

APPENDIX 1

Director General's Requirements, Project
Team and EIS Statement of Authorship

Project Team

Umwelt (Australia) Pty Limited – Environmental Impact Statement Preparation

<p>John Merrell, Associate B Env Sc</p>	Project Director, Report Review, Agency Liaison
<p>Gabrielle Allan, Senior Environmental Scientist B Env Sc</p>	Project Manager, Agency and Community Consultation, Preparation of EIS
<p>Allison Sharp, Senior Environmental Scientist B Env Sc (Env Mgt)</p>	Project Manager, Agency and Community Consultation, Preparation of EIS
<p>Elliot Holland, Environmental Scientist B Env Sc & Mngt</p>	Preparation of EIS
<p>Susan Shield, Technical Engineering Manager, Associate B Eng (Hons), M Eng (Water), MIEAust CPEng</p>	Water Resources Impact Assessment
<p>Anna Milner, Water Resources Engineer B Eng Env (Hons)</p>	Water Resources Impact Assessment
<p>Tim Procter, Manager, Engineering Services/Associate B Eng (Hons) Chem</p>	Noise, Vibration and Blasting Impact Assessment
<p>Anthony van der Horst, Process/Environmental Engineer B Eng Chem (Hons)</p>	Noise, Vibration and Blasting Impact Assessment
<p>Malcolm Sedgwick, Senior Energy and Greenhouse Specialist B Sc, MBA</p>	Greenhouse Gas and Energy Assessment
<p>Luke Bettridge, Senior Environmental Scientist B Env Sc</p>	Rehabilitation Planning
<p>Rebecca Abbott, Drafting Supervisor</p>	Drafting and Graphic Design
<p>Kerrie Hine, Project Administrator Joelle Brockman, Project Administrator</p>	Administration Support

Other Specialist investigations

SKM	Air Quality Assessment
Transport and Urban Planning	Traffic Impact Assessment
RPS	Groundwater Assessment

Holcim (Australia) Pty Ltd

The assistance of the following Holcim personnel during the preparation of this EIS is gratefully acknowledged. In addition, personnel from Holcim provided details regarding the project and participated in the community consultation process.

Ian Shenton	Senior Planning and Environment Coordinator – NSW & ACT
Justin Meleo	Planning and Approvals Manager – NSW, QLD
Damon Bird	Geology and Development Manager
Garth Stacey	Quarry Manager

STATEMENT OF AUTHORSHIP

EIS prepared by

Name: John Merrell
Group Manager, Environment and Community NSW

Qualifications: Bachelor of Environmental Science,
University of Newcastle

Address: Umwelt (Australia) Pty Limited
75 York Street
Teralba NSW 2284

In respect of: Proposed Teven Quarry Project as described in the
accompanying Environmental Impact Statement

Applicant Name: Holcim (Australia) Pty Limited

Applicant Address: 129-131 Stokers Lane
Teven NSW 2478

Land to be developed: Lots 1, 2 and 3 DP 732288

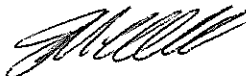
Proposed Development: Teven Quarry Project

Environmental Impact Statement An Environmental Impact Statement is attached.

Certification I declare that:

- the statement has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*,
- the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates; and
- that the information contained in the statement is neither false nor misleading.

Signature:



Name: John Merrell

Date: 12 November 2014



Mr Ian Shenton
Holcim (Australia) Pty Ltd
PO Box 5697
WEST CHATSWOOD NSW 1515

Dear Mr Shenton

**State Significant Development - Director-General's Requirements
Teven Quarry Project (SSD-6422)**

The Director General's environmental assessment requirements (DGRs) for the preparation of an Environmental Impact Statement (EIS) for the proposed Teven Quarry Project are attached.

These requirements are based on the information you have provided to date and have been prepared in consultation with relevant government agencies. Their comments, which you should address appropriately in preparing the EIS, are also attached (see Attachment 2). Please note that NSW Planning and Infrastructure (P&I) may alter these requirements at any time, and that you must consult further with P&I if you do not lodge a development application and EIS for the project within two years of the date of issue of these DGRs. P&I will review the EIS for the development carefully before putting it on public exhibition, and will require you to submit an amended EIS if it has not adequately addressed the DGRs.

I encourage you to consult broadly during the preparation of the EIS. Clear evidence must be presented to demonstrate that all issues raised during consultation (particularly issues raised by the community) have been addressed in the EIS.

Your development may require separate approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). P&I encourages you to confirm whether such an approval will be required as soon as possible (<http://www.environment.gov.au> or 6274 1111). If an EPBC Act approval is required, I would appreciate it if you would advise P&I accordingly, as the Commonwealth approval process may be integrated into the NSW approval process, and supplementary DGRs may need to be issued.

I would appreciate it if you would contact P&I at least two weeks before you propose to submit the development application and EIS for your project. This will enable P&I to:

- confirm the applicable fee (see Division 1AA, Part 15 of the *Environmental Planning and Assessment Regulation 2000*); and
- determine the number of copies (hard-copy and digital) of the EIS required for review.

If you have any enquiries about these requirements, please contact Sophie Butcher at the details listed above.

Yours sincerely

David Kitto
Director
Mining Projects
as delegate for the Director-General

Director General's Environmental Assessment Requirements

Section 78A(8A) of the *Environmental Planning and Assessment Act 1979*

State Significant Development

Application Number	SSD 6422
Development	<p>Teven Quarry Project, which includes:</p> <ul style="list-style-type: none"> • extracting and processing up to 500,000 tonnes per annum of hard rock for 30 years; • recycling and processing of up to 10,000 tonnes per annum of concrete; • continued use of existing and additional quarry infrastructure, including a mobile pugmill and asphalt plant; • transporting quarry products off-site by road; and • rehabilitating the site.
Location	Stokers Lane, Teven
Applicant	Holcim (Australia) Pty Ltd
Date of Issue	8 April 2014
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; • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; • a risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment; • 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 • a statement of commitments, outlining all the proposed environmental management and monitoring measures included in the EIS. <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 <i>Environmental Planning and Assessment Regulation 2000</i>) 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.

Key Issues

The EIS must address the following specific issues:

- **Land Resources** – including a detailed assessment of the potential impacts on:
 - 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;
- **Water Resources** – including:
 - detailed assessment of potential impacts on the quality and quantity of existing surface and ground water resources including the impacts on:
 - o existing user entitlements, affected licensed water users and basic landholder rights; and
 - o 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;
- **Noise** – including a quantitative assessment of potential:
 - construction, operational and 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;
- **Air Quality** – including a quantitative assessment of potential:
 - construction and operational impacts;
 - reasonable and feasible mitigation measures to minimise dust emissions; and
 - monitoring and management measures;
- **Greenhouse Gases** – including:
 - 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;
- **Traffic & Transport** – including:
 - 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 upgrade and/or maintain the capacity, efficiency and safety of effected roads and intersections over the life of the project, including concept plans for any proposed works;
- **Biodiversity** – including:
 - 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 mitigate impacts on biodiversity;
- **Heritage** – including:
 - an Aboriginal cultural heritage assessment (including both cultural and

	<p>archaeological significance) which must:</p> <ul style="list-style-type: none"> ○ 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); <p>- a Historic heritage assessment which must:</p> <ul style="list-style-type: none"> ○ 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); <ul style="list-style-type: none"> ● Rehabilitation – including the proposed rehabilitation strategy for the site, in regard to the key principles in the <i>Strategic Framework for Mine Closure</i>, including: <ul style="list-style-type: none"> - considerations 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; ● Visual – including: <ul style="list-style-type: none"> - a detailed assessment of the: <ul style="list-style-type: none"> ○ changing landforms on site during the various stages of the development; and ○ potential visual impacts of the development on private landowners in the surrounding area as well as any key vantage points in the public domain; - a detailed description of the measures that would be implemented to minimise the potential visual impacts of the development; ● 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 that waste is appropriately managed; ● Hazards – paying particular attention to public safety, including bushfires; ● Social & 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.
Plans and Documents	<p>The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the <i>Environmental Planning and Assessment Regulation 2000</i>. These documents should be included as part of the EIS rather than as separate documents.</p>
Consultation	<p>During the preparation of the EIS, you must consult with relevant local, State and Commonwealth Government authorities, service providers, community groups and affected landowners.</p> <p>In particular you must consult with the:</p> <ul style="list-style-type: none"> ● Commonwealth Department of the Environment; ● Office of Environment and Heritage (including the Heritage Branch); ● Environment Protection Authority; ● Division of Resources and Energy within the Department of Trade and Investment, Regional Infrastructure and Services;

	<ul style="list-style-type: none"> • Department of Primary Industries (including the NSW Office of Water, NSW Agriculture and Fisheries sections); • Transport for NSW (including Roads and Maritime Services); • Ballina Shire Council; and • the local Aboriginal community. <p>The EIS must:</p> <ul style="list-style-type: none"> • describe the consultation process used and demonstrate that effective consultation has occurred; • describe the issues raised by public authorities, service providers, community groups and landowners; • identify where the design of the development has been amended in response to issues raised; and • otherwise demonstrate that issues raised have been appropriately addressed in the assessment.
Further consultation after 2 years	If you do not lodge a DA and an EIS for the development within 2 years of the issue date of these DGRs, you must consult further with the Director-General in relation to the requirements for lodgement.
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, Attachment 1 contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this development.

ATTACHMENT 1 Technical and Policy Guidelines

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:

<http://www.planning.nsw.gov.au>

<http://www.bookshop.nsw.gov.au>

<http://www.publications.gov.au>

Policies, Guidelines & Plans

Risk Assessment

AS/NZS 4360:2004 Risk Management (Standards Australia)

HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)

Land Resources

Draft Agricultural Impact Assessment Guidelines 2011 (DP&I)

Agfact AC25: Agricultural Land Classification (NSW Agriculture)

Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)

Water Resources

National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)

National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)

National Water Quality Management Strategy: Guidelines for Sewerage Systems – Effluent Management (ARMCANZ/ANZECC)

National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ARMCANZ/ANZECC)

Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC)

State Water Management Outcomes Plan

Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011

Surface Water

NSW Government Water Quality and River Flow Objectives (DECC)

Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)

Managing Urban Stormwater: Soils & Construction (Landcom) and associated Volume 2E: Mines and Quarries.

