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# Environmental assessment for the new Berrima Clay/Shale Quarry

Environmental Assessment

austral bricks™

THE AUSTRAL BRICK COMPANY PTY LIMITED

ABN: 52 000 005 550

# Environmental Assessment

for the

# New Berrima Clay/Shale Quarry

Major Project No. 08-0212

*Prepared by:*

**R.W. CORKERY & CO. PTY. LIMITED**

**December 2010**

# Environmental Assessment

# for the

# New Berrima Clay/Shale Quarry

**Prepared for:**


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Ref No. 744/02

December 2010

## TERMINOLOGY REFERING TO GOVERNMENT AGENCIES

Throughout the planning for the New Berrima Clay/Shale Quarry, a number of NSW government agencies have been amalgamated/re-named etc. The following convention has been used throughout this document when referring to government agencies.

1. For referencing publications issued by government agencies, use is made of the Department's title at the date of publication.
2. For reference to meetings with, and correspondence to or from government agencies, use is made of the Department's title at the date of the meeting or correspondence.
3. For reference to Departments for ongoing involvement with the New Berrima Clay/Shale Quarry, including the consideration of the *Environmental Assessment,* reference is made to the current title of the Department i.e. particularly those below that changed titles during early August 2009.

   *Department of Environment and Climate Change*
   Now Department of Environment, Climate Change and Water – Environment Protection and Regulation Group

   *Department of Water and Energy*
   Now Department of Environment, Climate Change and Water – NSW Office of Water

   *Department of Primary Industries – Mineral Resources*
   Now Industry and Investment NSW – Primary Industries or Minerals Resources

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# Author's Certification

**for the submission of an Environmental Assessment prepared in accordance with the *Environmental Planning and Assessment Act 1979* (Part 3A – Section 75).**

**(a) EA prepared by:**

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| applicant name: | The Austral Brick Company Pty Ltd |
| applicant address: | PO Box 6550<br>WETHERILL PARK NSW 1851 |

**(c) Application Number:** 08_0212

**(d) Address/land details** "Mandurama" is located 1.5km east of New Berrima with an address of 1 Berrima Road, New Berrima. The Project Site and its access to the public road network are contained wholly within Lot 1, DP414246.

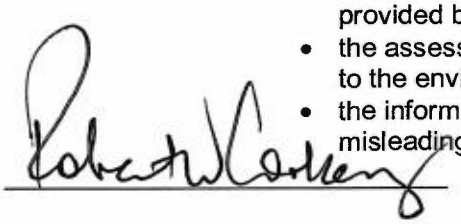
**(e) Project Outline:** The development and operation of New Berrima Clay/Shale Quarry involving:

- the extraction of clay/shale and associated materials;
- transportation of clay/shale and associated materials to the Bowral Brick Plant or other destinations;
- progressive rehabilitation of areas disturbed by extraction and associated activities; and
- all ancillary activities to the above.

**(f) Assessment of Environmental Impact:** The assessment of environmental impacts of this project includes the matters referred to in Director-General's Requirements provided to the Proponent on 21 November 2008 under Section 75F of the *Environmental Planning and Assessment Act 1979.*

**(g) Declaration:** I, Robert William Corkery, hereby declare that I have overseen the preparation of the contents of this assessment and to the best of my knowledge:

- it has addressed the Director-General's Requirements as provided by the Department on 21 November 2008;
- the assessment contains all available information that is relevant to the environmental assessment of the project; and
- the information contained in the statement is neither false nor misleading.

Signature: 

Name: Robert W. Corkery Date: 7 December 2010

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**SPECIALIST CONSULTANT STUDIES COMPENDIUM**

Part 1: Traffic Assessment
*Traffic Solutions Pty Ltd*

Part 2: Surface Water Assessment
*SEEC*

Part 3: Noise Impact Assessment
*Spectrum Acoustics Pty Limited*

Part 4: Flora Assessment
*Geoff Cunningham Natural Resource Consultants Pty Ltd*

Part 5: Fauna Assessment
*Aquila Ecological Surveys*

Part 6: Air Quality Assessment
*Heggies Pty Ltd*

Part 7: Soil and Land Capability Assessment
*Geoff Cunningham Natural Resource Consultants Pty Ltd*

Part 8: Aboriginal Cultural Heritage Assessment
*Archaeological Surveys & Reports Pty Ltd*

# Executive Summary

## Introduction

This *Environmental Assessment* has been prepared to support an application by The Austral Brick Company Pty Limited ("the Proponent") for project approval from the Minister for Planning to establish a clay/shale quarry near New Berrima in the Southern Highlands. The quarry would be developed to supply the bulk of the brick manufacturing raw materials required for the ongoing operation of the Bowral Brick Plant.

The area which is the subject of the application for project approval (the "Project Site") is located approximately 1.5km east of the township of New Berrima and approximately 5km northeast of Moss Vale (see **Figure A**).

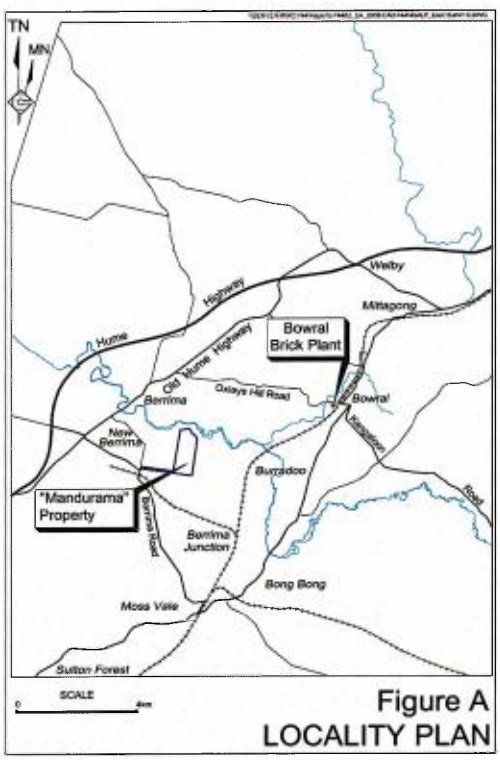


Figure A
LOCALITY PLAN

The Project is classified as a Major Project in accordance with the *State Environmental Planning Policy (Major Development) 2005*. Consequently, the Minister for Planning is the approval authority. As a Major Project, it would be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and an *Environmental Assessment* is required to be prepared to accompany the project application.

This executive summary introduces the Proponent, provides relevant background about the Project, presents an overview of the Project, outlines issue identification and prioritisation undertaken, identifies key issues and summarises the predicted Project-related impacts on the environment within and surrounding the Project Site.

## The Proponent

The Proponent for the Project is The Austral Brick Company Pty Ltd. The company trades as "Austral Bricks" and, since its formation in 1907, has been involved in the production and distribution of a range of quality fired clay products. The Proponent is the owner and operator of the existing Bowral Brick Plant and various other brick and paver plants throughout Sydney.

Brickworks Limited, the Proponent's parent company is a publicly listed company. Brickworks Limited also owns a range of other companies, including Bristile Roofing and Austral Masonry. These companies, together with the Proponent, manufacture a large range of clay bricks, pavers, terracotta floor tiles, roof tiles and concrete blocks. The Proponent is Australia's largest manufacturer of pavers, bricks, building materials, facade systems and landscaping products.

The products produced at the Bowral Brick Plant are used in a wide range of buildings and structures and are particularly sought after for renovations of private and public brick buildings constructed throughout the 20th Century.

## Background to the Project

The principal raw material used in the manufacture of the dry pressed bricks at the Bowral Brick Plant is Ashfield Shale. The Ashfield Shale has been extracted from a quarry adjacent to the Bowral Brick Plant for over 80 years, however, the remaining resources are limited and likely to be exhausted within about 5 years. The Proponent recently acquired the 100ha "Mandurama" property approximately 1.5km east of New Berrima and 1.5km northeast of the Berrima Cement Works (Boral Cement). The drilling investigations on the property have established there is in the order of 8 million tonnes of recoverable shale on the property, the bulk of which is ideally suited to the manufacture of dry pressed bricks at the Bowral Brick Plant. The Proponent proposes to extract the shale and a proportion of the clay and transport the materials to the Bowral Brick Plant to be used in the manufacture of dry pressed bricks to supply the Sydney market.

## Planning Context

The Project Site is located within Zone E3 identified as "Environmental Management" within Wingecarribee Local Environmental Plan (LEP) 2010, which does not permit *extractive industry* but permits *mining*. The Project is, however, permissible given the provisions of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

The Project would also be developed and operated with reference to relevant clauses of *State Environmental Planning Policies 33, 44* and *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

## Project Overview

The Proponent is proposing to extract and transport an average of approximately 120 000tpa shale, weathered shale, brick clay and some friable sandstone, with an upper limit of 150 000tpa, for a period of 30 years. The operation would employ approximately five part-time personnel for the duration of the project. The proposed hours of extraction operations are from 7:00am to 5:00pm Monday to Friday and 7:00am to 2:00pm on Saturdays with no work on Sundays. Product despatch would be from 7:00am to 4:00pm Monday to Friday and Saturdays under special circumstances and 8:00am to 4:00pm on Sundays under special circumstances. The proposed project would involve a capital investment of approximately $1 million.

The extraction of the resource would be undertaken on a campaign basis, with approximately two to three campaigns per year, in six stages principally to reduce the area of disturbance at any one time and to facilitate progressive rehabilitation of disturbed areas. The clay/shale product would be transported by truck to the Bowral Brick Plant along a defined transport route.

## The Project Site

The "Project Site" is a 51ha area within the "Mandurama" property, Lot 1 DP 414246, located at 1 Berrima Road, New Berrima. Access to the Project Site is from Berrima Road, approximately 300m north of the intersection of Berrima Road and Taylor Avenue. The "Mandurama" property lies immediately south of the Wingecarribee River, is currently used for the grazing of beef cattle and is predominantly covered in improved pastures with some windrows of introduced species.

## Project Site Layout

The Project Site incorporates the following components (see **Figure B**).

- A site access road from Berrima Road to the extraction area, a distance of approximately 800m.
- An extraction area covering approximately 7.7ha.


Figure B
PROJECT SITE LAYOUT

- A water storage facility in the active extraction area to store surface water runoff and incidental groundwater inflows to the extraction area.
- Re-development of two existing dams to serve as sedimentation dams which would capture run-off from disturbed areas outside of the extraction area.
- A transportable lunchroom/ amenities building.
- A storage and workshop area located within a shipping container.
- Three perimeter amenity bunds which would minimise visual amenity, noise and dust impacts, namely the combined Northern and Western Amenity Bunds and Southern Amenity Bund.
- A surplus overburden stockpile area which would initially be the storage area for surplus topsoil, overburden and product clay/shale and topsoil in the longer term.

## Project Activities

### Site Establishment

The establishment and construction phase would commence with the survey and marking of areas for roadways, extraction stages, amenity bunds, dams, diversion banks and other site features. Transportable buildings and containers would be brought to the site and fixed in place.

The access road would be upgraded, the bridge over Stony Creek assessed and the intersection of the access road and Berrima Road constructed. The Project Site would be fenced. Silt fencing and other erosion control structures would be constructed, as required.

A farm forest would be planted, using tube stock and/or direct seeding of a fast growing marketable native timber species, on the Stage 4 land (on the northern side of the hill within the extraction area) to provide the required visual screening of activities near the surface on the southern side of the hill. As Stage 4 progresses, these trees would be felled for timber sales.

### Land Preparation and Bund Construction

The few existing trees within the footprint of the extraction area would be felled and the felled timber mulched and used onsite. Topsoil and overburden would be strip cleared and used in the construction of amenity bunds. The clayey subsoil not immediately required for bund construction would be stockpiled on the floor of the extraction area or within the surplus overburden stockpile area for later use in rehabilitation or transported to the brick plant if considered suitable for brick manufacture.

Amenity bunds would be constructed to a height of 7m on the western, northern and southern sides of the extraction area. The purpose of these is to provide visual, noise and dust screening for surrounding residences. Bunds would be revegetated with a quick growing cover crop with longer term plantings of native tree tube stock.

### Water Management System

Five farm dams are located on the Project Site. Two of these dams would be upgraded to act as sedimentation dams. A system of diversion banks and channels would be constructed and maintained to divert "clean" runoff from entering the disturbed areas.

### Extraction

Extraction would be conducted on a campaign basis with about two to three 4 to 6 week campaigns per year. Extraction would be undertaken in six stages. Stages 1 to 3 would be on the southern side of the hill. Stage 3 is expected to cease after

approximately 18 years from commencement. Stages 4 to 6, on the northern side of the hill would proceed through Years 19 to 30.

Extraction face heights would be 10m, operational bench widths 30 to 50m and final bench widths, 5m. Equipment used would include a scraper, a dozer, a front-end loader and trucks. Excavation would reach a final elevation of approximately 640m AHD.

## Product Transportation

Transportation of the product clay/shale would be by road-registered articulated and rigid trucks, not exceeding 19m in length, predominantly Monday to Friday. The transportation route (see **Figure C**), involves a left turn from the Project Site access road onto Berrima Road, turning right into Taylor Avenue, through to Medway Road onto the Hume Highway.

Trucks would exit the Hume Highway onto the Old Hume Highway and travel through Mittagong via Cavendish Street and Old Bowral Road onto Mittagong Road. Trucks would turn left into Lyle Avenue and proceed into Kirkham Road and Oxley Hills Road to enter the Bowral Brick Plant via Kiama Street.

There would typically be up to 17, 30t loads or 34 truck movements per day for five days per week to transport approximately 2 500t of product clay/shale per week. However, following periods of prolonged wet weather, these traffic volumes may need to increase to as much as 68 loads per day albeit for only a few days to keep the brick plant operational.

## Final Land Use and Rehabilitation

The final land use would include agricultural purposes such as grazing on the extraction area floor, with strips of bushland on the rehabilitated benches. As areas of extraction are completed, benches would be progressively rehabilitated. This would involve placement of overburden and topsoil on the completed benches and revegetation with native trees and shrubs. The extraction area floor would be covered with material from the amenity bunds and revegetated with pasture species.

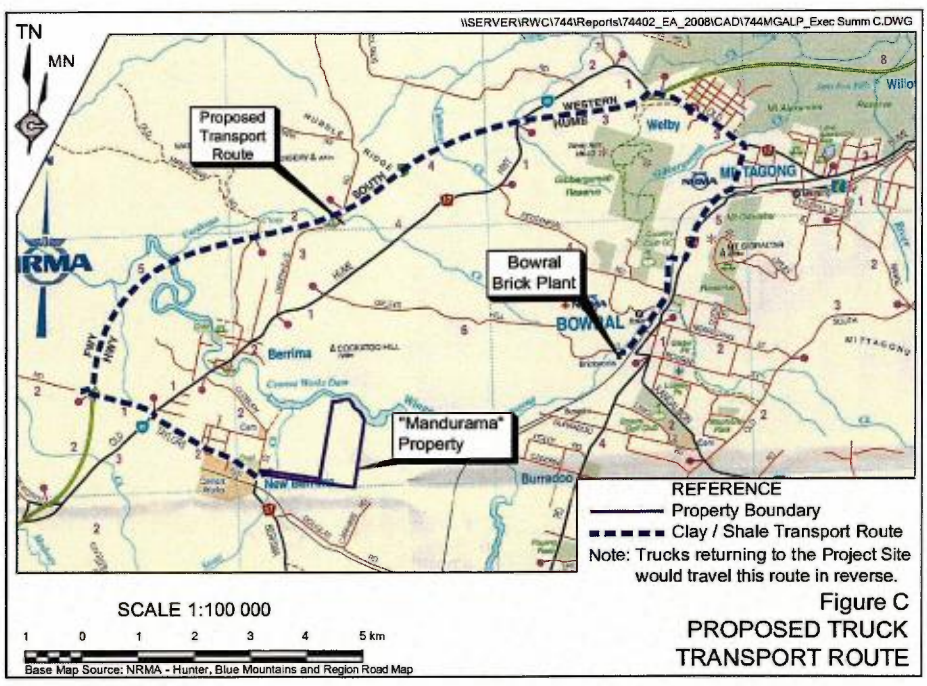


Figure C
PROPOSED TRUCK TRANSPORT ROUTE

## Issue Identification and Prioritisation

In order to undertake a comprehensive *Environmental Assessment* of the Project, appropriate emphasis has been placed on those issues likely to be of greatest significance to the local environment, neighbouring land owners and the wider community.

These issues and their potential impacts were identified through a program of community and government consultation and a review of relevant legislation and guidelines. This was followed by an analysis of the unmitigated environmental risk associated with each issue identified in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment.*

Through a review of the allocated risk ratings the following priority of issues was determined.

1. Traffic
2. Surface Water
3. Noise
4. Flora
5. Fauna
6. Visual Amenity
7. Air Quality
8. Socio-economic
9. Soil and Land Capability
10. Aboriginal Cultural Heritage
11. Groundwater

## Existing Environment, Proposed Safeguards and Impacts

The components of the existing environment within and surrounding the Project Site have been studied in detail and the Project designed to avoid or minimise potential impacts.

### Traffic

A review of the existing traffic and road capability indicated that the existing roads are operating satisfactorily. Assessment of the roads, intersections and traffic volumes under the predicted increased traffic attributable to the Project identified that minimal traffic nuisance and safety impacts could be expected but a type BAR intersection at the intersection of Berrima Road and the site access road is required.

### Surface Water

The Project Site is set back from the Wingecarribee River by approximately 730m. No watercourses or water bodies are within the extraction area, although Stony Creek crosses the site access road and there are five farm dams located within the Project Site. An assessment of the surface water impacts shows that with the proposed surface water control structures such as sedimentation dams and diversion banks, and with the installation of silt control fencing and sound management of the dams, impacts are predicted to be minimal.

### Noise

An assessment of ambient noise at various locations around and within the Project Site determined that the area experiences very low background noise levels. Assessment of potential impacts through modelling based on the proposed site layout and operations, including the mitigating features of amenity bunds and use of local topography, determined that noise impacts would be minimal and within DECCW established criteria. The modelling resulted in the management recommendations which included the restriction of some activities in some locations during adverse weather conditions.

### Flora

The flora of the existing environment comprises predominantly improved pasture species with some windrows of exotic tree species. A few of these trees would have to be removed to allow extraction and the construction of amenity bunds. The Project Site does not contain any threatened or endangered flora species, populations or communities. The assessment determined that impacts on flora attributable to the Project would be minimal.

### Fauna

The Project Site does not contain any threatened or endangered fauna species, habitats, populations or communities. The assessment determined that impacts on fauna attributable to the Project would be minimal.

### Visual Amenity

The existing visual character of the Project site and surrounds is a combination of a rural landscape, including grazing and bushland, and isolated industrial facilities such as the Boral Cement Plant at Taylor Avenue, New Berrima, and the Inghams Feed Plant at Douglas Road, Berrima. Visibility of the Project Site is greatest at elevated residences on the northern side of Wingecarribee River but these views are at considerable distance from the Project Site and against a backdrop of the cement plant and the stockfeed plant.

A range of design and operational mitigation measures would be implemented to reduce the visual impacts of the Project. These measures include the siting and staging of the Project to benefit from the natural topography, the construction of vegetated amenity bunds around three sides of the extraction area, tree screens and a proposed farm forest and the progressive rehabilitation of completed areas of extraction.

### Air Quality

An air quality assessment of the existing and predicted air environment based on dispersion modelling showed that impacts at the neighbouring residences would be within DECCW criteria. A range of design and operational mitigation measures would be implemented to reduce air quality impacts. These measures include the construction of amenity bunds, the watering of roads and other potentially dusty areas, as required, the vegetation of exposed areas, covering of loads and the correct use and maintenance of equipment.

### Socio-economic

The socio-economic assessment found that positive impacts of the Project include the provision and maximum utilisation of clay/shale which is a limited resource necessary for the manufacture of an important building product, the creation of up to five employment positions, the long-term viability of the Bowral Brick Plant and the associated benefits to employment and support of the local area. The negative impacts include the potential impacts upon of lifestyle and land values for neighbouring residents, although these impacts are considered to be minimal or negligible due to the mitigation measures proposed to reduce noise, visible amenity and air quality impacts.

### Soil and Land Capability

The soils and land capability within the Project Site were assessed. It was determined that the characteristics of the soil would not present any constraints to the Project, the topsoil resource would be conserved and used in rehabilitation and that the existing land capability would not be significantly impacted by the Project.

### Cultural Heritage

An Aboriginal cultural heritage assessment undertaken in accordance with legislative requirements, determined that there are no Aboriginal artefacts, sites or Potential Aboriginal Deposits on the Project Site or likely to be found on the Project Site. The Project Site does not contain any items or sites of non-Aboriginal Heritage significance. The impacts on heritage are considered to be minimal although precautions relating to the possibility of finding Aboriginal items would be adopted.

### Groundwater

Exploratory drilling did not intercept groundwater and it is considered unlikely that clay/shale extraction would intercept groundwater. It is considered that impacts on groundwater would be minimal.

## Project Evaluation and Justification

An evaluation of the Project has been undertaken by firstly re-assessing the risks posed to the local environment by project-related activities following the implementation of all design and operational safeguards and mitigation measures, and secondly, throughout the principles of ecologically sustainable development.

The evaluation found that, with the implementation of the proposed controls and safeguards measures, the residual risk posed by each possible environmental incident or impact was reduced from its original level and classified as either moderate or low, and therefore acceptable.

The Project has also addressed each of the sustainable development principles. It has been concluded that the Project achieves a sustainable outcome for the local and wider environment.

The Project has also been justified in terms of a wide range of biophysical, social and economic issues. These impacts have been justified in terms of the low risk of environmental impacts and the positive economic and social benefits that would result for the local community and broader Berrima-Bowral-Mittagong region.

## Conclusion

The Project has, to the extent feasible, been designed to address all issues raised by the local community and all levels of government as well as the principles of ecologically sustainable development.

The Project provides for the extraction and transportation of clay/shale which would provide the Proponent's Bowral Brick Plant with continued viability for at least 30 years. This would provide significant social and economic benefits to the local and wider community.

In light of the conclusions incorporated throughout the *Environmental Assessment*, it is assessed that the Project could be developed and operated in a manner which would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

The *Environmental Assessment* supported by the range of specialist consultant studies has established that if the Project proceeds, it would:

- provide necessary raw materials for the manufacture of significantly important building products for the Greater Sydney and regional area;
- maximise the utilisation of a limited resource in close proximity to its point of use;
- reduce risk levels associated with possible environmental incidents and adverse impacts on the environment to an acceptable level;
- have a minimal and manageable impact on the biophysical environment;
- satisfy sustainable development principles;
- provide for continuing and future use of the Project Site for agricultural purposes;
- provide social and economic benefit to the local and wider community; and
- address perceived social impacts.

# Section 1

# Introduction

*This section introduces the proposal by The Austral Brick Company Pty Limited (the "Proponent") to develop a clay/shale quarry at New Berrima for supply and road transportation of raw materials by to its brick plant at Bowral. This section provides information on:*

- *the scope and format of the Environmental Assessment;*
- *the Proponent;*
- *the relevant background to the Project;*
- *a summary of the approvals process;*
- *the environmental performance of the Bowral Brick Plant;*
- *the proposed approach towards environmental management and documentation; and*
- *identification of the personnel involved in the Project design, document preparation and specialist consultant investigations.*

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## 1.1 SCOPE

The Austral Brick Company Pty Ltd ("the Proponent") proposes to develop and operate a clay/shale quarry near New Berrima and transport the extracted clay/shale via the public road network to the Proponent's Bowral Brick Plant ("the Project"). The quarry is proposed within part of Lot 1, DP414246 ("Mandurama"), located 1.5km east of New Berrima and 1.5km northeast of the Berrima Cement Works (**Figure 1.1**).

The Project would involve the extraction of clay/shale from a resource of approximately 8 million tonnes defined within the Project Site. The Project has been classified as a Major Project in accordance with Paragraph 7(1)(b) of Schedule 1 of *State Environmental Planning Policy (Major Development) 2005* ("Major Projects SEPP") for which project approval is required under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The application is made possible as it satisfies the requirements of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty Limited in support of the Proponent's application for project approval (**Appendix 1**) in accordance with the requirements of Section 75H of the *EP&A Act*. The *Environmental Assessment* describes the Project and provides information or mitigation measures and management controls the Proponent would adopt to avoid or reduce potential impacts within and surrounding the Project Site. The residual impacts are described and proposed monitoring is outlined to assess the ongoing environmental performance of the Project.

The information provided in this document is presented to a level of detail which adequately addresses all relevant issues identified by the various stakeholders including government agencies, surrounding residents and the local community. Emphasis has been placed upon comprehensively addressing the key issues and limiting coverage of those issues that are not central to the determination of the project application for approval application. This approach is consistent with Director-General's Requirements issued for the Project (see **Appendix 2**).

## 1.2 THE PROPONENT

The Proponent for the Project is The Austral Brick Company Pty Ltd. The company trades as "Austral Bricks" and, since its formation in 1907, has been involved in the production and distribution of a range of quality fired clay products.

Brickworks Limited, the Proponent's parent company is a publicly listed company. Brickworks Limited was formed in 1934, shortly before it purchased New South Wales State Brickworks at Homebush Bay, in Sydney. Between 1934 and 1937, Brickworks Limited acquired a number of brick plants in and around Sydney.

Brickworks Limited also owns a range of other companies, including Bristile Roofing and Austral Masonry. These companies, together with the Proponent manufacture a large range of clay bricks, pavers, terracotta floor tiles and roof tiles. The Proponent is Australia's largest manufacturer of pavers, bricks, building materials, facade systems and landscaping products.

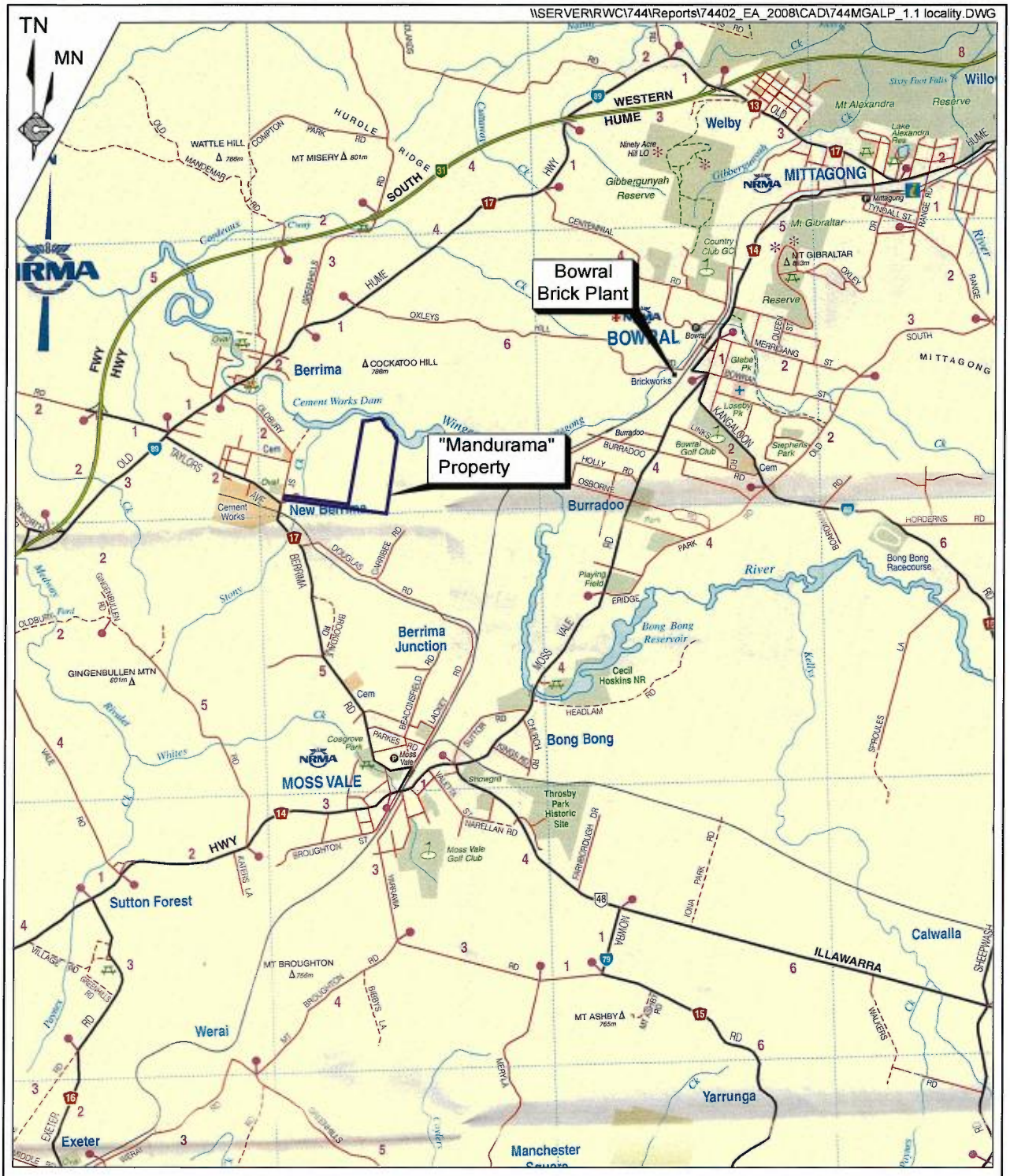


Figure 1.1
LOCALITY PLAN

## 1.3 DOCUMENT FORMAT

This *Environmental Assessment* includes seven sections of text, a glossary, references and a set of appendices. The information presented in this document covers all aspects of the Project, including planning, development, operation, rehabilitation and environmental monitoring at a level of detail dependent on the environmental risk posed by each issue. The issues and their relevant importance to the assessment of the Project have been identified through consultation with government agencies, the local community, stakeholders, surrounding landowners and specialist consultant assessments.

The format of the *Environmental Assessment* is as follows.

**Section 1:** introduces the Project, the Proponent and Project Site. A brief overview is also provided of the history and operations of the Bowral Brick Plant and the proposed environmental management and documentation that would be implemented and details related to the management of the investigations.

**Section 2:** provides a description of the Project, including the Proponent's objectives, the clay/shale resources and the proposed extraction, transportation and progressive and final rehabilitation activities.

**Section 3:** provides a summary of the consultation undertaken with the local community and relevant government agencies together with a review of the relevant preliminary environmental studies. Key issues for assessment are identified and prioritised based on the results of the consultation and preliminary environmental assessments.

**Section 4:** provides a range of background information related to the environmental setting of the Project Site.

**Section 5** provides a description of the components of the existing environment, proposed mitigation measures and management procedures, assessment of potential environmental impacts and monitoring that would be undertaken for the key issues identified in Section 3.

**Section 6:** provides a draft Statement of Commitments the Proponent would implement with respect to environmental management and monitoring for the Project.

**Section 7:** presents an evaluation of the Project assuming the adoption of all of the Proponent's commitments. The proposed direct and indirect impacts are then justified, particularly in light of the principles of Ecologically Sustainable Development.

**Section 8:** lists the various source documents referred to for information and data used throughout the preparation of the *Environmental Assessment.*

**Section 9:** presents a glossary of technical terms, symbols and acronyms and units used throughout the *Environmental Assessment.*

**Appendices:** present the following additional information.

Appendix 1: A copy of the Proponent's Major Projects Application.

Appendix 2: A copy of the Director-General's Requirements and a tabulated summary of those requirements and the *Environmental Assessment* requirements provided by other government agencies which identifies where each requirement is addressed in the *Environmental Assessment*.

The *Environmental Assessment* is accompanied by a *Specialist Consultant Studies Compendium* incorporating eight parts addressing the assessment of the following key issues.

Part 1: Traffic
Part 2: Surface Water
Part 3: Noise
Part 4: Flora
Part 5: Fauna
Part 6: Air Quality
Part 7: Soil and Land Capability
Part 8: Aboriginal Cultural Heritage

The contents of the assessment reports are summarised into the appropriate section(s) of the *Environmental Assessment*.

## 1.4 PROJECT BACKGROUND

### 1.4.1 Bowral Brick Plant

The Austral Brick Company Pty Ltd is the owner and operator of the Bowral Brick Plant, the Company's sole dry press brick manufacturing plant in NSW. This plant is recognised by the architectural fraternity for the wide range of brick products used both in architecturally designed buildings and importantly for many home and public building renovations/extensions. The bricks produced at Bowral are therefore in considerable demand and provide an important building material throughout Sydney, NSW and beyond. It is noted that since the Proponent Company acquired the Bowral Brick Plant in March 2001, in the order of $15 million has been invested into the upgrading and modernising plant increasing the capital value of the plant to in excess of $20 million.

The principal raw material used in the manufacture of the dry pressed bricks at the plant is Ashfield Shale, the material underlying many Sydney suburbs and which was first used to manufacture the billions of bricks manufactured throughout Sydney until 2003 when the Eastwood Brick Plant closed down, i.e. the last of over 20 dry-pressed brick plants to close in Sydney since the early 1980s. The Ashfield Shale has been extracted from a quarry adjacent to the Bowral Brick Plant for over 80 years, however, the remaining resources are limited and likely to be exhausted within about 5 years.

#### 1.4.1.1 Previous Operations

Bricks have been manufactured at the Bowral Brick Plant since 1922. During that time, the plant has grown to its current production rate of 24 million bricks and 1 million pavers per year. The Proponent purchased the Bowral Brick Plant in 2001 in readiness for when its Eastwood Plant ceased production in 2002.

The Bowral Brick Plant provides full-time equivalent employment for 38 persons on site, 7 persons are engaged as contracted drivers to deliver bricks and three drivers contracted part-time to transport raw materials from the Proponent's satellite quarries to the Bowral Brick Plant. Approximately 10.6% of the brick manufacturing raw materials are delivered from the satellite quarries within the remaining 89.4% extracted from the quarry adjacent to the plant.

The Bowral Brick Plant and its adjoining quarry have operated within the residential area in Bowral for almost 90 years. The Proponent has responded positively to the few complaints received during the past 10 years of ownership. Since 2001, there has been a marked improvement in environmental compliance and performance at the plant.

### 1.4.2 Clay/Shale Exploration and Site Selection

In light of the programmed completion of clay/shale extraction within the quarry adjacent to the Bowral Brick Plant (by about 2015), the Proponent embarked on an exploration program throughout the Southern Highlands in 2005 to identify a suitable replacement source of Ashfield Shale. Since 2005, several areas have been investigated and these are discussed in Section 7.3.1. The land which is the subject of the Project was selected on the basis that it presents fewer environmental constraints, primarily because the land is cleared and contains limited remnant native vegetation. The Proponent acquired the 100.2ha "Mandurama" property which is the subject of this proposal, in early April 2008.

The drilling investigations on the "Mandurama" property have established there is in the order of 8 million tonnes of recoverable clay/shale on the property, the bulk of which is ideally suited to the manufacture of dry pressed bricks at the Bowral Brick Plant. The Proponent proposes to extract the shale and a proportion of the clay and sandstone and transport the materials to the Bowral Brick Plant to be used in the manufacture of dry pressed bricks.

Based upon the results of the preliminary environmental studies conducted, the Proponent established that it was feasible to proceed with the Project and commissioned the preparation of an *Environmental Assessment* to support its application for project approval.

## 1.5 ENVIRONMENTAL MANAGEMENT AND DOCUMENTATION

### 1.5.1 Environmental Management

The Proponent operates a range of quarries adjacent to or at satellite locations to supply raw materials for its plants in Sydney and Bowral. Each quarry is operated under an Environmental Management System (EMS) incorporating the relevant elements of ISO14001. The EMS reflects the Proponent's Environmental Policy which focuses on sustainable development, pollution reduction and open communication with all stakeholders. The NSW Environmental Manager oversees environmental management of all quarries and each quarry is managed by registered personnel who are also responsible for the implementation of the EMS. The EMS also addresses the establishment of environmental targets and objectives, continual improvement, the identification of environmental aspects and impacts, control measures to remove or reduce environmental impacts, environmental competencies and training, corrective and preventive actions and incident and complaints management as well as environmental reporting. The implementation of the EMS includes and environmental audit program whereby each quarry is audited by an independent party annually.

### 1.5.2 Environmental Documentation

An *Environmental Management Plan* would be prepared and implemented for the management of the proposed New Berrima Quarry. This document would focus on providing sufficient detailed planning information to ensure all conditional requirements in the granted project approval (and associated commitments) are clearly outlined for operational personnel. The document would draw on relevant documents from the corporate EMS, including an environmental aspects and impacts register, a compliance register, management systems procedures and standard operating procedures, inspection checklists, training documents, corrective and preventive actions, monitoring records and an incident and complaints register.

## 1.6 MANAGEMENT OF INVESTIGATIONS

The preparation of this document has been managed by Mr Rob Corkery, (B.Appl.Sc.(Hons), M.App.(Sc)) Principal of R.W. Corkery & Co Pty Limited. The bulk of the document was assembled by Ms Lisa Aspinall (MBus, BAgSc, GradDipED) Environmental Consultant with R.W. Corkery & Co Pty. Limited. Mr Rob Corkery, (B.Appl.Sc.(Hons), M.Appl.(Sc)) of the same Company undertook a review of the document.

Various personnel working with the Proponent under the supervision of Mr Steve Wall (NSW Manufacturing Manager) have provided a range of technical information on the proposed development and assisted with finalising the document.

Strong emphasis has been placed upon a multi-disciplinary approach to the design of the Project, the description of the existing environment, identification of design and operational safeguards and resultant impact assessment. The following Specialist Consultants were commissioned by the Proponent to prepare specialist consultant studies for the Project. The various Specialist Consultant reports prepared for the Project are presented in the *Specialist Consultant Studies Compendium* accompanying this document.

- Traffic Assessment: Traffic Solutions Pty Ltd
  *(Mr Craig Hazell – Assoc.Dip. Eng)*
- Surface Water Assessment: SEEC
  *(Mr Andrew Macleod, B.Sc. (Hons))*
- Noise Assessment: Spectrum Acoustics
  *(Dr Neil Pennington – PhD, B.Sc. (Physics), B.Math (Hons))*
- Flora Assessment: Geoff Cunningham Natural Resource Consultants Pty Ltd
  *(Mr Geoff Cunningham – B.Sc.Ag (Hons))*
- Fauna Assessment: Aquila Ecological Surveys
  *(Mr Paul Burcher – B.Appl.Sc )*
- Air Quality Assessment: Heggies Pty Ltd
  *(Ms Tanya Henley – B.Sc. (App Chem) Dip Sc Practice)*

- Soil and Land Capability Assessment: Geoff Cunningham Natural Resource Consultants Pty Ltd

  *(Mr Geoff Cunningham – B.Sc.Ag (Hons))*

- Aboriginal Cultural Heritage Assessment: Archaeological Surveys and Reports Pty Ltd

  *(Mr John Appleton – B.A. (Hons))*

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# Section 2

# Project Description

*This section of the Environmental Assessment describes the proposed development and operation of the proposed New Berrima Clay/Shale Quarry, including:*

- *the Proponent's objectives;*
- *the approvals required;*
- *the geological setting and resource;*
- *the design of the extraction area and proposed on-site operations; the transportation of the clay/shale materials to the Bowral Brick Plant; and*
- *the proposed rehabilitation and final landform.*

*The proposed quarry design, operation and rehabilitation procedures described within this section reflect all environmental constraints identified and recommendations made throughout the environmental impact assessment process.*

*The information presented in this section is presented at a level of detail sufficient for the Minister to determine the Major Project Application.*

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# 2.1 OUTLINE OF THE PROJECT

## 2.1.1 Objectives

The Proponent's principal objectives for the Project are to:

i) secure access to clay/shale resources that would ensure the continued provision of a range of dry pressed bricks to the Sydney, Southern Highlands and NSW markets for a further 30 years;

ii) maintain the level of production from the defined extraction area at an average of approximately 120 000 tonnes per annum (tpa) to meet the supply demands of these markets particularly after clay/shale extraction ceases adjacent to the Bowral Brick Plant (in about 2015);

iii) progressively rehabilitate disturbed areas to limit visual impacts and to provide for a range of productive land uses at the completion of operations;

iv) maintain local employment levels, particularly at the Bowral Brick Plant; and

v) maximise the recovery of the natural resource.

The dry pressed bricks produced as a result of the extraction of the clay/shale from the Project Site would contribute significantly towards meeting the ongoing market demand for dry pressed bricks throughout the Sydney Metropolitan Area, Southern Highlands and NSW. These broad objectives would be achieved by:

a) planning and removing the clay/shale resource in a manner that maximises the quality and quantity of materials removed;

b) undertaking all activities in an environmentally responsible manner that enables compliance with all relevant legislative requirements;

c) planning and operating all activities in consultation with surrounding residents and the wider community; and

d) monitoring and reviewing the environmental performance of all activities.

## 2.1.2 The Project Site

The area which is the subject of the application for project approval ("the Project Site") is approximately 51ha in area and located within the "Mandurama" property, namely Lot 1 DP 414246, 1 Berrima Road, New Berrima which is 100.2ha in area. The "Mandurama" property is owned by The Austral Brick Company Pty Ltd. The Project Site effectively incorporates the optimum clay/shale resource area on the "Mandurama" property and the site access road between the property entrance and the extraction area.

The entrance to the "Mandurama" property is located on Berrima Road approximately 300m north of the intersection of Taylor Avenue and Berrima Road, New Berrima. **Figure 2.1** provides a topographic map presenting the location of the "Mandurama" property, the boundary of the Project Site and the proposed limit of extraction of clay/shale.

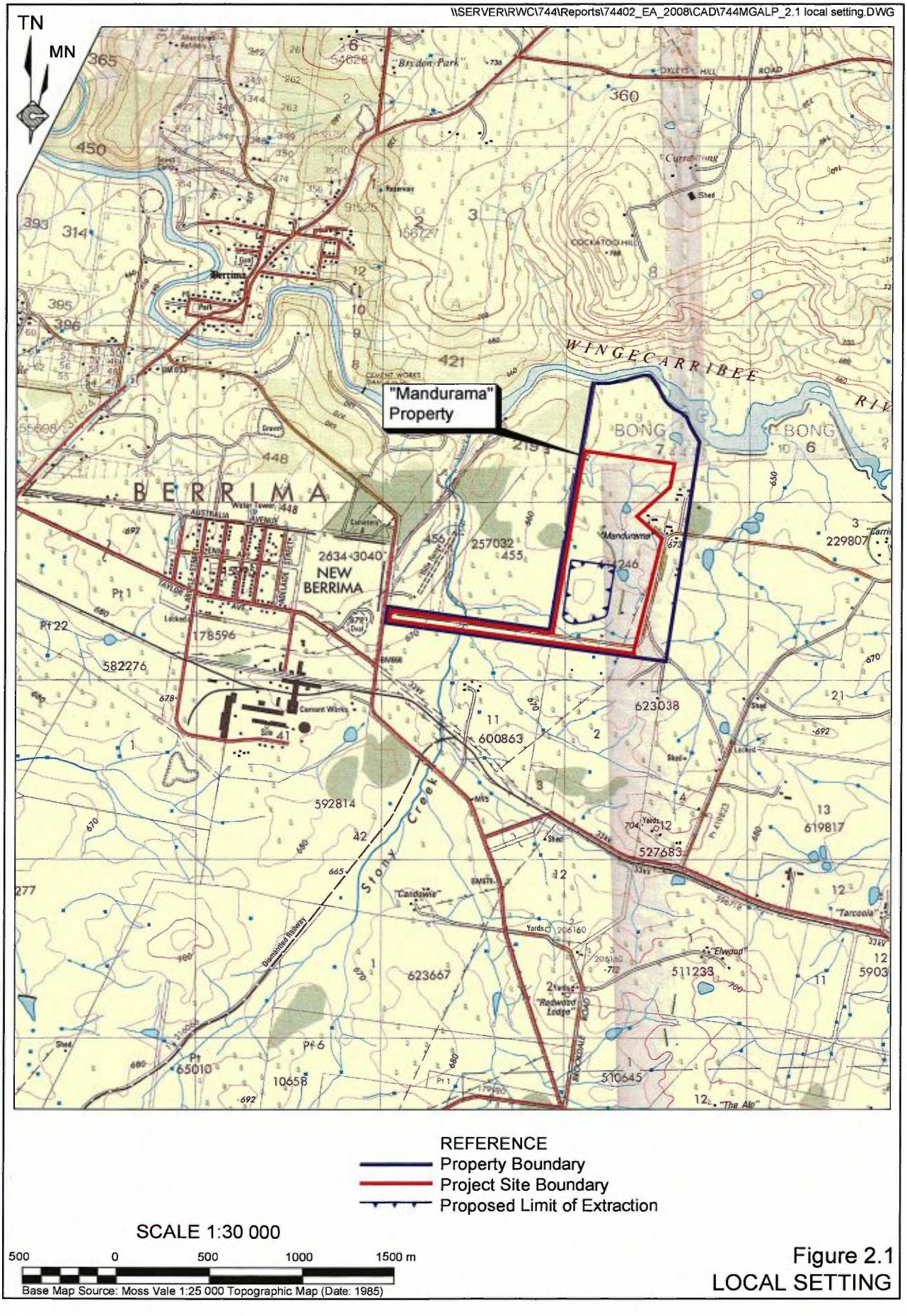


Figure 2.1
LOCAL SETTING

The entire Project Site has been previously disturbed, used for grazing, and is covered with pasture, comprising predominantly introduced pasture species and weeds. Five small farm dams are situated within the Project Site.

