Holcim

Strength. Performance. Passion.

Environmental Impact Statement

Cooma Road Quarry Continued Operations Project

October 2012

COOMA ROAD QUARRY CONTINUED OPERATIONS PROJECT

Environmental Impact Statement

October 2012

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Holcim (Australia) Pty Limited

Project Director: **John Merrell**
Project Manager: **Kirsty Davies**
Report No. **2992/R01/Final**
Date: **October 2012**

Newcastle

PO Box 3024
75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au

Executive Summary

Holcim (Australia) Pty Ltd (Holcim Australia) operates Cooma Road Quarry, an existing hard rock quarry located approximately 6 kilometres south of Queanbeyan. Cooma Road Quarry has been operating at the site since 1959. The current development consent for the quarry is due to expire in October 2015, however there will still be significant high quality rock resources available for quarrying at this time. Holcim Australia is seeking development consent to continue operation of the quarry for a further 20 years to allow for extraction of these remaining resources.

The Cooma Road Continued Operations Project (the Project) involves extending the approved extraction area and relocating some infrastructure components to allow for this extension. The Project also proposes to extend hours of operation for certain activities from 6.00 pm to 10.00 pm and increase production capacity from one million tonnes per annum (Mtpa) to 1.5 Mtpa to cater for forecast increases in demand due to population growth. The Project will also provide allowance to receive quarry materials from other sites for crushing and screening (as required), stockpiling and then sale, within the proposed total production capacity of 1.5 Mtpa.

The site has a long history of quarrying and has well established buffers around the site. It is situated within a primarily rural environment, surrounded by a mix of agriculture, native vegetation and rural residential land uses. The undulating topography and ridgelines surrounding the Project area provide effective shielding from much of the residential development nearby.

The Project will assist in meeting the strong ongoing demand for construction products driven primarily by a forecast 25 per cent increase in the population of Queanbeyan and the ACT over the next 20 years. There are limited sources of suitable quality quarry material to meet this forecast demand and Cooma Road Quarry is well positioned to cater for this growth given its strategic location close to major highways and urban development areas, and the limited supply available to serve these markets.

The Project will provide for the continued employment of the existing 33 quarry staff and drivers, plus employment of up to 10 additional staff during peak production, with flow on effects to the local and regional economy. The Project will also provide economic benefits through capital expenditure, ongoing operational expenditure and employee expenditure. The Project will also allow for the continued economic supply of quarry products in the region, the price of which are highly sensitive to transport costs.

The Project has been designed to minimise potential environmental and community impacts by:

- maximising the use of existing facilities;
- locating activities within existing and approved disturbance areas wherever possible;
- avoiding sensitive environmental areas; and
- implementing appropriate management measures.

The comprehensive environmental impact assessment undertaken for the Project demonstrates that the site is suitable for the proposed Project and that the environmental impacts of the Project can be effectively managed. It is considered that the Project has mitigated potential environmental impacts to a level that will allow for the significant benefits of the Project for the local and regional communities to be sustainably realised.

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 Introduction

Holcim (Australia) Pty Ltd (Holcim Australia) operates Cooma Road Quarry, an existing hard rock quarry located approximately 6 kilometres south of Queanbeyan (refer to **Figure 1.1**). Holcim Australia is seeking development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for continued operation of the existing Cooma Road Quarry, referred to herein as Cooma Road Quarry Continued Operations Project (the Project).

Holcim Australia has engaged Umwelt (Australia) Pty Ltd (Umwelt) to undertake the environmental and community assessment of the Project, which forms the basis of this Environmental Impact Statement (EIS).

1.1 The Proponent

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.

Cooma Road Quarry was initially owned by CSR Limited, operating under CSR Readymix. In 2003, CSR demerged, forming Rinker Group Australia Pty Limited which incorporated the CSR Readymix quarries and concrete businesses. CEMEX acquired Rinker Group Australia Pty Limited, including its Australian business, Readymix Holdings Pty Limited, in 2007. Two years later, in October 2009, Holcim Australia acquired CEMEX's Australian operations, including Cooma Road Quarry. To avoid confusion, Holcim Australia will be used to describe ownership of the Quarry and any associated approvals irrespective of timing, throughout this document.

1.2 Overview of Quarry History and Existing Operations

Cooma Road Quarry has been operating at the site since 1959. The current development consent for Cooma Road Quarry was granted on 26 October 1995 by Queanbeyan City Council and is due to expire in October 2015. Cooma Road Quarry is considered a significant regional supplier of granite and dacite hard rock aggregates with a maximum annual production capacity of 1 million tonnes per annum (Mtpa). Rock is extracted and processed on site using a fixed crushing and screening plant. Aggregate is then transported from site by truck via Old Cooma Road.

Cooma Road Quarry currently operates 6.00 am to 6.00 pm Monday to Saturday with general maintenance and truck movements associated with delivery vehicles returning to site permitted until 8.00 pm.

Further details of the existing operations are provided in **Section 2.1**.

Source: Holcim (2012), Google Earth (2011) and Queanbeyan City Council (2006)

Legend

Proposed Project Area

FIGURE 1.1

Locality Map

1.3 Overview of Proposed Project

The current development consent for Cooma Road Quarry will expire in October 2015, however, there will still be rock resources available for quarrying at the site. The Project will involve extending the life of the quarry for an additional 20 years to allow for extraction of these remaining resources and extension of the quarry pit to the north to extract an additional approximately 4.5 Mt of rock. As part of the Project, Holcim Australia also propose to increase the production capacity of the quarry to meet predicted peak increases in demand for construction materials associated with the planned future growth and development of the Canberra and Queanbeyan regions.

Approval is sought for the following:

- extraction of the remaining resources within the existing approved quarry pit area;
- extension of the approved extraction boundary to the north covering an area of approximately 3.5 hectares;
- increasing the maximum annual production limit from 1 Mtpa to 1.5 Mtpa;
- allowance to receive quarry materials from other sites for crushing and screening (as required) and then sale. Total product (including from both material quarried from the site and from materials imported to the site) will be maintained within the total production limit of 1.5 Mtpa;
- relocation of the existing workshop, truck parking and temporary stockpiles;
- addition of a mobile pug mill; and
- recycling of clean concrete on site for re-use as product.

Holcim Australia currently has approval to operate Cooma Road Quarry from 6.00 am to 6.00 pm Monday to Saturday, with maintenance permitted from 6.00 am to 10.00 pm and trucks permitted to return to the site until 8.00 pm. As part of the Project it is proposed to continue these hours and to also to undertake certain activities until 10.00 pm Monday to Friday to provide increased flexibility to supply material for projects and to accommodate the increased production rate. Activities proposed to be undertaken during the extended operating hours will include secondary crushing, stockpile management and dewatering activities.

As part of Holcim Australia's commitment to improving sustainable development, approval will also be sought to enable the site to carry out recycling of clean concrete waste from concrete plants/trucks for re-use as product.

All other aspects of the existing quarry operations will remain unchanged.

1.4 Site Context

1.4.1 Project Area and Surrounding Land Use

The Project area has historically been used for quarrying activities, including the extraction and processing of quarry materials. The primary land uses in the vicinity of the Project area include agriculture, environment protection, rural residential and residential uses.

Grazing land characterised by gently undulating slopes and plains are located to the south and east of the Project area. Large areas of remnant vegetation occur adjacent to the quarry to the north and west. Cuumbuen Nature Reserve is located approximately 3.5 kilometres to the north east and Jerrabomberra Mountain Reserve is 2 kilometres to the north-west (refer to **Figure 1.2**).

The rural residential area of Googong is located approximately 0.5 kilometre to the east of the quarry. The residential area of Jerrabomberra is located approximately 1 kilometre to the west, and Karabar is located approximately 2 kilometres to the north. The undulating slopes of the area provide topographical shielding for the quarry including a ridgeline separating Cooma Road Quarry from the residential area of Jerrabomberra.

The new townships of Googong and Tralee have been approved to the south and west of Cooma Road Quarry. The new township of Googong is to be located approximately 3 kilometres south east of Cooma Road Quarry and will be developed over 20 to 25 years to accommodate 16,000 people. The township of Tralee is to be located approximately 3 kilometres west of Cooma Road Quarry and will accommodate 5000 new homes.

Googong Dam, the largest water supply dam in the region, is located approximately 4.5 kilometres south east of Cooma Road Quarry (refer to **Figure 1.2**).

1.4.2 Land Ownership

A large portion of the existing quarry site is located on land owned by Holcim Australia, as shown in **Figure 1.3**. These parcels of land include lot 1 DP 808393, lot 2 DP 1087429 and lot 4 DP 582954. The remainder of the proposed Project area is located on privately owned land currently leased by Holcim Australia. These parcels of land include lot 110 DP 754881, lot 111 DP 754881, lot 103 DP 754881, lot 104 DP 754881 and lot 124 DP 754881. The schedule of lands is provided in **Appendix 1**.

Ownership of the land surrounding the Project area is also shown on **Figure 1.3**. The land surrounding the Project area to the east and south is generally privately owned, while areas to the north and west consist of Crown and Council owned land.

1.5 Need for the Project

The Project will support the planned future growth of the region, maintain local employment and local supply of quarry materials close to markets. The Project will allow Cooma Road Quarry to support the rapid growth and development of the area and assist in achieving the aims and objectives of the various strategic and regional planning policies, including the Queanbeyan Residential and Economic Strategy 2031, Sydney-Canberra Corridor Regional Strategy 2006-2031, the Canberra Plan and the Memorandum of Understanding on settlement between the Commonwealth, NSW and ACT governments.

A detailed economic and needs analysis has been completed for the Project and is provided in **Appendix 2**. The needs analysis found that there was a strong ongoing demand for quarry resources and that Cooma Road Quarry is well placed to meet this need. The needs analysis found that the Project will make a significant contribution to the local and regional economies through the ongoing supply of cost effective, high quality construction materials to support ongoing development of the community.

Source: Holcim (2012), Google Earth (2011) and Queanbeyan City Council (2006)

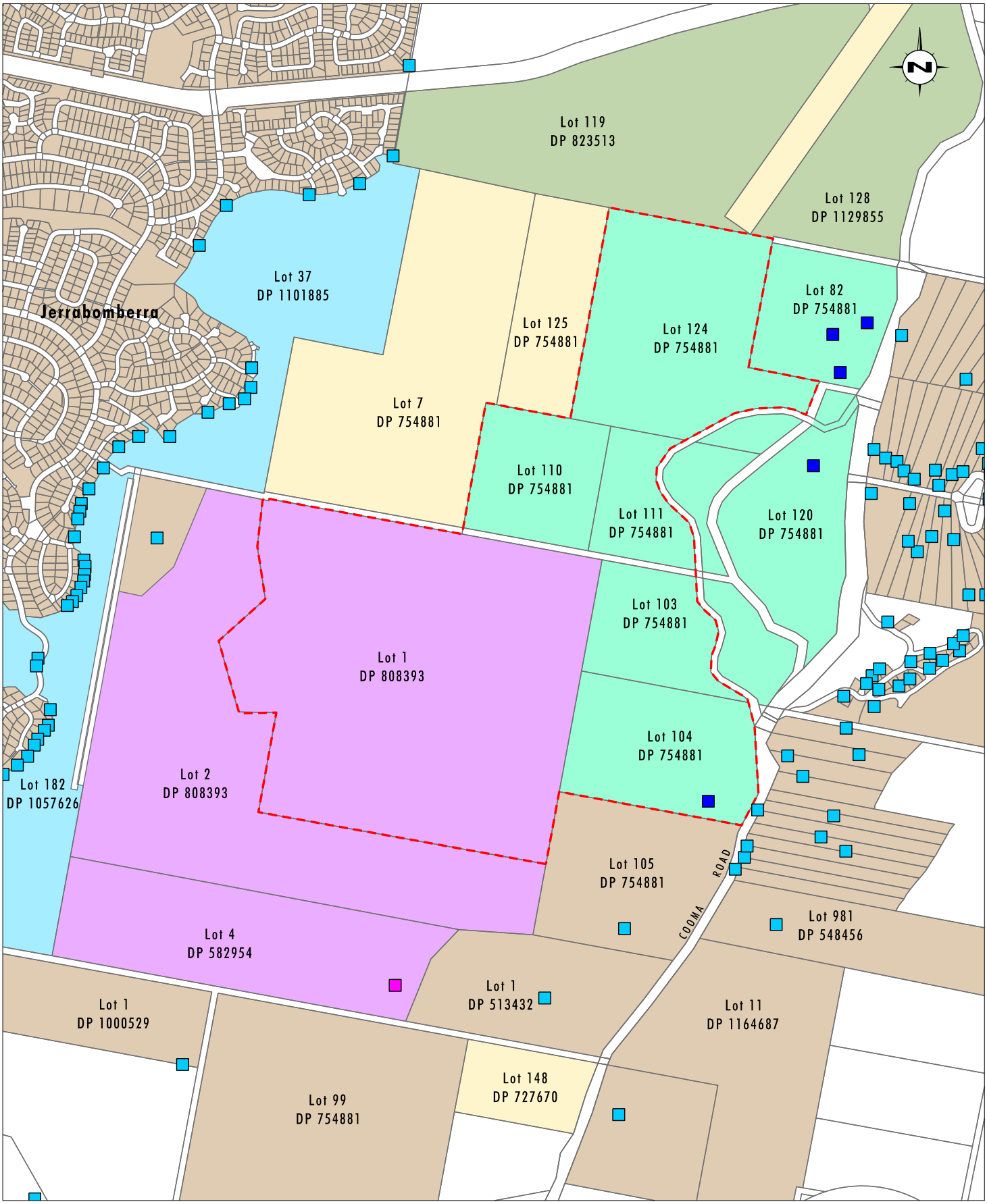
0 1 2 2.5km
1:50 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Disturbance Area - Workshop

FIGURE 1.2

Project Area and Surrounding Land Use



Source: LPMA (2010)

0 100 300 600m
1:17 000

Legend

- Proposed Project Area
- Holcim Owned Land
- Privately Owned Land Leased by Holcim
- Crown Land
- Queanbeyan City Council
- Ngambri Local Aboriginal Land Council
- Private
- Indicative Dwelling Location
- Holcim Lease
- Holcim Owned

FIGURE 1.3

Land Ownership

There are limited sources of quarry material within the region served by Cooma Road Quarry, with only one other hard rock quarry operating within the core supply area for the quarry and three others within reasonable transportation distance. Each quarry is limited in the amount it can produce, and produces only certain products. Cooma Road Quarry represents a major source of potential supply that will be able to provide for the increasing demand for hard rock in the ACT and Queanbeyan markets. Cooma Road Quarry is well positioned to cater for this growth given its strategic location close to major highways and urban development areas, and the limited number of major resources to serve these markets over the next 20 years.

The Project will provide the following key benefits:

- maximising, within environmental and geological constraints, the resource recovery from the existing disturbed quarry footprint while utilising existing infrastructure;
- extending the life of the quarry operations;
- continued employment of the existing workforce for the life of the Project,
- employment of up to 6 additional full time staff and 4 additional drivers, at peak production, with flow on effects to the local and regional economy;
- recovery of additional hard rock resources on site;
- capital expenditure of approximately $3.5 million;
- flow-on economic benefits of the direct expenditure is estimated to generate a further $9.8 million benefit within the local and State economies;
- continued payment of significant s94 development contributions to Queanbeyan City Council based on a cents per tonne rate of product transported from the site. At the proposed peak production rate of 1.5 Mtpa this will amount to approximately $435,000 per annum; and
- community investment.

Further analysis of the economic impact of the Project is provided in **Section 5.16** and **Appendix 2**.

Holcim Australia has an established relationship with the surrounding community and other stakeholders and has committed to working with the community to minimise the impacts of its operations such that it can continue to coexist with the local community. Holcim Australia recognises that achieving this outcome requires ongoing commitment and the development of a partnership with the local community. Holcim Australia's ongoing commitment to effective management of Cooma Road Quarry to minimise environmental and community impacts provides the opportunity to realise the economic benefits of the Project whilst minimising impacts.

1.6 Overview of Planning and Approvals Process and Director General's Requirements

On 1 October 2011, a new assessment system for projects of genuine State significance commenced in NSW. As the Project will produce more than 500,000 tonnes per annum of extractive material, the Project is considered to be a State significant development under Schedule 1 of the *State Environmental Planning Policy (State and Regional Development)* 2011 and requires approval under Part 4 of the EP&A Act.

The Department of Planning & Infrastructure (DP&I) issued Director General's Requirements (DGRs) for the Project on 14 February 2012. The DGRs outline the specific requirements to be addressed by this environmental impact statement (EIS). A copy of the DGRs are contained in **Appendix 1**. A checklist of the DGRs and where they have been addressed in the EIS is outlined in **Table 1.1**.

Table 1.1 – Checklist of Director General's Requirements for the Environmental Assessment

General Requirements	Relevant EIS Section
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 *Environmental Planning and Assessment Regulation 2000.*	
In addition, the EIS must include a:	Refer to **Section 2.0**
• detailed description of the development, including: - need for the proposed development; - justification for the proposed quarry plan, including efficiency of resource recovery, mine safety, and environmental protection; - likely staging of the development – including construction, operational stage/s and rehabilitation; - likely interactions between the development and existing, approved and proposed mining and quarry operations in the vicinity of the site; and - plans of any proposed building works;	
• consideration of all relevant environmental planning instruments, including Part 3 of the *Mining, Petroleum Production and Extractive Industry State Environmental Planning Policy 2007*, and identification and justification of any inconsistencies with these instruments;	Refer to **Section 4.0**
• risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment;	Refer to **Section 5.1**
• detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: - a description of the existing environment, <u>using sufficient baseline data;</u> - <u>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</u> - <u>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</u>	Refer to **Section 5.0**
• consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.	Refer to **Section 6.0**

Table 1.1 – Checklist of Director General's Requirements for the Environmental Assessment (cont.)

General Requirements	Relevant EIS Section
Key Issues The EIS must address the following specific issues:	
• **Land Resources** – including a detailed assessment of the potential impacts on: - soils and land capability (including salinity and contamination); - landforms and topography, including cliffs, rock formations, steep slopes, etc; and - land use, including agricultural, forestry, conservation and recreational use and potential urban expansion;	Refer to **Section 5.2**
• **Water Resources** – including: - detailed assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including: o detailed modelling of potential groundwater impacts; o impacts on affected licensed water users and basic landholder rights; and o impacts on riparian, ecological, geomorphological and hydrogeological values of watercourses, including environmental flows; - 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; - an assessment of proposed water discharge quantities and quality/ies against receiving water quality and flow objectives; - 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; - a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant WSP; and - a detailed description of the proposed water management system (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts;	Refer to **Section 5.3** and **5.4**
• **Biodiversity** – including: - measures taken to avoid, reduce or mitigate impacts on biodiversity; - accurate estimates of proposed vegetation clearing; - a detailed assessment of potential impacts of the development on any: o terrestrial or aquatic threatened species or populations and their habitats, endangered ecological communities and groundwater dependent ecosystems; and o regionally significant remnant vegetation, or vegetation corridors; and - a comprehensive offset strategy to ensure the development maintains or improves the terrestrial and aquatic biodiversity values of the region in the medium to long term;	Refer to **Section 5.5**

Table 1.1 – Checklist of Director General's Requirements for the Environmental Assessment (cont.)

General Requirements	Relevant EIS Section
• **Heritage** – including: - an Aboriginal cultural heritage assessment (including both cultural and archaeological significance) which must: o demonstrate effective consultation with Aboriginal communities in determining and assessing impacts, and developing and selecting mitigation options and measures; and o outline any proposed impact mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures); and - a Historic heritage assessment (including archaeology) which must: o include a statement of heritage impact (including significance assessment) for any State significant or locally significant historic heritage items; and o outline any proposed mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures);	Refer to **Section 5.6** and **5.7**
• **Air Quality** – including a quantitative assessment of potential: - construction and operational impacts, with a particular focus on dust emissions (including PM_{10} emissions, and dust generation from transport of quarry products), as well as diesel and blast fume emissions; - reasonable and feasible mitigation measures to minimise dust, diesel and blast fume emissions, including evidence that there are no such measures available other than those proposed; and - monitoring and management measures, in particular air quality monitoring;	Refer to **Section 5.8**
• **Greenhouse Gases** – including: - a quantitative assessment of potential Scope 1, 2 and 3 greenhouse gas emissions; - a qualitative assessment of the potential impacts of these emissions on the environment; and - an assessment of reasonable and feasible measures to minimise greenhouse gas emissions and ensure efficiency;	Refer to **Section 5.9**
• **Noise, Vibration & Blasting** – including a quantitative assessment of potential: - construction, operational and off-site transport noise impacts; - blasting impacts on people, livestock and property; - 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 5.10**
• **Traffic & Transport** – including: - accurate predictions of the road traffic generated by the Project; - an assessment of potential traffic impacts on the safety and efficiency of the road network; and - a detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network in the surrounding area over the life of the Project;	Refer to **Section 5.11**

Table 1.1 – Checklist of Director General's Requirements for the Environmental Assessment (cont.)

General Requirements	Relevant EIS Section
• **Visual** – including: - a detailed assessment of the: o changing landforms on the site during the various stages of the Project; and o 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 assessment of the measures that would be implemented to minimise the visual impacts of the Project;	Refer to **Section 5.12**
• **Waste** – including: - accurate estimates of the quantity and nature of the potential waste streams of the development, including reject material, receipt and handling of recycled concrete and the overburden emplacement strategy; 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 5.13**
• **Hazards** – including bushfires; and	Refer to **Section 5.14**
• **Rehabilitation** – including the proposed rehabilitation strategy for the site, having regard to the key principles in the Strategic Framework for Mine Closure, including: - rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria; - nominated final land use having regard to any relevant strategic land use planning or resource management plans or policies; and - the potential for integrating this strategy with any other rehabilitation and/or offset strategies in the region.	Refer to **Section 5.15**

1.7 Project Team

Umwelt has prepared this EIS on behalf of Holcim Australia. Component studies contributing to the EIS process were undertaken by a number of technical specialists, including:

- Sinclair Knight Merz (SKM) – Air Quality Assessment;
- Transport and Urban Planning – Traffic Impact Assessment;
- Coffey Geotechnics – Groundwater Assessment; and
- Foresight Partners Pty Limited – Economic Assessment.

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

1.8 Environmental Impact Statement Structure

The purpose of this EIS is to enable consideration of the implications of the Project and to seek approval for the continued operation of Cooma Road Quarry. The EIS has been prepared in accordance with the EP&A Act and the *Environmental Planning and Assessment Regulation* 2000. An overview of the layout of this EIS is provided below:

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

Section 1.0 introduces the Project, provides a brief overview of the quarry history and existing operations, provides a summary of the key Project details along with justification for the Project, and outlines the EIS Project team and EIS report structure.

Section 2.0 contains a detailed description of the Project and a description of the existing site operations, along with alternatives to the Project.

Section 3.0 describes the stakeholder consultation program and details the environmental and community issues identified as part of this process for consideration in the EIS.

Section 4.0 outlines the planning and environmental context for the Project, including the applicability of Commonwealth and state legislation.

Section 5.0 contains a description of the existing environment and a comprehensive analysis and assessment of the key environmental issues relevant to the Project.

Section 6.0 details the Statement of Commitments proposed to be adopted throughout the life of the Project in order to mitigate impacts.

Section 7.0 contains a conclusion and justification for the Project.

Section 8.0 contains a list of references cited in the EIS.

Section 9.0 provides a list of abbreviations and a glossary of technical terms.

2.0 Existing Operations and Proposed Project

2.1 Description of Existing Operations

Cooma Road Quarry has been operating since 1959 servicing the ACT and regional hard rock market. The quarry has a maximum production capacity of 1 Mtpa and is a significant local supplier of granite and dacite hard rock aggregates within the region.

Key components of the existing quarry include:

- a quarry pit providing granite and dacite resources;
- overburden and excess product emplacement areas;
- fixed crushing and screening plant and associated product stockpiles and materials handling facilities;
- a truck loading facility and access point (Old Cooma Road);
- road transport of up to 1 Mtpa of quarry product; and
- ancillary infrastructure including a workshop, office and amenity buildings, wheel wash station, weighbridge and other minor infrastructure.

The existing layout of Cooma Road Quarry is shown on **Figure 2.1**.

Cooma Road Quarry currently operates under a development consent (DA 371/94) granted by Queanbeyan City Council on 26 October 1995. On 9 July 2002, a minor modification application was approved by Queanbeyan City Council and amended conditions issued. The current development consent was granted for a period of 20 years and will expire in October 2015. At this time there will still be significant quarry resources available for extraction at the site. As discussed in **Section 2.2**, it is proposed to continue quarrying operations beyond this date to recover these resources and continue supply of this important resource to existing local and regional markets.

The quarry has approval to operate between 6.00 am and 6.00 pm Monday to Saturday, excluding public holidays, with general maintenance permitted until 10.00 pm and truck movements associated with delivery vehicles returning to site permitted until 8.00 pm on these days. All blasting occurs between the hours of 9.00 am and 3.00 pm Monday to Friday in accordance with the existing consent.

2.1.1 Resource, Products and Markets

2.1.1.1 Geology

Cooma Road Quarry extracts hard rock resources from two geological units. Altered volcanic rocks dominated by rhyolitic to rhyodacitic crystal and lithic tuff (referred to on site as ‘dacite’) are extracted from the southern half of the existing extraction area. These rocks are part of the Late Silurian age *Colinton Volcanics Formation* and are extracted primarily to produce high quality roadbase, crushed rock products, concrete and asphalt aggregates.

Extraction from the northern half of the existing extraction area is focussed on the removal of adamellite (referred to on-site as ‘granite’) – a coarse-grained intrusive igneous rock comprised of quartz, plagioclase, orthoclase and biotite. The adamellite is part of the Early Devonian age *Barracks Creek Adamellite*, and is extracted primarily to produce concrete aggregates.

Source: Google Earth (2011)

0 0.25 0.5 0.75km

1:15 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Approved Disturbance Area - Workshop Boundary
- Approved Disturbance Area - Overburden Emplacement

FIGURE 2.1

Cooma Road Quarry Existing Operations

2.1.1.2 Quarry Products

Rock extracted at Cooma Road Quarry is processed by the crushing and screening plan to produce products ranging in size from approximately 0.3 metre down to fine manufactured sand. The quarry also has the potential to produce larger rock fragments via by-passing the crushing and screening plant. Typical products produced by the quarry include:

- spalls (up to 300 mm);
- ballast (typically used for railway ballast);
- aggregate products ranging in size from 7.0 mm to 20 mm;
- asphalt aggregate (7.0 mm to 40 mm);
- manufactured sand; and
- road base.

These quarry products have a range of applications in the construction and landscaping industries including:

- use of aggregates in concrete, bituminous surfacing, asphalt, landscape works, drainage works, road construction and gravel surfacing;
- railway ballast;
- rock for gabion baskets and wire mattresses used in stabilisation (e.g. road batters) and drainage works;
- rock for protective works;
- manufactured sand, as fill, in landscaping applications and in concrete;
- road base for use in road construction, as fill and in landscaping applications; and
- oversize rock for landscaping, decorative and stabilisation works.

Based on current markets, it is expected that the majority of product from Cooma Road Quarry will be used for construction projects, primarily in concrete and roadway construction.

2.1.1.3 Markets

The quarry provides high quality construction material into the Canberra/Queanbeyan market. The quarry also supplies an extended area reaching as far as 150 kilometres from the quarry site. This supply area encompasses the towns of Goulburn and Yass to the north, Cooma to the south, Ulladulla to the east and Moruya and Batemans Bay to the south east. The quarry supplies various road and infrastructure projects (e.g. windmill farms) within this region, and also supplies Holcim Australia-owned concrete plants in Moruya, Mogo and Batemans Bay on the far south coast of NSW.

Approximately 95 per cent of the hard rock produced at the quarry is delivered within the core areas of Canberra and Queanbeyan.

2.1.2 Quarrying Techniques and Equipment

The quarrying process currently used at Cooma Road Quarry consists of the following key components:

- topsoil stripping;
- overburden removal and placement;
- drilling, blasting, loading and haulage of primary raw feed material; and
- crushing, screening and stockpiling of product.

The details of these components are outlined below.

2.1.2.1 Topsoil Stripping

Vegetation clearing and topsoil stripping is undertaken in accordance with the existing consent and Cooma Road Quarry Environmental Management Plan (EMP). Vegetation is removed with a bulldozer or similar equipment and the mulched material placed on stockpiles or rehabilitated areas as required. Topsoil and subsoil is stripped to its full depth using a scraper or combination of bulldozer/front-end loader/excavator and haul truck. Topsoil and subsoil is placed on areas undergoing rehabilitation or placed in stockpile areas for future rehabilitation works.

2.1.2.2 Overburden Removal

The removal of overburden is undertaken using an excavator and haul truck. The overburden material is pushed into site bunds or temporary stockpiles by a bulldozer or similar equipment, and then loaded into haul trucks and either placed in the existing emplacement areas or sold as a road base or general fill material. The existing and approved future overburden emplacement areas are shown on **Figure 2.1**.

2.1.2.3 Drilling and Blasting

Following the removal of overburden, the rock resource is drilled and blasted to break it into sizes which can be readily managed by front end loaders and transported to the primary crusher via haul trucks.

Drilling and blasting are carried out in accordance with the existing consent conditions and Environmental Protection Licence (EPL) No. 1453. Blasting occurs between the hours of 9.00 am and 3.00 pm Monday to Friday. Drilling occurs between 6.00 am and 6.00 pm Monday to Saturday.

Drill and Blast Procedures are detailed in the Cooma Road Quarry EMP. The typical maximum instantaneous charge (MIC) used for blasting undertaken at the quarry varies depending on location and proximity to sensitive receivers. All drill and blasting procedures are carried out by qualified contractors. No explosives are stored on site, with all explosives brought onto the site as needed and loaded directly into the drill holes.

Detailed monitoring is undertaken of each blast. The results of the monitoring are reviewed for compliance with ground vibration and airblast criteria. Monitoring results show that Cooma Road Quarry currently complies with airblast overpressure and ground vibration criteria, as stipulated in its Environmental Protection Licence (EPL 1453).

2.1.2.4 Loading and Haulage of Primary Raw Feed

After the rock is fragmented from blasting, the rock is loaded (typically by front-end loaders) into dump trucks which haul the material via internal quarry roads to the primary crusher. This material which is known as primary raw feed is then loaded into the primary crusher for crushing and screening to produce quarry product. Loading and haulage of primary raw feed from the quarry to the primary crusher occurs between 6.00 am and 6.00 pm Monday to Saturday.

2.1.2.5 Crushing, Screening and Stockpiling of Product

The crushing and screening process passes rock through a series of crushers to produce quarry products of various sizes and shapes to meet customer specifications. A series of screens and conveyors are used following each crusher to sort the crushed rock into various size categories. The location of the crushing and screening plant is shown on **Figure 2.1**.

Dust control systems are utilised on the crushing and screening plant to assist in the reduction of dust emissions and as part of site occupational health and safety management. Most conveyor transfer points are enclosed and water sprays are utilised to further minimise dust generation from material travelling along the conveyors. Dust control measures are undertaken in accordance with the Cooma Road Quarry EMP.

Product Stockpiling

There are two main stockpiling areas that are utilised at the quarry, storing primary raw feed, primary crushed rock awaiting secondary crushing and product in a range of size categories. Following the crushing and screening process, a series of conveyors load the processed material into separate stockpiles depending on size. The aggregate product is washed as part of the crushing and screening process and therefore has limited potential for dust emissions. These products are then loaded into trucks for sale and transported off site. Excess stock volumes are relocated via haul truck to the designated excess product stockpile area.

The current operation's requirements are for up to approximately 25 stockpiles with an average capacity of 6000 tonnes and ranging sizes up to 25,000 tonnes for some products.

2.1.3 Site Infrastructure

The existing site infrastructure required to provide for the operation of Cooma Road Quarry is shown on **Figure 2.1** and includes:

- primary crushing and screening plant;
- secondary crushing and screening plant;
- maintenance workshop and stores, including an above ground fuel storage area;
- administration buildings, amenities, weighbridge, wheel wash and parking; and
- associated services (e.g. power lines).

2.1.4 Traffic, Site Access and Parking

Haulage vehicles currently transporting product from Cooma Road Quarry consist of Holcim Australia owned and operated road trucks and independent transport contractors, primarily utilising truck and dog trailers and semi trailer configurations. Cooma Road Quarry currently has approval to transport a total of 1 Mtpa of product from the site per annum.

Cooma Road Quarry is accessed via a driveway access point off Old Cooma Road (refer to **Figure 2.1**).

Existing light vehicle parking is located at the front of the site near the current administration offices and accommodates approximately 12 light vehicles. An additional 12 light vehicles car parking spaces are available at the site laboratory.

2.1.5 Utilities

2.1.5.1 Lighting

Lighting is required during the early morning and evening operation of the crushing and screening plant and loading facilities. No mobile lighting is required for quarrying activities, however mobile lighting is required for essential night maintenance activities from time to time. All lights are fitted with shields and are directed down onto work areas to ensure fugitive light emissions are limited.

2.1.5.2 Power Supply

Mains power is supplied to the Project area by Essential Energy lines on Old Cooma Road to two transformers supplying the crushing infrastructure and workshop/office facilities.

2.1.5.3 Water and Waste Water

Potable water is delivered to the site by tankers for consumption. Operational water used for processing and dust suppression is sourced from water captured and stored on site. Water used within the processing plants is recycled in a closed system.

Waste water from the ablutions and staff facilities are disposed of within one of two septic tanks with absorption trenches and one Envirocycle system. Sludge from the septic tanks is removed from site when required by a suitably licensed contractor and disposed of at the Queanbeyan Sewerage Treatment Works. Water from the Envirocycle system is pumped out onto gardens around the weighbridge.

2.2 The Proposed Project

The Project will involve extending the life of the Cooma Road Quarry to enable the extraction of the remaining hard rock resources within the currently approved extraction area over a period of 20 years. In addition, the extraction boundary will be extended to the north to provide access to approximately 4.5 Mt of additional fresh and weathered granite resources (refer to **Figure 2.2**). Holcim Australia also propose to increase the production capacity of the quarry from 1 Mtpa to 1.5 Mtpa to allow the quarry to meet predicted future peak market demands to support the planned future growth and development of the Canberra and Queanbeyan regions.

Source: Holcim (2012), Google Earth (2011)

0 0.25 0.5 0.75km

1:15 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop
- Approved Disturbance Area - Overburden Emplacement
- Proposed Dam
- Clean Drain

FIGURE 2.2

Cooma Road Quarry
Continued Operations Project

File Name (A4): R01/2992_030.dgn
20121029 16.00

Approval is also sought for the following:

- relocation of the existing workshop, truck parking and temporary stockpiles;
- addition of a mobile pug mill;
- allowance to receive quarry materials from other sites for crushing and screening (as required) and then sale. Total product (including from both material quarried from the site and from materials imported to the site) will be maintained within the total production limit of 1.5 Mtpa;
- construction of surface water management system components (including the proposed Eastern Dam); and
- recycling of concrete on site for re-use as product.

The Project represents a continuation of the existing quarry operations, with quarry operations remaining substantially the same as that outlined in **Section 2.1**. A summary of the key components of the Project compared to the existing operations is provided in **Table 2.1**. A detailed description of the proposed changes is provided in the following sections.

Table 2.1 – Comparison of Approved Cooma Road Quarry Components and the Proposed Project

Major Project Components	Currently Approved Cooma Road Quarry	Proposed Project
Quarry Life	Quarry operations to cease October 2015	Based on current quarry plans and market forecasts, an additional 20 years of quarry life until 2035.
Limits on Production	1 Mtpa	1.5 Mtpa.
Quarry Footprint	As shown on **Figure 2.1**	Extension of quarry pit to include the existing disturbed quarry infrastructure area as shown on **Figure 2.2**.
Overburden Emplacement Areas	As shown on **Figure 2.1**	No change. Existing and approved overburden emplacement areas contain sufficient capacity for continued operations.
Hours of Operation	Full operations 6.00 am–6.00 pm Monday to Saturday. General maintenance permitted until 10.00 pm Monday to Saturday. Return of delivery trucks to site permitted until 8.00 pm Monday to Saturday. Blasting restricted to 9.00 am–3.00 pm Monday to Friday. No operations are undertaken on a Sunday or public holidays.	6.00 am–10.00 pm Monday to Friday and 6.00 am–6.00 pm Saturday. Primary crushing restricted to 6.00 am–6.00 pm Monday to Saturday (no change). Return of delivery trucks to site permitted until 8.00 pm Monday to Saturday (no change). Blasting restricted to 9.00 am–3.00 pm Monday to Friday (no change). No operations are undertaken on a Sunday or public holidays (no change).
Transport	Road transportation of 1 Mtpa.	Road transportation of 1.5 Mtpa.
Site Access	Old Cooma Road access point.	No change. Continued use of existing Old Cooma Road access point.
Employment	20 operational employees, plus 13 full time road transport drivers and up to 30 road transport contractors.	24-26 operational employees, plus up to 17 full time road transport drivers and 45 road transport contractors during peak production.

