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## JANDRA QUARRY

Biodiversity and Rehabilitation  
Management Plan

**FINAL**

August 2018



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Biodiversity and Rehabilitation Management  
Plan

## FINAL

Prepared by  
Umwelt (Australia) Pty Limited  
on behalf of  
Holcim (Australia) Pty Ltd

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# Table of Contents

<b>1.0</b>	<b>Introduction</b>	<b>1</b>
1.1	Project Description	1
1.2	Purpose and Scope	5
1.3	Objectives	5
1.4	Relationship with other Management Plans	5
<b>2.0</b>	<b>Regulatory Requirements</b>	<b>7</b>
2.1	Development Consent	7
2.2	Preparation of the Report	8
2.3	Stakeholder Consultation	8
<b>3.0</b>	<b>Baseline Data</b>	<b>9</b>
3.1	Jandra Quarry Site	9
3.2	Jandra Biodiversity Offset Area	10
3.2.1	Implementation of the Biodiversity Offset Strategy	10
<b>4.0</b>	<b>Objectives and Performance Criteria</b>	<b>11</b>
4.1	Objectives	11
4.2	Biodiversity Offset Strategy	15
4.2.1	Performance Indicators	15
4.2.2	Triggers for Remedial Action	16
4.3	Rehabilitation	16
4.3.1	Performance Indicators and Completion Criteria	16
4.3.2	Triggers for Remedial Action	17
<b>5.0</b>	<b>Biodiversity Management Measures</b>	<b>18</b>
5.1	Native Vegetation and Habitat Enhancement	18
5.2	Mitigation Measures to Minimise Impacts on Biodiversity Features	18
5.3	Landscaping to Minimise Visual Lighting Impacts	19
5.4	Pre-clearance Surveys and Tree-felling Procedure	19
5.4.1	Pre-clearance Survey	19
5.4.2	Tree-felling Procedure	20
5.4.3	Injured Fauna Procedure	20
5.5	Salvage of Resources	21
5.5.1	Salvage of Habitat Features	21
5.5.2	Salvage for Rehabilitation	21
5.6	Nest Box Installation	22
5.7	Weed Control	22
5.8	Feral Animal Control	23
5.9	Erosion and Sedimentation Control	23

5.10	Access Control	24
5.11	Bushfire Management	25
5.12	Rehabilitation Measures for Biodiversity Improvement	25
<b>6.0</b>	<b>Monitoring Program</b>	<b>27</b>
6.1	Rehabilitation Monitoring	27
6.1.1	Quarterly Rehabilitation Inspection	27
6.1.2	Monitoring Rehabilitation Progress against Performance Indicators	28
6.1.3	Process for Review and Refinement	28
6.2	Biodiversity Offset Area Monitoring	28
6.2.1	Flora Monitoring	29
6.2.2	Fauna Monitoring	29
6.2.3	Nest Box Monitoring	30
<b>7.0</b>	<b>Risks and Corrective Actions</b>	<b>31</b>
7.1	Risk Assessment	31
7.2	Corrective Actions	31
<b>8.0</b>	<b>Reporting Requirements</b>	<b>33</b>
8.1	Annual Review	33
8.2	Annual Biodiversity Offset Monitoring Report	33
8.3	Adaptive Management	34
8.4	Material Harm Incident Reporting Protocol	34
8.5	Complaint Response Protocol	34
8.6	Independent Audit	34
8.7	Access to Information	35
<b>9.0</b>	<b>Review and Improvement</b>	<b>36</b>
<b>10.0</b>	<b>Roles and Responsibilities</b>	<b>37</b>
<b>11.0</b>	<b>References</b>	<b>38</b>

## Figures

Figure 1.1	Locality Plan	3
Figure 1.2	Jandra Quarry Operations	4

## Tables

Table 1.1	Approved Activities	1
Table 2.1	Development Consent Conditions Relevant to this BRMP	7
Table 4.1	Biodiversity and Rehabilitation Objectives	12
Table 4.2	Performance Indicators and Criteria for the Biodiversity Offset Strategy	15
Table 4.3	Performance Indicators and Completion Criteria for Rehabilitation	16
Table 5.1	Recommended Species for Rehabilitation and Revegetation	26
Table 7.1	Risk Assessment for the Implementation of the BRMP	31
Table 7.2	Issue Identified and Recommended Corrective Actions	32
Table 10.1	Roles and Responsibilities	37

## Appendices

Appendix 1	Letter from DPE Approving Appointment of Kate Connolly
Appendix 2	Consultation with Council and OEH

# 1.0 Introduction

Holcim (Australia) Pty Ltd (Holcim Australia) operates Jandra Quarry, a hard rock quarry located approximately 18 kilometres south of Taree, New South Wales (NSW) in the Greater Taree Local Government Area (refer to **Figure 1.1**). The previous development consent for Jandra Quarry was granted on 30 March 2000 (DA231-10-99). Jandra Quarry sought a modification to this Development Consent under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to provide for an increase in production and transportation of quarry products in order to meet current and forecast market demands. The Jandra Quarry Intensification in Production Development Consent was granted on 13 March 2015 by the NSW Minister for Planning (DA231-10-99 MOD 5).

The Modification allows for an increase in production and transportation of quarry products to a maximum annual limit of 475,000 tonnes (refer to **Figure 1.2**). Holcim is committed to implementing contemporary environmental management requirements as part of its continued quarrying operations. This Biodiversity and Rehabilitation Management Plan (BRMP) has been prepared in accordance with Condition 25 of Schedule 3 of the Modification Development Consent (DA231-10-99 MOD 5) in consultation with the NSW Office of Environment and Heritage (OEH).

## 1.1 Project Description

The Jandra Quarry Development Consent DA231-10-99 (MOD 5) provides for the following approved activities, as shown in **Table 1.1** below.

**Table 1.1 Approved Activities**

Project component	Currently approved
Quarry life	Until 31 March 2045
Extraction limit (total)	16.5 million tonnes of quarry product over the quarry life
Extraction limit (annual)	490,000 tonnes of quarry product in any calendar year
Transport limit	475,000 tonnes of quarry product are to be transported from the site in any calendar year
Infrastructure	Mobile asphalt plant, mobile pug mill, primary, secondary crushing and screening plants, mobile crusher, workshop, fuel shed and maintenance area, office and amenities, sewage treatment system, heavy vehicle access road and stockpile area
Hours of operation	<p><b>Blasting:</b>            9:00am – 5:00pm Monday to Friday            9:00am – 3:00pm Saturday            At no time on Sundays or Public Holidays</p> <p><b>Mobile Asphalt Plant and Associated Transport:</b>            24 hours a day, 7 days a week (Sundays and Public Holidays included)</p> <p><b>Extraction and Processing Operations:</b>            6:00am – 10:00pm Monday to Friday            6:00am – 6:00pm Saturday            At no time on Sundays or Public Holidays</p>

	<b>Transportation Operations</b> 6:00am – 10:00pm Monday to Friday 6:00am – 10:00pm Saturday At no time on Sundays or Public Holidays
Blasting frequency limit	Two times per month
Quarry operations limit	Above RL 20m AHD

Transport operations approved outside of the hours specified in **Table 1.1** include the return of trucks to site prior to midnight Monday to Saturday; delivery or dispatch of materials as requested by Police, Fire Brigade or other similar authorities; and emergency work to avoid the loss of lives, property and/or to prevent environmental harm.

The blasting frequency limit is twice per month, however this is not inclusive of any blasts required to ensure the safety of the quarry or workers on site.

It is understood that the proposed construction of a new heavy vehicle access road and expansion of the finished product stockpile area have been approved in the modified Development Consent (DA231-10-99 MOD 5), requiring the clearing of 1.28 hectares of native vegetation. The implementation of a biodiversity offsetting strategy is required to offset the impacts of these actions (refer to **Section 3.2.1**).

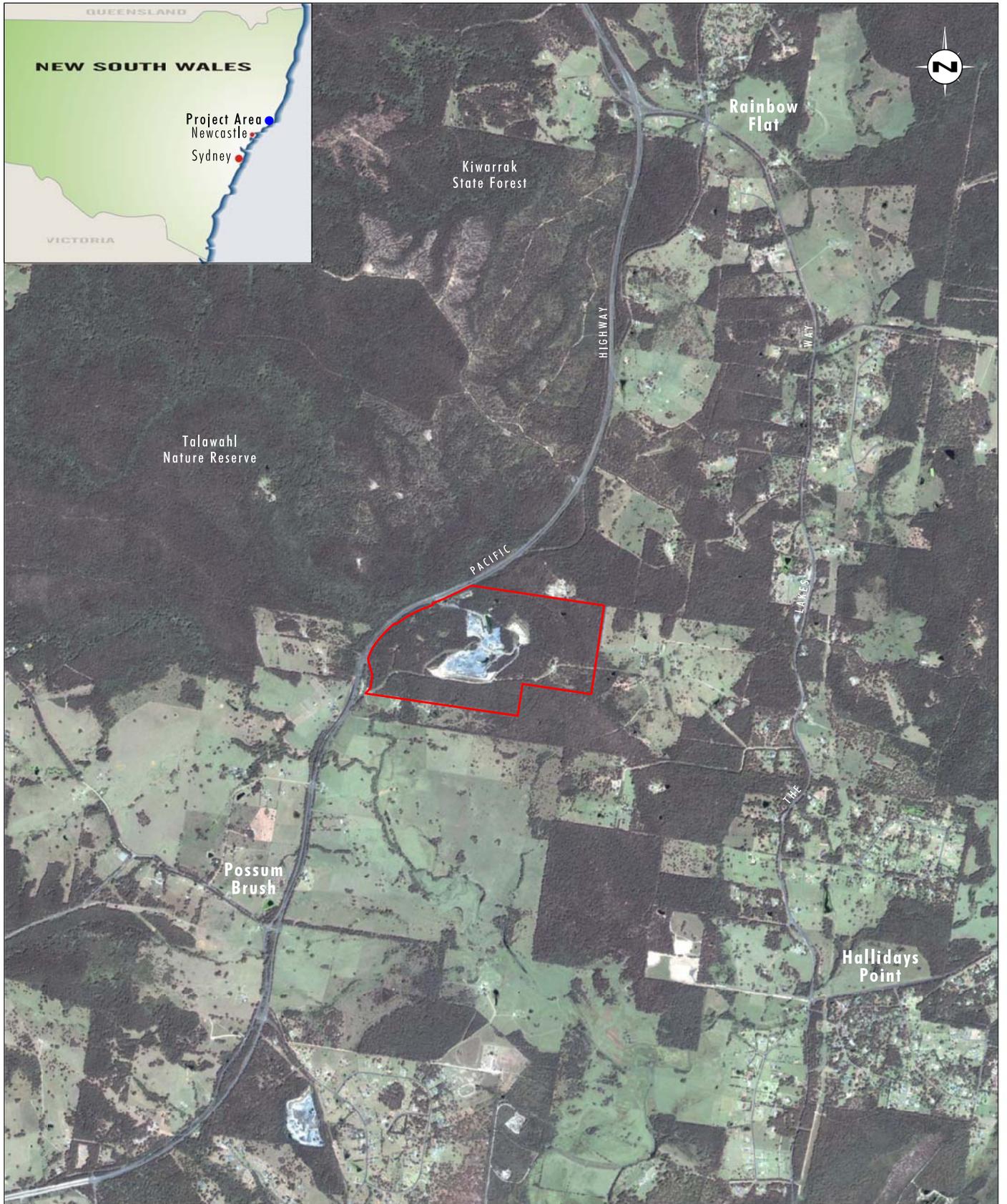


Image Source: Google, DigitalGlobe (2015)  
 Data Source: Holcim (2015)

