

Albion Park Quarry

Rehabilitation Management Plan

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.

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Document Control

Version	Date	Reason	Reviewed	Approved
V1.1	2/2/2023	Initial draft for Cleary Bros review	MH	
V1.2	7/2/2023	Preliminary draft for stakeholder consultation	MH	
V1.3	13/3/2024	Submission for approval following stakeholder consultation	MH	
V1.4	20/3/2024	Updated following comments from DPE	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 an 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 on Cleary Bros website (www.clearybros.com.au/albion-park/).

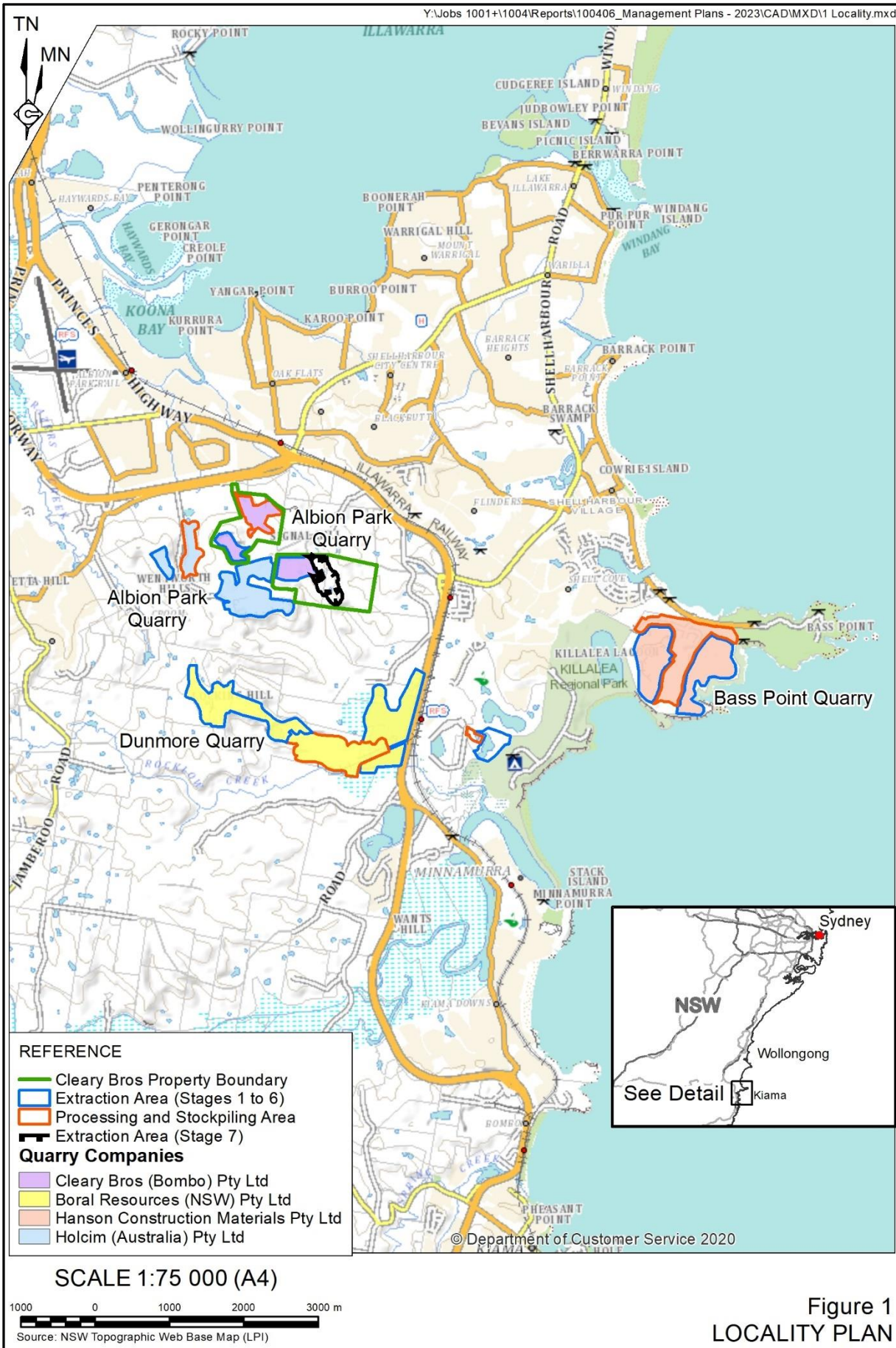
This *Rehabilitation Management Plan* (the Plan) describes the following, where relevant.

- Consultation undertaken during preparation of the Plan.
- Relevant legal and other statutory requirements and commitments that apply to the Quarry.
- A description of the activities approved under SSD 10369.
- Rehabilitation objectives, completion criteria and performance indicators.
- Key aspects of the rehabilitation scheduling and rehabilitation methodologies.
- Rehabilitation quality assurance process.
- Rehabilitation monitoring program, research, and trials.
- An overview of reactive and adaptive management measures.
- The procedures to review and update the Plan.

This document provides a detailed plan for progressive rehabilitation of the Quarry and will ensure a sustainable post-mining land use is achieved. The *Rehabilitation Strategy* (RS) for the Quarry provides a strategic overview of Quarry rehabilitation.

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 until this Plan has been approved by the Planning Secretary.



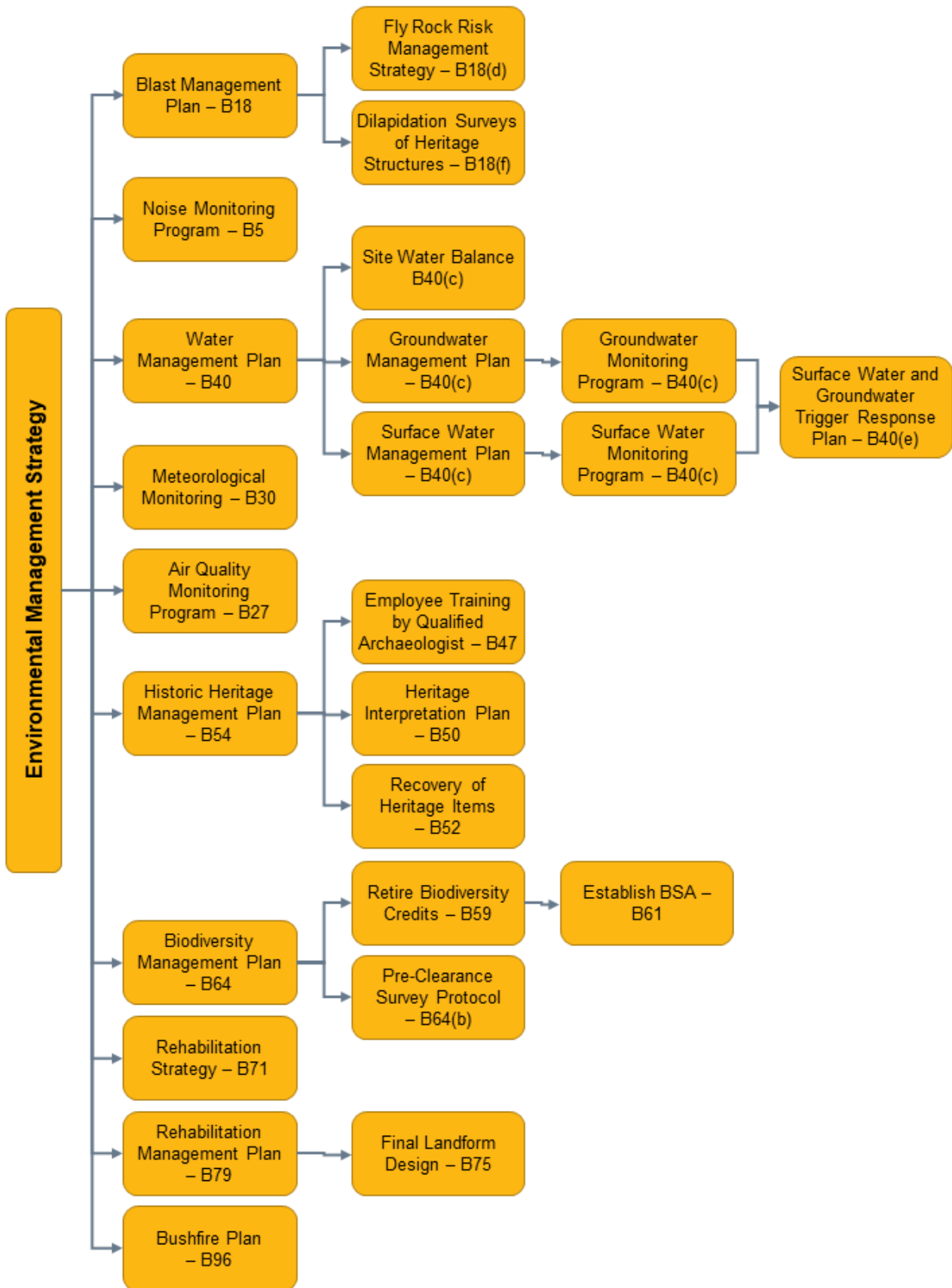


Figure 2 – Key Environmental Management Documents

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 Management Plan

Stakeholder	Date	Comments	Where Addressed in this Plan
DPE	9/2/24	DPE advised that they would review the plan once finalised and submitted via the Planning Portal.	N/A
	18/3/24	Add information into Rehab MP to suffice condition A10. Along with how the material will be: - used onsite (ag and/or native veg) - stored onsite prior to being spread - timeframe of material being delivered to being used on rehab areas.	Condition A10 added to Table 2. Refer to Sections 2.2, 5.2.2, and 5.2.4.
		Table 4 further information required on Heritage other Appendix 5 items - only the dry stone walls indicated.	Reference to Appendix 5 of SSD10369 added to Table 4.
		Incorrect conditions referenced in first sentence of Section 4.1.	Sentence corrected.
Council	12/03/24	Refer to Table 1 of the Rehabilitation Strategy	N/A

1.3 Document Preparation

Preparation of this document has been coordinated by Mr Mitchell Bland (BSc(hons), MEconGeol, LLB (hons)) Principal and Managing Director of R. W. Corkery & Co. Pty Ltd (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 – 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 – 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), Senior Spatial Analyst with RWC – 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 B79 of SSD 10369 and in consideration of the principles of the *Strategic Framework for Mine Closure* (AMZMEC and MCA, 2000).

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, sections of this Plan have been developed in accordance with the Resource Regulator’s *Form and Way – Rehabilitation Management Plan for Large Mines* (NSW Resources Regulator, 2021) guideline document.

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	Plan Section																
Quarry Product Extraction and Transport																		
A10	A maximum of 100,000 tonnes of VENM/ENM may be imported to the approved disturbance area for rehabilitation activities in any financial year.	RMP 2.2, 5.2.2, 5.2.4																
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> <tr> <td><i>Final void drainage pipeline and water discharge</i></td> <td> <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 </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. 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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>	RMP 5.1 and RS 6.1				
Detailed feasibility study and final landform design						
B75	<p>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:</p> <p>(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;</p> <p>(b) include a conceptual final landform study that includes but is not limited to:</p> <p>(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;</p> <p>(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</p> <p>(iii) an assessment of how the rehabilitation of the project can be proactively integrated with the rehabilitation strategies of neighbouring quarries;</p> <p>(iv) establishing in perpetuity vehicle access to the final landform that facilitates the proposed final land use;</p> <p>(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:</p> <p>(i) a geotechnical feasibility assessment that:</p> <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; 	Not yet applicable				

Cond No.	Requirement	Plan Section
	(ii) a detailed engineering design for the proposed pipeline and any associated infrastructure, including consideration of the lifespan of construction materials;	
	(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
	(l) 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	Plan Section
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
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

2.2 Protection of the Environment Operations Act 1997

Rehabilitation activities will involve placing imported material within the Quarry. Section 143 of the *Protection of the Environment Operations Act 1997* (PoEO Act) states that placement of waste on land without lawful authority is guilty of an offence. However, the PoEO Act provides exemptions for this offence, where the waste is applied in line with a resource recovery exemption.

The material that would be used for landform establishment during Quarry rehabilitation would be classified as one of the following.

- Virgin Excavated Natural Material (VENM)

VENM is defined under the PoEO Act as natural material (such as clay, gravel, sand, soil or rock fines):

- that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- that does not contain any sulfidic ores or soils or any other waste

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.'

- Excavated natural material (ENM).

ENM is defined under *The Excavated Natural Material Order 2014* as naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- been excavated from the ground, and
- contains at least 98% (by weight) natural material, and
- does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material:

- located in a hotspot;
- that has been processed; or
- that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.

Section 5.2.1 described the measures that would be implemented to ensure that all material imported for rehabilitation and landform establishment is classified as above.

2.3 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.	RS 6.2
2. Effective consultation is an inclusive process which encompasses all parties and should occur throughout the life of the mine.	RS 6.2
3. A targeted communication strategy should reflect the needs of the stakeholder groups and interested parties.	RS 6.2
4. Adequate resources should be allocated to ensure the effectiveness of the consultation process.	RS 6.2
5. Wherever practical, work with communities to manage the potential impacts of mine closure	RS 6.2
Planning	
Objective To ensure the process of closure occurs in an orderly, cost-effective and timely manner	
Principles	
1. Mine closure should be integral to the whole of mine life plan.	RS 6
2. A risk-based approach to planning should reduce both cost and uncertainty.	RS 5
3. Closure plans should be developed to reflect the status of the project or operation.	RS 6
4. Closure planning is required to ensure that closure is technically, economically and socially feasible	RS 6
5. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances.	RS 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.	RMP 6
Principles	
1. The accountability for resourcing and implementing the closure plan should be clearly identified.	RMP 6

Principle	Where addressed
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.	RS 6
4. A closure business plan provides the basis for implementing the Closure Plan.	RS 6
5. The implementation of the Closure Plan should reflect the status of the operation	RMP 6
Standards	
<p>Objective</p> <p>To establish a set of indicators which will demonstrate the successful completion of the closure process.</p>	
Principles	
1. Legislation should provide a broad regulatory framework for the closure process.	RMP 2
2. It is in the interest of all stakeholders to develop standards that are both acceptable and achievable.	RMP 2
3. Completion criteria are specific to the mine being closed, and should reflect its unique set of environmental, social and economic circumstances.	RMP 4
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	
<p>Objective</p> <p>To reach a point where the company has met agreed completion criteria to the satisfaction of the Responsible Authority.</p>	
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

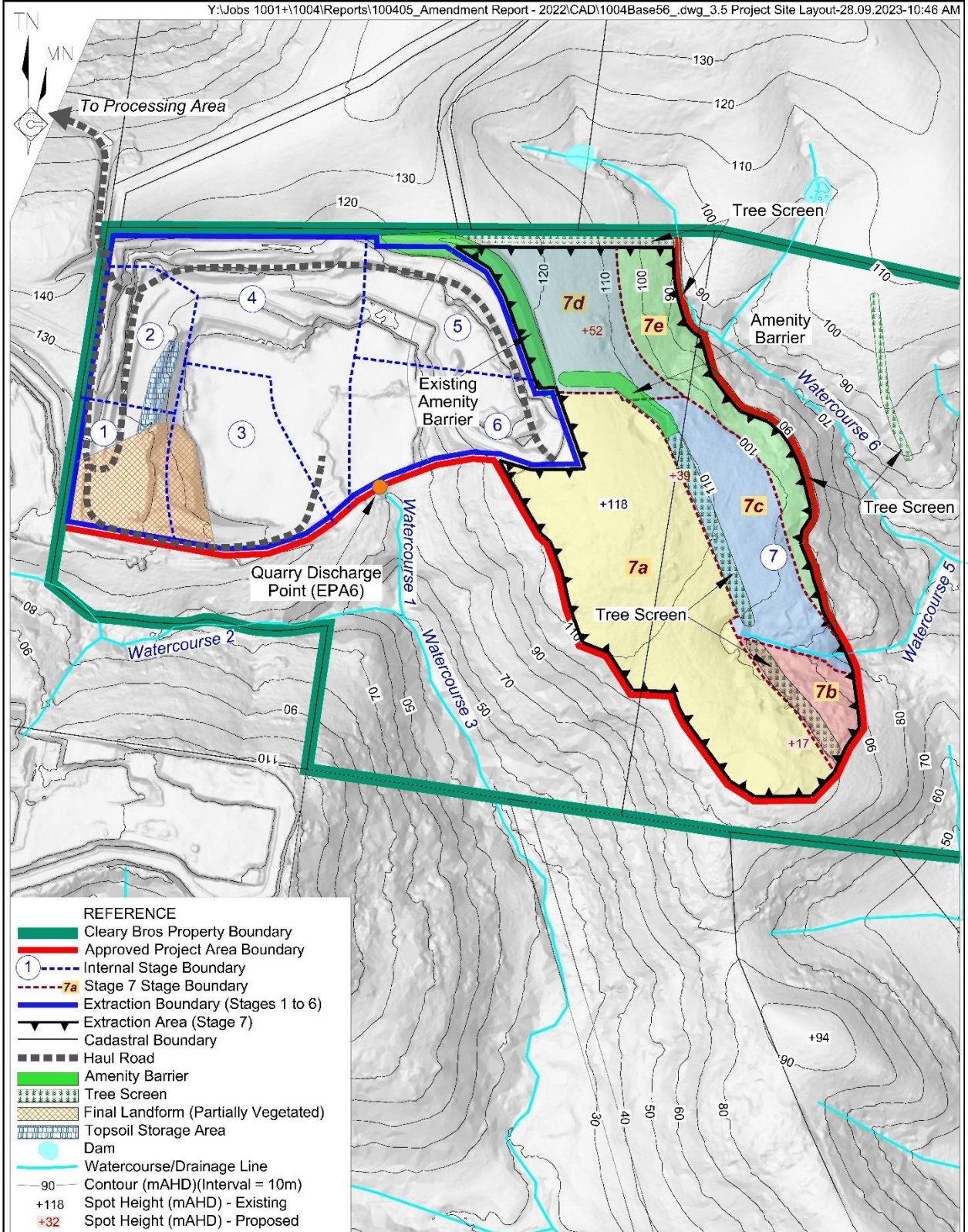
The approved activities include the following (**Figure 3**).

- 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.
- Importation of VENM/ENM to the Quarry for rehabilitation activities at a maximum rate of 100,000tpa.

