Strength. Performance. Passion.

Teven Quarry
Biodiversity & Rehabilitation Management

Holcim Australia
November 2021 Update

Tables

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APPENDICES

1. Introduction

1.1 Background

Holcim (Australia) Pty Ltd (Holcim Australia) own and operate an existing hard rock quarry located at Stokers Lane, Teven, New South Wales (NSW) in the Ballina Local Government Area (LGA). The site is approximately eight kilometres (km) north-west of Ballina town centre (**Figure 1**).

In 2014, Holcim Australia sought Development Consent under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) to increase the maximum annual production limit to 500,000 tonnes per annum (tpa) over a period of 30 years to 2045. The Teven Quarry Development Consent (SSD 6422) (Development Consent) was granted on 15 July 2015 by the NSW Minister for Planning.

The Development Consent allows for continued operations of the existing Teven Quarry which will enable the extraction of additional hard rock resources within the approved extraction area (**Figure 2**).

In accordance with Schedule 3, Condition 29 of the Development Consent, Holcim Australia is required to prepare a Biodiversity and Rehabilitation Management Plan (B&RMP) in consultation with the NSW Office of Environment and Heritage (OEH), now the Biodiversity Conservation Division (BCD) and to the satisfaction of the Secretary of the Department of Planning, Industry and Environment (DPIE), formerly the Department of Planning and Environment (DP&E).

1.2 Project Description

A summary of the primary components of the operation as approved by Development Consent SSD 6422, compared with that previously approved, is provided in **Table 1**.

Table 1 Approved activities

Project component	Currently approved (2015-2045)
Quarry life	30 years from date of approval (15 July 2015), ie to 15 July 2045
Limits of production	500,000 tonnes per annum (tpa)
Quarry footprint	Shown on **Figure 2**
Overburden management	Shown on **Figure 2**
Hours of operation	**Blasting:** 10:00 am - 3:00 pm Monday–Friday, at no time on Sundays or public holidays **All other activities:** 7:00 am – 6:00 pm Monday – Friday 7:00 am – 4:00 pm Saturday At no time on Sundays or public holidays **Extended hours for product loading and dispatch:**

	7:00 am – 10:00 pm Monday to Friday 7:00 am – 4:00 pm Saturday At no time on Sundays or public holidays
Transport	Road transport at approved production level
Employment	11 full time equivalent positions
Infrastructure	Fixed primary, secondary and tertiary plants with the addition of a mobile crushing and screening plant, and a mobile pug mill.
Site access	Off Stokers Lane
Concrete recycling for re-use	Recycling of up to 10,000 tpa of clean surplus concrete material on site using existing and proposed processing infrastructure for re-use as product

1.3 Purpose and Scope

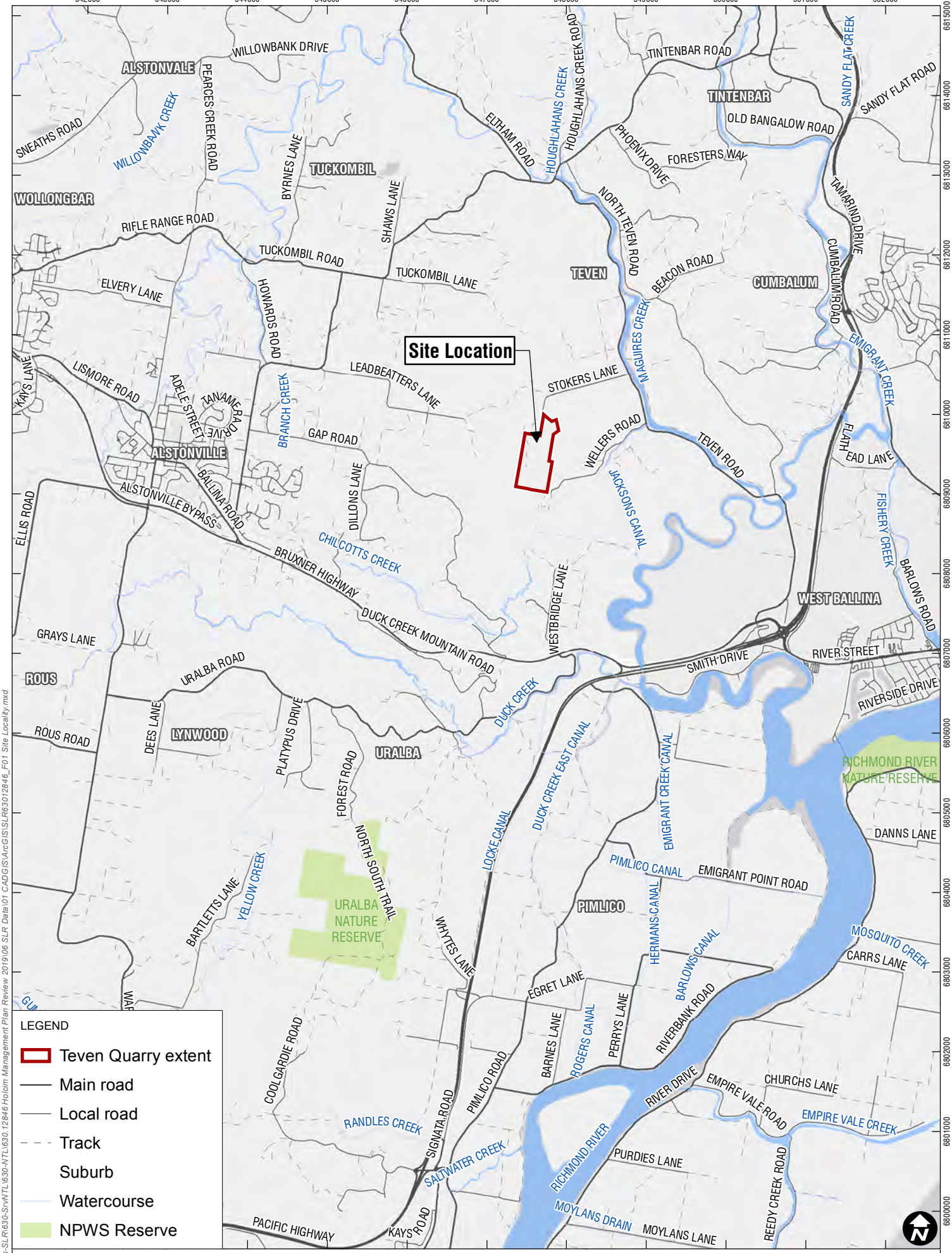
The purpose of this B&RMP is to describe the biodiversity and rehabilitation management strategies, procedures, controls and the monitoring programs that are to be implemented in accordance with the Teven Quarry Project Environmental Impact Statement (EIS) (Umwelt 2014) and the Development Consent. The B&RMP is stipulated as a requirement under the Development Consent and is designed to be prepared in consultation with the OEH and to the satisfaction of the Secretary.

The relevant Development Consent conditions and Statement of Commitments are provided in **Section 3.1** and **Section 3.2** respectively. This document also outlines the control measures to be implemented as part of the Teven Quarry Project operations to minimise potential impacts on biodiversity.

1.4 Objectives

The objectives of this B&RMP include the following:

- Detail the controls to be implemented to minimise impacts to biodiversity as a result of clearance activities for approved disturbance areas, remnant vegetation and fauna habitat features;
- Address the relevant conditions of the Development Consent (refer to **Table 2**);
- Establish management techniques associated with the clearance of vegetation in the approved extraction limit boundary;
- Establish general management requirements for the rehabilitation of the quarry pit;
- Provide details on the conceptual final landform and final land uses for the quarry;
- Establish rehabilitation monitoring requirements; and
- Detail the requirements for reporting biodiversity related incidents to the relevant stakeholders.



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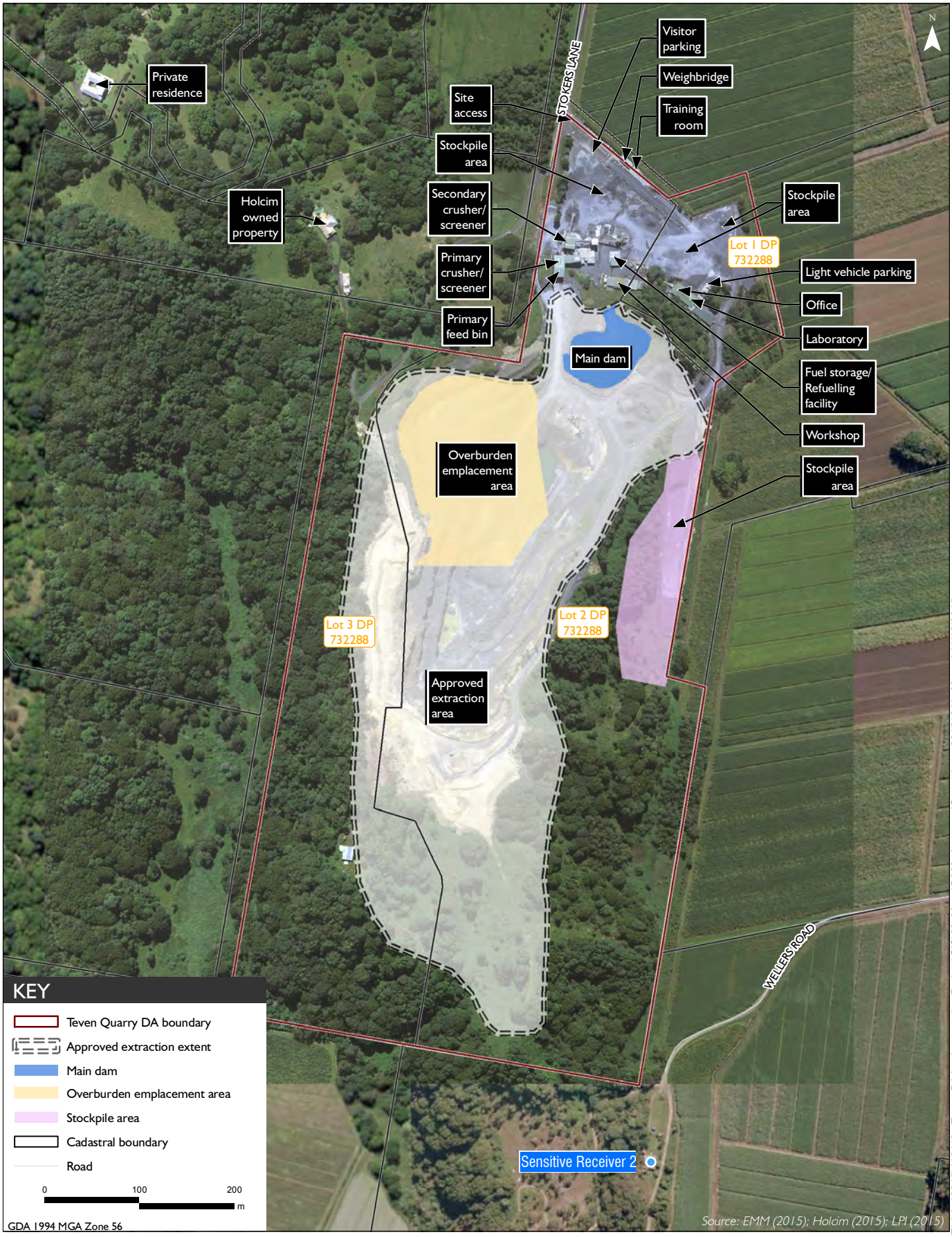
Site Locality

Figure 1



Approved operations

Teven Quarry

EMM

Figure 2

2. Stakeholder Consultation

2.1 Pre 2020 Consultation

A letter was sent to the then NSW Office of Environments and Heritage (OEH) on 16 October 2015 requesting agency input during the development of the draft B&RMP and review of the final draft document. Holcim received no response during this initial consultation and was unable to speak with the OEH either.

Following the initial communication, this document was sent to the OEH on 27 November 2015 as per Schedule 3, Condition 29 (a) of the Development Consent. Holcim has received no feedback from the OEH since submitting for review and considers that the OEH has had ample time to sufficiently review and comment on the draft document.

2.2 2020 Consultation

A copy of the 2020 updated management plan was provided to DPIE in August 2020. Holcim received comments from DPIE on 7 October 2020 and updated this document and will resubmit to DPIE on as required by the Development Consent (SSD 6422). See **Appendix A** for consultation.

DPIE requested BCD be consulted in regard to the October 2020 revision of this management plan. A copy of the revision was sent to BCD on 4 February 2021. Holcim received feedback from BCD on the 9 March 2021. Holcim have addressed BCD feedback. See **Appendix A** for consultation.

3. Statutory Requirements

3.1 Development Consent Requirements

Development Consent for the Teven Quarry Project was granted by the Minister for Planning on 15 July 2015. The requirement for this B&RMP arises from Schedule 3 Condition 29 of the Development Consent. The requirements from the Development Consent relating to biodiversity and rehabilitation, and where these requirements are addressed within this document, are provided in **Table 2**.

Table 2 Development Consent Conditions

<table>
<tr><th>Development Consent conditions</th><th>Section addressed</th></tr>
<tr><td colspan="2">Schedule 3 - Environmental Performance Conditions</td></tr>
<tr><td>27. The Applicant shall rehabilitate the site to the satisfaction of the secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and the conceptual final landform in Appendix 2, and must comply with the objectives in Table 5.
Table 5. Biodiversity and rehabilitation objectives
<table>
<tr><th>Feature</th><th>Objective</th></tr>
<tr><td>Site (as a whole)</td><td>Safe, stable and non-polluting
Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and designed to minimise the visual impacts of the development when viewed from surrounding land.
Restored with native, endemic vegetation</td></tr>
<tr><td>Surface Infrastructure</td><td>Decommissioned and removed, unless the Secretary agrees otherwise</td></tr>
<tr><td>Quarry benches</td><td>Landscaped and vegetated using native tree and understory species</td></tr>
<tr><td>Quarry pit floor</td><td>Landscaped and revegetated using native tree and understory species, above the final anticipated void water level</td></tr>
</table></td><td>Section 7</td></tr>
<tr><td>28. The Applicant shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.
Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in the future.</td><td>Section 5</td></tr>
<tr><td>29. The Applicant shall prepare and implement a Biodiversity and Rehabilitation Management Plan for the site to the satisfaction of the Secretary. The plan must:</td><td>This document</td></tr>
</table>

Development Consent conditions	Section addressed
a) Be prepared in consultation with OEH, and be submitted to the Secretary for approval within 6 months of the date of this consent, unless the Secretary agrees otherwise;	Section 2 Appendix A
b) Provide details of the conceptual final landform and associated land uses for the site;	Section 7.3 and Section 9
c) Describe how the management of biodiversity would be integrated with the overall rehabilitation of the site;	Section 7.4
d) Include detailed performance and completion criteria for evaluating the performance of the biodiversity management measures and rehabilitation of the site, including triggers for any necessary remedial action;	Section 7.2
e) Describe the short, medium, and long-term measures that would be implemented to: • Protect and enhance the remnant vegetation and habitat on the site; and • Ensure compliance with the biodiversity and rehabilitation objectives, and the progressive rehabilitation obligations in this consent.	Section 10
f) Include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for:	Section 10 and 11
• Maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in site; • Restoring and enhancing the quality of native vegetation and fauna habitat on site through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features; • Protecting vegetation and fauna habitat outside the approved disturbance area onsite; • Minimising the impacts on native fauna, including undertaking preclearance surveys; • Establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers; • Ensuring minimal environmental consequences for threatened species, populations and habitats; • Collecting and propagating seed; • Controlling weeds and feral pests; • Controlling erosion; • Controlling access; and • Managing bushfire risk.	Section 7.4 and 9
g) Include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria	Section 11
h) Identify the potential risks to the successful implementation of the plan	Section 11.3

Development Consent conditions	Section addressed
and include a description of the contingency measures that would be implemented to mitigate these risks; and	
i) Include details of who would be responsible for monitoring, reviewing, and implementing the plan.	Section 13 and 14
30. Within 6 months of the approval of the Biodiversity and Rehabilitation Management Plan, the Applicant shall lodge a Conservation and Rehabilitation Bond with the Department to ensure that the management of biodiversity and the rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the Biodiversity and Rehabilitation Management Plan. The sum of the bond shall be determined by: a) Calculating the cost of rehabilitating the site taking into account the likely surface disturbance over the next 3 years of quarrying operations; and b) Employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Secretary. *Note: If the rehabilitation of the site is completed to the satisfaction of the Secretary, then the Secretary will release the bond. If the rehabilitation of the site is not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.*	Noted.
31. Within 3 months of each Independent Environmental Audit (see Schedule 5 Condition 8), the Applicant shall review, and if necessary revise, the sum of the Conservation and Rehabilitation Bond to the satisfaction of the Secretary. This review must consider the: a) Effects of inflation; b) Likely cost of rehabilitating the site (taking into account the likely surface disturbance over the next 3 years of the development); and c) Performance of the implementation of the rehabilitation of the site to date.	Noted.
Schedule 5 - Environmental Management, Reporting and Auditing	
Management Plan Requirements 2. The Applicant shall ensure that the Management Plans required under this consent are prepared in accordance with any relevant guidelines, and include: a) detailed baseline data;	Section 4
b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 3; Section 7; and Section 7
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance	Section 9

Development Consent conditions	Section addressed
measures/criteria;	
d) a program to monitor and report on the: • impacts and environmental performance of the development; and • effectiveness of any management measures (see (c) above);	Section 11 and 12
e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 11.2
f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 13
g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria; and	Section 12
h) a protocol for periodic review of the plan.	Section 13

3.2 EIS Statement of Commitments

The biodiversity and rehabilitation related Statement of Commitments relevant to the B&RMP, and where they are addressed in this document, is detailed in **Table 3**.