Managing Urban Stormwater: Treatment Techniques (DECC)

Managing Urban Stormwater: Source Control (DECC)

Floodplain Development Manual (DIPNR)

Floodplain Risk Management Guideline (DECC)

A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)

Technical Guidelines: Bunding & Spill Management (DECC)

National Guidelines for Sewerage Systems - Effluent Management (ANZECC 1997)

Office of Water Guidelines for Controlled Activities (2012)

National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)

NSW State Groundwater Policy Framework Document (DLWC, 1997)

NSW State Groundwater Quality Protection Policy (DLWC, 1998)

Groundwater

NSW State Groundwater Quantity Management Policy (DLWC, 1998)

Murray-Darling Basin Groundwater Quality. Sampling Guidelines. Technical Report No 3 (MDBC)

Murray-Darling Basin Commission. Groundwater Flow Modelling Guideline (Aquaterra Consulting Pty Ltd)

Guidelines for the Assessment & Management of Groundwater Contamination (DECC, 2007)

Any relevant Water Sharing Plan for groundwater and surface water resources

NSW Aquifer Interference Policy (2012)

Biodiversity

Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECCW 2009)

Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DECC 2004)

Guidelines for Threatened Species Assessment (DoP 2005)

BioBanking Assessment Methodology and Credit Calculator Operational Manual (DECCW 2008)

The Threatened Species Assessment Guideline – The Assessment of Significance (DECC 2007)

NSW State Groundwater Dependent Ecosystem Policy (DLWC)

Policy & Guidelines - Aquatic Habitat Management and Fish Conservation (NSW Fisheries)

State Environmental Planning Policy No. 44 – Koala Habitat Protection

Principles for the Use of Biodiversity Offsets in NSW (OEH)

Heritage

Aboriginal

Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DEC 2005)

The Burra Charter (The Australia ICOMOS charter for places of cultural significance)

Historic

NSW Heritage Manual (NSW Heritage Office)

The Burra Charter (The Australia ICOMOS charter for places of cultural significance)

Traffic & Transport

Guide to Traffic Generating Development (RTA)

Road Design Guide (RTA)

Air Quality

Protection of the Environment Operations (Clean Air) Regulation 2002

Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC)

Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC)

Greenhouse Gases

National Greenhouse Accounts Factors (Australian Department of Climate Change (DCC))

Guidelines for Energy Savings Action Plans (DEUS)

Noise

NSW Industrial Noise Policy (DECC)

Environmental Noise Management – Assessing Vibration: a technical guide (DEC)

NSW Road Noise Policy (DECCW)

Waste

Waste Classification Guidelines (DECC)

Hazards

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

Hazardous and Offensive Development Application Guidelines - Applying SEPP 33

Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis

Rehabilitation

Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)

Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)

Strategic Framework for Mine Closure (ANZMEC-MCA)

Socio-Economic

Draft Economic Evaluation in Environmental Impact Assessment (DoP)

Techniques for Effective Social Impact Assessment: A Practical Guide (Office of Social Policy, NSW Government Social Policy Directorate)

NSW Government Guidelines for Economic Appraisal 2007

ATTACHMENT 2
Agency Input into Key Assessment Issues



APPENDIX 2

The Recovered Aggregate Exemption
2014



Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014

The recovered aggregate exemption 2014

Introduction

This exemption:

- is issued by the Environment Protection Authority (EPA) under clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation); and
- exempts a consumer of recovered aggregate from certain requirements under the *Protection of the Environment Operations Act 1997* (POEO Act) and the Waste Regulation in relation to the application of that waste to land, provided the consumer complies with the conditions of this exemption.

This exemption should be read in conjunction with 'the recovered aggregate order 2014'.

1. Waste to which this exemption applies

- 1.1. This exemption applies to recovered aggregate that is, or is intended to be, applied to land for road making activities, building, landscaping and construction works.
- 1.2. Recovered aggregate is a material comprising of concrete, brick, ceramics, natural rock and asphalt processed into an engineered material. This does not include refractory bricks or associated refractory materials, or asphalt that contains coal tar.

2. Persons to whom this exemption applies

- 2.1. This exemption applies to any person who applies, or intends to apply, recovered aggregate to land as set out in 1.1.

3. Duration

- 3.1. This exemption commences on 24 November 2014 and is valid until revoked by the EPA by notice published in the Government Gazette.

4. Premises to which this exemption applies

- 4.1. This exemption applies to the premises at which the consumer's actual or intended application of recovered aggregate is carried out.

5. Revocation

- 5.1. 'The recovered aggregate exemption 2010' which commenced on 13 September 2010 is revoked from 24 November 2014.

6. Exemption

- 6.1. Subject to the conditions of this exemption, the EPA exempts each consumer from the following provisions of the POEO Act and the Waste Regulation in relation to the consumer's actual or intended application of recovered aggregate to land when used for road making activities, building, landscaping and construction works at the premises:
- section 48 of the POEO Act in respect of the scheduled activities described in clauses 39 and 42 of Schedule 1 of the POEO Act;
 - Part 4 of the Waste Regulation;
 - section 88 of the POEO Act; and
 - clause 109 and 110 of the Waste Regulation.
- 6.2. The exemption does not apply in circumstances where recovered aggregate is received at the premises for which the consumer holds a licence under the POEO Act that authorises the carrying out of the scheduled activities on the premises under clause 39 'waste disposal (application to land)' or clause 40 'waste disposal (thermal treatment)' of Schedule 1 of the POEO Act.

7. Conditions of exemption

The exemption is subject to the following conditions:

- 7.1. At the time the recovered aggregate is received at the premises, the material must meet all chemical and other material requirements for recovered aggregate which are required on or before the supply of recovered aggregate under 'the recovered aggregate order 2014'.
- 7.2. The recovered aggregate can only be applied to land in road making activities, building, landscaping and construction works. This approval does not apply to any of the following applications:
- 7.2.1. Construction of dams or related water storage infrastructure,
 - 7.2.2. Mine site rehabilitation,
 - 7.2.3. Quarry rehabilitation,
 - 7.2.4. Sand dredge pond rehabilitation,
 - 7.2.5. Back filling of quarry voids,
 - 7.2.6. Raising or reshaping of land used for agriculture, and
 - 7.2.7. Construction of roads on private land unless:
 - (a) the recovered aggregate is applied only to the minimum extent necessary for the construction of the road, and
 - (b) a development consent has been granted under the relevant Environmental Planning Instrument (EPI), or

- (c) it is to provide access (temporary or permanent) to a development approved by a Council, or
 - (d) the works are either exempt or complying development.
- 7.3. The consumer must keep a written record of the following for a period of six years:
- the quantity of any recovered aggregate received; and
 - the name and address of the supplier of the recovered aggregate received.
- 7.4. The consumer must make any records required to be kept under this exemption available to authorised officers of the EPA on request.
- 7.5. The consumer must ensure that any application of recovered aggregate to land must occur within a reasonable period of time after its receipt.

8. Definitions

In this exemption:

application or apply to land means applying to land by:

- spraying, spreading or depositing on the land; or
- ploughing, injecting or mixing into the land; or
- filling, raising, reclaiming or contouring the land.

consumer means a person who applies, or intends to apply, recovered aggregate to land.

processor means a person who processes, mixes, blends, or otherwise incorporates recovered aggregate into a material in its final form for supply to a consumer.

Manager Waste Strategy and Innovation
Environment Protection Authority
(by delegation)

Notes

The EPA may amend or revoke this exemption at any time. It is the responsibility of the consumer to ensure they comply with all relevant requirements of the most current exemption. The current version of this exemption will be available on www.epa.nsw.gov.au

In gazetting or otherwise issuing this exemption, the EPA is not in any way endorsing the use of this substance or guaranteeing that the substance will confer benefit.

The conditions set out in this exemption are designed to minimise the risk of potential harm to the environment, human health or agriculture, although neither this exemption nor the accompanying order guarantee that the environment, human health or agriculture will not be harmed.

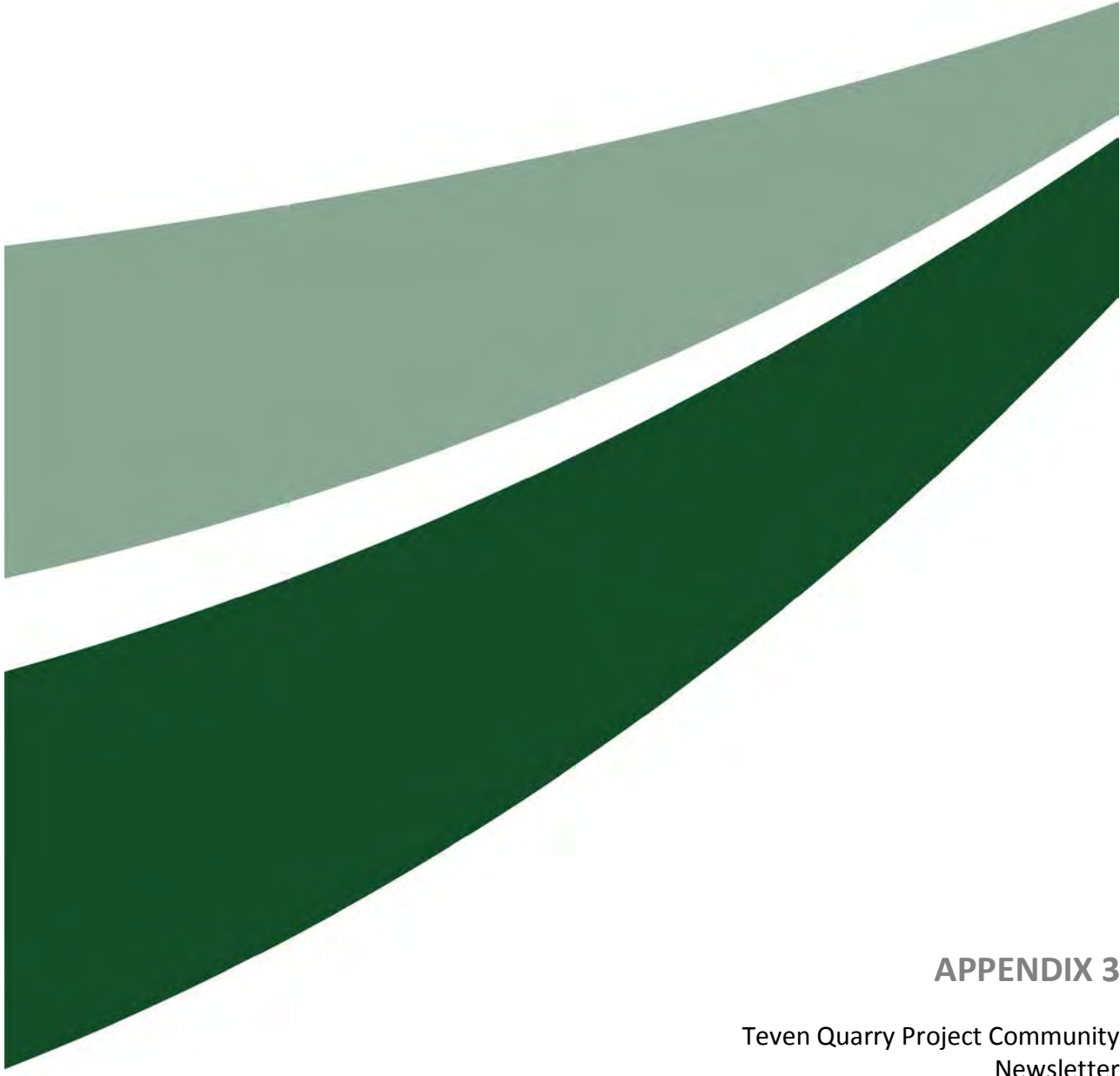
The consumer should assess whether or not the recovered aggregate is fit for the purpose the material is proposed to be used for, and whether this use will cause harm. The consumer may need to seek expert engineering or technical advice.