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 (visible) or 14m high (non-visible) faces, and 10m wide (visible) or 5m (non-visible) benches with face angles of between 75° (eastern wall) and 90° (all other walls).
- 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 water storage and 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 (see also Section 5.2.3).



Note: Some boundaries are coincident and are offset for clarity

SCALE 1:7 500 (A4)

100 0 100 200 300 400m

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

Figure 3
APPROVED QUARRY
SITE LAYOUT

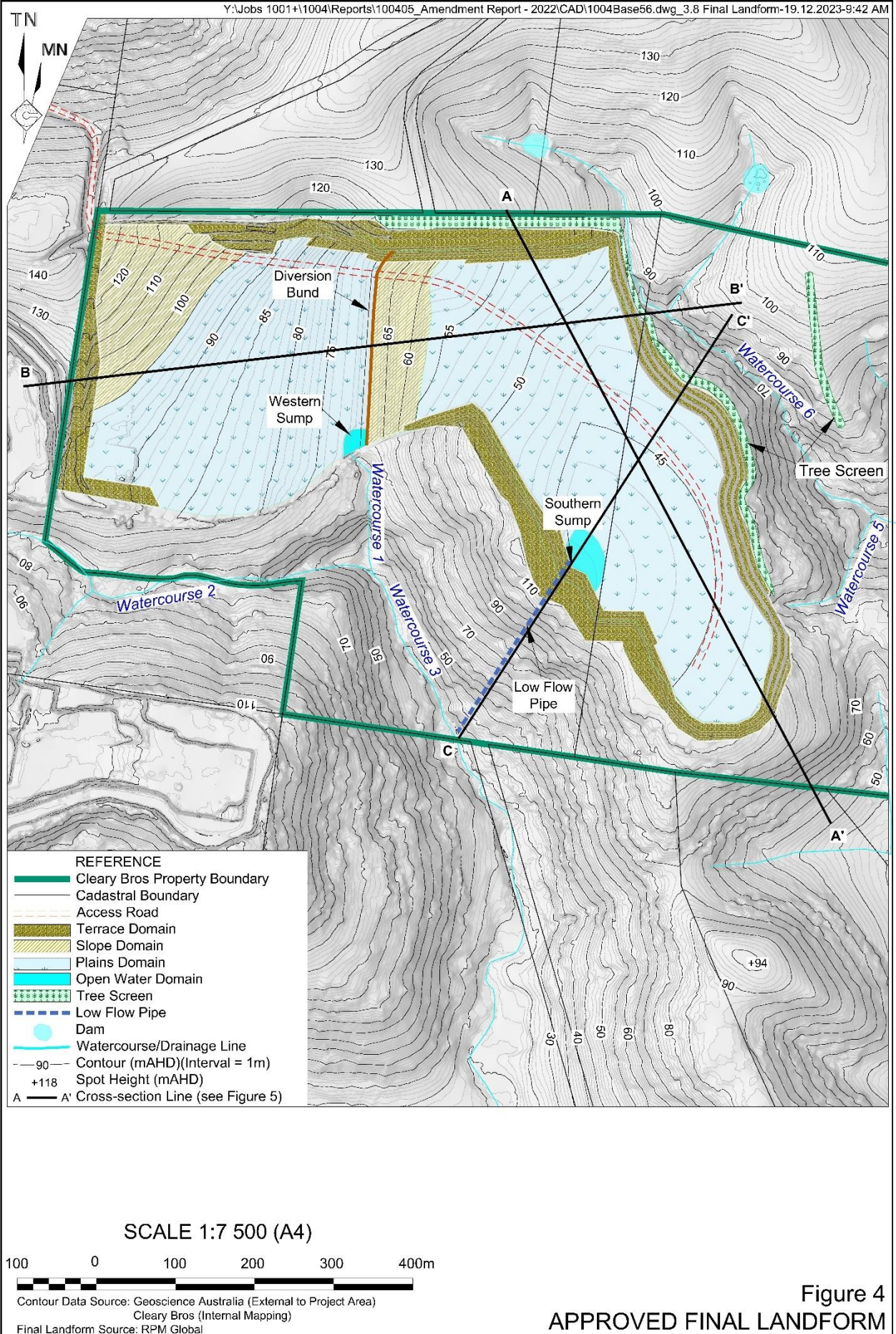


Figure 4
APPROVED FINAL LANDFORM

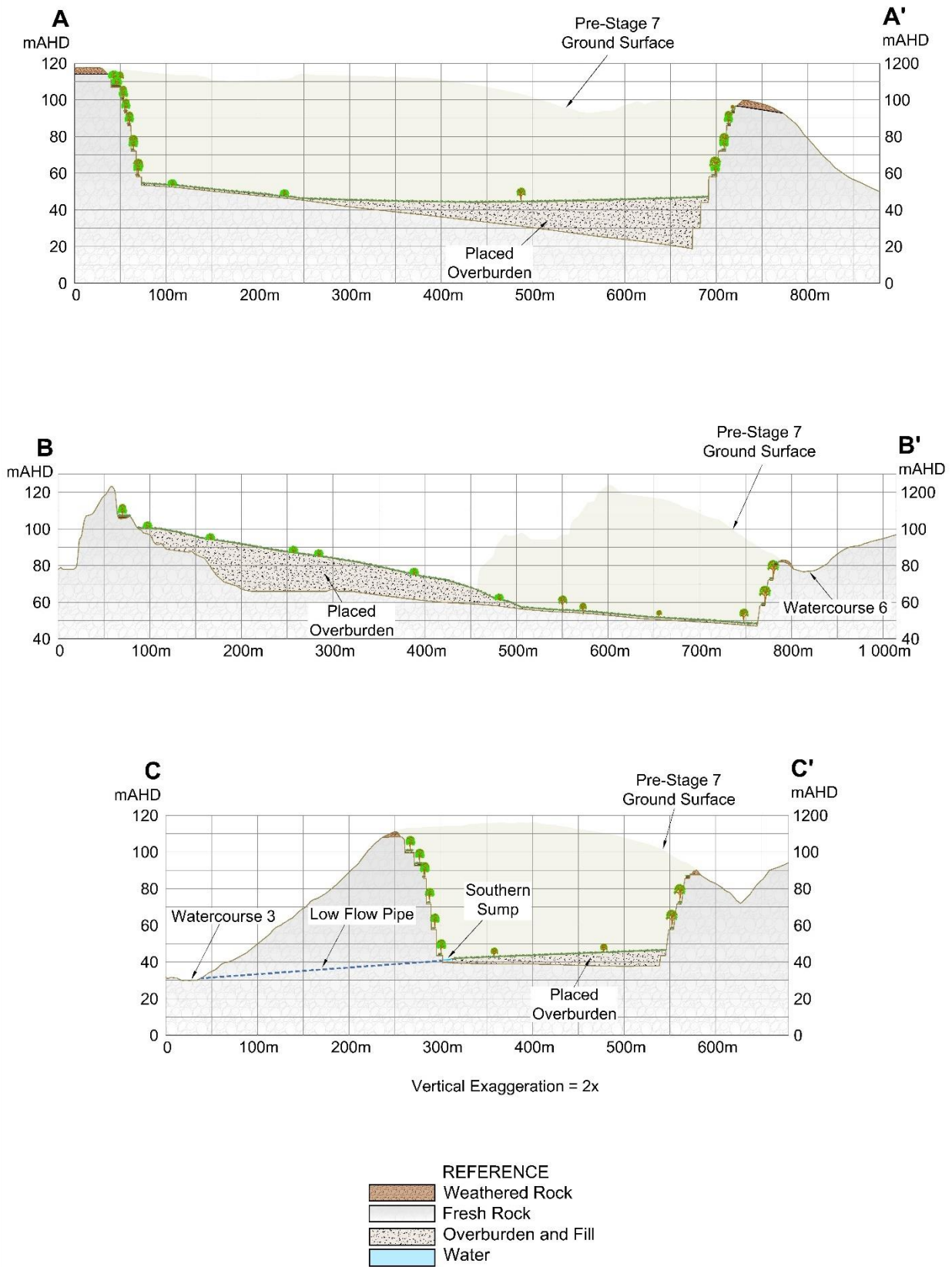


Figure 5
FINAL LANDFORM CROSS-SECTIONS

Source: RPM Global

Approved indicative final land uses would include the following.

- Terrace Domain – Native ecosystem.
- 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. Quarry closure planning and refinement is discussed further in Section 6 of the *Rehabilitation Strategy*.

3.3 Approved Visual Amenity Mitigation Measures

Figure 6 presents the existing and approved visual amenity mitigation measures for the Quarry, including the following. Section 5 describes in detail the implementation of each of these measures.

- An existing and revegetated amenity bund to the north and east of Stage 1 to 6. The eastern section of the amenity bund would be removed during Stage 7d.
- An approved 5m high amenity bund to the north of Stage 7a to be established and revegetated during Stage 7a and removed during Stage 7d.
- Approved vegetation screens to the east of Stage 7a, to be established during Stage 7a and progressively removed during Stage 7b and 7c.
- Approved tree screens to the north and east of the Stage 7 Extraction Area, as well as along a ridgeline to the east of Watercourse 6.
- Approved 10m wide terminal benches with 7m high faces on the visible sections of the western and northern terminal highwalls (**Figure 6**). The 10m wide terminal benches will be progressively established during Stage 7a and 7d.

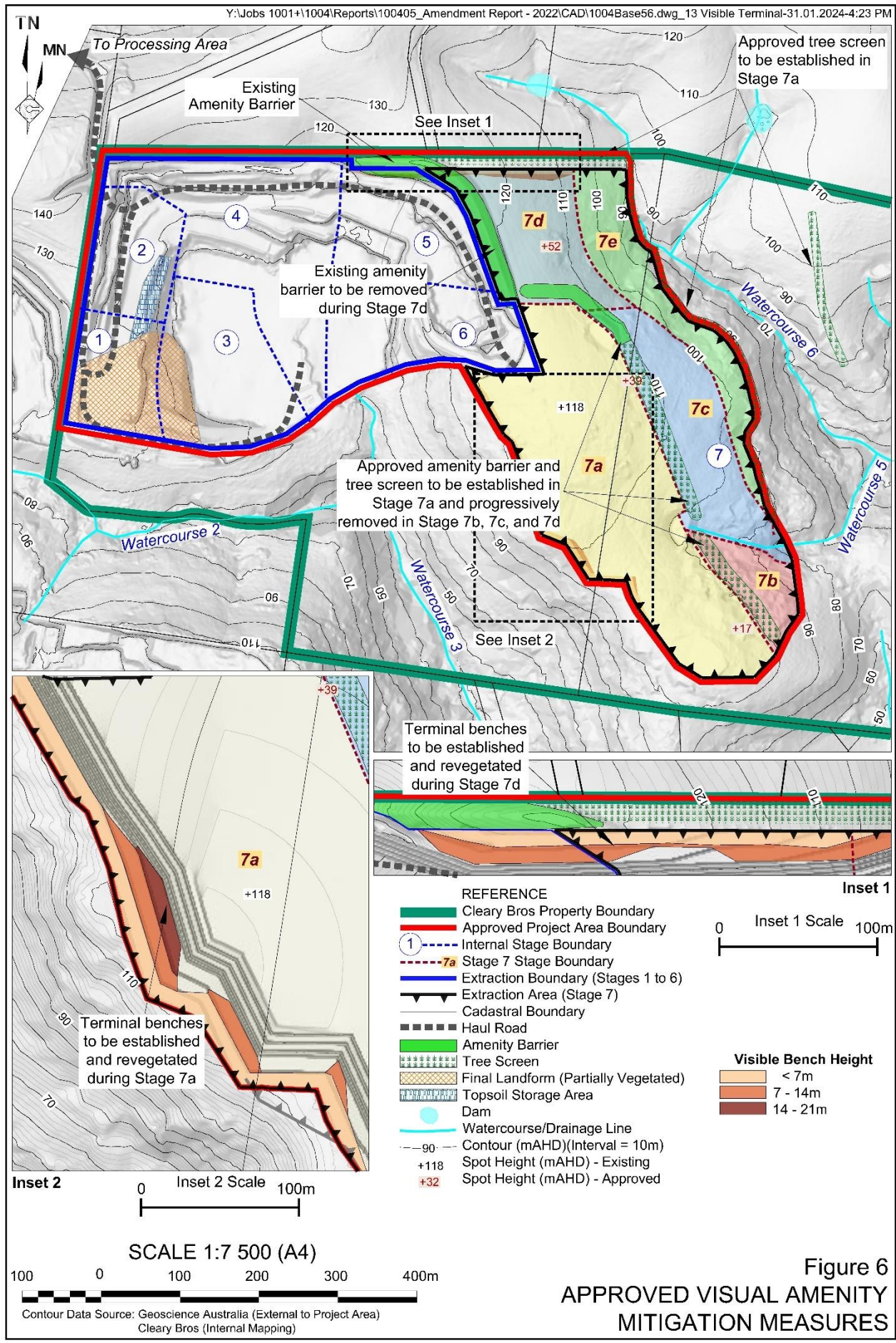


Figure 6
APPROVED VISUAL AMENITY
MITIGATION MEASURES



4. Rehabilitation Objectives, Completion Criteria and Performance Indicators

4.1 Rehabilitation Domains

Conditions B79(d and f) of SSD 10369 require that the *Rehabilitation Management Plan* include:

- detailed completion criteria for each rehabilitation objective included in Table 9 of SSD 10369, and any other rehabilitation objective identified within the *Rehabilitation Strategy*; and
- detailed performance indicators to be implemented to ensure compliance with all completion criteria and rehabilitation objectives.

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 life of Quarry Active Quarry and Final Land Use Domains for the Quarry are presented on **Figures 7** and **8** and are defined as follows. Section 5.1 presents the rehabilitation domains for Years 1 to 5 of the Quarry.

- Active Quarry Domain – is 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, the Active Quarry Domains include the following (**Figure 7**).
 - 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 and Southern Sumps which will be utilised for sediment control purposes, noting that the Southern Sump will vary throughout the life of the Quarry.
 - Active Extraction Area - noting that this will increase in area throughout the life of the Quarry.
 - Active Rehabilitation Area – comprising the approved vegetation screens and areas of progressive rehabilitation established throughout the life of the Quarry.
- Final Land Use Domain – is a land management unit with a specified final land use. In the case of the Quarry, the Final Land Use Domains include the following (**Figure 8**).
 - Native Ecosystem – comprising those sections of the final landform that would be returned to native vegetation.
 - Agricultural – Grazing – comprising those sections of the final landform that would be returned to agricultural use.
 - Water Management Area – comprising the final footprints of the Western and Southern Sumps.
 - Infrastructure Area – comprising that section of the final landform that would be retained as an access road.