Table 3 Statement of biodiversity-related commitments

Commitment	Section addressed
27. Holcim Australia will review the existing ecological mitigation and management measures set out in the Plan of Management (Readymix 2007) as part of an overall update to the Teven Quarry Environmental Management Plan.	Section 13
28. Holcim Australia will implement the following measures to minimise impacts of the operation on ecological values: • Avoidance of impact on remnant subtropical rainforest community within Lot 1; • Conservation, where possible, of hollow bearing trees; • Implementation of a tree felling procedure to minimise potential impacts on fauna, in particular, koalas; and • Implementation of a rehabilitation strategy targeting regeneration of Eucalypt, Brushbox and Rainforest communities across the non-disturbance areas of the site. • This strategy involves weed management protocols for Camphor Laurel, Lantana and weed species, and targeted planting of a range of recommended native species, including rare and threatened plant species	Section 7.4 Appendix C

Commitment	Section addressed
and species which may be of benefit to threatened fauna species.	
33. A detailed Quarry Closure Plan will be developed approximately three years prior to cessation of quarrying activities. Section 6.5.1 quarrying activities.	Section 7
34. The revised EMP will detail the approach to rehabilitation of the Project, including the species to be used in revegetation works.	Section 5
35. Where practicable, rehabilitation will be completed progressively as part of the ongoing development of the quarry.	Section 5
36. Annual inspections of rehabilitated areas will be undertaken over the life of the Project to assist in guiding rehabilitation practice.	Section 6

3.3 2019 Independent Environmental Audit – Updates

An Independent Environmental Audit (IEA) was completed for Teven Quarry by GHD, with the report dated April 2020. There were several recommendations from that report relevant to this management plan. A copy of the required updates is provided in **Table 4** below.

Table 4 Independent Environmental Audit – Required Updates

Recommendation from Auditor	Comment/Section Covered by Management Plan
Update the management plans required under the consent to include a contingency plan to manage unpredicted impacts.	Section 11.2.
Review the strategies, plans and programs following the annual review, incident report, audit report or modification and maintain evidence of the reviews.	Section 13
Lodge a Conservation and Rehabilitation Bond with the Department, in accordance with Condition 30, Schedule 3.	A Rehabilitation Bond was lodged with the Department in 2017
Notify the Secretary and any other relevant agencies of any incident, within 7 days of the date of the incident, in accordance with Condition 7, Schedule 5.	Section 12.2

4. Baseline Data

4.1 Existing Environment

An ecological assessment of the project area was completed by Warren (1994) as part of the original application to extend the quarry (McCloskey 1995). The assessment identified fauna species listed as threatened under the *National Parks and Wildlife Act 1974,* namely the Greater Broadnosed Bat (*Scoteanax rueppellii*) and Koala (*Phascolarctos cinereus*). Although not listed at the time, the Grey- headed Flying-fox (*Pteropus poliocephalus*) was also recorded.

In 1995, the *Threatened Species Conservation Act 1995* (TSC Act) became the Act that administered threatened species. The above species were subsequently listed under the TSC Act, with the Koala and Grey-headed Flying-fox also listed by the Commonwealth in 1999 under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 5 Threatened Biodiversity recorded in, and adjacent to the Project Area by Warren (1994)

Common name	Scientific name	TSC Act conservation status	Location
Threatened species			
Koala	*Phascolarctos cinereus*	Vulnerable	In project area
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	In project area
Greater Broadnosed Bat	*Scoteanax rueppellii*	Vulnerable	In project area
Threatened ecological communities			
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		Endangered	Directly adjacent to project area
Lowland Rainforest of Subtropical Australia		-	Directly adjacent to project area

Surveys were completed for the Teven Quarry Project EIS by Umwelt (2014). **Table 6** provides a list of the threatened biodiversity Umwelt (2014) identified during surveys for the EIS. Umwelt (2014) identified potential habitat within a 10 km radius of the quarry for the following species not recorded in the project area:

- 27 threatened flora species;
- 34 threatened fauna species; and
- 13 migratory species.

A complete list of these species is provided at **Appendix B.**

4.2 Project Impacts Requiring Rehabilitation and Management

The project area in its entirety was assessed in the original ecological assessment completed by Warren (1994) and was subsequently approved for clearing. However, vegetation has not yet been cleared in some parts of the Extraction Limit Boundary (**Figure 3**). The extent of vegetation clearing required in the Extraction Limit Boundary and the extent to remain in the project area is shown in **Table 6** and **Figure 3**. These areas represent the impacts that require future rehabilitation and management.

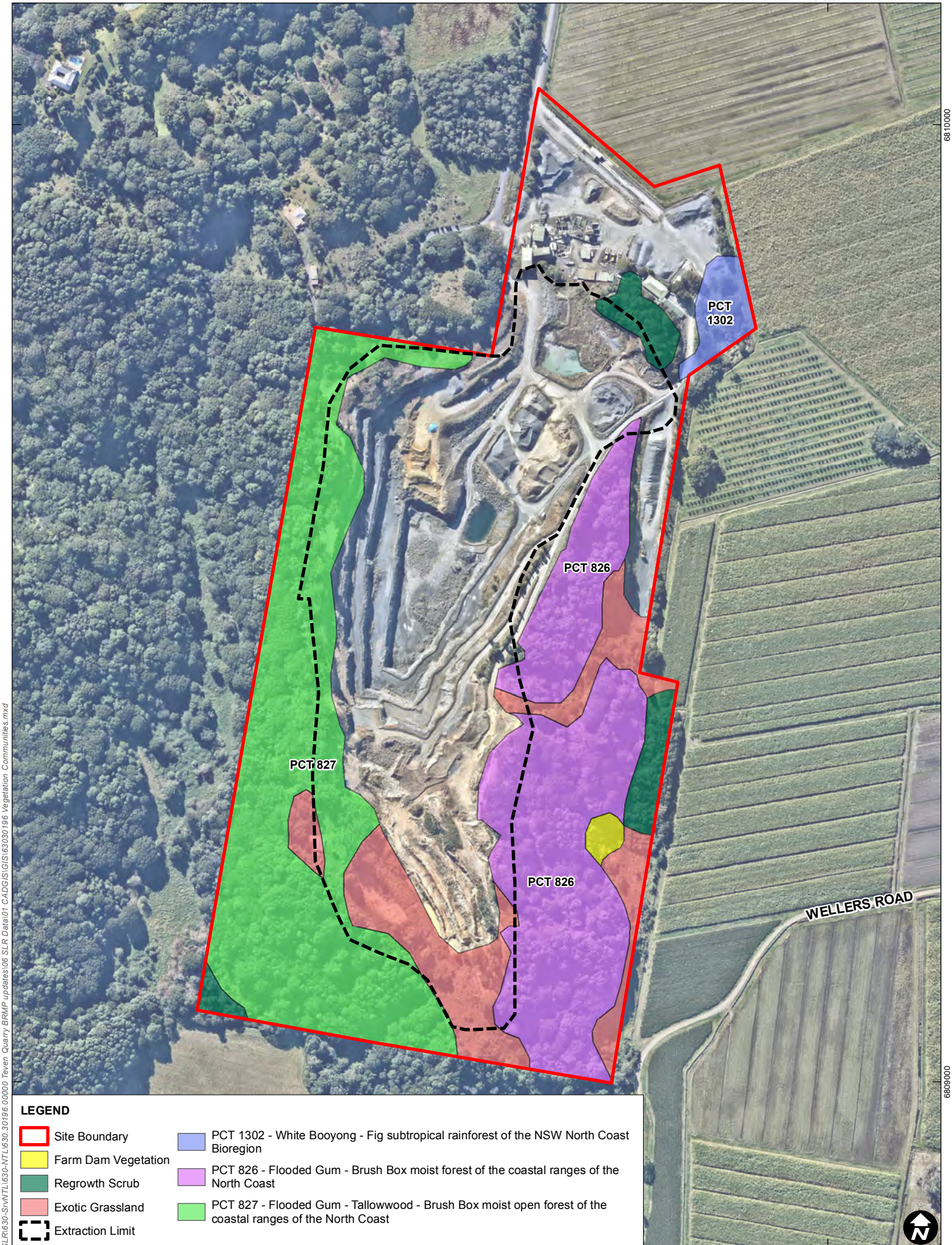
Table 6 Areas of Native Vegetation to be Cleared and Retained in the Project Area

Vegetation Community	Extent to be Cleared in the Extraction Limit Boundary (ha)	Extent to Remain in the Project Area (ha)
Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast (PCT 826)	0.8	5.75
Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast (PCT 827)	1.98	5.94
White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302)	0.00	0.53
Regrowth Scrub	0.11	0.86
Exotic Grassland	0.10	0.52
Farm Dam Vegetation	0.00	0.15
Total	**2.99**	**13.75**

4.3 Vegetation Condition within Retained Vegetation

General condition of the retained vegetation on the project area was assessed by an SLR ecologist in August 2021. Using the National Trust Vegetation Condition method (see **Appendix E**), the condition of retained vegetation was assessed as fair to very poor (**Figure 4**). Exotic weed species including Camphor Laurel (*Cinnamomum camphora*), Small-leaved Privet (*Ligustrum sinense*) and Lantana (*Lantana camara*) occur throughout the retained vegetation of the project area. Several parts of the project area contain patches of exotic grassland with little to no native vegetation.

It should be noted that whilst areas of PCT 827 along the western boundary have a canopy cover dominated by Camphor Laurel (*Cinnamomum camphora*) the understorey contains a diverse range of native flora species. There is also limited evidence of Camphor Laurel regeneration or other weediness. Hence, this section of the project area is categorised as poor-fair within the vegetation condition mapping (**Figure 4**). The control of Camphora Laurel in this area must be managed carefully in stages to allow native canopy species to mature and create canopy in small patches before moving focus onto controlling Camphor Laurel in another stage. Using a staged method will allow for a manageable control of weed species that are likely to become established with the temporary reduction of canopy coverage.


548000
6810000
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PCT 1302
PCT 826
PCT 827
PCT 826
WELLERS ROAD
LEGEND
Site Boundary
Farm Dam Vegetation
Regrowth Scrub
Exotic Grassland
Extraction Limit
PCT 1302 - White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion
PCT 826 - Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast
PCT 827 - Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast
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Scale: 1:5,000 at A4
Coordinate System: GDA 1994 MGA Zone 56
Date Drawn: 07-Sep-2021
Project Number: 630.30196
Data Source: NSW SS, 2021
Aerial imagery supplied by Nearmap (May, 2021)
*VISID524 © State Government of NSW and Department of Planning, Industry and Environment 2010
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Vegetation Communities
FIGURE 3
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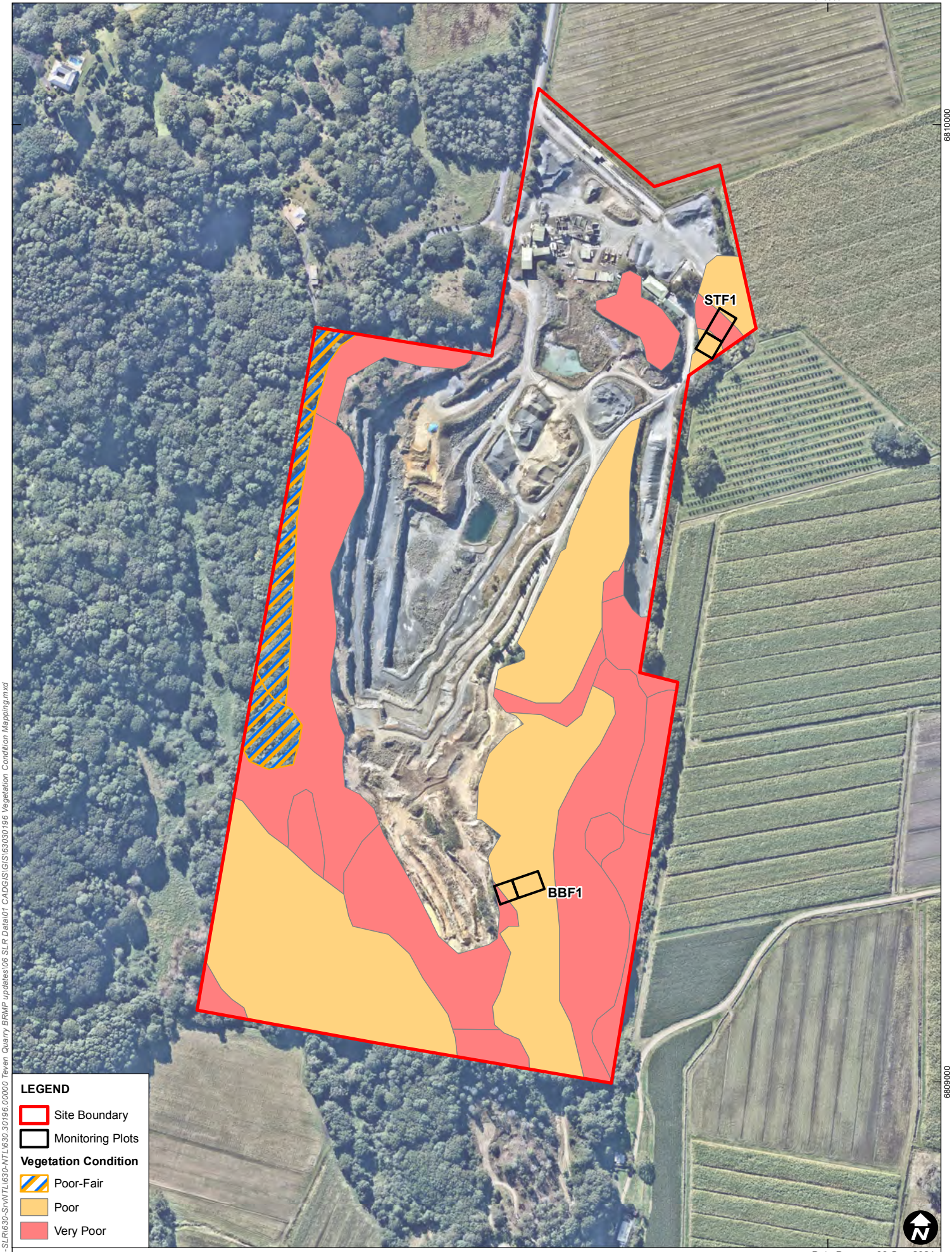

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Date Drawn: 08-Sep-2021
Project Number: 630.30196

Data Source: NSW SS, 2021
Aerial imagery supplied by Nearmap (May, 2021)
*VISID524 © State Government of NSW and Department of Planning, Industry and Environment 2010

SLR

Vegetation Condition Mapping

FIGURE 4

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4.4 Baseline Vegetation Monitoring

Baseline vegetation monitoring, following the methodologies of the Biodiversity Assessment Method (BAM) 2020 was conducted in August 2021 by an SLR Ecologist. Two plots were established for the baseline monitoring, one (BBF1) in PCT 826 and one (STR1) in PCT 1302 as a 20 m x 50 m plot with a nestled 20 m x 20 m floristic plot. The Vegetation Integrity (VI) score for each of these plots at baseline is 21.7 (BBF1) and 19.6 (STR1). Co-ordinates of the Vegetation monitoring plots are shown in **Table 7**. Each plot was selected at random, and a metal star picket was erected at the start and end of the 50 m centre transect. Field datasheets from the baseline monitoring survey are included in **Appendix E**. Plot locations are included in **Figure 4**. These plots are required to be re-surveyed and assessed against targets annually, with data presented in a report and submitted to BCD annually.

