



TEVEN QUARRY PROJECT

Environmental Impact Statement

December 2014



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

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Executive Summary

Holcim (Australia) Pty Ltd (Holcim Australia) operates Teven Quarry, an existing hard rock quarry located at Stokers Lane, Teven, approximately eight kilometres north west of Ballina NSW. Teven Quarry has been producing construction and road building materials since the 1940's and has approval to continue operation until 2056.

Teven Quarry supplies construction and road building materials to the Northern Rivers region, primarily to the Ballina, Byron, Lismore and Tweed local government areas. The quarry also supplies eight Holcim Australia concrete plants in the Northern Rivers region. The region is experiencing significant growth in the demand for construction materials as a result of population growth and major infrastructure projects, including the Pacific Highway Upgrade. Teven Quarry has been restricted in its capacity to supply such projects as a result of production limits set by its existing development consent, with production from the quarry at or close to approved production limits for the past five years.

Due to increasing demand for quarry products associated with current and future road upgrade works in the region and significant forecast population growth, Holcim Australia is seeking development consent to increase maximum annual production at Teven Quarry from the currently approved limit of 265,000 tonnes per annum (tpa) to 500,000 tpa. Holcim Australia is also seeking approval to extend the hours of operations and add additional processing options to the site infrastructure. Development consent is being sought for a period of 30 years. This proposal is referred to as the Teven Quarry Project (the Project).

The Project will provide for the ongoing supply of construction and road building materials to the local and regional markets over a 30 year period, providing a valuable and necessary resource to the local and regional economy.

There is strong ongoing demand for the products produced by Teven Quarry and the quarry is well placed to meet this demand. The ability to increase production up to 500,000 tpa to meet customer needs will allow Teven Quarry to meet the predicted needs of major construction projects, including major road upgrades, that will be of significant benefit to both the region and NSW.

The Project will provide ongoing economic benefit to the local area and region through secure supply of high quality quarry products, ongoing and increased employment, capital expenditure and ongoing operational expenditure. These benefits will have flow on effects within the local and regional economies.

The Project will result in only minor changes to the existing approved operations at the site, with no change to the existing approved quarry footprint or disturbance area. Minor additions are proposed to the site infrastructure to provide additional production capacity and product options. The Project will also optimise and modernise the approach to operations and environmental management at the quarry, providing ongoing economic benefits whilst effectively managing environmental and social impacts.

The Project satisfies the criteria for State Significant Development listed in Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* and therefore requires development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Minister for Planning is the approval authority for all projects assessed as State Significant Development, however, under Section 23 of the EP&A Act, the Minister has the ability to delegate this authority to the Planning Assessment Commission, the Secretary of the Department of Planning and Environment or any other public authority.

The Project has been designed with consideration to the environmental values of the Project Area and potential impacts of the Project have been minimised through appropriate Project design and control measures. The potential environmental impacts of the Project have been thoroughly assessed and, where potential impacts have been identified, mitigation measures and environmental safeguards have been recommended and incorporated in the Project design and operational management.

This Environmental Impact Statement (EIS) has been prepared in accordance with the environmental assessment requirements issued by the Secretary of the Department of Planning Environment on 7 April 2014. The potential environmental impacts of the Project have been identified through a process involving:

- assessment of site characteristics;
- consultation with government agencies;
- consultation with surrounding land owners and other stakeholders; and
- expert technical assessments.

The key issues identified were the subject of comprehensive technical assessment to identify and assess the potential impacts of the Project on the existing environment and community. These assessments have generally found that the impacts of the Project are broadly consistent with those of the existing Teven Quarry operations that are approved until 2056. Where changes in impacts have been identified, environmental management and mitigation measures have been proposed by Holcim Australia to address these impacts.

It is considered that the Project has identified and mitigated potential environmental and social impacts to a level that will allow for the significant benefits of the Project for the local and regional communities to be sustainably realised.

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3	Teven Quarry Project Community Newsletter
4	Teven Quarry Hydrogeological Assessment
5	Noise and Blasting Impact Assessment
6	Air Quality Impact Assessment
7	Traffic Impact Assessment for Teven Quarry
8	Road Safety Audit
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10	Ecological Assessment Supporting Documentation

1.0 Introduction

Holcim (Australia) Pty Ltd (Holcim Australia) operates the Teven Quarry, an existing hard rock quarry located at Stokers Lane, Teven, approximately eight kilometres north west of Ballina (refer to **Figure 1.1**). Teven Quarry has been producing construction and road building materials since the 1940's and has approval to continue operation until 2056.

Due to increasing demand for quarry products associated with current and future road upgrade works in the region and significant forecast population growth, Holcim Australia is seeking development consent to increase production at Teven Quarry from the currently approved limit of 265,000 tonnes per annum (tpa) to 500,000 tpa. Holcim Australia is also seeking approval to extend the hours of operations and add additional processing options to site infrastructure. Consent is being sought for a period of 30 years. Assuming approval is granted in 2015 and production is increased to its approved maximum, this would potentially reduce the current quarry lifespan by 11 years. This proposal is referred to as the Teven Quarry Project (the Project). The Project will result in very little change to the existing approved extraction and processing operations on site, with no change to the existing approved quarry footprint or disturbance area proposed as part of the Project. The Project will target the same resource approved for extraction under existing approvals. The Project is intended to allow flexibility for Holcim Australia to meet the peak demands of major construction and road building projects forecast over the coming years and provide an opportunity to bring the existing quarry approval, dating back to 1995, up to contemporary environmental compliance standards. Further detail of the proposed Project is provided in **Section 4.0**.

Approval for the Project is being sought under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Part 4, Division 4.1 of the EP&A Act provides a framework for the assessment and approval of development classified as 'State significant' in NSW. The Project satisfies the criteria for State Significant Development listed in Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* as it involves production of 500,000 tpa of saleable product from a resource exceeding 5 million tonnes. The Minister for Planning is the approval authority for all projects assessed as State Significant Development, however, under Section 23 of the EP&A Act, the Minister has the ability to delegate this authority to the Planning Assessment Commission, the Secretary or any other public authority.

1.1 The Proponent

The proponent for the Teven Quarry Project is Holcim Australia. Holcim Australia is one of the country's leading suppliers of construction materials including aggregates (crushed stone, gravel and sand), concrete, concrete pipe and products.

Holcim Australia has been providing construction materials to the Australian construction industry since 1901, originally under the well-known brands Readymix and Humes. Today, Holcim Australia has a network of over 200 concrete plants and 88 quarry operations in Australia, which continue to provide high quality concrete and aggregate products to a diverse range of customers. These basic products are essential building materials for roads, bridges, schools, hospitals, airports, commercial buildings and other infrastructure.



Image Source: Google Earth (2012)

0 1.0 2.0 4.0 km
1:75 000

Legend

Project Area

FIGURE 1.1
Locality Plan

1.2 Need for the Project

Teven Quarry is an existing hard rock quarry located in the Ballina Shire that supplies construction and road building materials to the Northern Rivers region, primarily to the Ballina, Byron, Lismore and Tweed local government areas. The quarry also supplies eight Holcim Australia concrete plants in the Northern Rivers region. The region is experiencing significant growth in the demand for construction materials as a result of population growth and major infrastructure projects, including the Pacific Highway Upgrade. Teven Quarry has been restricted in its capacity to supply such projects as a result of production limits set by its existing development consent, with production from the quarry at or close to approved production limits for the past five years. The Project includes increasing production from the quarry and is proposed in response to the current and forecast future growth in demand for hard rock in the region.

1.2.1 Demand for Hard Rock

Hard rock quarry materials can be used on their own to provide the foundations for major infrastructure such as road base or can be mixed to create construction materials such as concrete and asphalt. Demand for hard rock quarry products is influenced by population growth, road and other infrastructure construction and residential and commercial building.

Population growth of 26 per cent has been forecast within the supply region of the Teven Quarry between 2006 and 2031, with an additional 7,700 dwellings anticipated to be required in the Ballina Shire alone (Ballina Shire Council, 2012). Region wide, there is an anticipated demand for an additional 51,000 dwellings by 2031 (Ballina Shire Council, 2012).

NSW Trade and Investment collect production data from extractive industries on an annual basis. A review of annual return data submitted to NSW Trade and Investment indicates that over the four years 2009 to 2013, average annual production of hard rock for the Ballina, Byron and Lismore local government areas combined was approximately 1.24 million tpa. This equates to an average rate of hard rock production of approximately 10.6 tonnes per capita over this period.

Table 1.2 - Average Per Capita Production of Hard Rock in Ballina, Byron and Lismore LGA, 2009-2013

LGA	2013 Population (ABS, 2014)	Total Production 2009-13 (tonnes)	Average Annual Production (tonnes)	Average Per Capita Production (tonnes)
Ballina	41,335	3,270,651	817,663	19.8
Byron	31,612	570,767	142,692	4.5
Lismore	44,637	1,107,007	276,752	6.2
Total	117,584	4,948,425	1,237,106	10.5

Projections of future population growth prepared by the former NSW Department of Planning (2010) suggest that the population of the Ballina, Byron and Lismore LGAs will increase from 117,584 in 2013 to 149,700 in 2036. Based on these population projections, annual demand for hard rock within the supply region of Teven Quarry is anticipated to increase from 1.24 million tpa in 2013 to at least 1.57 million tpa in 2036 (assuming no increase in per capita demand), due to population growth alone.

Major Pacific Highway upgrade works between Tweed Heads and Ballina over the last 10 years have also significantly boosted demand for hard rock. This demand is set to continue and increase in the future with the Tintenbar to Ewingsdale upgrade currently under construction and planning approval being sought for the continuation of the Pacific Highway upgrade between Ballina and Woolgoolga. Pacific Highway works alone are expected to create demand for a further 500,000 to 1M tpa in the local market from 2015 through to at least 2020.

Other major projects in the region required to support a growing population will further boost demand for quarry products, including current projects such as the Lismore Hospital upgrade, the Pacific Pines Estate at Lennox Head, Ballina Byron Airport improvements and Ballina and Byron Shire Council's capital works programs.

1.2.2 Supply of Hard Rock

Supply of hard rock in the region serviced by Teven Quarry is limited, with only one other major quarry within the Ballina Shire, located approximately two kilometres north of Teven Quarry on North Teven Road. A further three smaller suppliers are present within the Shire at Alstonville, Bagotville and Lismore.

The Teven Quarry is an existing operation which is well placed to meet some of the additional demand for hard rock in the Northern Rivers region over the next 30 years. Teven Quarry has been operating at or close to maximum approved production capacity for the past five years and the Project will facilitate the ongoing cost-effective supply of construction materials to the local and regional market during a period of increasing demand.

The Quarry is highly accessible to key markets through its proximity to the Pacific Highway and the regional centre of Ballina. The safety and accessibility of the Quarry to markets has been greatly enhanced by the newly constructed Teven Road interchange providing safe access to the Buxner Highway and Pacific Highway via the Ballina Bypass. Its accessibility to these key markets helps reduce direct costs to the consumer in delivering products and reduces indirect costs to society associated with sourcing products from more distant locations, such as road maintenance, road safety, congestion and greenhouse gas emissions.

The Project will contribute to the availability of quality, affordable construction and road building product, helping to provide security of supply for future major infrastructure projects as well as meeting part of the demand generated by population growth. The Project has several advantages in relation to location, proximity to transport routes and markets and maximising the efficient utilisation of an existing resource and processing facilities. As discussed previously, the Quarry is approved to operate until 2056. The Project will remain within the currently approved footprint. The Project can therefore assist in meeting the future market demand for quarry products, including the peak demands of major infrastructure projects in the region, without increasing many of the environmental impacts commonly associated with extractive industries beyond what is current approved. As part of modernising the approval for the Quarry, improved environmental controls will also be put in place for the future operations, providing a further benefit. The Project also has the potential to avoid or delay the need for additional Greenfield development that may otherwise result in increased environmental and social impacts.

1.3 Director General's Requirements

The Department of Planning and Environment issued Director General's Requirements (DGRs) for the Project on 7 April 2014. The DGRs outline the specific requirements to be addressed by this environmental impact statement (EIS). A copy of the DGRs is contained in **Appendix 1**. A checklist of compliance with the DGRs is provided in **Table 1.1**.

Table 1.1 – Director-General's Requirements Checklist

Director General's Requirements	Relevant EIS Section
General Requirements	
<p>The Environmental Impact Statement (EIS) for the development must meet the form and content requirements in Clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>.</p> <p>In addition, the EIS must include a:</p> <ul style="list-style-type: none"> • detailed description of the development, including: <ul style="list-style-type: none"> - need for the proposed development; - alternatives considered; - likely components and staging of the development – including construction, operational stage/s and rehabilitation; and - plans of any proposed building works; 	<p>Refer to Sections 1.1,4.0 and 4.6</p>
<ul style="list-style-type: none"> • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; 	<p>Refer to Section 5.0</p>
<ul style="list-style-type: none"> • a risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment; 	<p>Refer to Section 7.1</p>
<ul style="list-style-type: none"> • detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: <ul style="list-style-type: none"> - a description of the existing environment, using sufficient baseline data; - an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; and - a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment; and 	<p>Refer to Section 7.0</p>
<ul style="list-style-type: none"> • a statement of commitments, outlining all the proposed environmental management and monitoring measures included in the EIS. 	<p>Refer to Section 8.0</p>
<p>The EIS must be accompanied by a report from a qualified quantity surveyor providing:</p> <ul style="list-style-type: none"> • a detailed calculation of the capital investment value (as defined in clause 3 of the Environmental Planning and Assessment Regulation 2000) of the proposal, including details of all the assumptions and components from which the CIV calculation is derived; • a close estimate of the jobs that will be created by the development during the construction and operational phases of the development; and • certification that the information provided is accurate at the date of preparation. 	<p>A quantity surveyors report will be provided to Department of Planning and Environment (DP&E) upon submission of this EIS.</p>

Table 1.1 – Director-General’s Requirements Checklist (cont).

Director General’s Requirements	Relevant EIS Section
General Requirements	
Key Issues	
The EIS must address the following specific issues:	
<ul style="list-style-type: none"> • Land Resources – including a detailed assessment of the potential impacts on: <ul style="list-style-type: none"> - landforms and topography; - land use, including agriculture; and - extractive material resources, including assessment of the size and quality of the resource and description of the methods used to assess the resource and its suitability for the intended applications; 	Refer to Sections 3.4.1 and 7.2
<ul style="list-style-type: none"> • Water Resources – including: <ul style="list-style-type: none"> - detailed assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including the impacts on: <ul style="list-style-type: none"> - existing user entitlements, affected licensed water users and basic landholder rights; and - groundwater-dependent and riparian ecology; - a detailed site water balance, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures; - identification of any licensing requirements or other approvals under the Water Act 1912 and/or Water Management Act 2000; - demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP) or water source embargo; and - a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts; 	Refer to Sections 7.3 and 7.4
<ul style="list-style-type: none"> • Noise – including a quantitative assessment of potential: <ul style="list-style-type: none"> - construction, operational and off-site transport noise impacts; - off-site road noise impacts; - reasonable and feasible mitigation measures, including evidence that there are no such measures available other than those proposed; and - monitoring and management measures; 	Refer to Section 7.5
<ul style="list-style-type: none"> • Air Quality – including a quantitative assessment of potential: <ul style="list-style-type: none"> - construction and operational impacts; - reasonable and feasible mitigation measures to minimise dust emissions; and - monitoring and management measures; 	Refer to Section 7.6
<ul style="list-style-type: none"> • Greenhouse Gases – including: <ul style="list-style-type: none"> - a quantitative assessment of potential Scope 1, 2 and 3 greenhouse gas emissions and an assessment of reasonable and feasible measures to minimise greenhouse gas emissions and ensure energy efficiency; 	Refer to Section 7.8

Table 1.1 – Director-General’s Requirements Checklist (cont).

Director General’s Requirements	Relevant EIS Section
General Requirements	
<ul style="list-style-type: none"> • Traffic & Transport – including: <ul style="list-style-type: none"> - accurate predictions of project-related traffic and a detailed assessment of the potential impacts of project-related traffic on the capacity, safety and efficiency of road networks, including modelling to predict queue lengths and intersection performance; and - a detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of effected roads and intersections over the life of the project, including concept plans for any proposed works; 	Refer to Section 7.7
<ul style="list-style-type: none"> • Biodiversity – including: <ul style="list-style-type: none"> - Accurate estimates of proposed vegetation clearing and impacts on remnant vegetation, or vegetation corridors; - a detailed assessment of potential impacts of the development on any terrestrial or aquatic threatened species or populations and their habitats, endangered ecological communities and groundwater dependent ecosystems; and - a detailed description of the measures that would be implemented to avoid, reduce or mitigation impacts on biodiversity; 	Refer to Section 7.9
<ul style="list-style-type: none"> • Heritage – including: <ul style="list-style-type: none"> - an Aboriginal cultural heritage assessment (including both cultural and archaeological significance) which must: - demonstrate effective consultation with the local Aboriginal communities in determining and assessing impacts, and developing and selecting mitigation options and measures; and - outline any proposed impact mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures); and - a Historic heritage assessment which must: - include a statement of heritage impact (including significance assessment) for any State significant or locally significant historic heritage items; and - outline any proposed mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures); 	Refer to Section 7.10 and 7.11
<ul style="list-style-type: none"> • Rehabilitation – including the proposed rehabilitation strategy for the site, having regard to the key principles in the Strategic Framework for Mine Closure, including: <ul style="list-style-type: none"> - Consideration for site maintenance and proposed plans for the final condition of the site; - Details for the storage of topsoil appropriate erosion and sediment control to manage the storage of topsoil; and - rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria; 	Refer to Section 7.15

Table 1.1 – Director-General’s Requirements Checklist (cont).

Director General’s Requirements	Relevant EIS Section
General Requirements	
<ul style="list-style-type: none"> • Visual – including: • a detailed assessment of the: <ul style="list-style-type: none"> - changing landforms on the site during the various stages of the Project; and - potential visual impacts of the Project on private landowners in the surrounding area as well as key vantage points in the public domain, including lighting impacts; and - a detailed description of the measures that would be implemented to minimise the visual impacts of the development; 	Refer to Section 7.12
<ul style="list-style-type: none"> • Waste – including: <ul style="list-style-type: none"> - accurate estimates of the quantity and nature of the potential waste streams of the development, including waste fines from processing; and - a description of measures that would be implemented to minimise production of other waste, and ensure that waste is appropriately managed; 	Refer to Section 7.14
<ul style="list-style-type: none"> • Hazards – paying particular attention to public safety, including bushfires; 	Refer to Section 7.13
<ul style="list-style-type: none"> • Social and Economic – including: <ul style="list-style-type: none"> - an assessment of potential impacts on local and regional communities including impacts on social amenity; - a detailed description of the measures that would be implemented to minimise the adverse social and economic impacts of the development, including any infrastructure improvements, or contributions and/or voluntary planning agreement or similar mechanism; and - a detailed assessment of the costs and benefits of the development as a whole, and whether it would result in a net benefit for the NSW community. 	Refer to Section 7.16

1.4 Project Team

Holcim Australia has engaged Umwelt (Australia) Pty Ltd (Umwelt) to undertake the environmental and community assessment of the Project and prepare an EIS for the Project. Input was provided by a number of technical specialists, including:

- Transport and Urban Planning – Traffic Impact Assessment; and
- Jacobs (formerly SKM) – Air Quality Impact Assessment
- RPS – Groundwater Assessment

The remaining specialist studies were completed by Umwelt technical specialists. Full details of the project team are provided in **Appendix 1**.

1.5 EIS Structure

The purpose of this EIS is to enable consideration of the implications of the Project and to seek approval for the Teven Quarry Project. The EIS has been prepared in accordance with the EP&A Act and Regulation and the DGRs for the Project.

The **Executive Summary** provides a brief overview of the proposed Project and the major findings of the EIS.

Section 1.0 introduces the Project, providing a brief overview of the proposed Project, existing operations and justification for the Project.

Section 2.0 describes the Project Area and surrounds and provides an overview of the existing environment.

Section 3.0 contains a detailed description of the existing approved operations of the Teven Quarry.

Section 4.0 provides a detailed description of the proposed Project.

Section 5.0 outlines the planning context for the Project, including the applicability of Commonwealth and state legislation.

Section 6.0 describes the stakeholder consultation program and details the environmental and community issues identified as part of this process for consideration in the EIS.

Section 7.0 contains a comprehensive analysis and assessment of the key environmental and community issues relevant to the Project.

Section 8.0 provides a summary of the proposed mitigation measures and commitments proposed to be adopted throughout the life of the Project in order to mitigate impacts.

Section 9.0 contains a conclusion and justification for the Project.

Section 10.0 contains a list of references cited in the EIS.

2.0 Site Context

2.1 Property Description and Ownership

The Teven Quarry Project Area comprises three lots as described in **Table 2.1** and shown on **Figure 2.1**.

Table 2.1 - Property Description and Ownership

Lot	Deposited Plan	Ownership
1	732288	Holcim Australia
2	732288	M.J. and P.E. Fox
3	732288	M.J. and P.E. Fox

Lot 1 is owned by Holcim Australia, while Lots 2 and 3 are leased by Holcim Australia for the purpose of operating Teven Quarry.

Quarry operations have historically encroached on a section of the road reserve of Stokers Lane (where there is no formed road) along the north-eastern boundary of Lot 2. This encroachment dates back to at least 1985 when Ballina Shire Council constructed a weighbridge in Stokers Lane. The weighbridge has since been removed and relocated within Lot 1. All Holcim Australia operations have ceased within this area and no future operations will occur in this area.

The Project Area is approximately 35.4 hectares in size, with the existing approved extraction area comprising approximately 16 hectares of the site.

The land surrounding the Project Area is privately owned as shown on **Figure 2.1**; however, Holcim Australia has an agreement to purchase an adjoining residential property to the west of the quarry infrastructure area (refer to **Figure 2.1**).

The cadastral information available from Land and Property Information for the Project Area and surrounds and used on many of the figures in this EIS is not highly accurate and should therefore be considered as indicative only of actual property boundaries. Discussions with Ballina Shire Council have confirmed the discrepancy is the result of the accuracy of the available cadastral information. When interpreting the figures included in this EIS it is important to recognise the accuracy of the available cadastral information.

2.2 Environmental Context

Prior to quarrying commencing within the Project Area in the 1940's, the area was substantially cleared for grazing purposes. Since the commencement of quarrying, vegetation regrowth has occurred in the southern portions of the Project Area. Areas of remnant vegetation regrowth also occur to the west of the Project Area, which appear to have been similarly affected by historical grazing practices. Land to the east of the Project Area has been completely cleared for sugar cane farming.



Image Source: Google Earth (2013)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- Project Area
- Residential Receiver Location
- Residence Subject to Commercial Agreement with Holcim Australia
- Privately Owned Land
- Holcim Leased Land
- Holcim Owned Land

FIGURE 2.1
 Land Ownership

Vegetation communities within the Project Area were mapped by Warren (1994) as part of flora and fauna survey completed for the *Environmental Impact Statement Extractive Industry & Gravel Crushing Plant Fox's Quarry – Stokers Lane Teven (B W McCloskey Pty Ltd, 1995)* (1995 EIS) and refined by Umwelt following a targeted rapid vegetation assessment for Holcim Australia in 2014. This mapping identified seven (7) main vegetation communities (retains community names defined by Warren, 1994):

- Brushbox Forest (Closed Forest) – The main vegetation community occurring in the Project Area, it occurs on the north-western slopes, southern slopes and south-western slopes; as well as a small area in the north-west corner of the Project Area.
- Camphor Laurel Forest – Occurs in small patches on the eastern slopes of the property, but mainly occurs as a small community on the western slopes of the Project Area.
- Mixed Eucalypt Forests – Occurs in the middle portion of the western side of the property.
- Regrowth Scrub – Occurs in a number of portions on the property.
- Sub-Tropical Rainforest – Occurs as a small remnant in Lot 1 on the north-eastern boundary of Lot 2 and as gully rainforest in association with the Brushbox Forest.
- Grassland – Occurs throughout the Project Area.
- Farm Dam Vegetation – Occurs around the farm dams in the Project Area.

The patch of Sub-Tropical Rainforest is 0.52 hectares in area and is highly disturbed and fragmented. However, as discussed in **Section 7.9** it is considered likely to confirm to two listed Threatened Ecological Communities listed since 1994 - Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions EEC listed under the Threatened Species Conservation Act 1995 (TSC Act). No other vegetation communities within the Project Area are listed under the Threatened Species Conservation Act 1995 or the Environment Biodiversity Protection and Conservation Act 1999. The Sub-Tropical Rainforest vegetation community is not located within the area approved for vegetation clearance by the existing development consent and will not be disturbed as part of this Project.

Further assessment of the potential impacts of the Project on the vegetation communities within the Project Area is provided in **Section 7.9**.

The Project Area has significant buffers to major residential areas, with the residential areas of Ballina located approximately 7.5 kilometres to the south-east of the quarry, Alstonville located approximately 4.5 kilometres to the west and the rural residential area of Cumbalum located approximately 5 kilometres to the north-east. The ridgeline and undulating terrain to the west of the Project Area provides topographical shielding for the Teven Quarry from the residential area of Alstonville (refer to **Figure 2.2**).

The Project Area forms part of the escarpment that separates the low-lying coastal floodplain and the Alstonville plateau. The land slopes steeply in a generally easterly to north-easterly direction towards the low lying floodplain east of the Project Area. Local relief through the centre of the Project Area is approximately 60 m Australian Height Datum (mAHD), falling steeply to approximately 5 mAHD along the east and north-east boundary (refer to **Figure 2.2**). The adjacent floodplain has an elevation of approximately 0 to 2 m AHD.

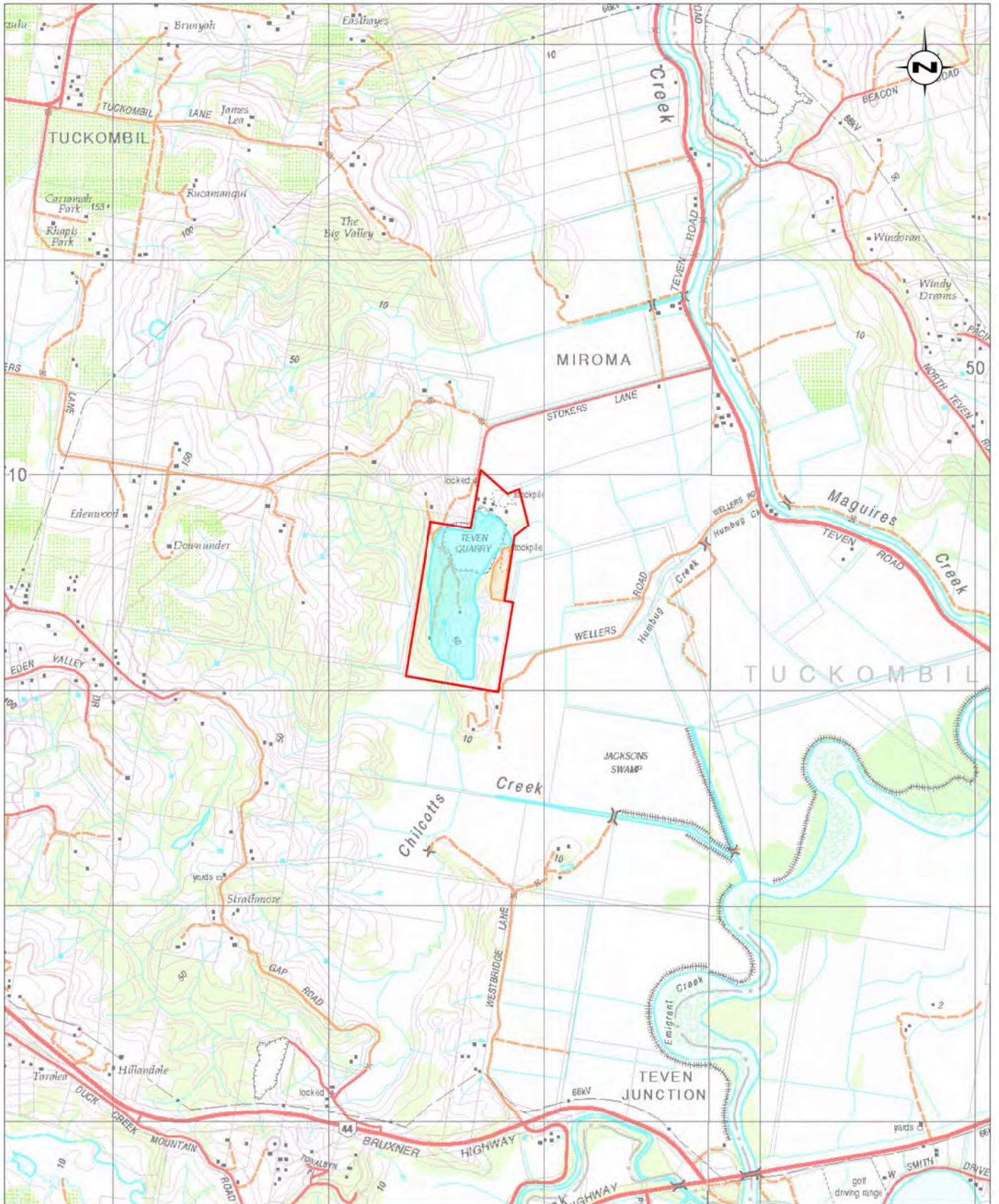


Image Source: Department of Lands (2006)
 Data Source: Holcim (Australia) Pty Ltd (2014)

0 0.25 0.5 1.0 km
 1:25 000

Legend

- Project Area
- Extraction Limit Boundary
- Stockpile Area

FIGURE 2.2
 Site Topography

Surface water flows from the Project Area to a cane drain located along the eastern boundary, which in turn drains to Maguires Creek, approximately one kilometre east of the Project Area. Maguires Creek is a tributary of Emigrant Creek which joins the Richmond River immediately west of Ballina (refer to **Figure 2.2**).

2.3 Climate

Ballina has a mild subtropical climate with an average annual daily temperature range of 14.3 to 24.4 degrees Celsius. Data collected from the Ballina Airport Bureau of Meteorology weather station (Station No. 58198) located approximately six kilometres east of the Project Area indicates that January is the warmest month, with an average temperature of 28.2 degrees Celsius, while July is the coldest month, with an average temperature of 19.6 degrees Celsius. Average annual rainfall is 1,781.8 mm, with March being the wettest month and September the driest. The region typically experiences light west to south-westerly winds during the morning period, with stronger southerly, south-easterly and north-easterly winds during the afternoon.

2.4 Land use

The Project Area has been used for quarrying activities since the 1940's, including the extraction and processing of quarry materials. Prior to this, the area was extensively cleared for grazing activities. The primary land uses in the vicinity of the Project Area include agriculture and rural residential uses. Land to the east of the Project Area is used almost exclusively for sugar cane farming, while land to the west is used for a mixture of grazing and rural residential purposes. The land use of the area surrounding Teven Quarry is shown on **Figure 2.3**.

These land uses are reflected in the zoning of surrounding land with land to the west of the Project Area zoned 7(d) – Environmental Protection (Scenic/Escarpment) and 1(b) – Rural (Secondary Agricultural Land) under the Ballina LEP 1987, and land to the east zoned RU1 – Primary Production under the Ballina LEP 2012 (refer to **Figure 2.4**). The primary objective of zone 1(b) is to encourage productive use of the land for agricultural purposes, while the primary objective of zone 7(d) is to protect areas of scenic value to the Shire of Ballina and to minimise soil erosion from escarpment areas.

2.5 Sensitive Receivers

A number of private residences are located within the vicinity of the Project Area as shown in **Figure 2.1**. Receiver 9 is the closest residence (approximately 108 metres) to the Project Area, Holcim is currently negotiating a purchase agreement with the land holders.

Receiver 12, is located approximately 176 metres to the south of the Project Area boundary and is privately owned.

2.6 Access Agreement

An informal agreement exists between Holcim Australia and owner of the residence identified as Receiver 5 on **Figure 2.1** to the west of the Project Area, regarding use of the Project Area to access this property. A legal access to Lot 1 DP 607332 exists via a private access track from Stokers Lane, however, Holcim Australia has allowed the owner to utilise part of the Project Area due to this access way having a reduced grade, making access easier for the resident. There is no intention to alter this mutual agreement, nor to formalise it as a result of the Project, as Holcim Australia has a purchase agreement over this property.

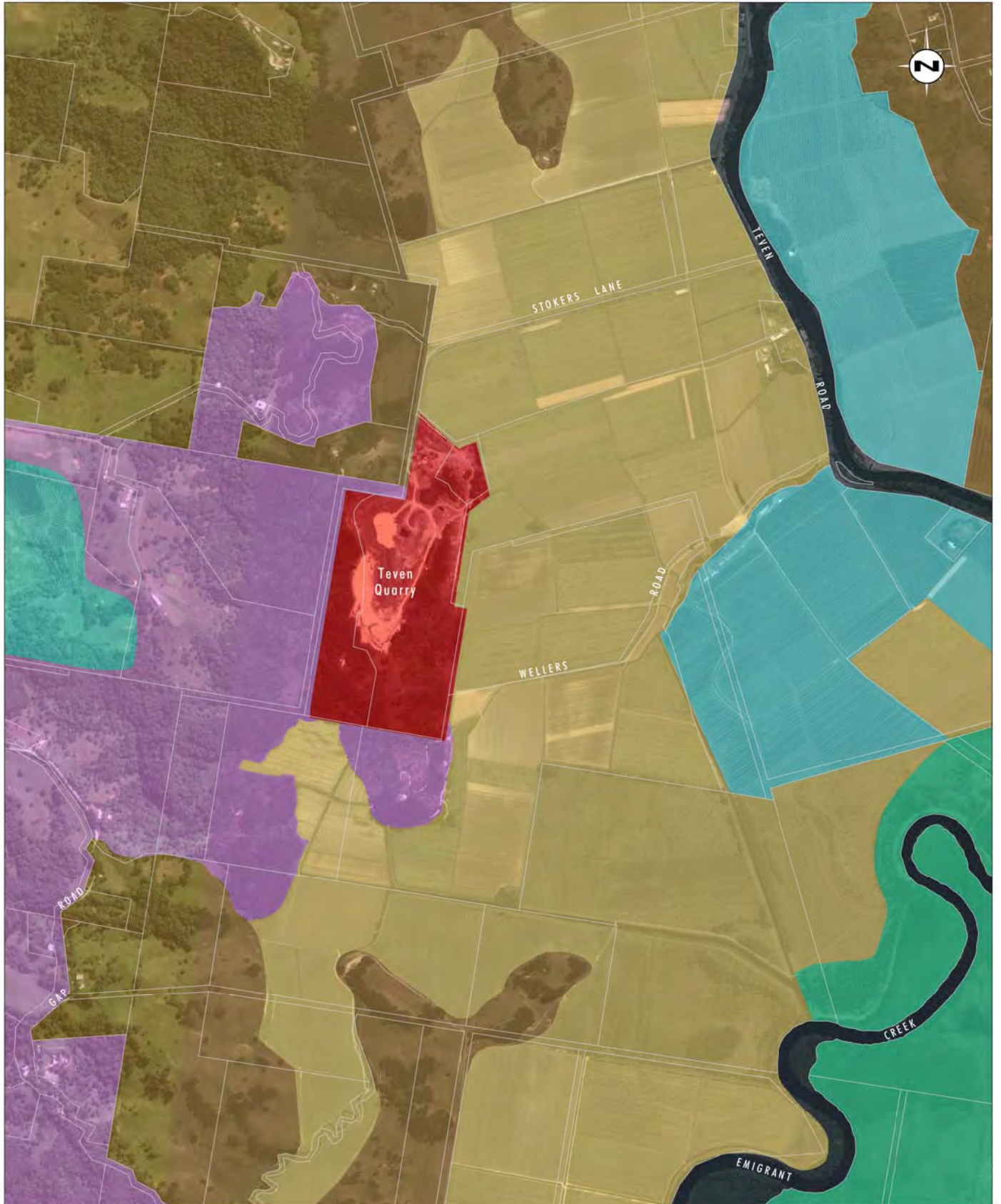


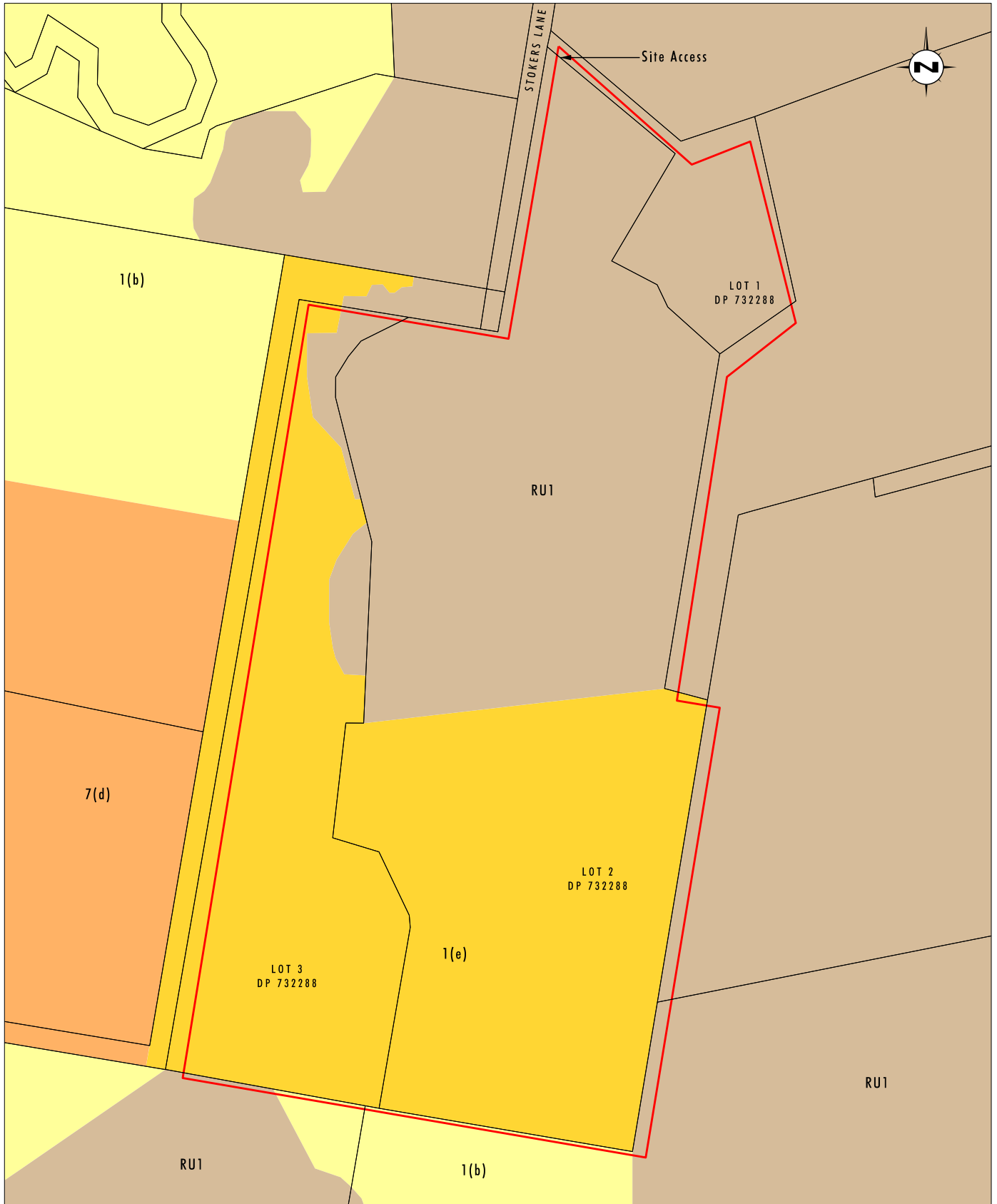
Image Source: Google Earth (2013)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

0 200 400 800m
 1:17 000

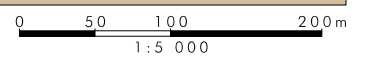
Legend

- Project Area
- Macadamia Plantation
- Native Vegetation
- Mixed Grazing/Rural Residential
- Rural Residential
- Sugar Cane

FIGURE 2.3
Land Use



Data Source: Holcim (Australia) Pty Ltd (2014), Ballina Local Environmental Plan (1987 & 2012)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.



