary. The Rehabilitation Strategy will be implemented as approved.

1.2 Consultation

Table 1 presents a summary of consultation undertaken with relevant stakeholders regarding preparation of this Plan.

Table 1 – Summary of Consultation – Rehabilitation Strategy

Date	Agency Comments	Response	Where Addressed in this Strategy
Biodiversity Conservation Division (BCD)			
4/10/2023	Letter sent to BCD requesting requirements for this document. BCD provided general comments on the framework and contents of the Strategy, as well as requesting the Strategy address the following:		
	Salvaging of topsoil, its management and use.	Details relating to the salvaging, management and use of topsoil are provided within RMP.	Section 5.2 of RMP
	Restoration of existing native vegetation surrounding the development footprint	The Biodiversity Management Plan describes how the indirect impacts of the development on the surrounding vegetation will be mitigated, including monitoring of these areas. Furthermore, Cleary Bros will establish a Biodiversity Stewardship Agreement (BSA) over the majority of the native vegetation surrounding the Extraction Area.	Section 5 and 6 of BMP
	Revegetation of disturbed areas – goals, locations, timing, stages, materials, and maintenance. Progressive rehabilitation using species in the PCTs to be removed, and inclusion of Illawarra Zieria.	Indicative rehabilitation scheduling is outlined within Section 6.1 of the Rehabilitation Strategy. Details relating to rehabilitation implementation and methodologies are provided in Section 5 of the RMP.	Section 6.1 of RS Section 5 of RMP
	Habitat creation – including salvaged habitat.	Plans for salvaging of existing habitat features for use in rehabilitation are outlined within the RMP.	Section 5.2.2 of RMP
	Weed management (how the final landform will reduce ongoing threat of weed invasion and provide access for weed management).	Weed management is outlined within the RMP.	Section 5.2 of RMP
	Wildlife corridors through site and preventing dead ends.	Refer to Biodiversity Management Plan.	BMP
	Areas proposed for agricultural land (how they can be sympathetic to areas proposed for nature conservation).	The Rehabilitation Strategy and RMP have been developed with and reviewed by both an agronomist and bush regeneration specialist to ensure continuity between the agricultural and native ecosystem domains. Monitoring of the Native Ecosystem Domain is described in the Strategy and RMP.	RMP and RS

Date	Agency Comments	Response	Where Addressed in this Strategy
	Water quality impacts associated with various landform stages and the final landform.	Impacts to water quality throughout the Quarry life have been considered in the Rehabilitation Risk Assessment for the Quarry (refer to Section 5 of the Rehabilitation Strategy). Water Management Infrastructure of the final landform is outlined within Section 5.2.3 of the RMP.	Section 5.2.3 of RMP
14/02/2024	BCS comments on Rehabilitation Strategy		
	"It may be beneficial to describe this topsoil seedbank management within one document (our preference being the BMP) and refer to this as required in other documents..."	Topsoil stockpiling procedures have been included in the RMP.	RMP 5.2.2
	"The Strategy identifies that revegetation of the "Native Ecosystem" domain would be undertaken using species consistent with either PCT1300 or PCT720, and that the species are presented in Table 12 of the Strategy. We note that there is a variety of species included in Table 12 that are not part of either abovementioned plant community type (PCT). We recommend the species list for the Native Ecosystem Domain is revised to ensure it is compatible with the abovementioned PCTs or native species occurring within the site as indicated in Annex 2 of the submitted Biodiversity Development Assessment Report (dated July 2023). Alternatively, provide a rationale in the Strategy for the inclusion of the species selection."	Table 12 of the Rehabilitation Strategy and Table 8 of the RMP have been updated to only include species consistent with PCT1300, PCT720, and native species present in the surrounding remnant communities.	RS 7.5.2 RMP 5.2.6
	For clarity, we also recommend that the subheadings in Table 12 relate to each domain singularly rather than merging the list of species together such as the currently presented subheading "Visual Screens and Native Ecosystem Domain".	Headings within Table 12 of the Rehabilitation Strategy and Table 8 of the RMP have been updated.	RS 7.5.2 RMP 5.2.6

Date	Agency Comments	Response	Where Addressed in this Strategy
	<p><i>[...] specific locations likely to contain native plant species soil stored seedbank,</i></p> <p>Section 5.4.5 of the BMP identifies that its Figure 3 shows the location of Zieria and refers to a high value soil seedbank. This is echoed in section 5.2.2 of the RMP and refers to its Figure 14.</p> <p>We are pleased with the Figure 14 showing locations of Zieria likely seedbank and would like to see the inclusion of areas of mapped “moderate- high” and “low (regen midstorey – no canopy)” of PCT 720.</p> <p>We see benefit in seed trials as described in the BMP for Zieria and would encourage the management and reuse of topsoil likely to contain native species seedbank even if the trials for Zieria show low germination rates. Seeds of other native species (e.g. of PCT 720) are of value for rehabilitation.</p> <p>We recommend that either the Strategy or the BMP be updated to identify areas likely containing a native plant species seedbank (not just a Zieria seedbank). Ideally on a map – otherwise described in detail and referring to an existing map.</p>	<p>Figure 14 within the RMP has been updated to show areas of potential seedbank for PCT720 (areas mapped as “moderate- high” and “low (regen midstorey – no canopy)”)</p>	<p>RMP 5.2.2</p>

Date	Agency Comments	Response	Where Addressed in this Strategy
	<p><i>estimated volumes of soil (current depth and area) at donor site,</i></p> <p>Table 5 of the RMP categorises Soil Types based on soil properties, but not with regard to a native plant species seedbank. Figure 14 of the RMP spatially presents four Soil Units and Table 6 of the RMP identifies the thickness (range and average) and quantity of each soil unit. However, there is no clear distinction between areas of Zieria Granulata Density and the Type 2 and Type 3 Soil Units from Figure 14. The Zieria areas appear as a subset of the Type 2 and 3 soils. Therefore the depth and area is unquantified. We recommend revising Table 6 to differentiate areas likely containing a native plant species seedbank to the remaining Type 2 and 3 soils.</p> <p>In addition, we recommend a revision of the “Controls to be Implemented” (page 42 of the RMP) so that topsoil with a native plant species seedbank can be managed differently (especially to avoid their mixing, prevent sowing with non-endemic crop, or other actions that reduce its reuse for native plant recruitment from the seedbank). We note a comment in section 5.4.5 of the BMP that states that certain soils will be segregated from the other soil resources retained – but this seems to relate to Zieria seed trials.</p>	<p>Table 5 of the RMP has been updated to include estimated volumes for topsoil containing potential native seedbank.</p>	<p>RMP 5.2.2</p>
	<p><i>ability to collect the soil given thin skeletal soil,</i></p> <p>In section 5.4.5 of the BMP are comments stating that topsoil can be stripped. We recommend some additional comments to address collection of thin skeletal soil if methods are different to removal of other topsoil.</p>	<p>The process for skeletal soils is the same as stripping thicker soils. In each case, a dozer will be used to strip the available topsoil.</p>	<p>N/A</p>

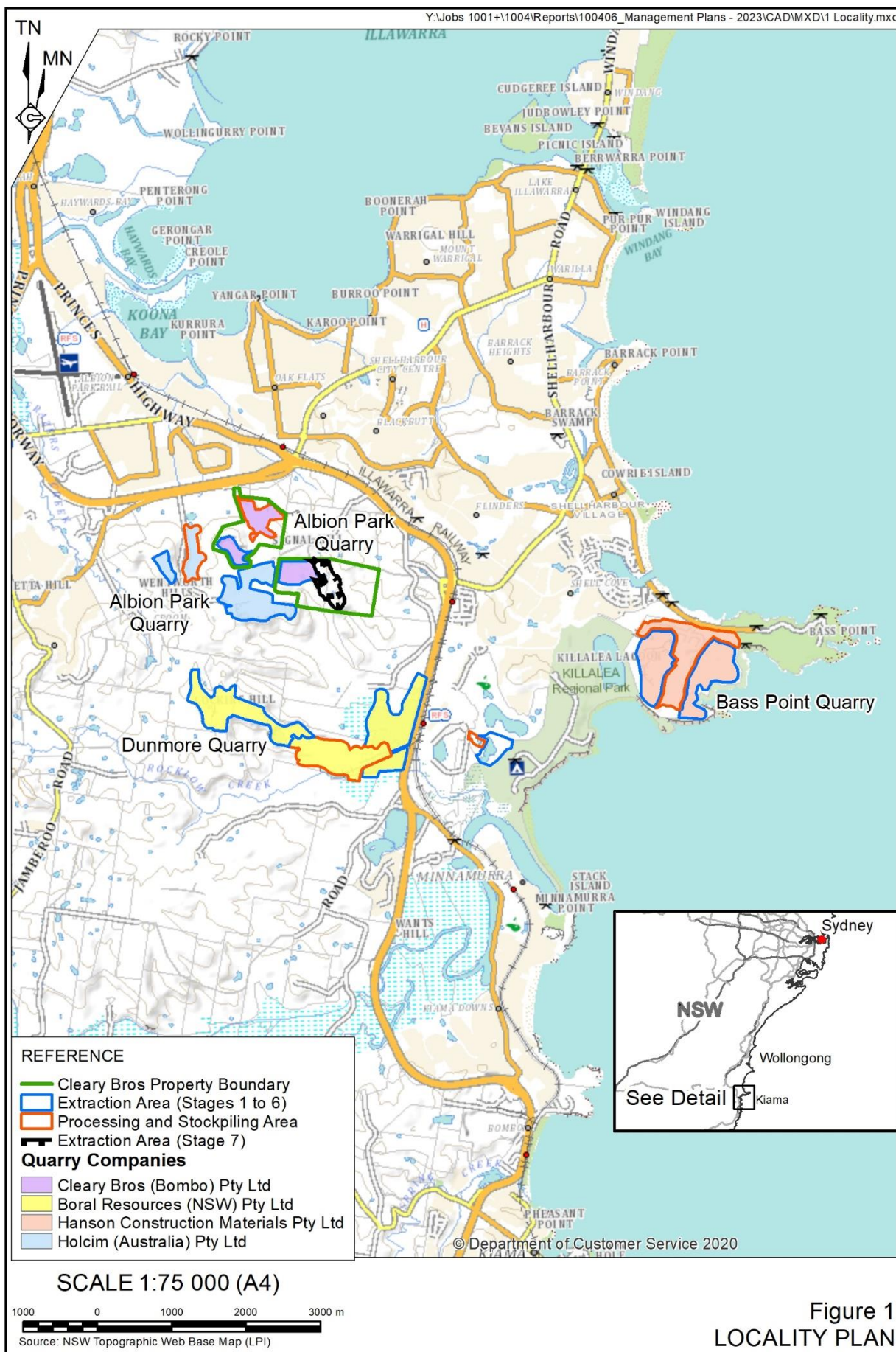
Date	Agency Comments	Response	Where Addressed in this Strategy
	<p><i>its storage details (duration, location and management) and</i></p> <p>We note that topsoil from the areas mapped as moderate and high density <i>Zieria granulata</i> in Figure 14 will preferentially be directly placed along prepared sections of the Native Ecosystem domain (page 47 of the RMP). In this case, storage may not be required. Directly placed is our preference, rather than storage for any period greater than 24 hours. Nonetheless, if storage is required, we see that topsoil management is described in section 5.2.2 of the RMP (ten points on page 42). We recommend revising these management points to make it clear how these relate to topsoil with a native seedbank.</p> <p>Furthermore, we have concern with the management point in 5.2.2 of the RMP that requires the spread seed of a suitable cover crop on all soil stockpiles; and suggest using the ‘spray on polymer-based products’ for its erosion management during stockpiling – and not using a cover crop.</p>	<p>Topsoil with potential native seedbank will be direct placed as much as practicable.</p> <p>Additional controls specific to soils containing native seedbank have been added to section 5.2.2 of the RMP.</p> <p>Section 5.2.2 has been amended to specify that spray on polymer-based products will be used for topsoil stockpiles with potential native seedbank.</p> <p>Cover crops will be utilised on soil stockpiles without native seedbank.</p>	RMP 5.2.2
	<p><i>its expected coverage (depth and area) at receiving site/s.</i></p> <p>Receiving sites for topsoil with native seedbank is described in 5.4.5 of the BMP as being utilised for the rehabilitation of parts of the Native Ecosystem Domain. The Native Ecosystem Domain is presented in Figure 8 of the RMP.</p> <p>Considering that Soil Type 2 and 3 are described in Table 5 of the RMP as 0 – 200mm and 0 – 400mm in depth, we recommend that its reuse is specified to be no deeper than these respective measurements.</p>	<p>Additional detail has been included in Section 7.3 of the Rehabilitation Strategy and Section 5.2.5 of the RMP to specify the maximum soil placement depth.</p>	RS 7.3 RMP 5.2.5
	<p>In Table 9 of the Strategy the rehabilitation risk assessment identifies a control using pre-emergent pesticide for weed control. We recommend careful evaluation for use of pre-emergent chemical on topsoil identified to have a native seedbank.</p>	<p>Table 9 updated to specify that pre-emergent pesticide will only be used on soils without native seedbank.</p>	RS 5.3

Date	Agency Comments	Response	Where Addressed in this Strategy
	<p><i>Special consideration should be given to ensure the best chance for Illawarra Zieria seedbank to remain viable for final placement in salvaged topsoil.</i></p> <p>Figure 3 of the BMP identifies areas of Zieria and therefore likely areas of seedbank. Germination of Zieria in the seedbank is proposed to be trialled (see section 5.4.5 of the BMP).</p> <p>This germination trial initiative, together with a revision of management measures as we mention above, may promote the best chance for Illawarra Zieria seedbank to remain viable for final placement in salvaged topsoil.</p>	Noted.	
DPE Water/Department of Climate Change, Energy, the Environment and Water (DCCEEW)			
9/10/2023	Letter sent to DPE Water requesting requirements for this document. DPE Water responded that they have no comments at this stage.	Noted	N/A
19/02/2024	Feedback from DCCEEW on the Rehabilitation Strategy:		
	Sharing of water must protect the water source, its dependent ecosystems and basic landholder rights.	Noted. Refer to Rehabilitation Objectives (Section 4.2)	RS 4.2
	Water sources, floodplains and dependent ecosystems are protected and restored.	Noted. Refer to Rehabilitation Objectives (Section 4.2)	RS 4.2
	Activities within a water source should avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, and where possible land should be rehabilitated.	Noted. Refer to Rehabilitation Objectives (Section 4.2)	RS 4.2
	The final Rehabilitation Management Plan/Strategy is made electronically available on a public accessible website.	Noted.	RMP 10 RS 8
	A conceptual model/diagram clearly presents how the groundwater and surface water systems interact with the final landform. This is to be informed by recent environmental assessments/modelling reviews.	Figure 6 has been inserted presenting the hydrological model for the final landform	RS Figure 6

Date	Agency Comments	Response	Where Addressed in this Strategy
	The final design and location of surface drainage features achieves a stable landform and maintains or improves riparian corridor functioning. This is to be completed with reference to industry guidelines such as: "Rehabilitation Manual for Australian Streams (LWRRDC 2000)", "Guideline: Works that interfere with water in a watercourse for a resource activity (DNRME 2019)" and "Guidelines for Controlled Activities on Waterfront Land (DPE 2022)" or their latest versions.	Section 5.2.3 of the RMP	RMP 5.2.3
	Dirty runoff catchment areas are rehabilitated and the conveyance of clean surface runoff downstream is maximised.	Section 5 of the RMP	RMP 5
	Decommissioning of groundwater boreholes is in accordance with the "Minimum Construction Requirements for Water Bores in Australia (2020)".	Specified within Section 5.2.3 of the RMP.	RMP 5.2.3
	Ongoing water take by the final landform via interception, storage or diversion is quantified and complies with relevant approvals and licences under the Water Management Act 2000 or a relevant exemption. Please note exemptions from the requirement to hold approvals under s.90 and 91 of the Water Management Act 2000 for approved SSD/SSI projects will not apply once the project approval ceases. Therefore, any relevant water management works that are to be retained will need to obtain an approval prior to the development consent lapsing.	Section 8 of the WMP	WMP 8
	Aquifer interference activities are designed to minimise ongoing water take and water quality impacts and meet the requirements of the NSW Aquifer Interference Policy.	Noted. Refer to Section 9.2 of the WMP.	WMP 9.2
	Final voids do not present a risk to important groundwater ecosystems and assets (groundwater dependent ecosystems, alluvial aquifers, and landholder bores).	Both the Rehabilitation Strategy and RMP include rehabilitation objectives and completion criteria to ensure the final landform is stable long term and does not pose a safety risk or a risk of environmental harm.	RMP 5 RS 4.2
	Final voids are designed to be sinks or to flow through the local groundwater system and need to be confirmed by a post-mining groundwater model.	Noted. Figure 6 of the Rehabilitation Strategy presents the conceptual hydrological model for the final landform.	RS Figure 6

Date	Agency Comments	Response	Where Addressed in this Strategy
	Residual risk to water sources is clearly understood and minimised. This is to include relevant assessment documentation and updated risk assessments to meet the requirements of the NSW Aquifer Interference Policy. Further detail can be found in Fact Sheet 5 in Appendix C of the "Guidelines for Groundwater Documentation for SSD/SSI Projects. Technical guideline (OPE 2022)".	Refer to Section 9.2 of the WMP.	WMP 9.2
	A monitoring and review program is included to ensure the rehabilitation outcomes are met.	Section 7 of the RMP	RMP 7
Shellharbour City Council (Council)			
9/10/2023	<p>Letter sent to Council requesting requirements for this document. Council responded on 30/10/2023 providing the following comments.</p> <ul style="list-style-type: none"> • Council require that the rehabilitation strategy cover the entire Quarry site and not just stage 7. This will allow a consistent approach throughout all pits and will result in a more effective final consolidated rehabilitation outcome throughout the whole quarry. • Rehabilitation should ensure that physical and visual connections between the heritage items in the vicinity be maintained in accordance with the aims of Shellharbour LEP 2013 Clause 1.2 Aims of the Plan and the objectives of Clause 5.10 Heritage Conservation. 	<p>The Rehabilitation Strategy covers the entire Site as defined in SSD10369, including Stages 1-6.</p> <p>Noted. Rehabilitation objectives include minimising amenity impacts to local heritage items to the greatest extent practicable, and also minimising visual impacts from surrounding land to the greatest extent practicable.</p>	<p>RS 1.1</p> <p>RS 4.2</p>
12/03/2024	The planting list is satisfactory but details of the number of plants and size is to be included.	Table 9 of the RMP details the planting densities for trees, small trees, shrubs and grasses within the Native Ecosystem domain. It also specifies tubestock will be used for plantings.	RMP 5.2.6
	The Remediation Management Strategy applies to the area of the quarry subject to SSD 10369 (Pit 3, as expanded). It is Council's view that this RMS should encompass the entirety of the Cleary Bros quarry operation (Pit 1 and 2) as noted in Condition B69. Given the age of the consents for these previous quarrying areas there is a lack of contemporary rehabilitation documents applicable to them.	The Rehabilitation Strategy and RMP cover the entire Site as defined in SSD10369, including Stages 1-6. The Pit 1 and Pit 2 quarry areas are subject to other development consents and fall outside the scope of the Stage 7 rehabilitation documents.	<p>RS 1.1</p> <p>RMP 1.1</p>

Date	Agency Comments	Response	Where Addressed in this Strategy
	Council would like Cleary Bros and the Department of Planning to investigate how information can be made available for future decision makers and land owners regarding the limitations of the site and ongoing management measures. It is recommended that this is placed on title or similar. Council would advise that this is included in the strategy.	All rehabilitation documents, including the Rehabilitation Strategy, RMP, and any subsequent updates to those plans, will be made publicly available on the Cleary Bros website. The Rehabilitation Strategy and RMP have been amended such that all relinquishment reports and associated documentation will be provided to Council to assist future decision makers and landowners.	RS 8.2 RMP 10.1
Community Consultative Committee (CCC)			
22/2/24	Letter sent to each member of the CCC with a copy of the draft Strategy, requesting comments on the draft. All members followed up via phone call or in person on the 4/3/24 or 5/3/24. Most members had no feedback on the Strategy. One member suggested option to include vegetation screen on external property.	Sections 7.1 and 7.2 updated to include framework for planting vegetation screens on adjacent heritage listed property, subject to landowner approval.	RS 7
Department of Planning, Housing and Infrastructure (DPHI)			
21/03/2024	Table 4 does not address: Ensure safety of native fauna and stock. Include objective and mitigation measures to ensure safety of native fauna and stock.	Tables 4 and 9 amended.	RS 4.2 and 5.3
	Include a commitment to implement the Rehabilitation Strategy	Commitment included.	RS 1.1