Table 2.1 – Comparison of Approved Cooma Road Quarry Components and the Proposed Project (cont.)

Major Project Components	Currently Approved Cooma Road Quarry	Proposed Project
Infrastructure	As shown on **Figure 2.1**	Relocate workshop, truck parking and temporary stockpiles to accommodate extension of extraction boundary (refer to **Figure 2.3**). Addition of mobile pug mill.
Receipt of Quarry Materials for Processing and Delivery	Not currently undertaken.	Receipt of hard rock material for processing, stockpiling and distribution. Total product (including from both material quarried from the site and from materials imported to the site) will be maintained within the total production limit of 1.5 Mtpa.
Concrete Recycling for re-use as Product	Not currently undertaken.	Commence recycling of clean surplus concrete material on site using the existing processing infrastructure for re-use as product.

The Project area has been highly disturbed by approved quarry operations and historical land uses. The project components have been designed sympathetically to be located within previously disturbed areas or within currently approved disturbance areas to avoid the potential for increased impacts.

The proposed quarry pit extension area and proposed water management system components are located almost entirely within areas that have been historically disturbed by approved quarry activities or previous land uses. The only additional disturbance is associated with the proposed Eastern Dam (refer to **Section 5.3**). The disturbance footprint of the dam is approximately 0.2 hectare.

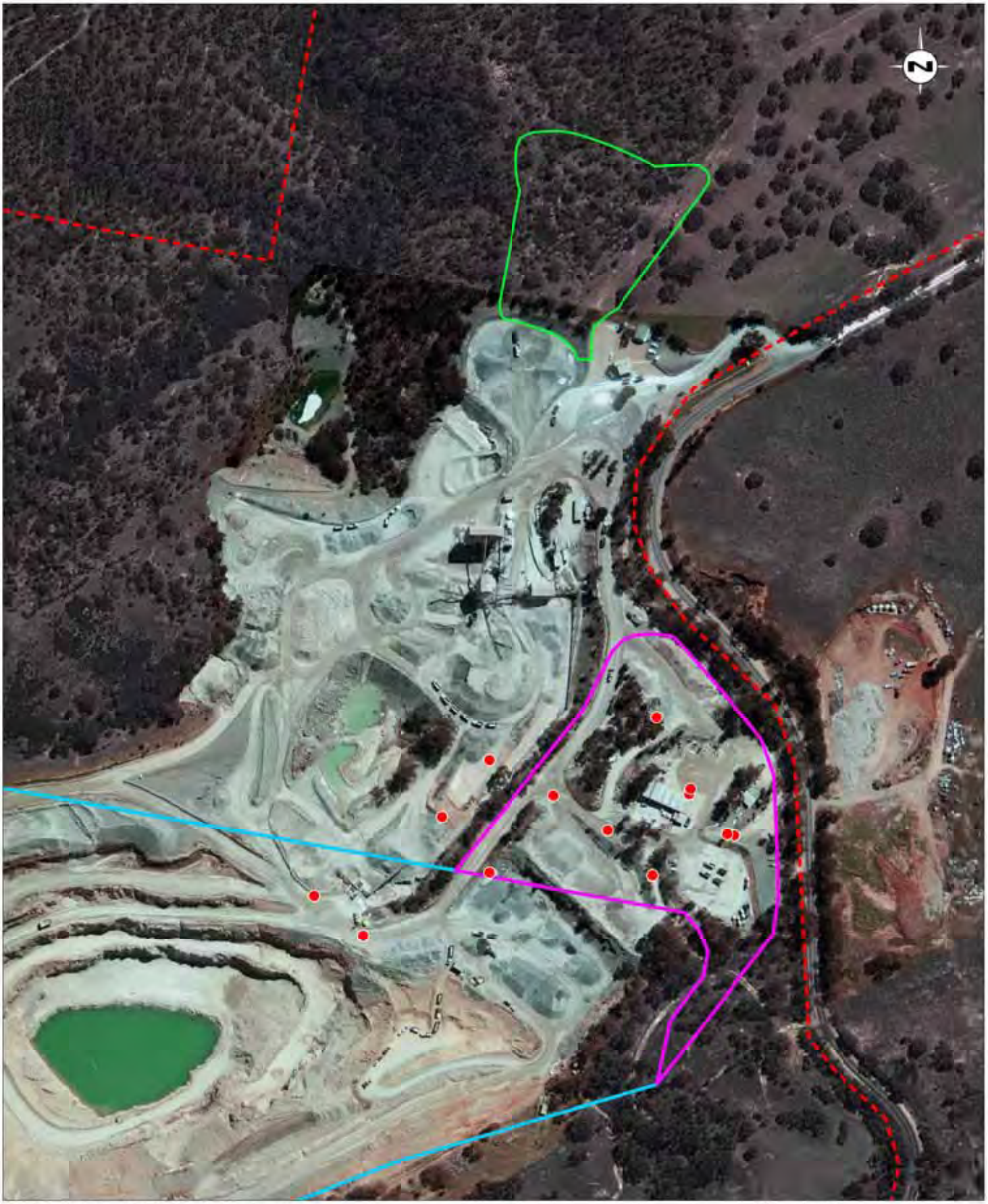
The proposed new infrastructure area has previously been approved for disturbance in the existing development consent held by Holcim Australia for Cooma Road Quarry (DA 371/94) as indicated on **Figure 2.1**. While the area has been approved for disturbance, the area has not yet been cleared.

2.2.1 Exploration and Resource Definition

A comprehensive drilling program covering the proposed quarry extension area consisting of 13 inclined drill holes (10 percussion and 3 diamond) was carried out in 2010/11 to further define the extent and quality of the resource (refer to **Figure 2.3**). The percussion drilled holes ranged in depth from 57 metres to 100 metres. While the diamond drill core holes ranged between 76 and 100 metres in depth. In total a combined length of 1002.6 metres was drilled.

Drill holes were collared with a view to testing:

- the depth of weathering;
- the quality of the granite beneath the weathered zone;
- the western granite boundary adjoining the Colinton Formation; and
- overall feasibility of shifting the existing quarry infrastructure in order to extract the underlying granite for use as concrete aggregate.



Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Infrastructure Area
- Exploration Boreholes

FIGURE 2.3

Exploration Drilling Locations

The existing quarry pit and extension area contain a substantial, high quality hard rock resource, suitable for the generation of quarry products for use in the construction industry. The target rock within the extension area is Silurian-Devonian Granite, a common igneous rock formed at depth in the crust. The resource quantities within the extension area have been estimated using a detailed geological model developed from the exploration program undertaken at the site.

The size of the resource in the extension area is indicated in **Table 2.2**.

Table 2.2 – Resource Statement for Proposed Extension Area

Rock Type	Quantity
Overburden (incl. weathered granite)	2.2Mt
Fresh granite	2.2Mt
Total Resource	**4.4Mt**

2.2.2 Extraction of Remaining Resources

When the current development consent lapses in October 2015, Holcim Australia estimates that approximately 2 Mt of granite and 10 Mt of dacite resources will remain within the currently approved extraction area. The proposed extension to the operational life of Cooma Road Quarry will enable the ongoing extraction of these resources to supply the strong forecast market demand for quarry products over the next 20 years.

2.2.3 Extension to Extraction Area

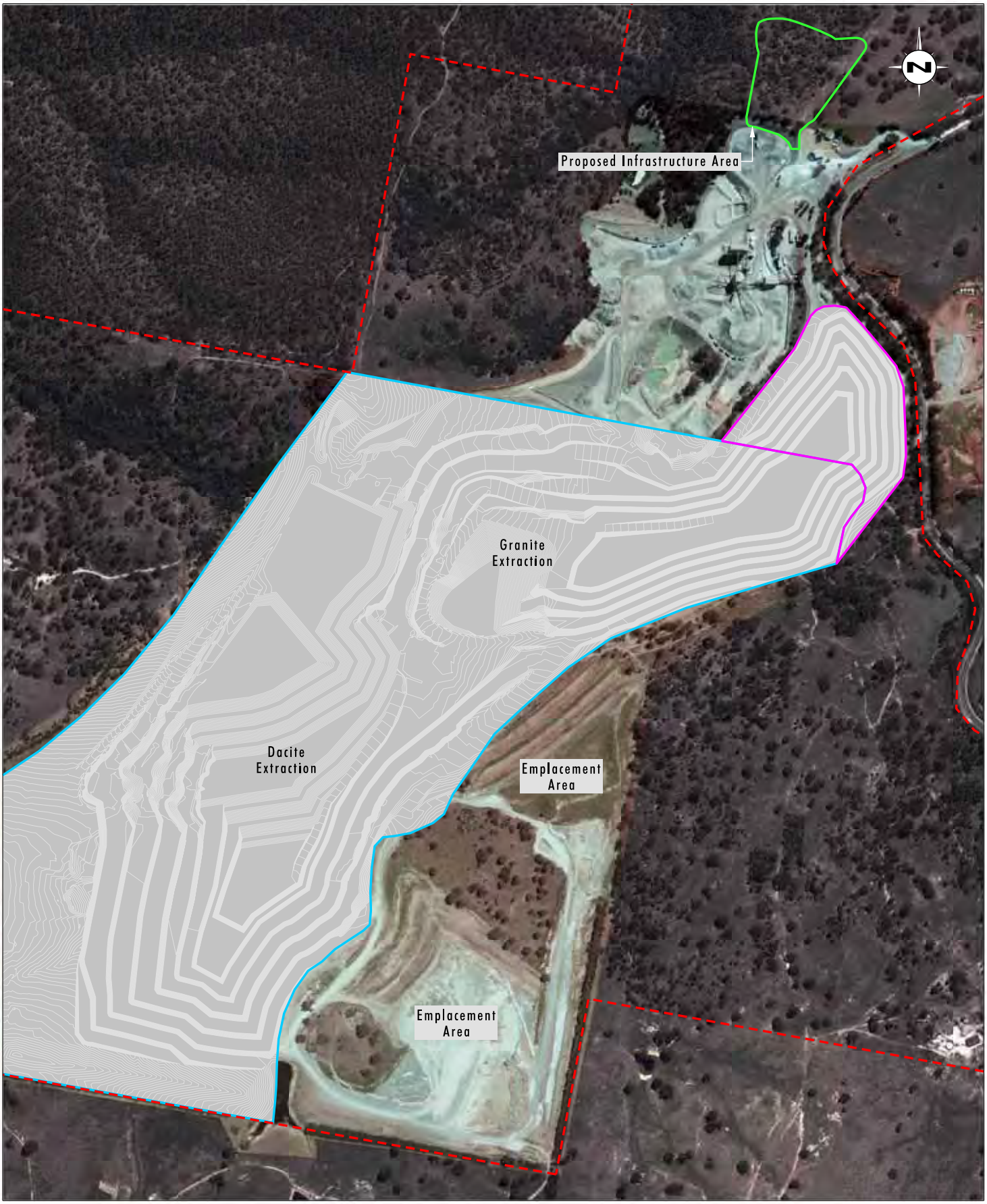
Holcim Australia is proposing to extend the northern limit of the currently approved extraction area to provide access to approximately 2.2 Mt of fresh granite resources and a further 2.2 Mt of weathered granite resources and overburden materials. The proposed extension area covers approximately 3.5 hectares of disturbed land currently occupied by the existing approved quarry infrastructure area.

Resource assessment drilling of the proposed extension area was undertaken by Holcim Australia in 2010 to determine the volumes/tonnages of materials within this area and confirmed that approximately 4.5 Mt of granite resources and overburden materials could be extracted from a viable pit design that has a floor level of 635 m AHD. This floor level is consistent with that of the existing quarry pit. A conceptual quarry plan for the Project is shown on **Figure 2.4**.

The depth of weathering within the extension area is variable, but averages approximately 20 metres. Weathered material is typically transported to overburden emplacements, but may be sold as roadbase or fill materials when the opportunity arises.

As shown on **Figure 2.1**, there is an area to the southwest of the existing quarry pit that lies within the approved extraction area that has not been quarried. Geological constraints have prevented quarrying of this area and it is not proposed to be quarried in the future. As a result, the Project will compensate for not being able to recover all of the resources within the approved extraction area.

As with all quarries, production levels from Cooma Road Quarry are variable depending on market demand. The Project has been designed to produce up to 1.5 Mtpa of saleable product at full production. It is envisaged however that average production levels will not increase significantly from current levels which are typically in the order of 650,000. The proposed increase in production capacity provides for flexibility to meet future periods of peak demand associated with particular projects.



Source: Holcim (2012), Google Earth (2011)
Note: Contour Interval 1m

0 100 200 300m
1:7000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Disturbance Area - Workshop

FIGURE 2.4

Conceptual Quarry Plan

Overburden from the proposed extension area can be readily accommodated within the existing and approved overburden emplacement areas (refer to **Figure 2.1**), with no new overburden emplacement areas proposed as part of the Project. It is noted that overburden emplacements have been approved which have not been used to date. Holcim Australia has no intention of using the approved emplacement area to the west of the current approved extraction boundary for the Project (refer to **Figure 2.1**).

2.2.4 Quarry Staging

The conceptual quarry plan for the Project is shown on **Figure 2.4**. As discussed in **Section 2.1.1**, different rock types are quarried in different parts of the quarry pit depending on market demand. The progression and timing of the quarry extraction will be market driven and long-term forecasting of exact customer needs is difficult. The conceptual quarry plan shown on **Figure 2.5** is the full extent of the proposed quarry pit which will be achieved over the life of the Project. Given that quarry staging could be variable over the life of the quarry, for environmental impact assessment purposes, reasonable worst case scenarios were used for environmental modelling. These typically related to either a maximum pit extent or a scenario with elevated quarry equipment operating locations (i.e. equipment operating in the upper benches of the quarry pit).

Rehabilitation activities will continue to be undertaken progressively where possible.

2.2.5 Importation of Aggregates and Crushed Rock Products

To supplement hard rock production at Cooma Road Quarry, Holcim Australia proposes to receive aggregates and crushed rock products from other Holcim Australia quarries and external suppliers, such as Lynwood Quarry in Marulan. The aggregates and crushed rock products received will be processed through the crushing and screening plant and/or pug mill (as required), stockpiled and distributed from Cooma Road Quarry. The aggregates and crushed rock products received would be dependent on production levels at Cooma Road Quarry and market demand at any time. Total product (including from both material quarried from the site and from materials imported to the site) will be maintained within the total production limit of 1.5 Mtpa.

It is envisaged that aggregates and crushed rock from other Holcim Australia quarries and external suppliers will generally be transported to Cooma Road Quarry by heavy vehicles returning to site. The transportation of these aggregates and crushed rock products will be undertaken within the heavy vehicle movement limits proposed to accommodate the proposed maximum production level of 1.5 Mtpa.

2.2.6 Relocation of Existing Infrastructure

In order to accommodate the proposed quarry extension area, the existing workshop, truck parking area and temporary stockpiles will be relocated to the north to an area approved for disturbance by the existing development consent (refer to **Figure 2.2**). The existing facilities will continue to be used until relocated.

The indicative layout of the relocated infrastructure is shown on **Figure 2.3**. The final layout may be subject to refinement as part of the detailed engineering design and construction process, however, the final layout will remain within the existing approved disturbance footprint shown on **Figure 2.2**. Similarly, the main infrastructure components will generally be consistent with those identified in the indicative layout.

Source: Google Aerial (2011)

0 50 75 100m
1:2000

Legend
Proposed Project Area
Proposed Infrastructure Area

FIGURE 2.5

Conceptual Proposed Infrastructure Area

The proposed quarry pit extension will also require the relocation of two product stockpile areas with a combined capacity of approximately 21,000 tonnes. These product stockpiles will be relocated to within the existing quarry pit (refer to **Figure 2.2**).

The new infrastructure area will require a wastewater disposal system for the purposes of disposal of effluent from the site. It is proposed that an Envirocycle system type system will be used, however, the exact details of the system will be confirmed during the detailed engineering design phase. Holcim Australia will obtain all necessary approvals from Council to operate this system once final design details have been confirmed and prior to construction.

An existing 11kV electrical transmission line (ETL) supplying power to the quarry will also be relocated to accommodate the extension to the quarry pit. The existing 11kV ETL is owned by Country Energy. The new 11kV ETL will be relocated within Holcim Australia owned or leased land within previously disturbed areas or within areas approved for disturbance.

2.2.7 Proposed Infrastructure and Processes

Holcim Australia propose to expand the range of products produced by Cooma Road Quarry by commencing recycling of clean surplus concrete material on site and the addition of a mobile pug mill. These processes are discussed further in the following sections.

2.2.7.1 Concrete Recycling

As part of Holcim Australia's commitment to improving sustainable development, approval is sought to enable the site to carry out concrete recycling for re-use as product. Essentially clean surplus concrete material and products from concrete plants will be re-processed through the existing processing infrastructure for re-use as product. The concrete material will primarily be sourced from Holcim Australia concrete plants, however, clean material from other 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, emptied into a bunded area and left to set, 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 and the landfill demand is also reduced.

The composition of the resource is approximately 50 per cent sand and 50 per cent gravel where the gravel size is 20 millimetres minus. 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.

The resource is alkaline in nature with a pH typically in the range of 11.5–13.0. The resource therefore has a neutralising effect in acid sulphate soils or water bodies such as those commonly found in sand extraction deposits.

No demolition concrete waste or concrete from other sources will be accepted or recycled at Cooma Road 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 nearby creeks and waterways. It will also maintained in a spadeable/solid form.

The validated clean concrete material will be recycled through the existing on-site processing plant and stored within the product stockpiling area prior to sale. It is proposed to recycle in the order of 10,000 Mtpa.

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.

The concrete material would be classified as General solid waste (non-putrescible) under the OEH Waste Classification Guidelines (DECCW, 2009) as it is *cured concrete waste from a batch plant*. There is currently a resource exemption in place that is likely to be applicable to the recovery of this material. A resource recovery exemption facilitates the land application or use of waste material if it is bona-fide, fit for purpose or is a reuse opportunity that causes no harm to the environment or human health, rather than a means of waste disposal. The proposed recycling of concrete material meets the requirements of *The recovered aggregate exemption 2010*, as gazetted under the *Protection of the Environment Operations (Waste) Regulation 2005*. If the resource recovery exemption didn't cover all of the proposed concrete material recycling, Holcim Australia will update its Environment Protection Licence in order to receive, store and reuse the concrete material, unless a resource recovery exemption is considered appropriate.

2.2.7.2 Pug Mill

The Project will include the addition of a mobile pug mill on site. 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.

2.2.8 Hours of Operations

The quarry currently has approval to operate between 6.00 am and 6.00 pm Monday to Saturday, excluding public holidays with general maintenance permitted until 10.00 pm and truck movements associated with delivery vehicles returning to site permitted until 8.00 pm. The Project proposes to extend the hours of operation for certain activities from 6.00 am to 10.00 pm Monday to Friday and 6.00 am to 6.00 pm Saturday.

Activities that are proposed to be undertaken within the extended hours of operation (6.00 am to 10.00 pm Monday to Friday and 6.00 am to 6.00 pm Saturday) are confined to:

- maintenance of fixed plant and mobile plant, as currently approved;
- secondary crushing and screening;
- product stockpile management;
- water cart operations for stockpile area and plant area; and
- pumping for dewatering activities.

The following activities will not be undertaken outside the currently approved hours of operation (6.00 am to 6.00 pm Monday to Saturday):

- primary crushing;
- in pit loading and hauling;
- any activity on the overburden areas;
- blasting activities, including blast hole drilling;
- road trucks departing from site; and
- road truck loading.

The return of delivery trucks to site will continue to occur up until 8.00 pm Monday to Saturday in accordance with current approvals and site practice.

The extended hours of operation will allow Holcim Australia to meet the maximum production limit of 1.5 Mtpa while minimising community exposure to high noise generating activities during the evening time period. The extended operating hours would allow Holcim Australia to process (secondary/tertiary crushing) and stockpile material in preparation for loading into trucks for the first delivery of the following day.

Due to the limited storage capacity and the need to meet customers' product specifications, Cooma Road Quarry is not able to produce large amounts of product for stockpiling. The extended hours of operations would allow the quarry to respond to customer needs and ensure that stores are not depleted during particularly busy periods. The extended hours would also minimise waiting times for heavy vehicles in the morning period waiting on product to be generated following the start up of the plant.

2.2.9 Workforce

The Project will provide an increase in employment from 20 employees to 24-26 employees, at peak production, as well as additional road transport drivers/contractors.

2.2.10 Traffic, Site Access and Parking

Queanbeyan City Council has approval to realign Old Cooma Road including the section that is used for quarry access. The new alignment of Old Cooma Road is further to the east (refer to **Figure 2.3**) and will result in traffic bypassing the quarry. The realignment has been designed to provide for ongoing quarry access, with construction of a new T junction intersection south of the existing Tempe Road/Old Cooma Road intersection. The existing section of Old Cooma Road will remain as an access to Cooma Road Quarry. No other properties will require access from this section of Old Cooma Road. Holcim Australia understands that construction is scheduled to commence on Stage 1 of the realignment in mid 2012.

Additional light vehicle parking will be provided in a car park in the new infrastructure area (refer to **Figure 2.5**). Heavy vehicle parking will also be provided on site within the new infrastructure area (refer to **Figure 2.5**). Holcim Australia has designed proposed parking facilities to cater for the predicted peak workforce with an appropriate allowance for visitors.

2.2.11 Water Management System

The proposed Water Management System (WMS) for the Project is consistent with the current water management strategies and will utilise the majority of the infrastructure of the existing WMS.

As part of the Project, the following improvements to Cooma Road Quarry WMS are proposed:

- an additional water dam (Eastern Dam) to partly intercept runoff from the areas to the east, upslope of the quarry;
- additional clean water drains and a clean water dam (North-West Dam) to intercept runoff from the upslope north-west catchment;
- monitoring of water transfers, usage and dam levels to account for water; and
- additional water management system infrastructure, including catch drains for the proposed workshop area.

The proposed drains and dams will assist in managing upslope runoff from the clean catchment areas upslope of the existing Cooma Road Quarry WMS.

Further details on the proposed WMS are discussed in **Section 5.3**.

2.3 Alternatives to the Project

The key alternative that requires consideration in regard to the Project is the 'do nothing' alternative, that is, proceeding with the quarry as currently approved and allowing operations to cease in 2015. This alternative is not considered desirable as significant resources will remain at the quarry that would otherwise not be recovered at cessation of quarrying. The additional resources will support the planned future growth for the region, maintain local employment and local supply of quarry materials close to markets.

The needs analysis found that there was a strong ongoing demand for quarry resources in the Queanbeyan/ACT area. If operations as Cooma Road Quarry are not continued, a greenfields development may be required to meet the need for hard rock resources in the market area. A greenfields development would have increased direct environmental impacts and would likely require longer transport distances. The continuation of Cooma Road Quarry will meet market demand while minimising potential environmental impacts that would be associated with a greenfields development.

The Project originally proposed to relocate infrastructure to the eastern side of Old Cooma Road, as outlined in the Preliminary Environmental Assessment (PEA) previously provided to the Department of Planning and Infrastructure (DP&I). The original site proposed for the new infrastructure area has previously been disturbed by quarrying activities. Queanbeyan City Council raised issues with the proposed site in its submission for the DGRs. Accordingly, Holcim Australia reviewed the Project design and moved the location of the proposed infrastructure area on a risk based approach.

The new proposed infrastructure site is an area that has previously been approved for disturbance as part of the existing development consent. While the area has been approved for disturbance, Holcim Australia has not undertaken any disturbance activities in the area to date. The site is considered preferable as it is located on the western side of Old Cooma Road, removing the need to cross Old Cooma Road. The site now proposed, as detailed in this EIS, is located adjacent to existing administration and stockpile areas and is considered a more suitable location in regard to both operational and environmental constraints.

Holcim Australia also considered alternate quarry pit designs to the one proposed for the Project. While remaining within previously disturbed areas, the alternate quarry pit designs were generally larger and would have resulted in potential additional impacts. The alternate pit designs would have required relocation of additional infrastructure, including the primary and secondary crushing equipment. If the relocation of the primary or secondary crushing equipment was needed, it is likely these would have been moved to an area closer to Old Cooma Road and subsequently closer to residences. The proposed quarry pit extension allows access to additional granite resources without the requirement to relocate major processing infrastructure. The quarry pit proposed for the Project, and assessed in this EIS, achieves a balance between resource recovery, efficient and cost effective use of existing infrastructure and minimising environmental and social impacts.

3.0 Consultation

Stakeholder consultation 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. Consultation with relevant stakeholders including affected landholders, the surrounding community, community groups, government authorities, service providers, Aboriginal groups and other relevant stakeholders commenced during the early Project planning phases and has continued through the preparation of the EIS.

Holcim Australia has an established relationship with surrounding community and other stakeholders through its ongoing operations at the site since 1959 and has implemented a process for ongoing engagement regarding its operations. This existing engagement program includes a community complaints telephone line and community open days. As part of the Project, Holcim is committed to working with the community to develop a Project that can coexist with the local community and has built on this existing engagement program to implement a detailed stakeholder engagement process for the Project.

The engagement process that has been undertaken as part of the environmental impact assessment and approval process provides the 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 3.1**, with details of consultation with the community and other stakeholder groups outlined in **Section 3.2**. An outline of the key issues identified during the consultation process, and where this has been addressed in the EIS, is included in **Section 3.3**.

3.1 Agency and Government Consultation

Consultation with the 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 3.1** below.

Table 3.1 – Summary of Agency Consultation

Agency	Date	Purpose
Queanbeyan City Council	25 January 2012	Initial Project briefing and the proposed environmental assessment approach
Department of Planning and Infrastructure (DP&I)	14 February 2012	DP&I issue of the DGRs for the Project
Queanbeyan City Council	29 August 2012	Follow up briefing on the Project to discuss assessment outcomes.

An initial briefing was provided to Queanbeyan City Council in order to introduce the Project and outline the key aspects of the Project in terms of project design and the approach to the environmental assessments and stakeholder engagement program.

A second meeting was held with Queanbeyan City Council once the environmental assessments were completed. Discussions focussed on the revision to the proposed infrastructure area, visual amenity and contributions for road maintenance.

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

- Office of Environment and Heritage;
- Division of Resources and Energy;
- Department of Primary Industries, including:
  - NSW Office of Water;
  - Forests NSW;
  - Fisheries NSW;
  - Agriculture NSW;
  - NSW Catchments and Lands;
- Roads and Maritime Service; and
- Murrumbidgee Catchment Management Authority.

Each of the agencies were contacted prior to relevant assessments being finalised by telephone. A brief summary of relevant preliminary results were provided to each agency. No additional assessment requirements were identified during discussions with the agencies. Holcim Australia offered to meet with any of the agencies as required to inform their assessments. 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. As discussed above, two meetings were held with Queanbeyan City Council.

While the Project is not proposing to impact on any matters of national environmental significance (refer to **Section 4.1.1**), the Department of Sustainability, Environment, Water, Population and Communities was consulted in accordance with the DGRs. As requested by the Department of Sustainability, Environment, Water, Population and Communities, a letter was provided detailing the Project and confirming that the Project would not trigger any of the matters of national environment significance and accordingly the Project would not be referred.

3.2 Community and Other Stakeholder Engagement

An initial community information sheet was distributed to residences in the vicinity of Cooma Road Quarry in mid January 2012 (refer to **Appendix 3**). The newsletter provided details of the Project, consultation process and how the community can be involved in the environmental assessment and approvals process. The newsletter also included a feedback form and an enclosed reply paid envelope 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, six responses were received from the community. The primary community issues raised during the consultation process included:

- traffic – frequency, noise, safety (including lighting, lanes and shared usage such as bicycles), road condition and maintenance;
- air quality – potential increased dust emissions and management thereof;
- operating hours;
- surface and groundwater – sourcing of water, potential downstream impacts and water quality; and
- potential endemic flora impacts and offsetting.

The most frequently raised community concern was in relation to the increased traffic associated with the Project. A detailed Traffic assessment was undertaken to fully address the potential impacts of the Project. The results of this assessment are summarised in **Section 5.11** and the assessment is attached in **Appendix 11**. Each of the other issues raised by the community are also addressed in **Section 5.0**. Responses were provided to each of the community members that provided feedback and further information was provided on their concerns once assessments were completed.

A face to face meeting was held with a private resident, at their request, on 25 January 2012. The main topics of discussion were noise from relocated infrastructure and truck movements. A follow up meeting was held to provide further information on their concerns once assessments were completed.

A meeting with the Talpa Heights Community Association (THCA) was held on the 21 February 2012 at which five people attended. The main topics of discussion and concern were around traffic, visual amenity and potential blasting impacts. As a result of this meeting, a photomontage was prepared from Talpa Heights (Mol Crescent, Googong) to identify potential visual impacts and inform the need for any visual mitigation works. This photomontage and visual impact assessment is presented in **Section 5.12**.

The Jerrabomberra Residents Association was also consulted in regard to the Project. Details of the Project were discussed with the Jerrabomberra Residents Association President on 28 February 2012. Further information was provided on the completion of assessments.

A second community information sheet was distributed in August 2012 to update the community and provide details on the assessment findings. The newsletter included a feedback form and an enclosed reply paid envelope so that community members could provide any feedback to Holcim Australia. The newsletter also included an offer to meet with Holcim Australia to discuss the Project or any of the assessment findings in further detail.

As a result of the second newsletter, four responses were received from the community. The primary community issues raised included:

- traffic – frequency, noise, safety (including lanes and shared usage such as bicycles), road condition and maintenance; and
- blasting – frequency and intensity.

The most frequently raised community concern was in relation to the increased traffic associated with the Project. A detailed Traffic assessment was undertaken to fully address the potential impacts of the Project with the findings provided in **Section 5.11**. Responses were provided to each of the community members that provided feedback and Holcim Australia offered to meet them face to face to discuss their concerns.

A follow up meeting was also held with the THCA on 25 September 2012 at which three local residents attended. Holcim Australia discussed the changes made to the Project since the previous meeting and presented the results of the visual assessment, including the photo montage prepared from a resident's balcony. THCA did not raise any specific concerns about the Project.

Holcim Australia also undertook follow up meetings with residents that they had previously met with about the Project to brief them on the assessment outcomes, including those issues that were previously identified as a concern during the first round of consultation.

3.3 Identification of Key Environmental and 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 (refer to **Sections 1.0**, **4.0** and **5.2**);
- the environmental risk assessment of potential environmental impacts associated with the Project (refer to **Section 5.1**);
- outcomes of the community and authority consultation process (refer to **Sections 3.1** and **3.2**); and
- the DGRs for the proposed Project (refer to **Section 1.7**).

Table 3.2 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 3.2 – Key Environmental and Community Issues

Issue	EIS Reference
Traffic and Transport	**Section 5.11**
Air Quality	**Section 5.8**
Noise Generation	**Section 5.10**
Blasting and Vibration	**Section 5.10**
Visual Impacts	**Section 5.12**
Land Resources, Rehabilitation and Decommissioning	**Section 5.2**
Ecology	**Section 5.5**
Surface and Groundwater	**Section 5.3** and **5.4**
Aboriginal and non-Aboriginal Heritage	**Sections 5.6** and **5.7**
Greenhouse Gas Emissions	**Section 5.9**
Waste Management	**Section 5.13**
Socio-Economic Impacts	**Section 5.16**

4.0 Planning Considerations

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

4.1 Commonwealth Legislation

4.1.1 *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 Sustainability, Environment, Water, Population and Communities 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;
- Ramsar wetlands;
- cetaceans, migratory species, threatened species, critical habitats or ecological communities listed in the EPBC Act;
- Commonwealth land, marine areas or reserves; and
- nuclear actions.

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 outlined in **Section 2.0**, the Project requires minimal change to the currently approved disturbance footprint. The Project is not predicted to significantly impact on migratory species, threatened species, or ecological communities listed under the EPBC Act (refer to **Section 5.3**) and the approval of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities is not required for the Project.

4.1.2 *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.

There are no areas of land within the Project Area where native title may not have been extinguished.

4.2 State Legislation

4.2.1 *Environmental Planning and Assessment Act 1979*

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

The objectives of the EP&A Act relevant to the Project encourage:

- the proper management, development and conservation of natural and artificial resources;
- the promotion and co-ordination of the orderly and economic use and development of land;
- the protection of the environment; and
- ecologically sustainable development.

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 detailed 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.

State Significant Development

Schedule 1 of the SEPP (State and Regional Development) 2011 describes development which requires approval under Part 4 of the EP&A Act. In particular, Section 7 (Extractive Industries) of the SEPP (State and Regional Development) 2011 provides that extractive industries is a class of development to which Part 4 of the EP&A Act applies. 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, or
> (c) Extracts from an environmentally sensitive area of State significance.

As the Project relates to an 'extractive industry' that extracts more than 500,000 tonnes of extractive material per year, it satisfies the requirements of the SEPP (State and Regional Development) 2011 and therefore is classed as a State significant development. The Project therefore requires approval under Part 4 of the EP&A Act.

As the Project requires approval under Part 4 of the *EP&A Act*, the Minister for Planning will determine the Project Application. However, under Section 23 of the EP&A Act the Minister has the ability to delegate this authority to the Planning Assessment Commission (PAC), the Director-General or to any other public authority.

The Director-General of DP&I has provided the assessment requirements for the EA, as discussed in **Section 1.7**.

Permissibility

The local environmental planning instrument relevant to the Project is the *Queanbeyan Local Environment Plan 1998* (LEP). The LEP was gazetted on 16 October 1998 and applies to the Queanbeyan Local Government Area (LGA). All of the land subject to quarrying and associated activities as part of the Project is zoned 1(a) Rural A under the LEP. Extractive industries are not permissible under the LEP within the zone 1(a) Rural A, however, the Project is permissible due to the operation of other environmental planning instruments as outlined below.

The permissibility provisions of SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Extractive Industries SEPP) are relevant to this Project. The Extractive Industries SEPP specifies that '*extractive industry on land on which development for the purposes of agriculture or industry may be carried out (with or without development consent)*'. Consequently, the Project is permissible with development consent under the provisions of the Extractive Industries SEPP as agriculture is permitted in zone 1(a) Rural A.

Queanbeyan City Council has recently publicly exhibited a new draft LEP. As this new LEP is not yet in force it has no effect on the permissibility of the Project, however, it is discussed for context. Under the new LEP, the Project would be located within a RU2 landscape. Extractive industries are permissible with consent under the proposed LEP within the RU2 zoning.

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 4.1**.

Table 4.1 – Section 79C Matters for Consideration

Matters for Consideration	Relevant EIS Section
(a) The provisions of: Any environmental planning instrument	Refer to **Section 4.0**
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	Refer to **Section 4.0**
Any development control plan	No development control plans are relevant to the Project
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

Table 4.1 – Section 79C Matters for Consideration (cont.)

Matters for Consideration	Relevant EIS Section
The regulations (to the extent that they prescribe matters for the purposes of this paragraph)	Refer to **Section 4.0**
Any coastal zone management plan (within the meaning of the *Coastal Protection Act 1979*) that apply to the land to which the development application relates	No coastal zone management plans apply to the land
(b) 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 5.0**
(c) The suitability of the site for the development	Refer to **Sections 5.0**, **6.0** and **7.0**
(d) Any submissions made in accordance with this Act or the regulations	Comments to be received on the EIS during the exhibition process
(e) The public interest	Refer to **Sections 6.0** and **7.0**

Approvals Legislation Which Does Not Apply

Under section 89J of the EP&A Act, if a State Significant Project is granted development consent under Part 4 of the EP&A Act, the following authorisations (refer to **Table 4.2**), which may otherwise have been relevant, will not be required to carry out the Project.

Table 4.2 – Authorisations Which Do Not Apply

Act	Approval Not Required
Coastal Protection Act1979	Carrying out works within the coastal zone.
Fisheries Management Act 1994	Permit for works or structures within a waterway.
Heritage Act 1977	Disturbance to an item listed on State Heritage Register or Interim Heritage Order; Excavation permit.
National Parks and Wildlife Act 1974	An Aboriginal heritage impact permit (AHIP) under s90 and Division 8 of Part 6.
Native Vegetation Act 2003	Consent for the clearing of native vegetation.
Rural Fires Act 1997	A bushfire safety authority under s100B.
Water Management Act 2000	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.

Approvals 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 4.3**), 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 4.3 – Approvals Legislation to be Applied Consistently with Development Consent

Act	Approval	Authority
Protection of the Environment Operations Act 1997	An Environment Protection Licence.	Office of the Environment and Heritage (OEH)
Roads Act 1993	An approval under s138 to impact on a public road.	All freeways and some other major roads (e.g. some highways) – Roads and Maritime Services (RMS) Crown Roads – the Minister for Roads and Ports Local Roads – Queanbeyan Council

4.2.2 Summary of Other State Legislation

A summary of the other State Acts potentially applicable to the Project is included in **Table 4.4**, including an indication of which additional approvals will be required.