0 0,5 1,0 2,0km  
 1:40 000

**Legend**

Development Consent Boundary

**FIGURE 1.1**  
**Locality Plan**



Image Source: Google, DigitalGlobe (2015)  
 Data Source: Holcim (2015)

0 100 250 500m  
 1:10 000

**Legend**

- ▭ Development Consent Boundary
- ▬ Biodiversity Offset Area (Indicative Boundary)

Previously Approved Boundaries:

- ▭ Access Road and Haul Routes
- ▭ Approved Extraction Area
- ▭ Approved Overburden Emplacement Area
- ▭ Approved Secondary Stockpile Area
- ▭ Approved Stockpile and Site Facilities

MOD5 Approved Boundaries:

- ▭ Finished Stockpile Area
- ▭ Heavy Vehicle Access Road

FIGURE 1.2

Jandra Quarry Operations

## 1.2 Purpose and Scope

The purpose of this BRMP is to describe the rehabilitation and biodiversity management strategies, procedures, controls and monitoring programs that are to be implemented as a result of quarrying related disturbance impacts and rehabilitation requirements as described in the Jandra Quarry Intensification in Production Environmental Assessment (EA) (Element Environment 2014). The area covered by this plan is the approved project boundary as shown on **Figure 1.2**. The approved quarrying plan has been designed to include a number of biodiversity impact mitigation factors and rehabilitation design factors. These measures are further described in **Section 5.0**.

This BRMP also addresses the requirements detailed in the Development Consent. A brief outline of the Development Consent conditions relevant to this plan is provided in **Section 2.1**, including a checklist of where each condition has been addressed within this document.

The plan outlines the control measures to be implemented as part of the continued operations at Jandra Quarry to minimise the potential impacts on biodiversity as a result of quarrying activities and to minimise risks associated with unsuccessful post-quarrying rehabilitation of the site.

## 1.3 Objectives

The objectives of this BRMP 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 **Section 2.1**)
- establish management techniques associated with the clearance of vegetation for the approved infrastructure area and the quarry pit extension area
- establish general management requirements for the rehabilitation of the quarry pit and overburden areas
- establish rehabilitation monitoring requirements and
- detail the requirement for reporting any biodiversity related incidents to the relevant stakeholders.

## 1.4 Relationship with other Management Plans

This plan is to be read in conjunction with the Environmental Management Strategy (EMS) (Element Environment 2015) prepared for the modification to the Jandra Quarry consent (DA231-10-99 MOD 5). The EMS includes the detailed site management programs and requirements for the Jandra Quarry including the:

- Environmental Management Strategy
- Noise and Blast Management Plan
- Air Quality Management Plan
- Soil and Water Management Plan

- Aboriginal Cultural Heritage Management Plan and
- Biodiversity and Rehabilitation Management Plan (this document)

This BRMP aims to provide further information on the biodiversity and rehabilitation objectives in relation to the wider Jandra Site and the Modification Project as required by the modified Development Consent (DA231-10-99 MOD 5).

This BRMP is independent of, and supersedes, the Flora and Fauna Management Plan and Landscape and Rehabilitation Management Plan (ERM 2000).

## 2.0 Regulatory Requirements

### 2.1 Development Consent

The Development Consent for the Jandra Quarry Intensification in Production Project was assessed under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Approval for the project was granted by the NSW Planning and Environment (DPE) Secretary on 3 March 2015. The requirement for this BRMP arises from Condition 25 of Schedule 3 of the Jandra Quarry Development Consent. A table detailing the BRMP and other rehabilitation related requirements from the Development Consent, and where these requirements are addressed within this document is provided in **Table 2.1**.

**Table 2.1 Development Consent Conditions Relevant to this BRMP**

Condition 25, Schedule 3	Section Addressed
(a) be prepared by suitably qualified person(s) whose appointment has been approved by the Secretary;	<b>Section 2.2</b> <b>Appendix 1</b>
(b) be prepared in consultation with OEH and Council, and submitted to the Secretary for approval prior to 31 August 2015;	<b>Section 2.3</b>
(c) describe the short, medium and long-term measures that would be implemented to: <ul style="list-style-type: none"> <li>manage the native vegetation and fauna habitat on the site;</li> </ul>	<b>Section 5.0</b>
<ul style="list-style-type: none"> <li>implement the biodiversity offset strategy; and</li> </ul>	<b>Section 3.2.1</b>
<ul style="list-style-type: none"> <li>ensure compliance with the biodiversity and rehabilitation objectives in Table 8, and progressive rehabilitation obligations in this consent;</li> </ul>	<b>Section 4.0</b> <b>Table 4.1</b>
(d) include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy and the rehabilitation of the site, including triggers for any necessary remedial action;	<b>Section 4.0</b> <b>Section 7.0</b>
(e) include a detailed description of the measures that would be implemented to: <ul style="list-style-type: none"> <li>enhance the quality of native vegetation and fauna habitat across the site and in the biodiversity offset area;</li> </ul>	<b>Section 5.1</b>
<ul style="list-style-type: none"> <li>minimise impacts on threatened species, populations and habitats as a result of the quarrying activities on the site;</li> </ul>	<b>Section 5.2</b>
<ul style="list-style-type: none"> <li>landscape the site to minimise visual and lighting impacts;</li> </ul>	<b>Section 5.3</b>
<ul style="list-style-type: none"> <li>minimise the impact of clearing on native fauna;</li> </ul>	<b>Section 5.4</b>
<ul style="list-style-type: none"> <li>maximise the salvage of environmental resources from any area approved to be cleared – including tree hollows, vegetative and soil resources – for beneficial reuse;</li> </ul>	<b>Section 5.5</b>
<ul style="list-style-type: none"> <li>provide two nest boxes for each tree-hollow destroyed by vegetation clearing;</li> </ul>	<b>Section 5.6</b>

Condition 25, Schedule 3	Section Addressed
<ul style="list-style-type: none"> <li>control weeds and feral pests;</li> </ul>	<p><b>Section 5.7</b> <b>Section 5.8</b></p>
<ul style="list-style-type: none"> <li>control erosion;</li> </ul>	<p><b>Section 5.9</b></p>
<ul style="list-style-type: none"> <li>control access; and</li> </ul>	<p><b>Section 5.10</b></p>
<ul style="list-style-type: none"> <li>bushfire management;</li> </ul>	<p><b>Section 5.11</b></p>
<p>(f) include a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</p>	<p><b>Section 6.0</b></p>
<p>(g) identify the potential risks to rehabilitation of the site and the implementation of the biodiversity offset strategy, and include a description of the contingency measures that would be implemented to mitigate these risks; and</p>	<p><b>Section 7.0</b></p>
<p>(h) include details of who would be responsible for monitoring, reviewing, and implementing the plan.</p>	<p><b>Section 10.0</b></p>

## 2.2 Preparation of the Report

This BRMP was prepared by Kate Connolly (Senior Ecologist) who was approved by the Secretary on 1 July 2015 (refer to **Appendix 1**).

## 2.3 Stakeholder Consultation

A copy of this document was submitted the NSW Office of Environment and Heritage (OEH) on the 8 December 2015 and Greater Taree City Council on the 9 September 2016 for their review and comment. No comments were received from either of these stakeholders. Evidence of correspondence is provided in **Appendix 2**.

## 3.0 Baseline Data

As per Condition 3, Schedule 5 of the Development Consent, the management plans prepared for the Jandra Quarry require a description of the baseline data that is relevant to the plan. The sections below provide detailed baseline data on the biodiversity and rehabilitation features of the Jandra Quarry site and the Biodiversity Offset Area.

### 3.1 Jandra Quarry Site

The Jandra Quarry Site is located approximately 18 kilometres south of Taree to the east of the Pacific Highway. The site is located adjacent to conservation reserves including Talawahl Nature Reserve, Talawahl State Conservation Area and Kiwarrak State Forest to the west of the site. Previous studies of the site (Niche 2014) identified a range of ecological features within the Jandra Quarry landholdings during surveys associated with the Jandra Quarry Intensification in Production Project. Construction associated with production intensification will involve the clearing of a total of approximately 1.28 hectares of native vegetation and ground disturbance.

Niche (2014) identified Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (Biometric Vegetation Type (BVT) HU620) as the most common vegetation community within the site. This is dominated by *Eucalyptus microcorys*, *E. propinqua*, *E. siderophloia*, *E. acmenoides* and *Corymbia intermedia*. The midstorey is dominated by *Allocasuarina torulosa* and *Lophostemon confertus* and the groundstorey is dominated by *Lomandra longifolia*, *Themeda australis* and *Imperata cylindrica*. One noxious weed species, *Lantana camara*, listed on the NSW Noxious Weeds Act 1993 is present in low abundance at the site.

The vegetation within the Jandra Quarry Site provides suitable foraging habitat for a range of species. *Eucalyptus* and *Corymbia* species dominate the overstorey and provide food sources (foliage, nectar, pollen, exudates and invertebrates) for birds, bats and arboreal mammals. *Allocasuarina torulosa* is a preferred feed tree species for the threatened glossy black-cockatoo (*Calyptorhynchus lathami*). The varied ground layer provides habitat for small mammals, reptiles and woodland birds and is enhanced by woody debris and leaf litter. The high density of fallen logs provides plenty of hollows and fissures used for shelter by small mammals. Reptiles shelter underneath logs and in dense leaf litter. The relatively grassy ground layer supports grazing macropods and wombats. A range of hollow-bearing trees also occur in the vegetated areas within the site, which are suitable for a range of fauna species including microbats, possums, parrots and gliders.