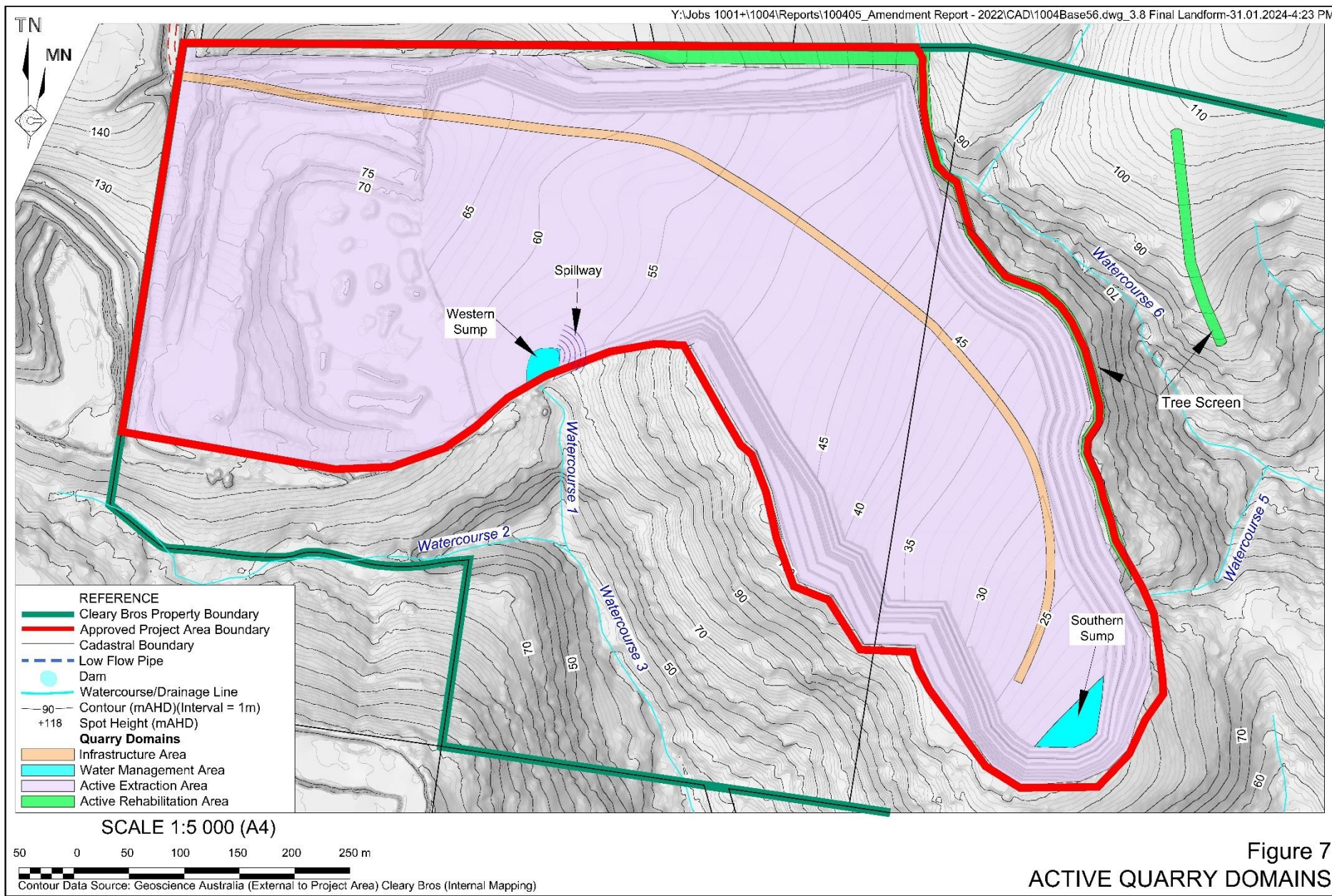


Figure 7
ACTIVE QUARRY DOMAINS



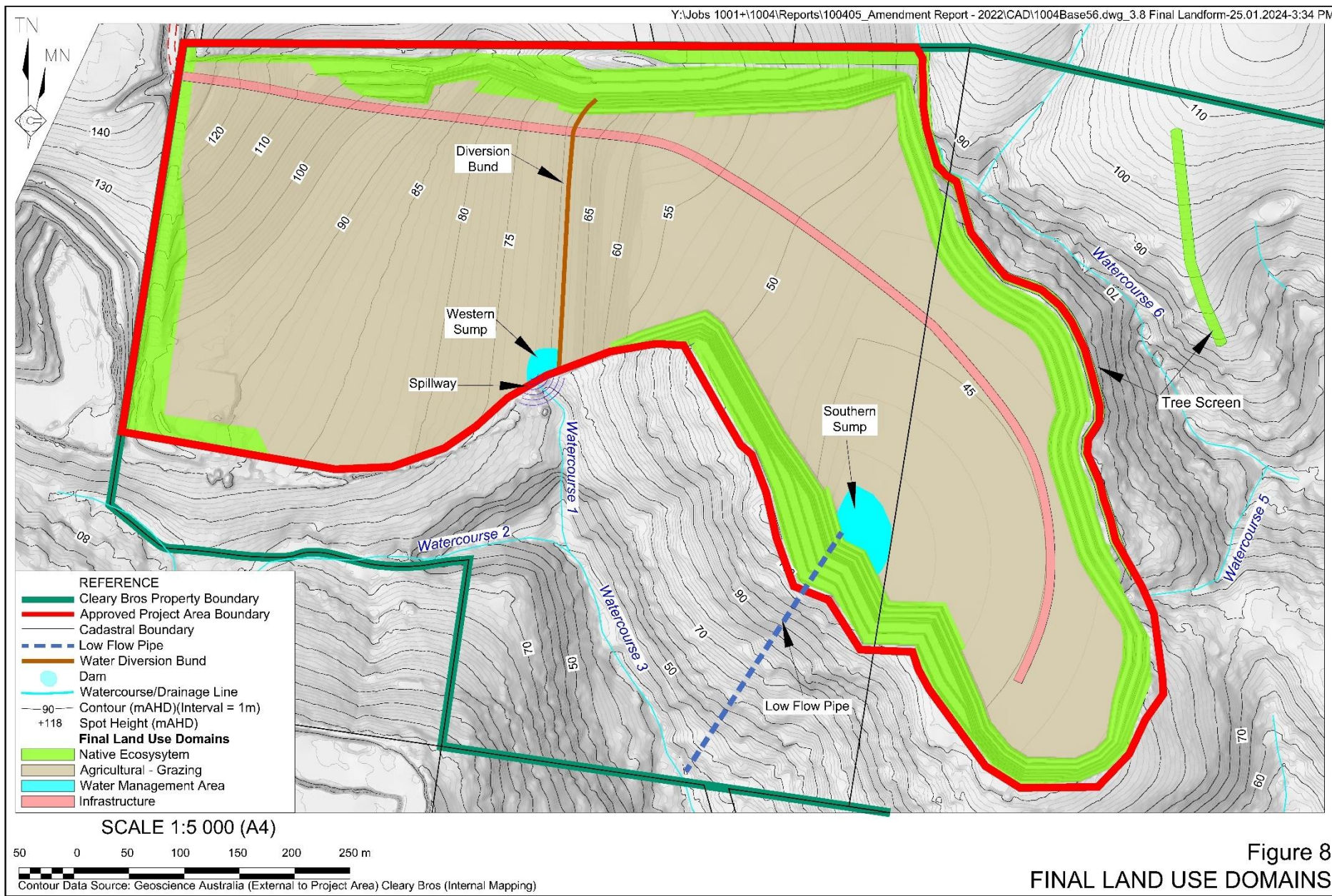


Figure 8
FINAL LAND USE DOMAINS

4.2 Rehabilitation Objectives, Completion Criteria and Performance Indicators

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, completion criteria and validation methods for the Quarry developed in consideration of the following.

- The rehabilitation objectives identified in Table 9 of SSD10369.
- The principles of the *Strategic Framework for Mine Closure*.
- Quarry-specific rehabilitation risks presented in Section 5 of the *Rehabilitation Strategy*.
- 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.

Table 4 – Rehabilitation Objectives, Performance Indicators and Completion Criteria

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
Infrastructure Area	Infrastructure Area	All infrastructure and services not required for the final land use are removed.	Presence of infrastructure	All infrastructure removed unless specified to be retained in the RMP.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
			Presence of services	All services disconnected unless required for the final land use.	
			Road width	Roads to be retained are no wider than 5m, excluding roadside drainage.	
			Road condition	Roads to be retained are graded and are accessible for 4WD vehicles in all weather.	
		All infrastructure that is to remain is compatible with the intended post-quarrying land use(s), is safe and does not pose any hazard to the community.	Nature of infrastructure	Infrastructure compatible with, necessary for or ancillary to the approved final land use. Scale of infrastructure is no larger than that reasonably required for the final land use.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
		All infrastructure to be retained is exempt development or benefits from the relevant approvals (e.g. development consent and/or agreement).	Infrastructure is ancillary to an approved final land use and further approvals not required. OR	Infrastructure necessary for or ancillary to the approved final land use.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning. Confirmation of exempt/ancillary status from Council or suitably qualified person.
Approvals and/or landholder agreements held for retained infrastructure.	All Infrastructure to be retained is permitted to be retained.		Single occurrence relinquishment inspection and report, including photographs, following decommissioning. Development consent and/or landholder agreement.		

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		Dry stone walls reconstructed along norther property boundary, and visible from the public road corridor	Presence of dry stone wall	Dry stone wall constructed on or adjacent to property boundary and visible from the public domain.	Single occurrence relinquishment inspection and report, including photographs.
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.	Visual evidence of erosion and geotechnical stability of water storages	No active erosion is observed. Geotechnical assessment determines that water storages retained/constructed are not likely to actively erode or 'slip' to an extent requiring further earthworks.	Visual inspections undertaken on a quarterly basis or following significant rainfall events (i.e. ≥ 90 mm within 24 hours) until site relinquishment. Single occurrence assessment and report prepared by a suitably qualified person following establishment of final landform, with follow up assessment to be undertaken in the event that further earthworks are required.
			Performance of spillway from Western Sump.	Design report prepared by a suitably qualified person. Spillway constructed to safely pass a 1% ARI critical duration storm event. No active erosion is observed.	Single occurrence assessment and report prepared by a suitably qualified person following establishment of final landform. Visual inspections undertaken on a quarterly basis and following significant rainfall events (i.e. ≥ 90 mm within 24 hours) until site relinquishment.
			Performance of Low Flow Pipe (stability, suitability, discharge rate, ability to drain water from the southern sump water storage).	Design report prepared by a suitably qualified person taking into consideration the requirements of condition B75 of SSD 10369, as well as hydraulic, geotechnical and geomorphological performance requirements of the low flow pipe. Low Flow Pipe constructed and performing as designed (i.e. no blockages or sediment buildup).	Geotechnical assessment and report prepared by a suitably qualified person following establishment of the low-flow pipe confirming consistency with design report. Visual inspections undertaken on a quarterly basis and following significant rainfall events (i.e. ≥ 90 mm within 24 hours) until site relinquishment. Visual inspections of Low Flow Pipe inlet for blockages and sediment accretion undertaken on a quarterly basis and following significant rainfall events (i.e. ≥ 90 mm within 24 hours) until site relinquishment.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
					Visual inspections of Low Flow Pipe outlet for erosion of the natural watercourse undertaken on a quarterly basis and following significant rainfall events (i.e. $\geq 90\text{mm}$ within 24 hours) until site relinquishment. Inspection of the low flow pipe, including downhole camera inspection, and report prepared by a suitably qualified person within two years of construction and again prior to relinquishment confirms hydraulic, geotechnical and geomorphological performance of the low flow pipe is as per the design report and industry practice.
		Retained water management structures are non-polluting and suitable for use as part of the final land use.	Quality of water discharged to natural drainage.	Water quality in retained water storages consistent with water quality in receiving environment and/or licenced discharge criteria.	Water quality testing of sumps and receiving environment undertaken on a quarterly basis and following significant rainfall events (i.e. $\geq 90\text{mm}$ within 24 hours) until site relinquishment or until monitoring results are consistent with the receiving environment and / or are within the licenced discharge criteria for four consecutive quarters.
		Water retained on the site is appropriately licensed and fit for the intended post-quarrying land use/s.	Water approval / licence or advice from relevant government agency.	Water take is fully licenced or exempt.	Confirmation from relevant government agency that water approvals / licences have been granted or are not required.
		Water discharged from site is suitable for the receiving waters and fit for aquatic ecology and riparian vegetation.	Quality of water discharged to natural drainage.	Water quality in retained water storages consistent with water quality in receiving environment and/or licenced discharge criteria.	Water quality testing of sumps and receiving environment undertaken on a quarterly basis and following significant rainfall events (i.e. $\geq 90\text{mm}$ within 24 hours) until site relinquishment or until monitoring results are consistent with the receiving environment and / or are within the licenced discharge criteria for four consecutive quarters.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		Groundwater quality is consistent with pre-disturbance water quality.	Groundwater quality.	Analysis of water samples from groundwater bores demonstrate water quality parameter levels within trigger values (refer to <i>Water Management Plan</i>).	Water quality testing undertaken quarterly for a minimum of one year following cessation of landform profiling activities or until monitoring results are within the relevant trigger levels for four consecutive quarters.
Agricultural - Grazing	Infrastructure Area, Active Extraction Area	All infrastructure and services not required for the final land use are removed.	Presence of infrastructure.	All infrastructure removed unless specified to be retained.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
			Presence of services.	All services disconnected unless required for the final land use.	
		Areas are non-polluting.	Presence of contamination.	No contamination present on site.	Single occurrence preliminary site investigation to assess land contamination, with follow up validation testing to be undertaken if required.
				No contaminated material imported and applied to land.	Imported VENM/ENM is assessed in line with the Resource Recovery Order prior to receipt on site and any material that does not meet these requirements is rejected. Records of all material received and where it was placed maintained and available for inspection.
			Presence of waste.	All rubbish and waste materials are removed from site or disposed of in areas designated within this Plan.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
		Final landforms are safe, stable and non-polluting and do not pose any hazards or constraints for the final land use of agriculture (grazing).	Visual evidence of erosion or landform instability.	Sown pasture species well established to withstand grazing, completed a flowering/seeding event and self-sustaining. No evidence of active erosion or other landform instability (e.g. gully) that would require moderate or significant maintenance is observed.	Visual inspections undertaken on a quarterly basis until site relinquishment.
					Visual inspections undertaken following significant rainfall events (i.e. ≥90mm within 24 hours).
Vegetation composition of pasture areas is consistent with target	Land use capability.	The re-established soil substrate can support the target pasture vegetation community	Soil testing and analysis undertaken by a suitably qualified person prior to seeding & 12 months after establishment.		

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		vegetation communities (see Table 8). Grassland areas are support sustainable agricultural activities.		and intended stocking rate on a sustained basis.	Pasture grass surface coverage visually assessed on a quarterly basis for at least two years following the introduction of livestock. Agricultural production monitored annually until relinquishment.
			Presence of priority weed species (e.g. high threat, noxious, invasive, or weed of national significance) or excessive weed abundance, or presence of feral species.	The rehabilitated areas are free of significant weed or feral animal issues, consistent with the surrounding areas.	Weed inspections and reports detailing observed weed occurrence (species and extent) and control measures implemented, undertaken within two years following rehabilitation and every two years until relinquishment.
		Bushfire risks to the community, environment and infrastructure have been addressed as part of rehabilitation.	Presence of bushfire controls	Appropriate bushfire hazard controls implemented, where required, on advice from the NSW Rural Fire Service.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
Native Ecosystem	Infrastructure Area, Active Extraction Area, Other	All infrastructure and services not required for the final land use are removed.	Presence of infrastructure	All infrastructure removed unless specified to be retained.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
			Presence of services	All services disconnected unless required for the final land use.	
		Areas are non-polluting.	Presence of contamination.	No contamination present on site.	Single occurrence preliminary site investigation to assess land contamination, with follow up validation testing to be undertaken if required.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
				No contaminated material imported and applied to land.	Imported VENM/ENM is assessed in line with the Resource Recovery Order prior to receipt on site and any material that does not meet these requirements is rejected. Records of all material received and where it was placed maintained and available for inspection.
			Presence of waste	All rubbish and waste materials are removed from site or disposed of in areas designated within this Plan.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
		Final landforms are safe, stable and non-polluting and do not pose any hazards or constraints for the final land use.	Visual evidence of erosion or landform instability	No evidence of significant active erosion or landform instability (e.g. mass movement) that would require moderate or significant maintenance is observed.	Final landform design reviewed and confirmed every five years by a geotechnical engineer until site relinquishment. Visual inspections undertaken on a quarterly basis until site relinquishment. Visual inspections undertaken following significant rainfall events (i.e. $\geq 90\text{mm}$ within 24 hours).
			Safety bunds and rock fall protection	Safety bunds and rock fall protection (catch berms and bunds) installed and effective	Inspections and reports, including photographs, during progressive landform establishment and following decommissioning.
			Vegetation composition of native ecosystem areas is consistent with target vegetation communities (see Table 8).	Biophysical process indices	Biophysical process indicators are equivalent to or better than those recorded for relevant analogue site types.
		Vegetation composition (species diversity and assemblages)		Vegetation composition and species assemblages are generally consistent with the target vegetation community type. Pasture species utilised in Agricultural – Grazing Domain not significantly establishing in Native Ecosystem Domain.	

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		Vegetation structure of rehabilitation is similar to that of native vegetation communities found in the local area.	Vegetation structure (cover and abundance of plant growth)	Vegetation structure (cover and abundance of plant growth) is trending towards or generally equivalent to that associated with the target vegetation community type.	
		Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustaining.	Indication of sustainable nutrient cycling	Litter cover is consistent with relevant analogue sites.	
			Plant survival and recruitment	Plant survival and recruitment are suitable for sustaining the target vegetation community type.	
			Grazing impacts (foliage cover (%) and plant mortality)	Grazing impacts within rehabilitated areas are consistent with those observed at analogue sites.	
			Resilience to drought and fire	Resilience demonstrated by the effects of drought and fire on composition, structure and other ecosystem function attributes.	
			Presence of priority weed species (e.g. high threat, invasive, or weed of national significance) or excessive weed abundance	Weed abundance within rehabilitated areas is equal to or less than that observed at analogue sites.	
		Priority weeds (e.g. Weeds of National Significance) are not significantly present within rehabilitation areas.			
		Bushfire risks to the community, environment and infrastructure have been addressed as part of rehabilitation.	Presence of bushfire controls	Appropriate bushfire hazard controls implemented, where required, on the advice from the NSW Rural Fire Service.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		Visual amenity impacts on heritage values of the Hill Complex (as identified in Appendix 5 of SSD10369) have been minimised to the greatest extent practicable.	Vegetation community structure (species assemblages, height)	Vegetation community structure is trending towards final characteristics consistent with target vegetation community types and analogue sites.	Surveys undertaken within two years following rehabilitation, with subsequent surveys undertaken every two years until target values are achieved.
			Presence of amenity bunds and tree screens	Tree screen established along the northern boundary of Stage 7 has shown consistent and continued growth of tree species to a minimum height of 10m.	Post construction/planting report, including photographs. Visual inspection, including photographs and estimates of tree height, undertaken within two years following planting, with subsequent inspections undertaken every two years until target values are achieved.
		Visual impacts when viewed from surrounding land have been minimised to the greatest extent practicable.	Vegetation community structure (species assemblages, height)	Vegetation community structure is trending towards final characteristics consistent with target vegetation community types and analogue sites.	Surveys undertaken within two years following rehabilitation, with subsequent surveys undertaken every two years until target values are achieved.
			Vegetation height and density on visible western benches achieve required criteria prior to commencement 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.	Visual inspection, including photographs, undertaken in conjunction with surveys within two years following rehabilitation, with subsequent surveys undertaken every two years until target values are achieved.
			Vegetation height and density on visible northern benches achieve required criteria prior to relinquishment	Surviving tree species – 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 shrub species – average interval between individuals along the bench no greater than 3.5m, with an average height of no less than 1m.	Visual inspection, including photographs, undertaken in conjunction with surveys within two years following rehabilitation, with subsequent surveys undertaken every two years until target values are achieved.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
All domains	All Domains	The final landform is stable for the long-term and does not pose a safety risk or a risk of environmental harm.	Geotechnical stability of final extraction area walls.	Geotechnical assessment determines that the retained extraction area walls are not likely to actively erode or 'slip' to an extent requiring substantial remedial earthworks.	Geotechnical assessment and report prepared by a geotechnical engineer every five years during the life of the Quarry and following establishment of final landform, with follow up assessment to be undertaken in the event that further works are required.
			Presence of safety bunds and fences in accessible section of the final highwall.	Safety bunds and fences with lockable gate(s) are present around accessible sections of the perimeter of the final highwall.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
			Stability of Watercourse 6 in the vicinity of Stage 7e	Sufficient offset between the outer limit of the safety bund and Watercourse 6 to prevent 1% AEP 72-hour rainfall event from entering the Extraction Area.	Modelling of cross sectional area required to pass 1% AEP 72-hour rainfall event. Detailed survey indicating that adequate cross sectional area retained.
			Presence of waste.	All rubbish and waste materials are removed from site or disposed of in areas designated within this Plan.	Single occurrence relinquishment inspection and report, including photographs, following decommissioning.
			Quality of water discharged to natural drainage.	Water quality in retained water storages consistent with water quality in receiving environment and/or licenced discharge criteria.	Water quality testing of sumps and receiving environment undertaken on a quarterly basis and following significant rainfall events (i.e. ≥ 90 mm within 24 hours) until site relinquishment or until monitoring results are consistent with the receiving environment and / or are within the licenced discharge criteria for four consecutive quarters.
		The final landform is integrated with surrounding natural and other quarry-related landforms to the greatest extent practicable.	Final landform design.	Final landform constructed to maximise integration with surrounding landforms.	Detailed Feasibility Study and Final Landform Design Report prepared within five years of commencing quarrying operations.