Table 4.4 – Summary of Other State Legislation

Act	Comments	Specific Approval Required for Project
Protection of the Environment Operations Act 1997	Holcim Australia hold an Environment Protection Licence (EPL No. 1453) for the Quarry. Should the Project be approved, the EPL will need to be modified to accommodate the proposed changes.	Yes
Water Act 1912	This Act has been repealed by the *Water Management Act 2000*; however, some of the licensing provisions remain in force where the water source is not covered by a water sharing plan. Holcim Australia currently holds Part 2 and Part 5 licences under this Act for the interception and extraction of groundwater and surface water as part of its operations. The Project will not require any further licences.	Yes
Water Management Act 2000	This Act regulates the taking, interception, storage and use of surface water and groundwater within areas subject to water sharing plans. There is no water sharing plan applicable to Cooma Road Quarry.	No
Threatened Species Conservation Act 1995	A licence under this Act is not required for any activity undertaken in accordance with a development consent granted under the EP&A Act. The ecological assessment completed for the Project has identified that there will not be any significant impact on any threatened species, populations or communities.	No

Table 4.4 – Summary of Other State Legislation (cont.)

Act	Comments	Specific Approval Required for Project
Roads Act 1993	The *Roads Act 1993* 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. Holcim Australia do not propose to undertake any works within a road reserve works associated with the realignment of Old Cooma Road will be undertaken by Council with no related works required by Holcim Australia.	No
Crown Lands Act 1989	The Crown Lands Act 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, reserved 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. The Project will not impact on any Crown Land. No further approvals will be required under this Act.	No
Dams Safety Act 1978	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. Any new prescribed dams are to be designed to the satisfaction of the DSC. Any dams required to be constructed as part of the Project will be subject to assessment in accordance with the DSC requirements to determine if any of these dams will be prescribed dams. It is proposed to construct two dams as part of the Project. The proposed dams are not expected to trigger the requirements of this Act.	No
Environmentally Hazardous Chemicals Act 1985	Under the EHC Act a licence is required for any storage, transport or use of prescribed chemicals. 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.	No

4.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are environmental planning instruments created by the State government. The SEPPs that are potentially relevant to the proposed modifications are discussed in the following section.

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

The State and Regional Development SEPP commenced on 1 October 2011, on the date Part 3A of the Act was repealed. 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 4.2.1**, 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.

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

The Extractive Industries SEPP was gazetted in February 2007. The SEPP outlines where various extractive industry activities are permissible both with and without development consent. The SEPP also defines mining, petroleum production and extractive industries developments that are prohibited, exempt or complying developments. The SEPP identifies 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 4.2.1**, the Project is zoned 1(a) Rural A under the Queanbeyan LEP. Under this zoning, extractive industries are not permissible. Agriculture and industry are however permissible in the 1(a) Rural A zone, and therefore, under the provisions of the Extractive Industries SEPP, the Project is permissible.

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 these matters and where they have been addressed in the EIS is outlined in **Table 4.5**.

Table 4.5 – Extractive Industries SEPP Part 3 Matter 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 Sections 1.4.1 and 7.2

Table 4.5 – Extractive Industries SEPP Part 3 Matter for Consideration (cont.)

Matters for Consideration	Relevant EIS Section
(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 Sections 1.4.1, 5.0 and 7.0
(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and	Refer to Sections 1.4.1 and 7.0
(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 Sections 1.4.1, 5.16 and 7.0
(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).	Refer to Sections 5.0 and 7.0
13 Compatibility of proposed development with mining, petroleum production or extractive industry	
(1) This clause applies to an application for consent for development on land that is, immediately before the application is determined:	
(a) in the vicinity of an existing mine, petroleum production facility or extractive industry, or	Refer to Section 1.4.1
(b) identified on a map (being a map that is approved and signed by the Minister and copies of which are deposited in the head office of the Department and publicly available on the Department's website) as being the location of State or regionally significant resources of minerals, petroleum or extractive materials, or	Site identified as non-coal extractive resource in the Sydney-Canberra Corridor Regional Strategy
(c) identified by an environmental planning instrument as being the location of significant resources of minerals, petroleum or extractive materials.	Refer to Section 4.0
(2) Before determining an application to which this clause applies, the consent authority must:	
(a) consider:	
(i) the existing uses and approved uses of land in the vicinity of the development, and	Refer to Sections 1.4.1 and 7.2
(ii) whether or not the development is likely to have a significant impact on current or future extraction or recovery of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of, those resources), and	Refer to Sections 2.0 and 7.0
(iii) any ways in which the development may be incompatible with any of those existing or approved uses or that current or future extraction or recovery, and	Refer to Sections 2.0 and 7.0
(b) evaluate and compare the respective public benefits of the development and the uses, extraction and recovery referred to in paragraph (a) (i) and (ii), and	Refer to Sections 5.16 and 7.0
(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).	Refer to Sections 2.0 and 7.0
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 4.5 – Extractive Industries SEPP Part 3 Matter 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 Sections 5.3 and 5.4
(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,	Refer to Section 5.5
(c) that greenhouse gas emissions are minimised to the greatest extent practicable.	Refer to Section 5.9
(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 5.9
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 2.0
(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 2.0
(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 2.0
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,	Traffic impacts of the Project are discussed in Section 5.11
(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,	Traffic impacts of the Project are discussed in Section 5.11
(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 5.11
(2) If the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within 7 days after receiving the development application, provide a copy of the application to:	
(a) each roads authority for the road, and	Not applicable to applicant
(b) the Roads and Traffic Authority (if it is not a roads authority for the road).	Not applicable to applicant
3) The consent authority:	

Table 4.5 – Extractive Industries SEPP Part 3 Matter for Consideration (cont.)

Matters for Consideration	Relevant EIS Section
(a) must not determine the application until it has taken into consideration any submissions that it receives in response from any roads authority or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application, and	Not applicable to applicant
(b) must provide them with a copy of the determination.	Not applicable to applicant
(4) In circumstances where the consent authority is a roads authority for a public road to which subclause (2) applies, the references in subclauses (2) and (3) to a roads authority for that road do not include the consent authority.	Not applicable to applicant
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 5.15
(2) In particular, the consent authority must consider whether conditions of the consent should:	
(a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or	Rehabilitation is discussed in Section 5.15
(b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or	Rehabilitation is discussed in Section 5.15
(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 5.15
(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 5.15

4.3.3 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.

Given that Cooma Road Quarry's existing operations are not classed as hazardous development and that 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, the Project is not considered a hazardous industry. Regardless, for completeness, a preliminary hazard analysis is provided in **Section 5.14.2**.

4.3.4 State Environmental Planning Policy 44 – Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection applies to the extent that a consent authority is restricted from granting development consent for proposals on land identified as core koala habitat, without the preparation of a plan of management. Queanbeyan City Council is not listed in Schedule 1 of SEPP 44. Therefore the provisions of this SEPP are not relevant to the Project.

4.3.5 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 OEH contaminated land public records was undertaken for the Project area. No listings were identified relating to the Project area. Potentially contaminating activities associated with Cooma Road Quarry and Project include the operation of a workshop and storage of diesel and oils in underground and 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. Given these controls, it is considered that the potential for contamination would be limited to minor hydrocarbon surface staining which would be addressed as part of the decommissioning and closure planning process.

5.0 Environmental Assessment

5.1 Preliminary Risk Analysis

A preliminary environmental risk analysis was completed 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 5.1**.

Table 5.1 – Potential Environmental Impacts Associated with the Project

Environmental Aspect	Preliminary Environmental Risk Analysis	Further Assessment Required for Project?
Soils, agricultural suitability, land capability and use	The Project will result in an increase in the quarry footprint, however all Project components, with the exception of the proposed eastern dam, will remain within the previously approved disturbed footprint of the existing quarry. Despite this, an assessment has been undertaken to verify that agricultural values and land capability will not be impacted by the Project. Soil erosion issues are addressed separately, as part of the surface water assessment.	Yes, refer to **Section 5.2**
Traffic	The proposed increase in production will require additional heavy vehicle movements. The potential implications of this increase on the local road network are assessed in a detailed Traffic Impact Assessment.	Yes, refer to **Section 5.11**
Groundwater	The existing quarry has minimal groundwater inflows. The Project does not propose to increase the maximum depth of the pit, and although the quarry footprint will expand it is unlikely to result in a substantial change in groundwater impacts. A Groundwater Impact Assessment has been completed in order to confirm this.	Yes, refer to **Section 5.4**
Surface Water	The Project will result in minor changes to the quarry water management system associated with the extension of the quarry pit and relocation of infrastructure. These changes and potential impacts on surface water quality have been assessed as part of a Surface Water Impact Assessment.	Yes, refer to **Section 5.3**
Ecology	The Project will result in an increase in the quarry footprint, however all project components, with the exception of the proposed eastern dam, are within areas previously approved for disturbed. Given the extent of existing disturbance within the Project area, a due diligence assessment has been undertaken in relation to the potential impact of the Project on ecological values.	Yes, refer to **Section 5.5**
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 5.8**
Noise and Blasting	The proposed changes in quarry pit development and infrastructure layout have the potential to 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 5.10**

Table 5.1 – Potential Environmental Impacts Associated with the Project (cont.)

Environmental Aspect	Preliminary Environmental Risk Analysis	Further Assessment Required for Project?
Aboriginal Archaeology	Given the extent of disturbance within the Project area and previous Aboriginal archaeological surveys undertaken,a due diligence assessment for Aboriginal archaeology has been undertaken in accordance with OEH's Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010).	Yes, refer to **Section 5.6**
Historical Heritage	Immediately east of the quarry and adjacent to Old Cooma Road are the remains of a lime kiln of substantial stone construction and two associated stone buildings. Existing management and mitigation measures are in place for the remains. A historic heritage assessment has been undertaken to assess the potential impacts on the historic heritage values of the kiln. In addition, the blasting assessment has considered potential impacts on this site. A review of relevant databases and site inspection has been undertaken to confirm no other sites will be potentially impacted by the Project.	Yes, refer to **Section 5.7**
Visual Amenity	The Project may have potential visual amenity impacts to nearby residents and the community through extension of operations and relocation of some infrastructure. A Visual assessment has been undertaken for the Project to assess potential impacts to visual amenity associated with the Project and to compare the additional impacts, if any, to those outlined in the 1994 EIS for Cooma Road Quarry.	Yes, refer to **Section 5.12**
Greenhouse Gas and Energy	Potential greenhouse gas (GHG) and energy impacts due to the proposed extension and increased extraction rate have been evaluated in accordance with DP&I expectations and relevant guidelines. The assessment developed GHG projections for the life of the quarry and quantifies how the Project will impact national and international greenhouse targets.	Yes, refer to **Section 5.9**
Rehabilitation	Rehabilitation of the quarry will remain generally consistent with that currently approved, however an updated outline of the approach to rehabilitating and closing the quarry once quarry operations have ceased has been provided. It also identifies opportunities for ongoing rehabilitation during the operation of the quarry, along with the proposed approach to final landform and land use.	Yes, refer to **Section 5.15**
Socio-economic Assessment	Socio-economic assessment is concerned with assessing and predicting the likely consequences of a project in both social and economic terms. The methodology that has been employed for the Social Impact Assessment (SIA) will largely centre on secondary data review. Engagement with local landholders and key community stakeholders has played a critical role in the SIA program. A quantitative economic impact assessment has also been completed for the Project.	Yes, refer to **Section 5.16**

The key environmental assessment aspects identified in **Section 3.0** as an outcome of the consultation process for the Project are also addressed in the sections as indicated above.

5.2 Land Resources

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

The Project presents limited opportunity for impacts on land resources and agricultural values as the Project is located almost wholly within the existing and approved disturbance area of Cooma Road Quarry. An additional disturbance area of approximately 0.2 hectare is proposed associated with construction of the proposed eastern dam which will form part of the surface water management system for the Project (refer to **Figure 2.4**). A discussion of the potential impacts of the Project on land resources and agricultural impacts is provided in the following sections.

5.2.1 Landform and Topography

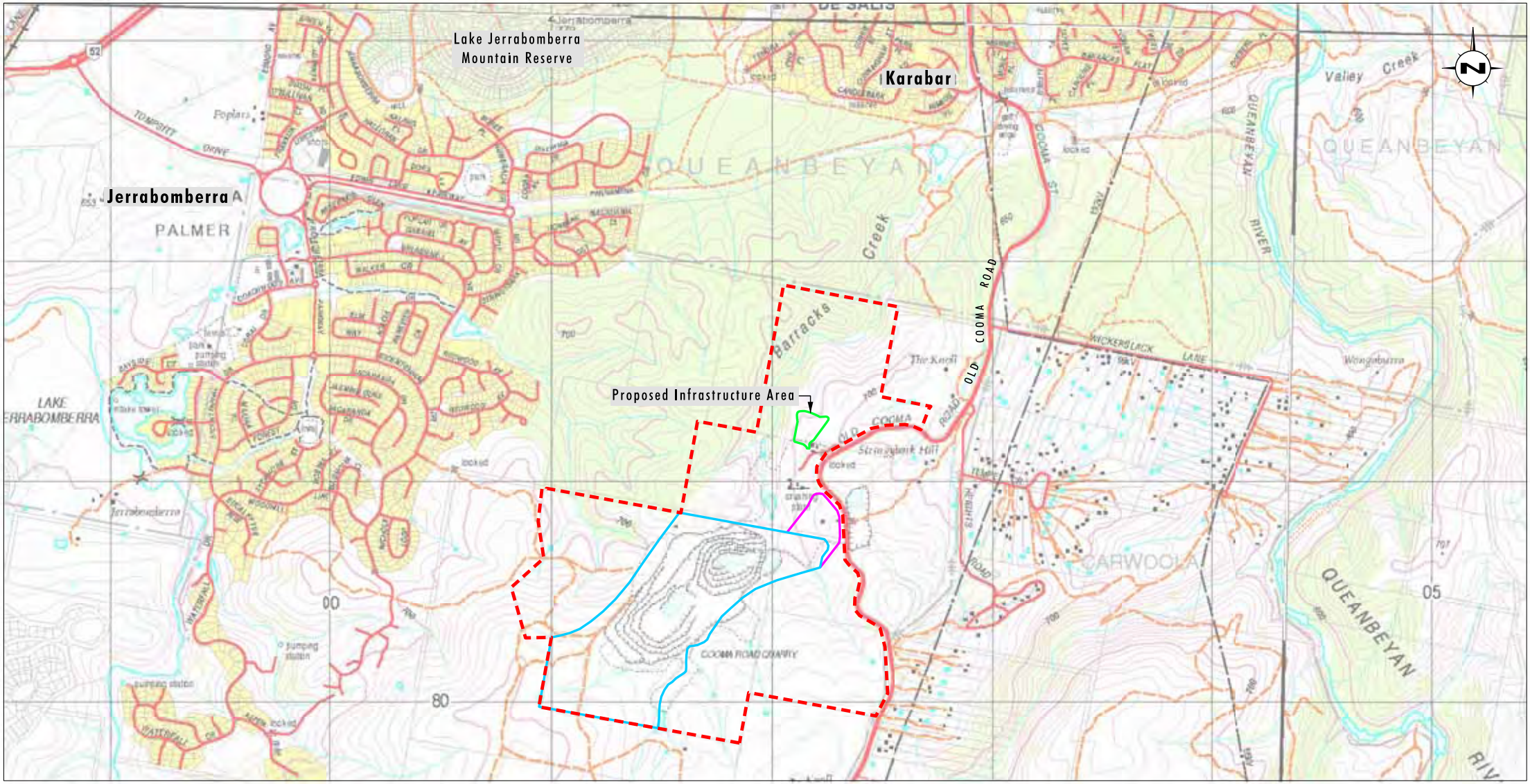
The Project area is located within the Canberra Lowlands, which forms part of the Southern Tablelands of NSW. The Southern Tablelands generally has an elevation of 550 metres to 650 metres (Jenkins 2000). The 'subdued relief and undulating terrain' of the Canberra Lowlands has been attributed to 'the softness of the underlying shale and siltstone of the Canberra Formation and interbedded sediments of the Deakin Volcanics' (Abell 1991, cited in Jenkins 2000).

Cooma Road Quarry comprises and is surrounded by rolling low hills and undulating rises. Slope gradients are gentler in the south, north east and east of the Project area, with slopes ranging between 0 to 10 per cent, and occasionally to 20 per cent. The western and northern portions of the Project area are characterised by steeper slopes ranging from 10 to greater than 50 per cent. The highest elevations within the Project area occur south and west of the quarry at 760 mASL, from where Lake Burley Griffin and Parliament House can be seen. The western, northern and north-eastern areas are generally below 730 mASL.

The Project area is located within the catchment area of Molongolo River which flows through Lake Burley Griffin. The Molonglo River forms part of the Murrumbidgee River catchment area. The surrounding watercourses are Jerrabomberra Creek to the west and north, Queanbeyan River to the east, with Googong Dam (Reservoir) located to the south-east of the Project area, and Barracks Creek to the north (refer to **Figure 5.1**). Surface water features of the Project are discussed in further detail in **Section 5.3**.

The Jerrabomberra Mountain Reserve is located less than 2 kilometres to the north-east of the Project area. A forested ridge line with an elevation of approximately 700 metre borders the north-western boundary of the Project area (refer to **Figure 5.1**). This ridge line effectively screens the quarry site from residential areas to the north and west.

The topography of the Project area has been affected since commencement of quarrying at the site in 1959. The quarry has created open pit extraction areas and emplacement areas which are now topographical features in the Project area. The rehabilitation of overburden emplacement areas is ongoing and the rehabilitation of the site and quarry pit is discussed further in **Section 5.15**. A detailed assessment of potential visual impacts associated with the Project has been undertaken and is provided in **Section 5.12**.



Source: LPMA (2006)

0 0.2 0.5 1.0km
1:25 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop

FIGURE 5.1

Topography

File Name (A4): R01/2992_023.dgn
20121029 15.55

5.2.2 Soil Resources

5.2.2.1 Soil Landscapes

The Project area is located in the Canberra Lowlands region of the Southern Tablelands. The predominant soil types in the Canberra Lowlands are 'Rudosols (Lithosols) on crests and near rock outcrops; Red Kurosols and Chromosols (Red Podzolic Soils), Brown Kandosols (Yellow Earths) and Yellow Chromosols (Yellow Podzolic Soils) on hillslopes; and Sodosols (Solodic Soils) and Stratic Rudosols (Alluvial Soils) along drainage lines (Jenkins 2000).

The soil landscapes for the Project area and immediate surrounds are shown in **Figure 5.2**. Based on this mapping (Jenkins 2000), there are five soil types situated within the Project area which can be generally described as:

- Burra – often comprised of footslopes; shallow to moderately deep soils; strongly acid soils with low fertility and low available waterholding capacity; and minor sheet erosion risk is high for this group.

- Campbell – generally comprised of rounded hills and mountains; shallow to moderately deep soils; soils are often infertile and acidic; and minor and moderate sheet erosion is common and widespread within this group.

- Macanally mountain – often rolling to steep low hills and hills; shallow to moderately deep soils; stony acidic, hardsetting soils of low fertility with possible aluminium toxicity; and minor to moderate sheet erosion is common and widespread.

- Celeys creek – mostly made of rolling low hills; shallow to moderately deep soils; soils are infertile, locally shallow and non-cohesive; and minor sheet erosion occurs on steeper slopes.

- Disturbed terrain – refers to a small number of quarries across the Canberra region including Cooma Road Quarry.

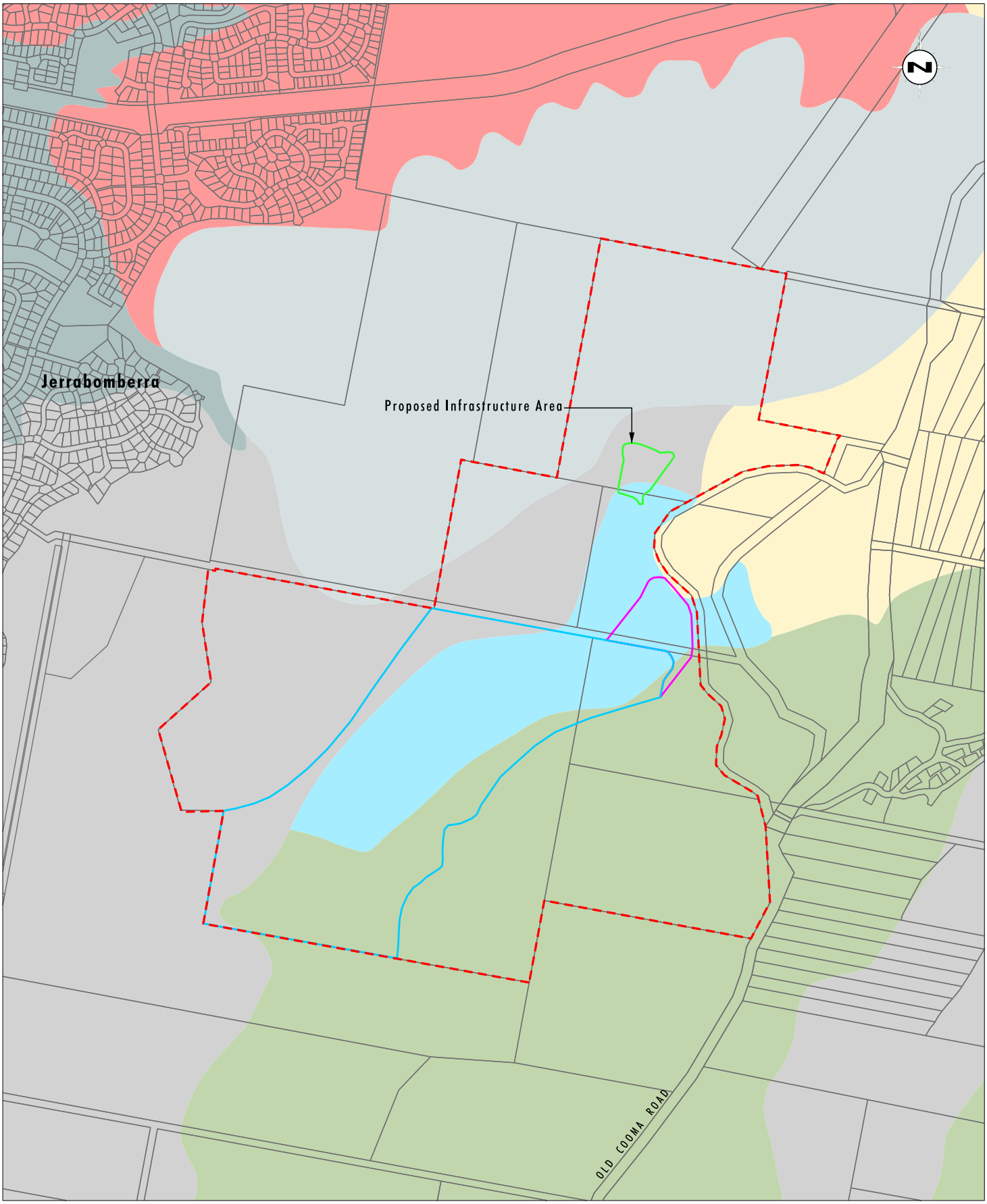
It should be noted that these are general descriptions of soil landscapes that cover a wider region (including Canberra and Queanbeyan), not specifically for the areas within the Project area.

In regard to the Project area, an extensive soil and soil conservation report was prepared for the 1994 EIS by Catherine Hird & Associates (1994). Despite the extensive disturbance to the Project area since this time due to ongoing quarrying, the results of this study still provide useful information in regard to soil properties. Previous soil survey included:

- air photo interpretation – stereo interpretation of aerial photographs supplemented by field surveys from which a landform map was created;

- soil profiles – exposure of the full soil profile through excavation at 30 sites selected from a 240 metre grid overlaid on the site from which a soils map was created; and

- interpretation of landform and soil maps to determine erosion hazard, topsoil availability and agricultural capability of the site.



Source: Department of Land (2006) and Office of Environment & Heritage (2005)

0 250 500 750m
1:15 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop

Soil Landscapes:

- Burra
- Campbell
- Celeys Creek
- Disturbed Terrain
- Macanally Mountain
- Queanbeyan
- Williamsdale

FIGURE 5.2

Soil Landscapes

This study determined that the most common soils within the Project area are Lithosol/Yellow Podzolic soils. The lithosols cover most of the site and are shallow sandy loam soils rarely more than 50 centimetres deep (Catherine Hird & Associates 1994). The soils have a low level of fertility because of low water and nutrient holding capacity. The pH at the surface is about 6.0 (slightly acidic). The topsoil has an average depth of approximately 12 centimetres and a median depth of 10 centimetres. Coarse gravelly material is present throughout the soil and there are frequent rocks and boulders. The soils have a high erosion potential in their natural state due to the sand sized particles and high potential for runoff.

An assessment of topsoil available for stripping and use for rehabilitation was also undertaken as part of the 1994 EIS (Catherine Hird & Associates 1994). This assessment is applicable to future quarry operations given the consistency of soil types across the Project area. The assessment found that lithosols are marginally suitable for stripping and reuse due to their shallow depth and other general undesirable characteristics (including difficulties in extraction due to potential surface rock and boulders).

The topsoil within the proposed quarry extension area has been largely disturbed by the construction of site infrastructure. However, where topsoil is to be disturbed as a result of the Project, Holcim Australia will implement the following procedures, consistent with existing operations:

- topsoil will continue to be stockpiled separately and stored for later use in rehabilitation activities;
- topsoil stockpiles will continue to be planted with a sterile cover crop if they are to remain in place for longer than three months; 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.

5.2.2.2 Land Capability

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 5.2**. 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 5.2 – Land Classification Interpretations (DECC 2009)

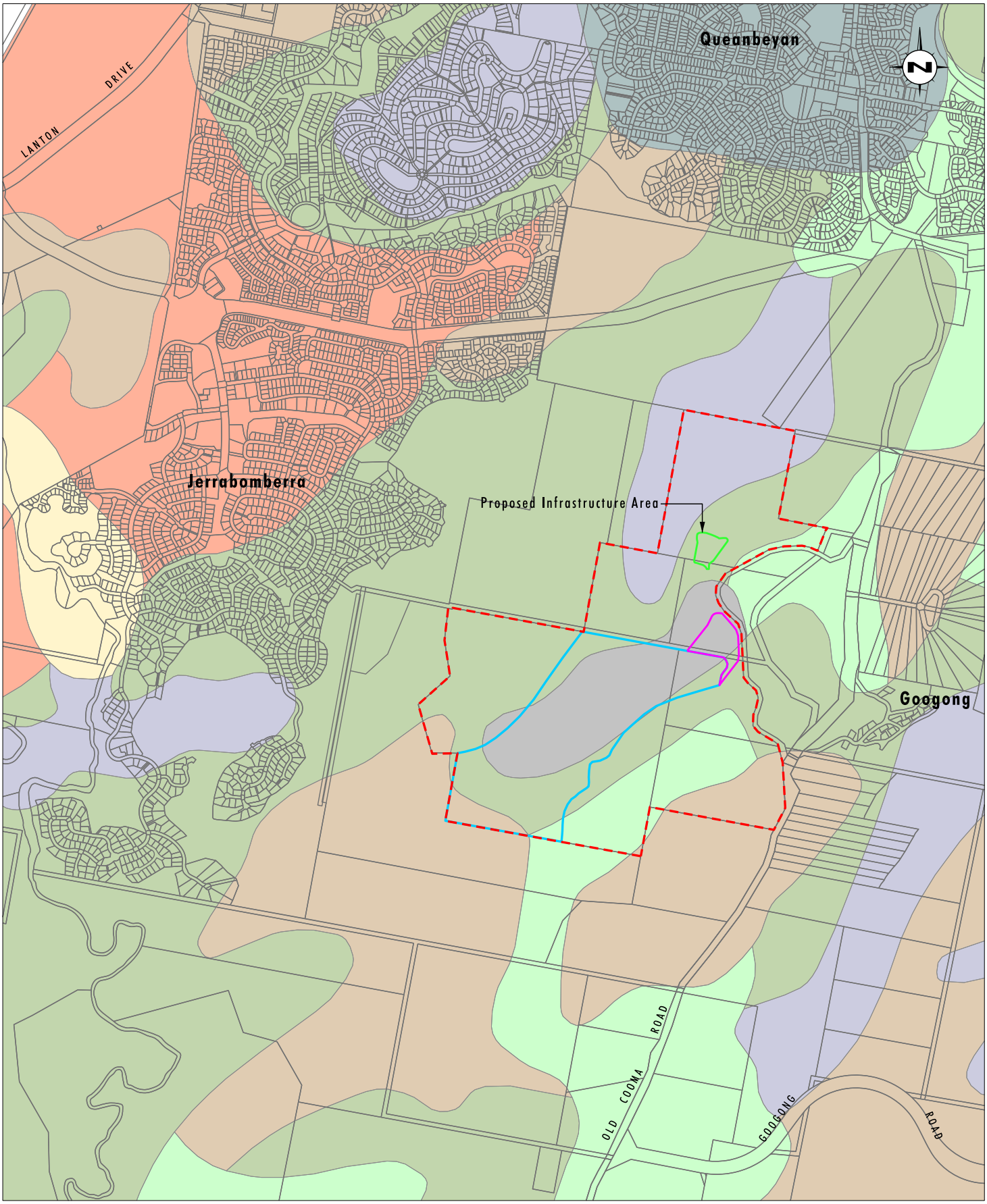
Land Classification		Interpretations and Implications
Capable of regular cultivation	1	Land capable of a wide variety of uses. Where soils are fertile, this is land with the highest potential for agriculture, and may be cultivated for vegetable and fruit production, cereal and other grain crops, energy 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.

Table 5.2 – Land Classification Interpretations (DECC 2009) (cont.)

Land Classification		Interpretations and Implications
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 majority of the Project area is classified as 'special land use – mining or quarrying' (DECC 2009), as shown in **Figure 5.3**, and is incapable of supporting agricultural land use due to previous quarrying activities. Surrounding the existing extraction area there is Class 6 land which is defined as 'capable of grazing with occasional cultivation'. Smaller portions of land classified as Class 4 and 5 in the south of the Project area are also defined as 'capable of grazing with occasional cultivation'. In the northern part of the Project area, leading into Barracks Creek, there is Class 7 land which generally comprises areas of steep slopes, shallow soils and/or rock outcrop (DECC 2009). Areas with high potential for agricultural purposes (Class 1, 2 and 3) are not present within the Project area, and Class 7 land with steep slopes will not be disturbed.

The Project will result in additional disturbance of approximately 0.2 hectare of Class 5 and 6 land associated with the construction of the proposed eastern dam. This land is not currently used for agricultural purposes and given the extent of similarly classed land in the immediate surrounds, it is considered that the Project will not have a significant impact on regional agricultural output. In addition, construction of the proposed eastern dam is not considered prohibitive to future agricultural land uses and would potentially add to future agricultural uses through the supply of water.



Source: Queanbeyan City Council (2006) and CMPS&F Environmental (2004)

0 0.5 1 1.25km
1:25 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop
- Capable of Regular Cultivation (2)
- Capable of Regular Cultivation (3)
- Capable of Grazing with Occasional Cultivation (4)
- Capable of Grazing with Occasional Cultivation (5)
- Capable of Grazing with Occasional Cultivation (6)
- Other (7)
- Mining or Quarrying
- Urban Area

FIGURE 5.3

Land Capability

5.2.2.3 Agricultural Suitability

The agricultural suitability of land is based on the presence of physical and/or chemical limitations (Riddler 1990). Factors considered include climatic and topographic factors, physical and chemical characteristics of the soil, ability to control erosion, drainage and flooding potential. All of these factors combine to determine the productive potential of the land and its capability to produce crops, pastures and livestock.

Agricultural suitability of land in NSW has been mapped at a scale of 1:50,000 by the former NSW Department of Agriculture and published by the former Department of Environment and Planning (1981). The five classes of agricultural suitability are:

- Class 1 – suitable for intense cultivation;
- Class 2 – suitable for cultivation;
- Class 3 – suitable for grazing and pasture improvement;
- Class 4 – marginally suitable for grazing; and
- Class 5 – unsuitable for agriculture.

The agricultural suitability of the Project area is based on previous mapping within the area (including the detailed soil and soil conservation report as part of the 1994 EIS), which has been updated to reflect current land use within the Project area. The agricultural suitability of the portion of the Project area that has not been disturbed by quarrying is predominantly Class 4 land with some areas of Class 3 and Class 5 also present.

Class 3 land, which is present in small patches, is suitable for grazing and pasture improvement and may be cultivated in rotation with pasture, however, production is moderate due to soil and environmental constraints (such as low water and nutrient holding capacity). The majority of the Project area is Class 4 land, which generally has low potential for productivity due to major environmental constraints, such as shallowness, rock outcrops, low water and nutrient holding capacity.

Using the soil landscape mapping (Jenkins 2000), the majority of the disturbance area falls within the Campbell group. This soil landscape is considered to have severe limitations for cultivation, high to moderate limitations for grazing, high to severe limitations for pasture establishment, and high limitations to earthworks. The limitations mainly occur due to shallow soils and steep slopes common in the Campbell soil landscape.

The proposed additional disturbance area associated with the construction of the eastern dam is considered to be of marginal agricultural potential and given the small area of additional disturbance (0.2 hectare), it is not considered that the Project will significantly impact on agricultural values.

5.2.2.4 Salinity and Contamination

Quarrying has occurred within the Project area since the 1950s and to date, there is no evidence of salinisation of land or water resources within or surrounding the Project area. In addition, the groundwater assessment undertaken for the Project identifies the highly impermeable nature of the rock within the Project area and indicates a general lack of groundwater aquifers within the Project area, which would limit the potential for the movement of salt to the ground surface with groundwater. When considering these factors, the Project is unlikely to cause or result in salinity impacts.

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

There has been no evidence in fuel inventories and through physical inspections of any fuel leaks from any of these tanks. It is considered therefore 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 Cooma Road Quarry and any areas of associated contamination assessed and appropriately remediated. The decommissioning and closure process is discussed further in **Section 5.15**.

5.3 Surface Water Resources

5.3.1 Surface Water Context

Cooma Road Quarry is located within the catchments of Barracks Creek and Jerrabomberra Creek. Barracks Creek is a minor tributary of the Queanbeyan River which flows into the Molonglo River upstream of Lake Burley Griffin. Jerrabomberra Creek flows directly into Lake Burley Griffin (refer to **Figure 5.4**). The Molonglo River which flows through Lake Burley Griffin in the Australian Capital Territory (ACT) forms part of the broader Murrumbidgee River catchment area.

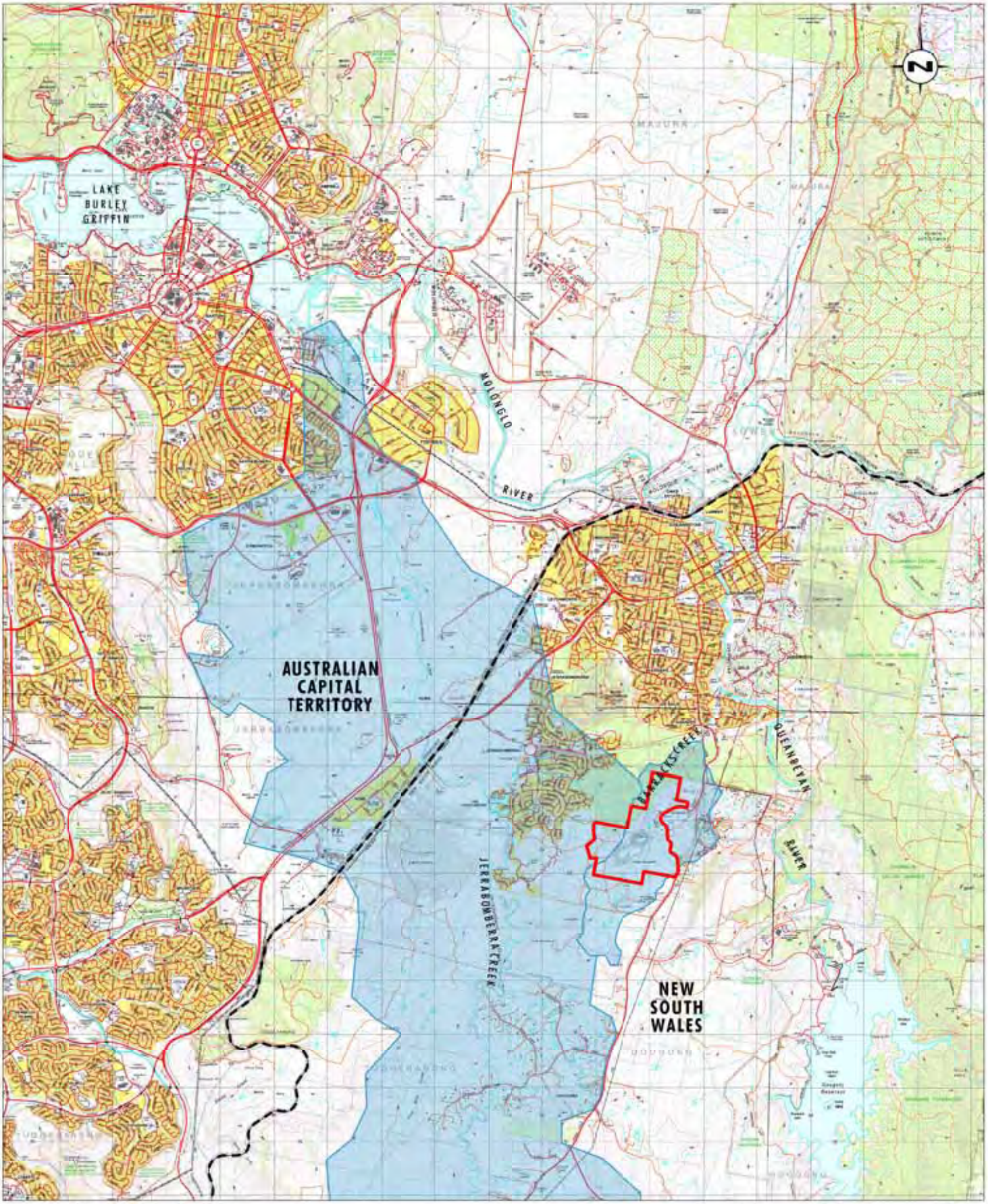
Barracks Creek is a 3rd order ephemeral watercourse. Barracks Creek has a total catchment area of approximately 650 hectares of which approximately one third is located upslope of the quarry. Barracks Creek flows into the Queanbeyan River approximately 2.5 kilometres north-east of the quarry's northern boundary. The headwaters of Barracks Creek are approximately 1.5 kilometres south of the quarry.