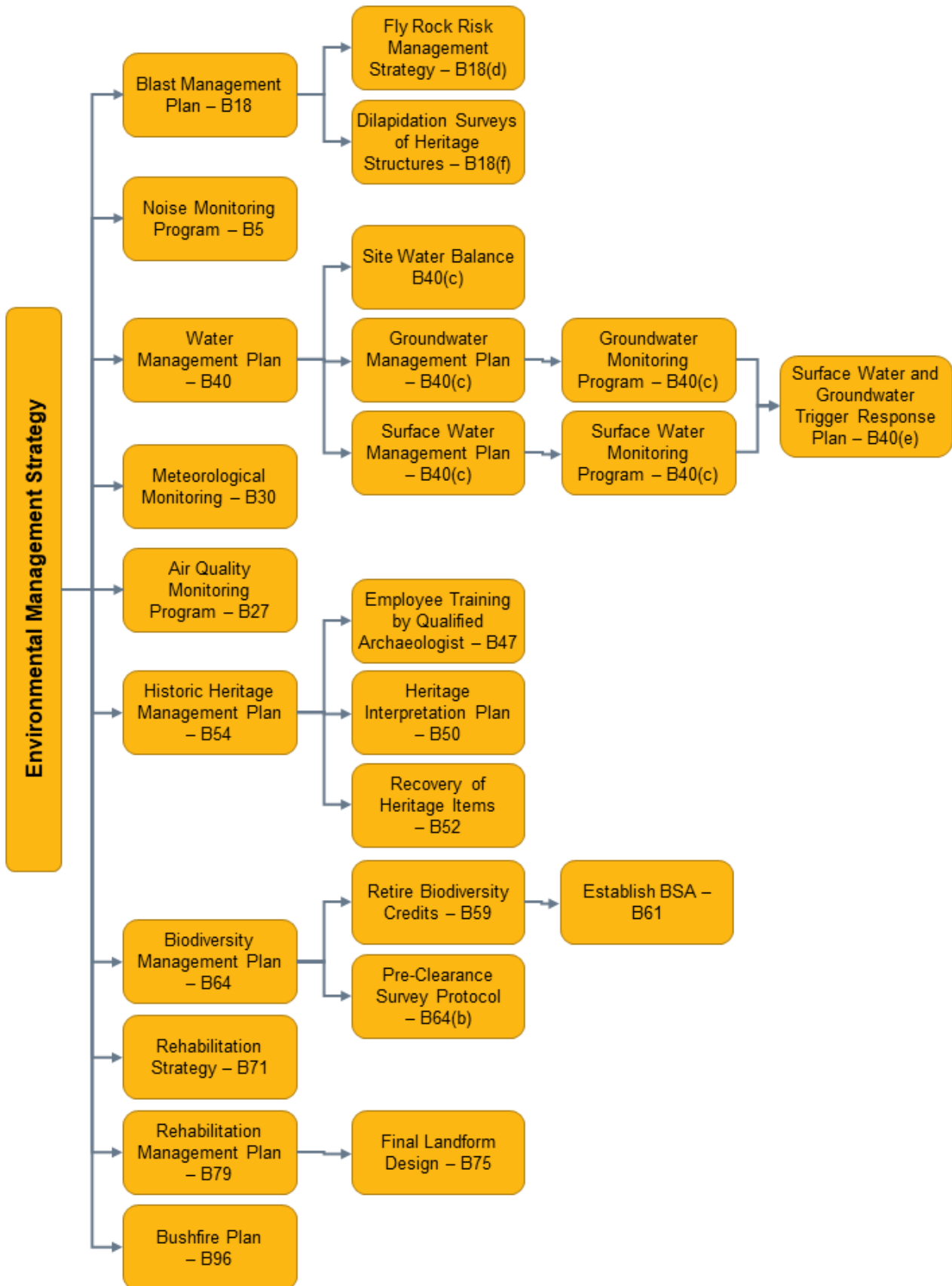


Figure 2 – Key Environmental Management Documents

1.3 Document Preparation

Preparation of this document has been coordinated by Mr Mitchell Bland, Principal and Managing Director of RW Corkery and Co Pty Limited (RWC). Mr Bland was assisted by Ms Grace Scullett-Dean (BSc, PhD), Graduate Environmental Consultant with RWC, in preparation of all sections. Mr Bland was assisted in the preparation of selected sections of this document by the following subject matter experts. **Appendix 1** presents an overview of which sections each individual contributed to.

- Mr Jack Flanagan (BSc, MEnvSci, Professional Certificate in Integrated Mine Closure), Senior Environmental Consultant with RWC – preparation and supervision of the rehabilitation risk assessment and closure objectives and input into closure planning.
- Mr David Ronchi – Geotechnical Engineer with Stantec – peer review of final landform closure plan from a geotechnical stability viewpoint.
- Mr Marcus Burgess (Diploma Conservation Land Management, Cert III Horticulture), Managing Director with Good Bush Pty Ltd – input related to revegetation strategies and species selection for native vegetation rehabilitation, including a peer review of the strategy for reinstating native vegetation communities in parts of the final landform.
- Mr Roger Garnsey, Agronomist with Roger Garnsey Agronomy Pty Ltd – input related to revegetation strategies and species selection for the reinstatement of agricultural land uses, including a peer review of the strategy for reinstating productive agricultural land in parts of the final landform.
- Mr Bill Johnston ((BEng(Hons)(Civil), MEngSc(Civ/Env)), Director with Strategic Environmental and Engineering Consulting Pty Limited – peer review of final landform closure plan from a water engineering standpoint.
- Mr Paul Ryall (B.Sc. Hydrology), Senior Environmental Consultant with RWC – peer review of final landform closure plan from a ground and surface water management standpoint.
- Mr Andrew Conacher (B. Architecture), Partner of Heritage Solutions – peer review of the final landform closure plan regarding integration into the heritage landscape.
- Dr Mudassar Arsalan (PhD – GIS and Remote Sensing, MSc, BSc) – peer review of the final landform visual mitigation design from the distribution of the widened benches standpoint.

Mr Mark Hammond (BEnvSc (Hons)), Quality and Environment Manager with Cleary Bros provided a range of information presented in this document, as well as reviewing the draft and approving the final version for release.

The appointment of each of the above individuals was approved by the Planning Secretary on 9 January 2024.

This document has been prepared in accordance with the requirements of Condition B71 of SSD 10369 and in consideration of the principles of the *Strategic Framework for Mine Closure* (AMZMEC and MCA, 2000).

2. Legal and Other Requirements

2.1 Development Consent

Table 2 identifies the conditional requirements of SSD 10369 relevant to this Plan and where they are addressed.

Table 2 – Development Consent Conditions (SSD 10369) – Rehabilitation

Cond No.	Requirement	Where addressed														
Rehabilitation Objectives																
B68	<p>The Applicant must rehabilitate the site to the satisfaction of the Planning Secretary. This rehabilitation must comply with the objectives in Table 9.</p> <p>Table 9: Rehabilitation objectives.</p> <table border="1"> <thead> <tr> <th>Feature</th> <th>Objective</th> </tr> </thead> <tbody> <tr> <td><i>All areas of the site affected by the development</i></td> <td> <ul style="list-style-type: none"> Safe and non-polluting Hydraulically and geotechnically stable Fit for the intended post-quarrying land use(s) Establish the final landform and post-quarrying land use/s as soon as practicable after cessation of quarrying operations Minimise post-quarrying environmental impacts Integrated with surrounding natural landforms and other quarry rehabilitated landforms, to the greatest extent practicable Minimise visual impacts when viewed from surrounding land to the greatest extent practicable Ensure safety of native fauna and stock </td> </tr> <tr> <td><i>Areas proposed for nature conservation</i></td> <td> <ul style="list-style-type: none"> Vegetation composition of rehabilitation contains species commensurate with native vegetation communities found in the local area Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining </td> </tr> <tr> <td><i>Areas proposed for agricultural land</i></td> <td> <ul style="list-style-type: none"> Establish grassland areas to support sustainable agricultural activities Use species found in the local area that are suitable for pasture production </td> </tr> <tr> <td><i>Infrastructure</i></td> <td> <ul style="list-style-type: none"> All infrastructure that is not to be used as part of the final land use is removed. All infrastructure that is to remain as part of the final land use is compatible with the intended post-quarrying land use/s, is safe and does not pose any hazard to the community. </td> </tr> <tr> <td><i>Water</i></td> <td> <ul style="list-style-type: none"> Water retained on the site is appropriately licensed and fit for the intended post-quarrying land use/s Groundwater quality is consistent with, or better than the pre-disturbance water quality </td> </tr> <tr> <td><i>Final void</i></td> <td> <ul style="list-style-type: none"> Optimise the size and depth of the final void to ensure the final landform is stable and non-polluting Minimise to the greatest extent practicable: <ul style="list-style-type: none"> the drainage catchment; any high wall instability risk; and the risk of flood interaction. Maximise potential for beneficial reuse, where practicable </td> </tr> </tbody> </table>	Feature	Objective	<i>All areas of the site affected by the development</i>	<ul style="list-style-type: none"> Safe and non-polluting Hydraulically and geotechnically stable Fit for the intended post-quarrying land use(s) Establish the final landform and post-quarrying land use/s as soon as practicable after cessation of quarrying operations Minimise post-quarrying environmental impacts Integrated with surrounding natural landforms and other quarry rehabilitated landforms, to the greatest extent practicable Minimise visual impacts when viewed from surrounding land to the greatest extent practicable Ensure safety of native fauna and stock 	<i>Areas proposed for nature conservation</i>	<ul style="list-style-type: none"> Vegetation composition of rehabilitation contains species commensurate with native vegetation communities found in the local area Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining 	<i>Areas proposed for agricultural land</i>	<ul style="list-style-type: none"> Establish grassland areas to support sustainable agricultural activities Use species found in the local area that are suitable for pasture production 	<i>Infrastructure</i>	<ul style="list-style-type: none"> All infrastructure that is not to be used as part of the final land use is removed. All infrastructure that is to remain as part of the final land use is compatible with the intended post-quarrying land use/s, is safe and does not pose any hazard to the community. 	<i>Water</i>	<ul style="list-style-type: none"> Water retained on the site is appropriately licensed and fit for the intended post-quarrying land use/s Groundwater quality is consistent with, or better than the pre-disturbance water quality 	<i>Final void</i>	<ul style="list-style-type: none"> Optimise the size and depth of the final void to ensure the final landform is stable and non-polluting Minimise to the greatest extent practicable: <ul style="list-style-type: none"> the drainage catchment; any high wall instability risk; and the risk of flood interaction. Maximise potential for beneficial reuse, where practicable 	Section 4 and RMP Section 4
Feature	Objective															
<i>All areas of the site affected by the development</i>	<ul style="list-style-type: none"> Safe and non-polluting Hydraulically and geotechnically stable Fit for the intended post-quarrying land use(s) Establish the final landform and post-quarrying land use/s as soon as practicable after cessation of quarrying operations Minimise post-quarrying environmental impacts Integrated with surrounding natural landforms and other quarry rehabilitated landforms, to the greatest extent practicable Minimise visual impacts when viewed from surrounding land to the greatest extent practicable Ensure safety of native fauna and stock 															
<i>Areas proposed for nature conservation</i>	<ul style="list-style-type: none"> Vegetation composition of rehabilitation contains species commensurate with native vegetation communities found in the local area Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining 															
<i>Areas proposed for agricultural land</i>	<ul style="list-style-type: none"> Establish grassland areas to support sustainable agricultural activities Use species found in the local area that are suitable for pasture production 															
<i>Infrastructure</i>	<ul style="list-style-type: none"> All infrastructure that is not to be used as part of the final land use is removed. All infrastructure that is to remain as part of the final land use is compatible with the intended post-quarrying land use/s, is safe and does not pose any hazard to the community. 															
<i>Water</i>	<ul style="list-style-type: none"> Water retained on the site is appropriately licensed and fit for the intended post-quarrying land use/s Groundwater quality is consistent with, or better than the pre-disturbance water quality 															
<i>Final void</i>	<ul style="list-style-type: none"> Optimise the size and depth of the final void to ensure the final landform is stable and non-polluting Minimise to the greatest extent practicable: <ul style="list-style-type: none"> the drainage catchment; any high wall instability risk; and the risk of flood interaction. Maximise potential for beneficial reuse, where practicable 															

Cond No.	Requirement	Where addressed
	<p><i>Final void drainage pipeline and water discharge</i></p> <ul style="list-style-type: none"> Engineered to be hydraulically, geotechnically, and geomorphologically stable Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation 	
	<p><i>Heritage</i></p> <ul style="list-style-type: none"> Minimise visual amenity impacts on heritage values of the Hill Complex (identified in Appendix 5) 	
	<p><i>Community</i></p> <ul style="list-style-type: none"> Ensure public safety Ensure the risk of bushfire is similar to or less than the pre-quarrying environment Minimise adverse socioeconomic effects associated with quarry closure 	
B69	The rehabilitation objectives in Table 9 apply to the entire site, including all landforms constructed under either this consent or previous consents. However, the Applicant is not required to undertake any additional earthmoving works on landforms that have been approved and constructed under previous consents, except where those earthworks are required for the establishment of a stable, non-polluting and free-draining landform.	Noted
Progressive Rehabilitation		
B70	<p>The Applicant must rehabilitate^a the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.</p> <p>^a This condition does not prevent further disturbance at some later stage of the development of areas that have been rehabilitated.</p>	Section 6.1 and RMP Section 5.1
Rehabilitation Strategy		
B71	<p>The Applicant must prepare a Rehabilitation Strategy for all land disturbed by the development. The strategy must:</p> <p>(a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;</p>	Section 1.3
	(b) be prepared in consultation with DPE Water, BCD, Council, and the CCC;	Section 1.2
	(c) use a risk-based approach;	Section 5
	(d) build upon the Rehabilitation Objectives in Table 9, describe the overall rehabilitation outcomes for the site and address all aspects of rehabilitation including quarry closure, final landform and final voids, post-quarrying land use/s and water management;	Section 6
	(e) align with strategic rehabilitation and quarry closure objectives and address the principles of the Strategic Framework for Mine Closure (AMZMEC and MCA, 2000);	Section 4.2
	(f) describe how the rehabilitation measures would be integrated with visual mitigation measures included in the progressive and final landform designs;	Section 7
	(g) describe how rehabilitation will be integrated with the quarry planning process, including a plan to address premature or temporary quarry closure;	Section 6.3
	(h) include indicative quarry plans and scheduling for life-of-quarry showing each rehabilitation domain;	Section 6.1
	(i) include details of target vegetation communities and species to be established within proposed revegetation and tree screening areas;	Section 7.2
	(j) include a strategic plan for the refinement and improvement of the final landform and final void outcomes over time;	Section 6.4

Cond No.	Requirement	Where addressed
	(k) include a post-quarry land use strategy to investigate and facilitate post-quarrying beneficial land uses for the site, that: <ul style="list-style-type: none"> (i) align with regional and local strategic land use planning objectives and outcomes; and (ii) support a sustainable future for the local community; 	Section 6.4
	(l) include a stakeholder engagement plan to guide rehabilitation and quarry closure planning processes and outcomes;	Section 6.2
	(m) investigate ways to minimise adverse socio-economic effects associated with rehabilitation and quarry closure;	Section 6.4
	(n) include a program to review and update the strategy every five years.	
B72	Prior to the commencement of quarrying operations within the Stage 7 extraction area, the Applicant must submit the Rehabilitation Strategy to the Planning Secretary for approval.	Noted
B73	The Applicant must not commence quarrying operations in the Stage 7 extraction area until the Rehabilitation Management Plan is approved by the Planning Secretary.	Noted
B74	The Applicant must implement the Rehabilitation Strategy approved by the Planning Secretary.	Noted
Detailed feasibility study and final landform design		
B75	Within five years of commencing quarrying operations within the Stage 7 extraction area, the Applicant must prepare a detailed final landform feasibility assessment. The detailed feasibility assessment must: <ul style="list-style-type: none"> (a) be prepared by a suitably qualified and independent expert(s) in relation to geotechnical, hydrological, and rehabilitation, whose appointment has been endorsed by the Planning Secretary; (b) include a conceptual final landform study that includes but is not limited to: <ul style="list-style-type: none"> (i) an assessment of alternative means of discharging water (including the option of nil release of water) from the rehabilitated quarry, including conceptual designs and cost estimates; (ii) an investigation and conceptual design of potential post-quarrying land use options, including opportunities to align with relevant local and regional strategic land use objectives and surrounding land uses; and (iii) an assessment of how the rehabilitation of the project can be proactively integrated with the rehabilitation strategies of neighbouring quarries; (iv) establishing in perpetuity vehicle access to the final landform that facilitates the proposed final land use; (c) include a geotechnical and engineering assessment of the construction and operation of the proposed pipeline or alternative water management options, that includes but is not limited to: <ul style="list-style-type: none"> (i) a geotechnical feasibility assessment that: <ul style="list-style-type: none"> – identifies relevant risks and how these risks would be managed; – identifies geological structures that could affect the construction and operation of the proposed pipeline and how any associated risks would be managed; – assesses the loading conditions of tunnel boring with varying depths of cover and how this would be managed in the design of the proposed pipeline; – demonstrates pit walls will meet the rehabilitation objectives in Table 9; (ii) a detailed engineering design for the proposed pipeline and any associated infrastructure, including consideration of the lifespan of construction materials; 	Not yet applicable

Cond No.	Requirement	Where addressed
	(iii) an assessment of the erosion risks of the proposed pipeline during construction and operation;	
	(d) include a safety assessment and maintenance strategy that provides:	
	(i) a detailed assessment of the safety risks of the proposed pipeline and how these risks would be managed to ensure the safety of people and fauna;	
	(ii) a process to manage blockages in the proposed pipeline;	
	(iii) an outline of the management and maintenance responsibilities that would be placed on future landowners;	
B76	Within five years of commencing quarrying operations in the Stage 7 extraction area, the Applicant must submit the detailed final landform feasibility assessment to the Planning Secretary for approval.	Not yet applicable
B77	The Applicant must not undertake quarrying operations within Stage 7b, 7c, 7d or 7e of the development until the Planning Secretary has approved the detailed final landform feasibility assessment.	Not yet applicable
B78	The Applicant must revise the Rehabilitation Strategy to incorporate the outcomes of the detailed final landform feasibility assessment as approved by the Planning Secretary.	Not yet applicable
Rehabilitation Management Plan		
B79	The Applicant must prepare a Rehabilitation Management Plan for the development. The plan must:	
	(a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;	RMP 1.3
	(b) be prepared in consultation with the Department and Council;	RMP 1.2
	(c) include a map of tree screens and areas of rehabilitation required as visual amenity mitigation measures for the development;	RMP 3.3
	(d) include detailed quarry plans and scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next five years, or other suitable time period as agreed with the Planning Secretary;	RMP 5.1
	(e) include a plan of water management infrastructure that is required to enable the function of the final landform after rehabilitation is complete;	RMP 5.2
	(f) include detailed completion criteria for each rehabilitation objective included in Table 9, and any other rehabilitation objective identified in the Rehabilitation Strategy;	RMP 4
	(g) describe the measures to be implemented on the site to achieve the completion criteria;	RMP 5.2
	(h) describe in detail the performance indicators to be implemented to ensure compliance with each completion criteria and the rehabilitation objectives in Table 9;	RMP 4
	(i) include a program to monitor, independently audit and report on progress against the completion criteria and the effectiveness of the measures implemented to achieve the completion criteria;	RMP 7
	(j) describe an adaptive management process that will be implemented if monitoring indicates that the measures implemented to achieve the completion criteria are not effective and/or if progress against the completion criteria is not consistent with the Rehabilitation Management Plan or Rehabilitation Strategy;	RMP 9
	(k) describe any further studies, work, research, or consultation that will be undertaken to expand the site-specific rehabilitation knowledge base, reduce uncertainty and improve rehabilitation outcomes; and	RMP 8
	(i) include a program to review and update the plan every five years including any revisions to the rehabilitation of the site identified by updates to the Rehabilitation Strategy.	RMP 10

Cond No.	Requirement	Where addressed
B80	Prior to commencing quarrying operations in Stage 7 extraction area, the Applicant must submit the Rehabilitation Management Plan to the Planning Secretary for approval.	Noted
B81	The Applicant must not commence quarrying operations in the Stage 7 extraction area until the Rehabilitation Management Plan is approved by the Planning Secretary.	Noted
B82	The Applicant must implement the Rehabilitation Management Plan as approved by the Planning Secretary.	Noted
Rehabilitation Bond		
B83	<p>Within 6 months of the approval of the Rehabilitation Management Plan, the Applicant must lodge a Rehabilitation Bond with the Department to ensure that the rehabilitation of the site is implemented in accordance with the performance and completion criteria set out in the plan and the relevant conditions of this consent. The sum of the bond must be an amount agreed by the Planning Secretary and determined by:</p> <p>(a) calculating the cost of rehabilitating all existing and immediately proposed disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and</p> <p>(b) employing a suitably qualified, independent, and experienced person to verify the calculated costs.</p>	Not Yet Applicable
B84	The calculation of the Rehabilitation Bond must be submitted to the Department for approval at least 2 months prior to the lodgement of the bond.	Not Yet Applicable
B85	<p>The Rehabilitation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following:</p> <p>(a) any update or revision to the Rehabilitation Strategy or Rehabilitation Management Plan;</p> <p>(b) the completion of an Independent Environmental Audit in which recommendations relating to the implementation of rehabilitation have been made; or</p> <p>(c) a request by the Planning Secretary,</p>	Not Yet Applicable
B86	If rehabilitation is completed generally in accordance with the relevant performance and completion criteria, to the satisfaction of the Planning Secretary, the Planning Secretary will release the bond.	Not Yet Applicable
B87	If rehabilitation is not completed generally in accordance with the relevant performance and completion criteria, the Planning Secretary will call in all, or part of, the bond, and arrange for the completion of the relevant works.	Not Yet Applicable
Final landform infrastructure bond		
B88	<p>Five years prior to the completion of quarrying operations in the approved disturbance area, unless otherwise agreed by the Planning Secretary, the Applicant must:</p> <p>(a) calculate the cost of maintaining any water management infrastructure incorporated in the final landform design, as identified in the Rehabilitation Management Plan required under condition B79, for a period of 30 years following completion of quarrying operations;</p> <p>(b) outline the process for establishing a final landform infrastructure bond process that:</p> <p>(i) includes a covenant on the title of Lot 1 DP 858245 and Lot 7 DP3709;</p> <p>(ii) requires future landowners to maintain the water management infrastructure for a period of 30 years; and</p> <p>(iii) provides monetary funding for the maintenance of the water management infrastructure equivalent to the costing calculated in accordance with condition B88.</p>	Not Yet Applicable
	The Applicant must submit the final landform infrastructure bond process required by condition B88 to the Planning Secretary for approval.	Not Yet Applicable

Cond No.	Requirement	Where addressed
	The Applicant must implement the final landform infrastructure bond process as approved by the Planning Secretary prior to the completion of rehabilitation.	Not Yet Applicable
B89	The Applicant must submit the final landform infrastructure bond process required by condition B88 to the Planning Secretary for approval.	Not Yet Applicable
B90	The Applicant must implement the final landform infrastructure bond process as approved by the Planning Secretary prior to the completion of rehabilitation.	Not Yet Applicable
Visual		
B91	The Applicant must: (a) implement all reasonable and feasible mitigation measures to: (i) minimise the visual and off-site lighting impacts of the development; (ii) shield views of quarrying operations and associated equipment from users of public roads and privately-owned residences; and (b) ensure that all external lighting associated with the development complies with relevant Australian Standards including the latest version of <i>Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting</i> ;	Noted
		Noted
Mitigation of visual amenity impacts to heritage values		
B92	Within two years of commencing quarrying operations in the Stage 7 extraction area, the Applicant must construct a tree screen between the northern extent of Stage 7d and the boundary of Lot 1 DP 858245 to mitigate the developments impact on the heritage values of The Hill Complex. The tree screen must be 10 metres of visual screening height prior to the commencement of Stage 7d and can include an amenity bund up to five metres tall if required.	Section 7.1-7.4

2.2 Principles of the Strategic Framework for Mine Closure

Condition B71(e) requires that this document address the principles of the *Strategic Framework for Mine Closure* (AMZEMC and MCA, 2000). **Table 3** presents where in this document or the *Rehabilitation Management Plan* those principles have been addressed.