Table 7 Baseline Monitoring Plot Locations

Plot	Start		End		Transect Line Bearing
	Easting	Northing	Easting	Northing	
STR1 (PCT 1302)	547896	6809803	547871	6809761	222°
BBF1 (PCT 826)	547655	6809195	547701	6809211	75°

5. Revegetation and Rehabilitation of Retained Vegetation

5.1 Revegetation Areas

Areas outside of the disturbance footprint that are potentially suitable for targeted revegetation were identified by the SLR ecologist during the survey in August 2021. These areas are identified in **Figure 5** and **Table 8**.

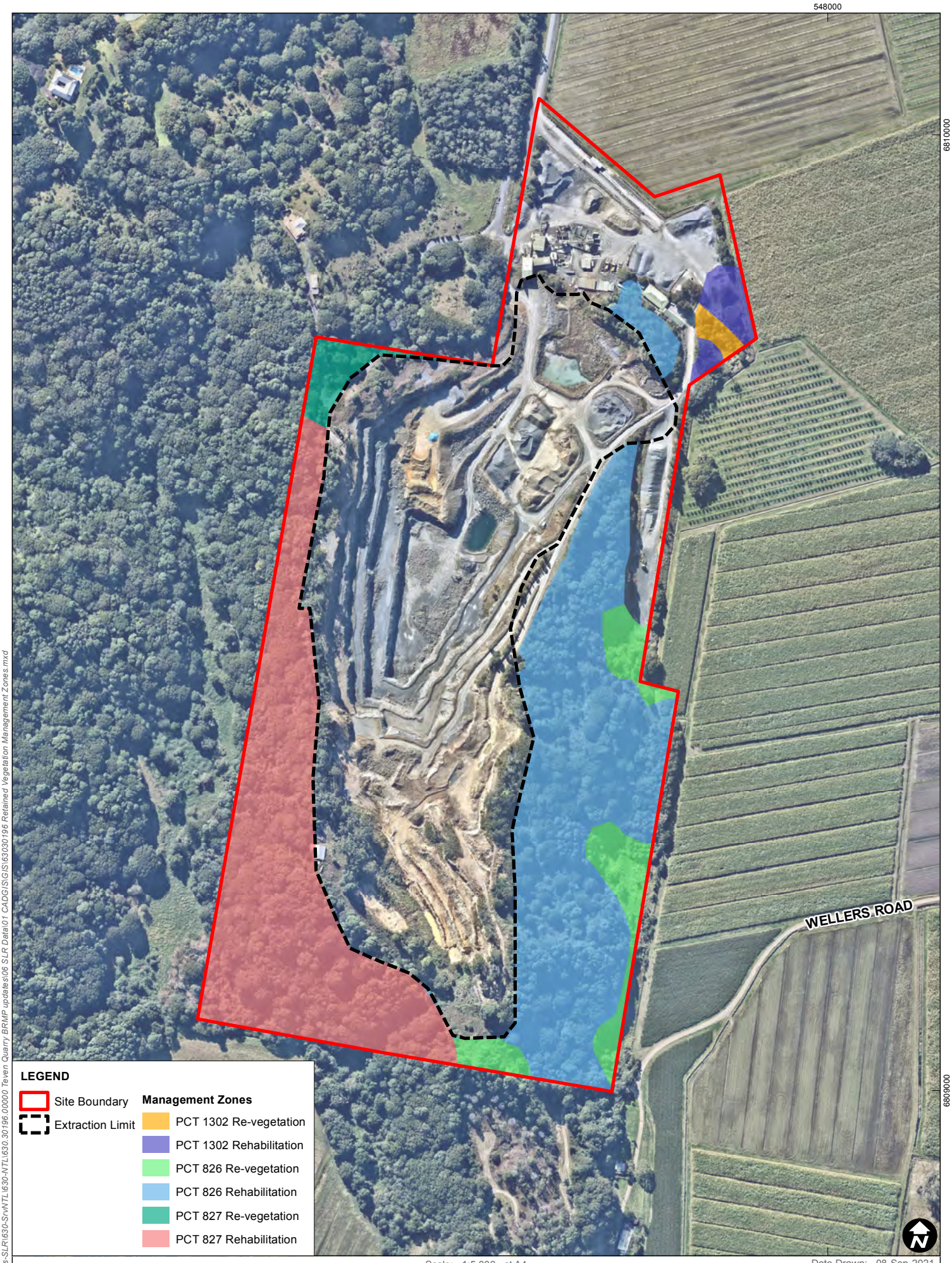
Table 8 Areas of Retained Native Vegetation to be Revegetated

PCT	Total Area (ha)
PCT 826	1.26
PCT 827	0.23
PCT 1302	0.14
Total	**1.63**

The Revegetation Areas would be suitably cleared of weeds and subject to replanting with species of the following PCTs that have been mapped within the project area:

- PCT 827 - Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North;
- PCT 826 - Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast; and
- PCT 1302 - White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion.

The Vegetation Classification Profiles for PCTs, including a list of species in the upper, middle and lower stratum, which would be suitable for planting in these areas are presented in **Appendix C**. Suitable benchmarks for these areas would be 50% of the target PCT benchmarks. Benchmark data is included in **Appendix F**.



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Coordinate System: GDA 1994 MGA Zone 56

Date Drawn: 08-Sep-2021
Project Number: 630.30196

Data Source: NSW SS, 2021
Aerial imagery supplied by Nearmap (May, 2021)
*VISID524 © State Government of NSW and Department of Planning, Industry and Environment 2010

Retained Vegetation Management Zones

FIGURE 5

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5.2 Rehabilitation Areas

The remainder of the Retained Vegetation areas would be suitably rehabilitated using gradual weeding with replanting only where monitoring finds specific areas that would benefit from planting. Areas suitable for rehabilitation are identified in **Figure 5** and **Table 9**.

Table 9 Areas of Retained Native Vegetation to be Rehabilitated

PCT	Total Area (ha)
PCT 826	5.75
PCT 827	5.51
PCT 1302	0.39
Total	**11.65**

Where planting is required plant species are to be selected using the appropriate PCT for the area included in **Appendix C**. Suitable benchmarks for these areas would be 80% of the target benchmarks. Benchmark data is included in **Appendix F**.

5.3 Planting, Weeding and Watering

Planting stocks should be from local provenance origins and suitable evidence of purchase (such as invoices) should be supplied in the annual reports. Any planting is required to be protected by a suitable plant guard to prevent herbivory and followed-up with monthly watering until established. Note it is not practical to undertake planting and monthly waterering in some parts of the quarry's retained vegetation due to limited safe access. Records are required to be kept for any plantings and follow-up surveys and these are to be included in the annual monitoring. An annual assessment of planting success shall be made with recommendations for replacement plantings where required.

Five problematic weeds including two Priority Weeds were identified during the baseline monitoring survey. Weed treatments for key target species and are included within **Table 10**.

Table 10 Weed Treatment for Key Target Species

Weed Species	Status	Location and Nature	Control	Frequency and Timing
Lantana (*Lantana camara*)	**Priority weed** - Prohibition on certain dealings. Must not be imported into the state, sold, bartered, exchanged or offered for sale.	All areas	Physical removal of small infestations. Cut and Paint isolated larger plants using glyphosate. Chemical treat larger infestations using splatter gun technique (glyphosate 360g/L at 10:100 water). Spot spray isolated	Treat during growing season (September to April). Follow up within 3 to 6 months.

			infestations (glyphosate 360g/L at 1:100 water).	
Crofton Weed (*Ageratina adenophora*)	Environmental Weed	PCT 1302 and road-sides	Physical removal of isolated infestations, crown must be removed. Chemical treat infestations (glyphosate 360g/L at 5:1000 water or Metsulfuron-methyl 600 g/kg at 15g per 100L water).	Treat during growing season (September to April). Follow up within 3 to 6 months.
Groundsel Bush (*Baccharis halimifolia*)	**Priority Weed** – Regional Recommendation Measure - The plant or parts of the plant should not be traded, carried, grown or released in the environment	PCT 826	Chemical treat infestations (glyphosate 360g/L at 1:100 water)	Treat during growing season (September to April). Follow up within 3 to 6 months.
Camphor Laurel (*Cinnamomum camphora*)	Environmental Weed	PCT 826 and PCT 827	Cut and paint / basal brush trees <10 cm diameter (glyphosate). Drill injection on large trees (4 ml glyphosate).	Treat during growing season (September to April).
Small-leaf Privet (*Ligustrum sinense*)	Environmental Weed	All areas	Physically remove by Hand pulling plants of <3 cm diameter. Steam injection / basal Brush larger plants (glyphosate)	Treat during growing season (September to April).

6. Monitoring of Retained Vegetation

Annual reports are required to be prepared and to include the outcomes of management activities in areas of retained vegetation, including, but not limited to, updates on vegetation condition and the rehabilitation activities undertaken in that reporting period. Changes in vegetation condition are required to be assessed by periodic determination of vegetation integrity, as per Chapter 4 of BAM 2020, along with reference to the identified benchmarks. Adaptive management procedures to be implemented in response to the results of monitoring.

Annual reports are required to be submitted to the Biodiversity Conservation Division of DPIE.

7. Rehabilitation objectives and criteria

7.1 Rehabilitation objectives

The rehabilitation objectives are provided in **Table 11**, in accordance with Development Consent Schedule 3 Condition 27.

Table 11 Rehabilitation objectives

Feature	Objective
Site (as a whole)	1. Safe, stable and non-polluting 2. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and designed to minimise the visual impacts of the development when viewed from surrounding land 3. Restored with native, endemic vegetation
Surface infrastructure	4. Restored with native, endemic vegetation
Quarry benches	5. Progressive landscaping and revegetation using native tree and understorey species
Quarry pit floor	6. Progressive landscaping and revegetation using native tree and understorey species, above the final anticipated void water level

7.2 Rehabilitation and closure criteria

Rehabilitation and closure criteria will be utilised to demonstrate achievement of rehabilitation objectives. Preliminary rehabilitation and closure criteria were developed as part of the Teven Quarry Project EIS (Umwelt 2014). These criteria have been developed further to incorporate progressive rehabilitation, erosion and sedimentation management, visual impact management and the preparation of a Closure Plan. The criteria are presented in **Table 12**. Triggers for corrective actions and recommended corrective actions, monitoring and reporting to assess rehabilitation performance against the criteria are provided in **Section 9**.

Table 12 Rehabilitation and closure criteria

Rehabilitation objective	Rehabilitation and closure criteria
1. Provide a safe, stable and non-polluting site	• Progressive stabilisation and rehabilitation of quarry benches and floor. • Rehabilitated slopes on overburden dumps are stable, and are battered to a maximum of 25°. • No significant erosion is present that would constitute a

Rehabilitation objective	Rehabilitation and closure criteria
	safety hazard or compromise the capability of support the end land use. • Terminal face rehabilitated landform has been assessed by a qualified geotechnical engineer to validate that it is stable and does not pose a safety risk. An indicative profile is shown in **Figure 4**. • Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff. • Surface layer is free of any hazardous materials. • Any contamination will be appropriately remediated so that appropriate guidelines for land use are met. • Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface. • Monitoring demonstrates soil profile development in rehabilitated areas (eg development of organic litter, litter layer). • Runoff water quality from the site does not pose a threat to downstream water quality. • Appropriate bushfire hazard controls have been implemented. • Appropriate mechanisms are established to control access and manage public safety post-closure.
2. Integrate the final landform with surrounding natural landforms as far as is reasonable and feasible, and minimise visual impacts on surrounding land	• Progressive revegetation of quarry benches and floor with plant species representative of surrounding vegetation communities. • Salvage topsoil and fauna habitat features from cleared areas for later use in rehabilitation. • Construct a visual bund on the western quarry boundary.
3. Restore the site with native, endemic vegetation	• Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities. • Weed levels in retained native vegetation are maintained at a low level and compare with reference sites.
4. Decommission and remove surface infrastructure, unless the Secretary agrees otherwise	• All surface infrastructure which does not have a potential future use associated with the post mining land use will be removed, unless such removal has greater environmental impact than rehabilitating the area with the infrastructure remaining in place. • Removal of all services (power, water and communications). • All infrastructure that is to remain as part of the future land use have been assessed by an appropriately qualified person and determined to be suitable for the intended use and do not pose any hazard to the community.
5. Progressively landscape and revegetate the quarry benches with native tree and understorey species	• Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (ie evidence of fruiting of native species observed). • More than 75% of trees are healthy as indicated by long-term monitoring. • Weeds do not comprise a significant proportion of species in any stratum (ie understorey, midstorey or canopy strata).
6. Progressively landscape and revegetate the quarry	• Low levels of feral fauna observed in area.

Rehabilitation objective	Rehabilitation and closure criteria
pit floor with native tree and understorey species, above the final anticipated water void	

The rehabilitation and closure criteria outlined in **Table 12** have been developed based on an assumed final land use as a native ecosystem. Revised criteria would be developed and documented in the Closure Plan (to be developed) if an alternative final land use is proposed. These criteria will be reviewed throughout the quarry life and used as the basis for further refinement following the commencement of rehabilitation activities, consideration of the results of rehabilitation monitoring programs, and consideration of any stakeholder feedback.

7.3 Proposed final land use

At the completion of extraction and rehabilitation works in the quarry pit, Holcim proposes to primarily establish a native ecosystem on land available for rehabilitation in the pit, overburden and surface infrastructure areas, consistent with surrounding vegetation communities. Areas within the pit that are unsuitable for the establishment of native vegetation communities (eg rock faces) will be rehabilitated to form a safe and stable landform. Quarry benches, bunds and overburden areas will be reshaped, stabilised and revegetated by:

- Striping topsoil from impact areas into loose piles;
- Spreading topsoil with a nominal 10 cm thickness;
- Sowing target flora species (see **Appendix C**); and
- Installing erosion and sedimentation controls in accordance with the Teven Quarry Water Management Plan.

The final landform will be integrated with the surrounding landform through the sowing of target flora species representative of surrounding vegetation communities, and the creation of visual screening. This is discussed further in **Section 9**.

An alternative land use for the pit and surface infrastructure areas identified by Holcim is ongoing light industrial use. However, any such future use would be subject to suitable zoning, environmental assessment and planning approval. It is intended that native vegetation communities would be established on the remaining areas of the site.