Regardless of any exemption provided by the EPA, the person who causes or permits the application of the substance to land must ensure that the action is lawful and consistent with any other legislative requirements including, if applicable, any development consent(s) for managing operations on the site(s).

The receipt of recovered aggregate remains subject to other relevant environmental regulations in the POEO Act and the Waste Regulation. For example, a person who pollutes land (s. 142A) or water (s. 120), or causes air pollution through the emission of odours (s. 126), or does not meet the special requirements for asbestos waste (Part 7 of the Waste Regulation), regardless of having an exemption, is guilty of an offence and subject to prosecution.

This exemption does not alter the requirements of any other relevant legislation that must be met in utilising this material, including for example, the need to prepare a Safety Data Sheet (SDS).

Failure to comply with the conditions of this exemption constitutes an offence under clause 91 of the Waste Regulation.



APPENDIX 3

Teven Quarry Project Community
Newsletter

Community feedback and how you can be involved

Holcim Australia believes that ongoing communication with the community we live and work in is an important aspect of corporate social responsibility. The company is committed to engaging with local communities in a transparent and responsible way to ensure a positive, long-term partnership exists with communities. As a result, community input will be a key element of the Project to ensure that any community concerns are recognised and incorporated into project planning and considered in the EIS.

We would appreciate your feedback on the proposal and any issues you would like considered in the EIS. We invite you to provide feedback by completing the enclosed feedback form and returning it in the envelope provided. Alternatively, if you would like to meet with representatives from Holcim Australia and Umwelt to discuss the Project further, please contact Ian Shenton (Holcim Australia) or Gabrielle Allan (Umwelt) on the contact numbers provided.

Holcim Australia will provide the community with further information on the results of the studies being undertaken as part of the EIS via a subsequent information sheet.

There will be further opportunity for the community to provide comments during the public exhibition phase of the EIS process. We will provide details on this closer to lodgement of the EIS in the second half of 2014.

Further Information

Ian Shenton

Senior Planning and Environment Coordinator – NSW & ACT
 Holcim (Australia) Pty Ltd
 Email: ian.shenton@holcim.com
 Phone: (02) 9412 6572

Gabrielle Allan

Senior Environmental Scientist
 Umwelt (Australia) Pty Limited
 Email: gallan@umwelt.com.au
 Phone: (02) 4950 5322

Teven Quarry Project Community Information Sheet No.1

April 2014

Who is Holcim Australia?

Holcim (Australia) Pty Ltd (Holcim Australia) is one of the country's leading producers and suppliers of construction materials such as concrete and quarry products.

The company has been serving 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 quarries, including Teven Quarry west of Ballina. Holcim Australia provides high quality concrete and quarry products to a diverse range of customers. Quarry products include rail ballast, aggregates, gravels, road pavement materials, manufactured and natural sands. These basic materials are essential construction products for concrete production and help to build roads, bridges, schools, hospitals, airports and other infrastructure as well as commercial and residential development – all vital for our communities to prosper.

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.

Purpose of this Information Sheet

To meet future demand for quarry materials associated with road construction and population growth in the Northern Rivers region, Holcim Australia will be submitting a development application that seeks to increase production at Teven Quarry. The purpose of this Community Information Sheet is to provide a general overview of the Teven Quarry Project (the Project), including an outline of the existing operations, a description of the proposal, the associated planning and approvals process and importantly, how the local community can remain informed and involved in this process.



Teven Quarry Project Community Feedback Form

Comments/Questions

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.....

.....

Name Address

Telephone Email

Preferred method for ongoing consultation: Mail Email Telephone In person
 NB. Your contact details will only be used for the purpose of providing you with information about this project.



Teven Quarry Project

Community Information Sheet No.1

Teven Quarry Operations

Teven Quarry is located off Stokers Lane approximately 8 kilometres west of Ballina, and has been in operation since the 1940s. The current development consent for Teven Quarry was granted in 1995 and allows production of approximately 265,000 tonnes of quarry product in 2014, increasing by 1.5% per year.

Figure 1 shows the Teven Quarry including the current approved extraction boundary which will remain unchanged.

What is Proposed?

Holcim Australia is seeking development consent to increase production from Teven Quarry to 500,000 tonnes per annum. No change to the quarry footprint or extraction area is proposed. Increasing production will allow Holcim Australia to meet the increasing demand for quarry products associated with current and future road upgrade works and significant forecast population growth in the region. To meet this increased demand, additional mobile plant may need to be utilised on site during periods of peak production. This includes a mobile crusher, mobile pugmill and mobile asphalt plant.

Teven Quarry currently operates between 7am and 5pm Monday to Friday with occasional operations between 7am and 4pm Saturdays. Approval will be sought to operate the quarry between 7am and 6pm Monday to Saturday, with Saturday operations continuing to be only occasional.

In addition to this, Holcim Australia will seek approval to transport product from the site up until 10pm Monday to Friday in order to service the occasional needs of special road projects. These extended hours will apply only to stockpile management, truck loading and product transport activities and will not apply to actual quarrying activities (e.g. blasting, digging, hauling, crushing, screening).

As part of Holcim Australia's commitment to improving sustainable development, approval will also be sought to enable the site to recycle clean surplus concrete from local approved concrete plants for re-use as product. Strict control conditions will apply to the concrete recycling process including:

- the receipt of clean concrete from approved suppliers only,
- proof of origin of the concrete, and
- validation of returned concrete material to confirm it is free of general waste materials, wood, paper and metals.

The validated clean concrete material will be stored on site and recycled through the on-site processing plant in accordance with all appropriate environmental management controls.

What Planning and Approvals will be Required?

Approval under the NSW Environmental Planning and Assessment Act 1979 will be required for the Project. A development application will be made to NSW Planning and Infrastructure which will be supported by an Environmental Impact Statement (EIS).

Umwelt (Australia) Pty Limited (Umwelt), an Environmental Consulting firm, has been engaged by Holcim Australia to complete the EIS for the Project. An outline of the indicative planning and approvals process is provided in Figure 2.



Figure 1 - Teven Quarry Approved Operations



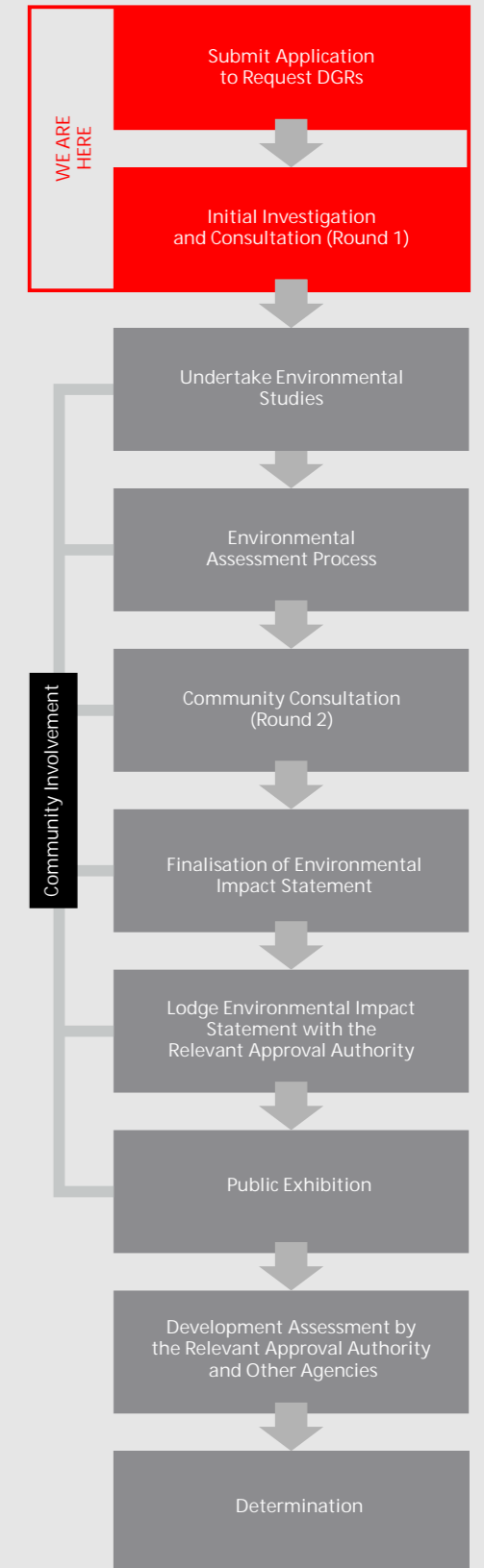
What will be Assessed?