The Jandra Quarry site also contains tree species suitable for foraging by the threatened koala (*Phascolarctos cinereus*) and is considered to be 'Secondary B Koala Habitat' and within the Priority Conservation Zone under the City of Greater Taree Comprehensive Koala Plan of Management (2002). The species however, has not been recorded within the site. Niche (2014) recorded the threatened grey-headed flying fox (*Pteropus poliocephalus*) and the migratory rufous fantail (*Rhipidura rufifrons*), listed under the EPBC Act. A targeted survey for the threatened and cryptic eastern underground orchid (*Rhizanthella slateri*) by Umwelt in 2014, did not locate the species on the site.

In the currently active quarry areas, rehabilitation has been undertaken along the southern and eastern quarry bench areas. Locally-occurring species have been planted in these locations to stabilise the soil and begin to establish an appropriate post-quarry landscape.

## 3.2 Jandra Biodiversity Offset Area

### 3.2.1 Implementation of the Biodiversity Offset Strategy

In accordance with Condition 23 of Schedule 3 of the Development Consent, Holcim Australia must, in consultation with OEH to the satisfaction of the Secretary, implement a strategy to offset the impacts of clearing 1.28 hectares of HU620 *Small-fruited Grey Gum – Tallowwood shrubby open forest on coastal foothills of the southern North Coast* vegetation community. Holcim Australia has elected to:

- establish a Biodiversity Offset Area (BOA) of at least 7 hectares of Small-fruited Grey Gum – Tallowwood shrubby open forest on coastal foothills of the southern North Coast vegetation community.

In the time since the Development Consent modification (DA231-10-99 MOD 5) was approved, HU620 has been decommissioned in the Vegetation Information System (VIS) and replaced with HU762 (PCT1548) *Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest on foothills of the lower North Coast*. Consultation with OEH on this matter confirms that the Department support the use of HU762 in place of the decommissioned HU620.

The BOA is currently proposed to be established as a 7.4 hectare corridor on the far eastern boundary of Holcim's landholdings at Jandra Quarry (refer to **Figure 1.2**). It is understood that HU762 is the dominant vegetation community across the Biodiversity Offset Area. HU762 in this area is in moderate to good condition with a mid-dense canopy dominated by tallowwood (*Eucalyptus microcorys*), small-fruited grey gum (*Eucalyptus propinqua*), grey ironbark (*Eucalyptus siderophloia*), spotted gum (*Corymbia maculata*), thick-leaved mahogany (*Eucalyptus carnea*) and pink bloodwood (*Corymbia intermedia*). Understorey species include forest oak (*Allocasuarina torulosa*), narrow-leaved geebung (*Persoonia linearis*), coffee bush (*Breynia oblongifolia*), large mock-olive (*Notelaea longifolia*) and cheese tree (*Glochidion ferdinandi*). Groundcover species include spiny-headed mat-rush (*Lomandra longifolia*), common bracken (*Pteridium esculentum*), wiry panic (*Entolasia stricta*), blue flax lily (*Dianella caerulea* var. *producta*), blady grass (*Imperata cylindrica*) and kangaroo grass (*Themeda triandra*).

At the time of writing, the BOA for the Jandra Quarry Development Consent has not been formally secured. The 7.4 hectares of HU726 vegetation community will be protected in perpetuity under a positive covenant (Section 88B Instrument). This offset strategy is supported by DPE, however the Section 88B instrument has not yet been finalised.

In accordance with the consent conditions, Holcim Australia will implement this offset strategy once the BOA has been secured through the positive covenant, and the BOA will be subject to a monitoring program, as detailed in **Section 6.2**.

## 4.0 Objectives and Performance Criteria

### 4.1 Objectives

Rehabilitation of the existing quarry pit and pit extension area, and the implementation of the Biodiversity Offset Strategy, will be undertaken in accordance with the objectives provided in Table 8 of the Jandra Quarry Development Consent, and is replicated as **Table 4.1** below.

**Table 4.1 Biodiversity and Rehabilitation Objectives**

Feature	Objectives	Short, Medium and Long-term Measures
<p>Site (as a whole)</p>	<ul style="list-style-type: none"> <li>• Safe, stable and non-polluting;</li> <li>• Final landform integrated with surrounding natural landforms as far as reasonable and feasible and has minimal visual impact when viewed from surrounding land.</li> </ul>	<p>Ongoing measures for the short and medium term life of the quarry include:</p> <ul style="list-style-type: none"> <li>• no erosion present that constitutes a safety hazard or compromises the ability to support the post-quarry land use</li> <li>• progressive rehabilitation of the site must occur as soon as practicable following disturbance</li> <li>• slopes and benches associated with the active pit are stable and monitored for signs of overtopping or scour</li> <li>• any contamination is appropriately and effectively remediated</li> <li>• runoff from site does not adversely impact downstream water quality</li> <li>• bushfire management strategies are in place to control fire hazards and</li> <li>• controls for access and public safety are implemented.</li> </ul> <p>In the long-term, at the closure of the Jandra Quarry, the final landform will be rehabilitated in accordance with a detailed Rehabilitation and Closure Plan, which will be prepared within 3 years of closure and address visual amenity and landform integration within the surrounding landscape. This plan will also address ongoing monitoring and management of the rehabilitated landscape as well as access and public safety post-closure.</p> <p>Further detail on the short, medium and long-term</p>

Feature	Objectives	Short, Medium and Long-term Measures
		measures is available in Noise, Blast, Air Quality, Soil and Water Management Plans.
Land identified in the Biodiversity Offset Strategy and other vegetated land	<ul style="list-style-type: none"> <li>• Conserved and enhanced with native, endemic vegetation.</li> <li>• Containing self-sustaining ecosystems.</li> </ul>	<p>In the short-term, the Biodiversity Offset Area is to be secured in perpetuity once the section 88B Instrument has been finalised.</p> <p>Short, medium and long-term biodiversity management measures such as weed management, feral animal control will be undertaken to enhance the BOA as well as nest box installation and habitat augmentation (refer to <b>Section 5.0</b>).</p> <p>In the medium and long-term, annual BOA monitoring surveys will monitor and report on the condition of the BOA (refer to <b>Section 6.2</b>).</p>
Surface Infrastructure	<ul style="list-style-type: none"> <li>• Decommissioned and removed, unless the Secretary agrees otherwise.</li> </ul>	At the closure of the Jandra Quarry, the surface infrastructure will be removed and the site will be subject to rehabilitation works in accordance with a detailed Rehabilitation and Closure Plan, which will be prepared within 3 years of closure.
Quarry Benches	<ul style="list-style-type: none"> <li>• Landscaped and vegetated using native tree and understorey species, to minimise the visual impact of the quarry.</li> </ul>	<p>In the short and medium term, the revegetation of exposed benches at the high points of the ridgeline is to occur as soon as practicable after disturbance using species known to occur in the locality (refer to <b>Table 5.1</b>) to ensure effective screening of the site.</p> <p>In the long term, lower quarry bench rehabilitation works will be revegetated in accordance with a detailed Rehabilitation and Closure Plan, which will be prepared within 3 years of closure.</p>

Feature	Objectives	Short, Medium and Long-term Measures
Quarry Pit Floor	<ul style="list-style-type: none"> <li>Landscaped and revegetated using native tree and understorey species.</li> </ul>	<p>Quarry pit rehabilitation works will use species known to occur in the locality (refer to <b>Table 5.1</b>) and provide visual screening as outlined in a detailed Rehabilitation and Closure Plan, which will be prepared within 3 years of closure.</p>

Additionally, in accordance with Condition 22, Schedule 3 of the Development Consent, Holcim Australia will rehabilitate the site progressively following the disturbance. Progressive rehabilitation aims to re-establish native flora and fauna habitat whilst controlling erosion, dust generation and minimising the visual impacts of the quarry. This will be undertaken in accordance with this plan and a detailed Rehabilitation and Closure Plan, which will be prepared within 3 years of closure. All reasonable and feasible measures will be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures will 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.

## 4.2 Biodiversity Offset Strategy

### 4.2.1 Performance Indicators

The following performance indicators in **Table 4.2** are to be used to assess the success of the management and improvement strategies, and to demonstrate progress towards achieving the biodiversity management objectives listed in **Table 4.1** relating to the Biodiversity Offset Strategy. A monitoring program for these performance indicators is outlined in **Section 6.2**.

**Table 4.2 Performance Indicators and Criteria for the Biodiversity Offset Strategy**

Performance Indicators	How Addressed
<ul style="list-style-type: none"> <li>An appropriate long-term land conservation mechanism for the Jandra Biodiversity Offset Area (BOA) is agreed upon in consultation with the relevant authorities.</li> </ul>	<p>A section 88B Instrument to secure the BOA has been agreed upon, in consultation with DPE (refer to <b>Section 3.2</b>).</p>
<ul style="list-style-type: none"> <li>Jandra site boundary fences are in place and reports of unauthorised access to the Jandra BOA are addressed as soon as practical.</li> </ul>	<p>Boundary fencing to be in place within 12 months of securing the Jandra BOA (refer to <b>Section 5.10</b>).</p> <p>Environmental inspections and annual BOA monitoring surveys will monitor and report on unauthorised access (refer to <b>Section 6.0</b>).</p>
<ul style="list-style-type: none"> <li>Monitoring indicates that remnant woodland areas are maintaining similar or increasing flora and fauna species diversity.</li> </ul>	<p>Biodiversity management measures such as weed management, feral animal control (refer to <b>Section 5.0</b>).</p> <p>Annual BOA monitoring surveys to monitor and report on ongoing species diversity (refer to <b>Section 6.2</b>).</p>
<ul style="list-style-type: none"> <li>There is no evidence of significant pest animal or weed infestation within the Jandra BOA.</li> </ul>	<p>Weed management and feral animal control measures (refer to <b>Sections 5.7</b> and <b>5.8</b> respectively).</p> <p>Annual BOA monitoring surveys, environmental inspections and the Annual Review will report on weed and feral animal infestations (refer to <b>Sections 7.0</b> and <b>9.0</b> respectively).</p>

Performance Indicators	How Addressed
<ul style="list-style-type: none"> <li>It can be demonstrated that accurate records are being maintained substantiating all activities and monitoring associated with the Jandra BOA</li> </ul>	An annual BOA Monitoring Report will provide accurate records of monitoring in the BOA (refer to <b>Section 8.0</b> ).

## 4.2.2 Triggers for Remedial Action

Triggers for remedial action are outlined in relation to the risk assessment and corrective actions outlined in **Section 7.0**.

## 4.3 Rehabilitation

### 4.3.1 Performance Indicators and Completion Criteria

Rehabilitation performance indicators and completion criteria will be used to demonstrate achievement of rehabilitation objectives. The rehabilitation performance indicators and completion criteria for the Jandra Quarry are outlined in **Table 4.3**.