Final Land Use Domain	Quarrying Domain	Rehabilitation Objective	Indicator	Rehabilitation Completion Criteria	Validation Method
		Final landform drainage catchment is minimised to the greatest extent practicable and flood risks are minimised.	Size of catchment.	Final landform constructed to maximise diversion of water around the Extraction Area and passive overflows within western section of the final Quarry void to discharge via Watercourse 1. Active erosion is no greater than surrounding land.	Detailed survey prior to relinquishment Visual inspections undertaken on a quarterly basis until site relinquishment. Single occurrence geotechnical assessment and report prepared by a geotechnical engineer following establishment of final landform, with follow up assessment to be undertaken in the event that further earthworks are required. Visual inspections undertaken following significant rainfall events (i.e. ≥90mm within 24 hours).
		Maximise the potential for beneficial reuse of the Quarry and minimise the potential for adverse socio-economic effects of quarry closure.	Alternate beneficial reuse considered and allowed for in rehabilitation planning and implementation.	Quarry Closure Stakeholder Engagement Plan implemented as described in the <i>Rehabilitation Strategy</i> . Potential post-quarrying options considered in the Detailed Feasibility Study and Final Landform Design required under Condition B75 of SSD10369.	Annual reporting, including a description of Stakeholder Engagement. Detailed Feasibility Study and Final Landform Design Report prepared within five years of commencing quarrying operations.

5. Rehabilitation Implementation

5.1 Quarry Development and Rehabilitation Schedule – Years 1 to 5

The Quarry will be progressively developed over its approved life, indicatively in five substages, namely Stages 7a to 7e. Section 6.1 of the *Rehabilitation Strategy* identifies the life of Quarry development and rehabilitation schedule. **Figures 9 to 13** present the expected Quarry development and rehabilitation schedule for the initial five years of the life of the Quarry, noting that quarry planning and development may vary from to some extent from the schedule proposed.

5.2 Phases of Rehabilitation and General Methodologies

5.2.1 Introduction

The following sections outline the methodologies and controls adopted to address risks identified in the rehabilitation risk assessment (refer to Section 5 of the *Rehabilitation Strategy*), and measures to be implemented to achieve the rehabilitation completion criteria (see Section 4.2). This subsection 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. In particular, as rehabilitation will be undertaken progressively over the life of the Quarry, sections of the Quarry Site will concurrently be at different stages of rehabilitation.

5.2.2 Active Quarrying Phase

Soil Resources

Soil Units

Table 5 identifies the soil units present within the Extraction Area and their suitability for use in rehabilitation works (**Figure 14**).

Table 5 – Stage 7 Soil Units

Soil Unit	Description and Soil Conditions	Comments
1	Red and brown Ferrosols (Krasnozems) with medium to heavy clay subsoils and slow to impeded drainage.	Topsoil material (0 to 200 mm deep) generally suitable for use for rehabilitation purposes. Subsoils (below 200 mm) not suitable for rehabilitation purposes unless heavily ameliorated to break up clays.
2	Red and brown Ferrosols (Krasnozems) with light clay subsoils and moderate drainage.	Topsoil and subsoil materials (0 to 200 mm deep) generally suitable for use for rehabilitation purposes. Subsoils (below 200 mm) require minor amelioration with gypsum to break up clays.
3	Shallow brown organic loams with frequent rock outcrop.	Topsoil material is 0 to 400 mm deep and generally suitable for use for rehabilitation purposes.
4	Stockpiled material. Mixture of brown and red clay loams and light clays.	All stockpiled material assumed to be generally suitable for use for rehabilitation purposes.