Comprehensive environmental assessments have commenced to identify the potential environmental impacts of the Project and how best to manage these impacts. Potential impacts will be managed through detailed project and operational design to avoid or minimise these impacts.

The EIS will address all potentially relevant environmental and community issues, with key focus areas including noise, air quality, water, traffic, greenhouse gas and energy and rehabilitation and closure of the site. As the approved quarry disturbance footprint will not change, other aspects such as ecological and archaeological impacts are not key issues for the Project.



Figure 2 - Indicative Planning Process





APPENDIX 4

Teven Quarry Hydrogeological
Assessment



**TEVEN QUARRY
HYDROGEOLOGICAL ASSESSMENT**





TEVEN QUARRY HYDROGEOLOGICAL ASSESSMENT

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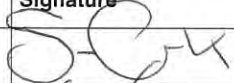
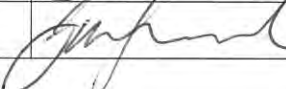
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1. INTRODUCTION

1.1 Background

Holcim (Australia) Pty Ltd (Holcim) operate the Teven Quarry, an existing hard rock quarry located at Stokers Lane, Teven (Lots 1, 2 and 3 DP 732288), approximately eight kilometres north-west of Ballina (Figure 1). Teven Quarry has been in operation since the 1940s and supplies filling, sub-base and aggregate material to the Ballina, Byron, Lismore and Teed Shires.

The quarry currently operates in accordance with two existing approvals:

- Development Consent 1995/263 – through Court Order 10722 in 1995
- Development Consent 2000/431 – issued by Ballina Shire Council.

DA1995/263 originally provided for an annual production of 200,000 tonnes of product with a 1.5 per cent annual increase, resulting in an approved production of approximately 265,000 tonnes per annum in 2014.

1.2 Proposed Project

Holcim is proposing to modify operations at the Teven Quarry by increasing the maximum production rate to 500,000 tonnes per annum (tpa). This increase will be achieved by maximising use of existing fixed plant with 350,000 tpa capacity and adding an in-pit mobile plant to cater for periods of peak demand with an additional 150,000 tpa capacity).

The addition of processing options will add value to the products produced on site, including the addition of a mobile pugmill, mobile asphalt plant and allowance for recycling of surplus concrete from Holcim batching facilities in the region for reuse as product.

It is noted that no changes are proposed to the current, approved project disturbance footprint or pit design. The final pit void is consistent with the existing approval, however will be reached in a shorter time frame.

1.3 Purpose of this Report

The proposed Teven Project has triggered a requirement for an Environmental Impact Statement (EIS) in accordance with the provisions of Part 4, of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Department of Planning and Environment (DP&E) have indicated a requirement for a hydrogeological assessment to be completed as part of the EIS process.

RPS was commissioned by Holcim to complete the hydrogeological assessment on its behalf. This report details the assessment and includes:

- a description of the conceptual hydrogeological model detailing the local and regional hydrogeology and hydrodynamics in the area
- an assessment conducted to identify the potential for the existing and proposed operations at Teven Quarry to have adverse impacts to the local or regional groundwater resource.

This assessment included a review of the existing operations to identify the potential for any impacts from future operations at Teven Quarry to the groundwater resource and/or any sensitive groundwater receptors in the area. In addition the overall cumulative impacts from the existing operations at Teven Quarry and surrounding land uses are discussed.

Information for this hydrogeological assessment has been sourced from historic operations (provided by the Holcim), the public domain and a site investigation conducted in May 2014.

2. LEGISLATION POLICY AND GUIDELINES

The following section describes the legislation and regulatory requirements of relevance to the Teven Quarry.

2.1 Commonwealth Legislation

2.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

Pursuant to the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action that has, will have, or is likely to have a significant impact upon Matters of National Environmental Significance (MNES) is declared a “controlled action” and requires the approval of the Department of the Environment and Minister for the Environment. Approval under the Commonwealth EPBC Act is in addition to requirements under NSW state legislation.

The EPBC Act lists eight MNES that must be addressed when assessing the impacts of a proposal, including impacts on water resources in relation to coal seam gas and large coal mining developments. As Teven Quarry is not a coal seam gas or large coal mining development, this MNES is not relevant to the Project. The Project therefore does not require approval under the EPBC Act on the basis of potential groundwater impacts.

2.2 NSW State Legislation

2.2.1 *Environment Planning and Assessment Act 1979*

The Teven Quarry Project is classed as State Significant Development as defined by the SEPP (State and Regional Development) 2011, and in accordance with the EP&A Act requires approval of the NSW Minister for Planning to proceed under Part 4.

The Director General’s Requirements (DGRs) stipulate that the assessment must meet the form and content requirements in Clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulations 2000.

The DGRs relating to groundwater for the Teven Quarry are outlined in Table 3.1.

2.2.2 *Strategic Regional Land Use Policy*

The Strategic Regional Land Use Policy has been implemented to identify, map and protect residential and agricultural land across the state from the impacts of mining and Coal Seam Gas (CSG) activity (New South Wales Government 2012).

The Project falls within the Far North Coast Regional Strategy and, the Teven Quarry is situated within an area identified as a regionally significant extractive resource without significant groundwater.

The Teven Quarry is not located in an area identified as having state, regional or local biodiversity significance.

2.2.3 *Water Management Act 2000*

2.2.4 *Aquifer Interference Policy*

The Aquifer Interference Policy (AIP) forms the basis of the assessment and subsequent advice provided by the NSW Office of Water for the assessment of the proposed activity under the EP&A Act (NSW Office of Water 2012).

It is important to note that the AIP defines an aquifer as any type of saturated geological formation irrespective of permeability or water quality. This differs to the traditional definition of an aquifer as being a groundwater system of sufficient permeability such that it can yield productive volumes of water.

The AIP provides minimal impact considerations for aquifer interference activities. The fractured basalt in the area is quantified as a less productive groundwater source and therefore potential impacts would fall under these considerations.

Teven Quarry has been assessed as not intersecting the saturated water table and therefore it is not deemed an aquifer interference activity while this remains the case.

2.2.5 Water Sharing Plans

Water sharing plans (WSPs) are being progressively developed for rivers and groundwater systems across NSW following the introduction of the *Water Management Act (2000)*. These WSPs are designed to provide long-term environmental protection and sustainability of the groundwater resources as well as directing how water will be allocated and shared among the various water users. WSPs apply the goals and principles of the State Groundwater Policy (1997) at a local and regional level.

Teven Quarry is located within the New England Fold Belt Coast Groundwater Source (Figure 1). This groundwater source falls under the management of the proposed draft WSP titled North Coast Fractured and Porous Rock Groundwater Sources. It is anticipated that the draft WSP will be exhibited in 2014; however, in the absence of a commenced WSP the groundwater intercepted at the quarry site is managed under the *Water Act 1912*.

Groundwater in the Alstonville Plateau to the north and west of Teven Quarry is managed under the Water Sharing Plan (WSP) for the Alstonville Groundwater Sources. Groundwater managed under this plan is classified as high risk of possible over-extraction and contamination in some parts. It is a valuable source of water for stock watering, domestic uses, irrigation and town water supply.

2.3 Quarry Water Supply

Teven Quarry does not abstract groundwater for operational uses. Surface water is collected and stored in the "Main Dam" this water is utilised for dust suppression and processing. The water balance discussed within the EIS main text outlines the water requirements and demands of the project.

2.4 Water Licensing

Teven Quarry holds an environment protection licence (number 3293) issued under Section 55 of the *Environment Operations Act 1997*. This licence covers water discharge during wet weather at the identified discharge point (Figure 2).

Teven Quarry does not hold any active groundwater licences. The proposed pit is not predicted to intersect the local groundwater table and operational dewatering is not required. A groundwater supply is not required to make up the water demand for the project therefore Holcim does not propose to purchase any licences for groundwater abstraction.

2.5 Director General Requirements

A list of the issued Director General's environmental requirements (DGRs) specific to groundwater resources is provided in Table 3.1 together with salient requirements issued for groundwater impact assessments.

The table provides a reference and outlines of how these requirements have been addressed within this hydrogeological assessment.

Table 2.1: Director General Requirements in Relation to Groundwater

DGRs Specific to Groundwater	How the DGR has been Addressed In the Hydrogeological Assessment
<p>Detailed assessment of potential impacts on the quality and quantity of existing ground water resources including impact on:</p> <ul style="list-style-type: none"> • Existing user entitlements, affected licensed water users and basic landholder rights. • Groundwater dependent and riparian ecology. 	<p>Description of conceptual hydrogeological model in Section 4. Assessment of potential impacts as described in Section 5.</p>
<p>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.</p>	<p>Groundwater is not expected to form an input to the site water balance. This requirement will be addressed within the site surface water assessment and EIS main text.</p>
<p>Identification of any licensing requirements or other approvals under the <i>Water Act 1912</i> and/or <i>Water Management Act 2000</i>.</p>	<p>No groundwater licensing is required with no dewatering requirements or groundwater supply. Environment Protection Licence number 3293 held for wet weather surface water discharge</p>
<p>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 WSP or water source embargo</p>	<p>This requirement is addressed within the EIS main text.</p>
<p>A detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts</p>	<p>Recommended monitoring program and water management strategy in Section 6.</p>
<p>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;</p>	<p>Recommended water management strategy in Section 6.</p>
<p>A description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant WSP or water source embargo.</p>	<p>The draft WSP for the area has not yet been gazetted.</p>
<p>A detailed description of the proposed water management system water monitoring regime, beneficial water reuse program and all other proposed measures to mitigate groundwater impacts.</p>	<p>Mitigation and recommendations Section 7.</p>

3. METHODOLOGY

Available information such as geology, topography and previous studies were assessed and a preliminary conceptual site model was developed. The desktop study included a search of the PINNEENA database (version 4.1) to identify groundwater users in the area (NSW Office of Water, 2014).