Legend

- Project Area
- Zone 1(b): Rural - Secondary Agricultural Land (LEP 1987)
- Zone 1(e): Rural - Extractive and Mineral Resources (LEP 1987)
- Zone 7(d): Environmental Protection - Scenic/Escarpment (LEP 1987)
- Zone RU1: Primary Production (LEP 2012)

FIGURE 2.4

**Teven Quarry
Project Area
Land Zoning**

3.0 Existing Operations

3.1 Description of Existing Operations

Teven Quarry has been in operation since the 1940s and supplies filling, sub-base, road base and aggregate material to the Northern Rivers region. The quarry operates in accordance with two existing approvals, these being:

- Development Consent 1995/263 (through Court Order 10722 of 1995) for extractive industry and gravel crushing plant; and
- Development Consent 2000/431 issued by Ballina Shire Council for alterations and additions to operational facilities and changes to stockpiling areas.

These approvals provide for resource extraction, processing and product transport by road from the site. DA1995/263 approved an annual production rate of 200,000 tonnes of product increasing annually by 1.5 per cent, resulting in a current approved production limit of approximately 265,000 tpa in 2014. DA 1995/263 provided for operations at Teven Quarry to continue until 2056, at which time, the production limit would be approximately 496,000 tpa.

The approved extraction limit boundary and location of existing processing infrastructure and stockpiling areas is shown on **Figure 3.1**.

Teven Quarry also holds an existing Environment Protection Licence (EPL) under Section 55 of the *Protection of the Environment Operations Act 1997* (EPL 3293). The licence establishes limits for wet weather discharges from site and for noise and blasting emissions.

The total resource (reserves) remaining at Teven Quarry is approximately 6.6 million tonnes and the estimated life of the quarry is approximately 25 to 30 years, subject to market demand. Notwithstanding, it should be noted that forecasting demand for quarry products decades in advance is uncertain as market demand is highly variable. While the quarry lifespan proposed by Holcim is a likely longest case scenario, it does take into the account the potential for future market uncertainty and the need for the approval timeframe to allow for several years that will be required for quarry rehabilitation works post closure.

Teven Quarry operates fixed primary, secondary and tertiary crushing and screening plant and transports quarry products by road throughout the region. The primary and secondary plant has been fully enclosed to control noise and dust emissions from the processing plant. Operations at Teven Quarry are generally undertaken between the hours of 7am and 5pm Monday to Friday and occasional operation between 7am and 4pm Saturdays. All blasting occurs between the hours of 9am and 3pm Monday to Friday in accordance with EPL 3293.

3.2 Quarry Staging

Teven Quarry's hard rock resource is located within a north-south ridge approximately 550 metres long and 300 metres wide with elevation ranging from 5.1 metres AHD on the eastern and western boundaries to 70 metres AHD in the centre of the site (Readymix, 2007). Based on current quarry planning, extraction will advance southwards using overburden to fill a void on the western edge of the pit, in order to create a visual and acoustic barrier for future quarrying activities and to create a more sympathetic final landform. **Figures 3.2 to 3.5** show indicatively the staged progression of the quarry, as it extends generally southwards then deepens, following construction of the western overburden emplacement area.

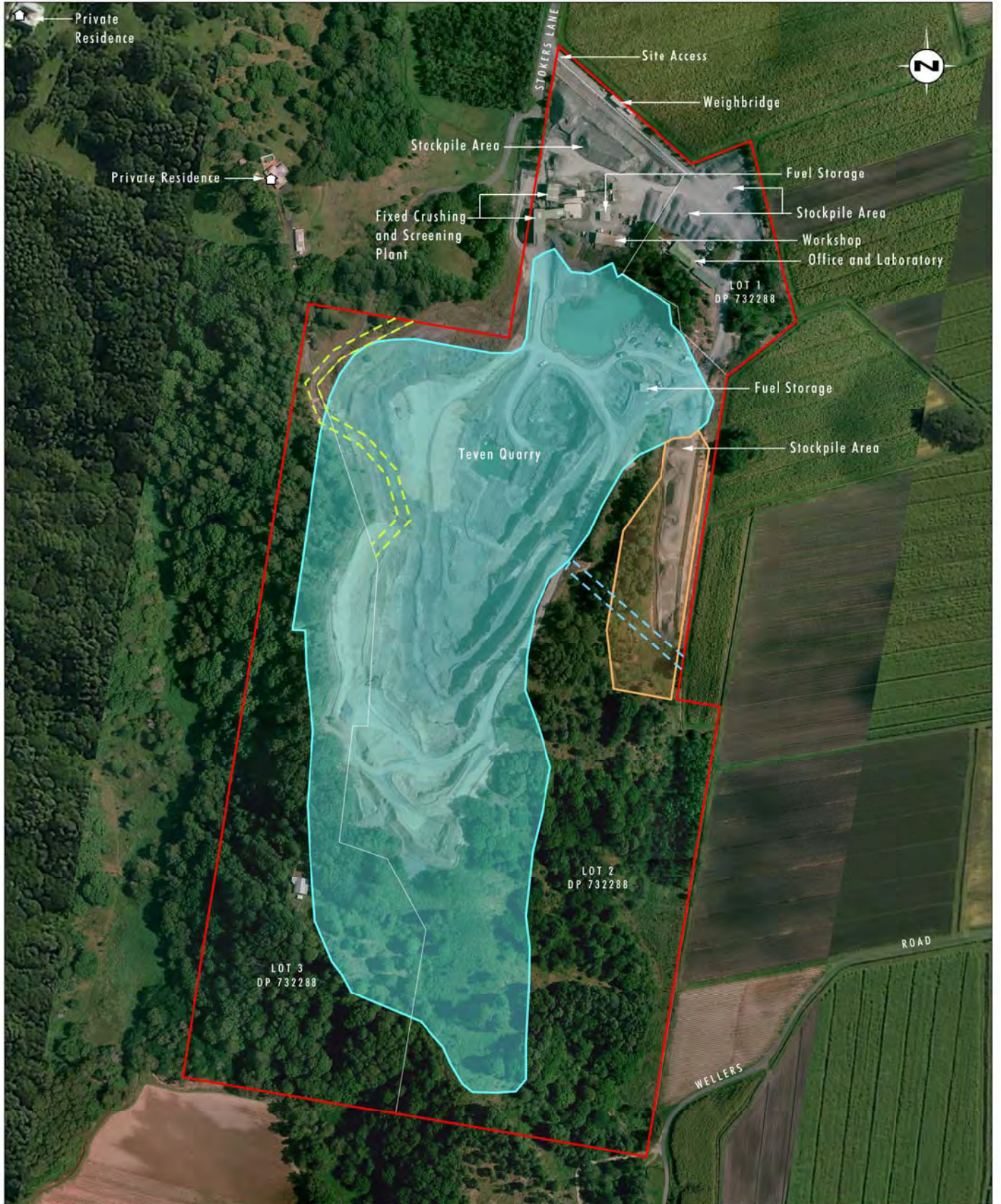


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- Project Area
- Extraction Limit Boundary
- Stockpile Area
- Private Residence
- Proposed Easement for Water Supply (10m wide)
- Right of Carriageway (10m wide)

FIGURE 3.1
Teven Quarry
Existing Operations



Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- ▭ Project Area
- ▭ Extraction Limit Boundary
- ▭ Western Overburden Emplacement Area
- 🏠 Private Residence
- Drainage Line

FIGURE 3.2
Current Quarry Plan

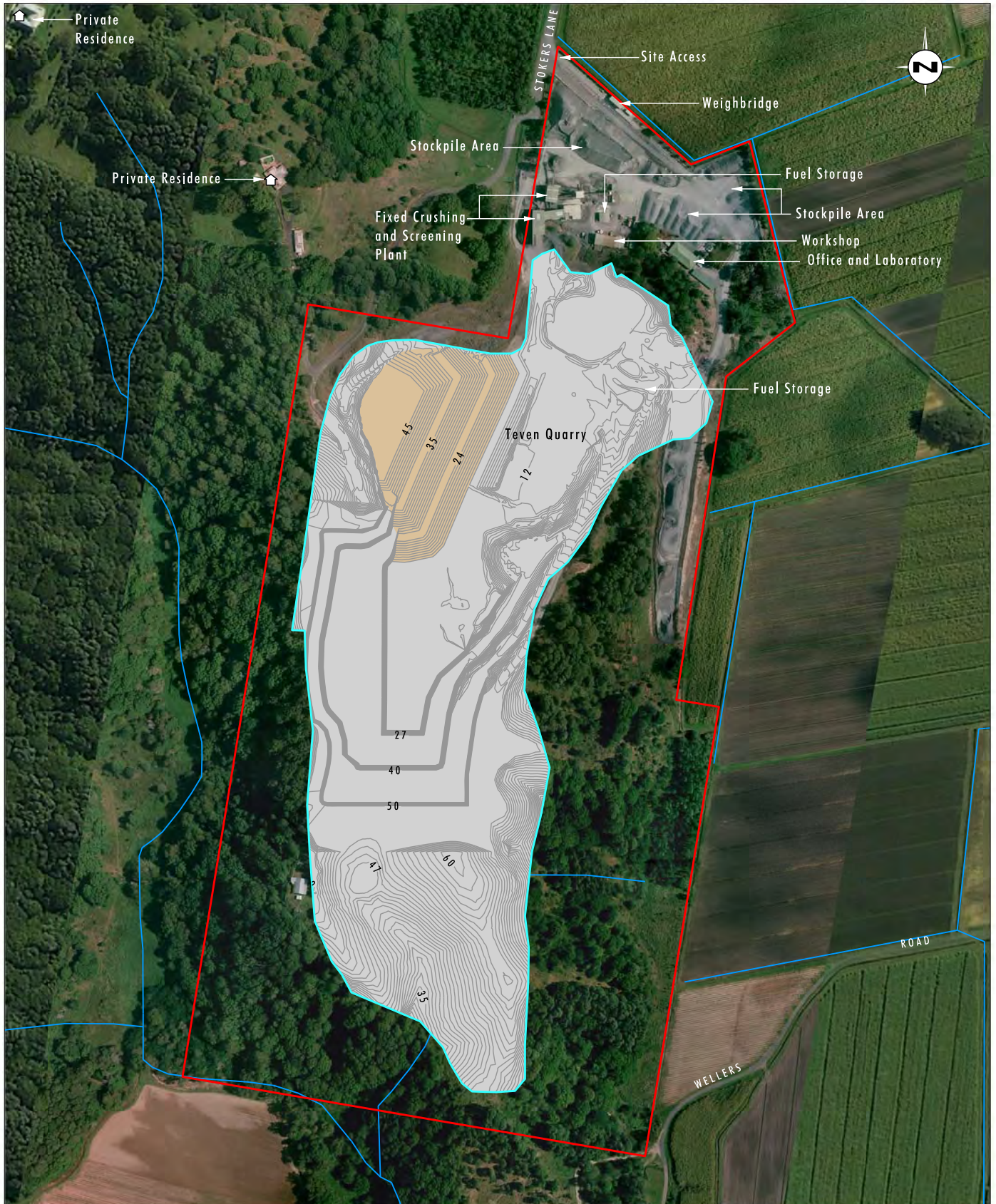


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- ▭ Project Area
- ▭ Extraction Limit Boundary
- ▭ Western Overburden Emplacement Area
- 🏠 Private Residence
- Drainage Line

FIGURE 3.3

Indicative Year 1 Quarry Plan

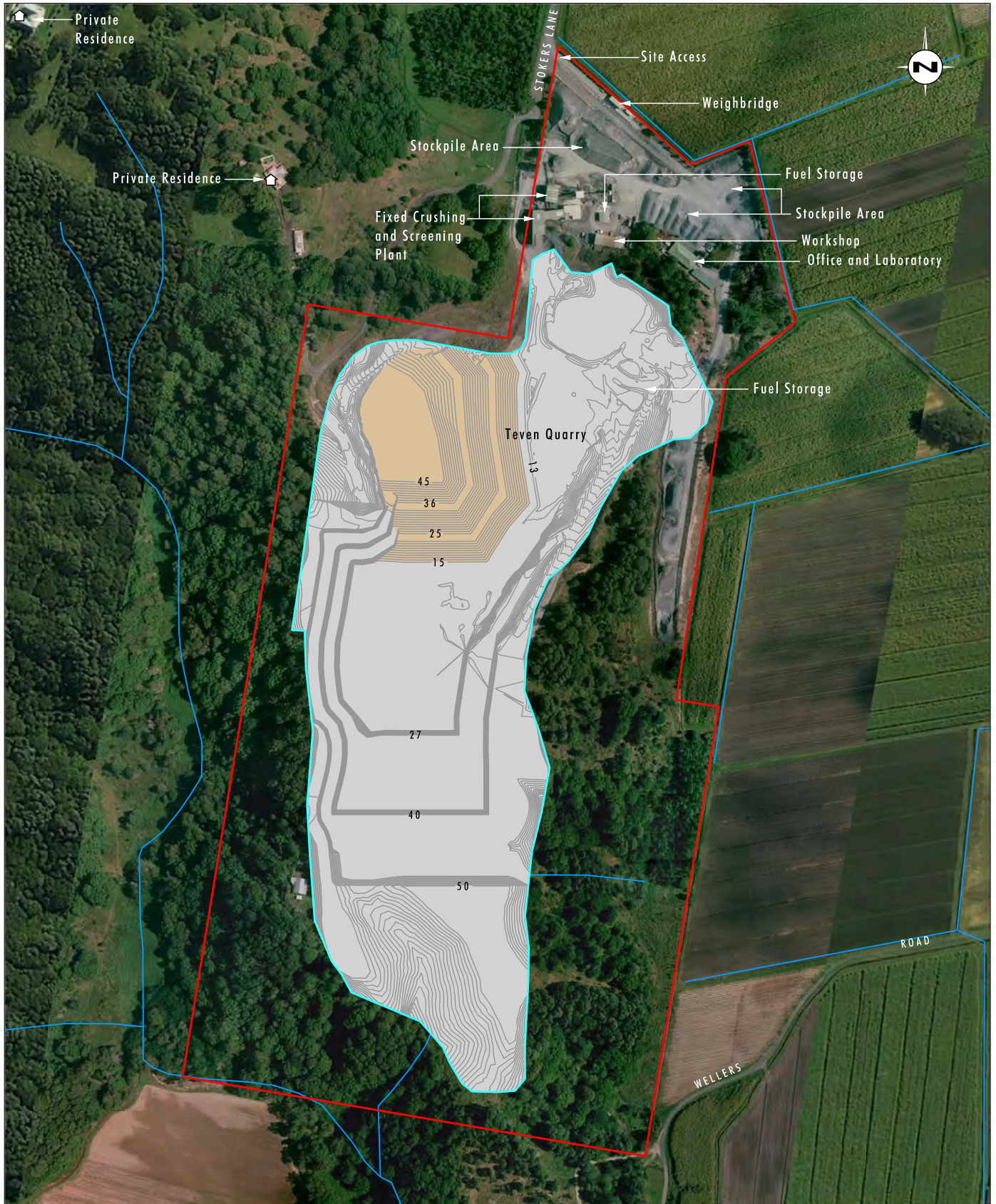


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- ▭ Project Area
- ▭ Extraction Limit Boundary
- ▭ Western Overburden Emplacement Area
- 🏠 Private Residence
- Drainage Line

FIGURE 3.4
Indicative Year 11 Quarry Plan

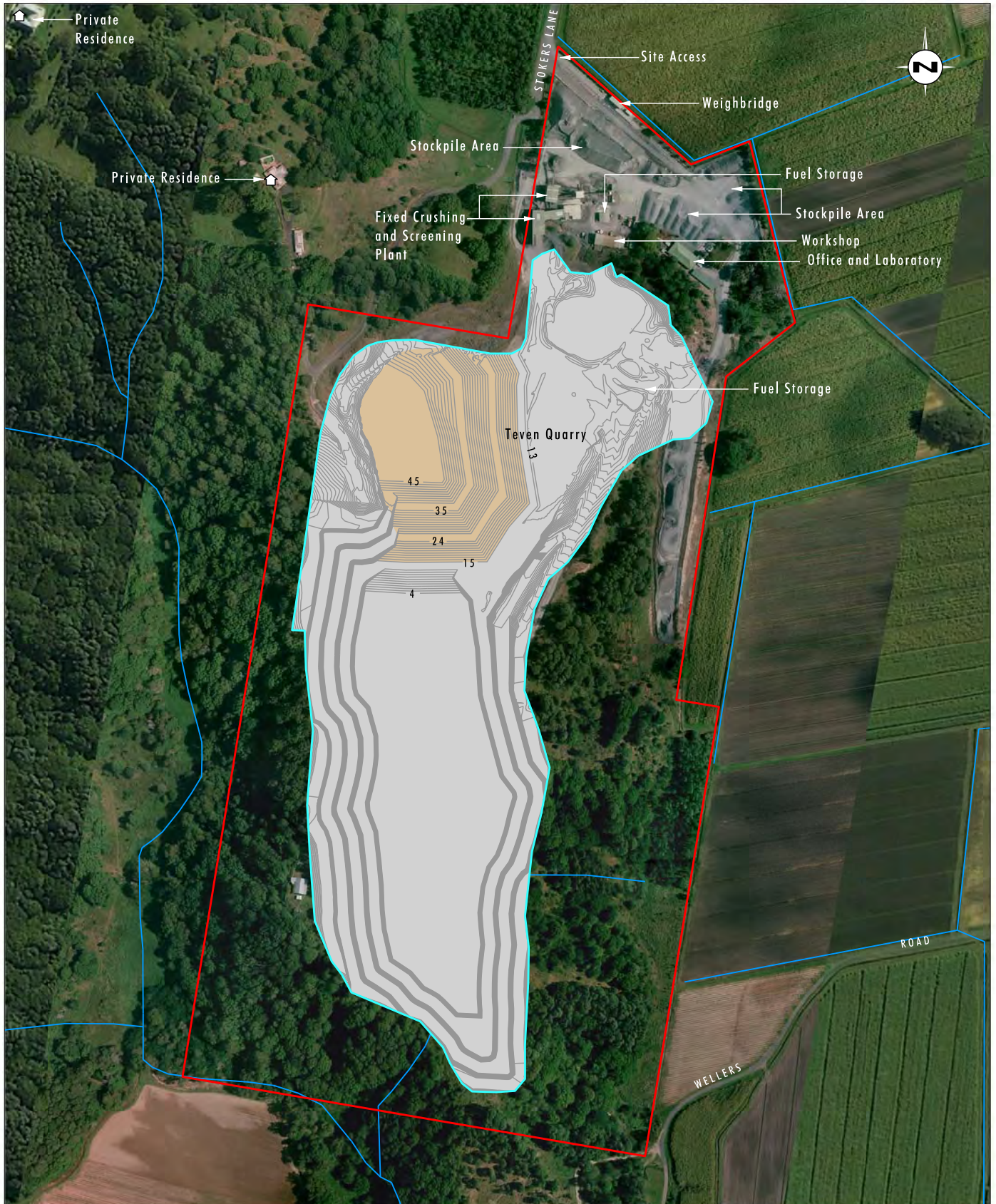


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- ▭ Project Area
- ▭ Extraction Limit Boundary
- ▭ Western Overburden Emplacement Area
- 🏠 Private Residence
- Drainage Line

FIGURE 3.5

Indicative Final Quarry Plan

3.3 Extraction Limit Boundary

The current extraction limit boundary and stockpile area approved under DA 1995/263 is shown on **Figure 3.1**. Not all of this area is currently used, however, all of this area will be used in the future as required.

3.4 Resource, Products and Markets

3.4.1 Geology, Exploration and Resource Definition

Teven Quarry extracts meta-argillite, a metamorphosed mudstone, from the late Devonian to early Carboniferous aged Neranleigh-Fernvale Beds. The Neranleigh-Fernvale beds in the vicinity of the quarry manifest as a prominent north-south oriented ridge that rises over 60 metres above the surrounding floodplain.

The geology and weathering profile of the site was confirmed from drilling investigations undertaken in 1993. The drilling program comprised 28 vertically oriented percussion drillholes that varied in depth from 11.5 - 31.5 metres. The program comprised a total of 610 metres of drilling and extended across the full extent of the approved extraction limit. The drilling program confirmed the lateral and depth extent of overburden materials dominated by clay; weathered argillite suited to lower grade quarry products; and slightly weathered to unweathered argillite suited to the production of aggregates.

The weathering profile across the site broadly mimics the topography, with surficial clay (overburden) ranging in thickness from 2.5 - 10.0 metres. The average thickness of this material is close to 6 metres. Underlying the surficial clay is a zone of variably weathered argillite that ranges in thickness from 2.0 - 18.5 metres, with an average thickness of approximately 9 metres. This in turn is underlain by slightly weathered to unweathered argillite that extends to depth beyond the approved depth limit of extraction.

A review of the geology undertaken in 2011 confirmed that at that time, the following material volumes/tonnages remained on the quarry site:

- Clay (Overburden) - 880kt;
- Weathered Argillite (Low Grade Raw Material) - 1.3Mt; and
- Slightly Weathered to Unweathered Argillite (High Grade Raw Material) - 5.5Mt.

At the expected average rate of quarry production, the site's reserves base of 6.8Mt was expected to the effect that the site's reserves base is expected to last in excess of 20 years.

3.4.2 Quarry Products

Rock extracted at Teven Quarry is processed by the crushing and screening plant to produce aggregates ranging in size from <7mm to 60mm. The primary products currently produced by the quarry are:

- sub-base;
- road base;
- asphalt aggregates; and

- concrete aggregates.

These quarry products are used primarily in concrete and roadway construction.

3.4.3 Markets

The quarry provides high quality aggregates, crushed rock and road base products to the Northern Rivers region, including the Ballina, Byron, Lismore and Tweed Shires. The quarry also supplies eight Holcim Australia owned concrete batching plants within the Northern Rivers region.

Approximately 60 to 65 per cent of the products produced at the quarry are delivered within the core supply areas of Ballina and Byron Shire.

3.5 Quarrying Techniques and Equipment

The quarrying process at Teven Quarry comprises the following key steps:

- vegetation clearing and topsoil stripping;
- overburden removal;
- drilling and blasting; and
- crushing, screening, stockpiling and delivery of product.

3.5.1 Vegetation Removal and Topsoil Stripping

Vegetation clearing and topsoil stripping is undertaken in accordance with Holcim Australia Guideline 4.19 – Quarry Development. The area to be cleared is clearly marked and following a pre-clearance inspection, vegetation is removed with a front end loader and/or excavator. Vegetation removed is stockpiled separately from topsoil and overburden for later use in rehabilitation works. If vegetation cannot be stockpiled, the vegetation is mulched and used in the rehabilitation process.

Topsoil is stripped using a front end loader and/or excavator and transported to separate topsoil stockpiling areas by a front end loader or haul truck for use in progressive rehabilitation. Where possible, topsoil is placed directly on to rehabilitation areas. Topsoil stockpiles which are expected to remain for longer than three months are sown with a suitable sterile cover crop to minimise erosion and invasion of weed species.

3.5.2 Overburden Removal

Overburden is the weathered material that overlays the target rock resource extracted by the Quarry. Overburden within the Teven Quarry consists of a soft clayey layer of weathered rock varying in depth across the site from between one and four metres thick. Currently, overburden is progressively stripped prior to rock extraction and either stockpiled on site for use in rehabilitation or placed directly on final benches within the extraction area in preparation for rehabilitation works. Overburden is stripped using a front end loader and/or excavator and transported to stockpiling areas by haul truck.

Based on current quarry plans, future overburden from Teven Quarry will be used to primarily fill a void on the western edge of the pit in order to create a visual and acoustic barrier for future quarrying activities and to create a more sympathetic final landform. This area is referred to as the western overburden emplacement area (refer to **Figures 3.2 to 3.5**).

3.5.3 Drilling and Blasting

Following removal of overburden, the hard rock resource is drilled and blasted to break it into sizes which can be handled by excavator or front end loader and transported to the primary crusher via haul truck. Drilling and blasting is undertaken by a contractor on a periodic basis, currently averaging one week in six but subject to demand and production requirements. Blasts are designed to avoid adverse impacts on surrounding receivers and monitoring of all blasts is undertaken at the weighbridge and nearest residential premises. The appropriate maximum instantaneous charge (MIC) is calculated for each individual blast, taking into account the blast requirements, environmental conditions and predicted airblast overpressure and ground vibration levels at sensitive receivers. The existing EPL for Teven Quarry includes blasting criteria as outlined in **Table 3.1**.

Table 3.1 – EPL 3293 – Air Overpressure and Ground Vibration Criteria

	Air Overpressure	Ground Vibration
Up to 5% of blasts can exceed during each reporting period	115 dB*	5 mm/s*
No exceedances permitted at any time	120 dB*	10 mm/s*

* - At any point within 1 metre of any affected residential property of other sensitive noise location

The existing EPL also requires blasting to be undertaken between the hours of 9am and 3pm Monday to Friday.

No explosives are stored on site, with all explosives brought onto the site as needed and loaded directly into drill holes.

3.5.4 Crushing, Screening and Stockpiling of Product

The crushing process passes rock through a series of crushers to reduce it into various sized fragments. A series of screens are then used to sort the crushed rock into size categories.

Teven Quarry operates a fixed, three-stage crushing and screening process, with primary, secondary and tertiary crushers. The processing plant has a capacity of approximately 120 tonnes per hour, equivalent to approximately 350,000 tpa. Conveyors transport crushed rock to the screens and screened rock to product stockpiles.

The primary and secondary processing plant sections are fully enclosed to minimise noise and dust emissions and dust control systems are installed on all crushers and screens. Conveyor transfer points are enclosed and water sprays are utilised to further minimise dust generation.

There are two main product stockpiling areas that are utilised at the quarry with a capacity of approximately 146,000 tonnes. The main product stockpile area is located to the north of the processing plant and office buildings along the northern site boundary. Excess product is stored in the eastern product stockpile area along the eastern boundary of the site (refer to **Figure 3.1**). While not all of the approved eastern product stockpile area is currently utilised, it will be in the future, subject to demand.

3.6 Site Infrastructure

The existing site infrastructure at Teven Quarry is shown on **Figure 3.6** and includes:

- primary, secondary and tertiary crushing and screening plant;
- weighbridge;
- truck wash;
- office, training rooms and parking facilities;
- laboratory;
- workshop; and
- covered fuel storage and refuelling facilities.

3.7 Noise Mitigation Program

Over the past three years, Teven Quarry has implemented a noise mitigation program in consultation with the NSW Environment Protection Authority (EPA), which has included enclosure of the fixed crushing and screening plant, installation of rubber lining to the primary feed bin, noise bunds around the operating area and the use of 'quackers' on mobile equipment in place of conventional reversing alarms. These measures have resulted in significant noise reductions from site. Following implementation of this noise mitigation program, the EPA established noise limits for the operation at the nearest potentially affected residence to the west of the quarry. These limits are included in EPL 3293.

3.8 Employment

Teven Quarry currently employs 8 full time equivalent positions, as well as additional contractors for maintenance and product transport.

3.9 Traffic, Access and Parking

Teven Quarry is accessed off Stokers Lane, which connects to Teven Road and the Pacific and Buxner Highways via a newly constructed interchange (refer to **Figure 1.1**). One residential property is accessed along the section of Stokers Lane between the quarry and Teven Road, one further residence, the subject of a purchase agreement with Holcim Australia, is accessed via Stokers Lane beyond the quarry access point.

Product is transported from site using truck and trailer or six wheeler configurations, varying in capacity from 7 tonnes to 33 tonnes. The average load size is 23 tonnes, reflecting current ex bin sales requiring smaller loads.

Light vehicle parking is provided for approximately 12 vehicles at locations adjacent to the weighbridge, office, laboratory and workshop buildings. Parking for heavy vehicles and plant is also provided within the main infrastructure area and at various locations around the site.

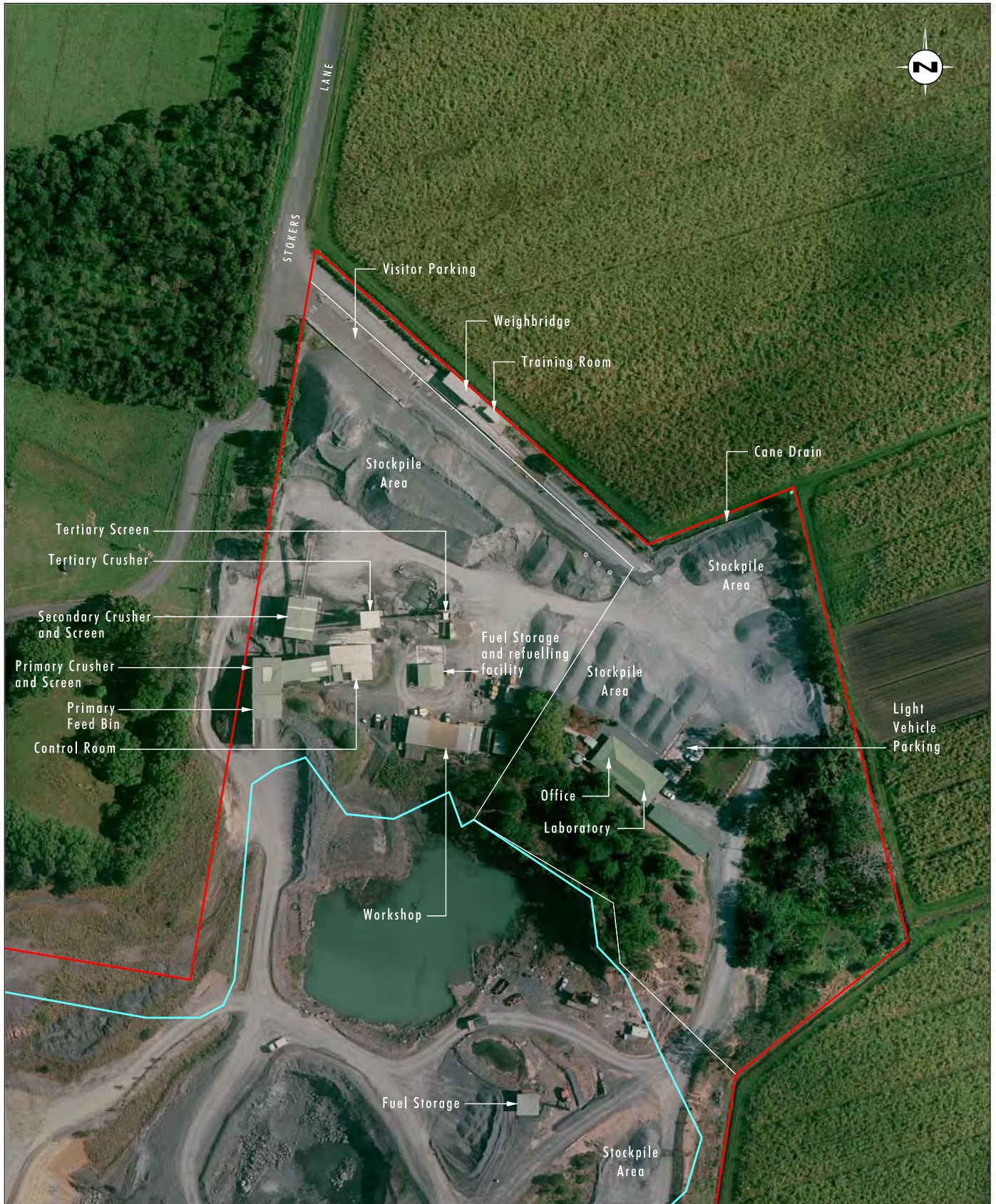


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- ▬ Project Area
- ▬ Extraction Limit Boundary

FIGURE 3.6
Teven Quarry
Site Infrastructure

3.10 Utilities

Potable water for consumption is delivered to the site by tankers. Operational water used for processing and dust suppression is sourced from water captured and stored on site in the main dam. Waste water from the office and amenities is managed via a septic tank with absorption trench.

Teven Quarry operates on mains power supplied to the site.

4.0 Proposed Project

Holcim Australia proposes to increase production at the Teven Quarry from the currently approved 265,000 tpa to a maximum of 500,000 tpa. This will be achieved by maximising use of the existing fixed crushing and screening plant (approximately 350,000 tpa capacity) and adding an in-pit mobile plant to cater for periods of peak demand (approximately 150,000 tpa capacity). Holcim Australia also proposes the addition of new processing options/equipment which will add value to the products produced on site, including the addition of:

- a mobile pugmill; and
- allowance for recycling of surplus concrete from local approved concrete batching facilities in the region for re-use as product.

To accommodate the needs of future major construction projects, for example road upgrades, Holcim Australia is also seeking to extend the hours of operation of Teven Quarry for a limited range of activities, including:

- truck loading and product transport;
- stockpile management; and
- maintenance.

The proposed extended operating hours would allow the above activities to operate up to 10pm Monday to Friday on a campaign basis (i.e. only when required to meet the needs of a particular project). No blasting, quarrying, crushing or screening would be undertaken during the proposed extended hours of operation.

The traffic impact assessment determined that the maximum heavy vehicle traffic movements during the extended evening hours (6pm to 10pm) would be limited to 6 loads per hour. Maximum heavy vehicle traffic movements during the daytime hours (7am to 6pm) would be limited to 12 loads per hour. The maximum traffic movements would be utilised on a campaign basis when meeting peak demand for quarry materials.

Holcim Australia is also seeking to standardise the existing hours of operation for the remaining site activities with the currently accepted day-time period, that is, between 7.00am and 6.00pm Monday to Saturday.

The proposed Project does not involve any change to the existing approved extraction limit boundary, disturbance area or depth of the Teven Quarry. Therefore, no additional ground disturbance or vegetation clearing to that already approved is proposed as a result of the Project.

A summary of the key components of the proposed Project compared to the existing approved operations is provided in **Table 4.1**. A detailed description of the proposed changes is provided in the following sections.

Table 4.1 – Comparison of Existing Operations and Proposed Project

Project Component	Currently Approved	Proposed Project
Quarry life	Quarry operations permitted until 2056	30 years from date of approval.
Limits of production	200,000 tpa in 1995, increasing annually by 1.5% to 495,974 tpa in 2056.	500,000 tpa.
Quarry footprint	Shown on Figure 3.2.	No change
Overburden management	Shown on Figures 3.2 to 3.5.	No change
Hours of operation	Blasting: 9.00am – 3.00pm Monday to Friday All other activities: 7.00 am – 5.00 pm Monday to Friday 7.00 am – 4.00 pm Saturday	Blasting: No change All other activities: 7.00 am – 6.00 pm Monday to Saturday Extended hours for product loading and transport, stockpile management and maintenance: 6.00 pm to 10.00 pm Monday to Friday
Transport	Road transport at current approved production level	Road transport at proposed production level
Employment	8 Full Time Equivalent positions	11 Full Time Equivalent positions
Infrastructure	Fixed primary, secondary and tertiary crushing and screening plant	Retain all existing plant plus new: Mobile crushing and screening plant; and Mobile pug mill.
Site Access	Off Stokers Lane	No change
Concrete recycling for re-use as product	Not currently undertaken	Commence 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.

4.1 Increased Production

To meet current and future demand for quarry materials associated with major road upgrade works and forecast population growth in the region, Holcim Australia is seeking approval to increase maximum production from Teven Quarry to 500,000 tpa. This increase will allow additional flexibility to cater for periods of peak demand associated with major construction projects, including the Tintenbar to Ewingsdale and Grafton to Ballina Pacific Highway upgrades, and development and growth within the region.

4.2 Proposed New Infrastructure and Processing Options

4.2.1 Mobile Crushing

In order to cater for periods of peak production in excess of the current fixed plant capacity of 350,000 tpa, it is proposed that a mobile crushing plant will be utilised on site. The mobile crushing plant will be located within the quarry extraction area to provide maximum acoustic shielding from surrounding residential receivers. To minimise dust emissions conveyors associated with the mobile crushing plant will be enclosed and dust suppressions sprays will be used as necessary. The mobile crushing plant is intended for use during periods of peak production, when demand exceeds the production capacity of existing plant (approximately 350,000 tpa), however there may be other occasions when the mobile crushing plant is required (e.g. specific products).