The quarry pit and infrastructure area is located within the catchment area of Barracks Creek. Runoff from the majority of the upslope catchment area is currently captured and managed in a series of dams prior to flowing into the quarry water management system (WMS).

Jerrabomberra Creek (refer to **Figure 5.4**) is a 4th order ephemeral watercourse. Jerrabomberra Creek has a catchment area of approximately 11,500 hectares of which approximately 103 hectares is located within Cooma Road quarry property area. The headwaters of Jerrabomberra Creek lie to the west of the quarry pit. The approved western overburden emplacement area for the quarry lies within the headwaters of an un-named tributary of Jerrabomberra Creek. At present, and for the foreseeable future, the western overburden emplacement will not be used and therefore remain as undisturbed land.

Surface Water Quality

Holcim Australia monitors surface water quality in Barracks Creek and within the quarry WMS on a monthly basis. The location of these monitoring points is shown on **Figure 5.5**. In addition, Holcim Australia monitors the quality of water discharged from Cooma Road Quarry WMS to Barracks Creek in accordance with EPL No. 1453. Discharge monitoring data indicates that the quarry has historically met EPL criteria for water released from the Sediment Interception Pond (SIP) to Barracks Creek. However, Holcim Australia also use monitoring of water quality downstream in Barracks Creek to determine potential impacts.



Source: LPI 1:25 000 mcp series

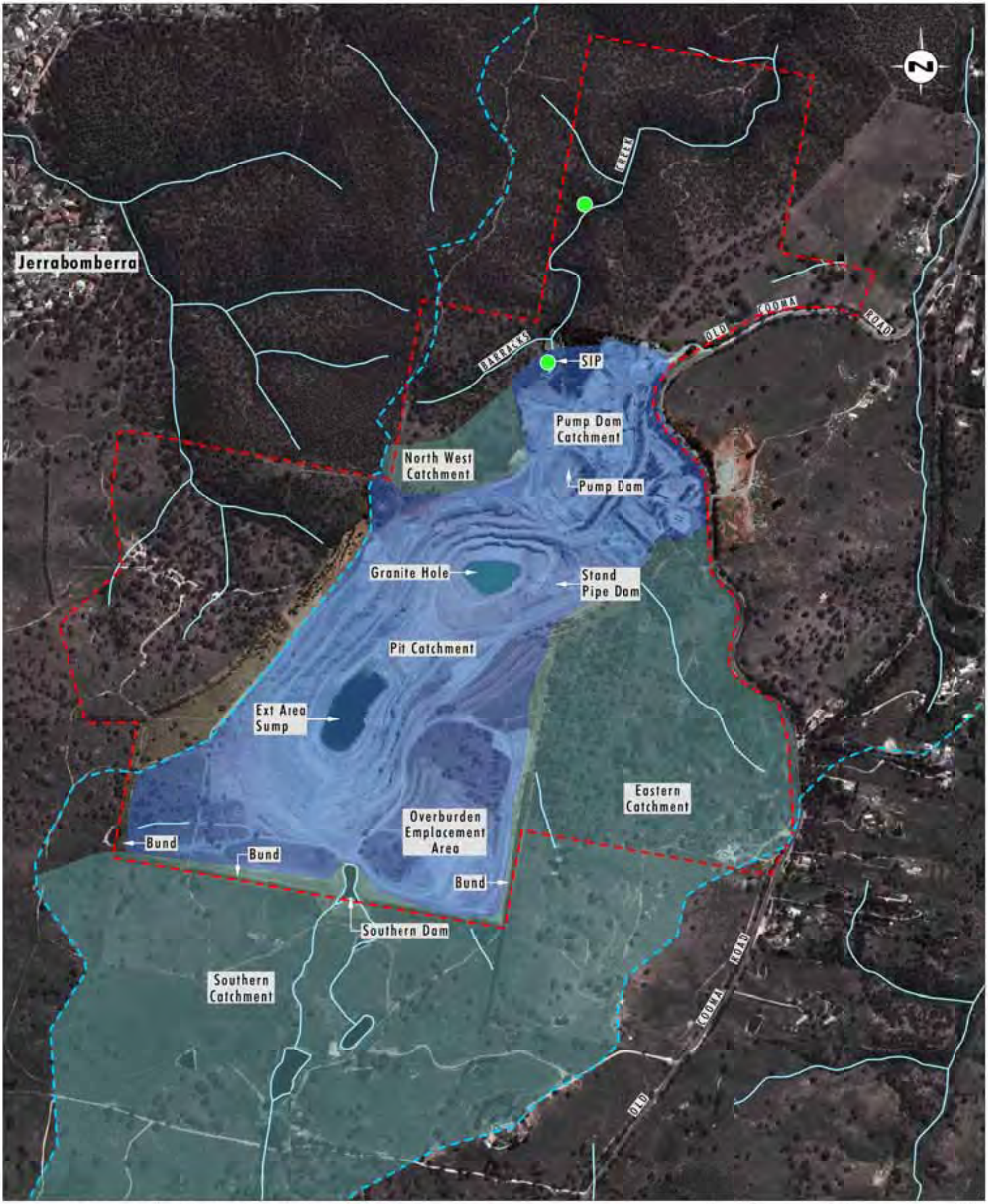
0 1.0 2.5 5.0km
1:100 000

Legend

- Proposed Project Area
- Catchment Boundary

FIGURE 5.4

Surface Water Context



Source: Holcim (2012), Google Earth (2011), LPI (2010)

0 100 300 400m
1:12 500

Legend

- Proposed Project Area
- Catchment Boundary
- Upslope Catchment Areas
- Water Management System Catchment Area
- Surface Water Monitoring Locations

FIGURE 5.5

Existing Water Management System

Historical water quality monitoring results for April 2002 to October 2011 are summarised in **Table 5.3** for the monitoring point in Barracks Creek immediately downstream of the quarry. **Chart 5.1** shows the total suspended solids (TSS) results for the same monitoring point for the period June 2007 to October 2011.

Table 5.3 – Barracks Creek Water Quality Downstream of the Quarry

Parameter	Unit	Limits	Max	Min	Ave	Number of Exceedances Above EPL Criteria
pH	-	6.5 to 8[1,2]	8.2	6.3	7.4	2
Electrical Conductivity	µS/cm	125-2200[2]	1600	140	1236	nil
Total Suspended Solids[3]	mg/L	<50[1]	57	<2	7.9	1

1. Based on limits in EPL No. 1453
2. Based on ANZECC guidelines
3. TSS monitoring commenced in June 2007

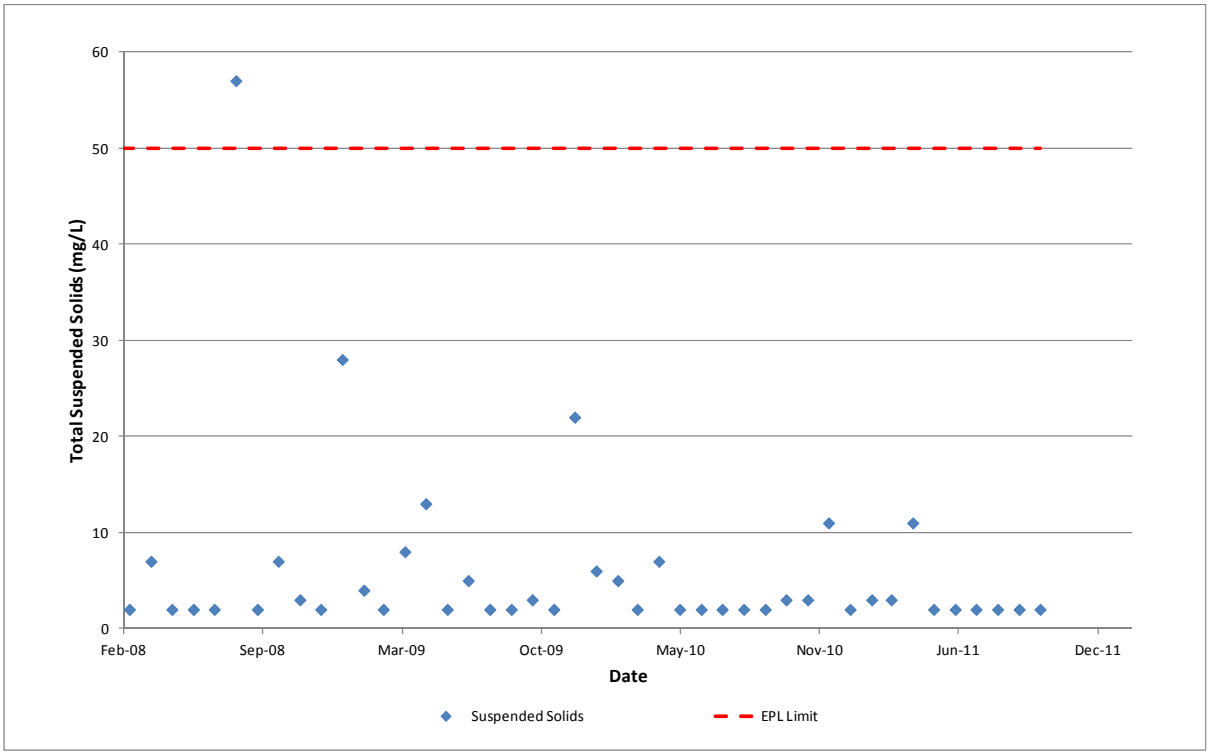


Chart 5.1 – Barracks Creek Total Suspended Solids (Downstream of the Quarry)

The results of the water quality monitoring indicate that pH and EC are typically within ANZECC guidelines (ANZECC, 2000) which are consistent with the NSW Water Quality and River Flow Objectives. In addition the results of the historical water quality monitoring program indicate that TSS in Barracks Creek downstream of the quarry is typically low, i.e. < 10 mg/L.

The water quality monitoring results indicate that the quarry has had minimal impact on the water quality in Barracks Creek with discharged water quality within EPL criteria and downstream water quality typically being of similar quality, with only two pH samples in nine years of monitoring and only one TSS sample in five years of monitoring being above EPL criteria in the downstream creek.

5.3.2 Potential Surface Water Impacts

As discussed in **Section 2.0**, the key features of the Project (refer to **Figure 5.5**) include:

- an extension of the extraction area to the north-east where the Stand Pipe Dam, workshop and stockpiles are presently located;
- continued overburden emplacement on the approved south-east emplacement area; and
- the relocation of the workshop and temporary stockpiles immediately to the north of the processing plant area.

The Project may result in the following impacts on the management of surface water at Cooma Road Quarry:

- changes to the quarry plan requiring the relocation/replacement of various water management system components (refer **Section 5.3.3**);
- the addition of new water management system controls including clean and dirty water controls (refer **Section 5.3.3**);
- changes to the site water balance (refer **Section 5.3.4**); and
- changes to the existing impacts on downstream surface water systems (refer to **Section 5.3.5**).

5.3.3 Water Management System

Existing Water Management System

Holcim Australia operates the quarry WMS in accordance with the Cooma Road Quarry Environmental Management Plan (EMP) (R.W. Corkery and Co. 2008). The overall strategic approach to water management is captured within three focus areas, supply, storage and water conservation. The principal objectives of the water management strategy at Cooma Road Quarry are to:

- minimise the quantity of stormwater runoff from undisturbed areas entering the quarry site;
- ensure that all surface waters discharged from the quarry site meets the water quality criteria set out in EPL No. 1453; and
- provide an adequate and reliable water supply for quarry operations.

The key components of the WMS are shown on **Figure 5.5**.

Presently, runoff from the upslope catchment of Barracks Creek flows into Cooma Road Quarry WMS. Runoff from the south of the quarry pit drains to the Southern Dam which seeps through the rock face, or when full, overflows into the pit for management within the WMS. Runoff from the east of the quarry pit drains to the Stand Pipe Dam. This water is then transferred from the Stand Pipe Dam to the Pump Dam (refer to **Figure 5.5**) for release via the SIP or use within the WMS.

All dirty water runoff from the overburden emplacement areas and the workshop is directed into the quarry pit. Water is collected in either the extraction area sump or granite hole and used for dust suppression on site, including in the processing plant, or transferred to the Pump Dam.

Dirty water runoff from the processing plant, and stockpile areas drains directly to the Pump Dam. Stormwater runoff from the upslope portion of the north-west catchment of the quarry also drains to the Pump Dam (refer to **Figure 5.5**). Water is sourced from the Pump Dam for use in the processing plant and other dust suppression activities on site. All excess water is transferred to the SIP which is in turn discharged to Barracks Creek via a manually operated discharge pipe. Water quality testing within the SIP is undertaken prior to any discharge to ensure the water quality meets EPL water quality criteria. There is currently no limit in the EPL on discharge volumes from the site.

Proposed Water Management System

The proposed WMS for the Project is consistent with the current water management strategies and will utilise the majority of the infrastructure of the existing WMS.

As part of the Project, the following improvements to the WMS are proposed:

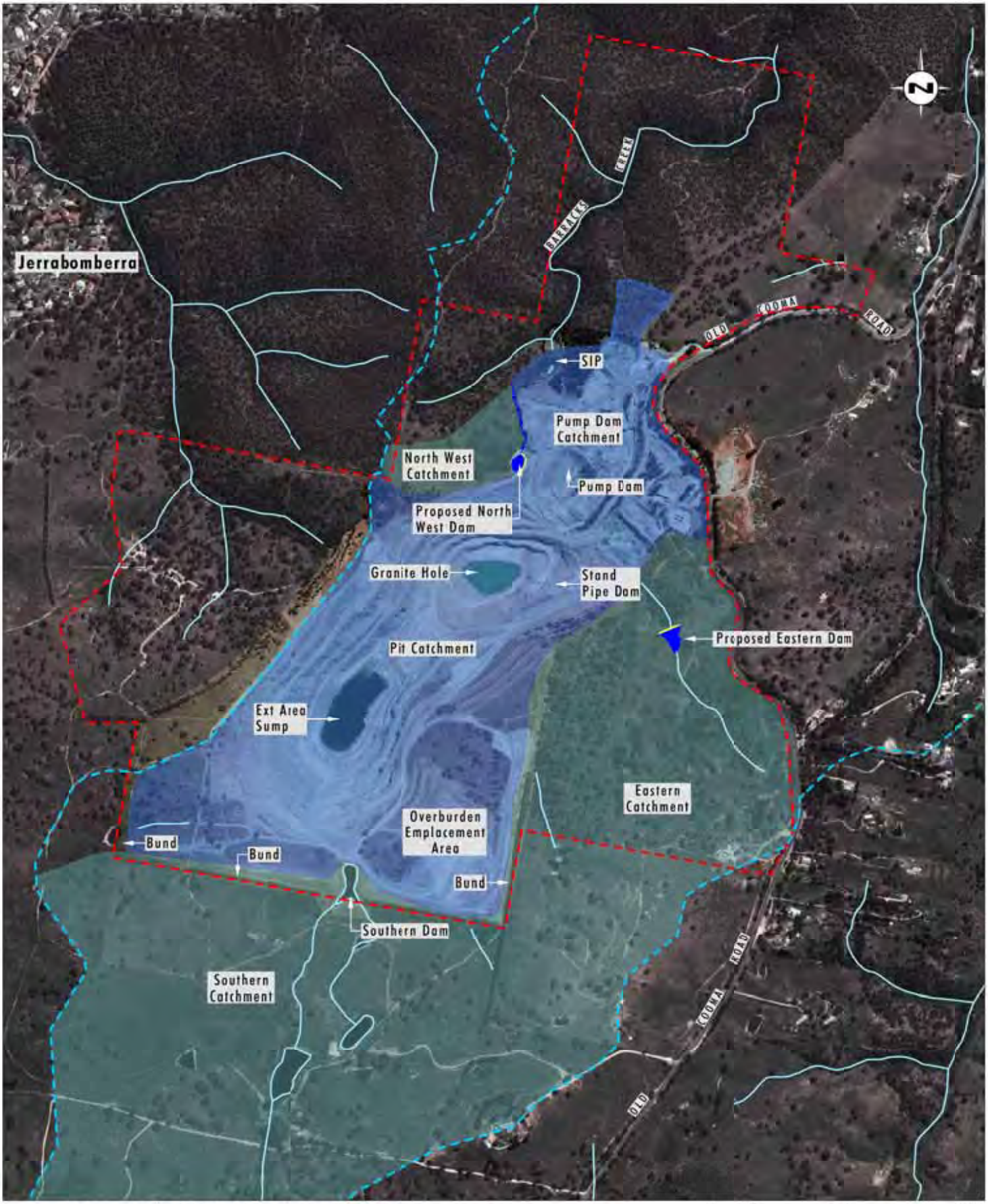
- an additional detention dam (Eastern Dam) to partly control clean water runoff from the areas to the east, upslope of the quarry;
- additional clean water drains and a detention dam (North-West Dam) to intercept runoff from the upslope north-west catchment;
- monitoring of water transfers, usage and dam levels to account for water; and
- additional WMS infrastructure, including catch drains for the proposed workshop area.

The proposed drains and detention dams will assist in managing upslope runoff from the clean catchment areas upslope of the existing WMS. As such the proposed detention dams will not hold any permanent water.

The WMS for the Project, including proposed drains and dams, is shown on **Figure 5.6** and **5.7**. Areas for catchments within the operational quarry WMS and catchments upslope of the quarry WMS are displayed in **Table 5.4**.

Table 5.4 – Catchment Areas

Catchment	Area (ha)
WMS	
Pit and Immediate Surrounds	73.0
Plant and Stockpiles	9.1
Workshop	1.3
SIP	2.7
Sub-Total WMS	**86.1**
Upslope	
Southern	123.2
Eastern	56.0
North-West	4.6
Sub-Total Upslope	**183.8**
Total	**269.9**



Source: Holcim (2012), Google Earth (2011), LPI (2010)

0 100 300 400m
1:12 500

Legend

- Proposed Project Area
- Catchment Boundary
- Clean Drain
- Dirty Drain
- Dam Wall Footprint
- Upslope Catchment Areas
- Water Management System Catchment Area

FIGURE 5.6

Proposed Water Management System

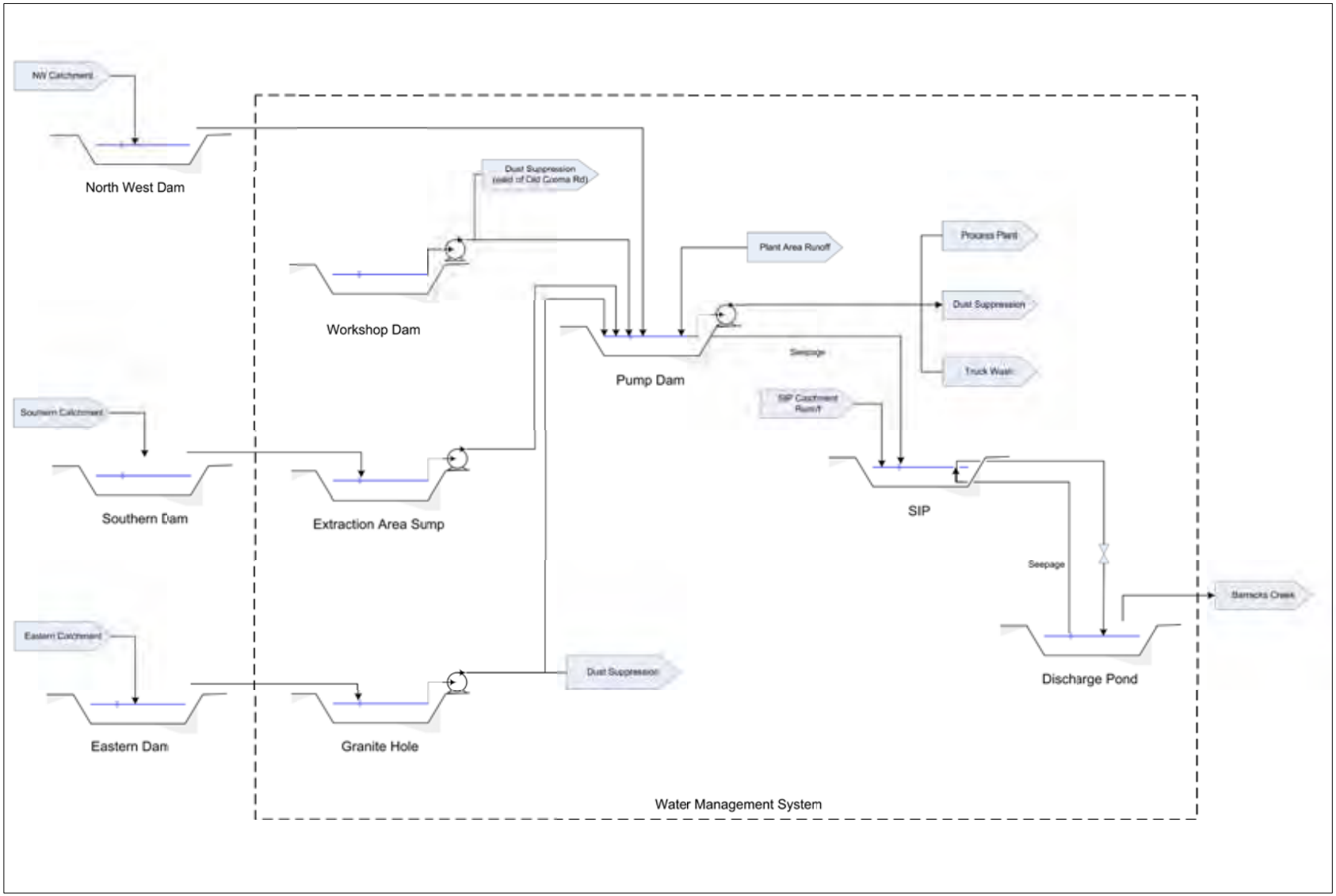


FIGURE 5.7

Schematic of Proposed Water Management System

Provisional detention dams, the Eastern Dam and North-West Dam, are proposed to assist Holcim Australia in managing the flow of runoff from the upslope catchment areas into the quarry WMS. The conceptual locations of the proposed detention dams are shown on **Figure 5.6**, however detailed design work on the placement and control benefits of these detention dams will be undertaken as part of the implementation of the Project. The detailed design review will include the level of benefit these detention dams will provide and associated construction requirements. The current proposed design is for neither the Eastern Dam or North-West Dam to hold permanent water but to overflow to the quarry WMS for transfer to Barracks Creek or for usage in the quarry, in accordance with Holcim Australia's surface water licence and harvestable rights provisions (refer to **Section 5.3.4.4**).

Ecological and archaeological impacts associated with the proposed water management system components have been addressed in the relevant sections, refer to **Sections 5.5** and **5.6** respectively.

Operation of the Southern Dam, Granite Hole and Extraction Area Sump will remain unchanged (refer to **Figure 5.7**).

Runoff from the new infrastructure area north of the processing plant will be diverted to the quarry's existing drainage system and the Pump Dam. All controls will be constructed in accordance with Blue Book requirements (Managing Urban Stormwater: Volumes 1 and 2, Landcom 2004 and DECC 2005) and will include methods to capture oil and grease (e.g. oils skimming, interceptors etc.).

5.3.4 Water Balance

5.3.4.1 Overview

Inflows to the quarry water balance include site rainfall runoff from both the WMS and upslope catchment areas, and water imported to site via tanker to meet both potable water demands and process water deficits. Holcim Australia currently holds a licence (40SL27690) to capture up to 98 ML of water per year of surface water runoff from upslope of the WMS for quarry related usage. It is understood that there is currently negligible groundwater inflows into the WMS.

The water demands at the quarry are primarily water for processing and dust suppression, with some water sourced for potable uses.

5.3.4.2 Water Sources

In the region surrounding Cooma Road Quarry there is only one Bureau of Meteorology (BoM) station, Canberra Airport (Station 070014), which currently records daily evaporation data. Canberra Airport BoM Station is located approximately 15 kilometres north of Cooma Road Quarry and has daily evaporation records from 1967 to date.

For water balance considerations it is important to have data that contains the long term climate records for a site (i.e. typically greater than 100 years). There are numerous BoM stations located in the region surrounding Cooma Road Quarry that record daily rainfall. Long term daily rainfall data is available for Queanbeyan Bowling Club (Station 070072) located approximately 9 kilometres north of Cooma Road Quarry with daily rainfall records from 1871 to date. Although the data available for recent years (i.e. 1973 to date) is missing significant periods of data, a comparison of long term climate records indicates that the available good quality data (i.e. 1871 to 1973) captures the long term rainfall variation (i.e. long term wet and dry periods).

Daily rainfall has also been recorded at Canberra Airport (Station 070014) from 1940 to 2010 and Canberra Airport (Station 070351) from 2008 to date. As such daily matched rainfall and evaporation data is available for a period of 45 years (1967 to date) and long term daily rainfall data available for a period of 103 years (1870 to 1973).

Holcim Australia has also monitored daily rainfall at Cooma Road Quarry since 2002.

The daily rainfall data for the above BoM stations is summarised in **Table 5.5**.

Table 5.5 – Average Yearly Rainfall

Period	Average Yearly Rainfall (mm)		
	Queanbeyan Bowling Club (070072)		Canberra Airport (070014)
	1871 to 1973	1940 to 1973	1940 to 1973
10th percentile	413	393	380
50th percentile	570	618	630
90th percentile	808	828	866

Rainfall from Queanbeyan Bowling Club (Station 070072) and Canberra Airport (Station 070014) were compared for the period where they have overlapping records (i.e. 1939 to 1973) and were found to have similar rainfall statistics (refer to **Table 5.5**). As such it is considered that Queanbeyan Bowling Club (Station 070072) will provide long term rainfall data that is representative of rainfall at Cooma Road Quarry and suitable to be used with average daily evaporation data for Canberra Airport (Station 070014) to represent the long term climate of the area.

Annual pan evaporation recorded at Canberra Airport (Station 070014) ranges from 1316 millimetres per year to 2024 millimetres per year for the period of record (1967 to date). Analysis of the historical record shows an expected trend of evaporation increasing during the summer months and decreasing during the winter months. Average daily Canberra Airport evaporation data for each month of the year is shown in **Table 5.6**.

Table 5.6 – Average Daily Pan Evaporation

Month	Average Daily Pan Evaporation (mm/day)
January	8.1
February	7.1
March	5.5
April	3.6
May	2.2
June	1.6
July	1.7
August	2.6
September	3.7
October	5.1
November	6.5
December	8.1

The catchment area of the WMS is largely unaffected by the Project in terms of catchment size, with an increase in area from approximately 81 hectares to approximately 89 hectares associated with the relocation of the workshop and stockpile sites to the north of the processing plant. Similarly the Project is not expected to influence the negligible groundwater inflows to the existing WMS.

5.3.4.3 Water Demands

Water use at Cooma Road Quarry is estimated at approximately 74 ML per year, and is used for process water and dust suppression. A breakdown of the current and predicted Project water demands is included in **Table 5.7**.

Table 5.7 – Quarry Water Demands (ML per year)

Use	Existing	Predicted
Processing Plant	40	60
Dust Suppression	30	30
Truck Wash	4	4
Total	**74**	**94**

Holcim Australia has indicated that the total site water demands for dust suppression and truck wash are not expected to increase with the Project. The increase in predicted water demands for the processing plant is associated with the proposed increase in maximum production from 1 Mtpa to 1.5 Mtpa.

5.3.4.4 Site Water Balance

The water balance for the existing operations was determined based on historical rainfall and evaporation data (refer to **Section 5.3.4.2**).

The existing water balance indicates that the quarry typically has a net water deficit in the order of 47 ML per year (refer to **Table 5.8**). The net water deficit is predicted to increase to 64 ML per year for a 50th percentile year with the Project (refer to **Table 5.8**).

Table 5.8 – Water Balance (ML per year)

Rainfall Condition	Existing (1 Mtpa)	Predicted (1.5 Mtpa)
10th percentile	-92	-112
50th percentile	-47	-64
90th percentile	27	17

The water balance in **Table 5.8** is based on capture of rainfall runoff within the WMS. Holcim Australia currently manage any water deficit with water sourced under harvestable rights provisions and surface water licence (40SL27690) from upslope catchment areas and from off-site supplies as required.

The water balance also indicates that the quarry may operate at times with an excess of water. During these periods the focus of the WMS is to manage water quality for discharge to Barracks Creek via the existing licensed discharge point, in accordance with the site EPL 1453.

Analysis of the water balance indicates that the worst 5 year water balance deficit (i.e. based on the driest 5 years on record from 1905 to 1909) for the Project would be in the order of 481 ML (i.e. an average deficit of 96 ML per year). This water deficit would need to be sourced either using Holcim Australia's surface water licence, harvestable rights or from off-site supplies. Water sourcing from upslope catchments is discussed further below.

Analysis of the water balance also indicates that the worst 5 year water balance surplus (i.e. based on the wettest 5 years on record from 1946 to 1950) for the Project would be in the order of 174 ML (i.e. an average surplus of 35 ML per year). This water surplus would need to be discharged via Holcim Australia's EPL to Barracks Creek. Water discharges, including an analysis of predicted volumes and frequencies is discussed further below.

The quarry has a large in-pit storage capacity that will continue to allow suitable carryover storage in the event of extended dry or wet periods.

Potable water demand for the quarry operation is estimated to be approximately 1.5 ML per year. All potable water for the Project will continue to be sourced from off-site supplies and is delivered to site via tanker.

Management of Upslope Catchment Runoff Volumes

Water balance modelling indicates that, on average, 82 ML of runoff will flow into the WMS from upslope catchment areas annually. Of this volume, approximately 5 ML could be sourced by private landholders as harvestable rights provisions (based on existing farm dams) and approximately 20 ML sourced by Holcim Australia under harvestable rights provisions. In addition, Holcim Australia has a licence (40SL27690) to capture up to 98 ML per year of runoff (refer to **Section 5.2.4.2**) to meet quarry water demands.

Holcim Australia proposes to manage and release any water that is captured from the upslope catchment areas that is in excess of the combination of Holcim Australia's harvestable rights provisions and surface water licence (40SL27690). The strategy for management of upslope runoff has been developed due to space, topographical, ecological, and archaeological constraints. As such, it is considered a better environmental outcome to manage upslope runoff as per the strategy proposed compared to construction of major diversion channels or complex pumping systems.

The volumes predicted to be managed associated with upslope catchment areas, with consideration of rainfall, runoff and evaporation are summarised in **Table 5.9**.

Table 5.9 – Upslope Catchment Management Summary

Condition	Runoff[1] (ML/yr)	Harvestable Rights Provisions (ML/yr)		Net Runoff[2] (ML/yr)	Surplus Runoff[3] (ML/yr)
		Private	Holcim		
10th percentile	24	5	20	0	0
50th percentile	103	5	20	78	0
90th percentile	258	5	20	233	135

1 - Total estimated runoff from upslope catchment areas (based on 103 years of data)

2 - Runoff minus harvestable rights provisions (based on 103 years of data)

3 - Runoff in excess of 40SL27690 (i.e. 98 ML/year) (based on 103 years of data)

The summary provided in **Table 5.9** indicates that on average Holcim Australia will not need to transfer runoff from the upslope catchment areas to Barracks Creek to not exceed licence limits. However, Holcim Australia will continue to need to transfer runoff that is either surplus to licence volumes and/or the site's water requirements to Barracks Creek. Further details on water discharges, including estimated volumes and frequencies is included below.

Water Sourcing

Holcim Australia proposes to continue to source water as required to meet site water deficits using water captured within the WMS, via Holcim Australia's existing surface water licence (40SL27690) and harvestable rights provisions. Any additional water deficits will be sourced using off-site water supplies via tankers.

Holcim Australia also proposes to continue to import potable water demands to Cooma Road Quarry from off-site water supplies.

The analysis provided in **Table 5.9** indicates that, based on historical rainfall and evaporation records, for 60 per cent of time Holcim Australia will not need to source external water to supplement on site supplies (i.e. in addition to harvestable rights and licensed water from upslope catchment areas). However, the analysis also indicates that Holcim Australia would need to import water to site in 40 per cent of years while operating at maximum production levels.

Water Discharges and Transfers

An analysis of the predicted water balance indicates that at maximum production levels, the WMS will have a water surplus 11 per cent of the time (i.e. on average 1 in every 10 years). The predicted 90th percentile surplus (i.e. will occur on average 1 in every 10 years) is 17 ML per year (refer to **Table 5.8**). The analysis also indicates that 60 per cent of the time (i.e. on average 3 in every 5 years), Holcim Australia will need to transfer water from the upslope catchment areas downstream to Barracks Creek that is either in excess of licensable limits or surplus to the site's water requirements. The average surplus is estimated to be 56 ML per year.

5.3.5 Downstream Surface Water Environment

Approximately 81 hectares of the existing WMS lies within the catchment area of Barracks Creek. With the Project, the catchment area of the WMS will increase by approximately 8 hectares. This will result in a net decrease in area of Barracks Creek of approximately 1 per cent. With the proposed transfer of runoff from areas upslope of the WMS, the Project is expected to have a negligible impact on annual flow volumes in Barracks Creek compared to the currently approved impacts.

The Project will not impact on annual flow volumes within Jerrabomberra Creek.

The Project is primarily located within the boundary of the existing WMS. Water management system infrastructure (refer to **Section 5.3.3**) is proposed for the new infrastructure area to the north of the processing plant. The construction and operation of the Project will be consistent with the existing EMP and associated erosion and sediment controls, therefore it is considered that there will be negligible impact on water quality in downstream surface water systems. As such it is considered that the Project will result in no changes to the currently approved impacts.

5.3.6 Monitoring, Licensing and Reporting Procedures

Construction Phase Works

During the construction of infrastructure for the Project all works and associated erosion and sediment controls will be inspected on a frequent basis to ensure that all required controls are in place and effective. In addition, all erosion and sediment controls will be designed, constructed and managed in accordance with the Blue Book Volumes 1 and 2 (Landcom 2004 and DECC 2008).

Following the completion of construction works, the work areas will be inspected monthly and after any rainfall events generating runoff until revegetation and stabilisation of drainage structures are complete.

All erosion and sediment controls and their monitoring and maintenance requirements for the construction phase of the Project will be detailed in a construction environmental management plan.

Operational Works

During the operational phase of the Project, monitoring of the water management controls will be undertaken on a monthly basis and after major storm events (refer to **Section 5.2.6.4**).

The walls of all water management dams will be inspected biennially (every two years) for their structural integrity and for any maintenance requirements. The walls of the water management dams will be grassed and kept free of any trees and shrubs.

Decommissioning

Assuming that the quarry is decommissioned at the end of the Project, water management dams will either remain in use as farm dams or will be removed. If the dams are to be retained, the capacity of the dams will be reviewed and the size/volume modified, if required to suit future land uses. The proposed diversion drains, catch drains and site bunding will remain in place as part of the final landform. All buildings/workshops and associated hardstand and sealed areas will be removed and revegetated.

Surface Water Monitoring and Reporting

Holcim Australia will continue to monitor water quality of all discharge waters in accordance with the EPL.