Table 3 – Strategic Framework for Mine Closure Principles

Principle	Where addressed
Stakeholder Involvement	
Objective To enable all stakeholders to have their interests considered during the mine closure process.	
Principles	
1. Identification of stakeholders and interested parties is an important part of the closure process.	Section 6.2
2. Effective consultation is an inclusive process which encompasses all parties and should occur throughout the life of the mine.	Section 6.2
3. A targeted communication strategy should reflect the needs of the stakeholder groups and interested parties.	Section 6.2
4. Adequate resources should be allocated to ensure the effectiveness of the consultation process.	Section 6.2
5. Wherever practical, work with communities to manage the potential impacts of mine closure	Section 6.2

Principle	Where addressed
Planning	
Objective To ensure the process of closure occurs in an orderly, cost-effective and timely manner	
Principles	Section 6
1. Mine closure should be integral to the whole of mine life plan.	Section 6
2. A risk-based approach to planning should reduce both cost and uncertainty.	Section 5
3. Closure plans should be developed to reflect the status of the project or operation.	Section 6
4. Closure planning is required to ensure that closure is technically, economically and socially feasible	Section 6
5. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances.	Section 6, 8
Financial Provision	
Objective To ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability.	To be addressed in accordance with Condition B83 of SSD10369
Principles	
1. A cost estimate for closure should be developed from the closure plan.	
2. Closure cost estimates should be reviewed regularly to reflect changing circumstances	
3. The financial provision for closure should reflect the real cost.	
4. Accepted accounting standards should be the basis for the financial provision.	
5. Adequate securities should protect the community from closure liabilities.	
Implementation	
Objective To ensure there is clear accountability, and adequate resources, for the implementation of the closure plan.	
Principles	RMP 6
1. The accountability for resourcing and implementing the closure plan should be clearly identified.	RMP 6
2. Adequate resources must be provided to assure conformance with the closure plan.	RMP 6, 7
3. The on-going management and monitoring requirements after closure should be assessed and adequately provided for.	Section 6
4. A closure business plan provides the basis for implementing the Closure Plan.	Section 6
5. The implementation of the Closure Plan should reflect the status of the operation	
Standards	
Objective To establish a set of indicators which will demonstrate the successful completion of the closure process.	
Principles	Section 2
1. Legislation should provide a broad regulatory framework for the closure process.	Section 2
2. It is in the interest of all stakeholders to develop standards that are both acceptable and achievable.	RMP 4
3. Completion criteria are specific to the mine being closed, and should reflect its unique set of environmental, social and economic circumstances.	

Principle	Where addressed
4. An agreed set of indicators should be developed to demonstrate successful rehabilitation of a site.	RMP 4
5. Targeted research will assist both government and industry in making better and more informed decisions.	RMP 8
Relinquishment	
Objective To reach a point where the company has met agreed completion criteria to the satisfaction of the Responsible Authority.	
Principles 1. A Responsible Authority should be identified and held accountable to make the final decision on accepting closure.	Noted
2. Once the completion criteria have been met, the company may relinquish their interest.	Noted
3. Records of the history of a closed site should be preserved to facilitate future land use planning.	Noted

3. Approved Activities

3.1 Overview

The approved Quarry activities include the following (**Figure 3**).

- Extension of the current Stage 1 to 6 Extraction Area to include the Stage 7 Extraction Area.
- Continued staged extraction of latite, agglomerate and overburden material using free dig and drill and blast extraction methods at a maximum rate of 900,000 tonnes per annum (tpa) of material exported from the Project Area. A total of 21.5Mt of hard rock resource will be extracted over the life of the Quarry.
- Continued primary, and on occasion secondary, processing operations within the Project Area.
- Continued transportation of extracted and processed material to Cleary Bros fixed processing plant for further processing.
- Continued operation of the Quarry between:
 - 7:00am and 6:00pm Monday to Friday;
 - 7:00am to 1:00pm on Saturdays (to a maximum of 16 Saturdays per calendar year within Stage 7); and
 - at no time on Sundays or Public Holidays.
- Operation of the Quarry until 2053.
- Rehabilitation of the final landform suitable for agriculture and nature conservation, including establishment and revegetation of:
 - Quarry extraction benches, including reduced height (7m high) faces on the upper western and northern highwalls of the Stage 7 Extraction Area;
 - the floor of the Extraction Area; and
 - two quarry sumps, including a pipeline to ensure the Southern Sump is free draining.

3.2 Approved Final Landform and Land Uses

Figures 4 and **5** presents the approved final landform which would include a partially backfilled final void. **Figure 4** presents the approved rehabilitation domains which may be described as follows.

- Terrace Domain – comprising the steep terminal faces of the Extraction Area with 7m or 14m high faces, and 5m or 10m wide benches with face angles of between 75° and 90°.
- Slope Domain – backfilled floor of the Extraction Area with variable slopes of between 5° and 18°.
- Plains Domain – backfilled floor of the Extraction Area with slopes of less than 5°.
- Water Management Structures – comprising two small sumps / dams that would facilitate managed discharge of surface water from the final landform to natural drainage. Each of the sumps would be of sufficient volume to allow suspended 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. **Figure 6** presents the conceptual hydrological model for the final landform.

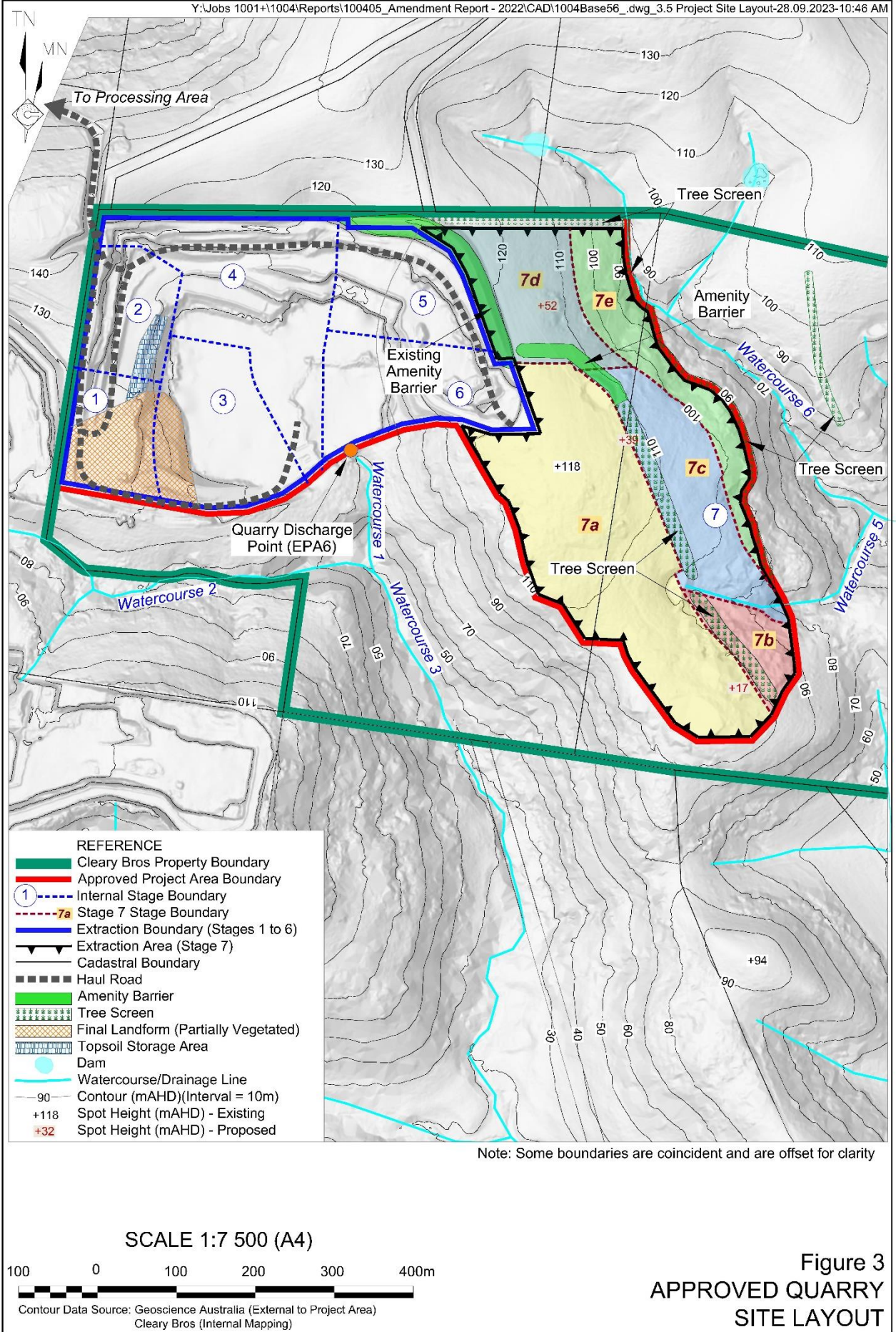
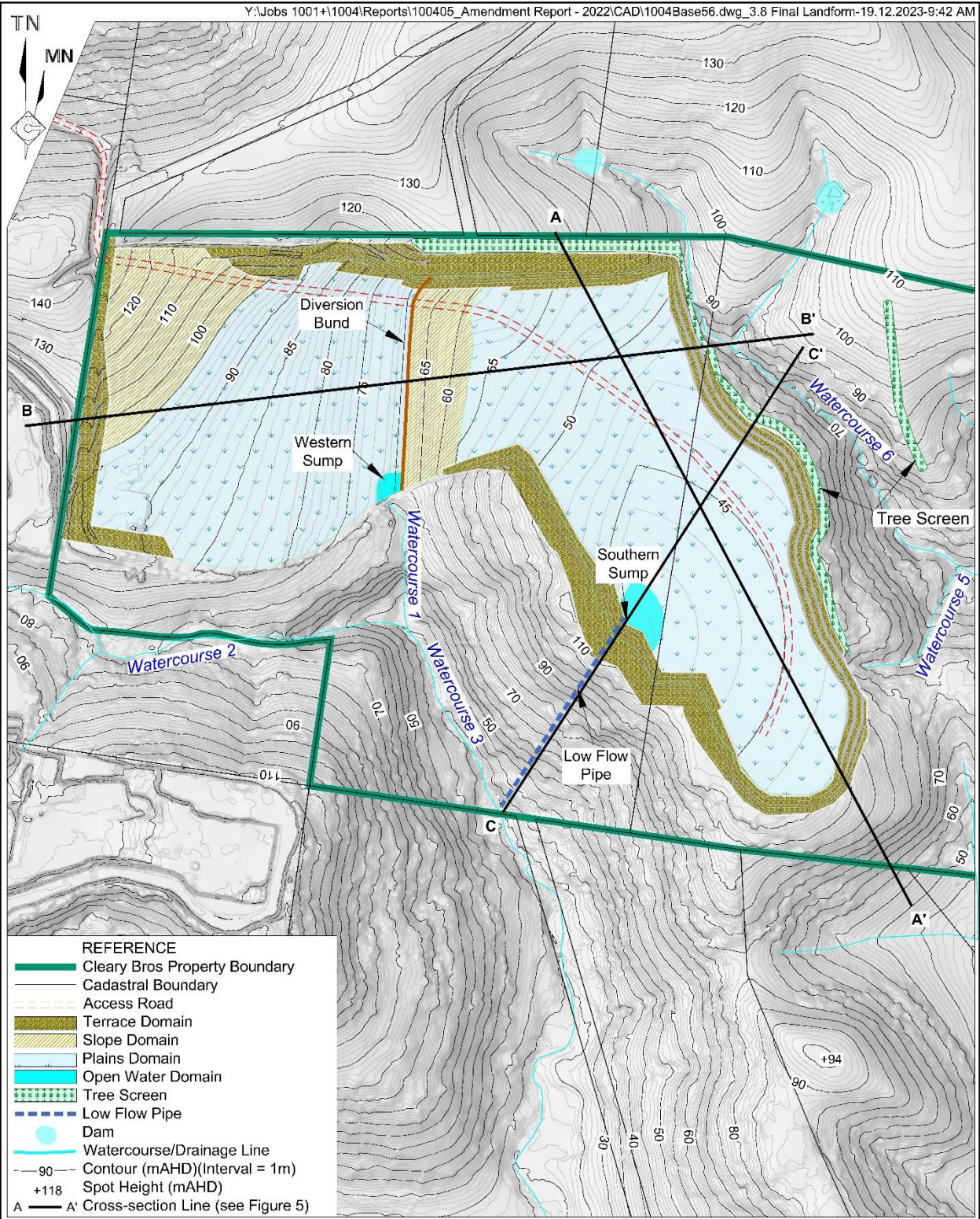


Figure 3
APPROVED QUARRY
SITE LAYOUT



- REFERENCE**
- Cleary Bros Property Boundary
 - Cadastral Boundary
 - Access Road
 - Terrace Domain
 - Slope Domain
 - Plains Domain
 - Open Water Domain
 - - - Tree Screen
 - - - Low Flow Pipe
 - Dam
 - Watercourse/Drainage Line
 - - - 90 Contour (mAHD)(Interval = 1m)
 - + 118 Spot Height (mAHD)
 - A' Cross-section Line (see Figure 5)

SCALE 1:7 500 (A4)



Contour Data Source: Geoscience Australia (External to Project Area)
 Cleary Bros (Internal Mapping)
 Final Landform Source: RPM Global

Figure 4
APPROVED FINAL LANDFORM



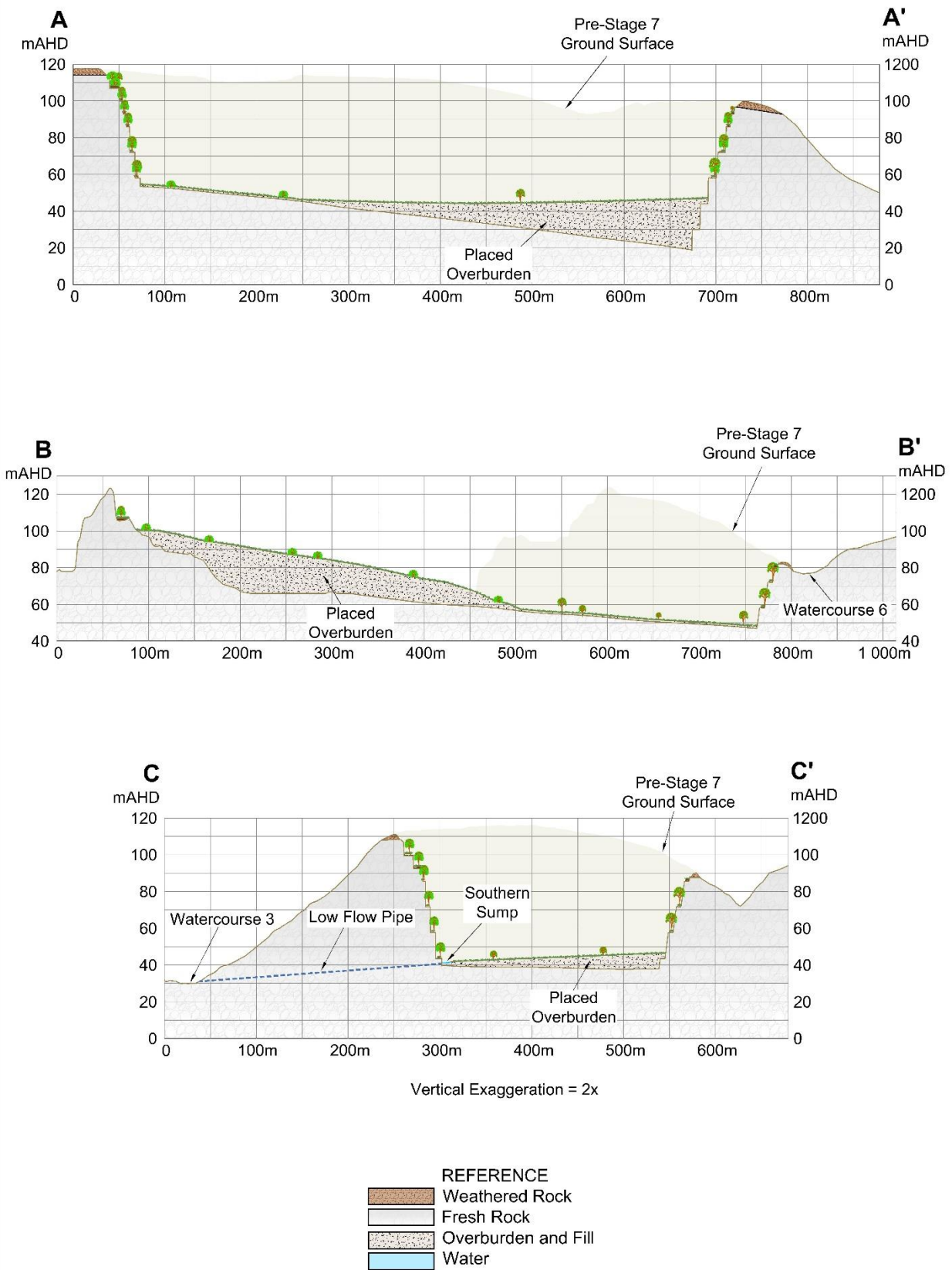
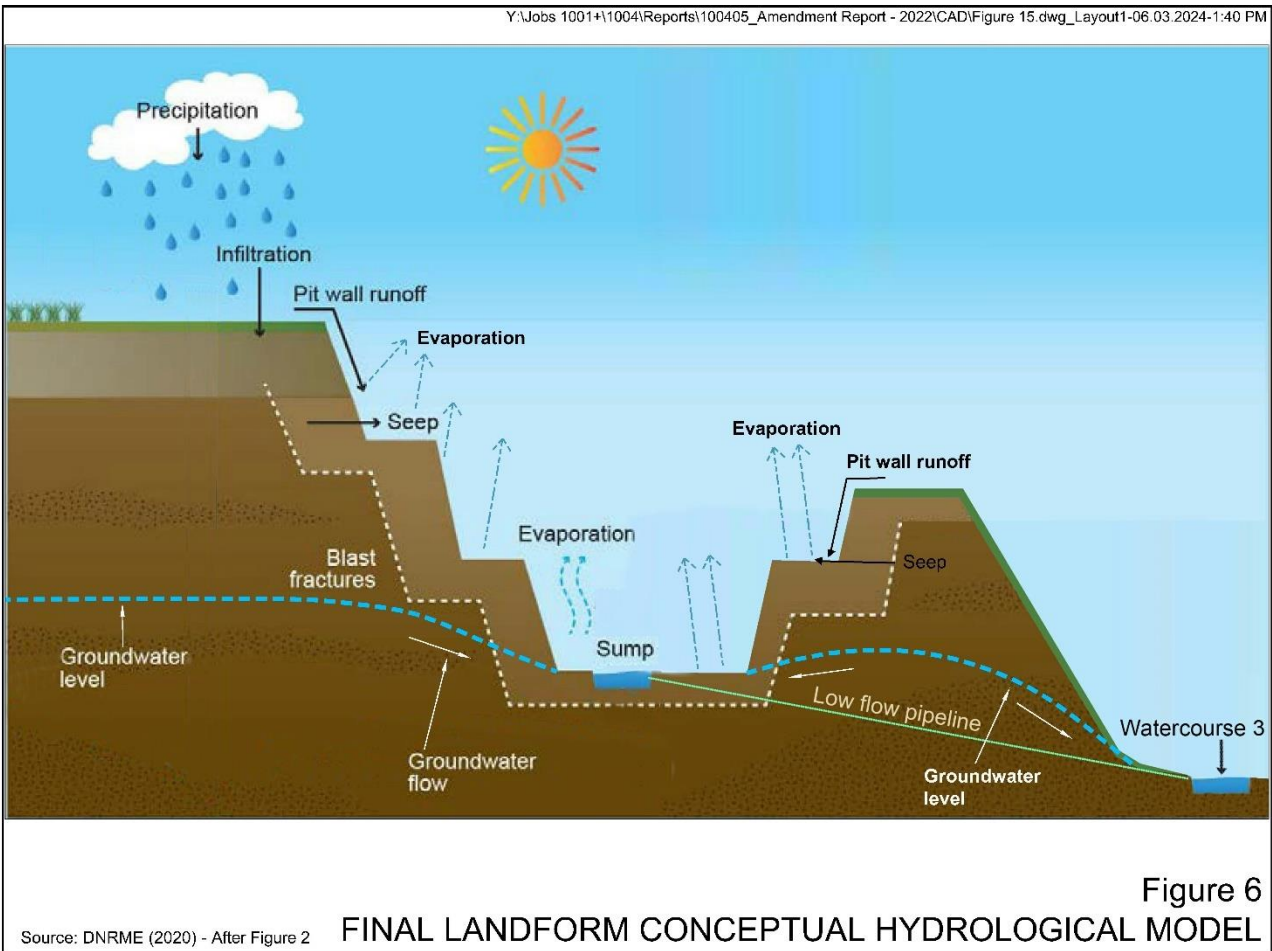


Figure 5
FINAL LANDFORM CROSS-SECTIONS

Source: RPM Global



Approved final land uses would include the following

- Terrace Domain – Nature conservation.
- Slope Domain – Agriculture – grazing.
- Plains Domain – Agriculture – grazing
- Water Management Structures – water storage.