Source: SEEC (2021) – Table 4

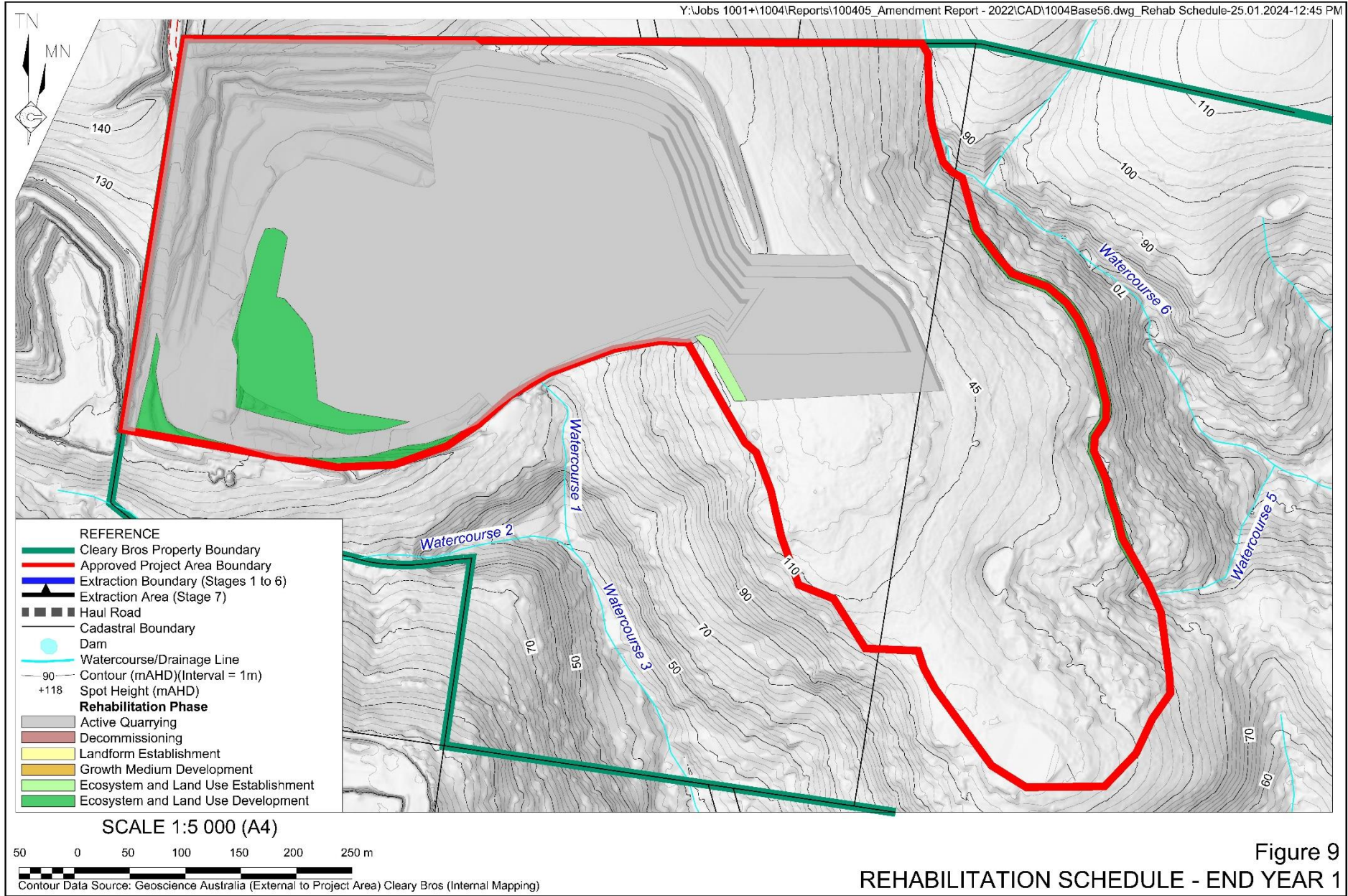


Figure 9
REHABILITATION SCHEDULE - END YEAR 1

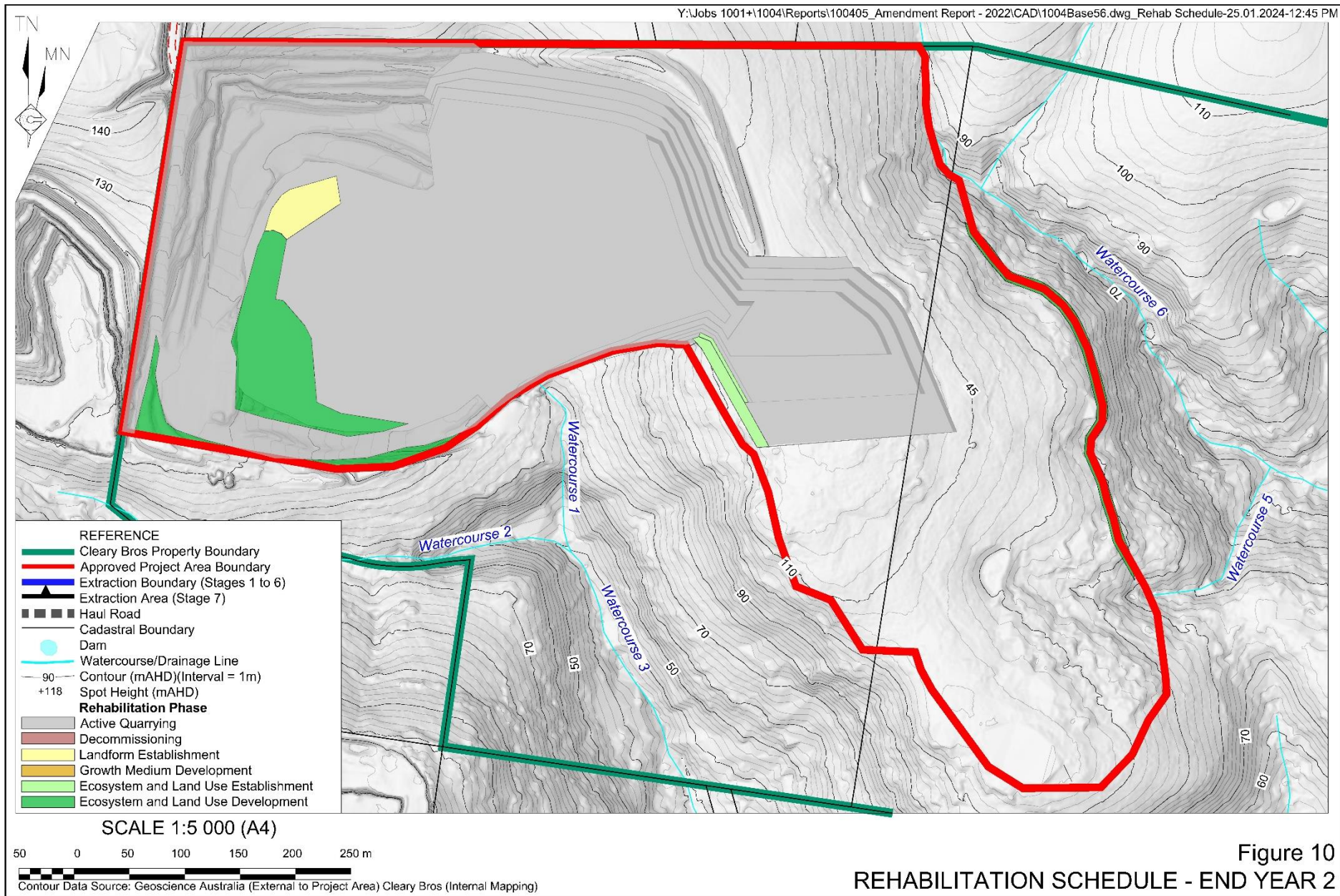


Figure 10
REHABILITATION SCHEDULE - END YEAR 2



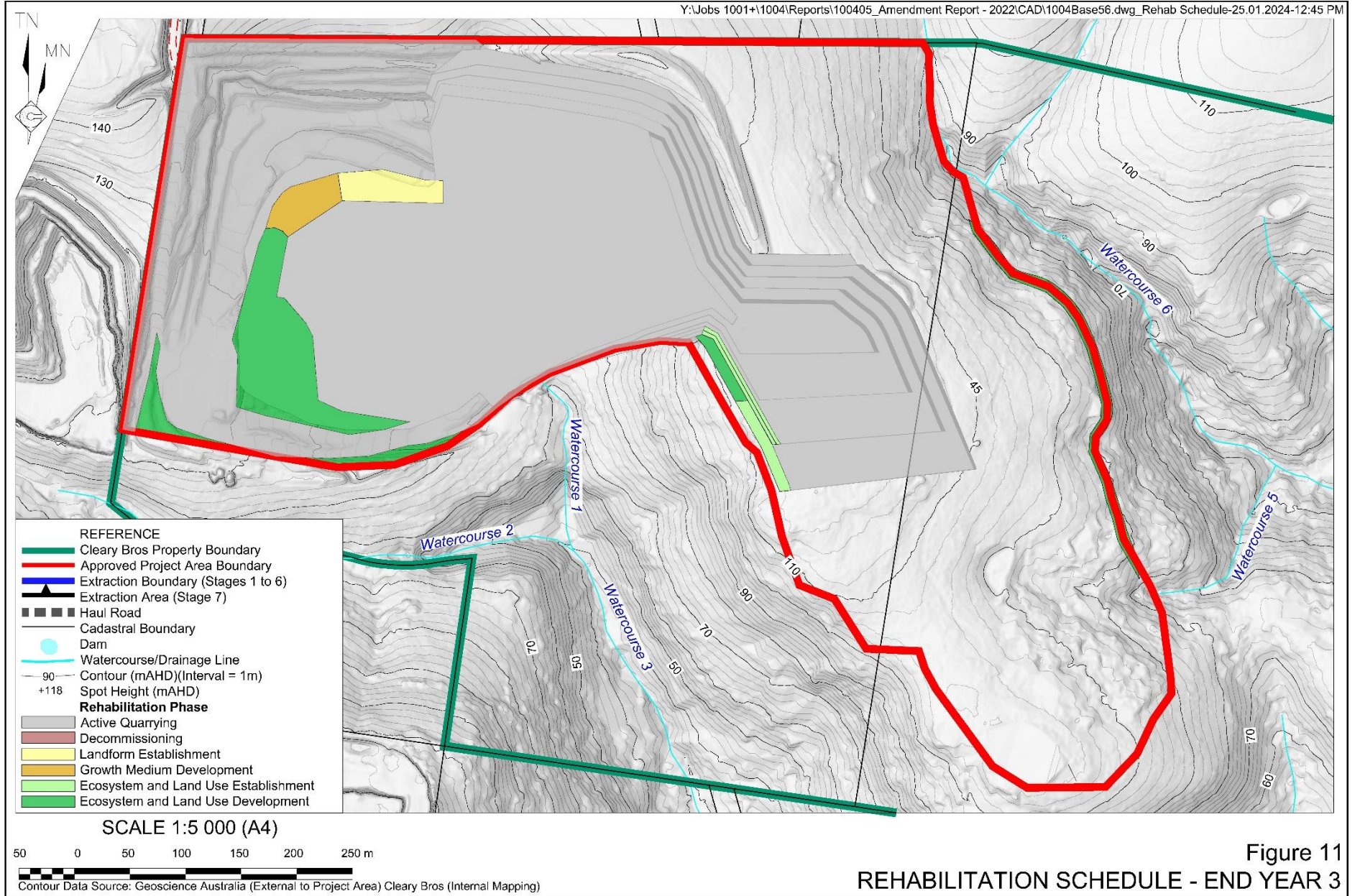


Figure 11
REHABILITATION SCHEDULE - END YEAR 3

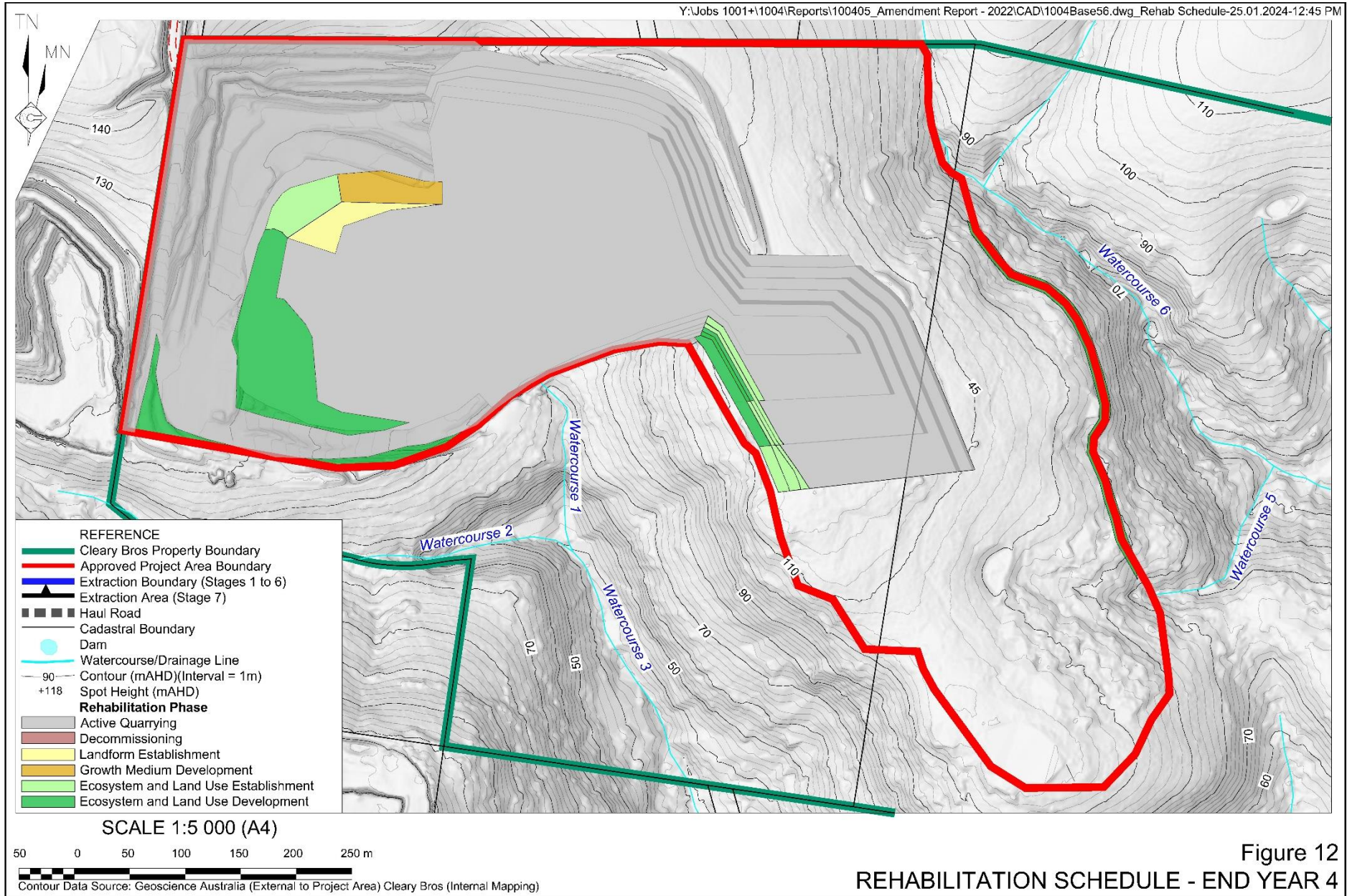


Figure 12
REHABILITATION SCHEDULE - END YEAR 4

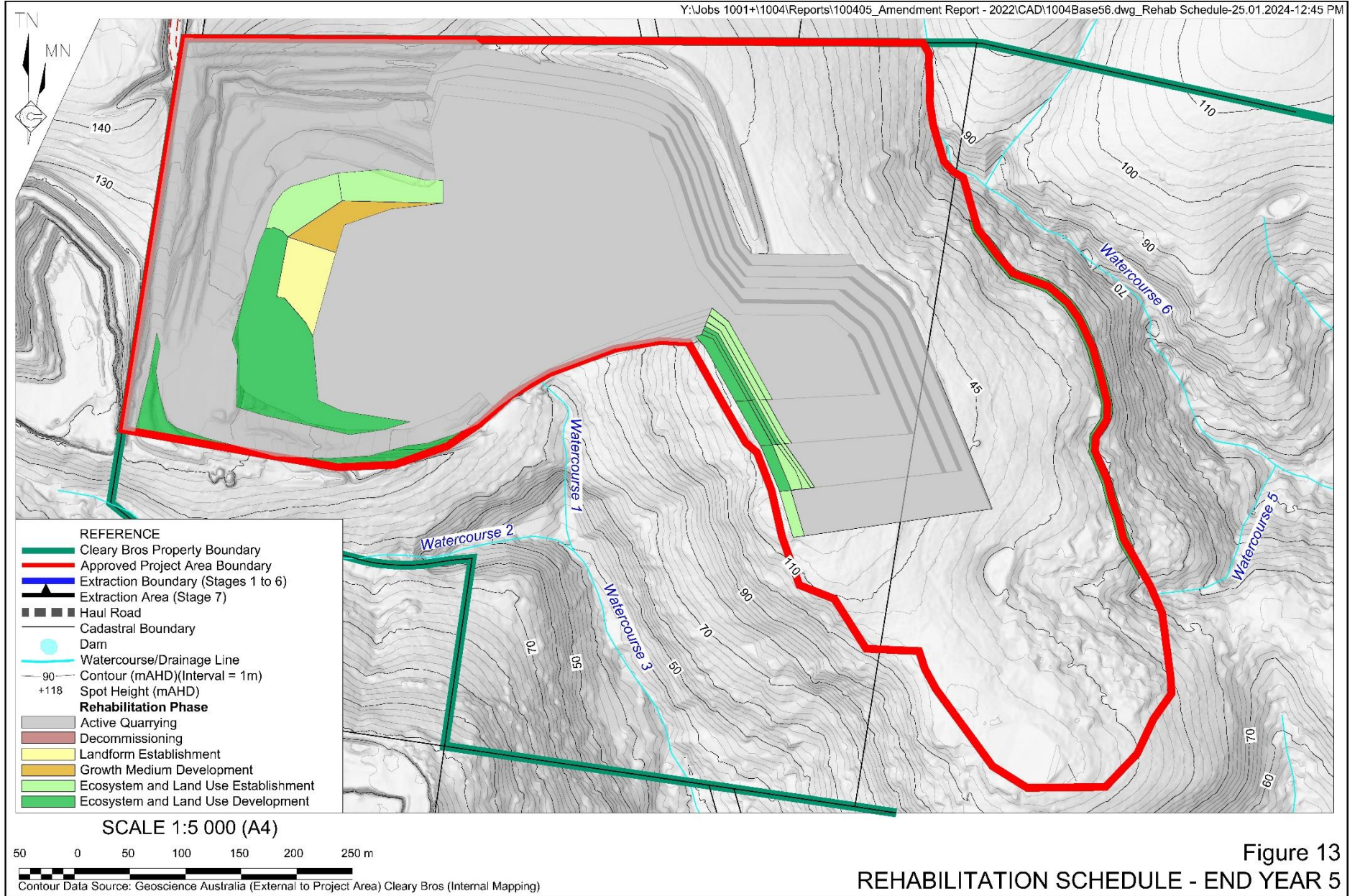


Figure 13
REHABILITATION SCHEDULE - END YEAR 5

Soil Inventory

Table 6 presents an estimate of the volume of topsoil and subsoil to be salvaged during Stage 7 operations.

Table 6 – Soil Inventory – Stage 7

Soil Unit	Topsoil				Subsoil		
	Thickness (m)		Total Quantity (lcm ³)	Quantity of Topsoil with potential <i>Zieria</i> Seedbank (lcm ³)	Thickness (m)		Quantity (lcm ³)
	Range	Average			Range	Average	
1	0 - 0.25	0.15	9,359	n/a	0.55 – 0.8	0.6	37,437
2	0 – 0.40	0.25	18,099	1,802	0.45 – 1.0	0.7	50,680
3	0 – 0.30	0.10	1,688	1	-	-	-
4	0 – 0.20	0.10	398	n/a	0.4 – 2.2	1.6	6,374
Total			29,544	1,803			94,491

Note 1: lcm = loose cubic meters
Source: SEEC (2021) – Table 19

Controls to be Implemented

Cleary Bros will implement the following topsoil management measures within areas of non-native vegetation (refer to **Figure 14**).

- Clearly mark areas for stripping and stockpiling in accordance with a permit to disturb process.
- Strip topsoil from all areas of disturbance and store in stockpiles on flat or gently sloping areas (<15% slope) orientated parallel to the contours no more than 2m high.
- Strip subsoil (where present) from areas of disturbance and store in stockpiles no more than 4m high. Subsoil stockpiles to be retained long term will be ameliorated or covered with 0.3m of topsoil and revegetated in the same manner as the topsoil stockpiles.
- Refrain from stripping or placing soil during wet conditions.
- Ensure that the soil stockpile surfaces have a surface that is as ‘rough’ as possible, in a micro-scale, to assist in surface water runoff control and seed retention and germination.
- Spread seed of a suitable cover crop on all soil stockpiles within one month of construction to facilitate early vegetation and apply water, if required.
- Ensure that soil stockpiles are constructed with side slopes of 1:3 (V:H) or less and ensure that the surface of stockpiles achieves an effective 70% vegetation cover as soon as practicable. This will be achieved through the use of mulches, spray on polymer-based products or other practices that allow a vegetative cover to become established.
- Signpost soil stockpiles and limit operation of machinery on the stockpiles to minimise compaction and further degradation of soil structure.
- Rip or scarify all areas to be respread with topsoil to allow the respread material to be keyed into the underlying material.
- Test and ameliorate topsoil and subsoil prior to use in rehabilitation to ensure appropriate growing conditions for the final land use.

Cleary Bros will implement the following topsoil management measures within areas of moderate or high *Zieria granulata* density (Zieria topsoil) and other areas predominantly comprising native vegetation (Native topsoil) which have the potential to contain valuable seedbank (refer to **Figure 14**).

- Clearly mark areas for stripping and stockpiling in accordance with a permit to disturb process.
- Strip topsoil from all areas of disturbance and store in clearly marked, separate *Zieria* or Native stockpiles on flat or gently sloping areas (<15% slope) orientated parallel to the contours no more than 2m high.
- Strip subsoil (where present) from areas of disturbance and store in stockpiles no more than 4m high. Subsoil stockpiles to be retained long term will be ameliorated or covered with 0.3m of topsoil and revegetated in the same manner as the topsoil stockpiles.
- Refrain from stripping or placing soil during wet conditions.
- Ensure that the soil stockpile surfaces have a surface that is as 'rough' as possible, in a micro-scale, to assist in surface water runoff control and seed retention and germination.
- Apply a spray-on polymer-based product within one month of construction to prevent erosion.
- Ensure that soil stockpiles are constructed with side slopes of 1:3 (V:H) or less.
- Signpost soil stockpiles and limit operation of machinery on the stockpiles to minimise compaction and further degradation of soil structure.
- Rip or scarify all areas to be respread with topsoil to allow the respread material to be keyed into the underlying material.
- Spread *Zieria* and Native topsoil in areas proposed to be used for native vegetation, including on benches and rocky areas where *Zieria* is known to flourish.
- Test and ameliorate topsoil and subsoil prior to use in rehabilitation to ensure appropriate growing conditions for the target species.

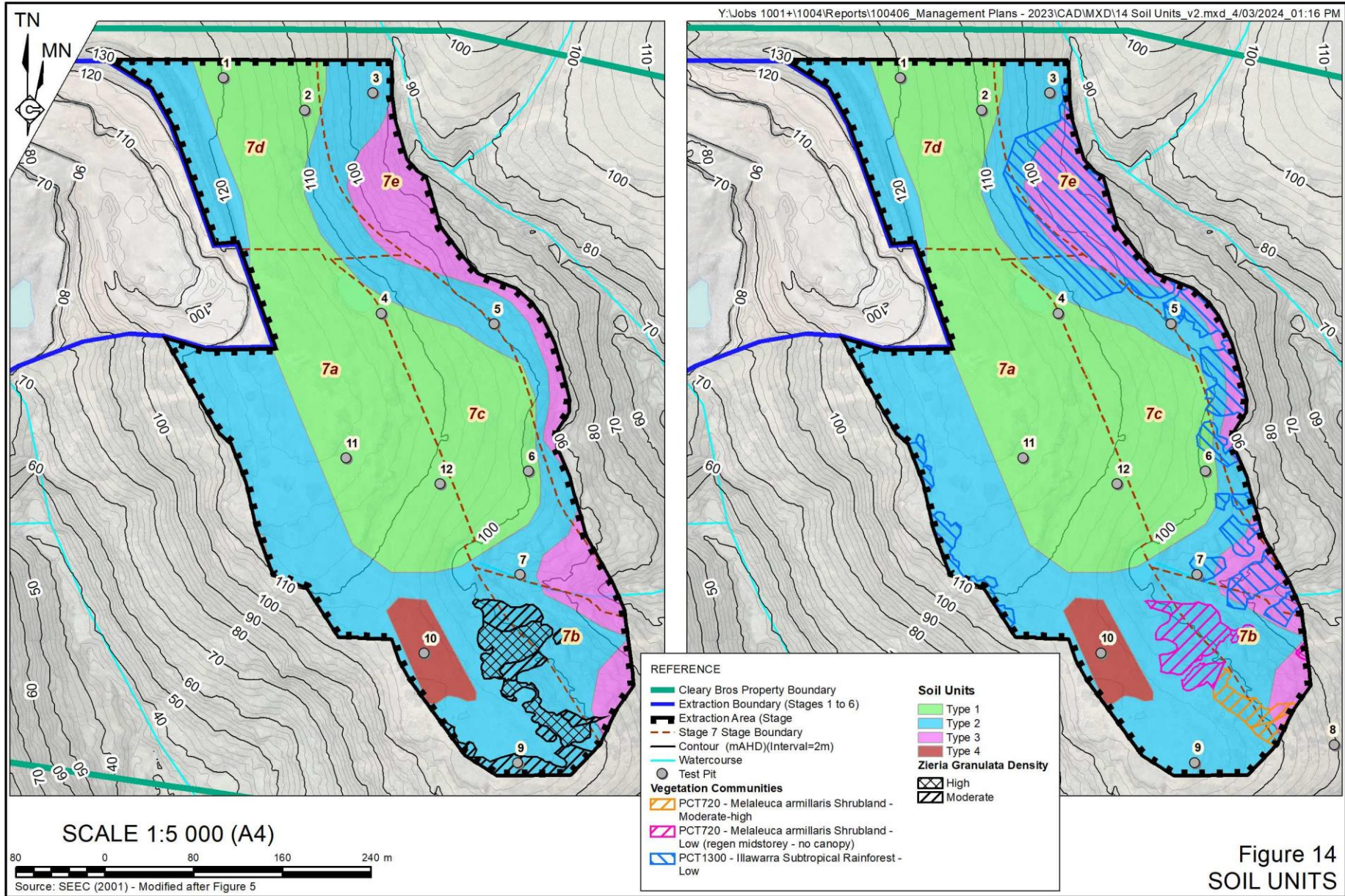


Figure 14
SOIL UNITS

Flora

Existing Environment

Niche Environment and Heritage Pty Ltd (Niche) prepared a Biodiversity Development Assessment Report for the Quarry (Niche, 2023). The following Plant Community Types (PCT) were mapped within the Project Site (Figure 15). Additional areas of non-native vegetation were also identified.

- PCT 1300 Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion (Illawarra Subtropical Rainforest) listed as Endangered under the *Biodiversity Conservation Act 2016* (BC Act) and Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.
- PCT 720 Bracelet Honey-myrtle – Australian Indigo dry shrubland on volcanics, southern Sydney Basin Bioregion (*Melaleuca armillaris* Tall Shrubland) listed as Critically Endangered under the BC Act.

The area of each community to be disturbed is as follows.

- PCT 13003.18ha
- PCT 7201.19ha
- Exotic vegetation.....remainder

In addition, one threatened flora species (*Zieria granulata*) was recorded within the Quarry Site, with approximately 1.33ha of habitat for the species to be impacted.

Controls to be Implemented

Management of biological resources, including vegetation maintenance and management, will be undertaken in accordance with the *Biodiversity Management Plan*. In summary, environmental management controls relating to flora are as follows.

- Vegetation clearing will be restricted to approved areas of disturbance.
- Rehabilitation works within the Native Ecosystem Domain will be implemented as advised by a bush restoration specialist.
- Weed control will be undertaken by site management and contracted specialists throughout both the operational and rehabilitation phases.
- Ongoing inspections will be undertaken and reported within the *Annual Review*.

Fauna

Existing Environment

Limited important breeding and sheltering habitat features for threatened fauna were identified during the surveys conducted by Niche (2023). A total of eight tree hollows, all less than 20cm in diameter within five hollow-bearing trees, and a single hollow stag tree, were recorded within the Quarry Site.

Species recorded or potentially present within the Quarry Site included four species of threatened microbat (Eastern Bentwing Bat, Little Bentwing Bat, Greater Broad-nosed Bat and Yellow-bellied Sheath-tailed Bat), all of which are listed as vulnerable under the BC Act. The Grey-headed Flying-fox, listed as vulnerable under both the BC Act and the EPBC Act, is also known to use habitat within the Quarry Site.

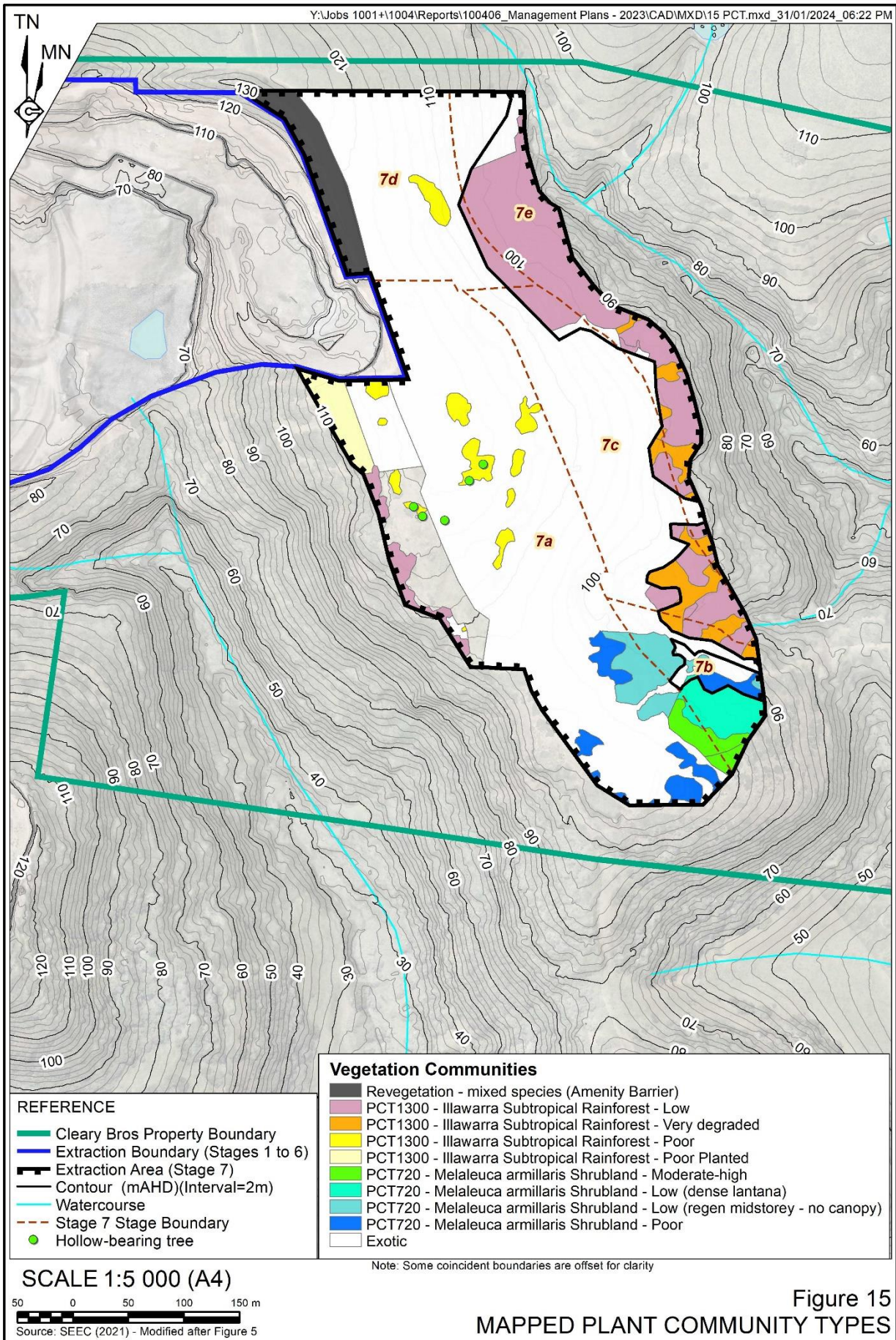


Figure 15
MAPPED PLANT COMMUNITY TYPES

Controls to be Implemented

Management of fauna, habitat features and pests will be undertaken in accordance with the approved *Biodiversity Management Plan*.