### 2.1.3 Overview of the Project

The Proponent proposes to extract and transport an average of approximately 120 000tpa shale, weathered shale, brick clay and some friable sandstone, with an upper limit of 150 000tpa, for a period of 30 years. The upper limit of 150 000tpa is being sought to allow for fluctuations in the demand for the various raw materials as determined by the production levels at the Bowral Brick Plant. The operation would employ approximately five part-time persons for the duration of the Project. The Project would involve a capital investment of approximately $1 million.

The extraction of the resource would be undertaken in six stages principally to reduce the area of disturbance at any one time and to facilitate progressive rehabilitation of disturbed areas. The Proponent's principal raw material requirement at its Bowral Brick Plant is for the shale material within the defined extraction area. Whilst the overlying clay, weathered shale and sandstone has uses in the manufacture of bricks, the Proponent anticipates at this time, that only small quantities of the these materials would be extracted and transported to the Bowral Brick Plant and potentially other Proponent's brick plants in the Sydney area and other sites requiring fill materials. For the purposes of the Project, the materials transported from the extraction area are referred to throughout this document as "product clay/shale".

The main features of the extraction operations would be:

- campaign stripping of topsoil and subsoil for use in the construction of amenity bunds and progressive site rehabilitation;
- progressive construction of amenity bunds;
- two or three extraction campaigns per year, each involving the excavation and stockpiling of the product clay/shale on the floor of the extraction area;
- a water management system to manage water collected within the sump and runoff from disturbed areas; and
- full-time transportation of the product clay/shale to the Bowral Brick Plant.

The Project has been designed cognizant of the SEPP (*Mining, Petroleum Production and Extractive Industries) 2007* and its intent to ensure that extractive material resources are properly developed and managed for the purpose of promoting the social and economic welfare of the State. The staging has been designed to avoid sterilisation of the total resource and to maximise its potential extraction beyond the proposed limit of extraction at a later date. The staging would also allow early and progressive rehabilitation, thereby reducing the impacts on visual amenity.

### 2.1.4 Approvals Required

The Project requires project approval under Part 3A of the *Environmental Planning and Assessment Act 1979*. As such, the Minister for Planning is the approval authority. Under Part 3A, the application for project approval must be made prior to the receipt of Director-General's Requirements for the project. The application for project approval was made in November 2008 (application number MP 08_0212).

The following licences and approvals, additional to those encompassed by the project approval process, would be required following the issue of the project approval to allow commencement of the project.

**Environment Protection Licence – Department of Environment, Climate Change and Water**
An Environment Protection Licence is required under Section 47 of the *Protection of the Environment Operations Act 1997* to develop and operate the quarry.

**Section 138 Road Permit – Wingecarribee Shire Council**
Under the *Roads Act 1993,* a permit would be required for the proposed works at the intersection of the site access road and Berrima Road.

**Water Licence – Department of Environment, Climate Change and Water – NSW Office of Water**
A licence may be required under Section 10 of the *Water Act 1912* to enable the Proponent to construct dams for the collection of surface water for dust suppression purposes i.e. within the Harvestable Right Dam Capacity for the property.

It is noted that a mining lease is not required for the Project as the ownership of the clay/shale to be extracted is vested in the landowner. Notwithstanding this, the Proponent will lodge a Section 8 Notice of Intent to satisfy the provisions of Section 8 of the *Mining Act 1992*.

Given the comparatively low-key nature of the proposed activity, it is proposed that no permanent buildings or sewerage systems would be constructed within the Project Site.

## 2.2 GEOLOGY AND RESOURCES

The Project Site is located close to the southwestern margin of the Sydney Basin where one of the main geological units is the Wiannamatta Group with the Ashfield Shale overlying the widespread Hawkesbury Sandstone. The drilling investigations undertaken by the Proponent on the "Mandurama" property have established there is in the order of 8 million tonnes of recoverable shale on the property, which is ideally suited to the manufacture of dry pressed bricks at the Bowral Brick Plant. **Figure 2.2** shows the extent of the optimum resource area within the Project Site and two representative cross-sections through the resource.

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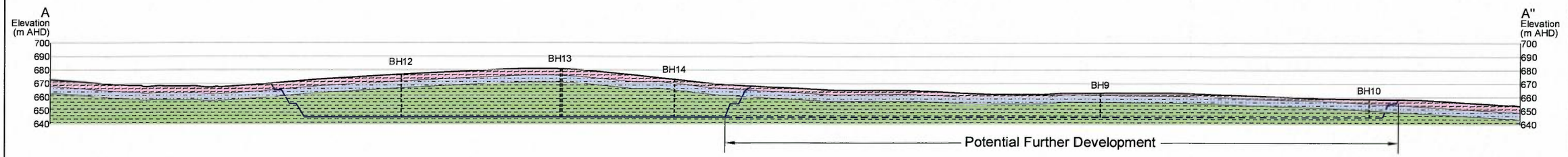
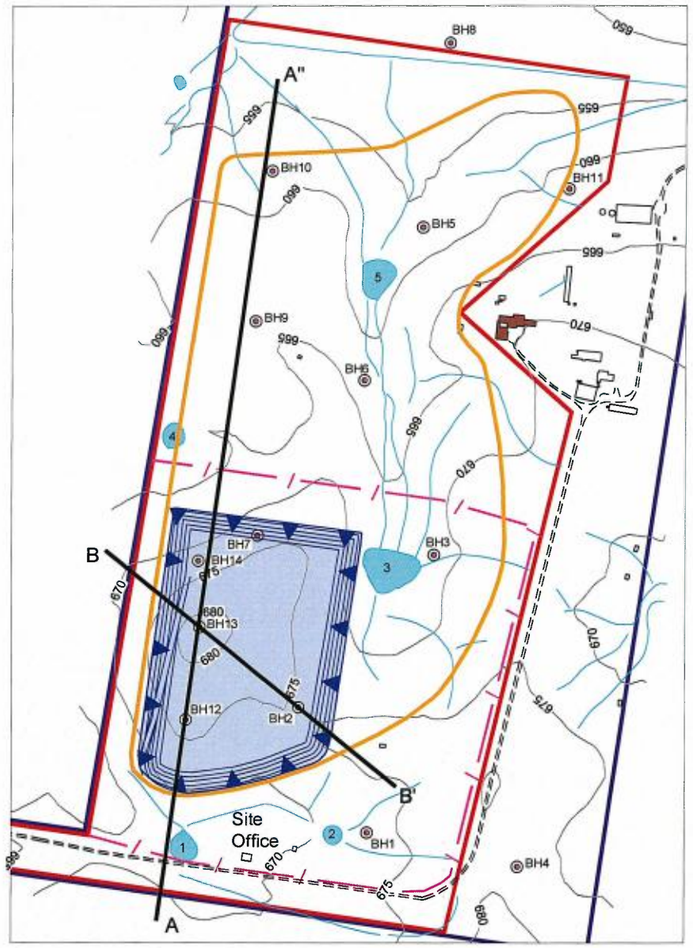
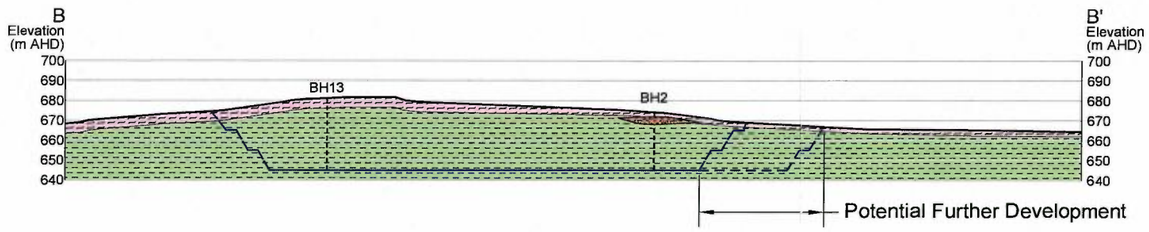


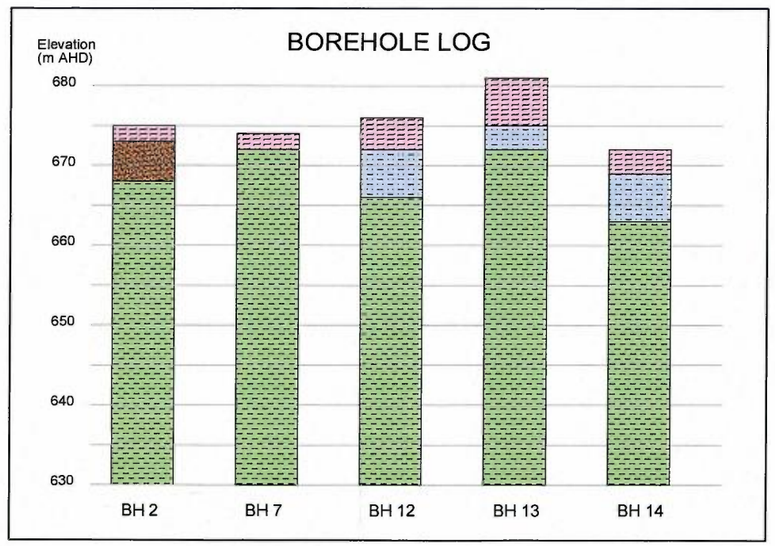




SCALE 1:3 000
50 0 50 100 150m

REFERENCE
- Property Boundary
- Project Site Boundary
- Clay/Shale Resource Boundary
- Limit of Extraction
- Contour (m AHD)(Interval = 5m)
- Creek / Drainage Line
- Dam / Water Storage (and Reference No.)
- Unsealed Road / Track
- Proposed Fence
- Residence / Building
- Bore Hole (and Reference No.)

RESOURCES
- Clay
- Weathered Shale
- Shale
- Sandstone




Base Map Source: Geo-Spectrum (Australia) Pty Ltd - Date of Photography: 26 August 2008

**Figure 2.2**
**RESOURCES**

The Proponent's experience in extracting Ashfield Shale over many years has assisted the Company to define the optimum extraction area within the "Mandurama" property. A total of 14 diamond holes drilled on the "Mandurama" property has assisted the Proponent to define the optimum area of extraction of the long term resource to underpin the manufacture of bricks at the Company's Bowral Brick Plant. The drilling established a common topsoil/subsoil thickness of at least 1m underlain by variable thicknesses of clay/weathered shale (1m to 8m) and shale (7m to 23m). Variable thicknesses of sandstone are present either in the more elevated areas on the southern side of the "Mandurama" property or in the lower northern parts of the property.

For the purposes of the current project application, approximately 3.6 million tonnes of shale has been defined within the southern section of the total identified resource. This quantity of shale would be sufficient to satisfy the raw material demands of the Bowral Brick Plant for approximately 30 years. However, in order to maximise the utility of the overall resource, the Proponent proposes to seek a further approval to extract the remainder of the 8 million tonne resource towards the completion of extraction within the defined extraction area. The Proponent recognises the importance of ensuring that the total resource of 8 million tonnes is not sterilised by subsequent and adjacent land uses and that it is available for future generations requiring bricks and pavers manufactured from Ashfield Shale.

## 2.3 SITE LAYOUT

The Project Site incorporates all areas of disturbance associated with the proposed Project-related activities and includes the following components (**Figure 2.3**).

- A site access road from Berrima Road to the extraction area, a distance of approximately 800m.
- An extraction area covering approximately 7.7ha.
- A water storage facility in the active extraction area to store surface water runoff and any incidental groundwater inflows to the extraction area.
- Re-development of two existing dams to serve as sedimentation dams which would capture runoff from disturbed areas outside the extraction area.
- A transportable lunchroom/amenities building.
- A storage and workshop area located within a shipping container.
- Three perimeter amenity bunds which would minimise visual, noise and dust impacts, namely the combined Northern and Western Amenity Bunds and Southern Amenity Bund.
- A surplus overburden stockpile area which would initially be the storage area for surplus overburden and product clay/shale and topsoil in the longer term.

# 2.4 SITE ESTABLISHMENT

## 2.4.1 Introduction

Due to the simplicity of the proposed extraction operations and despatch of product clay/shale, the Project Site would require minimal infrastructure development. There would be an initial program to establish the extraction operation with subsequent programs as the extraction area is developed.

## 2.4.2 Land Preparation

Land preparation activities would be undertaken, where practicable, on an ongoing annual campaign basis, with the area to be prepared limited to the area required for extraction-related activities during the subsequent 12 month period, whenever appropriate.

The following procedures would be implemented during the initial period of site establishment.

- The boundary of the approved extraction area would be surveyed and clearly marked at each main corner at intervals of approximately 100m together with the location of the three amenity bunds, surplus overburden stockpile area, haul road and site access road.
- Surface water and/or sediment and erosion controls would be installed or constructed prior to or during vegetation removal and soil stripping activities in accordance with a Sediment and Erosion Control Plan based on undertakings described in Section 5.2.
- Drains would be constructed adjacent to the haul road and surplus overburden stockpile area and other disturbed areas to direct runoff from disturbed areas into the sedimentation dams.
- Screening trees would be planted east of the proposed surplus overburden stockpile area, following appropriate soil preparation to receive the tube stock. Planted areas would be mulched and protected with temporary fencing.
- A plot of farm forest, approximately 4ha in size, would be planted on the northern side of the extraction area, over the proposed Stage 4 area. The purpose of these trees would be to provide screening from the north of the extraction area during Stage 4. A tall and fast growing native species which provides marketable timber, such as *Corymbia maculata*, would be planted. It is expected that these trees would be up to 18 years old and of sufficient height to provide good visual screening when Stage 4 commences. They would be subsequently strip cleared as Stage 4 proceeds down the hill in a northerly direction (see Section 5.6.4).

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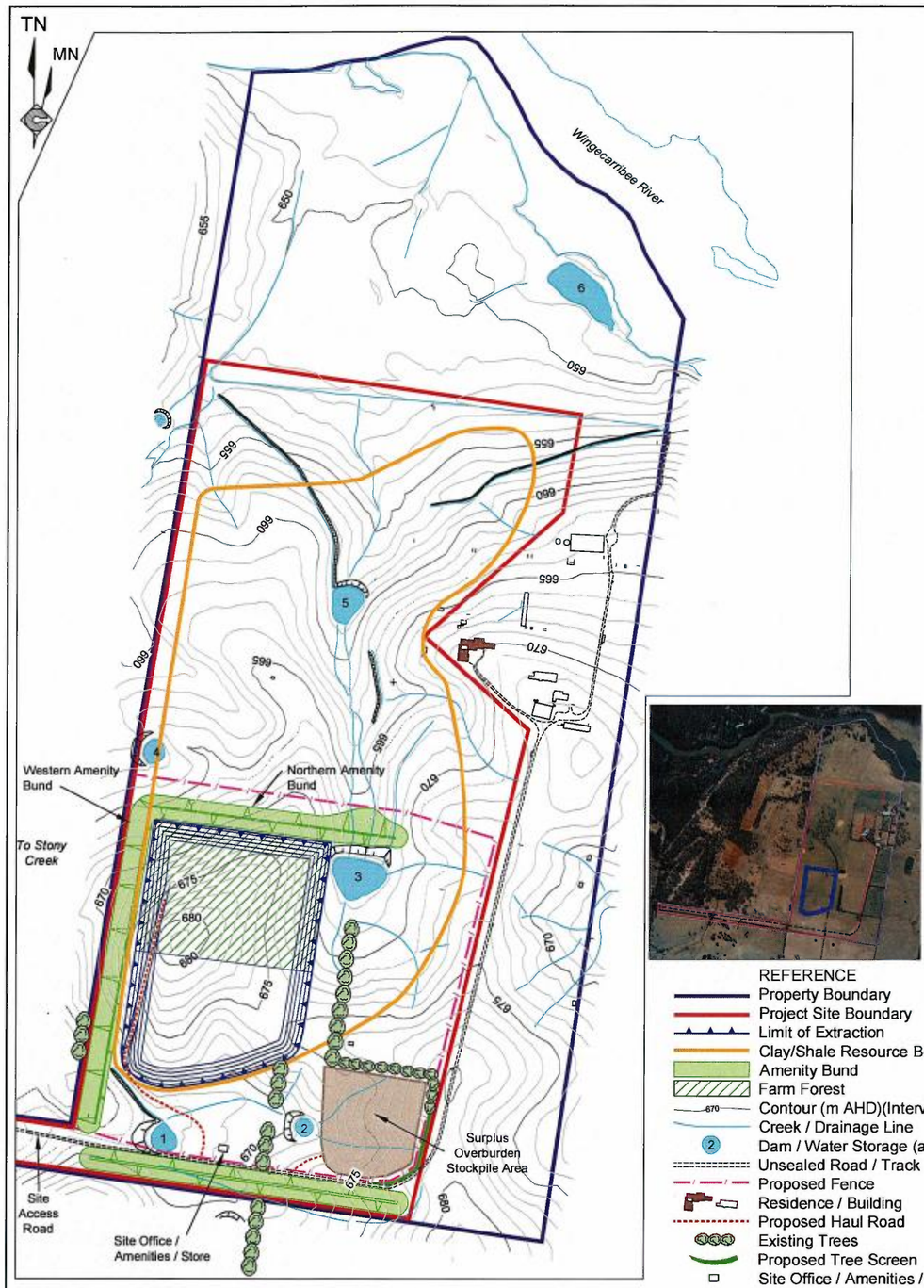





REFERENCE
- Property Boundary
- Project Site Boundary
- Limit of Extraction
- Clay/Shale Resource Boundary
- Amenity Bund
- Farm Forest
- Contour (m AHD)(Interval = 1m)
- Creek / Drainage Line
- Dam / Water Storage (and Reference No.)
- Unsealed Road / Track
- Proposed Fence
- Residence / Building
- Proposed Haul Road
- Existing Trees
- Proposed Tree Screen
- Site Office / Amenities / Storage


Base Photograph Source: Geo-Spectrum (Australia) Pty Ltd - Date of Photography: 26 August 2008

Figure 2.3
PROPOSED SITE LAYOUT

### 2.4.3 Infrastructure and Services

Two Telstra telephone lines traverse the "Mandurama" property, one of which traverses the proposed extraction area. This would be relocated before any earthworks commence. The existing telecommunications line would be connected to the site office. Potable water would be transported to site in portable tanks/bottles. The supply of any electrical power required would be through the use of a diesel generator.

A transportable lunchroom/amenities would be placed on the southern side of the active extraction area. A small shipping container would be brought to the site to serve as a storage area for small quantities of earthmoving equipment consumables and general tools and small equipment. Diesel would not be stored on site but be delivered as required by mobile tankers. A small skip bin would be kept on site for general rubbish and collected, as required.

The extraction area would be fenced with lockable gates for security and safety purposes. The remainder of the Project Site and the "Mandurama" property would continue to be used for grazing and cropping. The bridge on the site access road currently supports large cattle trucks but would undergo an engineering inspection and rectification or improvement as required, prior to use by heavy haulage vehicles. As recommended in the Traffic Assessment Report (Traffic Solutions, 2010), the intersection of Berrima Road and the site access road would be upgraded to an RTA type BAR treatment to provide safe traffic movements. The existing gate/driveway would be reconstructed to allow two heavy vehicles to pass at the entrance, if required. Approximately 400m of the western end of the site access road would be sealed to minimise the tracking of mud from the Project Site onto public roads.

### 2.4.4 Vegetation Removal

The existing vegetation on the Project Site comprises mainly introduced pasture species. This would be removed during topsoil stripping and remain incorporated in the topsoil. Should it be necessary, a herbicide may be sprayed across the area to be stripped prior to soil stripping to limit the presence of weeds in the stripped topsoil.

A few trees would require removal, principally near the centre of the extraction area and at the southern boundary of the property at the proposed location of the southern amenity bund. These trees are cotoneaster shrubs, pine trees which have been planted to form windbreaks and two *Eucalyptus botryoides* (Bangalay). The flora assessment has determined that the two *E. botryoides* are not potential habitat trees or threatened species. All trees would be felled and mulched and the mulch used on site.

### 2.4.5 Soil Stripping and Handling

Stripping of topsoil and subsoil would be undertaken in accordance with the recommendations of GCNRC (2009b). Topsoil would be stripped to a depth of approximately 15cm from all areas to be extracted and those areas to be disturbed, such as beneath the proposed amenity bunds. Handling of the topsoil and subsoil would be kept to a minimum and avoided during wet conditions to protect against damage to the soil's structure.

Stripping would not be conducted under the temporary structures such as the site lunchroom/amenities. The topsoil would be temporarily stockpiled for later dressing of the constructed amenity bunds. As the extraction area is further developed and where practicable, emphasis would be placed upon directly transferring a proportion of the soils removed from the proposed extraction area to a completed section of a final perimeter bund. It is anticipated that there would be a surplus supply of topsoil during the stripping of Stage 4 because amenity bunds would be fully established. Topsoil not used immediately for rehabilitation would be stockpiled and vegetated for stability in the surplus overburden stockpile area for later rehabilitation work.

The clayey subsoil would be stripped to a depth of approximately 100cm and either directly placed in the area of amenity bunds, stockpiled for use in rehabilitation activities, or used for brick manufacture.

## 2.5 EXTRACTION OPERATIONS

### 2.5.1 Design of Extraction Area

Extraction operations would involve two or three campaigns each year, with approximately 40 000 to 60 000 tonnes of product clay/shale extracted throughout each campaign.

The principal design parameters of the extraction area are as follows.

| | |
|---|---|
| Face Heights: | 10m |
| Bench Widths (operational): | 30m to 50m |
| Final Bench Widths: | 5m |
| Face Angle: | Approximately 70 degrees from the horizontal |
| Haul Road Grade: | Variable but typically >1:10 (V: H) |

### 2.5.2 Methodology

The approach to the extraction of the product clay/shale would generally be consistent with that adopted in the extraction area adjacent to the Bowral Brick Plant. Following removal of all topsoil and unwanted clayey subsoil, the weathered shale would be pushed up with a bulldozer and used in bund construction, stockpiled in the surplus overburden stockpile area or stockpiled for despatch, as required. Topsoil would be stockpiled separately if not immediately required for bund construction or rehabilitation. Weathered shale would be stockpiled separately from other inferior clays. Similarly, sandstone would be used in bund construction or stockpiled for despatch or rehabilitation.

Based on an area of 40 000m$^2$, an average topsoil depth of 15cm and an average overburden depth of 7m, approximately 6 000m$^3$ of topsoil and 280 000m$^3$ of overburden would have to be removed during Stage 1 to access the shale. Of the overburden, approximately 50 000m$^3$ would be sandstone and the remaining 230 000m$^3$ would be clay and weathered shale. Depending on its quality and suitability for brick manufacture, a proportion of the weathered shale, clay and sandstone may be removed from site by truck. An additional 6 000m$^3$ of topsoil would be stripped from areas under the amenity bunds and used immediately if possible or stockpiled for

later use in rehabilitation. The surplus overburden stockpile area would be approximately 2ha in size, with a capacity to store approximately 100 000m$^3$ of materials. It is anticipated that the construction of the amenity bunds would require approximately 140 000m$^3$ of material and 7 000m$^3$ of topsoil. Therefore, approximately 45 000m$^3$ of material would have to be stored in the excavation area or transported off site during Stages 1 to 3. It is noted that a proportion of this material would be used for rehabilitation which would commence following Stage 1. A temporary "wet weather" stockpile of product clay/shale would be established in the surplus overburden stockpile area. This would allow some transportation of product clay/shale during wet weather events which prevent trucks entering and departing from the extraction area.

Once exposed, the shale would be ripped and then cross ripped preferably across a vertical interval of at least 5m to achieve the required level of blending. The ripped shale would then be pushed up into one or more stockpiles on the floor of the extraction area, typically to a height of approximately 4.5m.

In the event any lenses or bands of sandstone are encountered during the extraction campaigns, the upper surface of the sandstone would be cleaned of shale and the sandstone ripped and either used in bund construction, pushed with a bulldozer to a completed section of the extraction area, placed in the surplus overburden stockpile area or despatched from site.

Each extraction campaign would conclude with a program of activities to ensure that no sediment-laden runoff is possible external to the boundary of the extraction area during the intervening period until the next extraction campaign. A sump or similar structure of appropriate capacity would be left to ensure that internal runoff within the extraction area would be directed away from the area that would be the subject of the next extraction campaign.

### 2.5.3 Amenity Bunds

**Figure 2.3** displays the amenity bunds that would be constructed on the northern, western and southern sides of the extraction area. Amenity bunds are not required on the eastern side of the quarry due to the natural topography and an existing row of trees on the "Mandurama" property, both of which would shield areas east of the property from visual and noise impact. The bunds would be constructed progressively, dependent on the availability of the subsoil and sandstone stripped from the extraction area. Sandstone extracted would be the preferred material for the bunds, particularly the southern and western bunds as these bunds would be potentially more permanent than the northern bund. Clay and weathered shale would also be used in bund construction depending on its quality and suitability for brick manufacture. Construction of bunds would commence with the northern and then western bunds to provide a visual barrier for residents on these sides of the extraction area as early as possible. Much of the extraction area is shielded to the north throughout Stages 1 to 3 of extraction, due to the natural topography. However, the face of the uppermost southern bench would progressively become more visible to residents on the north, so rehabilitation of this face would commence as soon as extraction to the first bench is completed.

**Table 2.1** outlines the approximate dimensions and volumes of materials required for the three amenity bunds.

**Table 2.1**
**Amenity Bund Dimensions**

| Amenity Bund | Height (m) | Base width (m) | Length (m) | Bund Base Surface area (ha) | Approximate Volume of subsoil/clay required ($m^3$) | Approximate Volume of topsoil required ($m^3$) |
|---|---|---|---|---|---|---|
| Northern | 7 | 30-50m variable | 365 | 1.1 | 38 000 | 1 900 |
| Western | 7 | 30 | 465 | 1.4 | 49 000 | 2 400 |
| Southern | 7 | 30 | 500 | 1.5 | 52 000 | 2 600 |
| **Total** | | | | **4.0** | **139 000** | **6 900** |

The footprint of each amenity bund would be stripped of its existing topsoil. If appropriate, up to 0.5m of subsoil would be placed on the surface of the materials used to form each bund and moderately compacted. A 150mm layer of topsoil would be placed on the surface of the bund with mild compaction using the tracks of a bulldozer.

The outside slopes and tops of the amenity bunds would be revegetated with a quick growing cover crop for rapid stabilisation and a seed mix of native grasses and shrubs indigenous to the area and known to have high establishment success.

All bunds would be constructed to a height of approximately 7m above the existing surface. Bunds would have a top width of 2m and a 1:1 (V:H) grade on the inside slopes and a 1:3 (V:H) grade on the outside slopes to provide the maximum visual impact and noise attenuation possible.

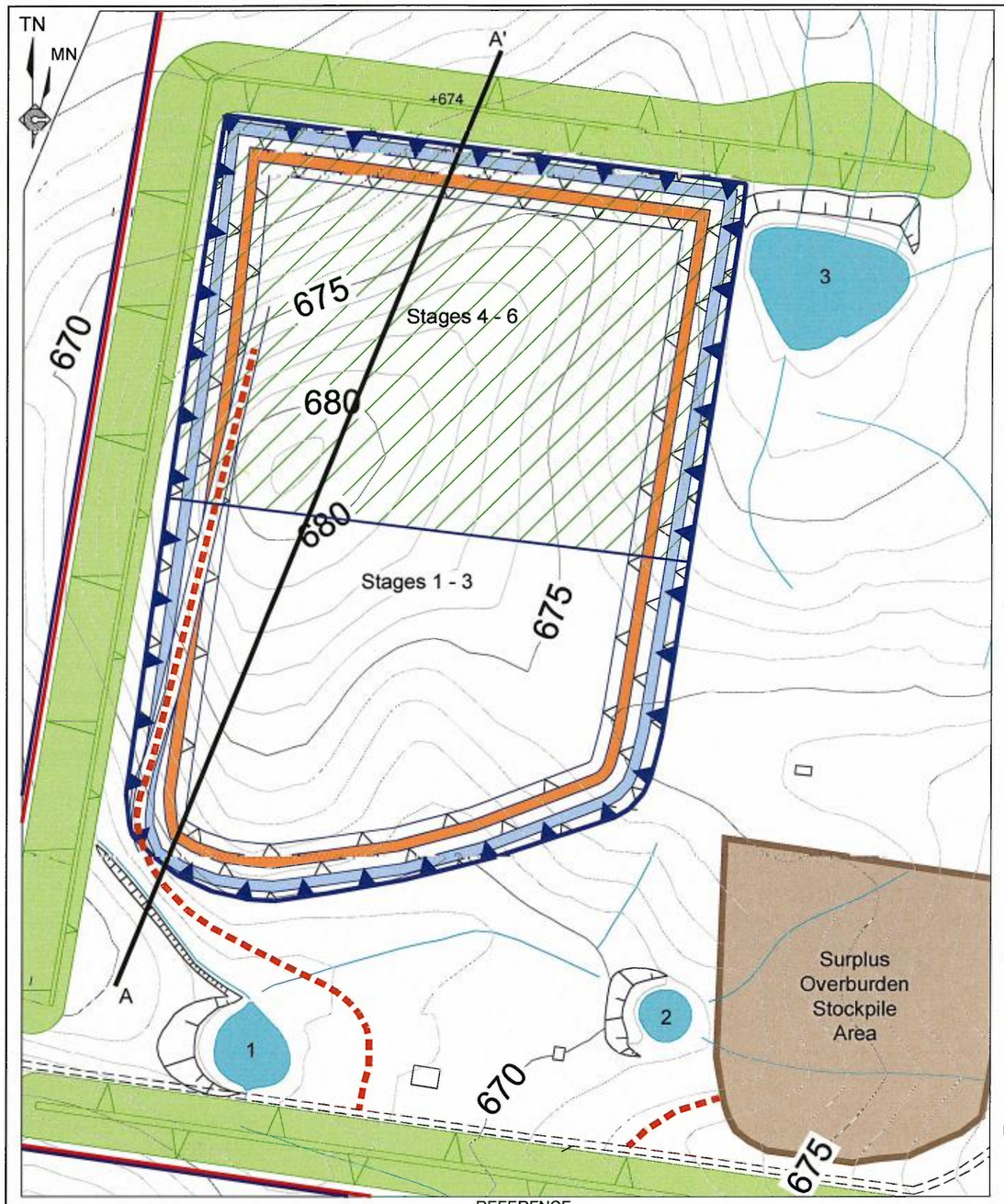
### 2.5.4 Staging

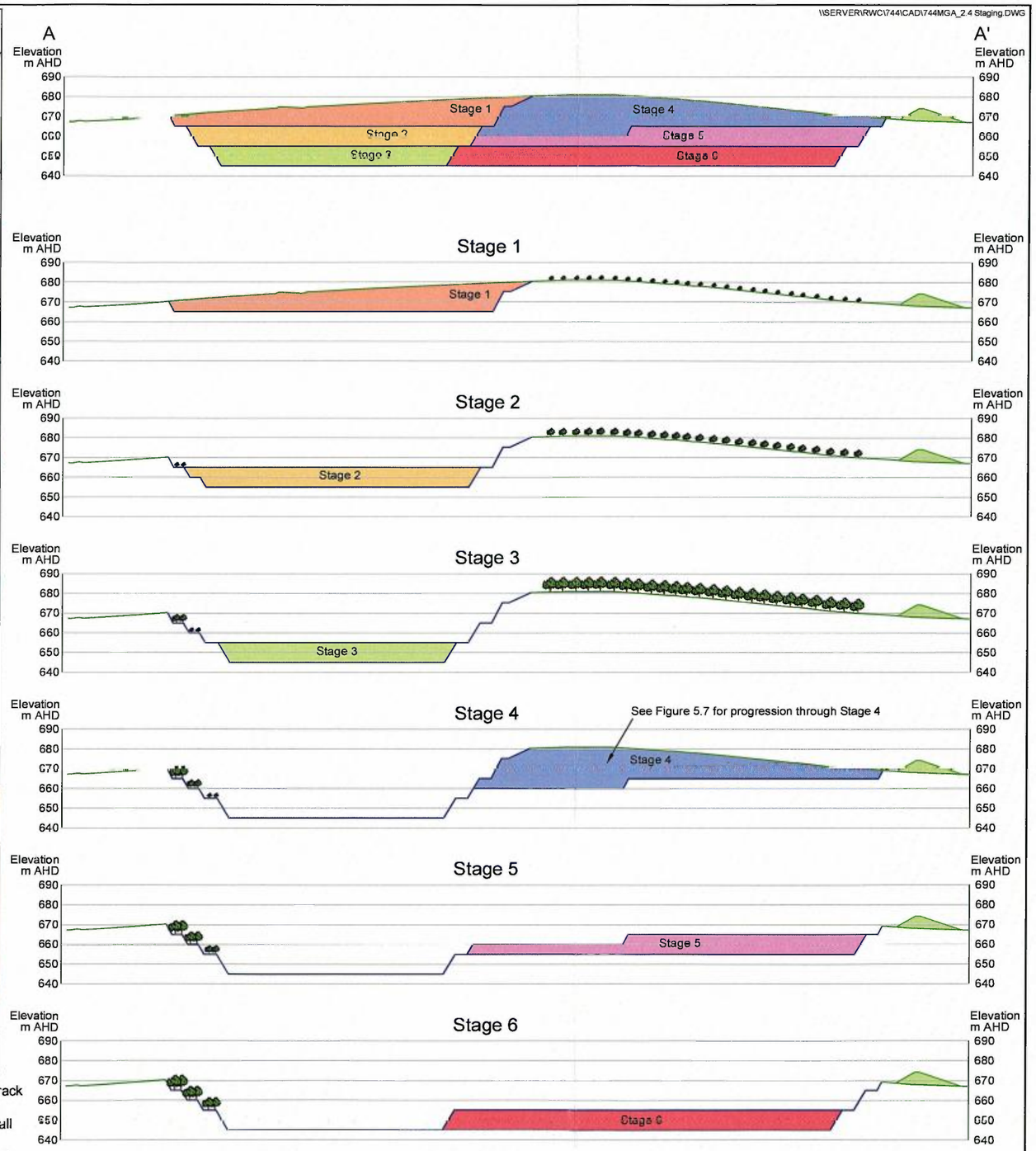
The six stages of extraction are shown in **Figure 2.4**. The first three stages would be on the southern side of the extraction area and Stages 4, 5 and 6 would be on the northern side of the extraction area. **Table 2.2** lists the estimated duration of each extraction stage and the approximate quantity of product clay/shale to be recovered.

**Table 2.2**
**Duration and Extraction Quantities of Product Clay/Shale for Quarry Stages**

| Stage | Depth (to m AHD) | Approximate Extraction Period | Extraction (t) | Cumulative Extraction (t) |
|---|---|---|---|---|
| 1 | 665 | Years 0 – 8 | 830 000 | 830 000 |
| 2 | 655 | Years 9 – 13 | 650 000 | 1 480 000 |
| 3 | 645 | Years 14 – 18 | 540 000 | 2 020 000 |
| 4 | 665 | Years 19 – 23 | 540 000 | 2 560 000 |
| 5 | 655 | Years 24 – 26 | 500 000 | 3 060 000 |
| 6 | 645 | Years 27 – 30 | 540 000 | 3 600 000 |

The current plans for the extraction area depict the floor of the extraction area to be approximately 645m AHD. It is intended as part of the ongoing operation of the extraction area beyond the initial 30 year quarrying life to also establish through further exploration the type and quantity of shale beneath the 645m AHD level. In the event it is feasible to recover further shale at depth within the extraction area, project approval would be sought for this activity at that time.




REFERENCE
- Property Boundary
- Project Site Boundary
- Limit of Extraction
- 680 Contour (m AHD)(Interval = 1m)
- +674 Spot Height (m AHD)
- Creek / Drainage Line
- 2 Dam / Water Storage (and Reference No.)
- Unsealed Road / Track
- Building
- Vegetated Bund Wall
- Farm Forest
- Proposed Haul Road
- 655m Bench
- 665m Bench

SCALE 1:2 500
25 0 25 50 75 100 125 m

Base Map Source: Geo-Spectrum (Australia) Pty Ltd - Date of Photography: 26 August 2008

Figure 2.4
EXTRACTION STAGES

### 2.5.5 Equipment

The mobile equipment involved in the extraction operations would typically include the following.

- A scraper (e.g. Cat 637) for initial topsoil removal and subsoil/clay removal and construction of the amenity bund walls.
- A bulldozer (e.g. Cat D10) for topsoil removal beneath amenity bund walls and ongoing topsoil stripping campaigns, ripping and pushing up weathered shale and unweathered shale, ripping and pushing sandstone.
- An articulated haul truck (e.g. Cat 740) for re-location of ripped/broken sandstone within the extraction area and to the surplus overburden stockpile area.
- A front-end loader (e.g. Cat 966) for loading product clay/shale into highway trucks and ripped/broken sandstone into the articulated haul truck.

### 2.5.6 Campaign Duration

The extraction campaigns would typically produce approximately 2 000t per day or an average of 10 000t per week. Based on this weekly yield, each campaign would typically occur over a period of 4 to 6 weeks, depending on limiting weather conditions.

## 2.6 PRODUCT TRANSPORTATION

### 2.6.1 Introduction

The product clay/shale would be loaded into haul trucks by a front-end loader and transported to the Bowral Brick Plant. The loading of the trucks would invariably be carried out by the truck drivers themselves or one of the other operators on site throughout extraction campaigns.

Transportation of the product clay/shale from the quarry would be by road-registered trucks predominantly Monday to Friday. In special circumstances, such as following prolonged wet weather, transportation would be conducted on Saturdays and Sundays. This capability would allow the Bowral Brick Plant to remain operational after wet weather events.

The trucks would comprise both rigid and articulated configurations including truck and dog trailers with an average load capacity of approximately 30t. All trucks would be operated by an authorised contractor whose drivers have all been fully inducted and aware of the Proponent's Drivers Code of Conduct.

Further discussion on the transportation route and the proposed mitigation measures relating to the proposed traffic levels is provided in Section 5.1.

### 2.6.2 Internal Roads

The existing site access road within the Project Site from Berrima Road would be retained principally as a single-lane road with the last 400m sealed. **Figure 2.5** displays the alignment of the internal haul road from the site access road into the extraction area. The internal haul road within the extraction area would be located on the western side of the extraction area to maximise the acoustic shielding of trucks travelling into and out of the extraction area from the New Berrima township.

The existing bridge across Stony Creek along the site access road has been assessed as suitable for the proposed truck movements. The integrity/structure of the bridge would be reviewed periodically and if required repaired. All repair works would be undertaken with reference to "Guidelines for Controlled Activities Watercourse Crossings".

### 2.6.3 Transportation Route

The proposed transport route between the Project Site and the Bowral Brick Plant is shown on **Figure 2.5**. All trucks would exit the Project Site and turn left on to Berrima Road, turn right on to Taylor Avenue, follow the existing heavy vehicle route on the southern side of New Berrima to the Hume Highway and then the existing designated heavy vehicle transport route via the Hume Highway to Bowral Brick Plant. Transportation would not be via Berrima Road, north of the entrance to the Project Site, due to the 10t load limit which is imposed on this section of road. The distance between the proposed extraction area and the Bowral Brick Plant is approximately 23km by the prescribed route. Depending on demand, limited quantities of product clay/shale, including sandstone may be sent to other brick plants in Sydney or other sites requiring the material(s).

### 2.6.4 Traffic Volumes

Transportation of product clay/shale would be predominantly conducted Monday to Friday on a full-time basis. Assuming full-time transportation, up to approximately 2 500t of product clay/shale would be transported to the brick plant each week. With each load being approximately 30t, there would be approximately 17 loads per day, or 34 truck movements per day, for 5 days per week. This represents approximately eight or nine return trips for two trucks each day. Alternatively, if a two week per month campaign basis is adopted, there would be 34 loads per day, or 68 truck movements per day for 10 days every four weeks, This represents approximately eight or nine return trips for four trucks each day.

Following periods of prolonged wet weather, traffic volumes may need to be as high as 68 loads per day or 136 truck movements per day albeit only for a few days. This would allow the Bowral Brick Plant to quickly accumulate product clay/shale which it had not been able to access during the wet weather, thus enabling the plant to remain operational. This level of traffic movements would rarely occur, however, it is necessary to provide for this contingency to maintain the supply of raw materials for brick manufacture.