All monitoring results will be reported in the Annual Review and the monitoring data will be retained in an appropriate database.

The results of the water quality monitoring will be used to review the effectiveness of the water management system on an ongoing basis.

Water usage, water imported to site, rainfall, dam volumes and discharges (including transfers) at Cooma Road Quarry will be monitored to assist in the management of the water and accounting for water.

Once operational, the water management dams will be monitored to ensure that any overflows or discharges are to an appropriate standard and in accordance with licence conditions.

Licensing Requirements

Water Act and Water Management Act

As yet no Water Sharing Plans have been finalised for the surface waters in the vicinity of the Project. Therefore the Project is governed by the *Water Act 1912* until such plans are gazetted.

There are several dams proposed as part of the Project. These dams include clean water catch dams for control of upstream runoff/flooding and sediment dams. The water collected in the clean water catch dams will be managed within the WMS. The water captured in the sediment dams will either be used for dust suppression or discharged downstream to Barracks Creek in accordance with the site EPL.

Holcim Australia will continue to source water for quarry operations from within the WMS boundary, harvestable rights provisions from upslope catchment areas and under surface water licence (40SL27690) from upslope catchment areas. Holcim Australia proposes to continue to operate under the existing surface water licensing for the quarry.

Potable water needs for the site will continue to be provided through off-site supplies.

Protection of the Environment Operations Act

Cooma Road Quarry holds an existing EPL under the *Protection of the Environment Operations Act 1997* for discharges from the water management system to Barracks Creek. Discharges from the proposed water management system will continue to be licensed under the *Protection of the Environment Operations Act 1997*.

5.3.7 Conclusions

The surface water resources assessment for the Project indicates that the Project will have a minimal impact on the surface water of the surrounding region, in particular:

- the proposed WMS will result in improved management of undisturbed catchment runoff and disturbed catchment runoff;
- the proposed water monitoring systems will enable accurate accounting of water;
- the overall site water balance will remain largely unchanged; and
- downstream water quality should not experience any adverse impacts with the appropriate implementation and management of appropriate erosion and sediment controls.

5.4 Groundwater

As discussed in **Section 2.0**, the overall footprint of the quarry pit is not increasing significantly compared to the currently approved footprint and the maximum depth of extraction will not change. Also of note is that Cooma Road Quarry currently experiences negligible groundwater inflow to the existing quarry pit. It was therefore expected that the Project had limited potential to adversely impact on groundwater resources. However, to identify the potential for any impacts on groundwater, a groundwater assessment was undertaken by Coffey Geotechnics and is included as **Appendix 4**. A summary of the key findings of the groundwater assessment are outlined below.

As discussed in **Section 2.0**, Holcim Australia quarry dacite and granite at Cooma Road Quarry from two connected pits within the approved extraction area. The dacite pit is located within the southern portion of the quarry and occasionally holds water. The granite pit, located in the northern part of the extraction area, typically holds water at or below the lowest bench. The level in the granite pit is over 20 metres lower than in the dacite pit and over 5 metres deeper than Barracks Creek which is located to the north of the quarry (refer to **Figure 5.4**). The dacite pit and granite pit are separated by an east-west trending shear zone.

Cooma Road Quarry currently experiences negligible groundwater inflows into the existing quarry pit. Given the minimal groundwater inflows previously experienced at Cooma Road Quarry no monitoring program was in place to record groundwater levels or inflow. As part of the groundwater assessment three temporary monitoring bores were installed to verify groundwater systems. The focus of the monitoring was the granite pit, as this is the deepest area within the quarry pit and has the greatest potential to intercept regional groundwater.

Water levels within the existing pit, particularly within the dacite pit, are generally considered to be influenced by surface water, primarily rainfall events. Although there is minimal groundwater inflow, the granite pit is considered to be at a depth that intercepts the regional groundwater table. The groundwater monitoring indicates, however, that there is limited connectivity between the granite pit with the nearest aquifers.

Water level records and bail-down tests on the three temporary monitoring bores installed to assess the groundwater at the quarry also indicate that the granite rock has a very low permeability (cm/day) and based on the width of the quarry and the low hydraulic conductivity, the interaction of the granite pit with regional groundwater is considered to be very limited. With a prospective well yield of less than 0.01 L/s, Coffey Geotechnics found that the rock mass has not been proven to be a viable aquifer. In terms of aquifer properties, the fractured granite system would yield only 0.34 m^3/d, or 0.004 L/s to a well, which is not considered a productive aquifer (Driscoll 1989).

The groundwater assessment also found that the impact of the Project on groundwater is not likely to increase with the proposed extension to the granite pit. Furthermore, the assessment found that hydraulic connection, of the quarry pit to the regional aquifer is very limited or even non-existent. Based on a hydraulic conductivity of 0.17m/d, the groundwater flow through the granite pit can be estimated as no more than 161 m^3/day.

In summary, the groundwater assessment concluded that the Project is not considered likely to have a significant impact on the regional groundwater resource, as:

- the quarry site is in a tight rock formation where no meaningful groundwater extractions can be attained;
- quarrying activities do not impact on a viable aquifer;
- the volume of groundwater affected by Cooma Road Quarry is limited to the exposed water table in the granite pit;
- interaction of the granite pit with regional groundwater is very limited; and
- the maximum extraction depth will not be increased.

Given the fact that both rock types quarried at Cooma Road Quarry, granite and dacite, are relatively stable with respect to groundwater quality, there is no concern regarding the potential for the quarried material to affect groundwater quality.

5.5 Biodiversity

The Project presents limited opportunity for significant impacts on ecological values as the Project is located almost wholly within the existing and approved disturbance area of Cooma Road Quarry. An additional disturbance area of approximately 0.2 hectare is proposed associated with construction of the proposed eastern dam which will form part of the surface water management system for the Project (refer to **Figure 2.4**).

Holcim Australia has had a number of previous ecological studies completed at the site which have identified some significant ecological values. A key driver for the Project was to limit the disturbance footprint as much as possible to the existing and approved disturbance areas and to avoid native woodland areas and other areas with high ecological value. This aim has been achieved, with an area of only approximately 0.2 hectare of disturbed grassland to be impacted outside of the existing and approved disturbance footprint (refer to **Figure 5.8**).

As part of the ecological assessment for the Project, a detailed review of all previous studies and a search of relevant ecological databases (EPBC Protected Matters and the NSW Wildlife Atlas Database) was completed to gain an understanding of the existing ecological environment. A targeted ecological survey was then conducted over two days at three sites within the Project area targeting all potential impact areas. The vegetation of the study area was surveyed using the random meander technique and the following data collected for each site:

- flora and fauna species inventory;
- broad vegetation community description; and
- habitat assessment.

All flora and fauna species observed on site were recorded on data sheets and unknown specimens either sampled or photographed for later identification.

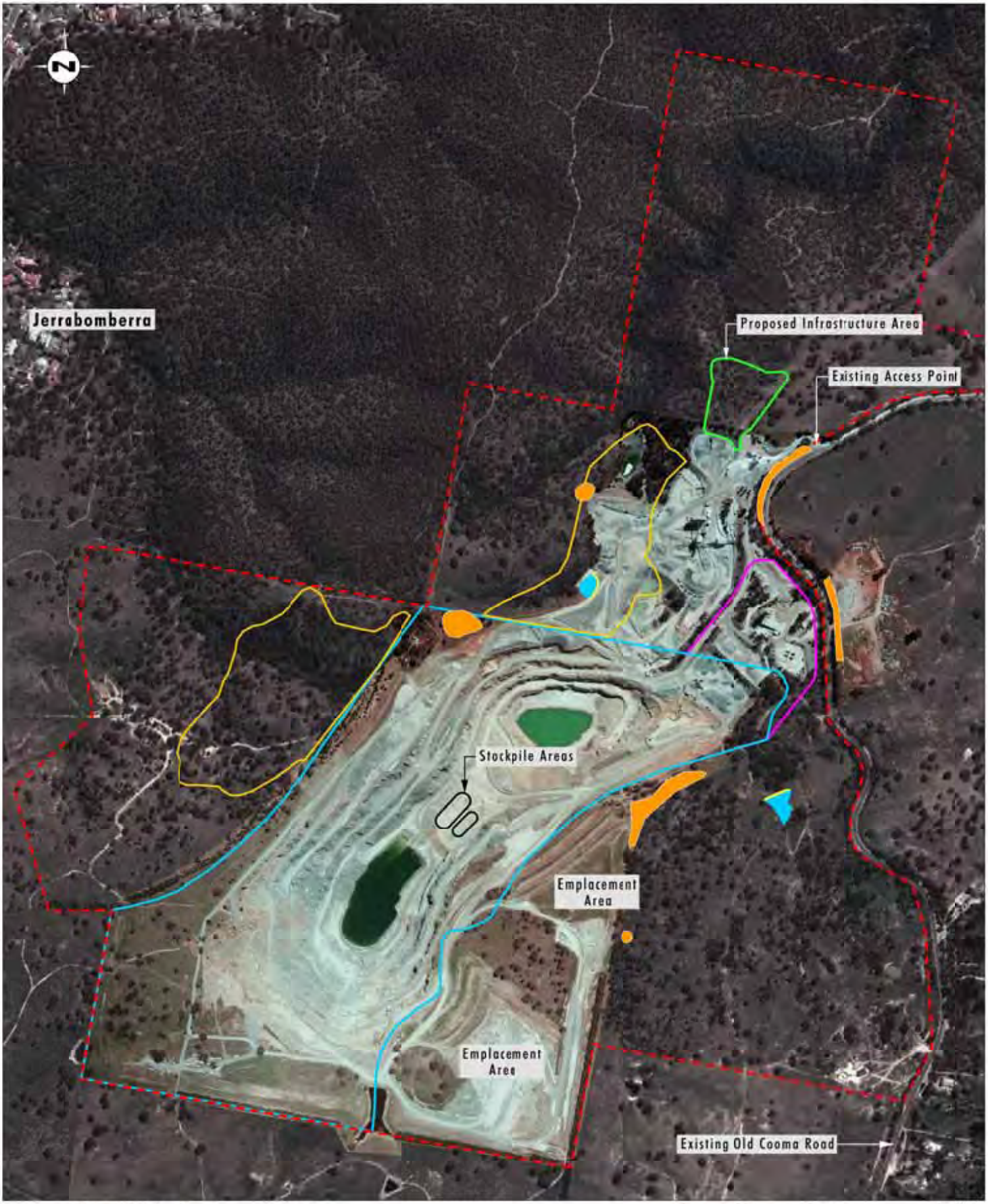
Following the completion of the targeted ecological survey and the identification of areas with significant ecological value (e.g. the identification of a population of Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) listed as Endangered under the EPBC Act), the design of the Project was modified to reduce potential impacts on ecologically significant areas. This included modifying the initially proposed design of the water management system. These measures have assisted in further reducing the impact of the Project on ecological values.

A discussion of the potential impacts of the Project on ecological values is provided in the following sections.

5.5.1 Existing Environment

A detailed summary of the findings of the previous ecological studies completed in the Project area is provided in **Appendix 5**. In summary, these studies have identified that the two main vegetation types found in the Project area are alliances and constituents of yellow box/Blakely's red gum community and red stringybark/scribbly gum community. As a result of a history of selective clearing (as suggested by Crawford 1993) the remnant trees perhaps constitute only part of what might have originally been box-gum woodland.

The most recent study conducted by Eco Logical Australia (2011) identified four separate vegetation communities, including red box woodland, yellow box - red box woodland, inland scribbly gum - stringybark gully forest and apple box woodland. The remnant yellow box/red gum woodland community is described as 'dominated by yellow box and red box along with scribbly gum and apple box. The community broadly conforms to the white box - yellow box - Blakely's red gum woodland (EEC) listed under the TSC Act and some areas may also conform to the white box - yellow box - Blakely's red gum grassy woodland and derived native grassland (CEEC) listed under the EPBC Act' (Eco Logical Australia 2011).



Source: Holcim (2012), Google Earth (2011)

0 100 250 500m
1:10 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Disturbance Area - Workshop
- Approved Disturbance Area - Overburden Emplacement
- Dam
- Hoary Sunray Locations

FIGURE 5.8

Hoary Sunray Locations

Two populations of hoary sunray (*Leucochrysum albicans* var. *tricolor*) were also observed by Eco Logical, with hoary sunray also being recorded by Umwelt during surveys in 2012 (refer to **Figure 5.8**).

Two threatened woodland birds have previously been recorded on the site by Crawford (1993), namely diamond firetail and hooded robin. Potential habitat exists for a number of other threatened species (refer to **Appendix 5**).

Specifically in regard to the proposed additional disturbance footprint, the Umwelt surveys identified that it is largely previously disturbed, containing no trees and a ground layer of mostly exotic grasses. Small patches of degraded native pasture are also present and support several native species including purple wiregrass (*Aristida ramosa*), wallaby grasses (*Austrodanthonia* spp.), spear grasses (*Austrostipa* spp.) and redleg grass (*Bothriochloa macra*).

The vegetation present within the additional disturbance footprint is not consistent with any listed Threatened Ecological Community (TEC) and supports only marginal habitat opportunities for fauna. During field surveys approximately 20 eastern grey kangaroo (*Macropus gigantea*) were observed foraging and moving through this area. Similarly to the kangaroos, other fauna potentially occurring in this area would mainly be moving through the area between proximate areas of better quality habitat in addition to occasional and opportunistic foraging.

The proposed additional disturbance footprint area has poor habitat quality and is unlikely to represent an important feature in the area for locally occurring native flora and fauna species.

No groundwater dependent ecosystems have been identified within or adjacent to the Project area, including the area proposed for disturbance associated with the Eastern Dam. Therefore, impacts on groundwater dependent ecosystems are not considered a potential issue for the Project.

5.5.2 Ecological Impact Assessment

As discussed, the Project will result in impacts on approximately 0.2 hectare of poor quality ecological habitat, beyond the existing and approved disturbance areas for Cooma Road Quarry.

During the course of site inspections, several occurrences of the EPBC Act Endangered species hoary sunray (*Leucochrysum albicans* var. t*ricolor*) were located. As discussed above, the Project has been designed to avoid impact on these occurrences. Therefore, the Project is not predicted to impact on hoary sunray. While these areas are not affected by the Project, the effective management of these areas can be achieved as part of the ongoing land management activities at the quarry.

Past studies in the Project area (Eco Logical, 2011) have also identified the likely occurrence of White box – yellow box – Blakely's red gum woodland and derived native grassland Critically Endangered Ecological Community (CEEC) listed under the EPBC Act and the comparable community listed under the NSW TSC Act in the Project area. This community does not occur in the additional disturbance footprint that will be disturbed as part of the Project.

The ecological assessment has therefore found that the Project will not affect any area of woodland or derived native grassland consistent with definitions of TECs. It will also not impact any areas of habitat for any listed threatened species whether under NSW or Commonwealth legislation.

Consideration of the proposal under Section 5A of the *Environment Planning and Assessment Act 1979* determined there was unlikely to be any significant impacts to species or communities listed in NSW (refer to **Appendix 5**). The Project is also considered unlikely to result in a significant impact on EPBC Act listed species and communities, or on migratory species (refer to **Appendix 5**).

5.5.3 Management of Ecological Values

The ongoing management of the ecological values of the Project area will be addressed by the implementation of the Cooma Road Quarry EMP. The EMP will be revised to include a clearing protocol for tree felling to ensure that this is undertaken in a manner that minimises the potential for impacts on fauna species. It is noted that further clearing is required from within the existing and approved disturbance footprint for the quarry.

The ongoing management of the quarry buffer lands under the EMP will provide for the maintenance and enhancement of ecological values across the non-operational parts of the Project area. The EMP will be updated to include specific management measures for hoary sunray and the white box – yellow box – Blakely's red gum woodland and derived native grassland community. This will include identification of appropriate management controls to enhance natural regeneration, as well as periodic ecological monitoring to inform adaptive management.

As outlined in **Section 5.15**, Holcim Australia's proposed approach to rehabilitation and eventual closure of the site is to enhance the ecological values of the Project area to link in with surrounding habitat areas. The rehabilitation program will therefore use appropriate local native species to establish target native vegetation communities. The rehabilitation species mix to be used at the site will be specified in the revised EMP prepared as part of the implementation of the Project.

5.6 Aboriginal Archaeology

The DGRs for the Project require an Aboriginal cultural heritage assessment, including both cultural and archaeological significance, to be undertaken.

Due to the highly disturbed nature of the site and the small (0.2 hectare) increase to the existing and approved disturbance footprint, a due diligence assessment was undertaken by Umwelt to determine the Aboriginal archaeological potential and values of the Project area in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010). A copy of the due diligence assessment report is provided as **Appendix 6**.

Members of the Ngambri Local Aboriginal Land Council (NLALC), who are also representatives of the Ngunnawal Elders, were present during the due diligence inspections. The representatives of the NLALC who were present during the inspections have also prepared a statement on the cultural heritage values of the Project area (refer to **Appendix 6**).

Consultation with the Aboriginal community is an integral part of identifying and assessing the significance of Aboriginal objects and/or places and determining and carrying out appropriate strategies to mitigate impact upon Aboriginal heritage. Holcim Australia and the Ngunnawal Elders/NLALC have a well established working relationship and Memorandum of Understanding in place. In accordance with this memorandum, Holcim Australia has consulted with the NLALC regarding the Project, and therefore NLALC have been involved in ongoing consultation for the Project.

5.6.1 Previously Recorded Archaeological Sites

Searches of the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) register were undertaken on 29 January 2012 and 18 April 2012 and identified no previously recorded sites within the Project area. There are, however, 25 previously registered sites surrounding the Project area (refer to **Figure 5.9**). It is noted that three of these sites are duplicated, making 22 sites in total.

5.6.2 Due Diligence Methodology

Pedestrian due diligence inspections were undertaken of the proposed works impact areas (including those areas previously disturbed and approved for disturbance) on 3 April 2012, 16 May 2012 and 11 July 2012. The inspections were carried out by an Umwelt Archaeologist and representatives from NLALC.

During the inspections participants were spaced approximately 5 metres apart to cover the proposed impact areas. All exposed areas were examined during the inspection and the landforms within the Project area were assessed for subsurface archaeological potential.

5.6.3 Survey Results

A large portion of the Project area is previously disturbed land, with only small areas of substantially unmodified landscape. Previous ground disturbing works in the Project area include vegetation clearance, erosion, as well as quarrying, importing fill, bulk earthmoving and road construction in the modified areas. The potential for subsurface artefacts in the modified areas is zero, with all areas having previously been quarried, removing all potential.

No Aboriginal objects were located within the proposed disturbance area of the Project during the due diligence inspections. One isolated artefact, a silcrete broken flake (identified as Cooma Quarry 2), was located on the spur crest adjacent to the proposed infrastructure area (refer to **Figure 5.10**). The artefact is located approximately 7 metres east of the proposed bund along the eastern edge of the new infrastructure area. Holcim Australia has committed that the Project will not impact on this site.

A second Aboriginal object, a quartz flake (identified as Cooma Quarry 1), was located on the eastern side of Cooma Road (refer to **Figure 5.10**). This artefact is located outside the Project area and will not be impacted by the Project (refer to **Appendix 6** for further details).

5.6.4 Risk Assessment

The risk of the Project harming an Aboriginal object and an assessment of the possibility of avoiding harm through appropriate management measures was undertaken in accordance with the due diligence guidelines (DECCW 2011).

In addition to no proposed impacts to known sites, the Project area is assessed, from an archaeological perspective, as having low potential to contain subsurface artefacts or intact archaeological deposits. The due diligence assessment therefore determined that, from an archaeological perspective, the works can proceed with caution in accordance with the recommendations set out in **Section 5.6.5**.

Source: Holcim (2012), Google Earth (2011)

0 200 400 800m
1:16 000

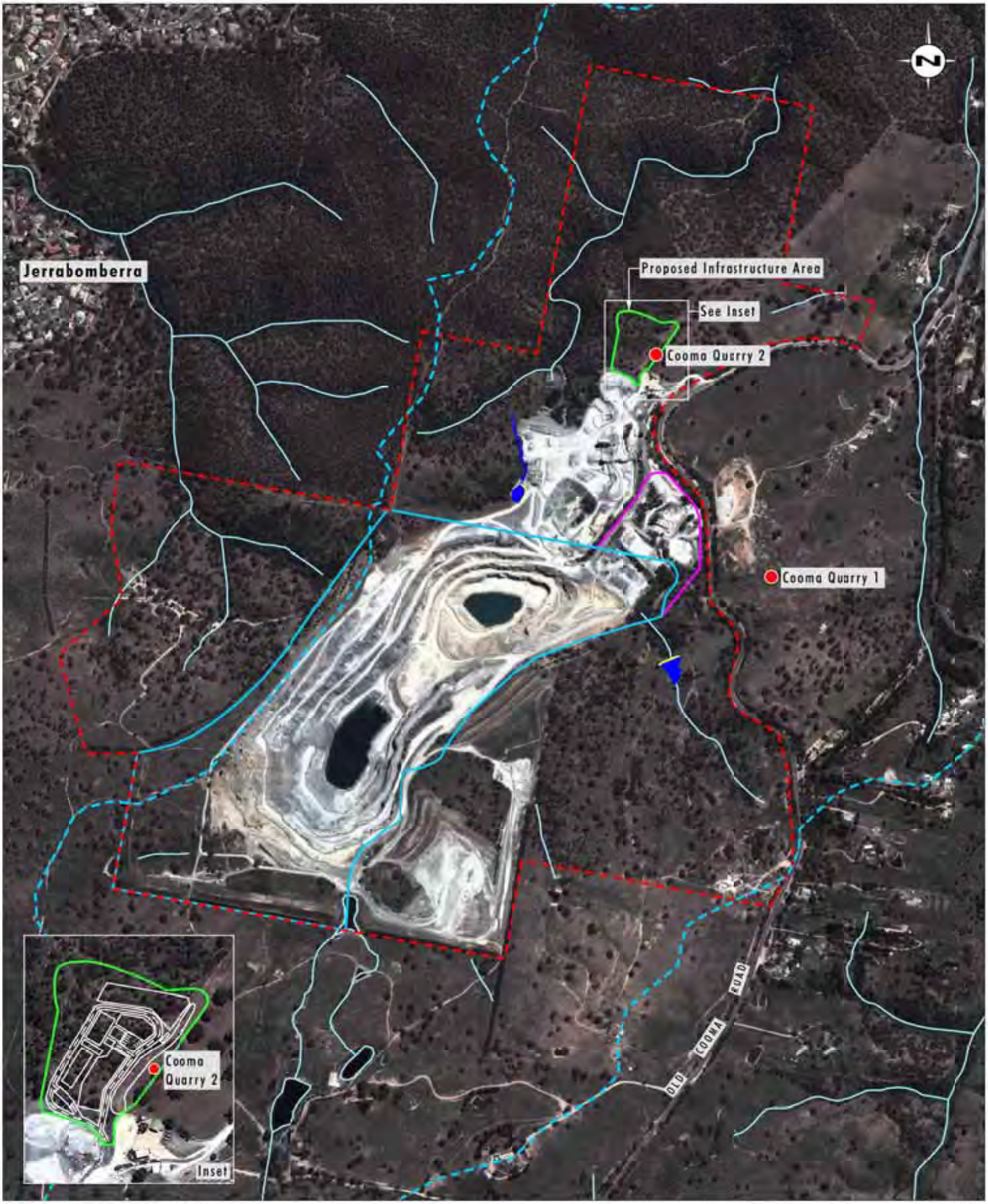
Legend

Proposed Project Area

Artefact Scatter

FIGURE 5.9

Aboriginal Heritage Information Management System (AHIMS) Previously Registered Sites



Source: Google Earth (2011)

0 100 300 400m
1:12 500

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Disturbance Area - Workshop
- Catchment Boundary
- Clean Drain
- Isolated Artefacts

FIGURE 5.10

New Archaeological Sites

5.6.5 Aboriginal Archaeological Management Recommendations

As discussed in **Appendix 6**, the Project is assessed as having a low risk of directly harming Aboriginal objects. However, it is recommended that the Project proceed with caution and that the following recommendations be implemented:

- All Holcim Australia employees and contractors are to be made aware of the location of Cooma Quarry 1 and Cooma Quarry 2 and the need to avoid impacts on these sites.
- Temporary fencing of Cooma Quarry 2 is recommended to avoid any unintended impacts to the site during construction.
- Consultation with the Ngunnawul Elders and NLALC be undertaken to develop a culturally appropriate management strategy to avoid unintended impacts to Cooma Quarry 1 and Cooma Quarry 2.
- Appropriate contingency plans be implemented should previously unknown Aboriginal Cultural Heritage be discovered in the process of carrying out the Project, as set out in the due diligence assessment (refer to **Appendix 6**).

5.7 Historic Heritage

A historic heritage assessment, which includes a Statement of Heritage Impact (SOHI) for the locally significant Moses Morley's Lime Kiln, has been prepared for the Project by Umwelt and is provided in **Appendix 7**. The historic heritage assessment and SOHI has been undertaken in accordance with guidelines set out in the *NSW Heritage Manual 1996*, produced by the Heritage Branch, Department of Planning (DoP), including *Statements of Heritage Impact* and *Assessing Heritage Significance* and with consideration of the principles contained in *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 1999* (Australia ICOMOS 2000). The assessment included a review of:

- the State Heritage Register (SHR) and State Heritage Inventory maintained by the NSW Heritage Council;
- the Australian Heritage Database maintained by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC);
- the Register of the National Estate (RNE);
- the Queanbeyan Local Environmental Plan 1998; and
- the Draft Queanbeyan Local Environmental Plan 2011.

Four locally significant historic heritage sites have been identified in the immediate local vicinity by the Draft Queanbeyan LEP 2011, including:

- Moses Morley's Lime Kiln at 501 Cooma Road (located in the Project area);
- McCawley 'Sunset' Homestead at 141 Googong Dam Road;
- Marchiori's Lime Kiln at the southeast corner of Jumping Creek; and
- White Rocks Limestone Kilns at 300 Cooma Street.

Of these sites only Moses Morley's Lime Kiln is located within the Project area (refer to **Figure 5.11**).

Site inspections were undertaken as part of the Aboriginal archaeology due diligence assessment. No other potential sites were located as part of these inspections.

While Moses Morley's Lime Kiln is located within the Project area, it is located outside of the proposed quarry extension area and will not be directly impacted by the Project. The construction of the Eastern Dam and vibration from blasting operations were identified as having the potential to result in indirect impacts on the kiln site and therefore required further assessment.

5.7.1 Moses Morely's Lime Kiln

Moses Morley's Lime Kiln comprises a stone kiln and the remains of two stone buildings dating to around the late 1870s (refer to **Figure 5.12**). The kiln is a 'D'-shaped kiln and is the most common type in NSW from the late nineteenth and early twentieth century's.

Morley's kiln was built into a bank to allow for top loading. It measures 6 metres in length and 5 metres in width. There is a single draw hole at the base, beneath the firing chamber. A large tree trunk, laid transversely across the draw hole, reinforces the firing chamber. There are two angled stone buttresses at the front of the kiln, one of which has partly collapsed (O'Keefe and McGowan 1993:13).

Approximately 7 metres to the south of the kiln are the remains of two stone constructed buildings set into an embankment. The main structure measures 5 by 3.5 metres. The second building is located 2 metres further south (O'Keefe and McGowan 1993:14).

The stone construction of the two buildings is unusual in an area where timber was plentiful. The use of stone and the lack of any fireplace suggests the structures were built as storerooms rather than residences. However, they are likely to have also provided temporary accommodation for Morley when limeburning was in progress as the operation took between 48 and 90 hours to complete and required continual monitoring and feeding of the fire (O'Keefe and McGowan 1993:14).

The evidence provided by the other known remaining kiln structures in the area indicates that Morleys Lime kiln is either the oldest or one of the oldest known surviving lime kilns in the region.

5.7.2 Significance Assessment

While Moses Morley's Lime Kiln is located within the Project area, it is located outside of the proposed quarry extension area and will not be directly impacted by the Project.

As there is no proposed physical impacts to the stone constructed kiln site, the previous historical research, significance assessment and comparative analysis undertaken as part of the 1993 assessment by O'Keefe & McGowan (Heritage Assessment Cooma Road Quarry Queanbeyan) has been utilised, rather than re-assessing the already identified locally significant item.

Source: Holcim (2012), Google Earth (2011) and Queanbeyan City Council (2011)

0 0.5 1.0 1.5km
1:30 000

Legend

- Proposed Project Area
- Moses Morley's Lime Kiln Site
- Historical Heritage Items (From Draft Queanbeyan LEP)

FIGURE 5.11

Draft Queanbeyan LEP 2011 Listed Items

PLATE 5.4
1993 photograph of second stone structure, view to east

PLATE 5.5
May 2012 photograph of second stone structure, view to east

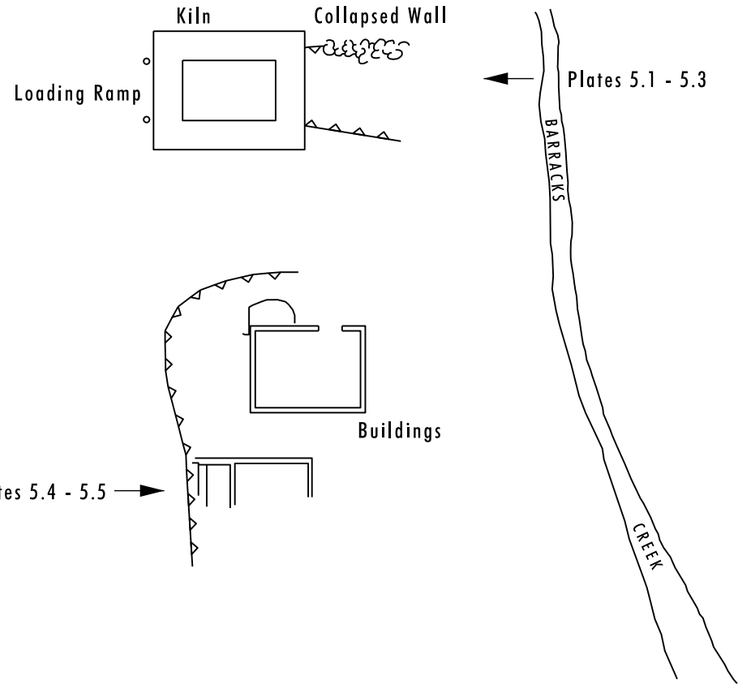


PLATE 5.1
1993 photograph of kiln structure, view to west

PLATE 5.2
May 2012 photograph of kiln structure, view to west

PLATE 5.3
May 2012 photograph of kiln structure, view to west

FIGURE 5.12

1993 Sketch Plan of Kiln Site with Photograph Locations Indicated

While other examples of twentieth century lime kilns are present within the region, Moses Morley's kiln is likely to be the oldest surviving example of a nineteenth century lime kiln in the Canberra-Queanbeyan region and an intact representation of an early industry crucial to the spread of European settlement in the region. Morley would have supplied lime for mortar and plaster essential for the construction of many of Queanbeyans' buildings from 1876 to approximately 1895. The kiln itself, while being an example of the common 'D' type of kiln, is a well preserved and intact example demonstrating a high level of technical accomplishment in a rural setting. The site has archaeological significance and research value for its potential to reveal further information on the workings of the kiln and the functions of the associated stone constructed buildings (O'Keefe and McGowan 1993:15-16).

Moses Morley's Lime Kiln is considered to be of local significance.

5.7.3 Heritage Impact Assessment

The Project is unlikely to result in any impacts which affect the historical heritage values of Moses Morley's kiln with the exception of potential impacts associated with:

- the construction of the proposed eastern dam; and
- vibration resulting from blasting.

These potential indirect impacts are discussed below.

Eastern Dam Construction

The eastern dam is proposed to be constructed approximately 40 metres north of the kiln site. The dam will comprise an earthen bund forming an approximately two metre high, 20 metre wide dam wall. The dam is not designed to permanently hold water, but rather act as a temporary storage to manage higher volumes of water during heavy rain. The maximum extent of inundation associated with the dam would be approximately 5 metres away from the kiln and associated buildings in horizontal distance. Therefore the kiln site is not predicted to be impacted by inundation.

The setting of the kiln site is important as the site is considered to have high aesthetic significance. Its relationship to Barracks Creek and the immediate surrounding topography are important factors to the setting (as a result of the need for a water supply and the construction methodology of being excavated into the slope). These relationships will be maintained and, with the exception of temporary inundation of the area adjacent to the kiln site during rain periods, the immediate setting of the kiln site will be retained.

Vibration

Indirect impacts such as vibration from blasting have the potential to damage historical heritage items such as the kiln site.

The previous blasting activities associated with quarrying operations have exposed the kiln site to vibration levels similar to those predicted for the Project. There has been some minor slippage and collapsing of the kiln site in the period since the previous assessment was undertaken in 1994, however, whether this was caused by vibration associated with Cooma Road Quarry or natural deterioration over time is unknown. The kiln site will continue to be exposed to vibration levels from blasting similar to those currently experienced.

5.7.4 Management Strategy

While Moses Morley's Lime Kiln will not be directly impact by the Project, the following management strategies will be implemented to manage potential indirect impacts, including the construction and operation of the eastern dam and vibration from blasting:

- an exclusion zone of at least 20 metres will be established around the lime kiln and associated buildings during the construction of the proposed Eastern Dam;
- the existing fence around the lime kiln and associated buildings will be maintained and the opportunity for extending the fencing out to include the exclusion zone will be investigated;
- vegetation will be managed to ensure the growth of vegetation does not further increase any natural deterioration of the site. The vegetation growing in the soil within the fenced area will be cut, while the vegetation growing in the walls of the stone kiln and associated buildings will be poisoned and left *in situ*;
- a program of blast monitoring will be implemented to verify the vibration levels from blasting activities do not exceed the existing vibration levels. The physical condition of the kiln site will be compared with the photographs contained in this report on a six-monthly basis and reported in the site's annual environmental reporting;
- if appropriate, detailed examination and structural analysis of the kiln site may be undertaken to further define blasting tolerance;
- blast monitoring at the kiln site will be implemented to verify the vibration levels from blasting activities do not exceed the nominated vibration level;
- prior to any blasting or construction activities, photographic/archival recording of the kiln site will be undertaken in accordance with Heritage Branch, OEH guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006); and
- further assessment and comparative analysis will be undertaken should any additional impacts in the vicinity of the kiln site be proposed.

5.7.5 Conclusion

The only Historic Heritage site within the Project area is the kiln site. The Project will not physically impact Moses Morley's Lime Kiln and is very unlikely to affect the identified heritage significance of the locally listed kiln site.

No other known potential historical heritage items or archaeological sites at risk of impact from the Project.

5.8 Air Quality

A comprehensive Air Quality assessment was undertaken for the Project by Sinclair Knight Merz (SKM) and is presented in **Appendix 8**. The assessment incorporated an analysis of existing air quality parameters based on current quarry operations and background data, along with predictive modelling for the Project. A summary of the key findings of the assessment is provided in the following sections.

5.8.1 Air Quality Assessment Criteria

The OEH air quality assessment criteria relevant to the Project are provided in **Table 5.10**.

Table 5.10 – OEH 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/m^3 = micrograms per metre cubed

ppm = parts per million

5.8.2 Existing Environment

Holcim Australia has monitored dust deposition on a monthly basis at five locations within the Project area since 2001. Dust deposition data from the site shows that annual average dust deposition levels have been below the OEH goal of 4 g/m^2/month, with the maximum of annual average deposition being 3.5 g/m^2/month.

Background dust concentration data was analysed from the closest air quality monitoring station located at Monash, approximately 12 kilometres south of the Project area. The Monash site is operated by the ACT EPA and is surrounded by rural and residential land uses. No exceedance of the 24 hour average PM_{10} criteria of 50µg/m^3 was experienced at this station during 2010, the most recent year for which data are available.

From the available monitoring data, the following background concentrations have been applied to the Project:

- annual average TSP of 30 µg/m^3;
- 24-hour average PM_{10} of 24 µg/m^3;
- annual average PM_{10} of 15 µg/m^3; and
- annual average dust deposition of 3.5 g/m^2/month.

Meteorological data for dispersion modelling was generated for the Project area using The Air Pollution Model (TAPM), developed by the CSIRO. TAPM generated data was compared to meteorological data from the Bureau of Meteorology automatic weather station at Tuggeranong, approximately 11 kilometres west of the Project area which was found to be accurate.

There is no weather station at the quarry site. Therefore, the air quality dispersion modelling was based on the use of meteorological data generated for the quarry site by TAPM. TAPM combines synoptic scale meteorological data with local terrain and land use features to simulate the meteorological conditions at the site.