4.2.2 Mobile Pug Mill

The Project will include the addition of a mobile pug mill on site to expand the range of products produced by Teven Quarry. The pug mill, or continuous mixing plant, allows materials to be simultaneously ground and mixed with water or liquid clay additives. The pug mill will be utilised to mix aggregate with cement, crushed or milled concrete, cement ash or other cementitious products to meet customer specifications. The pug mill will be located on previously disturbed land within the existing infrastructure or extraction area.

4.2.3 Concrete Recycling

As part of Holcim Australia's commitment to improving sustainable development, approval is sought to enable the site to carry out recycling of up to 10,000 tpa of clean, validated surplus concrete (concrete washout waste) from local concrete plants for re-use as product.

Holcim Australia proposes to re-process uncontaminated surplus concrete material from local approved concrete plants through the existing and proposed processing infrastructure for re-use as aggregate product. The concrete material will primarily be sourced from Holcim Australia concrete plants, however, uncontaminated concrete material from other local approved concrete plants may also be accepted with suitable verification.

Presently, if a concrete customer over orders concrete for a concrete pour, the excess material retained within the concrete truck is returned to the concrete plant, washed from the agitator, emptied into a bunded area and left to drain off excess water, prior to being disposed of at a licensed waste facility. By reusing the resource through reprocessing, the amount of raw quarry product required is reduced, as is demand currently associated with disposal.

The composition of the resource is approximately 50 per cent sand and 50 per cent gravel where the gravel size is 20 millimetres or less. Typically cement to aggregate ratios of the resource are in the range of 3 per cent to 8 per cent. The resource contains nil to minimal heavy metal concentrations of elements commonly found within cementitious materials.

No demolition concrete waste or concrete from other sources will be accepted or recycled at Teven Quarry. Strict control conditions will apply to the concrete recycling process including:

- proof of origin of the concrete; and
- validation of recycled concrete material to confirm it is free of general waste materials, wood, paper and metals.

The resource will be stockpiled within a bunded area which will prevent the possibility of contamination of waterways. It will also be maintained in a spadeable/solid form.

The validated clean concrete material will be recycled through the existing and proposed processing plant and stored within the product stockpiling area prior to sale. The recycled concrete material will be blended into the appropriate product streams from the quarry through the crushing and screening process for sale to customers for road construction, building, landscaping and construction applications.

The concrete material would be classified as General solid waste (non-putrescible) under the EPA Waste Classification Guidelines (DECCW, 2009) as it is *cured concrete waste from a batch plant*. However, a general resource recovery exemption under Part 9, Clause 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 applies to the recovery of aggregate material. *The recovered aggregate exemption 2014*, gazetted in 2014, exempts the processing of recovered aggregate (including concrete) from classification as a scheduled activity under Section 48 of the *Protection of the Environment Operations Act 1997*, subject to a number of conditions. Therefore, the processing of recycled concrete material, as proposed by Holcim Australia, can be undertaken without the need for an Environment Protection License provided the conditions set out in the exemption are met. A copy of *The recovered aggregate exemption 2014* is provided in **Appendix 2**.

4.3 Hours of Operation

Teven Quarry currently operates between 7am and 5pm Monday to Friday and 7am and 4pm Saturday. Holcim Australia is seeking approval to operate Teven Quarry during standard day-time hours between 7am and 6pm Monday to Saturday, with extended hours of operation for a limited range of activities until 10pm Monday to Friday. Activities that are proposed to be undertaken within the extended hours of operation (until 10pm Monday to Friday) will be confined to:

- product loading and transport;
- stockpile management; and
- maintenance (including repair, cleaning and replacement of machinery and/or machinery components).

All maintenance activities are intended to ensure the plant operates as efficiently and effectively as possible.

As detailed in **Section 7.7.3.1**, traffic movements during extended hours would be limited to a maximum of six loads per hour. In addition, as detailed in **Section 7.5.4.2**, the maximum predicted evening noise levels meet the noise goals at all sensitive receptors.

No crushing or screening, in pit loading or hauling, overburden management, drilling or blasting is proposed to be undertaken within the extended hours of operation.

Blasting will continue to be undertaken between 9am and 3pm Monday to Friday, in accordance with EPL 3293.

The proposed extended hours of product management and delivery will allow Holcim Australia to meet the needs of major road construction projects which, by their nature, require delivery of material outside normal operating hours. The proposed extended hours of operation would only be utilised on a campaign basis to meet the needs of particular projects and would not represent normal operations.

4.4 Traffic, Access and Parking

Heavy vehicle traffic movements from the quarry will increase as a result of the proposed increase in production. At a maximum production rate of 500,000 tpa, the Project is expected to generate 70 light vehicle movements per day (35 in/35 out) and 146 product truck movements per day (73 truck loads). This represents an increase of approximately 10 light vehicle movements (5 in/5 out) and 68 product truck movements (34 in/34 out) per day compared to current levels. Further details regarding proposed traffic movements associated with the Project are provided in **Section 7.7**.

Existing site access and parking arrangements will not change as a result of the proposed Project. Access will continue to be provided via Stokers Lane (refer to **Figure 3.1**).

4.5 Employment

The proposed Project will provide an increase in employment from 8 full time equivalent positions to 11 full time equivalent positions at maximum production levels, plus the additional contractors required for the additional haulage of product.

4.6 Alternatives to the Project

Holcim Australia is committed to considering potential environmental and community impacts when designing its projects and minimising the potential impacts through appropriate consideration of community and environmental constraints. During the planning phase for the Teven Quarry Project, a number of operational alternatives were considered and a detailed analysis of the potential environmental and community constraints associated with the Project undertaken in order to evaluate alternative operational scenarios.

Two key alternatives were considered during the Project planning phase, including:

- seeking approval for transport of product 24 hours a day to allow for maximum flexibility; and
- do nothing, that is operating the site under its current approval.

The option of 24 hour transport of product from the site was considered during the initial constraints phase of the Project as this would allow maximum flexibility for the supply of product to current and planned major road infrastructure projects, primarily the Pacific Highway upgrade works, over the next 8-10 years. However, following initial consultation with the DP&E and completion of the preliminary environmental risk analysis, Holcim Australia elected to restrict the proposed hours for the transport of product to 7am to 10pm Monday to Friday and 7am to 6pm Saturday due to the potential for unacceptable noise impacts for residents surrounding the site and adjacent to Teven Road as a result of 24 hour operations.

The 'do nothing' option was also considered undesirable as it does not allow Holcim Australia to maximise the efficient use of an existing resource to meet the needs of local infrastructure projects or the planned future growth in the region. Without the Project, Teven Quarry would continue to operate in accordance with the existing consent and with similar environmental and community impacts as are predicted to be experienced under the Project. The quarry would, however, be unable to assist in meeting the peak demands of future planned infrastructure projects.

If this demand is not able to be met by existing approved resources, a Greenfield development may be required within the region to meet this need. A Greenfield development would have increased direct environmental impacts and would not represent an efficient use of existing resources approved for this purpose.

5.0 Planning Context

The following section identifies relevant State and Commonwealth legislation and discusses the application of these planning provisions to the Project.

5.1 Commonwealth Legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), approval by the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance. These matters are:

- World Heritage Properties;
- National Heritage Places;
- Wetlands of International Importance;
- Threatened Species and Ecological Communities;
- Migratory Species;
- Commonwealth Marine Areas;
- Nuclear actions; and
- A water resource, in relation to coal seam gas development and large coal mining development.

If an 'activity' is likely to have a significant impact on a matter of national environmental significance then it may be a 'controlled action' and should be referred to the Commonwealth Minister for the Environment for considerations.

The only provisions of this legislation which are potentially relevant to the Project relate to potential impacts on migratory species, threatened species, or ecological communities listed under the EPBC Act, as none of the other matters would be impacted by the Project (and it is not a nuclear action or a coal seam gas or coal mining development). As outlined in **Section 4.0**, the Project does not propose to change the existing approved extraction limit boundary or disturbance footprint and is therefore not predicted to have a significant impact on migratory species, threatened species, or ecological communities listed under the EPBC Act (refer to **Section 7.9**).

For this reason Holcim Australia does not consider that the Project requires the approval of the Commonwealth Minister under the EPBC Act.

5.1.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) is administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. The NT Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land.

All land within the existing quarry is freehold land that was granted prior to 1 January 1994 and as a result native title has been extinguished. All land is owned by Holcim Australia.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is administered by DP&E and local government. It is the primary legislation governing environmental planning and assessment for NSW.

The objects of the EP&A Act are set out in Section 5 of the Act and are:

- (a) to encourage:
 - (i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
 - (ii) the promotion and co-ordination of the orderly and economic use and development of land,
 - (iii) the protection, provision and co-ordination of communication and utility services,
 - (iv) the provision of land for public purposes,
 - (v) the provision and co-ordination of community services and facilities, and
 - (vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
 - (vii) ecologically sustainable development,
 - (viii) the provision and maintenance of affordable housing,
- (b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and
- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

The project's consistency with these objectives is discussed further in **Table 5.1**.

Table 5.1 – Objectives of the Environmental Planning and Assessment Act 1979

Objective	Comments	Project Consistent with Objective?
Encourage, the proper management, development and conservation of natural and artificial resources,	The Project will optimise the future development of the quarry resources at the existing Teven Quarry site through timely provision of these resources to meet customer demand. This optimisation is achieved with minimal additional environmental impacts to those already approved. Environmental management measures are in place at the quarry to minimise impacts and reduce the potential for impacts on other natural resources that are not the target of the quarry operations (e.g. soil and water).	Yes

Table 5.1 – Objectives of the Environmental Planning and Assessment Act 1979 (cont.)

Objective	Comments	Project Consistent with Objective?
Encourage, the promotion and co-ordination of the orderly and economic use and development of land,	The Project improves the viability of an existing quarry with no change to the approved disturbance footprint. The project will have minimal impact on other land uses in the vicinity of the project and will supply construction materials to other developments in the region. The quarry will continue to make a contribution to the local and regional economies.	Yes
Encourage, the protection, provision and co-ordination of communication and utility services,	This objective is not relevant to the Teven Quarry Project as utility services will not be affected by the Project.	Yes
Encourage, the provision of land for public purposes,	This objective is not relevant to the Teven Quarry Project as no public land is located within the Project Area. No public land is predicted to be significantly affected by the Project.	Yes
Encourage, the provision and co-ordination of community services and facilities	The Teven Quarry Project will not adversely affect community services and facilities. Where new facilities are required to be constructed, the quarry could provide construction materials for these works.	Yes
Encourage, the protection of the environment,	As outlined in Section 7.0 , the environmental impacts of the Project will be largely similar to those of the existing approved Teven Quarry. A range of measures are proposed to be implemented as part of the Project to protect the environment as outlined in Sections 7.0 and 8.0 .	Yes
Encourage, ecologically sustainable development (ESD)	The Project will not result in any clearing of native vegetation beyond that currently approved. Consistency of the Project with the principles of ESD is discussed further in Section 8.0 .	Yes
Encourage, the provision and maintenance of affordable housing	The Teven Quarry Project has the potential to contribute to the provision and maintenance of affordable housing through the economic supply of quality construction materials to the region.	N/A
Encourage, to provide public involvement and participation in the planning process	Holcim Australia has engaged with the community as part of the Project design and environmental assessment process. Holcim Australia also conducts ongoing stakeholder engagement as part of normal operations at Teven Quarry. Community and agency consultation is discussed in further detail in Section 6.0 . Public exhibition and the development application assessment process provide a further opportunity for public participation in the consideration of this Project.	Yes

It is considered that the Project meets these objectives as it relates to planning for the safe and economic recovery of the State's natural resources whilst effectively managing impacts on the environment and community. A stakeholder engagement program has also been undertaken for the Project, providing the community with an opportunity to be involved in the planning and assessment process for the Project.

Part 4 of the EP&A Act provides an approval process for State significant development which is either declared to be a State significant development by a State Environmental Planning Policy (SEPP) or by order of the Minister published in the Gazette. As outlined below, the Project is classed as State significant development in accordance with SEPP (State and Regional Development) 2011.

5.2.1.1 Approval Pathway

Schedule 1 of the State and Regional Development SEPP lists classes of development declared as State significant development under Section 89C of the EP&A Act and which requires approval under Part 4, Section 89E of the EP&A Act. Clause 7 of Schedule 1 provides that extractive industries of a certain type and scale are classed as State significant development. The listing in Schedule 1 that applies to the Project is:

7 Extractive Industries

(1) Development for the purpose of extractive industry that:

(a) extracts more than 500,000 tonnes of extractive material per year, or

(b) extracts from a total resource (the subject of the development application) of more than 5 million tonnes

As the Project relates to an 'extractive industry' that will extract 500,000 tonnes of extractive material per year from a total resource of approximately 6.6 million tonnes, it satisfies the requirements of the State and Regional Development SEPP and therefore is classified as State significant development. The Project therefore requires approval under Part 4.1 of the EP&A Act.

As the Project requires approval under Part 4.1 of the EP&A Act, the Minister for Planning is the prescribed consent authority in respect of the development application. However, under Section 23 of the EP&A Act the Minister has the ability to delegate this authority to the Planning Assessment Commission, the Director-General or to any other public authority. By an instrument of delegation that commenced on 1 October 2011 and remains in force, the Minister has delegated to the Planning Assessment Commission the function of determining State significant development.

The Director-General of DP&E has provided the assessment requirements for the EIS, as discussed in **Section 1.0**.

5.2.1.2 Assessment Requirements

As State significant development, the Project is subject to the general assessment requirements under Part 4 of the EP&A Act as amended by the requirements under Part 4, Division 4.1 of that Act. These requirements are discussed below.

Matters for Consideration (Section 79C)

Section 79C of the EP&A Act identifies matters for the consent authority to take into account when determining a development application. A checklist of these matters and where they have been addressed in the EIS is outlined in **Table 5.1**.

Table 5.1 – Section 79C Matters for Consideration

Matters for Consideration	Relevant EIS Section
The provisions of: <ul style="list-style-type: none"> Any environmental planning instrument. 	Refer to Sections 5.2 and 5.3 .
<ul style="list-style-type: none"> Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved). 	No proposed instruments identified as being relevant to the Project.
<ul style="list-style-type: none"> Any development control plan. 	No development control plans are relevant as the Project is classed as State significant development under the EP&A Act (refer to Section 5.2.1.1).
<ul style="list-style-type: none"> Any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F. 	No planning agreements have been entered into under s93F.
<ul style="list-style-type: none"> The regulations (to the extent that they prescribe matters for the purposes of this paragraph). 	Refer to Section 5.2 .
<ul style="list-style-type: none"> Any coastal zone management plan (within the meaning of the <i>Coastal Protection Act 1979</i>) that applies to the land to which the development application relates. 	No coastal zone management plans apply to the land
The likely impacts of that development, including environmental impacts, on both the natural and built environments, and social and economic impacts in the locality.	Refer to Section 7.0 .
The suitability of the site for the development.	Refer to Sections 7.0 and 9.2 .
Any submissions made in accordance with this Act or the regulations.	Comments to be received on the EIS during exhibition period.
The public interest.	Refer to Sections 1.1 and 9.0 .

Permissibility

The local environmental planning instruments relevant to the Project are the *Ballina Local Environmental Plan 2012* (Ballina LEP 2012) and the *Ballina Local Environmental Plan 1987* (Ballina LEP 1987).

Under the Ballina LEP 2012, extractive industry means the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming. The Project satisfies this description.

Under the Ballina LEP 2012, the northern portion of the site is zoned RU1 – Primary Production (refer to **Figure 2.4**). The southern portion of the site is identified as a ‘deferred matter’ under the Ballina LEP 2012. As a result, the Ballina LEP 2012 does not apply. Land identified as ‘deferred matter’ is still subject to the provisions of the Ballina LEP 1987.

Under the Ballina LEP 1987, the southern portion of the site is zoned 1(e) Rural – Extractive and Mineral Resources (refer to **Figure 2.4**). Extractive industries are not defined by the 1987 LEP. Extractive industries are permissible with consent within both these zones.

5.2.1.3 Authorisations Which Do Not Apply

Under section 89J of the EP&A Act, if a State significant development is granted development consent under Part 4 of the EP&A Act, the following authorisations (refer to **Table 5.2**), which may otherwise have been relevant, will not be required to carry out the Project.

Table 5.2 – Authorisations Which Do Not Apply

Act	Approvals Not Required
<i>Coastal Protection Act 1979</i>	Carrying out works within the coastal zone.
<i>Fisheries Management Act 1994</i>	Permit for works or structures within a waterway.
<i>Heritage Act 1977</i>	Disturbance to an item listed on State Heritage Register or Interim Heritage Order; Excavation permit.
<i>National Parks and Wildlife Act</i>	An Aboriginal heritage impact permit (AHIP) under s90 and Division 8 of Part 6.
<i>Native Vegetation Act 2003</i>	Consent for the clearing of native vegetation.
<i>Rural Fires Act 1997</i>	A bushfire safety authority under s100B.
<i>Water Management Act 2000</i>	A water use approval under s89, a water management work approval under s90 or an activity approval (other than an aquifer interference approval) under section 91.

5.2.1.4 Legislation to be Applied Consistently

If a State Significant Project is granted development consent under Part 4 of the EP&A Act, the following authorisations (refer to **Table 5.3**), which will be required for the Project, must not be refused by the relevant authority and must be substantially consistent with the terms of the development consent.

Table 5.3 – Approvals Legislation to be Applied Consistently with Development Consent

Act	Approval	Authority
<i>Protection of the Environment Operations Act 1997</i>	An Environment Protection Licence	Environment Protection Authority (EPA)

5.2.2 Summary of Other State Legislation

A summary of the other State Acts potentially applicable to the Project is included in **Table 5.4**, including an indication of which additional approvals will be required.

Table 5.4 – Summary of Other State Legislation

Act	Comments	Specific Approval Required for Project
<i>Protection of the Environment Operations Act 1997</i>	Holcim Australia holds an Environment Protection Licence (EPL No. 3293) for the Quarry. The EPL will need to be varied to accommodate the proposed changes to the quarry. The revised EPL will need to address the proposed increased maximum production level and the changes to site infrastructure.	Yes
<i>Water Act 1912</i>	<p>This Act has been repealed by the <i>Water Management Act 2000</i>; however, some of the licensing provisions remain in force where the water source is not covered by a water sharing plan. The Project is located within a groundwater area currently administered by the <i>Water Act 1912</i> as there is no water sharing plan in place for the area.</p> <p>Holcim Australia does not hold any active groundwater licences for the existing operations and groundwater is not required to supply water to the quarry. As the Project is not predicted to intersect the local groundwater table and operational dewatering is not required, Holcim Australia does not require a licence under the Water Act for groundwater abstraction (refer to Section 7.4.2).</p>	No
<i>Water Management Act 2000</i>	This Act regulates the taking, interception, storage and use of surface water and groundwater within areas subject to water sharing plans. There is no groundwater sharing plan applicable to the Teven Quarry Project Area, however surface water within the catchment area of the Richmond River is managed under the Water Sharing Plan for the Richmond River Area Unregulated, Regulated and Alluvial Water Sources, 2010. As such surface water within the catchment is managed under the <i>Water Management Act 2000</i> . Holcim Australia does not currently hold any water access licences (WALs) under the <i>Water Management Act 2000</i> for Teven Quarry. As the WMS only manages runoff from dirty water areas of the site for reuse or discharge Holcim Australia does not propose to purchase any WALs for Teven Quarry as a result of the Project.	No
<i>Threatened Species Conservation Act 1995</i>	<p>A licence under this Act is not required for any activity undertaken in accordance with a development consent granted under the EP&A Act.</p> <p>As discussed in Section 4.0, the Project will not result in any direct impact on the ecological values of the Project Area as no additional ground disturbance or vegetation clearing is required. An assessment of the potential indirect impacts of the Project concluded that it is unlikely to have a significant impact on any threatened flora or fauna species, migratory fauna species, endangered population or Threatened Ecological Communities listed under the TSC Act (refer to Section 7.9).</p>	No

Table 5.4 – Summary of Other State Legislation (cont.)

Act	Comments	Specific Approval Required for Project
<i>Roads Act 1993</i>	<p>The <i>Roads Act 1993</i> determines the rights of the public and adjacent land owners to use public roads, and establishes procedures for the opening and closing of public roads. Under the Act applications are required to be made for the closure of roads and for works in road reserves.</p> <p>No works will be undertaken on roads or within road reserves as part of the Project.</p>	No
<i>Crown Lands Act 1989</i>	<p>The Crown Lands Act 1989 provides for the administration and management of Crown land in the eastern and central divisions of NSW. Crown land may not be occupied, used, sold, leased, dedicated, reserve or otherwise dealt with unless authorised by this Act or the Crown Land (Continued Tenures) Act 1989. The Minister may grant a 'relevant interest' such as a lease, licence or permit, over Crown land for the purpose of any infrastructure, activity or other purpose that the Minister thinks fit.</p> <p>The Project will not impact on any Crown land and no approvals will be required under this Act.</p>	No
<i>Dams Safety Act 1978</i>	<p>This Act requires that the NSW Dams Safety Committee (DSC) periodically review large dams that may constitute a hazard to human life and property. These dams are known as prescribed dams and are listed in Schedule 1 of the Dams Safety Act 1978.</p> <p>The Project does not propose the construction of any new dams and as such no approval is required under this Act.</p>	No
<i>Environmental Hazardous Chemicals Act 1985 (EHC Act)</i>	<p>Under the EHC Act a licence is required for any storage, transport or use of prescribed chemicals.</p> <p>Holcim Australia does not propose to store, transport or use any chemicals currently subject to a Chemical Control Order (CCO) under this Act. Should such chemicals be required during the life of the Project, Holcim Australia will manage the chemicals in accordance with the relevant CCO, including obtaining any appropriate licences.</p>	No

5.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are environmental planning instruments with application at State level. The SEPPs that are potentially relevant to the Project are discussed in the following section.

5.3.1 State Environmental Planning Policy (State and Regional Development) 2011

The State and Regional Development SEPP commenced on 1 October 2011. The aim of the SEPP is to identify development that is State significant development. The SEPP also identifies development that is State significant infrastructure and critical State significant

infrastructure. Schedule 1 of the State and Regional Development SEPP identifies types of developments that are considered to be State significant developments.

As discussed in **Section 5.2.1.1**, the Project is of a class of development listed in Schedule 1 of the State and Regional Development SEPP and therefore is a State significant development and requires development consent under Part 4 of the EP&A Act.

5.3.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) (Extractive Industries SEPP)

The Extractive Industries SEPP was gazetted in February 2007. The SEPP deems that various extractive industry activities are permissible both with and without development consent. The SEPP also deems mining, petroleum production and extractive industries developments to be either exempt or complying development or prohibited. The SEPP also provides that extractive industries are permissible with development consent on land for which development for the purposes of agriculture or industry may be carried out (with or without development consent).

As discussed in **Section 5.2.1.1**, extractive industries are permissible with consent within the Project Area under the Ballina LEP 2012 and Ballina LEP 1987. The Project therefore does not need to rely on the permissibility provisions of the Extractive Industries SEPP.

Part 3 of the Extractive Industries SEPP identifies matters for the consent authority to take into account when determining a development application. A checklist of the matters relevant to the application and where they have been addressed in the EIS is outlined in **Table 5.5**.

Table 5.5 – Extractive Industries SEPP Part 3 Matters for Consideration

Matters for Consideration	Relevant EIS Section
12 Compatibility of proposed mine, petroleum production or extractive industry with other land uses	
Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:	
(a) consider:	
(i) the existing uses and approved uses of land in the vicinity of the development, and	Refer to Section 2.4 and 7.2.1
ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and	Refer to Section 7.2
(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and	Refer to Section 7.2
(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and	Refer to Section 7.2
(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).	Refer to Section 7.2
14 Natural resource management and environmental management	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:	

Table 5.5 – Extractive Industries SEPP Part 3 Matters for Consideration (cont.)

Matters for Consideration	Relevant EIS Section
(a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,	Refer to Section 7.3 and 7.4
(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,	Refer to Section 7.9
(c) that greenhouse gas emissions are minimised to the greatest extent practicable.	Refer to Section 7.8
(2) Without limiting subclause (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.	Refer to Section 7.8
15 Resource recovery	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.	Resource recovery is discussed in Section 3.4
(2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.	Resource recovery is discussed in Section 3.4
(3) The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.	Resource recovery is discussed in Section 3.4
16 Transport	
(1) Before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following:	
(a) require that some or all of the transport of materials in connection with the development is not to be by public road,	Alternative methods of product transport are not available or feasible from Teven Quarry. Traffic impacts of the Project are discussed in Section 7.7
(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,	The main transport route for Teven Quarry is not on roads in residential areas or on roads near schools. Traffic impacts of the Project are discussed in Section 7.7
(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.	Traffic impacts of the Project are discussed in Section 7.7

Table 5.5 – Extractive Industries SEPP Part 3 Matters for Consideration (cont.)

Matters for Consideration	Relevant EIS Section
17 Rehabilitation	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.	Rehabilitation is discussed in Section 7.15
(2) In particular, the consent authority must consider whether conditions of the consent should:	Rehabilitation is discussed in Section 7.15
(a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or	
(b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or	Rehabilitation is discussed in Section 7.15
(c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under section 145C of the Act and the Contaminated Land Management Act 1997), or	Rehabilitation is discussed in Section 7.15
(d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.	Rehabilitation is discussed in Section 7.15

5.3.3 State Environmental Planning Policy 33 – Hazardous and Offensive Development

SEPP No. 33 – Hazardous and Offensive Development requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. The aim of this policy is to link the permissibility of a proposal to its safety and pollution control performance. The assessment process establishes whether the proposal is potentially hazardous or offensive and if this is not the case, SEPP 33 is not applicable.

The Project is not considered a hazardous industry as the Project is essentially a continuation of existing land use and will not result in significant changes to the existing infrastructure and hazardous materials storage areas. Regardless, for completeness, a preliminary hazard analysis is provided in **Section 7.13**.

5.3.4 State Environmental Planning Policy 44 – Koala Habitat Protection

SEPP 44 restricts a Council from granting development consent for proposals on land identified as core koala habitat without preparation of a plan of management. Ballina LGA is listed in Schedule 1 of SEPP 44 and therefore the SEPP applies to the Project.

As discussed in **Section 4.0**, the Project will not result in any additional clearing or ground disturbance beyond that currently approved. Therefore, the Project will not result in any change to the currently approved impacts on potential koala habitat. Consequently, preparation of a koala plan of management is not required under SEPP 44.

5.3.5 State Environmental Planning Policy 55 – Remediation of Land

SEPP No. 55 – Remediation of Land aims to provide a state wide planning approach to the remediation of contaminated land, and to reduce the risk of harm to human health and the environment, by consideration of contaminated land as part of the planning process. Under the SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.

A search of the EPA contaminated land public records was undertaken for the Project Area. No listings were identified relating to the Project Area or surrounds. Potentially contaminating activities associated with Teven Quarry and Project include the operation of a workshop and storage of diesel and oils. These facilities are operated in a manner so as to prevent contamination through the implementation of appropriate management controls, bunding, roofing, monitoring and regular maintenance. Given these controls, it is considered that the potential for contamination would be limited to minor hydrocarbon surface staining which would be addressed on an ongoing basis and as part of the decommissioning and closure planning process.

5.3.6 Aquifer Interference Policy

The NSW Aquifer Interference Policy (NSW Office of Water 2012) clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation and defines considerations in assessing the level of impacts on aquifers. The policy requires extractive industries to consider 'Minimal Impact Considerations' with respect to groundwater sources. The fractured basalt within the Teven Quarry extraction area is quantified as a less productive groundwater source and therefore potential impacts would fall under the minimal impact considerations.

A groundwater assessment has been completed for the Project and Teven Quarry has been found to not intersect the saturated water table (refer to **Section 7.4.2**) and therefore it is not deemed an aquifer interference activity.

6.0 Stakeholder Engagement

Stakeholder engagement is key to the planning and assessment process to assist in determining the relevant issues to be considered in the Project design and environmental impact assessment process. Engagement with relevant stakeholders including nearby landholders, surrounding residents, government authorities, service providers and other relevant stakeholders commenced during the early Project planning phases and has continued through the preparation of the EIS.

Holcim Australia is committed to working with the community to develop a Project that can coexist with the local community and has implemented a stakeholder engagement process to assist in achieving this goal. The engagement process that has been undertaken as part of the environmental impact assessment and approval process provides an opportunity for the community to provide input into project planning, to identify community needs, concerns and opportunities, and to be involved in the environmental and social assessment process.

The details of the authority consultation program are outlined in **Section 6.1**, with details of consultation with the community and other stakeholder groups outlined in **Section 6.2**. An outline of the key issues identified during the consultation process, and where these have been addressed in the EIS is included in **Section 6.3**.

6.1 Authority Consultation

Consultation with relevant government agencies has been undertaken throughout the preparation of the EIS to enable key authority issues to be identified and the approach to the impact assessment process to be refined to ensure these issues are appropriately addressed.

A summary of the agency consultation undertaken during the EIS preparation is provided in **Table 6.1** below.

Table 6.1 – Summary of Agency Consultation

Agency	Date	Purpose
DP&E	30 January 2014	Initial Project briefing and the proposed environmental assessment approach. Seek DP&Es key issues and input to EIS.
	27 February 2014	Submit request for DGRs for the Project and preliminary environmental assessment to DP&E.
	28 March 2014	DP&E provide Agency comments on DGRs for the Project.
	7 April 2014	DP&E issue DGRs for the Project.
Ballina Council	17 February 2014	Provide initial Project overview and the proposed environmental assessment approach. Seek Council's key issues and input to EIS.
	27 February 2014	Receive response from Council accepting proposed scope of EIS.
	9 May 2014	Meeting with Ballina Council staff to discuss management of Stokers Lane and ongoing s94 contributions.
NSW EPA	3 April 2014	Discuss scope of EPA's EIS requirements.

Table 6.1 – Summary of Agency Consultation (cont).

Agency	Date	Purpose
Office of Environment and Heritage	3 April 2014	<p>Clarify EIS requirements provided for the DGRs. OEH confirmed intended scope of survey and assessment work for Biodiversity and Archaeology aspects.</p> <p>OEH acknowledged the project had no direct impact on habitat therefore the intended scope of assessments was to consider indirect impacts from the Project. OEH confirmed that a detailed survey effort would not be required.</p> <p>OEH confirmed that if the <i>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales</i> was followed, that this would satisfy OEH requirements.</p>

Other government agencies were also consulted during the preparation of the EIS, including:

- Division of Resources and Energy;
- Department of Primary Industries, including:
 - NSW Office of Water;
 - Fisheries NSW;
 - Agriculture NSW;
- Roads and Maritime Service;
- Commonwealth Department of the Environment; and
- Air Services Australia.

Each of the agencies were contacted and provided with an overview of the project, its potential impacts and proposed management measures relevant to the agency. Each of the agencies were provided with the opportunity to meet and discuss the Project further, however, most elected to review the EIS information and determine whether or not a meeting would assist in their assessment process.

6.1.1 Ballina Shire Council

In addition to consultation regarding the broader environmental and social aspects of the Project, Holcim Australia has consulted with Ballina Shire Council in relation to two specific aspects of the Project, ongoing road maintenance contributions for Teven Quarry and the unformed section of Stokers Lane adjacent to the Quarry. A summary of these issues is provided in the following sections.

Road Maintenance Contributions

Holcim Australia currently pays a road maintenance contribution to Ballina Shire Council at a rate of \$0.345 per tonne. The current Ballina Shire Heavy Haulage Contributions Plan (2011) specifies a contribution rate of \$0.6455 per tonne, however Section 3.3.1 of the Contributions Plan (2011) provides for Council's discretion to apply a different formula for calculation of the contribution as follows:

'Council however may at its discretion use a different travel distance for the purpose of this formula where there is sufficient evidence provided or obtained that indicates that there is a significant difference between the typical/average travel distance and the standard 12 km assumed travel distance.'

Section 3.3.1 of the Contributions Plan (2011) also stipulates an average replacement cost of \$0.053 tonne per kilometre for the damage to pavement by a typical heavy vehicle used to transport quarry material for a typical shire road.

The primary haul route for the Project, which will cater for approximately 95% of Project related haulage vehicle movements, is from Teven Quarry to Teven Road and south to the Bruxner Highway. Based on a weighted average travel distance of 5.99 km (half the 12 km assumed travel distance), a pro rata application of the replacement cost for damage to Council roads caused by haul trucks from Teven Quarry would be \$0.317/tonne. This rate is slightly less than the current contribution rate of \$0.345/tonne paid by Teven Quarry. It is considered that this rate is adequate and in accordance with the purpose of the Contributions Plan (2011).

Hence, it is proposed that an equitable contribution rate for Teven Quarry would be maintenance of the existing contribution rate of \$0.345/tonne, subject to CPI increases as detailed in the Contributions Plan (2011).

Status of Stokers Lane

As discussed in **Section 2.1**, quarry operations have historically encroached on an unformed section of Stokers Lane along the north-eastern boundary of Lot 2. This encroachment dates back to at least 1985 prior to Holcim Australia's ownership of the site, when Ballina Shire Council constructed a weighbridge in Stokers Lane. The weighbridge has since been removed and relocated within Lot 1, and it is understood that there have been historical informal agreements with Ballina Shire Council in regard to the encroachment.

As part of this Project, Holcim Australia has met with Ballina Council to discuss options regarding this historical encroachment. Key options included formalising the ongoing use of this land by way of enclosure permit under the *Roads Act 1993* or rehabilitating this area and erecting a new fencing along the boundary. Following further consultation with Ballina Council and a review of operational need, Holcim Australia elected to remove all operations from this area, rehabilitate the former operational area and erect a new boundary fence.

6.2 Community Engagement

A Project-specific community engagement program was implemented during the planning and assessment phase of the Project. This included the distribution of an initial community information sheet to residences in the vicinity of Teven Quarry in April 2014 (refer to **Appendix 3**). The newsletter provided details of the Project, environmental assessment process and how the community could be involved in the environmental assessment and approvals process. The newsletter also included a feedback form so that community members could provide any feedback to Holcim Australia and also included an offer to meet with Holcim Australia to discuss the Project in further detail.

As a result of the initial newsletter, two responses were received from the community and Holcim Australia staff met with three nearby residents to discuss the Project. The primary community issues raised during the consultation process included:

- dust generation from the operation and potential air quality impacts;
- noise from the operation of proposed mobile plant and equipment;
- additional truck movements; and
- potential odour implications associated with the introduction of an asphalt plant on site.

A second community information sheet will be distributed in late 2014 concurrent with the lodgement of the development application for this Project to update the community and provide details on the assessment findings. This newsletter will also include a feedback form and contact details for Holcim Australia and Umwelt staff so that community members can provide any feedback on the Project or assessment process. The newsletter will also include an offer to meet with Holcim Australia to discuss the Project or any of the assessment findings in further detail.

6.3 Key Stakeholder Issues

Identification of key environmental and stakeholder issues for the Project is based on consideration of:

- the planning and environmental context for the locality;
- the environmental risk assessment of potential environmental impacts associated with the Project (refer to **Section 7.1**);
- outcomes of the community and authority consultation process; and
- the DGRs for the proposed Project (refer to **Section 1.3**).

Table 6.2 provides a summary of the key issues identified through these processes and provides reference to the section of the EIS in which these issues have been addressed.

Table 6.2 – Key Environmental and Community Issues

Issue	EIS Reference
Land Resources	Section 7.2
Surface Water	Section 7.3
Groundwater	Section 7.4
Noise Generation	Section 7.5
Blasting and Vibration	Section 7.5
Air Quality	Section 7.6
Traffic and Transport	Section 7.7
Greenhouse Gas Emissions	Section 7.8
Biodiversity	Section 7.9
Aboriginal Heritage and Historical Heritage	Section 7.10, 7.11
Visual Amenity	Section 7.12
Hazards	Section 7.13
Waste	Section 7.14
Rehabilitation	Section 7.15
Socio-Economic Impacts	Section 7.16

7.0 Environmental Assessment

7.1 Preliminary Environmental Risk Assessment

A preliminary environmental risk analysis was undertaken for the Project which identified the environmental aspects that could potentially be impacted as a result of the Project and which required further detailed assessment as part of this EIS. The findings of the preliminary environmental risk analysis are provided in **Table 7.1**.

Table 7.1 - Potential Environmental Impacts Associated with the Project

Environmental Aspect	Preliminary Environmental Risk Analysis	Further Assessment Required?
Landform, soils, land use, land capability and agricultural suitability	No additional land disturbance is proposed as part of the Project as there will be no change to the current approved extraction limit boundary or disturbance associated with the infrastructure and stockpiling areas. Potential impacts on land resources are therefore limited. A qualitative review of these aspects has been included in the EIS and land management measures relevant to the ongoing operation of the quarry have been identified.	Yes, refer to Section 7.2
Surface water resources	The Project will not change the existing quarry footprint or associated water management system. The proposed increase in production will however impact on the water balance of the quarry and potentially influence current site water discharges. A review of the existing water management system has been undertaken and the potential changes and impacts to water demand and water quality have been assessed as part of the Surface Water Impact Assessment.	Yes, refer to Section 7.3
Groundwater resources	Teven Quarry experiences negligible groundwater inflows and as the Project requires no change to the approved quarry footprint or depth, a significant impact on groundwater sources, groundwater dependent ecosystems or groundwater users is considered unlikely. For these reasons, and following advice from DP&E, the assessment of potential groundwater impact has focused on a review of existing available groundwater and geological data from the local area to determine the local groundwater level and quality, assessment of potential aquifer parameters, assessment of groundwater-surface water interaction and identification of local groundwater users.	Yes, refer to Section 7.4
Noise and vibration	The proposed increase in production and additional plant items will change the noise and blasting impacts of the quarry. A noise and blasting assessment has been completed to assess the impacts of these changes.	Yes, refer to Section 7.5
Air Quality	The proposed increase in production is likely to change the air quality impacts of the quarry. An Air Quality Impact Assessment has been completed to assess the impacts of these changes.	Yes, refer to Section 7.6
Traffic	The proposed increase in production will result in additional heavy vehicle movements from the site. The potential impacts of this increase in traffic on the local road network have been assessed in a detailed Traffic Impact Assessment.	Yes, refer to Section 7.7

Table 7.1 - Potential Environmental Impacts Associated with the Project (cont).