Holcim will consider other sustainable and economically productive post-closure land uses as part of the detailed Quarry Closure Plan to be developed. Such post-closure land uses will be considered in the context of local and regional land use strategies that are in operation closer to the end of the quarry's life. Holcim will consult with relevant stakeholders including Ballina Shire Council during development of the Quarry Closure Plan with regard to the proposed final land use.

7.4 Integration of biodiversity management and rehabilitation

Biodiversity management has been integrated with rehabilitation by adopting the hierarchy of avoidance, minimisation and mitigation through rehabilitation. The following avoidance, minimisation and mitigation/rehabilitation strategies will be applied:

- Avoiding impacts on remnant subtropical rainforest (**Figure 3**);
- Avoiding and minimising of hollow-bearing tree removal;
- Minimising potential harm to fauna through implementation of a tree felling procedure;
- Mitigation of vegetation and habitat loss through the implementation of a rehabilitation strategy that targets the regeneration of surrounding Eucalypt, Brushbox and Rainforest communities outside the disturbance footprint, removes target weeds (Camphor Laurel and Lantana), and plants a variety of native species that provide habitat for fauna species; and
- Mitigation of habitat loss through the salvage and re-use of fauna habitat features.

Adoption of the above hierarchy results in an integrated biodiversity management strategy rather than isolated approaches throughout the project life. Mitigation measures will be implemented during operation and rehabilitation of the quarry to ensure impacts to vegetation and fauna follow this hierarchy.

Progressive rehabilitation will be undertaken to ensure visual, erosion and dust impacts are minimised. It should be noted however that the majority of rehabilitation will be completed closer to closure and post closure. Ecologically sensitive areas and areas outside of the extraction limit will be avoided, particularly Lowland Rainforest endangered ecological community, by clearly marking and restricting access to these areas. These areas are important in providing connectivity to native vegetation areas outside of the extraction boundary once rehabilitation has taken place. Retained vegetation will be managed such that impacts are avoided in areas directly adjacent to the extraction limit boundary. Regular inspections will be completed in retained native vegetation and rehabilitation areas to monitor weed infestations. Weed control protocols will be implemented in areas of native vegetation and rehabilitation if infestations are found.

Species to be used for revegetation and reseeding will be representative of surrounding native vegetation communities to ensure successful integration of rehabilitation and biodiversity management at the site. Fauna habitat features and topsoil to will be salvaged for use during rehabilitation, including felled hollow-bearing trees, fallen timber and bush rock. The use of existing materials with newly instated habitat features will encourage fauna to utilise the rehabilitated areas and provide connectivity to adjacent native vegetation and rehabilitation areas.

8. Remnant vegetation and habitat disturbance management controls

The relevant remnant vegetation and habitat disturbance management controls are outlined in **Table 13**.

Table 13 Remnant vegetation and habitat disturbance management controls

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
Pre-clearance surveys				
BR1	Pre-clearance surveys will be completed by a suitably qualified and experienced ecologist prior to any vegetation clearing within the Extraction Limit Boundary. The purpose of the pre-clearance survey is to identify fauna habitat features including tree hollows, hollow logs, burrows, nests, boulders and Koala feed trees (ie Tallowwood) that require management during vegetation clearing.	Previous management plan	Prior to clearing	Quarry Manager Ecologist
BR2	Fauna habitat features will be marked with brightly coloured (ie pink/red) spray paint and flagging tape. The location and type (ie hollow tree) will be recorded using a digital GPS. The results will be tabulated in the pre-clearing report, which will determine the number, type and location of fauna habitat features for management during vegetation clearing. The report will also document the habitat features available for salvage and future use in rehabilitation (see **Section 9**).	Previous management plan	Prior to clearing	Quarry Manager Ecologist
Vegetation clearing procedure				
BR3	The Extraction Limit Boundary will be surveyed by a registered surveyor and clearly marked in the field with survey pegs.	2015 EIS	When clearing	Quarry Manager Ecologist
BR4	The vegetation clearing area will be checked for the presence of Koalas prior to any tree felling. If Koalas are present in the area to be cleared, clearing will cease in this area until such time that the Koala moves outside	2015 EIS	When clearing	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	the clearing area.			Ecologist
BR5	All non-hollow bearing trees will be cleared first, and the clearing of all hollow-bearing trees and Koala feed trees will be avoided, where possible. This will provide hollow-dependent fauna with a chance to self -relocate and reduce handling stress.	2015 EIS	When clearing	Quarry Manager Ecologist
BR6	Hollow bearing trees will be shaken by tapping the tree with the excavator bucket the afternoon/evening prior to clearing.	2015 EIS	When clearing	Quarry Manager Ecologist
BR7	Hollow bearing trees and Koala feed trees will be cleared 24 hours following the clearing of non- hollow bearing trees under the supervision of a suitably qualified and experienced ecologist.	2015 EIS	When clearing	Quarry Manager Ecologist
BR8	The clearing plant operator will fell the tree as slowly as possible to minimise the intensity of the impact to any fauna potentially roosting in the tree hollow.	2015 EIS	When clearing	Quarry Manager Ecologist
BR9	The ecologist will view the tree hollows with an inspection camera for signs of any trapped or injured fauna.	2015 EIS	When clearing	Quarry Manager Ecologist

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
BR10	Injured fauna will be carefully captured by the ecologist and taken to the nearest veterinarian.	2015 EIS	When clearing	Quarry Manager Ecologist
BR11	Juvenile fauna will be carefully captured by the ecologist and taken to the nearest wildlife carer.	2015 EIS	When clearing	Quarry Manager Ecologist
BR12	Felled hollow bearing trees should be left in situ for 24 hours following clearing to allow fauna potentially roosting in the hollows to self-relocate.	2015 EIS	When clearing	Quarry Manager Ecologist
BR13	Where practical, felled hollow bearing trees should be stockpiled for future use in the future rehabilitation areas, where they would provide habitat for ground-dwelling fauna species.	2015 EIS	When clearing	Quarry Manager Ecologist
Weed Management				
BR14	Soil disturbance for quarrying and the entry of machinery from off site has the potential to introduce weeds or cause existing weeds to spread into areas of retained native vegetation and rehabilitation areas. A weed management program will be implemented, consisting of: Regular inspections of the retained native vegetation and rehabilitation areas to identify weed infestations;	2015 EIS	When clearing	Quarry Manager Weed contractor

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	• Weed control in accordance with the techniques prescribed in Noxious and Environmental Weed Control Handbook (http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/noxious-enviro-weed-control); and • Annual review of the noxious weed listings for the Ballina LGA to identify any recently listed species that may require control.			
BR15	Weed control should focus on Camphor Laurel, Lantana and other exotic weeds identified during regular weed inspections.	2015 EIS	When clearing	Quarry Manager Weed contractor
Habitat Reinstatement				
BR16	Where practical, felled hollow-bearing trees and rocks will be stockpiled for future use in the rehabilitation areas. These habitat features will provide shelter habitat in the rehabilitation areas and encourage ground-dwelling fauna to recolonise the cleared area.	2015 EIS	When clearing and in future rehabilitation	Quarry Manager
Bushfire Management				
BR17	The site water management system provides a sufficient water supply to use in the event of a bushfire. Where possible, firefighting equipment including fire hydrants, extinguishers and hose reels are provided at all infrastructure areas and on mobile equipment. Such equipment will be maintained in accordance with Australian Standards and Work Health and Safety guidelines.	2015 EIS	Throughout life of the quarry	Quarry Manager
BR18	Holcim has a history of safe operation of Teven Quarry and the implementation of appropriate bushfire risk measures. Holcim will continue to implement these measures to minimise the risk of bushfire, in	2015 EIS	Throughout life of the quarry	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	consultation with the NSW Rural Fire Service (RFS).			
Erosion and sediment control				
BR19	Appropriate erosion and sediment control works will be implemented and maintained by Holcim in the vicinity of the construction and infrastructure areas. Measures will also be implemented to stabilise the rehabilitation areas prior to revegetation. All erosion and sediment controls will be implemented in accordance with the Teven Quarry Water Management Plan.	2015 EIS	Throughout life of the quarry	Quarry Manager
Retained vegetation management				
BR20	The following management controls and activities are permitted in areas of retained native vegetation (**Figure 3**), ie the area between the extraction limit boundary and project area boundary: • Use and maintenance of existing access tracks; • Exclusion of stock; • Fencing repair/installation (where required); • Erosion and sediment control (where required); • Management of vegetation for bushfire, in consultation with the RFS; • Routine weed control; and • Feral animal control (if required).	2015 EIS	Throughout life of the quarry	Quarry Manager
BR21	Install boundary marking to separate retained vegetation from clearance areas. This will be completed in accordance with *Attachment 4.19A Holcim (Australia) Aggregates Boundary Marking Standard* and Section 6.18 of *Attachment 6.00A Environmental Standards for Aggregate Operations.*	BCD consultation letter March 2021	Throughout life of the quarry	Quarry Manager
BR22	Undertake an annual weeding program.	BCD consultation letter March	Throughout life of the quarry	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
		2021		
BR23	Undertake an annual inspection of retained vegetation areas to assist with management.	BCD consultation letter March 2021	Throughout life of the quarry	Quarry Manager
BR24	Undertake annual vegetation monitoring program at the two established monitoring plots located within PCT 827 and PCT 1032. Monitoring to follow the Biodiversity Assessment Method (BAM) 2020 methodology.	BCD consultation letter March 2021	Throughout life of the quarry	Quarry Manager
BR25	Quarry staff involved with onsite operations will undergo an induction in regard to identifying clearing and disturbance boundary limits and vegetation exclusion zones.	BCD consultation letter March 2021	Prior to starting work as a Teven staff member.	Quarry Manager

9. Rehabilitation management controls

The relevant rehabilitation management controls are outlined in **Table 14.**

Table 14 Rehabilitation Management Controls

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
Progressive rehabilitation				
R1	Rehabilitation will be undertaken progressively to minimise the visual impact of the quarry the potential for erosion and dust generation and provide native vegetation and habitat resources for fauna. Rehabilitation will follow clearing and quarrying activities, which will commence at the highest bench and terminate at the quarry floor. Each bench will be stabilised and revegetated following clearing.	2015 EIS	Throughout life of the quarry	Quarry Manager
Salvage of materials				
R2	Habitat Features Where practical, habitat features including hollow-bearing trees, hollow logs and rocks will be salvaged during vegetation clearing and stockpiled for future use in the rehabilitation areas. These habitat features will provide shelter habitat in the rehabilitation areas and encourage ground-dwelling fauna to recolonise the cleared area.	2015 EIS	During clearing	Quarry Manager
R3	Topsoil Holcim has sufficient volumes of suitable overburden for use during rehabilitation activities. However, local topsoil may be intermittently imported and stockpiled upon availability. Soil testing (including suitability, contamination and weed infestation) will be completed prior to importing soil or other organic materials to the site.	2015 EIS	During clearing	Quarry Manager
R4	Topsoil Where practical, topsoil from cleared areas will be salvaged during clearing	2015 EIS	During clearing	Quarry Manager

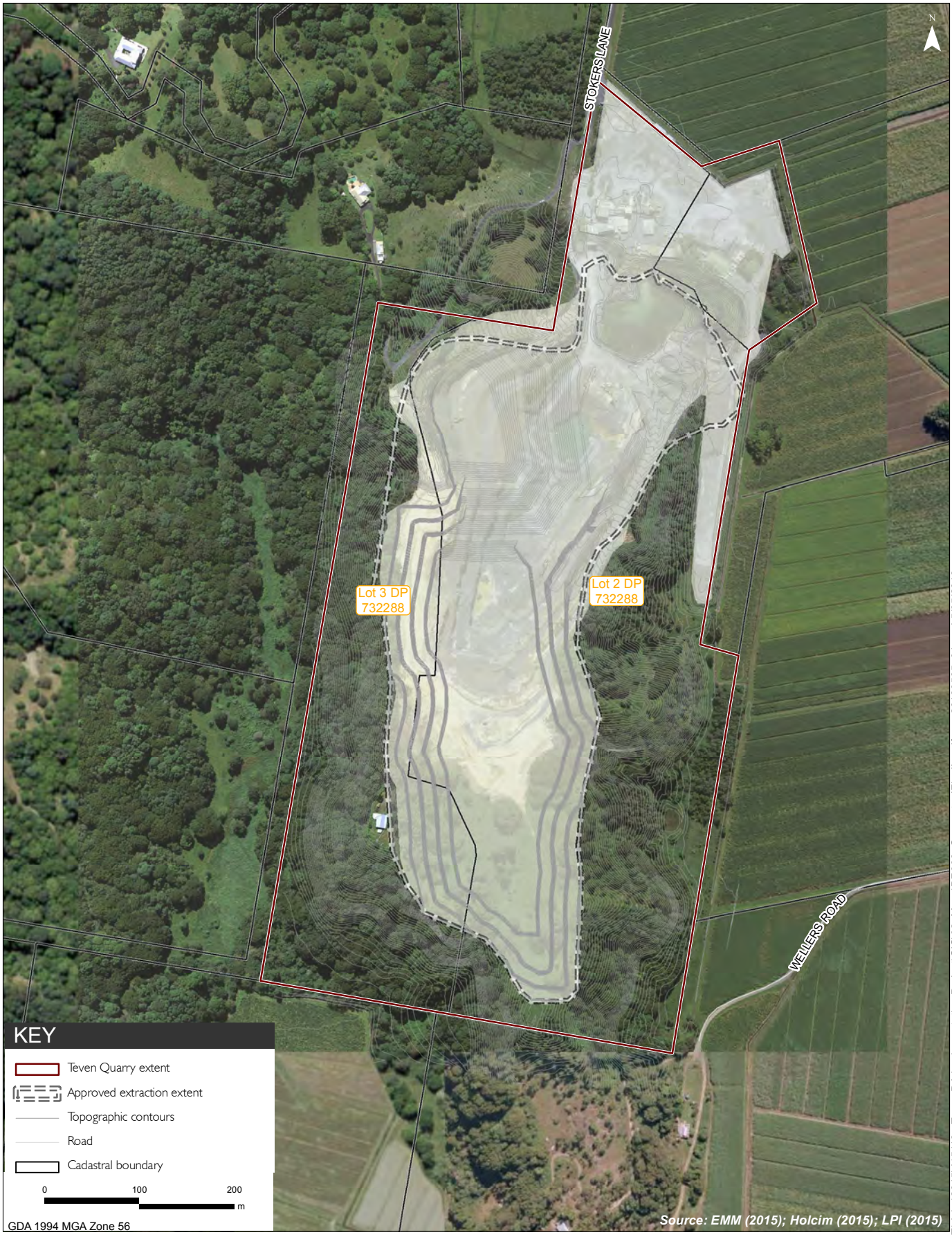
Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	operations and stored for later use on the rehabilitation areas. The following topsoil management controls will be implemented: • Where practical, topsoil will be stripped when moist to maintain soil structure and reduce dust; • Topsoil stockpile sites will be located on level or gently sloping areas to minimise erosion; • Sediment and erosion controls will be implemented to prevent erosion; • The height of topsoil stockpiles will not exceed 3 m, and will be placed in windrows to maximise surface exposure; • Topsoil stockpiles stored in excess of three months will be stabilised with a sterile cover crop to prevent erosion and weed invasion; • Topsoil stockpiles will be monitored regularly for weed growth; • Weed growth will be scalped from the top of topsoil stockpiles prior to re-spreading in the rehabilitation areas; and • Topsoil stockpiles will be appropriately signposted to prevent unauthorised use or disturbance.			
R5	<u>Substrate preparation</u> The substrate should be prepared in accordance with the following measures: • Prior to revegetation, soils will be characterised to determine the type and required application rates of soil ameliorants (ie gypsum, lime, fertiliser, biosolids); • The required soil ameliorants will be applied prior to reshaping of the landform; • In areas where direct seeding is proposed, the soil should be deep ripped parallel to the contour; and • Appropriate erosion and sediment control measures will be implemented.	2015 EIS	During clearing	Quarry Manager
Seed collection and propagation				