Throughout the life of the Quarry, Cleary Bros will, in consultation with key stakeholders, refine and improve the final landform design and final land uses to ensure alignment with regional and local strategic land use planning objectives and outcomes as they evolve with time (see Section 6).

4. Rehabilitation Domains and Objectives

4.1 Rehabilitation Domains

Condition B71(d) of SSD 10369 requires the *Rehabilitation Strategy* to identify rehabilitation objectives that:

- build upon the Rehabilitation Objectives in Table 9 of SSD 10369;
- describe the overall rehabilitation outcomes for the site; and
- address all aspects of rehabilitation including quarry closure, final landform and final voids, post-quarrying land use/s and water management.

While the Quarry is not classified as a “mine” under the *Mining Act 1992*, as a quarrying operation, it shares many of the rehabilitation risks that are relevant for mining operations. As a result, in developing the rehabilitation objectives for the Quarry, reliance has been placed on Section 4 of the document *Form and Way – Rehabilitation Management Plan for Large Mines* (NSW Resources Regulator, 2021). That document requires identification of mining (active quarry) and final land use domains. The Active Quarry and Final Land Use Domains for the Quarry are presented on **Figures 6** and **7** and are defined as follows.

- Active Quarry Domain – a land management unit with a discrete operational function, and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s). In the case of the Quarry, Active Quarry Domains include the following (**Figure 6**).
 - Infrastructure Area – comprising the haul road, noting that the location of the haul road will vary throughout the life of the Quarry.
 - Water Management Area – comprising the Western Sump and Southern Sump which will be utilised for sediment control purposes, noting that the location of the Southern Sump will vary throughout the life of the Quarry.
 - Active Extraction Area – comprising the approved Extraction Area, noting that this area will be developed progressively throughout the life of the Quarry (see Section 6.1).
 - Active Rehabilitation Area – comprising the approved vegetation screens and any areas of progressive rehabilitation established throughout the life of the Quarry (see Section 6.1).
- Final Land Use Domain – a land management unit with a specified post-extraction final land use. In the case of the Quarry, the Final Land Use Domains include the following (**Figure 7**).
 - Native Ecosystem – comprising areas of the final landform that would be returned to native vegetation.
 - Agricultural – Grazing – comprising areas of the final landform that would be returned to agricultural use (i.e. grazing).
 - Water Management Area – comprising the final footprints of the Western Sump and Southern Sump to be retained for water storage and management purposes.
 - Infrastructure Area – comprising parts of the haul road which will be retained as an access road.

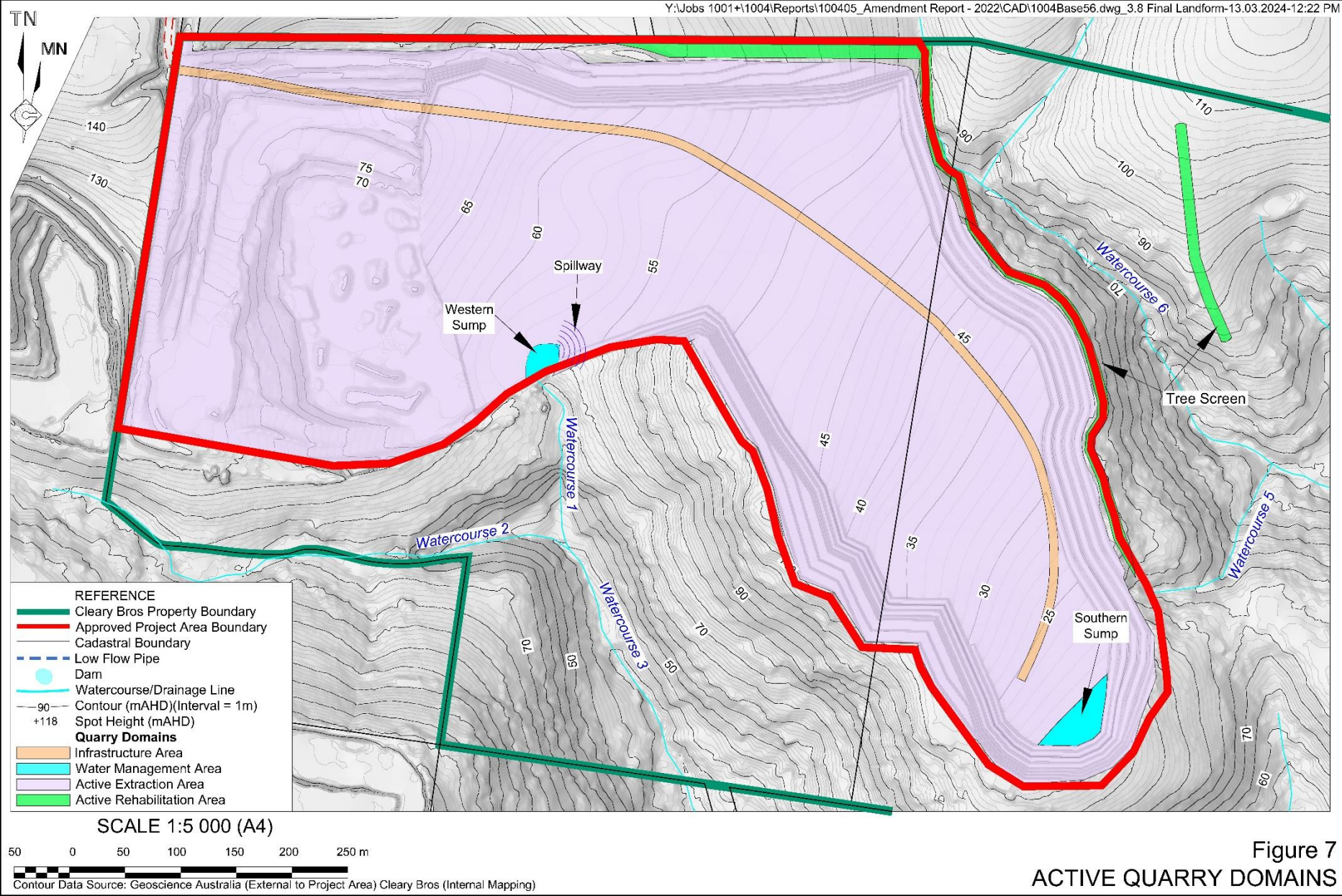


Figure 7
ACTIVE QUARRY DOMAINS



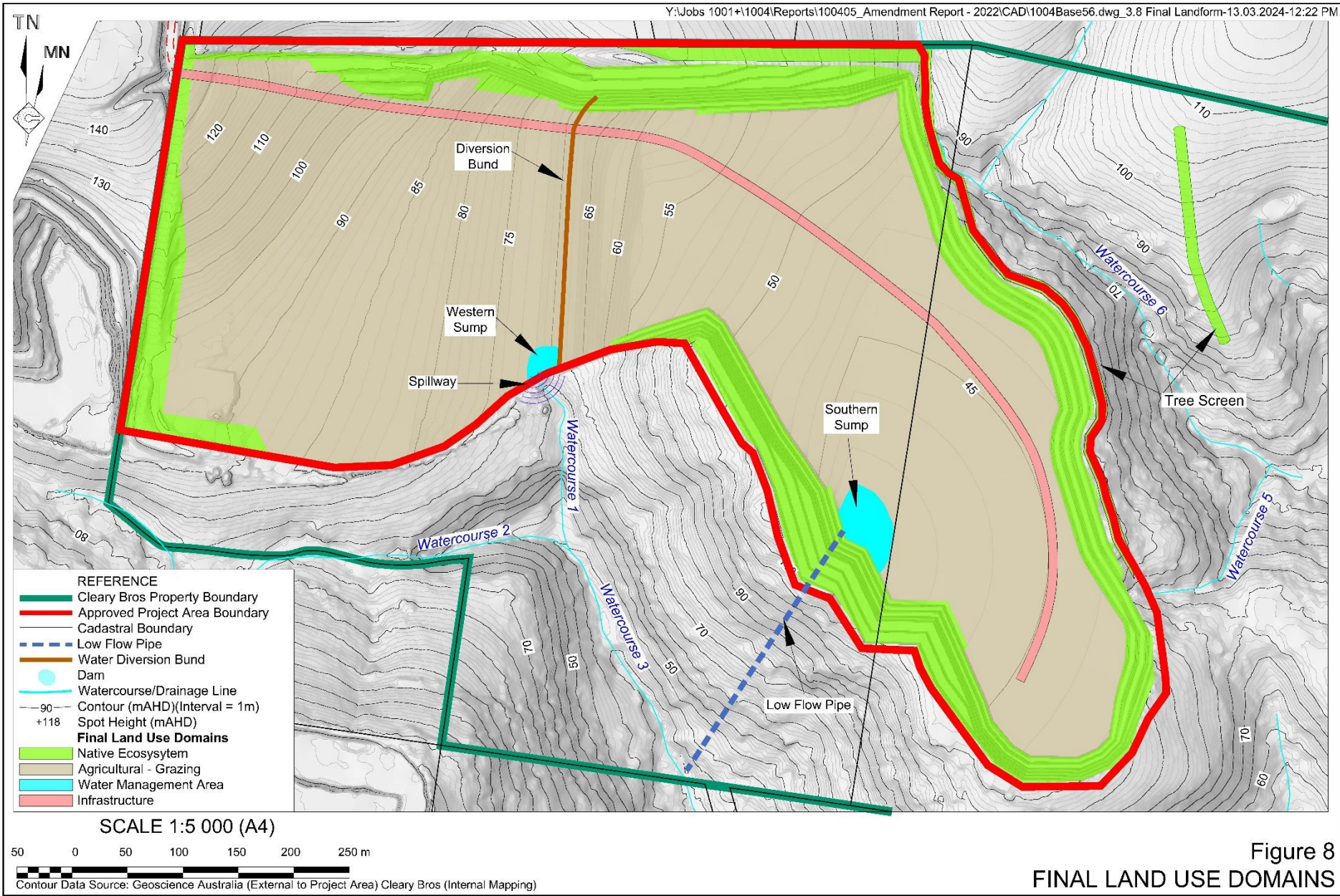


Figure 8
FINAL LAND USE DOMAINS



4.2 Rehabilitation Objectives

The document *Form and Way – Rehabilitation Management Plan for Large Mines* requires specific rehabilitation objectives for each combination of Final Land Use Domain and Active Quarry Domain. **Table 4** presents the rehabilitation objectives for the Quarry developed in consideration of the following.

- The rehabilitation objectives identified in Table 9 of SSD 10369.
- The principles of the *Strategic Framework for Mine Closure*.
- Quarry-specific rehabilitation risks presented in Section 5.
- Feedback received by RWC from the NSW Resources Regulator in relation to rehabilitation objectives prepared for *Rehabilitation Management Plans* for numerous mining operations in NSW.

Rehabilitation indicators, completion criteria and validation methods to demonstrate compliance with each of the objectives are presented in Section 4.2 of the *Rehabilitation Management Plan*.

Table 4 – Rehabilitation Objectives

Final Land Use Domain	Active Quarry Domain	Rehabilitation Objective
Infrastructure Area	Infrastructure Area	All infrastructure and services not required for the final land use are removed.
		All infrastructure that is to remain as part of the final land use is compatible with the intended post-quarrying land use(s), is safe and does not pose any hazard to the community.
		All infrastructure to be retained is exempt development or benefits from the relevant approvals (e.g. development consent and/or agreement).
		Dry stone walls reconstructed along norther property boundary, and visible from the public road corridor.
Water Management Area	Water Management Area	Retained water management structures are safe, stable (including being hydraulically, geotechnically and geomorphologically stable) and provide for long-term water storage and transfer to natural drainage.
		Retained water management structures are non-polluting and suitable for use as part of the final land use.
		Water retained on the site is appropriately licensed and fit for the intended post-quarrying land use/s.
		Water discharged from site is suitable for the receiving waters and fit for aquatic ecology and riparian vegetation
		Groundwater quality is consistent with pre-disturbance water quality.
Agricultural - Grazing	Infrastructure Area, Active Extraction Area	All infrastructure and services not required for the final land use are removed.
		Areas are non-polluting.
		Final landforms are safe, stable and non-polluting and do not pose any hazards or constraints for a final land use of agriculture (grazing).
		Vegetation composition of pasture areas is consistent with target vegetation communities (see Section 7.5.2).
		Grassland areas support sustainable agricultural activities.
		Bushfire risks to the community, environment and infrastructure have been addressed as part of rehabilitation.

Final Land Use Domain	Active Quarry Domain	Rehabilitation Objective
Native Ecosystem Area	Infrastructure Area, Active Extraction Area, Other	All infrastructure and services not required for the final land use are removed.
		Areas are non-polluting.
		Final landforms are safe, stable and non-polluting and do not pose any hazards or constraints for the final land use.
		Vegetation composition of native ecosystem areas is consistent with target vegetation communities (see Section 7.5.2).
		Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area.
		Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining.
		Bushfire risks to the community, environment and infrastructure have been addressed as part of rehabilitation.
		Visual amenity impacts on heritage values of the Hill Complex have been minimised to the greatest extent practicable.
		Visual impacts when viewed from surrounding land have been minimised to the greatest extent practicable.
All domains	All Domains	The final landform is integrated with surrounding natural and other quarry-related landforms to the greatest extent practicable.
		The final landform is stable for the long-term and does not pose a safety risk or a risk of environmental harm.
		Final landform drainage catchment is minimised to the greatest extent practicable and flood risks are minimised.
		Maximise the potential for beneficial reuse of the Quarry and minimise the potential for adverse socio-economic effects of quarry closure.
		The final landform is safe for native fauna and stock.

5. Rehabilitation Risk Assessment

5.1 Scope

The following rehabilitation risk assessment was undertaken generally in accordance with:

- Australian Standards HB 203:2006, AS/NZS 4360:2004 and AS/NZS ISO 31000:2018 Risk Management – Principles & Guidelines;
- NSW Resources Regulator’s *Rehabilitation Risk Assessment Guideline* dated 2 July 2021; and
- Cleary Bros Hazard Identification, Risk Assessment and Control Work Instruction.

While the Quarry is not classified as a “mine” under the Mining Act 1992, it shares many of the rehabilitation risks that are relevant for mining operations. As a result, the risk assessment has considered the requirements of Schedule 8A of the *Mining Regulation 2016*, which requires a rehabilitation risk assessment that:

- identifies, assesses and evaluates the risks that need to be addressed to achieve:
 - the rehabilitation objectives (see Section 4.2);
 - the rehabilitation completion criteria (see Section 4.2 of the RMP);
 - the final land use (see Section 3.2); and
 - identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.

5.2 Methodology

Risks to achieving the approved final landform and land uses identified in Section 3.2 and the rehabilitation objectives identified in Section 4.2 were identified and assessed jointly by Cleary Bros, RWC, and relevant experts. **Table 5** presents a list of participants involved with the preparation of this risk assessment.

Site-specific threats to rehabilitation were assessed based on:

- detailed knowledge of site-specific conditions and threats to rehabilitation;
- experience of Cleary Bros personnel undertaking rehabilitation of its various operations in the Illawarra Region;
- experience of Cleary Bros contractors undertaking rehabilitation on various sites throughout the Illawarra Region; and
- observations of planned and unplanned rehabilitation at non-Cleary Bros sites throughout the Region;

This risk assessment was completed with consideration of existing controls as well as those risk controls outlined in the *Rehabilitation Management Plan*.

This risk assessment has been prepared in consideration of Part 6 of the Resource Regulator’s *Form and Way – Rehabilitation Management Plan for Large Mines* (NSW Resources Regulator, 2021) guideline document. Specifically, the risk assessment has been separated into the six phases of rehabilitation: active mining phase, decommissioning, landform establishment, growth medium development, ecosystem and land use establishment, and ecosystem and land use development.

Table 5 – Risk Assessment Participants

Name	Company	Position	Role in Risk Assessment	Risk Assessment Version
Mark Hammond	Cleary Bros (Bombo) Pty Ltd	Quality and Environment Manager	Content Expert, Participant	1
Todd Kalajich	Cleary Bros (Bombo) Pty Ltd	General Manager Quarries	Content Expert, Participant	1
Mitch Bland	R.W. Corkery & Co. Pty Limited	Principal/ Managing Director	Participant	1
Jack Flanagan	R.W. Corkery & Co. Pty Limited	Senior Environmental Consultant	Participant	1
Grace Scullett-Dean	R.W. Corkery & Co. Pty Limited	Graduate Environmental Consultant	Participant	1
Roger Garnsey	Roger Garnsey Agronomy Pty Limited	Director and Agronomist	Reviewer	1
Marcus Burgess	Good Bush Pty Limited	Director and Bush Regeneration Practitioner	Reviewer	1

For each identified risk to rehabilitation, potential adverse outcomes were identified and allocated a risk rating based on the potential consequences and likelihood of occurrence. **Tables 6, 7 and 8** present the consequence, likelihood and risk rating used during this analysis. Where risks were determined to be classified as “Moderate” or above, a Trigger Action Response Plan has been developed and is presented in Section 9 of the *Rehabilitation Management Plan*.

Table 6 – Qualitative Consequence Rating

Level	Descriptor	Description
1	Minimal	No detrimental impact on the final land use is measurable or envisaged.
2	Minor	An event which could have temporary and minor effects on the suitability of the final land use.
3	Moderate	An event which would create substantial temporary or minor permanent damage to the suitability of the final land use.
4	Significant	An event which could have a substantial and permanent consequence to the suitability of the final land use.
5	Catastrophic	A major event which could cause severe damage to the suitability of the final land use with actual or potential loss of credibility with key stakeholders, environmental liability, regulatory intervention, national publicity/complaints, or could close the operation prematurely.

Table 7 – Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost Certain	<p>"A Very High Likelihood is present when any of the following are in place:</p> <ol style="list-style-type: none"> 1. Almost certain to occur in the identified circumstances without any controls in place; and/or 2. The number and regularity of reported incidents / issues arising from this risk indicates a trend with regularity, expecting it to occur again with near-certainty; and/or 3. A quantified very high exposure to the risk without any controls in place"
B	Likely	<p>"A High Likelihood is present when any of the following are in place:</p> <ol style="list-style-type: none"> 1. Strong anecdotal evidence that it is likely to occur in the identified circumstances without any controls in place; and/or 2. The number and regularity of reported incidents / issues arising from this risk indicates a trend with regularity but not indicating a near-certainty of re-occurrence; and/or 3. A quantified high exposure to the risk without any controls in place"
C	Possible	<p>"A Medium Likelihood is present when any of the following are in place:</p> <ol style="list-style-type: none"> 1. May occur in the identified circumstances without any controls in place; and/or 2. The number and regularity of reported incidents / issues arising from this risk is infrequent and time to time; and/or 3. A quantified moderate exposure to the risk without any controls in place"
D	Unlikely	<p>"A Low Likelihood is present when any of the following are in place:</p> <ol style="list-style-type: none"> 1. Could occur at some time in the identified circumstances without any controls in place but not expected; and/or 2. There are one or two reported incidents / issues arising from this risk to date; and/or 3. A quantified low exposure to the risk without any controls in place"
E	Rare	<p>"A Very Low Likelihood is for the following:</p> <ol style="list-style-type: none"> 1. Highly unlikely to occur in the identified circumstances without any controls in place; and/or 2. No evidence of reported incidents / issues in the past; and/or 3. No quantified and known exposure to the risk without controls in place"

Table 8 – Qualitative Risk Rating

		Consequences				
Likelihood		1 Minimal	2 Minor	3 Moderate	4 Significant	5 Catastrophic
A	Almost Certain	M	H	VH	VH	VH
B	Likely	L	M	H	VH	VH
C	Possible	L	M	M	H	VH
D	Unlikely	L	L	M	H	H
E	Rare	L	L	L	M	H

Risk Rating: L = Low, M = Moderate, H = High and EH = Very High

5.3 Rehabilitation Risk Assessment

Table 9 presents the results of the risk analysis assuming the implementation of standard mitigation measures and those outlined within the *Rehabilitation Management Plan*.