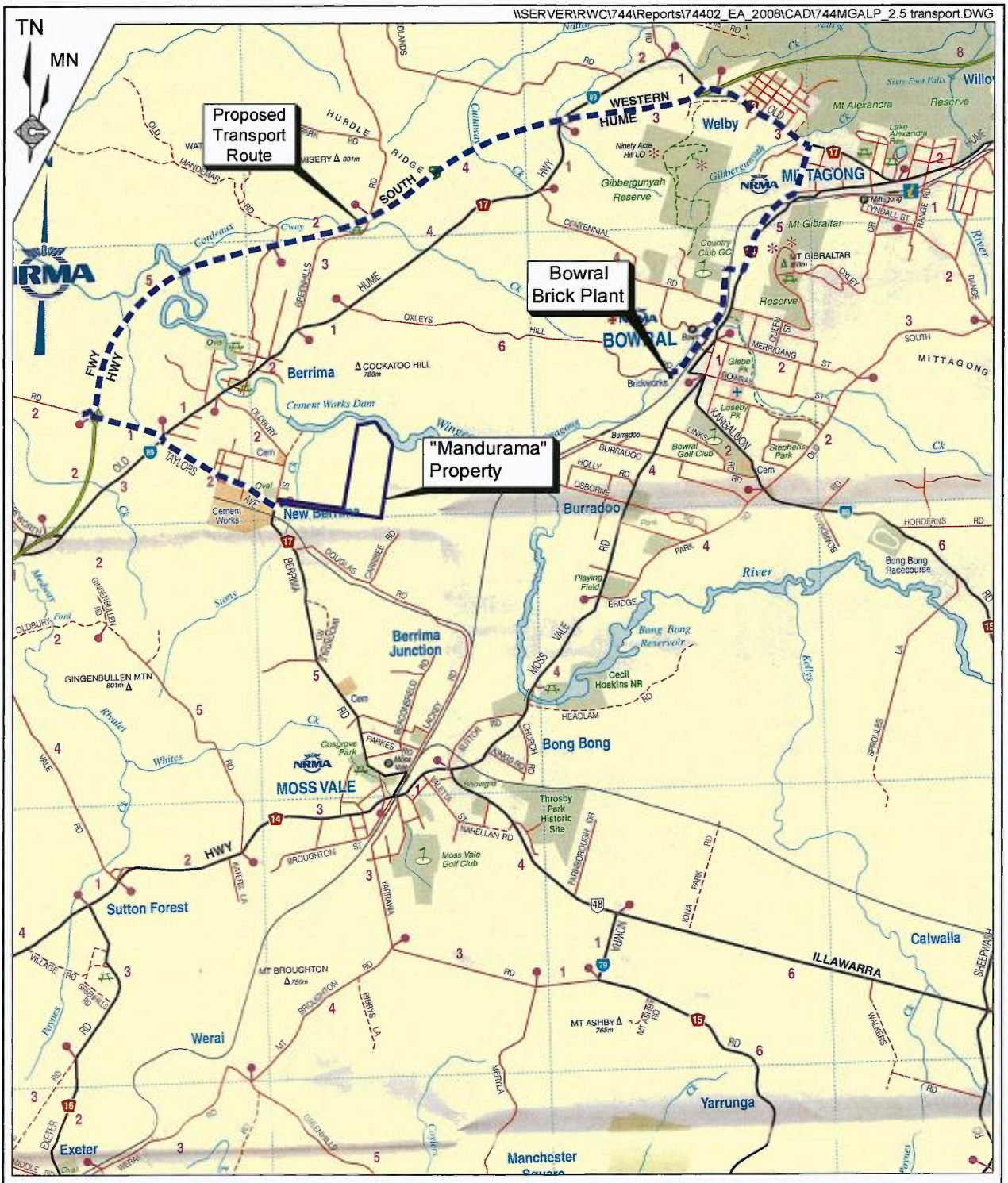



Figure 2.5
PROPOSED CLAY / SHALE TRANSPORT ROUTE

# 2.7 HOURS OF OPERATION AND PROJECT LIFE

## 2.7.1 Hours of Operation

The proposed hours of operation for site activities and despatch of product clay/shale are presented in **Table 2.3.** Transportation of product clay/shale would be predominantly undertaken on weekdays, however, transportation may need to be undertaken on weekends in special circumstances such as following periods of prolonged wet weather.

**Table 2.3**
**Proposed Hours of Operation**

| Activity | Monday to Friday | Saturday | Sunday |
|---|---|---|---|
| Extraction Operations | 7:00am – 5:00pm | 7:00am – 2:00pm | nil |
| Product Clay/shale Despatch | 7:00am – 4:00pm | 7.00am - 4.00pm if required due to special circumstances | 8.00am - 4.00pm if required due to special circumstances |
| Repairs & Maintenance | 6:00am – 6:00pm | 7:00am – 6:00pm | 8:00am – 6:00pm |

## 2.7.2 Project Life

The quantity of shale within the proposed extraction area is approximately 3.6 million tonnes. At an annual average production rate of 120 000t, the proposed extraction area would provide sufficient material for approximately 30 years. It is noted that geological testing throughout the entire Project Site has identified a total resource of approximately 8 million tonnes of shale. The Proponent intends to re-apply for a further project approval towards the end of the 30 year operational life to continue to provide the product clay/shale from the Project Site to the Bowral Brick Plant.

# 2.8 WASTE MANAGEMENT

## 2.8.1 Production Waste

All overburden and subsoil materials would be retained on site for the construction of bunds or for rehabilitation, or despatched from site by trucks, if suitable for the manufacture of bricks. No other production wastes would be produced.

## 2.8.2 Non-Production Waste

### Domestic Wastes and Maintenance Consumables

General domestic waste would be segregated into recyclable and non-recyclable materials and removed from site by a licenced contractor or returned to the Bowral Brick Plant for collection at that site. All on-site bins would be fitted with lids. Any other waste generated would be removed to a facility licenced to receive these materials.

**Waste Oils and Filters**

No routine maintenance of trucks and machinery would be undertaken on the Project Site, therefore there would not be a regular source of waste oils or filters. In the event of emergency maintenance and repairs, small amounts of waste oils and filters would be stored temporarily in sealed containers in the on-site container and transported off site as soon as possible.

### 2.8.3 Sewage and Effluent Disposal

A portaloo would be established on site for use of the on-site personnel (when present) and truck drivers. The unit would be serviced on a regular basis by a local contractor.

## 2.9 UTILITIES AND SERVICES

The proposed quarry would not require any utilities or services connected on site. Reliance will be made upon the maximum harvestable right dam capacity for the on-site water supply for dust suppression. SEEC (2010) reviewed the water security for the proposed water supply and confirmed that the annual total water demand (8.05ML/yr) would be met 100% of the time from the harvestable right dam capacity of 4.59ML. No reliance would be placed upon the recovery of any groundwater from beneath the Project Site.

No fuel would be stored onsite as fuel would be transported to site, as required, by a local fuel supplier. Limited lubricants would be retained on site (and stored in a lockable container). Notwithstanding the absence of fuel storage on site, the Proponent would maintain a spill kit on site for use in the event of a spillage, hydraulic hose breakage etc.

Heggies (2010) record that the annual diesel usage for earthmoving equipment operating on site and to transport the clay/shale to the Bowral Brick Plant would vary from 148kL to 181kL per year. All road-registered trucks would be re-fuelled off site.

The Proponent promotes a high degree of energy efficiency throughout all facets of its business including product delivery.

## 2.10 EMPLOYMENT AND ECONOMIC CONTRIBUTION

Each extraction campaign would involve one machinery operator (full time) and a quarry manager (part time) for a period of 4 to 6 weeks, two to three times per year. Transportation of product clay/shale would involve up to four contracted truck drivers. Overall, the extraction and transportation of the product clay/shale would employ approximately four full time equivalent positions.

The Project would involve a capital investment value of approximately $1 million for the purchase and upgrade of equipment, site establishment and road construction.

## 2.11 SAFETY AND SECURITY

It is the Proponent's policy that each person employed on, or visiting the Project Site, is provided with a safe and healthy working environment. In order to achieve this, the Proponent would implement an induction and training program to achieve the following objectives.

- Ensure compliance with statutory regulations.
- Eliminate or control safety and health hazards in the working environment.
- Provide relevant occupational health and safety information and training to all personnel.
- Develop and review safe working practices and job training.
- Ensure all contractors adopt and maintain the Proponent's policy objectives and safety standards at all times.

Furthermore, as the proposed quarry is located largely amongst quiet agricultural areas with distant rural-residential areas and low density housing, procedures and controls would protect the safety of the neighbours and general public.

The following safety and security measures would be implemented.

- Installation and maintenance of standard agricultural perimeter fence around the active extraction area (see **Figure 2.3**);
- Installation of a lockable gate near Dam 1. This would be the only access to the extraction area and would be unlocked whenever either extraction activities or despatch of product clay/shale are in operation. Other gates in the perimeter fence would be kept locked at all times. The existing automatically controlled gate at the site access road entrance on to Berrima Road would be retained, allowing easy access for the residents and visitors to "Mandurama".
- Security and warning signs would be positioned at strategic locations around or within the extraction area indicating the presence of earthmoving equipment, deep excavations, steep slopes and possibly deep water. The positioning of signs would depend on the location of the extraction and transportation activities at any one time.
- Employee and visitor inductions would include safe working practices and regular follow-up safety meetings and reviews, when necessary.
- Where the internal road is adjacent to steep slopes, bunds would be constructed and maintained along the downslope margins of these roads to a minimum half the wheel height of the largest item of mobile equipment on-site.
- Strict compliance with all project approval conditions.

# 2.12 SITE REHABILITATION

## 2.12.1 Introduction

The Proponent would adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, areas where extraction and activities are completed are quickly shaped and vegetated to provide a stable landform. The progressive formation of the post-extraction landform and the establishment of a vegetative cover would also minimise the potential for adverse visual impacts, quarry-related air quality and surface water impacts on the surrounding environment.

The following sub-sections describe the Proponent's rehabilitation objectives and procedures and the proposed final landform on completion of all proposed extraction and transportation-related activities. It remains the Proponent's intention at this stage to re-apply for a further project approval to allow the Company to extend the lateral extent and potentially depth of the extraction area. As a consequence, the following sub-sections examine rehabilitation outcomes for the end of the 30 year period which could be easily modified to suit further development.

The proposed final landform, rehabilitation procedures and the selection of the revegetation species have been based on the long-term objective of returning as much of the disturbed area to its current use for grazing. It is noted that refinements to these procedures may be introduced, depending on the Proponent's plans to further develop the Project Site to maximise the extraction and utility of the total resource. These refinements would be reported in the relevant Annual Environmental Management Report prepared by the Proponent throughout the life of the Project.

## 2.12.2 Rehabilitation Objectives

The Proponent's rehabilitation objectives for all areas of quarry-related surface disturbance within the Project Site can be defined in the short term and long term.

In the short term, the objectives would be:

- to stabilise all earthworks, drainage lines and disturbed areas no longer required for extraction-related activities in order to minimise the risk of erosion, sedimentation and air quality impacts on the environment surrounding the Project Site; and
- to minimise the visual impacts of the extraction area, particularly from those residences on the northern side of Wingecarribee River through progressive rehabilitation.

The Proponent would ensure that progressive rehabilitation is undertaken as soon as practicable once an area is no longer required for extraction or transportation-related operations.

In the longer term, the Proponent's objective is to progressively provide a low maintenance, stable and safe landform that provides land capabilities on the completed extraction floor comparable with the pre-extraction land capabilities.

### 2.12.3 Final Landform

An important component in the rehabilitation of areas disturbed by extraction-related activities is the reconstruction of a landform that can support the proposed vegetation and subsequent land uses. **Figure 2.6** presents the final landform following the completion of all extraction and transportation-related activities.

The final landform would be a rectangular basin with a dam in the final sump location, collecting runoff from the 7.7ha internal area of the extraction area. The features of the final landform would be as follows.

- A basin landform within the extraction area with a gently sloping floor to the north. Walls of the basin would retain a maximum slope of 75° with the new horizontal benches progressively covered with selected overburden and supporting native shrubs and trees.
- A final dam with a capacity of approximately 2ML in the location of the final quarry sump.
- An access track to allow vehicular access to the basin.
- In the event there is no extension sought for the life of the quarry beyond 30 years, the amenity bunds would be removed and the recovered materials removed from site and/or placed on the extraction area floor. Sandstone and heavy subsoils would be laid down first and then the removed topsoil placed on top. The placement of this material on the extraction area floor would raise the surface by approximately 2m. The extraction area floor and bund areas would be revegetated with pasture species consistent with the existing pastures.

It is noted, however, that the retention or removal of the amenity bunds would be dependent on the Proponent's intentions for the future of the site. It is probable that, close to completion of the currently proposed extraction area, the Proponent would seek approval to extend the extraction area to maximise the recovery of the 8 million tonne resource. Similarly, assessment closer to the completion of extraction may identify an alternative preferable land use or determine that bund removal could cause the destruction of established habitat. If a further approval was granted for an extension of the extraction area and/or depth, the northern bund would be removed. Materials from this bund would be used in the construction of additional bunding required of the new development.

### 2.12.4 Final Land Use

The Proponent plans to establish improved pasture on the floor of the quarry and return it to its previous use as grazing land. The basin walls would be too steep for cropping or any machinery based activity, but would support stands of native trees and shrubs.

### 2.12.5 Rehabilitation Activities

Rehabilitation would be undertaken progressively as soon as practicable after sections of the Project Site are no longer required for extraction or transport-related activities. The following procedures would be implemented throughout rehabilitation to ensure the rehabilitation objectives identified in Section 2.12.2 are achieved.


Figure 2.6
FINAL LANDFORM

i) Sediment and erosion controls would be re-instated as required around all areas of disturbance.

ii) The final extraction faces would have an average overall grade of 2:1 (V: H) at the end of the extraction period. Terminal benches would be backfilled with subsoil to a height of approximately 2m to 3m against the extraction face. The relief of the placed subsoil would be made irregular to retard and catch runoff. Topsoil would be spread and the areas vegetated. A quick growing cover crop would be seeded to provide rapid stabilisation. Trees and shrubs endemic to the area would also be planted by seed and/or tube stock. It is noted that rehabilitation of Stage 1 extraction faces should be quite advanced as excavation proceeds to Stages 3 and 4.

iii) The operational haul road into the extraction area would be regraded to suit any changed grades of the basin walls and used as an access track into the basin.

iv) The floor of the excavation area would be deep ripped following the progressive completion of excavation. Stockpiled overburden and materials from the amenity bunds would be used to re-surface the floor of the excavation area.

v) Topsoil would be applied over the deposited overburden/subsoil.

vi) The surface of the placed topsoil would be left even but 'roughened' to assist with infiltration of water and seed retention.

vii) Pasture species would be seeded over all arable areas and fertilisers applied as recommended. The pasture species would be selected by the Proponent's farm manager reflecting the stock being carried on the property at that time.

viii) Stock would be prevented from entering rehabilitated areas until pasture is well established.

ix) The area to be rehabilitated would be fenced and signs erected to restrict access to the area.

x) Rehabilitation would be monitored regularly as described in Section 2.11.7.

### 2.12.6 Infrastructure and Services

Following the completion of extraction and transportation activities, the Project-related infrastructure and services, such as the, site amenities, container, redundant fences and signage would be removed. Sections of the Project Site which has been compacted would be ripped. Topsoil would be spread over the areas to be rehabilitated and these areas would be seeded as described in Section 2.11.5.

### 2.12.7 Rehabilitation Monitoring, Maintenance and Reporting

The Proponent's commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program throughout and immediately following the life of the Project. Areas undergoing progressive rehabilitation would be regularly inspected and assessed against the short and long term rehabilitation objectives outlined in Section 2.12.2.

During regular inspections, the following would be monitored.

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover.
- Success of pasture establishment, where present.
- Incidence of pasture attack by pests.
- Natural regeneration of native species on amenity bunds and benches within the extraction area.
- Adequacy of drainage controls.
- General stability of the rehabilitation areas.

Throughout the life of the Project, the following rehabilitation maintenance activities would be undertaken.

- Where monitoring indicates that rehabilitation success appears limited, the following maintenance activities would be initiated.
  - Re-seeding, re-topsoiling and/or the application of specialised treatments such as composted mulch and fertiliser to areas with poor vegetation establishment.
  - Protection against grazing by native animals.
  - Repair or reconstruction of drainage controls should existing controls be found to be inadequate.
- Where monitoring identifies excessive erosion and sedimentation, remedial works such as importation of additional fill, subsoil or topsoil material, or re-designing of water management structures would be undertaken.
- Where monitoring identifies actual or potential weed infestations, the Proponent would undertake appropriate weed control or eradication programs.

No time limit has been placed on post-extraction rehabilitation monitoring and maintenance. Rather, these activities would continue until such time as the rehabilitation objectives outlined in Section 2.12.2 are met to the satisfaction of the relevant government agencies.

The status of rehabilitation activities would be reported annually in the Annual Environmental Management Report.

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# Section 3

# Issue Identification and Prioritisation

*This section of the Environmental Assessment provides information outlining the steps undertaken to identify and prioritise the relevant environmental issues that are required to be addressed in the assessment of the Project.*

*The steps undertaken to identify environmental issues included:*

- *consultation with the local community;*
- *consultation with State and local government agencies;*
- *a review of relevant statutory requirements, State and Local Planning policies and environmental guidelines; and*
- *a review of the preliminary environmental studies undertaken for the Project.*

*The identified issues and potential impacts were then subjected to a risk analysis and the findings used to prioritise the assessment of the identified environmental issues within this Environmental Assessment.*

*This section concludes with a prioritisation of the identified environmental issues to be addressed.*

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## 3.1 METHODOLOGY

In order to prepare a comprehensive *Environmental Assessment* for the Project, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment and the surrounding local and wider community. The following sub-sections outline the results of the process undertaken to identify the most relevant environmental issues and potential impacts.

## 3.2 CONSULTATION

The process of consultation was initiated prior to, and was instrumental in the final selection of the site and elimination of alternative sites. The consultation process continued and broadened and provided information which was used to prioritise the assessment of the identified environmental issues within this *Environmental Assessment.*

### 3.2.1 Community Consultation

The Proponent has undertaken two community consultation programs regarding the proposed project. The first program commenced in August 2008 with a mail-out explaining the proposal as it was then envisaged and an invitation to respond with comments and questions. This was supplemented with telephone calls to ensure letters were received and ensuing discussions between property owners and representatives of the Proponent. Contact was made with 18 property owners in the near vicinity of the Project Site. A total of two persons responded during the first program with one person expressing support for the Project and the second person concerned about traffic, noise and visual amenity. The proposal at the time included a significantly larger extraction area with a project life in excess of 60 years. Following the Planning Focus Meeting for the project, the scope of the project involved a reduction in the proposed extraction area and a project life of 30 years.

The second program was undertaken during the period from November 2009 to January 2010, after the Planning Focus Meeting and receipt of Director-General's Requirements. The program involved the circulation of a newsletter incorporating an explanation of the revised project. The newsletter was sent by mail or hand delivered to 24 property owners in the near vicinity of the Project Site. This consultation program included property owners additional to recipients in the earlier program. A copy of the Newsletter and the Feedback form circulated to surrounding property owners is duplicated in **Appendix 3**.

A total of six persons responded during the second program. The issue of greatest concern to those surrounding property owners was traffic. Of the five comments raised regarding traffic impacts, two were in relation to traffic near the Project Site at the New Berrima end of the proposed route, two were in relation to traffic impacts at Bowral and Mittagong and one was in relation to traffic in general. The remaining concerns and the number of times raised were as follows.

- Noise (4)
- Surface Water (3)
- Visual Amenity (3)
- Air Quality (2)
- Ecology (2)
- Land use/Planning (2)
- Property Values (1)

### 3.2.2 Government Agency Consultation

Following the preparation of a *Preliminary Environmental Assessment*, the following government agencies and organisations were consulted by the Proponent and/or its specialist consultants.

- Department of Planning.
- Department of Water and Energy (now the Department of Environment, Climate Change and Water – NSW Office of Water).
- Wingecarribee Shire Council.
- Department of Primary Industries – Mineral Resources (now Industry and Investment NSW – Mineral Resources).
- Department of Environment and Climate Change (now the Department of Environment, Climate Change and Water).
- NSW Roads and Traffic Authority.
- Sydney Catchment Authority.
- Department of Lands.

Representatives of all the listed government agencies attended a Planning Focus Meeting convened by the Department of Planning on 18 September 2008. An initial indication of the issues considered being of primary concern and therefore requiring priority in the *Environmental Assessment* was gained at the Planning Focus Meeting. This was followed up by written requirements from each agency provided to the Department of Planning for incorporation into the Director-General's Requirements (DGRs) for the Project. The DGRs, were provided to the Proponent on 21 November 2008. The key issues within the DGRs are identified as follows. It is recognised that some aspects relating to these "key" issues are not relevant to the Project and are somewhat generic in nature.

#### Soil, Surface and Groundwater

Include a detailed description of the water management system for the site including water quality management, stormwater management, erosion and sediment control and monitoring programs. Identify and address any water supply, groundwater and water licencing issues. Outline potential pollution impacts and relevant management strategies.

#### Ecology

Include a detailed assessment of the potential impacts of the project on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and regional wildlife habitat corridors. Consider an offset strategy to address loss of riparian habitat.

#### Rehabilitation and Final Landform

Include a detailed description of the rehabilitation strategy for the site, taking into consideration any relevant strategic land use planning or resource management plans or policies.

### Noise

Include a detailed assessment of the noise impacts associated with construction, quarry operation, and road traffic noise taking the entire proposed transport route into account.

### Air Quality

No specific requirements were nominated.

### Heritage

Both Aboriginal and non-Aboriginal issues need to be addressed.

### Transport

Include a detailed assessment of the potential impacts of the project on the safety and performance of the surrounding road network and entire transport route. Include a detailed description of any proposed road or intersection upgrades.

### Visual

Address minimisation of the visibility of the site from the surrounding area, particularly from likely affected residences.

### Waste

Include a detailed description of the measures that would be implemented to minimise, re-use, recycle and dispose of any waste produced on site.

### Strategic Planning

Assess the project against the strategic land use planning objectives for the area, including those contained in the draft *Wingecarribee Local Environmental Plan 2007* and the *Drinking Water Catchments Regional Environmental Plan No. 1.*

A full copy of the DGRs, along with a tabulated summary of all government agency requirements is presented as **Appendix 2**. **Table 3.1** presents a summary of the frequency with which particular environmental issues were identified by the government agencies consulted.

It is noted that the Planning Focus Meeting comments, recommendations made by the various government agencies and the DGRs themselves relate to the initially proposed project which comprised a considerably larger project site and a 60 year project life.

**Table 3.1**
**NSW Government Agency Issue Identification**

| Government Agency | Issue[1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Air Quality | Noise | Ecology | Groundwater | Surface Water (including ESCP) | Aboriginal Heritage | Rehabilitation & Final Land Use | Planning / Land Use / Statutory | Visual Amenity | Soils / Land Capability / Agricultural Suitability | Transport / Traffic | Socio-economic Impacts / Property Values | Waste and Chemicals |
| DECC (now DECCW) | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | | | |
| DWE (now DECCW) | | | ✓ | ✓ | ✓ | | ✓ | | | | | | ✓ |
| DoL | | | ✓ | | | | | ✓ | | | | | |
| SCA | | | | ✓ | ✓ | | | | | | | | |
| WCC | | | | | | | | ✓ | ✓ | | ✓ | | |
| **Total** | **1** | **1** | **3** | **2** | **3** | **1** | **1** | **3** | **1** | **0** | **1** | **0** | **1** |

## 3.3 LEGISLATIVE REQUIREMENTS PLANNING INSTRUMENTS AND ENVIRONMENTAL GUIDELINES

### 3.3.1 Introduction

Several pieces of Commonwealth and NSW legislation and State and local planning instruments apply to the proposed quarry. These acts, regulations and planning instruments were reviewed to identify any relevant environmental aspects requiring consideration in the *Environmental Assessment*. In addition, the DGRs identified a number of guideline documents to be referenced/reviewed during the preparation of the *Environmental Assessment* (see **Table A2-1**).

A brief summary of each relevant statutory provision and planning instrument is provided in the following sections. Additionally, the application and relevance of planning instruments related to specific environmental issues have been assessed in the relevant specialist consultant assessments.

### 3.3.2 Legislative Requirements

#### 3.3.2.1 *Environment Protection and Biodiversity Conservation Act 1999*

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a person must not, without an approval under the Act, take an action that has or would have, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES). A project is determined a Controlled Action when it is considered likely that it has had or is likely to have a significant impact on any MNES. MNES are defined under Part 3 of the EPBC Act and include the following.

- World heritage sites.
- National heritage places.

- Ramsar wetlands or wetlands of international importance.
- Nationally listed threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- Nuclear actions.

Under the EPBC Act, where a proposed development has the potential to have a significant impact on a MNES, the proposal is required to be referred to the Commonwealth Department of the Environment, Water, Heritage and the Arts for assessment of the likelihood of a significant impact requiring assessment under the Act.

The preliminary flora and fauna and cultural heritage assessments found that the activities related to the proposed Project were not likely to have a significant impact on any MNES or Commonwealth lands and therefore would not need Commonwealth approval (refer to Sections 5.4 and 5.5).

#### 3.3.2.2 *Environmental Planning and Assessment Act 1979*

The principal Act in NSW relating to the control and environmental assessment of development is the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act establishes a legislative framework for the assessment of development proposals and proposals which are for major projects.

The framework for development assessment and land use planning in NSW is primarily established under environmental planning instruments (EPIs) formed under Part 3 of the EP&A Act. EPIs comprise:

- State Environmental Planning Policies (SEPPs); and
- Local Environment Plans (LEPs).

EPIs may identify whether a development is permissible without consent, permissible with consent or is prohibited.

Part 3A of the EP&A Act would apply where the development is determined to be a major project, either by the Minister for Planning, or by definition within a SEPP. Under *State Environmental Planning Policy (Major Development) 2005,* this proposed project is deemed to be a major project for which project approval under Part 3A of the (EP&A Act) is required.

#### 3.3.2.3 Other State Legislation

The relevance of other pieces of NSW legislation to the Project is provided in **Table 3.2**.

**Table 3.2**
**Applicability of State Legislation**

| Act | Purpose | Relevance to the Project |
|---|---|---|
| *Protection of the Environment Operations Act 1997* (POEO Act) | The purpose of the POEO Act is to protect the environment from degradation and pollution. Chapter 3 of the POEO Act provides for a single licensing arrangement to replace the different licences and approvals that were required under separate Acts relating to air pollution, water pollution, noise pollution and waste management. Schedule 1 of the POEO Act lists activities for which a licence is required ("scheduled activities").<br>Sections 120 and 142 of the POEO Act establish that it is an offence to cause pollution to water or land. | Schedule 1 of the POEO Act establishes that the proposed Project is a scheduled activity because more than 30 000 tonnes of extractive materials would be extracted. An Environment Protection Licence is therefore required. |
| *Water Management Act 2000 (WMA), Water Act 1912 (WA)* | The objective of the *WMA 2000* is the sustainable and integrated management of the State's water for the benefit of both present and future generations. It is progressively replacing the Water Act 1912 as more water sharing plans become gazetted. The WMA also controls development in close proximity to waterways. The WA requires that an approval be held for any works which would intercept groundwater and a licence be held for any use of water from the dams on the property which is beyond the Harvestable Rights limits. | The proposal does not require a water supply other than Harvestable Rights supply for which a licence or approval is not required. Also no activities associated with the project would be conducted within 40m of a waterway and interception of groundwater is not expected. The "Mandurama" property is not subjected to a Water Sharing Plan. |
| *National Parks and Wildlife Act 1974* | Section 87 of the Act identifies that a permit is required to disturb or destroy objects of Aboriginal heritage significance. However, Section 75U of the EP&A Act states that such an approval is not required for a Project under Part 3A of that Act. | The Heritage assessment has not identified any Aboriginal sites or objects on the Project Site and suggests that the discovery of these is unlikely. No request for approval to disturb or destroy objects of Aboriginal significance is required., |
| *Roads Act 1993* | Under Section 138 of the Act, works must not be conducted or a structure erected in a public road without the consent of the road authority and concurrence with the RTA, if it is a classified road. | Road works would be undertaken at the intersection of Berrima Road and the site access road. Concurrence from RTA and approval from Wingecarribee Council would be required. |
| *Threatened Species Conservation Act 1995 (TSC Act)* | The TSC Act sets out provisions for planning and assessment of impacts on threatened species, populations and ecological communities. The TSC Act lists a number of factors to be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats. | The Flora and Fauna assessments were undertaken in accordance with this Act. They determined that threatened species, populations or ecological communities are not located or likely to be located on the Project Site or impacted by the proposed activities. |

### 3.3.3 Planning Instruments

#### 3.3.3.1 State Environmental Planning Policy (Major Development) 2005

This SEPP, gazetted on 25 May 2005, identifies projects of significance to NSW, which are required to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979.* It applies to all projects satisfying nominated criteria contained within the schedules of the SEPP. Under Schedule 1 of the SEPP, the project would be classified as a Group 2 development, i.e. mining, petroleum production, extractive industries and related industries given the size of the extractive material resource is greater than 5 million tonnes. The proposed New Berrima Clay/Shale Quarry project would draw upon a total resource of approximately 8 million tonnes of shale.

#### 3.3.3.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP was gazetted on 17 February 2007, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries. The quoted aims of the SEPP are as follows.

*a) "To provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State.*

*b) To facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources.*

*c) To establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources."*

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that a consent authority needs to consider when assessing a new or modified proposal (Part 3 - Clauses 12 to 17 of the SEPP) is as follows.

**Clause 12**: Compatibility of proposed mine, petroleum production or extractive industry with other land uses.

Consideration must be given to:

- the existing uses and approved uses of land in the vicinity of the development;
- the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and
- any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.

The respective public benefits of the development and the existing, approved or preferred land uses must be evaluated and compared, along with any measures proposed by the Proponent to avoid or minimise the incompatibility.

**Clause 13:** Compatibility of the project with mining, petroleum production or extractive industry.

Consideration must be given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible. Measures taken by the Proponent to avoid or minimise any incompatibility are to be considered. The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.

**Clause 14:** Natural resource management and environmental management.

Consideration must be given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:

- impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;
- impacts on threatened species and biodiversity, are avoided or minimised; and
- greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.

**Clause 15:** Resource recovery.

This clause requires the efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, be considered.

**Clause 16:** Transportation.

Consideration must be given to alternative means of product transportation other than by road and that a code of conduct for the transport of materials on public roads is prepared.

**Clause 17:** Rehabilitation.

The rehabilitation of the land affected by the development must be considered including:

- the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;
- the appropriate management of waste generated by the development;
- remediation of any soil contaminated as a result of the development; and
- the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.

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

Hazardous and offensive industries, and potentially hazardous and offensive industries, relate to industries that, without the implementation of appropriate impact minimisation measures would, or potentially would, pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment.

In accordance with SEPP 33, the hazardous substances and dangerous goods to be held or used on the Project Site are required to be identified and classified in accordance with the risk screening method contained within the document entitled "Applying SEPP 33 2nd edition", (DUAP, 1997). Hazardous materials are defined within DUAP (1997) as substances falling within the classification of the Australian Code for Transportation of Dangerous Goods by Road and Rail (Dangerous Goods Code).

The project would not involve the storage of diesel fuel because it would be delivered by small mobile tankers, as required. No substantive servicing of equipment would be conducted on site. Consequently, the storage of other hydrocarbons including lubricating oils and grease would be very limited.

No assessment or screening thresholds are provided in relation to the transport of Class 3 C1 or C2 combustible liquids. However, experience with determinations for projects transporting similar quantities of Class 3 hazardous materials, via comparable transportation routes suggests transportation of diesel to the Project Site would not be considered potentially hazardous.

Based on the risk screening method of DUAP (1997), no activities on the Project Site would result in the project being considered potentially hazardous under SEPP 33. As such, there is no requirement to undertake a Preliminary Hazard Analysis for the Project.

#### 3.3.3.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

The Wingecarribee Local Government Area (LGA) is identified in Schedule 1 of this policy as an area that could provide habitat for Koalas. The policy requires an investigation be carried out to determine if core or potential Koala habitat is present on the areas of the Project Site likely to be disturbed. Core Koala habitat comprises land with a resident population of Koalas whereas potential Koala habitat comprises land with native vegetation with known Koala feed trees constituting at least 15% of the total number of trees present on a site.

As required by the SEPP, an investigation was carried out to determine if the Project Site contains potential Koala habitat. Due to the disturbed nature of the site and isolation from remnant bushland the "Mandurama" property was found not to contain any core or potential Koala habitat.

#### 3.3.3.5 Drinking Water Catchments Regional Environmental Plan No. 1

This plan (deemed a SEPP in July 2009), which commenced on 1 January 2007, addresses water quality in the catchments that supply drinking water to Sydney, Blue Mountains and the Illawarra. It has the following key elements of:

- setting water quality objectives;
- requiring new developments to have a neutral or beneficial effect on water quality;
- introducing strategic land and water capability assessments;
- developing rectification action plans.

The Sydney Catchment Authority administers the Plan. Being a Major Project to be determined under Part 3A of the EP&A Act, the Proponent's project is not formally subject to the requirements of the Drinking Water Catchments Regional Environmental Plan No. 1. Nevertheless, the proposal has been developed having regard to the water quality objectives of the Plan. Section 5.2 outlines the potential impacts to surface water and determines that the proposed project would have a neutral effect on water quality in the sub-catchment of the Wingecarribee River.

#### 3.3.3.6 Wingecarribee Local Environment Plan

The Wingecarribee Local Environmental Plan (LEP) 2010 is the principal environmental planning instrument governing land use within the Wingecarribee LGA. The aim of the Wingecarribee LEP is to provide for appropriate planning and environmental control over the use and development of land within the local government area, in order to uphold and promote the objectives of the *Environmental Planning and Assessment Act, 1979*.

The proposed clay/shale quarry is situated in Zone E3 (Environmental Management) (**Figure 3.1**). The objectives of this zone are:

- to protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values;
- to provide for a limited range of development that does not have an adverse effect on those values;
- to encourage the retention of the remaining evidence of significant historic and social values expressed in existing landscape and land use patterns;
- to minimise the proliferation of buildings and other structures in these sensitive landscape areas;
- to prevent the further clearing of remnant native vegetation and further modification of the natural landform except in a limited number of prescribed circumstances;
- to provide for a restricted range of development and land use activities that provide for rural settlement, sustainable agriculture, other types of economic and employment;
- development, recreation and community amenity in identified drinking water catchment areas;
- to protect significant agricultural resources (soil, water and vegetation) in recognition of their value to Wingecarribee's longer term economic sustainability;
- to conserve and enhance the quality of potentially valuable environmental assets, including waterways, riparian land, wetlands and other surface and groundwater resources, remnant native vegetation and fauna movement corridors as part of all new development and land use;

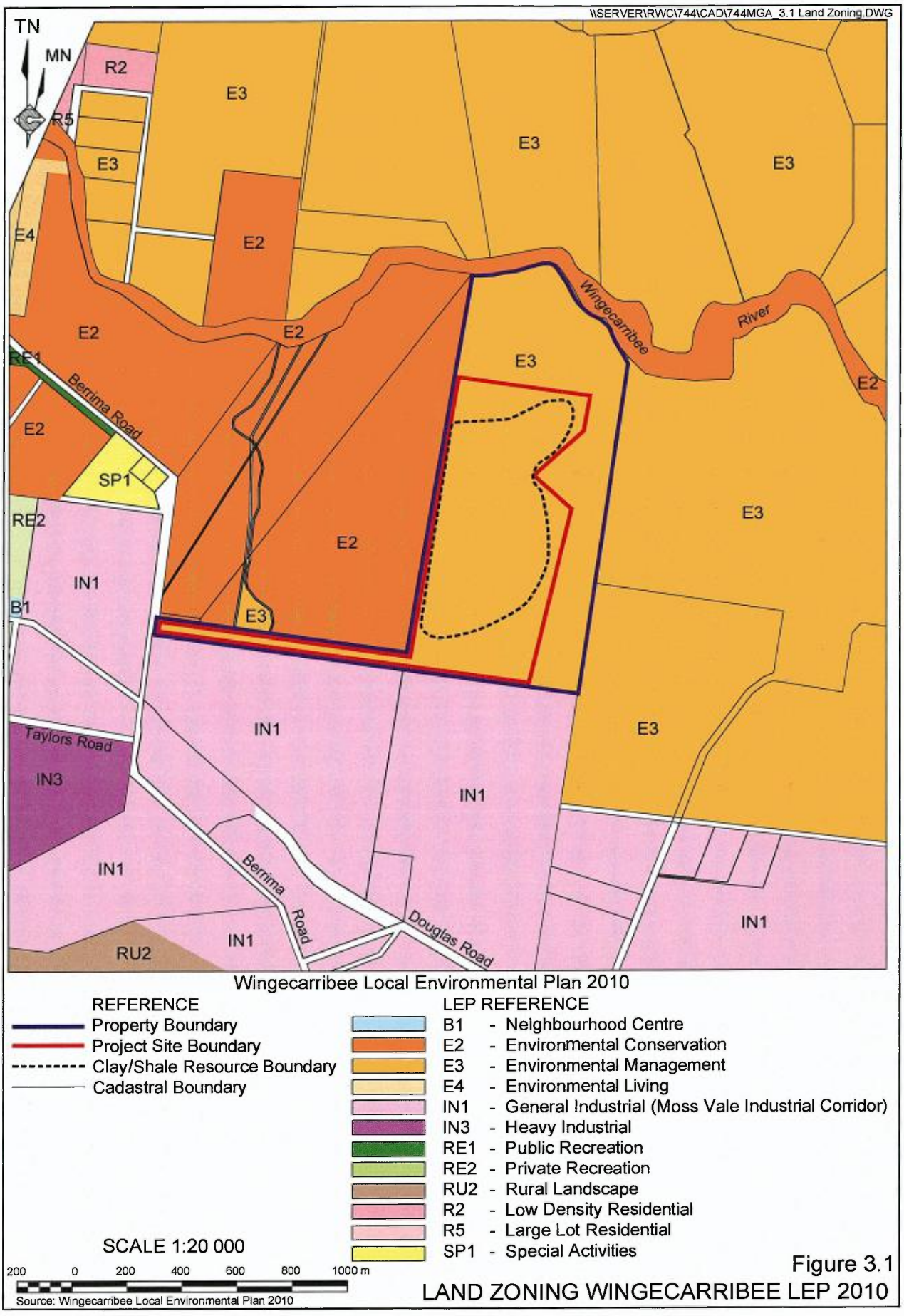


Figure 3.1
LAND ZONING WINGECARRIBEE LEP 2010

- to retain, protect and enhance fauna movement corridors across rural lands linking fragmented core fauna habitat areas;
- to provide for the effective management of remnant native vegetation, including native vegetation regeneration, noxious and environmental weed eradication, and bush fire hazard reduction; and
- to manage land in a way that minimises impacts on its environmental and scenic value from adjacent and nearby development and land use activity.

*Extractive industries* and all other industries are not permitted on land within this zone. *Mining*, however, is a permitted land use with consent. Notwithstanding, the non-permissibility under the WLEP 2010, the proposed Project is a permissible use given the provisions of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* as agricultural activities are a permissible land use in the subject zone.

#### 3.3.3.7 Adjacent Land Use Strategies

The Wingecarribee LEP 2010 provides for the zoning of land adjacent to the south of the Project Site as IN1 General Industrial. These lands are described as the Moss Vale Enterprise Corridor. The proposed quarry activities would be consistent with the purposes of this adjacent industrial corridor.

The Crown land to the west of the Project Site is zoned E2 – Environmental Conservation. This document assesses the proposed quarry activities would not adversely impact upon this land.

### 3.3.4 Environmental Guidelines

The Director-General's Requirements include a list of policies, guidelines and plans which should be considered for applicability to the environmental impact assessment of the project. The following have been identified as reference documents which are of greatest significance to the environmental assessment of this project.

- Aboriginal Cultural Heritage Standards and Guidelines Kit (DECC)
- Interim Community Consultation Requirements for Applicants
- Managing Urban Stormwater: Soils and Construction (Landcom)
- National Greenhouse Accounts (NGA) Factors
- Waste Classification Guidelines
- Guide to Traffic Generating Development
- NSW Industrial Noise Policy
- Environmental Criteria for Road Traffic Noise
- National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)

## 3.4 PRELIMINARY ENVIRONMENTAL STUDIES

During the planning phase for the Project, the following preliminary environmental studies were undertaken by the specialist consultants listed below to identify the constraints posed by the local environment and what elements of the local environment would require further consideration and assessment during preparation of the *Environmental Assessment*.

- Surface water (SEEC).
- Noise (Spectrum Acoustics).
- Air Quality (Heggies Pty Ltd).
- Soil Land and Capability (Geoff Cunningham Natural Resource Consultants Pty Ltd)
- Traffic and Transportation (Traffic Solutions Pty Ltd).
- Fauna (Aquila Ecological Surveys).
- Flora (Geoff Cunningham Natural Resource Consultants Pty Ltd
- Cultural Heritage (Archaeological Surveys and Reports Pty Ltd).

The results of each of the above studies were incorporated into the *Preliminary Environmental Assessment* that was prepared to accompany the Major Projects Application for the Project.

The preliminary studies identified the following issues within these fields which could potentially constrain the Project and have therefore been considered issues of priority.

### Surface Water

Preliminary studies identified a Category 2 watercourse crossing beneath the site access road on the Project Site. The existing site access road crosses this watercourse via a timber bridge. All extraction would be at least 600m from this creek and located in a separate catchment. Additionally, no bridge or road related work is planned for near this creek and therefore the impacts of the project on this surface water feature is not likely. The Project Site contains five dams and several ephemeral Category 3 watercourses which drain to the Wingecarribee River after heavy rains. The degree of impact of the Project on these surface water features and the risk of sediment transportation into Wingecarribee River has therefore been identified as requiring detailed assessment.

### Groundwater

Negligible groundwater was encountered during the exploratory drilling to depths as great as 35m (630mAHD) i.e. well below the level of the nearby Wingecarribee River and hence groundwater resources are considered not to be a key issue for the project.

### Traffic

Traffic Solutions undertook an assessment of the existing road network and traffic volumes to assess whether the Project may be constrained by the proposed traffic generation. They also assessed sight distances and intersection suitability and concluded:

- the proposed transport route would include regional and local roads, all of which are classified to take 19m vehicles which are proposed for the Project;
- existing traffic volumes are very low; and
- sight distances to and from the entrance to the Project Site are very good and exceed AS 2890.1 and 2 requirements.

Traffic generation is unlikely to constrain the Project, however, the possible impact on road condition, traffic levels and congestion, and general road safety has been identified as an issue requiring further assessment as part of this *Environmental Assessment.*

### Noise

Ambient noise levels were measured by Spectrum Acoustics at two residences on properties near the Project Site as part of preliminary investigations. The measurements established that the daytime noise levels are comparatively low. The proposed extraction operations should be sufficiently distant from surrounding residences to ensure that noise generated lies well within noise criteria. The need for a comprehensive noise assessment, in accordance with the *NSW Industrial Noise Policy* and *Environmental Criteria for Road Traffic Noise* was identified.

### Air Quality

Sources of particulate matter on and around the Project Site are currently generated from a number of sources that include the Berrima Cement Works, traffic on unsealed roads, local building and construction activities, grazing activities and to a lesser extent traffic on local roads. Generation of deposited dust and $PM_{10}$ dust from on-site activities is expected to be minor. Emissions of nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$) and carbon monoxide (CO) would be associated with on-site operations through the combustion of diesel by mobile earth-moving equipment.

The impact of dust and emissions generated from the Project Site and cumulative impacts from the surrounding industries have been identified as requiring further assessment, in accordance with Approved Methods for the atmospheric dispersion Modelling and Assessment of Air Pollutants in NSW (Department of Environment, Climate Change and Water).

### Flora

A search on the NSW Wildlife Atlas, as part of the preliminary investigations, found that a total of 11 species and the *Southern Highlands Shale Woodlands,* an *endangered ecological community* are listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) are likely to occur within the local area of the Project Site. A search on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also found nine species, listed under the Act, that are likely to occur within the local area of the Project Site. At the time of writing, this has increased to 12 species.

The potential impact to threatened flora species has been identified as an issue requiring further assessment.

### Fauna

A search on the NSW Wildlife Atlas found that a total of seven fauna species are listed under the TSC Act and no species listed under the EPBC Act occur within the local area incorporating the "Mandurama" property.

The potential impact to threatened fauna species has been identified as an issue requiring further assessment.