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
R6	Holcim personnel will review the feasibility of seed collection in the project area. If it is deemed to be feasible, seed collection will focus on locally native plant species representative of the surrounding native vegetation communities. Where adverse seasonal conditions (ie drought) affect seed production in the project area, local provenance seed (ie within 10–20 km of the project area) should be sought from a local nursery.	2015 EIS	During clearing	Quarry Manager Ecologist
Species and communities to be planted				
R7	The following communities should be the focus of revegetation activities: • PCT 827 - Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North ; • PCT 826 - Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast ; and • PCT 1302 - White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion . Species characteristic of these vegetation communities are recommended for use in revegetation and are listed in Appendix C.	2015 EIS	During rehabilitation	Quarry Manager
Fencing and Access Controls				
R8	The Extraction Limit Boundary should be marked and maintained to prevent access into the retained native vegetation where reasonable and practical, with the exception of contractors undertaking weed and introduced fauna management.	2015 EIS	During clearing	Quarry Manager
Conceptual Final Landform				
R9	The conceptual final landform for the quarry is shown in **Figure 6** and will primarily consist of the rehabilitated western overburden emplacement area, water management structures, and the quarry void. An indicative	2015 EIS	During rehabilitation	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	cross section of the quarry benches in the final void is presented in **Figure 7**, which will comprise the following: • Shaped, stabilised and planted quarry benches; • Planted vegetation screening along the western quarry boundary to minimise visual impacts; • A safety bund (approximately 1.5 m height) at the toe of each bench; • Trees and shrubs planted on backfilled benches; and • A vehicle access track (approximately 3 m wide) with spoon drains to redirect water runoff along each bench.			
R10	Quarry Pit Rehabilitation of the quarry pit will be achieved by battering back the upper bench in highly weathered material to achieve a stable sloping landform of approximately 1V:2H. The gradient of this conceptual final landform is considered to result in a safe and stable landform. Notwithstanding, Holcim will conduct ongoing stability monitoring throughout the life of the quarry.	2015 EIS	During rehabilitation	Quarry Manager
R11	Quarry Pit Quarry benches will be rehabilitated with overburden material. A 1.5 m high bund will be created at the toe of each quarry bench to act as a safety barrier and redirect water runoff. The overburden will then be covered with stored topsoil or a suitable alternative that is seeded with locally endemic plant species. A sterile cover crop will be applied prior to native seed broadcasting to stabilise the topsoil. The safety bund will be direct seeded with endemic grass species.	2015 EIS	During rehabilitation	Quarry Manager
R12	Quarry Pit Where possible, rehabilitation will be completed progressively as part of the ongoing development of the quarry. Opportunities for progressive rehabilitation of the quarry pit will be limited until such time as the quarry pit	2015 EIS	During rehabilitation	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	has expanded to its full extent. Terminal quarry pit walls will be progressively rehabilitated once they are available, and opportunities for progressive rehabilitation within the pit will be sought and implemented during staged quarry development.			
R13	Quarry Pit Rehabilitation areas will be seeded/planted with a mixture of locally endemic plant species, representative of the surrounding vegetation communities. Revegetation will be conducted using direct seeding with locally endemic species and a cover crop for stabilisation. Where direct seeding is not possible or fails to establish native species cover, native tubestock should be planted. Planting tubestock is considered appropriate for steep slopes.	2015 EIS	During rehabilitation	Quarry Manager
R14	Quarry Pit Security measures including a fence, appropriately designed safety berms and signage will be installed and maintained in consultation with the landowner and the relevant government agencies. Measures to restrict access and manage public safety following site closure will be developed as part of the Quarry Closure Plan.	2015 EIS	During rehabilitation	Quarry Manager
R15	Overburden emplacement areas Overburden will be placed in the western overburden emplacement area (see **Figure 6**), in accordance with the following measures: • Slopes will be battered to a maximum of 25°; • The surface of the overburden emplacement area will be constructed such that excess ponding of surface water is prevented and a profile is created that is broadly commensurate with the local topography; • A surface drainage network will be established that diverts most surface water away from the final pit and the replenishment of natural catchment areas is maximised;	2015 EIS	During rehabilitation	Quarry Manager

Mitigation ID	Mitigation Measures	Reference Document	When Required	Responsibility
	• The overburden emplacement area will be covered with topsoil (or a suitable alternative) and seeded with local provenance seed; and • A sterile cover crop will be applied prior to broadcasting local provenance seed.			
R16	Surface infrastructure areas During decommissioning, the processing plant, workshop and other buildings no longer required will be removed. Where required, the product stockpile, processing plant, workshop, office and weighbridge areas will be reshaped, deep ripped, topsoiled and revegetated.	2015 EIS	During rehabilitation	Quarry Manager
R17	Holcim Australia will implement the following measures to minimise impacts of the operation on ecological values: • Avoidance of impact on remnant subtropical rainforest community within Lot 1; • Conservation, where possible, of hollow bearing trees; • Implementation of a tree felling procedure to minimise potential impacts on fauna, in particular, koalas; and • Implementation of a rehabilitation strategy targeting regeneration of Eucalypt, Brushbox and Rainforest communities across the non-disturbance areas of the site. This strategy involves weed management protocols for Camphor Laurel, Lantana and weed species, and targeted planting of a range of recommended native species, including rare and threatened plant species and species which may be of benefit to threatened fauna species.	Statement of Commitments	During rehabilitation	Quarry Manager
R18	A detailed Quarry Closure Plan will be developed approximately three years prior to cessation of developed approximately three years prior to cessation of quarrying activities. Section 6.5.1 quarrying activities.	Statement of Commitments	Three years prior to closure	Quarry Manager
R19	The revised EMP will detail the approach to rehabilitation of the Project, including the species to be used in revegetation works.	Statement of Commitments	This document	Quarry Manager
R20	Where practicable, rehabilitation will be completed progressively as part of the ongoing development of the quarry.	Statement of Commitments	During rehabilitation	Quarry Manager
R21	Annual inspections of rehabilitated areas will be undertaken over the life of the Project to assist in guiding rehabilitation practice.	Statement of Commitments	Annual during rehabilitation	Quarry Manager

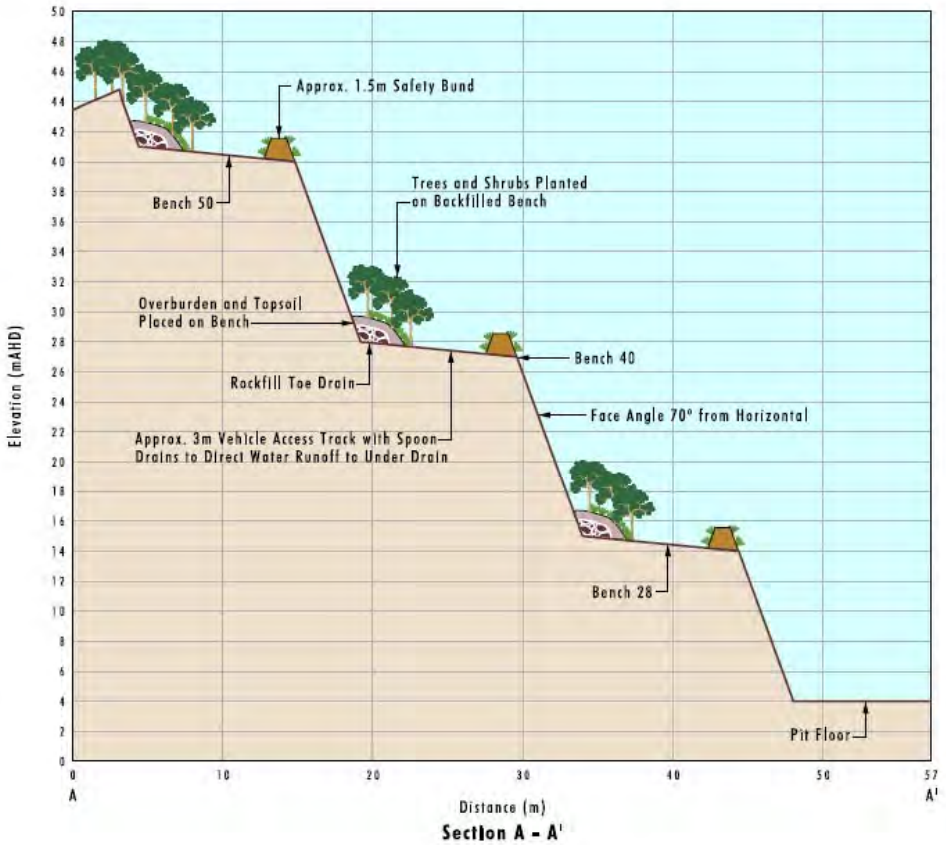


Conceptual final landform

Teven Quarry
Biodiversity and Rehabilitation Management Plan

Figure 6

Plan



Section A – A'

Legend

- Project Area
- Extraction Limit Boundary
- Cross-Section Location
- Proposed Final Landform
- Safety Bund
- Overburden
- Rockfill Toe Drain
- Trees
- Grass

Image Source: Holcim (Australia) Pty Ltd (2014)
Data Source: Holcim (Australia) Pty Ltd (2014)

Plan 1:8 000

Section 1:400

File Name (A4): R01/3230_038.dgn
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Indicative Cross-section of Rehabilitated Quarry Benches

Figure 7

10. Short, medium and long-term biodiversity management measures

Specific measures have been provided to be implemented in the short, medium and long-term during the quarry's life. Short-term measures will be completed between 0-3 years, medium-term actions from 3-10 years and long-term measures from 10-30 years. These measures and the timing of their implementation are described in **Table 15**.

Table 15 Timing of implementation

Measure	Timing of implementation		
	Short term (0-3 years)	Medium-term (3-10 years)	Long-term (10-30 years)
Decommissioning			□
Pre-clearance surveys prior to vegetation clearing	□	□	□
Stablised slopes to be rehabilitated on overburden dumps and contour banks.	□	□	□
Progressive rehabilitation to avoid visual, erosion and dust impacts from the works.	□	□	□
Install erosion and sediment controls.	□	□	□
Rehabilitation of any contaminates.	□		
Spread of topsoil or a suitable alternative over rehabilitation surfaces to develop a soil profile	□	□	□
Appropriate bushfire hazard controls Implemented	□	□	□
Strip topsoil from impact areas.	□	□	□
Sow target flora species in rehabilitation areas	□	□	□
Retained vegetation strategy to avoid ecological sensitive areas and areas outside of the extraction limit.	□		
Weed controls in areas of native vegetation and rehabilitation areas when infestations are found.	□	□	□
Salvage of fauna habitat features and topsoil.	□	□	□
Staged clearing of hollow-bearing and Koala trees.	□	□	□

10.1 Measures to be implemented over the next three years

Activities at Teven Quarry over the next three years will focus on development of the quarry and to commence progressive rehabilitation. The primary short-term objectives (i.e. next 3 years) will be to minimise the impacts of quarry to biodiversity, and commence progressive rehabilitation as soon as practical. Biodiversity management and rehabilitation activities will consist of the following during the next three years:

- Weed monitoring and identification of introduced fauna control requirements;
- Weed management to enhance the value of remnant native vegetation;
- Rehabilitation activities where possible; and
- Commencement of the rehabilitation monitoring program (if any active rehabilitation has been undertaken).

11. Ecological and rehabilitation monitoring and management

Rehabilitation monitoring is required by Condition 29(g) of the Development Consent (SSD 6422). This chapter details the rehabilitation monitoring program, completion criteria and reporting requirements for Teven Quarry. Baseline monitoring of areas of retained native vegetation was undertaken by SLR in August 2021.

11.1 Rehabilitation monitoring and reporting

Rehabilitation areas will be monitored on an annual basis, by site staff, for the life of quarrying operations. An annual report of monitoring results will be completed in accordance with the Teven Quarry Annual Review, in accordance with the Development Consent.

The following variables will be monitored:
- Soil conditions and erosion;
- Performance of drainage and sediment control structures;
- Runoff water quality;
- Native plant germination rates;
- Plant health; and
- Weed infestation.

The rehabilitation monitoring results will be reviewed and the required corrective measures will be determined. Depending on the monitoring results, the following corrective measures may be required:
- Weed and feral animal control in rehabilitation areas;
- Erosion control;
- Additional seed broadcasting or planting tubestock where germination and/or survival rates are low; and
- Repair of fences, access tracks and other general land management.

The monitoring program and implementation of corrective actions will be continued until it can be demonstrated that the completion criteria have been satisfied.

Holcim will record the details of each rehabilitation and revegetation action undertaken to facilitate a review of their effectiveness, allow for adaptive management and achievement of good environmental outcomes. The following will be recorded:
- Landform design details;
- Drainage design details;
- Substrate characterisation;
- Site preparation techniques (eg topsoil source, time of sowing, soil ameliorants applied);
- Revegetation methods (eg cover crop and rate, seed germination rates);
- Weather conditions;
- Photographic records; and
- Corrective actions implemented.

11.2 Monitoring progress of rehabilitation against performance criteria (Contingency Response)

Rehabilitation performance indicators are provided in **Section 7**. Rehabilitation monitoring against performance indicators will be undertaken progressively during rehabilitation of the site. Refinement of closure criteria will be undertaken through the development of a Closure

Plan, which will be developed three years from closure. There have been no changes to closure criteria during the 2021 document review.

Monitoring rehabilitation progress against closure criteria provides a positive feedback loop whereby, based on the results of monitoring, specific actions can be implemented to assist in the progression of rehabilitation and achievement of rehabilitation goals and objectives.

The rehabilitation performance indicators will be reviewed and revised in consultation with DPIE throughout the life of quarrying operations and used as the basis for further refinement following:

- Ecological management activities;
- Consideration of the results of rehabilitation monitoring programs; and
- Consideration of stakeholder feedback.

It is envisaged that this process will occur as part of subsequent reviews of the B&RMP that are submitted to DPIE.

The gradual achievement (or otherwise) of these completion criteria will be assessed and discussed in the annual monitoring report, which will include the identification of instances where criteria is not met, and measures taken to address any issue.

Rehabilitation monitoring will determine how the site is tracking against completion criteria. It is noted that much of the rehabilitation at site will not be completed until close to closure.

The contingency response regarding the site's progress against rehabilitation monitoring is outlined in **Table 16**.