A site investigation was completed following the desktop study to confirm the conceptual understanding of the site and collect groundwater data.

3.1 Literature Review

As part of the desktop investigation for the Teven Quarry, the following scientific reports and resources were reviewed:

- Blakebrook Quarry Expansion – Groundwater Monitoring and Management Plan, April 2012, Environmental Resource Management Australia, Revision B.
- Blakebrook Quarry Report on Investigations – Groundwork Environmental Management Services Pty Ltd, March 2008.
- Bureau of Meteorology Groundwater Ecosystem Atlas.
- Environmental Impact Statement – Extractive Industry & Gravel Crushing Plant Fox’s Quarry – Stoker Lane Teven.
- Mapping Groundwater Dependent Ecosystems: A Case Study in the Fractured Basalt Aquifers of the Alstonville Plateau, NSW Australia.

The following relevant legislative requirements and policy was also reviewed:

- Director General Requirements – issued on 7 April 2014 for the proposed Teven Quarry Modification (application number SSD 6422).
- NSW Aquifer Interference Policy – NSW Office of Water, September 2012.

3.2 Registered Groundwater Users

A search of the PINNEENA database (version 4.1) was completed using a two kilometre (km) search radius centered on Teven Quarry. Nine registered bores were identified in the local area, as summarised in Table 3.1 and presented in Figure 3.

Table 3.1: Registered Groundwater Bores within 2 km of Teven Quarry

Work Number	Works Description	Location	Depth (mbgl)	Water Level (mbgl)	Yield (L/sec)	Groundwater Source
GW046449	Bore	LOT 4 DP1127857	NA	NA	1.5*	Alstonville Basalt
GW046361	Well	LOT187	3.1	NA	NA	
GW067070	Bore	LOT 14 DP738058	37	30	0.5	
GW300851	Bore	LOT 16 DP832010	50	NA	NA	
GW048878	Bore	L3 DP247224 (159)	27	NA	NA	
GW301212	Bore	LOT 1 DP733060	54	24	3.8	
GW302606	Bore	LOT 11 DP608672	24	14.24	0.45	
GW300755	Bore	LOT 14 DP1058398	70	NA	NA	
GW046101	Well	LOT 236 DP755745	4.3	NA	NA	Quaternary Alluvium

Notes: NA – Not available, mbgl – metres below ground level, L/s – litres per second, *anecdotal

Eight of the identified bores are located to the west of the Teven Quarry on the Alstonville Plateau. These bores are situated at a higher elevation than the Teven Quarry on the Alstonville Plateau (Figure 1).

The depths of the Alstonville Plateau bores range from 3 to 70 metres below ground level (mbgl) and standing water levels range from 14.2 to 30 mbgl. This range is inferred to represent a typical depth of groundwater on the Alstonville Basalt highlands.

The registered groundwater yields for bores on the Alstonville Plateau show typically low to moderate yields of 0.5 litres per second (L/s) to 3.8L/s.

One shallow groundwater well (GW046101) located to the south-east of Teven Quarry is the only registered bore within the 2 km radius that accesses groundwater from Quaternary alluvial deposits associated with the Richmond River and its tributaries. This alluvial well is shallow, at 4.3 m depth however, no standing water level or groundwater yield is recorded.

It is noted that to the east of Teven Quarry are sugar cane farms. While not registered groundwater users these landholders make use of the high surface run-off and shallow groundwater table with shallow excavated drains (cane drains) as a way of controlling and redistributing surface run-off for irrigation of the cane crops.

3.3 Site Investigation

A two-day site investigation was conducted in May 2014 to assess the site and investigate the interaction that the existing quarry operations have with the groundwater resource.

The site investigation focused on:

- Visual inspection of pit floor and walls for evidence of groundwater inflows (seepages).
- Assessment of the local groundwater level.
- Measurement of field water quality parameters (electrical conductivity (EC) and pH).
- Water sampling from the pit dams, site discharge point and local groundwater bores for comprehensive laboratory analysis.

3.3.1 Sampling Locations

Water samples were collected in accordance with the RPS standard operating procedures from the following locations:

- Teven Quarry Pit Dam and Main Dam.
- Cane Drain – located adjacent to the Teven Quarry overflow discharge point.
- Private registered groundwater bores (GW302606 and GW301212).

These samples were sent to a NATA accredited laboratory for comprehensive water quality analysis. The results are presented and discussed in Section 3 of this report, with the laboratory certificates of analysis provided in Appendix B.

3.4 Data Assessment and Reporting

A conceptual model was developed for the groundwater resource contained within the weathered basalt and surrounding alluvial aquifer system, based on the results from the desktop study and field investigation. These results are presented in the following sections and the conclusions and recommendations are based on this reported data.

4. ENVIRONMENTAL SETTING

The environmental setting at Teven Quarry is rural in nature and characterised by scattered dwellings, rural residential subdivisions, intensive horticulture (sugar cane and macadamias) and low intensity cattle grazing. Some pockets of native vegetation remain intact.

4.1 Topography and Drainage

Teven Quarry is situated within the Richmond River catchment, a coastal catchment located on the north coast of NSW. The area is bounded by the coast to the east and the Tertiary basaltic plateau highlands to the west.

Teven Quarry extracts rock from a locally elevated basalt outcrop with a maximum elevation of 60 m AHD. The outcrop is bordered to the north, east and south by low-lying alluvial flood plain with an elevation marginally above sea level (0–2 m AHD).

Excavation at Teven Quarry has reached a maximum depth of 4 m AHD, surface drainage from the south and west are captured in this area known as the Pit Dam (Figure 2). Proposed extraction at the site includes widening of the pit and progressively backfilling with a maximum extraction depth of 4 m AHD.

A 2 metre (m) bund constructed around the eastern side of the quarry captures remaining surface water run-off, which is stored within the Main Dam. A channel drain outside of the bund diverts any overflow during periods of higher run-off to an approved discharge point (Figure 2).

4.2 Climate

The climate in the area is sub-tropical and typically characterised by hot, humid summers and generally mild winters.

4.2.1 Rainfall

The nearest Bureau of Meteorology rain gauging station to Teven Quarry is Ballina Airport, station number 58198. The rainfall records for this station are available from 1992 (22 years of data).

The nearest long-term rain gauging station to Teven Quarry is Ballina West, station number 58135 with data available from 1968 (46 years of data).

Table 4.1 provides a summary of the rainfall data from the two nearby weather stations.

Table 4.1: Rainfall Data from Nearby Bureau of Meteorology (mm)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ballina Airport, Station No. 58198 (Closest Weather Station)												
Mean	178.6	198.3	215.6	190.5	170.8	203.3	122.5	85.0	63.8	102.5	124.8	137.0
Median	163.6	164.4	204.9	155.0	132.9	184.2	95.8	59.2	45.8	86.0	104.6	107.0
Highest Daily	157.4	188.0	162.0	142.0	133.0	190.0	130.6	128.0	92.0	175.0	98.6	168.0
Meerschaumvale, Station No. 58135 (Long-term Data Available)												
Mean	179.3	225.5	251.4	203.6	192.6	159.1	99.4	67.7	59.5	110.5	130.9	153.8
Median	123.7	179.9	208.2	169.0	157.2	128.8	87.5	45.0	40.8	78.2	119.0	133.8
Highest Daily	290.0	427.2	249.0	208.0	199.4	277.0	144.4	131.0	161.0	225.0	145.6	135.5

Rainfall occurs in the Teven Quarry vicinity throughout the year with the December to March period the wettest accounting for approximately 40% of total annual rainfall.

4.3 Geology

The Tweed Heads 1:250,000 Geological Map Sheet indicates Teven Quarry is underlain by the Early Carboniferous to Late Devonian, Neranleigh-Fernvale beds. This formation is composed of

feldspathic and lithic meta arenite, metasiltstone, mudstone, shale, chert, jasper, basic metavolcanics, pillow lava conglomerate (DMR 1969).

Teven Quarry extracts hard rock aggregate from a Tertiary basalt formation deposited over the Neranleigh-Fernvale Beds by volcanic flows approximately 22 million years ago. The basalt is predominantly composed of tholeiitic, andesite with minor icelandite and sporadic flows of mildly alkaline rocks (Duggan 1978).

The low-lying alluvial flood plain bordering the Teven Quarry and consists of Quaternary sediments associated with the Richmond River.

4.4 Hydrogeology

The identified aquifers within the vicinity of Teven Quarry consist of a fractured rock aquifer of low hydraulic conductivity (permeability) and a shallow unconfined system in the alluvial sediments to the east of the quarry.

The hydraulic conductivity of basalt is typically low at 10^{-5} to 10^{-11} m/sec (Freeze and Cheery 1979), however, some elevated permeabilities may be dictated by the presence of weathering, fractures, palaeosols and lava tubes.

The groundwater within the fractured basalt can be categorised into two systems:

- A shallow local-scale unconfined groundwater system existing in the weathered or highly fractured basalt. This aquifer is typically low yielding and subject to drying out during periods of drought (ephemeral). In general, when it rains streams tend to recharge the aquifers and during dry periods the aquifers tend to return base flow to the streams (until the aquifers run out of water)
- A deeper intermediate-scale groundwater system existing in interlayered and fractured horizons within the basaltic sequence. These aquifers are generally classified as semi-confined or confined aquifers.

4.4.1 Groundwater Inflows

A specific focus during the site investigation was to understand if the existing pit had intersected the groundwater table; if this was the case, groundwater inflow to the pit should be observed. A site walk over and visual inspection of the pit walls did not find any evidence of groundwater inflows.

It is noted that, during the lead up to the site visit, a week of wet weather was reported and during the investigation, a heavy downpour was experienced. Significant surface run-off associated with the rainfall event was observed but no evidence of groundwater inflow was identified.

Anecdotal reports from site personnel indicated the intermittent presence of minor “seeps” in two specific areas of the pit. These seepage areas were visually inspected during the investigation and deemed to be associated with surface water run-off (Figure 2).