Table 9 – Rehabilitation Risk Assessment – Version 1

Risk	Risk Control	Final Land Use Domain				Where Addressed
		Native Ecosystem	Agricultural – grazing	Water Management Areas	Infrastructure Areas	
General						
Insufficient skills and experience of rehabilitation personnel.	Engagement of specialist consultants or contractors to address specific matters or tasks. Employment of a suitably qualified and experienced Environmental Officer.	L (E3)	L (E3)	L (E3)	L (E3)	RMP Section 6
Lack of clearly defined responsibilities.	Responsibilities as defined in the RMP.	L (E3)	L (E3)	L (E3)	L (E3)	RMP Section 6
Insufficient funding for or prioritisation of rehabilitation activities.	Progressive rehabilitation. Lodgement of rehabilitation bond. Need to complete rehabilitation prior to sale or repurposing of land.	L (E3)	L (E3)	L (E3)	L (E3)	Section 6
Active Mining Phase of Rehabilitation						
Inappropriate biological resource (e.g. subsoil, topsoil, vegetative material, seedbank) salvage and maintenance practices.	Retention of cleared vegetation for use during rehabilitation where practicable. Growth medium stripping and stockpiling procedure. Growth medium inventory and balance. Growth medium stockpile signposting and shaping to prevent vehicle access.	M (D3)	M (D3)	N/A	N/A	RMP Section 5.2
Limited pre-existing and stockpiled biological resources for use (e.g. topsoil, woody debris).	Maximise growth medium stripping and stockpiling from Stage 7 Extraction Area. Growth medium inventory and balance.	L (B1)	L (B1)	N/A	N/A	RMP Section 5.2
Adverse meteorological conditions during salvage of biological resources.	Growth medium stripping and stockpiling procedure.	L (E3)	L (E3)	N/A	N/A	RMP Section 5.2
Adverse impacts on surface and groundwater quality and quantity arising from quarrying activities.	Revegetation of externally draining disturbance areas as soon as practicable. Remaining disturbance areas internally draining. Storage of all hydrocarbons and chemicals in accordance with AS1940:2017 – The storage and handling of flammable and combustible liquids. Controlled discharge of water within the Quarry Sumps during the operational life of the Quarry. Maintain sufficient groundwater allocation for modelled or measured groundwater inflow during and following the operational phase of the Quarry.	M (D3)	M (D3)	M (D3)	N/A	RMP Section 5

Risk	Risk Control	Final Land Use Domain				Where Addressed
		Native Ecosystem	Agricultural – grazing	Water Management Areas	Infrastructure Areas	
Impacts to native fauna and stock	Presence of wildlife friendly fences and tree screens around the perimeter of the extraction area. Implementation of approved <i>Biodiversity Management Plan</i>	L (D2)	L (E2)	L (E2)	L (E2)	BMP RMP Section 5.2
Visual catchment and associated heritage values of “The Hill Farm Complex” heritage site impacted by quarrying activities.	Planting of vegetation screens. High visibility upper benches designed (i.e. 7m high faces and 10m wide benches) and progressively rehabilitated to screen quarry faces. Ongoing discussions with the owners of “The Hill Farm Complex” in relation to mitigation measures.	M(D3)	L (D2)	N/A	N/A	Section 7
Reduction in visual amenity for observers surrounding the Quarry.	Planting of vegetation screens and construction of amenity bunds. High visibility upper benches designed (i.e. 7m high faces and 10m wide benches) and progressively rehabilitated to screen quarry faces. Commitment not to commence Stage 7e until vegetation on high visibility upper benches achieved identified criteria.	M (D3)	L (D2)	N/A	N/A	Section 7
Geotechnical stability of the terminal faces limits the ability to establish vegetation on high visibility upper benches	Geotechnical assessment and design by a qualified expert	M (E4)	N/A	N/A	N/A	RMP Section 5
Decommissioning Phase of Rehabilitation						
Adverse impacts on surface and groundwater quality and quantity arising from decommissioning operations.	Storage of all hydrocarbons and chemicals in accordance with AS1940:2017 – The storage and handling of flammable and combustible liquids. Controlled discharge of water within the Quarry Sumps during the operational life of the Quarry. Maintain sufficient groundwater allocation for modelled or measured groundwater inflow during and following the operational phase of the Quarry.	L (D2)	L(D2)	L(D2)	N/A	RMP Section 5
Unauthorised access to Quarry void and infrastructure areas.	Presence of security fencing, signage and safety bunds, as well as ongoing presence of personnel during decommissioning. Difficulty accessing site.	L (D1)	L (D1)	L (D1)	L (D1)	Section 3.2
Groundwater and surface water accumulation in Quarry void adversely impacts on decommissioning operations.	Controlled discharge of water from the Quarry Sumps during the decommissioning phase of the Quarry. Maintain sufficient groundwater allocation for modelled or measured groundwater inflow during and following the operational phase of the Quarry.	L (E3)	L (E3)	L (E3)	L (E3)	Section 3.2, RMP Section 5.2

Risk	Risk Control	Final Land Use Domain				Where Addressed
		Native Ecosystem	Agricultural – grazing	Water Management Areas	Infrastructure Areas	
Landform Establishment Phase of Rehabilitation						
Upper, visible sections of the final landform are inconsistent with the approved design.	All landforms planned and constructed as per approved project description, <i>Final Landform Feasibility Assessment</i> , commitments, approvals and permits. Survey of terminal faces during construction. Material adjacent to 10m wide terminal bench not removed until design determined to be consistent with the approved design.	M (D3)	N/A	N/A	N/A	Section 7
Final landform unsuitable for final land use (landform instability).	All landforms planned and constructed as described in Geotechnical Stability Assessment and Mine Plan. Geotechnical review to be completed regularly during the life of the Quarry and prior to relinquishment.	M (E4)	M (E4)	N/A	N/A	RMP Section 5
Final landform unsuitable for final land use (flooded final void).	Low flow pipe installed as per <i>Final Landform Feasibility Assessment</i> . Geotechnical and Engineering Assessment of low flow pipe. Final landform constructed as designed to maximise passive overflows within western end of the final Quarry void to discharge via Watercourse 1.	M (E4)	H (D4)	H (D4)	H (D4)	RMP Section 5
Final landform not suitable for intended target plant species.	Rehabilitation trials and monitoring program.	L (D2)	L (D2)	N/A	N/A	Section 7.5, RMP Section 5.2
Lack of availability of suitable materials for construction of final landform features (backfilling of final void).	VENM progressively imported throughout the life of the Quarry. Seek additional time for continued importation of VENM until final landform created.	L (E3)	L (E3)	N/A	N/A	RMP Section 5
Growth Medium Development Phase of Rehabilitation						
Inappropriate physical and structural properties of substrate.	Rehabilitation trials and monitoring program. Terminal benches subject to 0.5m of sub-blast to establish fractured substrate.	L (E3)	L (E3)	N/A	N/A	Section 7.5, RMP Section 5.2
Growth medium deficit for rehabilitation activities.	Growth medium stripping and stockpiling procedure.	L (E3)	L (E3)	N/A	N/A	RMP 5.2
Growth medium inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).	Growth medium inventory and balance. Growth medium inspected for presence of weed propagules prior to spreading on final landform. Growth medium tested prior to spreading on the final landform and ameliorants (lime, gypsum, fertiliser) added based on soil test results. Spread growth medium to the thicknesses described in the EIS.	L (E3)	L (E3)	N/A	N/A	Section 7.5

Risk	Risk Control	Final Land Use Domain				Where Addressed
		Native Ecosystem	Agricultural – grazing	Water Management Areas	Infrastructure Areas	
Ecosystem and Land Use Establishment Phase of Rehabilitation						
Lack of availability and quality of target seed resources, including genetic integrity.	Source pasture seed of proven pasture varieties demonstrating persistence and production in the local region.	L (E3)	L (E3)	N/A	N/A	Section 7.5
Poor seed viability, seed dormancy.	Source native vegetation seed of local provenance (source from the Quarry Site and surrounding lands within Dunmore Hills when available).	L (E2)	L (E2)	N/A	N/A	Section 7.5
Poor quality tubestock.	Where purchased native vegetation stock used, source from a range of sources to increase genetic diversity. Store and prepare seed in a manner to ensure its viability. Identification of reputable commercial suppliers of seed. Purchase certified seed only ensuring minimum quality standards including varietal purity, germination, pure seed content and weed content.	L (E2)	L (E2)	N/A	N/A	Section 7.5
Weed/insect/pest infestation.	Maintain access to rehabilitated areas, including rehabilitated benches. Rehabilitation monitoring, weed/insect/pest control programs (including application of pre-emergent (only applied to soils without a native seedbank) and/or post emergent pesticides for optimum weed and insect control).	L (D2)	L (D2)	N/A	N/A	Section 7
Inappropriate or inadequate rehabilitation techniques.	Undertake rehabilitation in accordance with the <i>Rehabilitation Management Plan</i> . Engage reputable bush regeneration expert/agronomist to oversee revegetation operations. Rehabilitation trials and monitoring program. Rehabilitation personnel induction and training.	L (E3)	L (E3)	L (E3)	L (E3)	RMP Section 5
Inappropriate revegetation species mix for targeted final land use.	Engage reputable bush regeneration expert/agronomist to source appropriate species and high-quality seed to match the target vegetation communities.	L (E3)	L (E3)	N/A	N/A	Section 7.5
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Meteorological monitoring. Rehabilitation planning / scheduling focussed on appropriate timing.	M (D3)	M (D3)	L (D1)	L (D1)	RMP Section 5
Areas not available for revegetation during optimal seasonal conditions.		L (E2)	L (E2)	N/A	N/A	Section 6.1, RMP Section 5.1
Lack of habitat structures for colonisation or use.	Placement of habitat features (rocks, logs) from vegetation clearing on site on final landform. Engage reputable bush regeneration expert/agronomist to oversee revegetation operations. Ecosystem Function Analysis monitoring.	L (D2)	L (D2)	N/A	N/A	RMP Section 5.2

Risk	Risk Control	Final Land Use Domain				Where Addressed
		Native Ecosystem	Agricultural – grazing	Water Management Areas	Infrastructure Areas	
Lack of infrastructure to support intended final land use (e.g. bunding, fences, watering facilities).	Retention of infrastructure required for final land use. Install required infrastructure prior to completion of this rehabilitation Phase	L (E2)	L (E2)	L (E2)	L (E2)	Section 6, RMP Section 5
Ecosystem and Land Use Development Phase of Rehabilitation						
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Meteorological monitoring. Rehabilitation planning / scheduling focussed on appropriate timing. Engage reputable bush regeneration expert/agronomists to oversee maintenance operations.	M (D3)	M (D3)	M (D3)	L (D2)	RMP Section 5
Damage to rehabilitation (e.g. fauna, domestic stock, vandalism, vehicular interactions, bushfire, insects and plant disease).	Safety bund and stock/feral-proof fencing. Fencing/caging of individual plants where required to minimise potential grazing and rutting impacts. Bushfire controls.	L (E3)	L (E3)	L (E3)	L (E3)	RMP Section 5
Re-disturbance of established rehabilitation areas.	Rehabilitation planning / scheduling.	L (E2)	L (E2)	N/A	N/A	Section 6.1, RMP Section 5.1
Insufficient establishment of target species and limited species diversity.	Rehabilitation monitoring. Engage reputable bush regeneration expert/agronomist to oversee revegetation operations. Utilise a range of stratum in native vegetation plantings including trees, shrubs, grasses and groundcover. Replanting/amelioration as required	M (D3)	M (D3)	N/A	N/A	Section 7.5, RMP Section 5.2
Erosion and failure of landform, drainage and water management/storage structures.	Visual inspection program. Geotechnical assessment and report prepared by a suitably qualified person following establishment of final landform. Low flow pipe management strategy included within the <i>Final Landform Feasibility Assessment</i> .	M (E4)	L (D2)	L (E1)	L (E2)	RMP Section 5.2
Final landform water quality inadequate to be discharged to the environment	Establish the approved low flow pipe from the Southern Sump only once rehabilitation operations are complete and water quality criteria are consistently achieved.	N/A	N/A	M (D3)	N/A	RMP Section 5.2
Lack of resources for rehabilitation maintenance.	Rehabilitation bond. Rehabilitation undertaken progressively. Rehabilitation planning / scheduling.	L (E3)	L (E3)	L (E3)	L (E2)	RMP Section 5.2
Impacts to native fauna and stock	Presence of wildlife friendly fences and tree screens around the perimeter of the rehabilitated extraction area. Implementation of approved <i>Biodiversity Management Plan</i>	L (D2)	L (E2)	L (E2)	L (E2)	BMP RMP Section 5.2

6. Quarry Closure Planning and Refinement

6.1 Indicative Rehabilitation Scheduling

The Quarry will be progressively developed over its approved life, indicatively in five substages, namely Stages 7a to 7e. **Figure 8 to 12** present the expected rehabilitation status at the end of each substage for the life of the Quarry. Notwithstanding the above, Cleary Bros recognises that quarry planning and development throughout the life of the Quarry may vary from the schedule currently proposed. The Rehabilitation Strategy will be updated and submitted to the Planning Secretary for approval prior to any significant change to the current schedule. The following subsections describe how the quarry closure planning and refinement process would be undertaken.

6.2 Quarry Closure Stakeholder Engagement Plan

The approved quarrying activities are a temporary use of the Quarry Site. As a result, reviewing the approved final landforms and land uses throughout the life of the Quarry will be critical, particularly as community needs and demands are likely to vary over that period. Stakeholder engagement is an important aspect of the quarry planning and refinement process.

The identification of relevant stakeholders aims to identify parties with an interest in the ongoing use and environmental management of the Quarry Site post-closure. **Table 10** presents the stakeholders that have been identified as having an interest in the Quarry Site post-closure and will be consulted throughout the life of the Quarry. This is a non-exhaustive list of stakeholders and Cleary Bros would actively seek to refine the list of stakeholders throughout the life of the Quarry. An updated list of stakeholders would be presented in each update of this document and in the *Rehabilitation Management Plan* for the Quarry.

Table 10 also presents the anticipated consultation methodology and frequency to be used during consultation. Similarly, the method and frequency of consultation will be refined throughout the life of the Quarry.

The results of Quarry-related closure consultation will be summarised in the *Annual Review* each year and will be presented and taken into consideration in each update of this document or the *Rehabilitation Management Plan* for the Quarry.