Overburden and VENM/ENM Management

The following classes of materials will be accepted on site as available throughout the life of the project for use in rehabilitation and final landform establishment.

- VENM
- ENM

The following controls will be implemented to ensure that only the above materials are permitted to be imported to and placed within the Quarry for rehabilitation activities.

1. Supplier of material completes a “Pre-acceptance Form” with the following information.
 - Classification of the material to be provided, including any test work or certification required under the Resource Recovery Order.
 - Volume, timing and delivery method for the material to be provided.
 - Signature of a suitably authorised representative (Director or Manager) of the supplier.
2. Cleary Bros inspect the source site and verifies the information provided in Step 1. If acceptable, a consignment for the number of loads required is generated using Cleary Bros transport allocations system.
3. Each load to be delivered is registered as a unique consignment number in the transport allocations system and is weighed at the weighbridge on entry and the vehicle and driver details are recorded.
4. The load will be transported to the predetermined backfill area and unloaded and inspected by quarry personnel. Any material not complying with the relevant classification will be removed from the site, either for return to the source site or to a licenced waste facility.
5. Material that has been accepted will then be reshaped into the final landform (refer to Section 5.2.4).
6. Documentation in relation to each load received and placed will be retained for 7 years, including the following.
 - Source and delivery details.
 - Classification and verification results.
 - Placement location.
7. An annual audit of the above procedure will be undertaken by Cleary Bros personnel, with audit results and evidence retained for 7 years.

Imported VENM/ENM, as well as overburden generated over the Quarry life, would be used to backfill sections of the Extraction Area and for progressive rehabilitation of the visible Quarry benches. Section 6.1 of the *Rehabilitation Strategy* identifies the progressive rehabilitation of the Extraction Area throughout the life of the Quarry. In summary, the general progression of backfilling throughout Stage 7 will be as follows.

- Overburden extracted from and VENM/ENM imported during Stages 7a and 7b will be placed within the Stage 1-6 extraction area and either profiled to form part of the final landform or stockpiled and reclaimed for sale, when required. Limited quantities of overburden or VENM/ENM would be placed on the visible terminal faces for use in rehabilitation of those faces.
- During Stages 7c and 7d, overburden and VENM/ENM will be progressively placed as backfill into sections of Stages 7a and b.
- During Stage 7e, overburden and VENM/ENM will be placed within Stages 7b and 7c.

Waste Management

General waste management activities within the Quarry Site will continue in accordance with the *Environmental Management Strategy* (EMS) for the Quarry.

Non-production wastes generated within the Quarry Site will generally comprise:

- replaced equipment parts e.g. conveyor belts, broken excavator teeth; consumables containers including air and oil filters; together with hydraulic oils and cooling fluids;
- general waste (including food waste); and
- general recyclables.

These wastes will be collected on a daily basis and placed in the relevant waste receptacle in the area adjacent to the workshop (on Lot 420 DP1252087 outside of the Quarry Site) for removal (when required) to appropriately licenced facilities for reuse, recycling or disposal.

No hydrocarbon or chemical storage is present within the Quarry Site. Handling of hydrocarbon and chemicals will continue to be managed in accordance with the EMS and all such activities will be undertaken in designated areas of the workshop and fixed processing plant northwest of the Quarry Site.

Geology and Geochemistry

Section 3.3 of the EIS provides a summary of the regional and local geology surrounding the Quarry site. In summary, the Quarry site is located on a regionally extensive latite flow known as the Bumbo Latite (Lee, 2020). It is a porphyritic basalt to latite, with phenocrysts of plagioclase and clinopyroxene in a fine-grained groundmass of feldspar, chlorite, and iron oxide. Columnar jointing is well developed, with zones of volcanic breccia occurring near the bottom of each unit and separating the individual flows (Lee, 2020).

There are no geological or geochemistry-related risks, including minerals hazardous to human health (e.g. naturally occurring asbestos or respirable silica) or likely to result in adverse environmental impacts (e.g. potentially acid forming materials), associated with the latite material. As a result, geology- or geochemistry-related risks from overburden stockpiles are considered to be negligible and no specific risk controls are required.

Erosion and Sediment Control

Erosion and sediment control within the Quarry Site will be managed in accordance with the approved *Water Management Plan*.

Management of Potential Cultural and Heritage Issues

Management of Cultural Heritage will be in accordance with the approved Historic Heritage Management Plan and EMS.

Visual amenity impacts to the heritage values of “The Hill Complex”, including Residences R1 and R2 within the “Figtree Hill” property, have been considered in the Quarry design, extraction sequence and rehabilitation stages. During the Stage 7 operational life, visual impacts from The Hill Complex will be minimised through the proposed extraction sequencing, together with the progressive establishment of vegetation on the upper extraction benches (refer to Section 5.2.3). At the end of Stage 7, the vegetation on the upper benches on the western and southern sides of the extraction area, which will be visible from the Hill Farm Complex, will be 15 to 20 years old and well advanced. The views from residences R1 and R2 towards the former extraction area will largely be composed of advanced vegetation, albeit with a degree of linearity reflecting the presence of the near horizontal benches.

Management of Resources for Use in Rehabilitation

Successful rehabilitation of the final landform will be achieved with the following resources which will be salvaged or imported throughout the life of the Quarry.

- Approximately 50,000 loose cubic metres (lcm) of topsoil and 120,000lcm of subsoil.
- Approximately 1.4Mlcm of overburden and low quality rock comprising clay and weathered latite and agglomerate.
- Up to approximately 3.0Mt or 1.5Mlcm of VENM and/or ENM.
- Stockpiled and mulched vegetation salvaged or produced during vegetation clearing programs.

Topsoil from the areas mapped as moderate and high density *Zieria granulata* (refer to **Figure 14**) will preferentially be direct placed along prepared sections of the Native Ecosystem 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.

Overarching management measures for the stockpiling of subsoil and topsoil (and associated seedbanks) are outlined in Section 5.2.2 – Soil Resources and will ensure the quality of rehabilitation resources is maintained for use in rehabilitation works.

Existing habitat features including rocks, tree trunks, major limbs and, if practicable, minor branches, will be identified prior to ground-disturbance activities, and where practicable, salvaged and stockpiled within the Quarry Site.

Habitation features will be retained for future use in rehabilitation. Other cleared vegetation will be mulched and used to stabilise disturbed areas.

Other resources, such as seed and tube stock, ameliorants and fertiliser, fencing, pumps and pipes will be sourced from offsite during rehabilitation operations.

Amenity Barrier and Tree Screen Establishment

Figure 3 presents the amenity barriers and tree screens that will be established within 2 years of the commencement of quarrying operations under SSD10369 (during the Active Quarrying Phase).

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

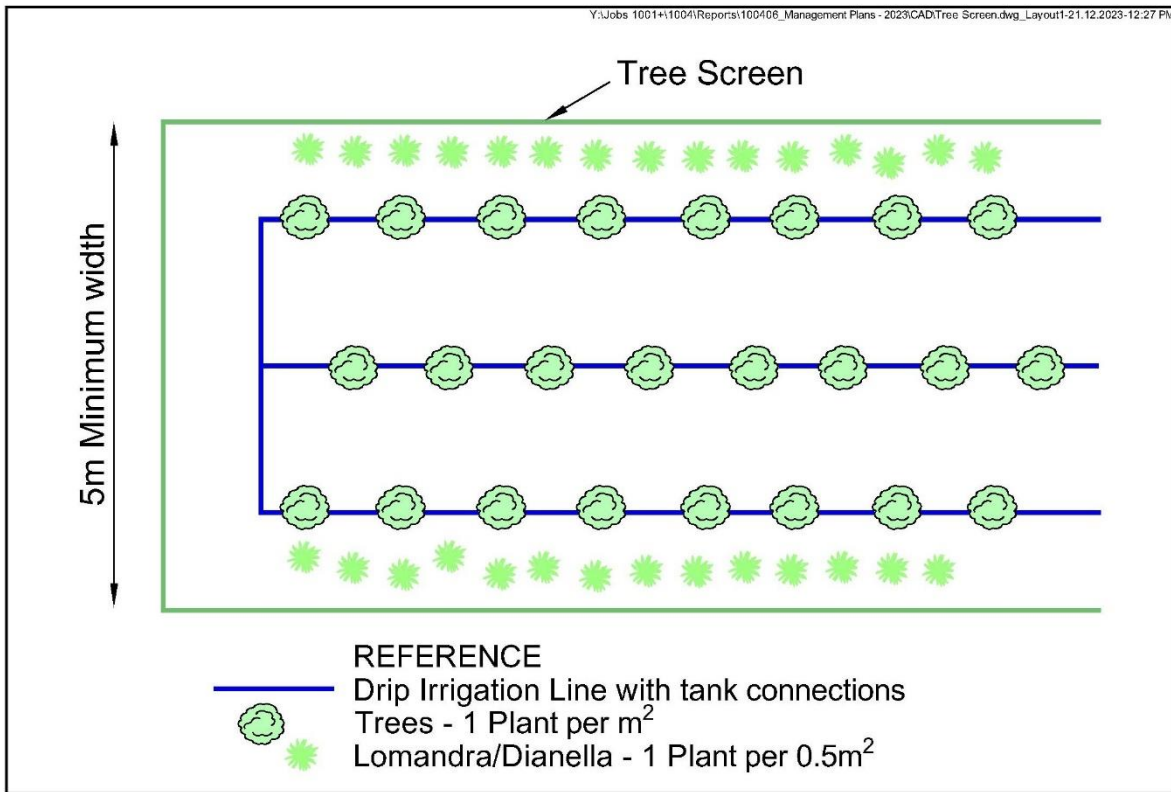
Soil materials will be inspected for the presence of weed propagules prior to use in construction of the amenity barriers.

- 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.
- Planting preparation works will involve broad scale spraying of pasture grasses.
- Mulching the planting areas to a depth of 100mm using clean tree mulch.
- Planting the screens using plant species consistent with those identified in Section 7.5.2 supplied as tubestock from a reputable local plant grower or commercial nursery. The species have been selected to minimise the risk of root jacking and rockfalls associated with the highwall crest.
- Planting grasses on the edges of the planting screens to minimise pasture grasses encroaching into the site.
- 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 the below diagram.



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.

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.

5.2.3 Decommissioning

Site Security

Existing site security measures will be maintained during decommissioning and active rehabilitation operations at the Quarry unless they are required to be modified for rehabilitation purposes. No public access to the Quarry Site is currently permitted, with the Quarry Site entry point secured by a locked gate outside of operating hours. Exclusion of the public from the Quarry Site is currently provided via a combination of perimeter security fencing, stock-proof fencing and security personnel.

Infrastructure to be Removed or Demolished

Infrastructure to be removed following the completion of Quarrying operations will include the following.

- Mobile plant and other equipment.
- Transportable buildings including ablution facilities and crib room.
- Pumps, pipes and related infrastructure.
- Any other infrastructure not required for the final landform.

Decommissioning of groundwater boreholes will be in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (2020).

Infrastructure to be Retained

At the end of extraction operations, the haul road will be partially ripped, with a 5m wide access road with adjacent road-side drainage retained to provide long-term access to the final landform. The ripped area adjacent to the access road will be covered with subsoil and topsoil and incorporated into the Agriculture - Grazing domain.

Water Management Infrastructure

The final landform will comprise an internally draining final void. The approved final landform comprises a Western and Southern Sump, with the former discharging via a spillway to Watercourse 1 and the latter discharging via a low flow pipe to Watercourse 3 (**Figure 4**). Condition B75 of SSD10369 requires preparation of a *Detailed Feasibility Study and Final Landform Design* within five years of commencing quarrying operations. That study is required to amongst other things:

- assess alternative means of discharging water from the final void; and
- undertake detailed geotechnical studies and engineering designs for the proposed pipeline and any associated infrastructure.

In light of the above, the following description of water management infrastructure is based on the approved final landform.

Western Section

The western section of the final void will comprise the majority of the Stage 1-6 Extraction Area. Surface water in this section of the final void will flow from the west to the east. A diversion bund will be constructed between the eastern and western sections of the final void and will divert surface water to the Western

Sump. The Western Sump will initially capture water for testing prior to controlled discharge to Watercourse 1 in a manner consistent with current operational procedures (see Section 5.3 of the *Water Management Plan*).

Following confirmation that water quality is suitable for passive discharge to Watercourse 1, an engineered, stabilised spillway will be constructed in accordance with the relevant design criteria applicable at the time. **Figure 16** presents a conceptual layout for the Western Sump spillway to Watercourse 1.

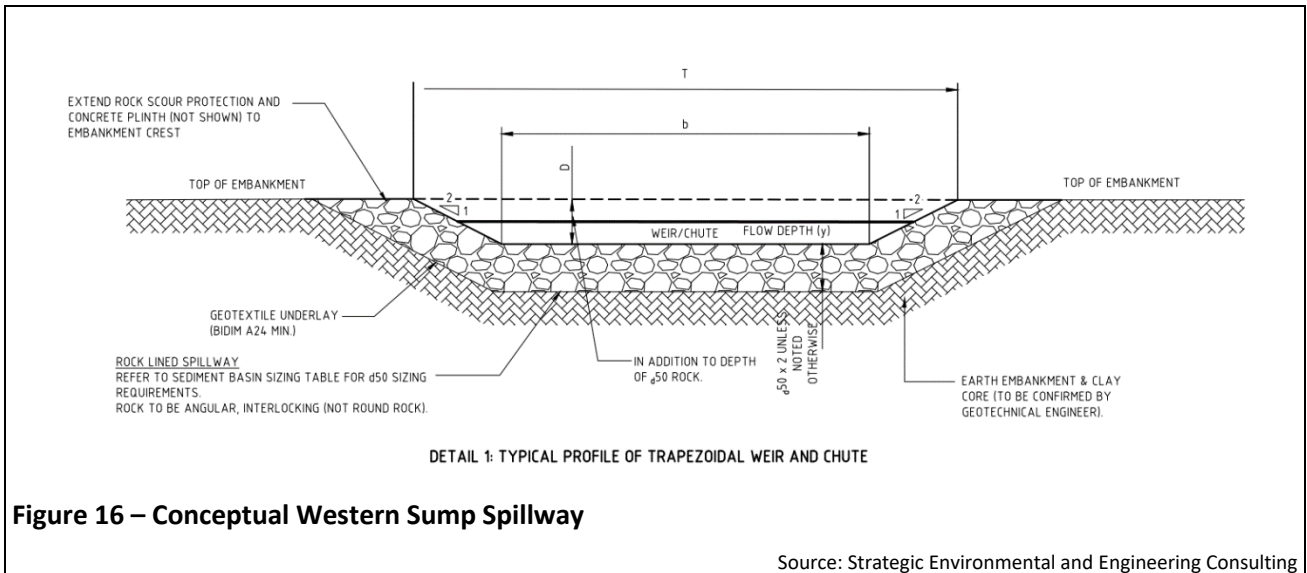


Figure 16 – Conceptual Western Sump Spillway

Source: Strategic Environmental and Engineering Consulting

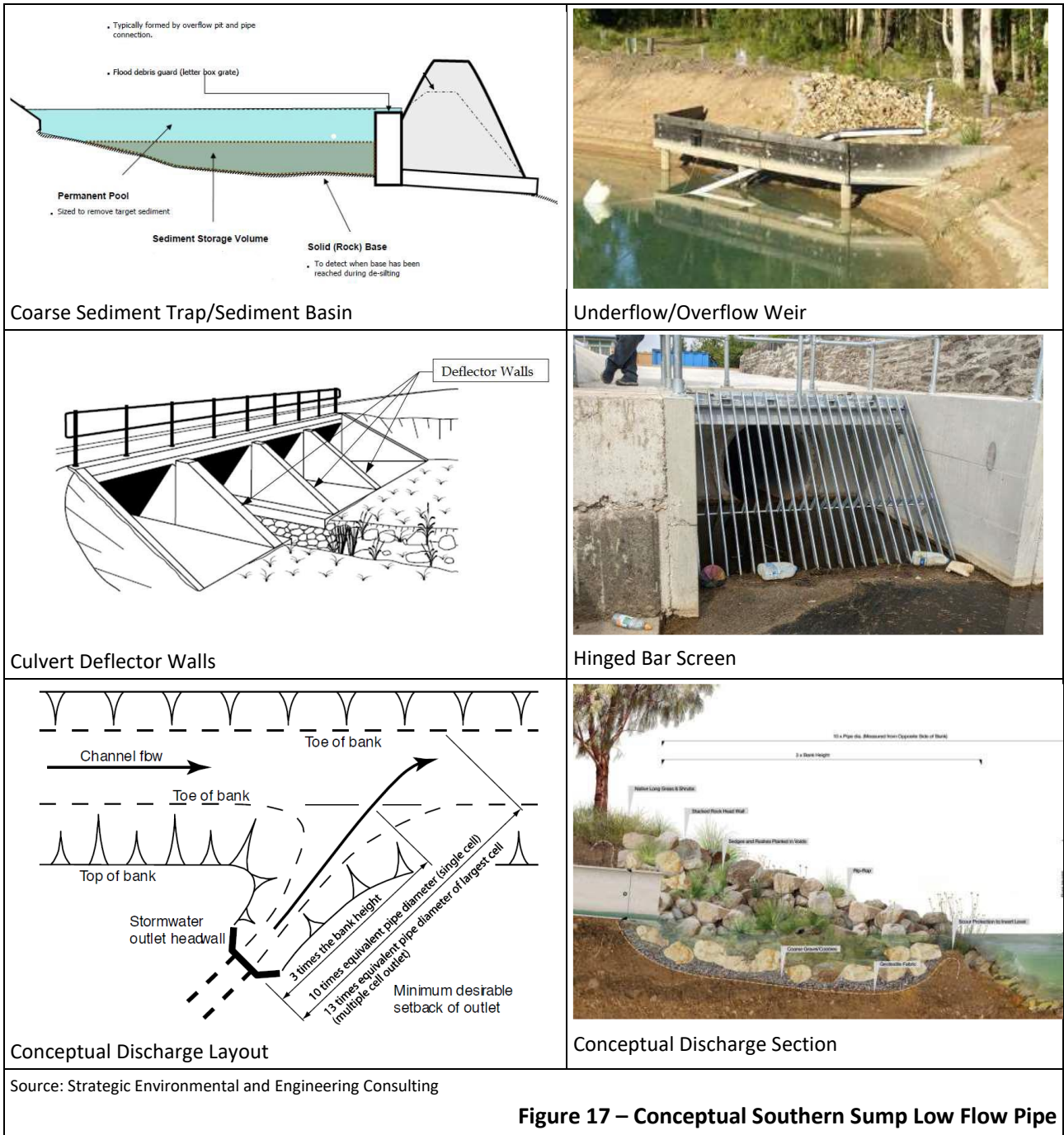
Eastern Section

The Eastern section of the final void will comprise the Stage 7 Extraction Area, as well as a small section of the Stage 1-6 Extraction Area. Surface water within the eastern section of the Extraction Area will flow to the Southern Sump. As for the Western Sump, the Southern Sump will initially capture water for testing prior to controlled discharge to Watercourse 3 or 5 in a manner consistent with current operational procedures (refer to the *Water Management Plan*). Alternatively, water within the Southern Sump may be used for rehabilitation purposes or may be pumped to the Western Sump for discharge via that sump.