### Aboriginal Heritage

Archaeological Surveys and Reports Pty Ltd (ASR) initiated an archaeological assessment of the "Mandurama" property. They advertised seeking contact from potential interested stakeholders with an interest in the "Mandurama" property in accordance with the "Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation" (July 2005), Part 6 Approval of the *National Parks & Wildlife Act 1974* (as amended). ASR also undertook a search of the Aboriginal Sites Register (Aboriginal Heritage Information Management System – AHIMS) within a 64km$^2$ area surrounding the property.

The potential impact to Aboriginal heritage has been identified as an issue requiring further assessment.

### Soils, Land Capability and Agricultural Suitability

Site investigations by Geoff Cunningham Natural Resources Consultants Pty Ltd established the physical and chemical nature of the soil within the proposed areas of disturbance to assist in the assessment of the risk of erosion and the suitability for revegetation. The investigation included the classification of the land capability and agricultural suitability of the Project Site.

The potential risk of erosion and sediment transportation into watercourses was identified as an important issue, requiring further assessment.

## 3.5 ENVIRONMENTAL RISK ANALYSIS

Risk is the chance of something happening that would have an impact upon the objectives of the Project, namely to operate the New Berrima Clay/Shale Quarry with minimal effect on the local environment. Risk is measured in terms of consequence (severity) and likelihood (probability) of the event happening. For each environmental issue identified in **Table 3.6**, the potential environmental impacts have been allocated a risk rating based on the potential consequences and likelihood of occurrence and in accordance with Australian Standards HB 203:2006 and AS/NZS 4360:2004.

The allocation of a consequence rating was based on the definitions contained in **Table 3.3**. It is noted that the assigned consequence rating represents the highest level applicable, i.e. if a potential impact is assigned a level of 4 - Major based on impact to the environment and 2 - Minor based on area of impact, the consequence level assigned would be 4 - Major. The likelihood or probability of each impact occurring was then rated according to the definitions contained in **Table 3.4**.

The risk associated with each environmental impact was assessed **without** the inclusion of any operational controls or safeguards in place and based on the qualitative assessment of consequence and likelihood, a risk ranking of either; low, medium, high or extreme was assigned to each potential impact based on the matrix of **Table 3.5**.

**Table 3.3**
**Qualitative Consequence Rating**

| Level | Descriptor | Description |
|---|---|---|
| 5 | Catastrophic | • Massive and permanent detrimental impacts on the environment.<br>• Very large area of impact.<br>• Massive remediation costs.<br>• Reportable to government agencies.<br>• Large fines and prosecution resulting in potential closure of operation.<br>• Severe injuries or death. |
| 4 | Major | • Extensive and/or permanent detrimental impacts on the environment.<br>• Large area of impact.<br>• Very large remediation costs.<br>• Reportable to government agencies.<br>• Possible prosecution and fine.<br>• Serious injuries requiring medical treatment. |
| 3 | Moderate | • Substantial temporary or minor long term detrimental impact to the environment.<br>• Moderately large area of impact.<br>• Moderate remediation costs.<br>• Reportable to government agencies.<br>• Further action may be requested by government agency.<br>• Injuries requiring medical treatment. |
| 2 | Minor | • Minor detrimental impact on the environment.<br>• Affects a small area.<br>• Minimal remediation costs.<br>• Reportable to internal management only.<br>• No operational constraints posed.<br>• Minor injuries which would require basic first aid treatment. |
| 1 | Insignificant | • Negligible and temporary detrimental impact on the environment.<br>• Affects an isolated area.<br>• No remediation costs.<br>• Reportable to internal management only.<br>• No operational constraints posed.<br>• No injuries or health impacts. |
| Source: modified after HB 203:2006 - Table 4(B) | | |

**Table 3.4**
**Qualitative Likelihood Rating**

| Level | Descriptor | Description |
|---|---|---|
| A | Almost Certain | Is expected to occur in most circumstances. |
| B | Likely | Would probably occur in most circumstances. |
| C | Possible | Could occur. |
| D | Unlikely | Could occur but not expected. |
| E | Rare | Occurs only in exceptional circumstances. |
| Source: HB 203:2006 - Table 4(A) | | |

**Table 3.5**
**Risk Rating**

| Likelihood | Consequences | | | | |
|---|---|---|---|---|---|
| | Insignificant 1 | Minor 2 | Moderate 3 | Major 4 | Catastrophic 5 |
| A (Almost Certain) | H | H | E | E | E |
| B (Likely) | M | H | H | E | E |
| C (Possible) | L | M | H | E | E |
| D (Unlikely) | L | L | M | H | E |
| E (Rare) | L | L | M | H | H |

Note: Rating modified after HB 203:2006 - Table 4(C)

The four risk rankings are defined as follows.

Low (L): requiring a basic assessment of proposed controls and residual impacts. Any residual impacts are unlikely to have any major impact on the local environment or stakeholders.

Moderate (M): requiring a medium level assessment of proposed controls and residual impacts. It is unlikely to preclude the development of the project but may result in impacts deemed unacceptable to some local or government stakeholders.

High (H): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures. Ultimately, this level of risk may preclude the development of the project.

Extreme (E): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures and possible preparation of a specialised management plan. Unless considered to be adequately managed by the controls and/or management plan, this level of risk is likely to preclude the development of the project.

**Table 3.6** provides an assessment of the **unmitigated** risk for each potential environmental impact based on the classifications and definitions provided.

**Table 3.6**
**Analysis of Unmitigated Risk**

Page 1 of 3

| Potential Impact | Consequence | Likelihood | Risk Rating |
|---|---|---|---|
| **Transport / Traffic** | | | |
| Increased traffic on roads – congestion and delays nuisance | 1 | A | H |
| Increased deterioration of road pavement | 1 | A | H |
| Increased risk of accident – major accident | 5 | E | H |
| Increased risk of accident – serious accident | 4 | E | H |
| Increased risk of accident – minor accident | 3 | E | M |

**Table 3.6 (Cont'd)**
**Analysis of Unmitigated Risk**



| Potential Impact | Consequence | Likelihood | Risk Rating |
|---|---|---|---|
| **Noise** | | | |
| Increased noise impacts at receptors – occasional minor exceedance (1-2 dBA) | 1 | C | L |
| Increased noise impacts at receptors – regular minor exceedance (1-2 dBA) | 2 | D | L |
| Increased noise impacts at receptors – occasional high exceedance (3-5 dBA) | 2 | D | L |
| Increased noise impacts at receptors – regular high exceedance (3-5 dBA) | 3 | E | M |
| Increased traffic noise | 2 | A | H |
| **Air Quality** | | | |
| Deposited dust impact on native vegetation off site (no native vegetation on site) | 1 | E | L |
| Deposited dust – nuisance to residences | 3 | C | H |
| TSP – nuisance to residences | 2 | E | L |
| PM10 – health impacts at residences | 2 | E | L |
| Significant emissions of greenhouse gases | 2 | D | L |
| **Visual Amenity** | | | |
| Temporary (<2 years) view of disturbed areas | 1 | A | H |
| Medium-term (>2, <15 years) view of disturbed areas | 2 | C | M |
| Long-term >15 years) view of disturbed areas | 2 | B | H |
| Highly identifiable permanent impact | 1 | B | M |
| **Surface Water** | | | |
| Reduced water quality in Wingecarribee River | 2 | B | H |
| Reduced flows into Wingecarribee River | 2 | C | M |
| **Groundwater** | | | |
| Reduced water quality of groundwater | 2 | E | L |
| Impacted levels of groundwater table | 2 | E | L |
| **Soils and Land Capability** | | | |
| Loss of soil by erosion | 2 | D | L |
| Sedimentation impacting land and water | 2 | D | L |
| Degradation of soil quality | 2 | C | M |
| Reduction in land capability / agricultural land | 3 | C | H |
| **Ecology** | | | |
| Death or injury to native species | 2 | E | L |
| Loss of habitat for native species | 2 | E | L |
| Disruption to breeding cycle of native species | 2 | E | L |
| Reduced biodiversity | 2 | E | L |

**Table 3.6 (Cont'd)**
**Analysis of Unmitigated Risk**

Page 3 of 3

| Potential Impact | Consequence | Likelihood | Risk Rating |
|---|---|---|---|
| **Cultural Heritage** | | | |
| Destruction of Aboriginal sites, artefacts, objects | 3 | E | M |
| Damage to Aboriginal sites, artefacts, objects | 2 | E | L |
| Destruction of non-Aboriginal sites, artefacts, objects | 2 | E | L |
| Damage to non-Aboriginal sites, artefacts, objects | 2 | E | L |
| **Land Contamination** | | | |
| Contamination by hydrocarbons | 1 | D | L |
| **Waste** | | | |
| Litter and waste accumulation | 1 | D | L |
| Loss of resources | 2 | A | H |
| **Socio-economic impacts, property values** | | | |
| Increased employment | 2 | A | H |
| Loss of property values of neighbouring properties | 3 | C | H |

## 3.6 ENVIRONMENTAL ISSUE PRIORITISATION

The consultation and review process described in Sections 3.2, 3.3, 3.4 and 3.5 resulted in the identification of a range of environmental issues that require consideration within the *Environmental Assessment*. The issues identified as requiring assessment within the *Environmental Assessment* have been prioritised based upon the following.

- The key assessment requirements of the DGRs (see **Appendix 2**).
- The frequency of identification during community and government consultation and preliminary investigations (**Tables 3.1** and **3.2**).
- Issues identified with a high or extreme risk rating (see **Table 3.6**).

**Table 3.7** presents a summary of the identified environmental issues, the frequency with which each was identified and the frequency of an assigned "High" risk rating following the risk analysis described in Section 3.5.

**Table 3.7**
**Summary of Identified Environmental Issues**

Page 1 of 2

| Environmental Issue | Source and Frequency of Identification | | | | |
|---|---|---|---|---|---|
| | Community Consultation[1] | Government Consultation[2] | Preliminary Environmental Studies[3] | High or Extreme Risk Rating | TOTAL |
| Transport / Traffic | 5 | 1 | 1 | 4 | 11 |
| Surface Water | 3 | 3 | 1 | 1 | 8 |
| Noise | 4 | 1 | 1 | 1 | 7 |
| Ecology | 2 | 3 | 1 | 0 | 6 |

**Table 3.7 (Cont'd)**
**Summary of Identified Environmental Issues**



| Environmental Issue | Source and Frequency of Identification | | | | |
|---|---|---|---|---|---|
| | Community Consultation[1] | Government Consultation[2] | Preliminary Environmental Studies[3] | High or Extreme Risk Rating | TOTAL |
| Visual Amenity | 3 | 1 | - | 2 | 6 |
| Air Quality | 2 | 1 | 1 | 1 | 5 |
| Planning / Land Use / Statutory | 2 | 3 | - | - | 5 |
| Socio-economic impacts / Property Values | 1 | - | - | 2 | 3 |
| Soils and Land Capability | - | - | 1 | 1 | 2 |
| Cultural Heritage | - | 1 | 1 | 0 | 2 |
| Groundwater | - | 2 | - | 0 | 2 |
| Waste[4] | - | 1 | - | 1 | 2 |
| Land Contamination[4] | - | 1 | - | 0 | 1 |
| Rehabilitation, final landform[4] | - | 1 | - | - | 1 |

Note 1: Summarised from verbal and written feedback from surrounding property owners.
Note 2: Summarised from the Director-General's Requirements and attached correspondence to DoP from consulted government agencies (see Appendix 2).
Note 3: Based on the identified constraints of preliminary environmental studies conducted by the specialist consultants for the Project.
Note 4: The nominated issue is separately covered as part of the Project description or in the appropriate titled section of this document.

Based on the above, the identified environmental issues have been prioritised in order of decreasing priority. This order of priority has been used to inform the level of assessment undertaken for each identified environmental issue and the order in which each issue is addressed in Section 5 of this *Environmental Assessment.*

# Section 4

# Environmental Setting

*This section describes the environmental setting within and surrounding the Project Site for the proposed New Berrima Clay/Shale Quarry.*

*Emphasis is placed in this section on providing information about the environmental features that would contribute to, or influence, the assessment of a range of other environmental parameters. Information is provided on the local and Project Site topography and drainage, geology, climate, land ownership and land use.*

*Other features of the surrounding environment that would or may be affected by the proposed quarry extension are detailed in Section 5 in conjunction with the design and operational safeguards and impact assessment for those features.*

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# 4.1 TOPOGRAPHY

## 4.1.1 Local Topography

The local topography and drainage are illustrated in **Figure 4.1**. The local topography is dominated by the valley through which the Wingecarribee River flows, i.e. westward from Wingecarribee Reservoir, between Bowral and Robertson, through the township of Berrima and into the Wollondilly River which feeds into the Hawkesbury Nepean River system. In the vicinity of New Berrima, the topography of the land on the southern side of the river is undulating to flat. The topography on the northern side of the river is steeper with a ridge orientated east - west and featuring Cockatoo Hill with an elevation of 788m AHD.

## 4.1.2 Project Site Topography

The Project Site is located on a low topographic rise overlooking the Wingecarribee River valley to the north, (**Figure 4.2**). Crossing the site access road and within the Project Site, approximately 800m to the west of the extraction area is Stony Creek which flows northward into the Wingecarribee River. Approximately 500m east of the Project Site is an unnamed creek which also flows northward to the river. A small unnamed ephemeral creek bisects the Project Site, also flowing into the river after periods of heavy rain. Two small farm dams are located on this ephemeral creek. Elevations in the Project Site descend from a little over 680m AHD on the summit of the rise, down to 640m AHD on the northern boundary.

# 4.2 CLIMATE

## 4.2.1 Introduction

New Berrima is situated in the Southern Highlands between the sub-tropical and temperate latitudes but experiences a cool climate due, which is mostly attributable to its elevation of 680m AHD.

Meteorological data relevant to the Project have been derived from the long term data collected by the Bureau of Meteorology at the Moss Vale (Hoskins Street) automatic weather station (AWS Station No. 068045) located approximately 6.2km west-southwest of the Project Site. This station has been collecting data since 1870. The records have been assembled in **Table 4.1** as mean monthly data.

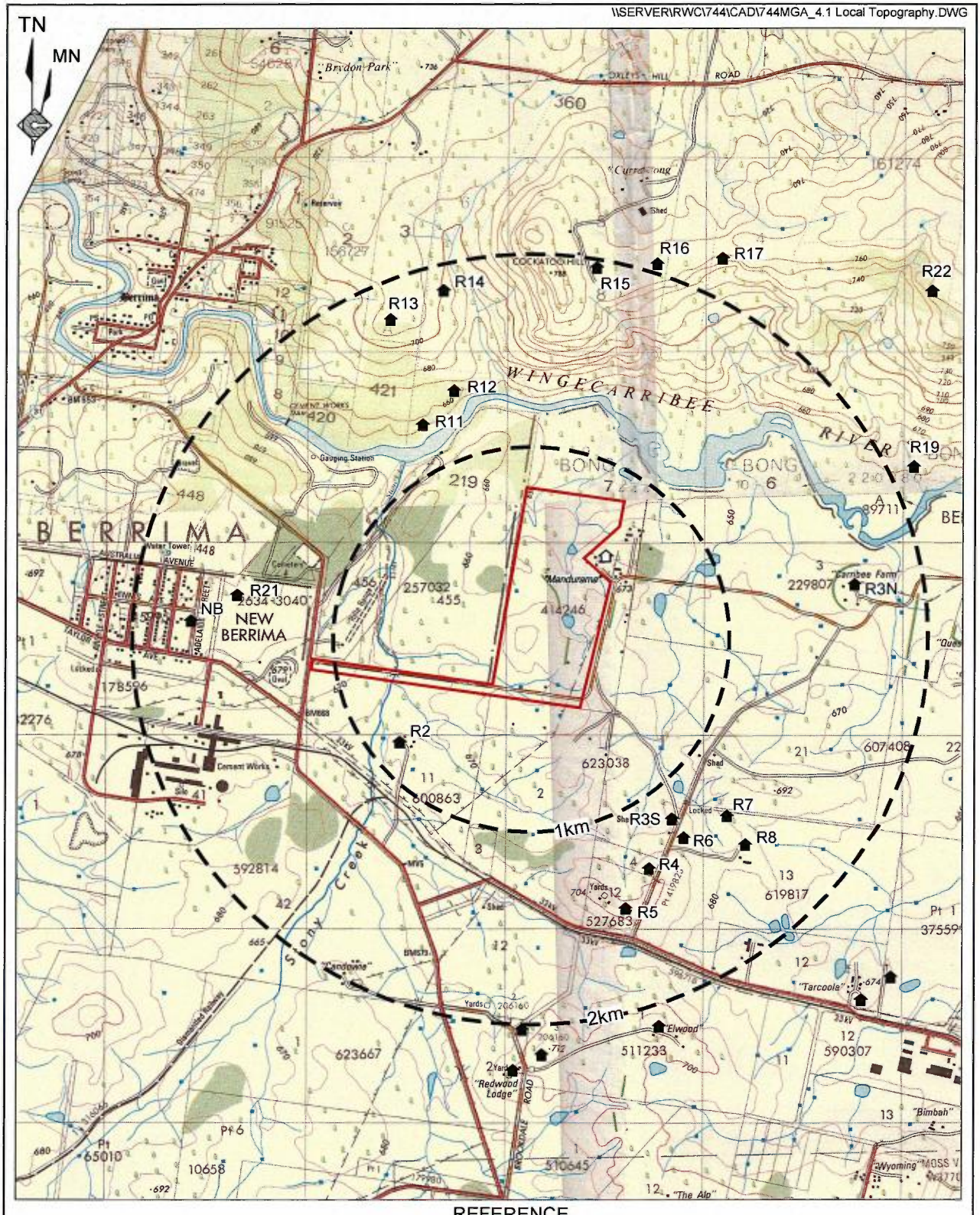



Figure 4.1
LOCAL TOPOGRAPHY

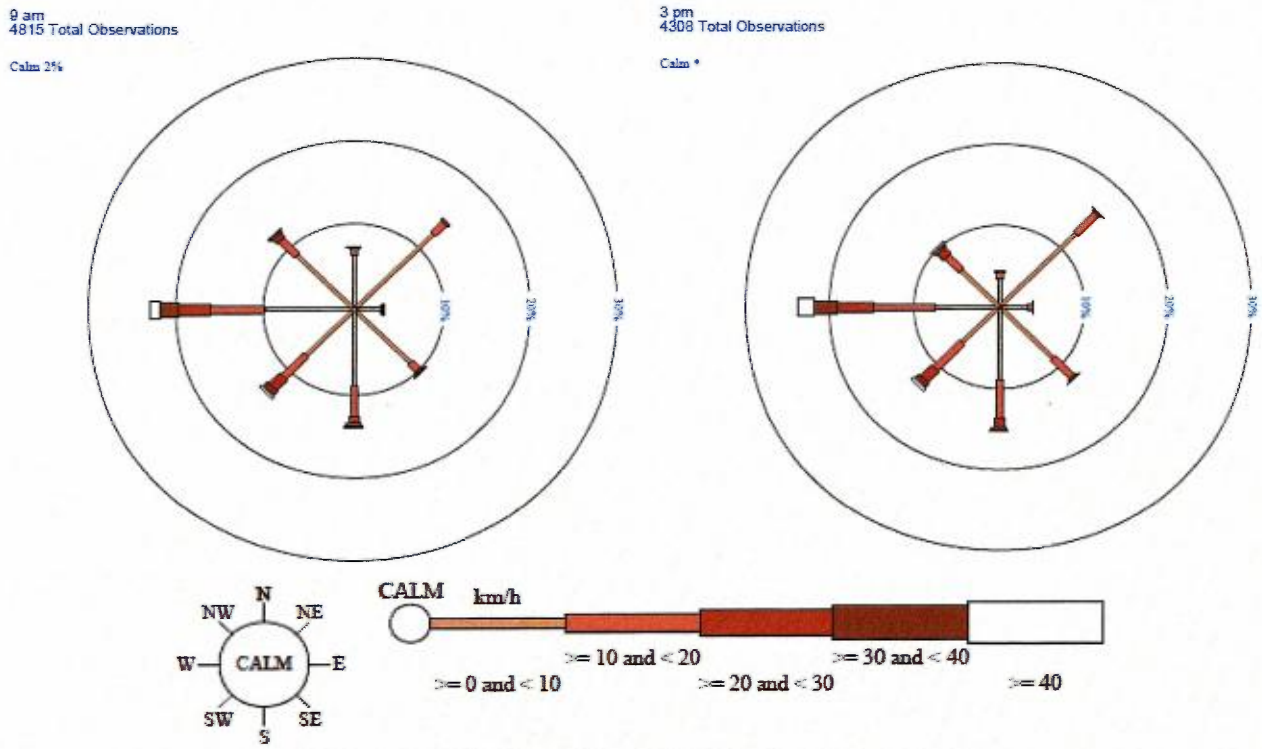

Figure 4.2
PROJECT SITE TOPOGRAPHY

**Table 4.1**
**Mean Monthly Meteorological Data – Moss Vale (Hoskins Street) AWS (068045)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | No. Years Data |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature (°C)** | | | | | | | | | | | | | | |
| Mean Maximum | 25.8 | 25.2 | 23.1 | 19.2 | 15.3 | 12.3 | 11.8 | 13.4 | 16.7 | 19.9 | 22.6 | 25.0 | 19.2 | 64 |
| Mean Minimum | 12.4 | 12.6 | 10.8 | 7.4 | 4.3 | 2.3 | 1.3 | 2.0 | 4.0 | 6.5 | 8.8 | 11.1 | 7.0 | 64 |
| **Rainfall (mm)** | | | | | | | | | | | | | | |
| Mean Monthly Rainfall | 89.3 | 95.3 | 90.3 | 81.3 | 84.9 | 100.4 | 76.1 | 63.6 | 60.4 | 74.8 | 72.9 | 76.5 | 965.3 | 139 |
| Mean number of days of rain > 1mm | 8.4 | 8.4 | 8.4 | 7.5 | 7.4 | 7.7 | 7.1 | 7.1 | 7.4 | 7.9 | 8.0 | 7.7 | 93.0 | 134 |
| **Relative Humidity (%)** | | | | | | | | | | | | | | |
| Mean 9:00am | 70 | 75 | 81 | 80 | 82 | 81 | 79 | 73 | 66 | 64 | 60 | 62 | 73 | 13 |
| Mean 3:00pm | Not available | | | | | | | | | | | | | |
| **Winds (km/hr)** | | | | | | | | | | | | | | |
| Mean 9:00am Wind Speed | 10.6 | 9.3 | 10.0 | 10.7 | 11.7 | 10.7 | 12.8 | 13.2 | 13.5 | 12.3 | 12.8 | 10.4 | 11.5 | 13 |
| Mean 3:00pm Wind Speed | 12.5 | 10.6 | 11.4 | 12.0 | 13.7 | 13.4 | 15.6 | 15.5 | 14.9 | 13.6 | 14.4 | 12.5 | 13.3 | 12 |

Source: Bureau of Meteorology (at February 2010). Elevation of Moss Vale AWS: 675m.

Moss Vale experiences moderate summer temperatures and cool winters. It receives moderate levels of rainfall with summer being the wettest season. Annual wind roses displaying wind speed and directions at 9am and 3pm at Moss Vale are shown in **Figure 4.3.** During mornings and afternoons, winds are predominantly from the west, ranging from south east to northwest with strong winds over 40km/hr coming mainly from the west.




An asterisk (*) indicates that calm is less than 0.5%

**Figure 4.3**
**ANNUAL 9AM AND 3PM WIND ROSES FOR MOSS VALE – BUREAU OF METEOROLOGY AWS (068045)**

# 4.3 LAND OWNERSHIP AND LAND USE

## 4.3.1 Introduction

In order to assess the impact the construction and operation of the New Berrima Clay/Shale Quarry would have on the surrounding environment, an understanding of the number and location of surrounding landholdings and residences along with the land use is required. This sub-section identifies the landholdings and the proximity of surrounding residences to the main proposed areas of activity. An overview is provided of the land uses both in the local area and immediately surrounding the Project Site.

## 4.3.2 Land Ownership and Surrounding Residences

**Figure 4.4** presents the land ownership details within and immediately surrounding the Project Site. It also shows the locations of the non-project-related residences surrounding the Project Site. The distances from each of the residences to the nearest side of the extraction area are listed in **Table 4.2**.

## 4.3.3 Land Uses

### 4.3.3.1 Existing Land Uses

The existing land uses in the vicinity of the Project Site are shown in **Figure 4.5**. The Project Site is currently used for agricultural purposes. Most of the land is under pasture and grazed by beef cattle. Properties immediately to the east and south are also used for grazing. The property immediately to the west of the Project Site is owned by the State of NSW and the eastern section is used for agricultural purposes whilst the timbered western section includes a pistol/archery range within the vegetated section. Properties on the northern side of Wingecarribee River, are lifestyle blocks, providing rural/residential housing with some varying degrees of agricultural use. Those further west on the river are heavily timbered rural residential, primarily serving a nature conservation purpose whilst those further east are primarily used for grazing.

### 4.3.3.2 Proposed Land Uses

The Moss Vale Enterprise Corridor Development Control Plan 2008 was adopted by Wingecarribee Shire Council on 13 August 2008 and came into force on 27 August 2008. This plan aims to support the provisions of Wingecarribee Draft Local Environmental Plan 2007 (now Draft LEP 2009) and establish more detailed controls on development in the Moss Vale Enterprise Corridor which comprises a defined corridor of land between Moss Vale and New Berrima.

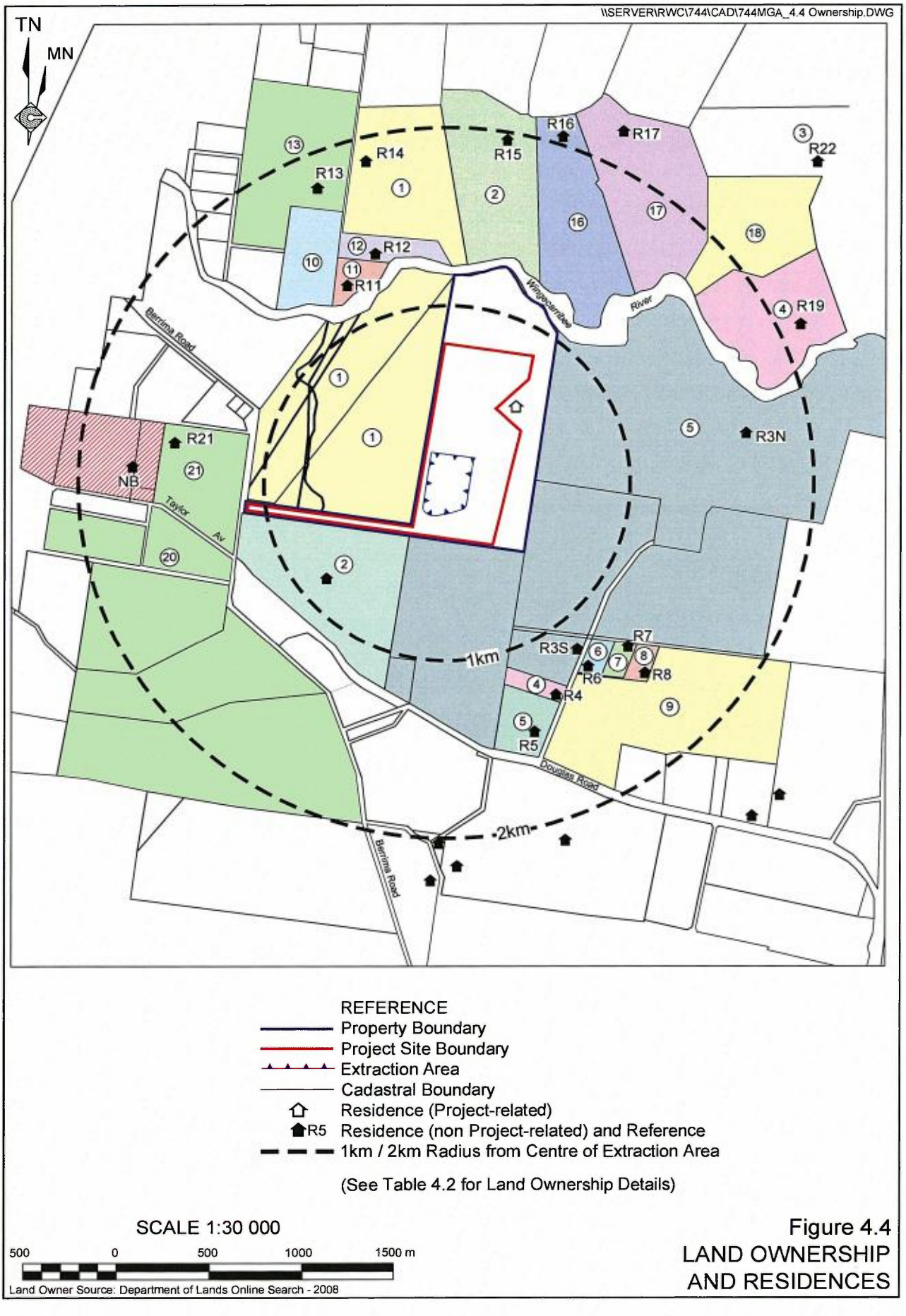



Figure 4.4
LAND OWNERSHIP
AND RESIDENCES

**Table 4.2**
**Land Ownership and Residences**

| Ref* | Land Owner | Distance from Residence to nearest side of the Extraction Area (km) |
|---|---|---|
| 1 | The State of NSW (Crown Land) | No residence |
| 2 | Wyndlorn Pastoral Company Pty Ltd | 0.7 |
| 3 | Cowley Hills Pty Ltd | 1.5 |
| 4 | P.N. Radnedge | 1.2 |
| 5 | P.A. & R.F. Rusconi | 1.3 |
| 6 | A.V. Dickson | 1.2 |
| 7 | M. & R.K. Senior | 1.2 |
| 8 | P.R. Rosen | 1.4 |
| 9 | Fortius Funds Management Pty Ltd | No residence |
| 10 | C. & K. Vella Enterprises Pty Ltd | No residence |
| 11 | C. & K. Vella Enterprises Pty Ltd | 1.1 |
| 12 | Pingama Pty Ltd | 1.2 |
| 13 | P.J. & D.J. Daly | 1.6 |
| 14 | G.W. Holdings Pty Ltd | 1.6 |
| 15 | Flocolo Pty Ltd | 2.0 |
| 16 | R.L. Lavender | 2.0 |
| 17 | P.S. Holeck | 2.0 |
| 18 | D. Ricci | No residence |
| 19 | Mulberrygong Investments Pty Ltd | 1.8 |
| 20 | Blue Circle Southern Pty Ltd | No residence |
| 21 | Perth Street, New Berrima | 1.4 |
| 22 | C. Westman | 2.6 |

* See **Figure 4.4**

The Draft LEP 2009 designates two broad land uses zones– conservation and employment.

The Conservation Area comprises land with significant environmental and heritage constraints. These include:

- major riparian corridors and flood-prone land;
- significant vegetation and fauna habitat; and
- sites and areas of Aboriginal cultural significance.

The Employment Area comprises land generally suitable for urban development with appropriate controls. The zone is further divided into two precincts – Enterprise Precinct and General Industrial Precinct.

The Enterprise Precinct includes land at and near the interface with the Moss Vale township and existing light industrial development. This precinct would facilitate a transition between residential uses and heavier industrial uses across the northern parts of the Enterprise Corridor. This precinct would accommodate a mix of light industrial and commercial office uses.

The General Industrial Precinct covers the balance of the employment zoned land and would accommodate a wide range of industrial and warehouse land uses including freight terminal facilities and warehouse and distribution centres.

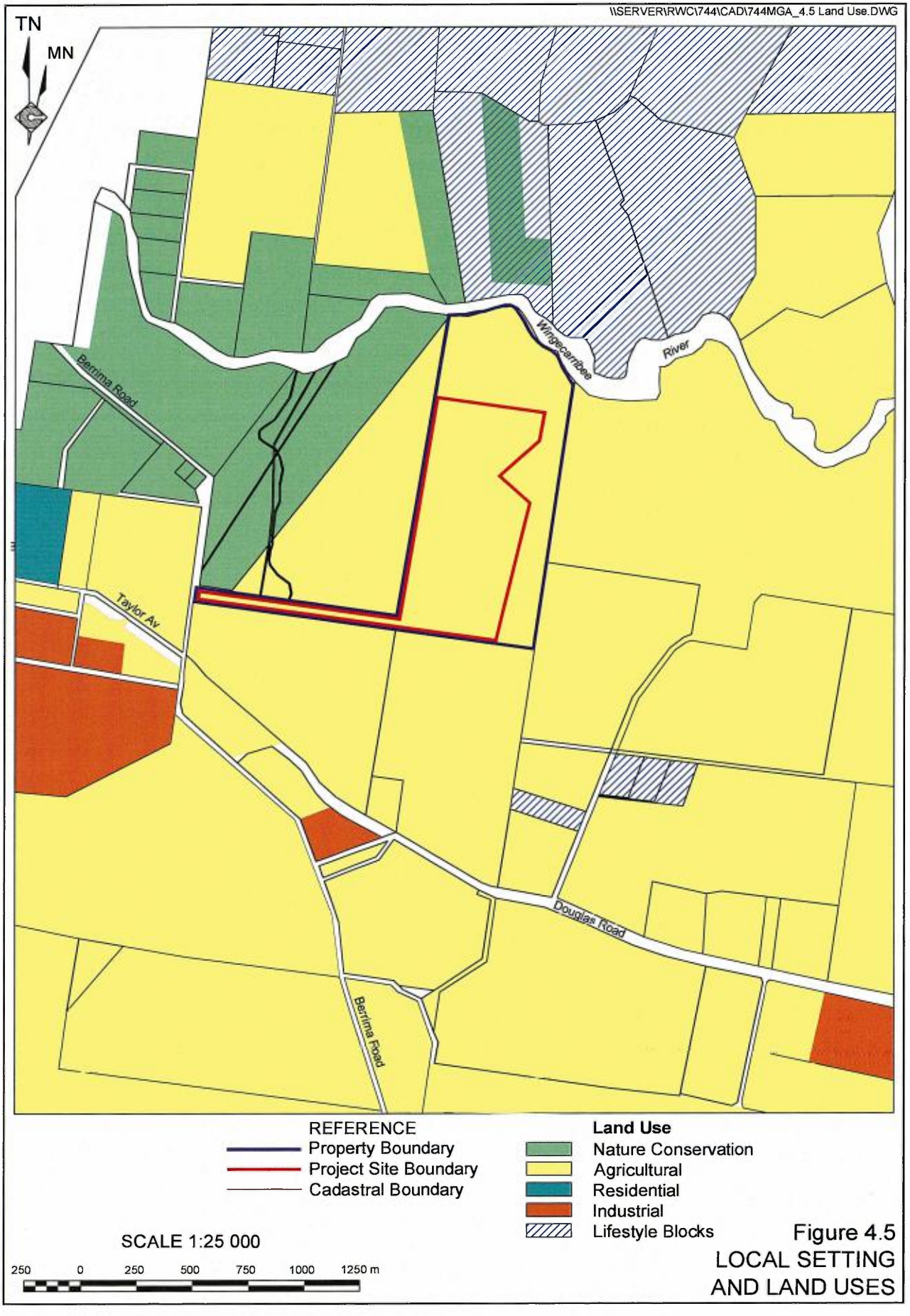



Figure 4.5
LOCAL SETTING
AND LAND USES

The plan also provides for the extension and changes to Taylor Avenue, Douglas Road, Berrima Road and a New Berrima bypass incorporating a new bridge to overpass the railway siding.

The Project Site lies immediately north of the Moss Vale Enterprise Corridor. Land immediately south of the Project Site has been designated General Industrial Precinct (nearest to the extraction area) and Enterprise Precinct and Potential Constraint Area near the Project Site access road. The Potential Constraint Area is associated with Stony Creek and its catchment.

The land use proposed by the Project would be consistent with the land uses designated within the Moss Vale Enterprise Corridor.

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# Section 5

# Assessment and Management of Key Environmental Issues

*The assessment and management of the key environmental issues identified in Section 3 are then generally addressed in the order of priority established in Section 3.6.*

*For each key environmental issue, the existing features are described and the constraint(s) the existing features would have on the design and operation of the project are identified. The mitigation measures and operational procedures required to manage each issue are then outlined together with the predicted changes to that component of the environment on and/or surrounding the Project Site. Residual impacts are then assessed against statutory criteria or goals or relevant guidelines and/or policies. Where appropriate, a program of monitoring and documentation is proposed to demonstrate that the predictions presented in this document are being achieved and compliance criteria or goals satisfied.*

*The text for the bulk of this section is drawn from studies undertaken by a range of specialist consultants commissioned by the Proponent. Wherever possible, the study results have been summarised focussing only upon the key points. Readers should refer to the relevant part in the Specialist Consultant Studies Compendium in the event further detail is required.*

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# 5.1 TRAFFIC

*The traffic assessment for the Project was undertaken by Traffic Solutions Pty Ltd. The full assessment, hereafter referred to as Traffic Solutions, (2010), is presented as Part 1 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

## 5.1.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.6**), the potential environmental impacts relating to traffic and transport requiring assessment and their **unmitigated** risk rating are as follows.

- Increased traffic congestion and delays nuisance (high risk).
- Road pavement deterioration (high risk).
- Increased risk of accident/incident on roads (moderate to high risk).

In addition, the Director-General's Requirements issued by the DoP identify "Transport" as a key issue for consideration within the *Environmental Assessment* and require that the assessment includes potential impacts of the project on the safety and performance of the surrounding road network and entire transport route as well as a detailed description of any proposed road or intersection upgrades.

The Director-General's Requirements also require that the assessment of traffic impacts take into account the following policies, guidelines and plans as applicable:

- *Guide to Traffic Generating Development (Roads & Traffic Authority)*; and
- *Road Design Guide (Roads & Traffic Authority).*

The following sub-sections assess the existing road and traffic environments, the proposed changes generated by the quarry, relevant design features, operational safeguards and ongoing management to mitigate the risks posed and an assessment of residual impacts.

## 5.1.2 The Existing Environment

### Access

The Project Site includes an unsealed road in a wide 66m corridor of cleared land providing access to the extraction area from Berrima Road. The existing driveway through the electronic gate to the property is narrow and can only accommodate one vehicle at a time. It is currently used for light vehicles and trucks carrying cattle and farm supplies.

A site inspection revealed that the existing driveway easily exceeds the Australian Standard requirements AS 2890.1 and 2 for the posted speed limit along Berrima Road.

#### 5.1.2.1 The Road Network

The proposed transport route between the Project Site and Bowral Brick Plant (**Figure 2.5**) follows a network of local, regional and State roads as shown in **Table 5.1**. All of the local roads are not approved for B-double vehicles and are limited to 19m articulated vehicles. All of the State and regional roads, with the exception of Mittagong Road, are approved for 23m, 25m and 26m B-double vehicles. Mittagong Road, between Old Bowral Road and Lyle Avenue is limited to 19m B-double vehicles.

Berrima Road north of Taylor Avenue has a 10t load limit restriction imposed by Wingecarribee Shire Council. This restriction is imposed to restrict heavy vehicle traffic travelling through Berrima residential streets. Trucks over 10t would be permitted to use this section of road (from Taylor Avenue) for the specific purpose of accessing the Project Site.

**Table 5.1**
**Heavy Vehicle Transport Route Road Classifications**

| Road | Section | Classification | RTA approved routes |
|---|---|---|---|
| Berrima Road | North of Taylor Avenue | Local Road | 19m articulated |
| Taylor Avenue | Full length | Regional Road | 23, 25 and 26m B-double |
| Medway Road | Old Hume Hwy to Hume Hwy | Regional Road | 23, 25 and 26m B-double |
| Hume Highway | Medway Road to Old Hume Highway | State Road | 23, 25 and 26m B-double |
| Old Hume Highway | Hume Highway to Cavendish Street | Regional Road | 25 and 26m B-double |
| Cavendish Street | Old Hume Hwy to Old Bowral Road | Local Road | 25 and 26m B-double |
| Old Bowral Road | Cavendish Street to Mittagong Road | Local Road | 25 and 26m B-double |
| Mittagong Road (The Highlands Way/Bowral Road) | Old Bowral Road to Lyle Avenue | Regional Road | 19m B-double |
| Lyle Avenue | Mittagong Road (The Highlands Way/Bowral Road) to Kirkham Road | Local Road | 19m articulated |
| Kirkham Road | Lyle Avenue to Oxley Hills Road | Local road | 19m articulated |
| Oxley Hills Road | Kirkham Road to Kiama Street | Local Road | 19m articulated |
| Kiama Street | Full length | Local Road | 19m articulated |

Source: Traffic Solutions (2010) – Table 3.1

Berrima Road carries predominantly local traffic, light traffic accessing the Blue Circle Southern Cement factory and serves as a connector road between Moss Vale and Berrima. Taylor Avenue similarly provides a route from Moss Vale to the Hume Highway and is used by Blue Circle Southern Cement and local traffic. The Hume Highway is a State highway providing a link between Sydney and Melbourne and regional links between various cities such as Goulburn. The Old Hume Highway provides a link between the Hume Highway and Mittagong and various other Southern Highland towns and also carries a substantial amount of local Mittagong traffic. Mittagong Road, also known as the Highlands Way, provides a major link between Mittagong and Bowral. Lyle Avenue is a local road which runs along the western side of the railway line between Mittagong and Bowral. Along with Kirkham Road, Oxley Hills Road and Kiama Street, it is currently used by heavy vehicles delivering raw materials to Bowral from various satellite quarries and for the delivering of products from the Bowral Brick Plant.

#### 5.1.2.2 Parking and Traffic Controls

There are no restrictions on parking in the vicinity of the Project Site. Berrima Road is a two lane paved road with centre line markings with overtaking permitted at selected locations, and has a 90 km/h speed limit in the vicinity of the Project Site. Taylor Avenue has a speed limit of 50 km/h from immediately west of Berrima Road to Howard Avenue and then has an 80 km/h speed limit as is Old Hume Highway and Medway Road. The intersection at Berrima Road and Taylor Avenue is wide and traffic on Taylor Avenue is required to give way to traffic on Berrima Road. Council officers have reported that a problem exists at this intersection where some vehicles cut the corners at this intersection. Stop signs have been provided in addition to the standard railway level crossing signs on Berrima Road south of Taylor Avenue. The junction of Taylor Avenue, Medway Road and Old Hume Highway is a large, recently constructed roundabout.

The speed limit on the Old Hume Highway, at the Mittagong end of the route, is limited to 80km/hr and then to 60km/hr after Bendooley Street. Speeds along Cavendish Street, Old Bowral Road and Mittagong Road are limited to 60km/hr and 50km/hr along Kirkham Road. The intersection of Mittagong Road with Old Bowral Road is signalised and with Lyle Street includes a line larked seagull treatment with ample turning width for heavy vehicles. The railway goes under Lyle Road via a tunnel. Traffic on Kirkham Road is controlled at the intersection with Wingecarribee Street with "Stop" signposting, giving way to traffic on the bridge (Wingecarribee Street).

#### 5.1.2.3 Traffic Flows

The Traffic Assessment undertaken by Traffic Solutions included a survey of existing traffic movements in the vicinity of the Project Site by Curtis Traffic Surveys on 20 August 2008. The traffic flows at the Mittagong section and Bowral end of the route were not surveyed because this road network already experiences very high volumes of traffic, large proportions of which are heavy vehicles. The additional traffic attributable to the proposed quarry would be insignificant in comparison to volumes currently experienced on these roads.