The wind patterns in the TAPM-generated data were compared to wind patterns in data collected by the Bureau of Meteorology at Tuggeranong. This comparison was done to check that the wind data generated by TAPM were generally similar to other wind data collected in the region. It was found that the TAPM-generated data showed some similarities to the Tuggeranong site with regards to wind direction but wind speeds were lower in the Tuggeranong data, due mainly to the sheltered nature of the site. Given that the TAPM-generated data were specific to the quarry site, the TAPM data were used for the air dispersion modelling.

The Tuggeranong weather station was selected to review the TAPM-generated data as opposed to other regional meteorological stations as it was considered more representative of the site. For example, data is collected by the Bureau of Meteorology at Canberra Airport which is a similar distance from the quarry site. The Canberra Airport site is, however, in a more exposed area than Tuggeranong and on this basis the data from Tuggeranong was considered more appropriate.

5.8.3 Assessment Methodology

The air quality assessment was undertaken in accordance with the OEH's *Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2005). The assessment used the computer-based dispersion model AUSPLUME to predict off-site dust concentration and dust deposition levels due to the Project.

The 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 two worst case operating scenarios:

- scenario 1 was based on existing operations assuming maximum production levels of 1 Mtpa and operation between 6.00 am and 6.00 pm Monday to Saturday; and

- scenario 2 was based on proposed continued operations assuming a maximum production rate of 1.5 Mtpa, recycling of 1,000 tonnes of concrete and operation between 6.00 am and 10.00 pm, Monday to Friday, for certain activities (excluding primary crushing and blasting).

5.8.4 Air Quality Impact Assessment

The results of the predictive air quality modelling have identified that the Project will comply with the relevant air quality criteria at all nearby sensitive receiver locations under worst case operating conditions. The results of the assessment are summarised in **Table 5.11**. **Figure 5.13** shows the predicted dust concentrations resulting from worst case operating conditions.

Table 5.11 – Summary of Air Quality Impact Assessment Findings

Pollutant	Average Period	Adopted Background	Predicted Concentration at Most Affected Sensitive Receiver	Goal
TSP	Annual	30 $\mu g/m^3$	30.8 $\mu g/m^3$	90 $\mu g/m^3$
PM_{10}	24-hour	24 $\mu g/m^3$	29 $\mu g/m^3$	50 $\mu g/m^3$
	Annual	15 $\mu g/m^3$	15.6 $\mu g/m^3$	30 $\mu g/m^3$
Dust deposition	Annual	3.3 g/m^2/month	3.4 g/m^2/month	4 g/m^2/month

Source: Google Earth (2011)

0 0.5 1.0 1.5km
1:30 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop

FIGURE 5.13

Worst Case Air Quality Contours

As shown in **Table 5.11** and **Figure 5.13**, dispersion modelling undertaken for the Project demonstrates that the dust impacts from the Project will be minimal and that the predicted dust levels are below the OEH assessment criteria.

5.8.4.1 Other Potential Air Quality Impacts

The Project will require an increase in motor vehicle and machinery activity, which would result in an increase in emissions due to combustion of petroleum products such as petroleum and gasoline. Emissions generated would include carbon monoxide, carbon dioxide, oxides of nitrogen, sulphides and trace amounts of non-combustible hydrocarbons.

Blasting will be managed to minimise the potential for blast fumes being generated, including an assessment of weather conditions prior to blasting.

The impact from an increase in emissions due to an increase in vehicle and machinery activity is predicted to be minimal provided the equipment is appropriately maintained, and given the low existing concentrations of CO and NO_2 in the region (refer to **Appendix 8**), exceedances are highly unlikely to arise from proposed vehicle and machinery activity.

5.8.4.2 Assessment of Cumulative Impacts

The air quality assessment has considered cumulative impacts with existing sources in the area, as existing air quality has been considered in the assessment. At the time of preparing this air quality assessment, the NSW Department of Planning and Infrastructure's project database was reviewed and there were no Projects with the potential to impact on air quality levels in the Queanbeyan Local Government Area. As such, no cumulative impact assessment with other future Projects is necessary.

5.8.5 Air Quality Control Measures 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 measures include:

- minimisation of the total disturbed/working areas at any one time;
- dust collection during drilling operations;
- enclosure of the primary and secondary crushing plants and screening transfer points;
- watering of unsealed roads, working areas and stockpiles;
- water sprays on the conveyors;
- dust extraction system within the secondary crushing plant; and
- truck wheel wash facility.

As per Holcim's *Environmental Management Plan* (Corkery 2008), deposited dust levels will be monitored at five sensitive receiver locations on a monthly basis (refer to **Figure 5.14**).

Source: Holcim (2012), Google Earth (2011) and Queanbeyan City Council (2006)

0 0.5 1 1.75km
1:25 000

Legend
- Proposed Project Area
- Indicative Dwelling Location
- Existing Dust Deposition Gauges

FIGURE 5.14

Dust Monitoring Locations

5.9 Greenhouse Gases

The DGRs for the Project require a greenhouse gas assessment to be undertaken, including a quantitative assessment of the potential Scope 1, 2 and 3 emissions associated with the Project, a qualitative assessment of the impacts of these emissions on the environment and an assessment of reasonable and feasible measures to minimise greenhouse gas emissions and ensure energy efficiency. Umwelt has prepared a greenhouse gas assessment for the Project (refer to **Appendix 9**). This section provides a summary of the key findings of the greenhouse gas assessment.

5.9.1 Assessment Methodology

The greenhouse gas assessment framework is based on the methodologies and emission factors contained in the *National Greenhouse Accounts (NGA) Factors (2011).* The assessment framework also incorporates the principles of *The Greenhouse Gas Protocol*. *The Greenhouse Gas Protocol* (World Resources Institute/World Business Council Sustainable Development 2004) (The 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.

Energy consumption and greenhouse gas emissions were calculated based on forecast activity data for the duration of the Project. Activity data estimates were developed from quarry plans that may achieve a maximum extraction rate of 1.5 Mtpa.

5.9.2 Greenhouse Gas Emissions

At maximum production, the Project is forecast to contribute up to 7400 tonnes of carbon dioxide equivalent (t CO_2-e) per annum, including direct and indirect emissions, comprising the following:

- Scope 1 emissions – Predicted direct greenhouse gas emissions from the Project are forecast to be up to 3,600 t CO2-e per annum from stationary and transport fuel use.
- Scope 2 emissions – Predicted indirect greenhouse gas emissions from the Project are forecast to be up to 1,900 t CO2-e per annum from consuming electricity.
- Scope 3 emissions – Predicted indirect and downstream greenhouse gas emissions from the Project are forecast to be up to 1,900 t CO2-e per annum. Scope 3 emissions will result from energy extraction/transmission, out-sourced product transport and employee commuting.

These greenhouse gas emissions estimates are likely to overestimate the actual greenhouse gas emissions of the Project, as it is unlikely that Cooma Road Quarry will operate at the proposed maximum extraction rate of 1.5 Mtpa each year over the life of the Project.

5.9.3 Impact Assessment

The Project's annual greenhouse gas emissions are well below the National Greenhouse and Energy Reporting System (NGERS) reporting thresholds and relatively small when compared to other extractive industries.

The Project is forecast to generate up to 3,600 t CO_2-e Scope 1 emissions per annum by 2020. The Project's annual Scope 1 emissions are forecast to represent up to 0.00069 per cent of Australia's national emissions by 2020. The Project's Scope 2 and 3 emissions should not be considered against national objectives, as Scope 2 and 3 emissions will be reported by other sectors of the Australian economy.

To put the Project's emissions into perspective, it needs to be noted that global Scope 1 emissions are forecast to be approximately 46,000,000,000 t CO_2-e per year by 2020 (Sheehan *et at* 2008). During operation, the Project will contribute approximately 0.0000078 per cent to global emissions per annum.

An evaluation of the Project's greenhouse gas emissions found that the Project is unlikely to limit Australia meeting its national and international greenhouse gas targets. The Project in isolation is unlikely to have an impact on climate change.

5.9.4 Greenhouse Gas Management Commitments

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 address greenhouse gas emissions. 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 significantly reduce the greenhouse gas intensity of the Project. An on-going program to review and replace equipment to improve diesel use efficiency is both a reasonable and feasible greenhouse gas mitigation measure. In addition, Cooma Road Quarry will:

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

5.10 Noise and Blasting

The existing development consent and EPL for Cooma Road Quarry do not specify noise limits for the quarry. Noise from the quarry has not historically been a concern for the local community with no complaints regarding noise being received. As part of the community engagement program for the Project, three individuals identified noise as an issue of potential concern. Although noise impacts have not previously been an issue for the quarry, Holcim Australia recognised the need to undertake a detailed noise assessment for the Project and to implement feasible and reasonable management approaches based on contemporary noise targets.

A comprehensive noise impact assessment has been undertaken for the Project by Umwelt. A summary of the key findings of the assessment is included below, with the full assessment report included as **Appendix 10**.

The noise impact assessment was undertaken in accordance with the *NSW Industrial Noise Policy* (EPA 2000) and relevant OEH 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.

5.10.1 Existing Noise Environment

The existing background noise levels of the Project area and surrounds were established using continuous noise loggers over a period of one week in January 2012. In order to establish background noise levels, loggers were placed at three locations in Googong and Jerrabomberra considered representative of the residential receivers surrounding the Project area. The background noise monitoring locations are shown on **Figure 5.15**, as are the locations of the nearest potentially affected residential receivers.

Ambient noise levels surrounding the Project area are influenced by traffic noise from Old Cooma Road, aircraft flyover noise associated with Canberra Airport, bird noise and domestic noise sources. Location N1 (Googong) has the highest background noise level due to the influence of noise from Old Cooma Road. Location N3 (Jerrabomberra) to the west of the quarry had the lowest background noise level.

5.10.2 Noise Assessment Criteria

5.10.2.1 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. 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 5.12**.

Table 5.12 – Project-Specific Noise Levels (dBA)

Period	Receiver Location		
	N1 ($L_{Aeq,\ 15\ minute}$)	N2 ($L_{Aeq,\ 15\ minute}$)	N3 ($L_{Aeq,\ 15\ minute}$)
Day (7.00am–6.00pm)	44	37	35
Evening (6.00pm–10.00pm)	39	35	35
Night part operation (6.00am–7.00am)	43	40	35

Source: Holcim (2012), Google Earth (2011) and Queanbeyan City Council (2006)

0 0.5 1 1.25km
1:25 000

Legend
- Proposed Project Area
- Indicative Dwelling Location
- Noise Logger Location

FIGURE 5.15

Noise Receiver and Monitoring Locations

5.10.2.2 Sleep Disturbance Criteria

As the Project will continue to operate during the last hour of the night time period between 6.00 am and 7.00 am, it is relevant to consider the potential for sleep disturbance of surrounding residential receivers. Sleep disturbance criteria are established by the *Noise Guide for Local Government* (OEH 2010). To prevent sleep arousal, the $L_{A1,1minute}$ level of a noise source should not exceed the L_{A90} background noise level by more than 15 dB. The sleep disturbance criteria for the Project are summarised in **Table 5.13**.

Table 5.13 – Sleep Disturbance Criteria (dBA)

Sleep Disturbance Criteria	Receiver Location		
	N1	N2	N3
$L_{A1,1minute}$	53	50	45

5.10.2.3 Construction Noise Criteria

Criteria for construction noise are established by the *Interim Construction Noise Guideline* (DECCW 2009). The construction criteria states that the $L_{Aeq,15minute}$ noise level from construction activities should not exceed the RBL plus 10 dB.

The construction criteria relevant to the Project are outlined in **Table 5.14**.

Table 5.14 – Construction Noise Criteria

Construction Noise Criteria	Receiver Location		
	N1	N2	N3
$L_{Aeq,15minute}$	49	42	40

5.10.2.4 Road Traffic Noise Criteria

The *NSW Road Noise Policy* (DECCW 2011) sets noise criteria applicable to different road classifications and developments. The Project will generate additional traffic on the roads accessing the site. The relevant road traffic noise criteria for the Project are outlined in **Table 5.15**.

Table 5.15 – Road Traffic Noise Criteria

Type of Development	Criteria	
	Day (7.00 am–10.00 pm) dB(A)	Night (10.00 pm–7.00 am) dB(A)
3. Existing residences affected by additional traffic on existing freeways/arterial/sub arterial roads generated by land use developments	$L_{Aeq(15hr)}$ 60 (external)	$L_{Aeq(15hr)}$ 55 (external)

Where the criteria in **Table 5.15** are not achievable through feasible and reasonable mitigation measures, Section 3.41 of the *NSW Road Noise Policy* (DECCW 2011) gives further guidance stating: ‘any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

5.10.2.5 Blasting Emissions Criteria

The OEH has established guidelines for blasting based on the impacts on human comfort levels. These guidelines are adapted from the *ANZECC guideline 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 5.16**.

Table 5.16 – Blasting Criteria for Residential Receivers

Blasting Impact	Recommended 95th Percentile Maximum Level1	Maximum Level
Airblast (dB Linear Peak)[1]	115	120
Ground Vibration (mm/s)[2]	5	10

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

Note 2: It is recommended that a level of 2mm/s be considered as a long term regulatory goal.

5.10.3 Noise Impact Assessment

Cooma Road Quarry is an existing operation with no established noise limits under its existing development consent or EPL. Section 10 of the INP (EPA 2000) establishes a process for reducing noise levels from existing operations to acceptable levels over time by setting achievable noise target and applying feasible and reasonable control measures. Holcim Australia acknowledges that while the site has not historically been the subject of noise complaints from the community, the Project provides an opportunity to implement feasible and reasonable control measures. Holcim Australia has therefore committed to implementation of a range of structural and operational noise management measures to improve the environmental performance of the existing quarry and proposed Project. These controls have been factored into the noise modelling for Project and include:

- the attenuation of the primary crushing plant from a sound power level of 120 dB(A) to approximately 112 dB(A);
- the management of loaders and road haulage trucks to minimise the number of machines running in exposed locations at any one point in time;
- the management of the layout of the stockpiles and work areas to minimise the number of machines running in exposed locations;
- the management of stockpiles to act as barriers between working machines and potential receiver areas (applicable to potential exposed areas higher within the quarry and product area);
- not running the secondary crushing plant during the evenings (between 6.00 pm and 10.00 pm) if potentially adverse weather conditions aid in the propagation of noise to the receiver areas; and
- the construction of an earth-berm situated along the eastern extent of the proposed infrastructure area.

Noise impacts from the Project were modelled using computer based noise modelling software, the Environmental Noise Model (ENM). The ENM noise models were based on an inventory of plant and equipment to be used by the Project, a digital terrain map of the region and atmospheric conditions. The model was conservatively based on both calm and adverse weather conditions which favour the propagation of noise.

5.10.3.1 Operational Noise Impacts

Two operational scenarios were modelled for the Project to represent the different stages of extraction:

- a 'shallow extraction' scenario, considered to be the worst case scenario, with the quarry operating at maximum production capacity and extraction occurring at a shallow depth within the proposed quarry extension area; and

- a 'deep extraction' scenario, with the quarry operating at maximum production capacity and extraction occurring deeper within the proposed quarry extension area.

Modelling results indicate that under worst case operational and meteorological conditions, with the implementation of the noise management measures outlined above, the Project is predicted to result in an exceedance of the PSNLs at one privately owned residence located to the south east of the Project area (N67) of up to 4dB during the day time period (refer to **Figure 5.15**). If the secondary crushing plant were to be operated during the evening under worst case meteorological conditions, this same residence could be expected to experience exceedances of up to 3dB during the evening period. Holcim has however committed not to operate the secondary crushing plant under such conditions, namely gradient winds from the north east, thereby avoiding this potential impact.

Under calm or neutral conditions, modelling indicates that a minor exceedance of 1dB could be expected at three privately owned residences in Googong (N09, N12 and N35) during the day time period (refer to **Figure 5.15**). No exceedances are predicted during the evening or early morning (6.00am to 7.00am) period under these conditions.

Without implementation of the noise management measures committed to by Holcim Australia as part of the Project, exceedance of the PSNLs of up to 6dB could be expected at five privately owned residences. These controls will reduce the level of noise currently being experienced by the surrounding residences from the existing quarry operations.

5.10.3.2 Sleep Disturbance Impacts

Activities undertaken during the early morning (6.00 am to 7.00 am) period with the potential to cause sleep disturbance include reversing beepers, trucks on the weighbridge and loaders operating around the crusher and stockpile area. An assessment of noise levels associated with these activities found they comply with the OEH sleep disturbance criteria and are therefore unlikely to lead to sleep disturbance.

5.10.3.3 Construction Noise Impacts

The predicted worst case construction noise levels associated with the Project were modelled and are predicted to comply with the OEH's construction noise criteria.

5.10.3.4 Road Traffic Noise Impacts

The predicted increase in road traffic noise impacts due to the Project, based on the projected additional traffic volumes associated with the Project are presented in **Table 5.17**.

Table 5.17 – Predicted Weekday Day Time $L_{Aeq,1hour}$ Noise Levels, dB(A)

Residence Setback Distance (m)	Old Cooma Road North of the Project, South of West Avenue			Old Cooma Road North of the Project			Old Cooma Road South of the Project		
	Pre	Post	Increase	Pre	Post	Increase	Pre	Post	Increase
25	62.2	62.4	0.2	58.9	59.5	0.6	56.9	57.0	0.1
50	55.3	55.5	0.2	52.4	53.1	0.7	49.6	49.7	0.1
100	50.4	50.7	0.3	47.8	48.5	0.7	44.6	44.7	0.1

The results presented in **Table 5.17** indicate the predicted increase in two way traffic volumes due to the Project along Old Cooma Road would not result in current road traffic noise levels exceeding the *NSW Road Noise Policy* (DECCW 2011) criteria presented in **Table 5.15**.

On Old Cooma Road north of the Project, south of West Avenue the noise levels are predicted to be above the criteria of 60dB (refer to **Table 5.15**) at a setback distance of 25 metres. The predicted noise levels are not associated with traffic generated by the Project.

The predicted increase in traffic noise levels from vehicle movements associated with the Project are predicted to lead to insignificant increases in existing road traffic noise levels along Old Cooma Road. That is, the predicted increase in the road traffic noise level is less than the maximum increase of 2 dB recommended in Section 3.41 of the *NSW Road Noise Policy* (DECCW 2011).

It is noted however, that with the planned realignment of Old Cooma Road by Queanbeyan City Council, future traffic noise levels were predicted as part of the assessment undertaken for the road realignment, to exceed road traffic noise goals along Old Cooma Road. Appropriate noise mitigation works are proposed as part of the realignment and duplication works to address these predicted exceedances.

5.10.3.5 Blasting Impacts

An assessment of the vibration and airblast impacts of blasting on sensitive residential receivers was undertaken for the Project based on historical maximum blast charges used at 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.

As discussed in **Section 5.7**, blasting impacts on the locally-listed Moses Morley's Lime Kiln site will be managed so that it is not subjected to peak particle velocity vibration levels in excess of those currently experienced at the kiln site.

5.10.4 Management and Monitoring

As discussed in **Section 5.10.3**, a range of structural and operational noise management measures are proposed to be implemented as part of the Project to minimise the noise impacts associated with the existing and proposed operations.

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. The Plan will outline the feasible and reasonable noise management measures to be investigated as a part of the proposed Operational Noise and Vibration Review for the Project, and noise and vibration monitoring program that will confirm the operational noise levels and performance of the proposed mitigation measures in accordance with the target project-specific noise criteria for the Project.

Within 24 months of the date of consent, Holcim Australia will undertake an Operational Noise and Vibration Review to confirm the noise and vibration control measures being implemented for the Project. The review will seek to confirm the predicted operational noise levels, evaluate all feasible and reasonable noise and vibration mitigation measures and identify any further specific mitigation measures if necessary.

On an annual basis, Holcim Australia will undertake compliance noise and vibration monitoring to confirm the operational noise levels of the Project. The noise monitoring will be based around an attended monitoring program that:

- measures $L_{A90,15\ minute}$ and $L_{Aeq,15\ minute}$ ambient noise levels;
- measures and/or calculates the contributed noise level from the operation;
- measures other statistical noise levels representative of the noise environment including the maximum and minimum noise levels measured during the interval; and
- records weather conditions at the monitoring site.

Further targeted monitoring will be undertaken should any complaints be received by Holcim Australia during the life of the Project.

It is noted that impacts to Holcim Australia owned land and leased properties have not been included in this assessment as Holcim Australia has management control of this land. Holcim Australia intends to continue to hold leases over this land for the operational life of the quarry. In the event that a current lease arrangement concludes for any reason during the life of the quarry operations, Holcim Australia, will aim to negotiate a private agreement with the owners of these properties. If a private agreement cannot be reached, Holcim Australia will consult with DP&I on potential impacts and management requirements for this land.

5.11 Traffic and Transport

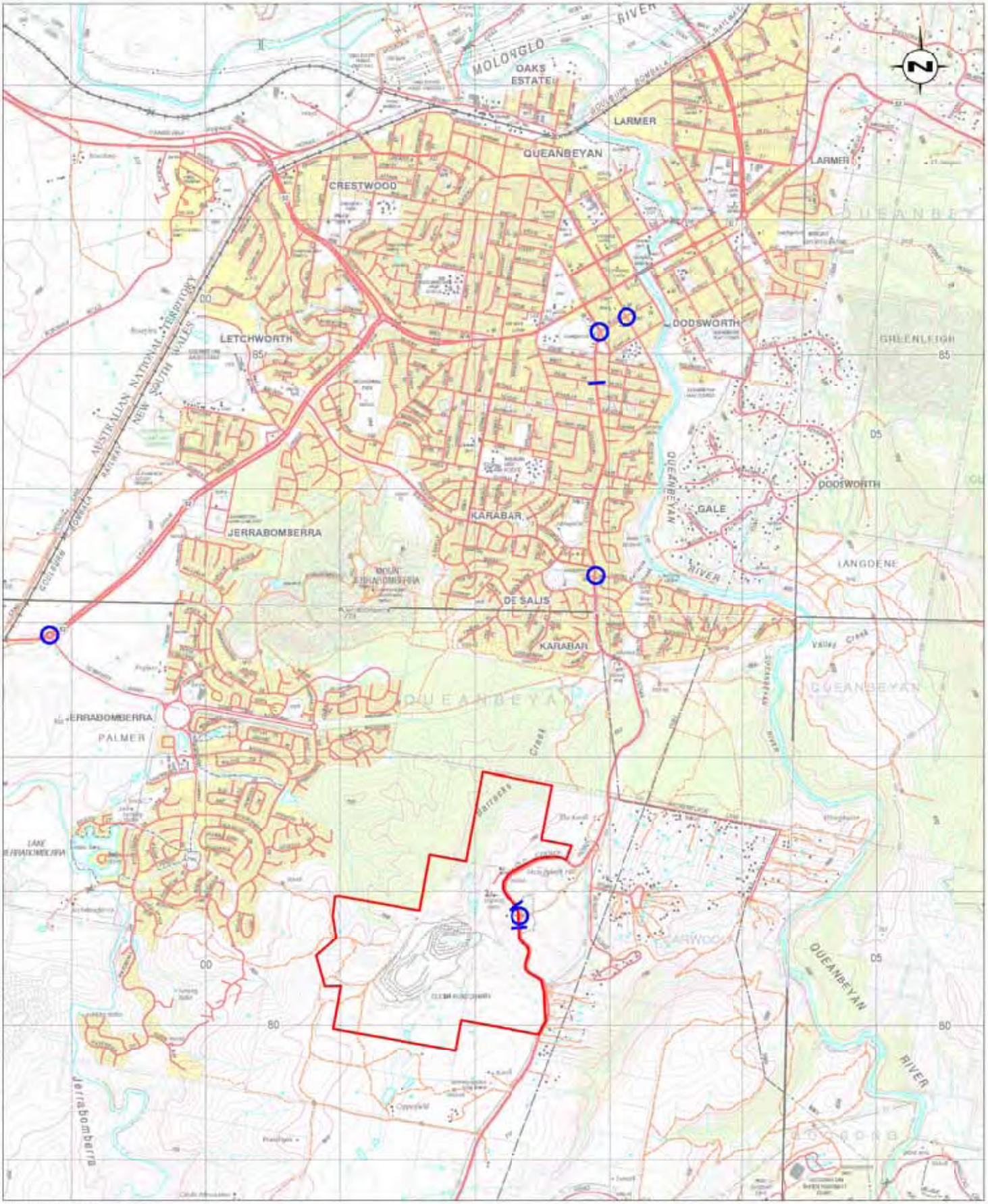
An assessment of the potential impacts of the Project on the capacity, efficiency and safety of the local road network has been completed by Transport and Urban Planning. A copy of the assessment is included as **Appendix 11** and a summary of the key findings is provided below.

5.11.1 Existing Traffic Conditions

The principal road network and transport routes that services Cooma Road Quarry are shown on **Figure 5.16** and include:

- Old Cooma Road (north of the Quarry)/Cooma Street/Lowe Street (MR 584) and Rutledge Street/Crawford Street;
- Southbar Road (from Cooma Road) and Lanyon Drive (MR 52);
- Old Cooma Road (MR 584) south of the quarry (occasional route only); and
- Kings Highway (MR51).

Cooma Road Quarry will continue to utilise existing haulage routes on major roads with capacity for current and proposed operations. These main haulage routes include Old Cooma Road, Cooma Street, Lowe Street, Rutledge Street, Crawford Street, Southbar Road, Lanyon Drive and Kings Highway.



Legend

- Proposed Project Area
- Daily Volume and Vehicle Classification Count
- Weekday AM Peak Hour Count

FIGURE 5.16

Traffic Network and Traffic Count Locations

Currently some 75 per cent of quarry product is transported by Holcim Australia to its concrete batching plants or other customers and the remaining 25 per cent of the quarry product are ex bin sales. Approximately 90 per cent of product is transported towards the ACT (Canberra) area and the remaining 10 per cent towards Bungendore/NSW south coast area. This is not expected to change significantly over the 20 years of the Project. The highest traffic generation from the quarry occurs during the morning period between 6.00am and midday.

Based on traffic counts undertaken during March 2012 and peak traffic generation associated with existing maximum production levels of 1 Mtpa, the existing average traffic generation of the quarry is:

- 130 two way light vehicle movements per day based on 65 inbound trips/65 outbound trips, including employee trips, visitors and some ex bin sales in small vehicles; and
- 224 two way heavy vehicle movements (truck and dog trailers and semi trailers) based on 112 inbound trips/112 outbound trips.

The existing average hourly traffic generation for the quarry is:

- 20 heavy vehicle movements (10 truck loads) during an average hour; and
- 32 heavy vehicle movements (16 truck loads) during a busy hour.

5.11.2 Planned Road Network Changes

Queanbeyan City Council has identified and adopted plans for a number of road network improvements to cater for the future traffic growth on the local road network. These road network changes are presented in a Gabites Porter (2008) traffic study and include:

- the realignment and upgrade of Old Cooma Road in two stages, resulting in a four lane dual carriageway linking Queanbeyan and the new township of Googong. Construction of Stage 1, being a 1.5 kilometre realignment of Old Cooma Road, is scheduled to commence in mid 2012;
- the extension of Edwin Land Parkway (currently under construction and expected to open in mid 2012) involving a new two lane single carriageway road which will link Jerrabomberra to Old Cooma Road at Karabar; and
- the extension of Ellerton Drive (currently no date for construction) involving a proposed link from Ellerton Drive to the new Edwin Land Parkway intersection at Old Cooma Road, comprising a two lane road, with provisions for cyclists.

As part of Stage 1 works for the realignment of Old Cooma Road, a new intersection will be provided for the quarry access approximately 200 metres south of the existing Tempe Crescent/Old Cooma Road intersection. Current draft intersection plans show a T junction intersection incorporating:

- left turn deceleration lane into the Quarry Access Road and left turn acceleration lane out of the Quarry Access Road in Old Cooma Road;
- right turn bay in Old Cooma Road for the right turn;
- one northbound through lane and 2 southbound through lanes in Old Cooma Road; and
- a single lane approach and a departure lane in the Quarry Access Road.

It is expected that the design will be in accordance with current Austroad standards with regard to auxiliary lane lengths and merge distances, as well as sight distance for traffic turning into and out of the Quarry Access Road.

5.11.3 Road Safety

Road crash statistics were provided by the Roads and Maritime Services (RMS) for sections of the road network adjacent to Cooma Road Quarry for the 3 year period from 1 October 2008 to 30 September 2011. An assessment of these crash statistics for the 3 year period found that:

- there were no crashes at the intersection of Cooma Road Quarry Vehicle Access Road/Old Cooma Road;
- the majority (nearly all) of the crashes across the road network involved light vehicles. Heavy (truck) vehicles were involved in a very small number of crashes; and
- the proposed realignment of Old Cooma Road between Edwin Land Parkway and Googong Road should address the adverse crash history in this section of Old Cooma Road.

5.11.4 Road Transport Impacts of the Project

5.11.4.1 Traffic Generation of Project

The Project seeks approval to increase maximum production from 1 Mtpa to 1.5 Mtpa. Proposed increases in production and staffing levels associated with the Project will result in increased traffic generation. It is projected that the increase to peak production will generate an additional 110 haulage vehicle movements (55 truck loads) per day and an additional 30 light vehicle movements per day. A summary of the total future traffic volumes generated by Cooma Road Quarry, with the Project, is provided in **Table 5.18**.

Table 5.18 – Predicted Average Daily Traffic Volumes

	Existing Volumes (vehicle movements per day – 2 way trips)	Future Peak Volumes (vehicle movements per day – 2 way trips)	Increase
Haulage vehicles	224	334	110
Service and Passenger vehicles	130	160	30
Total	**354**	**494**	**140**

There will be no increase in heavy truck trips due to the addition of a mobile pug mill or concrete recycling operation, as neither of these would result in any separate additional traffic generation. Concrete for recycling will typically be delivered as part of the return trip from haulage vehicles making deliveries to Holcim Australia batching plants and the pug mill allows variation to quarry products which have been factored into production estimates. Total truck movements will be managed so that truck movements associated with bringing quarry materials to the site for processing, stockpiling and sale do not increase total truck movements beyond those resulting from transport of 1.5 Mtpa product.

Average hourly haulage vehicle movements due to the Project are also predicted to increase in an average hour from 20 haulage vehicle movements (10 truck loads) per hour to 28 haulage vehicle movements (14 truck loads) per hour, and during a busy hour from 32 haulage vehicle movements (16 truck loads) per hour to 48 haulage vehicle movements (24 truck loads) per hour.

5.11.4.2 Road Network Impacts of Project

The assessment of the traffic impacts of the Project on the local road network has been undertaken for the year 2013 when it is assumed that Stage 1 of the Old Cooma Road realignment and the Edwin Land Parkway Extension would be completed.

A summary of predicted future traffic volumes with the addition of the Project is provided in **Table 5.19**.

Table 5.19 – Future Weekday Two Way Traffic Volumes

Location	Existing Traffic Volume	Project Additional Volume	Future Traffic Volume (with Project)
	Light Vehicles (heavy vehicles)	Light Vehicles (heavy vehicles)	Light Vehicles (heavy vehicles)
Old Cooma Rd (south of Quarry)	2,628 (208)	0 (4)	2,628 (212)
Old Cooma Rd (north of Quarry)	2,749 (564)	30 (106)	2,779 (670)
Cooma St (south of West St)	13,552 (894)	18 (72)	13,570 (966)

The Project is predicted to generate an additional 110 heavy vehicle movements per day, of which, approximately 106 vehicles would be expected to travel north along Old Cooma Road and 4 would be expected to travel south along Old Cooma Road. This represents an increase in heavy vehicle movements, as a proportion of total traffic, on these sections of Old Cooma Road of less than 2.4 per cent. This increase is expected to be readily accommodated by the existing road network.

A summary of predicted future peak hour traffic volumes with the addition of the Project is provided in **Table 5.20**.

Table 5.20 – Morning Peak hour Two Way Traffic Volumes

Location	Existing Traffic Volume	Project Additional Volume	Future Traffic Volume (with Project)
	Light Vehicles (heavy vehicles)	Light Vehicles (heavy vehicles)	Light Vehicles (heavy vehicles)
Old Cooma Rd (north of Quarry)	302 (33)	3 (16)	305 (49)
Cooma Street (south of Southbar Rd)	883 (39)	2 (10)	885 (49)
Cooma Street (north of Southbar Rd)	718 (31)	2 (10)	720 (41)
Cooma St (south of Lowe St)	702 (22)	2 (10)	704 (32)
Lowe St (south of Kings Highway)	299 (4)	1 (4)	300 (8)
Rutledge St (east of Lowe St)	435 (18)	1 (6)	436 (24)
Crawford St (south of Kings Highway)	328 (19)	1 (6)	329 (25)

The additional traffic from the Project during the morning peak hour will be relatively small with heavy vehicle movements, as a proportion of total traffic, predicted to increase by between 1.1 per cent and 3.9 per cent at local intersections. This increase is expected to be readily accommodated by the existing road network.

5.11.4.3 Impacts on Road Intersections

To examine the impacts of the additional traffic from the Project on the operational performance of local intersections, traffic modelling was undertaken for a busy morning peak hour using SIDRA software.

The intersections modelled include:

- Quarry Access Road/realigned Old Cooma Road, for both a normal operating scenario where 90 per cent of vehicles turn north onto Old Cooma Road and for a potential operating scenario where 50 per cent of vehicles turn south onto Old Cooma Road to account for traffic movements during construction of the new town of Googong;
- Cooma Street/Southbar Road – Traffic Signal Control;
- Cooma Street/Lowe Street/Rutledge Street – Roundabout Control; and
- Rutledge Street/Crawford Street – Roundabout Control.

SIDRA analysis indicates that with the addition of the Project, the Quarry Access Road intersection will operate at a good to very good level of service for both the normal and potential maximum operating scenario. All other local intersections modelled will continue to operate at a good level of service with minimal to no change in operating conditions as a result of the additional traffic from the Project.

5.11.5 Construction Traffic Impacts

The construction period for the Project is expected to be undertaken in 2 stages. Construction of the surface water management system components are scheduled to take place between 2013 and 2014. Between 2018 and 2020, the quarry's infrastructure area is to be relocated. The construction impacts are not expected to be significant and in terms of the combined traffic generation for the quarry (i.e. construction traffic plus operational traffic) would not exceed the traffic generation of the operational phase of the Project for any day, or hour of the day. Holcim Australia will accommodate any construction traffic within proposed maximum heavy vehicle traffic movements by altering operational traffic movements where necessary.

Some co-ordination will be required with Queanbeyan City Council concerning the vehicle access to the quarry during the construction of the new Quarry Access Road/realigned Old Cooma Road intersection.

5.11.6 Conclusion

The impact of increased traffic associated with the Project on the local road network is expected to be satisfactory. On the wider network, the increase in traffic as a result of the Project will comprise a very small proportion of total traffic and will be dispersed over a number of routes, resulting in relatively small increase in the overall traffic levels on these roads and intersections. When compared to existing conditions, there is minimal to no change in operating conditions of local intersections due to the additional traffic from the Project.

Most importantly the Project is not expected to have a negative impact on road safety. The assessment of recent crash history for the local road network does not indicate that heavy vehicles are over-represented in crash statistics. Furthermore, to improve accessibility and safety for pedestrians and cyclists within the road network, current and future road upgrades aim to incorporate various strategies such as shared bicycle and pedestrian paths, wide sealed shoulders that can be used by cyclists and pedestrian/cyclist refuges where practicable.

The road upgrades, including the realignment of Old Cooma Road (Stages 1 and 2) and the extension of Edwin Land Parkway, as well as the future Ellerton Drive extension and the proposed intersection upgrades will assist in managing/addressing future road safety issues associated with the overall future traffic growth on the road network, including the relatively small increase in traffic volumes due to the Project.

5.12 Visual

5.12.1 Existing Visual Amenity

The Project area is located in a predominantly rural setting, comprising of cleared hillsides to the south and east, with relatively higher, vegetated areas to the north and west. The rural landscape to the south and east has been largely cleared of vegetation to allow for grazing activities, with pockets of scattered remnant vegetation remaining. The cleared land and remnant vegetation surrounding the Project area is considered to provide views of moderate to high scenic quality. The varying scenic quality of the area is generally dependent on elevation and surrounding land uses.

Views from the elevated Talpa Heights community located to the east would generally be considered of high scenic quality. Views from these areas are generally characterised by the undulating terrain with distant views of the heavily vegetated areas west of the quarry, including Black Mountain, which forms part of the Canberra Nature Park. Closer views are predominantly characterised by cleared grazing land.

The rural-residential area of Googong north east of the quarry generally has moderate scenic quality. These areas have lower elevations and views are generally restricted to surrounding properties with some filtered views of surrounding undulating hills. Long distant views are generally restricted due to topography and existing vegetation.

The elevated residential areas of eastern Jerrabomberra have variable scenic quality, with, the undulating terrain providing views of moderate to high scenic quality predominantly to the north, west and south from some locations. Views to the east and south east, towards the quarry, are generally shielded due to topography.