Table 16 Rehabilitation and closure criteria and triggers for corrective action (Contingency Response)

Rehabilitation objective	Performance criteria	Triggers for corrective action	Recommended corrective actions	Monitoring	Reporting
1. Provide a safe, stable and non-polluting site	• Progressive stabilisation and rehabilitation of quarry benches and floors	• Works have been completed on quarry bench or floor however rehabilitation has not commenced	• Commence rehabilitation of quarry bench/floor	• Keep records of the staging of works	• Annual reporting
	• Rehabilitated slopes on overburden dumps are stable, and are battered to a maximum of 25°	• Rehabilitated slopes on overburden dumps are eroding	• Stability assessment of overburden dumps by a qualified geotechnical engineer • Re-shape and spray with cover crop	• Visual stability inspections	Annual reporting
	• No significant erosion is present that would constitute a safety hazard or compromise the capability of support the end land use	• Erosion observed during rehabilitation monitoring	• Stability assessment by a qualified geotechnical engineer • Stabilise surface prior to significant erosion occurring	• Visual erosion inspections	• Annual reporting
	• Terminal face rehabilitated landform has been assessed by a qualified geotechnical engineer to validate that it is stable and does not pose a safety risk. An indicative profile is shown in **Figure 7**	• Terminal face landform is unstable	• Stability assessment of terminal face by a qualified geotechnical engineer • Compact and spray with cover crop	• Visual landform stability inspections	• Annual reporting
	• Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff	• Evidence of overtopping and scouring from runoff	• Stability assessment of contour banks by a qualified geotechnical engineer as required • Re-shape and spray with cover	• Visual contour bank inspections	• Annual reporting

Rehabilitation objective	Performance criteria	Triggers for corrective action	Recommended corrective actions	Monitoring	Reporting
	• Surface layer is free of any hazardous materials	• Hazardous materials observed in surface layer	• Contamination assessment by a suitably qualified contamination specialist • Demark area and test to confirm contamination. If contaminated excavate and remove to a licensed facility	• Visual inspections to identify contamination	• Annual reporting
	• Any contamination will be appropriately remediated so that appropriate guidelines for land use are met	• Contamination is identified	• Remediation plan developed by a suitably qualified contamination specialist • Excavation and removal of contaminated material to a licensed facility	• Visual inspections to identify contamination	• Annual reporting
	• Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface	• Unsuitable soil has been spread, or not spread uniformly	• Import suitable soil or spread soil uniformly	• Visual inspection to determine topsoil spreading and quality	• Annual reporting
	• Monitoring demonstrates soil profile development in rehabilitated areas (eg development of organic litter, litter layer)	• Soil profile not well developed	• Add woody debris or mulch	• Visual inspection to ensure suitable development of topsoil growth media	• Annual reporting
	• Runoff water quality from the site does not pose a threat to downstream water quality	• Runoff water quality outside of the benchmarks outlined in the Teven Water Management Plan	• Treat water in accordance with water management plan prior to discharge off site	• Water quality monitoring in accordance with the Teven Quarry Water Management Plan.	• Annual reporting
	• Appropriate bushfire hazard controls have been implemented	• Bushfire	• Review bushfire management procedures and asset protection	• Event-driven bushfire monitoring	• Annual reporting

Rehabilitation objective	Performance criteria	Triggers for corrective action	Recommended corrective actions	Monitoring	Reporting
			zones		
	• Appropriate mechanisms are established to control access and manage public safety post-closure	• Unauthorised entry	• Review fencing and security measures and implement appropriate measures to secure the site where reasonable and practical	• Visual inspection of fencing and security measures	• Annual reporting
2. Integrate the final landform with surrounding natural landforms as far as is reasonable and feasible, and minimise visual impacts on surrounding	• Revegetation of quarry benches and floor with plant species representative of surrounding vegetation communities	• Unsuitable plant species used in revegetation (ie those not locally sourced or different species than those listed in **Section 4** and Appendix C)	• Use locally sourced plant species from the recommended list in Appendix C	• Audit of species against the target communities and provenance	• Annual reporting
	• Salvage topsoil and fauna habitat features from cleared areas for later use in rehabilitation	• Topsoil and habitat features stockpiled, and not spread across the rehabilitation area	• Evenly spread topsoil fauna habitat features across the rehabilitation area	• Visual inspection of topsoil and fauna habitat features	• Annual reporting
	• Construct a visual bund on the western quarry boundary	• Survival of planted visual bund tubestock falls below 70%, and/or does not provide appropriate screening	• Replace lost tubestock	• Quarterly monitoring to determine survival rates of tubestock	• Annual reporting
3. Restore the site with native, endemic vegetation	• Revegetation areas contain flora species assemblages characteristic of the desired native vegetation	• Unsuitable plant species used in revegetation (ie those not locally sourced or	• Use locally sourced plant species from the recommended list in Appendix C	• Audit of species against the target communities and provenance	• Annual reporting

Rehabilitation objective	Performance criteria	Triggers for corrective action	Recommended corrective actions	Monitoring	Reporting
	communities.	different species than those listed in **Section 7** and Appendix C			
		• Survival of planted tubestock falls below 70%	• Replace lost tubestock	• Quarterly monitoring to determine survival rates of tubestock	• Annual reporting
	• Weed levels in retained native vegetation are maintained at a low level and compared with reference sites	• Weed levels exceed those recorded at reference sites	• Weed control using best practice guidelines	• Follow-up weed inspections	• Annual reporting
4. Decommission and remove surface infrastructure, unless the Secretary agrees otherwise	• All surface infrastructure which does not have a potential future use associated with the post mining land use will be removed, unless such removal has greater environmental impact than rehabilitating the area with the infrastructure remaining in place	• Surface infrastructure not removed by decommissioning stage	• Remove surface infrastructure	• Monitoring in accordance with the Closure Plan to be developed	• Reporting in accordance with the Closure Plan to be developed
	• Removal of all services (power, water and communications)	• Services not removed by decommissioning stage	• Remove services	• Monitoring in accordance with the Closure Plan to be developed	• Reporting in accordance with the Closure Plan to be developed.
	• All infrastructure that is to remain as part of the future land use have been assessed by an	• Infrastructure not assessed by decommissioning stage	• Assess infrastructure to remain	• Monitoring in accordance with the Closure Plan to be developed	• Reporting in accordance with the Closure Plan

Rehabilitation objective	Performance criteria	Triggers for corrective action	Recommended corrective actions	Monitoring	Reporting
	appropriately qualified person and determined to be suitable for the intended use and do not pose any hazard to the community				to be developed
5. Progressively landscape and revegetate the quarry benches with native tree and understorey species	• Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (ie evidence of fruiting of native species observed)	• No evidence of fruiting/seeding observed	• Source suitable local seed and replant species that are not fruiting	• Comparison of short-term monitoring results (0-3 years) with medium term (3-10 years) results	• Annual reporting
6. Progressively landscape and revegetate the quarry pit floor with native tree and understorey species, above the final anticipated water void level	• More than 75% of trees are healthy as indicated by long-term monitoring	• Less than 75% of trees are healthy	• Plant additional trees	• Comparison of long-term (10-30 years) plant survival when compared with numbers originally planted	• Annual reporting
	• Weeds do not comprise a significant proportion of species in any stratum (ie understorey, midstorey or canopy strata)	• New noxious weed species recorded	• Engage a weed control contractor	• Floristic plots in retained native vegetation and rehabilitation areas to determine weed coverage.	• Annual reporting
	• Low levels of feral fauna observed in area	• Fox observed in the project area • Rabbit warrens observed in the project area	• Engage a suitably qualified pest contractor to undertake pest control	• Visual inspection for scats and tracks	• Annual reporting

11.3 Risks to the successful implementation of the plan

Risks to the successful implementation of this plan include:

- Poor definition of roles and responsibilities for implementation;
- Failure of responsible parties to complete required actions;
- Failure to complete adequate reviews of the plan and implement corrective actions;
- Vegetation clearing outside the Extraction Limit Boundary; and
- Stochastic events that affect revegetation success, i.e. bushfire or drought.

These risks will be managed through a clear definition of roles and responsibilities, adhering to regular reviews of the plan, adherence to the Extraction Limit Boundary and adaptive management.

12. Reporting and Compliance Management

12.1 Annual Review

A summary of rehabilitation and remnant vegetation monitoring results and management works including rehabilitation will be provided in the Teven Quarry Annual Review in accordance with Schedule 5 Condition 4 of the Development Consent.

12.2 Incident Reporting

Clearing outside the Extraction Limit Boundary will be managed in accordance with the Teven Quarry EMS which includes a procedure for the management of environmental incidents and community complaints. Reporting and management of incidents will be completed as per **Table 17**.

Table 17 Reporting and Management of Incidents

Aspect	Summary
Initial Notification	As soon as practical after becoming aware of the breach of results due to quarry activities, the Quarry Manager will notify the Holcim NSW Planning and Environment Manager and enter the incident into the Holcim Safety, Health & Environment (SHE) reporting database (INX). The Quarry Manager will notify the Secretary of the DPIE of the EPA of the incident as soon practicable.
Reporting	A report will be prepared and submitted by the Quarry Manager to the DPIE and EPA within 7 days of becoming aware of the incident, this report will include: • Cause of the non-compliance. • Environmental Harm caused due to the non-compliance. • Actions undertaken to rectify the non-compliance and ensure.
Subsequent Review	Following the reporting of subsequent review, should it be concluded that the Quarry is the source of elevated pollutant levels, the continuous improvement process outlined in the EMS is to be implemented and corrective actions identified.

12.3 Complaint Response

Complaints relating to biodiversity or rehabilitation from Teven Quarry are to be managed in accordance with the requirements of the Teven Quarry EMS. A summary of complaints will be available to regulatory authorities on request, published on the Holcim website and provided in the Annual Review.

12.4 Training

Staff involved with onsite operations will undergo an induction in regard to identifying clearing and disturbance boundary limits and vegetation exclusion zones. Those completing rehabilitation work at Teven Quarry will be provided a copy of this management plan to assist with rehabilitation and closure implementation. Training will be provided to on-site personnel in regard to avoiding sensitive vegetation (listed in **Table 5** and **Appendix B**).

13. Review and Improvement

Ongoing monitoring and review of the performance and implementation of this plan will be undertaken in accordance with the Teven Quarry EMS.

As per Schedule 5, Condition 5 of the Development Consent, Holcim will review, and if necessary revise, the plan within three months of the submission of an:

- Annual review;
- Incident report;
- Audit report; and
- Any modifications to the Development Consent.

In terms of sub clause a), the requirement to review and update management plans will be assessed during the preparation of each Annual Review. The Annual Review will state which management plans require updating and which management plans do not require updating. Details on the requirements to prepare Annual Reviews are outlined in the Environmental Management Strategy.

Updated versions of management plans will be put on the website.

14. Roles and Responsibilities

The roles and responsibilities for implementing this plan are provided in **Table 18**.

Table 18 Roles and responsibilities

Role	Responsibilities
Holcim Australia General Manger and Operations Manager	• Approve appropriate resources for the effective implementation of this plan
Teven Quarry Manager	• Allocate sufficient resources to facilitate implementation of this B&RMP • Coordinate implementation of this B&RMP • Review the plan and audit its implementation against the conditions of development consent • Coordinate rehabilitation monitoring • Evaluate and report monitoring results
Holcim Planning and Approvals Manager	• Coordinate biodiversity-related incident investigations and reporting as required by legislation and internal standards and guidelines
Holcim Environmental Manager	• Assist with the review of this plan • Assist with biodiversity-related incident investigations and reporting as required by legislation and internal standards and guidelines
All employees and contractors of Teven Quarry	• Comply with all requirements of this plan • Report all potential environmental incidents immediately to the supervisor • Seek approval from the Teven Quarry Manger prior to changing infrastructure/processes which may result in impacts to biodiversity and rehabilitation areas

15. References

BW McCloskey Development Consultants 1995, Environmental Impact Statement: Extractive Industry and Gravel Crushing Plan Fox's Quarry – Stokes Lane Teven, Lots 2 and 3 DP732288 Shire of Ballina.

EMM Consulting 2019. Pollution Reduction Program – Teven Quarry – Review of Current Sediment Basin Management and Stormwater Management.

GHD April 2020. Teven Quarry Project Independent Environmental Compliance Audit.

National Trust of Australia 1999, Bush Regenerators Handbook, NSW National Trust of Australia, Sydney.

Umwelt 2014, Teven Quarry Project Environmental Impact Statement, report to Holcim Australia.

16. Change Information

Table 19 summarises the main changes in the management plan updates.

Table 19 Summary of Document Changes

Version	Date	Change Summary
1	May 2016	Original management plan
2	August 2020	Review of the template for all Teven management plans; • General structure updates; • Section 2- Consultation – separate section; • Section 3 – Statutory requirements; • Section 6 and 7 – inclusion of responsibilities and timing for controls; • Section 11 – inclusion of change information. The following did not change: • No change to monitoring or reporting requirements; and • No change to figures.
3	November 2021	See Appendix A for changes in response to DPIE's review and BCD's review.

DPIE

Dear Evan Smith,

The Department is requesting that you provide additional information in relation to the Teven Quarry - B&RMP.

Please access your profile for details of this request and to upload your response. You are requested to provide this response by 6/11/2020.

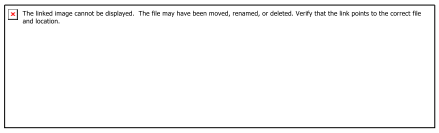
If you have any enquiries, please contact Mark Davis at Mark.Davis@planning.nsw.gov.au .

To sign in to your account click here or visit the Major Projects Website.

Please do not reply to this email.

Kind regards

Department of Planning, Industry and Environment



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Planning, Industry & Environment

Mr Evan Smith
Environmental Manager

Teven Quarry
By email: evan.smith@lafargeholcim.com

07/10/2020

Dear Mr. Smith

Teven Quarry (SSD-6422)
Request for Additional Information

I refer to your submission of the revised Biodiversity & Rehabilitation Management Plan (B&RMP), dated August 2020, in accordance with condition 29 of Schedule 3 of the Teven Quarry development consent (SSD-6422).

The Department has carefully considered the revised B&RMP and requests that you provide additional information as detailed in Attachment A.

You are requested to provide the revised B&RMP to the Department by Fri 06 November 2020. If you are unable to meet this deadline, you are required to provide an updated timeframe for the provision of this information.

If you have any questions, please contact Mark Davis at 8275 1518.

Yours sincerely

Colin Phillips

Colin Phillips
Team Leader
Resource Assessments (Coal & Quarries)

Teven Quarry
Department of Planning Industry and Environment
Biodiversity & Rehabilitation Management Plan Review – Oct 2020

Biodiversity & Rehabilitation Management Plan, Schedule 3, Condition 29	**Satisfactory (Yes/No)**	**Comment**	**Action Required**	**Holcim Response**
Biodiversity & Rehabilitation Management Plan (B&RMP) 29. The Applicant shall prepare and implement a Biodiversity and Rehabilitation Management Plan for the site to the satisfaction of the Secretary. The plan must: a) Be prepared in consultation with OEH, and be submitted to	**Partial**	• 29.a requires consultation with the BCD (formerly OEH) in the preparation of the amended B&RMP. • The Quarry's Consent	Holcim must update this plan to address the DPIEs comments.	• Biodiversity Management Plan sent BCD on 4 February 2021. Feedback was received on the 9 March 2021. Holcim have addressed BCD feedback

Biodiversity & Rehabilitation Management Plan, Schedule 3, Condition 29	**Satisfactory (Yes/No)**	**Comment**	**Action Required**	**Holcim Response**
the Secretary for approval within 6 months of the date of this consent, unless the Secretary agrees otherwise;		allows, with the Secretary's approval, for the revised management plan to be prepared without further agency consultation. However, as comments were not provided by BCD (OEH) in 2016 DPIE requires that consultation with BCD be undertaken for this revised 2020 B&RMP. Copies of consultation for the 2020 version of the B&RMP need to be included in an Appendix to the B&RMP. • Section (S.) 2.2 'update management' (plan).		(see Appendix A).
b) Provide details of the conceptual final landform and associated land uses for the site;	**Yes**	• S.5.3 & S.7 R9-R21.		
c) Describe how the management of biodiversity would be integrated with the overall rehabilitation of the site;	**Yes**	• S.5.4		
d) Include detailed performance and completion criteria for evaluating the performance of the biodiversity management measures and rehabilitation of the site, including triggers for any necessary remedial action;	**No**	• DPIE requires clarity on how the adjacent weeds (Commitment 28 dot-point 4) are managed. The criterion that weeds being at the same levels as adjacent sites is not acceptable if those sites are infested with weeds i.e. Camphor Laurel Forest,	Where is the evidence for the Weed Management Program?	• Weed management in retained vegetation areas is addressed by Section 5.4 and Table 9 (BR20). The wording for weed criteria has been changed to compare against reference sites: '*weed levels in retained native vegetation are maintained at a low level and compared with reference sites*'. Weed management across the site during different

Biodiversity & Rehabilitation Management Plan, Schedule 3, Condition 29	Satisfactory (Yes/No)	Comment	Action Required	Holcim Response
		which is 100% weeds.		stages of the quarry including clearing, and rehabilitation are addressed by Section 5.3, Table 9 (BR20 and Table 10 R17 collectively. Weed control is currently occurring around the office and entrance way. A fee proposal has been requested to implement weed management protocols for Camphor laurel, Lantana and other weed species.
e) Describe the short, medium, and long-term measures that would be implemented to: • Protect and enhance the remnant vegetation and habitat on the site; and • Ensure compliance with the biodiversity and rehabilitation objectives, and the progressive rehabilitation obligations in this consent.	**Yes**	• S.8		
f) Include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3-year period following initial approval of the plan) including the procedures to be implemented for: • Maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in site; • Restoring and enhancing the quality of native vegetation and fauna habitat on site through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features; • Protecting vegetation and fauna habitat outside the approved disturbance area onsite; • Minimising the impacts on native fauna, including undertaking preclearance surveys; • Establishing vegetation screening to minimise the visual impacts of the site on	**No**	• S.8 & 9. S.8.2 Where is the record of measures that were implemented within the first three years regarding weed and pest management and lessons learnt that can be used to update this B&RMP?	Where is the evidence for the Pest Management Program?	• Previously the management plan only required pest management if pests were observed in rehabilitation (See Table 12). Considering rehabilitation has not commenced at Teven and pests have not been observed, the site has not required pest management. While pest management has not occurred at the site, it will be undertaken if triggered by the requirement in Table 12.