The detailed results of the survey and diagrammatic representation of peak hour flows are shown respectively as Appendix C and Figure 4 of Traffic Solutions (2010). These data are summarised in **Tables 5.2** and **5.3**. They show that 100 vehicles, comprising 93 cars and seven trucks (>3t), and 129 vehicles, comprising 118 cars and 11 trucks (>3t) are using Berrima Road at the Berrima Road / Taylor Avenue intersection in the 8.00am to 9.00am peak hour and 3.00pm to 4.00pm peak hours respectively. The heavy vehicle volumes represent 5% and 6.2% in the morning and evening peak hours respectively.

**Table 5.2**
**Berrima Road Peak Hour Vehicle Volume, Direction and Classification**

| Peak Hour | Northbound | | Southbound | | Total |
|---|---|---|---|---|---|
| | Cars | Trucks (>3t) | Cars | Trucks (>3t) | |
| AM Peak hour 8.00am – 9.00am | 40 | 5 | 53 | 2 | 100 |
| PM Peak hour 3.00pm – 4.00pm | 59 | 8 | 59 | 3 | 129 |
| Source: Traffic Solutions (2010) – Table 3.2 | | | | | |

The data show that 205 vehicles, comprising 162 cars and 43 trucks (>3t), and 224 vehicles, comprising 172 cars and 52 trucks (>3t) are using Taylor Avenue at the Berrima Road / Taylor Avenue intersection in the 8.00am to 9.00am peak hour and 3.00pm to 4.00pm peak hours respectively. The heavy vehicle volumes represent 21.0% and 23.2% in the morning and evening peak hours respectively.

**Table 5.3**
**Taylor Avenue Peak Hour Vehicle Volume, Direction and Classification**

| Peak Hour | Westbound# | | Eastbound@ | | Totals |
|---|---|---|---|---|---|
| | Cars | Trucks (>3t) | Cars | Trucks (>3t) | |
| AM Peak hour 8.00am – 9.00am | 50 | 20 | 112 | 23 | 205 |
| PM Peak hour 3.00pm – 4.00pm | 115 | 28 | 57 | 24 | 224 |

Source: Traffic Solutions (2010) – Table 3.3 # Towards the Hume Highway @ From the Hume Highway

The traffic flows show that a large proportion of the traffic using the intersection is using Taylor Avenue and the section of Berrima Road, south of Taylor Avenue.

Tube counters placed on Berrima Road, north of Taylor Avenue for a week from the 22 August to 29 August 2009 recorded traffic 24hrs/day for the week. This showed that peak hour flows were 97 and 129 for morning and evening peak hours respectively, suggesting that whilst the northern section of Berrima Road, near the entrance to the "Mandurama" property, provides an important link, overall traffic flows are low.

Assessment of the traffic survey data against the RTA's "Guide to Traffic Generating Developments, Section 4.2.4 – Table 4.5" for rural roads (Table 3.5 of Traffic Solutions, 2010) shows that the existing operation of Berrima Road with 129 vehicles in the maximum peak hour and 8% heavy vehicles, operates at a very good level of service "A", based on the following criteria:

- Terrain level with 20% no overtaking.
- Rolling with 40% no overtaking.
- Mountainous with 60% no overtaking.
- 3.7 m traffic lane width with side clearances of at least 2m.
- 60/40 directional split of traffic.

Taylor Avenue with 224 vehicles per hour in the maximum peak hour and 22% heavy vehicles also operates at level of service 'A'.

A SIDRA analysis, reveals that the intersection of Berrima Road and Taylor Avenue currently operates at a very good level of service with minimal delays and spare capacity. The recently constructed roundabout at the intersection of Taylor Avenue, Medway Road and Old Hume Highway is 26m B-double approved and Council officers report that it has been designed to cater for B-triples.

The proposed route includes local roads, Lyle Avenue, Kirkham Road and Oxley Hill Road which service the surrounding industrial area. These roads are collector roads and carry high volumes of traffic, with significant heavy vehicle proportions.

### 5.1.3 Potential Impacts

#### 5.1.3.1 Vehicle Access and Parking

The driveway and entrance gate for the site access road to Berrima Road is currently not wide enough to accommodate 19m articulated trucks passing, i.e. one truck entering and one truck leaving the Project Site. The Australian Standard, *AS 2890.2:2002* specifies that the minimum driveway width for 19m articulated vehicles is 12.5m.

The *Australian/New Zealand Standards, Parking Facilities Part 1; Off-street Car Parking (AS/NZS 2890.1)* of 2004 classifies this development as a Class 1A off-street car parking facility. Given the Project Site has a total area of 51ha, ample area would be available for parking of cars and compliance with this standard can be achieved.

Wingecarribee Shire Council's "*Development Control Plan 12 Off-street Car Parking, Loading Facilities and Access*" has no requirements applicable to this Project. The Proponent estimates the quarry would employ five part-time staff, and given the size of the site, it is considered that ample parking area is available to cater for staff cars and contractors trucks, as required.

#### 5.1.3.2 Increased Traffic

Traffic Solutions assessed the increased impacts of the Project - related traffic on Berrima Road and Taylor Avenue flows, the Berrima Road / Taylor Avenue intersection and the intersection of the proposed driveway with Berrima Road. The assessment was based on the worst case scenario of 132 truck and eight light vehicle movements per day for five days per week which may be adopted in extreme circumstances following prolonged wet weather. The modelling assumed an additional 17 vehicle trips in the morning and evening peak hours comprising seven truck and four cars approaching the Project Site and six trucks exiting the Project Site in the morning peak hour and the reverse in the evening peak hour (**Figure 5.1**).

For the purposes of the assessment, 13 of the additional 17 traffic movements (heavy vehicle) per peak hour were assigned as using Taylor Avenue as this is the proposed route. Of the four light vehicles pre peak hour it was assumed that two would approach the Project Site from Berrima and two would approach from Moss Vale, with none using Taylor Avenue.

**Table 5.4** and **5.5** provide a comparison of traffic volumes for existing and proposed peak hour situations.

**Table 5.4**
**Comparison of Existing and Proposed Traffic Volumes for Berrima Road during Peak Hours**

| Peak Hour | Existing | | | | Proposed | | | |
|---|---|---|---|---|---|---|---|---|
| | Cars | Trucks (>3t) | Total | Truck % | Cars | Trucks (>3t) | Total | Truck % |
| AM Peak hour 8.00am – 9.00am | 93 | 7 | 100 | 7.0 | 97 | 20 | 117 | 17.1 |
| PM Peak hour 3.00pm – 4.00pm | 118 | 11 | 129 | 8.5 | 122 | 24 | 146 | 16.4 |
| Source: Traffic Solutions (2010) – Table 4.1 | | | | | | | | |

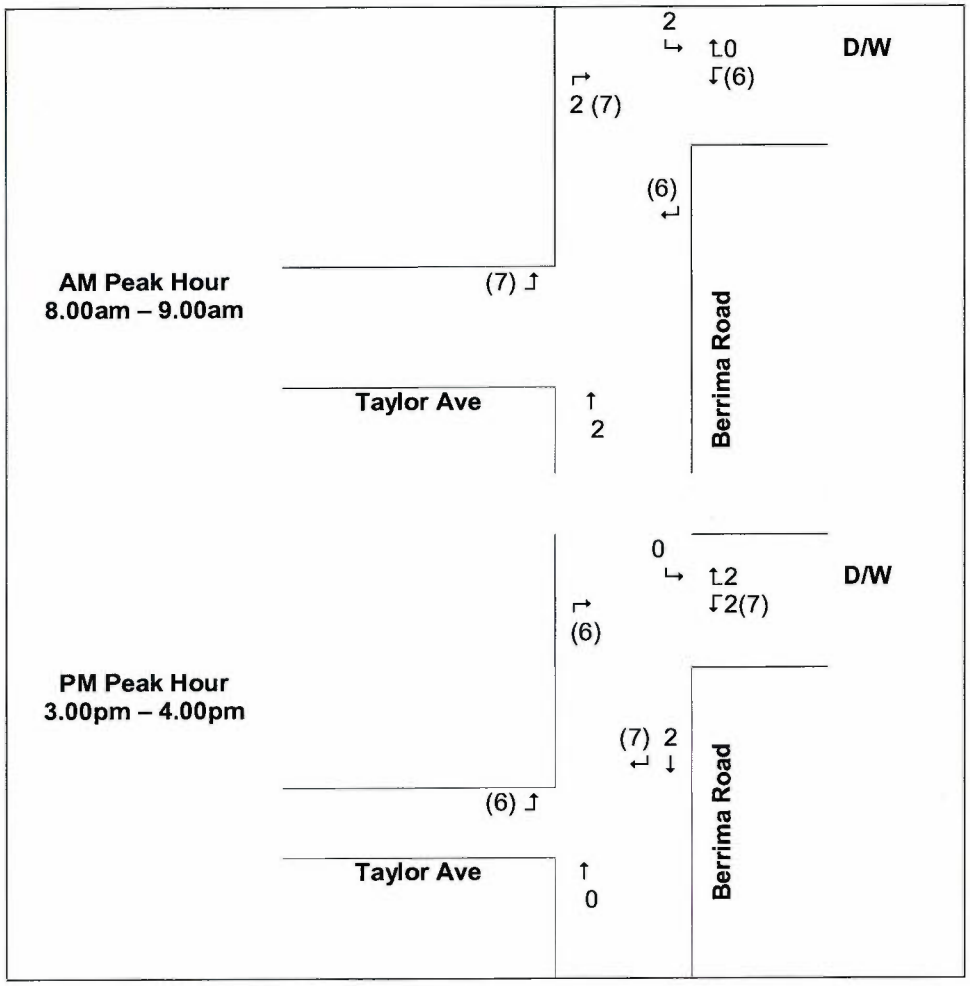



**Figure 5.1**
**PROPOSED ADDITIONAL PEAK HOUR FLOWS**

The Project would increase the proportion of heavy vehicles along Berrima Road (north of Taylor Avenue) from 7.0% to 17.1% and from 8.5% to 16.4% for morning and evening peak hours respectively.

**Table 5.5**
**Comparison of Existing and Proposed Traffic Volumes for Taylor Avenue during Peak Hours**

| Peak Hour | Existing | | | | Proposed | | | |
|---|---|---|---|---|---|---|---|---|
| | Cars | Trucks (>3t) | Total | Truck % | Cars | Trucks (>3t) | Total | Truck % |
| AM Peak hour 8.00am – 9.00am | 162 | 43 | 205 | 21.0 | 166 | 56 | 222 | 25.2 |
| PM Peak hour 3.00pm – 4.00pm | 172 | 52 | 224 | 23.2 | 176 | 65 | 241 | 27.0 |
| Source: Traffic Solutions (2010) – Table 4.2 | | | | | | | | |

The Project would increase the proportion of heavy vehicles along Taylor Avenue from 21.0% to 25.2% and from 23.2% to 27.0% for morning and evening peak hours respectively, assuming the worst case scenario of all the light vehicle traffic using Taylor Avenue.

Assessment of the predicted potential traffic volume and classification against the RTA's "Guide to Traffic Generating Developments, Section 4.2.4 - Table 4.5" for rural roads (Table 3.5 of Traffic Solutions, 2010) shows that the post development operation of Berrima Road with 146 vehicles in the maximum peak hour and 17.1% heavy vehicles, would continue to operate at a very good level of service "A". Taylor Avenue with 241 potential vehicles and 27.0% heavy vehicles would also to operate at a level "A" service.

#### 5.1.3.3 Intersection Performance

The increased usage of the road network between the Project Site and the Bowral Brick Plant could potentially have an impact on the level of service at the various intersections along the transport route. Traffic Solutions (2010) identified that two of the nine intersections used should be assessed for their level of service, both now and in the future. These intersections assessed are:

- the intersection between the site access road and Berrima Road at the entrance to the Project Site; and
- the intersection between Berrima Road and Taylor Avenue.

**Table 5.6** provides data of intersection factors for the proposed peak hour situations at the Berrima Road / access driveway, based on intersection modelling.

**Table 5.6**
**Intersection Modelling Results – Berrima Road/Site Access Road, New Berrima (Give Way control type BAR intersection)**

| | Proposed | |
|---|---|---|
| | **AM** | **PM** |
| Level of Service | A | A |
| Degree of Saturation | 0.030 | 0.039 |
| Total Average Delay (sec/veh) | 2.4 | 2.1 |
| Source: Traffic Solutions (2010) – Table 4.4 | | |

**Table 5.7** provides a comparison of intersection factors for existing and proposed peak hour situations, based on intersection modelling at these two intersections which is more fully described in Traffic Solutions (2010).

**Table 5.7**
**Intersection Modelling Results – Berrima Road/Taylor Avenue Intersection**

| | Berrima Road and Taylor Avenue, New Berrima (Give Way control 'T' intersection) | | | |
|---|---|---|---|---|
| | Existing | | Proposed | |
| | **AM** | **PM** | **AM** | **PM** |
| Level of Service | A | A | A | A |
| Degree of Saturation | 0.155 | 0.131 | 0.158 | 0.131 |
| Total Average Delay (sec/veh) | 8.6 | 9.3 | 9.1 | 10.1 |
| Average delay for right turn from Taylor Avenue(sec/veh) | 9.9 | 12.7 | 16.9 | 20.5 |
| Source: Traffic Solutions (2010) – Table 4.3 | | | | |

The results of the modelling reveal the following.

- The good Level of Service at the intersection of Berrima Road and Taylor Avenue would not change with the estimated additional Project-related traffic generation.
- The additional traffic demand on the intersection of Berrima Road and Taylor Avenue as a consequence of the proposed development would only alter the Degree of Saturation and Total Average Delays minutely.
- The proposed new intersection at the entrance to the Project Site would operate at a very good level of service with minimal delays.

An increase of approximately 4 to 14 trucks per hour to Lyle Avenue, Kirkham Road and Oxley Hills Road would be an additional truck every 4 minutes 17 seconds to 15 minutes and 53 seconds. Since these roads already experience quite high volumes of traffic servicing the industrial area on the west of the railway line, the additional impact would be diluted by the existing traffic volumes.

Traffic Solutions reviewed the additional seven intersections along the transport route and established that because of the comparatively low traffic levels attributed to the Project (compared with total traffic) that modelling of the level of service at these intersections was unnecessary. Traffic Solutions has provided the following description of the seven additional intersections and the basis for concluding intersection modelling is not required.

1. Old Hume Highway with Medway and Taylor Roads – recently upgraded to 2 land roundabout which easily copes with existing and future traffic demands.
2. Hume Highway at Medway – Freeway on and off ramps designed for high capacity are not under traffic demand pressure. RTA controlled intersection.
3. Hume Highway at Old Hume Highway – Freeway on and off ramps designed for high capacity are not under traffic demand pressure. RTA controlled intersection.
4. Old Hume Highway and Lyell Street – sign controlled intersection with no observed capacity constraints or delays. Trucks only have one opposing movement to Give Way to in each direction, i.e. turning right into Lyell or left out of Lyell.
5. Lyell Street and Old Bowral Road – heavy vehicles on haulage route have priority.
6. Old Bowral Road and Bowral Road – recently installed traffic signals which would have taken into consideration future traffic volume growth of area. RTA controlled intersection.
7. Bowral Road and Lyle Avenue – sign controlled intersection with no observed capacity constraints or delays. Trucks only have one opposing movement to Give Way to in each direction, i.e. turning right into Lyle or left out of Lyle. RTA controlled intersection.

#### 5.1.3.4 Road Pavement Damage

The use of public roads by heavy vehicles is recognised as a contributor to the deterioration of road pavement. The Proponent recognises that, like all other heavy vehicles using the State-funded road system, the significant taxes paid through registration and fuel charges contribute to the maintenance of those sections of roads. The Proponent similarly acknowledges that, for local roads in Wingecarribee Local Government Authority, contribution for road maintenance by all trucks using the local roads is appropriate, i.e. adopting an "user pays" principle.

#### 5.1.3.5 Other Potential Impacts

The proposed transportation program could potentially lead to the transportation of mud onto public roads which presents a safety risk and a source of siltation of gutters, drains and public and private land. The risk of the spread of weeds is also introduced, although the "Mandurama" property is largely free of weeds and most of the vehicles exiting the site would be carrying clay/shale material which is not a source of weed seeds under normal circumstances. Topsoil which is a potential source of weed seeds and propagules would remain on the Project Site.

Rocks could potentially fall from loaded trucks and present a safety risk.

### 5.1.4 Mitigation Measures

The following mitigation measures would be adopted to reduce the potential traffic related to impacts discussed in Section 5.1.3.

- In order to permit safe and easy access for 19m articulated vehicles to the Project Site from Berrima Road, a Basic Rural intersection treatment (BAR) would be constructed. This would be incorporated with the construction of a new entrance gate and driveway, which would be at least 12.5m in width to comply with *AS 2890.2:2002.*
- The proposed route has been directed along Cavendish Street in Mittagong to avoid Lyell Street in which a school is located and has parking on both sides of the road.
- All vehicles exiting the Project Site would be required to pass over a truck shaker grid constructed at the eastern end of a 400m sealed section of site access road leading up to the site entrance (to reduce the deposition of mud from truck tyres on Berrima Road).
- All loaded trucks would have their loads covered.
- Truck drivers would be required to adhere to the existing Austral Bricks' Drivers Code of Conduct which identifies the required safety and courtesy requirements for drivers travelling to and from all Austral Bricks' quarries. The drivers are re-inducted annually to ensure issues relating to familiarisation/complacency are avoided.

- All safety procedures to be adopted during the Berrima Road / access driveway intersection construction would be incorporated in the Section 138 Permit sought under the *Roads Act 1993*.
- The Proponent would provide a quarterly payment to Wingecarribee Shire Council as its contribution to the maintenance of the local roads used by trucks travelling between the Project Site and Boral Brick Plant. The payment would be in the order $0.04 per kilometre travelled on local roads maintained solely by Council

### 5.1.5 Assessment of Impacts

It is noted that all traffic modelling was based on the worst case scenario of 132 truck movements per day which would only occur for short periods in extreme circumstances such as following prolonged wet weather. The most likely truck volume would be approximately 32 movements per day, for a five day week, which equates to one movement approximately every 32 minutes over a nine hour working day.

The assessment estimated that upon the implementation of mitigation measures outlined in Section 5.1.4, the proposed quarry would have minimal impacts relating to traffic. The conclusions of the traffic assessment are as follows.

- The Project Site provides ample off-road parking for employees' vehicles and contractors' trucks.
- The location of the driveway provides good sight distance in both directions along Berrima Road.
- Berrima Road and Taylor Avenue would continue to operate at a good level of service "A".
- The Berrima Road / Taylor Avenue intersection would continue to operate at a good level of service "A" with only minimal impacts on the degree of saturation and total average delays.
- The Berrima Road / access driveway intersection would operate at a good level of service "A".
- Impacts on traffic volumes and intersections at the Bowral end of the route would be insignificant due to the existing high volumes, particularly heavy vehicles, on those roads.
- The proposed route is approved to take the proposed 19m articulated vehicles.

## 5.2 SURFACE WATER

*The surface water assessment was undertaken by Strategic Environmental and Engineering Consulting (SEEC). The full surface water assessment, hereafter referred to as SEEC (2010) is presented as Part 2 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

### 5.2.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.6**), the potential surface water impacts requiring assessment and their unmitigated risk rating are as follows.

- Reduced water quality in the Wingecarribee River associated with quarry operations (high risk).
- Reduced water flows in the Wingecarribee River associated with quarry operations (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of surface water impacts describe the water management system and consider erosion and sediment control and pollution of water, as well as the sustainability of water supply demands.

The Director-General's Requirements also require that the assessment of surface water impacts refer to the following policies, guidelines and plans as applicable.

- *Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ ARMCANZ);*
- *Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ ARMCANZ);*
- *Using the ANZECC Guideline and Water Quality Objectives in NSW (DECCW;)*
- *State Water Management Outcomes Plan;*
- *NSW Government Water Quality and River Flow Environmental Objectives (DECCW);*
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECCW);*
- *Managing Urban Stormwater: Soils & Construction (Landcom);*
- *Floodplain Management Manual (DECCW);*
- *Floodplain Risk Management Guideline (DECCW);*
- *Technical Guidelines: Bunding and Spill Management (DECC); and*
- *A Rehabilitation Manual for* Australian Streams (LWRRDC and CRCCH).

Relevant information on the existing environment, surface water criteria, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

## 5.2.2 The Existing Environment

### 5.2.2.1 Catchments and Water Features

The Project Site is located on a property adjoining the Wingecarribee River, a Category 1 watercourse. The Project Site occupies a hillcrest position with radial drainage in all directions. The first three stages of extraction would be undertaken on the southern slope of the hill which does not drain directly to the river. The remaining stages involve extraction of the northern side of the hill and within the slope which drains towards the Wingecarribee River. The extraction area is set back approximately 730m from the bank of the Wingecarribee River. Three local catchments on the Project Site would be disturbed by extraction operations, all of which ultimately drain to the Wingecarribee River. These are shown in **Figure 5.2** and are labelled as Catchments A, B and C respectively. It is noted that the extraction area has been designed such that all runoff from disturbed areas would be captured within the void itself and would not flow to the Wingecarribee River.

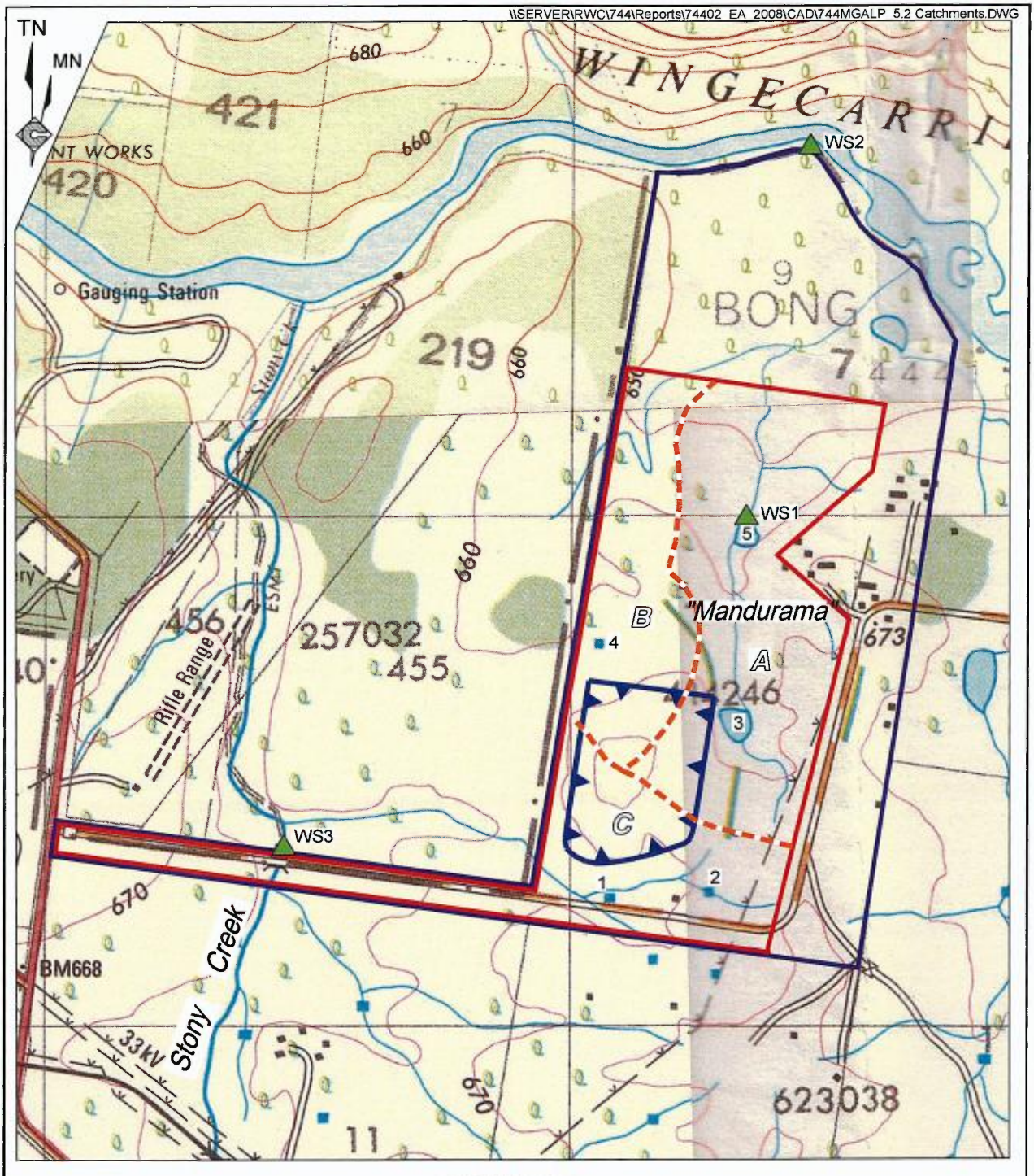
Catchment A drains into a man-made drain, which in turn drains in to Catchment B at the north-western boundary of the Project Site. Catchment B drains directly into the Wingecarribee River via an open grassy depression. Catchment C drains the southern part of the Project Site via a series of open grassy depressions into Stony Creek, a Category 2 watercourse, before eventually entering the Wingecarribee River. None of these drainage lines on the Project Site have permanent flows and all are classified as Category 3 watercourses. The site access road connecting the quarry site with Berrima Road traverses Stony Creek as shown in **Figure 5.2**. None of the drainage channels towards the Wingecarribee River show evidence of erosion. This is likely to be attributable to the gentle slopes and the well swathed pastures providing effective stabilisation.

The Project Site includes five farm dams. All dams appear to be structurally sound and capable of holding water. No dams exhibited obvious signs of leakage through their walls. Farm dams are numbered on **Figure 5.2** and their estimated capacities are shown in **Table 5.8**.

**Table 5.8**
**Estimated Existing Dam Capacities**

| Structure Number | Approximate Surface Area ($m^2$) | Assumed Capacity (ML) (average depth =1m) |
|---|---|---|
| 1 | 950 | 1.43 |
| 2 | 460 | 0.69 |
| 3 | 2,960 | 4.44 |
| 4 | 670 | 1.01 |
| 5 | 1,570 | 2.36 |
| **Total** | | **9.93** |
| Source: Modified from SEEC (2010) – Table 4.2 | | |

Flood modelling was not undertaken in the Surface Water Assessment as the extraction area and all proposed infrastructure are well above the historic flood level.




Source: SEEC (2010) - Figure 4

Figure 5.2
PROJECT SITE CATCHMENTS

### 5.2.2.2 Water Quality

The Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) suggest that site specific water quality data be used where possible to establish trigger values for selected indicators below which there is no adverse effect on biodiversity. Since there is very limited water quality data applicable to the Project Site, the ANZECC guidelines are useful in conjunction with the water quality results collected during the Surface Water Assessment.

Water quality was tested at the following three sampling sites on and in the vicinity of the Project Site in August 2008 (see **Figure 5.2** for the locations of the sampling sites).

- WS1 – Farm Dam 5.
- WS2 - the Wingecarribee River adjacent to the "Mandurama" property.
- WS3 – Stony Creek at the bridge crossing on the site access road.

Water quality results and relevant ANZECC trigger values are presented in **Table 5.9**.

**Table 5.9**
**Surface Water Quality Results**

| Parameter | Units | ANZECC Default Trigger Value# | WS 1@ | WS 2@ | WS 3@ |
|---|---|---|---|---|---|
| pH in water | pH units | 6.5 – 8.0 | 7.7 | 7.5 | 7.8 |
| Electrical Conductivity (EC) | uS/cm | 30 - 350 | 393 | 102 | 396 |
| Total alkalinity | mg/L | - | 76 | 27 | 89 |
| Chloride | mg/L | - | 60 | 15 | 55 |
| Sulphate | mg/L | - | 2 | <2 | 26 |
| Ion Balance | | | | | |
| Anions total | me/L | - | 3.0 | 0.9 | 3.6 |
| Cation total | me/L | - | 3.2 | 0.9 | 3.8 |
| Percent Difference | % | - | 6.5 | - | 5.4 |
| Total Nitrogen | mg/L | 0.25 | 7.3 | 0.2 | <0.1 |
| Total Phosphorus | mg/L | 0.02 | 0.2 | 0.02 | 0.03 |
| Iron | mg/L | - | 7.92 | 0.82 | 0.45 |
| Major Cations | | - | | | |
| Calcium | mg/L | - | 13.6 | 4.0 | 34.6 |
| Magnesium | mg/L | - | 7.9 | 2.9 | 6.8 |
| Sodium | mg/L | - | 26.9 | 10 | 29.5 |
| Potassium | mg/L | - | 27.1 | 1.2 | 8.4 |
| Total suspended solids | mg/L | 2 - 25 NTU* | 32 | 11 | 4 |

# Upland River (>150m altitude) @ see **Figure 5.2**
* ANZECC Guidelines state that values for turbidity and suspended particulate matter are similar.
Source: Modified from SEEC (2010) – Table 5.2.

Water sampled at WS1 is from a farm dam collecting runoff from Catchment A. The data shows that this water is above the trigger values for electrical conductivity, total nitrogen, total phosphorus and suspended solids. This dam is in the middle of a grazing paddock and serves as a water source for cattle and would be subject to the influence of grazing animals, such as manure, urine and trampling of the dam bank, as well as the application of chemical fertilisers to the pasture.

Water sampled at WS2 is from the Wingecarribee River with all measured parameters below the ANZECC trigger values. Water sampled at WS3 is from Stony Creek near the site access road and has electrical conductivity and total phosphorus values which exceed the ANZECC trigger values. This water would primarily be runoff from pastures south of the site access road and the application of chemical fertilisers on the adjoining property may account for these high values.

### 5.2.3 Potential Impacts

#### 5.2.3.1 Catchment Area and Run-off

Extraction operations would lead to the reduction of the catchment areas for all three local catchments as shown in **Table 5.10**. However, it is expected that the total volumes of runoff from the Project Site would be only minimally reduced because the rainfall entering the extraction area would be pumped to a dam for use in dust suppression purposes.

**Table 5.10**
**Catchment Areas**

| Catchment | Existing Catchment Area (ha) | Reduction of Catchment Area due to the Extraction Area (ha) |
|---|---|---|
| A | 27.0 | 2.4 |
| B | 11.4 | 1.5 |
| C | 12.7 | 3.8 |
| Source: Modified from SEEC (2010) – Table 5.1 | | |

The Proponent would not draw water from the Wingecarribee River or any other watercourse. Present NSW legislation permits landholders to capture and use up to 10% of the total runoff from their land without requiring a licence. Two factors determine the harvestable right multiplier at a piece of land, namely – the property's geographical location and the size of the property.

The entire 51ha of the Project Site was assessed using the harvestable right dam capacity calculator. The site has a dam multiplier value of 0.09ML/ha, giving a total harvestable right of 4.59ML dam/basin capacity. Note that this is based on the assumption that any dams or basins are "off-line" from natural watercourses. The outcome of this determination is that the Project Site is entitled to store a maximum of 4.59ML. The remaining 50ha of the "Mandurama" property, owned by the Proponent, would be used for the purpose of cattle grazing and would have an additional harvestable right, allowing cattle to be watered from additional farm dams.

Dams or basins constructed for the purposes of maintaining water quality (e.g. sedimentation basins, effluent management structures or water quality control ponds) are exempt from the harvestable right calculation for a site, although this assumes that water detained in these structures is not re-used on site and is eventually released to downstream waters.

Three sedimentation basins are proposed during the operational phase of the Project and a fourth sedimentation basin would be in use during the initial stage of the project while amenity bunds are being constructed (**Figure 2.3**). If water from these basins is not re-used on site they are exempt from the harvestable right and 4.59ML of storage can be provided elsewhere.

However, if water from these basins is used to meet the demands of the Project then they need to be considered as part of the harvestable right.

Quarry activities would require a minimal volume of water for dust suppression. Allowing for dust suppression over 25% of the extraction area, 70% of the site access road area and 25% of the overburden stockpile, it is estimated that dust suppression would require approximately 33,400L per non-rainy day during the months from September to March and 8,350L per non-rainy day during the months from April to August. It is allowed that up to approximately 2,000L/day over the course of each year would be required for the wash down of machinery watering of vegetation. The annual water requirement is approximately 8.05ML.

Water for dust suppression would be sourced primarily from harvested surface water runoff, either from Sedimentation Basins 1 and 3 or from alternative storages. Dams 1 and 3 would collect sediment-laden water pumped out of the extraction area sump and 'clean' runoff from their upslope catchments. They would be managed as sedimentation basin to settle out any suspended sediment prior to discharge.

The harvestable right dam capacity for the Project Site permits a total of 4.59ML of water storage for re-use. Supply to meet the demand for wash down and dust suppression would be sourced from this volume, taken either from the sedimentation basins or from other storages within the Project Site. Regardless of where water is sourced from, no more than 4.59ML of water storage would be required for on-site use.

Water supply modelling was undertaken as part of the Surface Water Assessment using 100 years of daily rainfall data from the Moss Vale rainfall station and assuming no more than 4.59ML of water storage is available. The model assumed inherent system losses (e.g. infiltration, surface wetting) and runoff coefficients, calibrated for the site using data from Australian Rainfall and Runoff (IEA, 1998), and the daily water demand calculated above.

It was assumed that water would be sourced from Sedimentation Basins 1 and 3, with water collecting in the extraction area being pumped to these structures according to extraction staging (i.e. Stages 1 to 3 dewatered to Dam 1 and Stages 4 to 6 dewatered to Dam 3). Modelling assumed that the total combined catchment draining to Dams 1 and 3 is 1.95ha, with the runoff coefficient set at 60% and initial loss of 5mm per day.

The model predicted that the anticipated total demand of 8.05ML/year would be met 100% of the time from the harvestable right of 4.59ML. The modelling output data are provided in Appendix 3 of SEEC (2010). Further modelling revealed that 2.9ML of storage (i.e. well below the maximum harvestable right) would give 99.9% supply confidence.

As such, the Project is unlikely to reduce flows to the Wingecarribee River and there would be no requirement for make-up water.

#### 5.2.3.2 Water Quality

The greatest risk to water quality attributable to the proposed quarry is the flow of sediment - laden runoff to the Wingecarribee River. SEEC (2010) predicts that approximately 13.6ha of land would be progressively disturbed during the construction of the bunds, clay/shale extraction and the development of infrastructure and the stockpile area. Stripping of topsoil from the extraction area and stockpiling it to create the amenity bunds would result in

approximately 11.6ha of exposed soil although it is noted this area would not be exposed at one time. However, this area would quickly reduce as the amenity bunds would be vegetated for long-term stability.

After stabilisation of the amenity bunds, the only potential sources of sediment would be the extraction area, the surplus overburden stockpile and any unsealed haul roads. Given the proposal to progressively rehabilitate disturbed areas and the fact that the extraction area would be internally draining, the maximum extent of sediment-generating land at any one time is estimated at 2.5ha.

Soil testing (SEEC, 2010 and GCNRC, 2010b) has determined that the topsoil is not significantly dispersible. Through SOILOSS modelling, it has been determined that the topsoil has a soil erodibility factor of 0.042 (GCNRC, 2010b) to 0.064 (SEEC, 2010) which is moderate to high. SEEC (2010), calculated that given the Project Site's average gradient, soil characteristics, rainfall data and assuming bare soils, the soil loss can be expected to be approximately 225t/ha/year, which is low according to Landcom (2004).

Additional sources of impacts on surface water quality include the potential for hydrocarbon spills such as fuels, oils and hydraulic fluids. These potential impacts are discussed more fully in Section 5.2.5.

### 5.2.4 Mitigation Measures

#### 5.2.4.1 Introduction

The Proponent has located the boundaries of the Project Site and designed the extraction area to minimise the impact on the local watercourse system, particularly the Wingecarribee River by:

- positioning the extraction area at least 730m from the river;
- commencing extraction on the southern slopes of the hill towards the southern side of the Project Site;
- placement of amenity bunds which would act as diversion bunds directing surface runoff from upslope areas away from the extraction area;
- use of existing dams (with some minor modifications) for use as sedimentation basins;
- use of harvestable rights water for on-site water use;
- early and progressive revegetation of amenity bunds and rehabilitation of completed extraction areas;
- the use of fast growing cover crops to protect exposed areas;
- no storage of fuel and no washdown activities on site;
- all sewage would be collected in portaloo and removed off site;
- no processing of materials on site; and
- all loads exiting the site would be covered.

SEEC (2010) incorporates a Water Management Strategy which is aimed at minimising potential impacts of the proposed quarry on surface water quality and supply. The strategy includes three key components.

1. Construction and operation of various surface water management controls such as diversion structures and sediment retention basins.
2. Ongoing monitoring of water quality in both release water from the various structures and in downstream areas.
3. A maintenance and upgrade program to quickly repair any problems and to adapt the strategy as the operation progresses.

The water management strategy aims to address the following objectives.

- Minimise changes to the hydrology of all catchments affected by the Project operations, so as to minimise potential impacts on surface water flows.
- Address the water quality requirements of key agencies such as Department of Environment, Climate Change and Water and the Sydney Catchment Authority.
- Minimise the demand for water as much as possible and ensure demand is met from within the harvestable right for the Project Site.
- Maintain ecological conditions in downstream waters through adequate surface water management.
- Avoid artificial diversions of water between neighbouring catchments, (i.e. maintain run-on and runoff within the original, natural catchments).

Collectively, the implementation of these objectives would contribute to achieving a neutral effect on the water quality within the Wingecarribee River.

#### 5.2.4.2 Sedimentation Basins

Four sedimentation basins would be constructed in locations shown in **Figure 5.3** during the six month construction phase of the project. This would involve in some cases the reshaping of the existing farm dams to achieve the required capacities.

Table 6.1 of SECC (2010) details the sizing of these structures during establishment (construction and stabilisation of amenity bunds) and then during the operational phase. Calculations for the sizing of all sedimentation basins are included in Appendix 4 of SEEC (2010).

Sedimentation basins required during establishment are short-term structures. Consequently, they are sized according to the 5-day, 80$^{th}$ percentile rainfall depth criteria detailed in Landcom (2004). Sedimentation basins would have final operational capacities of approximately 8 000m$^3$, 7 000m$^3$ and 7 000m$^3$ for Dams 1, 2 and 3 respectively, whilst the short-term Dam 4 would have a capacity of 850m$^3$.

Operational dams use a sediment retention and storage zone sized in accordance with Landcom (2004) and DECC (2008). The settling (water) zone of operational dams is sized to address the SCA requirement that water quality control structures such as these detain the whole runoff volume from the 100-year ARI 24-hour event.


Figure 5.3
SEDIMENTATION BASINS AND WATER DIVERSIONS

Some of the volume of water stored in Sedimentation Basins 1 and 3 would be "clean" runoff and could be re-used on site for dust suppression, as part of the harvestable right for the Project Site. This equates to a total storage capacity of 4.59ML and only that storage volume would be made available for on-site reuse. A log would be maintained showing re-use and pumping volumes to demonstrate to consent authorities that the harvestable right was not being exceeded.

SEEC (2010) developed the water management strategy based on the following design, monitoring and maintenance requirements.

- The design of operational sedimentation basins would include an emergency spillway designed to safely convey the 100-year ARI flow (DECC, 2008).
- Sedimentation basins would be inspected fortnightly and immediately following any rain event exceeding 25mm to check their capacity and integrity.
- Excess water would only be discharged from the sedimentation basins when water has 50mg/L or less of suspended sediment. It is noted that soil investigations indicate that sediment would naturally settle out. If this does not occur in practice, flocculation to assist settling would be investigated.
- Waters would be discharged within five days after the conclusion of a rain event, at or below the required water quality limit of 50mg/L.
- A marker would be installed in each sedimentation basin showing the boundary between the Storage Zone (i.e. the lower zone) and the Settling Zone (i.e. the upper zone) in the basin.
- After discharging treated water from any sedimentation basin, the level of retained sediment would be inspected. If retained sediment exceeded the marked level of the Storage Zone, sediment would be removed and added to an active stockpile.
- Any damaged components of the sedimentation basins would be repaired as soon as practicable.
- The management procedures for the sedimentation basins would be regularly reviewed to ensure ongoing efficient operation and protection of downstream water quality.
- Water sourced from the sedimentation basins for washdown or dust suppression does not need to meet any specific criteria for suspended sediment first. However, any such water would be used within the upslope catchment of a sedimentation basin, so that any accidental runoff simply drains back to a basin.

#### 5.2.4.3 Diversion Structures

The amenity bunds around the perimeter of the extraction area would act as diversion structures directing natural flows around the extraction area and sedimentation basins. A diversion structure would be required to ensure that overflows from Sedimentation Basin 2 do not flow into Sedimentation Basin 1. A diversion bund is required upslope of Sedimentation Basin 3 to divert runoff from the undisturbed portion of its catchment to the south-east and east.

Diversion bunds or channels would be constructed with the following features.

- All structures would be stabilised using appropriate ground cover to achieve a C-factor of 0.05 (achievable with 70% grass cover or equivalent) or less (Landcom, 2004) prior to conveying water.
- All structures would be designed to fully convey the 20-year ARI time-of-concentration event, and would be stabilised using materials capable to safely managing that flow volume and velocity.
- Potential scour points (e.g. channel inlets/outlets and bends) would be armoured with rock.
- All structures would be inspected monthly and following any rain event that generates flow in the drains to identify areas of erosion, scour or damage. Any problem areas would be repaired and/or appropriate stabilising action taken.
- Inspection of diversion drains would also identify potential flow constrictions that might compromise channel capacity and, if required, remove them.

#### 5.2.4.4 Erosion Controls

The most effective means of controlling erosion include controlling runoff rates and volumes, controlling slope gradients and lengths and by providing an effective protective cover over exposed soils. Runoff rates and volumes and slope lengths and gradients would be managed through the use of diversion banks and channels. All exposed soils would be revegetated as quickly as possible. Soil stripping would be undertaken in narrow strips to ensure that unnecessary or early clearing of vegetation is not carried out.

Amenity bunds would be stabilised using quick growing grass cover crops to achieve at least 60% cover within 20 days of final shaping and 70% cover within a further 2 months. Following establishment of the grass cover crop, shrubs and tree tube stock would be planted to provide more permanent stabilisation.

In the early stages of the project, all overburden material would be incorporated into amenity bunds and stabilised as described above. In later stages of the project, when amenity bunds are already constructed and stabilised, overburden would be stored whenever possible in the quarry pit. If the quarry pit does not have, at the time, capacity to store the overburden it would be stockpiled in the surplus overburden stockpile area. If it is considered that the material would not be transported away within three months of stockpiling it would undergo stabilisation with vegetative cover.

Clay/shale product awaiting transport would be stockpiled on the floor of the extraction area whenever possible. This ensures that any erosion of this material is confined within the extraction area and can be pumped to a sedimentation basin if required. If the quarry pit does not have, at the time, capacity to store the product material it would be stockpiled in the surplus overburden stockpile area. Due to the existing natural topography, any erosion from the surplus overburden stockpile area would be transported to Sedimentation Basin 2.

#### 5.2.4.5 Site Access Road

Any upgrade of the site access road crossing over Stony Creek would be undertaken during the drier periods of the year such as August to September and include erosion and sediment controls in accordance with Landcom (2004).

#### 5.2.4.6 Management and Monitoring

A Surface Water Management Plan would be prepared prior to any construction at the quarry. This plan would outline all control structures and procedures and include a surface water quality monitoring program. Annual water quality monitoring would be undertaken at the three water sample sites used for baseline data for the parameters previously reported. Monitoring would also be undertaken in the event there is an overflow from either Dams 1 and/or 3. Samples would be tested at an accredited laboratory and results would be reported in the Annual Environmental Management Report. Any declines in water quality would be investigated and if required, remedial action taken. The frequency, location of sampling and parameters tested would be reviewed periodically.