Environmental Aspect	Preliminary Environmental Risk Analysis	Further Assessment Required?
Greenhouse Gas and Energy	Increased production and additional plant proposed for the Teven Quarry will affect the greenhouse gas intensity of the quarry, however, not the total output from the quarry. The potential greenhouse gas and energy impacts of Project have been quantitatively assessed in accordance with current guidelines and the impact of the Project in relation to national and international greenhouse targets quantified.	Yes, refer to Section 7.8
Biodiversity	No additional land disturbance or vegetation clearing is proposed as part of the Project as there will be no change to the current approved extraction limit boundary or infrastructure and stockpiling areas. Potential impacts on biodiversity values are therefore limited to indirect impacts of quarrying activities. As agreed with OEH following discussions regarding the proposed assessment approach, an assessment of the indirect impacts of the Project on the ecological values of the Project Area has been completed, along with a review of existing ecological management measures relevant to the ongoing operation of the quarry.	Yes, refer to Section 7.9
Aboriginal Archaeology	No additional land disturbance is proposed as part of the Project as there will be no change to the current approved extraction limit boundary or infrastructure and stockpiling areas. No Aboriginal sites have been identified within or in the vicinity of the Project Area. A review of archaeological issues has been included in the EIS and appropriate management measures relevant to the ongoing operation of the quarry have been identified.	No, refer to Section 7.10
Historic Heritage	No additional land disturbance is proposed as part of the Project as there will be no change to the current approved extraction limit boundary or infrastructure and stockpiling areas. No historic sites were identified within or in the vicinity of the Project Area. A review of heritage issues has been included in the EIS and appropriate management measures relevant to the ongoing operation of the quarry have been identified.	No, refer to Section 7.11
Visual Amenity	Potential visual impacts of the Project are limited to the addition of new plant items within the existing infrastructure or mobile plant in the extraction area. An assessment of the potential impact on visual amenity has been undertaken.	Yes, refer to Section 7.12
Hazard and Risk	The quarry transports and stores a number of dangerous goods required for ongoing operation. A preliminary risk screening under SEPP 33 has been undertaken to determine whether a Preliminary Hazard Analysis is required. Teven Quarry is located on land partially mapped as bushfire prone, therefore a bushfire threat assessment has been completed.	Yes, refer to Section 7.13
Waste	The Project will generate limited volumes of waste. The EIS documents the types of waste generated and outlines existing waste minimisation measures to be implemented for the Project.	Yes, refer to Section 7.14

Table 7.1 - Potential Environmental Impacts Associated with the Project (cont).

Environmental Aspect	Preliminary Environmental Risk Analysis	Further Assessment Required?
Rehabilitation and Closure	A review of the existing rehabilitation strategy and closure criteria has been completed. The review includes identification of opportunities for ongoing rehabilitation during operation of the quarry and the proposed approach to final landform and land use.	Yes, refer to Section 7.15
Socio-economic	The potential impacts of the Project on the social and economic life of the surrounding community have been assessed and methods used to engage the local community in the Project planning process have been documented in the EIS.	Yes, refer to Section 7.16
Cumulative Impacts	The cumulative impacts of the Project have been addressed as part of the various specialist environmental studies undertaken for the Project.	Yes, refer to Section 7.16

7.2 Land resources

A Land Resources assessment has been undertaken for the Project, including a review of potential impacts on landforms and topography, soil and land capability, land use and agricultural values.

The Project is located wholly within the existing and approved disturbance area of the Teven Quarry. No land disturbance additional to that already approved is proposed as part of the Project, therefore potential impacts on land resources and agricultural values are limited. A discussion of potential impacts of the Project on land resources and agricultural impacts is provided in the following sections.

7.2.1 Land Use

The Project Area is located within the Northern Rivers region of NSW approximately 8 kilometres north-west of Ballina and approximately 4 kilometres east of Alstonville. Land to the east of the Project Area is comprised of low lying coastal plain which is almost exclusively used for sugar cane farming, with some utilised for macadamia farming.

The steeper slopes associated with the escarpment to the west of the Project Area are generally heavily vegetated, with some limited use for grazing. Further west on the Alstonville Plateau the dominant land uses are grazing, small scale cropping such as macadamia plantations and rural residential land.

The Project Area has been utilised as a quarry since the 1940's and has approval to operate until 2056. The Project will not result in any change to the existing land use and is not predicted to result in significant impacts on the surrounding land use. The existing quarry operation has co-existed with the adjoining agricultural operations for decades and the Project does not result in change the nature of the quarry operations and is not expected to result in any significant change to impacts on the adjoining agricultural land uses.

Detailed assessments of the potential of the Project to impact on the private land surrounding the Project Area are included throughout **Section 7.0**, in particular the assessments of noise and vibration, air quality and visual impacts. It is also noted that Holcim Australia is currently negotiating a purchase agreement with Receiver 9. This agreement was planned as part of the existing quarry operations and is not proposed as a result of the Project.

7.2.2 Landform and Topography

The landform to the east of the Project Area is comprised of low lying coastal plain with an elevation of between 3 and 5 mAHD (refer to **Figure 2.2**). The Project Area is located on the edge of the coastal plain where the land rises steeply to an escarpment. This escarpment runs north-south through much of the Ballina Shire and forms the boundary between the coastal plain and adjacent plateau. The 'Alstonville Plateau' has been formed from the eroded remnants of an ancient shield volcano (Ballina Shire Council 2003), and has an elevation of around 140mAHD.

Land within the Project Area rises steeply from the north eastern boundary where elevations are 5 mAHD to approximately 60 mAHD through the central and western areas of the Project Area (refer to **Figure 2.2**). The existing infrastructure and stockpiling areas are located on the lower lying flat land in the north of the Project Area, while the extraction area extends into the elevated central and southern portions of the site. Slope gradients are gentler in the north-east of the Project Area, with slopes ranging between 0 per cent to 5 per cent, and occasionally greater than 50 per cent. The western, southern and eastern portions of the Project Area are characterised by steep slopes ranging from 10 per cent to greater than 50 per cent.

The Project Area is located within the Maguires Creek and Emigrant Creek catchment areas. Surface water flows from the Project Area drain to Maguires Creek approximately 1 kilometre to the east via a cane drain along the eastern boundary of the Project Area (refer to **Figure 2.2**). Maguires Creek flows into Emigrant Creek, a tributary of the Richmond River which flows in an easterly direction to the coast at Ballina.

The topography of the Project Area has been affected since commencement of quarrying at the site in the 1940's to early 1950's. The quarry has created an open pit extraction area extending into the side of the escarpment in a southerly direction. The bulk of the extraction area sits behind a narrow ridge which largely shields views of the extraction area to the south. An assessment of potential visual impacts associated with the Project has been undertaken and is provided in **Section 7.12**.

The Project will not result in any change to the existing approved quarry extraction area. In addition, the revised rehabilitation plan for the final landform and updated closure and rehabilitation criteria detailed in **Section 7.15** are expected to increase the visual shielding of the extraction area and better integrate the rehabilitation of the quarry extraction area with the surrounding landform. The Project is therefore not anticipated to significantly change the existing approved landform and topography impacts of the Teven Quarry.

7.2.3 Soil Resources

7.2.3.1 Soil Landscapes

The soil landscapes within the Project Area and immediate surrounds are shown in **Figure 7.1**. Based on this mapping (Morand, 1994), there are three soil types situated within the Project Area which are described briefly in **Table 7.2**.



Data Source: Soil Conservation Service of NSW
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

0 100 250 500m
1:10 000

Legend

- Project Area
- Empire Vale variant b Soil Landscape
- Billinudgel Soil Landscape
- Burns Point variant a Soil Landscape
- Disputed Plain variant a Soil Landscape
- Wollongbar Soil Landscape

FIGURE 7.1
Teven Quarry Project Area Soil Landscapes

Table 7.2 – Soil Landscape Characteristics

Soil Landscape	Terrain	Soil Profile Types	Other Characteristics	Hazards
Billinudgel	Covers low rolling hills with slope ranges from 10 to 20 per cent.	The main soils are Yellow Podzolic Soils and Yellow Podzolic Soil/Soloth Intergrades on crests and slopes. Yellow Podzolic Soils and Red Podzolic Soil/Red Earths on siltstone.	Profile depth up to 150 cm pH 4.0 to 5.5. Low fertility. Low water holding capacity.	Low to moderate erodibility. Mass movement hazard. Strongly acidic to extremely acidic soil. Aluminium toxicity potential.
Empire Vale variant b	Associated with floodplains, extensively cleared closed and open forest; now almost entirely devoted to sugar cane growing.	The soils in this landscape are generalised as poor to moderately well drained Prairie Soils and Humic Gley soils.	Profile depth more than 200 cm. pH 4.5 to 8.0. Low fertility. Poor to moderately well drained.	Moderate to high erodibility. Localised potential acid sulphate soils. Flood hazards. Reactive, highly plastic soils with permanently high watertables and localised low wet bearing strength and salinity.
Disputed Plain variant a	The soils in this landscape derived from basalt and are associated with footslopes and fans (derived from metamorphic rock) with deep cracking clays.	The main soils are Yellow Podzolic Soils and Soloths. Up to 30 cm of massive, hardsetting silty or sandy clay loam overlays 50 cm or more of mottled blocky clay.	Profile depth more 100 cm. pH 5.0 to 8.0. Poorly to moderately well drained.	Highly plastic soils of low permeability. Permanently high watertables. Moderate erodibility.

The Project Area is dominated by soils of the Billinudgel soil landscape, with low fertility and low to moderate erodability. The topsoil within the infrastructure and extraction areas has been largely disturbed by existing quarry operations. As the Project does not propose any additional ground disturbance beyond that already approved, the Project will not have any additional impact on topsoils within the Project Area beyond that already approved.

7.2.3.2 Topsoil Management

The topsoil within the Project Area has been largely disturbed by the existing approved operation. However, where topsoil is to be disturbed as a result of ongoing extraction activities, Holcim Australia will continue to implement the following procedures:

- topsoil will continue to be stripped prior to quarrying and stockpiled separately for later reuse in rehabilitation activities;
- where topsoil stockpiles are expected to remain in place for longer than three months, they will be re-grassed with local native seed to inhibit erosion, dust and siltation; and

- where possible, freshly stripped topsoil will continue to be placed directly onto rehabilitated areas to reduce the potential for loss of soil structure and make best use of soil seed stores.

Further detail regarding rehabilitation procedures is provided in **Section 7.15**.

7.2.3.3 Acid Sulphate Soils

Acid sulphate soils are known to occur beneath the topsoils of Empire Vale variant b soil landscape of the adjoining low-lying coastal floodplain. The Ballina LEP 2012 maps potential acid sulphate soils within the Ballina Shire, and indicates that there are areas of Class 3 and 5 acid sulphate soils within the Project Area. Class 3 acid sulphate soils occurs along the northern and north-eastern edge of the Project Area on the low lying land within Lots 1 and 2 (refer to **Figure 7.2**). A narrow band of Class 5 acid sulphate soils occur along the boundary between Class 3 land and the remainder of the Project Area (refer to **Figure 7.2**). Clause 7.1(2) of the Ballina LEP 2012 details the works requiring development consent in Class 3 and 5 land, these work are described in **Table 7.3**.

Table 7.3 – Works Requiring Development Consent on Class 3 and 5 Land

Class of Land	Works Requiring Consent
3	Works more than 1 metre below the natural ground surface.
	Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
5	Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

The Project does not involve any additional land disturbance to that already approved and will not involve any excavation more than 1 metre below the natural ground surface within class 3 or 5 land. Therefore the Project will not result in any impact on acid sulphate soils.

Weekly on-site pH monitoring of water from the main site dam is undertaken in accordance with EPL 3293. A review of weekly monitoring data collected during 2013 and 2014 shows compliance with pH concentration limits and no significant variance in pH concentrations over time as a result of activities at the quarry. Results demonstrate a stable and relatively alkaline pH level of approximately 8 pH units. Although no interactions with acid sulphate soils are predicted as part of the Project, if any substantial variation in pH concentration is identified as a result of weekly monitoring, Holcim Australia will notify Ballina Shire Council and the EPA in accordance with the existing Plan of Management (Readymix 2007).

Holcim Australia will continue to monitor pH levels on a weekly basis in accordance with EPL 3293 should consent for the Project be granted.

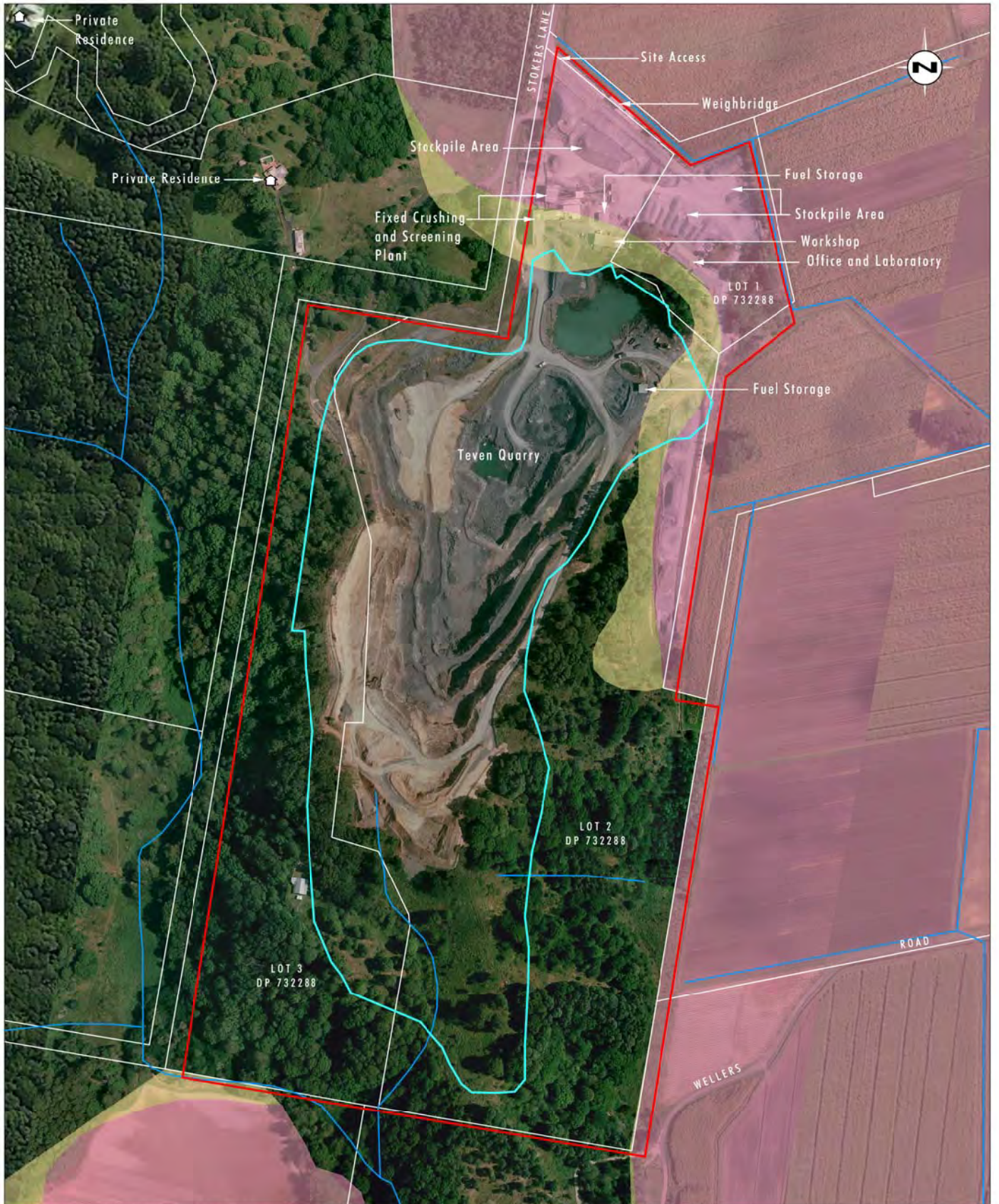


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014), LPI (2014)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

0 50 100 200m
 1:5 000

Legend

- Project Area
- Extraction Limit Boundary
- Class 3
- Class 5
- Private Residence
- Drainage Line

FIGURE 7.2
Teven Quarry
Project Area
Acid Sulphate Soils

7.2.3.4 Land Capability and Agriculture

Land capability is the ability of the land to maintain its productive potential under a specified use, without degradation. Climate, soils, geology, geomorphology, soil erosion, site and soil drainage characteristics and current land use data are all considered in determining land capability (Emery undated). Land Capability classes for NSW have been developed by the NSW Soil Conservation Service and are summarised in **Table 7.4**. Each class outlines the types of land uses appropriate for a particular area of land and the types of land management practices needed to prevent soil erosion and maintain the productivity of the land.

Table 7.4 – Land Classification Interpretations (DECC 2009)

Land Classification		Interpretations and Implications
Capable of regular cultivation	1	Land capable of a wide variety of uses. Where soils are fertile, this is land with the highest potential for agriculture, and may be cultivated for vegetable and fruit production, cereal and other grain crops, energy crops, fodder and forage crops, and sugar cane in specific areas. Includes 'prime agricultural land'.
	2	Usually gently sloping land capable of a wide variety of agricultural uses. Has a high potential for production of crops on fertile soils similar to Class 1, but increasing limitations to production due to site conditions. Includes 'prime agricultural land'.
	3	Sloping land capable of cropping on a rotational basis. Generally used for the production of the same type of crops as listed for Class 1, although productivity will vary depending upon soil fertility. Individual yields may be the same as for Classes 1 and 2, but increasing restrictions due to soil erosion hazard will reduce the total yield over time. Soil erosion problems are often severe. Generally fair to good agricultural land.
Capable of grazing with occasional cultivation	4	Land not capable of cultivation on a regular basis owing to limitations of slope, gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Comprises the better classes of grazing land of the State and can be cultivated for an occasional crop, particularly a fodder crop, or for pasture renewal. Not suited to the range of agricultural uses listed for Classes 1 to 3.
	5	Land not capable of cultivation on a regular basis owing to considerable limitations of slope, gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class 4. Can be cultivated for an occasional crop, particularly a fodder crop or for pasture renewal. Not suited to the range of agricultural uses listed for Classes 1 to 3. If used for 'hobby farms', adequate provision should be made for water supply, effluent disposal, and selection of safe building sites and access roads.
	6	Productivity will vary due to the soil depth and the soil fertility. Comprises the less productive grazing lands. If used for 'hobby farms', adequate provision should be made for water supply, effluent disposal, and selection of safe building sites and access roads.
Other	7	Generally comprises areas of steep slopes, shallow soils and/or rock outcrop. Adequate ground protection must be maintained by limiting grazing and minimising damage by fire. Destruction of trees is not generally recommended, but partial clearing for grazing purposes under strict management controls can be practised on small areas of low erosion hazard. Where clearing of these lands has occurred in the past, unstable soil and terrain sites should be returned to timber cover.
	8	Land unsuitable for agricultural or pastoral uses. Recommended uses are those compatible with the preservation of the natural vegetation, namely, water supply catchments, wildlife refuges, National and State Parks, and scenic areas.

The classification does not necessarily reflect existing land uses; rather, it indicates the potential of the land for different agricultural purposes, while maintaining the quality of natural assets.

The land capability of the Project Area and surrounds has been mapped and is shown on **Figure 7.3**. The majority of the Project Area is classified as Class 7 land, which generally comprises areas of steep slopes, shallow soils and/or rock outcrop, generally unsuitable for agricultural uses with the exception of limited grazing undertaken under strict management control (DECC, 2009). Small areas with high potential for agricultural purposes (Class 1) occur in the north and east of the Project Area, associated with the adjacent low-lying floodplain.

The Class 1 land within the Project Area is approved for disturbance under the existing consent and is not currently used for agricultural purposes. Given the Project will not result in any additional disturbance of Class 1 land and the extent of higher classed land in the immediate surrounds, it is considered that the Project will not impact on regional agricultural output.

At the completion of extraction and rehabilitation works within the quarry pit, Holcim Australia proposes to primarily establish a native ecosystem on land available for rehabilitation throughout the pit, overburden and surface infrastructure areas, consistent with surrounding vegetation communities. There is some potential for the pit and infrastructure area to provide for ongoing light industrial use subject to a suitable zoning and development approvals, however, any such future use would require environmental assessment and planning approval. It is intended that the balance of the site would be established as native ecosystem.

Teven Quarry has a long history of operating adjacent to the high quality agricultural land to the east of the Project Area. No material adverse impacts on the productivity of this land have been identified as a result of historic quarry operations. As the scope of potential impacts associated with the Project are similar to those already experienced, it is not anticipated that there will be a significant impact on the productivity of adjacent agricultural land as a result of the Project.

7.2.3.5 Biophysical Strategic Agricultural Land

During 2013, the NSW Government announced mapping of more than one million additional hectares of NSW's most valuable farming land, known as Biophysical Strategic Agricultural Land (BSAL). Following public consultation on the draft mapping in late 2013, the maps were given legal effect via an amendment to the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries (2007))* (the Mining SEPP).

Through the amendments to the Mining SEPP, any State significant mining or coal seam gas (CSG) proposal on BSAL will be subjected to an additional level of scrutiny via the Gateway process. The Gateway process does not apply to the Project as it is not for the purpose of mining or CSG.

BSAL mapping (Department of Planning and Infrastructure 2013) indicates that there is no BSAL located within the Project Area, with the closest area of BSAL within the vicinity of the Project Area located approximately 600 metres north-west of the Project Area. This area of BSAL is associated with the Wollongbar Soil Landscape (refer to **Figure 7.1**). The Project will therefore not impact on any areas mapped as BSAL and as discussed in **Section 7.2.3.5**, is not predicted to result in significant impacts on agricultural land.



Data Source: Soil Conservation Service of NSW
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- Project Area
- Suitable for Grazing with no Cultivation
- Suitable for Regular Cultivation
- Other

FIGURE 7.3
Teven Quarry
Project Area
Land Capability

7.2.3.6 Salinity and Contamination

Quarrying has occurred within the Project Area since the 1940's and to date there is no evidence of salinisation of land or water resources within or surrounding the Project Area. Water quality monitoring undertaken both on-site and offsite measured within the range of fresh potable water quality (refer to **Section 7.3.1.1**).

Potential sources of hydrocarbon contamination within the existing operations include quarry plant and equipment, and storage of diesel and oils in above ground storage tanks. These facilities are operated in a manner so as to prevent contamination through the implementation of appropriate management controls, monitoring and regular maintenance.

There are no known areas of significant contamination within the Project Area and there has been no evidence in fuel / oil inventories and through physical inspections of any fuel / oil leaks from any of these tanks. It is therefore considered that the potential for contamination within the Project Area would be limited to minor hydrocarbon surface staining. Continued monitoring and regular maintenance will minimise the potential for contamination.

Diesel and oil storage tanks will be decommissioned and removed as part of the decommissioning and closure phase of Teven Quarry and any areas of associated contamination assessed and appropriately remediated. The decommissioning and closure process is discussed further in **Section 7.15**.

7.3 Surface Water Resources

7.3.1 Surface Water Context

All current and approved operations at Teven Quarry are located within the catchment areas of Emigrant Creek and Maguires Creek (a sub-catchment of Emigrant Creek) (refer to **Figure 7.4** and **Table 7.5**). Emigrant Creek is a tributary of the Richmond River which flows in an easterly direction to the coast at Ballina.

Table 7.5 - Catchment Context

Watercourse	Catchment Area (ha)	Teven Quarry Project Area within Catchment Area (ha)	Teven Quarry Project Area within Catchment Area (%)
Richmond River ¹	690,000	16	<0.003%
Emigrant Creek ²	15,300	16	0.1%
Maguires Creek	6,000	8	0.1%

¹ Includes the catchment area of Emigrant Creek.

² Includes the catchment area of Maguires Creek.

Holcim Australia currently manages surface water at Teven Quarry in accordance with the *Plan of Management for Teven Quarry* (Readymix, 2007).

The current quarry water management system (WMS) covers an area of approximately 10 hectares, with the full footprint of the quarry not yet developed. The WMS currently includes approximately 7 hectares of Maguires Creek sub-catchment and approximately 3 hectares of direct catchment of Emigrant Creek. The quarry water management system is approved to increase to approximately 16 hectares within the approved quarry extraction area (refer to **Figure 7.5**), and will ultimately occupy approximately 7 hectares of the Maguires Creek catchment and approximately 9 hectares of the direct catchment of Emigrant Creek (refer to **Figure 7.5**). There are no proposed changes to the catchment area of the

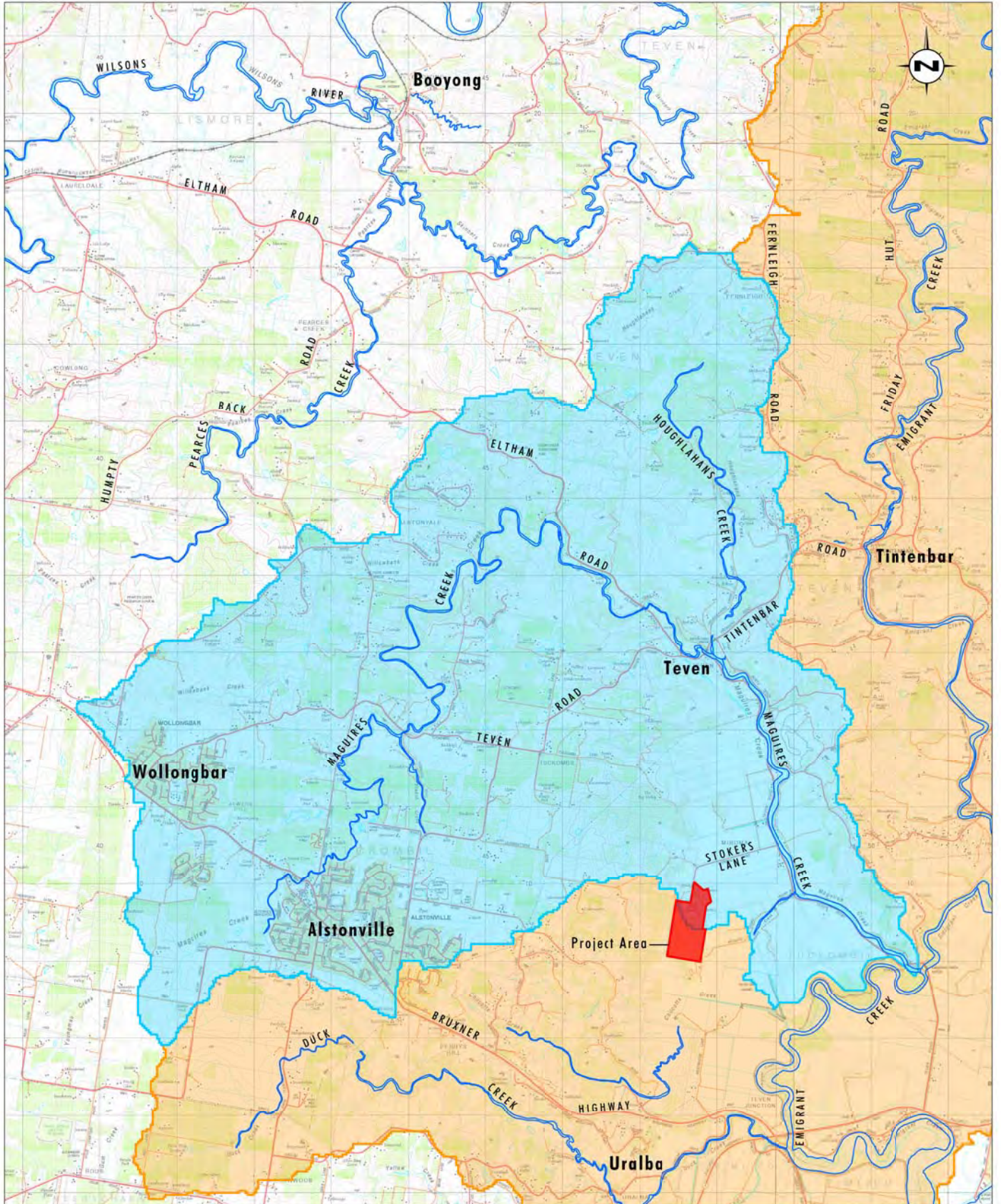


Image Source: Department of Lands (2006)
 Data Source: Data Source: Holcim (Australia) Pty Ltd (2014)

0 1.0 2.0 3.0km
 1:70 000

Legend

- Project Area
- Maguires Creek Catchment
- Eltham Creek Catchment
- Emigrant Creek Catchment
- Drainage Line

FIGURE 7.4
Teven Quarry
Catchment Context

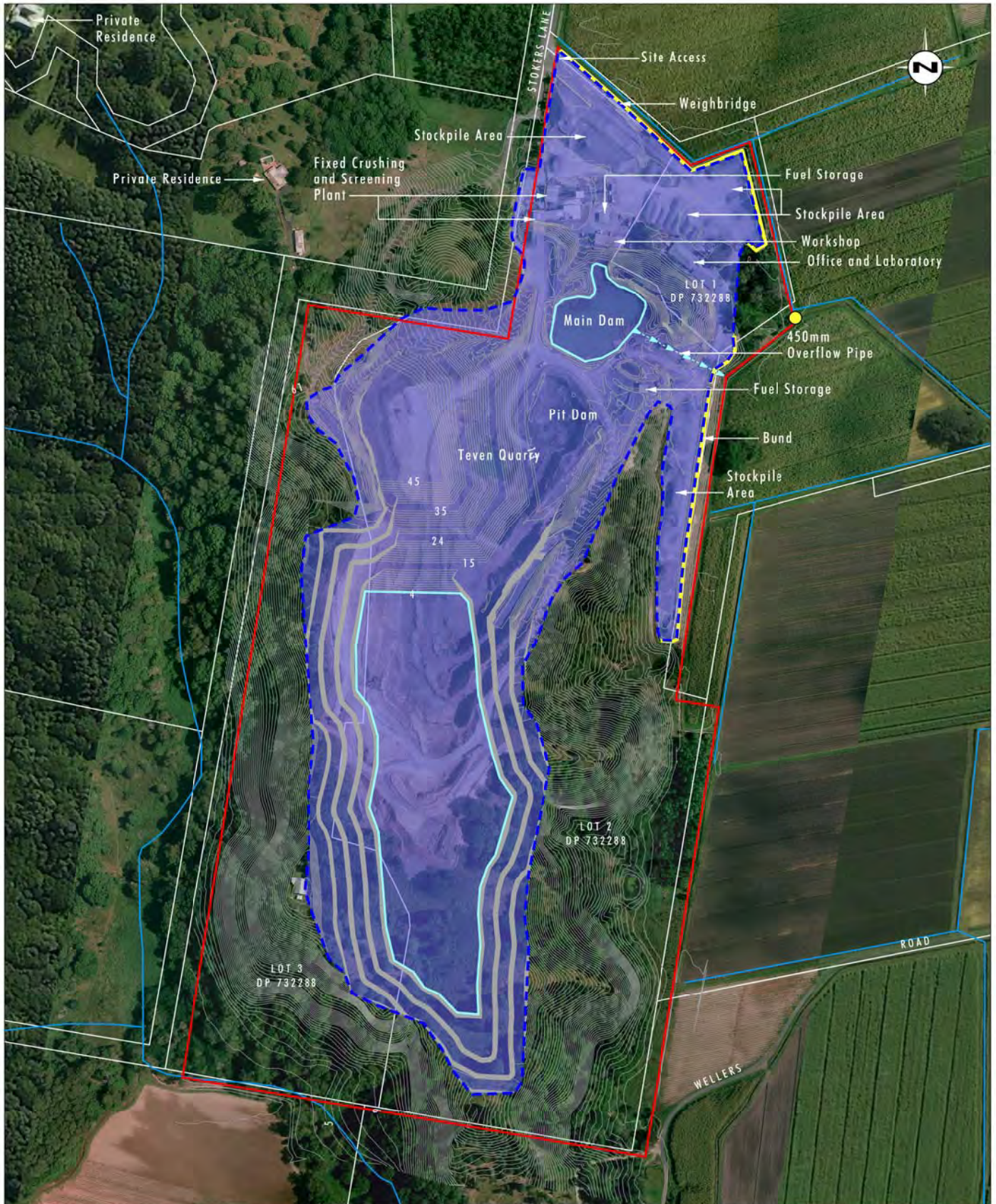


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014), LPI (2014)
 Note: Contour interval 1m. Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- Project Area
- WMS
- Final Dam Location
- Bund
- Final Stage Contours (mAHD)
- Drainage Line
- Licensed Discharge Point

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FIGURE 7.5
Teven Quarry
Approved Water
Management System

approved water management system with the Project. The existing water management system is described in **Section 7.3.2**.

7.3.1.1 Water Quality

Teven Quarry currently operates under EPL 3293. EPL 3293 allows the quarry to discharge water from site via a licensed discharge point (refer to **Figure 7.5**). EPL 3293 establishes limits and requires water quality monitoring of discharges as listed in **Table 7.6**.

Table 7.6 - EPL 3293 Water Quality Limits and Monitoring Requirements

Parameter	Frequency of Monitoring	Licence Limit
pH	Weekly	6.5 to 8.5
Oil and Grease	Annual (during discharge)	10 mg/L
Total Suspended Solids (TSS)	Annual (during discharge)	50 mg/L

In addition, the NSW Water Quality and River Flow Objectives set the agreed environmental values and long-term goals for NSW's surface waters. The NSW Water Quality and River Flow Objectives are consistent with the agreed national framework for assessing water quality set out in the ANZECC 2000 Guidelines. The ANZECC Guidelines provide an agreed framework to assess water quality in terms of whether the water is suitable for a range of environmental values (including human uses). The ANZECC guidelines provide technical guidance to assess if water quality meets the NSW Water Quality and River Flow Objectives.

The results of the 2013 water quality monitoring undertaken at Teven Quarry are shown in **Table 7.7**. All water quality monitoring results from 2013 comply with the Teven Quarry EPL licence limits. In addition, Teven Quarry water quality monitoring results for pH and TSS are within the default ANZECC guidelines. The oil and grease concentration identified in quarry discharges could potentially be within ANZECC default limits, however as the sensitivity of the analysis used for oil and grease is less accurate than the default ANZECC guideline limit, an accurate comparison is not able to be achieved.

Table 7.7 – Licensed Discharge Point Water Quality Monitoring Results for 2013 and Default ANZECC Guidelines

Parameter	No. Samples	Range of Results	Default ANZECC Guidelines
pH	52	8.1 to 8.3	6.5 to 8.5 ¹
Oil and Grease	1	<2 ⁴	<0.3 mg/L ²
TSS	1	5	<40 mg/L ³

¹. Trigger values for NSW Australia, slightly disturbed ecosystems, lowland river

². Toxicant guidelines for the protection of aquaculture species, freshwater

³. Physico-chemical stressor guideline for the protection of aquaculture species, freshwater

⁴. The oil and grease concentration identified in quarry discharge could potentially be within ANZECC default limits, however as the sensitivity of the analysis used for oil and grease is less accurate than the default ANZECC guideline limit, an accurate comparison is not able to be achieved.

7.3.1.2 Flooding

The 2007 Ballina Flood Study Update (BMT WBM, 2007) estimated the 100 year flood level to be approximately 2.02 mAHD at the confluence of Emigrant Creek and Maguires Creek. Teven Quarry is located approximately 2 kilometres upstream of the confluence of Emigrant Creek and Maguires Creek, along Maguires Creek. *The Plan of Management for Teven Quarry* (Readymix, 2007) notes that historic flooding in the local area reached approximately

2.8 mAHD in a major flood event during 1985. To reduce flood risk at the quarry, a 2 metre high bund has been constructed around the eastern extent of the quarry, adjacent to the canefields (refer to **Figure 7.5**). The elevation of the flood bund is approximately 2 mAHD. As such the flood bund will provide some protection, however, the northern portion of the quarry site, that is the stockpile and infrastructure area, will flood during the 100 year flood event. As no changes are proposed to the stockpile or infrastructure area as part of the Project this flood risk will remain for the future quarry operations. Holcim Australia proposes to review the risk of flooding to the stockpile and infrastructure areas and determine if additional flood protection measures are required (refer to **Section 7.3.5**).

7.3.1.3 Downstream Users

The Project Area is located within the Richmond River catchment, and water use within this catchment is regulated under the *Water Sharing Plan (WSP) for the Richmond River Area Unregulated, Regulated and Alluvial Water Sources*, 2010. The WSP area is comprised of the Richmond River catchment and the coastal catchment of Evans Creek. The WSP covers 21 unregulated water sources and one regulated water source. Extractions from unregulated rivers in the Richmond River catchment range between 1 per cent to 20 per cent of the average annual flow, and cease to pump rules have been established to protect environmental flows.

7.3.2 Water Management System

7.3.2.1 Existing Water Management System

The approved Teven Quarry water management system is shown in **Figure 7.5**. Clean upstream catchment runoff is diverted away from the quarry and conveyed to the canefield drains which flow to Maguires Creek and Emigrant Creek. Runoff from disturbed areas within the quarry operations are managed within the water management system.

The Teven Quarry water management system has two dams/storages, the Main Dam and the Pit Dam (refer to **Figure 7.5**). Runoff within the quarry pit is managed in the primary siltation storage (Pit Dam), from which surplus water is pumped to the main silt retention storage (Main Dam) at the northern end of the quarry. The quarry water management system is designed to maximise sedimentation of pit runoff on site, prior to reuse on site or discharge via the licensed discharge point.