Following confirmation that water quality is suitable for passive discharge to Watercourse 3 the following infrastructure would be established (**Figures 4, 5 and 17**).

- One or more horizontally drilled bore holes from the Southern Sump to Watercourse 3, immediately north of the southern boundary of Cleary Bros’s property. The number, diameter, lining material and construction methodology of the bore hole(s) will be determined during preparation of the *Detailed Feasibility Study and Final Landform Design* within five years of the commencement of quarrying operations. However, at this stage the conceptual design includes the following.
 - Number of pipes one or two
 - Diameter approximately 450mm
 - Length approximately 250m
 - Slope approximately 4%
 - Inlet elevation approximately 42m AHD
 - Outlet elevation approximately 32m AHD

- The pipe inlet would indicatively be protected by infrastructure to prevent blockage and ensure safety for personnel. This infrastructure may include some, or all of the following elements shown on **Figure 17**. However, the final design would be determined and presented in the *Detailed Feasibility Study and Final Landform Design*.
 - Upstream coarse sediment trap/sediment basin.
 - Sediment/debris deflector wall.
 - Screen / cage.
 - Screen – underflow/overflow weir.



- The pipe outlet in Watercourse 3 will indicatively be protected by the following infrastructure to prevent erosion and scour of the creek bed (**Figure 17**).
 - An outlet angled at between 45° and 60° to the stream axis.
 - A rock lined discharge bed.
 - Scour protection on the opposite bank of Watercourse 3.

Hazardous Materials Management

No hazardous materials, including herbicides, pesticides, hydrocarbons and/or explosives are stored within the Quarry Site. Where required, all hazardous materials are brought to site on an as-needed basis and stored/used in accordance with all relevant safety standards.

No hazardous materials are proposed to be retained following the cessation of quarrying and rehabilitation operations.

5.2.4 Landform Establishment

General Requirements

Final landform establishment comprises design and construction of the final void. As the final void will be progressively established throughout the life of the Quarry this will be an iterative process that will include the following.

- Assessment of potential geotechnical and erosional issues, including rock mass properties, large structural features and depth of partially weathered overburden material.
- Incorporating characteristics of surrounding landforms, particularly those associated with the Holcim Quarry located to the west of the Quarry Site.
- Continued assessment of visual amenity.

The following sections provides an overview of the rehabilitation methods for various domains within the final landform.

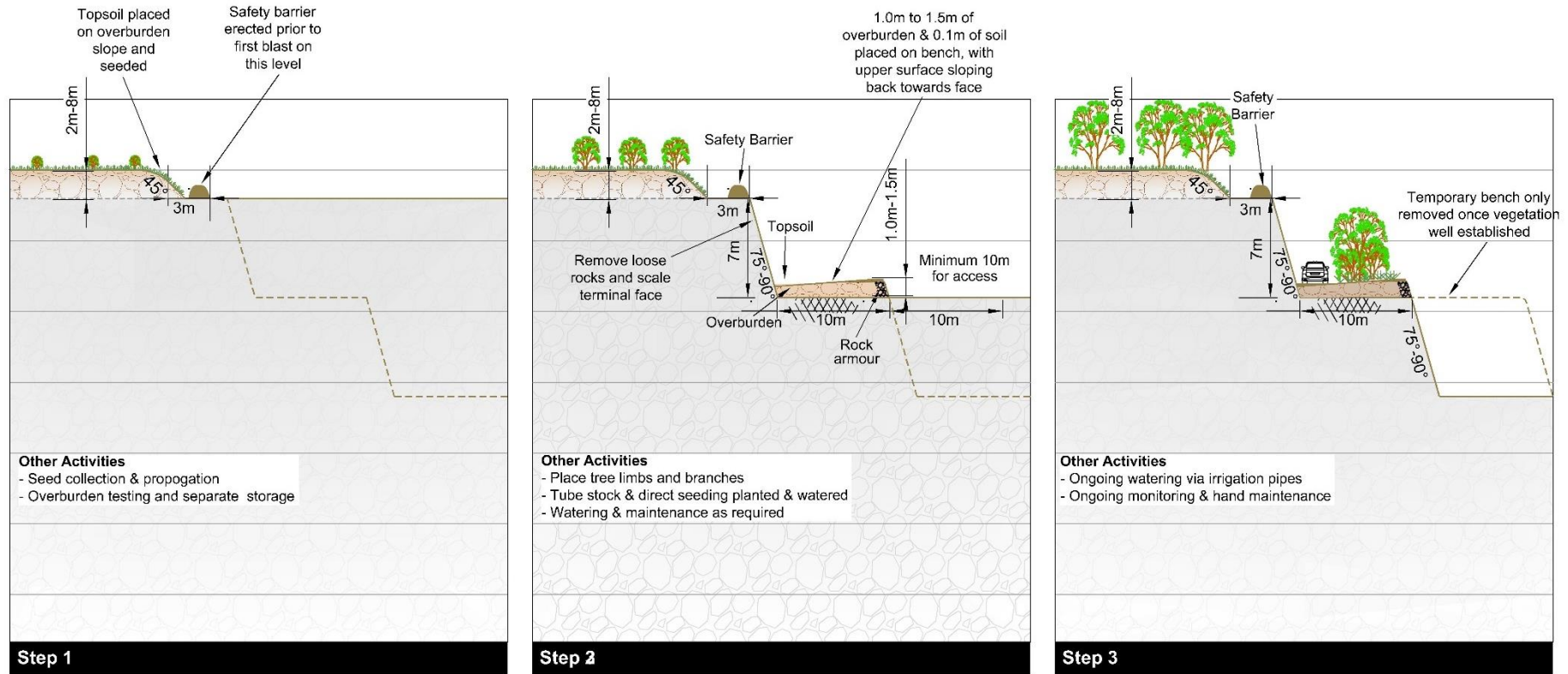
Native Ecosystem Domain – Upper, weathered sections of the Quarry face

The uppermost 2m to 8m of the Quarry faces are likely to be in partially weathered overburden. In order to stabilise these faces, the weathered/partially weathered material will be shaped to achieve a slope no steeper than 45°. The shaped landform will be ripped parallel to the contour to maximise the potential for water and root penetration.

Where required on the northern and western boundary of the Stage 1 to 6 Extraction Area, suitable surface water control structures will be installed to transfer water from land to the north and west of the Extraction Area to the floor of the final void and from there to the Western Sump. All other sections of the Extraction Area perimeter drain away from the Extraction Area.

Native Ecosystem Domain – Visible Terminal Benches

Section 7.1 of the Rehabilitation Strategy identifies those sections of the Terminal benches that would be visible to observers located to the east and southeast of the Extraction Area. **Figure 18** presents a schematic overview of the proposed rehabilitation process.



Not to Scale

Figure 18
SCHEMATIC VISIBLE QUARRY
BENCH REVEGETATION PROCEDURE

Prior to establishing the visible terminal face the following will be undertaken.

- Determine if the section of terminal face to be established will be visible following completion of Stage 7e.
- Obtain geotechnical advice at least every 5 years in relation to the measures to be implemented to ensure long-term stability of the terminal faces, 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.
- Ensure that the nominated design criteria are achieved, namely a 7m high face and 10m wide bench.

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.
- Progressively 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 or suitable imported VENM/ENM with the appropriate characteristics for use as substrate, i.e. a well-graded material with a plasticity index greater than 6.
- 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.

Native Ecosystem Domain – Non-visible Terminal Benches

Prior to establishing the non-visible terminal face the following will be undertaken.

- Determine if the section of terminal face to be established will be visible following completion of Stage 7e.
- Obtain 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.
- Ensure that the nominated design criteria are achieved, namely a 14m high face and 5m wide bench.

Once the fragmented material has been removed undertake the following.

- Maintain a minimum 20m wide work zone at the base of the terminal face.
- Progressively 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 5m wide bench to provide a safety bund for the final landform and prevent erosion of the outer edge of the rehabilitated landform.
- Spread a minimum of 1.0m to 1.5m of overburden or suitable imported VENM/ENM 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 the retained to ensure retention of water on the rehabilitated landform.

Agriculture – Grazing Domain

Throughout the life of the Quarry, surplus overburden together with any imported VENM/ENM will be transported to and placed within completed sections of the Extraction Area to establish the final landform (**Figure 4**). This will initially involve placement of material into the western section of the Stage 1-6 Extraction Area followed by placement in completed sections of Stage 7 as areas become available (see Section 5.1 of this document and Section 6.1 of the *Rehabilitation Strategy*). At least 2m of overburden and/or VENM/ENM will be placed on the final extracted floor of the Quarry to provide a suitable substrate for the ongoing agricultural use of the rehabilitated landform.

Deep ripping parallel to the slope will be undertaken to promote root and water penetration.

5.2.5 Growth Medium Development

General Requirements

The growth medium development phase involves the establishment and maintenance of growth medium on the completed landform.

Soil characterisation testing will be undertaken for all stockpiled soils, including available topsoil, subsoil, overburden, and any externally sourced material, to ensure compliance with the criteria identified in **Table 7**. Where required, apply ameliorants to achieve the required criteria. Based on initial soil characterisation testing undertaken by SEEC (2021), ameliorants will likely include fertilisers alongside gypsum and/or lime. Where topsoil and subsoil material is directly placed on the final landform during stripping operations, no testing will be undertaken.

Target soil criteria will be updated as required based on results from rehabilitation trials and rehabilitation monitoring results (refer to Sections 7 and 8).

Table 7 – 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	

Indicator	Target	Validation Method
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)		

Weed control during growth medium development will consist of inspections and control of on-site weeds prior to and during placement of the growth medium. This will include a visual examination of stockpiled material. Where topsoil has been sourced from off site, targeted inspections of the material will be undertaken following placement to identify any weed material inadvertently imported. All vehicles and equipment used during rehabilitation will be inspected for weed material prior to commencement of operations.

Seasonal and local meteorological conditions will be monitored to identify conditions which may result in delaying vegetation establishment (e.g. drought conditions).

Native Ecosystem Domain – All

A minimum of 0.1m of soil will be spread on the shaped and ripped landform and immediately scarified and then revegetated as described in Section 5.2.6. 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 (**Table 5**).

Topsoil from the areas mapped as moderate and high density *Zieria granulata* (refer to **Figure 14**) will preferably be direct placed along 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.

Agriculture – Grazing Domain

A minimum of 0.1m of soil will be spread on the shaped and ripped landform and immediately scarified and then revegetated as described in Section 5.2.6.

5.2.6 Ecosystem and Land Use Establishment

General Requirements

Table 3 identifies the following objectives in relation to vegetation to be established on the final landform.

- Vegetation composition of native ecosystem areas 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.
- Grassland areas are established to support sustainable agricultural activities and suitable species grown in the local area that are used 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.

Vegetation 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 include species that would be unlikely to cause root jacking and rockfalls on the rehabilitated 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). Vegetation established on the higher elevation exposed benches would target the ‘Melaleuca armillaris Tall Shrubland’ vegetation community, while vegetation established on the lower benches would target the ‘Illawarra Subtropical RF complex’ vegetation community. Topsoil from the areas mapped as moderate and high density *Zieria granulata* (refer to **Figure 14**) will preferably be direct placed along 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 will be planted consistent with PCT720.

Revegetation of the “Agricultural – Grazing” domain would rely upon pasture species commonly found in the local area and not likely to outcompete native vegetation in the adjoining Native Ecosystem domain.

Table 8 presents the target vegetation species to be planted within the “Native Ecosystem” or “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).

Table 8 – 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	
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 longibrachiata</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

Common Name	Scientific Name	Planting Method	Comments
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 semiglauc</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
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			

Seed material will be sourced where possible from local suppliers, nurseries and/or propagation specialists. Seed will also be sourced from commercial suppliers where the required volume of seed material or specific species are not available locally for rehabilitation works. Where soil from mapped areas of *Zieria granulata* has been directly translocated, no additional seed will be applied, however, additional tubestock may be planted consistent with PCT720 or PCT1300. Seasonal and local meteorological conditions will be monitored to identify conditions which may result in delaying vegetation establishment (e.g. drought conditions), and adjusted in consultation with the revegetation contractor.

Where practicable, clean woodchip mulch will be used to support revegetation. Based on previous examples of revegetation operations, the use of hydroseeding and mulching techniques help reduce the need for irrigation to promote germination and establishment of vegetation.

Where required, irrigation of establishing vegetation may be undertaken using water from the Quarry sumps. All water used would be covered by existing licencing and approvals. No additional water licences are anticipated to be required as part of rehabilitation operations.

Ongoing weed and pest inspection and control programs will continue to be implemented throughout all phases of rehabilitation. Targeted inspection and control operations will be undertaken in the vicinity of newly sown or established vegetation. This may include identification and monitoring of target or priority weed species communities and timing control operations based on phenological stage (i.e. during or prior to flowering), as well as increased or additional pest control programs.

Native Ecosystem Domain – All

The following subsections describe the revegetation methods for the native ecosystem domain.

Direct Planting

Plants from tube stock or HIKO trays will be installed using the following steps.

- All plants will be thoroughly watered prior to planting.
- Holes will be dug at twice the depth and width of the pot size being installed.
- Plants will be installed slightly lower than surrounding ground level and a bowl like depression will be created around the base of the plant to catch water runoff.
- Water crystals will be used to assist plant establishment where extended dry periods are expected. One small handful of pre-soaked water crystals will be incorporated into the soil during the tree installation process.
- All plants will be watered thoroughly after installation weekly for a period of eight weeks in wet weather or for a period of ten weeks in dry weather conditions.

Planting densities to be utilised during revegetation works are presented in **Table 9**.

Table 9 – Planting Densities

Plant Type – Stratum	Planting Density
Trees	1 plant per 4m ²
Small Trees	1 plant per 3m ²
Shrubs	1 plant per 1m ²
Grasses	4 plants per 1m ²
Vines	Native vines will not be utilised in initial vegetation establishment as they can effectively smother trees and be as detrimental as weed vines. Vines will only be incorporated into the revegetation program once the vegetation structure has become established and trees are large enough to support the vines.

Direct Seeding

Direct seeding will provide an additional means for revegetation. Native seeds will be mixed with a sticking agent, a small amount of fertiliser and a light mulch and will be directly cast over the revegetation area.

Hydromulching

Hydromulching may be utilised for revegetation and stabilisation of quarry benches and to minimise erosion from the revegetated landforms.

Agriculture – Grazing Domain

Revegetation of grazing areas would be undertaken by the following steps:

- i) 7 days prior to sowing pasture species mix, apply a knockdown herbicide (e.g. Glyphosate) for final weed control. Herbicide rates to be provided by a qualified agronomist based on weed species present;
- ii) 7 days after final knockdown herbicide applied, pasture species mix to be mechanically sown using a direct drill with narrow points (40mm wide Baker boot points or similar) to place seeds at a depth of 2 cm with fertiliser recommended from soil test results;

After sowing and before pasture emergence, apply per-emergent weed and insect control as 200 mL Dual Gold/ha + 100 mL Talstar 250EC insecticide/ha to provide residual weed and insect control for optimum pasture establishment.

5.2.7 Ecosystem and Land Use Development

Monitoring

All rehabilitated areas will be monitored in accordance with procedures identified in Section 7. Based on the results of that monitoring, the following management measures will be implemented and revised as required.

Weed and Pest Management

The presence of weeds and pest impacts will be recorded by an agronomist, ecologist or bush regeneration contractor as part of annual rehabilitation monitoring activities (see Section 7). A report comprising the following would be prepared following the inspection.

- A list of weed species identified during rehabilitation monitoring and any other inspections completed at the Quarry Site.
- Details of any pests or evidence of damage to revegetated areas identified during inspections, including a plan showing the distribution within the Quarry Site, where appropriate.
- An overview of any weed and pest management measures implemented at the Quarry Site during the previous reporting period.
- Recommendations for specific weed and pest management measures to be implemented during the subsequent 12-month period.

The resulting recommendations will be implemented in the subsequent period.

Surface Water Management

Visual inspections of erosion and drainage control structures and monitoring of surface water quality will be undertaken following significant rainfall events as described in Section 7. Where required, surface water controls, including the approved low-flow pipe, would be modified or repaired to ensure ongoing performance of the infrastructure.

Revegetation

Results from rehabilitation monitoring will be used to assess the progress of revegetated areas towards target values (see Section 7). Where rehabilitation is not progressing as expected, additional management actions may be implemented as required. These additional management actions may include, but would not be limited to:

- growth medium amelioration (e.g. fertiliser or organic matter application);
- brush matting with locally sourced vegetation material;
- reseeded of areas with seed of target species where species assemblages are not consistent with target assemblages; and
- engaging a relevant expert to provide recommendations to improve rehabilitation outcomes.

Land Management and Infrastructure Maintenance

Site infrastructure including retained roads, security and stock-proof fencing, safety bunds and signage will be inspected on an annual basis. Additionally, infrastructure vulnerable to erosion (e.g. unsealed roads) will be inspected following significant rainfall events.

The results of infrastructure inspections as well as records of annual infrastructure maintenance activities will be included as part of the Annual Review.