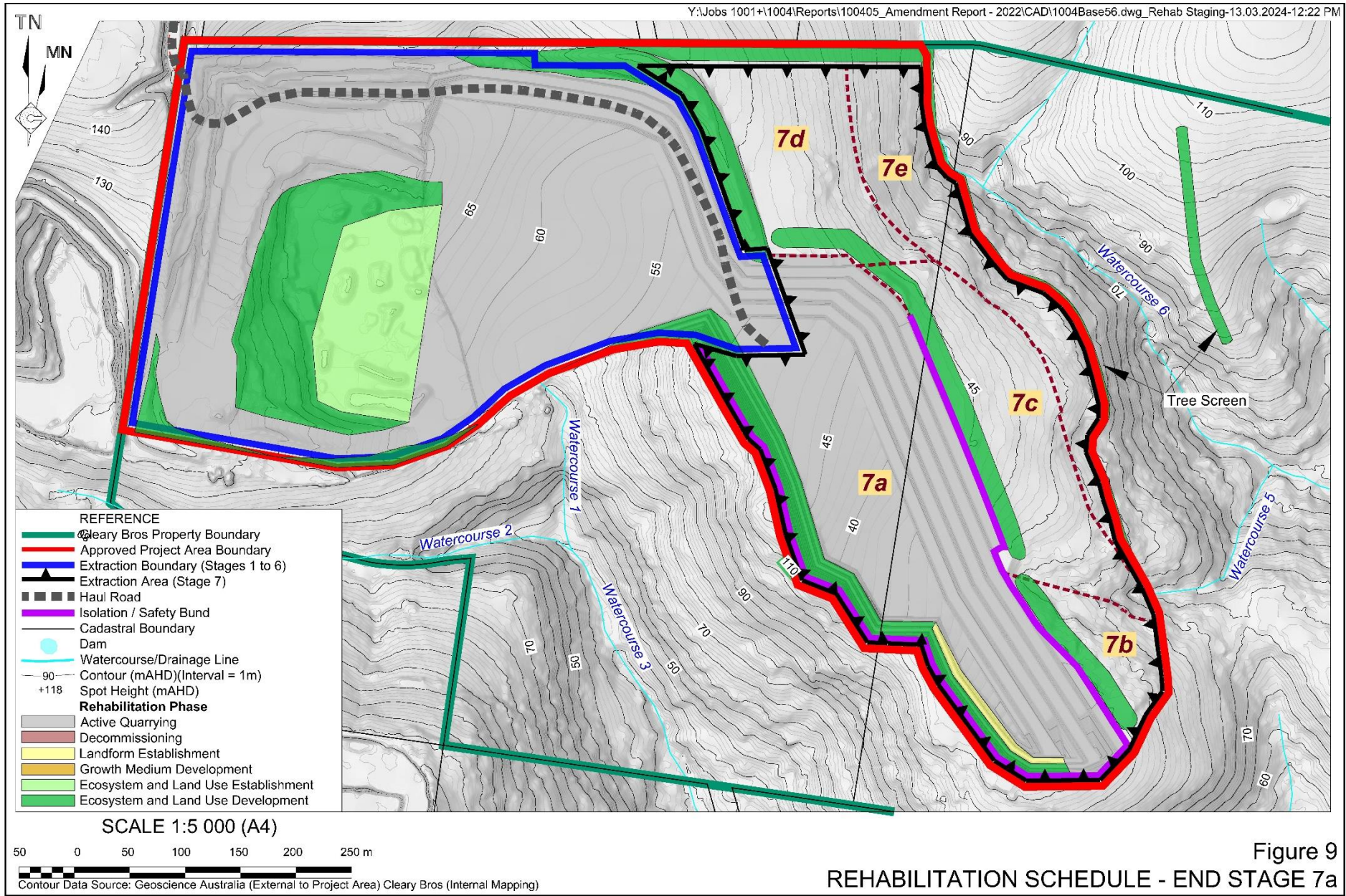


Figure 9
REHABILITATION SCHEDULE - END STAGE 7a



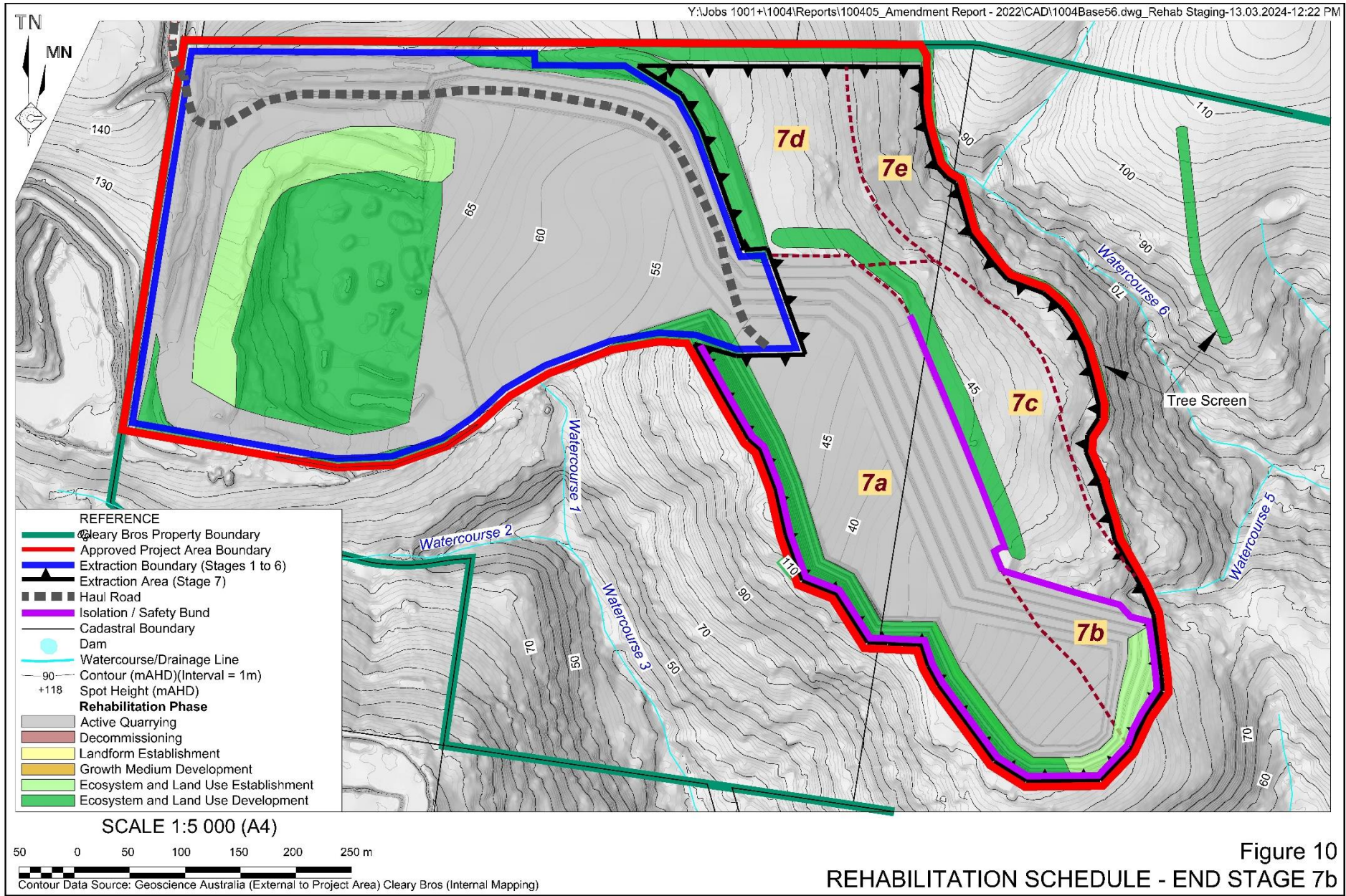


Figure 10
REHABILITATION SCHEDULE - END STAGE 7b



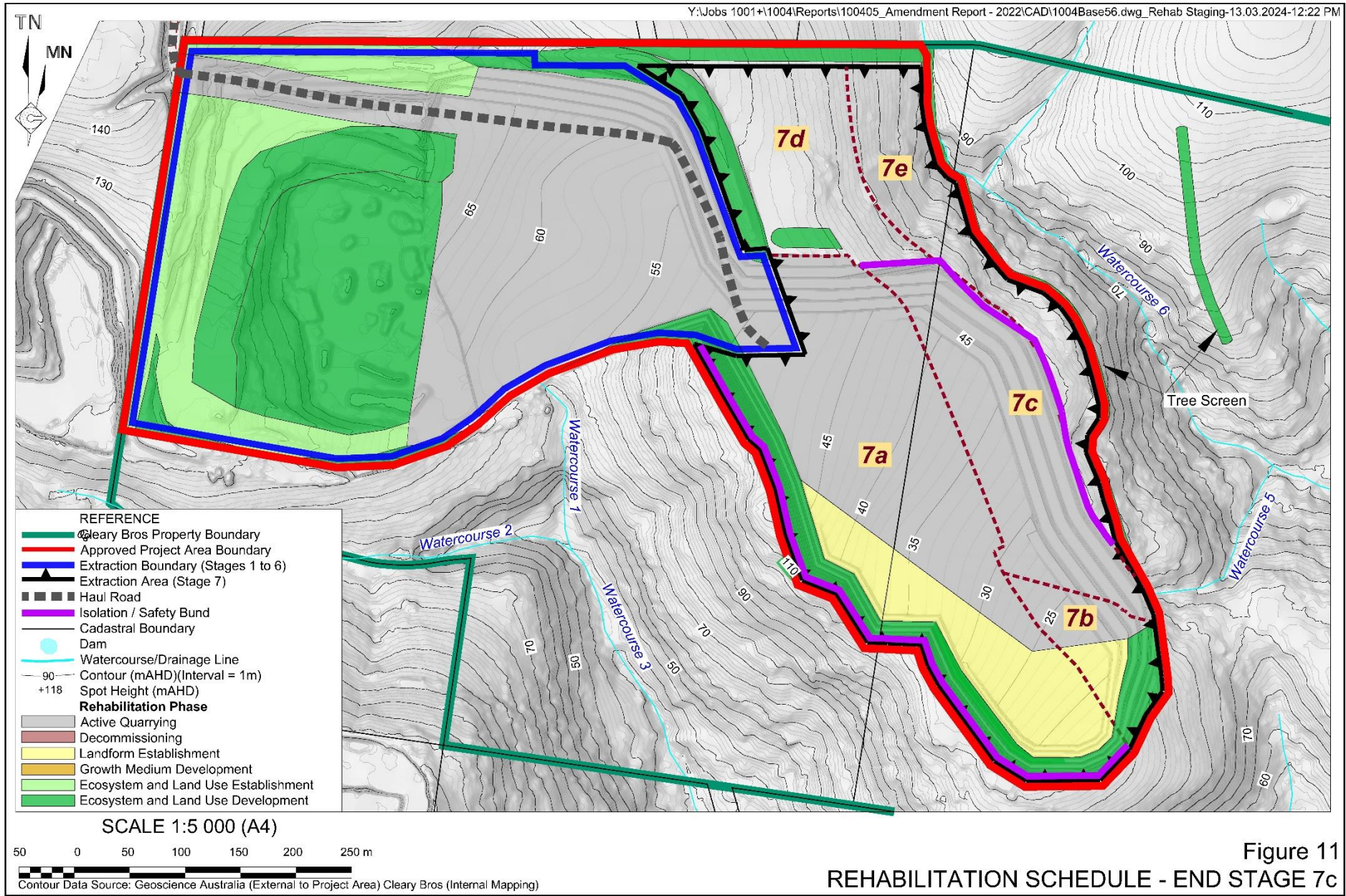


Figure 11
REHABILITATION SCHEDULE - END STAGE 7c



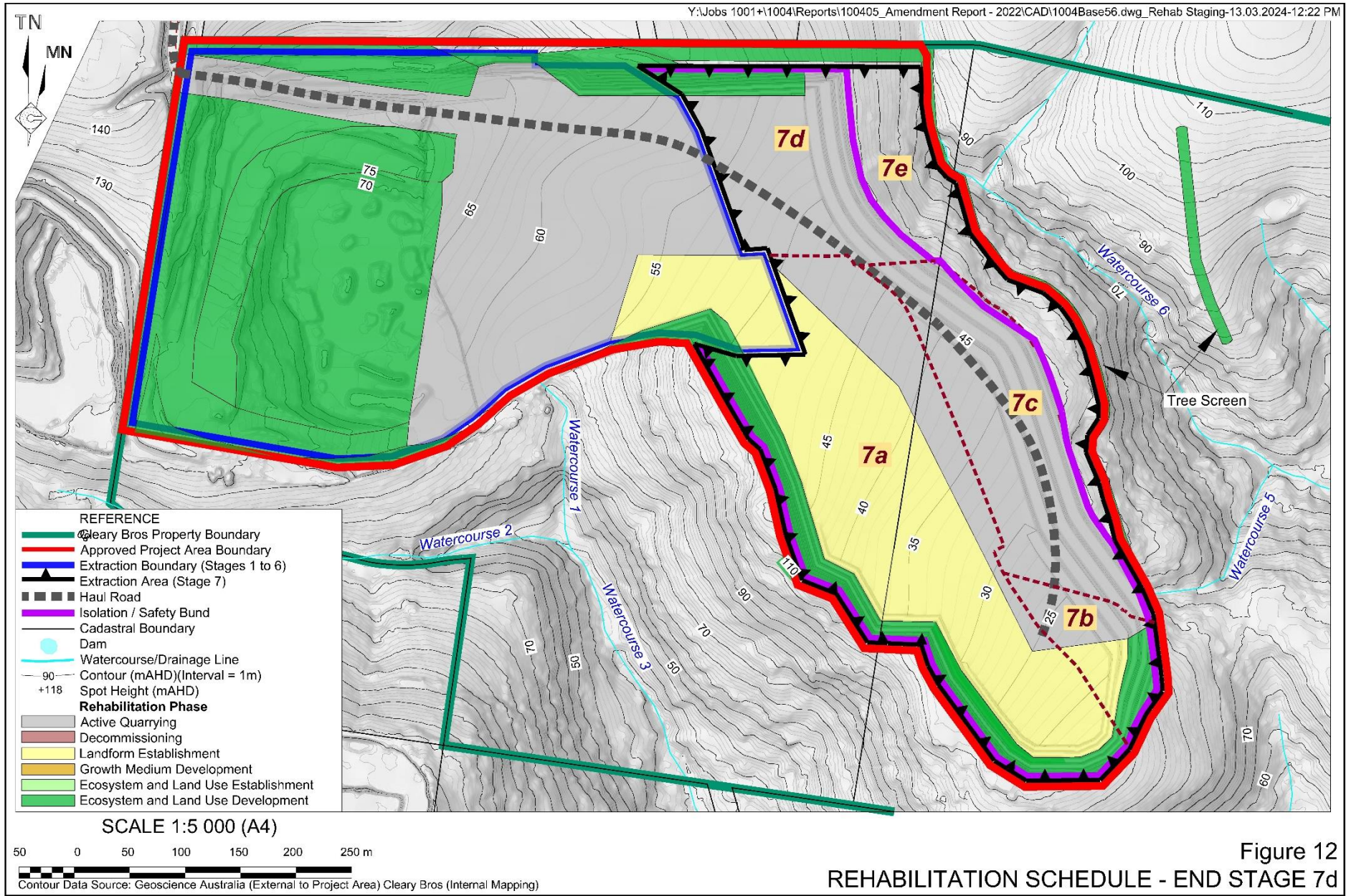


Figure 12
REHABILITATION SCHEDULE - END STAGE 7d



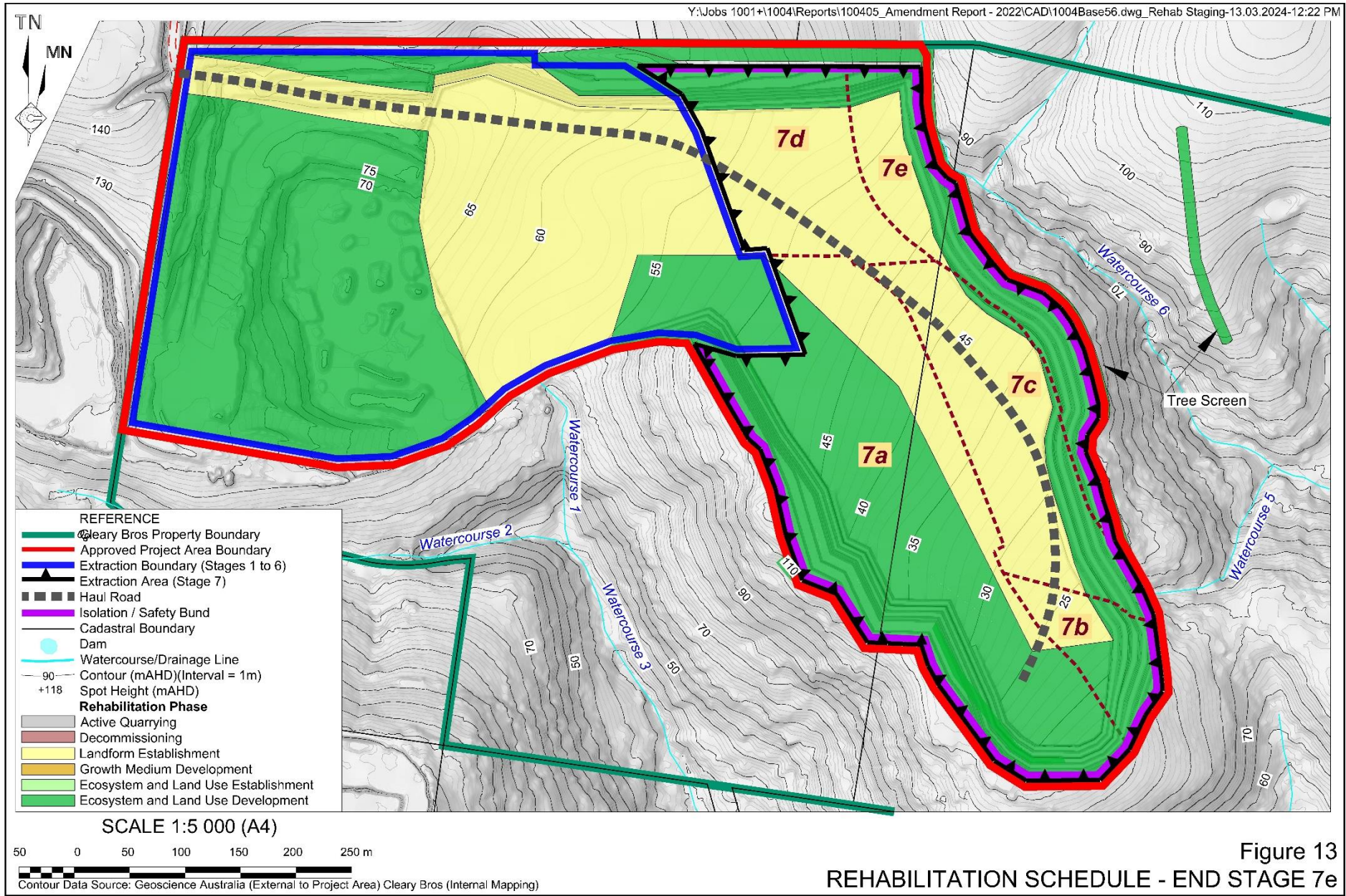


Figure 13
REHABILITATION SCHEDULE - END STAGE 7e



Table 10 – Quarry Closure Stakeholder Engagement Plan

Stakeholder	Engagement Method	Engagement Frequency
Internal Stakeholders		
Cleary Bros employees	<ul style="list-style-type: none"> Company meetings and focus sessions Employee surveys 	<ul style="list-style-type: none"> 5 years prior to closure
Cleary Bros customers	<ul style="list-style-type: none"> Customer survey 	<ul style="list-style-type: none"> 5 years prior to closure
Cleary Bros suppliers	<ul style="list-style-type: none"> Supplier survey 	<ul style="list-style-type: none"> 5 years prior to closure
Non-government Stakeholders		
Owners of “Fig Tree Hill”	<ul style="list-style-type: none"> Face-to-face meetings 	<ul style="list-style-type: none"> Minimum annually
Private adjoining landholders	<ul style="list-style-type: none"> Face-to-face meetings Landholder surveys Focus groups 	<ul style="list-style-type: none"> 5 years prior to closure
Quarry-related adjoining landholders	<ul style="list-style-type: none"> Business-to business meetings 	<ul style="list-style-type: none"> Ad hoc as required
Community Consultative Committee	<ul style="list-style-type: none"> Face-to-face meetings 	<ul style="list-style-type: none"> Biannual until 5 years prior to closure, then more frequently
Non-adjoining landholders west of the Princes Motorway	<ul style="list-style-type: none"> Landholder surveys Focus groups 	<ul style="list-style-type: none"> 5 years prior to closure
Landholders and residences east of the Princes Motorway	<ul style="list-style-type: none"> Landholder surveys Focus groups 	<ul style="list-style-type: none"> 5 years prior to closure
Business-related non-government organisations (i.e. Business Illawarra)	<ul style="list-style-type: none"> Stakeholder survey Focus groups 	<ul style="list-style-type: none"> 10 years prior to closure
Special interest groups (i.e. heritage or environmental organisations)	<ul style="list-style-type: none"> Stakeholder survey Focus groups 	<ul style="list-style-type: none"> 10 years prior to closure
Individual or business with an interest in the final landform or final land use (i.e. potential developers)	<ul style="list-style-type: none"> Business-to business meetings 	<ul style="list-style-type: none"> Ad hoc as required
Government Agency Stakeholders		
Shellharbour City Council	<ul style="list-style-type: none"> Provision of Annual Review Face-to-face meetings / CCC Site inspections 	<ul style="list-style-type: none"> Annual and as required
	<ul style="list-style-type: none"> Stakeholder survey Focus groups 	<ul style="list-style-type: none"> 10 years prior to closure
	<ul style="list-style-type: none"> Participation in strategic planning reviews 	<ul style="list-style-type: none"> Ad hoc as invited by Council
Department of Planning, Housing and Infrastructure	<ul style="list-style-type: none"> Provision of Annual Review 	<ul style="list-style-type: none"> Annual
	<ul style="list-style-type: none"> Face-to-face meetings Site inspections 	<ul style="list-style-type: none"> As required / requested
	<ul style="list-style-type: none"> Stakeholder survey Focus groups 	<ul style="list-style-type: none"> 5 years prior to closure

Stakeholder	Engagement Method	Engagement Frequency
Biodiversity Conservation Division	• Provision of Annual Review	• Annual
	• Face-to-face meetings	• As required
	• Site inspections	
Environment Protection Authority	• Provision of Annual Review	• Annual
	• Face-to-face meetings	• As required
	• Site inspections	
Department of Climate Change, Energy, the Environment and Water - Water (and related agencies)	• Provision of Annual Review	• Annual
	• Face-to-face meetings	• As required
	• Site inspections	
Department of Climate Change, Energy, the Environment and Water (Cth)	• Provision of Annual Review	• Annual
	• Face-to-face meetings	• As required
	• Site inspections	

6.3 Integration of Rehabilitation and Quarry Planning

The Stage 7 Extraction Area has been designed with parameters comparable to those already adopted for Stages 1 to 6. Those design parameters were determined based on a *Geotechnical Stability Assessment and Mine Plan* prepared by Cardno dated 13 July 2017 (Cardno, 2017). That report recommended the following design criteria for the Quarry.

- Western-facing faces: 14m high faces at 75° from the horizontal, with 5m wide berms.
- All other faces: 14m high faces at 90° from the horizontal, with 5m wide berms.

During preparation of the EIS for the Quarry the recommended design criteria were amended to account for the following.

- Extraction of weathered rock in the upper few metres below the natural land surface.
- Visual amenity impacts for faces that would be visible to observers located to the east and southeast of the Quarry.

The design criteria for the approved Quarry are as follows.

- Weathered rock overburden slopes (up to 8 metres below natural surface) at approximately 45° from the horizontal.
- Terminal slopes visible from the east and southeast at the end of Stage 7e: 7m high faces at 90° from the horizontal, with 10m wide berms.
- Western-facing terminal slopes not visible from the east and southeast at the end of Stage 7e: 14m high faces at 75° from the horizontal, with 5m wide berms.
- All other terminal slopes not visible from the east and southeast at the end of Stage 7e: 14m high faces at 90° from the horizontal, with 5m wide berms.

The *Geotechnical Stability Assessment and Mine Plan* will be updated periodically, nominally every 5 years, by a suitably qualified geotechnical engineer. The updated Plan will assess the long-term stability of the Quarry faces based on the performance of the faces to that point and will recommend revised design criteria if required. Stantec was preparing an updated *Geotechnical Stability Assessment and Mine Plan* at the time of finalisation of this document.

In the event that the updated Plan recommends revised design criteria, this document will be updated, and terminal slopes established after that time would reflect the revised design criteria. Cleary Bros would also seek advice from a geotechnical engineer in relation to terminal faces already established.

The regular updating of the *Geotechnical Stability Assessment and Mine Plan*, together with progressive rehabilitation of the terminal faces, will ensure integration of rehabilitation with Quarry planning and that limited rehabilitation of terminal faces is required in the event of premature or unplanned Quarry closure.

In addition, Cleary Bros would continue to accept VENM and ENM at the approved rate of up to 100,000tpa for the purposes of rehabilitation of the Quarry. **Figures 8 to 12** present the proposed rehabilitation schedule, including rehabilitation of those sections of the Quarry that would be backfilled to establish the approved final landform. Backfilled sections of the Quarry would be progressively rehabilitated throughout the life of the Quarry. In addition, the *Rehabilitation Management Plan* will be regularly updated to reflect rehabilitation forward planning (i.e. figures will identify sections of the quarry to be backfilled and rehabilitated during the subsequent 5-year period). This will allow for integration of rehabilitation with Quarry planning and will also ensure that limited rehabilitation of backfilled areas is required in the event of premature or unplanned Quarry closure.

6.4 Final Landform and Land Use Optimisation

The approved final landform and land uses are described in Section 3.2. In summary, the approved final landform would include a free draining final void with:

- revegetated berms;
- a Western Sump that would discharge to Watercourse 1 via a spillway;
- a Southern Sump that would discharge to Watercourse 3 via a low flow pipeline; and
- backfilled and revegetated floor of the Quarry.

The approved final land uses include those which could be undertaken at the time of approval of SSD 10369, namely agriculture and nature conservation.

Notwithstanding the above, given the 30-year life of the Quarry, the approved final landform and land uses may not be the optimal outcomes at the time of closure. In particular, numerous examples of former quarries that have been repurposed for industrial, recreational, or residential purposes exist throughout the Illawarra region and elsewhere in NSW and the world. In light of this fact, Cleary Bros will regularly review the approved final landform and final land use to ensure that it:

- aligns with regional and local strategic land use planning objectives and outcomes applicable at the time;
- supports a sustainable future for the local community; and
- minimises adverse socio-economic effects associated with rehabilitation and quarry closure.

In the event of potential changes to the final landform and/or land use, Cleary Bros would implement the following.

- The Stakeholder Engagement Plan described in Section 6.2 would be implemented, with particular emphasis on the following triggers for consultation in relation to the final landform and land uses.
 - Receipt of an updated Geotechnical Stability Assessment and Mine Plan.
 - Preparation of an updated version of this document and/or the *Rehabilitation Management Plan*.
 - Consultation with the Community Consultative Committee, Shellharbour City Council and relevant government agencies.
- Based on the above, Cleary Bros would prepare a document describing the proposed amended final landform and land use. That document would form the basis for further consultation with affected landholders and other stakeholders, including Shellharbour City Council and relevant government agencies.
- In the event that the amended final landform or land use provided an equal or superior outcome based on the above objectives when compared with the approved option, a modification to SSD 10369 or a new approval for the proposed alternate final landform or land use would be sought.

7. Rehabilitation and Visual Mitigation Measures

7.1 Introduction and Background

The Quarry is located on elevated land to the south and west of the Princes Motorway. Section 6.3 of the EIS included an assessment of visual impacts associated with the Quarry. Subsequently, the Extraction Area design was amended to that described in Section 3.1 of this document and a revised visibility assessment was presented in Section 6.2 of the *Amendment Report*. That assessment was supported by:

- a *Landscape Character Assessment* presented as Appendix 4 of the Scoping Report; and
- an *Amended Visual Impact Assessment* presented as Appendix 5 of the Scoping Report.

The results of the amended visibility assessment are summarised below.

Potential Visual Impacts

The potential visual impacts generated by the Quarry will be as follows.

- As the eastern side of Stage 7 is progressively lowered (i.e. in Stages 7b to 7e), the upper extraction faces on the western and northern faces of Stage 7 would be progressively exposed to views from the east and southeast. Changes to the existing skyline when viewed from the east are also possible.
- Earthmoving and mobile equipment would periodically be visible within the Amended Project Area.
- Infrequent and short-lived dust plumes associated with Quarry blasting may be visible within the Project Area.