**Table 4.3 Performance Indicators and Completion Criteria for Rehabilitation**

Performance Indicators and Completion Criteria	How Addressed
<b>Native Rehabilitated Vegetation and Habitat</b>	
<ul style="list-style-type: none"> <li>Rehabilitated quarry benches and quarry pit areas contain flora species assemblages characteristic of the desired native vegetation communities in the surrounding landscape.</li> </ul>	Rehabilitation will use species known to occur in the locality (refer to <b>Table 5.1</b> ).  Ongoing rehabilitation maintenance works (medium and long-term) will include weed control (refer to <b>Section 5.7</b> ) and monitoring of vegetation health and composition (refer to <b>Section 6.1.1</b> )
<ul style="list-style-type: none"> <li>Monitoring indicates that natural regeneration is occurring in rehabilitated areas.</li> </ul>	Quarterly rehabilitation monitoring will observe natural regeneration (refer to <b>Section 6.1.1</b> ).
<ul style="list-style-type: none"> <li>The majority of trees are healthy and growing in rehabilitated areas.</li> </ul>	Rehabilitation activities will include rehabilitation maintenance works such as watering, weed control, fertilising and erosion management (refer to <b>Section 5.0</b> ).  Quarterly rehabilitation monitoring will observe tree health (refer to <b>Section 6.1.1</b> ).
<ul style="list-style-type: none"> <li>There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum in rehabilitated areas.</li> </ul>	Rehabilitation activities will include weed control (refer to <b>Section 5.7</b> ).  Quarterly rehabilitation inspections will note the incidence of weeds (refer to <b>Section 6.1.1</b> ).

Performance Indicators and Completion Criteria	How Addressed
<ul style="list-style-type: none"> <li>It can be demonstrated that accurate records are being maintained substantiating all activities and monitoring associated with the rehabilitation areas.</li> </ul>	Relevant summaries in the Annual Review will provide accurate records of the rehabilitation process (refer to <b>Section 8.1</b> ).
<b>Landform</b>	
<ul style="list-style-type: none"> <li>No significant erosion or runoff impacts are present.</li> </ul>	Surface water impacts will be managed in accordance with the Soil and Water Management Plan (Element Environment 2015).  Quarterly rehabilitation inspections will note the incidence of erosion impacts (refer to <b>Section 6.1.1</b> ).
<ul style="list-style-type: none"> <li>Rehabilitation activities are undertaken as soon as reasonably possible to minimise unnecessary dust generation from cleared areas.</li> </ul>	Rehabilitation activities will be undertaken in accordance with this BRMP and a Rehabilitation and Closure Plan, which will be prepared within 3 years of closure.
<ul style="list-style-type: none"> <li>No significant visual impacts from the quarry works.</li> </ul>	Immediate rehabilitation and revegetation of exposed benches at the highpoint of ridgelines will be undertaken to ensure effective screening (refer to <b>Section 5.3</b> ).
<b>Decommissioning</b>	
<ul style="list-style-type: none"> <li>All surface infrastructure to be decommissioned and removed, including the removal of services (power, water and communications).</li> </ul>	Decommissioning of the quarry will be undertaken in accordance with the Closure Plan.
<b>Safety</b>	
<ul style="list-style-type: none"> <li>Access and public safety to be managed during operations and at the closure of the quarry.</li> </ul>	Access control measures will be undertaken (refer to <b>Section 5.10</b> ).  Decommissioning of the quarry will be undertaken in accordance with the Closure Plan.

The rehabilitation performance indicators will be reviewed and revised throughout the life of the quarry and used as the basis for further refinement following the commencement of rehabilitation activities and guide the closure criteria to be outlined in the Jandra Quarry Closure Plan to be prepared three years prior to the closure of the quarry.

### 4.3.2 Triggers for Remedial Action

Triggers for remedial action are outlined in the in relation to the risk assessment and corrective actions outlined in **Section 7.0**.

## 5.0 Biodiversity Management Measures

Holcim Australia is committed to implementing reasonable and feasible rehabilitation and biodiversity management measures. A range of management controls will be implemented throughout the life of the operation to achieve ongoing mitigation of potential impacts on remnant vegetation and habitat disturbance and for the establishment of the Jandra BOA. These specific management controls are detailed in the sections below.

### 5.1 Native Vegetation and Habitat Enhancement

The following measures are proposed to be undertaken within the Jandra BOA and within buffer lands for the Jandra Quarry site to enhance the native vegetation habitats in these areas:

- habitat augmentation with salvaged habitat features from vegetation clearance (refer to **Section 5.5**)
- increasing hollow capacities by undertaking nest box installation (refer to **Section 5.6**)
- weed management (refer to **Section 5.7**)
- feral animal control (refer to **Section 5.8**)
- erosion and sediment control works (where required) (refer to **Section 5.9**)
- bushfire load monitoring and reduction works in consultation with the NSW Rural Fire Service (RFS) (refer to **Section 5.11**).

Periodic inspections and monitoring of the buffer lands and the Jandra BOA will identify any maintenance actions required in order to assist in the enhancement of these areas. Inspections will identify issues such as fence condition, progression of regenerating native vegetation and the need for targeted weeding and feral animal programs.

### 5.2 Mitigation Measures to Minimise Impacts on Biodiversity Features

The following measures are proposed to be undertaken within the Jandra Quarry site to minimise the impacts on threatened species, populations and habitats as a result of the quarrying activities on the site:

- Pre-clearance surveys and tree-felling supervision to minimise impacts on arboreal fauna species (refer to **Section 5.4**)
- Areas of biodiversity value outside the disturbance area will be demarcated and signposted, where appropriate, to prevent the unnecessary disturbance during the construction phase (refer to **Section 5.10**)
- Traffic control measures/speed limits/signage will be enforced on haul roads and access roads to minimise fauna injury/road kills, as much as possible, and an injured fauna procedure will be followed in the instance that injured fauna is found on site (see **Section 5.4.3**)
- Weed management (refer to **Section 5.7**)
- Feral animal control (refer to **Section 5.8**)

- Erosion and sediment control works (where required) (refer to **Section 5.9**)
- Employee education and training including inductions for staff, contractors and visitors to the site will be conducted to inform personnel of the biodiversity issues present at the site and to ensure they know their role and responsibilities in relation to the protection and/or minimisation of impacts to all native biodiversity during construction.

### **5.3 Landscaping to Minimise Visual Lighting Impacts**

The construction of the new heavy vehicle access road and expansion of the finished product stockpile area are the only proposed changes to the approved disturbance area. This proposed new infrastructure will be located immediately adjacent to the approved site facilities area and will be screened from all surrounding residential properties by existing vegetation and topography. Visual impacts will be addressed by the:

- retention of vegetation at the top of cut faces and
- progressive rehabilitation of quarry benches including immediate revegetation of exposed benches at the high point of ridgelines to ensure effective screening for properties to the east and west of the quarry.

Fugitive light emissions resulting from the construction and operation of the quarry may result in adverse impacts on adjacent habitats and fauna species such as nocturnal fauna species, particularly birds and bats. Night lighting of the quarry is required for safety reasons, however the rehabilitation and landform design of the quarry provides the protection of surrounding landscapes from the lighting emitted from the quarry. Progressive rehabilitation will also provide screening of these impacts.

### **5.4 Pre-clearance Surveys and Tree-felling Procedure**

#### **5.4.1 Pre-clearance Survey**

Pre-clearance surveys will be required for the clearing of native vegetation in the disturbance footprint in the Jandra Quarry site. Pre-clearance surveys will be undertaken by suitably qualified and experienced ecologists and involve the following:

- the demarcation of areas approved for clearing to reduce risk of accidental clearing
- habitat resources and habitat trees will be identified and marked. This may include hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage. Other habitat features to be identified may include fallen timber/hollow logs, burrows and boulder piles
- potential presence of threatened flora and fauna species, endangered populations and threatened ecological communities (e.g. koala feed trees)
- hollows identified will be 'stag-watched' for 30 minutes prior to or immediately following dusk and
- the identification of habitat features that are suitable for salvage.

## 5.4.2 Tree-felling Procedure

The clearing of vegetation will be undertaken as soon as possible after the pre-clearance survey and in accordance with the following 'two-stage' clearing procedure:

- all non-habitat trees and the understorey vegetation will be cleared, taking care to avoid all marked habitat trees and features
- within one day following the clearing of non-habitat trees, habitat trees will be cleared in the presence of a suitably qualified ecologist. Before clearing, the trunk of the hollow-bearing tree will be shaken vigorously with heavy machinery then shaking will be paused for 30 seconds to allow any fauna present to escape, prior to felling of the tree. The machinery operator will then push the tree over as slowly as possible, so as to minimise the intensity of impact when hitting the ground
- once the tree has been felled, the ecologist will inspect the tree (particularly tree hollows) for signs of any trapped or injured fauna
- any injured fauna will be carefully captured by the qualified and experienced person, and taken to a wildlife carer or veterinary clinic and
- the ecologist will identify any habitat features (hollows, logs, etc) that are suitable for salvage (refer to **Section 5.5.1**).

Disturbance activities must be targeted for specific times of the year to minimise impacts to species usage of habitat features for breeding and roosting. Preferred times are September – October, or March – May.

Detailed records will be maintained regarding the type and number of habitat features cleared, the type and number of fauna encountered and their fate. This will assist in informing mitigation programs such as nest boxes and habitat augmentation programs. A summary of the results of the tree-felling procedure will be reported in the Annual Review (refer to **Section 8.1**).

## 5.4.3 Injured Fauna Procedure

In the event that injured wildlife is found on site, the following steps will be taken:

1. Stop all work in the vicinity of the fauna and immediately notify the Quarry Manager, Pit Supervisor or their delegate.
2. Contact a suitably licenced fauna ecologist or wildlife carer to carry out any fauna handling.
3. Animals that are venomous, or present a risk to human health (e.g. bats that may have Australian Bat Lyssavirus) are not to be handled, and are to be left to a suitably qualified professional.
4. Contact the relevant rescue agency/veterinary service and follow any advice provided. Appropriate agencies may include FAWNA (02 6581 4141) or WIRES (1300 094 737).
5. The Quarry Manager, Pit Supervisor or their delegate, must record all details of the incident in an internal incident report. All relevant characteristics of the fauna will be recorded to the extent practicable (i.e. species, nature of injury, behaviour exhibited, location, habitat, date, time, weather). A Material Harm Incident Report may need to be completed, dependent on the nature of the cause of the injury (see **Section 8.4**).

6. Following consultation with relevant stakeholders, the site shall implement any additional safeguards or corrective actions.