The Pit Dam is a sump storage at the base of the quarry pit and as such will change in location and volume as the quarry progresses. As the quarry extends from current pit extent to approved final pit extent, the Pit Dam will increase in storage volume from approximately 17.7 ML to approximately 23.5 ML.

During operations, the water collected in the Pit Dam is pumped to the Main Dam where water is reused for dust suppression and processing. The Main Dam has an estimated maximum storage volume of approximately 11.5 ML. Surplus water in the Main Dam is discharged via a 450 mm pipe to the canefield drain to the east of the site in accordance with conditions specified in EPL 3293 (refer to **Table 7.6** and **Figure 7.5**).

Runoff from the northern portion of the quarry site including the stockpile and infrastructure area, currently ponds at the low point of this area with runoff either seeping into the ground or flowing off site to the adjacent cane drain during high rainfall events. Holcim Australia will review the existing water management measures for the stockpile and infrastructure areas as part of the implementation of the Project (refer to **Section 7.3.5**).

7.3.2.2 Proposed Water Management System

As there will be no change to the approved quarry footprint or disturbance area, the approved water management system will be maintained for the Project. The proposed increase in peak production will result in an increase in processing water demands and dust suppression demands during periods of peak production, however no change to the existing water management infrastructure (e.g. dams, diversions) will be required to cater for the Project.

7.3.3 Water Balance

A water balance model was developed for three scenarios:

- approved current operations;
- approved final operations; and
- proposed future operations based on the increased peak production level of 500,000 tpa.

The water balance model used was a daily timestep model that used Bureau of Meteorology (BOM) rainfall from Meerschaumvale (station 58135) from 1968 to 2013, and average monthly evaporation data from Alstonville (station 058131) from 1963 to 2011. The Meerschaumvale station was selected for rainfall data as the location of this rainfall station indicates that it will most likely experience similar orographic rainfall effects as Teven Quarry due to the lifting of moist air over the escarpment, while the Alstonville gauge is situated further inland on the plateau. The closest BOM station that records evaporation is located at Alstonville and is considered suitable to represent the evaporation at Teven Quarry.

The runoff rates used in the water balance model were calculated using the historical rainfall and evaporation data referenced above. The runoff model was calibrated to an average annual runoff rate of 1.40 ML/ha/year. This rate is consistent with the average regional runoff rate published in the harvestable rights farm dams calculator by the NSW Office of Water (NOW). The Hydrogeological Assessment (RPS, 2014) prepared for the Project (refer to **Appendix 4**), indicates that Teven Quarry does not intersect the groundwater table and as such no groundwater inflows were included in the water balance (refer to **Section 7.4**).

The results of the water balance modelling for the approved current and approved final quarry operations, and the proposed operations are provided in **Table 7.8** and **Table 7.9**. **Table 7.8** summarises the average modelled annual quarry inflows, demands and losses. The water balance shown in **Table 7.9** indicates that Teven Quarry is a water surplus site, and that the proposed operations will reduce the site water surplus in comparison to the approved final quarry. The reduction in surplus water for the proposed operations is due to an increase in processing demand and dust suppression on site. The average annual evaporation from site storages for the proposed operations is less than evaporation from storages for the approved final quarry as higher site demands for the proposed operations result in a reduction of volume of water stored on site and associated evaporation.

Table 7.9 summarises the modelled annual volume and frequency of discharges via the existing licensed discharge point. An interpretation of these results is included in the following sections.

**Table 7.8 - Teven Quarry Water Balance Model Summary
(Average Annual Results)**

	Approved Current (ML/year)	Approved Final (ML/year)	Proposed Operations (ML/year)
Inflows			
Rainfall/runoff	51.0	84.7	84.7
Groundwater	0.0	0.0	0.0
Total Inflow	51.0	84.7	84.7
Demands/Losses			
Evaporation	5.4	18.7	17.8
Dust suppression	0.6	0.6	1.1
Processing Demand	10.4	10.4	19.7
Total Demands/Losses	16.4	29.7	38.6
Water Balance	34.6	55.0	46.1

Table 7.9 - Teven Quarry Licensed Discharge Point Volume and Frequency

Parameter	Approved Current	Approved Final	Proposed Operations
Volume			
10 th percentile (ML/year)	13.4	23.0	15.9
50 th percentile (ML/year)	31.1	50.0	42.5
90 th percentile (ML/year)	59.9	95.4	84.1
Frequency			
10 th percentile (days/year)	22 days (6%)	39 days (11%)	22 days (6%)
50 th percentile (days/year)	41 days (11%)	64 days (17%)	42 days (12%)
90 th percentile (days/year)	67 days (18%)	97 days (27%)	71 days (19%)

Summary of Approved Quarry Water Balance

As shown in **Table 7.8**, modelling indicates that water demands for the approved current and approved final quarry operations, and the proposed operations at the approved annual production limits can be met by capture of runoff from disturbed areas within the quarry water management system. Modelling indicates that the site has a water surplus.

Modelling indicates that the current quarry water management system manages approximately 51 ML/year of rainfall/runoff from disturbed areas (average year). As the quarry extends from the current water management system area of 10 hectares to the approved final water management system area of 16 hectares, the quarry water management system will capture approximately 84.7 ML/year of rainfall/runoff from disturbed areas (average year).

Modelling indicates that approximately 31.1 ML/year of water is currently discharged from Teven Quarry via the licensed discharge point, with discharges occurring in the order of 41 days/year (50th percentile year). As the quarry progresses, the discharge volume and frequency will typically increase with modelling indicating that once the approved final quarry footprint is reached, the quarry will discharge approximately 50.0 ML/year with discharges occurring in the order of 64 days/year (50th percentile year).

Water Balance with Proposed Project

The Project will not change the catchment area of the water management system, or the operation of the quarry water management system, nor will the Project increase the depth of the quarry.

The proposed increase in peak production will increase the on-site water demands for production and dust suppression. The increases in on-site demands will reduce the typical volume and frequency of water discharged from site via the licensed discharge point (refer to **Table 7.8**) in comparison to the currently approved operations. The modelling also indicates that with the proposed increase in production, the maximum daily discharge rates from the quarry will not increase in comparison to the approved final operations.

7.3.4 Surface Water Impact Assessment

The Project will not result in any changes to the quarry water management system or associated water management measures. The only potential changes in surface water impacts as a result of the Project are associated with the change in water demands.

Water balance modelling indicates that the proposed increase in peak production and associated increase in peak water demands will reduce the 50th percentile discharge volumes by approximately 15% and reduce the frequency of site discharge by approximately 34% compared to the approved quarry. As the final approved water management system equates to approximately 0.1% of the Emigrant Creek catchment area and less than 0.003% of the Richmond River catchment area, it is considered that the modelled reduction in site discharge volumes and frequency with the Project will have a negligible impact on annual flow volumes and flooding in Maguires Creek, Emigrant Creek and the Richmond River.

To manage potential water quality impacts on downstream watercourses and users throughout the life of the quarry, it is proposed to maintain the approved water management system for the quarry. The Project is considered to have negligible potential impacts on water quality on downstream watercourses. Based on the assessments above regarding annual flow volumes, flooding and water quality, the Project is considered to have negligible potential impacts on downstream water users.

7.3.5 Surface Water Monitoring, Management, Licensing and Reporting

As discussed in **Section 7.3.1.1**, the Teven Quarry EPL 3293 requires water quality monitoring to be undertaken at the licensed discharge point shown on **Figure 7.5** for the parameters identified in **Table 7.6**. No changes to the existing Teven Quarry EPL discharge limits or licensed discharge point are proposed as part of the Project, with surface water monitoring to continue in accordance with the requirements of the EPL.

Clean water runoff from upslope catchment areas is diverted around the quarry, and this will continue with the Project. Dirty water runoff within the disturbed area (i.e. the water management system area) will continue to be managed within the quarry water management system. Dirty water within the water management system will continue to be reused on site for dust suppression and processing with surplus water discharged off site via the licensed discharge point in accordance with EPL 3293.

Holcim Australia will review the risk of flooding to the stockpile and infrastructure areas and determine if additional flood protection measures are required. If this review indicates that further flood protection measures are required (eg. upgrading of the existing flood protection bund), a separate approval for these works will be sought.

Holcim Australia will also review the existing water management measures for the stockpile and infrastructure areas as part of the implementation of the Project. This review will identify the need for further controls to more effectively manage surface water runoff in this area. This review will be completed considering the requirements of the Blue Book (Managing Urban Stormwater: Volumes 1 and 2, Landcom 2004 and DECC 2008).

Surface water within the catchment area of the Richmond River is currently managed under the *Water Sharing Plan for the Richmond River Area Unregulated, Regulated and Alluvial Water Sources*, 2010. As such, surface water within the catchment is managed under the *Water Management Act 2000*. The WMS captures water for pollution control purposes, with some of this water reused and the remainder treated and discharged in accordance with the EPL. Holcim Australia does not hold any water access licences under the *Water Management Act 2000* for Teven Quarry.

Teven Quarry will continue to report on site performance regarding water discharges in the annual review and EPL annual returns.

7.4 Groundwater

Teven Quarry has been in operation since the 1940s and the quarry pit has been extracted to its maximum depth of 4mAHD. To date, Holcim Australia has not observed groundwater inflows to the Teven Quarry pit indicating that extraction has not extended below the local groundwater table. In order to assess the potential impacts of the Project on local groundwater resources, users and groundwater dependent ecosystems in accordance with the DGRs for the Project, a hydrogeological assessment was completed for the Project by RPS and is included as **Appendix 4**. The assessment included a desktop review of available information, development of a preliminary conceptual site model and site investigations to confirm the understanding of the site and collection of groundwater data. A summary of the findings of the assessment are provided in the following sections.

Teven Quarry extracts hard rock from a Tertiary basalt formation located adjacent to a low-lying alluvial floodplain consisting of Quaternary sediments associated with the Richmond River. There are two identified groundwater aquifers within the vicinity of the quarry:

- a fractured rock aquifer of low hydraulic conductivity (typically 10^{-5} to 10^{-11} m/s), associated with the basalt formation; and
- a shallow unconfined aquifer in the alluvial sediments to the east of the quarry, associated with the alluvial floodplain.

Groundwater within the fracture rock aquifer can be categorised into two systems:

- a shallow local-scale unconfined groundwater system within the weathered basalt, which is typically low yielding and ephemeral; and
- a deeper intermediate-scale semi-confined or confined groundwater system within the interlayered and fractured horizons of the basaltic sequence.

Visual inspection of the quarry pit walls by a hydrogeologist did not find any evidence of groundwater inflows to the pit. On this basis, groundwater levels within the weathered basalt are estimated to range from 0 to 3mAHD, as the quarry has been extracted to its maximum depth of 4mAHD. The groundwater level in the alluvial sediments of the flood plain to the east of the quarry is estimated to be approximately 0mAHD, based on the observed water level in the various cane drains in the area.

Water quality data was analysed from on-site sources including the main and pit dams and surface water runoff, and from offsite sources including the adjacent cane drain and two registered bores to the west of the quarry. The results of water quality monitoring indicate that water quality within the Teven Quarry main dam and pit dam reflects surface water runoff as the primary/only water source.

No groundwater dependent ecosystems have been identified within the immediate area of Teven Quarry. The nearest groundwater dependent ecosystem identified is the floodplain wetlands associated with Maguires Creek.

7.4.1 Groundwater Impacts

The results of the hydrogeological assessment indicate that the local and regional groundwater table is located below the current and proposed elevation of the Teven Quarry pit floor. The quarry has been extracted to its maximum depth of 4mAHD without any evidence of groundwater inflows. For this reason, the assessment concludes that the Project will have a negligible impact on groundwater levels, groundwater quality, groundwater receptors, groundwater dependent ecosystems and groundwater users in the local area.

7.4.2 Groundwater Monitoring, Licensing and Reporting

Analysis indicates that extraction will not intersect the regional water table. Ongoing surface water monitoring will serve to notify of potential changes to groundwater via changes to quality or unforeseen discharges into the pit (interference with groundwater flow). If groundwater interception is suspected based on observation of sustained inflow, a hydrological investigation will be completed in consultation with NOW and DP&E.

The Project is located within a groundwater area currently administered by the *Water Act 1912* as there is no water sharing plan in place for the area. Holcim Australia does not hold any active groundwater licences for the existing operations. As the Project is not predicted to intersect the local groundwater table, operational dewatering is not required and groundwater is not required to supply water to the quarry, the groundwater assessment found that Holcim Australia does not require a licence under the Water Act for groundwater abstraction. The Project will not impact on existing groundwater user entitlements, licensed water users or other groundwater users.

The Project will not impact on groundwater dependent or riparian ecology as the Project is not predicted to intersect the local groundwater table. No groundwater dependent ecosystems have been identified that have the potential to be impacted by the Project.

As discussed in **Section 5.3.6**, the Project has been assessed under the NSW Aquifer Interference Policy and found to not be deemed an aquifer interference activity as the quarry does not intersect the saturated water table. An Aquifer Interference Approval is therefore not required for the Project.

7.5 Noise and Vibration

Teven Quarry entered into a noise reduction program in consultation with the EPA in 2007, resulting in a noise goal for one nearby residence (residence 9) being included in the Quarry's EPL. As part of the noise reduction program, Teven Quarry implemented a range of noise control measures and technologies including:

- enclosure of the primary crusher and screens, including partial enclosure around the primary dump hopper;

- enclosure of secondary crusher and screens;
- installation of rubber lining to the primary feed bin;
- upgrade of noise attenuation of haul truck exhaust systems; and
- installation of a new primary crusher with enhanced noise attenuation.

Following implementation of these noise control measures and the resultant reduction in noise emissions, Teven Quarry has not been the subject of ongoing noise complaints from surrounding residents. The noise limits imposed in the EPL (limit of 46dB(A) at residence 9 which is now the subject of a purchase agreement with Holcim) is, however, not consistent with contemporary noise goals for similar projects. A comprehensive noise impact assessment has therefore been undertaken for the Project by Umwelt to assess the noise impacts of the quarry in accordance with contemporary standards and identify the need for any further noise controls to be implemented. A summary of the key findings of the assessment is included below, with the full assessment report included as **Appendix 5**.

The noise impact assessment was undertaken in accordance with the *NSW Industrial Noise Policy* (EPA 2000) (INP) and relevant EPA guidance notes, *NSW Road Noise Policy* (DECCW 2011) and *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and ground Vibration* (ANZECC 1990). The assessment considered potential noise impacts from the construction and operational phases of the Project as well as traffic noise and blasting impacts.

7.5.1 Existing Noise Environment

The existing background noise levels for the Project Area and surrounds were established using three continuous noise loggers over a period of 18 days. The loggers were placed at three locations considered to be representative of the residential receivers surrounding the Project Area. The background noise monitoring locations are shown on **Figure 7.6** as are the locations of the nearest potentially affected residential receivers.

The results of the background noise monitoring program have been used to determine the rating background level (RBLs) and mean LAeq, period (where 'period' equals day, evening or night) noise levels in the region surrounding the Project Area. The background noise levels are provided in **Table 7.10**.

Table 7.10 – Background Noise Monitoring Results, RBL and Mean LAeq, period, dB(A)

Monitoring Location	Time Period	RBL ¹	Mean LAeq, period
N1 – 217 Leadbeatters Lane, Teven	Day	31.8	45.5
	Evening	30.5	36.2
	Night	30.0 (28.5)	36.2
N2 – 433 Teven Road, Teven	Day	32.5	55.8
	Evening	30.0	47.7
	Night	30.0 (27.9)	42.8
N3 – 168 Wellers Road, Teven	Day	36.0	41.3
	Evening	38.0	44.0
	Night	37.3	40.4

Note 1: Where the RBL is less than 30 dB(A) the RBL is set at 30 dB(A). The values in the parentheses are the actual RBL determined from the monitoring data.

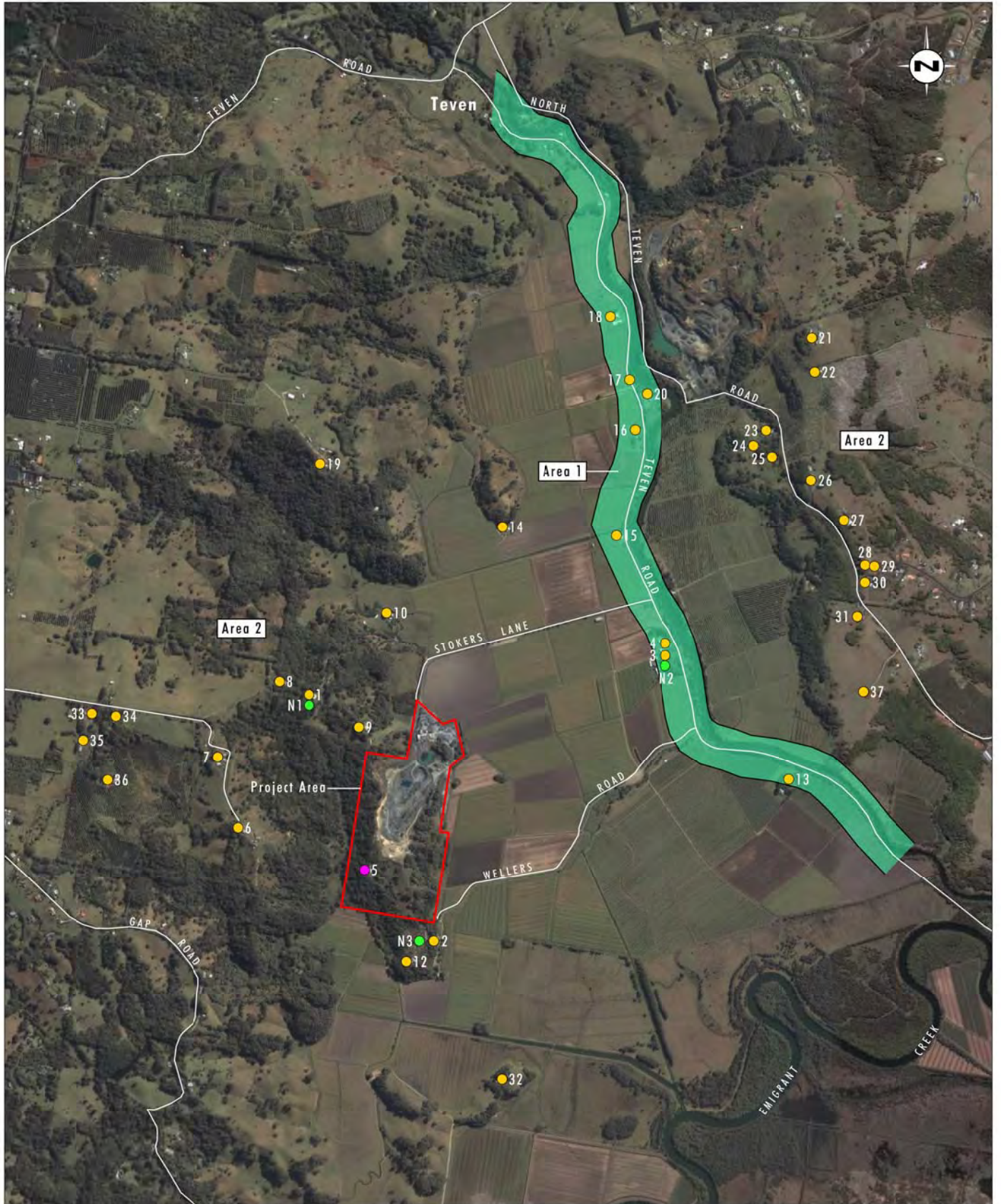


Image Source: Google Earth (2014)
 Data Source: Holcim (2014)

0 0.25 0.5 1.0 km
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Legend

- Project Area
- Residential Receiver Location
- Subject to Commercial Agreement Receiver Location
- Noise Monitoring Location

FIGURE 7.6

**Sensitive Receivers and
 Noise Monitoring Locations**

The existing noise environment at N1 - 217 Leadbeatters Lane shows little to no influence from road traffic noise or from the existing Teven Quarry operations. The existing noise environment at N2 - 433 Teven Road is influenced by road traffic noise from Teven Road. The existing noise environment at N3 - 168 Wellers Road shows the influence of local noise sources specifically insects (cicadas) and frogs. During the monitoring program the contribution from other sources of industrial noise was estimated to be more than 10 dB below the mean LAeq and would therefore not contribute to the existing cumulative industrial noise levels.

7.5.2 Noise Assessment Criteria

7.5.2.1 Project Specific Noise Levels

The INP establishes two separate noise criteria when assessing noise from industrial sources, one to account for intrusive noise from a proposed development and the other to protect the amenity of particular land uses that considers all noise sources (i.e. cumulative noise levels). The intrusive and amenity criteria are derived separately and the more stringent of the two sets the project-specific noise levels (PSNLs) for a project.

In accordance with Section 10 of the INP, the PSNLs provide the initial target levels for existing industrial premises to drive a process of assessing feasible and reasonable control measures. This process ultimately leads to the establishment of achievable noise limits.

The PSNLs were calculated for the Project using the methodology established in the INP and are summarised in **Table 7.10**.

Table 7.10 – Project Specific Noise Levels (dBA)

Monitoring Location	Time Period	Intrusiveness Criteria LAeq, 15 minute	Amenity Criteria LAeq, period	PSNL
N1 – 217 Leadbeatters Lane, Teven	Day	37	50	37 LAeq,15min
	Evening	36	45	36 LAeq,15min
	Night	35	40	35 LAeq,15min
N2 – 433 Teven Road, Teven	Day	38	50	38 LAeq,15min
	Evening	35	45	35 LAeq,15min
	Night	35	40	35 LAeq,15min
N3 – 168 Wellers Road, Teven	Day	41	50	41 LAeq,15min
	Evening	41	45	41 LAeq,15min
	Night	41	40	41 LAeq,15min 40 LAeq, night

Thirty four residences in the region surrounding the Project Area have been grouped into localities or areas that have similar representative background noise levels. These areas have been defined giving consideration to the relative location of other noise sources (such as industrial and road traffic noise sources). Attended monitoring undertaken at monitoring location N3 indicated the influence of existing operations from Teven Quarry with the RBLs ranging from 36 to 38 dB(A) depending on the time of day. In accordance with Section 3 of the INP (EPA 2000), the noise impacts from Teven Quarry have been excluded from the final PSNLs by utilising the more conservative PSNLs from background noise monitoring location N1. The defined areas are presented in **Figure 7.6** and form two distinct areas:

- Area 1 consists of rural residential receivers located in the proximity of Teven Road. The background noise level at these residences is likely to be influenced by existing levels of road traffic noise on Teven Road.
- Area 2 which comprises all other rural residential receivers in the vicinity of the Project.

The PSNLs determined for each defined area in the region surrounding the Project Area are presented in **Table 7.11**.

Table 7.11– Residential Receiver PSNL, dB(A)

Receiver Description	Time Period	PSNL ¹
Area 1 – Residences located in proximity of Teven Road	Day	38 LAeq,15min
	Evening	35 LAeq,15min
	Night	35 LAeq,15min
Area 2 – All other residential receivers	Day	37 LAeq,15min
	Evening	36 LAeq,15min
	Night	35 LAeq,15min

Note 1: The most conservative of the alternatives available has been used to set the PSNL

7.5.2.2 Sleep Disturbance Criteria

The INP Application Notes state that the sleep disturbance criteria is normally assessable for the night time period only (10.00 pm to 7.00 am). As the Project does not seek to operate from 10.00 pm to 7.00 am, sleep disturbance criteria are not applicable.

7.5.2.3 Construction Noise Criteria

Construction activities associated with the upgrade and modifications to the quarry infrastructure area to accommodate the additional mobile plant would not generate noise exceeding the general activities considered in the operational noise assessment. An assessment of construction noise levels is therefore not required.

7.5.2.4 Road Traffic Noise Criteria

The Project will generate additional traffic on the roads accessing the site and therefore consideration of road noise impacts is required. The NSW Road Noise Policy (RNP) (DECCW 2011) sets noise criteria applicable to different road classifications and developments. The relevant road traffic noise criteria for the Project are outlined in **Table 7.12**.

Table 7.12 – Road Noise Criteria, dB(A)

Road Category	Type of Project/Land Use	Assessment Criteria dB(A)	
		Day (7.00 am – 10.00 pm)	Night (10.00 pm – 7.00 am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq, 15 hour 60 (external)	LAeq, 9 hour 55 (external)
Local Roads	Existing residences affected by noise by additional traffic on existing local roads generated by land use developments	LAeq, 1 hour 55 (external)	LAeq, 1 hour 50 (external)

Source: NSW Road Noise Policy (DECCW 2011)

Where the criteria in **Table 7.12** are not achievable through feasible and reasonable mitigation measures, the RNP gives further guidance stating: 'any increase in the total traffic noise level should be limited to 2dB. Holcim will manage operations at Teven Quarry to comply with these noise limits.

7.5.3 Blasting Emissions Criteria

The EPA has established guidelines for blasting based on the impacts on human comfort levels. These guidelines are adapted from the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC 1990) and applied as a comfort based criteria for residential receivers. The criteria are presented in **Table 7.13**.

Table 7.13 – Blasting Emissions Criteria for Residential Receivers

Blasting Impact	Recommended 95th Percentile Maximum Level ¹	Maximum Level
Airblast (dB Linear Peak) ¹	115	120
Ground Vibration (mm/s)	5	10

Source: Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC 1990).

Note 1: This level may be exceeded on up to 5 per cent of the total annual number of blasts.

No heritage sites are located within proximity to the Project, therefore no specific heritage building blasting criteria are required.

7.5.4 Noise Impact Assessment

The computer-based modelling software package Environmental Noise Model (ENM) was used to predict the noise levels likely to be produced by the Project within the surrounding environment. ENM is recognised and accepted by the EPA as a computer modelling program suited to predicting noise impacts from industrial noise sources.

The noise impact assessment is based on the noise levels predicted by the ENM model of the proposed operations for the Project and provides an assessment of the predicted noise levels against the PSNLs. In accordance with the DGRs an assessment of noise mitigation and management measures was also undertaken.

7.5.4.1 Mitigation Measures included in Noise Modelling

Extensive consideration was given to project alternatives during the iterative Project design and assessment process to minimise noise impacts. Of the measures considered, the options found to be reasonable and feasible were included in the noise modelling. These control measures included:

- the maintenance of product stockpiles in strategic locations, where practicable, along the northern edge of the Project site shielding product trucks and product loading equipment;
- the use of broad band reversing alarms instead of beeper style alarms on all mobile equipment; and
- the management of mobile machines during adverse weather conditions when wind conditions or inversion conditions enhance the noise propagation towards sensitive receiver locations. In order to control/eliminate noise impacts this would likely include:
 - ensuring the sales loader operates behind the product stockpile during adverse weather conditions in the evening period;
 - moving quarrying activities to locations deeper in the quarry pit during adverse weather conditions; and
 - shut down of some equipment during adverse weather conditions if required.

7.5.4.2 Predicted Operational Noise Levels

Two operational scenarios for Year 1 and Year 11 of the conceptual operations were modelled for the purpose of assessing the potential noise impacts of different operational stages. These scenarios were selected as they were considered to represent the range of worst case noise generating operations at the site, with equipment in both scenarios operating at high elevations in the quarry pit. Both scenarios assumed maximum production levels of 500,000 tpa.

Modelling results indicate that under worst case operational and meteorological conditions (modelled at per INP requirements), and with the implementation of the noise management measures outlined above, the Project is not predicted to exceed the PSNLs at any privately owned residences surrounding the Project Area, with the exception of Receiver 9 which is currently being purchased by Holcim Australia as discussed below.

Excluding Receiver 9, during the day-time period, the maximum predicted noise levels are at Receiver 3 (PSNL of 38 dB(A)), where the predicted noise level is 37 dB(A). The modelled scenario involves the maximum simultaneous operation of all noise generating equipment on the Project site, including the mobile crushing plant and pug mill which are proposed to be operated on a campaign basis only during periods of maximum production for the Project.

Excluding Receiver 9, during the evening period, the maximum predicted noise levels are at Receivers 3 (PSNL of 35 dB(A)) and Receiver 4 (PSNL of 35 dB(A)), where the predicted noise level is 35 dB(A) during Autumn evenings when the wind is from the WSW at 3m/s. As evening loading operations are proposed only on a campaign basis, the potential for this scenario to occur is reduced.

Holcim Australia is currently negotiating a purchase agreement with the owners of Receiver 9. The maximum predicted day time operational noise levels at Receiver 9 (PSNL of 37 dB(A)) is 45 dB(A).

7.5.4.3 Cumulative Noise Impact Assessment

The Project is located in an area generally consisting of rural and rural residential developments. Potential sources of industrial noise within the vicinity of the Project include:

- Boral Teven Quarry located on North Teven Road 2.5 kilometres to the north east; and
- Tuckombil Quarry located on Gap Road Alstonville 3.2 kilometres to the west.

However, it is unlikely that these sources of industrial noise will cumulatively add to noise emissions from the Project due to the combined effects of:

- the relative locations of the sensitive receivers to the Project and the cumulative noise sources in the surrounding region; and
- the relative direction of significant meteorology for the area that is unlikely to enhance the propagation of noise from more than one operation at a time.

Due to the above reasons, it is unlikely that the cumulative noise impact assessment criteria will be exceeded due to the Project and noise contribution from the relevant surrounding industrial operations. This was confirmed by attended noise monitoring, undertaken as part of the NIA at the nearest sensitive receivers. During the noise monitoring program no other sources of industrial noise were identified at the monitoring locations.

7.5.4.4 Road Traffic Noise Assessment

The predicted existing and Project related road traffic noise impacts for Receivers 4, 15, 16 and 17 are above the relevant road traffic noise criteria and therefore the relative increase criteria of 2 dB needs to be considered. The criteria are predicted to be met for all other locations.

Road traffic noise levels associated with Receivers 15, 16 and 17, however, are predicted to decrease due to the Project (due to the rerouting of haulage traffic to the south) compared to the existing approved scenario, while the predicted relative increase in road traffic noise levels at Receiver 4 are considered negligible at 1.2 dB. It is noted that existing traffic noise levels off Teven Road are above the predicted noise level contributed by the Project

7.5.5 Blasting Impact Assessment

In relation to historical blast impacts at Teven Quarry, monitoring of airblast and ground vibration has been carried out at Receiver 9 with a number of minor exceedances identified. The purchase of Receiver 9 is currently being negotiated, it is expected that the purchase agreement will be in place prior any change in existing operations at the site. Teven Quarry has otherwise complied with the relevant blasting limits.

With regard to the impacts of future blasting at Teven Quarry as part of the Project, Umwelt has undertaken an assessment of the vibration and airblast impacts of blasting on sensitive residential receivers surrounding the quarry. The results indicate that the Project can comply with relevant vibration and airblast criteria at all sensitive residential receivers through ongoing management of blast design and size.

In accordance with Teven Quarry's existing practice, the permissible maximum instantaneous charge (MIC) for each blast will be calculated based on the specific location in which it will occur and on the blasting site law. Holcim Australia will design all blasts to comply with ground vibration and air blast criteria.

The blasting site law will be updated using site-specific blast monitoring data on an ongoing basis. This process will provide Teven Quarry with flexibility to design blasts to best meet production requirements while complying with relevant criteria for residential receivers.

7.5.6 Noise Monitoring and Management

Holcim Australia will prepare and implement a Noise Management Plan for the Project as part of the overall Project Environmental Management Plan. The Noise Management Plan will:

- outline the noise management measures to be implemented on the site;
- identify staff training requirements;
- detail noise monitoring processes;
- identify noise related complaints handling processes; and
- identify roles and responsibilities relating to noise.

As discussed in **Section 7.5.4**, a range of structural and operational noise measures are proposed to be implemented as part of the Project to minimise the noise impacts. These include:

- the maintenance of product stockpiles in strategic locations, where practicable, along the northern edge of the Project site shielding product trucks and product loading equipment;
- the use of broad band reversing alarms instead of beeper style alarms on all mobile equipment; and
- the management of mobile machines during adverse weather conditions when wind conditions or inversion conditions enhance the noise propagation towards sensitive receiver locations. In order to control/eliminate noise impacts this would likely include:
 - ensuring the sales loader operates behind the product stockpile during adverse weather conditions in the evening period;
 - moving quarrying activities to locations deeper in the quarry pit during adverse weather conditions;
- shut down of some equipment during adverse weather conditions if required;
- regular inspection and maintenance of noise attenuation systems; and
- implementation of a process for periodic review of noise performance of equipment. This process will be outlined in a Noise Management Plan to be prepared for the Project.

7.5.6.1 Noise Monitoring

Teven Quarry will undertake a noise monitoring program on an annual basis comprising of day time operations and if/when undertaken, evening operations. Noise monitoring will be undertaken as outlined in the Noise Management Plan prepared for the Project, with the initial form of the monitoring program outlined below.

Noise monitoring locations will be developed based on suitability and available land access, however, would ideally assess noise impacts at Receiver 14 and a selected other nearest sensitive receivers (for example, Receivers 2, 3/4 or 10 depending on the prevailing meteorological conditions at the time of monitoring). The monitoring program will include:

- attended noise monitoring to measure ambient noise levels in the surrounding region and determination of the quarry's contribution to measured noise levels;
- comparison of the attended noise monitoring results with relevant limits and predicted noise levels from the Project under similar meteorological conditions; and
- assessment of performance of noise control measures and recommendations for additional measures if required.

Blast monitoring will continue to be undertaken for each blasting event, as well as recording the precise location of each blast, to allow for further refinement of the ground vibration site law.

A summary of the noise monitoring and blasting monitoring results will be reported in the Annual Review for the Project.

7.6 Air Quality

A comprehensive Air Quality Impact Assessment has been undertaken for the Project by Jacobs SKM and is presented in **Appendix 6**. The assessment utilises air dispersion modelling to predict air quality impacts of the Project compared to those of the existing operations. Model predictions have been compared to relevant air quality criteria in order to assess the effect of the Project on the existing air quality environment. A summary of the key findings of the assessment is provided in the following sections.

7.6.1 Existing Air Quality Environment

The Project Area is surrounded by predominantly rural land uses, with no other major industrial sources likely to contribute to local concentrations of air pollutants in the environment surrounding the quarry. Existing air quality is therefore likely to be influenced by agricultural activities, sea salt, pollens, traffic on local roads, dust storms and bush fires.

While Teven Quarry undertakes monthly monitoring of deposited dust levels at four sites within and surrounding the quarry, there are no known air quality monitoring stations located in the Ballina region which could be used to quantify existing particulate concentrations levels. A review of the OEH air quality monitoring network across NSW identified that the closest station to Teven Quarry is at Tamworth, over 300 kilometres to the southwest, which is not considered representative of conditions in the Ballina region. A review of data from other OEH sites in similar, semi-rural, coastal environments identified the OEH site at Bargo as the most likely to be the representative of conditions near Ballina.

The air quality data from the Bargo OEH monitoring site outlined in **Table 7.14** has been adopted as background levels applying to sensitive receptors around Teven Quarry. These levels are likely to be conservative estimates of the Teven area since the Bargo monitoring site is in a more densely populated area and near the Hume Highway.

Table 7.14 – OEH Air Quality Statistics - Bargo 2004 – 2013

Pollutant/averaging time	Adopted Background Concentration
PM ₁₀ / 95 th percentile 24-hour average	26 µg/m ³
PM ₁₀ / Annual Average	14 µg/m ³

µg/m³ = micrograms per cubic metre

7.6.2 Air Quality Assessment Criteria

The EPA air quality assessment criteria relevant to the Project are provided in **Table 7.15**.

Table 7.15 – EPA Assessment Criteria for Particulate Matter

Pollutant	Averaging time	Criterion	Application
Total Suspended Particulates (TSP)	Annual average	90 µg/m ³	Cumulative
PM ₁₀	Annual average	30 µg/m ³	Cumulative
	Maximum 24-hour average	50 µg/m ³	Cumulative
Deposited dust	Annual average (maximum increase)	2 g/m ² /month	Cumulative
	Annual average (maximum total)	4 g/m ² /month	Cumulative

µg/m³ = micrograms per cubic metre

7.6.3 Assessment Methodology

The air quality assessment was undertaken in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2007). The assessment used the computer-based dispersion model CALPUFF to predict off-site dust concentration and dust deposition levels due to the Project.

Background air quality and meteorology data collated for the site were used in conjunction with a comprehensive emissions inventory developed for the Project to model potential air quality impacts of the Project. The model was run under three operating scenarios:

- scenario 1 representing existing approved operations - based on existing operations assuming a maximum production level of 265,000 tpa;
- scenario 2 representing the proposed Project in Year 1 (indicative) assuming a maximum production rate of 500,000 tpa (refer to **Figure 3.3**).
- scenario 3 representing the proposed Project in Year 11 (indicative) assuming a maximum production rate of 500,000 tpa (refer to **Figure 3.4**).

7.6.4 Air Quality Impact Assessment

The results of the predictive air quality modelling have identified that the change in air quality impacts due to the Project when compared to existing approved operations is predicted to be negligible, with the results for all scenarios predicted to be very similar. **Figure 7.7** shows the predicted dust concentrations resulting from the Project. Dust prediction contours for all scenarios modelled are provided in **Appendix 6**.