Visual Catchments

Identification of the Quarry's visual catchments relied upon the visibility tools of ArcGIS to assess the areas within the landscape that could, in the absence of vegetation or other factors limiting views, be seen from the boundary of the Extraction Area. Based on that analysis, an algorithm was then used to establish the potential level of visibility of the Extraction Area, with the visibility categorised from not visible to very high visibility. Based on this the following four visibility catchments were identified (**Figure 13**).

- "Figtree Hill" Visual Catchment. A written agreement addressing visual amenity-related impacts has been signed with the owners of "Fig Tree Hill". However, heritage-related impacts associated with changes to the visual setting of the "Hill Complex" heritage site are not capable of being addressed by that agreement.
- West of Princes Highway Visual Catchment (Dunmore Valley).
- West of Dunmore Road Visual Catchment (Shell Heights).
- Shell Cove West Visual Catchment (Shell Cove West).

Other areas of potential visibility were also recorded, but these areas were determined to be either located on land owned by other quarry operators or too distant to be relevant.

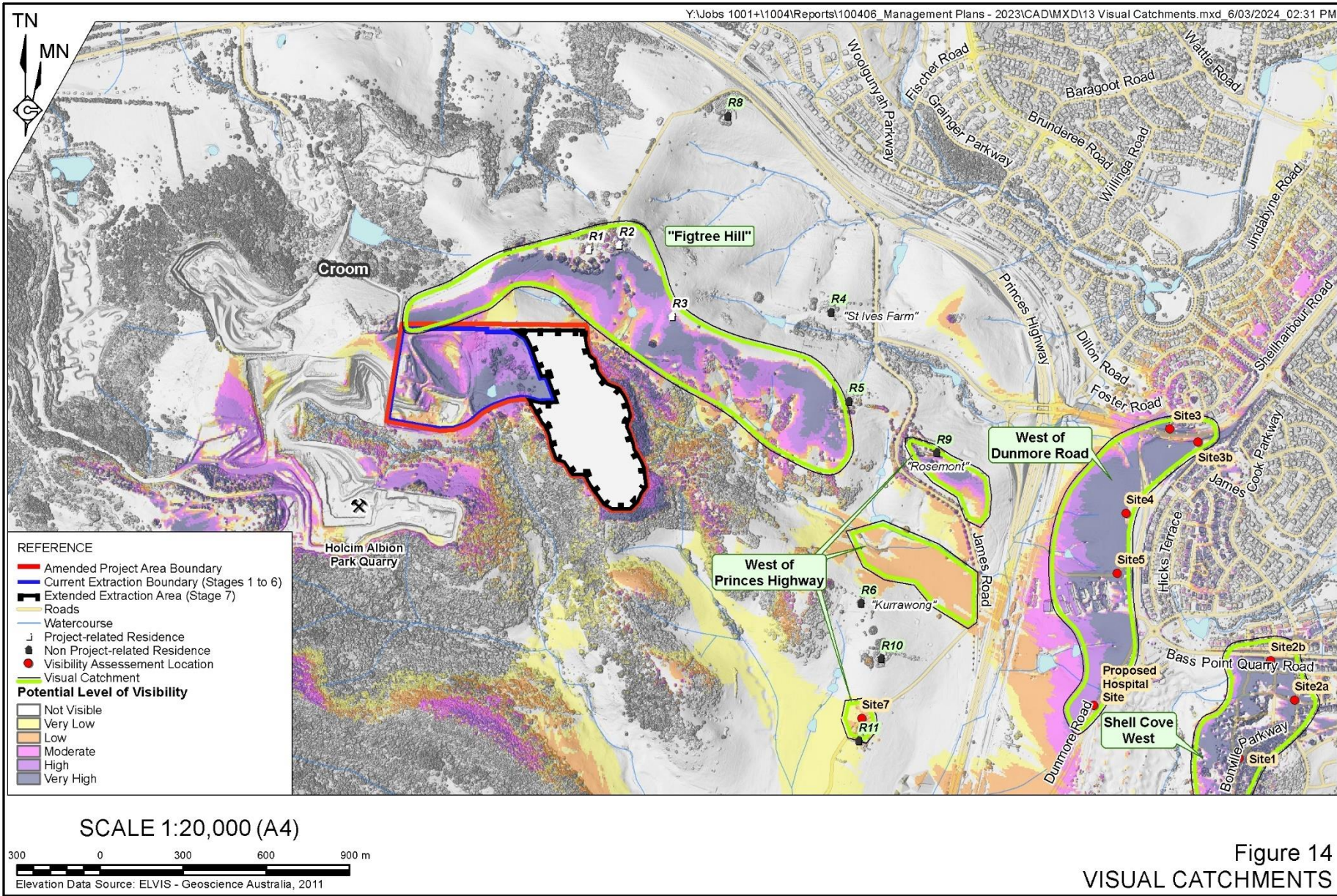


Figure 14
VISUAL CATCHMENTS

Safeguards and Mitigation Measures

The following rehabilitation-related design safeguards and mitigation measures are to be implemented throughout the life of the Quarry.

- Extraction and Rehabilitation Staging

The Quarry substages, namely Stages 7a to 7e, have been designed to minimise visual impacts for observers located to the east and southeast of the Extraction Area. Staging of extraction operations also allows progressive rehabilitation of completed sections of the Quarry as described in Section 6.1. Sections 7.2 to 7.4 of this document and Section 3.3 of the *Rehabilitation Management Plan* present a description of the progressive rehabilitation to be undertaken to manage visual amenity-related impacts.

- Terminal Face Design and Rehabilitation

Sections of the terminal faces that would be visible from selected vantage points to the east and southeast of the Extraction Area following extraction of Stage 7e will be constructed with the following design criteria.

- Face height: 7m.
- Bench width: 10m.

The benches would be progressively rehabilitated as they are constructed as described in Section 7.3 and the following completion criteria would be achieved on those visible parts of the western face of the Extraction Area prior to the extraction of Stage 7e.

- Surviving trees – average interval between individuals along visible benches is no greater than 7m, with an average height no less than 2m below the top of the bench above.
- Surviving shrubs – average interval between individuals along the bench no greater than 3.5m, with an average height of no less than 1m.

- Amenity Barriers and Tree Planting

Figure 3 presents the amenity barriers and tree screens to be commenced within 12 months of commencing extraction in Stage 7. The amenity barrier would be constructed to a height of approximately 5m and with vegetation growth conservatively extending the effective height to approximately 8m in 5 years and 10m in 10 years.

Planting of the tree screens would similarly be commenced within 12 months of commencing extraction in Stage 7 and are expected to attain effective heights of 3m, 5m and 10m in 5, 10 and 15 years respectively.

If requested by the owners of Figtree Hill, Cleary Bros will plant a vegetation screen in an agreed location on the Figtree Hill property to provide near-field screening from the residences.

The dry stone walls present within the development area would be reconstructed along the northern property.

One mature fig tree outside of the development boundary and to the southwest of the Belmont homestead would be retained and remain visible from neighbouring properties.

Section 7.2 presents a description of the procedures to be implemented to establish the amenity barriers and tree screens.

Assessment of Visual Impacts

Extraction operations in Stage 7 would commence with extraction of Stage 7a from north to south. The eastern boundary of Stage 7a, together with the proposed amenity barrier and tree screen, would prevent views into the Extraction Area from the east and southeast during this Stage.

During Stages 7b, 7c and 7d, namely between 2035 and 2048, the uppermost sections of the western terminal face would be progressively exposed to observers to the east and southeast of the Extraction Area. In addition, the uppermost benches of the active northern face of the Extraction Area would be visible to observers to the southeast. At the end of Stage 7d, in the mid-2040's, the uppermost benches of the northern terminal face would be visible to observers to the southeast of the Extraction Area.

During the extraction of Stage 7e in the late-2040's to early-2050's, the remainder of the uppermost benches of the western and northern terminal faces would be visible to observers to the southeast of the Amended Project Area.

The following methodology was used to determine the extent of visibility of the western and northern terminal faces to observers within the visual catchments to the east and southeast of the Extraction Area.

- The preliminary quarry design was embedded in a Digital Terrain Model.
- 10m high barriers representative of the proposed tree screens were added to the model.
- The Viewshed tool in ArcGIS was used to determine the extent of the western and northern terminal faces that would be visible to observers located within the visual catchments to the east and southeast of the Extraction Area.

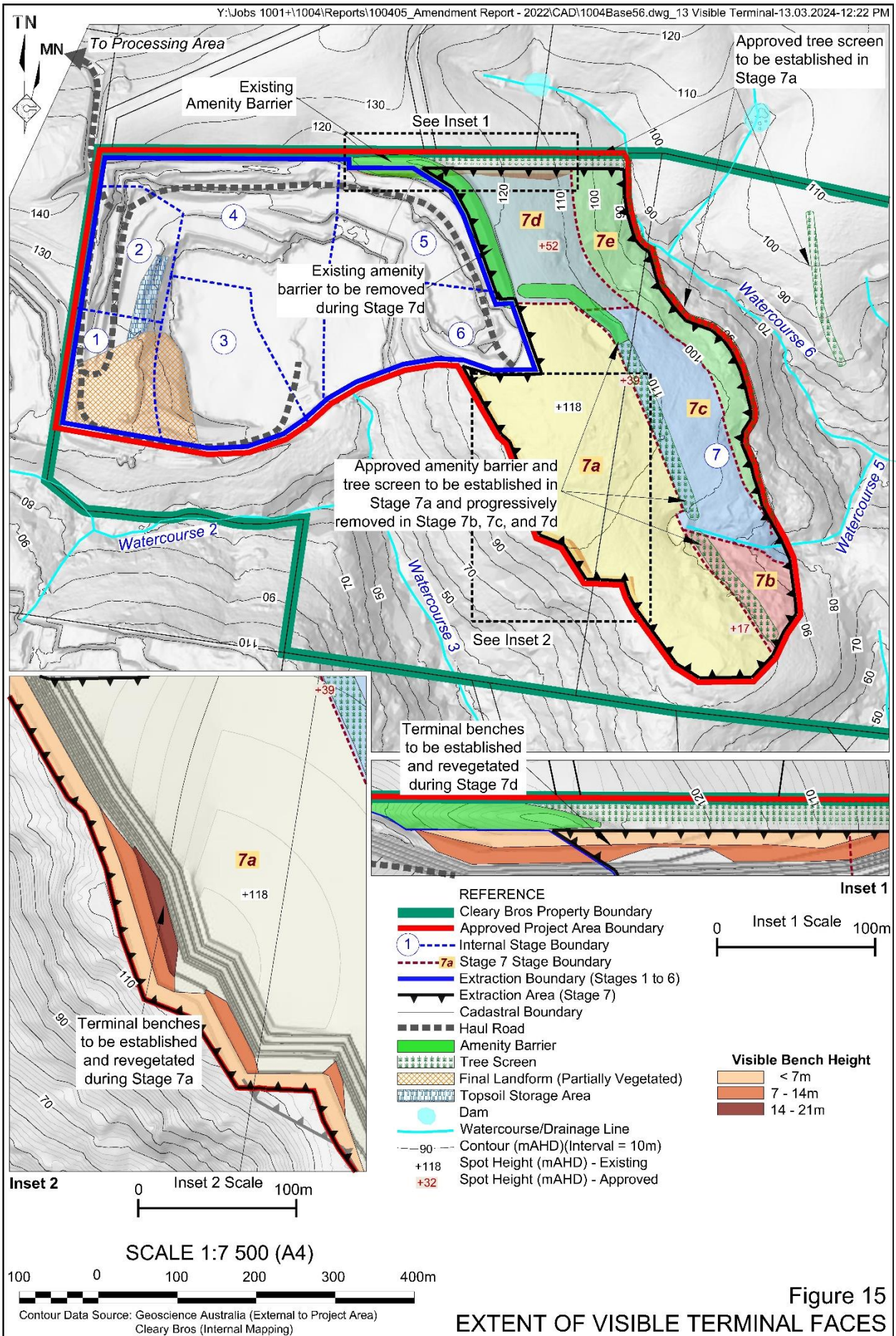
Figure 15 presents the results of the assessment which may be summarised as follows.

- Western terminal face – an approximately 400m long section of the western terminal face would be visible at the end of Stage 7e, with the depth of the visible face varying from nil at the northern and southern ends to approximately 21m in the central section.
- Northern terminal face – an approximately 290m long section of the northern terminal face would be visible at the end of Stage 7, with the depth of the visible face varying from negligible at the eastern and western ends to approximately 14m close to the eastern end.

In addition, the western, uppermost section of the Stages 1 to 6 Extraction Area will be visible for observers to the east of the Extraction Area following the completion of Stage 7e.

7.2 Amenity Barrier and Tree Screen Establishment and Maintenance

Figure 3 presents the amenity barriers and tree screens that will be commenced within 12 months of the commencement of quarrying operations under SSD10369. In addition, if requested by the owners of Figtree Hill, Cleary Bros will plant a vegetation screen on the Figtree Hill property to provide near-field screening from the residences. This vegetation screen would be located in a location nominated by the owners of Figtree Hill, using species and planting methods agreed to with the owners, noting that these may differ from those detailed in the following sections.



The amenity barriers would be constructed and revegetated as follows.

- The boundaries of the amenity barrier will be pegged.
- Construct the amenity barriers using overburden sourced from the Stage 7a area to comply with the following design criteria.
 - Height: approximately 5m
 - Side slopes: approximately 1:3 (V:H) or less

Soil materials will be inspected for the presence of weed propagules prior to use in construction of the amenity barriers.

- Apply approximately 0.1m of soil to comply with the criteria identified in Section 7.5.1.
- Scarify the shaped landform across the slope to minimise erosion and maximise infiltration of surface water.
- Revegetate the amenity bund with species consistent with those identified in Section 7.5.2 using a combination of hydromulching and tube stock derived from locally sourced seed.

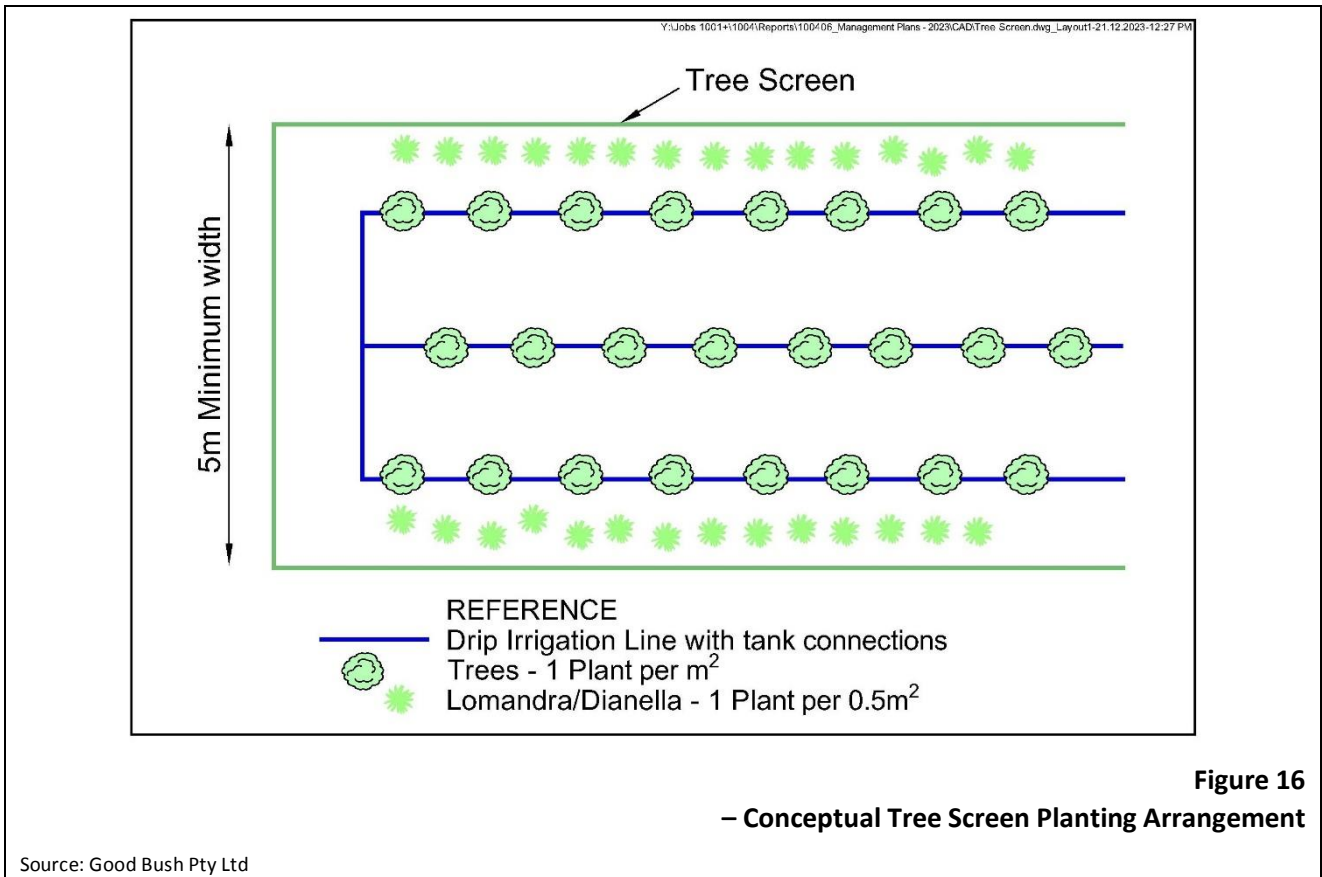
The tree screens would be established as follows.

- Survey and mark out the extent of the tree screens. The northern tree screen would be offset from the excavation limit by approximately 10 metres, to prevent root jacking and rockfalls from the rehabilitated highwall.
- Planting preparation works will involve broad scale spraying of pasture grasses.
- Mulching the planting areas to a minimum depth of 100mm using clean tree mulch.
- Planting the screens using species consistent with those identified in Section 7.5.2 supplied as tube stock from a reputable local plant grower or commercial nursery.
- Planting clumping native grasses on the edges of planting areas to minimise pasture grass encroachment.
- Initial watering of all plants on the day of planting if required.
- Installation of a drip irrigation system to provide water to the plants during dry conditions.

Tree screens would be configured generally as shown in **Figure 16**.

The dry stone walls present within the development area would be reconstructed along the northern property boundary (as described in the *Historic Heritage Management Plan*), where they would be visible (depending on screening vegetation) from the Figtree Hill residences, and to those accessing the public road reserve of Dunsters Lane.

One mature Moreton Bay Fig Tree outside of the development boundary and to the southwest of the Belmont homestead would be retained and remain visible from neighbouring properties for the duration of its natural life. This fig tree is one of a number of Moreton Bay Fig Trees which are dominant features of the Belmont landscape.



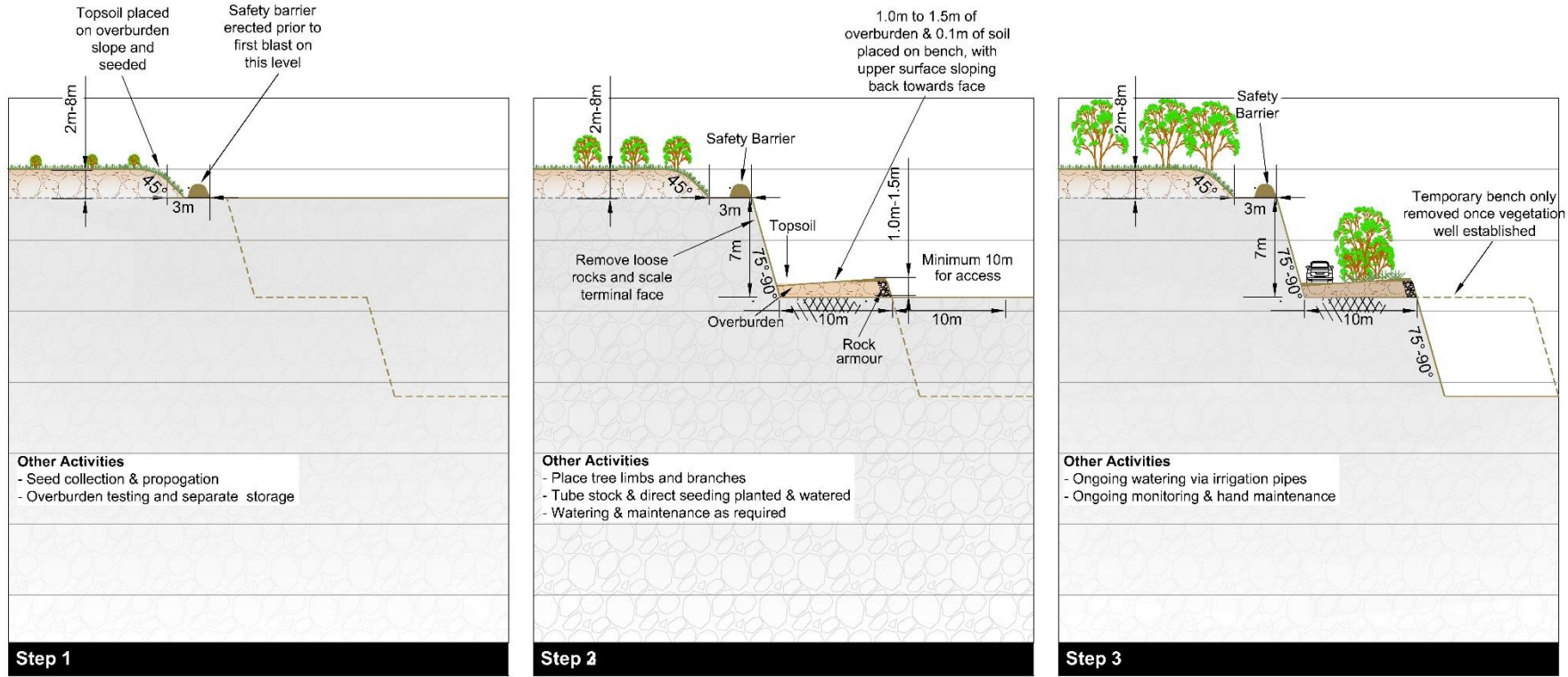
The revegetated amenity barrier and tree screens would be maintained and monitored as follows.