The Proponent would also undertake a program of water quality monitoring once the sediment basins are completed to establish water quality, particularly with respect to both total suspended solids and turbidity. It is envisaged a site-specific relationship can be developed between both parameters so that field testing of turbidity should be sufficient to establish whether it is suitable to discharge excess water from one or more of the sediment basins.

### 5.2.5 Assessment of Impacts

It is assessed that the proposed quarry would have minimal adverse impacts on surface water quality and flows considering the following.

- The setback of the proposed extraction area from the river.
- The calculated soil loss of 225t/ha/year (which according to Landcom, 2004, is low) assuming no protection against erosion.
- The construction of sedimentation basins to capture sediment.
- The construction of diversion structures to limit the flow of runoff on to disturbed areas.
- The prompt and comprehensive revegetation of disturbed surfaces.
- Progressive rehabilitation.
- Implementation of a water management strategy formalised in a Surface Water Management Plan, including best practice management of structures and activities and a water quality monitoring program.

It is envisaged a site-specific relationship can be developed between both parameters so that field testing of turbidity should be sufficient to establish whether it is suitable to discharge excess water from one of more of the sediment basins.

## 5.3 NOISE

*The noise assessment was undertaken by Spectrum Acoustics. The full assessment, hereafter referred to as Spectrum Acoustics (2010) is presented as Part 3 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

#### 5.3.1.1 Introduction

Based on the environmental risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential environmental noise impacts requiring assessment and their unmitigated risk rating are as follows.

- Increased noise levels associated with quarry operations causing annoyance and distractions (moderate and low risk).
- Increased noise levels associated with road traffic causing annoyance and distractions (high risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of noise impacts include impacts associated with the construction, quarry operation and road traffic, including the entire proposed transport route.

The Director-General's Requirements also require that the assessment of noise impacts take into account the following policies, guidelines and plans as applicable:

- *NSW Industrial Noise Policy(INP) (DECCW)*;
- *Environmental Criteria for Road Traffic Noise (DECCW, 1999)*;
- *Environmental Noise Control Manual (ENCM)(DECCW, 1994)*; and
- *Assessing Vibration: A Technical Guideline (DECCW).*

Relevant information on the existing environment, environmental noise criteria, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

### 5.3.2 The Existing Noise Environment

Spectrum Acoustics conducted noise monitoring at three locations during August 2008 to determine ambient noise levels. One of the monitoring locations was the entrance gate to the "Mandurama" property, a project-related location. This site was selected to provide a measure of noise levels at the boundary of the Project Site nearest the residential area of New Berrima. The other two locations were selected to represent the nearest and most potentially affected non-project related properties. Residence N2 (R2) "Chesley Park" and N3 (R3) "Carribee Farm" are approximately 800m and 1600m from the centre of the extraction area respectively, although the logger for "Carribee Farm" was at the southern entrance gate, approximately 1150m from the centre of the extraction area. Measurements were undertaken in accordance with relevant DECCW guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". Details of the methodology employed are detailed in Section 3.2 of Spectrum Acoustics (2010). Locations of potential noise residence receivers and loggers are shown in **Figure 5.4**.

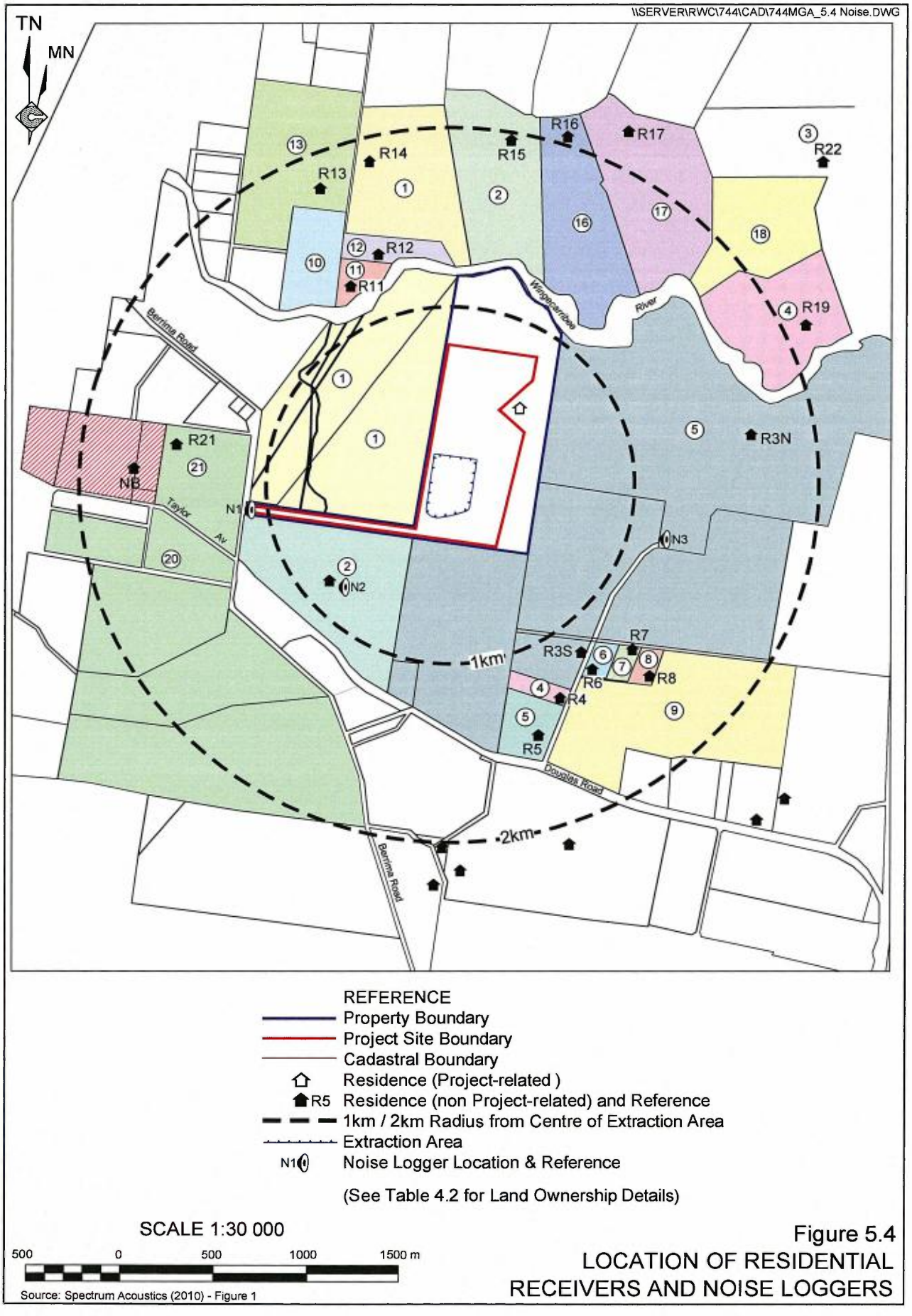



Figure 5.4
LOCATION OF RESIDENTIAL RECEIVERS AND NOISE LOGGERS

The measured ambient $L_{Aeq}$ and Rating Background Levels (RBL,$L_{A90}$) are listed in **Table 5.11**.

Most of the noise data were found to be wind-affected, with noise from nearby trees contributing strongly to data at N1 and N2. The logger at N3 was placed in an open paddock and, in the interests of conservatism, the daytime RBL of 33dB(A),$L_{90}$ was adopted for all assessed receivers.

**Table 5.11**
**Ambient Noise Levels – August 2008**

| Location | $L_{eq}$ (day) | $L_{eq}$ (eve) | $L_{eq}$ (night) | $L_{90}$ (day) | $L_{90}$ (eve) | $L_{90}$ (night) |
|---|---|---|---|---|---|---|
| N1 "Mandurama" | 57 | 57 | 54 | 48 | 47 | 46 |
| N2 "Chesley Park" | 46 | 44 | 43 | 39 | 36 | 38 |
| N3 "Carribee Farm" | 55 | 46 | 46 | 33 | 32 | 34 |
| Source: Spectrum Acoustics (2010) – Table 2 | | | | | | |

### 5.3.3 Potential Impacts

The project could potentially produce noise emissions with the following potential impacts.

- Noise induced hearing loss.
- Noise induced speech disturbance.
- Sleep disturbance.
- Intrusiveness.
- Annoying noise characteristics such as tones, impulses, low frequency noise and intermittent noise.
- Cumulative impacts with other noise sources.
- Reduction in amenity which would in turn impact property values. (This socio-economic impact is discussed in Section 5.8).

The noise impacts would be mitigated to a limited extent in some directions by the natural topography of the land and the existing substantial tree windrows.

### 5.3.4 Noise Level Criteria

#### 5.3.4.1 Introduction

The assessment of impacts of the Project upon the local noise climate has been undertaken by calculating likely noise levels at the closest residential receivers to the Project Site under a range of operational scenarios and comparing those noise levels against the noise criteria established through reference to:

- the Interim Construction Noise Guideline (DECC) – for site construction noise;
- the Industrial Noise Policy (INP) (DECCW) – for site operational noise;
- the Environmental Criteria for Road Traffic Noise (ECRTN)(DECCW) – for product transportation activities (on public roads); and
- the existing noise climate established at residences surrounding the Project Site (see Section 5.3.2).

### 5.3.4.2 Construction and Operational Noise Criteria

The construction stage of the Project largely comprises the construction of amenity bunds which would be designed to reduce noise, visual and air quality impacts at surrounding residences. A construction noise criterion is established through reference to the 2009 DECCW publication Interim Construction Noise Guideline, which nominates a criteria of "Background (RBL) plus 10dB" expressed as a 15-minute $L_{Aeq}$, i.e. during standard working hours.

Based upon the lowest background noise level, the construction noise criterion at all receivers is equal to 43dB(A),$L_{eq(15min)}$.

The environmental noise criteria for the operation of a project needs to consider both the "intrusiveness" criterion which limits $L_{Aeq(15minute)}$ noise levels from industrial sources to RBL + 5dB(A), and the "amenity" criterion which considers cumulative noise impacts in areas with competing industrial noise sources.

When establishing the intrusiveness criterion for each noise assessment location, the lowest RBL values in any relevant time period would be taken. Due to the absence of significant industrial noise sources in the area, operational noise criteria would be based on the intrusiveness criterion, in accordance with the Industrial Noise Policy. The operational criterion for the project, therefore, has been established as the "Background (RBL) plus 5 dB" expressed as a 15-minute $L_{Aeq}$.

Based upon the lowest background level, the operational noise criterion at all receivers is equal to 38 dB(A),$L_{eq(15min)}$.

The construction and operational noise criteria are provided in **Table 5.12**.

**Table 5.12**
**Construction and Operational Noise Criteria**

| | Lowest daytime Rating Background Level $L_{A90}$ | Construction Noise Criterion dB(A),$L_{eq(15min)}$. | Operational Noise Criterion dB(A),$L_{eq(15min)}$. |
|---|---|---|---|
| N3 "Carribee Farm" | 33 | 43 | 38 |

### 5.3.4.3 Traffic

The haulage route between the Project Site and the Bowral Brick Plant comprises local, connector and arterials roads. Criteria for the generation of additional traffic noise on public roads were sourced from the DECCW *Environmental Criteria for Road Traffic Noise* (ECRTN) as shown in **Table 5.13**.

**Table 5.13**
**ECRTN Traffic Noise Criteria**

| Policy | Roads | Criteria | |
|---|---|---|---|
| | | **Daytime (7am – 10pm)** | **Night-time (10pm – 7am)** |
| Land use development with potential to create additional traffic on **existing freeways/arterials** | Hume Highway | 60dB(A),$L_{eq(15hr)}$ | 55dB(A),$L_{eq(15hr)}$ |
| Land use development with potential to create additional traffic on **existing collector road** | Taylor Avenue, Old Hume Highway, Medway Road, Mittagong Road | 60dB(A),$L_{eq(1hr)}$ | 55dB(A),$L_{eq(1hr)}$ |
| Land use development with potential to create additional traffic on **existing local road** | Berrima Road, Cavendish Street, Old Bowral Road, Lyell Avenue, Kirkham Road, Oxley Hills Road, Kiama Street | 55dB(A),$L_{eq(1hr)}$ | 50dB(A),$L_{eq(1hr)}$ |
| Source: Modified from Spectrum Acoustics (2010) and Traffic Solutions (2010) | | | |

Residences are adjacent to the proposed transport route at sections of Taylor Avenue. At all locations with residences adjacent along the proposed transport route, with the exception of Taylor Avenue, the proposed number of vehicles would be less than 5% of the existing traffic volume and no quantitative assessment of traffic noise is necessary. Only traffic noise impacts at Taylor Avenue require assessment.

### 5.3.5 Mitigation Measures

The Project has been designed with an objective to minimise the noise generated during extraction operations and transportation of clay/shale product from the Project Site. The design features and safeguards which would be implemented during the construction and operational stages of the Project to meet this objective are listed below. It is noted that the design features have been considered in the modelling and assessment of impacts.

**Design Features**

- The construction of amenity bunds on three sides (southern, western and northern) of the extraction area and retention of the existing tree screen on the eastern side of the extraction area. Bunds and tree screens are effective noise mitigating structures which would reduce noise impacts at nearby residences.
- Extraction would commence (Stages 1 to 3) on the southern side of the hill which provides noise screening to residences on the northern side of Wingecarribee River, until amenity bunds are fully established with trees.
- No processing of materials would be conducted on site.
- The proposed transport route avoids wherever possible residential, school and other sensitive receiver areas. Significant proportions of the proposed route include State or regional roads or an existing transportation route.

**Construction Safeguards**

- Under northeast wind conditions, bund construction would be limited to the northern end of the western bund or the northern bund.
- Construction of the southern bund and southern section of the western bund would be limited to westerly wind conditions or neutral conditions.
- Construction of the southern bund and southern section of the western bund would not occur during any transportation campaign.

**Operational Safeguards**

- All hours of operation presented in Section 2.7.1 would be strictly adhered to.
- All equipment on site would be regularly serviced to ensure sound power levels of each item remains at or below that nominated for noise modelling purposes (see Section 4.2 of Spectrum Acoustics, 2010).
- Reversing alarms (mid frequency band) would be fitted to all earthmoving equipment to avoid high frequency noise associated with conventional alarms.
- All truck drivers would be required to comply with the Bowral Brick Plant Drivers Code of Conduct which outlines procedures for reducing noise impacts during transportation.

### 5.3.6 Assessment of Impacts

#### 5.3.6.1 Methodology

The assessment of noise was completed by Spectrum Acoustics (2010) using the RTA Technology's Environmental Noise Model (ENM) v3.06. The various noise sources of the Project were identified and located within the Project Site to simulate Project operations for five typical scenarios throughout the life of the Project. The local topography of the existing landscape and the constructed amenity bunds were considered in the modelling of the respective scenarios. All modelling for the operational stages of the Project assumed the existence of the 7m high amenity bunds as shown on **Figure 2.3**.

The predicted noise levels received at residential receivers surrounding the Project Site were then calculated under the three sets of prevailing meteorological conditions – see Section 5.3.5.3.

All major noise producing items were modelled at most exposed positions and point calculations performed for each receiver location. Noise contours were also generated for the surrounding area, although it should be noted that differences of up to ±2 dB between point calculations and values read off the contours for the same receiver are common. This is because calculation sections in contouring mode rarely intercept the receiver locations, whereas point calculations are for the exact receiver locations.

#### 5.3.6.2 Noise Sources

Noise data for significant sources associated with the Project were obtained from measurements of similar machinery previously conducted by Spectrum Acoustics. Sound power levels for noise sources used in the modelling are shown below in **Table 5.14**.

**Table 5.14**
**Noise Source Sound Power Levels**

| Noise source | Sound power level dB(A),$L_w$ |
|---|---|
| Scraper (CAT 637, construction only) | 118 |
| Bulldozer (CAT D10) | 116 |
| Front-end loader (CAT 966) | 111 |
| Haul Truck (30t) | 110 |
| Product truck (road-registered) | 108 ($L_{max}$ pass-by) |
| Source: Spectrum Acoustics (2010) – Table 3 | |

#### 5.3.6.3 Noise Modelling Scenarios

Modelling was conducted for the following atmospheric conditions:

- Daytime 'neutral' – Air temperature 20°C, 70% relative humidity (RH), no wind, -1°C/100m vertical temperature gradient (boundary layer adiabatic lapse);
- North-East wind – Air temperature 20°C, 70% R.H., 3m/s wind speed.
- Westerly wind – Air temperature 20°C, 70% R.H., 3m/s wind speed.

Spectrum Acoustics (2010) modelled five construction / operational scenarios, each chosen to represent the potentially noisiest scenario to the fifteen assessment locations shown in **Table 5.15** and on **Figure 4.4**. The five scenarios modelled were as follows.

**Scenario 1(a) – Construction of south- western and southern bunds**

Use of a scraper and bulldozer to form the proposed environmental bunds along the south-western and southern sides of the extraction area using topsoil and overburden removed from the proposed Stage 1 area. Noise sources are situated at natural ground level to reflect worst case conditions with respect to the closest receivers (*R2* to the south-west and *R11* to the north-west). Off-site transportation of material would not occur during this stage and noise modelling has been confined to the initial construction earthworks to determine the impact of these sources alone.

**Scenario 1(b) – Construction of north-western and northern bunds**

Use of a scraper and bulldozer to form the proposed environmental bunds along the north-western and northern sides of the extraction area, using topsoil and overburden removed from the proposed Stage 1 area. Noise sources are situated at natural ground level to reflect worst case conditions with respect to the closest receivers (R2 to the south-west and R11 to the north-west). Off-site transportation of material would not occur during this stage and noise modelling has been confined to the initial construction earthworks to determine the impact of these sources alone.

**Scenario 2(a) – Extraction during Stage 1 and maximum truck movements (four per 15 minutes)**

Commencement of extraction of the clay/shale which would be approximately 7m below natural ground level at the northern extent of the proposed Stage 1 extraction area (i.e. at the highest point in the proposed area of disturbance at 680m AHD). The product transportation scenario involved a maximum of four truck movements per 15 minutes (132 movements per day). Modelling was not undertaken for Stages 2 and 3 because operations during these stages would be deeper in the pit. Stage 1 operation represents the worst case scenario amongst Stages 1 to 3.

**Scenario 2(b) – Extraction during Stage 1 and average truck movements (two per 15 minutes)**

Commencement of extraction of the clay/shale which would be approximately 7m below natural ground level at the northern extent of the proposed Stage 1 extraction area (i.e. at the highest point in the proposed area of disturbance at 680m AHD). The product transportation scenario involved an average of two truck movements per 15 minutes (68 movements per day). Modelling was not undertaken for Stages 2 and 3 because operations during these stages would be deeper in the pit. Stage 1 operation represents the worst case scenario amongst Stages 1 to 3.

**Scenario 3 – Extraction during Stage 4 and average truck movements (two per 15 minutes)**

Commencement of topsoil and overburden removal and extraction of clay/shale at the southern extent of the proposed Stage 4 extraction area. One truck transporting overburden to the proposed surplus overburden stockpile area (assumed 10m above ground level at the centre) (although, in practice, this may not occur at this stage of the project because excavated materials may remain in-pit). Average product transport rate of 68 movements per day. Modelling was not undertaken for Stages 5 and 6 because operations during these stages would be deeper in the pit. Stage 4 operation represents the worst case scenario amongst Stages 4 to 6.

#### 5.3.6.4 Off-site Road Traffic Noise

The assessment employed the methodology from the US Environmental Protection Agency document No. 550/9-74-004 "Information on Levels of Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974".

Modelling was undertaken for the maximum number of trucks movements (136 movements per day) and the average number of movements (64 movements per day) at the residence in Taylor Avenue nearest to the road. Noise levels were assessed to a point 1m from the façade of the residence at a distance of 18m from the centre of the road.

#### 5.3.6.5 Residual Impacts

**Construction Noise**

The assessment determined the noise levels attributable to the construction of the bunds for three sets of meteorological conditions, with the described design mitigation measures in place. Noise levels predicted at each of the receiver locations for each scenario are provided in **Table 5.15**. The one predicted exceedance of the criterion is denoted by bold print. Noise contours for bund construction during NE wind conditions (which produce the worst potential noise impacts) are provided in Figures C1 and C2 of Spectrum Acoustics (2010).

**Table 5.15**
**Predicted Construction Noise Levels (Scenarios 1(a) and 1(b)) dB(A),$_{Leq(15minute)}$**



| Ref | Land owner | Meteorological Condition | | | | | |
|---|---|---|---|---|---|---|---|
| | | Southern and south-western bund | | | Northern and north-western bund | | |
| | | Calm | W wind | NE wind | Calm | W wind | NE wind |
| R2 | Wyndlorn Pastoral Company Pty Ltd | 40 | 36 | **47** | 34 | 31 | 38 |
| R3 | Cowley Hills Pty Ltd | 20 | 30 | <20 | 25 | 35 | <20 |
| R4 | P.N. Radnedge | 24 | 35 | 30 | 30 | 35 | 32 |
| R5 | P.A. & R.F. Rusconi | 25 | 35 | 30 | 28 | 32 | 30 |
| R6 | A.V. Dickson | 25 | 33 | 25 | 25 | 34 | 26 |
| R7 | M. & R.K. Senior | 25 | 32 | 25 | 27 | 34 | 28 |
| R8 | P.R. Rosen | 22 | 30 | 20 | 25 | 33 | 26 |
| R11 | C. & K. Vella Enterprises Pty Ltd | 35 | 35 | 35 | 35 | 35 | 35 |
| R12 | Pingama Pty Ltd | 35 | 35 | 35 | 35 | 35 | 35 |
| R13 | P.J. & D.J. Daly | 30 | 30 | 30 | 35 | 32 | 31 |
| R14 | G.W. Holdings Pty Ltd | 30 | 30 | 30 | 35 | 32 | 31 |
| R15 | Flocolo Pty Ltd | 29 | 27 | 24 | 28 | 28 | 30 |
| R16 | R.L. Lavender | 29 | 27 | 24 | 28 | 28 | 30 |
| R17 | P. Holicek | 29 | 27 | 24 | 28 | 28 | 30 |
| R21 | Perth St, New Berrima nearest residence | 34 | 30 | 35 | 30 | 29 | 36 |

Source: Modified after Spectrum Acoustics (2010) – Table 4

## Operational Noise

The assessment determined the noise levels attributable to the operations of the quarry for three sets of meteorological conditions, with the described design mitigation measures in place.

Noise levels predicted at each of the receiver locations for each scenario during extraction of Stage 1 are provided in **Table 5.16**. Noise contours for extraction during Stage 1 during various wind conditions for the average number of truck movements (Scenario 2(b)) are provided in Figures C3, C4 and C5 of Spectrum Acoustics (2010).

**Table 5.16**
**Predicted Stage 1 Operational Noise Levels (Scenarios 2(a) and 2(b)) dB(A),$_{Leq(15minute)}$**



| Ref | Land owner | Meteorological condition | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 truck movements / 15 minutes | | | 2 truck movements / 15 minutes | | |
| | | Calm | W wind | NE wind | Calm | W wind | NE wind |
| R2 | Wyndlorn Pastoral Company Pty Ltd | 34 | 34 | 38 | 31 | 31 | 35 |
| R3 | Cowley Hills Pty Ltd | 20 | 31 | <20 | 20 | 31 | <20 |
| R4 | P.N. Radnedge | 26 | 29 | 30 | 26 | 29 | 30 |
| R5 | P.A. & R.F. Rusconi | 25 | 30 | 30 | 25 | 30 | 30 |
| R6 | A.V. Dickson | 24 | 33 | 25 | 24 | 33 | 25 |
| R7 | M. & R.K. Senior | 24 | 34 | 24 | 24 | 34 | 23 |

**Table 5.16 (Cont'd)**
**Predicted Stage 1 Operational Noise Levels (Scenarios 2(a) and 2(b)) dB(A),$_{Leq(15minute)}$**



| Ref | Land owner | Meteorological condition | | | | | |
|---|---|---|---|---|---|---|---|
| | | 4 truck movements / 15 minutes | | | 2 truck movements / 15 minutes | | |
| | | Calm | W wind | NE wind | Calm | W wind | NE wind |
| R8 | P.R. Rosen | 23 | 33 | 24 | 22 | 33 | 22 |
| R11 | C. & K. Vella Enterprises Pty Ltd | 23 | 22 | 22 | 22 | 22 | 22 |
| R12 | Pingama Pty Ltd | 23 | 22 | 22 | 22 | 22 | 22 |
| R13 | P.J. & D.J. Daly | 22 | 22 | 22 | 22 | 22 | 22 |
| R14 | G.W. Holdings Pty Ltd | 22 | 22 | 22 | 22 | 22 | 22 |
| R15 | Flocolo Pty Ltd | 23 | 25 | 20 | 23 | 25 | 20 |
| R16 | R.L. Lavender | 23 | 25 | 20 | 23 | 25 | 20 |
| R17 | P. Holicek | 23 | 25 | 20 | 23 | 25 | 20 |
| R21 | Perth St, New Berrima nearest residence | 24 | 20 | 29 | 23 | <20 | 26 |
| Source: Modified after Spectrum Acoustics (2010) – Table 5 | | | | | | | |

Noise levels predicted at each of the receiver locations for each scenario during extraction of Stage 4 are provided in **Table 5.17**. Noise contours for extraction during Stage 4 during various wind conditions for the average number of truck movements (Scenario 3) are provided in Figures C6, C7 and C8 of Spectrum Acoustics (2010).

**Table 5.17**
**Predicted Stage 4 Operational Noise Levels (Scenario 3) dB(A),$_{Leq(15minute)}$**

| Ref | Land owner | Meteorological condition | | |
|---|---|---|---|---|
| | | Calm | W wind | NE wind |
| R2 | Wyndlorn Pastoral Company Pty Ltd | 30 | 30 | 34 |
| R3 | Cowley Hills Pty Ltd | <20 | 29 | <20 |
| R4 | P.N. Radnedge | 21 | 24 | 24 |
| R5 | P.A. & R.F. Rusconi | 20 | 25 | 24 |
| R6 | A.V. Dickson | 20 | 25 | 20 |
| R7 | M. & R.K. Senior | 20 | 24 | <20 |
| R8 | P.R. Rosen | <20 | 25 | <20 |
| R11 | C. & K. Vella Enterprises Pty Ltd | 20 | 20 | <20 |
| R12 | Pingama Pty Ltd | 20 | 20 | <20 |
| R13 | P.J. & D.J. Daly | 20 | <20 | <20 |
| R14 | G.W. Holdings Pty Ltd | 20 | <20 | <20 |
| R15 | Flocolo Pty Ltd | 20 | 20 | 20 |
| R16 | R.L. Lavender | 20 | 20 | 20 |
| R17 | P. Holicek | 20 | 20 | 20 |
| R21 | Perth St, New Berrima nearest residence | 20 | <20 | 22 |
| Source: Spectrum Acoustics (2010) – Table 6 | | | | |

The predicted noise levels shown in **Tables 5.16** and **5.17** indicate that the highest operational noise level would be during Stage 1 and received at R2 during NE wind conditions with four truck movements per 15 minutes (132 movements per day), and is equal to the operational noise criteria of 38dB(A),$L_{eq(15min)}$. The results indicate compliance with the operational noise criterion.

#### Off-site Road Traffic Noise

The assessment determined the noise levels attributable to the transportation of the product, received at the nearest residence to the transportation route, being a residence on Taylor Avenue (Spectrum Acoustics, 2010 – Table 7). The predicted noise level was calculated to be 51dB(A),Leq(1 hour) which is significantly below the criterion of 60dB(A),Leq(1 hour).

## 5.4 FLORA

*The flora assessment was undertaken by Geoff Cunningham Natural Resource Consultants Pty Ltd. The full assessment (hereafter referred to as GCNRC, 2010a) is presented as Part 4 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

### 5.4.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential flora impacts requiring assessment and their unmitigated risk rating are as follows.

- Death or injury to native species (low risk).
- Loss of habitat for native species (low risk).
- Disruption to breeding cycle of native species (low risk).
- Reduced biodiversity (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of flora impacts address potential impacts on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and regional wildlife habitat corridors.

The Director-General's Requirements also require that the assessment of flora impacts take account of the following policies, guidelines and plans, as applicable.

- *Draft Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act (1979) (DECCW);*
- *NSW Groundwater Dependent Ecosystem Policy (DLWC);*
- *State Environmental Planning Policy No. 44 – Koala Habitat Protection.*

Relevant information on the existing flora, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

## 5.4.2 The Existing Flora

### 5.4.2.1 Study Methodology

An investigation into the existing flora commenced with a review of previous vegetation studies and maps relevant to the study area which includes the Project Site. This was followed with a field survey of the Project Site on 8 August 2008, followed by supplementary field work in November 2009. Seven-Part Tests were undertaken for relevant species within the Project Site.

#### Previous Studies

A review of the Wingecarribee Shire Council Vegetation map and the Burragorang 1:100 000 vegetation map sheet shows that the vegetation community at the Project Site and in the surrounding study area is not mapped. The Project Site is in the vicinity of a Mittagong Sandstone Woodland community and the Southern Highlands Shale Woodland Endangered Ecological Community, however, these communities are not represented at the Project Site as the characteristic tree species are not present.

#### Field Survey

The study area was defined as the entire "Mandurama" property which includes the Project Site. The field survey on 8 August 2008 included the identification of flora species at nine 40m x 40m quadrats in the study area (**Figure 5.5**). The species composition data was recorded at each of these sites. The different vegetation communities within the Project Site were identified during the field survey and sampled to ascertain the variation in species density and composition.

### 5.4.2.2 Study Results

#### Vegetation Communities Identified

The field study identified two separate vegetation communities within the study area. These are:

- Community 1 – Cleared Pastureland Community, and
- Community 2 – Remnant Open Woodland Community.

Tree species and groundcover species identified in the survey are provided in Tables 4.1 and 4.2 respectively of GCNRC (2010a). A number of planted linear windbreaks and clumps, comprising introduced trees and shrubs, were recorded within the study area.

Community 1 is the dominant vegetation community within the study area. It is almost completely cleared of trees and shrubs and has been sown to *Lolium sp.* (Ryegrass). It contains other introduced pasture species such as *Dactylis glomerata* (Cocksfoot), *Phalaris aquatica* (Phalaris), and *Trifolium subterraneum* (Subterranean Clover). In addition to the sown pasture species, a range of weed species was evident in the ground cover over the whole study area. There were few native groundcover species present. The area occupied by the Cleared Pastureland Community also supports a number of planted windbreaks of introduced tree and shrub species, as well as two specimens of *Eucalyptus botryoides* (Bangalay) which were confirmed during the field survey in November 2009. These eucalypts are not native to the Berrima area.

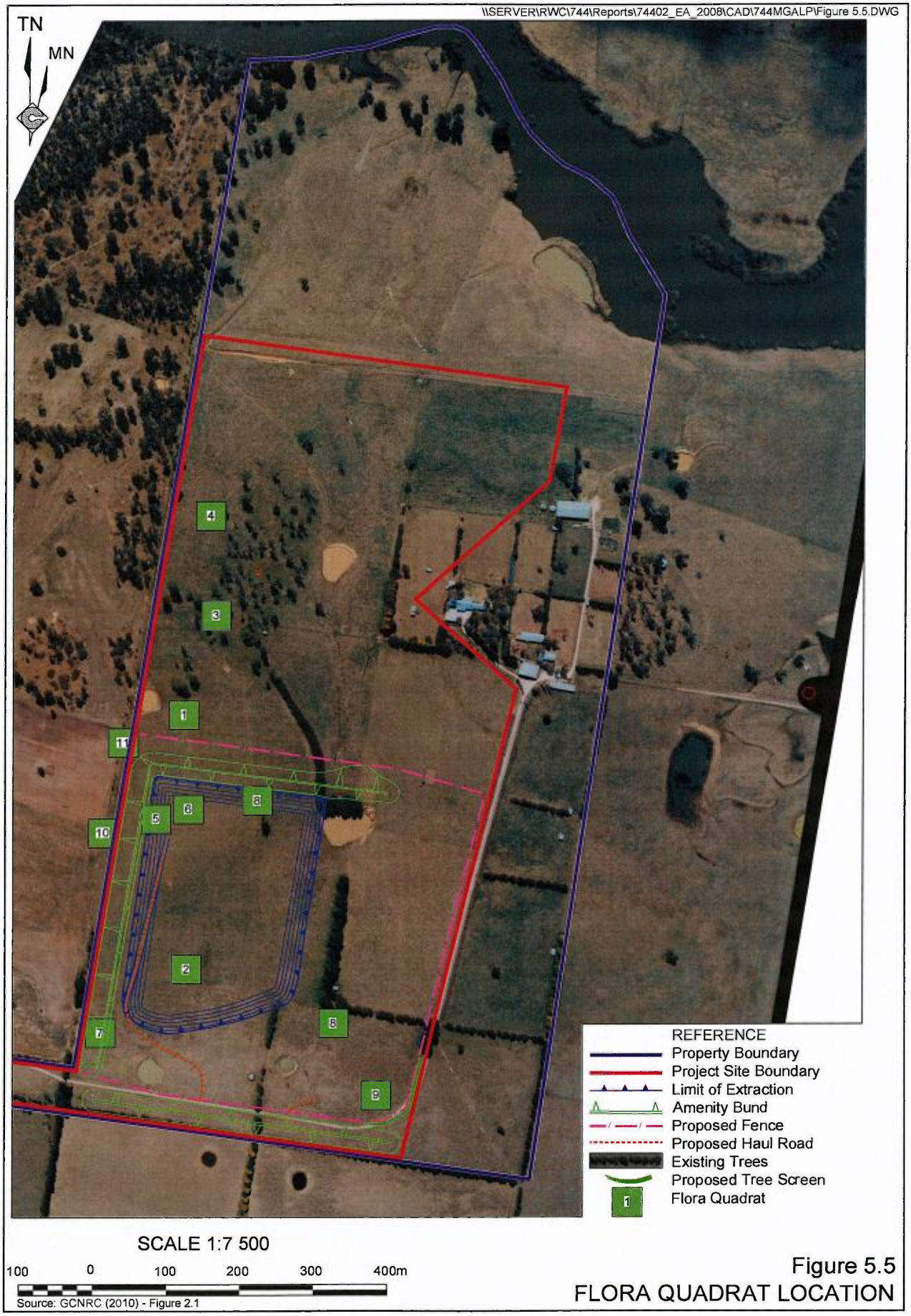



Figure 5.5
FLORA QUADRAT LOCATION

Community 2 is an open woodland remnant in the centre of the study area, comprising scattered tress (mostly 10-20m apart) of mainly *Eucalyptus radiata* subsp. *radiata* (Narrow-leaved Peppermint) and *Eucalyptus dives* (Broadleaf Peppermint) with some *Eucalyptus mannifera* (Brittle Gum) and an occasional *Eucalyptus pauciflora* (Snow Gum) (not recorded in the survey quadrats). There is no native shrub layer present. The groundcover is comprised of a mixture of the ground cover species listed for Community 1, with few native groundcover species present. The eucalypts are generally highly debilitated and showing evidence of recent wind storm damage and dieback.

### Weeds

Two of the nineteen groundcover species recorded within the study area were native species. The introduced pasture and weed species account for about 90% of the number of groundcover species present but they occur in such abundance that they account for almost 100% of the total ground cover.

A review of the schedule of Noxious Weeds for the Wingecarribee Shire contained on the Industry and Investment NSW (Agriculture) website. (*date of search 11 November 2009*) indicates that there are no noxious weed species within the study area.

### Koala Habitat

Schedule 1 of SEPP 44 lists the Wingecarribee Shire as a local government area to which the Policy applies. SEPP 44 requires the identification of any "potential Koala habitat" within the study area.

It is considered that the study area does not contain any potential Koala habitat because the field survey did not identify any Koala feed trees.

### Threatened Flora Species

A search of the "Atlas of NSW Wildlife" database found that seven threatened flora species under the *Threatened Species Conservation Act 1995* (NSW) have been located within a 20km x 20km square around the study area. A search of the Commonwealth Environment Protection and Biodiversity Conservation Act Online Database (Protected Matters Report) revealed that eight plant species listed as threatened species under the EPBC Act (Commonwealth) were likely to occur within a 10km radius of the centre of the study area. Three of these species were common to both lists.

An assessment of the likelihood of the occurrence of these twelve threatened species at the Project Site is provided in GCNRC (2010a) Table 7.1. The assessment concluded that none of these twelve species are present at the Project Site. This was confirmed during the field survey.

### Threatened Ecological Communities, Populations and Habitat

A search of the "Atlas of NSW Wildlife" database found one critically endangered ecological community and 35 endangered ecological communities under the *Threatened Species Conservation Act 1995* (NSW), which may potentially occur within the within the boundaries of the Burragorang and Moss Vale 1:100 000 scale map sheet areas. An assessment provided in GCNRC (2010a) Table 7.2 concludes that none of the communities are present within the study area. This was confirmed by the field survey.

A search of the Commonwealth *Environment Protection and Biodiversity Conservation Act* Online Database (Protected Matters Report) revealed that one threatened ecological community listed under the EPBC Act is likely to occur within the vicinity of the study area.

This is the critically endangered White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. This community was not identified in the survey within the study area.

No endangered flora populations or critical habitat are recorded from the Burragorang and Moss Vale 1:100 000 scale map sheet areas. This was confirmed during the field survey.

### 5.4.3 Potential Impacts

The total area of disturbance would be approximately 11ha, comprising approximately 7.7ha of extraction area and 3.3ha of additional disturbance for amenity bunds and infrastructure. The Project would involve the removal of approximately five individual trees. These are two cotoneaster shrubs and one pine tree which have been planted in windbreaks and two *Eucalyptus botryoides* (Bangalay), a coastal species which has been planted. The Project would also involve the clearing of improved pasture.

The spread of weed species through the use of machinery and trucks is a potential impact of the project. Exposed soil on bunds and dam walls would be susceptible to the invasion of weeds which could spread and present a risk to local agricultural areas and native vegetation.

### 5.4.4 Mitigation Measures

Weeds would be controlled through the implementation of a weed management procedure which would involve:

- quick establishment of a selected cover crop;
- spraying of weeds with an authorised herbicide;
- retention of all cleared vegetation on the Project Site; and
- a rubble pit at the site entrance to remove clay from truck wheels.

### 5.4.5 Assessment of Impacts

The flora assessment concludes that no threatened flora species, endangered or critically endangered ecological communities, endangered flora populations or critical habitat exist or are likely to exist within the Project Site or study area.

The Wingecarribee Tree Preservation Order (TPO) provides a regulatory process for the protection of trees, recognising their contribution as significant elements of the landscape and essential components of the Shire's local ecology and biodiversity. It also serves to enhance environmental quality and amenity while considering community safety. Two species of eucalypt, *Eucalyptus aquatica* (Mountain Swamp Gum) and *Eucalyptus macarthurii* (Paddy's River Box) are listed as rare trees in the TPO and have been noted as possibly occurring in the study area. These species were not recorded during the field survey.

In conjunction with clauses of the Wingecarribee LEP, the TPO relates to land currently zoned 7(b) Environmental Protection in which the Project Site is located. Given that the three trees to be removed for the development of the project are not native to the Berrima area and could not be considered to be significant specimens of their species, it is not likely that the proposed development would contravene the provisions of the Wingecarribee Tree Preservation Order.

In accordance with the *Environmental Planning and Assessment Act 1979*, the Project was assessed for the likelihood of causing a significant effect on threatened species, populations or ecological communities, or their habitats, (Seven-Part Test). Details of the Seven-Part Test are provided in GCNRC (2010a) – Section 9. It is concluded that the Project would not have a significant impact on threatened flora species, endangered or critically endangered ecological communities, endangered flora populations or critical habitat. Furthermore, it has been assessed that the Project would have minimal impact on the flora of the area. A referral under the EPBC Act is not required.

## 5.5 FAUNA

*The fauna assessment was undertaken by Aquila Ecological Surveys. The full assessment (hereafter referred to as Aquila, 2009) is presented as Part 5 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

### 5.5.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential fauna impacts requiring assessment and their unmitigated risk rating are as follows.

- Death or injury to native species (low risk).
- Loss of habitat for native species (low risk).
- Disruption to breeding cycle of native species (low risk).
- Reduced biodiversity (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of fauna impacts address potential impacts on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and regional wildlife habitat corridors.

The Director-General's Requirements also require that the assessment of fauna impacts take account of the following policies, guidelines and plans as applicable:

- *Draft Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act (1979) (DECCW);*
- *State Environmental Planning Policy No. 44 – Koala Habitat Protection.*

Relevant information on the existing fauna, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

## 5.5.2 The Existing Fauna

### 5.5.2.1 Study Methodology

An investigation into the existing fauna commenced with a review of literature and databases relevant to the study area which includes the Project Site. This was followed with a field survey of the Project Site on 26 August 2008.

#### Literature Review and Database Search

The following databases were searched for any records of threatened species, communities, habitats, populations relevant to the local area.

- The Atlas of NSW Wildlife (DECCW, 2010a)
- The Bionet online database (NSW Government, 2009)
- Vegetation Mapping of South-eastern NSW (Tozer et al, 2005)
- Wingecarribee Shire Council State of the Environment Report (Anon, 2008)

#### Field Survey

A field survey of the Project Site was undertaken on 20 August 2008. A detailed description of the field survey is provided in Aquila (2010). The survey methodology included survey along a transect shown in **Figure 5.6.** The presence of specific sources of native fauna food and shelter, such as dense shrubs, flowering trees, standing water, tree hollows, caves and rock outcrops was recorded to enable predictions of species that would be likely to use the site. Accessible tree hollows were inspected for the presence of fauna or signs of use. All species detected during the field survey were recorded.

Aquatic habitats were identified in Stony Creek which is traversed by the site access road and in the farm dams. The survey did not include any aquatic habitats because it is considered that the disturbance relating to the Project would not be near nor impact on any natural aquatic habitats.

### 5.5.2.2 Study Results

#### Literature Review and Database Search

A search of the "Atlas of NSW Wildlife" database produced a list of fauna likely to be found within and surrounding the Project Site. The results of this search are provided in Aquila (2010) Appendix 1.

The search also found that ten threatened fauna species under the *Threatened Species Conservation Act 1995* (NSW) have been located within a 5km radius of the centre of the Project Site since 1980. A search of the Bionet database within a 10km x 10km grid centred on the Project Site did not find any additional threatened species. A search of the Commonwealth *Environment Protection and Biodiversity Conservation Act* Online Database (Protected Matters Report) revealed that one fauna species (Grey-headed Flying-fox) listed as threatened species under the EPBC Act (Commonwealth) was likely to occur within a 10km radius of the centre of the study area. This species was common to both lists.

A description of the habitats which support these ten vulnerable species is provided in Aquila (2010) Table 3.1.