## **5.5 Salvage of Resources**

### **5.5.1 Salvage of Habitat Features**

Where feasible, the salvage and relocation of hollow logs, fallen timber and boulders will be undertaken to augment habitat complexity within any areas to be rehabilitated or within the Jandra BOA (if this area has low occurrences of such habitat resources). The purpose of this will be to increase habitat complexity in these areas, to make them more habitable for native species, particularly threatened fauna species.

Habitat features suitable for salvage will have been identified and marked in the field as part of pre-clearance surveys. The procedure for salvaging and reinstating habitat features is as follows:

- salvage hollow bearing trees identified as part of the pre-clearance surveys, where practical and safe to do so
- hollow bearing trees can be stockpiled in unused areas, if necessary, until able to be reinstated
- identify suitable areas to reinstate hollow bearing trees
- carefully reinstate hollow bearing trees to identified area and
- hollow logs can be placed in small piles to increase habitat complexity, while others can be placed individually in post-mining rehabilitation areas.

### **5.5.2 Salvage for Rehabilitation**

Where there are opportunities to salvage topsoil-type material for rehabilitation purposes, the following measures will be adopted to protect its quality and enhance rehabilitation outcomes:

- where possible, topsoil will be stripped when moist to help maintain soil structure and to reduce dust generation
- level or gently sloping areas will be selected as stockpile sites to minimise erosion and potential soil loss
- appropriate sediment controls will be installed at the base of stockpiles to prevent soil loss
- topsoil and subsoil stockpiles will be generally less than 2 and 3 metres high respectively. The stockpiles will be set out in windrows to maximise surface exposure and biological activity and
- weed growth will be monitored and subsequently controlled if necessary.

## 5.6 Nest Box Installation

Nest boxes will be established in retained vegetation in Holcim-owned land in proximity to the impact site to mitigate the loss of hollow-bearing trees. Nest boxes will be installed at a ratio of 2:1 for every hollow removed and maintained for five years post-clearance. These nest boxes will be representative of the size of the hollows removed. This aims to compensate for the loss of these hollows and therefore maintain the density of available hollows in the locality. The nest boxes to be installed would include boxes designed to meet the requirements of locally-occurring hollow-dependent bird, mammal and bat species. The specific location of the nest boxes will be determined in consultation with a suitably qualified ecologist.

## 5.7 Weed Control

Weed species could inadvertently be brought into Jandra Quarry and BOA with imported materials, machinery, or stock movement, or allowed to invade naturally through removal of native vegetation. The presence of weed species has the potential to be a major hindrance to revegetation and regeneration activities.

A weed control program will be implemented to limit the spread and colonisation of noxious and environmental weeds at the Jandra Quarry and BOA, in accordance with the Jandra Quarry Weed Management Procedure (Safe Work Procedure WC001) and will include:

- regular inspections of the Quarry area to clarify any potential weed infestations
- the implementation of weed management measures as required including hand removal, mechanical removal and application of approved herbicides (in accordance with the *Pesticides Act 1999*) in authorised areas when favourable conditions prevail
- control of noxious weeds in accordance with the relevant legislation
- monitoring and inspections (refer to **Section 6.0**) of areas to assess the effectiveness of the weed control program and to understand any requirement for further work and
- ongoing consultation with the relevant authorities, as required, regarding weed listings, weed occurrence and management technologies, as required.

Visual inspections for weed treatment performance are to be completed when weed control contractors are onsite for other activities (grounds keeping/gardening), as part of quarterly rehabilitation monitoring, and Biodiversity Offset Area monitoring (refer to **Section 6.0**). The inspections will report outcomes of previous treatments, note any new infestations, and report whether natives are regenerating in successfully treated areas.

A site register is used to record when spraying has taken place. This register must be kept up-to-date with complete records, including weed species treated, treatment methods and location of treatment (mapping these areas if possible). These observations will be used to assess the effectiveness of the weed control program, help target future inspections, and inform new weed control strategies, should they be required.

A weed spraying campaign is to be undertaken every 3 months, where possible. Timing may be subject to variables such as:

- Weather conditions
- Seasonal growth or seeding of weeds.
- Recent rainfall
- Rapid growth of weeds
- Previous effectiveness
- Visual identification of new hot spots.

Chemicals to be used on site for the purposes of weed control will be evaluated by review of their Material Safety Data Sheet and chemical label to determine their registration for control of target species, as well as the safety and environmental requirements during their use. Chemical spraying will be undertaken in accordance with the *Pesticides Act 1999* with records of use maintained for a period of three years. A summary of the weed management activities undertaken on site, and the results of monitoring inspections will be reported in the Annual Review (refer to **Section 8.1**).

## 5.8 Feral Animal Control

Feral animals at Jandra Quarry and BOA may impact on the native fauna species through predation and competition for resources such as food, shelter, and breeding sites. Feral animals can also have a detrimental effect on regenerating areas as well as soil stability. Wild dogs, in particular, are known to occur in adjacent lands.

Inspections of the occurrence of feral animals will be undertaken by the Environmental Representative and reported on as noted by quarry staff. Additionally, regular monitoring of rehabilitation and BOA will be undertaken to determine the impact of feral animals.

Feral animal control programs will be completed as required. These programs typically consist of feral animal baiting. The details of feral animal sightings, control actions and the effectiveness of these control strategies will be reported in the Annual Review (refer to **Section 8.1**).

## 5.9 Erosion and Sedimentation Control

The erosion and sediment control measures that will be implemented to minimise risks associated with potential erosion and sediment impacts will be undertaken in accordance with the Jandra Quarry Soil and Water Management Plan (Element Environment 2015). Relevant information in Table 8 of this Plan is summarised as follows:

- The outlet from the wheel wash system discharges in close proximity to the low flow outlet from the Main Dam. It is recommended that either:
  - A baffle (sediment curtain) be installed to lengthen the flow path of wheel wash water to the dam outlet; or

- The wheel wash outlet be moved further away from the Main Dam outlet to encourage greater drop out of sediment from wheel wash water and to reduce the risk of highly sediment laden wash off water from short-circuiting and discharging into the downstream waterway when the Main Dam is full and in bypass mode
- Runoff from undisturbed catchments is to be diverted around the quarry area prior to discharge into the dam
- Disturbed sites prone to erosion (i.e. exposed earth batters around processing areas) will be stabilised with vegetation
- Exposed earth channels and flow paths will be stabilised with vegetation where appropriate.
- Where monitoring of Total Suspended Solids indicates levels in excess of 50mg/L, the Main Dam will be treated with a flocculating agent immediately following any storm event large enough to cause runoff. Such dosing is to occur within 24 hours of the conclusion of each storm event.
- Construction of the heavy vehicle access road and expansion of the finished product stockpile area will be timed where possible during low rainfall months of the year (July to October if possible)
- A sediment fence would be erected within the watercourse, immediately downslope of the northernmost edge of the expanded finished product stockpile area, prior to construction & ground disturbance.
- Drainage structures (pipe or box culverts) to convey overflow from the Main Dam levy, under the heavy vehicle access road, would be constructed first, to allow clean water from the Main Dam to 'bypass' the construction works, preventing the mobilisation of sediments during dam discharges
- Inspections of erosion and sediment controls will be undertaken on a regular basis and at least quarterly.

## 5.10 Access Control

Access control can be an important feature in protecting and demarcating conservation areas from vehicle access, human access or invasive feral species. In the case of limiting access and disturbance for areas of important vegetation and habitats, all native flora and fauna species are considered to benefit from these measures. Measures proposed for the Jandra Quarry and the Jandra BOA include:

- appropriate fencing and signposting of areas of biodiversity value where appropriate to prevent the uncontrolled entry of people and to minimise vehicular and human traffic
- alternatives to barbed-wire fencing will be considered when fencing is required including the use of plain wire fencing or the addition of visible tagging to tall barbed-wire fencing that may obstruct flight paths of birds, bats and gliders
- appropriate fencing around the Jandra Site will be established within 12 months of securing the site as an in perpetuity offset for the Modification Project
- clear and visible signage is to be appropriately located to inform employees and others of the restricted access or otherwise of areas of biodiversity value and
- locking of gates to prevent unwanted vehicle, person access and disturbance.

## 5.11 Bushfire Management

Water for use in fire-fighting is provided for by the site water management system, to ensure that there is sufficient water available on site for bushfire fighting purposes. Fire-fighting equipment including fire hydrants, extinguishers and hose reels will continue to be provided at all infrastructure areas and mobile equipment maintained in accordance with Australian Standards and Workplace Health and Safety (WHS) guidelines.

Holcim has a long history of safe operation of Jandra Quarry and implementation of appropriate measures on site for managing bushfire risk. Holcim will continue to implement the appropriate measures to reduce the risk of fire ignition and the spread of bushfire across the site in consultation with the NSW Rural Fire Service (RFS).

## 5.12 Rehabilitation Measures for Biodiversity Improvement

- The following measures will be undertaken during the progressive rehabilitation program at the Jandra Quarry to provide appropriate rehabilitation in the context of the surrounding landscape in accordance with the objectives outlined in **Table 4.1**. Natural vegetation buffers will be retained and/or created, wherever possible, adjacent to the areas of development.
- As outlined in **Section 5.5.2**, where possible, topsoil from clearance works will be salvaged and used in rehabilitation campaigns to maintain the naturally occurring seedbank, soil micro-organisms and organic matter.
- Rehabilitation planting will be targeted for late Summer to early Autumn, where possible, to allow time for roots to become established before the new Spring growth occurs.
- Revegetation will involve direct seeding, tubestock and/or natural regeneration.
- Revegetation of the quarry pit and quarry benches will be undertaken using the species outlined in **Table 5.1** below.

**Table 5.1 Recommended Species for Rehabilitation and Revegetation**

<b>Groundcovers</b>
mat rush ( <i>Lomandra longifolia</i> )
blady grass ( <i>Imperata cylindrica</i> )
dusky coral pea ( <i>Kennedia rubicunda</i> )
leafy purple-flag ( <i>Patersonia glabrata</i> )
<b>Understorey Species</b>
coffee bush ( <i>Breynia oblongifolia</i> )
scrubby spurge ( <i>Phyllanthus gunnii</i> )
<i>Glycine</i> sp.
blue flax-lily ( <i>Dianella caerulea</i> )
<b>Midstorey Species</b>
black she-oak ( <i>Allocasuarina littoralis</i> )
forest oak ( <i>Allocasuarina torulosa</i> )
dogwood ( <i>Jacksonia scoparia</i> )
two-veined hickory ( <i>Acacia binervata</i> )
native cherry ( <i>Exocarpus cupressiformis</i> )
<b>Overstorey Species</b>
pink bloodwood ( <i>Corymbia intermedia</i> )
spotted gum ( <i>Corymbia maculata</i> )
white mahogany ( <i>Eucalyptus acmenoides</i> )
tallowwood ( <i>Eucalyptus microcorys</i> )
small-fruited grey gum ( <i>Eucalyptus propinqua</i> )
broad-leaved white mahogany ( <i>Eucalyptus umbra</i> )

## 6.0 Monitoring Program

Ecological and rehabilitation monitoring is required by Condition 25(f) of Schedule 3 of the Development Consent. This section details the rehabilitation and BOA monitoring program requirements for Jandra Quarry.