The following site observations are noted in relation to the identified “seepage areas”:

- The west pit wall, constructed from back-filled overburden for operational purposes (Figure 4). The wall, comprised of loose unconsolidated fill, has a relatively high hydraulic conductivity in comparison to the natural basalt and therefore an enhanced infiltration rate. It is inferred that the fill material saturates during periods of high rainfall and this water then gradually seeps out and evaporates at the pit face
- The seepage zone identified to the south was located in an area where three surface drainage lines converge (Figures 2 and 4). Surface run-off was observed to pool above this area and trickle down during the site investigation
- Both seepages were noted on the pit wall at approximately 15 m AHD. Beneath this level the pit wall was observed to remain dry showing no evidence that the regional groundwater level had been intersected (Figure 4).

4.4.2 Groundwater Level

The groundwater level within the weathered basalt at the Teven Quarry is estimated to range from 0 to 3 m AHD. This range is based on the absence of inflows to the current Teven Pit (extracted to a maximum 4 m AHD) and the groundwater level within the surrounding alluvial flood plains.

The groundwater level in the alluvial sediments of the low-lying flood plains bordering the Teven Quarry is estimated to be approximately 0 m AHD. This level is based on the agricultural “cane drains” with an observed water level of less than 0.5 metres below ground level (mbgl).

4.4.3 Groundwater Flow Direction

The groundwater flow within the shallow unconfined aquifer adjacent to Teven Quarry was observed to be consistent with topography with the cane drains flowing to the east, toward Maguires Creek and the Richmond River.

Very little water level data is available in the area for the fractured rock aquifers. Water levels recorded at four registered bores west of Teven Quarry, on the Alstonville Plateau, indicate a general flow direction to the south-east. This is consistent with the regional surface water drainage.

Groundwater flow within fractured aquifers is controlled by the presence of fractures creating preferential flow pathways. Due to the low permeability of the basalt and the topography it is likely that there is high surface run-off following precipitation and low levels of aquifer recharge.

4.4.4 Water Quality

Site water quality monitoring (July 2013 to January 2014) at the Main Dam shows a stable, slightly basic pH range of 8.1 to 9.1 pH units (Figure 5). Field water quality parameters measured during the site investigation (May 2014) support this data with the Pit Dam, the Main Dam recording measurements in this range (Table 4.2).

The pH level measured in the cane drain was neutral at 7.5 pH units with the pH levels measured within local groundwater bores, west of the Quarry, also returning neutral levels (Table 4.2).

The salinity measurements (measured as EC) recorded during the site investigation returned a fresh potable water quality (144 $\mu\text{S}/\text{cm}$ to 1322 $\mu\text{S}/\text{cm}$) with the registered bores showing the lowest salinity (Table 4.2). The highest salinity (1,322 $\mu\text{S}/\text{cm}$), recorded within the Pit Dam, is inferred to be due to evaporative concentration of the surface run-off.

Table 4.2: Field Water Quality Parameters – May 2014

Sampling Location	Electrical Conductivity ($\mu\text{S}/\text{cm}$)	pH (pH Units)	Temperature ($^{\circ}\text{C}$)
Teven Quarry			
Main Dam	1,068	9.0	19.8
Pit Dam	1,322	8.6	20.5
Cane Drains ¹	1,013	7.5	19.4
Surface Run-off ²	972	9.2	20.7
Registered Bores			
GW301312	144.2	7.1	16.2
GW046449	362	7.82	20.3

Notes: ¹ Sample taken from outside the Teven Quarry in cane drain the adjacent to the discharge point

² Surface run-off was captured at the bottom of the Teven Quarry Pit decline following a rainfall event

The results from a laboratory analysis on collected water samples are presented in Table 4.3 and are compared with the 2011 Australian drinking water quality guidelines (NHMRC, NRMCC 2011).

Analysis for total metals only detected small concentrations at all sample points, in most cases within the Australian drinking water quality guidelines values (NHMRC, NRMMC 2011). The arsenic concentration was marginally above the guideline value in the Pit Dam and Main Dam (Table 4.3).

Results from the laboratory analysis are also presented graphically on a Piper Diagram in Figure 6. Piper diagrams allow an understanding of the general chemical nature of the water/groundwater by plotting major cation and anion concentrations on a trilinear diagram. The water collected from the Main Dam and Pit Dam at Teven Quarry plots as calcium-sulfate dominant and the groundwater collected from registered bores GW3013012 and GW046449 plots with a marginal sodium dominance (Figure 6).

It is considered that the water quality from the Teven Pit and Main Dam reflects surface water runoff as the primary/only water source.

Table 4.3: Teven Quarry Water Quality Analysis

Sample ID	Units	2011 Guidelines Values*	Date	Main Dam	Pit Dam	Discharge Point	GW302606	GW301212
General Parameters								
TDS	mg/L	< 600	8/05/2014	626	732	563	61	186
pH	pH units	6.5–8.5	8/05/2014	7.26	7.72	6.7	6.06	7.4
EC	µS/cm	940	8/05/2014	900	1110	857	109	281
Hydroxide Alk as CaCO ₃	mg/L		8/05/2014	<1	<1	<1	<1	<1
Carbonate Alk as CaCO ₃	mg/L		8/05/2014	<1	<1	<1	<1	<1
Total alkalinity as CaCO ₃	mg/L	200	8/05/2014	48	97	114	8	90
Major Cations								
Calcium	mg/L		8/05/2014	112	150	104	2	12
Magnesium	mg/L		8/05/2014	17	20	20	1	9
Sodium	mg/L	180	8/05/2014	51	58	49	15	31
Potassium	mg/L		8/05/2014	13	6	9	2	4
Total Cations	mg/L		8/05/2014	9.54	11.8	9.2	0.89	2.79
Major Anions								
Bicarbonate alkalinity as CaCO ₃	mg/L	200	8/05/2014	48	97	114	8	90
Sulphate as SO ₄ ²⁻	mg/L	250	8/05/2014	347	407	295	3	12
Chloride	mg/L	250	8/05/2014	30	34	32	26	26
Total Anions	mg/L		8/05/2014	9.2	11.4	9.32	0.96	2.78
Total Metals								
Arsenic	mg/L	0.01	8/05/2014	0.011	0.02	0.003	<0.001	<0.001
Cadmium	mg/L	0.002	8/05/2014	<0.0001	<0.0001	<0.0001	0.0007	<0.0001
Chromium	mg/L	0.05	8/05/2014	<0.001	<0.001	0.006	<0.001	<0.001
Copper	mg/L	2	8/05/2014	<0.001	<0.001	0.007	2.39	<0.001
Lead	mg/L	0.01	8/05/2014	<0.001	0.001	0.004	0.007	<0.001
Nickel	mg/L	0.02	8/05/2014	<0.001	0.003	0.006	0.005	<0.001
Mercury	mg/L	0.001	8/05/2014	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Zinc	mg/L	3	8/05/2014	<0.005	0.013	0.035	0.882	<0.005

Note: *NHMRC, NRMMC (2011), Guideline values for physical and chemical characteristics of drinking water
 Shaded cells indicate exceedances of guideline values.

4.5 Groundwater Dependent Ecosystems

A site biodiversity assessment completed by Holcim at Teven Quarry did not identify any groundwater dependent ecosystems (GDEs) within the immediate area. A search of the Bureau of Meteorology's Groundwater Dependent Ecosystem Atlas (BoM 2014) supports this finding with no GDEs mapped within the project area.

The flood plain wetlands associated with Macguires Creek are the only GDE within a 3 km radius of Teven Quarry. The flood plain wetland is classed as an ecosystem that relies on the surface expression of groundwater.

5. ASSESSMENT OF POTENTIAL GROUNDWATER IMPACTS

For the purpose of this impact assessment the pit, as it currently is, has been used as the baseline case. The assessed risk is therefore the additional risk imposed on the groundwater regime resulting from the proposed increase to the extraction rate at Teven Quarry.

5.1 Impacts to Groundwater Level

There is potential for Teven Quarry to impact on the groundwater resource by creating a groundwater sink and associated cone of drawdown. This would occur if extraction progresses below the local groundwater table (phreatic surface).

The current Teven pit has been extracted to the maximum depth of 4 m AHD. The proposed future extraction will widen and extend the pit but will not progress below this depth. As there are currently, no observed groundwater inflows it is considered unlikely that future extraction will intersect the groundwater table.

Based on available information and hydrogeological conceptualisation, the proposed quarrying activities associated with the increased production are therefore not expected to impact the groundwater level.

5.1.1 Impacts to Groundwater Users

The absence of any drawdown resulting from extraction below the groundwater table indicates that groundwater users in the vicinity of the quarry will not be adversely affected by the proposed operations at Teven.

5.1.2 Groundwater Dependent Ecosystems

The alluvial flood plain to the east of Teven Quarry is the only identified GDE in the area. The flood plain is not expected to be impacted by quarrying operations.

It is also noted that the approximate elevation range of the alluvial flood plain (0 m–2 m AHD) is below the maximum depth of the quarry. It is therefore predicted that the alluvial flood plain will not be influenced by the proposed quarrying activities.

5.2 Groundwater Pollution

The site is contoured such that surface water run-off from disturbed areas is captured and stored in the Main Pit, while minor, undisturbed areas outside of the pit run-off to the canefield drains. The low permeability of the basalt dictates that the infiltration of stored surface run-off to groundwater will be negligible. This is consistent with the constant presence of the unlined Main Dam and Pit Dam.

The potential water quality impacts to groundwater from the proposal are those related to pollution from on-site activities involving nitrates from blasting, hydrocarbons, oil and grease and total suspended solids (TSS). As the extraction rate increases so will vehicle traffic and the use of blasting and machinery.

Although there is a risk of pollutants from the existing operations, the proposed increase to the production rate will not significantly alter surface water flows on and off site. The diversion of surface water from to the Main Pit will generally help to control the risk of sediment laden water overflowing off site. Site surface water management plans are detailed within the surface water assessment.

The original EIS completed for Teven Quarry in 1995 notes that the site showed minor traces of potential acid forming sulfide minerals (McCloskey B.W. Pty Ltd 1995). Additionally the Piper Diagram (Figure 6) indicates a calcium sulfate dominance supporting this initial finding.

Fortnightly monitoring of pH levels in the ponded pit water completed over 2013 demonstrates a stable and relatively alkaline pH level at approximately 8 pH units (Figure 5). It is possible the acidic forming potential is buffered/neutralised by carbonate minerals or carbonate alteration within the basalt. This would explain the relatively high calcium concentrations, released by the buffering reaction.