Biodiversity & Rehabilitation Management Plan, Schedule 3, Condition 29	Satisfactory (Yes/No)	Comment	Action Required	Holcim Response
surrounding receivers; • Ensuring minimal environmental consequences for threatened species, populations and habitats; • Collecting and propagating seed; • Controlling weeds and feral pests; • Controlling erosion; • Controlling access; and • Managing bushfire risk.				
g) Include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria	**Yes**	• S.9		
h) Identify the potential risks to the successful implementation of the plan and include a description of the contingency measures that would be implemented to mitigate these risks; and	**Yes**	• S.6, 7 & 9.2.		
i) Include details of who would be responsible for monitoring, reviewing, and implementing the plan.	**No**	• Is the Quarry Manager responsible?	How has the Quarry Manager fulfilled their responsibilities?	• Yes.

Other Comments on Biodiversity & Rehabilitation Management Plan	*Holcim Response*
• S.1.1 para 4 says 'formally' instead of 'formerly'. • Figure 1 needs to be updated to show the current route of the Pacific Highway. • T.3 Commitment 33 please correct the wording of the commitment. • T.4 IEA para 3 indicates that a required Rehabilitation Bond may not have been provided to DPIE. However, according to DPIE records, this was lodged in 2017. • T.5 Title needs '… recorded in, and adjacent to, …'. Headings in last two columns are in error, please correct. • S.5.4 Para 2 on page 20 Incorrect word usage in 'by clearing (clearly) marking and restricting access'. • T.10 R9 second 'Figure 4' should be 'Figure 5'. • T.10 R15 dot point 1: should 25 be followed by degrees? • T.13 What is INX? • S.10.4 There needs to be training of on-site personnel in the avoidance of sensitive vegetation. • T.15 Change Summary reference to Lynwood management plan is inappropriate.	• Addressed. • Addressed. • Wording corrected. • Comments in Table 4 have been updated to explain the Rehabilitation Bond was lodged with the Department in 2017. • Addressed. • Table corrected. • Addressed. • Addressed. • The degree symbol has been added. • INX has been expanded upon. • A commitment has been added to this section stating on-site personnel will receive training on how to avoid sensitive vegetation (as described in **Table 5** and **Appendix B**). • Reference to Lynwood has been changed to Teven.

BCD Recommendations	Holcim Response
1. The proponent should consider revising the vegetation mapping in the BRMP to accord with the NSW Vegetation Information System Vegetation Classification scheme (i.e. identification of PCTs) and updating mapping in the plan accordingly.	• Vegetation mapping has been undertaken for the site with maps displaying PCTs. The revised plan includes two new figures which detail PCTs within the site including **Figure 3** 'Vegetation Communities' and **Figure 5** 'Retained Vegetation Management Zones'.
2. If the proponent decides to revise the vegetation mapping into PCTs, then the management actions should be tailored to each PCT.	• Management actions have been tailored for each PCT throughout the plan.
3. The BRMP should be amended to:	
a. clearly identify the measures to be implemented for protecting retained vegetation, including, but not limited to, erecting temporary and clearly identifiable fencing along the clearing boundaries, requiring quarry staff to undergo induction so they are made aware of the clearing and disturbance boundary limits and vegetation exclusion zones.	• Measures to protect retained vegetation have been included in **Section 5.** These include measures to undertake weed clearing and replanting of the relevant PCTs. • Holcim will peg around retained vegetation in accordance with *Attachment 4.19A Holcim (Australia) Aggregates Boundary Marking Standard* and Section 6.18 of *Attachment 6.00A Environmental Standards for Aggregate Operations.* • The following text has been added to **Table 13** and **Section 12.4** committing staff to inductions: *Staff involved with onsite operations will undergo an induction in regard to identifying clearing and disturbance boundary limits and vegetation exclusion*

	zones.
b. clearly identify planting, watering and weeding regimes and protocols for the regeneration activities within the areas of retained vegetation.	• Planting, watering and weeding regimes in areas of retained vegetation are discussed in **Section 5**. Note it is not practical to undertake planting and monthly watering in some parts of the quarry's retained vegetation due to limited safe access.
c. require baseline condition assessments of the retained vegetation areas prior to the implementation of the BRMP management actions. We suggest that the condition of the vegetation on site be determined using the relevant parts of Chapter 4 of the Biodiversity Assessment Method (BAM) 2020.	• Baseline monitoring of areas of retained native vegetation was undertaken by SLR in August 2021. The results of the assessment undertaken in accordance with the relevant parts of Chapter 4 of the Biodiversity Assessment Method (BAM) 2020 are summarised in **Section 4**.
d. identify suitable benchmarks for the retained vegetation.	• Suitable benchmarks for retained vegetation are described in **Section 5** and **Appendix F**.
e. include monitoring and reporting procedures and state timelines to enable assessments of the efficacy of ongoing revegetation actions and weed and pest management actions.	• **Section 6** describes monitoring and the requirement to submit annual reports which detail the outcomes of monitoring and management within retained vegetation areas to the Biodiversity Conservation Division of DPIE.
f. identify adaptive management procedures to be implemented in response to the results of monitoring.	• **Section 11.2** and **Table 16** address adaptive management primarily around rehabilitation.
g. require the preparation of annual reports on the outcomes of management activities in areas of retained vegetation, including, but not limited to, updates on vegetation condition and the rehabilitation activities undertaken in that reporting period. Changes in vegetation condition should be assessed by periodic determination of vegetation integrity, as per Chapter 4 of BAM 2020, along with reference to the identified benchmarks.	• **Section 6** describes monitoring and the requirement to submit annual reports which detail the outcomes of monitoring and management within retained vegetation areas to the Biodiversity Conservation Division of DPIE.
	• Linked to Condition 3 (g) above.

h. require submission of annual reports to the BCD.	

Appendix B

Threatened and migratory species not recorded, but likely to occur within 10 km of the project area

Table 1 Threatened and migratory species not recorded, but with potential to occur within 10 km of the project area

Common name	Scientific name	TSC Act conservation status	EPBC Act status
Threatened flora species			
Acalypha	*Acalypha eremorum*	Endangered	-
Arrow-head Vine	*Tinopspora tinosporoides*	Vulnerable	-
Ball Nut	*Floydia praealta*	Vulnerable	Vulnerable
Brush Sophora	*Sophora fraseri*	Vulnerable	Vulnerable
Coast Euodia	*Melicope vitiflora*	Endangered	-
Davidson's Plum	*Davidsonia jerseyana*	Endangered	Endangered
Durobby	*Syzygium moorei*	Vulnerable	Vulnerable
Dwarf Heath Casuarina	*Casuarina defungens*	Endangered	Endangered
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	Endangered	-
Hairy Jointgrass	*Arthraxon hispidus*	Vulnerable	Vulnerable
Jointed Baloghia	*Baloghia marmorata*	Vulnerable	Vulnerable
Knicker Nut	*Caesalpinia bonduc*	Endangered	-
Leafless Tongue Orchid	*Cryptostylis hunteriana*	Vulnerable	Vulnerable
Macadamia Nut	*Macadamia integrifolia*	-	Vulnerable
Magenta Lilly Pilly	*Syzygium paniculatum*	Endangered	Vulnerable
Minature moss-orchid	*Bulbophyllum globuliforme*	Vulnerable	Vulnerable
Onion Cedar	*Owenia cepiodora*	Vulnerable	Vulnerable
Red Lilly Pilly	*Syzygium hodgkinsoniae*	Vulnerable	Vulnerable
Rough-shelled Bush Nut	*Macadamia tetraphylla*	Vulnerable	Vulnerable
Scented Acronychia	*Acronychia littoralis*	Endangered	Endangered
Small-leaved Tamarind	*Diploglottis campbellii*	Endangered	Endangered
Smooth Davidson's Plum	*Davidsonia johnsonii*	Endangered	Endangered
Southern Ochrosia	*Ochrosia moorei*	Endangered	Endangered
Southern Swamp Orchid	*Phaius australis*	Endangered	Endangered
Stinking Cryptocarya	*Cryptocarya foetida*	Vulnerable	Vulnerable
Thorny Pea	*Desmodium acanthocladum*	Vulnerable	Vulnerable
White Lace Flower	*Archidendron hendersonii*	Vulnerable	-
Threatened fauna species			
Albert's Lyrebird	*Menura alberti*	Vulnerable	-
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	Endangered
Australian Painted Snipe	*Rostratula australis*	-	Endangered, Migratory
Black Bittern	*Ixobrychus flavicollis*	Vulnerable	-
Black-necked Stork	*Ephippiorhynchus asiaticus*	Endangered	-
Brolga	*Grus rubicunda*	Vulnerable	-
Bush Stone Curlew	*Burhinus grallarius*	Endangered	-
Common Planigale	*Planigale maculata*	Vulnerable	-
Coxen's Fig Parrot	*Cyclopsitta diopthalma coxeni*	Critically Endangered	Endangered

East Coast Freetail Bat	*Mormopterus norfolkensis*	Vulnerable	-
Eastern Bentwing Bat	*Miniopterus schreibersii oceanensis*	Vulnerable	-
Eastern Grass Owl	*Tyto longimembris*	Vulnerable	-
Eastern Long-eared Bat	*Nyctophilus bifax*	Vulnerable	-

Table 2 Threatened and migratory species not recorded, but with potential to occur within 10 km of the project area

Common name	Scientific name	TSC Act conservation status	EPBC Act status
Eastern Osprey	*Pandion cristatus*	Vulnerable	-
Freckled Duck	*Stictonetta naevosa*	Vulnerable	-
Greater Broadnosed Bat	*Scoteanax rueppellii*	Vulnerable	-
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	Vulnerable	-
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable
Little Bentwing Bat	*Miniopterus australis*	Vulnerable	-
Little Eagle	*Hieraeetus morphnoides*	Vulnerable	-
Long-nosed Potoroo	*Potorous tridactylus*	Vulnerable	Vulnerable
New Holland Mouse	*Pseudomys novaehollandiae*	-	Vulnerable
Red Goshawk	*Erythrotriorchis radiates*	Endangered	Vulnerable
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	Endangered
Rose-crowned Fruit Dove	*Ptilinopus regina*	Vulnerable	-
Southern Myotis	*Myotis macropus*	Vulnerable	-
Spotted Harrier	*Circus assimilis*	Vulnerable	-
Spotted-tail Quoll	*Dasyurus maculatus*	Vulnerable	Endangered
Swift Parrot	*Lathamus discolor*	Endangered	Endangered
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	Vulnerable	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable	-
Wallum Froglet	*Crinia tinnula*	Vulnerable	-
Wallum Sedge Frog	*Litoria olongburensis*	Vulnerable	Vulnerable
Water Mouse	*Xeryomys myoides*	-	Vulnerable
Wompoo Fruit Dove	*Ptiliopus magnificus*	Vulnerable	-
Migratory species			
Black-faced Monarch	*Monarcha melanopsis*	-	Migratory
Cattle Egret	*Ardea ibis*	-	Migratory
Fork-tailed Swift	*Apus pacificus*	-	Migratory
Great Egret	*Ardea modesta*	-	Migratory
Oriental Plover	*Charadrius veredus*	-	Migratory
Rufous Fantail	*Rhipidura rufifrons*	-	Migratory

Satin Flycatcher	*Myiagra cyanoleuca*	-	Migratory
Spectacled Monarch	*Monarcha trivirgatus*	-	Migratory
White-throated Needletail	*Hirundapus caudacutus*	-	Migratory

Appendix C

Bionet Profiles of PCTs Recommended for Rehabilitation

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 826

PCT Name: Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast

Classification Confidence Level: 5-Very Low

Vegetation Description: Other Diagnostics Features: Very tall to extremely tall moist open forest.; LandscapePosition: Occurs on sheltered valleys, creek flats or benches.

Variation and Natural Disturbance:

Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: North Coast Wet Sclerophyll Forests;

IBRA Bioregion(s): NSW North Coast; South Eastern Queensland;

IBRA Sub-region(s): Clarence Lowlands; Scenic Rim; Macleay Hastings; Coffs Coast and Escarpment; Karuah Manning; Burringbar-Conondale Ranges;

LGA: Not Assessed

Lithology: Not Assessed

Landform Pattern: Not Assessed

Landform Element: Not Assessed

Emergent species: None

Upper Stratum Species: Eucalyptus grandis; Lophostemon confertus; Eucalyptus microcorys; Archontophoenix cunninghamiana; Polyscias elegans;

Mid Stratum Species: Alpinia caerulea; Cissus antarctica; Dioscorea transversa; Diospyros pentamera; Linospadix monostachyos; Mallotus philippensis; Neolitsea dealbata; Pittosporum multiflorum; Polyscias elegans; Guioa semiglauca; Synoum glandulosum;

Ground Stratum Species: Adiantum formosum; Doodia aspera; Oplismenus aemulus; Smilax australis;

Diagnostic Species: Not Assessed

Fire Regime:

TEC Assessed: No associated TEC

TEC List: Not Assessed

Associated TEC Comments: 13-04-2017 - Subtropical Coastal Floodplain Forest TEC removed. No TEC match for this PCT.

PCT Percent Cleared: 40.00

PCT Definition Status: Approved

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 827

PCT Name: Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast

Classification Confidence Level: 5-Very Low

Vegetation Description: Other Diagnostics Features: Tall to extremely tall moist open forest, often with an understorey of rainforest trees and shrubs.; LandscapePosition: Mainly in near coastal valleys and foothills of the Nambucca, Bellinger, Orara and Tweed Valleys.

Variation and Natural Disturbance:

Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: North Coast Wet Sclerophyll Forests;

IBRA Bioregion(s): NSW North Coast; South Eastern Queensland;

IBRA Sub-region(s): Macleay Hastings; Scenic Rim; Coffs Coast and Escarpment; Burringbar-Conondale Ranges;

LGA: Not Assessed

Lithology: Not Assessed

Landform Pattern: Not Assessed

Landform Element: Not Assessed

Emergent species: None

Upper Stratum Species: Eucalyptus grandis; Eucalyptus microcorys; Lophostemon confertus; Syncarpia glomulifera; Corymbia intermedia;

Mid Stratum Species: Acmena smithii; Archontophoenix cunninghamiana; Cissus hypoglauca; Cordyline stricta; Cryptocarya microneura; Cryptocarya rigida; Dioscorea transversa; Smilax australis; Smilax glyciphylla; Trochocarpa laurina; Wilkiea huegeliana; Guioa semiglauca; Synoum glandulosum; Syzygium smithii;

Ground Stratum Species: Adiantum hispidulum; Blechnum cartilagineum; Dianella caerulea; Hibbertia scandens; Morinda jasminoides;

Diagnostic Species: Not Assessed

Fire Regime:

TEC Assessed: No associated TEC

TEC List: Not Assessed

Associated TEC Comments: 13-04-2017 - Subtropical Coastal Floodplain Forest TEC removed. No TEC match for this PCT.