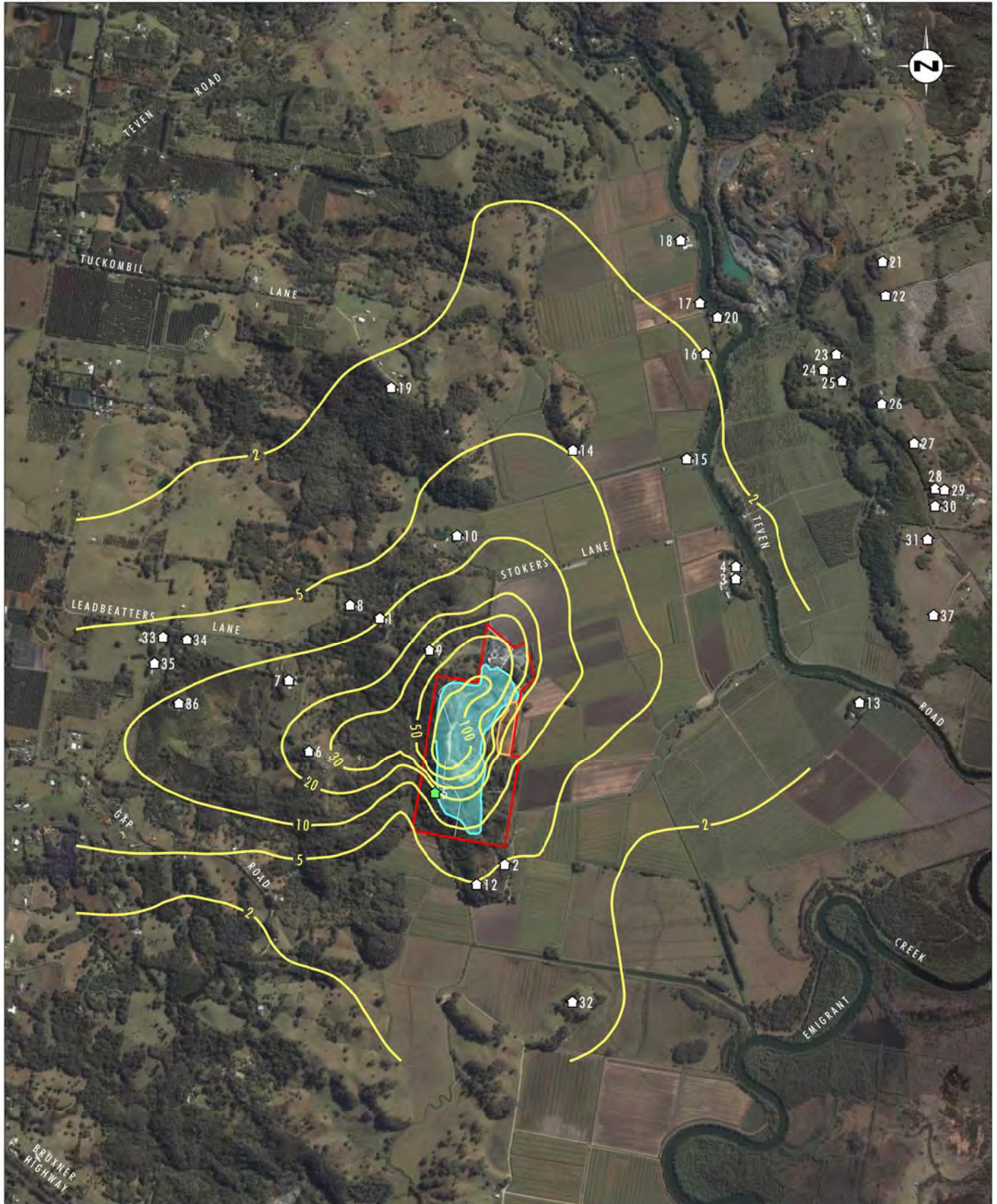


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014)

0 0.25 0.5 1.0 km
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Legend

- Project Area
- Extraction Limit Boundary
- Stockpile Area
- Private Residence
- Private Residence with Holcim Australia Agreement
- Dust Concentration Contours (PM₁₀)

File Name (A4): R01/3230_046.dgn
 20140909 11.31

FIGURE 7.7

Predicted Worst Case 24 Hour
 PM₁₀ Dust Concentration Contours

The Project is predicted to comply with the relevant air quality criteria at all nearby sensitive receiver locations under worst case operating conditions, with the exception of 24-hour average PM₁₀ concentrations at two nearby sensitive receiver locations - Receiver 9 and Receiver 6 (refer to **Figure 2.1**). Predictions suggest that 24-hour average PM₁₀ levels may exceed the criteria of 50µg/m³ up to one day per year at these two receivers by between 1 and 7µg/m³. This exceedance is due to the combined effect of Teven Quarry activities and maximum background levels. As noted in **Section 2.5**, the purchase of Receiver 9 is currently being negotiated, the purchase agreement will be finalised prior to any change in the existing operations. Based on this agreement, it is considered that the air quality criteria will not apply at Receiver 9 once the agreement is finalised.

It is noted that a conservative approach was adopted for the assessment of 24-hour average PM₁₀ concentrations whereby maximum predictions were added to 95th percentile background levels. If, on any day, the background levels were average rather than at maximum levels, then no property would be predicted to experience 24-hour average PM₁₀ concentrations above the criteria.

The results of the assessment are summarised in **Table 7.16** and are further detailed in **Appendix 6**.

Table 7.16 – Summary of Worst Case Air Quality Impact Assessment Findings

Pollutant	Average Period	Predicted Worst Case Concentration at Most Affected Sensitive Receiver – Existing Operations (Scenario 1 - existing)	Predicted Worst Case Concentration at Most Affected Sensitive Receiver – Proposed Project (Scenarios 2 and 3 - project)	Goal
TSP	Annual	39.1 µg/m ³	41.1 µg/m ³	90 µg/m ³
PM ₁₀	24-hour	55 µg/m ³	57 µg/m³	50 µg/m ³
	Annual	16.4 µg/m ³	17.3 µg/m ³	30 µg/m ³
Dust deposition	Annual	2.6 g/m ² /month	2.9 g/m ² /month	4 g/m ² /month

7.6.5 Air Quality Management and Monitoring

The dust control measures available for quarry operations are generally a combination of engineering controls, operational controls, and planning controls.

The current dust control measures implemented onsite will continue to be implemented as part of the Project. These controls include:

- watering of unsealed roads, working areas and stockpiles;
- water sprays on conveyors;
- dust suppression systems on drill rigs;
- primary and secondary crushing plants are enclosed;
- water sprays on the entrance to the primary crusher bin;
- water sprays on product stockpiles;

- wheel wash at weighbridge; and
- progressive rehabilitation of overburden emplacement areas.

In addition to the above existing controls, Holcim will implement the following controls as part of the Project:

- installation of sprinklers along haul roads to work in combination with water carts or equivalent measures to achieve the same level of dust control;
- water sprays on the mobile crushing and screening plant;
- defining all roads and limiting access to minor and non-designated access alignments roads;
- imposition of speed limits on all internal roads;
- disturbance of the minimum area practicable for quarry operations;
- designing of blasts to minimise dust, including adequate stemming;
- consideration of current weather conditions prior to blasting. This includes visual observations of wind speed and wind direction to determine whether any dust emissions from the blast will be carried in the direction of nearest sensitive receptors;
- implementation of blast fume management procedures; and
- awareness training regarding air quality management for employees and contractors, where relevant.

7.6.6 Air Quality Monitoring

Holcim Australia will continue to monitor deposition dust in the area surrounding the quarry. In addition, consistent with the recommendations of the air quality assessment, Holcim Australia also proposes to install and operate a real-time meteorological station to enable identification of adverse meteorological conditions (such as strong winds blowing towards sensitive receptors) that may result in adverse short-term dust impacts.

The meteorological station will collect as a minimum, hourly (or finer resolution) wind speed and wind direction data, with monitoring to be carried out with consideration of the *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC 2007).

7.7 Traffic and Transport

An assessment of the potential impacts of the Project on the capacity, efficiency and safety of the local road network has been completed by Transport and Urban Planning. A copy of the assessment is included as **Appendix 7** and a summary of the key findings is provided below.

7.7.1 Existing Traffic Conditions

The principal road network and transport routes that services Teven Quarry are shown on **Figure 7.8** and include:

- Stokers Lane;

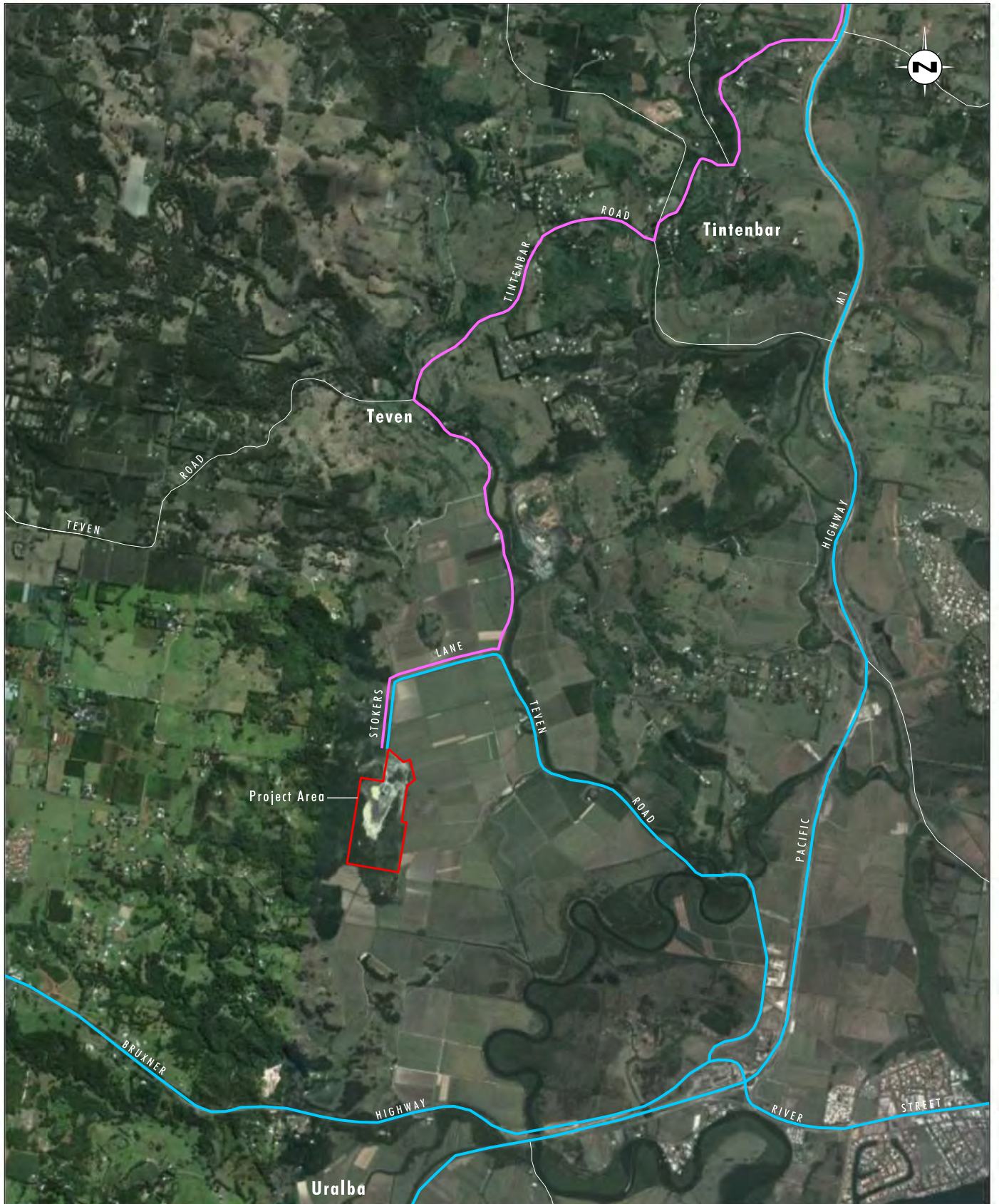


Image Source: Google Earth (2012)

0 0.5 1.0 2.0km
1:45 000

Legend

- Project Area
- Primary Transport Route
- Local Deliveries Only

FIGURE 7.8
Teven Quarry
Transport Routes

- Teven Road;
- Bruxner Highway;
- Pacific Highway;
- River Street (Old Pacific Highway); and
- Tintenbar Road.

Stokers Lane is a local road carrying low traffic volumes. It provides access to Teven Quarry at its western end and only one residence located to the west of the quarry. Teven Road is a local road connecting the Bruxner Highway to Tintenbar Road and carries relatively low traffic volumes both north and south of Stokers Lane. Tintenbar Road is an unclassified regional road which carries moderate traffic volumes between the Pacific Highway and Teven Road. The Bruxner Highway is a state highway linking the Pacific Highway to Alstonville, Lismore and Casino, while River Street (Old Pacific Highway) is a state road providing the main connection to Ballina from the Pacific and Bruxner Highways. Both the Bruxner Highway and River Street carry moderately high traffic volumes.

The primary transport routes currently utilised by Teven Quarry are:

- Route 1 – Stokers Lane, south along Teven Road to Bruxner Highway and then west towards Lismore or east to the Pacific Highway (for trips north or south) or to Ballina (east) via River Street (Old Pacific Highway); and
- Route 2 – Stokers Lane, north along Teven Road to Tintenbar Road and then north along Tintenbar Road to Tamarind Drive to join the Pacific Highway.

Currently approximately 70 per cent of product trucks travel on Route 1 and 30 per cent on Route 2. The majority of product transported via Route 2 is for the upgrade of the Pacific Highway around Tintenbar and further north. Following a review of road safety aspects associated with each of the transport routes undertaken as part of the Project, to improve safety outcomes for the community, Holcim Australia is proposing to utilise Route 1 for all product trips to the Pacific Highway, including future upgrade works to the north, with Route 2 utilised for local deliveries only. Route 1 is therefore anticipated to carry 95 per cent of product truck movements associated with the Project. The proposed transport routes are reflected on **Figure 7.8**.

Based on traffic counts undertaken during February 2014 and peak traffic generation associated with existing maximum production levels of 265,000 tpa, the existing average daily traffic generation of the quarry is:

- 60 two way light vehicle movements per day based on 30 inbound trips/30 outbound trips, including employee trips, visitors and some ex bin sales in small vehicles; and
- 78 two way heavy vehicle movements (truck and dog trailers and semi trailers) based on 39 inbound trips/39 outbound trips. This increases to approximately 106 two way heavy vehicle movements per day (53 inbound/53 outbound) during a busy week.

The existing hourly traffic generation for the quarry varies based on demand, however would generally consist of:

- 8-10 heavy vehicle movements (4-5 truck loads) during an average hour;
- 16-20 heavy vehicle movements (8-10 truck loads) during a busy hour; and
- 24 heavy vehicle movements (12 truck loads) per hour at the maximum loading capacity of the quarry.

The highest traffic generation from the quarry occurs during the morning period between 7.00am and midday.

7.7.2 Road Safety

A Road Safety Audit of the existing and proposed transport routes was undertaken as part of the Project in accordance with the Roads and Maritime Services Guidelines for Road Safety Audit Practice. The audit is included as in **Appendix 8**.

The audit found that the alignment of Teven Road between Stokers Lane and Bruxner Highway is superior to the section north of Stokers Lane, with fewer curves and better sight lines. It also noted that the upgraded Pacific Highway between Bruxner Highway and Tamarind Drive is superior to the Tintenbar Road /Tamarind Drive route north of the quarry and is better suited to heavy vehicles. Hence, the audit supports the use of Route 1 as the primary transport route for the Project.

A number of minor improvements were recommended for Route 1 to improve the safety for night time haulage as proposed by the Project, including:

- centreline markings in Teven Road between Stokers Lane and Bruxner Highway including the maintenance of the existing linemarking (where required) in Teven Road;
- provision of reflectors on the existing guardrail fencing at the intersections of Stokers Lane and Wellers Road, with Teven Road; and
- maintenance of existing end treatment of guardrail in Teven Road at Stokers Lane.

Holcim Australia will liaise with Ballina Shire Council in relation to implementing the recommendations of the Road Safety Audit.

7.7.3 Traffic Impact Assessment

7.7.3.1 Traffic Generation of the Project

The Project seeks approval to increase maximum production limits from the current approved level of 265,000 tpa (increasing annually by 1.5%) to 500,000 tpa, resulting in increased traffic generation associated with additional product transport and three additional operational staff. It is projected that the increase to peak production will generate an additional 68 haulage vehicle movements (34 truck loads) per day and an additional 10 light vehicle movements per day. Proposed peak production levels of 500,000 tpa would only occur on a campaign basis in response to periods of peak demand associated with major construction projects. The assessment of traffic impacts associated with the Project has however been conservatively based on maximum traffic generation assuming peak production of 500,000 tpa.

A summary of the total future traffic volumes generated by Teven Quarry, with the Project, is provided in **Table 7.17**.

Table 7.17 – Predicted Increase in Average Daily Traffic Volumes

	Existing Approval 265,000 tpa		Project 500,000 tpa		Difference	
	Loads	Two Way Trips	Loads	Two Way Trips	Loads	Two Way Trips
Product Trucks	39	78	73	146	+34	+68
Light vehicles	30	60	35	70	+5	+10

There will be no increase in heavy vehicle trips due to the addition of a mobile pug mill or concrete recycling operations. The mobile pug mill will add value to products already produced by the quarry and concrete for recycling will typically be delivered as part of the return trip from product trucks making deliveries to local batching plants (i.e. back loading).

The existing hourly traffic generation of product trucks described in **Section 7.7.1** will also change as a result of the proposed Project. An increase of 2 loads per hour is anticipated for the average and busy hour. There will be no increase in the maximum hourly truck movements during the daytime period as the current maximum of 12 loads per hour represents the maximum loading capacity of the quarry. However, the Project seeks to extend the hours for product loading and transport into the evening period until 10.00pm. The maximum number of hourly truck movements during this evening period would be limited to 6 loads per hour.

The anticipated increase in hourly product truck loads as a result of the Project is summarised in **Table 7.18**.

Table 7.18 – Predicted Increase in Hourly Traffic Volumes

	Existing Approval 265,000 tpa		Project 500,000 tpa		Difference	
	Loads	Two Way Trips	Loads	Two Way Trips	Loads	Two Way Trips
Average Hour	5	10	7	14	+2	+4
Busy Hour	8-10	16-20	10	20	+2	+4
Maximum Hour (7.00am – 6.00pm)	12	24	12	24	Nil	Nil
Maximum Hour (6.00pm – 10.00pm)	-	-	6	12	+6	+12

7.7.3.2 Road Network Impacts

A summary of the future traffic volumes on the main transport routes servicing Teven Quarry with the addition of the Project at maximum production, is provided in **Table 7.19**.

Table 7.19 – Future Weekday Two Way Traffic Volumes

Location	Existing Traffic Volume	Project Additional Volume
	Total Volume (heavy vehicles)	Total Volume (heavy vehicles)
Stokers Lane	205 (115)	78 (68)
Teven Road (north of Stokers Lane)	693 (203)	-18 (-18)
Teven Road (south of Stokers Lane)	760 (246)	96 (86)
Bruxner Highway (west of Teven Road)	- ¹	16 (12)
Bruxner highway (east of Teven Road)	- ¹	80 (74)
Pacific Highway (north of Bruxner Highway)	- ¹	50 (50)
Pacific Highway (south of Bruxner Highway)	- ¹	6 (6)
River Street (east of Pacific Highway)	18,243 (1,558)	24 (18)

¹ – Daily traffic counts not completed. Hourly counts for relevant intersections indicate high traffic volume roads.

As indicated by **Table 7.19**, there will be a decrease in the number of heavy vehicles generated by the quarry using Tintenbar Road and Teven Road north of Stokers Lane due to the proposed change in transport routes discussed in **Section 7.7.1**. The impacts of increases across the remainder of the road network would be relatively minor, with the proportion of heavy vehicles using Stokers Lane increasing from 56.1 per cent to 66.8 per cent. The proportion of heavy vehicles using Teven Road south of Stokers Lane will increase from 32.4 per cent to 38.6 per cent. Increases in daily volumes on the Bruxner Highway, Pacific Highway and River Street will be an extremely small proportion of the total traffic using these roads and would have negligible impact given the high volume of existing traffic.

The anticipated increase in hourly traffic volumes of four truck movements per hour using Stokers Lane and Teven Road south of Stokers Lane, would also have a relatively minor impact on these roads and intersections, as well as the on the adjoining road network. Modelling of intersection performance based on maximum hourly truck movements from the quarry has been completed and is summarised in **Section 7.7.3.3**.

7.7.3.3 Intersection Performance

To examine the impacts of the maximum hourly traffic generated by the Project (12 loads per hour) on the operational performance of local intersections, traffic modelling was undertaken using SIDRA software. Modelling was undertaken for the morning, midday and afternoon peak hour periods and the intersections modelled were the Teven Road/Stokers Lane intersection and the Bruxner Highway/Teven Road intersection.

SIDRA analysis indicates that the Teven Road/Stokers Lane intersection will continue to have a very good Level of Service (Level of Service A) with the additional of the Project.

Analysis of the Bruxner Highway/Teven Road intersection shows that the right turn out of Teven Road into Bruxner Highway is the critical movement for this intersection, and that the morning peak is the critical peak hour. The intersection will retain its existing satisfactory Level of Service (Level of Service C) during the morning peak hour, and a satisfactory to good Level of Service (Level of Service C and B) during the afternoon and midday peaks.

Traffic modelling confirms that traffic conditions at the principle local intersections will remain satisfactory with the addition of traffic from the Project, with little change in overall vehicle delay indicating the impacts on the Project on intersection capacity are relatively small.

On the wider road network, including the roundabout intersection at Bruxner Highway/Pacific Highway and River Street, the additional volumes associated with the maximum hour will be easily accommodated without any measurable change in the Level of Service or vehicle delay.

7.7.4 Traffic Management

The assessment of traffic impacts associated with the Project found that impacts on the road network and principle intersections would be satisfactory and there is no requirement to upgrade the roads or intersections surrounding the site provided that the measures referred to at **Section 7.7.2** are undertaken. As discussed in **Section 7.7.2**, a review of road safety recommended prioritising the use of Route 1 for product transport and recommended a number of minor improvements to Route 1 to improve the safety for night time haulage, including centre line marking, reflectors and maintenance of existing guard rails at locations along Route 1. Holcim Australia will implement the recommendations of the Road Safety Audit.

Holcim Australia currently pays road maintenance contributions to Ballina Shire Council and expects that this will continue under any new consent granted for the Project.

7.8 Greenhouse Gas and Energy

An assessment of the potential impacts of the Project's greenhouse gas emissions on the environment and the ability of governments to achieve national and international greenhouse gas reduction policy objectives has been completed by Umwelt. A copy of the assessment is included as **Appendix 9** and a summary of the key findings is provided below.

7.8.1 Greenhouse Assessment Framework

The Greenhouse Gas and Energy Assessment (GHGEA) framework is based on the methodologies and emission factors contained in the National Greenhouse Accounts (NGA) Factors 2013. The assessment framework also incorporates the principles of The Greenhouse Gas Protocol 2004.

The Greenhouse Gas Protocol (The GHG Protocol) provides an internationally accepted approach to greenhouse gas accounting. The Protocol provides guidance on setting reporting boundaries, defining emission sources and dealing with issues such as data quality and materiality.

Scope 1 and 2 emissions were calculated based on the methodologies and emission factors contained in the National Greenhouse Accounts (NGA) Factors 2013 (DCCEE 2013).

Scope 3 emissions associated with product transport were calculated based on fuel efficiency factors contained in the National Greenhouse Gas Inventory: Analysis of Recent Trends and Greenhouse Gas Indicators (AGO 2007). Other Scope 3 emissions were calculated using methodologies and emission factors contained in the National Greenhouse Accounts (NGA) Factors 2013 (DCCEE 2013).

7.8.2 Greenhouse Gas Impact Assessment

The Project will not result in a significant change in the net greenhouse gas emissions of Teven Quarry, as the total quantity of resource extracted and processed by the quarry over its life does not change as a result of the Project.

The predicted direct and indirect greenhouse gas emissions for the Project are:

- Scope 1 emissions – Predicted direct greenhouse gas emissions from the Project are forecast to increase by approximately 3,750 t CO₂-e over the life of the quarry, as a result of increased diesel consumption associated with the use of mobile crushing plant and pug mill.
- Scope 2 emissions – Predicted indirect greenhouse gas emissions from the Project are forecast to decrease by approximately 3,900 t CO₂-e over the life of the quarry, as a result of reduced electricity consumption associated with a shift in the proportion of product processed by fixed plant versus diesel powered mobile plant.
- Scope 3 emissions – Predicted indirect and downstream greenhouse gas emissions from the Project are forecast to decrease by approximately 600 t CO₂-e over the life of the quarry as a result of decreased electricity consumption and changes to third party transport of product and fuel.

The direct (Scope 1) greenhouse gas emissions from the Project are forecast to be approximately 3,750 t CO₂-e over the life of the quarry, or approximately 300 t CO₂-e per annum. In the context of estimated global anthropogenic greenhouse gas emissions in 2013 of 38,800,000,000 t CO₂-e (BOM and CSIRO 2014), this represents approximately 0.000008 per cent of global anthropogenic emissions per annum.

Impact on National Policy Objectives

The Australian Government has committed to reduce Australia's greenhouse gas emissions by 5 per cent from 2000 levels by 2020. If Australia is able to meet the 5 per cent reduction target by 2020, the nation will be generating approximately 525,000,000 t CO₂-e per annum (National Greenhouse Gas Inventory 2011). The Project's contribution of approximately 300 t CO₂-e of Scope 1 emissions per annum is negligible and unlikely to prevent the Federal Government achieving its national greenhouse gas objectives.

Impact on International Policy Objectives

There is currently no comprehensive global agreement on greenhouse gas reduction targets that includes all major emitters such as China, India and the United States. The most relevant international commitment made by Australia is under the United Nations Framework Convention on Climate Change in 2010, whereby Australia has committed to reducing its 2020 national greenhouse gas inventory by 5 per cent (based on the 2000 inventory).

This commitment aligns with the national objectives and based on this, the Project is unlikely to prevent the Federal Government achieving its national or international greenhouse gas reduction targets.

7.8.3 Greenhouse Management and Monitoring

Holcim Australia's environmental performance is driven by its Environmental Policy (Holcim (Australia) Pty Ltd 2010), which states that protecting the environment is integral to sustainable development. The Environmental Policy (Holcim (Australia) Pty Ltd 2010) includes specific commitments which seek to minimise greenhouse gas emissions and improve energy efficiency. The commitments are:

- ensure energy efficiency, optimum use of raw materials and the reduction of waste in all operations; and
- respond to the challenges presented by climate change by identifying opportunities to reduce its carbon footprint.

Holcim Australia designs and manages its operations to achieve these commitments.

The majority of the Project's greenhouse gas emissions are generated by the combustion of diesel and are under the direct control of Holcim Australia. Holcim Australia will continue to mitigate Scope 1 emissions through diesel use efficiency initiatives. The Project will continue to monitor diesel usage and seek opportunities for further efficiency. All Holcim Australia sites are required to complete an annual self-assessment report against Holcim Australia standards, which include fuel efficiency. The self-assessment process drives sites to review current practices and implement fuel efficiency initiatives.

Diesel use efficiency projects have the potential to reduce energy usage and the greenhouse gas emissions from the Project. Holcim Australia will implement a program to review diesel use efficiency and include fuel efficiency in equipment procurement decisions. In addition, Holcim Australia will:

- monitor developments in alternative fuel technology; and
- consider biodiesel compatibility in future procurement decisions.

7.9 Biodiversity

The vegetation of the Project Area reflects the historical use of the site for grazing. Historical and aerial photography shows the site almost completely devoid of vegetation throughout the 1940s to the early 1970s (Warren 1994). At this time the quarry operations within the Project Area were expanded and grazing continued within non-operational areas until at least the mid 1990s. The majority of vegetation present within the Project Area represents regrowth which has occurred since that time.

The existing development consent which applies to Teven Quarry provides approval for ground disturbance and vegetation clearing. Additional approval for the clearing of vegetation is not required as part of the Project.

The Project will not involve any additional direct impact on the ecological values of the Project Area as no additional ground disturbance or vegetation clearing is required, beyond that already approved. The potential impacts of the Project on ecological values is therefore limited to indirect impacts arising from the operation of the Project, including changes to noise, dust and runoff regimes.

Following confirmation of the scope of the ecological assessment from OEH in April 2014, an assessment of the potential indirect ecological impacts of the Project was undertaken by Umwelt. The assessment included an ecological inspection of the Project Area undertaken on the 7 and 8 May 2014 by an Umwelt ecologist. The purpose of the inspection was to gain an appreciation of any potential ecological values which may be indirectly impacted upon by the Project. Following the inspection, an assessment of the indirect impacts of the Project on threatened and migratory species, endangered populations and TECs listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was completed and a review of existing ecological mitigation and management measures implemented at Teven Quarry was undertaken.

7.9.1 Methodology

Literature Review and Database Searches

Prior to conducting the field inspection, a review of previous ecological studies of the Project Area and updated searches of threatened species databases were completed. The documents reviewed and the databases searched were:

- *Flora and Fauna Assessment for Extension of Quarrying Activities*, prepared by James Warren, Biological and Environmental Consultant, August 1994;
- a 10 kilometre radius search from the centre of the Project Area of the NSW Office of the Environment and Heritage (OEH) Atlas of NSW Wildlife (May 2014); and
- a 10 kilometre radius search from the centre of the Project Area of the Commonwealth Department of the Environment (DotE) Protected Matters Database (May 2014).

Following the review, a list of known and expected threatened and migratory species, endangered populations and threatened ecological communities (TECs) was compiled to assist the development of a site inspection methodology.

Site Inspection

The site inspection consisted of rapid assessments of the vegetation community types and their condition within the Project Area and general observations of specific flora and fauna habitats. The inspection included:

- six rapid vegetation assessments; and
- general walking observations.

The rapid vegetation assessments were used to assist in the delineation and refinement of the existing vegetation mapping (Warren 1994). Rapid vegetation assessment points were located within distinct vegetation community units, rather than within ecotones, to allow data collection for each community without confounding effects from adjacent communities. Dominant, common and some uncommon (but notable) plant taxa were recorded within each vegetation community rapid assessment. The vegetation structure at each rapid vegetation assessment point was documented, including the dominant species in each stratum.

The general walking observations were used to gain an overall appreciation of the ecological values (flora and fauna) of the Project Area and allowed for all habitat types to be surveyed in a short period of time. The locations of the rapid vegetation assessments and the general walking observations are shown on **Figure 7.9**.

7.9.2 Results

Literature Review and Database Searches

An ecological assessment was undertaken within the Project Area by Warren in 1994 as part an application to extend quarrying activities. Warren (1994) identified a total of two threatened fauna species listed under the then *National Parks and Wildlife Act 1974* (NPW Act). The species recorded were the greater broad-nosed bat (*Scoteanax ruppellii*) and the koala (*Phascolarctos cinereus*) which are both listed under the TSC Act which superseded the NPW Act in 1995. The grey-headed flying fox, which was not listed as threatened at that time, was also recorded within the Project Area and has since been listed as vulnerable

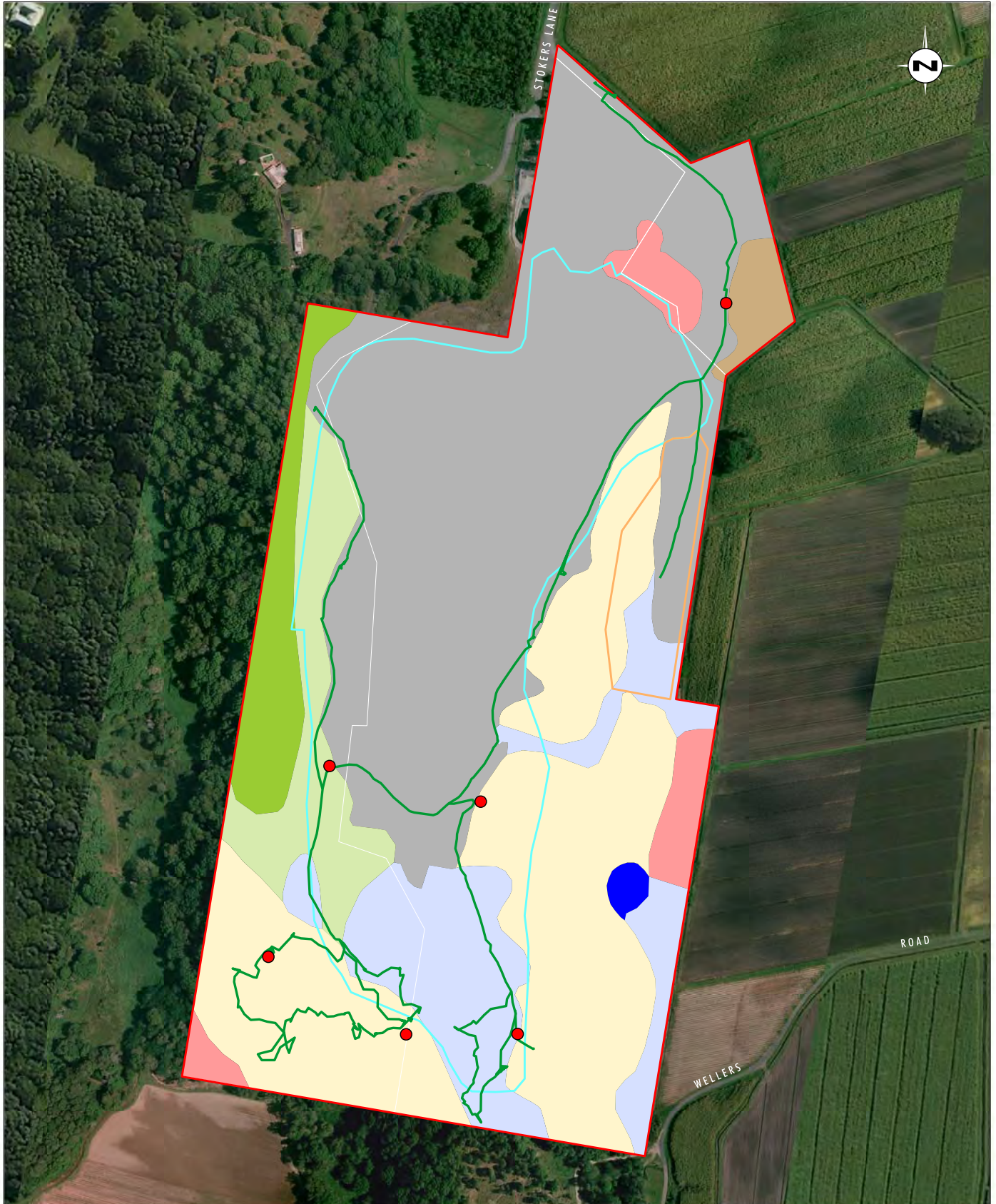


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)

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

Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

0 50 100 200m
1:5 000

Legend

- Project Area
- Extraction Limit Boundary
- Stockpile Area
- Rapid Vegetation Assessments
- General Walking Observations
- Brushbox Forest
- Camphor Laurel Forest
- Mixed Eucalyptus Forest
- Regrowth Scrub
- Subtropical Rainforest
- Exotic Grassland
- Farm Dam Vegetation
- Disturbed Land

FIGURE 7.9

**Inspection Locations and
Vegetation Communities**

under the EPBC Act and TSC Act. The koala is now also listed as vulnerable under the EPBC Act.

No threatened flora species, endangered populations or TECs were recorded by Warren (1994). Warren described one vegetation community located in the north east corner of the Project Area as subtropical rainforest (refer to **Figure 7.9**). This community is considered likely to conform to the Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community (EEC) listed under the TSC Act and the Lowland Rainforest of Subtropical Australia Critically Endangered Ecological Community (CEEC) listed under the EPBC Act.

The searches of the databases identified a further 72 threatened species, 60 migratory species, and four TECs as occurring or having the potential to occur within 10 kilometres of the Project Area. Some species and communities identified during the database searches are considered unlikely to occur within the Project Area as they require specific habitats that are not present within the Project Area (e.g. migratory shorebird species or pelagic species). Based on the results of the literature review and database searches, the following list (**Table 7.20**) of species and communities were identified within the Project Area, outside the approved extraction area, or are predicted to occur within a 10 kilometre radius of the Project Area.

Table 7.20 – Threatened and Migratory Species and TECs Identified or Predicted to Occur Within a 10 kilometre radius of the Project Area

Common Name	Scientific Name	TSC Act Status	EPBC Act Status	Recorded on Site?
Threatened Flora Species				
Dwarf heath casuarina	<i>Casuarina defungens</i>	E	E	No
Southern Ochrosia	<i>Ochrosia moorei</i>	E	E	No
Davidson's Plum	<i>Davidsonia jerseyana</i>	E	E	No
Smooth Davidson's Plum	<i>Davidsonia johnsonii</i>	E	E	No
Acalypha	<i>Acalypha eremorum</i>	E		No
Miniature moss-orchid	<i>Bulbophyllum globuliforme</i>	V	V	No
Leafless tongue-orchid	<i>Cryptostylis hunteriana</i>	V	V	No
Jointed Baloghia	<i>Baloghia marmorata</i>	V	V	No
Knicker Nut	<i>Caesalpinia bonduc</i>	E		No
Brush Sophora	<i>Sophora fraseri</i>	V	V	No
White Lace Flower	<i>Archidendron hendersonii</i>	V		No
Stinking Cryptocarya	<i>Cryptocarya foetida</i>	V	V	No
Green-leaved Rose Walnut	<i>Endiandra muelleri</i> subsp. <i>bracteata</i>	E		No
Onion cedar	<i>Owenia cepiodora</i>	V	V	No
Arrow-head vine	<i>Tinospora tinosporoides</i>	V		No
Thorny pea	<i>Desmodium acanthocladum</i>	V	V	No
Red pilly pilly	<i>Syzygium hodgkinsoniae</i>	V	V	No
Durobby	<i>Syzygium moorei</i>	V	V	No
Magenta lilly pilly	<i>Syzygium paniculatum</i>	E	V	No
Southern swamp orchid	<i>Phaius australis</i>	E	E	No

Table 7.20 – Threatened and Migratory Species and TECs Identified or Predicted to Occur Within a 10 kilometre radius of the Project Area (cont).