Existing surface water management includes monitoring of water quality, in particular hydrocarbons, at the two pits (pit dam and main dam) and the discharge point. It is considered that this will provide an adequate identification measure for this potential impact.

6. MITIGATION

6.1 Monitoring Program

The existing monitoring program on site involves the measurement of water quality. It is anticipated that this monitoring, as detailed within the surface water impact assessment, will be continued for the life of the quarry.

6.2 Water Management Strategy

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 the NSW Office of Water and the Department of Planning and Environment. It is anticipated this would be conducted in accordance with the requirements of the AIP (NSW Office of Water 2012) with respect to assessment against the minimal harm criteria.

6.3 Recommendations

This hydrogeological assessment has concluded that predicted groundwater impacts from the proposed project are negligible. Nonetheless, it is recommended that the following management measures are followed:

- The water monitoring program is maintained as detailed within the surface water assessment.
- The water monitoring plan should be reviewed annually and the results reported in the environmental reporting. Ongoing review will facilitate continuous improvement of the monitoring and ensure compliance with environmental regulations.
- Should the quarry intersect the groundwater table (evidenced by sustained inflows) then a hydrogeological investigation will be completed in consultation with the NSW Office of Water and the Department of Planning and Environment.
- All potentially contaminating materials used or stored on site during the project, including fuels, lubricants, reagents, solvents or other chemicals, as well as domestic and/or industrial wastes generated by operations, be prevented from entering the groundwater system, either by method of disposal or accidental spillages.

7. CONCLUSION

Holcim is proposing to modify operations at the Teven Quarry by increasing the production rate to 500,000 tonnes per annum (tpa). This increase will be achieved by maximising use of existing fixed plant with 350,000 tpa capacity and adding an in-pit mobile plant to cater for periods of peak demand with an additional 150,000 tpa capacity).

A desktop study was conducted to assess the available information and form a conceptual hydrogeological model of the project site. To confirm the site conceptualisation a field investigation was completed which included a two-day site inspection and the collection of groundwater data.

The results from the desktop and field investigations indicate a local and regional groundwater table below the current and proposed elevation of the pit floor. The potential impacts to groundwater and its receptors were identified and the risk proposed by the project assessed.

Based on information obtained during the site visit and from the hydrogeological assessment it has been concluded that the proposed project will have a negligible impact on groundwater levels, groundwater quality, groundwater receptors and groundwater users in the local area.

8. REFERENCES

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FIGURES

Figure 1: Teven Quarry Regional Setting

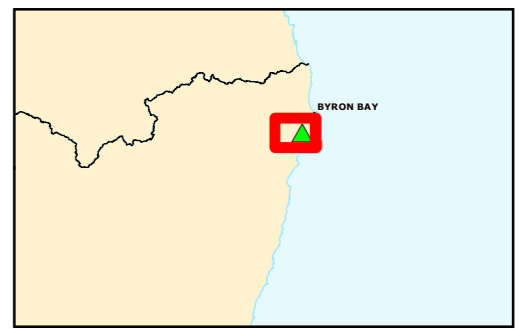
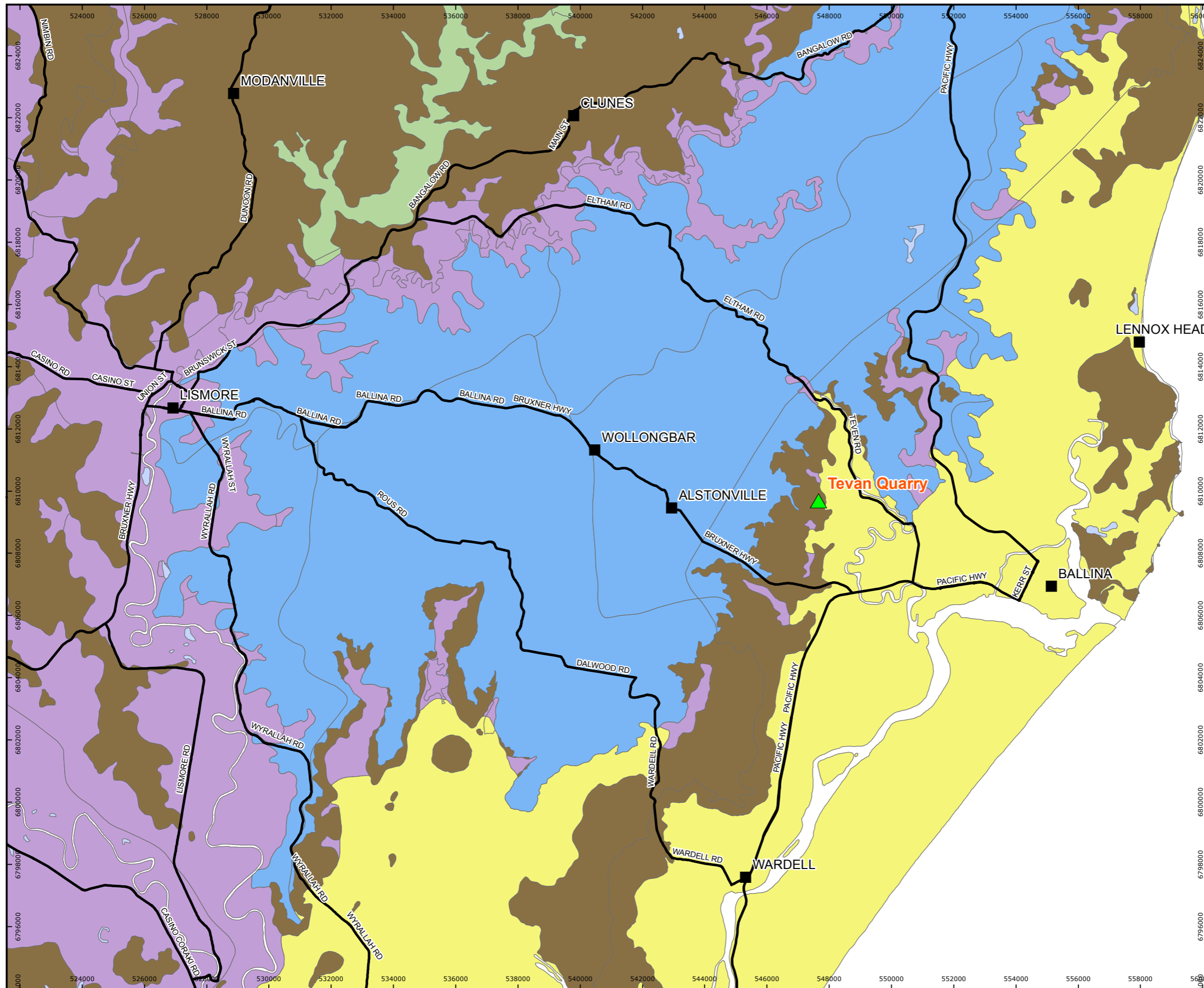
Figure 2: Teven Quarry Pit Layout

Figure 3: Registered Bore Search

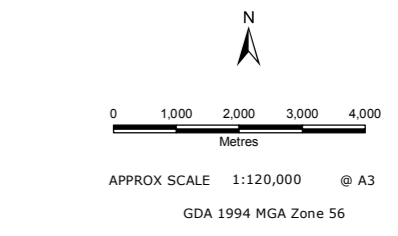
Figure 4: Teven Quarry Pit Wall Face

Figure 5: Water Quality Monitoring – pH

Figure 6: Piper Diagram



- LEGEND**
- ▲ Tevan Quarry
 - Locality
 - Main Road
- Water Sharing Plan**
- Alstonville Plateau Groundwater Sources 2003
 - Draft North Coast Coastal Sands Groundwater Sources
 - Draft North Coast Fractured and Porous Rock Groundwater Sources
 - Richmond River Area Unregulated, Regulated and Alluvial Water Sources 2010
 - Water Sharing Plan for the Coopers Creek Water Source 2003



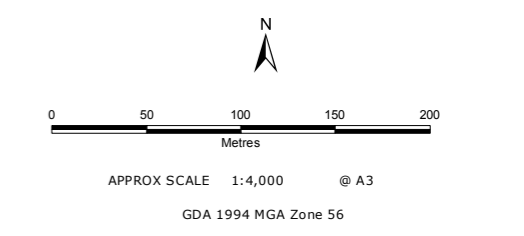
Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.



FIGURE 1
Tevan Quarry
Regional Setting



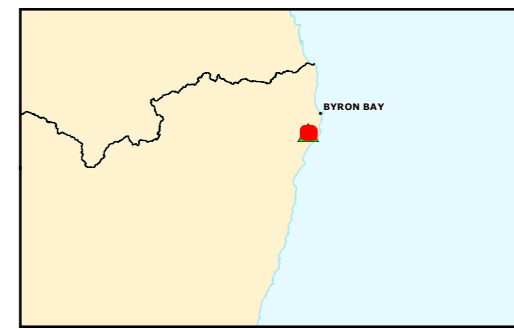
- LEGEND**
- Teven Dam
 - Observed Seepage Location
 - ➔ Licenced Discharge Location



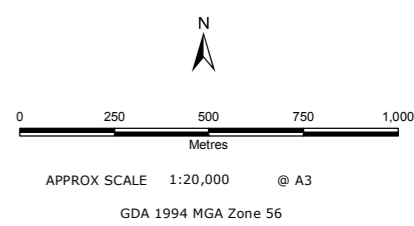
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FIGURE 2
Teven Quarry
Pit Layout