Views of the existing quarry infrastructure are possible from sections of Old Cooma Road and elevated areas to the east of the Project area from Talpa Heights. The upper benches of the existing quarry pit have some limited visibility from sections of Old Cooma Road and Talpa Heights, however, these are generally obstructed by existing vegetation and favourable topography. The quarry represents the only industrial land use visible within the local landscape and while well screened with vegetation, is in clear contrast to the surrounding rural landscape.

5.12.2 Visibility of the Project

The key elements of the Project that have the potential to be visible from public viewing locations, including private residences, are the existing infrastructure area, the proposed infrastructure area to the north of the existing administration building and the proposed quarry extension area. Limited views of the existing overburden emplacement areas are also available. There are no proposed changes to the location or height of the previously approved overburden emplacement areas.

Views of the existing infrastructure area are available from Old Cooma Road and from elevated locations to the east of the quarry, including Talpa Heights. Views from Old Cooma Road are confined to short sections adjacent to the quarry entry, with views generally filtered by existing roadside vegetation. The elevated Talpa Heights area to the east of the quarry has obstructed views of the existing administration building. These views are from a distance of approximately 1 kilometre and filtered by existing vegetation.

Views of the proposed infrastructure area will be possible from Old Cooma Road and from elevated locations east of the quarry, including Talpa Heights. Views of the proposed infrastructure area from Talpa Heights will be similarly distant to existing views of the quarry administration building and partially obstructed by existing vegetation and topography.

An assessment of surrounding topography indicates that views of the proposed quarry extension area would only be available from limited sections of Old Cooma Road. This section of Old Cooma Road is scheduled to be realigned by Queanbeyan City Council, with construction of the realignment due to commence in 2012. The realignment will result in Old Cooma Road being situated further to the east of Cooma Road Quarry, generally along the alignment of Heights Road. The existing section of Old Cooma Road will remain to provide access to the quarry and land leased by Holcim Australia, however no other private properties are accessed from this section of Old Cooma Road.

5.12.3 Viewing Points and Assessment Methodology

A detailed visual assessment was undertaken for the Project to identify surrounding locations from which views of the Project may be possible and identify necessary mitigation measures.

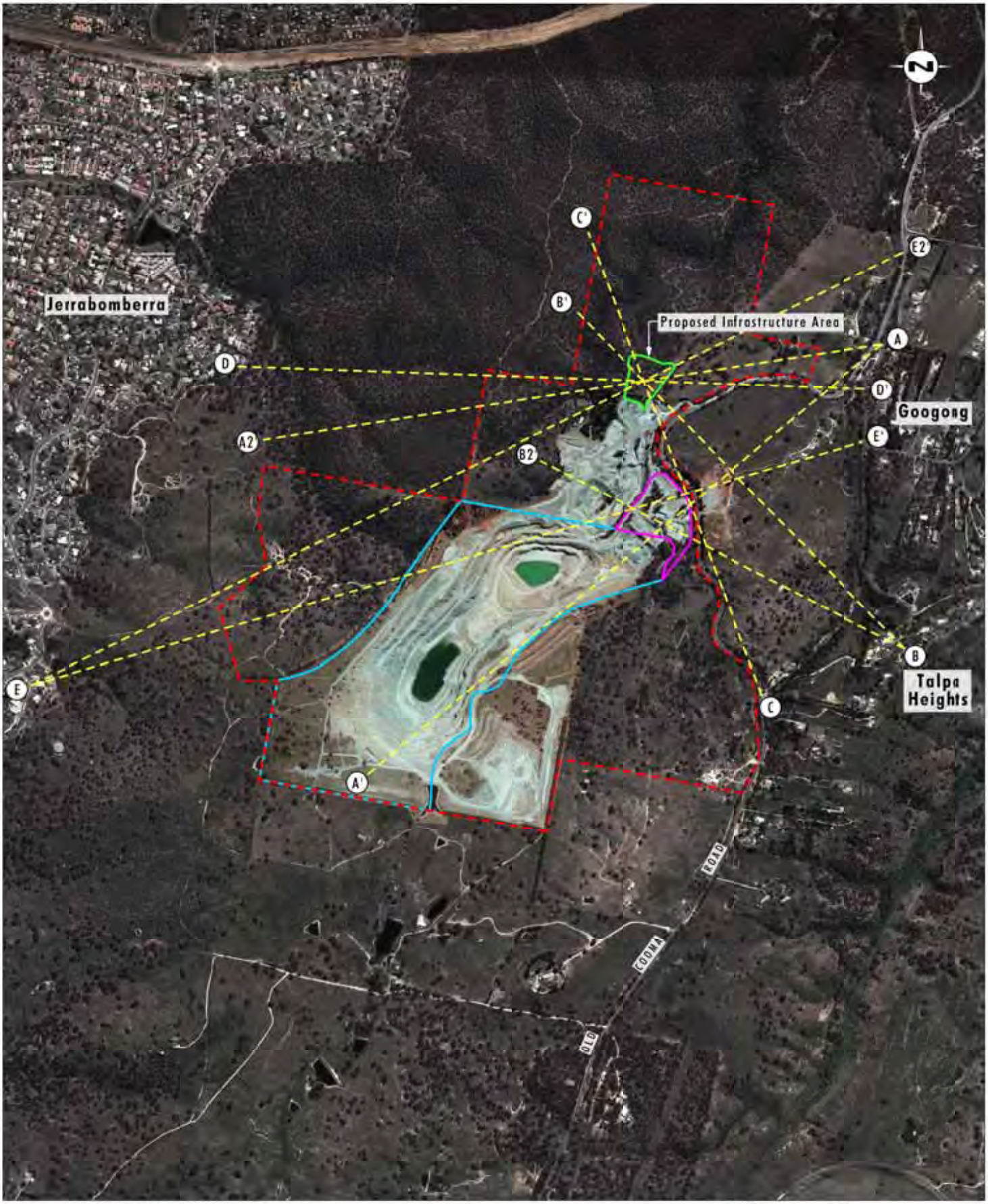
A radial topographic analysis technique was used to identify areas potentially visible from the Project area, based on ground topography alone (i.e. no allowance was made for existing vegetation). The analysis was completed using the final stage landform as this was considered to be representative of the worst-case for viewing locations. The model indicated that views of the quarry are limited due to the topography of the area.

Views of the new infrastructure area were most likely from the east of the Project area, while views of the pit were limited to short sections along Old Cooma Road.

The following locations, shown on **Figure 5.17**, were chosen for more detailed transect analysis:

- assessment point A, being at the intersection of Old Cooma Road and Tempe Crescent, located approximately 600 metres to the north east of the Project area (refer to **Figure 5.18**);

- assessment point B, an elevated private residence in Talpa Heights, approximately 1 kilometre east of the Project area (refer to **Figure 5.19**);



Source: Holcim (2012), Google Earth (2011)

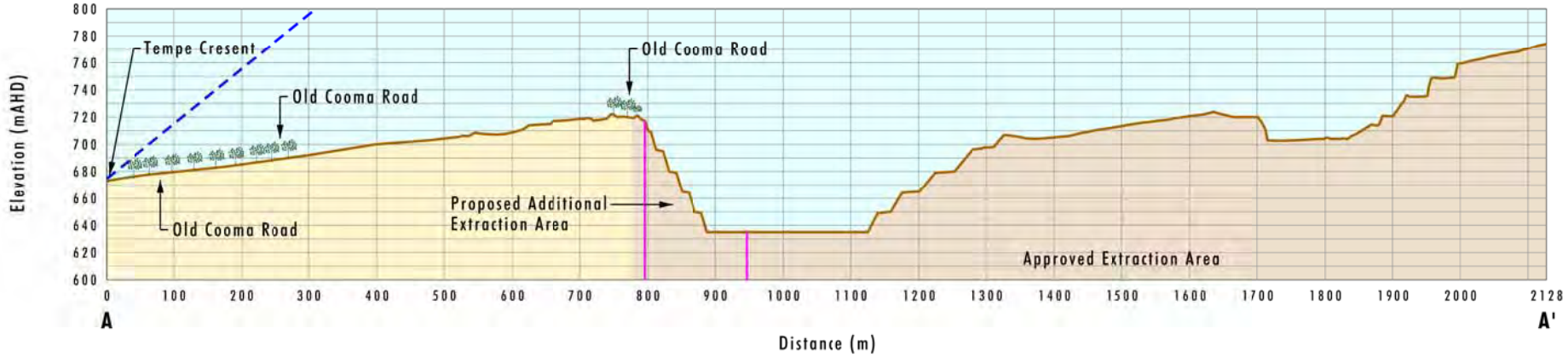
0 100 300 400m
1:17 000

Legend

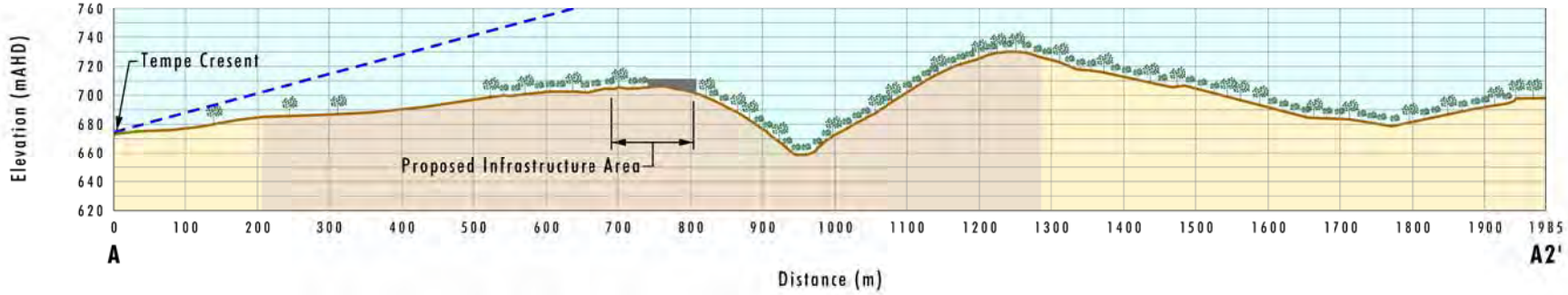
- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Approved Disturbance Area - Workshop
- Transect Location

FIGURE 5.17

Visual Transect Locations



Transect A-A'



Transect A-A2'

Legend

- Landform
- Line of Sight
- Proposed Project Area
- Existing Trees

Note: Vertical Exaggeration 2:1
Source: Holcim and LPI

0 100 200 400m
Horizontal Scale 1:10 000

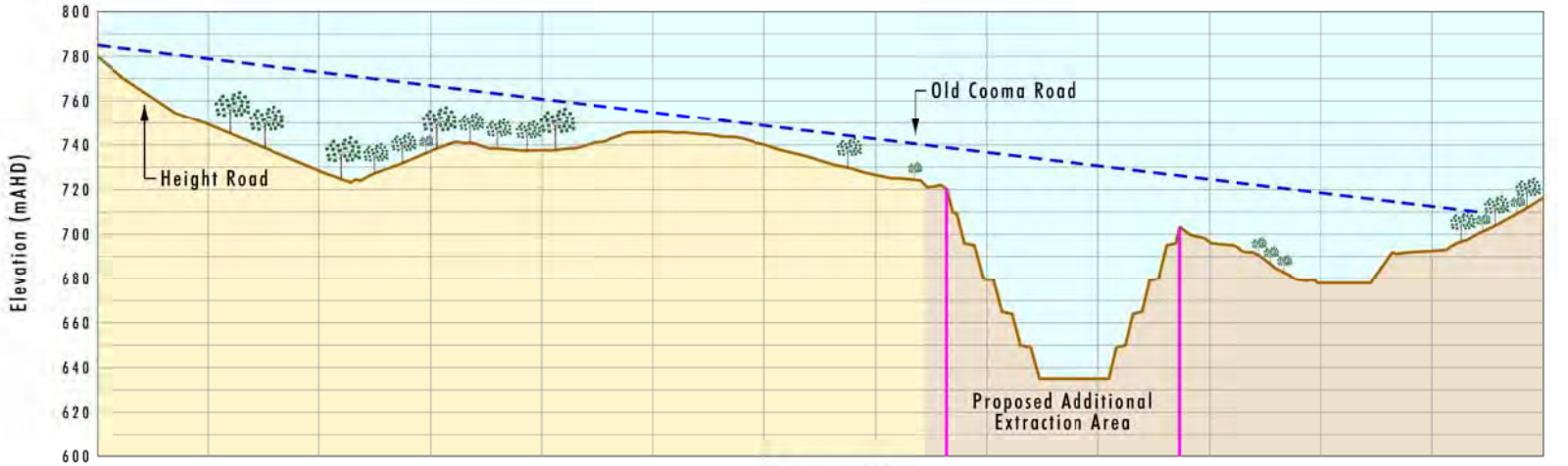
0 50 100 200m
Vertical Scale 1:5 000

File Name (A4): R01/2992_078.dgn
20121029 16.28

FIGURE 5.18

Visual Transect A-A' and A-A2
Tempe Crescent, Googong

Transect B-B'



Transect B-B2'

Legend

- Landform
- Line of Sight
- Proposed Project Area
- Existing Trees

Note: Vertical Exaggeration 2:1

Source: Holcim and LPI

0 100 200 300m
Horizontal Scale 1:7 000

0 50 100 150m
Vertical Scale 1:3 500

FIGURE 5.19

Visual Transect B-B' and B-B2
Mol Crecent, Googong (Talpa Heights)

File Name (A4): R01/2992_079.dgn
20121029 16.29

- assessment point C, being at the southern intersection of the existing Old Cooma Road and proposed realignment, 600 metres to the south east of the Project area (refer to **Figure 5.20**);

- assessment point D, a private residence in the suburb of Jerrabomberra, located approximately 1.5 kilometres to the west of the Project area (refer to **Figure 5.21**); and

- assessment point E, an elevated private residence in the suburb of Jerrabomberra, located approximately 2 kilometres to the south west of the Project area (refer to **Figure 5.22**).

The transect analysis was completed based on the topographic model of the final stage quarry landform taking into account existing vegetation. View lines from the identified assessment points were used to illustrate the extent of visibility of the Project, with intervening vegetation providing a filtering or complete blocking of these views.

A photo montage was also created from assessment point B to demonstrate the visual impact that the Project may have and provide a comparison to existing views (refer to **Figure 5.23**). This point was selected based on the sensitivity of the viewing location, proximity to the proposed Project area and potential extent of visual impact.

As the Project does not proposed to change the approved location or height of the overburden emplacement areas, no further visual assessment has been undertaken for the overburden areas.

5.12.4 Visual Impact Assessment

A detailed description of the visual impacts for each assessment point is provided below.

5.12.4.1 Assessment Point A-A[1] and A-A2[1]

Views of the proposed infrastructure area may be visible from assessment point A, although they would be significantly obscured by vegetation, as shown in **Figure 5.17**. The potential views from assessment point A would be from a distance greater than 0.5 kilometre and not dissimilar to the existing infrastructure area that is currently visible from this location. Views would also primarily be from vehicles and will therefore be short term.

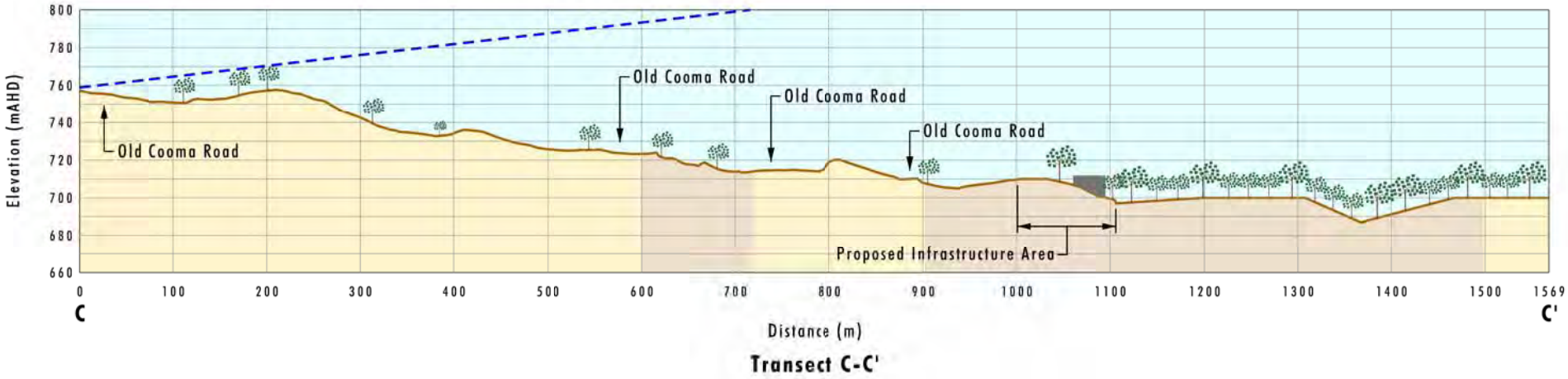
Due to the relative elevation of the topography surrounding the site, the proposed quarry extension area will not be visible from this assessment point, as shown in **Figure 5.17**.

5.12.4.2 Assessment Point B-B[1] and B-B2[1]

Assessment point B is representative of the elevated land to the east of the Project area, known as Talpa Heights. This area has high scenic quality and the greatest potential for views of the Project area.

Filtered views of the existing site office and administration building are currently available from this location. As shown on **Figure 5.18**, filtered views of the proposed infrastructure area will also be possible from Talpa Heights. This will include views of buildings, vehicle parking and laydown areas. Holcim Australia proposes to establish additional tree screening along a constructed bund adjacent to the proposed infrastructure area to further screen these views (refer to **Figure 5.18**).

Views of the proposed quarry extension area from assessment point B will not be possible, with shielding provided by topography and existing vegetation (refer to **Figure 5.18**).



Transect C-C'

Legend

- Landform
- Line of Sight
- Proposed Project Area
- Existing Trees

Note: Vertical Exaggeration 2:1

0 100 200 300m
Horizontal Scale 1:7 000

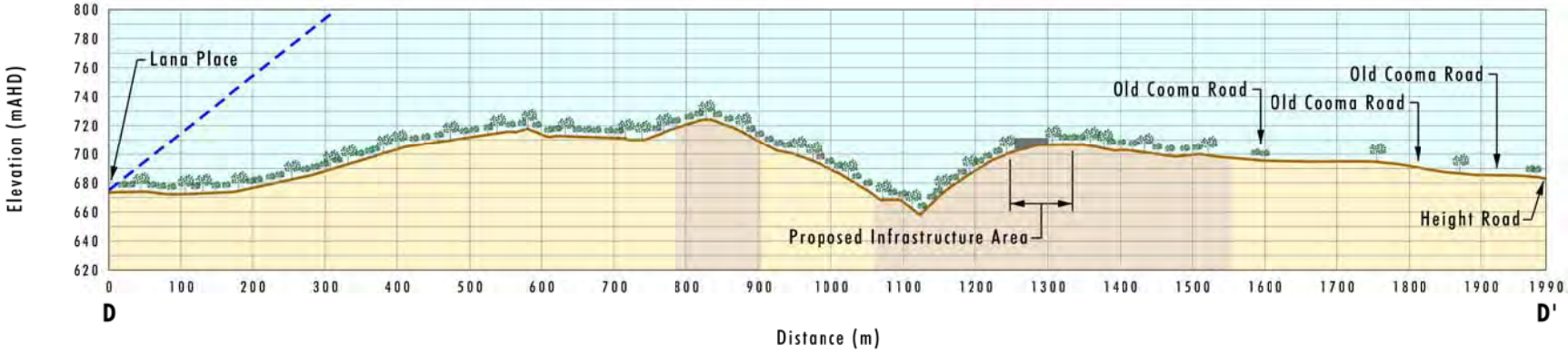
0 50 100 150m
Vertical Scale 1:3 500

Source: Holcim and LPI

File Name (A4): R01/2992_080.dgn
20121029 16.30

FIGURE 5.20

Visual Transect C-C'
Old Cooma Road, Googong



Transect D-D'

Legend

- Landform
- Line of Sight
- Proposed Project Area
- Existing Trees

Note: Vertical Exaggeration 2:1
Source: Holcim and LPI

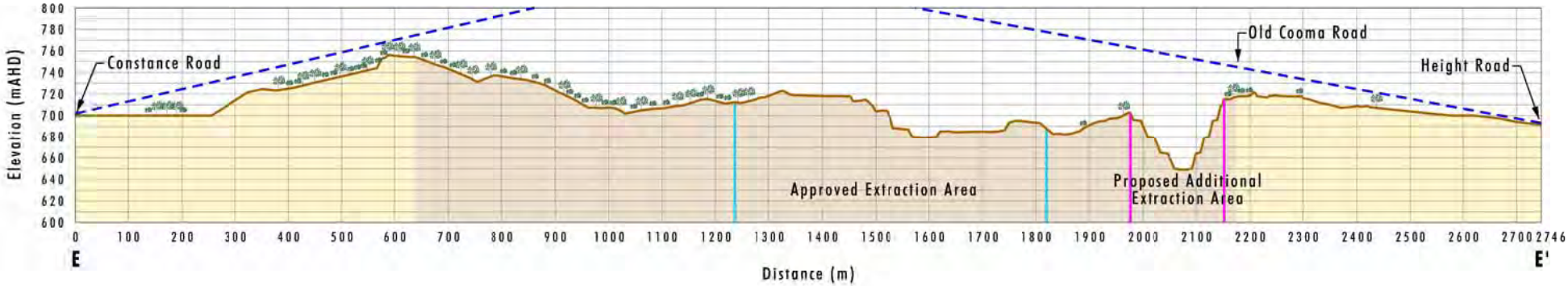
0 100 200 400m
Horizontal Scale 1:10 000

0 50 100 200m
Vertical Scale 1:5 000

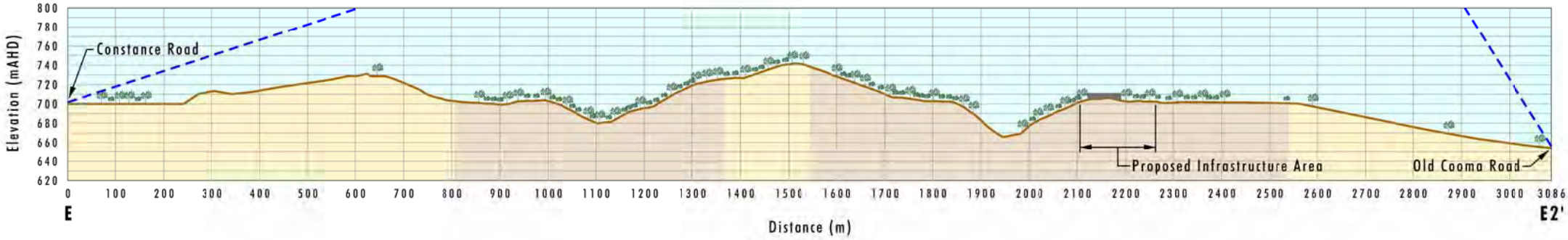
FIGURE 5.21

Visual Transect D-D'
Lana Place, Jerrabomberra

File Name (A4): R01/2992_081.dgn
20121029 16.31



Transect E-E'



Transect E-E2'

Legend

- Landform
- Line of Sight
- Proposed Project Area
- Existing Trees

Note: Vertical Exaggeration 2:1
Source: Holcim and LPI

0 200 400 600m
Horizontal Scale 1:12 000

0 100 200 300m
Vertical Scale 1:6 000

FIGURE 5.22

Visual Transect E-E' and E-E2'
Constance Road, Jerrabomberra

File Name (A4): R01/2992_082.dgn
20120815 10.03

Before - Existing view towards Cooma Road Quarry

After - View of Proposed Infrastructure Area

View of Proposed Infrastructure Area with Tree Screening

FIGURE 5.23

Photomontage - Private Residence B
facing north-west towards
Cooma Road Quarry

Figure 5.23 provides a montage of the view from this property before and after the Project to give a thorough understanding of the level of visual impact at this location. **Figure 5.23** also provides a view of the additional tree screening proposed to mitigate views of the proposed infrastructure area.

5.12.4.3 Assessment Point C-C[1]

The transect analysis shown on **Figure 5.20** demonstrates that views of the Project from assessment point C, which is representative of rural-residential areas to the south, will not be possible due to topography and existing vegetation.

5.12.4.4 Assessment Point D-D[1], E-E[1] and E-E2[2]

Figures 5.21 and **5.22** demonstrate that the residential area of Jerrabomberra will not have views of the existing or proposed quarry operations, or of quarry infrastructure, due to topography. A major ridgeline between Jerrabomberra and the Project area restricts views to the east towards the quarry. The Project will remain shielded from the residential area of Jerrabomberra.

Looking from the residences on Heights Road back towards the Project area, it is clear that views of the existing quarry pit and proposed extension area will not be possible due to topography. Views of the proposed infrastructure area may be possible, albeit filtered substantially by existing vegetation along the road.

5.12.5 Summary of Visual Impacts

Due to favourable landform and topography, the Project area is largely shielded from view from most directions. Views are primarily limited to elevated areas in the east and along Old Cooma Road, and are typically filtered by vegetation or undulating topography.

The primary visual impact of the Project is likely to be exposed or filtered views of the proposed infrastructure area from elevated locations to the east, including Talpa Heights. These locations currently have limited views of existing quarry infrastructure. Additional tree planting proposed by Holcim Australia will assist in shielding and minimising views of infrastructure from this location (refer to **Figure 5.23**).

The realignment of Old Cooma Road to the east of its current location will significantly limit access to the quarry's main public viewing location. The realignment of the road will remove the majority of passenger vehicles from this section of road, limiting potential viewing of the existing and proposed operations.

With the proposed vegetation screening, it is considered that there will be minimal impact on visual amenity from sensitive visual receivers, when compared to the existing situation.

Minimal lighting is required during the evening and night time periods due to restricted activities after 6pm. The existing topography and vegetation limit any potential impacts from lighting. All lights are currently positioned to direct towards work areas and away from residences. Lighting will continue to be managed to minimise the potential for any impact.

5.12.6 Visual Amenity Management

Holcim Australia proposes to implement additional controls in order to minimise the visual impact of the Project. Tree planting will be undertaken to screen the proposed infrastructure area from elevated residences to the east, as shown in **Figure 5.23**. Vegetation screening will consist of local native species consistent with the local landscape. Tree planting will be prioritised early in the Project to minimise impacts during construction of the proposed infrastructure area and allow for maximum growth over the life of the Project. Additionally, built elements of the new infrastructure area will be sympathetically coloured to blend into the environment, where feasible (e.g. use of green and brown tones).

Holcim Australia will continue the use of existing visual mitigation techniques for the Project, as outlined in the EMP (Corkery 2008), including:

- use of overburden to further develop and enhance visual bunds;
- progressive rehabilitation for areas where the final landform has been achieved;
- revegetation, including planting of visual screens as an ongoing activity during the life of the Project; and
- minimisation of night lighting impacts on surrounding residents by ensuring that, where possible, lights are positioned to direct towards work areas and away from residents.

5.13 Waste

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

Section 2.0 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.

5.13.1 Predicted Waste Streams

Wastes that will require management in association with the quarry activities include:

- construction waste;
- 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.

Cooma Road Quarry currently generates approximately 1300 m^3 of general waste per annum. It is anticipated that the Project will not significantly increase the level of waste generated from Cooma Road Quarry. Holcim Australia also currently recycles steel, paper and cardboard from their Cooma Road Quarry operations. Cooma Road Quarry currently recycles approximately 20 tonnes of steel per annum and 125 m^3 of paper and cardboard per annum.

5.13.2 Waste Management

Holcim is committed to the waste hierarchy where emphasis is placed upon reduce, re-use, recycle 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 be adopted:

- the proposed workshop, laboratory and amenities buildings will be constructed of predominantly modular/prefabricated components, which are not expected to generate a significant amount of waste during construction. Any construction waste generated will be recycled wherever possible, or where recycling is not possible, disposed of to an appropriately licensed waste management facility;
- 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;
- the relocated truck wash facility will drain to an oil/water separator and sediment trap;
- silt will be periodically removed from the various silt control structures and placed/stored in the product stockpiles 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 a licensed contractor for disposal/recycling at an appropriate waste management facility;
- waste water from the proposed amenities, workshop and laboratory will be treated and disposed of via an onsite wastewater treatment system, to be installed with the approval of Queanbeyan City Council. The onsite wastewater treatment system servicing the existing amenities block and workshop will be pumped out, decommissioned and removed to allow for extension of the quarry extraction area; and
- all waste tyres will be removed by the supplier of replacement tyres.

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

5.14 Hazard

5.14.1 Safety, Health and Environment

Hazards onsite will be managed in accordance with the Holcim Safety Health and Environment (SHE) Management System and Guidelines and in accordance with the New South Wales *Occupational Health and Safety Act 2000* (OH&S Act), the Occupational Health and Safety Regulation 2001 and relevant Australian Standards.

Holcim Australia aims to eliminate all injuries, occupational illnesses and preventable vehicular incidents (**Zero4Life** initiative). The company seeks to achieve this by:

- identifying and reducing the risks of all types of work activities that have the potential to produce personal injury or occupational illness;
- ensuring that everyone (including visitors and contractors) complies with appropriate legal and workplace requirements relating to safety and health;
- establishing measurable objectives and targets for Safety, and Health to ensure continuous improvement aimed at elimination of work related illness and injury;
- providing instruction, training and supervision to improve individual's understanding of workplace hazards, including safe work practices and emergency procedures;
- involving individual's in safety and health matters within the workplace, and consulting with them in ways to recognise, evaluate and control workplace hazards via the risk management process;
- communicating safety and health information to all employees, contractors, labour hire employees and visitors to the workplace; and
- effectively implementing the S&H Policy.

5.14.2 Preliminary Hazard Assessment

SEPP 33 – Hazardous and Offensive Development (SEPP 33) (NSW Government 1997) requires a preliminary risk screening of a proposed development to determine the need for a preliminary hazard analysis (PHA) to assess the potential hazard associated with a proposed development. The preliminary screening involves identification and assessment of the storage of specific dangerous goods classes that have the potential for significant off-site effects. If, at the proposed location, and in the presence of controls, the risk level exceeds the acceptable criteria for impacts on the surrounding land use, the development is classified as 'hazardous' or 'offensive' industry and may not be permissible within most land use zones in NSW.

A 'hazardous industry' under SEPP 33 is one which, when all locational, technical, operational and organisational safeguards are employed continues to pose a significant risk. An 'offensive industry' is one which, even when controls are used, has emissions which result in a significant level of offence e.g. odour or noise emissions. A proposal cannot be considered either hazardous or offensive until it is firstly identified as potentially hazardous or potentially offensive, and is subjected to the assessment requirements of SEPP 33. A PHA is required if a proposed development is potentially hazardous.

A proposed development may also be potentially hazardous if the number of traffic movements for the transport of hazardous materials exceeds the annual or weekly criteria outlined in *Table 2 of Applying SEPP 33* (DoP 2011). If these thresholds are exceeded a route evaluation study is likely to be required.

HIPAP No. 6 – Guidelines for Hazard Analysis (DoP 2011) and *Multi-level Risk Assessment* (DoP 2011) notes that a PHA should identify and assess all hazards that have the potential for off-site impact. The expectation is that the hazards would be analysed to determine the consequence to people, property and the environment and the potential for hazards to occur.

5.14.2.1 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 5.21 contains a list of hazardous materials to be stored and used at Cooma Road Quarry and the SEPP 33 screening criteria.

Table 5.21 – Hazardous Materials Inventory

Material	ADG Code Class (PG)	Estimated Project Storage Capacity (kg)	Screening Threshold (kg)	Trigger SEPP 33
Acetylene	2.1	40	100	No
Aerosols	2.1	50	100	No
LPG (Handigas)	2.1	45	10,000	No
Methylated Spirits	3 (II)	10	5,000	No
Thinners	3 (II)	20	5,000	No
Kerosene	3 (III)	10	5,000	No
Galmet Primer	3(III)	10	5,000	No

ADG Code – Australian Dangerous Goods Code

The aggregate quantity of Class 2.1 flammable gases (excluding LPG) of 90 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 5.21** 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.

RIO-FLEX (ammonium nitrate suspension) is a Class 5.1 explosives pre-cursor and is not stored on site but used immediately on delivery to Cooma Road Quarry. Upon delivery to Cooma Road Quarry, the shot fire contractor incorporates a sensitizer with the RIO-FLEX 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 RIO-FLEX.

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

5.14.2.2 Transport Quantity Screening

Table 5.22 contains details of the anticipated dangerous good related traffic movements associated with the proposed development. Traffic movements associated with all classes of hazardous materials do not trigger the need for a transport safety study based on the estimated number and frequency of movements for these materials.

Table 5.22 – Estimated Vehicle Movements of Dangerous Goods

Material	ADG Code Class	Delivery Quantity (t)	No. of Deliveries /Despatches		Minimum Quantity (t)		Screening Threshold		Trigger SEPP 33
			Weekly	p.a.	Bulk	Packages	Weekly	p.a.	
Aggregate flammable gases	2.1	<2*	<30*	<500*	2	5	>30	>500	No
Aggregate Flammable liquids	3 (II)	<2*	<30*	<500*	3	10	>30	>500	No
RIO-FLEX (Ammonium Nitrate)	5.1 (III)	12	1	12	2	5	>30	>500	No

* Delivery quantities and frequencies estimated by Umwelt.

5.14.2.3 Conclusion

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

5.14.3 Bushfire Management

The majority of the Project area is cleared of vegetation and is subject to previous quarrying activities, however areas of land to the north and northwest of the site are identified as being partially bushfire prone by the Queanbeyan City Council Bushfire Prone Land Mapping System. The north and northwest area of the site contains remnant vegetation associated with the adjoining Jerrabomberra Mountain Reserve which represents a potentially significant fuel load capable of sustaining and promoting the spread of bushfire and is the most significant bushfire threat to the site.

Existing Bushfire Management

The Project represents the continuation of existing quarry operations. The proposed relocation of the existing infrastructure area including the existing workshop and truck parking area will be within the existing approved disturbance footprint. The existing management measures include:

- maintained fire trails;
- water carts;
- management of buffer lands to manage fuel loads;
- fire extinguishers on all machinery;
- emergency response system; and
- an annual review with the RFS.

Holcim Australia intend to continue to implement existing bushfire management measures currently in place at the site in consultation with the Rural Fire Service (RFS).

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. 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 understory vegetation, leaf litter and for forest vegetation, the connection of the trees within the canopy.

The majority of the existing active quarry areas within the site are surrounded by open grassland and woodland vegetation formations. The proposed infrastructure area is located on the northern side of the site, this area supports woodland vegetation to the east and northeast and forest vegetation to the west and northwest which links with the adjoining Jerrabomberra Mountain Reserve.

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, with the exception of the steep slopes created by the existing quarry operations and a gully which runs from northeast to southwest through the north and northeast side of the site, the topography across the remainder of the Project area varies between 5 and 10 degree slopes. The proposed infrastructure area lies within an area of varying slope, the land slopes up to the north, 5 to 10 degrees to the east and south and 15 to 18 degrees to the west down into the existing gully.

Asset Protection Zones

An Asset Protection Zone (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.

The required APZ's comparing grassland, woodland and forest vegetation on slopes of 5 to 10 degrees are 10, 20 and 35 metres and the flat areas of the site or land which slopes up requires APZ's of 10, 10 and 20 metres respectively. The minimum APZ required for forest vegetation on slopes of 15 to 18 degrees is 60 metres. For forest vegetation an APZ can consist of an Inner and Outer Protection Area (IPA and OPA). The IPA is located immediately adjacent to the asset as a defendable space and the OPA is a fuel reduced area designed to slow the rate a bushfire can spread. A 60 metre APZ for forest vegetation can consist of a 30 metre IPA and 30 metre OPA.

The general layout of the existing site, including the active quarrying areas, out-of-pit emplacement areas and quarry access and haul roads creates significant separation distances from the surrounding vegetation ensuring the required APZ's are created and sufficient protection from bushfire threat is provided. These areas also act as effective firebreaks to prevent bushfires spreading on, from or into the site. The haul roads also provide access across the site for fire fighting vehicles.

In relocating the infrastructure area there is a need to balance the clearing of vegetation and bushfire risk, as such the establishment of a 60 metre APZ cannot be achieved. However the proposed layout for the relocated infrastructure area includes a perimeter road and the clearance of vegetation within the approved disturbance area which will establish an effective inner protection area. As noted above, PBP 2006 was developed to provide a guide when developing areas for residential use which are likely to be affected by bushfire and the requirements do not specifically apply to a Project of this nature. Given the design of the infrastructure area and the implementation of ongoing bushfire management measures, Holcim Australia consider that any potential bushfire risk would be appropriately managed.

Clearance of vegetation within the approved disturbance area and hazard reduction measures within the surrounding vegetation will be continually maintained throughout the life of the Project. Hazard reduction measures will continue to be assessed on an annual basis by the Quarry Manager in consultation with the local RFS and designed to minimise impacts on biodiversity.