Common Name	Scientific Name	TSC Act Status	EPBC Act Status	Recorded on Site?
Hairy jointgrass	<i>Arthraxon hispidus</i>	V	V	No
Ball nut	<i>Floydia praealta</i>	V	V	No
Macadamia nut	<i>Macadamia integrifolia</i>		V	No
Rough-shelled bush nut	<i>Macadamia tetraphylla</i>	V	V	No
Scented acronychia	<i>Acronychia littoralis</i>	E	E	No
Coast euodia	<i>Melicope vitiflora</i>	E		No
Small-leaved tamarind	<i>Diploglottis campbellii</i>	E	E	No
Threatened Fauna Species				
Wallum froglet	<i>Crinia tinnula</i>	V		No
Green and golden bell frog	<i>Litoria aurea</i>	E	V	No
Wallum sedge frog	<i>Litoria olongburensis</i>	V	V	No
Three-toed snake-tooth skink	<i>Coeranoscincus reticulatus</i>	V	V	No
Freckled duck	<i>Stictonetta naevosa</i>	V		No
Wompoo fruit-dove	<i>Ptilinopus magnificus</i>	V		No
Rose-crowned fruit-dove	<i>Ptilinopus regina</i>	V		No
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	E		No
Australasian bittern	<i>Botaurus poiciloptilus</i>	E	E	No
Black bittern	<i>Ixobrychus flavicollis</i>	V		No
Spotted harrier	<i>Circus assimilis</i>	V		No
Red goshawk	<i>Erythrotriorchis radiatus</i>	E	V	No
Little eagle	<i>Hieraaetus morphnoides</i>	V		No
Eastern osprey	<i>Pandion cristatus</i>	V		No
Brolga	<i>Grus rubicunda</i>	V		No
Bush stone-curlew	<i>Burhinus grallarius</i>	E		No
Swift parrot	<i>Lathamus discolor</i>	E	E	No
Coxen's fig-parrot	<i>Cyclopsitta diophthalma coxeni</i>	CE	E	No
Eastern grass owl	<i>Tyto longimembris</i>	V		No
Regent honeyeater	<i>Anthochaera phrygia</i>	CE	E	No
Albert's lyrebird	<i>Menura alberti</i>	V		No
Grey-crowned babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V		No
Varied sittella	<i>Daphoenositta chrysoptera</i>	V		No
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	V	E	No
Common planigale	<i>Planigale maculata</i>	V		No
Koala	<i>Phascolarctos cinereus</i>	V	V	Yes
Long-nosed potoroo	<i>Potorous tridactylus</i>	V	V	No

Table 7.20 – Threatened and Migratory Species and TECs Identified or Predicted to Occur Within a 10 kilometre radius of the Project Area (cont).

Common Name	Scientific Name	TSC Act Status	EPBC Act Status	Recorded on Site?
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	V	V	Yes
East coast freetail-bat	<i>Mormopterus norfolkensis</i>	V		No
Little bentwing-bat	<i>Miniopterus australis</i>	V		No
Eastern bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V		No
Southern myotis	<i>Myotis macropus</i>	V		No
Eastern long-eared bat	<i>Nyctophilus bifax</i>	V		No
Large-eared pied bat	<i>Chalinolobus dwyeri</i>	V	V	No
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	V		Yes
New Holland mouse	<i>Pseudomys novaehollandiae</i>		V	No
Water mouse	<i>Xeromys myoides</i>		V	No
Migratory Species				
Fork-tailed swift	<i>Apus pacificus</i>		MIG	No
White-bellied sea-eagle	<i>Haliaeetus leucogaster</i>		MIG	No
White-throated needletail	<i>Hirundapus caudacutus</i>		MIG	No
Rainbow bee-eater	<i>Merops ornatus</i>		MIG	No
Black-faced monarch	<i>Monarcha melanopsis</i>		MIG	No
Spectacled monarch	<i>Monarcha trivirgatus</i>		MIG	No
Satin flycatcher	<i>Myiagra cyanoleuca</i>		MIG	No
Rufous fantail	<i>Rhipidura rufifrons</i>		MIG	No
Great egret	<i>Ardea modesta</i>		MIG	No
Cattle egret	<i>Ardea ibis</i>		MIG	No
Oriental plover	<i>Charadrius veredus</i>		MIG	No
Latham's snipe	<i>Gallinago hardwickii</i>		MIG	No
Australian painted snipe	<i>Rostratula benghalensis australis</i>		E MIG	No
TECs				
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community		EEC		Likely
Lowland Rainforest of Subtropical Australia			CEEC	Likely

NOTE:

CE:	critically endangered
CEEC:	critically endangered ecological community
E:	endangered
EEC:	endangered ecological community
EPBC:	Environment Protection and Biodiversity Conservation Act 1999
MIG:	migratory
TSC:	Threatened Species Conservation Act 1995
V:	vulnerable

Site Inspection

The results of the inspection were consistent with the findings in the previous ecological study (Warren 1994). Warren (1994) noted that the majority of vegetation communities were in poor condition with significant invasion by exotic species such as Camphor laurel and Lantana. Many of the vegetation communities described by Warren are still exhibiting a high density of weed species, including camphor laurel (*Cinnamomum camphora*) and lantana (*Lantana camara*).

A total of seven vegetation communities were described and mapped by Warren (1994) and were confirmed as still occurring within the Project Area during the recent inspection (refer to **Figure 7.9**). These communities are:

- Brushbox Forest;
- Camphor Laurel Forest;
- Mixed Eucalypt Forest;
- Regrowth Scrub;
- Subtropical Rainforest;
- Grassland; and
- Farm Dam Vegetation.

The patch of Subtropical Rainforest mapped by Warren (1994) is very small in area and is highly disturbed and fragmented. However it is considered likely to conform to the following two TECs listed since 1994, Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions EEC listed under the TSC Act (listed in 2006), and the Lowland Rainforest of Subtropical Australia CEEC listed under the EPBC Act (listed in 2011). The subtropical rainforest occurs within the Project Area in Lot 1, adjacent to the stockpile yard (refer to **Figure 7.8**), and has continued to be protected and regenerated by Holcim Australia during its tenure operating Teven Quarry. The area of Sub-Tropical Rainforest is not located within the currently approved disturbance footprint for Teven Quarry and will not be impacted by the Project. As there will be no additional ground disturbance or vegetation clearing outside of that currently approved, no direct impact is expected on this community.

Fauna habitat assessment was completed as part of the inspection with opportunistic fauna observations also recorded. A total of 23 bird species, two macropods and one amphibian species were observed. All 26 fauna species detected were considered common species of the area and none are listed on the TSC Act or EPBC Act.

A variety of fauna habitats were observed within the Project Area. Several large trees on the periphery of the disturbance area were noted as containing numerous hollows of various sizes, with the remainder of the Project Area containing a low density of tree hollows. The mid-storey vegetation within the forest communities was generally moderate to dense, providing shelter habitat for a range of small mammals and birds. A small amount of fallen timber and hollow logs was also observed. The forest vegetation within the Project Area occurred on moderate to steep slopes however no exposed rocky areas or natural cave habitats were observed. One SEPP 44 listed koala feed tree species, *Eucalyptus microcorys*, was recorded within the Project Area and it is considered that the forest vegetation provides appropriate habitat for the koala. The proposed Project will not involve any additional direct impacts to these fauna habitats as no additional ground disturbance or vegetation clearing is proposed.

No threatened or migratory species or endangered populations were recorded during the ecological inspection.

Impacts of the Project on Ecological Values

The proposed Project will not involve any additional direct impact on the ecological values of the Project Area including remnant vegetation or vegetation corridors as no additional ground disturbance or vegetation clearing (above that already approved) is required. The potential for indirect impacts on ecological values include those associated with noise, dust and water runoff from the existing and approved quarry works. However, no evidence of such indirect impacts to vegetation communities or habitat types was recorded. Based on the assessment findings outlined in **Section 7.0** of this EIS, the Project is unlikely to result in a significant change to the existing noise, dust and water runoff impacts of Teven Quarry, therefore it is considered that any indirect impacts to ecology that occur will be minor and will be consistent with the existing approved impacts. It is unlikely that any minor indirect impacts that do occur would result in a significant impact on the ecological values of the Project Area.

An assessment of the indirect impacts of the Project on threatened and migratory species, endangered populations and TECs listed under the TSC Act and the EPBC Act is included in **Appendix 10** and summarised in the sections below.

Impact Assessment under the EP&A Act

An Assessment of Significance of potential indirect impacts was completed for the TSC Act threatened species and TECs and included in **Appendix 10**.

The Project will not involve any additional direct impact on the ecological values of the Project Area as no additional ground disturbance or vegetation clearing (above that already approved) is required. The potential indirect impacts identified are considered unlikely to substantially impact on any TSC Act listed species or TECs. As such, it is considered that the Project is unlikely to have a significant impact on any threatened species or TECs listed under the TSC Act.

Impact Assessment under the EPBC Act

Under the Commonwealth EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance (MNES) (refer to **Section 5.1.1**).

An Assessment of Significance of the potential indirect impacts was undertaken for the EPBC Act threatened and migratory species and TECs and is included in **Appendix 10**.

The Project will not involve any additional direct impact on the ecological values of the Project Area as no additional ground disturbance or vegetation clearing (above that already approved) is required. The potential indirect impacts identified are considered unlikely to substantially impact on any MNES. As such, it is considered that the Project is unlikely to have a significant impact on any MNES.

7.9.3 Conclusions

The results of the impact assessments under the EP&A Act and the EPBC Act conclude that the indirect impacts of the Project are unlikely to have a significant impact on any threatened flora or fauna species, migratory fauna species, endangered population or TEC listed under the TSC Act and/or the EPBC Act.

7.9.4 Ecological Management Measures

While the Project is not expected to result in any additional impact on the ecological values of the Project Area, the existing ecological mitigation and management measures set out in the Plan of Management (Readymix 2007) will be reviewed and updated as part of an overall update to the Teven Quarry Environmental Management Plan (refer to **Section 8.0**). Holcim Australia will implement a range of existing ecological management measures to minimise impacts of the operation on ecological values, including:

- avoidance of impact on the remnant subtropical rainforest community within Lot 1 (refer to **Figure 7.9**);
- 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 will involve weed management protocols for Camphour 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.

7.10 Aboriginal Archaeology and Cultural Heritage

The Project does not involve any additional ground disturbance to that already approved, therefore the potential for impacts on items of Aboriginal cultural heritage is limited to indirect impacts such as from blasting or runoff. As there are no known Aboriginal sites within the Project Area, consultation was not undertaken with any Aboriginal groups, however, an assessment of the potential indirect impacts of the Project has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010).

7.10.1 Aboriginal Heritage Impacts

No known Aboriginal cultural heritage sites occur within or in close proximity to the Teven Quarry Project Area. Given the terrain and history of extensive clearing, grazing and quarrying, the area is considered to have low archaeological potential.

As the proposed Project does not involve any additional ground disturbance, the potential for impacts on items of Aboriginal cultural heritage is limited to indirect impacts such as from blasting or runoff.

A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken for the Project in March 2014 and indicated that no known items or places of Aboriginal heritage significance are located in or within 50 metres of the Project Area. The Project is therefore not expected to impact either directly or indirectly on any known items of Aboriginal cultural heritage. Accordingly no further assessment of potential Aboriginal cultural heritage impact associated with the Project is required.

7.10.2 Aboriginal Archaeological Management Recommendations

If during the course of operations, Holcim Australia becomes aware of any previously unknown Aboriginal archaeological material, all works likely to affect the material or site will cease immediately and OEH, relevant Aboriginal stakeholders and a suitably qualified archaeologist will be consulted to determine an appropriate course of action prior to the recommencement of work at the site.

7.11 Historic Heritage

No known items of historic heritage significance occur within the Teven Quarry Project Area. As the proposed Project does not involve any additional ground disturbance beyond that already approved, the potential for impact on items of historic heritage is limited to indirect impacts such as from blasting or runoff.

To assist in assessing the potential for the Project to result in indirect impacts on heritage sites, a search of local, State and national heritage databases was undertaken in March 2014, including:

- the State Heritage Register (SHR) and State Heritage Inventory;
- the Australian Heritage Database;
- the Ballina LEP 1987; and
- the Ballina LEP 2012.

No historic heritage sites were found to be located within or in close proximity to the Project Area. The closest heritage item was located approximately three kilometres to the south east in Alstonville, a sufficient distance to not experience or be impacted by indirect impacts associated with the Project. The Project is therefore not expected to impact either directly or indirectly on any listed heritage items.

7.12 Visual Amenity

7.12.1 Existing Visual Amenity

The Project Area is located in a predominantly rural setting, comprising low lying cleared floodplains to the east and higher, vegetated land to the west associated with an escarpment and the Alstonville Plateau.

The rural landscape to east of the Project Area has been largely cleared of vegetation to allow for agricultural activities, predominantly cane farming. The agricultural land is considered to provide views of moderate scenic quality enhanced by the backdrop of the escarpment to the west. The small number of rural residences to the east of the quarry along Teven Road are also considered to have moderate scenic quality. These areas have low elevations and views are generally restricted to surrounding agricultural land and the escarpment to the west. Long distance views are generally restricted due to topography and existing vegetation.

The landscape of the escarpment and plateau to the west comprises steep, largely vegetated slopes, with some more open areas of grazing land. The escarpment is considered to provide views of high scenic quality and potential long distance views in areas where vegetation or topography do not limit views. As Teven Quarry is located on the eastern side of the escarpment at its base and the residences in these areas are predominantly located further west at the top of the escarpment or on the plateau, the topographical location of these residences generally restricts views of the existing Teven Quarry operation. Some limited views of the upper benches of the quarry are possible from residence 1 (refer to **Figure 2.1**), however these are substantially filtered by vegetation and topography.

In terms of other potential public viewing locations, Teven Road is located approximately 1 kilometre to the east of the Project Area; with views of the Teven Quarry operations available along Teven Road to the north and east of the Project Area. Other minor roads including Stokers Lane and Wellers Road also have existing views of the Teven Quarry operations.

In general terms, the visual catchment of the existing approved Teven Quarry operations extends to the immediate area of one to two kilometres to the north and east, with only limited or no views available from the south and west.

Given the nature of the topography and land use surrounding the Project Area, there is considerable variation in scenic quality. In general terms, scenic quality is considered to improve with increasing diversity of topographic ruggedness, vegetation patterns, natural and agricultural landscapes and water bodies (Andrews Neil, 1999). Scenic quality is typically considered to decrease with views of the built environment (including both urban and industrial development) and areas of extensive earthworks (e.g. mines and quarries). The landscape surrounding the Project Area is therefore considered to have moderate to high scenic quality, moderated somewhat by the presence of the existing quarry and cane farming operations which can dramatically change the landscape depending on the crop cycle and time of year.

7.12.2 Visibility of the Project

As discussed in **Section 4.0**, the Project does not propose any change to the existing approved extraction limit boundary of the Teven Quarry. Therefore, no additional ground disturbance to that already approved is proposed as part of the Project. The key elements of the Project that have the potential to be visible from public and private viewing locations, and that have not been considered as part of existing approvals, are:

- additional mobile plant to be located within the infrastructure and extraction areas; and
- additional night lighting associated with proposed extended hours of operation.

The key elements of the existing approved operations that have the potential to be visible from public and private viewing locations are the existing infrastructure area and extraction area.

Views of the existing operation are primarily limited to the low lying areas to the north and east along Teven Road, including a limited number of rural residences. These views are predominantly of the upper benches of the extraction area and the infrastructure area and are from a distance of between approximately one and two kilometres. Views from Teven Road are filtered at times by roadside vegetation and sugar cane crops, when present.

Views of the existing approved infrastructure area from the north and east will remain throughout the life of the Project, mitigated somewhat by the continued growth of vegetation in rehabilitation areas in the north-east of the Project Area and by cane crops on adjacent properties, when present (refer to **Plate 7.1**).



PLATE 7.1
View south toward Teven Quarry from Stokers Lane

Due to favourable landform and topography, the Project Area is largely shielded from residents to the west. This will not change as a result of the Project. Rehabilitation of the upper final benches and the western overburden emplacement area will further help to screen existing filtered views of the upper benches from residence 1 (refer to **Figure 2.1**).

Figures 3.2 to 3.5 show indicatively the staged progression of the quarry as it extends southwards then deepens. The extraction area sits behind a narrow north-south running ridge with an elevation of approximately 40mAHD which shields quarrying activities below this elevation from views to the east. Quarrying, overburden emplacement and rehabilitation activities undertaken above this narrow ridge are however visible from the east.

Figure 3.2 to 3.5 show the progressive construction of the western overburden emplacement area as extraction extends in a southerly direction. The western overburden emplacement area will act to largely screen future quarry extraction from views from the north. The western overburden emplacement area and upper final quarry benches will be progressively rehabilitated reducing the visual impact of the Project over time. Further details regarding rehabilitation are provided in **Section 7.15**.

As discussed in **Section 4.3**, the Project proposes extended hours of operation which will require some additional lighting within the existing infrastructure area to enable product loading and transport and stockpile management activities up until 10pm Monday to Friday.

It is noted that these activities and the extended hours of operations (refer to **Section 4.3**) would only be utilised on a campaign basis to meet the needs of particular projects and would not represent normal operations.

7.12.3 Visual Impact Assessment

Visual impacts are dependent on characteristics of the existing landscape, sensitivity of viewers and the extent to which visual modification will occur as a result of the Project. The visual impact assessment is focused on the most sensitive receivers, such as local residents and local road users.

As discussed in **Section 4.0**, the Project does not propose to change the existing approved extraction area, therefore the additional visual impacts of the Project are limited to the addition of mobile plant to the infrastructure and extraction areas and the use of night lighting during extended hours of operation.

The addition of a mobile pug mill within the existing infrastructure area will not significantly change the existing views available of this area, as the mobile plant will be consistent in appearance and lower in height than existing equipment utilised on site. Similarly, the addition of a mobile crusher within the extraction area will not significantly change existing views of the site as it will be consistent in appearance and height with existing plant and will be located within a shielded location in the quarry pit to maximise acoustic shielding.

The use of night lighting associated with extended hours of operation will be of limited temporal scale (*ie.* campaign basis). Further, given the distance to the nearest surrounding private residences with a direct line of sight to the quarry (> 1 km), it is considered that night lighting can be managed to limit potential impacts on local residents. Proposed management measures are discussed further in **Section 7.12.4**.

It is therefore considered that the proposed Project will not significantly change existing views of the Teven Quarry and, with the implementation of appropriate night lighting controls, not significantly impact on the existing visual amenity of the surrounding locality.

7.12.4 Visual Management Measures

While the Project will not significantly change the existing views of the quarry from surrounding areas, Holcim Australia will implement the following measures to mitigate existing visual impacts of the operation:

- maintenance of existing vegetation outside the extraction limit boundary for visual screening;
- additional screening plantings of tall tree species will be planted adjacent to the eastern pit perimeter in order to assist in screening the more elevated western faces from viewing locations to the east, including Teven Road
- ensuring that areas of disturbance are kept to the minimum practicable at any one point in time;
- rehabilitation of disturbed areas as soon as practical; and
- minimise night lighting impacts on surrounding land owners and road users by ensuring night lighting is installed and operated in accordance with AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting, including measures such as directing lighting downwards towards work areas and not toward private residences and roads, and where appropriate, shields are used to limit the emission of light off site.

7.13 Hazard and Risk

7.13.1 Preliminary Hazard Analysis

The Project has been assessed in accordance with SEPP 33 to determine whether a Preliminary Hazard Analysis (PHA) is required to support the development application. A development is considered potentially hazardous and requires a PHA if the storage or transport of hazardous substances exceeds specific screening thresholds outlined in SEPP 33. A preliminary risk screening has been completed for the Project to determine whether a PHA is required.

SEPP 33 also applies to developments that are considered to be potentially offensive. A development is potentially offensive if it requires an EPL from the EPA.

Preliminary Risk Screening

Preliminary risk screening is undertaken to determine the requirement for a PHA. SEPP 33 contains a number of criteria for hazardous material storage quantities that have the potential to create off site impacts.

Table 7.21 contains a list of hazardous materials to be stored and used at Teven Quarry and the SEPP 33 screening criteria.

Table 7.21 – Hazardous Materials Inventory

Material	ADG Code Class (PG)	Estimated Project Storage Capacity (kg)	Screening Threshold (kg)	Trigger SEPP 33
Acetylene	2.1	30	100	No
Aerosols	2.1	10	100	No
LPG (Handigas)	2.1	20	10,000	No
Methylated Spirits	3 (II)	5	5,000	No
Thinners	3 (II)	20	5,000	No
Kerosene	3 (III)	10	5,000	No
Galmet Primer	3(III)	15	5,000	No

ADG Code – Australian Dangerous Goods Code

The aggregate quantity of Class 2.1 flammable gases (excluding LPG) of 40 kilograms to be stored on site is below the SEPP 33 screening threshold of 100 kilograms, as is the stored quantity of LPG. The aggregate quantity of Class 3 flammable liquids of 50 kilograms to be stored on site is also below the SEPP 33 screening threshold of 5000 kilograms. Based on the information in **Table 7.21** the development is not considered potentially hazardous with respect to the storage of hazardous materials. Diesel fuel is also stored on site however is not subject to SEPP 33 screening as it is not stored with Class 3 flammable liquids.

Ammonium nitrate suspension is a Class 5.1 explosives pre-cursor and is not stored on site but used immediately on delivery to Teven Quarry. Upon delivery to Teven Quarry, the shot fire contractor incorporates a sensitizer with the ammonium nitrate suspension to render the material explosive prior to immediate use for blasting. Therefore the site does not have an explosives storage magazine or on site storage of the Class 5.1 ammonium nitrate suspension.

Holcim Australia will continue to store all dangerous goods in accordance with dangerous goods storage requirements and relevant Australian Standards.

Transport Quantity Screening

A proposed development may also be potentially hazardous if the quantity of hazardous materials transported or the number of traffic movements for the transport of hazardous materials exceeds the criteria outlined in *Table 2 of Applying SEPP 33* (NSW Planning 2008). If these thresholds are exceeded a route evaluation study is likely to be required.

Table 7.22 contains details of the anticipated hazardous material/dangerous good related traffic movements associated with the proposed development. The quantity of dangerous goods transported will not differ as a result of the Project from those associated with existing approved operations. A slight increase in the frequency of these movements will however occur.

Table 7.22 – Estimated Vehicle Movements of Dangerous Goods

Material	ADG Code Class	Estimated Project Deliveries			SEPP 33 Transport Screening Threshold				Trigger SEPP 33
		Delivery Quantity (t)	No. of Deliveries		Minimum Quantity (t)		Vehicle Movements		
			Weekly	p.a.	Bulk	Packages	Weekly	p.a.	
Aggregate flammable gases	2.1	<2	<3	<50	2	5	>30	>500	No
Aggregate Flammable liquids	3 (II)	<2	<2	<50	3	10	>45	>750	No
Ammonium Nitrate Suspension	5.1 (III)	6	1	12	2	5	>30	>500	Yes

Teven Quarry currently uses the class 5.1 (III) ammonium nitrate suspension as an explosive pre-cursor. As a class 5.1 (III) dangerous good the ammonium nitrate suspension is currently delivered to Teven Quarry in 6 tonne bulk lots. The delivery quantity exceeds the bulk quantity transport screening threshold of 2 tonnes indicating the Project is potentially hazardous with respect to the transport of hazardous materials/dangerous goods. However, it should be noted that the quantity of ammonium nitrate suspension proposed to be delivered to Teven Quarry in each movement will not differ as a result of the Project.

As a potentially hazardous development with respect to the transport of hazardous material/dangerous good the Project should be assessed against the requirements of *Hazardous Industry Planning Advisory Paper No 11: Route Selection* (HIPAP 11). The objective of the route selection process is to:

- examine the road hierarchy and identify routes for heavy vehicles;
- eliminate routes where there are legal or physical constraints, special/sensitive land uses or where there is inadequate emergency access;
- rate potential routes on the basis of environment and land use risk factors, traffic factors and economic factors; and
- compare each of the route alternatives on the basis of their rating against each of the factors.

All hazardous materials/dangerous goods are currently transported to the quarry via Stokers Lane and Teven Road to the Pacific Highway to the south of the quarry. No other route is used and this will not differ as a result of the Project. In addition to the transport of hazardous materials/dangerous goods, the majority of the product generated by the Teven Quarry uses the same route. The existing route satisfies the mandatory requirements of HIPAP 11 regarding the statutory, legal and physical constraints of the access route are satisfied for the transport of hazardous materials/dangerous goods to the Project. In addition to this, recent upgrades of the Pacific Highway, the Pacific Highway Teven Road intersection and Teven Road have improved the structural and geometric adequacy of the access route. The recent upgrades would have also improved the speed of response of emergency services should there be accident. As a result, a detailed transport safety study is not warranted for the ongoing transport of hazardous materials/dangerous goods to the Project.

Conclusion

The Project is not considered to be a potentially hazardous development with respect to the storage or use of hazardous substances. Therefore, in accordance with SEPP 33, a PHA is not required for the storage or use of hazardous substances and no further risk assessment is required.

The existing operations and the Project are considered potentially hazardous with respect to the transport of hazardous materials/dangerous goods. As a result, the Project has been assessed against the requirements of HIPAP 11. As an existing operation the access route to Teven Quarry satisfies the requirement of HIPAP 11 for the transport of hazardous materials/dangerous goods to the site and a detailed transport safety study is not warranted.

7.13.2 Bushfire Management

The majority of the Project Area is cleared of vegetation and is subject to previous or current quarrying activities; however, the vegetation remaining within the Project Area associated with the escarpment is mapped by Ballina Shire Council as bushfire prone land comprising both Category 1 vegetation and land within a 100 meter buffer of Category 1 Vegetation (refer to **Figure 7.10**).

Existing Bushfire Management

The Project represents the continuation of existing quarry operations and will not result in any change the approved disturbance footprint or bushfire hazard. The existing bushfire management measures implemented by Teven Quarry include:

- maintaining fire trails;
- water carts;
- fire extinguishers on all machinery; and
- emergency response system.

Holcim Australia will continue to implement the existing bushfire management measures currently in place at the site.

Bushfire Threat Assessment

A bushfire threat assessment involves assessing the vegetation formations and the slope of the land to determine the appropriate Asset Protection Zone's (APZ's) required in accordance with the methods in *Planning for Bushfire Protection* (PBP) 2006 (NSW Rural Fire Service, 2006). It is noted that PBP 2006 was developed to provide a guide to the necessary planning considerations when developing areas for residential use which are likely to be affected by bushfire. While the requirements do not specifically apply to a Project of this nature, the methods provided for calculating APZ's from PBP 2006 have been used as a general guide in this assessment.

Vegetation Formations

Vegetation formations play a key role in bushfire behaviour, woodland and forest vegetation formations represent large fuel loads due to the presence of understorey vegetation, leaf litter and for forest vegetation, the connection of the trees within the canopy.

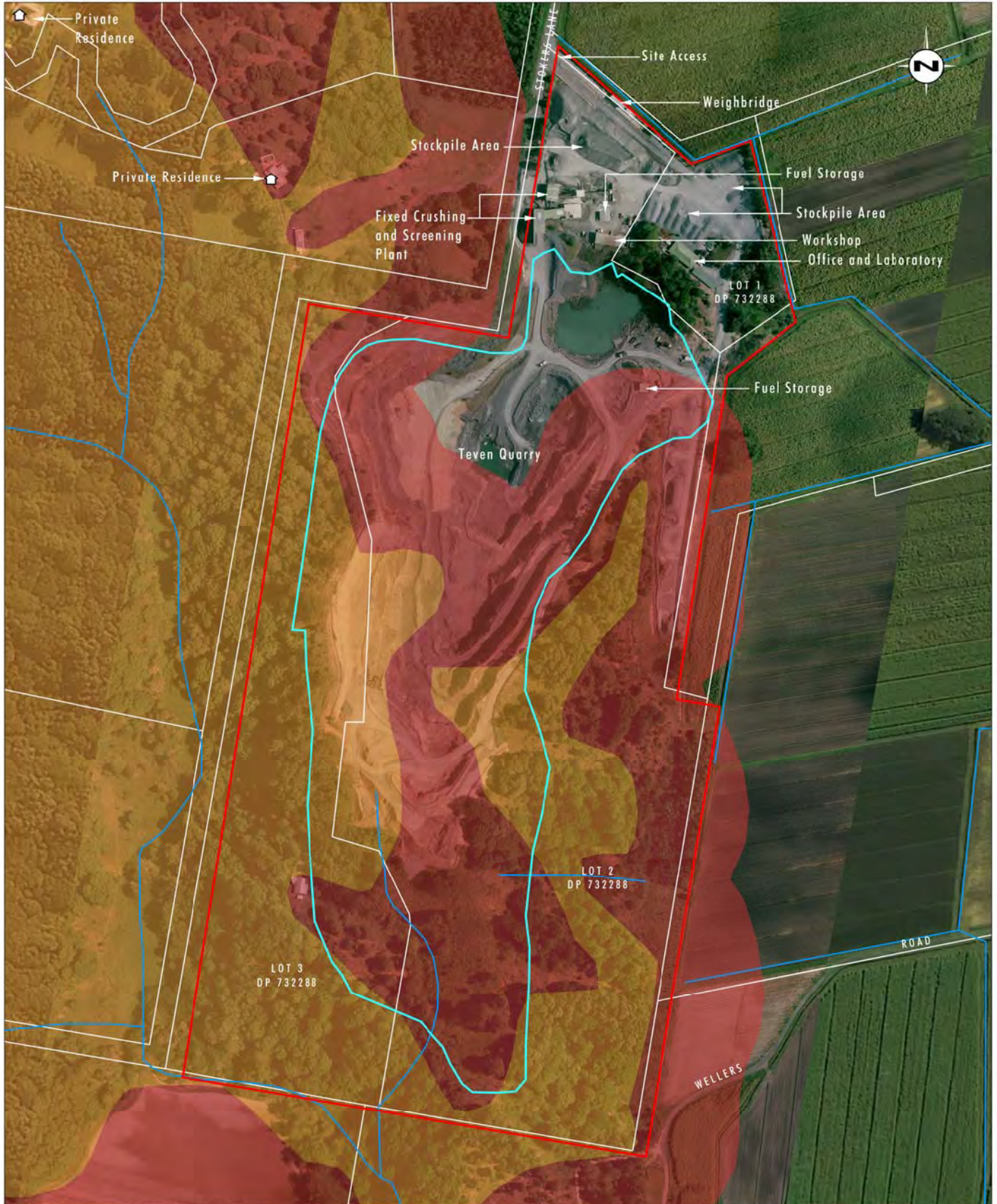


Image Source: Google Earth (2013), Holcim (Australia) Pty Ltd (2014)
 Data Source: Holcim (Australia) Pty Ltd (2014), LPI (2014), Department of Lands (2009)
 Note: Cadastral data used on this figure is regional data supplied by NSW Land and Property and is not survey accurate. It is broadly indicative only of actual property boundaries.

Legend

- Project Area
- Extraction Limit Boundary
- Vegetation Category 1 - forest, woodlands, heath & wetlands
- Buffer - 100m Vegetation Category 1 and 30m Vegetation Category 2
- Private Residence
- Drainage Line

FIGURE 7.10
 Bushfire Prone Land

The vegetation formation within the escarpment areas to the west and south of the Teven Quarry infrastructure area has been assessed as forest vegetation for the purpose of determining an APZ.

Slope Analysis

Slope plays an important role in the rate a bushfire can spread. As a bushfire spreads it pre-heats the fuel source through radiation and convection, and as a consequence of this heat transfer, fire accelerates when travelling uphill and will decelerate when travelling downhill.

The slope across the site varies significantly. The low lying infrastructure area in the north of the Project Area is largely flat with slopes generally less than 1%. The escarpment areas to the west and south of the infrastructure area are generally steeply sloping, with much of the land ranging between 33% (18 degrees) and greater than 50% (26 degrees).

The Teven Quarry infrastructure and office facilities are located downslope of surrounding bushfire prone vegetation with significant areas of cleared land surrounding site structures. As the structures on site are located downslope of bushfire prone vegetation, the effective slope for the purpose of determining an APZ is 0°.

Asset Protection Zones

An APZ is a fuel reduced area surrounding a built asset or structure. While PBP 2006 has been developed for residential development, the method for the development of an APZ provided by PBP 2006 can be used as a guide for all developments which may be affected by bushfire.

With forest vegetation formation to the west and south of the infrastructure area and an effective slope of 0°, the adopted APZ for buildings within the infrastructure area is 20 metres. For forest vegetation an APZ can consist of an Inner and Outer Protection Area. The Inner Protection Area is located immediately adjacent to the asset as a defensible space and the Outer Protection Area is a fuel reduced area designed to slow the rate a bushfire can spread. A 20 metre APZ for forest vegetation can consist of a 10 metre Inner Protection Area and 10 metre Outer Protection Area.

The general layout of the existing site, including the active extraction area, emplacement areas and quarry access and haul roads creates significant separation distances between site buildings and surrounding forest vegetation. These existing cleared areas are in excess of the required APZ and provide sufficient protection from bushfire threat. These areas also act as effective firebreaks to preventing bushfires spreading on, from or into the site. The haul roads also provide access across the site for fire fighting vehicles.

Clearing of vegetation within the approved extraction limit boundary and hazard reduction measures within the surrounding vegetation will be continually maintained throughout the life of the Project.

Ongoing 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 work health and safety (WHS) guidelines.

Holcim Australia has a long history of safe operation of Teven Quarry and implementation of appropriate measures on site for managing bushfire risk. Holcim Australia will continue to implement appropriate measures to reduce the risk of fire ignition and the spread of bushfire across the site.

7.14 Waste

The DGRs for the Project identify waste management as a key issue to be addressed.

Section 7.14 provides details of the approach to ongoing management of overburden for quarry operations. This section focuses on the identification and management of other waste material produced as part of ongoing operations.

7.14.1 Predicted Waste Streams

Wastes that require management in association with ongoing quarry activities include:

- workshop wastes, including waste oil, filters, grease cartridges, oily rags and scrap metal;
- silt (from aggregate washing);
- office paper and general rubbish;
- wastewater from amenities and office; and
- tyres.

Teven Quarry currently generates minimal quantities of general waste from office and administration facilities. This general waste is disposed of or recycled via existing Council collections. It is anticipated that the Project will not significantly increase the level of general waste generated from Teven Quarry.

Holcim Australia also recycles waste oil and steel from its Teven Quarry operations. Approximately 4,200 litres of waste oil is recycled per annum via a licensed contractor and up to 20 tonnes of scrap steel is collected bimonthly for recycling. Volumes of waste oil and steel are unlikely to change significantly as a result of the Project.

7.14.2 Waste Management

All waste generated by Teven Quarry is managed by way of Council collection services or via appropriately licensed waste contractors. No on-site disposal of general waste occurs. Holcim Australia is committed to the waste hierarchy where emphasis is placed upon reducing, re-using and recycling prior to disposal of its wastes. In order to minimise the generation of waste and maximise re-use of waste products, where practicable, the following practices will continue to be implemented on site:

- all waste oil will be collected and stored in containers within a covered and bunded area, and will be removed from the site by an appropriately licensed contractor with all relevant waste tracking documentation completed;
- all oil filters will be separately stored and returned to the manufacturer for re-use;

- scrap metal will be deposited into a dedicated skip bin for periodic collection and recycling;
- diesel fuel will be stored within a self bunded above ground tank and all refuelling will be undertaken on a hardstand area which drains to an oil/water separator;
- silt will be periodically removed from the various silt control structures and placed/stored in the product stockpile area or overburden materials for use in progressive rehabilitation;
- all office paper and general waste originating from the office, amenities building, and packaging from routine equipment and vehicle maintenance consumables will be placed in appropriate containers for collection by Council or a licensed contractor for disposal/recycling at an appropriate waste management facility;
- waste water from the amenities, workshop and laboratory will continue to be treated and disposed of via the septic tank with absorption trenches/pump-out; and
- all waste tyres will be removed by the supplier of replacement tyres.

With these controls in place, it is expected that the impacts associated with waste generation and disposal resulting from the Project can be effectively managed.

7.15 Rehabilitation and Closure

Holcim Australia is committed to the effective rehabilitation and closure of all its quarry sites. This is achieved through progressive rehabilitation and managing the quarry operations to work progressively towards the eventual final rehabilitation and closure of the site. Based on current resource definition and anticipated productions levels, Teven Quarry will close during the life of the Project. The following section discusses Holcim Australia's approach to rehabilitation of the site and approach to quarry closure, including conceptual final land use.

As part of the detailed quarry planning process, a detailed Quarry Closure Plan will be developed approximately three years prior to cessation of quarrying activities. The Quarry Closure Plan will describe in detail the proposed operational and progressive rehabilitation procedures for the remainder of the quarry life and subsequent to the quarry closure. Preliminary closure criteria for the quarry are outlined in **Section 7.15.3**. These will be refined in consultation with relevant stakeholders, including Ballina Shire Council, as part of the development of the detailed Quarry Closure Plan.

7.15.1 Proposed Final Land use

At the completion of extraction and rehabilitation works within the quarry pit, Holcim Australia proposes to primarily establish a native ecosystem on land available for rehabilitation throughout the pit, overburden and surface infrastructure areas, consistent with surrounding vegetation communities. Areas within the pit that are unsuitable for the establishment of a native ecosystem, such as rock faces, will be rehabilitated to form a safe and stable landform.

There is some potential for the pit and infrastructure area to provide for ongoing light industrial use subject to a suitable zoning and development approvals, however any such future use would require environmental assessment and planning approval. It is intended that the balance of the site would be established as native ecosystem.

As part of the development of the detailed Quarry Closure Plan, Holcim Australia will investigate the potential for any other sustainable and economically productive post-closure land uses in consideration of the local and regional land use strategies that may have further evolved towards the end of the quarry life.

As discussed above, Holcim Australia will consult with relevant stakeholders including Ballina Shire Council in regards to the suitability of the proposed final land use as part of the development of the Quarry Closure Plan.

7.15.2 Closure and Rehabilitation Objectives

Rehabilitation of the quarry extraction area will be undertaken in accordance with the key principles of the Strategic Framework for Mine Closure and encompasses the following objectives:

- provide a safe and stable landform compatible with the intended final land use;
- comply with relevant regulatory requirements and attain regulatory consensus on the successful closure and rehabilitation of the Project Area;
- establish a sustainable native ecosystem;
- reduce the need for long term monitoring and maintenance by achieving effective rehabilitation;
- complete the closure, decommissioning and rehabilitation works as quickly and cost effectively as possible whilst achieving primary objectives;
- provide a sustainable plant cover through rehabilitation of disturbed areas;
- implement appropriate control and remediation strategies in the event that any currently unknown contamination sources are identified, to prevent offsite impacts; and
- ensure that the design periods and factors for safety for all site works take into account extreme events and other natural processes such as erosion.