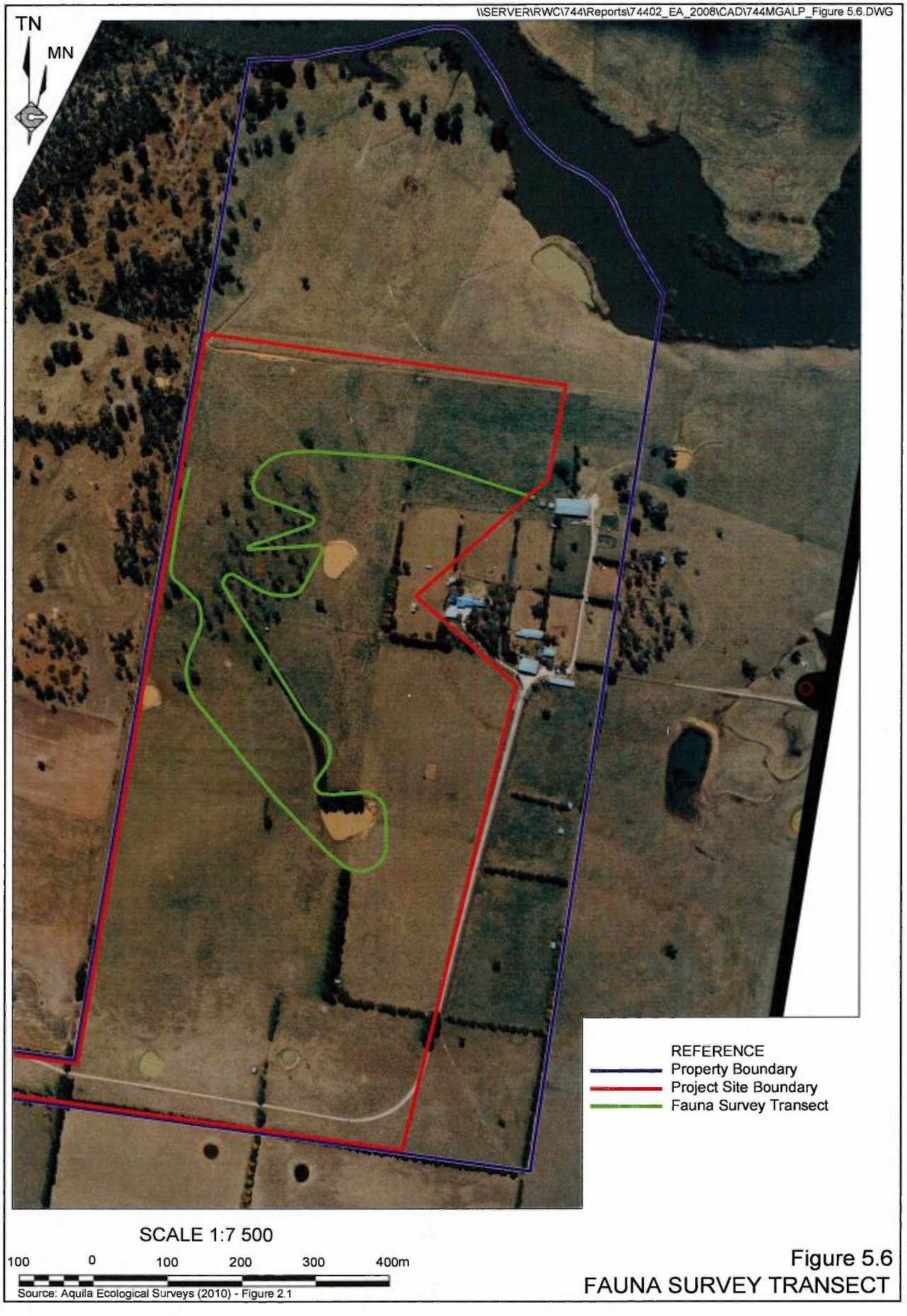



Figure 5.6
FAUNA SURVEY TRANSECT

### Field Survey

The field survey identified five fauna species, all of which are birds (Aquila, 2009 – Appendix 1). These were:

- *Chenonetta jubata* (Maned Duck)
- *Tachybaptus novaehollandiae* (Australasian Grebe)
- *Rhipidura fuliginosa* (Willie Wagtail)
- *Gymnorhina tibicens* (Australian Magpie)
- *Corvus coronoides* (Australian Raven)

Fauna habitat within the Project Site is highly modified consisting mostly of pasture dominated by introduced grasses and herbs, as confirmed in GCNRC (2010a). The Project Site is not part of a wildlife corridor. Within the pasture is a hedgerow of the introduced shrub *Cotoneaster glaucophyllus* (Cotoneaster) and some *Pinus sp* (Pine Trees). This habitat type is of value to a limited range of common, native fauna species such as *Rhipidura fuliginosa* (Willie Wagtail), *Gymnorhina tibicens* (Australian Magpie) and *Corvus coronoides* (Australian Raven), which were detected during the survey.

To the north and northwest of the proposed extraction area and beyond are some remnant eucalypts mostly being *Eucalyptus piperita* (Sydney Peppermint) and *E. radiata* (Narrow-leaved Peppermint), as confirmed by GCNRC (2010a). These trees are generally in poor condition and a number of them are in decline. Hollows suitable for habitation by fauna such as birds, arboreal mammals and insectivorous bats are present in some of these trees. Inspection of accessible hollows only revealed the presence of old nesting material, possibly that of *Platycercus eximius* (Eastern Rosellas), a species detected during the survey.

The five small farm dams within the Project Site provide limited habitat for waterfowl such as the *Chenonetta jubata* (Maned Duck) and *Tachybaptus novaehollandiae* (Australasian Grebe), which were observed during the field survey. The lack of fringing vegetation suggests that these dams are not likely to be used for breeding by waterfowl or frog species.

The dams represent minimal fish habitat. They are not connected to any stream by a recognisable permanent or ephemeral stream and do not contain substrates or refuge areas that could be used by fish. The only fish species likely to be present would be the occasional *Anguilla reinhardtii* (Long-finned Eel) and the introduced *Gambusia holbrookii* (Mosquito Fish).

### Threatened Species

No threatened fauna species were detected during the field survey. An assessment, detailed in Aquila (2010) Section 3.2.3 concludes that it would be very unlikely for any of the ten vulnerable species listed in Aquila (2010) – Table 3.1 to be present within the Project Site.

### Koalas

The Project Site does not contain any primary or secondary Koala feed trees and is not contiguous with any native bushland. It can be concluded therefore that it is highly unlikely that the Project Site is used by Koalas for permanent or transitory habitat.

### Giant Dragonfly

The Department of Environment Climate Change and Water requested that *Petalura gigantea* (Giant Dragonfly) be considered in the fauna assessment. The Giant Dragonfly lives in permanent swamps and bogs with some free water and open vegetation (DECCW 2009b). Farms dams do not fit this description, so no such habitat occurs within the Project Site.

### 5.5.3 Potential Impacts

The total area of disturbance is approximately 11ha, comprising approximately 7.7ha of extraction area and 3.3ha of additional disturbance for amenity bunds and infrastructure. The Project would involve the removal of approximately five individual trees and the clearing of improved pasture. This could potentially cause the removal of fauna habitat such as tree hollows, feed sources and roosting sites. The farm dams would be retained but may undergo some modification which could potentially temporarily disturb some fauna and fauna habitat.

Noise from the Project operations could potentially disturb fauna and fauna breeding.

### 5.5.4 Mitigation Measures

In order to reduce destruction of fauna, trees to be felled would be inspected for hollows and other obvious habitat. If these are detected, trees would be felled and left overnight to allow fauna to escape before further disturbance.

### 5.5.5 Assessment of Impacts

The fauna assessment concludes that no threatened fauna species, endangered or critically endangered ecological communities, endangered fauna populations or critical habitat exist or are likely to exist within the Project Site or study area. Furthermore, it has been assessed that the Project would have minimal impact on the fauna of the area. A referral under the EPBC Act is not required.

## 5.6 VISUAL AMENITY

### 5.6.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential environmental impacts relating to visual amenity requiring assessment and their unmitigated risk rating are as follows.

- Temporary views of disturbed areas (high risk).
- Medium term views of disturbed areas (moderate risk).
- Long term views of disturbed areas (high risk).
- Highly identifiable permanent impact (moderate risk).

In addition, the Director-General's Requirements issued by the DoP identify "Visual Impact" as a key issue for consideration within the *Environmental Assessment* and require that the assessment address minimisation of the visibility of the Project Site from the surrounding area, particularly from likely affected residences.

The following sub-sections assess the existing visual amenity, the proposed changes generated by the quarry, relevant design features, operational safeguards and ongoing management to mitigate the risks posed and an assessment of residual impacts.

### 5.6.2 The Existing Visual Amenity

The visibility of the proposed quarry site is shielded from the south, east and west by the natural topography and the existing tree windrows. The northern side of the proposed extraction area is visible from a number of properties on the northern side of the Wingecarribee River. Residences 16 and 17 **(Figure 4.4)** which are located approximately 1.9km and 2.0km respectively from the closest edge of the extraction area and at an approximate elevation of 730m AHD have clearest views of the proposed extraction area. All other residences on the northern side of the river are screened from the proposed extraction area by forest or natural topography or viewers could see the proposed extraction area only at a considerable (>2km) distance. It is noted that views of the proposed extraction area from Residence 15, which is directly north of the proposed extraction area, are screened by trees growing on that property. It is also noted that existing views to the south from residences north of the river include the Boral Cement plant and the Inghams Stock Feed plant, **(Plate 5.1)**.

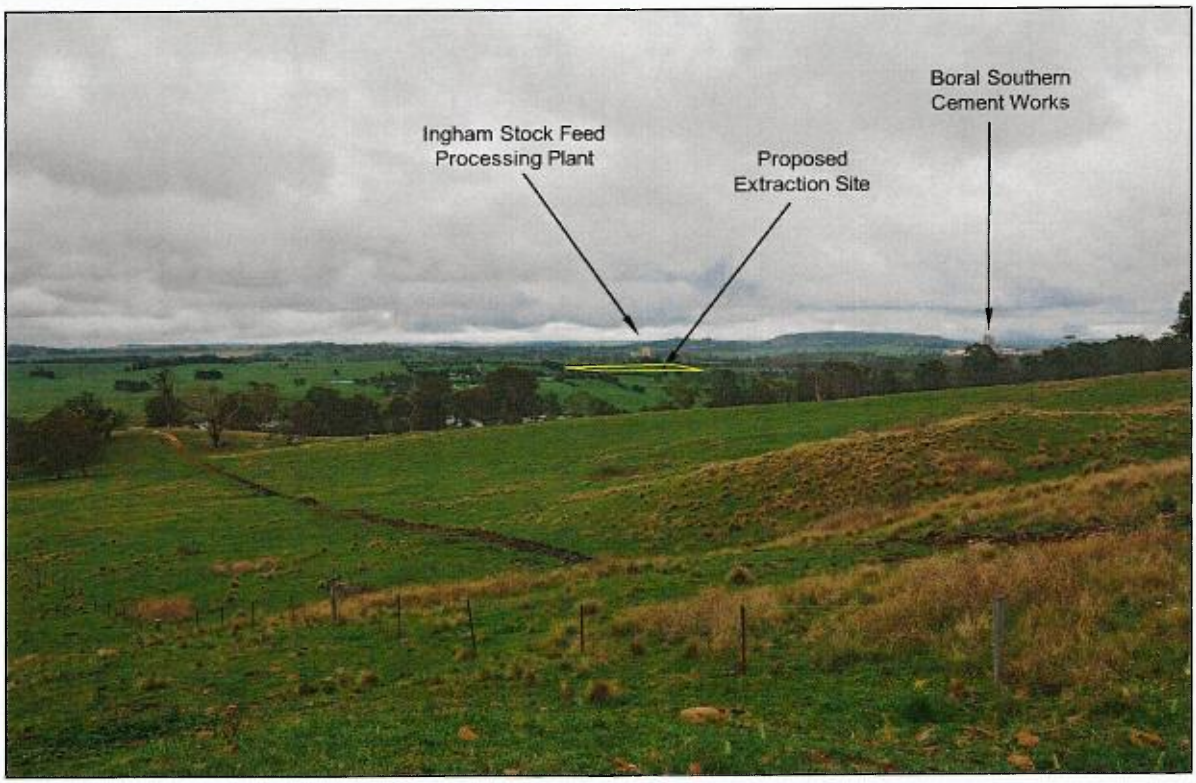



**Plate 5.1**: View to the South towards the proposed extraction area from Residence 17 (Ref: E744E-025)

### 5.6.3 Potential Impacts

The extraction area would not be visible from the east, south or west due to the existing topography, windrows and proposed amenity bunds and tree screenings.

The extraction area would be visible at considerable distance (approximately 2km) from residences on the northern side of the river. At the time of the preparation of this report, Residence 16 was under construction and it was not possible to photograph the proposed extraction area from this location. A photograph of the view from Residence 17, which is at the same approximate elevation but is 100m further from the extraction area, is shown in **Plate 5.1**. **Figure 5.7** indicates the indicative sight lines of viewing from Residence 16.

### 5.6.4 Mitigation Measures

The following mitigation measures would be taken to reduce visible amenity impacts.

- The 7m high southern and western amenity bunds would screen the views of the extraction area and the surplus overburden stockpile area from the west and south.
- The existing tree screen would be extended on the eastern side of the surplus overburden stockpile area to screen stockpiles from the east (see **Figure 2.3**).
- A farm forest would be planted over the Stage 4 area during the first 2 years of the project. These trees would be of sufficient height at the commencement of Stage 4 (18 years) to provide screening of the proposed activities and exposed extraction faces within the Stage 4 extraction area (see **Figure 5.7**). The farm forest would be progressively cleared in strips as extraction proceeds northward with the remaining trees required to screen the operation area(s).
- The extraction area during Stages 5 and 6 would be topographically lower and screened from the north by the vegetated northern amenity bund.
- Rehabilitation of the southern extraction benches and faces would be very advanced (13-18 years) by the end of Stage 4 – hence, there would be little recognisable extraction components visible from residences to the north of the Wingecarribee River.

### 5.6.5 Assessment of Impacts

The quarry would change the visual landscape through the clearing of approximately 8ha of pasture, the establishment of amenity bunds and temporarily through the introduction of earthmoving equipment. However, due to the existing topography and the implementation of the proposed mitigation measures, the altered landscape would be largely screened from view or be vegetated consistent with a range of native / exotic vegetation and pasture in the area.

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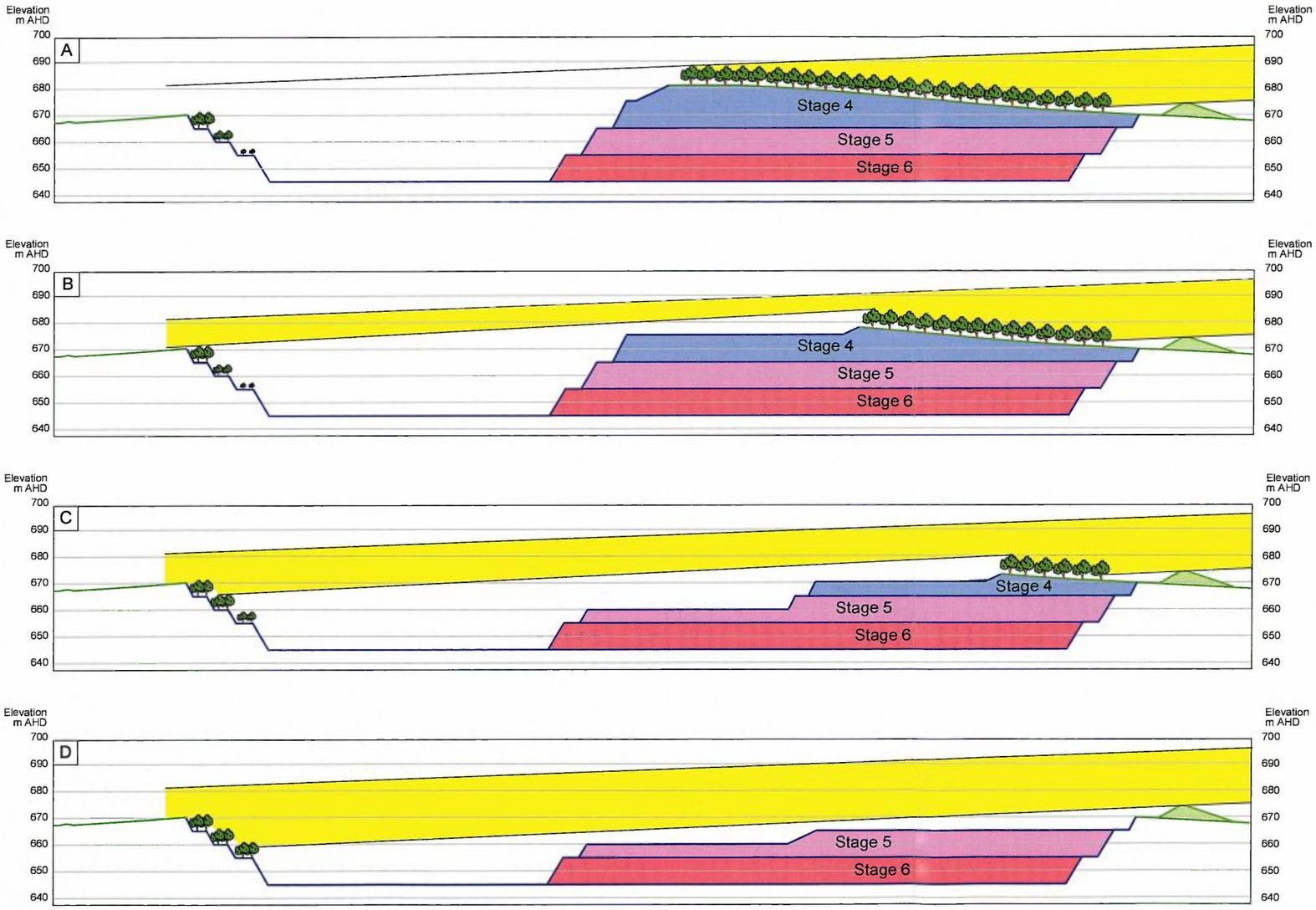
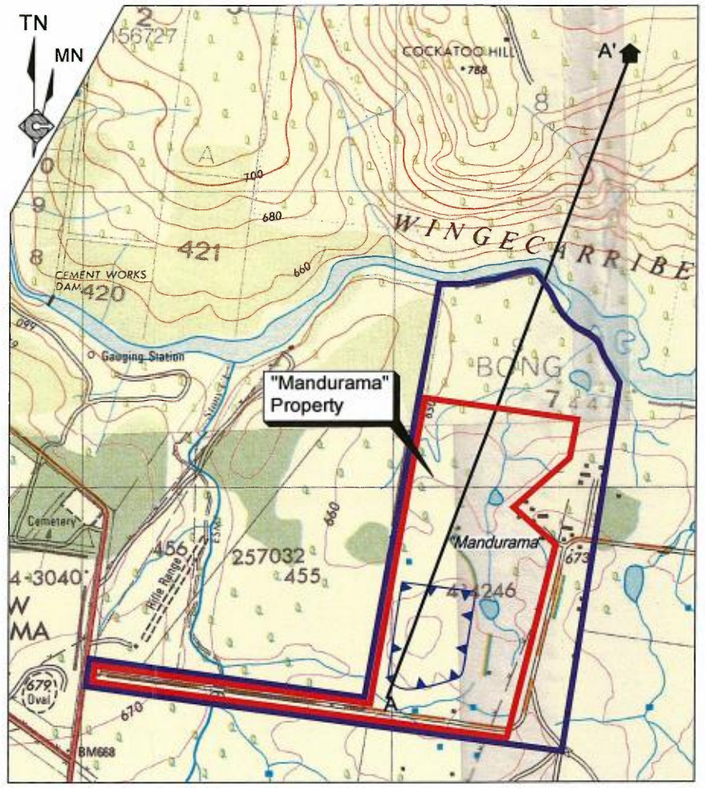



DETAILED SECTION SCALE 1:7 500

100 0 100 200 300 400m




PLAN SCALE 1:20 000

200 0 200 400 600 800 1000 m

Base Map Source: Moss Vale 1:25 000 Topographic Map (Date: 1985)

REFERENCE
- Property Boundary
- Project Site Boundary
- Proposed Limit of Extraction
- Sight Line Arc

**Figure 5.7**
**VISIBILITY SECTIONS**

R.W. CORKERY & CO. PTY. LIMITED

# 5.7 AIR QUALITY

*The air quality assessment was undertaken by Heggies Pty Ltd. The full assessment (hereafter referred to as Heggies, 2010) is presented as Part 6 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

## 5.7.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential environmental air quality impacts requiring assessment and their unmitigated risk rating are as follows.

- Deposited dust impact on native vegetation (low risk).
- Deposited dust - a nuisance to residences (low risk).
- Total Suspended Particles – a nuisance to residences (low risk).
- $PM_{10}$ – health impacts on residents (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of air quality impacts address protection of sensitive receptors from any adverse impacts from dust and odour and consider options to minimise fugitive dust from stockpiles and cleared areas.

The Director-General's Requirements also require that the assessment of air quality impacts refer to the following policies, guidelines and plans as applicable:

- *Protection of the Environment Operations (Clean Air) Regulation 2002;;*
- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DECCW);*
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DECCW).*

Relevant information on the existing air environment, air quality criteria, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

## 5.7.2 The Existing Air Environment

The Project Site is situated in a semi-rural area dominated by agriculture and livestock operations. However, two industrial operations, with potential to influence air quality, are in the vicinity of the Project Site. The Ingham's Stock Feed Processing Plant is approximately 1.8km south of the Project Site and the Boral Cement site is approximately 2.3km west-southwest of the Project Site. Whilst potential exists, neither operations are understood to be contributing noticeable quantities of dust to the residential receptors around the Project Site. Other local sources of air pollutants are road and railway traffic.

The level of pollutants generated by agricultural and livestock operations is considered low. Based on the data provided by the National Pollutant Inventory (NPI), cement plants can potentially emit significant levels of particulate matter to the local air shed. Consequently, the potential for cumulative impact of emissions generated from the Project Site and the surrounding industries needs to be considered.

There is no air quality monitoring conducted in the area surrounding the Project Site. The nearest and most representative monitoring is located at Oakdale, approximately 50km north-northeast of the Project Site. The DECCW-recorded monitoring data Oakdale ($PM_{10}$) has been used to provide a suitable representation of the air quality environment currently present at the Project Site in the absence of site specific data.

The results indicate that the highest 24-hour average $PM_{10}$ concentration at the Oakdale monitoring site was 49.2µg/m$^3$, recorded on 4 May 2007. The annual average $PM_{10}$ concentration for 2007, recorded at the DECCW's Oakdale monitoring site was 12.8µg/m$^3$.

No monitoring data is available for TSP for the area surrounding the Project Site. It is noted that the $PM_{10}$ sub-set is typically approximately 50% of TSP in the ambient air in regions where road traffic is not the dominant particulate source, such as rural areas (US EPA, 2001). In the interest of conservatism, the annual average TSP concentrations has been assumed to be 19.2µg/m$^3$, 1.5 times the annual average $PM_{10}$ concentrations.

In the absence of deposited dust records for the Project Site, dust deposition associated with the Project Site would be assessed based on the incremental guideline of 2g/m$^2$/month.

The site-specific background air quality levels adopted for this assessment are presented in **Table 5.18**.

**Table 5.18**
**Background Air Quality Environment for Assessment Purposes and Assessment Criteria**

| Air Quality Parameter | Averaging Period | Assumed Background Concentration / Level | Assessment Criteria |
|---|---|---|---|
| $PM_{10}$ | 24-hour | Daily Varying | 50 |
| | Annual | 12.8 µg/m$^3$ | 30 |
| TSP | Annual | 19.2 µg/m$^3$ | 90 |
| Dust | Annual | 2 g/m$^2$/month | Maximum incremental increase of 2g/m$^2$/month. Maximum Total of 4g/m$^2$/month |
| Source: Modified after Heggies (2010) - Table 4.3 | | | |

## 5.7.3 Air Quality Criteria

The air quality goals adopted for the assessment, which conform to current DECCW and Commonwealth air quality criteria, are also listed in **Table 5.18**.

### 5.7.4 Potential Impacts

Potential air quality impacts include dust and exhaust and greenhouse gas emissions. The sources of these emissions would be as follows.

- Excavation and extraction – topsoil stripping, overburden excavation, extraction of the clay/shale product.
- Bund construction – placement of overburden and topsoil.
- Transportation – dust emissions from the materials being transported.
- Road dust – dust emissions from the internal roads as vehicles travel along them.
- Stockpiles – dust emissions from bare stockpiles and bunds prior to revegetation.
- Exhaust and greenhouse gas emissions from trucks and machinery.

### 5.7.5 Mitigation Measures

The Proponent proposes to adopt the following safeguards and mitigation measures to limit the generation of dust and other emissions from site activities.

- Vegetated amenity bunds would provide barriers to minimise the spread of dust from the Project Site.
- All disturbed areas would be progressively rehabilitated, commencing as soon as possible after the completion of extraction in that area.
- A water truck would be used to routinely spray unsealed roads and tracks.
- The last 400m of the site access road would be sealed to limit mud tracking onto Berrima Road.
- A truck shaker grid would be installed at the start of the 400m section of the site access road, to minimise the amount of rock and soil adhering to the truck tyres.
- Extraction practices would be amended, as required during adverse wind conditions, to minimise the generation and spread of dust from the Project Site.
- Trucks leaving the Project Site would be covered and tailgates effectively sealed.
- Vehicles and machinery would not be permitted to idle unnecessarily.
- Vehicles and machinery would be maintained in accordance with manufacturers' specifications.
- The drop heights between front-end loader buckets and truck trays would be minimised through operator training and education on the management of dust.

### 5.7.6 Assessment of Impacts

**$PM_{10}$**

Atmospheric dispersion modelling was undertaken to assess the potential for dust and particulate generation from activities at the extraction site. Modelling was conducted in accordance with DECCW's Approved Methods document and the methodology used is described in Section 6 of Heggies (2010). Modelling assumed a worst case scenario which involved full-time operation of a scraper, bulldozer and FEL, transportation of product and bund construction, extraction rate of 2000t per day, 68 truck loads despatched per day, and surplus stockpile haulage rate of nine trucks per day. This level of activity would rarely be achieved and therefore represents a worst case situation for the air quality assessment. Modelling assumed the mitigation capabilities of the proposed amenity bunds and dust suppression watering of the internal roads at a rate of $2L/m^2/hr$ (an emission reduction of 50%).

The maximum predicted incremental increases in 24-hour average $PM_{10}$ at the sensitive receptor locations are listed in **Table 5.19**. When these concentrations are paired against their corresponding 24-hour concentrations within the adopted 2007 monitoring dataset, in accordance with DECCW's Approved Methods document, the total cumulative impact at each receptor is predicted. **Table 5.19** presents the maximum predicted 24 hour $PM_{10}$ concentration at each receptor using this approach.

**Table 5.19**
**Predicted Incremental and Cumulative $PM_{10}$**

| Receptor ID | Maximum Predicted Increment $PM_{10}$ | Maximum Predicted Cumulative Concentration $PM_{10}$ | DECCW $PM_{10}$ Goal |
|---|---|---|---|
| NB (New Berrima) | 9.5 | 49.2 | 50 |
| R2 | 19.5 | 49.2 | 50 |
| R3N | 17.9 | 56.0 | 50 |
| R3S | 18.9 | 49.5 | 50 |
| R11 | 25.3 | 49.2 | 50 |
| R12 | 17.8 | 49.2 | 50 |
| R13 | 14.6 | 49.2 | 50 |
| R14 | 10.7 | 49.2 | 50 |
| R15 | 15.4 | 49.2 | 50 |
| R19 | 12.4 | 50.6 | 50 |
| R22 | 13.2 | 49.3 | 50 |
| Source: Heggies (2010) – Tables 7.1 and 7.2 (modified) | | | |

The modelling calculates an exceedance of the $50\mu g/m^3$ assessment criterion at R3N and R19 on a day when background levels are abnormally high (and the predicted 24-hour increment on this day is a low $1.4\mu g/m^3$). This indicates that the potential for cumulative exceedance of the 24-hour average $PM_{10}$ assessment criterion does exist during proposed operations at the Project Site.

However, an analysis of the frequency distribution of these data (Figure 7.1 of Heggies, 2010) shows that the potential for adverse impacts from proposed quarry operational emissions on the surrounding environment in relation to 24-hour average $PM_{10}$ concentrations is low.

The total predicted incremental increase in annual average $PM_{10}$ attributable to the Project at all identified sensitive receptors is presented in **Table 5.20**. Addition of the adopted background annual average $PM_{10}$ concentration of 12.8µg/m$^3$ allows assessment against the DECCW annual average $PM_{10}$ criterion.

**Table 5.20**
**Predicted Annual Average $PM_{10}$ Concentration (µg/m$^3$)**

| Receptor | Predicted Incremental Concentration | Adopted Background Concentration | Predicted Cumulative Concentration | DECCW Goal |
|---|---|---|---|---|
| NB (New Berrima) | 0.4 | 12.8 | 13.2 | 30 |
| R2 | 2.3 | 12.8 | 15.1 | 30 |
| R3N | 1.7 | 12.8 | 14.5 | 30 |
| R3S | 1.2 | 12.8 | 14.0 | 30 |
| R11 | 1.0 | 12.8 | 13.8 | 30 |
| R12 | 0.9 | 12.8 | 13.7 | 30 |
| R13 | 0.6 | 12.8 | 13.4 | 30 |
| R14 | 0.5 | 12.8 | 13.3 | 30 |
| R15 | 0.4 | 12.8 | 13.2 | 30 |
| R19 | 0.7 | 12.8 | 13.5 | 30 |
| R22 | 0.4 | 12.8 | 13.2 | 30 |
| Source: Modified after Heggies (2010) – Table 7.4 | | | | |

The incremental increase in annual average $PM_{10}$ is predicted to be less than 2.3µg/m$^3$ at all sensitive receptor locations for the modelled scenario. When the adopted ambient annual average $PM_{10}$ concentration, 12.8µg/m$^3$ (Section 5.7.2), is applied to these model predictions, the total annual average $PM_{10}$ is predicted to be less than 15.1µg/m$^3$ at all locations. Based on the DECCW assessment criterion for annual average $PM_{10}$, 30µg/m$^3$, emissions of $PM_{10}$ from the Project Site are not predicted to adversely impact upon the surrounding environment.

### TSP

The predicted incremental increases and total predicted cumulative annual average TSP are presented in **Table 5.21**.

These results show that the incremental increase in annual average TSP is predicted to be less than 7.2µg/m$^3$ at all sensitive receptor locations across the modelled scenario. When the adopted ambient annual average TSP concentration, 19.2µg/m$^3$ (Section 5.7.2), is applied to these model predictions, the total annual average TSP is predicted to be less than 26.4µg/m$^3$ at all locations.

**Table 5.21**
**Predicted Annual Average TSP Concentration (µg/m$^3$)**

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| Receptor | Predicted Incremental Concentration | Adopted Background Concentration | Total Predicted Concentration | DECC Goal |
|---|---|---|---|---|
| NB (New Berrima) | 1.3 | 19.2 | 20.5 | 90 |
| R2 | 7.2 | 19.2 | 26.4 | 90 |
| R3N | 4.3 | 19.2 | 23.5 | 90 |
| R3S | 3.6 | 19.2 | 22.8 | 90 |
| R11 | 2.8 | 19.2 | 22.0 | 90 |

**Table 5.21 (Cont'd)**
**Predicted Annual Average TSP Concentration (µg/m$^3$)**



| Receptor | Predicted Incremental Concentration | Adopted Background Concentration | Total Predicted Concentration | DECC Goal |
|---|---|---|---|---|
| R12 | 2.5 | 19.2 | 21.8 | 90 |
| R13 | 1.7 | 19.2 | 20.9 | 90 |
| R14 | 1.5 | 19.2 | 20.7 | 90 |
| R15 | 1.3 | 19.2 | 20.5 | 90 |
| R19 | 2.0 | 19.2 | 21.2 | 90 |
| R22 | 1.4 | 19.2 | 20.6 | 90 |
| Source: Modified after Heggies 2010 – Table 7.5 | | | | |

Based on the DECCW assessment criterion for annual average TSP, 90µg/m$^3$, emissions of TSP from the Project are not predicted to adversely impact upon the surrounding environment.

### Dust Deposition

The predicted incremental increases and total predicted cumulative monthly average dust deposition is presented in **Table 5.22**.

The results show that the incremental increase in monthly average dust deposition is predicted to be less than 1.9µg/m$^3$ at all sensitive receptor locations across the modelled scenario.

**Table 5.22**
**Predicted Dust Deposition (g/m$^2$/month)**

| Receptor | Predicted Incremental Concentration | Adopted Background Concentration | Total Predicted Concentration | DECCW Goal |
|---|---|---|---|---|
| NB (New Berrima) | 0.2 | 2.0 | 2.2 | 4.0 |
| R2 | 1.3 | 2.0 | 3.3 | 4.0 |
| R3N | 1.9 | 2.0 | 3.9 | 4.0 |
| R3S | 0.7 | 2.0 | 2.7 | 4.0 |
| R11 | 0.9 | 2.0 | 2.9 | 4.0 |
| R12 | 0.8 | 2.0 | 2.8 | 4.0 |
| R13 | 0.6 | 2.0 | 2.6 | 4.0 |
| R14 | 0.4 | 2.0 | 2.4 | 4.0 |
| R15 | 0.2 | 2.0 | 2.2 | 4.0 |
| R19 | 0.5 | 2.0 | 2.5 | 4.0 |
| R22 | 0.1 | 2.0 | 2.1 | 4.0 |
| Source: Modified after Heggies (2010) – Table 7.6 | | | | |

Based on the DECCW assessment criterion for dust deposition, (a maximum incremental increase of 2g/m$^2$/month), emissions of dust from the Project Site are not predicted to adversely impact upon the surrounding environment.

### Greenhouse Gas Emissions

A summary of the greenhouse gas emission predictions for two possible levels of annual production is presented in **Table 5.23**. The emissions would be attributable to the consumption of fuel for the extraction and transportation of the clay/shale and other transportation associated with the operation. Scope 3 emissions (those associated with the consumption of electricity) have not been assessed as the project would use negligible electricity.

**Table 5.23**
**Total GHG Emissions by Project Scenario**

| Scenario (Annual production) | GHG Emissions by Scope (t $CO_2$-e/year) | | Total Emissions (t $CO_2$-e/year) |
|---|---|---|---|
| | Scope 1 | Scope 3 | |
| 120 ktpa | 399 | 55 | 454 |
| 150 ktpa | 489 | 69 | 558 |
| Source: Modified after Heggies (2010) – Table 9.4 | | | |

A comparison of the annual Scope 1 GHG emissions from the Project against published net total GHG emissions for NSW and Australia during 2007 shows that Scope 1 emissions from the Project would represent between approximately 0.0002 % and 0.0003% of total NSW emissions and approximately 0.0001% of total Australian emissions.

### Cumulative Impacts

It is noted that the Bowral Brick Plant, located approximately 5km to the northeast of the Project Site does generate particulate pollution, but taking into account the distance between the Project Site and this source, it is considered that the cumulative impacts upon receptors surrounding the Project Site would be negligible.

The predicted 24-hour and annual average $PM_{10}$ concentrations at the listed residences, using dispersion modelling, accounted for the emissions from other sources. Cumulative impacts therefore have been built into the impact predictions. It is considered that use of the daily varying 2007 Oakdale $PM_{10}$ data would appropriately account for any cumulative impacts the Berrima Cement Works and other sources may have in combination with emissions from the Project Site.

### Conclusion

The air quality assessment indicates that the proposed project would have minimal dust and emissions impacts on the local and broader environment when mitigation measures such as amenity bunds, dust suppression by watering and the use of appropriately maintained machinery are implemented.

# 5.8 SOCIO-ECONOMIC SETTING

## 5.8.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential socio-economic impacts requiring assessment and their unmitigated risk rating are as follows.

- Increased employment, (high positive risk).
- Loss of property values of neighbouring properties, (high risk).

Relevant information on the existing socio-economic environment, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections. The assessment of socio-economic impacts is contingent on the assessment of other potential impacts such as visual amenity, noise and traffic which may influence impacts on property values of neighbouring properties. Therefore the socio-economic assessment considers the residual impacts of those aspects after mitigation measures would have been implemented.

## 5.8.2 The Existing Environment

The proposed clay/shale quarry is located in a semi-rural setting on the eastern side of New Berrima. Section 4.5 provides a summary of land ownership and use around the proposed quarry. The land immediately adjacent to the proposed quarry is used for agricultural purposes, mainly beef cattle. Land on the northern side of the Wingecarribee River is used for semi-rural residential purposes as well as agriculture. Some of these properties have large tracts of native forest which the land owners have left undisturbed to provide nature conservation areas. Some of these semi-rural residential or lifestyle blocks are not permanently habitated, but provide rural retreats for the owners on a part-time basis. Some property owners on the northern side of the river have expressed that their purpose for purchasing their lifestyle block and living on their property is to enjoy the semi-rural setting which is dominated by peace and quiet, pleasant views of the rural lands to the south and the richness of the flora and fauna around them.

Whilst Berrima has an established tourism industry which focuses on a 'clean, quiet, rural' environment, the proposed quarry is not near or visible from any existing tourism facilities, routes or accommodation sources.

## 5.8.3 Potential Impacts

The Project could potentially alter the socio-economic values that the residents around the Project Site hold. Since the project would not impact on the agricultural use of the land and there are not any established tourism facilities in the nearby vicinity of the Project Site, it is considered that the proposed project would not impact on any economic activities in the area.

The potential visual amenity, dust, noise and traffic impacts could lower the amenity of the rural setting that has attracted land owners to the area. As a consequence, the perceived reduction in amenity may be reflected in a lowering of land values and property prices.

The major socio-economic benefit of the Project would be to provide for the continued supply of raw materials for the manufacture of dry pressed bricks at the Bowral Brick Plant. The Bowral Brick Plant employs approximately 38 people and these jobs would be lost if the plant was to close. Also the Bowral Brick Plant is a significant supplier of dry pressed bricks in the Sydney and Southern Highlands region and closure of the plant would lead to increased materials and transportation costs to the building industry.

The Project would also lead to the direct employment of approximately four people. It would also provide some employment for local contractors and service companies providing mechanical, technical and ancillary services. Ongoing employment for both the extraction of clay/shale and the manufacture of bricks would have additional flow-on benefits including an impetus to other local businesses through quarry expenditure on fuel, parts and consumables and support of the local community services, organisations and projects. The annual economic contribution of the Project and the ongoing operation of the Bowral Brick Plant to the local community and region is summarised in **Table 5.24**.

**Table 5.24**
**Anticipated Annual Economic Contribution**

Page 1 of 2

| Item | Annual contribution |
|---|---|
| **Local and Regional Contributions - Direct** | |
| Wages (gross wages, superannuation, etc) | $2,644,000 |
| Consumables (fuel, oils, tyres, office consumables, etc) | $247,000 |
| Services (surveying, environmental management, maintenance, communications, etc) | $2,016,000 |
| Capital (equipment and building replacement) | $200,000 |
| Local Government Taxes (rates, contributions, etc) | $247,000 |
| Community support (sponsorships, donations, in-kind support, etc) | $12,000 |
| **Sub-total** | **$5,300,000** |
| **Local and Regional Contributions – Indirect** | |
| Transportation, including:<br>• drivers wages;<br>• consumables (fuel, tyres, maintenance) ; and<br>• capital (equipment/vehicle replacement). | $2,900,000 |
| **Sub-total** | $2,900,000 |
| **State and National Contributions** | |
| State taxes (payroll tax, etc) | $139,000 |
| Royalties | $5,000 |
| **Sub-total** | **$144,000** |
| **Total** | **$8,344,000** |
| Source: The Austral Brick Company Pty Ltd | |

## 5.8.4 Mitigation Measures

The majority of mitigation measures which would be implemented by the Proponent to limit the impact of the Project on the socio-economic values of the local community have been described and discussed in the preceding sections of the *Environmental Assessment*. Reference to the appropriate sections is as follows.

- Increased traffic – Section 5.1.
- Increased noise levels – Section 5.3.
- Impacts upon visual amenity – Section 5.6.
- Reduced air quality – Section 5.7.

In addition, the Proponent intends to establish a community consultative committee to facilitate open discussion and allow the Proponent to address any concerns of surrounding landholders. The Proponent would display and advertise a telephone number at the entrance to the Project Site off Berrima Road which could be contacted to allow members of the public to raise complaints and enquiries.

### 5.8.5 Assessment of Impacts

Impacts on aesthetic values of the local setting would be addressed through the establishment of amenity bunds and tree screens, progressive rehabilitation and general maintenance of the Project Site. The Proponent has also committed to its management of a complaints register and Community Consultative Committee, such that any concerns of the local community can be swiftly identified and effectively dealt with.

Ultimately, the degree of impact on the socio-economic values of the local community would reflect the Proponent's adherence to the proposed operational safeguards and management measures. This conclusion is possible given the environmental assessments of impact included in Section 5 indicate that the Project would be unlikely to have a significant impact on traffic, water resources, noise, flora and fauna, air quality, heritage, visible amenity or land use.

Furthermore, the Project would continue to provide, or marginally increase employment in the Southern Highlands region and contribute to the economic viability of the building industry, the region and the State.

## 5.9 SOILS, LAND CAPABILITY AND AGRICULTURAL SUITABILITY

*The soils, land capability and agricultural suitability assessment was undertaken by Geoff Cunningham Natural Resource Consultants Pty Ltd. The full assessment (hereafter referred to as GCNRC, 2010b) is presented as Part 7 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

### 5.9.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential soil, land capability and agricultural suitability impacts requiring assessment and their unmitigated risk rating are as follows.

- Loss of soil by erosion (low risk).
- Sedimentation impacting land and water (low risk).

- Degradation of soil quality (moderate risk).
- Reduction in land capability and agricultural suitability (high risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of soil, land capability and agricultural suitability impacts include potential impacts such as erosion and sedimentation.

The Director-General's Requirements also require that the assessment of soil, land capability and agricultural suitability impacts take account of the following policies, guidelines and plans as applicable.

- *Rural Land Capability mapping (DLWC)*;
- *Agricultural Land Classification (I&I NSW)*;
- *State Environmental Planning Policy No. 55 – Remediation of Land*; and
- *Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (DoP).*

Relevant information on the existing soil, land capability and agricultural suitability, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub-sections.

## 5.9.2 The Existing Soils, Land Capability and Agricultural Land Suitability

### 5.9.2.1 Soils

GCNRC (2010b) identified two soil mapping units on the Project Site (see **Figure 5.8**). A description of these soils is as follows.

- **Soil Mapping Unit 1**

  This soil mapping unit occurs on the hilltops and upland drainage depressions and covers approximately half of the Project Site (the southern half) and all of the extraction area. The topsoil is a silty loamy sand/clay loam/clay and recorded a pH 6.0 to 6.5, and showed moderate dispersibility. The subsoil is a clay/clay loam, with a pH of 4.5 to 7.0 and showed negligible to high dispersibility.

- **Soil Mapping Unit 2**

  This soil mapping unit occurs on the midslopes, lower slopes and drainage depressions and covers approximately half of the Project Site (the northern half) and none of the extraction area. The topsoil is a light clay/light to medium or medium clay and recorded a pH 5.5 to 6.0, and showed slight to moderate dispersibility. The subsoil is a medium to heavy clay, with a pH of 4.5 to 5.5 and showed negligible to moderate dispersibility.