6. Rehabilitation Quality Assurance Process

The following section details the rehabilitation quality assurance process for the Quarry in accordance with Resources Regulator’s *Guideline 3: Rehabilitation Controls* (July 2021). The rehabilitation quality assurance checklist is intended to be used as an indicative guide for rehabilitation operation managers and practitioners responsible for the rehabilitation of the Quarry.

As the Quarry is currently operational, many of the pre-disturbance risk controls outlined in Guideline 3 (e.g. baseline assessments and monitoring) have either been completed or form part of ongoing investigations to be undertaken during rehabilitation planning. As such, items applicable to the remaining active quarrying and planned rehabilitation phases of the Quarry Site will be the focus of ongoing risk control checks.

As part of the rehabilitation quality assurance process, relevant records and documentation will be recorded in a Rehabilitation Register and reported as part of the Annual Review for the Quarry. The Rehabilitation Register will be maintained, reviewed and refined by the Quarry Manager to ensure that it is reflective of current rehabilitation progress, risk controls implemented at the Quarry Site and the outcomes of any updated rehabilitation risk assessments.

Table 10 outlines key responsibilities for Cleary Bros’ personnel with regards to rehabilitation operations.

Table 10 – Roles and Responsibilities

Roles	Responsibilities
Chief Executive Officer	<ul style="list-style-type: none"> • Provide strategic direction regarding environmental policy. • Independently review indicators of rehabilitation performance, review compliance with rehabilitation objectives and approvals. • Provide adequate resources for implementation of this Plan.
General Manager Quarries	<ul style="list-style-type: none"> • Accountable for the overall environmental performance of the Quarry, including the outcomes of the Plan. • Independently review indicators of rehabilitation performance, confirm compliance with applicable laws, regulations, licences and approvals. • Ensure all contractors, sub-contractors and service personnel are appropriately qualified and/or licenced to undertake the required work. • Ensure that appropriate resources are available to site management and personnel to enable the implementation of this Plan.
Environmental Officer	<ul style="list-style-type: none"> • Ensure monitoring is undertaken in accordance with the Plan. • Undertake/organise, review and analyse all monitoring data. • Ensure all internal and external reporting requirements are met. • Respond to all incidents and complaints. • Ensure that the Rehabilitation Register is maintained and up to date based on site activities. • Ensure that the workforce is aware of relevant development and rehabilitation risks and management and mitigation measures, including any additional corrective and/or preventative measures. • Ensure that the documentation and recording of rehabilitation risk controls occurs within a suitable timeframe. • Ensure that specialist contractors adhere to the guidelines and methodologies outlined in this RMP where required, or that the guidelines and methodologies in this Plan are updated to reflect those employed at the Quarry Site. • Update the Plan as required.

Roles	Responsibilities
Operational Staff and Contractors	<ul style="list-style-type: none">• Undertake all environmental training and awareness induction as directed.• Follow directions provided by the Environmental Officer, Supervisors and Quarry management.• Show due care not to cause environmental harm.• Notify the Quarry Manager / Environmental Officer in the event that uncontrolled rehabilitation risks are identified at the Quarry.

7. Rehabilitation Monitoring Program

7.1 Analogue Site Baseline Monitoring

Thirteen vegetation monitoring plots have previously been established in the remnant and revegetation areas south of the Stage 1-6 area. These plots will provide the baseline data to define the proposed rehabilitation objectives and completion criteria for the areas of Native Ecosystem vegetation, as defined in Section 4 and **Table 4**. It is noted that there is significant variability between the existing monitoring plots, and such variance will be taken into account when reviewing the performance of the quarry rehabilitation.

Two analogue sites are proposed to be established within the areas of pasture vegetation within the Cleary Bros Property Boundary to determine baseline values against which ecosystem establishment can be measured. It is anticipated that further refinement of the proposed rehabilitation completion criteria may be undertaken once analogue sites have been established.

7.2 Internal Rehabilitation Monitoring

Internal rehabilitation monitoring by Cleary Bros personnel will focus upon determining whether progress towards achieving the relevant performance indicators and completion criteria presented in Section 4 and **Table 3** are being achieved.

Rehabilitation monitoring will initially involve inspections 2, 4 and 6 weeks after sowing/planting followed by quarterly inspections of each area under rehabilitation, increasing to annually as rehabilitation progresses, and will consist of the following.

- Photo monitoring of rehabilitated areas, including prior to and following landform establishment, growth medium development, and ecosystem and land use establishment.
- Visual inspections and documentation following significant rainfall events (i.e. ≥ 90 mm within 24 hours) to identify any signs of erosion or sedimentation and detail any follow up actions required (e.g. repairs, installation of additional erosion and sediment controls).
- Recording of all monitoring and inspection events and any follow up activities or recommendations, in accordance with the Rehabilitation Register.

All follow up activities and recommendations would be implemented as soon as reasonably practicable, and the above steps would be repeated until the nominated rehabilitation criteria have been achieved.

7.3 Independent Review of Rehabilitation Performance

Section 4.2 and **Table 3** identify the validation method for each of the nominated rehabilitation completion criteria. This would form the basis of the independent review of rehabilitation performance that would be undertaken every five years and prior to relinquishment. In summary, Cleary Bros would appoint independent experts to audit and report on progress against completion criteria and the effectiveness of measures implemented to achieve the completion criteria. As this is the first Rehabilitation Management Plan for the Quarry under SSD10369, many of the completion criteria will not be relevant during the life of this document. In summary, the following independent experts would be appointed.

- Geotechnical – to review the stability of the final landform and compliance with the identified design criteria.

- Native Ecosystem Domain – to review the progress of rehabilitated areas against analogue sites within Cleary Bros land, as described in the Biodiversity Management Plan.
- Agricultural – Grazing - to review the progress of rehabilitated areas against analogue sites within Cleary Bros land to be selected during the initial site inspection. The nature of the agricultural monitoring to be undertaken would be a matter for the independent expert. However, methods such as quadrat sampling (for species density) or ground cover % estimate (or suitable equivalent) will likely be undertaken to monitor agricultural performance of the rehabilitated areas, noting that stock will not be introduced to the final landform until after quarry operations are complete.

The establishment of analogue sites to inform rehabilitation completion criteria will begin once rehabilitation has commenced. Once monitoring has established suitable analogue sites and associated target values for key ecosystem characteristics within the identified vegetation community types, the target values will be recorded in this Plan.

The results of the above rehabilitation monitoring will be compared against target values to determine:

- the relative performance of rehabilitated areas compared to other sites within the Quarry Site;
- the rate of development towards target values, including a timeline for the achievement of target values and/or rehabilitation completion criteria; and
- whether additional controls, management measures or specialist assessments to identify issues and provide recommendations are required.

Any resulting recommendations will be implemented as required.

7.4 Reporting

The results of the internal and independent reviews of rehabilitation performance will be presented in or appended to the Annual Review for the Quarry. The Annual Review will also include information in relation to the implementation of recommendations arising from each of the reviews.

The Rehabilitation Register will be used to record details of any additional management measures or risk controls implemented during the ecosystem development phase in response to the analysis of rehabilitation monitoring results.

8. Rehabilitation Research, Modelling and Trials

8.1 Current Rehabilitation Research, Modelling and Trials

No specific rehabilitation research or rehabilitation trials have previously been undertaken within the Quarry Site.

8.2 Future Rehabilitation Research, Modelling and Trials

Rehabilitation research and trials will commence during quarrying operations, as suitable areas become available. Indicatively, this will include trials to confirm the optimal:

- substrate and growth medium depth and treatment; and
- revegetation species and methodologies.

8.2.1 Native Ecosystem Domain – Key Rehabilitation Activities and Considerations

Trials for the Native Ecosystem domain would be based on the known success of soil translocation at Boral's Dunmore Quarry. Future trials will aim to focus on confirming the existing seed bank and suitability of the stripped and stockpiled soil resources. Indicatively, the trials would proceed as follows.

- Samples from 5-10 plots within moderate and high density *Zieria granulata* areas will be collected. Each sample will be a composite sample of 5 points from within the 1m² plot, with the aim of collecting 2-5kg of topsoil for each sample.
- Each sample will then be spread in an individual clean seed tray and placed in a greenhouse environment.
- Samples will be kept moist for a period of 6 months from the late Winter – late Summer period in the greenhouse, and the number of each species germinating recorded.
- Samples may be periodically thinned to encourage ongoing germination, with any removed individuals included in the germination counts.
- The translocation process will be informed by the number of each species germinating within the samples.

Results from the rehabilitation trials will be presented in the Annual Review for the Quarry. Additional trials will likely be developed throughout the Quarry life and will be included within revisions of this Plan.

8.2.2 Agricultural Domain – Key Rehabilitation Activities and Considerations

The following subsections describe the preliminary Agricultural Domain rehabilitation trials and testing to occur prior to execution of the full revegetation works.

Planting trial

- Suggested format of the planting trial is as follows:
 - Sow agricultural species seed mix as outlined in Table 8 – Target Vegetation Species.
 - Sow pasture seed mix into a minimum of 0.1m of soil as outlined in section 5.2.5 Growth Medium Development.

- Sowing to be completed in Autumn. After 12 months, complete plant condition assessment to determine the following.
 - Survival percentage.
 - Ratio impacted by browsing.
 - Ratio impacted by dehydration.
 - Ratio impacted by nutrient deficiency.
 - Ratio impacted by insect/weed pressure.
- Plant condition assessment and results from each domain will then be used to determine any modifications required when completing full revegetation works. The aim of the planting trial is to improve the success rate of rehabilitation efforts and reduce costs associated with ongoing maintenance and any future infill planting works.

Planting Approach

- The ideal planting season for the agricultural area is early Autumn based on local climatic conditions. Plants are able to establish across winter and spring before the onset of hot and dry conditions in summer.
- Revegetation works should not be completed in unsuitable weather conditions such as extreme heat, cold or wind.
- Seeds should be sown to a depth of no more than 10-20 mm with fertilizer recommended from soil test results by direct drill seeder to simulate conditions encountered during full revegetation works.
- Large rocks should be removed from the areas to be sown.

Maintenance

- Plants should be watered within 1 hour of installation for optimum germination and survival of seedlings.
- Ongoing maintenance across the site should involve the following.
 - Watering plants as required by seasonal conditions. Plants should be watered at least once per month across Autumn and Spring; twice per month minimum during summer conditions.
 - Watering frequency should be greater in the first 3 months following sowing (if dry conditions prevail). This helps to ensure plants are able to become established quickly and able to survive dry conditions.
- Seedling emergence and survival should be monitored 2, 4 and 6 weeks after sowing, followed by quarterly inspections of each area under rehabilitation, increasing to annually as rehabilitation progresses.
- If required, weed and insect control may need to be completed based on these assessments.

9. Intervention and Adaptive Management

9.1 Trigger Action Response Plan

Table 11 presents the Trigger Action Response Plan for each of the rehabilitation threats and potential adverse outcomes identified in the risk assessment as having a risk rating of moderate or above.

The results of rehabilitation trials, including the development of procedures to be implemented during rehabilitation operations as outlined in Section 8, will be continually reviewed and reported in the Annual Review for the Quarry. Where rehabilitation trial outcomes suggest that rehabilitation methods outlined in this Plan may not support the realisation of rehabilitation completion criteria, this Plan will be updated to detail additional or alternative rehabilitation methods as required.

Table 11 – Trigger Action Response Plan

Rehabilitation Risk	Potential Adverse Outcome	Trigger	Action/Response
Active Mining Phase of Rehabilitation			
Limited pre-existing and stockpiled biological resources for use (e.g. topsoil, woody debris).	Reduced suitability of final landform for native flora and fauna.	Biological resource inventory indicates that required volume of biological resources will be unavailable at time of rehabilitation works.	Continue to manage soil and biological resource inventory to balance available and required topsoil volumes. Import additional topsoil if required.
Adverse impacts on surface and groundwater quality and quantity arising from quarrying activities.	Final landform unsuitable for final land use.	Surface water or groundwater monitoring indicates water contamination resulting from quarrying activities.	Review and inspect existing water management infrastructure to identify potential sources of contamination and investigate potential control operations, including removal and/or treatment of contaminated material.
Visual catchment and associated heritage values of “The Hill Farm Complex” heritage site impacted by quarrying activities.	Decreased visual amenity within “The Hill Farm Complex”	Tree screens are not achieving target height and density. Vegetation establishment on visible benches is not trending towards target values.	Engage an experienced ecologist or revegetation specialist to assess vegetation establishment and provide recommendations in relation to species selection/coverage. Implement recommended actions.
Reduction in visual amenity for observers surrounding the Quarry.	Decreased visual amenity within the region surrounding the Quarry.	Tree screens are not achieving target height and density. Vegetation establishment on visible benches is not trending towards target values.	Engage an experienced ecologist or revegetation specialist to assess vegetation establishment and provide recommendations in relation to species selection/coverage. Implement recommended actions.
Geotechnical stability of the terminal faces limits the ability to establish vegetation on High visibility upper benches	Final landform unsuitable for final land use.	Evidence of significant geotechnical instability in operational or terminal faces. Evidence of significant erosion of the final faces.	Engage a geotechnical engineer to assess the stability of the terminal faces and provide recommendations in relation to design and/or stabilisation of the affected areas. Implement recommended actions.
Decommissioning Phase of Rehabilitation			
All identified risks allocated “Low” risk rating.			

Rehabilitation Risk	Potential Adverse Outcome	Trigger	Action/Response
Landform Establishment Phase of Rehabilitation			
Final landform unsuitable for final land use (landform instability).	Final landform unsuitable for final land use.	Evidence of geotechnical instability in operational or terminal faces. Evidence of erosion of the final faces.	Engage a geotechnical engineer to assess the stability of the terminal faces and provide recommendations in relation to design and/or stabilisation of the affected areas. Implement recommended actions.
Growth Medium Development Phase of Rehabilitation			
All identified risks allocated "Low" risk rating.			
Ecosystem and Land Use Establishment Phase of Rehabilitation			
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Delay to or failure of vegetation establishment.	Visual monitoring during and/or after adverse weather/climatic events identifies limited opportunities for progressive rehabilitation or negative effects on vegetation establishment.	Review of rehabilitation schedule and update to forward schedule. Rehabilitation areas are assessed for damage and necessary repairs and/or revegetation efforts are employed as required.
Ecosystem and Land Use Development Phase of Rehabilitation			
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Delay to or failure of vegetation establishment.	Visual monitoring during and/or after adverse weather/climatic events identifies negative effects on vegetation establishment.	Rehabilitation areas are assessed for damage and necessary repairs and/or revegetation efforts are employed as required.
Insufficient establishment of target species and limited species diversity.	Species assemblage on final landform does not conform to target flora species assemblages based on analogue sites or species identified in Table 8 of this document.	Rehabilitation monitoring identifies floristic assemblages which are not consistent with analogue sites or species identified in Table 8 of this document.	Undertake additional revegetation works (e.g. supplementary seeding) to develop species assemblage comparable to analogue sites or species identified in Table 8 of this document.
Erosion and failure of landform, drainage and water management/storage structures.	Final landform is a source of water pollution	Surface water monitoring results consistently exceed water quality trigger values.	Undertake remediation of visibly eroding areas through additional earthworks, soil works, revegetation or other stabilisation works.
Final landform unsuitable for final land use (flooded final void).	Final landform unsuitable for final land use.	Visual inspection indicates low-flow pipe is not discharging water as designed.	Assessment undertaken by a geotechnical engineer or hydrogeologist to re-establish low-flow pipe functionality. Implement recommended actions. Controlled discharge of water from the Quarry Sumps.
Final landform water quality inadequate to be discharged to the environment	Final landform is a source of water pollution	Surface water monitoring results consistently exceed water quality trigger values.	Implement water treatment system to allow for discharge. Undertake assessment to determine source of water contamination and implement remedial works where required.

9.2 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 (Section 9.1).

10. Reporting, Publishing, Review and Continual Improvement

10.1 Reporting and Publishing

In accordance with condition D15 of SSD 10369, Cleary Bros will make the Rehabilitation Management Plan 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 the Rehabilitation 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.

10.2 Plan Review

In accordance with Condition B79(i) this Rehabilitation Management Plan will be reviewed and updated every five years in conjunction with the following.

- The final landform feasibility assessment required under Condition B77.
- The Rehabilitation Strategy review required under Condition B71(n).

Further, in accordance with Condition 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.

10.3 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 Management Plan. 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.

11. References

Biosis Pty Ltd (2021b) – Albion Park Quarry Extension: Archaeological Report, Part 5 of the Specialist Consultant Studies Compendium, prepared for Cleary Bros (Bombo) Pty Ltd.

Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd (2021). *Surface Water Assessment*. Presented as Part 7 of the *Specialist Consultant Studies Compendium* for the EIS. Prepared on behalf of Cleary Bros (Bombo) Pty Ltd.

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 Sculleth-Dean	All	Assistance with preparation of all sections	31/01/2024 – Version 1 r2
Mr Jack Flanagan	All	Preparation of Section 4, supervision of the preparation of Section 5 and peer review of entire document.	22/01/2024 – Version 1 r2
Mr David Ronchi	3, 4, 5	Review of relevant components of Section 4.2 Review and confirmation of final landform design criteria and final landform risks	05/03/2024 – Version 1 r3
Mr Marcus Burgess	4.2, 5.2, 7, 8, 9	Contribution to Sections 5.2.5, 5.2.6, 5.2.7 and 7 Review of relevant components of Sections 4.2, 8 and 9	02/02/2024 – Version 1 r2
Mr Roger Garnsey	4.2, 5.2, 7, 8, 9	Contribution to Section 5.2.5, 5.2.6, 5.2.7, 7 and 8 Review of relevant components of Sections 4.2 and 9	23/01/2024 – Version 1 r2
Mr Bill Johnston	4.2, 5.2.3	Review of relevant components of Section 4.2 and Section 5.2.3	23/01/2024 – Version 1 r2
Mr Paul Ryall	4.2, 5.2.3	Review of relevant components of Section 4.2 and Section 5.2.3	19/01/2024 – Version 1 r2
Mr Andrew Conacher	4.2, 5, 9	Review of heritage aspects of Sections 4.2, 5 and 9 and suggestions for additional matters not originally considered	05/03/2024 – Version 1 r3
Dr Mudassar Arsalan	5	Review of relevant components of Section 5	23/01/2024 – Version 1 r2