7.15.3 Preliminary Closure and Rehabilitation Criteria

Completion criteria will be utilised to demonstrate achievement of rehabilitation objectives/performance standards. The preliminary closure and rehabilitation criteria for the Project are outlined in **Table 7.23**.

Table 7.23 – Preliminary Closure and Rehabilitation Completion Criteria

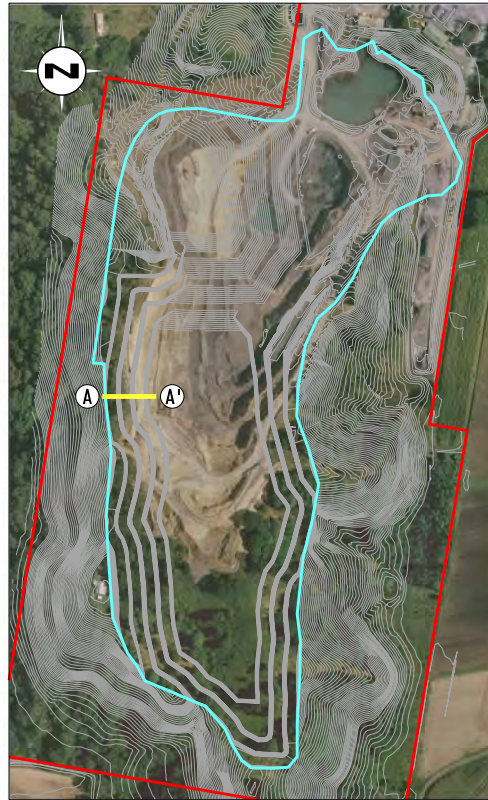
Aspect	Preliminary Completion Criteria
Decommissioning	<ul style="list-style-type: none"> • All surface infrastructure which does not have a potential future use associated with the post mining land use will be removed, unless such removal has a greater environmental impact than rehabilitating the area with the infrastructure remaining in place. • Services: removal of all services (power, water, 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.
Landform	<ul style="list-style-type: none"> • Rehabilitated slopes on overburden dumps are stable. • No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting 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 7.11. • 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.
Soil	<ul style="list-style-type: none"> • Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface. • Monitoring demonstrates soil profile development in rehabilitated areas (e.g. development of organic layer, litter layer).
Water	<ul style="list-style-type: none"> • Runoff water quality from the site does not pose a threat to downstream water quality.
Native Vegetation	<ul style="list-style-type: none"> • Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities. • Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed). • More than 75 per cent of trees are healthy as indicated by long term monitoring. • There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.
Bushfire Hazard	<ul style="list-style-type: none"> • Appropriate bushfire hazard controls have been implemented.
Ongoing Public Safety	<ul style="list-style-type: none"> • Appropriate mechanisms are established to control access and manage public safety post closure.

The preliminary closure and rehabilitation criteria outlined in **Table 7.23** have been developed based on an assumed final land use as a native ecosystem. Revised criteria would be developed if an alternate final land use is proposed.

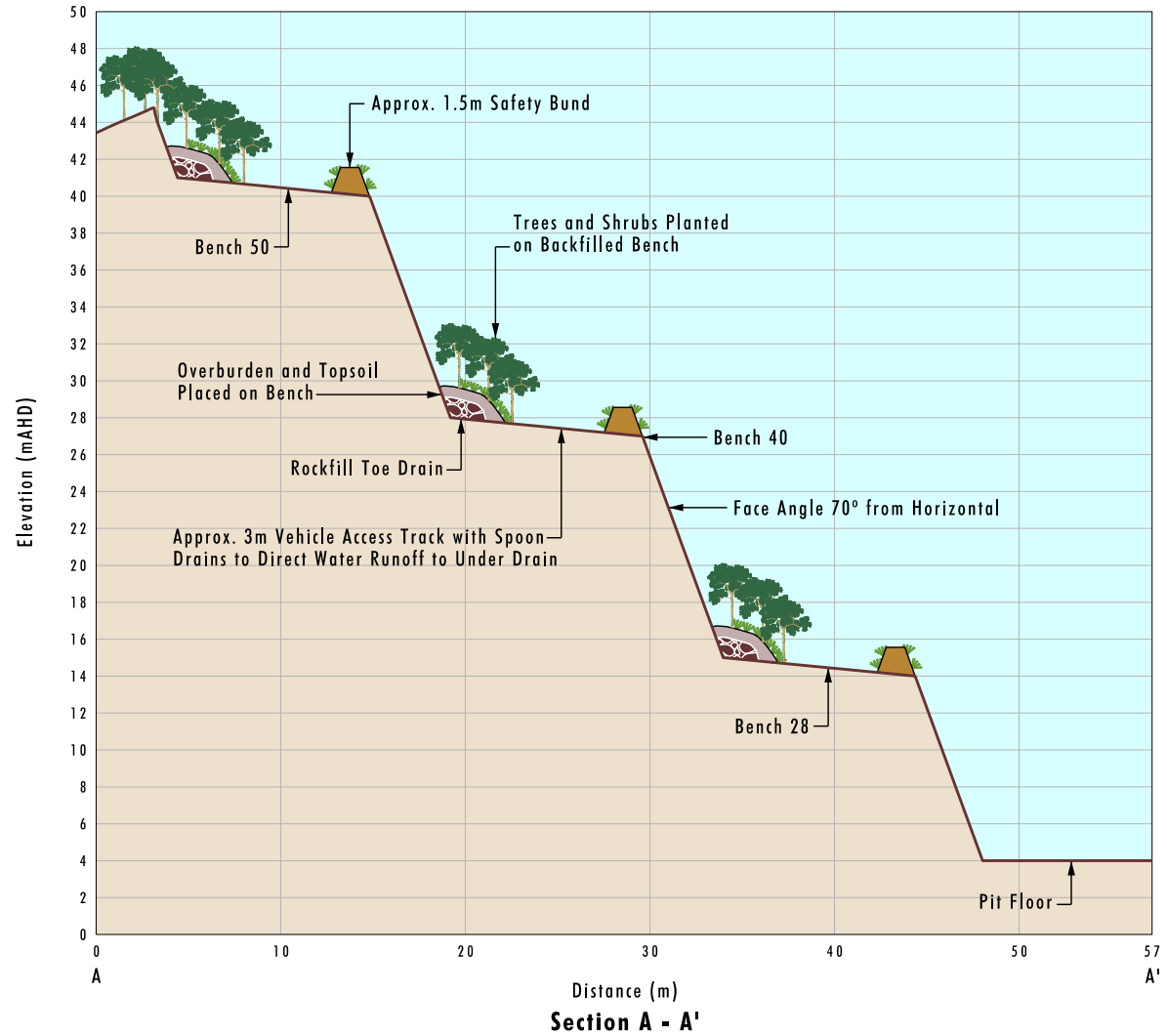
The preliminary closure criteria will be reviewed and revised throughout the Project life and used as the basis for further refinement following the commencement of rehabilitation activities; consideration of the results of rehabilitation monitoring programs; and consideration of any stakeholder feedback.

7.15.4 Final Landform

An indicative cross-section of the rehabilitation quarry benches and conceptual final landform of the quarry are shown in **Figure 7.11**. Further details on the rehabilitation methodology to achieve the indicative landform design are outlined below.



Plan



Legend

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

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

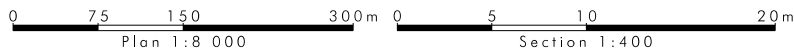


FIGURE 7.11

Indicative Cross-section of Rehabilitated Quarry Benches

Quarry Pit

Rehabilitation of the quarry pit will be achieved by battering back the upper bench located within highly weathered material to achieve a more sloping landform. The battering will result in a stable sloping landform of approximately 1V:2H. It is considered that this proposed final landform gradient for the upper bench will result in a safe and stable landform. Notwithstanding, Holcim Australia will conduct ongoing stability monitoring throughout the Project.

Once the battering back of the bench is complete, the shaped areas will be covered with topsoil or a suitable alternative and seeded with a local shrub/tree species mix. To provide for initial stabilisation of the substrate prior to the natives becoming established, a suitable cover crop mix will be applied.

Rehabilitation of the remaining quarry benches will involve placing overburden material across the bench. A 1.5 metre bund will be created on the outer edge of the quarry bench to act as a safety barrier rendering the bench internally draining, ensuring any rain captured will be retained and be available for vegetation. Overburden will then be covered with available topsoil (or suitable alternative), excluding an access track area which will be retained along the entire bench. Once topsoiled, the bench will be seeded with a local shrub/tree species mix. The safety bund will be seeded with a grass species mix.

Security measures such as a fence line, appropriately designed safety berms and signage will be installed and maintained in consultation with the landholder and the relevant government agencies to prevent access. The appropriate mechanism/s to restrict access and manage ongoing public safety after the closure of the site will be developed as part of the Quarry Closure Plan.

Overburden Areas

Overburden will be progressively placed within the in-pit western overburden emplacement area (refer to **Figure 7.11**). Key features and processes associated with the western overburden emplacement area are outlined below.

- Slopes will be battered to an average of 25 degrees.
- The top surface of the overburden emplacement area will be constructed to provide variability in local relief in order to prevent excessive ponding of surface water as well as create a profile that is broadly commensurate with the natural local topography.
- A surface drainage network will be established to divert the bulk of surface water away from the final pit so as to maximise replenishment of the local catchment areas.
- The shaped overburden area will be covered with topsoil or a suitable alternative and seeded with a local shrub/tree species mix. To provide for initial stabilisation of the substrate prior to the natives becoming established, a suitable cover crop mix will be applied.

Surface Infrastructure Area

During the decommissioning process, the processing plant, workshop and other buildings no longer required will be removed. Where required, the areas occupied by the product stockpile, processing plant, workshop, office and weighbridge areas would be re-profiled, deep ripped, topsoiled and revegetated.

7.15.5 Proposed Quarry Pit Rehabilitation

Wherever 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 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 where practical throughout the staged quarry development.

Rehabilitation areas will be seeded/planted with a mixture of local shrub/tree species. Revegetation strategies will include the following:

- revegetation will primarily involve direct seeding of native species along with a cover crop as required to prevent soil loss and add biomass to the profile. A range of other techniques including the planting of tubestock may also be utilised where appropriate over isolated areas associated with steep slopes; and
- the requirement to utilise local indigenous species in the revegetation mix as a priority.

Use of Topsoil or Organic Material

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;
- stockpiles to be kept longer than three months will be sown with a suitable sterile cover crop to minimise erosion and invasion of weed species;
- weed growth will be monitored and subsequently controlled if necessary;
- prior to re-spreading, any weed growth will be scalped from the top of the stockpiles to minimise the transport of weeds into rehabilitated areas; and
- stockpiles will be appropriately sign-posted to identify the area and minimise the potential for unauthorised use or disturbance.

Currently Holcim Australia has sufficient volumes of suitable overburden for use as a substrate during rehabilitation activities, however local topsoil or suitable alternative may be intermittently imported and stockpiled upon availability. Thorough soil testing (including suitability, contamination and weed infestation) will be sought prior to bringing soil or organic material onto the site.

Substrate Separation

General surface preparation activities to be undertaken as part of rehabilitation activities include:

- prior to revegetation activities, soils (or suitable alternatives) will be characterised to determine the type and application rate that may be required for the addition of soil ameliorants (e.g. gypsum, lime, fertiliser, biosolids, etc.);
- appropriate soil ameliorants will be applied for incorporation into the final shaped surface;
- where direct tree seeding is planned, final shaped overburden emplacement surfaces will be deep ripped parallel with the contour prior to the application of seed to provide an adequate seed bed;
- where grass seeding is planned the surface will be harrowed/tilled across the contour to provide for an adequate seed bed; and
- suitable erosion and sediment control measures (e.g. catch drains, sediment dams, silt fences, mulches, etc.) will be implemented to minimise soil loss from areas undergoing rehabilitation.

7.15.6 Proposed Rehabilitation Monitoring and Maintenance

A rehabilitation monitoring program will be implemented to include the aspects outlined below.

Quarry Records

Throughout the life of the Project, active records will be maintained in relation to processes that may impact upon rehabilitation of the Project Area. This will provide the basis for interpretation of subsequent rehabilitation monitoring outcomes. The records to be maintained will include the following:

- detailed rehabilitation procedures;
- identification of any potentially contaminated sites (e.g. fuel/oil facilities);
- environmental monitoring records;
- records of topsoil stockpiles, including information such as the date on which they were formed and maintenance works undertaken (e.g. weed control, planting with native legumes to maintain microbes etc.); and
- environmental incident records.

Rehabilitation Methodology Records

Details of each rehabilitation campaign will be recorded so that they are available for later interpretation of rehabilitation monitoring results with the aim of continually improving rehabilitation standards. Key monitoring parameters to be included in the program relate to the following:

- landform design details;
- drainage design details;

- substrate characterisation;
- site preparation techniques (e.g. topsoil and source, time of sowing, soil ameliorants used etc.);
- revegetation methodologies (e.g. rate and type of fertiliser, cover crop and rate, seed viability);
- weather conditions;
- photographic records; and
- initial follow-up care and maintenance works.

Rehabilitation Monitoring

Annual inspections of rehabilitated areas will be undertaken over the life of the Project to assess soil conditions and erosion, drainage and sediment control structures, runoff water quality, revegetation germination success, plant health and weed infestation. Outcomes of annual rehabilitation inspections will be recorded and any required management actions that are identified as part of the inspection implemented as soon as practical. Where necessary, rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

The objective of this monitoring is to evaluate the progress of rehabilitation towards fulfilling long term land use objectives and criteria. The monitoring program will be continued until it can be demonstrated that rehabilitation has satisfied the closure and rehabilitation criteria (refer to **Section 7.15.3**). Information from this monitoring program will also be used to refine closure and rehabilitation criteria as required.

Rehabilitation Care and Maintenance

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

- weed and feral animal control;
- erosion and sediment control works;
- re-seeding/planting of rehabilitation areas that may have failed;
- maintenance fertilising; and
- repair of fence lines, access tracks and other general related land management activities.

7.15.7 Conceptual Decommissioning Plan

Decommissioning will occur at the completion of quarrying and rehabilitation within the pit. This will occur once the resource within the Project Area has been exhausted and will involve the decommissioning of plant and infrastructure as well as the finalisation of rehabilitation works consistent with the intended final land use.

A summary of the general decommissioning activities that will be undertaken as part of the closure and rehabilitation of the Project Area is outlined below.

- The plant and equipment will be decommissioned, transferred or sold, either for use at another quarry or industrial operation, or for scrap metal. All surface infrastructure including the crushing and screening plant will be removed and the areas containing this infrastructure rehabilitated. However, some infrastructure (i.e. sheds) may possibly be retained for the post-quarrying land use following consultation and agreement with the landowner.
- It is envisaged that electricity services to any remaining infrastructure will be removed prior to the commencement of building demolition works. Other services such as telecommunication and water supply will also be disconnected and removed where practical.
- Provided that it does not pose a constraint to the proposed final land use, there may be circumstances where structures such as footings, underground water pipelines and disconnected power cables are left *in situ*. Such circumstances may include where it is not practical to retrieve the structures or where their removal may lead to environmental damage (e.g. erosion or loss of vegetation through clearing). In such circumstances, the location of these remaining structures will be surveyed and recorded on a plan and provided to the landowner.
- Where potential contamination may have occurred as a result of activities (e.g. re-fuelling areas, workshops, etc.), appropriate investigations will be undertaken to determine the presence and extent of any contamination. Where it is identified, contaminated material will be managed in accordance with relevant legislative requirements. Further investigations involving sampling will be undertaken to validate that contamination has been remediated to acceptable levels having regard to the intended future use of the site.

As discussed above, a detailed quarry closure planning process resulting in the development of a Quarry Closure Plan will be implemented approximately three years prior to cessation of quarrying activities. This plan will formalise the approach to decommissioning and closure of Teven Quarry.

7.16 Socio-economic Assessment

7.16.1 Social Impact Assessment and Community Attitudes

A Project-specific community engagement program was implemented during the planning and assessment phase of the Project. Community feedback was sought and used to identify the key community issues and perceived impacts of the Project. Potential noise, air quality and traffic impacts were the most commonly identified concerns associated with the Project, (refer to **Section 6.2**).

Holcim Australia has undertaken a range of detailed environmental studies to assess the potential impact of the Project on a broad range of environmental aspects, including those with the potential to result in impacts on the community (eg. air quality, noise and vibration, traffic, visual) and those of key concern to the local community. Through this process, Holcim Australia has incorporated a range of controls into the Project design and a range of mitigation measures and management controls to be implemented over the life of the Project to minimise potential impacts on the community wherever practicable. The range of controls and environmental management measures to be implemented are detailed in **Section 7.0**.

The environmental impact assessment findings identified that, with the implementation of the proposed environmental controls, the Project will not result in any significant changes to the environmental and community impacts of the Project. The overall life of the Teven Quarry is not increasing and the nature of the operations is not changing significantly, such that changes to the interactions of the Quarry with the community will significantly alter. At peak production levels the traffic generation will increase, however, Holcim Australia has made commitments to alter transport routes to reduce impacts and undertake improvements to the road network to improve road safety.

Employment at the quarry will increase slightly, with approximately three new employees plus additional haulage contractors at maximum production levels. The change in employees will result in a small positive economic benefit without impacting on the capacity of community services and infrastructure. Overall, the socio-economic impacts of the Project are therefore predicted remain broadly consistent with those of the existing approved Teven Quarry and no significant adverse social impacts are predicted to occur.

7.16.2 Economic Impact Assessment

Teven Quarry delivers a range of positive economic benefits to the local and regional economy including the ongoing employment of 8 full time equivalent staff, truck drivers plus up to 3 local contractors. An additional 3 full time equivalent positions are expected to be generated as a result of the Project.

The Project will bring direct expenditure in the local economy of approximately \$2 million, plus continued ongoing expenditure associated with quarry operations and labour of approximately \$3.2 million annually, much of which spent locally providing benefits to the local and regional economies. In addition, the quarry currently contributes to the State and Commonwealth Government through the payment of taxes, and to Ballina Shire Council for the maintenance of the local road network at a current rate of \$0.36 per tonne (equates to \$180,000 per annum at the proposed maximum production levels).

The increase in production proposed by the Project will contribute to the availability of quality, affordable construction materials in the Northern Rivers region, helping to provide for security of supply during peak demand periods associated with the construction of major infrastructure projects, as well as meeting part of the demand generated by population growth.

The ability to increase production up to 500,000 tpa to meet customer needs will allow Teven Quarry to meet the predicted needs of major construction projects, including major road upgrades, that will be of significant benefit to both the region and NSW.

The Project will provide ongoing economic benefit to the local area and region through secure supply of high quality quarry products, ongoing and increased employment, capital expenditure and ongoing operational expenditure. These benefits will have flow on effects within the local and regional economies.

No significant adverse environmental or social impacts are predicted to occur as a result of the Project that cannot be addressed by appropriate environmental management measures. In addition, the Project will bring direct expenditure in the local economy of approximately \$2 million, plus continued ongoing expenditure associated with quarry operations and labour of approximately \$3.2 million annually.

7.16.3 Ongoing Community Engagement

Holcim Australia focuses on community and environmental concerns both during and after its quarrying operations. The company is committed to developing and maintaining long-term relationships with all stakeholders by communicating openly, honestly and in a transparent manner.

In line with contemporary standards, Holcim Australia will establish and operate a Community Consultative Committee for the Project in accordance with the *Guidelines for Establishing and Operating Community Consultative Committees For Mining Developments* (Department of Planning 2007). The committee will provide for the ongoing communication of information relating to quarry operations to the local community and stakeholders and provide an opportunity to receive feedback on the quarry's environmental performance.

Holcim Australia will operate a Community Line for Teven Quarry for the life of the Project providing a dedicated communication point for community enquiries and complaints. Teven Quarry has a complaints management process that includes investigating and responding to complaints should they occur.

Holcim Australia is committed to establishing positive, long-term partnerships with communities and has been involved in the local Ballina community for a number of years through the support of community organisations, including providing sponsorship for the local Riding for the Disabled Association and staff participation in the Meal on Wheels program. Holcim Australia will continue to work with the local community as part of its ongoing operations at Teven Quarry including contributing to community initiatives and programs as appropriate.

8.0 Statement of Commitments

The DGRs for the Project required a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.

If development consent is granted under Part 4 of the EP&A Act for the Project, Holcim Australia will commit to the following controls.

Life of Operation, Production and Product Delivery

Project Life

- 1 The project approval life will be for 30 years from the date of development consent. Closure and rehabilitation activities may extend beyond the 30 year operational approval period.

Production Limits

- 2 Holcim Australia will not transport more than 500,000 tpa of product from the site.

Hours of Operation

- 3 Quarry operations will be undertaken between 7.00 am and 6.00 pm Monday to Saturday.
- 4 The following activities may be undertaken between 7.00 am and 10.00 pm Monday to Friday:
 - maintenance (including repair, cleaning and replacement of machinery and/or machinery components);
 - product stockpile management; and
 - product loading and transport.
- 5 Blasting activities will be undertaken between 9.00 am and 3.00 pm Monday to Friday.
- 6 No operations will be undertaken on a Sunday or on public holidays.

Concrete Recycling

- 7 Holcim Australia will not recycle more than 10,000 tpa of clean, validated surplus concrete. Recycling of surplus concrete will be undertaken in accordance with '*The recovered aggregate exemption 2010*' or subsequent revision.

Environmental Management, Monitoring and Reporting

Environmental Management Plan

- 8 Within six months of development consent, Holcim Australia will update its existing Plan of Management (POM) with an Environmental Management Plan (EMP) as part of the implementation of the Project. The EMP will include the management and monitoring commitments outlined in the EIS

Annual Review

- 9 Holcim Australia will prepare an Annual Review of the environmental performance of the Project and will make this available to the public, Ballina Council and relevant government agencies.

Water

- 10 Holcim Australia will continue to monitor water quality associated with water discharges at the Teven Quarry licensed discharge point in accordance with the requirements of its Environment Protection Licence.
- 11 Holcim Australia will review the risk of flooding to the stockpile and infrastructure areas and determine if additional flood protection measures are required.
- 12 Holcim Australia will review the existing water management measures for the stockpile and infrastructure areas as part of the implementation of the project considering the requirements of the Blue Book (Managing Urban Stormwater: Volumes 1 and 2, Landcom 2004 and DECC 2008).
- 13 If groundwater interception is suspected based on observation of sustained inflow, a hydrogeological investigation will be completed in consultation with the NSW Office of Water and DP&E.
- 14 Holcim Australia will continue to report on site performance regarding water discharges in the annual review and EPL annual returns.

Noise and Blasting

- 15 Holcim Australia will implement the following noise controls as part of the Project:
- the maintenance of product stockpiles in strategic locations, where practicable, along the northern edge of the Project site shielding product trucks and product loading equipment;
 - the use of broad band reversing alarms instead of beeper style alarms on all mobile equipment; and
 - the management of mobile machines during adverse weather conditions when wind conditions or inversion conditions enhance the noise propagation towards sensitive receiver locations which is likely to include:
 - ensuring the sales loader operates behind the product stockpile during adverse weather conditions in the evening period;
 - moving quarrying activities to locations deeper in the quarry pit during adverse weather conditions; and
 - shut down of some equipment during adverse weather conditions if required.
 - regular inspection and maintenance of noise attenuation systems; and
 - implementation of a process for periodic review of noise performance of equipment. This process will be outlined in a Noise Management Plan to be prepared for the Project.
- 16 Within six months of the date of consent, Holcim Australia will prepare and implement a Noise Management Plan for the Project. The Noise Management Plan will be integrated into the site Environmental Management Plan (refer to commitment 8).

17 Holcim Australia will undertake a noise monitoring program on an annual basis (or as otherwise outlined in the Noise Management Plan) including:

- attended noise monitoring to measure ambient noise levels in the surrounding region and determination of the quarry's contribution to measured noise levels;
- comparison of the attended noise monitoring results with relevant limits and predicted noise levels from the Project; and
- assessment of performance of noise control measures and recommendations for additional measures if required.

18 Blast monitoring will continue to be undertaken for each blasting event.

19 A summary of the noise monitoring and blasting monitoring results will be reported in the Annual Review for the operation.

Air Quality

20 The existing dust control measures implemented onsite will continue to be implemented as part of the Project. These controls include:

- watering of unsealed roads, working areas and stockpiles;
- water sprays on conveyors;
- dust suppression systems on drill rigs;
- primary and secondary crushing plants are enclosed;
- water sprays on the entrance to the primary crusher bin;
- water sprays on product stockpiles;
- wheel wash at weighbridge; and
- progressive rehabilitation of overburden emplacement areas.

21 In addition to the existing dust controls, Holcim Australia Holcim will implement the following controls as part of the Project:

- installation of sprinklers along haul roads to work in combination with water carts or equivalent measures to achieve the same level of dust control;
- water sprays on the mobile crushing and screening plant;
- defining all roads and limiting access to minor and non-designated access alignments roads;
- imposition of speed limits on all internal roads;
- disturbance of the minimum area practicable for quarry operations;
- designing of blasts to minimise dust, including adequate stemming;

- consideration of current weather conditions prior to blasting. This includes visual observations of wind speed and wind direction to determine whether any dust emissions from the blast will be carried in the direction of nearest sensitive receptors;
- implementation of blast fume management procedures; and
- awareness training regarding air quality management for employees and contractors, where relevant.

22 Holcim Australia will continue to monitor dust deposition in the area surrounding the quarry, unless otherwise agreed with DP&E.

23 Holcim Australia will install and operate a real-time meteorological station to enable identification of adverse meteorological conditions (such as strong winds blowing towards sensitive receptors) that may result in adverse short-term dust impacts. The meteorological station will collect as a minimum, hourly (or finer resolution) wind speed and wind direction data, with monitoring to be carried out with consideration of the *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC 2007).

Traffic

24 Holcim Australia will utilise Teven Road south of Stokers Lane (Route 1) as the primary heavy vehicle transport route for all product deliveries to the Pacific Highway. Teven Road north of Stokers Lane and Tintenbar Road will be used for local deliveries only.

25 Holcim Australia will liaise with Ballina Shire Council in relation to implementing the recommendations of the Road Safety Audit, including:

- centreline markings in Teven Road between Stokers Lane and Bruxner Highway including the maintenance of the existing line marking (where required) in Teven Road;
- provision of reflectors on the existing guardrail fencing at the intersections of Stokers Lane and Wellers Road, with Teven Road; and
- maintenance of existing end treatment of guardrail in Teven Road at Stokers Lane.

Greenhouse Gases

26 Holcim Australia will continue to investigate and where feasible, implement initiatives to reduce energy consumption and greenhouse gas emissions.

Biodiversity

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.

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;

- 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 Camphour 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.

Aboriginal Cultural Heritage

29 If during the course of operations, Holcim Australia becomes aware of any previously unknown Aboriginal archaeological material, all works likely to affect the material or site will cease immediately and OEH, relevant Aboriginal stakeholders and a suitably qualified archaeologist will be consulted to determine an appropriate course of action prior to the recommencement of work at the site.

Visual Amenity

30 Holcim Australia will implement the following measures to mitigate potential visual impacts from the Project:

- maintenance of existing vegetation outside the extraction limit boundary for visual screening;
- additional screening plantings of tall tree species will be planted adjacent to the eastern pit perimeter in order to assist in screening the more elevated western faces from viewing locations to the east, including Teven Road;
- ensuring that areas of disturbance are kept to the minimum practicable at any one point in time;
- rehabilitation of disturbed areas as soon as practical; and
- install and operate night lighting in accordance with *AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting*.

Hazard

31 Holcim Australia will store dangerous goods in accordance with dangerous good storage requirements and relevant Australian Standards.

32 Holcim Australia will continue to implement appropriate measures to reduce the risk of fire ignition and the spread of bushfire across the site.

Rehabilitation

33 A detailed Quarry Closure Plan will be developed approximately three years prior to cessation of quarrying activities.

34 The revised EMP will detail the approach to rehabilitation of the Project, including the species to be used in revegetation works.

35 Where practicable, rehabilitation will be completed progressively as part of the ongoing development of the quarry.

36 Annual inspections of rehabilitated areas will be undertaken over the life of the Project to assist in guiding rehabilitation practice.

Community Engagement

- 37 Holcim Australia will establish and operate a Community Consultative Committee for the Project in accordance with the *Guidelines for Establishing and Operating Community Consultative Committees For Mining Developments* (Department of Planning 2007).
- 38 Holcim Australia will operate a Community Line for Teven Quarry for the life of the Project.

9.0 Conclusion

9.1 Environmental Impacts

The potential environmental impacts of the Project have been identified through a process involving:

- assessment of site characteristics;
- consultation with government agencies;
- consultation with surrounding land owners and other stakeholders; and
- expert technical assessments.

The key issues identified were the subject of comprehensive technical assessment to identify and assess the potential impacts of the Project on the existing environment and community. The results of these assessments are detailed in **Section 7.0** and the appendices of this EIS.

The environmental and social impacts of the Project have been minimised through maintaining the existing and approved disturbance areas, refining the Project design in consideration of environmental constraints and stakeholder input, maximising the use of the existing quarry resources and infrastructure, and implementation of appropriate control measures as part of an iterative Project design process.

With the proposed measures to avoid, minimise and/or manage impacts associated with the Project, it is anticipated that the Project can proceed without significantly changing the extent of impact on the environment or local community.

9.2 Suitability of the Site

The Project Area is located within a generally rural environment approximately 8 kilometres west of Ballina. The primary land uses in the vicinity of the Project Area include agriculture including sugar cane farming and grazing as well rural residential uses. While the quarry is neighboured by some rural residences, the Project Area is a significant distance from major residential areas. The ridgeline and undulating terrain to the west of the Project Area provides topographical shielding for the Teven Quarry from the residential area of Alstonville.

Teven Quarry has been producing construction and road building materials since the 1940's and has approval to continue operation until 2056. The site is highly accessible to key markets through its proximity to the Pacific Highway and the regional centre of Ballina. The safety and accessibility of the Quarry to markets has been greatly enhanced by the newly constructed Teven Road interchange providing safe access to the Buxner Highway and the Pacific Highway via the Ballina Bypass. Population growth within the Ballina, Byron, Lismore and Tweed LGAs are expected to drive demand for hard rock resources in the region by 26 per cent over the next 23 years. Significant demand is expected to continue as a result of major Pacific Highway upgrade works between Tintenbar and Ewingsdale and Ballina to Woolgoolga.

The Project will result in very little change to the existing approved extraction and processing operations on site, with no change to the existing approved quarry footprint or disturbance area proposed as part of the Project. The Project will target the same resource approved for extraction under existing approvals. The Project is intended to allow flexibility for Holcim Australia to meet the peak demands of major construction and road building projects forecast

over the coming years and provide an opportunity to bring the existing quarry approval, dating back to 1995, up to contemporary environmental compliance standards.

The comprehensive environmental impact assessment demonstrates that the site is suitable for the proposed Project and that the environmental impacts of the Project can be effectively managed.

9.3 Benefits of the Project

The continued operation of Teven Quarry will provide significant ongoing benefits. The key benefits associated with Teven Quarry include:

- the Project will provide a high quality supply of construction materials into the Ballina, Byron, Lismore and Tweed markets to meet identified need for these materials;
- the Project will support continued rapid growth and development of the area through supply of high quality construction materials;
- the Project is well positioned to cater for the predicted growth in quarry products given its proximity to the Pacific Highway;
- the Project maximises the production ability of the quarry to meet the growth in demand and utilises existing infrastructure already available onsite;
- the quarry is positioned away from major population centres and incompatible land uses and has a substantial existing buffer zone and topographic shielding for the key residential area of Alstonville;
- the Project will be developed entirely within the existing and approved disturbance footprint, limiting the potential environmental and social impacts of the Project;
- the Project will allow for continued employment of the existing 8 quarry personnel with an additional 3 staff to be employed;
- the Project will provide direct economic benefits in the form of \$2 million in capital expenditure, plus continued ongoing expenditure associated with quarry operations and labour of approximately \$3.2 million annually, providing an ongoing contribution to the local and regional economies;
- the quarry contributes to Ballina Shire Council for the maintenance of the local road network at a current rate of \$0.36 per tonne (equates to \$180,000 per annum at the proposed maximum production levels); and
- the quarry contributes to the State and Commonwealth Government through the payment of taxes.

9.4 Ecologically Sustainable Development

The EP&A Act aims to encourage ecologically sustainable development (ESD) within NSW. As outlined in **Section 5.0**, the Project requires approval from the Minister for Planning, or their delegate, under Part 4 of the EP&A Act. As such, the Minister needs to be satisfied that the Project is consistent with the principles of ESD. This section provides an assessment of the Project in relation to the principles of ESD.

To justify the Project with regard to ESD principles, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The ESD principles encompass the following:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity; and
- valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

9.4.1 The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

- (i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) an assessment of the risk-weighted consequences of various options.

In order to achieve a level of scientific certainty in relation to potential impacts associated with the Project, this EIS has undertaken an extensive evaluation of all the key components. Detailed assessment of all key issues and necessary management procedures has been conducted and is documented in this EIS.

The assessment process has involved a detailed study of the existing environment and the use of engineering and scientific modelling and study to assess and determine potential impacts as a result of the Project. To this end, there has been careful evaluation to avoid, where possible, irreversible damage to the environment.

The decision making process for the design, impact assessment and development of management processes has been transparent in the following respects:

1. Relevant government authorities, community members and other stakeholders were consulted during EIS preparation (refer to **Section 6.0**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.
2. Holcim Australia has an established Safety, Health and Environmental (SHE) Management System. In addition, the approved quarry incorporates an environmental management plan and environmental monitoring that will be revised in consideration of the Project.

3. This EIS has been undertaken on the basis of the best available scientific information about the Project Area. Where uncertainty in the data used in the assessment has been identified, a conservative worst case analysis has been undertaken and contingency measures have been identified to manage that uncertainty. A validation program has also been proposed to measure predicted against actual impacts of the Project for relevant key aspects (refer to **Section 7.0**), so that contingency measures, if required, can be implemented in a timely and pro-active manner.
4. An auditing and review process is an integral component of Holcim Australia's existing SHE management system for the Quarry, providing for verification of future Quarry performance by independent auditors and relevant government agencies. Holcim Australia will implement this auditing and verification process for the Project.

9.4.2 Intergenerational Equity

The EP&A Regulation defines intergenerational equity as:

that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, bio-diversity and productivity.

The key objective of the Project is to maximise the effective use of existing resources and meet the needs of the community for quarry products, whilst minimising environmental and social impacts. As part of quarrying operations to recover a substantial, hard rock resource, a comprehensive rehabilitation strategy will be developed for the Project Area.

As detailed in **Section 7.0**, the Project can be undertaken without significantly changing the impacts of the quarry from the existing and currently approved impacts, and without having a significant adverse impact on the local environment or community. The environmental management measures discussed in **Section 7.0** have been developed to minimise the impact of the Project on the environment and community to the extent reasonably practicable.

The management of environmental issues as outlined in this EIS will maintain the health, diversity and productivity of the environment for future generations.

9.4.3 Conservation of Biological Diversity

The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project are described in this EIS. As outlined in this EIS, the Project will not result in direct impacts to biodiversity values with no additional clearing proposed beyond that currently approved. As also outlined in this EIS, the predicted indirect impacts on biodiversity values are not expected to significantly impact on biodiversity values and are predicted to be consistent with those currently occurring and approved. The Project is not predicted to result in adverse biological diversity outcomes. Holcim Australia has committed to measures to ameliorate any potential negative impacts on biodiversity as part of the Project (refer to **Section 8.0**).

9.4.4 Valuation and Pricing of Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle of improved valuation and pricing refers to the need to determine proper values of services provided by the natural environment. The objective is to apply economic terms and values to the elements of the natural environment. This is a difficult task largely due to the intangible comparisons that need to be drawn in order to apply the values.

The Project optimises the valuation and pricing of the hard rock resource with minimal impact by:

- optimising the operations at Teven Quarry to suit predicted future markets by providing additional infrastructure to assist in meeting client product needs and meet peak market demand through increased annual production capacity;
- providing for the ongoing operational viability of the quarry by optimising the approach to extraction of the approved quarry resources, maximising the use of existing infrastructure and maximising operational and economic efficiencies; and
- providing for the recovery of a current waste by providing for the recycling of clean concrete material to generate quarry products.

Project feasibility considerations have included the costs of integration of effective management measures to minimise potential environmental and social impacts as well as design of the Project to limit the impact on other natural resources including water and native vegetation.

9.5 Conclusion

The Project will provide for the ongoing supply of construction and road building materials to the local and regional markets over a 30 year period, providing a valuable and necessary resource to the local and regional economy. Teven Quarry is currently approved to operate until 2056, however, the Project optimises and modernises the approach to operations and environmental management at the quarry, providing ongoing economic benefits whilst effectively managing environmental and social impacts.

There is strong ongoing demand for the products produced by Teven Quarry and the quarry is well placed to meet this demand. The ability to increase production up to 500,000 tpa to meet customer needs will allow Teven Quarry to meet the predicted needs of major construction projects, including major road upgrades, that will be of significant benefit to both the region and NSW.

The Project will provide ongoing economic benefit to the local area and region through secure supply of high quality quarry products, ongoing and increased employment, capital expenditure and ongoing operational expenditure. These benefits will have flow on effects within the local and regional economies.

The Project has been designed with consideration to the environmental values of the Project Area and potential impacts of the Project have been minimised through appropriate Project design and control measures. The potential environmental impacts of the Project have been thoroughly assessed and, where potential impacts have been identified, mitigation measures and environmental safeguards have been recommended and incorporated in the Project design and operational management.

It is considered that the Project has identified and mitigated potential environmental and social impacts to a level that will allow for the significant benefits of the Project for the local and regional communities to be sustainably realised.

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