### 6.1 Rehabilitation Monitoring

#### 6.1.1 Quarterly Rehabilitation Inspection

Quarterly inspections of rehabilitated areas (or other frequency as agreed with DPE) will be undertaken over the life of the quarrying operations to assess:

- soil conditions and erosion (i.e. stability)
- drainage and sediment control structures
- runoff water quality
- germination rates
- plant health
- natural regeneration and
- weed infestation.

Outcomes of the rehabilitation inspections will be recorded and any required reasonable and feasible management actions that are identified as part of the inspection, are to be implemented. Where necessary, rehabilitation and revegetation procedures will be amended accordingly with the aim of continually improving standards. The results of the rehabilitation inspections will be compared with the rehabilitation objectives and performance indicators as part of the Annual Review (refer to **Section 8.1**).

Dependent upon the outcomes of the rehabilitation inspection as outlined above, the scope of the rehabilitation care and maintenance phase may include the following:

- re-seeding/planting of rehabilitation areas that may have failed
- weed and feral animal control
- fire management
- additional watering requirements for dry areas
- thinning of colonising species to reduce competition, if required
- erosion control works
- maintenance fertilising and
- repair of fence lines, access tracks and other general related land management activities.

It is envisaged that this program will be continued as required until it can be demonstrated that the rehabilitation of Jandra Quarry has satisfied the closure criteria.

### **6.1.2 Monitoring Rehabilitation Progress against Performance Indicators**

Rehabilitation performance indicators are provided in **Section 4.3**. 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 Quarry Closure Plan, which will be developed when three years from closure. 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.

### **6.1.3 Process for Review and Refinement**

The rehabilitation performance indicators will be reviewed and revised in consultation with NSW Department of Planning and Environment (DPE) 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 BRMP that are submitted to DPE.

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

## **6.2 Biodiversity Offset Area Monitoring**

The Biodiversity Offset Area will be subject to ongoing monitoring and maintenance actions to ensure that the area progresses towards meeting the objectives and targets set out in **Section 4.0** in a timely manner. The monitoring program will monitor the success of the management actions, in addition to compliance with the approval conditions, against performance indicators described in **Table 4.2** and the requirements of a BioBanking Agreement, if applicable.

Monitoring events will identify any corrective actions required or whether assistance is required to achieve targets. Monitoring events will target issues such as progression of regenerating native vegetation and the need for targeted weeding programs.

Monitoring of the BOA will be undertaken on an annual basis for the first 5 years after securing the BOA and ongoing monitoring schedules will be reassessed thereafter. Monitoring results will be assessed and utilised in the continual improvement of revegetation techniques and management actions, and will be documented as part of the Annual Review.

### **6.2.1 Flora Monitoring**

The condition of vegetation in the Biodiversity Offset Area will be monitored to identify any deterioration or improvement in habitat quality during the life of the quarry. This monitoring will involve the establishment of permanent monitoring plots within the Biodiversity Offset Area. Two flora monitoring plots will be established in the BOA. This monitoring will be undertaken every two years.

The monitoring approach will involve surveys at permanent monitoring plots, which will be sampled in order to record species diversity and structural composition. Plots will be sampled using floristic and vegetation integrity assessments in accordance with the Biodiversity Assessment Method (BAM), to ensure data is comparable over time using current best-practice monitoring methods.

Photo monitoring points will also be established within each of the permanent monitoring plots, to enable a visual assessment of changes over time.

In addition to data collected through vegetation integrity plots, the monitoring surveys will also record the following attributes:

- general health of vegetation
- evidence of natural regeneration
- occurrence and abundance of weed species
- presence of threatened or other significant species
- signs of disturbance, either by stock, feral animals or humans and
- any observable impacts of the Quarry, such as the effectiveness of fencing and weed control actions.

### **6.2.2 Fauna Monitoring**

Within the Biodiversity Offset Area a range of fauna survey techniques will be employed to determine ongoing fauna use of habitat within the site, particularly focusing on the ongoing presence of threatened species. Monitoring will be undertaken in the first year of the project and then every three years in accordance with this plan. Two fauna monitoring sites will be established in the BOA.

At each of the monitoring sites the following fauna monitoring surveys will be completed:

- spotlighting surveys
- diurnal bird searches
- diurnal herpetological surveys
- nocturnal herpetological surveys in appropriate habitat areas
- Anabat surveys
- remote camera surveys targeting ground and arboreal fauna and
- opportunistic surveys, including identification and reporting of feral animal species.

In the event that further threatened species are identified within the Biodiversity Offset Area the monitoring program will be reviewed to ensure it adequately monitors these species.

### **6.2.3 Nest Box Monitoring**

Nest box monitoring will be undertaken annually for five years after the first phase of nest box installation to record the effectiveness of artificial habitat structures. This monitoring will report on the degree of use of nest boxes and make recommendations regarding maintenance activities as required. The need for this monitoring program to continue will be assessed at this time.

Monitoring will be undertaken during spring each year when the use of boxes by bird species can be detected. While mammal species will den in the nest boxes all year, bird species such as parrots using the boxes solely for breeding will only be present for 8 to 12 weeks during spring. Nest box monitoring will be undertaken by a qualified ecologist and the findings included in the Annual Review Report.

Nest box condition monitoring will be undertaken by the Environmental Officer for the life of the quarry to prevent loss of boxes through deterioration over time.

# 7.0 Risks and Corrective Actions

## 7.1 Risk Assessment

A risk based approach to the implementation of this BRMP has been considered such that risks to the establishment and management of the Biodiversity Offset Area are identified and a strategy developed to avoid or minimise the potential for them to occur. **Table 7.1** summarises the risks identified and sections of this BRMP where they are discussed.

		CONSEQUENCE (C)				
		Insignificant (F)	Minor (I)	Moderate (D)	Major (J)	Significant (S)
LIKELIHOOD (L)	Remote (R)	Negligible (N)	Negligible (N)	Very Low (L)	Low (W)	Medium (M)
	Unlikely (U)	Negligible (N)	Very Low (L)	Low (W)	Medium (M)	High (H)
	Possible (P)	Very Low (L)	Low (W)	Medium (M)	High (H)	Very High (V)
	Likely (L)	Low (W)	Medium (M)	High (H)	Very High (V)	Extreme (E)
	Almost Certain (C)	Medium (M)	High (H)	Very High (V)	Extreme (E)	Extreme (E)

**Table 7.1 Risk Assessment for the Implementation of the BRMP**

Risk	L	C	Rating
Inadequate resourcing to implement the management strategy	U	J	M
Inadequate resourcing to meet the monitoring and reporting requirements	U	J	M
Weed infestations leading to degradation of biodiversity values	P	D	M
Feral animal species leading to degradation of biodiversity values	P	D	M
Unauthorised/uncontrolled access leading to damage	P	I	W
Failure to meet rehabilitation targets in the quarry pit or quarry benches	P	D	M

## 7.2 Corrective Actions

As identified in **Section 7.1** above, there are a range of uncertainties associated with implementation of the BRMP. In order to ensure delivery of the stated outcomes, and compliance with the approval conditions, a range of further actions are to be undertaken in the event it becomes apparent that performance indicators are not being met.

The results of monitoring will feed into the adaptive management process (refer to **Section 8.3**). The Environmental Representative will utilise the results of the monitoring activities to identify any corrective actions required to meet the objectives and targets. The indicative triggers and corrective actions outlined in **Table 7.2** have been identified would be subject to review based on the adaptive management process.

**Table 7.2 Issue Identified and Recommended Corrective Actions**

Issues Identified by Monitoring Trends or an Observed Non-compliance	Potential Corrective Actions
Unauthorised access resulting in damage	<ul style="list-style-type: none"> <li>• Identify access points and repair as required.</li> <li>• Review site security.</li> </ul>
Infestations of noxious and environmental weeds in the BOA and/or rehabilitation areas	<ul style="list-style-type: none"> <li>• Adapt weed management strategy and modify accordingly.</li> <li>• Actively monitor the results of modifying strategy.</li> </ul>
Infestations of feral animal species in the BOA and/or rehabilitation areas	<ul style="list-style-type: none"> <li>• Adapt feral animal control strategy and modify accordingly.</li> <li>• Actively monitor the results of modifying strategy.</li> </ul>
Scarcity of key habitat features in the BOA and/or rehabilitation areas	<ul style="list-style-type: none"> <li>• Add logs or branches;</li> <li>• Increase the number of vegetation layers in the patch; and</li> <li>• Establish further nest boxes for target species, if suitable.</li> </ul>
Dense stands of colonising tree or shrub species dominant in the rehabilitation areas	<ul style="list-style-type: none"> <li>• Assess whether thinning is necessary;</li> <li>• Leave if patches are small and plants are native; and</li> <li>• Thin manually if appropriate.</li> </ul>
Low species diversity in the rehabilitation areas	<ul style="list-style-type: none"> <li>• Targeted weed control; and</li> <li>• Consider the need for active revegetation techniques including direct seeding or tubestock planting, following appropriate ground preparation such as weed control, ripping and augering.</li> </ul>

# 8.0 Reporting Requirements

## 8.1 Annual Review

In accordance with Condition 4 of Schedule 5 of the Jandra Quarry Development Consent, by the end of March each year, Holcim Australia will review the environmental performance of the development to the satisfaction of the Secretary. The review must:

- describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year
- include a comprehensive review of the monitoring results and complaints recorded -over the previous calendar year, which includes a comparison of these results against:
  - the relevant statutory requirements, limits or performance measures/criteria
  - the monitoring results of previous years and
  - the relevant predictions in the previous approvals, the Environmental Assessment (Element Environment 2014) and the conditions in the Development Consent
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance
- identify any trends in the monitoring data over the life of the development
- identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies.

## 8.2 Annual Biodiversity Offset Monitoring Report

Following the securing of the BOA in perpetuity under a Section 88B Instrument (positive covenant), the area will be subject to regular monitoring, and the production of an Annual Biodiversity Offset Monitoring Report. Holcim may need to produce these reports to relevant authorities on request. The Annual Biodiversity Offset Monitoring Report will include:

- methods and results of monitoring program outlined in **Section 6.2**
- records of the management actions undertaken in the BOA, including minor alterations that are part of adaptive management
- a record of events that have had an impact on the site's biodiversity values
- any problems experienced and the recommendations proposed or the actions taken to address them
- commentary on results and trends towards performance indicators outlined in **Table 4.2**

### 8.3 Adaptive Management

In accordance with Condition 2 of Schedule 5 of the Development Consent, Holcim Australia will assess and manage biodiversity and rehabilitation related risks to ensure compliance with the criteria outlined in **Section 4.0**.