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 OH&S guidelines.

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

5.15 Rehabilitation and Closure

Holcim Australia is committed to the effective rehabilitation and closure of all of 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. 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 closure 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 5.15.3**. These will be refined in consultation with relevant stakeholders, including Queanbeyan City Council, as part of the development of the detailed Quarry Closure Plan.

5.15.1 Proposed Final Land Use

At the completion of extraction and rehabilitation works within the existing pit, Holcim Australia propose to primarily establish a native ecosystem throughout the pit, overburden and surface infrastructure areas, which is in keeping with the surrounding landscape. This also provides the opportunity to link the rehabilitation of the quarry with the vegetation offset area situated on the southern and western boundaries of the extraction area. This vegetation offset area has been designated by Queanbeyan City Council for the proposed Old Cooma Road duplication (NGH Environmental 2010).

It is also noted that there is the potential for the pit and infrastructure area to provide for ongoing light industrial use subject to a suitable zoning and development approvals. Any such future use would require future environmental assessment and planning approval. It is predicted that the balance of the site would be established as native ecosystem.

However, as part of the development of the detailed Quarry Closure Plan as outlined above, Holcim Australia will investigate the potential for 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 Queanbeyan City Council in regards to the suitability of the proposed final land use as part of the development of the Quarry Closure Plan.

5.15.2 Closure and Rehabilitation Objectives

Rehabilitation of the existing quarry pit and proposed pit extension will be undertaken in accordance with the following objectives:

- establish a sustainable native ecosystem, commensurate with adjacent land use types;
- provide a safe and stable landform compatible with the intended final use;
- comply with relevant regulatory requirements and attain regulatory consensus on the successful closure and rehabilitation of the Project area;
- 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 of safety for all site works take into account extreme events and other natural processes such as erosion.

5.15.3 Closure and Rehabilitation Criteria

Completion criteria will be utilised to demonstrate achievement of rehabilitation objectives. The preliminary closure and rehabilitation criteria for the Project are outlined in **Table 5.23**.

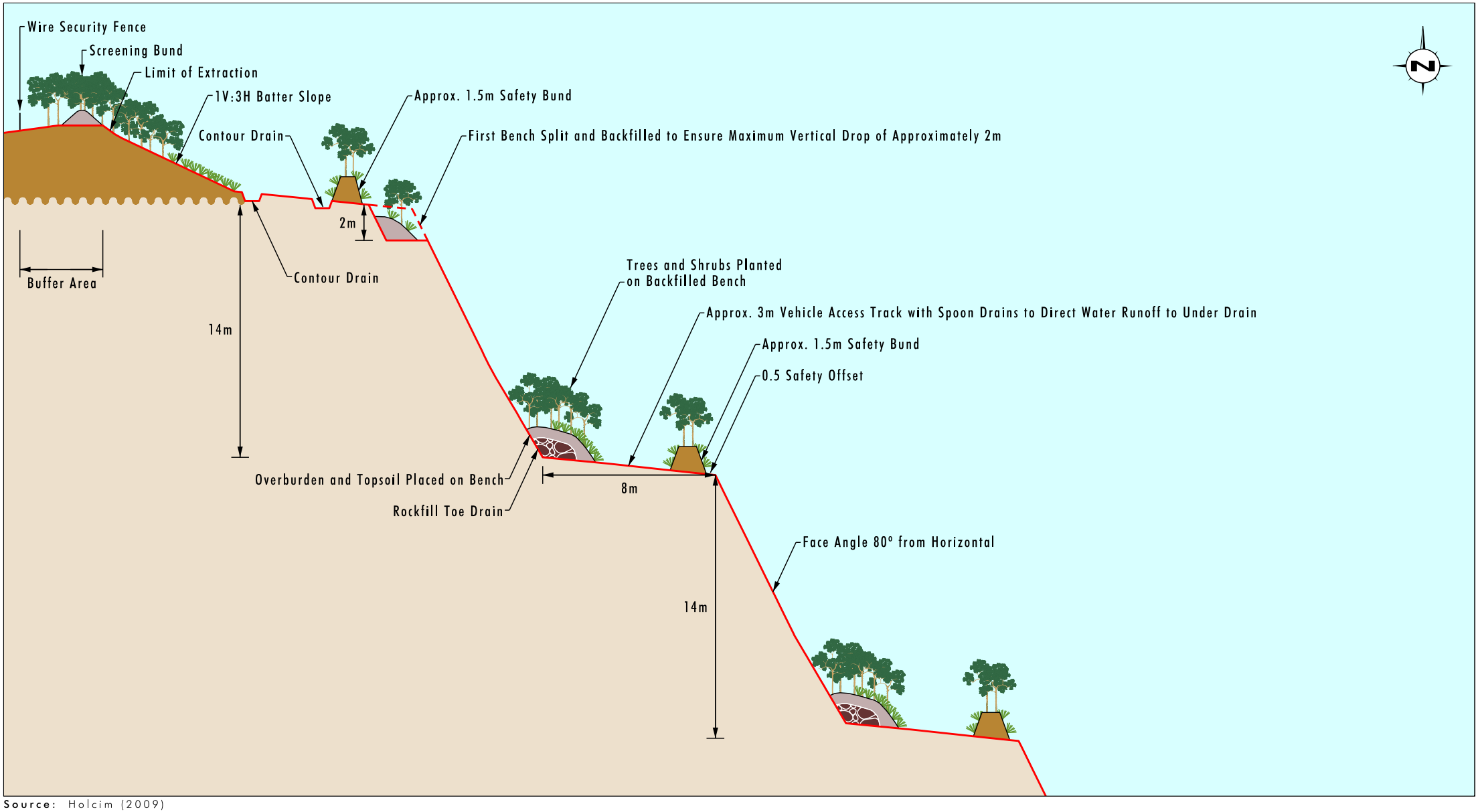
Table 5.23 – Preliminary Closure and Rehabilitation Criteria

Aspect	Preliminary Closure Criteria
Decommissioning	• 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	• 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 5.24**. • 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	• Topsoil or a suitable alternative has been spread uniformly over the rehabilitation surface. • Soil pH to be in the range of analogue sites. • Monitoring demonstrates soil profile development in rehabilitated areas (e.g. development of organic layer, litter layer).
Water	• Runoff water quality from the site does not pose a threat to downstream water quality.
Native Vegetation	• 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 and growing 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	• Appropriate bushfire hazard controls have been implemented.
Ongoing Public Safety	• Appropriate mechanisms are established to control access and manage public safety post closure.

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.

5.15.4 Final Landform

An indicative cross-section of the rehabilitation quarry benches and conceptual final landform of the quarry are shown in **Figure 5.24** and **5.25** respectively. Further details on the rehabilitation methodology to achieve the indicative landform design are outlined below.



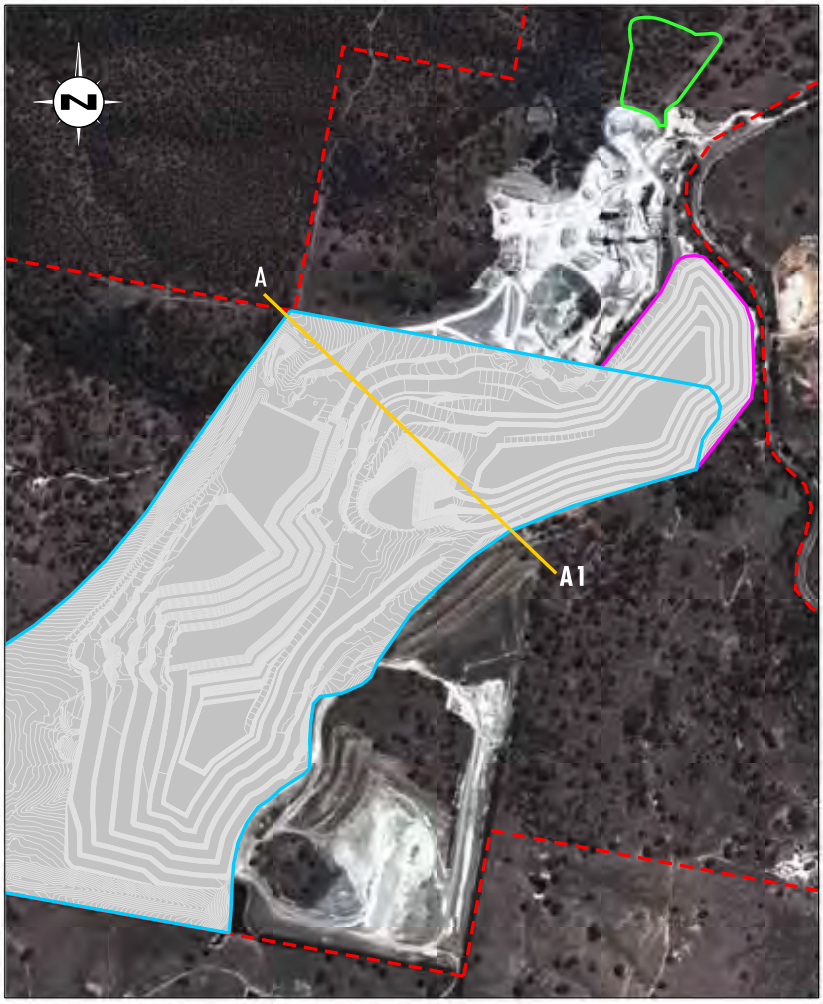
Source: Holcim (2009)
Note: Not to Scale

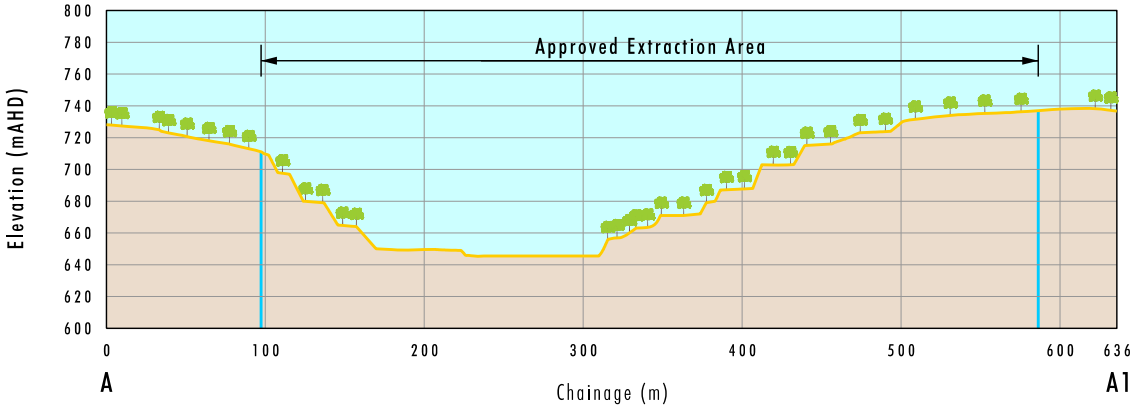
Legend

- Cross-section Location
- Safety Bund
- Overburden
- Rockfill Toe Drain
- Trees
- Grass

FIGURE 5.24

Indicative Cross-section of Rehabilitated Quarry Benches





0 100 200 250m
1:5000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additonal Extraction Area
- Proposed Disturbance Area - Workshop

FIGURE 5.25

Conceptual Final Landform Cross-Section A-A1

Source: Google Earth (2011)

Quarry Pit

Rehabilitation of the quarry pit will be achieved by battering back the upper benches to achieve a more sloping landform. The battering will result in a stable sloping landform of approximately 1V:2H. It is considered that the proposed final landform gradient 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 benches 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.

The first bench below will be split and backfilled to ensure a maximum vertical drop of approximately 2 metres. Rehabilitation of the remaining quarry benches will involve placing overburden material across the bench. A 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 as described above. The safety bund will be seeded with a grass species mix.

The quarry pit floor and lower benches within the hard rock may be partially filled with remaining overburden material. As part of the development of the Quarry Closure Plan, an assessment will be undertaken in regards to the likely groundwater inflow rate and as to whether specific measures may need to be incorporated into the rehabilitation design to accommodate these levels.

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

Key features and processes associated with the overburden emplacement areas are outlined below.

- All slopes will be battered to an average of 10 degrees to minimise erosion risk.
- The top surface of overburden dumps will be constructed to provide variability in local relief in order to prevent ponding of surface water as well as create a profile that is 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.
- Shaped overburden 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.

Surface Infrastructure Area

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

5.15.5 Proposed Quarry Pit Rehabilitation

Wherever possible, rehabilitation will be completed progressively as part of the ongoing development of the quarry. Rehabilitation of areas disturbed during the establishment and construction phase for the Project will occur generally within one month of the completion of the subject earthworks. This approach will minimise the visual impact of the Project from surrounding areas and stabilise the surfaces reducing the potential for erosion.

In regard to the quarry pit, terminal quarry pit walls will be progressively rehabilitated once they are available. It is noted, however, that opportunities for progressive rehabilitation within the pit are limited as there are few benches shaped to final profile during the staged quarry development. This is due to the fact that the benches have the potential to be altered by subsequent quarrying activities. However, opportunities for progressive rehabilitation within the pit will be sought and implemented where practical throughout the staged quarry development.

The construction of visual and acoustic bunds proposed as part of the currently approved quarry (including western edge of Cooma Road, east of the Quarry road, along ridgelines, east of the current workshop, and south of the extraction operations) has been completed, however revegetation maintenance of these bunds is continuing.

Rehabilitation areas will be seeded/planted with a mixture of the local shrub/tree species. Conceptual revegetation strategies 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.

A conceptual revegetation plan for Cooma Road Quarry, including the proposed infrastructure area, is presented in **Figure 5.26**.

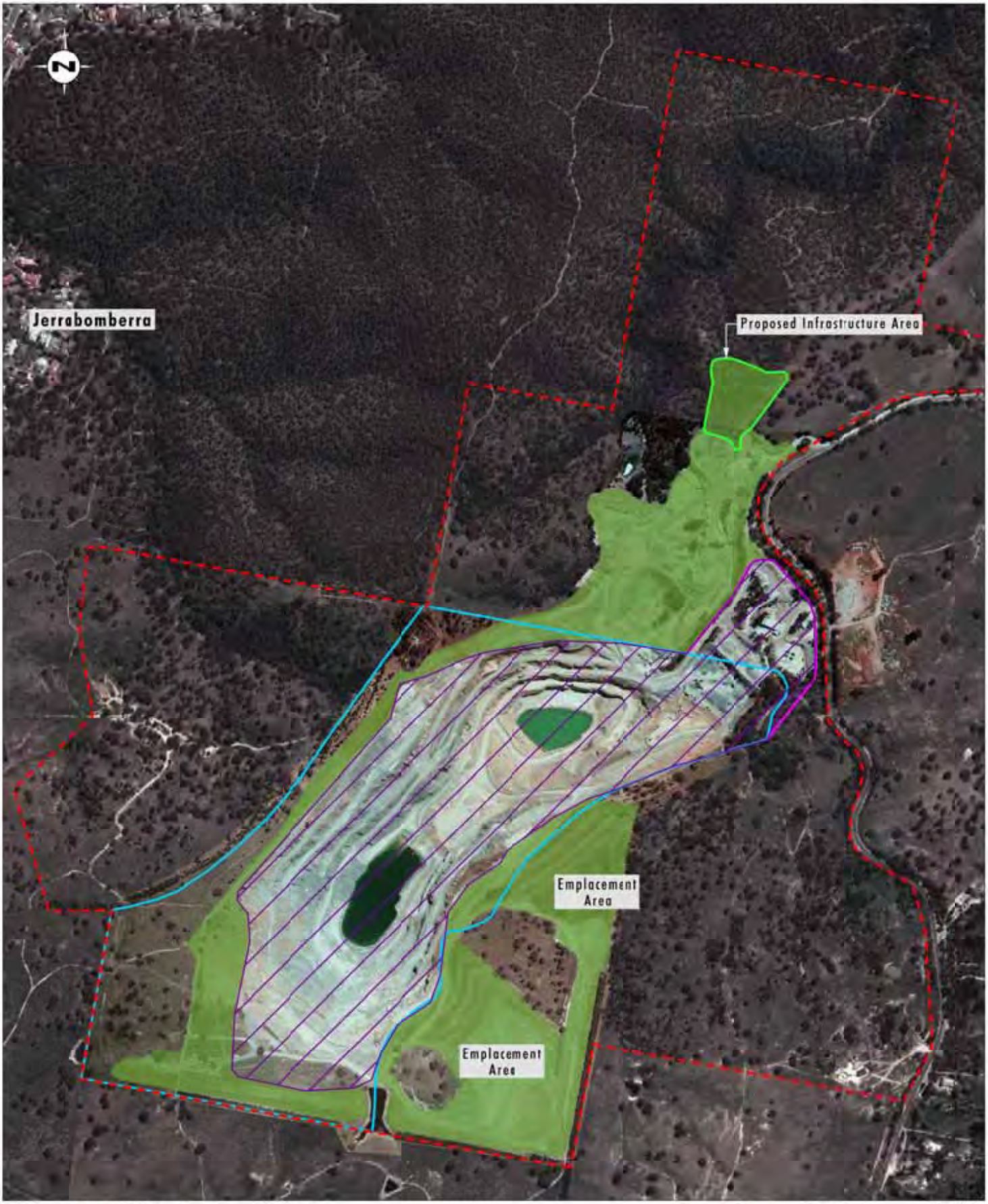
Use of Topsoil or Organic Material

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;



Source: Holcim (2012), Google Earth (2011)

0 100 250 500m
1:10 000

Legend

- Proposed Project Area
- Approved Extraction Area
- Proposed Additional Extraction Area
- Proposed Disturbance Area - Workshop
- Quarry Pit Revegetation (Refer to Figure 5.25)
- Native Revegetation

FIGURE 5.26

Conceptual Revegetation Areas

- 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 significant amounts onto the site.

Substrate Preparation

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 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.

5.15.6 Proposed Rehabilitation Monitoring and Maintenance

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

5.15.6.1 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. Amongst these records to be maintained 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 in which they were formed and maintenance works undertaken (e.g. weed control, planting with native legumes to maintain microbes etc.); and
- environmental incident records.

5.15.6.2 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.

5.15.6.3 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 rates, 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 criteria (refer to **Section 5.13.3**). Information from this monitoring program will also be used to refine closure criteria as required.

5.15.6.4 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 of rehabilitation;
- 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.

5.15.7 Conceptual Decommissioning Plan

Decommissioning will occur at the completion of quarrying and rehabilitation within the existing pit, including the proposed extension. 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.

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

5.16 Social and Economic

A detailed economic assessment and needs analysis has been completed for the Project and is provided in **Appendix 2**. This assessment found that there was a strong ongoing demand for quarry resources and that Cooma Road Quarry is well placed to meet this need and make a significant contribution to the local and regional economies through the ongoing supply of cost effective, high quality construction materials to support ongoing development of the community.

The economic and needs analysis found that the continued operation of Cooma Road Quarry will provide significant ongoing socio-economic benefits. The key benefits identified included:

- the Project will provide a long-term, high quality supply of construction materials into the Queanbeyan/ACT markets. The continued operation and increase in annual production will help provide for security of supply during peak demand periods (i.e. associated with the construction of future major infrastructure projects) as well as meeting the demand generated by population growth and providing competition within the market (i.e. moderating prices during peak and typical demand periods);
- maximises the operating life of an existing facility, thereby avoiding/delaying the need to develop a greenfield site;
- the quarry is positioned away from major population centres and incompatible land uses and has a substantial existing buffer zone. Including significant topographic shielding separating it from the key residential areas of Jarrabomberra and Googong;
- the quarry has convenient access to the regional road network and is located within 40 kilometres of its core market, which assists with reducing supply costs, greenhouse gas emissions and other environmental impacts per tonne kilometre transported;
- the Project can be developed almost entirely within the existing approved disturbance footprint of Cooma Road Quarry, limiting the potential environmental and social impacts of the Project;
- the Project will allow for continued employment of existing quarry personnel, plus additional employment associated with increased production;
- the Project will provide direct economic benefits in the form of capital expenditure (approximately $3.5 million), ongoing operational expenditure and employee expenditure; and
- the Project will continue to contribute to the Commonwealth and State government's through taxes.

In addition, Holcim Australia will continue the existing s94 development contributions made to Queanbeyan City Council for the life of the Project. Based on peak production, this would amount to approximately $435,000 per annum.

5.16.1 Social Impact Assessment and Community Attitudes

A Project-specific community engagement program was implemented during the planning and assessment phase of the Project utilising Holcim's established relationships with the surrounding community and other stakeholders. Community feedback was sought and used to identify the key community issues and perceived impacts of the Project. Potential traffic impacts were the most commonly identified concern associated with the Project, followed by air quality, hours of operation, visual, water and ecological impacts (refer to **Section 3.0**).

Holcim 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 of key concern to the local community. Through this process, Holcim has incorporated a range of controls into the Project design and a range of environmental management and mitigation controls to be implemented over the life of the Project to minimise potential impacts on the community wherever possible. The range of controls and environmental management measures to be implemented are detailed in **Section 5.0**.

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 socio-economic impacts of the Project therefore remain consistent with those of the existing approved Cooma Road Quarry.

5.16.2 Economic Impact Assessment

A key benefit of the Project is the significant economic benefit it would provide to the local region and State associated with employment, capital expenditure, ongoing operation expenditure and employee expenditure.

Cooma Road Quarry currently provides employment for 33 staff plus up to 30 contractors. The Project will provide for the continued employment of this workforce and additional employment for up to a further 9 staff. Further employment will be generated during the construction phase and additional indirect employment generated as a result of the Project.

The Project will bring direct expenditure in the local economy of approximately $3.5 million. The flow-on economic benefits of this direct expenditure is estimated to generate a further $9.8 million benefit within the local and State economy. There would also be an economic benefit to the State and federal governments over the life of the Project due to payments of royalties and taxes.

5.16.3 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.

Cooma Road Quarry currently engages with the community through a number of mechanisms including newsletters, open days and face to face meetings. Cooma Road Quarry produce regular newsletters which are distributed to the local residences to keep the local community informed about the quarry operations. Open days are also occasionally held at the quarry and face to face meetings are undertaken as required. Cooma Road Quarry will continue to utilise the existing mechanisms to engage with the local community for the life of the Project.

Holcim Australia currently maintain an information line for Cooma Road Quarry. The number is advertised on the sign at the front gate of the quarry. The information line can be used for the community to lodge any complaints about the Cooma Road Quarry operations. Cooma Road Quarry have a process in place to collect, monitor, evaluate and action community feedback. Any complaints and other feedback are stored in a complaints register in order to be monitored and evaluated. Each complaint or other piece of information received from the community is appropriately followed up in a timely manner.

Cooma Road Quarry will continue to actively engage with the local community and stakeholders through these current mechanisms.

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

6.1 Compliance with the EIS

6.1.1 To carry out the development for the Project generally in accordance with the Development Application and this EIS.

6.2 Life of Operation, Production, Conceptual Quarry Plan and Product Delivery

Project Life

6.2.1 The project approval life will be for an additional 20 years from the date of expiry of the current development consent which is October 2015, that is, until October 2035. Closure and rehabilitation activities will be undertaken in accordance with a detailed Quarry Closure Plan, at the time of closure. These works may extend beyond the 20 year operational approval period.

Production Limits

6.2.2 The quarry may transport from the site up to 1.5 Mtpa of product.

Hours of Operation

6.2.3 Quarry operations will be undertaken between 6.00 am and 6.00 pm Monday to Saturday.

6.2.4 The following activities may occur between 6.00 am and 10.00 pm Monday to Saturday:

- maintenance of fixed plant and mobile plant;
- secondary crushing and screening;
- product stockpile management;
- water cart operations for stockpile area and plant area; and
- pumping for dewatering activities.

6.2.5 Road trucks will not leave the site after 6.00 pm and may return to the site till 8.00 pm Monday to Saturday.

6.2.6 Blasting activities will be undertaken between 9.00 am and 3.00 pm, Monday to Friday only.

6.2.7 No operations are undertaken on a Sunday or public holidays.

Infrastructure

6.2.8 The final infrastructure layout (subject to a detailed design process) will remain within the existing approved disturbance footprint in the general area indicated in **Section 2.0**. The main infrastructure components will generally be consistent with those identified in this EIS.

Concrete Recycling

6.2.9 The receipt and processing of clean excess concrete from approved suppliers for recycling as product. Proof of origin of the concrete and validation of recycled concrete material received (to confirm it is free of general waste materials, wood, paper and metals) will apply to the concrete recycling process. No demolition wastes, or similar, will be accepted.

6.3 Environmental Management, Monitoring and Reporting

Environmental Management Plan

6.3.1 Within six months of development consent, Holcim Australia will revise its existing Environmental Management Plan (EMP) as part of the implementation of the Project. The EMP will include all of the management and monitoring commitments outlined in the EIS (specifically those outlined in this Statement of Commitments).

Annual Review

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

6.4 Surface Water

6.4.1 All erosion and sediment controls will be designed, constructed and managed in accordance with the Blue Book Volumes 1 and 2 (Landcom 2004 and DECC 2008).

6.4.2 A Construction Erosion and Sediment Control Plan will be prepared for the construction of infrastructure for the Project. The Plan will include the works required and inspection requirements.

6.4.3 During the operational phase of the Project, monitoring of the water management controls will be undertaken on a monthly basis and after major storm events.

6.4.4 The walls of all water management dams will be inspected biennially (every two years) for their structural integrity and for any maintenance requirements. The walls of the water management dams will be grassed and kept free of any trees and shrubs.

6.4.5 Holcim Australia will continue to monitor water quality of all discharge waters and Barracks Creek in accordance with the EPL.

6.4.6 All monitoring results will be reported in the Annual Review.

6.4.7 Water usage, water imported to site, rainfall, dam volumes and discharges (including transfers) at Cooma Road Quarry will be monitored to assist in the management of the water and accounting for water.

6.5 Biodiversity

6.5.1 The revised EMP will include measures to manage biodiversity impacts, including:

- a clearing protocol for tree felling to ensure that this is undertaken in a manner that minimises the potential for impacts on fauna species; and
- specific management measures for hoary sunray and the white box – yellow box – Blakely's red gum woodland and derived native grassland community occurring in the Project Area, including identification of appropriate management controls to enhance natural regeneration, as well as periodic ecological monitoring to inform adaptive management.

6.6 Aboriginal Archaeology

6.6.1 All Holcim Australia employees and contractors accessing Cooma Road Quarry will be made aware of the presence of archaeological sites Cooma Quarry 1 and Cooma Quarry 2, and the need to avoid impacts on these sites.

6.6.2 Cooma Quarry 2 will be fenced during the construction phase to avoid any unintended impacts to the site.

6.6.3 Consultation with local Aboriginal community representatives will be undertaken to develop a culturally appropriate ongoing management strategy to avoid unintended impacts to Cooma Quarry 1 and Cooma Quarry 2.

6.7 Historic Heritage

6.7.1 An exclusion zone of at least 20 metres will be established around the Moses Morley's Lime Kiln site and associated buildings during the construction of the Eastern Dam.

6.7.2 The existing fence around the Moses Morley's Lime Kiln site and associated buildings will be maintained and the opportunity for extending the fencing out to include the exclusion zone will be investigated.

6.7.3 Vegetation within the existing fenced area of the Moses Morley's Lime Kiln site will be managed to limit adverse impacts on the kiln site associated with vegetation growth.

6.7.4 A program of blast monitoring will be implemented to verify the vibration levels from blasting activities do not exceed those currently experienced at the kiln site.

6.7.5 Holcim Australia will inspect the physical condition of the Moses Morley's Lime Kiln site on a 6-monthly basis and compare the condition with the photographs contained in this report. The results of these inspections will be reported in the site's Annual Review.

6.7.6 Prior to any blasting or construction activities, photographic/archival recording of the Moses Morley's Lime Kiln site will be undertaken in accordance with Heritage Branch, OEH guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006). The photographic/archival record will be updated every five years until the cessation of quarrying activities.

6.8 Air Quality

6.8.1 The existing dust control measures will continue to be implemented on site, including:

- minimisations of the total disturbed/working areas at any one time;
- dust collection during drilling operations;
- enclosure of the primary and secondary crushing plants and screening transfer points;
- watering of unsealed roads, working areas and stockpiles;
- water sprays on the conveyors;
- dust extraction system within the secondary crushing plant; and
- truck wheel wash facility.

6.8.2 Air quality monitoring will continue to be undertaken in accordance with the EMP.

6.9 Greenhouse Gases

6.9.1 Holcim Australia will monitor diesel usage and seek opportunities for further efficiency, including consideration of fuel efficiency in equipment selection.

6.10 Noise and Blasting

6.10.1 Holcim Australia is committed to managing the noise impact of the Project and will implement the following controls:

- the attenuation of the primary crushing plant from a sound power level of 120 dB(A) to approximately 112 dB(A);
- the management of loaders and road haulage trucks to minimise the number of machines running in exposed locations at any one point in time;
- the management of the layout of the stockpiles and work areas to minimise the number of machines running in exposed locations;
- the management of stockpiles to act as barriers between working machines and potential receiver areas (applicable to potential exposed areas higher within the quarry and product area);

- not running the secondary crushing plant during the evenings (between 6.00 pm and 10.00 pm) if potentially adverse weather conditions aid in the propagation of noise to the receiver areas; and

- the construction of an earth-berm situated along the eastern extent of the proposed infrastructure area.

6.10.2 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. The Plan will outline the feasible and reasonable noise management measures to be investigated as a part of the proposed Operational Noise and Vibration Review for the Project. The Plan will also outline the noise and vibration monitoring program that will be implemented to confirm the operational noise levels and performance of the proposed mitigation measures in accordance with the target project-specific noise criteria for the Project.

6.10.3 Within 24 months of the date of consent, Holcim Australia will undertake an Operational Noise and Vibration Review to confirm the noise and vibration control measures being implemented for the Project. The review will seek to confirm the predicted operational noise levels, evaluate all feasible and reasonable noise and vibration mitigation measures and identify any further specific mitigation measures if necessary.

6.10.4 On an annual basis, Holcim Australia will undertake compliance noise and vibration monitoring to confirm the operational noise levels of the Project.

6.10.5 Holcim Australia will manage the design and size of blasts to meet relevant ANZECC and OEH ground vibration and airblast criteria at all sensitive residential receiver locations.

6.10.6 Ongoing monitoring of ground vibration and airblast levels will be undertaken during each blasting event at sensitive residential receiver locations and the Moses Morley's Lime Kiln site. The precise location of each blast will also be recorded to determine compliance with relevant standards and to allow for further refinement of the ground vibration site law.

6.11 Visual

6.11.1 Holcim Australia will undertake tree planting to screen the proposed infrastructure area.

6.11.2 Built elements of the new infrastructure area will be sympathetically coloured to blend into the environment, where feasible (e.g. use of green and brown tones).

6.12 Hazard

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

6.12.2 Holcim Australia will continue to implement the appropriate measures to reduce the risk of fire ignition and the spread of bushfire across the site in consultation with the RFS.

6.13 Rehabilitation

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

6.13.2 Wherever possible, rehabilitation will be completed progressively as part of the ongoing development of the quarry.

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

6.14 Community Engagement and Environmental Reporting

6.14.1 Holcim Australia will continue to operate a Community Line for the Cooma Road Quarry for the life of the Project.

6.14.2 Holcim Australia will provide an annual report on the environmental performance of the quarry on its website and will provide copies to Council and DP&I.

7.0 Conclusion and Justification

7.1 Environmental Impacts

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

- assessment of the site characteristics;
- consultation with government agencies;
- consultation with surrounding landowners, the Aboriginal community 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 5.0** and the appendices of this EIS.

The environmental and social impacts of the Project have been minimised through maximising the use of 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, as detailed in **Section 2.0**.

With the proposed measures to avoid, minimise 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.

7.2 Suitability of the Site

The Project area is located within a generally rural environment approximately 6 kilometres south of Queanbeyan. The primary land uses in the vicinity of the Project area include agriculture, environment protection, rural residential and residential uses. While the quarry is neighboured by rural residential areas, the undulating slopes of the area provide topographical shielding for the quarry including a ridgeline separating Cooma Road Quarry from the residential area of Jerrabomberra.

Quarrying activities have been undertaken at the site since 1959. Cooma Road Quarry is a well established quarry operation, with facilities to support quarrying activities. The site is also strategically placed to provide hard rock quarry products to existing markets and significant growth areas. A detailed needs analysis completed for the Project (refer to **Appendix 2**), found that there is a strong ongoing demand for the products produced by Cooma Road Quarry driven primarily by a forecast 25 per cent increase in the population of Queanbeyan and the ACT over the next 20 years.

The Project will result in the extension and continuation of the existing quarry operation, maximising the use of existing facilities and resulting in minimal disturbance (approximately 0.2 hectare) outside of the existing and approved disturbance footprint. The Project has been designed to maximise the use of these existing and approved disturbance areas and to avoid sensitive environmental areas.

The existing land uses of the Project area and surrounding areas are described in **Section 1.4.1**. A detailed analysis of potential on-site and off-site impacts is provided in **Section 5.0**. 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.

7.3 Benefits of the Project

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

- the Project will provide a high quality supply of construction materials into the Queanbeyan/ACT markets to meet identified need for these materials;
- the Project will support the rapid growth and development of the area through supply of high quality construction materials and assist in achieving the aims and objectives of the various strategic and regional planning policies, including the Queanbeyan Residential and Economic Strategy 2031, Sydney-Canberra Corridor Regional Strategy 2006-2031, the Canberra Plan and the Memorandum of Understanding on settlement between the Commonwealth, NSW and ACT governments;
- the Project is well positioned to cater for the predicted growth in quarry products given its strategic location close to major highways and urban development areas, and the limited number of major resources to serve these markets over the next 20 years;
- the quarry has convenient access to the regional road network and is located within 40 kilometres of its core market, which assists with reducing supply costs, greenhouse gas emissions and other environmental impacts per tonne kilometre transported;
- the Project maximises, within environmental and geological constraints, the resource recovery from the existing disturbed quarry footprint while utilising existing infrastructure;
- it maximises the operating life of an existing facility, thereby avoiding/delaying the need to develop a greenfield site to meet the need for quarry products;
- the quarry is positioned away from major population centres and incompatible land uses and has a substantial existing buffer zone and topographic shielding for key residential areas to the north and west;
- the Project can be developed almost entirely within the existing and approved disturbance footprint of Cooma Road Quarry, limiting the potential environmental and social impacts of the Project;
- the Project will allow for continued employment of the existing 20 quarry personnel and 13 road transport drivers, plus employment of up to 6 additional full time staff and 4 additional drivers at peak production levels with flow on effects to the local and regional economy;
- the Project will provide direct economic benefits in the form of capital expenditure (approximately $3.5 million), ongoing operational expenditure and employee expenditure;
- flow-on economic benefits of the direct expenditure is estimated to generate a further $9.8 million benefit within the local and State economies;
- continued payment of significant s94 development contributions to Queanbeyan City Council based on a cents per tonne rate of product transported from the site. At the proposed peak production rate of 1.5 Mtpa this will amount to approximately $435,000 per annum; and
- the Project will continue to contribute to the Commonwealth and State government's through taxes.

7.4 Ecologically Sustainable Development

The EP&A Act aims to encourage ecologically sustainable development (ESD) within NSW. As outlined in **Section 4.0**, 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.

7.4.1 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 3.0**). 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 (refer to **Section 5.0**), 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.

7.4.2 Intergenerational Equity

The EP&A Regulation defines intergenerational equity as:

> Intergenerational equity namely, 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 5.0**, the Project can be undertaken without having a significant adverse impact on the local environment or community. The environmental management measures discussed in **Section 5.0** have been developed to minimise the impact of the Project on the environment and community to the greatest extent reasonably possible.

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

7.4.3 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. Potential impacts are also outlined and measures to ameliorate any negative impact are outlined in the statement of commitments (refer to **Section 6.0**).

The ecological assessment completed for the Project (refer to **Section 5.5**) has found that due to the minimal area of proposed additional disturbance (approximately 0.2 hectare), the Project will not have a significant impact on biodiversity.

7.4.4 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:

- ensuring the long-term viability of the quarry by optimising the remaining viable quarry resources, maximising the use of existing infrastructure and maximising operational and economic efficiencies; and

- maximising the efficient extraction of the hard rock resource through detailed design and planning.

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.

7.5 Conclusion

The Project will allow for the ongoing supply of construction and road building materials to the local and regional markets for up to an additional 20 years, providing a valuable and necessary resource to the local economy. A detailed needs analysis completed for the Project (refer to **Appendix 2**), found that there is a strong ongoing demand for the products produced by Cooma Road Quarry and that the quarry is well placed to effectively and economically meet this demand. The Project will provide significant 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 into Project design and operational management. Wherever possible, these mitigation measures have been built into the design of the Project to minimise the need for ongoing management throughout the life of the Project.

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