PCT Percent Cleared: 55.00

PCT Definition Status: Approved

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 1302

PCT Name: White Booyong - Fig subtropical rainforest of the NSW North Coast Bioregion

Classification Confidence Level: 5-Very Low

Vegetation Description: Other Diagnostics Features: None; LandscapePosition: Low altitudes on fertile soils near sea level, in sheltered mid altitude valleys or on basalt terraces.

Variation and Natural Disturbance:

Vegetation Formation: Rainforests;

Vegetation Class: Subtropical Rainforests;

IBRA Bioregion(s): NSW North Coast; South Eastern Queensland;

IBRA Sub-region(s): Coffs Coast and Escarpment; Macleay Hastings; Scenic Rim; Clarence Lowlands; Burringbar-Conondale Ranges;

LGA: Not Assessed

Lithology: Not Assessed

Landform Pattern: Not Assessed

Landform Element: Not Assessed

Emergent species: None

Upper Stratum Species: Ficus spp.; Daphnandra micrantha; Cryptocarya obovata; Endiandra pubens; Castanospermum australe; Flindersia schottiana; Dysoxylum fraserianum; Archontophoenix cunninghamiana; Dysoxylum muelleri; Toona australis; Dendrocnide excelsa; Sloanea australis;

Mid Stratum Species: Cordyline petiolaris; Cyathea leichhardtiana; Harpullia alata; Linospadix monostachyos; Neolitsea dealbata;

Ground Stratum Species: Adiantum formosum; Elatostema reticulatum; Helmholtzia glaberrima; Lastreopsis spp.; Pteris umbrosa;

Diagnostic Species: Not Assessed

Fire Regime:

TEC Assessed: Has associated TEC

TEC List: Listed BC Act,E: Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Equivalent); Listed BC Act,E: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (Equivalent); Listed EPBC Act,CE: Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (Equivalent); Listed EPBC Act,CE: Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Equivalent);

Associated TEC Comments:

PCT Percent Cleared: 75.00

PCT Definition Status: Approved

Appendix D

National Trust Vegetation Condition Method

Table D1 Vegetation Condition Assessment according to National Trust Method

Colour Code	Condition of Bushland	Description	Intervention Required
Green	Good	• Virtually weed free • A healthy native community	• Minimal • Prevention of future impacts • Removal of possible scattered weed
Blue	Fair	• Minor infestation of weeds • Natives dominate the site	• Low • Requires removal of minor impact (eg overuse) • Low level weed invasion
Orange	Poor	• Severely infested • Regeneration of native species is being suppressed	• Medium • Removal of impacts required • Removal of weeds • Additional “kick-start” to promote natural regeneration (eg fire, physical disturbance)
Red	Very Poor	• Bushland replaced by exotic species; or • Only mature specimens of highest stratum remain – no seedlings or saplings due to infestation of understorey with exotics	• Medium or high • Ability of system to recover is lost or seriously limited • Definitely needs a “kick-start” or may need reconstruction to approximate the original system

Source: NSW National Trust of Australia 1999

Appendix E

Baseline Monitoring Plot Field Data

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet #	1 of 2	**Date**	3/8/21	**Survey name**	Tenon Quarry.	**Plot identifier**	STR 1
Recorders	J. Beeton.			**IBRA region**		**Veg zone ID**	
[1]Datum		**Coordinate system**	□ Projected □ Geographic	**MGA zone**		**[1]X coordinate** 28.838544	**[1]Y coordinate** 153.49099
Location description	Adjacent to Site House (office) to the						222°
[1]Plot dimensions	For composition & structure (400m²): 20 m x 20 m For function (1000m²): 20 m x 50 m	20 x 50				**[1]Orientation of midline from 0 m point**	**Photo #**

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). MGA Zone (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). X/Y coordinate: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)		Sum values	**Structure** (400 m² plot)		Sum values (%) (may sum to >100%)	**Function** (1000 m² plot) [3]Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	1	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	30	80 + cm	Count
	Shrubs (SG)	2		Shrubs (SG)	10.1	50 – 79 cm	Count (best practice)/tick If large tree benchmark size ≥50 cm, count
	Grasses etc. (GG)	1		Grasses etc. (GG)	0.5	30 – 49 cm	Count (best practice)/tick. If large tree benchmark size ≥ 30 cm, count
	Forbs (FG)	2.		Forbs (FG)	0.6	20 – 29 cm	Count (best practice)/tick. If large tree benchmark size ≥ 20 cm, count
	Ferns (EG)	1		Ferns (EG)	4	10 – 19 cm	Count (best practice)/tick
	Other (OG)	5		Other (OG)	6.3	5 – 9 cm	Count (best practice)/tick
						[4]Tree regeneration <5 cm	✓
			Total high threat weed cover		63.3 %	[5]Length of fallen logs	Tally trace Total 8 m
						[6]Hollow bearing trees	Tick

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7]Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	90 80 100 100 90	10 20 0 0 0	10 0 0 0 0	0 0 0 0 0
Average of the 5 subplots				

These attributes require consideration of site observations and may be completed after field work:

Vegetation class	**[8]Large tree benchmark size**	20/ 30/ 50/ 80 DBH	Confidence	H/ M/ L
Plant community type (PCT)		**EEC** Tick	Confidence	H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern		Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope		Aspect		Site drainage		Distance to nearest water and type	

Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (id. native/stock)		
Fire damage		
Storm damage		
Weediness		
Other		

Brief site description or other notes

Steep site.
High Canopy cover of Camphor laurel. regenerating native understory.
Dense weed after 30m of small leaf privet.

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	m	m	m	m	m	m	m	m	m

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Tever Quarry.

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date 3 8 21	STR 1 (Tever)		J Beeton.

GF code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	[2] Foliage cover	Abund-ance	Voucher
OC	1 Archontophenix cunninghamia	N	60	40	
	2 Ligustrum sinense	HTW	30	100+	
SC	3 Ficus coronata	N	5	50	
OC	4 Cordyline stricta	N	10	30	
	5 Paspalum dilatatum.	HTW	3	30	
	6 Ipomoea cairica	HTW	0.5	10	
	7 Lantana camara	HTW	0.5	10	
	8 Bidens pilosa	HTW	0.5	30	
TC	9 Glochidion sumatranum.	N	0.1	1	
TC	10 Acmena smithii	N	0.25	6	
SC	11 Myrsine variabilis.	N	0.1	1	
OC	12 ~~Elaeo~~. Ceratopetalum gymnosum	N	0.1	3	
	13 Senna pendula	HTW	0.5	5	
CC	14 Oplismenus hirtellus	N	0.5	15	
	15 Ageratina adenophora	HTW	0.1	10	
OC	16 Parsonia straminea	N	0.1	3	
OC	17 Passiflora herbertiana.	N	0.1	1	
TC	18 Cupaniopsis anacardioides.	N	0.1	3	
FC	19 Persicaria spp.	N	0.1	4	
TC	20 Neolitsea spp.	N	0.1	2.	
	21 Solanum nigrum	Non-HTW	0.1	1	
	22				
	23				
	24				
	25				
	26				
	27				
	28				
	29				
	30				
	31				
	32				
	33				
	34				
	35				

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

[1] **GF Code:** see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

[2] **Foliage cover:** 0.1, 0.2, 0.3, …, 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 …, when ≤10, estimate when >10, 20, 30 … 100, 200, 300 …, 1000, 2000, 3000 … (as integer values).

Numbers [1-8] on this page correlate with the numbers and explanatory notes on page 3

Site sheet # 1 of 2. **Date** 3/8/21 **Survey name** BBFI Tever **Plot identifier** BBF 1

Recorders J. Beeton. **IBRA region** **Veg zone ID**

[1]Datum **Coordinate system** ☐ Projected ☐ Geographic **MGA zone** **[1]X coordinate** 28.844039 **[1]Y coordinate** 153.488540.

Location description descriptive notes to locate site without grid reference

[1] Plot dimensions For composition & structure (400m²): 20 m x 20 m For function (1000m²): 20 m x 50 m 20x20 20x50. **[1] Orientation of midline from 0 m point** 75 Magnetic ° **Photo #**

Datum: AGD66, WGS84, GDA94, GDA2020 or Other (specify). MGA Zone (for Projected coordinate. system only): 56 (Coastal NSW), 55 (Central NSW or 54 (Western NSW). X/Y coordinate: Long/Lat (for Projected coordinate. system), Easting/Northing (for geographic coordinate. system)

Vegetation integrity

Composition and structure sum values may be completed after entering data into available tools. It is not required while in the field

Composition (400 m² plot)		Sum values	**Structure** (400 m² plot)		Sum values (%) (may sum to >100%)	**Function** (1000 m² plot) [3]Tree stem size class (DBH)	If data are to be used as more appropriate local data i.e. to generate local benchmarks, stems must be counted
Total count of native plant species **(richness)** in each growth form group (not individual plants within each growth form)	Trees (TG)	4	Sum of [2] **foliage cover** of native plant species by growth form group	Trees (TG)	6.2.	80 + cm	Count
	Shrubs (SG)	2.		Shrubs (SG)	5.1	50 – 79 cm	Count (best practice)/tick. If [6]large tree benchmark size ≥50 cm, count
	Grasses etc. (GG)	1		Grasses etc. (GG)	0.5	30 – 49 cm	Count (best practice)/tick. If [6]large tree benchmark size ≥ 30 cm, count
	Forbs (FG)	1		Forbs (FG)	0.1	20 – 29 cm	Count (best practice)/tick. If [6]large tree benchmark size ≥ 20 cm, count
	Ferns (EG)	0		Ferns (EG)	0	10 – 19 cm	Count (best practice)/tick
	Other (OG)	4		Other (OG)	70.2.	5 – 9 cm	Count (best practice)/tick
						[4]Tree regeneration <5 cm	Tick ✓
			Total high threat weed cover		35.2. %	[5]Length of fallen logs	Tick IIII IIII I Total 11 m
						[6]Hollow bearing trees	Tick

Vegetation integrity - function cont. (five 1 m²) **plots)**	[7]Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	30 40 60 100 40 40 30 30 0 30	0 0 0 0 0	0 0 0 0 0	0
Average of the 5 subplots				

These attributes require consideration of site observations and may be completed after field work:

Vegetation class **[8]Large tree benchmark size** 20/ 30/ 50/ 80 DBH Confidence H/ M/ L

Plant community type (PCT) **EEC** Tick Confidence H/ M/ L

Physiography and site features that may help in determining PCT and management zone (optional) or for BioNet systematic flora survey purposes:

Morphological type		Landform element		Landform pattern		Microrelief	
Lithology		Soil surface texture		Soil colour		Soil depth	
Slope		Aspect		Site drainage		Distance to nearest water and type	

Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (id. native/stock)		
Fire damage		
Storm damage		
Weediness		
Other		

Brief site description or other notes

Strong canopy cover between 0-20m of Archontophoenix cunninghamiana

Open area of Weed and exotic grasses across the plot between 20m-40m.

large Fig trees canopy 40-50m.

Emergents heights			Upper stratum heights			Middle stratum heights			Lower stratum heights		
Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom	Top	Mid	Bottom
m	m	m	m	m	m	m	m	m	m	m	m

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² floristics plot:	Survey name	Plot identifier	Recorders
Date 5 8 21	Tara Quarry	BBF 1.	J. Beeton

GF code	Species name Full species name, or a unique means of identifying separate taxa within a survey is mandatory. Data from here will be used to assign growth form richness and cover.	N, HTW or non-HTW	[2] Foliage cover	Abund-ance	Voucher
	Cinnamomum camphora	HTW	60	5	
	Ligustrum sinensis.	HTW	2.	30.	
SC	P. Haperum undulatum.	N	10.	15	
TC	Cupaniopsis anacardioides	N	1	3	
OC	Livistona australis	N	0.1	1	
OC	Maclura cochinchinensis.	N	5	15	
~~OC~~	Passiflora suberosa.	HTW	0.1	1	
OC	~~Gigantochloa~~ Ceitonoplesium cymosum.	N	0.1	1	
	Senna pedula		2.	5	
OC	Eustrephus latifolius.	N	0.1	1	
	Wilkiea huegeliana.	N	0.1	1	
	Lantana camara	HTW	0.1	1	
	Ochra serrulata	HTW	0.1	1	
GC	Gahnia aspera.	N	0.5	2.	
OC	Smilax australis.	N	1	8	
FC	Alpinia caerulea	N	0.5	4.	
	Paspalum dilatum.	HTW	1	20	
FC	Dianella caerulea.	N	0.1	1	
EC	Adiantum hispidulum	N	4	20	
SC	~~Doleschea~~ longifolia	N	0.1	1	
	Ageratina riparia	~~N~~ HTW	0.5	10	
TC	~~Neo~~litsea dealbata.	N	30	~~6~~ 16	

Print more copies of this page to allow for higher species counts at a plot. All vascular plant species in a plot need to be recorded.

GF Code: see growth form definitions in BAM 2020 Appendix F. **N:** native, **HTW:** high threat weed.

[2] **Foliage cover:** 0.1, 0.2, 0.3, ..., 1, 2, 3, 4, 5, 10, 15, 20, 25, ...100%; Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately *1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.* Note the top 3 dominant native species within each GF group.

Abundance: Count 1, 2, 3 ..., when ≤10, estimate when >10, 20, 30 ... 100, 200, 300 ..., 1000, 2000, 3000 ... (as integer values).

Appendix F

Benchmark Data

Table F1 Benchmark Species Richness Targets for PCT 826 and PCT 827

	Tree Richness	Shrub Richness	Grass And Grass Like Richness	Forb Richness	Fern Richness	Other Richness
Benchmark	13	14	5	6	5	14
Rehabilitation (80%)	10.4	11.2	4	4.8	4	11.2
Revegetation (50%)	6.5	7	2.5	3	2.5	7

Table F2 Benchmark Cover Targets for PCT 826 and PCT 827

	Tree Cover	Shrub Cover	Grass And Grass Like Cover	Forb Cover	Fern Cover	Other Cover
Benchmark	99	34	10	3	15	31
Rehabilitation (80%)	79.2	27.2	8	2.4	12	24.8
Revegetation (50%)	49.5	17	5	1.5	7.5	15.5

Table F3 Benchmark Function Targets for PCT 826 and PCT 827

	Total length of fallen logs	Litter Cover	Number of Large Trees	Large Tree Threshold Size
Benchmark	59	80	3	80
Rehabilitation (80%)	47.2	64	2	64
Revegetation (50%)	29.5	40	2	40

Table F4 Benchmark Species Richness Targets for PCT 1302

	Tree Richness	Shrub Richness	Grass And Grass Like Richness	Forb Richness	Fern Richness	Other Richness
Benchmark	19	10	2	4	9	15
Rehabilitation (80%)	15.2	8	1.6	3.2	7.2	12
Revegetation (50%)	9.5	5	1	2	4.5	7.5

Table F5 Benchmark Cover Targets for PCT 1302

	Tree Cover	Shrub Cover	Grass And Grass Like Cover	Forb Cover	Fern Cover	Other Cover
Benchmark	140	32	1	2	38	44
Rehabilitation (80%)	112	25.6	0.8	1.6	30.4	35.2
Revegetation (50%)	70	16	0.5	1	19	22

Table F6 Benchmark Function Targets for PCT 1302

	Total length of fallen logs	Litter Cover	Number of Large Trees	Large Tree Threshold Size
Benchmark	47	81	6	50
Rehabilitation (80%)	37.6	64.8	4.8	40
Revegetation (50%)	23.5	40.5	3	25


Holcim