Where a non-compliance relating to biodiversity or rehabilitation has occurred, Holcim Australia will, to the satisfaction of the Secretary:

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

A strong feedback loop between monitoring and management will be established. Adaptive management of the BOA and rehabilitation areas will be responsive to any new ecological data that may arise through the monitoring described in **Section 6.0**, legislative change or any other studies completed at the site. This will enable a flexible approach to management requirements, allowing ongoing feedback and refinement of the management strategy.

### 8.4 Material Harm Incident Reporting Protocol

In accordance with Condition 6 of Schedule 5 of the Jandra Quarry Development Consent, Holcim Australia will notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment.

For any other environmental incidents associated with Jandra Quarry operations, Holcim Australia will notify the Secretary and any other agencies as soon as practicable after Holcim Australia become aware of the incident. Within 7 days of the date of the incident, Holcim Australia will provide the Secretary and any relevant agencies with a detailed report on the incident, and any further reports that may be requested.

### 8.5 Complaint Response Protocol

Complaints relating to biodiversity or rehabilitation from Jandra Quarry are to be managed in accordance with the requirements of the Jandra Quarry Environmental Management Strategy. A summary of complaints will be available to regulatory authorities on request and summarised in the Annual Review.

### 8.6 Independent Audit

By 31 March 2016, and every 3 years thereafter, unless the Secretary directs otherwise, Holcim Australia will commission and pay the full cost of an Independent Environmental Audit of the development. Within 3 months of commissioning the audit, or as otherwise agreed by the Secretary, Holcim Australia will submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.

## 8.7 Access to Information

This BRMP will be made publicly available on the Holcim Australia website (<http://www.holcim.com.au/>) following approval by the Secretary including any subsequent revisions.

## 9.0 Review and Improvement

Ongoing monitoring and review on the performance and implementation of this BRMP will be undertaken in accordance with Jandra Quarry Environmental Management Strategy.

In accordance with Condition 5 of Schedule 5, Holcim Australia shall review, and if necessary revise, the strategies, plans, and programs required under Development Consent to the satisfaction of the Secretary, within 3 months of the submission of:

- (a) *an annual review under condition 4;*
- (b) *an incident report under condition 6; and*
- (c) *an audit report under condition 9; and*
- (d) *any modifications to this consent*

*the Applicant shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.*

The above reviews will be undertaken by the Jandra Quarry Manager in consultation with Holcim Australia environmental personnel. Any significant changes made to the BRMP as a result of the review will be made in consultation with OEH and Greater Taree City Council. The revised BRMP will be supplied to the Secretary for approval. The BRMP will reflect changes in environmental requirements, technology and operational procedures. Updated versions of the approved BRMP will be made publicly available on the Holcim Australia website (<http://www.holcim.com.au/>).

## 10.0 Roles and Responsibilities

The relevant roles and responsibilities associated with this BRMP are presented in **Table 10.1** below.

**Table 10.1 Roles and Responsibilities**

Role	Responsibilities for this BRMP
Holcim Australia District Manager	<ul style="list-style-type: none"> <li>• Approve appropriate resources for the effective implementation of this plan.</li> </ul>
Jandra Quarry Manager	<ul style="list-style-type: none"> <li>• Provide that sufficient resources are allocated for the implementation of this Plan.</li> <li>• Coordinate the implementation of biodiversity and rehabilitation management controls and strategies in accordance with this Plan.</li> <li>• Coordinate the review of this plan in accordance with the requirements of the Development Consent.</li> <li>• Coordinate the rehabilitation monitoring requirements of this plan, and evaluate and report monitoring results as required.</li> </ul>
Holcim Australia Environmental personnel	<ul style="list-style-type: none"> <li>• Assist with the rehabilitation monitoring requirements of this plan, and evaluate and report monitoring results as required.</li> <li>• Coordinate biodiversity related incident investigations and reporting as required by legislation and internal standards and guidelines.</li> <li>• Assist with the review of this plan.</li> </ul>
All employees and contractors	<ul style="list-style-type: none"> <li>• Comply with all requirements of this Plan.</li> <li>• Report all potential environmental incidents to their supervisor immediately.</li> <li>• Seek approval from the Quarry Manger prior to making changes to infrastructure/processes which may result in biodiversity and rehabilitation area impacts.</li> </ul>

## 11.0 References

Austin, M, P, Cawsey, E, M, Baker, B, L, Yialeloglou, M, M, Grice, D, J, and Briggs, S, V, (2000) Predicted Vegetation Cover in the Central Lachlan Region. Final report of the Natural Heritage Trust Project AA 1368.97. CSIRO Wildlife and Ecology, Canberra

Element Environment (2014) Jandra Quarry Intensification in Production Environmental Assessment, prepared for Holcim (Australia) Pty Ltd, July 2014.

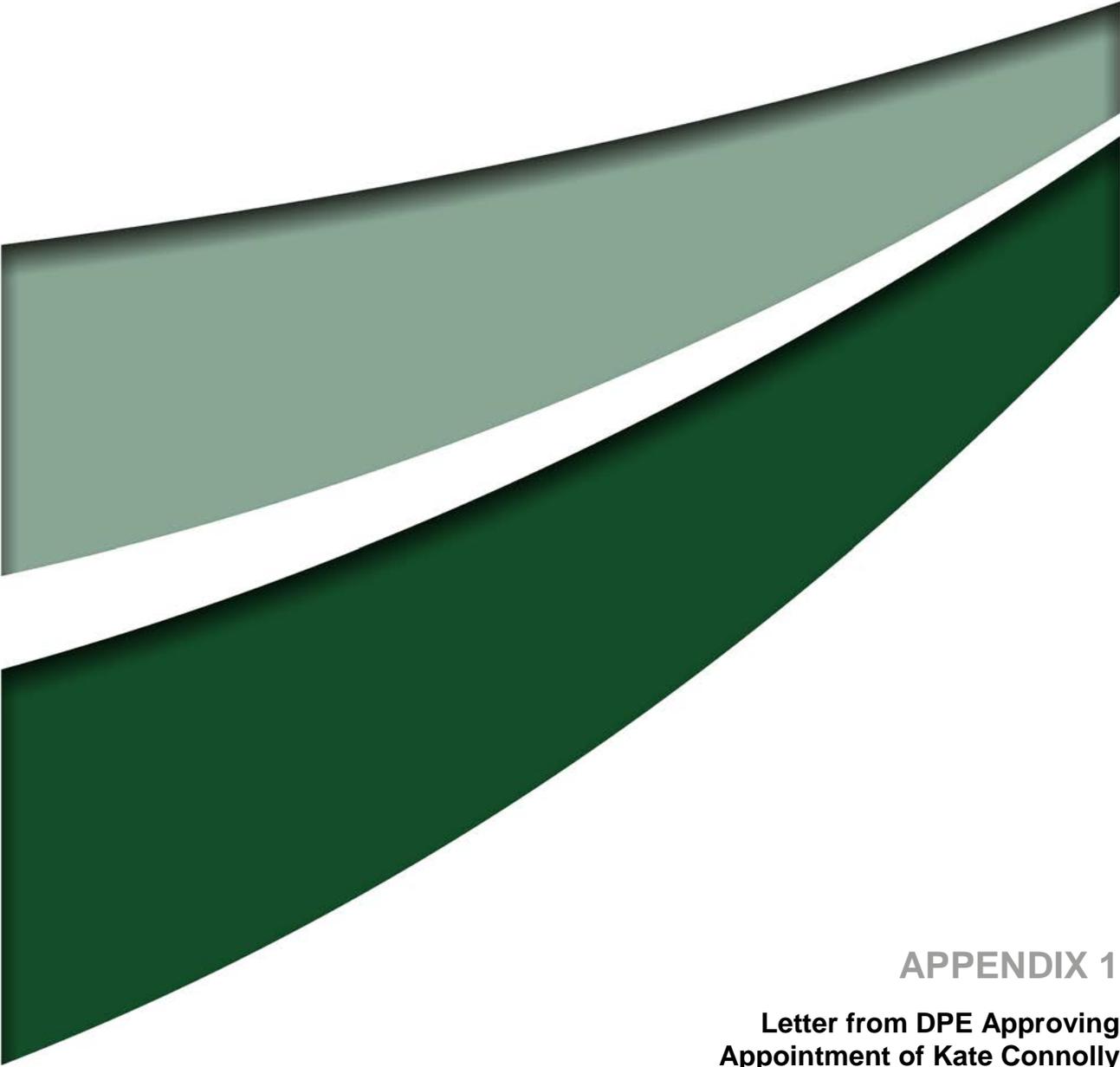
Element Environment (2015) Jandra Quarry Environmental Management Strategy, prepared for Holcim (Australia) Pty Ltd, 2015.

ERM Mitchell McCotter (2000) Environmental Management Plan for the Jandra Quarry, including the Flora and Fauna Management Plan, Landscape and Rehabilitation Management Plan and Soil and Water Management Plan, prepared for Holcim (Australia) Pty Ltd, May 2000.

Greater Taree City Council Draft Comprehensive Koala Plan of Management (CKPoM) (2002), prepared for Greater Taree City Council by the Australian Koala Foundation, September 2002.

Niche Environment and Heritage (Niche) (2014) Jandra Quarry Intensification Project – Flora and Fauna Impact Assessment, prepared for Element Environment, June 2014.

Poore, M. E. D. (1955) The use of phytosociological methods in ecological investigations. I. The Braun-Blanquet system. *Journal of Ecology* 42: 216-224.