- LEGEND**
- NOW Registered Bore Location
 - ▲ Tevan Quarry



Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

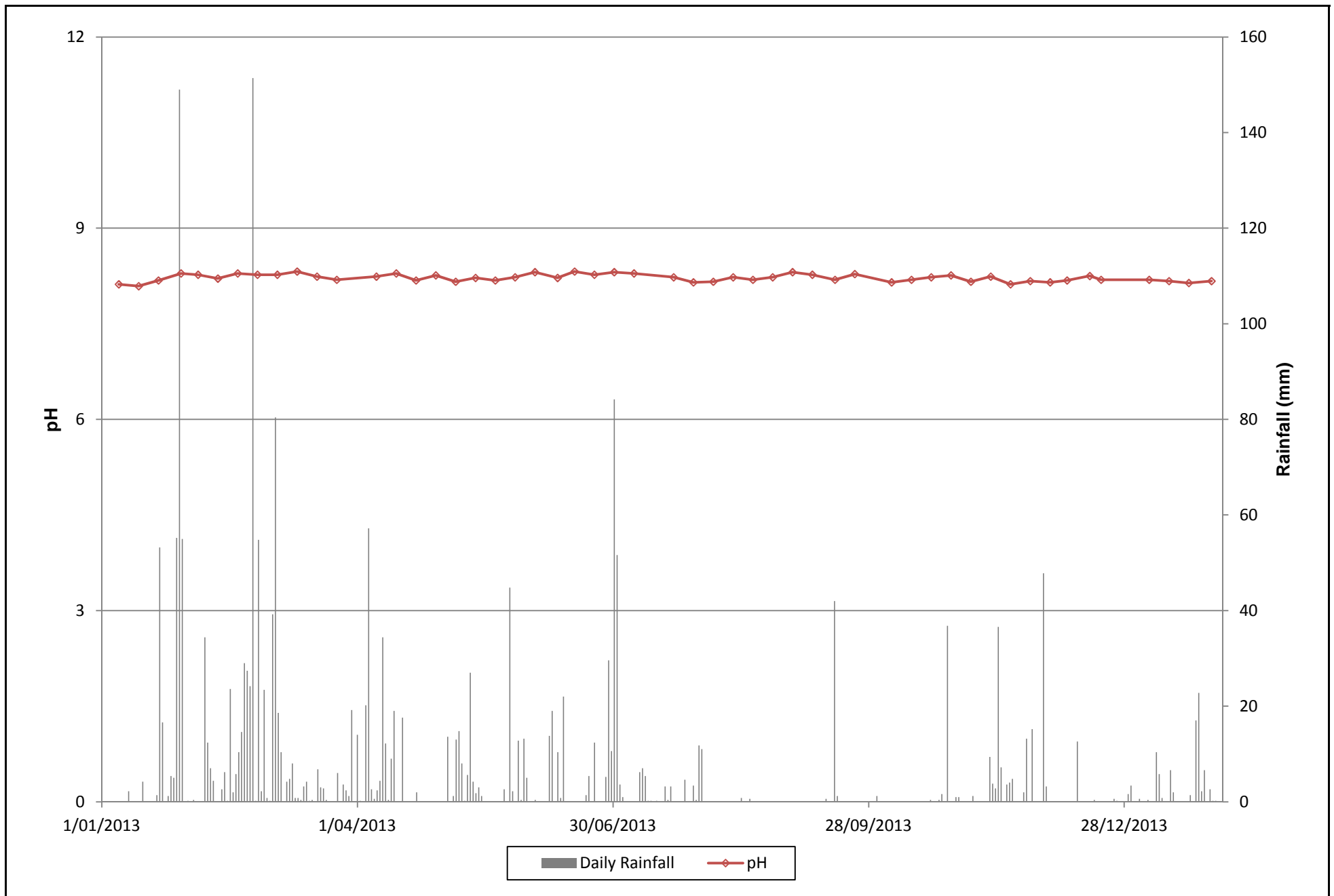
RPS
FIGURE 3
Tevan Quarry
NOW Registered Bore Locations

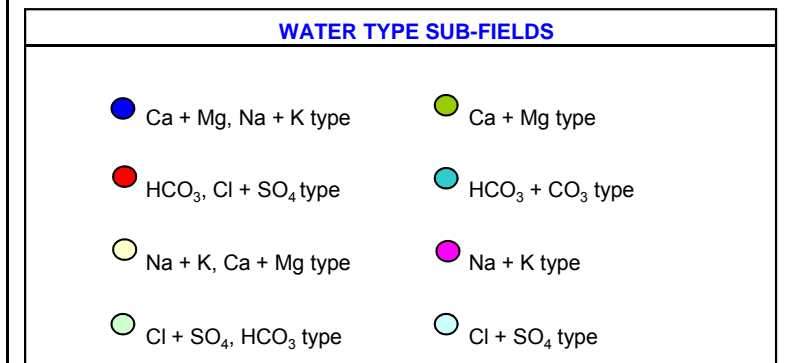
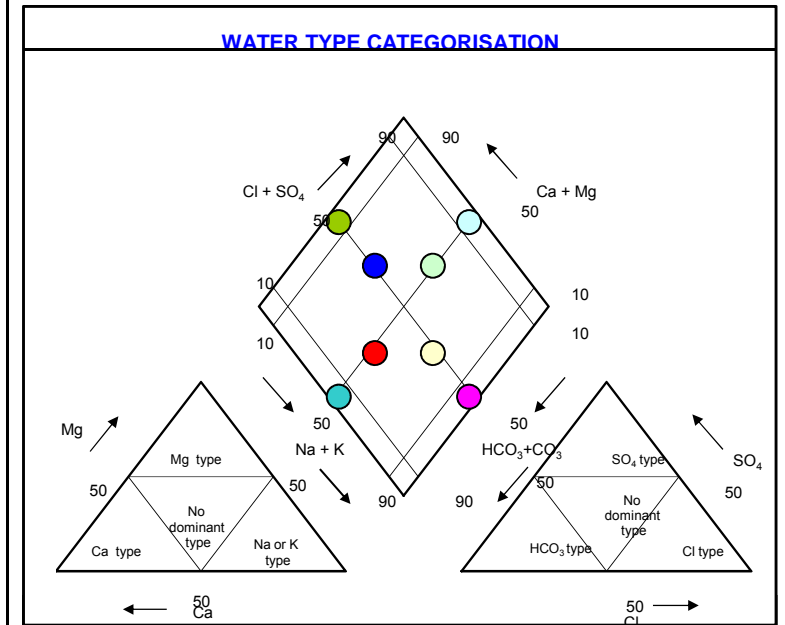
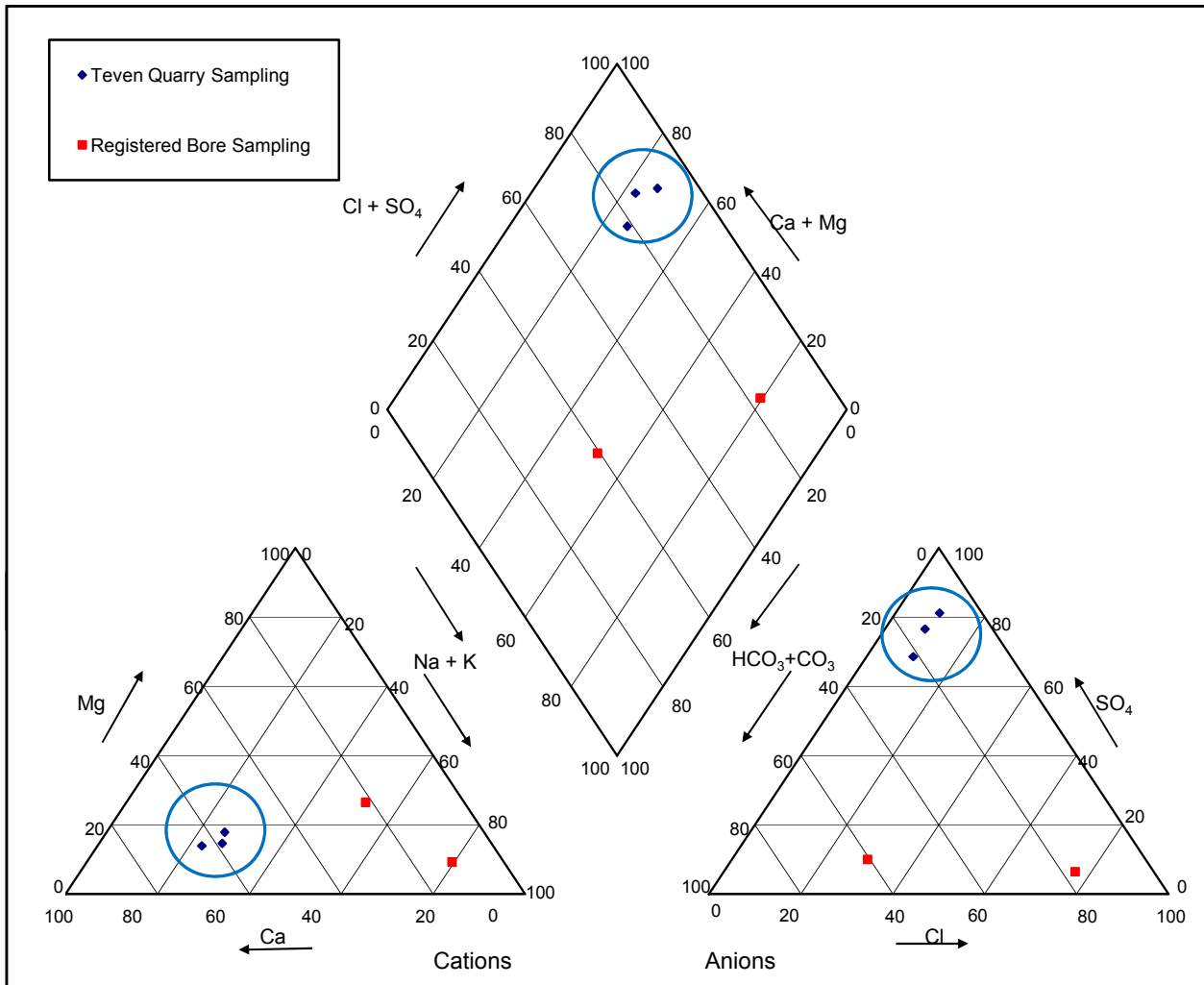
SOUTH PIT WALL



WEST PIT WALL







Piper Diagram

Figure 6

Date: 23/05/14

F:\Jobs\S63\300\Water quality

Project: Teven Quarry
 Project No: S31D

Description: Water Quality Analysis
 Client: Holcim (Australia) Pty Ltd

HydroCHEM 2.0