- Undertake quarterly weed inspection and control programs, with the programs becoming less frequent as the vegetation communities become self-sustaining.
- Undertake annual monitoring and reporting of the success or otherwise of the revegetation, including but not limited to the following. The monitoring report will be appended to the *Annual Review* to be prepared for the Quarry.
 - Degree of establishment of seeded/planted vegetation.
 - Species mix of established vegetation, including a comparison with the target species mix and identification of weeds or other non-desirable species.
 - Distribution, height, and density of established vegetation.
 - Evidence of natural recruitment.
 - Evidence of grazing by native or other herbivores adversely impacting on establishment of vegetation.
 - Recommendations in relation to remedial actions required during the subsequent 12 months.

7.3 Rehabilitation and Maintenance of Visible Terminal Benches

Section 7.1 and **Figure 15** present the sections of the western and northern terminal faces that would be visible at the end of Stage 7e. The visible sections of those faces would be constructed and rehabilitated as follows. **Figure 17** presents a schematic overview of the proposed rehabilitation process.

1. Prior to establishing the visible terminal face undertake the following.
 - Determine if the section of terminal face to be established will be visible following completion of Stage 7e.
 - Review geotechnical advice in relation to the measures to be implemented to ensure long-term stability of the face, including slope of the face and recommended blasting methodology (i.e. pre-split, depth of sub drill, etc).
 - Undertake drill and blast operations in accordance with the above recommendations.
2. Once the fragmented material has been removed undertake the following.
 - Retain a minimum 20m wide work zone at the base of the terminal face until completion of revegetation works.
 - Scale and clean the terminal face and bench floor and ensure that it is safe for vehicles and workers.
 - 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.
 - Spread 1.0m to 1.5m of overburden with the appropriate characteristics for use as substrate, i.e. a well-graded material with a moderate quantity of clayey materials.
 - Ensure that the shaped landform slopes towards the back of the bench to ensure retention of water on the rehabilitated landform.
 - Establish vehicular access along the inner section of the bench to permit long-term access for maintenance and monitoring.
 - Apply a minimum of 0.1m of soil across the area to be revegetated to comply with the criteria identified in Section 7.5.1. Where topsoil has been sourced from areas that were predominantly native vegetation, a maximum depth consistent with the original depth of the topsoil (up to 0.4m) will be applied.
 - Scarify the spread soil along the bench to minimise erosion and maximise infiltration of surface water.
 - Revegetate the area with species consistent to those identified in Section 7.5.2 using a combination of hydromulching and tube stock derived from locally sourced seed. Where topsoil is directly transferred from areas with moderate or high-density *Zieria granulata* (refer to Figure 14 of the RMP), a thin seed-free mulch may also be applied, with additional tube stock planted consistent with Section 7.5.2.
 - Retain a minimum 10m wide access way beyond the outer edge of the bench until such time as the vegetation is established.
 - Retain vehicular access along the inner section of the rehabilitated bench to maintain permanent access to the final landform.



Not to Scale

Figure 17
SCHEMATIC QUARRY BENCH
REVEGETATION PROCEDURE

The revegetated terminal benches will be maintained and monitored as follows.

- Undertake quarterly weed inspection and control programs, with the programs becoming less frequent as the vegetation communities become self-sustaining.
- Undertake annual monitoring and reporting of the success or otherwise of the revegetation, including but not limited to the following. The monitoring report will be appended to the *Annual Review* to be prepared for the Quarry.
 - Degree of establishment of seeded/planted vegetation.
 - Species mix of established vegetation, including a comparison with the target species mix and identification of weeds or other non-desirable species.
 - Distribution, height and density of established vegetation, including progression towards the completion criteria identified in Section 4.2 of the *Rehabilitation Management Plan*.
 - Evidence of natural recruitment.
 - Evidence of grazing by native or other herbivores adversely impacting on establishment of vegetation.
 - Recommendations in relation to remedial actions required during the subsequent 12 months.

7.4 Rehabilitation and Maintenance of Visible Sections of Stages 1 to 6

The visible sections of the Stages 1 to 6 Extraction Area will be constructed and revegetated as follows.

- Progressively place overburden and imported VENM/ENM into completed sections of the Stages 1 to 6 Extraction Area and shape the landform generally in accordance with the final landform design (see Section 3.2).
- Apply a minimum of 0.1m of soil to comply with the criteria identified in Section 7.5.1.
- Scarify the shaped landform across the slope to minimise erosion and maximise infiltration of surface water.
- Revegetate with species consistent with those identified in Section 7.5.2 using a combination of hydromulching and tube stock derived from locally sourced seed.

The revegetated areas will be maintained and monitored as follows.

- Undertake quarterly weed inspection and control programs, with the programs becoming less frequent as the vegetation communities become self-sustaining.
- Undertake annual monitoring and reporting of the success or otherwise of the revegetation, including but not limited to the following. The monitoring report will be appended to the *Annual Review* to be prepared for the Quarry.
 - Degree of establishment of seeded/planted vegetation.
 - Species mix of established vegetation, including a comparison with the target species mix and identification of weeds or other non-desirable species.
 - Distribution, height and density of established vegetation.
 - Evidence of natural recruitment.

- Evidence of grazing by native or other herbivores adversely impacting on establishment of vegetation.
- Recommendations in relation to remedial actions required during the subsequent 12 months.

7.5 Target Soil Criteria, Vegetation Communities and Species

7.5.1 Target Soil Criteria

Table 11 presents the soil criteria to be achieved prior to establishment of native or pasture species within the “Native Ecosystem” or “Agricultural – grazing” domains. Target soil criteria will be updated as required based on results from rehabilitation trials and rehabilitation monitoring results (refer to Sections 7 and 8 of the RMP).

Table 11 – Target Soil Criteria for Native Ecosystem and Agricultural – Grazing domains

Indicator	Target	Validation Method
Depth (m)	≥0.1*	Test pits and photographs
Soil acidity (CaCl ₂)	5.2-6.0	Soil sampling and testing through NATA accredited lab
Organic carbon (%)	≥2	
Phosphorus (Colwell) (mg/kg)	≥30	
Sulphur (KCl) (mg/kg)	≥10	
Potassium (meq/100 g K)	≥0.4	
Calcium (meq/100 g Ca)	≥2.0	
Magnesium (meq/100 g Mg)	≥0.8	
Aluminium (% CEC)	<5	
Sodium (% CEC)	<6	
Chloride (mg/kg)	<300	
Electrical Conductivity, Saturated extract (dS/m)	<1.5	
Copper (DTPA) mg/kg	0.3-100	
Zinc (DTPA) mg/kg	1.2-300	
Manganese (DTPA) mg/kg	2-50	
Iron (DTPA) mg/kg	4-100	
Boron (DTPA) mg/kg	1-2	

Source: Roger Garnsey

* Stockpiled soil containing native seedbank will be placed to a depth consistent with the source location of the topsoil, with a maximum depth of 0.4m (refer to **Table 5** of the RMP)

7.5.2 Target Vegetation Communities and Species

Table 9 of SSD10369 identifies the following rehabilitation objectives for the Quarry.

- Areas proposed for nature conservation.
 - Vegetation composition of rehabilitation contains species commensurate with native vegetation communities found in the local area.
 - Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area.
 - Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining.

- Areas proposed for agricultural land.
 - Establish grassland areas to support sustainable agricultural activities.
 - Use persistent species grown in the local area that are suitable for pasture production.

Vegetation communities within and surrounding the Extraction Area include the following. The mapped vegetation communities are described in detail in Annex 1 of the Biodiversity Development Assessment Report presented as Appendix 4 of the *Amendment Report* for the Quarry.

- PCT1300 - Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion.
- PCT720 - Bracelet Honey-myrtle - Australian Indigo dry shrubland on volcanics, southern Sydney Basin Bioregion.

Species selection for the Visual Screens would target a range of fast-growing local tree and shrub species, supported by clumping native grasses to restrict exotic grass invasion during establishment. The screen along the eastern boundary of Stage 7 would not include tree species likely to result in rock jacking and instability of the highwall crest.

Revegetation of the “Native Ecosystem” domain would be undertaken using species consistent with PCT1300, PCT720, and other species present in the remnant communities adjacent to the Stage 7 area (local presence). Topsoil from the areas mapped as moderate and high density *Zieria granulata* (refer to Figure 14 of the RMP) will preferentially be directly placed in sections of this domain where the landform has been established, with the aim of encouraging the establishment this species. *Zieria granulata* is known to respond well to disturbance, and as such the transfer of topsoil in this manner is likely to encourage germination. Additional tubestock of species consistent with PCT1300 or PCT720 will also be planted.

Revegetation of the “Agricultural – Grazing” domain would be undertaken using pasture species commonly used in the local area.

Table 12 presents the target vegetation species for the Visual Screens, “Native Ecosystem”, and “Agricultural – Grazing” domains. Target vegetation species will be updated as required based on availability and outcomes of any rehabilitation trials or rehabilitation monitoring results (refer to Sections 7 and 8 of the RMP). Not all targeted species will be able to be utilised due to availability and the suitability of each site.

Table 12 – Target Vegetation Species

Common Name	Scientific Name	Planting Method	Comments
Visual Screens			
Gossamer Wattle	<i>Acacia floribunda</i>	Tube stock	
Hickory	<i>Acacia implexa</i>	Tube stock	
Maidens Wattle	<i>Acacia maidenii</i>	Tube stock	
Black Wattle	<i>Acacia mearnsii</i>	Tube stock	
Brush Kurrajong	<i>Androcalva fraseri</i>	Tube stock	
Pink Tips	<i>Callistemon salignus</i>	Tube stock	
River She-Oak	<i>Casuarina cunninghamiana</i>	Tube stock	
Swamp She-Oak	<i>Casuarina glauca</i>	Tube stock	
Cabbage Gum	<i>Eucalyptus amplifolia</i>	Tube stock	

Common Name	Scientific Name	Planting Method	Comments
Coast White Box	<i>Eucalyptus bosistoana</i>	Tube stock	
Forest Red Gum	<i>Eucalyptus tereticornis</i>	Tube stock	
White Top Box	<i>Eucalyptus quadrangulata</i>	Tube stock	
Tick Bush	<i>Kunzea ambigua</i>	Tube stock	
Red Cedar	<i>Toona ciliata</i>	Tube stock	
Poison Peach	<i>Trema tomentosa</i>	Tube stock	
Mat Rush	<i>Lomandra longifolia</i>	Tube stock	
Flax Lily	<i>Dianella caerulea</i>	Tube stock	
Native Ecosystem Domain			
Maidens Wattle	<i>Acacia maidenii</i>	Tube stock	Local presence
Black Wattle	<i>Acacia mearnsii</i>	Tube stock	Local presence
Lilly Pilly	<i>Acmena smithii</i>	Tube stock	Local presence
Native Quince	<i>Alectryon subcinereus</i>	Tube stock	PCT1300
Red Ash	<i>Alphitonia excelsa</i>	Tube stock	PCT1300
Brown Kurrajong	<i>Androcalva fraseri</i>	Tube stock	Local presence
Brush Bloodwood	<i>Baloghia inophylla</i>	Tube stock	PCT1300
Illawarra Flame Tree	<i>Brachychiton acerifolius</i>	Tube stock	PCT1300
Coffee Bush	<i>Breynia oblongifolia</i>	Tube stock	PCT720
Carex	<i>Carex appressa</i>	Tube stock	Local presence
Drooping Carex	<i>Carex longebrachiata</i>	Tube stock	Local presence
Hairy Clerodendron	<i>Clerodendrum tomentosa</i>	Tube stock	Local presence
Black Plum	<i>Diospyros australis</i>	Tube stock	PCT1300
Native Tamarind	<i>Diploglottis australis</i>	Tube stock	PCT1300
Hop Bush	<i>Dodonaea viscosa var angustifolia</i>	Tube stock	Local presence
Koda	<i>Ehretia accuminata</i>	Tube stock	PCT1300
Saloop	<i>Einadia hastata</i>	Tube stock	PCT720
White Top Box	<i>Eucalyptus quadrangulata</i>	Tube stock	Local presence
Forest Red Gum	<i>Eucalyptus tereticornis</i>	Tube stock	PCT720
Sandpaper Fig	<i>Ficus coronata</i>	Tube stock	PCT1300
Moreton Bay Fig	<i>Ficus macrophylla</i>	Tube stock	PCT1300
Small Leaf Fig	<i>Ficus obliqua</i>	Tube stock	PCT1300
Port Jackson Fig	<i>Ficus rubiginosa</i>	Tube stock	PCT1300
Deciduous Fig	<i>Ficus superba</i>	Tube stock	PCT1300
Cheese Tree	<i>Glochidion ferdinandi</i>	Tube stock	Local presence
Guioa	<i>Guioa semiglauca</i>	Tube stock	PCT1300
Native Hibiscus	<i>Hibiscus heterophyllus</i>	Tube stock	PCT1300
Bleeding Heart	<i>Homolanthus populifolius</i>	Tube stock	Local presence
Indigofera	<i>Indigofera australis</i>	Tube stock	PCT720
Common Rush	<i>Juncus usitatus</i>	Tube stock	Local presence
Bracelet Honey-myrtle	<i>Melaleuca armillaris</i>	Tube stock	PCT720
White Cedar	<i>Melia azaderach var. australasica</i>	Tube stock	Local presence

Common Name	Scientific Name	Planting Method	Comments
Snow Wood	<i>Parachidendron pruinosum</i>	Tube stock	Local presence
Brown Beech	<i>Pennantia cunninghamiana</i>	Tube stock	PCT1300
Hairy Pittosporum	<i>Pittosporum revolutum</i>	Tube stock	Local presence
Tussock Grass	<i>Poa labillardieri</i>	Tube stock	PCT720
Whalebone Tree	<i>Streblus brunonianus</i>	Tube stock	PCT1300
Red Cedar	<i>Toona ciliata</i>	Tube stock	PCT1300
Illawarra Zieria	<i>Zieria granulata</i>	Tube stock	PCT720
Agricultural – Grazing Domain			
Victorian ryegrass	<i>Lolium perenne</i> var. Victorian	Mechanical Seeding @ 3 kg/ha	
Australian Phalaris	<i>Phalaris aquatica</i> var. Australian	Mechanical Seeding @ 3 kg/ha	
Holdfast GT Phalaris	<i>Phalaris aquatica</i> var. Holdfast GT	Mechanical Seeding @ 3 kg/ha	
Uplands Spanish cocksfoot	<i>Dactylis glomerata</i> var. Uplands	Mechanical Seeding @ 2 kg/ha	
Riverina sub clover	<i>Trifolium subterraneum</i> var. Riverina	Mechanical Seeding @ 3 kg/ha	
Goulburn sub clover	<i>Trifolium subterraneum</i> var. Goulburn	Mechanical Seeding @ 3 kg/ha	
Bindoon sub clover	<i>Trifolium subterraneum</i> var. Bindoon	Mechanical Seeding @ 3 kg/ha	
Source: Visual Screens and “Native Ecosystem” domain – Marcus Burgess “Agricultural – Grazing” domain – Roger Garnsey			

8. Incident Management, Reporting Publishing, Review and Continual Improvement

8.1 Incident and Non-compliance Identification and Management

Conditions D8 and D9 of SSD10369 require Cleary Bros to notify the Department of Planning and Environment and any other relevant government agency of incidents or non-compliances with the conditions of the consent.

For the purposes of this Plan, an incident or non-compliance is as follows.

- Incident - An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance. Material harm is defined as

“harm to the environment that:

- involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or
- results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)

Material harm does not include “harm” that is authorised under SSD10369 or any other statutory approval.

- Non-compliance - An occurrence, set of circumstances or development that is a breach of this consent.

Cleary Bros will notify the Department immediately on becoming aware of an incident, or within 7 days of becoming aware of a non-compliance. The notification will identify the location and nature of the incident or non-compliance, and the reasons for the non-compliance (where applicable).

In accordance with the Conditions of Consent, where any exceedance of the criteria or performance measures outlined within this document has occurred, Cleary Bros will:

- take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- implement reasonable remediation measures as directed by the Planning Secretary.

Cleary Bros has adopted a Trigger Action Response Plan (TARP) methodology for identifying key risks to the successful achievement of rehabilitation performance criteria (refer to Section 9.1 of the RMP).

8.2 Reporting and Publishing

In accordance with condition D15 of SSD 10369, Cleary Bros will make the Rehabilitation Strategy available on their website. The website will be updated regularly to ensure all information is up to date.

Shellharbour City Council will be provided with copies of all relinquishment reports and similar documentation, to assist future decision makers and landowners understand the limitations of the site.

An *Annual Review* must be prepared and submitted to the Department by 30 September each year addressing the matters identified in Condition D10 of SSD10369. The *Annual Review* will include the progress of rehabilitation on the site, as well as rehabilitation-related monitoring and other relevant matters for the 12-month period to the preceding 30 June, as well as measures including rehabilitation to be implemented for the following 12-month period.

The Annual Review will include information relevant to:

- Activities undertaken during the year, and activities planned to be carried out over the next year.
- A review of all monitoring results associated with this plan, including how they compare to the limits and performance criteria identified in this plan, the risk assessment in Section 5 of this Strategy, previous years monitoring results, the predictions from the EIS, and any trends observed.
- Details of compliance and any non-compliance with the conditions and the plans, and any incidents.
- Details of any complaints received, and how Cleary Bros has responded to them.
- Any discrepancies between the observed impacts of the Quarry and that predicted by the EIS.
- Any measures that will be implemented in the next year to improve the environmental outcomes of the Quarry.

The Annual Review will be uploaded to the Planning Portal or otherwise submitted to the Planning Secretary in line with the current submission process.

8.3 Plan Review

In accordance with Condition B71(n) This Rehabilitation Strategy will be reviewed and updated every five years in conjunction with the following.

- The final landform feasibility assessment required under Condition B77.
- The Rehabilitation Management Plan review required under Condition b79(i).

Further, in accordance with Conditions D6 of SSD 10369, this Management Plan will be reviewed and, if required, revised within 3 months of:

- the submission of an incident report under Condition D8 or D9;
- the submission of an Annual Review under Condition D10;
- the submission of an Independent Environmental Audit under Condition D11;
- the approval of any modification of the conditions of this consent (unless the conditions require otherwise); or
- notification of a change in development phase under condition A14.

This review will include the adequacy of strategies, plans and programs as required under SSD 10369.

8.4 Independent Environmental Audit

In accordance with Condition D11 of SSD 10369 and Condition 25 of 2020-8871, Cleary Bros will engage a third party to undertake an independent environmental audit of the conditions of these approvals and the implementation of the Rehabilitation Strategy. The first audit will be undertaken within 12 months of commencement of quarrying activities under SSD 10369, and will be undertaken every three years thereafter. The Independent environmental audit will be undertaken as per the process described in the Environmental Management Strategy.

In accordance with D12 of SSD 10369, Cleary Bros will review each Independent Environmental Audit and submit a response to the Planning Secretary and any other relevant agencies. The response will include a timetable for the implementation of the recommendations of the Independent Environmental Audit. The Independent Audit Report and Response will be made available on the Cleary Bros' website within 60 days following submission to the Planning Secretary.

Appendix 1 – Document Preparation and Contributors

Approved Expert	Section of Document	Description	Review and comments incorporated date/version
Mr Mitchell Bland	All	Supervision of preparation and peer review of entire document, in particular to ensure consistency with the approved Project and commitments made during the application for SSD 10369	31/01/2024 – Version 1 r2
Ms Grace Scullett-Dean	All	Assistance with preparation of all sections	31/01/2024 – Version 1 r2
Mr Jack Flanagan	4, 5, 6 and 7	Preparation and/or supervision of Sections 4 and 5 and peer review of Sections 6 and 7	22/01/2024 – Version 1 r2
Mr David Ronchi	6.3 and 6.4	Review and confirmation of final landform design criteria and final landform optimisation	05/03/2024 – Version 1 r3
Mr Marcus Burgess	5.3, 6.4 and 7	Review of relevant components of the Risk Assessment Review of Section 6.4 Review of Section 7 and provision of selected criteria presented in Section 7.5	02/02/2024 – Version 1 r2
Mr Roger Garnsey	5.3, 6.4 and 7	Review of relevant components of the Risk Assessment Review of Section 6.4 Review of Section 7 and provision of selected criteria presented in Section 7.5	23/01/2024 – Version 1 r2
Mr Bill Johnston	6.4	Review final landform optimisation	23/01/2024 – Version 1 r2
Mr Paul Ryall	6.4	Review final landform optimisation	19/01/2024 – Version 1 r2
Mr Andrew Conacher	7	Review of heritage aspects of Section 7 and suggestions for additional matters not originally considered	05/03/2024 – Version 1 r3
Dr Mudassar Arsalan	7	Review and confirmation of visible sections of approved Extraction Area	23/01/2024 – Version 1 r2