**APPENDIX 1**

**Letter from DPE Approving  
Appointment of Kate Connolly**



## Planning & Environment

**Planning Services  
Resource Assessments and Compliance**

Contact: Margaret Kirton  
Phone: (02) 9228 6289  
Email: [margaret.kirton@planning.nsw.gov.au](mailto:margaret.kirton@planning.nsw.gov.au)

Mr Daniel Lidbetter  
NSW Planning & Environment Coordinator  
Holcim (Australia) Pty Ltd  
Tower B, Level 8  
799 Pacific Highway  
Chatswood NSW 2067

Dear Mr Lidbetter,

**JANDRA QUARRY DEVELOPMENT CONSENT  
(DA 213-10-99)  
MANAGEMENT PLANS**

I refer to your letters dated 11 May 2015 advising that Holcim wishes to appoint:

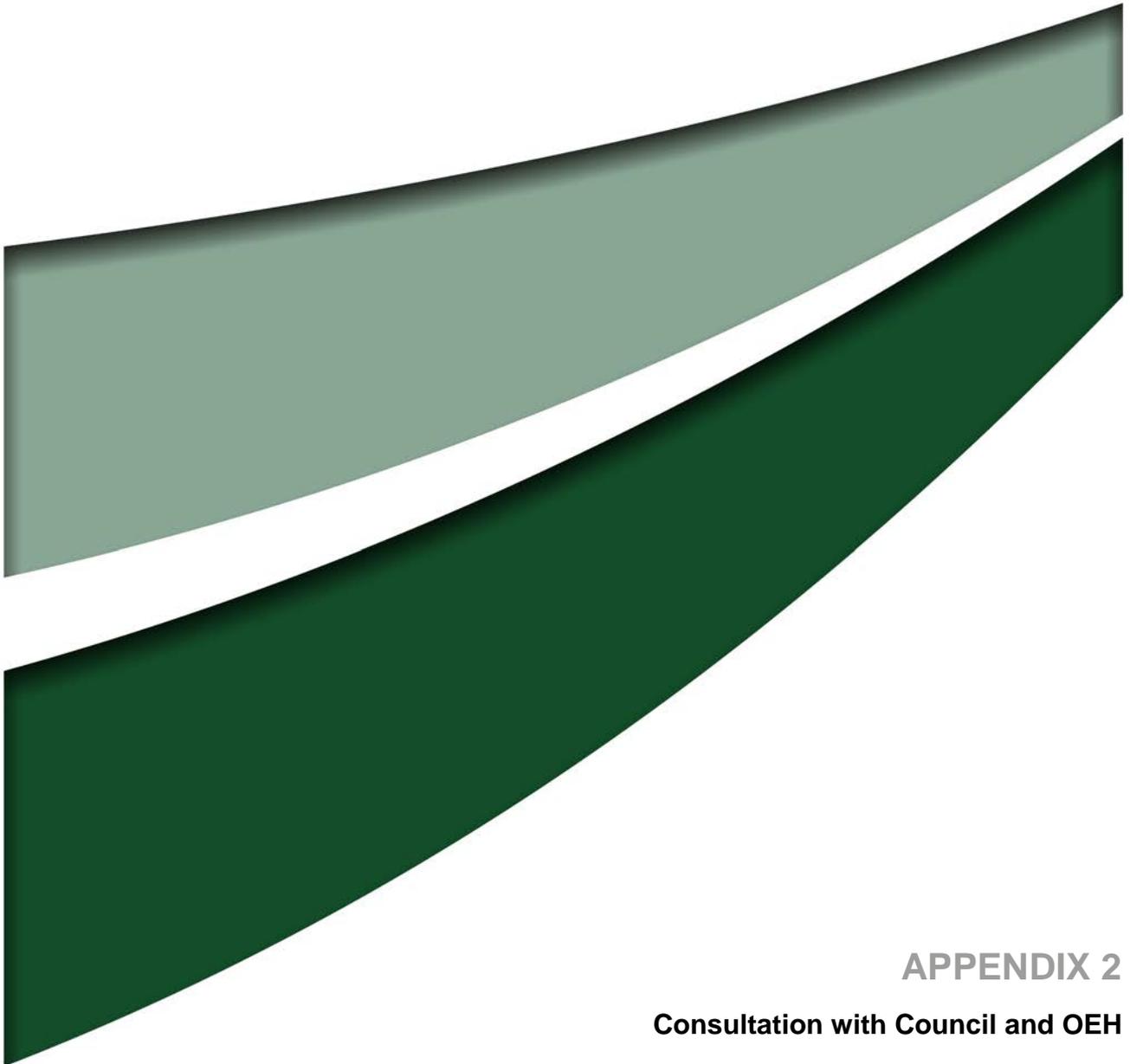
- Darren Green (Element Environment Pty Ltd) and Dr Adam Wyatt (Storm Consulting Pty Ltd) to prepare the Soil and Water Management Plan required by condition 19 of Schedule 3 of the abovementioned consent; and
- Travis Peake, Liza Hill and Kate Connolly (Umwelt Consultants Pty Ltd) to prepare the Biodiversity and Rehabilitation Management Plan required by condition 25 of Schedule 3 of the abovementioned consent.

Please be advised that the Secretary has considered the qualifications and experience of these consultants and approves their appointment to prepare the relevant management plans.

Should you have any questions about this letter, please contact Margaret Kirton on 9228 6289.

Yours sincerely

  
Howard Reed *1-7-15*  
**Director Resource Assessments**  
as the Secretary's nominee



## APPENDIX 2

**Consultation with Council and OEH**



Daniel Lidbetter <daniel.lidbetter@lafargeholcim.com>

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## Holcim Jandra Biodiversity Rehabilitation Management Plan

1 message

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**Daniel Lidbetter** <daniel.lidbetter@lafargeholcim.com>

9 September 2016 at 14:02

To: Arnna.Fotheringham@gtcc.nsw.gov.au

Cc: Matt Neil <matt.neil@lafargeholcim.com>, Ian Shenton <ian.shenton@lafargeholcim.com>

Hi Arnna,

In accordance with the request from council please see the attached copy of the BRMP for Jandra Quarry.

This item comes following a request by Greater Taree Council to submit a copy of the plan following correspondence from GHD during the Jandra Independent Environmental Audit.

If you have any questions regarding the plan please give me a call to discuss.

Thanks....Dan

--

Regards....Dan

Daniel Lidbetter  
Holcim (Australia) Pty Ltd  
NSW/ACT Planning & Environment Coordinator  
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A member of LafargeHolcim.

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1297K



Daniel Lidbetter &lt;daniel.lidbetter@lafargeholcim.com&gt;

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**Holcim Jandra Quarry: Biodiversity & Rehabilitation Management Plan**

1 message

**Ian Shenton** <ian.shenton@lafargeholcim.com>

8 December 2015 at 12:55

To: Steve Lewer &lt;Steve.Lewer@environment.nsw.gov.au&gt;

Cc: Daniel Lidbetter &lt;daniel.lidbetter@lafargeholcim.com&gt;

Hi Steve,

In accordance with Condition 25 (Schedule 3) of the Jandra Quarry Development Consent, Holcim are required to prepare and implement a Biodiversity and Rehabilitation Management Plan for the site.

This plan must be prepared in consultation with OEH.

Could you please review the attached Biodiversity and Rehabilitation Management Plan and provides comments back to me by no later than **Friday 15 January 2016**. Should no comments be received by this date it will be taken that OEH accept the Management Plan.

Please contact me if you have any questions.

Thanks,

Ian

--

**Ian Shenton**

Planning &amp; Environment Manager - NSW &amp; ACT

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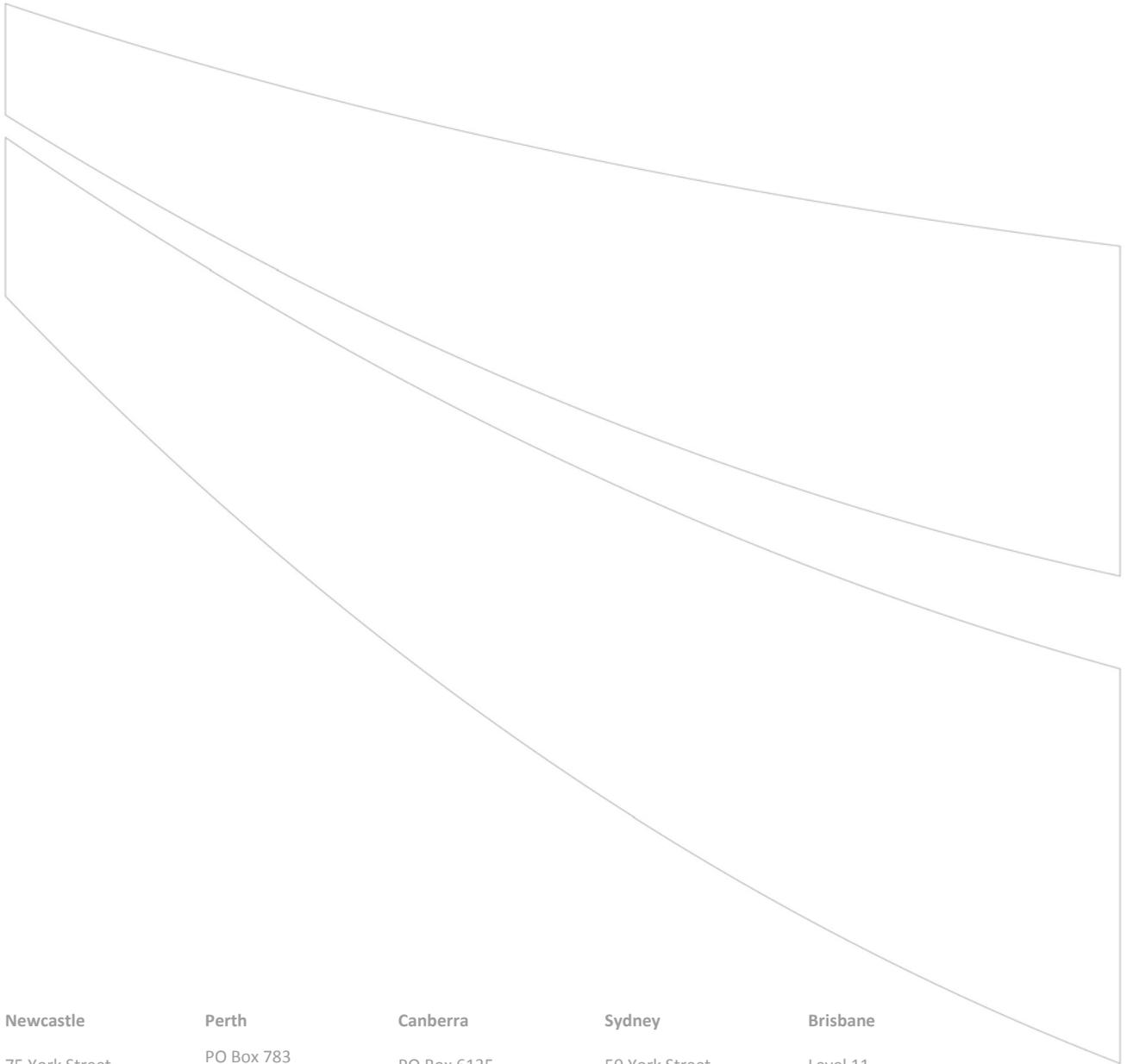
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