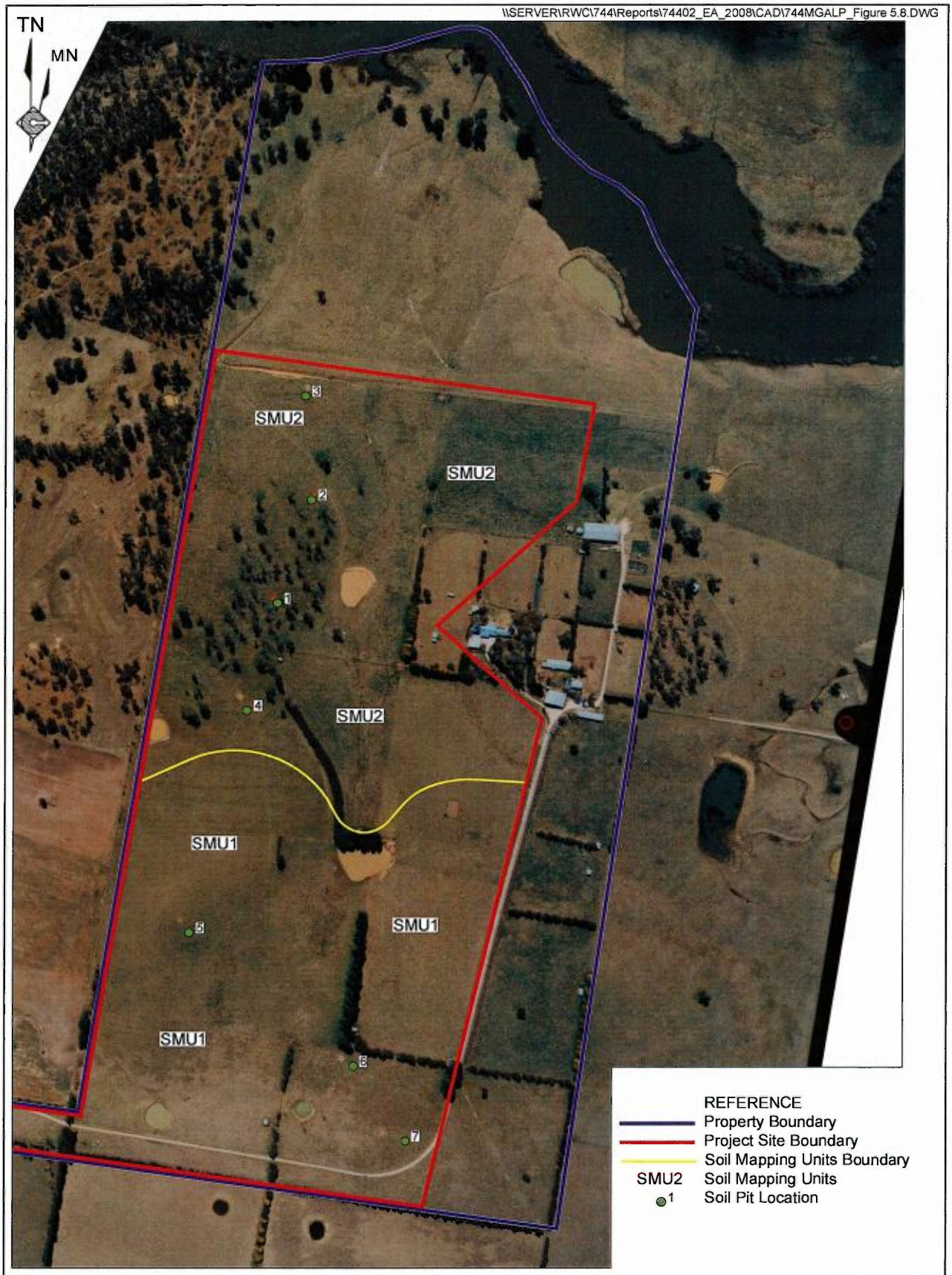


Figure 5.8
SOIL SURVEY LOCATIONS AND SOIL MAPPING UNITS

#### 5.9.2.2 Land Capability

"Land capability" was defined by Houghton and Charman (1986) as "the ability of land to accept a type and intensity of use permanently, or for specified periods under specific management, without permanent damage". Land that is used beyond its capability ultimately loses its production value through exhaustion of soil nutrient levels or land degradation of some description.

The DECCW land classification system (prepared by the former Soil Conservation Service of NSW) identifies two classes of land capability at the Project Site. Class III land is located in the southern section of the Project Site and comprises most of the extraction area. Class III land is land suitable as grazing land, for pasture improvement, regular cultivation on a rotational basis with the land protected by structural soil conservation works such as graded banks, waterways and diversion banks, together with soil conservation practices such as conservation tillage.

Class IV land is located in the northern section of the Project Site and does not include any of the extraction area. Class IV land is land suitable for grazing with occasional cultivation. Soil conservation practices such as pasture improvement, stock control, application of fertiliser and minimal cultivation for the establishment or re-establishment of permanent pasture are all measures that would maintain the capability of these lands.

### 5.9.3 Agricultural Land Suitability

Reference to the Agricultural Land Suitability Classification map (Industry and Investment – Primary Industries), identifies the land within the Project Site as Class 3 agricultural land. Class 3 land is "*grazing land that is well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture. The overall level of* production *is moderate as a result of edaphic (soil related) or environmental constraints. Erosion hazard or soil structural breakdown limit the frequency of ground disturbance, and conservation or drainage works may be required.*"

### 5.9.4 Management issues

The main soil-related issues to be managed throughout the life of the Project are as follows.

i) To ensure that the available soil resources are removed and managed such that they can be used to rehabilitate the final landform as described in Section 2.12.

ii) To ensure that the soil is managed to minimize erosion and sedimentation from the Project Site.

iii) To ensure that the soil profile of the final landform is adequate to support the final land uses proposed in Section 2.12.4.

iv) To maximise the capability of the land in the final landform.

## 5.9.5 Mitigation Measures

### 5.9.5.1 Topsoil and Subsoil Management

The Proponent is conscious of the need to conserve the topsoil resources on the Project Site and their importance in assisting with successful long-term rehabilitation. The main features of the topsoil management program are as follows.

i) All available topsoil to a depth of approximately 0.15m would be stripped from the surface of each extraction stage.

ii) Wherever practicable, stripped topsoil would be placed directly onto the constructed amenity bunds or areas prepared and awaiting rehabilitation.

iii) If no areas are available, topsoil would be stockpiled in predetermined areas for later reclamation. Topsoil stockpiles would be limited to no more than 2m in height to minimise adverse impacts upon the biological activity of the topsoil. The location of topsoil stockpiles would reflect operational constraints at the time, however, it is anticipated they would be placed as 'wind row' type structures around the perimeter of the active extraction stages, or otherwise located on the floor of the extraction area.

iv) Subsoil to a depth of approximately 0.85m would also be removed and if not able to be immediately used in the construction of amenity bunds or on areas prepared and awaiting rehabilitation, would also be stockpiled in predetermined areas for later reclamation. This may be in the surplus overburden stockpile area or preferably on the floor of the extraction area.

v) The formed stockpile surfaces would be left with a generally even surface that is as 'rough' as possible, in a micro-sense, to assist in runoff control and seed retention and germination.

vi) If topsoil stockpiles are likely to remain for extended periods, a pasture seed mix would be broadcast to assist with temporary stabilisation.

vii) Excessive handling of the materials during the stripping and stockpiling operation and handling when the soils are wet would be avoided to protect soil structure. This would be accomplished, where possible, through the preferential direct transfer of the soils from stripping location to the amenity bunds and rehabilitation area.

viii) Driving of machinery on the topsoil and subsoil stockpiles, as well as the respread soil, would be kept to an absolute minimum to maximise soil aggregation and prevent compaction, particularly when the stockpiles are moist.

ix) Stockpiles would be positioned where run off from upslope does not pose a problem.

x) Silt-stop fencing or similar would be placed immediately down slope of stockpiles and amenity bunds where required, until a stable vegetation cover is established.

xi) Areas undergoing rehabilitation would be sown with a fast growing cover crop.

It is noted that topsoil would be placed on areas requiring revegetation at a depth not exceeding 0.15m. This judicious use of topsoil would ensure there would be sufficient topsoil for the rehabilitation of the entire area disturbed by the extended quarry.

#### 5.9.5.2 Contaminated Soil Management

The main source of potential soil contamination associated with the Project would be a result of fuel or lubricant spills. The potential for soil contamination would be minimised by:

- restricting all refuelling and vehicle maintenance activities to designated areas which are either sealed, bunded or located with access to spill control kits; and
- regular house keeping and maintenance of areas where hydrocarbons are used.

In the event of a spill or leak outside the nominated storage/maintenance areas leading to the contamination of soils, the Proponent would implement the following controls.

i) The source of the spill or leak would be isolated and either stopped or removed to an appropriate location, eg. fuel storage or vehicle maintenance area.

i) If required, temporary bunding would be pushed up around the spill site to prevent the spread of the contamination.

ii) The contaminated soil would be excavated and, if only a small quantity, eg. several FEL bucket loads or 1m3 to 2m3, spread over a cleared and bunded area of the Project Site which is isolated from natural or created drainage for natural remediation.

iii) If the contamination is greater than 1m3 to 2m3, the contaminated material would be removed from the Project Site and delivered to a site licensed to accept hydrocarbon waste.

### 5.9.6 Assessment of Impacts

#### 5.9.6.1 Soil Management

The management procedures for the topsoil and subsoil resource as set out in Section 5.9.4 have been designed to ensure their proper handling and to provide the maximum opportunity for its re-use in the successful rehabilitation of the Project Site. As such, the impact associated with topsoil/subsoil removal, storage and re-use is anticipated to be minimal. A review of soil management practices would be conducted as part of the Annual Environmental Management Report (AEMR) and variations to the described controls implemented as appropriate.

Considering the immediate transfer of topsoil and other soil management controls to be implemented, it is assessed that the impact on the soil resources would be moderate and temporary.

### 5.9.6.2 Land Capability and Agricultural Land Suitability

Assuming the final landform is created as described in Section 2.12 and presented on **Figure 2.6**, with shallow slopes over the completed floor of the extraction area, a cover of topsoil, retained water storages and vegetation to suit the final land use, it is considered likely that the capability of much of the final landform would approximate that of the pre-quarry environment. Approximately 3ha of the final landform would comprise extraction faces and benches which would not be suitable for agriculture.

## 5.10 ABORIGINAL CULTURAL HERITAGE

*The Aboriginal cultural heritage assessment was undertaken by Archaeological Surveys and Reports Pty Ltd. The full assessment (hereafter referred to as ASR, 2010) is presented as Part 8 of the Specialist Consultant Studies Compendium, with the relevant information from the assessment summarised in the following sub-sections.*

### 5.10.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential heritage impacts requiring assessment and their unmitigated risk rating are as follows.

- Destruction of Aboriginal sites, artefacts and objects, (moderate risk).
- Damage to Aboriginal sites, artefacts and objects, (low risk).
- Destruction of non-Aboriginal sites, artefacts and objects, (low risk).
- Damage to non-Aboriginal sites, artefacts and objects, (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of heritage impacts include both Aboriginal and non-Aboriginal heritage, incorporate consultation with Aboriginal communities, comply with the principles set out in the Burra Charter and notify new sites to DECCW.

The Director-General's Requirements also require that the assessment of heritage impacts take account of the following policies, guidelines and plans as applicable:

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DECCW);*
- *NSW Heritage Manual (NSW Heritage Office and DoP); and*
- *The Burra Charter (The Australia ICOMOS charter for places of cultural significance).*

Relevant information on the existing heritage environment, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub sections.

### 5.10.2 Method of Investigation

The Aboriginal heritage assessment comprised the following components.

1. A review of previous archaeological investigations on and surrounding the Project Site.
2. An advertisement to invite registered Aboriginal stakeholders with a cultural interest in the area in which the Project Site occurs to register their interest with the project archaeologist in the Project in the *Highlands Post*, 21 August 2008. No response to the advertisement was received.
3. An invitation to the Aboriginal community (Illawarra LALC The Wodi Wodi Elders Corporation, and Korewal Elouera Jerrungurah Tribal Elders Council), in accordance with the DECCW's Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community consultation, for involvement in the survey and assessment of cultural heritage items. Interest was registered by the Illawarra LALC.
4. A review of the Aboriginal Sites Register (Aboriginal Heritage Information Management System – AHIMS) covering the Project Site and surrounding local area and recent archaeological investigations within the local area.
5. An assessment of the archaeological potential of the Project Site based on the presence or absence of resources such as vegetation, water and stone.
6. The development of a predictive model for archaeological material that might realistically be expected to be present.
7. The completion of a comprehensive field survey over the majority of the Project Site.
8. Determination that there were no sites or items of Aboriginal heritage in the Project Site.
9. Development of recommendations for the management of any identified sites of Aboriginal significance should they be located at a later time.
10. An assessment of the impact on Aboriginal heritage as a result of the Project as it relates both to identified sites and artefacts and the cumulative impacts on the regional record.

### 5.10.3 The Existing Environment

A search of the AHIMS database covering the Project Site and the surrounding area resulted in a listing of 39 sites. Two of these were in the immediate vicinity of the Project Site, namely axe grinding grooves in Stony Creek to the north of the site access road. The exact locations of these sites are uncertain due to inconsistencies in the map referencing of the sites, but were provenanced to locations at the confluence of Stony Creek with a tributary north of the proposed access corridor from the descriptions given on the Site Recording Forms.

No sites or items of archaeological or indigenous cultural significance or locations of Potential Archaeological Deposits (PADs) were identified in the Project Site during the survey. The two AHIMS registered sites were not located during the field survey.

### 5.10.4 Possible Impacts

The Project is not expected to have any impacts on Aboriginal heritage since no items or sites of Aboriginal heritage significance have been recorded at the site, on previous occasions or during the recent survey.

It is possible, however, that Aboriginal heritage sites and items do exist on the Project Site and these could be damaged or destroyed if not identified.

### 5.10.5 Mitigation Measures

In order to comply with the provisions of the *National Parks and Wildlife Act 1974* (as amended) the Proponent would implement the following management practices.

- Employees, earthmoving contractors, subcontractors, machine operators and their representatives, whether working in the survey area or elsewhere, would be instructed that in the event of any bone or stone artefacts, or discrete distributions of shell, or any objects of cultural association, being unearthed during earthmoving, work would cease immediately in the area of the find.
- In the event that any bone cannot be clearly identified by a qualified archaeologist as being of animal remains, the police would be informed of its discovery, and officials and/or their representatives of the Illawarra Local Aboriginal Land Council, Wodi Wodi Elders Corporation, and Korewal Elouera, Jerrungarugh, and the Archaeologist, DECCW (Wollongong) advised that the bone is subject to police investigation.
- Work would not recommence in the area of the find until both the police (if unidentified bone has been found) and those officials or representatives have given their permission to do so.
- Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the *National Parks and Wildlife Act 1974*, as amended.

### 5.10.6 Assessment of Impacts

The Aboriginal or cultural significance of Aboriginal relics and sites can only be assessed by the Aboriginal community, and in particular, the Elders. It is the responsibility of the archaeologist to ensure that the Elders or elected representatives of the Aboriginal community are advised of the survey results, and are consulted as to their knowledge and opinion of the significance of the area, and to transcribe and present those expressions in report form. A copy of the draft Aboriginal Cultural Heritage Assessment was forwarded to the Illawarra LALC for comment.

In this instance Steven Marsden, Sites Officer, Illawarra LALC, reported the results of the investigation to the Land Council. Archaeological Surveys & Reports received a report from the Land Council, with the recommendations that there were no constraints on cultural grounds to the proposed New Berrima Clay/Shale Quarry. A copy of the Land Council's report is included as Appendix 2 of ASR (2010).

In the absence of any archaeological sites or places assessed to be of potential archaeological research (PADs), the survey area is assessed to be of no research potential.

## 5.11 EUROPEAN CULTURAL HERITAGE

Based on the Risk Analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential impacts upon European heritage have been assessed to be low.

Reference to the Wingecarribee LEP (2010), the NSW State Heritage Register, Australian heritage Places Inventory and the Australian heritage Database established that there are no listed European heritage sites within the Project Site or on adjoining landholdings.

The closes listed heritage sites lie within the township of Berrima where a total of 61 sites are recorded with the schedule attached to Wingecarribee LEP (2010). None of the locations within Berrima are visible from the proposed extraction area.

## 5.12 GROUNDWATER

### 5.12.1 Introduction

Based on the risk analysis undertaken for the Project (Section 3.5 and **Table 3.7**), the potential groundwater impacts requiring assessment and their unmitigated risk rating are as follows.

- Reduced water quality of groundwater (low risk).
- Impacted levels of the groundwater table (low risk).

In addition, the Director-General's Requirements issued by DoP require that the assessment of groundwater impacts address any works likely to impact groundwater quality and levels, impacts on other groundwater users and groundwater dependent ecosystems, as well as the sustainability of water supply demands.

The Director-General's Requirements also require that the assessment of surface water impacts refer to the following policies, guidelines and plans as applicable:

- *Guidelines for Groundwater Protection in Australia (ANZECC/ ARMCANZ)*;
- *NSW State Groundwater Policy Framework Document (DLWC)*;
- *NSW State Groundwater Quality Protection Policy (DLWC)*;
- *NSW State Groundwater Quantity Management Policy (DLWC).*

Relevant information on the existing groundwater environment, proposed operational safeguards and mitigation measures for the quarry and an assessment of the residual impacts following the implementation of these safeguards and mitigation measures is presented in the following sub sections.

### 5.12.2 The Existing Groundwater Environment

Exploratory drilling within the Project Site in 2008, to depths as great as 35m below the ground surface to elevations of approximately 630m AHD, did not intercept groundwater. Five groundwater bores are located within a 2km radius of the centre of the Project Site. The closest of these is approximately 200m east of the "Mandurama" property near the Wingecarribee River and to a depth of 96.30m below ground level (approximately 554m AHD). The primary water supply stratum for that bore and others in the surrounding area is the Hawkesbury Sandstone, i.e. the geological unit below the Ashfield Shale.

### 5.12.3 Potential Impacts

It is proposed that clay/shale would be extracted to approximately 630m AHD. Since groundwater was not encountered at this elevation during drilling, and surrounding groundwater bores are some distance away, at greater depths and drawing water from the Hawkesbury Sandstone, it is considered that there would be limited impacts on groundwater. The Proponent has no intention of using any groundwater for activities associated with the proposed quarry. Further, no drilling is required for any groundwater bores given the absence of groundwater established during the resource investigation program.

### 5.12.4 Mitigation Measures

No mitigation measures are proposed since it is considered that groundwater would not be intercepted.

### 5.12.5 Assessment of Impacts

It is considered that there would be no impacts on groundwater.

# Section 6

# Draft Statement of Commitments

*This section has been prepared in accordance with the requirements of Part 3A of the Environmental Planning and Assessment Act 1979, and presents a compilation of the actions and initiatives the Proponent commits to implement if the proposed New Berrima Clay/Shale Quarry is approved. These commitments are effectively built upon a wide range of actions that the Proponent implements at its other quarries and are designed to effectively manage, mitigate, guide and monitor the Project from commencement through to full production and eventually rehabilitation of the Project Site.*

*The Environmental Assessment of the Project has identified a range of environmental, social and management outcomes and measures, all required to avoid or reduce the environmental and social impacts of the Project.*

*All parties involved in the design, establishment and operational phases of the Project would be required to undertake their work in accordance with these commitments. The commitments are presented in tabular form* ***(Table 6.1)*** *and identify the desired outcome, action and timing of commitments.*

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**Table 6.1**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **1. Area of Activities and Operations** | | | |
| All approved activities are undertaken in the area(s) nominated on the approved plans and figures (unless moved slightly to avoid individual trees). | 1.1 | Survey and mark the boundaries of the areas of disturbance on the ground. | Prior to any vegetation clearing. |
| Satisfaction of the requirement of Industry and Investment NSW for production data. | 1.2 | Provide annual production data to Industry and Investment NSW (and include in the AEMR). | Annually (July). |
| **2. Operating Hours** | | | |
| Management of operations in accordance with the approved operating hours. | 2.1 | Undertake extraction operations between 7:00am and 5:00pm on Monday to Fridays and 7:00am to 2:00pm on Saturdays. | During operations. |
| | 2.2 | Undertake product clay/shale despatch between 7:00am and 4:00pm, Monday to Friday, 7:00am and 4:00pm on Saturdays if required due to special circumstances and 8:00am to 4:00pm Sundays if required due to special circumstances. | During operations. |
| | 2.3 | Undertake repairs and maintenance between 6:00am and 6:00pm on Monday to Fridays, 7:00am and 6:00pm on Saturdays and 8:00am to 6:00pm on Sundays. | During operations. |
| **3. Traffic** | | | |
| Minimisation of traffic impacts, including road safety. | 3.1 | Construct a Basic Rural intersection treatment (BAR) to permit safe and easy access for 19m articulated vehicles to the Project Site from Berrima Road. This would be incorporated with the construction of a new entrance gate and driveway, which would be at least 12.5m in width to comply with AS 2890.2:2002. | During six month construction period. |
| | 3.2 | Align the transport route along Cavendish Street in Mittagong to avoid Lyell Street in which a school is located and has parking on both sides of the road. | Prior to off-site transportation. |
| | 3.3 | Construct a rubble pit at the western end of the site access road, which all vehicles exiting the Project Site must pass over, to reduce soil and mud on their wheels. | During six month construction period. |
| | 3.4 | Seal the last 400m of the site access road from the entrance to the Project Site | During six month construction period. |
| | 3.5 | Cover all loads. | Ongoing. |
| | 3.6 | Ensure truck drivers adhere to the existing Austral Bricks Drivers Code of Conduct which identifies the required safety and courtesy requirements for drivers travelling to and from all Austral Bricks quarries. | Ongoing. |
| | 3.7 | Adopt all safety procedures during the Berrima Road / access driveway intersection construction and incorporate in the Section 138 Permit sought under the Roads Act 1993. | During six month construction period. |

**Table 6.1 (Cont'd)**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **4. Surface Water** | | | |
| Minimisation of potential impacts on surface water quality and supply of the local watercourse system, particularly the Wingecarribee River. | 4.1 | Commence extraction on the southern slopes of the hill in the middle of the Project Site to minimise the risk of sediment – laden flows to the Wingecarribee River. | Commencement of extraction. |
| | 4.2 | Ensure early and progressive revegetation of amenity bunds and rehabilitation of completed extraction areas. | Ongoing. |
| | 4.3 | Use of any water sourced from the sedimentation basins for dust suppression within the upslope catchment of a sedimentation basin. | As required. |
| | 4.4 | Install sediment control fencing around the amenity bunds under construction and other areas of exposed soil until vegetation has been established. | As required. |
| | 4.5 | Construct and operate various surface water management controls such as diversion structures and sedimentation basins. | During six month construction period. |
| | | • Design operational sedimentation basins including an emergency spillway designed to safely convey the 100-year ARI flow (DECC, 2008). | During six month construction period. |
| | | • Inspect sedimentation basins fortnightly and within 24 hours following any rain event exceeding 5mm to check their capacity and integrity. | Ongoing. |
| | | • Repair any damaged components of the sedimentation basins as soon as practicable. | As required. |
| | | • Discharge sedimentation basins only when water has 50mg/L or less of suspended sediment. | As required. |
| | | • Discharge waters within five days after the conclusion of a rain event, at or below the required water quality limit of 50mg/L. | As required. |
| | | • Install a marker in each sedimentation basin showing the boundary between the Storage Zone (i.e. the lower zone) and the Settling Zone (i.e. the upper zone) in the basin. | During six month construction period. |
| | | • Inspect the level of retained sediment after discharging treated water from any sedimentation basin. If retained sediment exceeds the marked level of the Storage Zone, remove sediment and add to an active stockpile. | As required. |
| | | • Regularly review the management procedures for the sedimentation basins to ensure ongoing efficient operation and protection of downstream water quality. | Ongoing. |

**Table 6.1 (Cont'd)**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **4. Surface Water (Cont)** | | | |
| Minimisation of potential impacts on surface water quality and supply of the local watercourse system, particularly the Wingecarribee River. | | • Armour potential scour points (e.g. channel inlets/outlets and bends) with rock.<br>• Inspect diversion structures monthly and within 24 hours following any rain event that generates flow in the drains to identify areas of erosion, scour or damage. Repair any problem areas and/or take appropriate stabilising action. | During six month construction period.<br>Ongoing. |
| | 4.6 | Undertake any maintenance/upgrade of the Stony Creek crossing in accordance with the NOW Guidelines for Controlled Activities Watercourse Crossings. | As Required. |
| **5. Noise** | | | |
| Minimise of the noise impacts attributable to extraction and transportation of clay /shale product from the Project Site. | 5.1 | Construct amenity bunds on three sides (southern, western and northern) of the extraction area and retain the existing tree screen on the eastern side of the extraction area. | During six month construction period. |
| | 5.2 | Commence extraction (Stages 1 to 3) on the southern side of the hill, providing noise screening to residences on the northern side of Wingecarribee River, until amenity bunds are fully established with trees. | Commencement of extraction. |
| | 5.3 | Align the proposed transport route avoiding wherever possible residential, school and other sensitive receiver areas. | Prior to off-site transportation. |
| | 5.4 | Under NE wind conditions, bund construction would be limited to the northern end of the western bund or the northern bund. | During six month construction period. |
| | 5.5 | Construction of the southern bund and southern section of the western bund would be limited to westerly wind conditions or neutral conditions. | During six month construction period. |
| | 5.6 | Construction of the southern bund and southern section of the western bund would not occur during any transportation campaign. | During six month construction period. |
| | 5.7 | Adhere to all hours of operation presented in Section 2.8.1. | Ongoing. |
| | 5.8 | Regularly service all equipment on site to ensure sound power levels of each item remains at or below that nominated for noise modelling purposes. | Ongoing. |
| | 5.9 | Ensure all truck drivers comply with the Bowral Brick Plant Drivers Code of Conduct which outlines procedures for reducing noise impacts during transportation. | Ongoing. |

**Table 6.1 (Cont'd)**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **6. Flora** | | | |
| Minimisation of the spread of weeds, on and off site. | 6.1 | Quick establishment of a selected cover crop. | During six month construction period and ongoing. |
| | 6.2 | Spray weeds with an authorised herbicide. | As required. |
| | 6.3 | Ensure all earthmoving equipment is appropriately cleaned prior to being brought to site for each campaign. | Prior to each campaign. |
| **7. Visual Amenity** | | | |
| Reduce visible amenity impacts. | 7.1 | Construct 7m high southern and western amenity bunds to screen the views of the extraction area and the surplus overburden stockpile area from the west and south. | During six month construction period. |
| | 7.2 | Plant trees screenings at the eastern side of the surplus overburden stockpile area to screen stockpiles from the east. | During six month construction period. |
| | 7.3 | Establish a farm forest over the Stage 4 area at the commencement of the project. These trees would be of sufficient height at the commencement of Stage 4 (18 years) to provide screening of the Stage 4 extraction area. Strip clearing as extraction proceeds northward of farm forest would ensure that screening is maximised. | During six month construction period. |
| | 7.4 | Screen the extraction area during Stages 5 and 6 from the north by the vegetated northern amenity bund. | During extraction period. |
| | 7.5 | Commence progressive rehabilitation of completed faces and all other completed disturbed areas as soon as possible after completion of extraction. Rehabilitation of the southern extraction area wall would be very advanced (13-18 years) and protect against views of extraction faces during Stages 5 and 6. | Ongoing. |
| **8. Air Quality** | | | |
| Limit the generation of dust and other emissions from site activities. | 8.1 | Construct vegetated amenity bunds to provide barriers to minimise the spread of dust from the Project Site. | During six month construction period. |
| | 8.2 | Commence progressive rehabilitation of all disturbed areas as soon as possible after the completion of excavation in that area. | Ongoing. |
| | 8.3 | Use water truck to routinely spray unsealed roads, tracks and stockpile areas. | Ongoing. |
| | 8.4 | Routinely spray stockpiles and stockpile transfer points with water. | Ongoing. |
| | 8.5 | Cover and effectively seal tailgates of trucks leaving the Project Site. | Ongoing. |

**Table 6.1 (Cont'd)**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **8. Air Quality (Cont'd)** | | | |
| | 8.6 | Install a truck shaker grid or rubble pit near the Project Site exit to minimise the amount of clay adhering to the truck. | During six month construction period. |
| | 8.7 | Prohibit all vehicles and machinery from idling unnecessarily. | Ongoing. |
| | 8.8 | Maintain all vehicles and machinery in accordance with manufacturers' specifications. | Ongoing. |
| Limit the generation of dust and other emissions from site activities. | 8.9 | Amend extraction practices as required during adverse wind conditions to minimise the generation and spread of dust from the Project Site. | As required. |
| | 8.10 | Minimise drop heights between front-end loader buckets and truck trays through operator training and education on the management of dust. | Ongoing. |
| **9. Soils, Land Capability and Agricultural Sustainability** | | | |
| Conservation of topsoil resources. | 9.1 | Strip all available topsoil to a depth of approximately 0.15m from the surface of each extraction stage. | Ongoing. |
| | 9.2 | Wherever practicable, place stripped topsoil directly onto the constructed amenity bunds or areas prepared and awaiting rehabilitation. | Ongoing. |
| | 9.3 | Stockpile topsoil in predetermined areas for later reclamation if no areas are available. Limit topsoil stockpiles to no more than 2.0m in height to minimise adverse impacts upon the biological activity of the topsoil. | Ongoing. |
| | 9.4 | Broadcast a native seed mix to assist with temporary stabilisation if topsoil stockpiles are likely to remain for extended periods. | As required. |
| | 9.5 | Avoid excessive handling of soil during the stripping and stockpiling operation and handling when the soils are wet to protect soil structure. | Ongoing. |
| | 9.6 | Restrict driving of machinery on the topsoil and subsoil stockpiles, as well as the respread soil, to maximise soil aggregation and prevent compaction, particularly when the stockpiles are moist. | Ongoing. |
| | 9.7 | Position stockpiles where run-off water from upslope does not pose a problem. | During six month construction period. |
| | 9.8 | Place silt-stop fencing or similar immediately down-slope of stockpiles and amenity bunds where required, until a stable vegetation cover is established. | During six month construction period. |

**Table 6.1 (Cont'd)**
**Draft Statement of Commitments for Site Construction, Operations and Management**



| Desired Outcome | Action | | Timing |
|---|---|---|---|
| **9. Soils, Land Capability and Agricultural Sustainability (Cont'd)** | | | |
| Minimise the potential for soil contamination. | 9.9 | Restrict all refuelling and vehicle maintenance activities to designated areas which are either sealed, bunded or located with access to spill control kits. | Ongoing. |
| | 9.10 | Complete regular house keeping and maintenance of vehicle maintenance areas. | Ongoing. |
| **10. Heritage** | | | |
| Comply with the provisions of the *National Parks and Wildlife Act 1974* (as amended). | 10.1 | Instruct employees, earthmoving contractors, subcontractors, machine operators and their representatives, whether working in the survey area or elsewhere, that in the event of any bone or stone artefacts, or discrete distributions of shell, or any objects of cultural association, being unearthed during earthmoving, work would cease immediately in the area of the find. | Ongoing. |
| | 10.2 | Immediately report the find to the Department of Environment, Climate Change and Water (DECCW) and the relevant Local Aboriginal Land Councils. | As required. |
| | 10.3 | In the event that any bone cannot be clearly identified by a qualified archaeologist as being of animal remains, inform the police of its discovery, and officials and/or their representatives of the Illawarra Local Aboriginal Land Council, Wodi Wodi Elders Corporation, and Korewal Elouera, Jerrungarugh, and the Archaeologist, DECCW (Wollongong) advised that the bone is subject to police investigation. | As required. |
| | 10.4 | Do not recommence work in the area of the find, until both the police (if unidentified bone has been found) and those officials or representatives have given their permission to do so. | As required. |
| **11. Groundwater** | | | |
| Appropriate management of any unexpected groundwater inflows | 11.1 | In the event that significant groundwater inflows are encountered a monitoring bore network will be established and an ongoing program of water level monitoring implemented to identify potential impacts on surrounding areas. Any water licences required to account for these inflows will be obtained to the satisfaction of NOW. | If significant groundwater inflows occur. |

# Section 7

# Evaluation and Justification

*This section concludes the Environmental Assessment of the proposed New Berrima Clay/Shale Quarry and its extractive and transportation operations. Alternative development options are considered and the residual environmental risks assessed. This section also includes an assessment of the Project against the principles of Ecologically Sustainable Development and concludes with a justification of the Project.*

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# 7.1 INTRODUCTION

As a conclusion to the *Environmental Assessment*, the proposed New Berrima Clay/Shale Quarry is evaluated and justified through consideration of both the potential impacts on the environment and benefits to the local and wider community.

Project evaluation has been undertaken by firstly re-assessing the risks posed to the local environment by Project activities, following consideration of the controls, safeguards and/or mitigation measures proposed by the Proponent and summarised in Section 5. The Project has also been evaluated against the principles of Ecologically Sustainable Development (ESD) in order to provide further guidance as to the acceptability of the Project, as presented in the *Environmental Assessment*.

Section 7.4 presents the justification of the Project and reviews the predicted residual impacts on the biophysical environment, considers the socio-economic benefits which would be provided and assesses the consequences of not proceeding with the Project.

# 7.2 EVALUATION OF THE PROJECT

## 7.2.1 Residual Environmental Risk and Impacts

Following consideration of the proposed operational safeguards, controls and mitigation that would be implemented by the Proponent as part of the project design, **Table 7.1** reassesses the mitigated risk associated with each of the potential environmental impacts identified in Section 3.5.

**Table 7.1**
**Analysis of Mitigated Environmental Risk**

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| Potential Impact | Unmitigated Risk Rating | Consequence of Occurrence if mitigated | Likelihood of Occurrence if mitigated | Residual Risk Rating |
|---|---|---|---|---|
| **Transport / Traffic** | | | | |
| Increased traffic on roads – congestion and delays nuisance | H | 1 | D | L |
| Increased deterioration of road pavement | H | 1 | C | L |
| Increased risk of accident – major accident | H | 5 | E | H* |
| Increased risk of accident – serious accident | H | 4 | E | H* |
| Increased risk of accident – minor accident | M | 3 | E | M* |
| **Consequence of Occurrence:** | 1 = Insignificant; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Catastrophic | | | |
| **Likelihood of Occurrence:** | A = Almost Certain; B = Likely; C = Possible; D = Unlikely; E = Rare | | | |
| **Risk Rating:** | E = Extreme; H = High; M = Moderate; L = Low | | | |
| Note * | This is the lowest possible risk rating given the likelihood of occurrence category of E: Rare | | | |
| Note # | This is the lowest possible risk rating given the consequence of occurrence category of 1: Insignificant | | | |

**Table 7.1 (Cont'd)**
**Analysis of Mitigated Environmental Risk**



| Potential Impact | Unmitigated Risk Rating | Consequence of Occurrence if mitigated | Likelihood of Occurrence if mitigated | Residual Risk Rating |
|---|---|---|---|---|
| **Noise** | | | | |
| Increased noise impacts at receptors – occasional minor exceedance (1-2 dBA) | L | 1 | D | L |
| Increased noise impacts at receptors – regular minor exceedance (1-2 dBA) | L | 2 | E | L |
| Increased noise impacts at receptors – occasional high exceedance (3-5 dBA) | L | 3 | E | M* |
| Increased noise impacts at receptors – regular high exceedance (3-5 dBA) | M | 3 | E | M* |
| Increased traffic noise | H | 2 | E | L |
| **Air Quality** | | | | |
| Deposited dust impact on native vegetation off site (no native vegetation on site) | L | 1 | E | L |
| Deposited dust – nuisance to residences | H | 2 | E | L |
| TSP – nuisance to residences | L | 2 | E | L |
| $PM_{10}$ – health impacts at residences | L | 2 | E | L |
| Significant emissions of greenhouse gases | H | 2 | E | L |
| **Visual Amenity** | | | | |
| Temporary (<2 years) view of disturbed areas | H | 1 | C | L |
| Medium-term (>2, <15 years) view of disturbed areas | M | 2 | D | L |
| Long-term >15 years) view of disturbed areas | H | 2 | D | L |
| Highly identifiable permanent impact | M | 1 | D | L |
| **Surface Water** | | | | |
| Reduced water quality in Wingecarribee River | H | 2 | E | L |
| Reduced flows into Wingecarribee River | M | 2 | E | L |

**Consequence of Occurrence**: 1 = Insignificant; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Catastrophic
**Likelihood of Occurrence**: A = Almost Certain; B = Likely; C = Possible; D = Unlikely; E = Rare
**Risk Rating:** E = Extreme; H = High; M = Moderate; L = Low

Note * This is the lowest possible risk rating given the likelihood of occurrence category of E: Rare
Note # This is the lowest possible risk rating given the consequence of occurrence category of 1: Insignificant

**Table 7.1 (Cont'd)**
**Analysis of Mitigated Environmental Risk**



| Potential Impact | Unmitigated Risk Rating | Consequence of Occurrence if Mitigated | Likelihood of Occurrence if Mitigated | Residual Risk Rating |
|---|---|---|---|---|
| **Groundwater** | | | | |
| Reduced water quality of groundwater | L | 2 | E | L |
| Impacted levels of groundwater table | L | 2 | E | L |
| **Soils and Land Capability** | | | | |
| Loss of soil by erosion | L | 2 | E | L |
| Sedimentation impacting land and water | L | 2 | E | L |
| Degradation of soil quality | M | 2 | E | L |
| Reduction in land capability / agricultural land | H | 2 | D | L |
| **Ecology** | | | | |
| Death or injury to native species | L | 2 | E | L |
| Loss of habitat for native species | L | 2 | E | L |
| Disruption to breeding cycle of native species | L | 2 | E | L |
| Reduced biodiversity | L | 2 | E | L |
| **Heritage** | | | | |
| Destruction of Aboriginal sites, artefacts, objects | M | 3 | E | M* |
| Damage to Aboriginal sites, artefacts, objects | L | 2 | E | L |
| Destruction of non-Aboriginal sites, artefacts, objects | L | 2 | E | L |
| Damage to non-Aboriginal sites, artefacts, objects | L | 2 | E | L |
| **Land Contamination** | | | | |
| Contamination by hydrocarbons | L | 1 | E | L |
| **Waste** | | | | |
| Litter and waste accumulation | L | 1 | E | L |
| Loss of resources | H | 1 | B | M# |
| **Socio-economic impacts, property values** | | | | |
| Increased employment | H | 2 | A | H positive |
| Loss of property values of neighbouring properties | H | 3 | E | M* |

**Consequence of Occurrence:** 1 = Insignificant; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Catastrophic
**Likelihood of Occurrence:** A = Almost Certain; B = Likely; C = Possible; D = Unlikely; E = Rare
**Risk Rating:** E = Extreme; H = High; M = Moderate; L = Low

Note * This is the lowest possible risk rating given the likelihood of occurrence category of E: Rare
Note # This is the lowest possible risk rating given the consequence of occurrence category of 1: Insignificant

Through the implementation of the proposed controls, safeguards and mitigation measures summarised in Section 5, the risk rating for the majority of potential environmental impacts has been reduced to either a moderate or low risk rating.

It is noted that the residual risk ratings for major and serious road accidents attributable to increased traffic remain "High" despite mitigation measures. Every precaution would be taken by the Proponent in relation to the design of traffic management and education of its workforce and the likelihood of a major or severe accident involving Project-related traffic has been considered rare. However, it is considered that the likelihood cannot be reduced to non-existent. Therefore, even though it is highly unlikely that an accident would occur, as the consequence of a major or severe accident is considered major or catastrophic, the overall risk rating has been retained as high.

The risks associated with the majority of possible environmental impacts are considered moderate or less and therefore, while these may result in impacts deemed unacceptable to some stakeholders, with the implementation of appropriate management plans, are overall considered acceptable.

## 7.2.2 Ecologically Sustainable Development

### 7.2.2.1 Introduction

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. Schedule 2(6) of the *Environmental Planning and Assessment Regulation 2000*, requires an environmental impact assessment process to evaluate projects in terms of the principles of Ecologically Sustainable Development (ESD). The principles of ESD that have been recognised for well over a decade were based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives.

Throughout the design of the Project, the Proponent has endeavoured to address each of the sustainable development principles as identified during the 1992 *Inter-governmental Agreement on the Environment* and defined in Section 6(2) of the *Protection of the Environment Administration Act 1991*. The following sub-sections draw together the features of the Project that reflect the four principles of sustainable development, namely:

- the precautionary principle;

  *"If 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"*

- the principle of social equity;

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

- the principle of the conservation of biodiversity and ecological integrity

  *"Conservation of biological diversity and ecological integrity should be a fundamental consideration"*

- the principle for the improved valuation and pricing of environmental resources.

  *"Environmental factors should be included in the valuation of assets and services, such as:*

  i) *polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

  ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

  iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems."*

#### 7.2.2.2 The Precautionary Principle

The precautionary principle holds that 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 impacts. In the application of this principle, decisions need to be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options should be made. Emphasis must be placed on anticipation and prevention of environmental damage, rather than remediation after the damage has occurred.

During the planning phase for the Project and throughout the preparation of the *Environmental Assessment*, the Proponent has engaged specialist consultants to examine the existing environment to clarify areas of uncertainty regarding potential environmental harm and to conduct detailed assessments of a number of environmental issues identified during the consultation and issue identification stage of the environmental assessment. They have predicted possible impacts and recommended controls, safeguards and/or mitigation measures in order to ensure that the level of impact satisfies statutory requirements or reasonable community expectations. Throughout the development of the Project, the Proponent and its consultants have adopted an anticipatory approach to impacts, particularly to the socio-economic values of the Project Site and its surrounds by undertaking an analysis of the risks posed by activities of the Project, and an appropriate level of research and baseline investigations.

The controls, safeguards and/or mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by Project activities. This level of planning has ensured that there is a sufficient scientific understanding of the Project and the surrounding environment to enable the Minister to make a decision consistent with this principle.

Examples of matters relating to the precautionary principle that were considered during the various stages of the Project are listed below.

### Project Objectives

The Project has been designed with the principal objective being to develop and operate the proposed quarry in a safe and environmentally responsible manner, ensuring compliance with relevant statutory requirements, environmental criteria, accepted industry standards and reasonable community expectations.

The Proponent recognises that only through comprehensive environmental assessment and an environmentally responsible approach to the design and operation of the Project can the risk of harm to the environment be minimised. Demonstration of this approach is provided both by the identification and prioritisation of issues (Section 3) for which a risk analysis formed an important component, and the draft Statement of Commitments provided in Section 6.

### Design Safeguards

A number of design features of the Project were incorporated in recognition of the Precautionary Principle. These design features included the following.

- The proposed extraction area was reduced in size and duration since the original proposal presented to government agencies and the community in 2008, to reduce the level of potential environmental impact associated with the Project. These reductions included:
  - reduction of the Project duration from 60 years to 30 years;
  - reduction of the extraction area from 26.7ha to 7.7ha; and
  - locating the extraction area approximately 730m south of the bank of the Wingecarribee River.
- Staging of the extraction to facilitate the following.
  - Progressive rehabilitation to reduce visual amenity, air quality, noise and other impacts. The Project is to be staged such that extraction operations are to be completed within one section of the extraction area prior to commencing within the next section. This would ensure that the area disturbed at any one time is minimised and that rehabilitation is undertaken progressively throughout the life of the Project.
  - Optimisation of shielding of the extraction area by the local topography and the proposed farm forest.
- Use of the existing topography to offer shielding of the extraction area.
- Retention of existing trees which offer screening of the extraction area.
- Design of amenity bunds to shield the extraction area and reduce noise, air quality and visual amenity impacts.
- Establishment of farm forest on land which would be excavated during later stages, to provide long-term screening.

- Stockpiling would be undertaken within the deepest section of the extraction area wherever possible. This would ensure that noise, air quality and visual amenity impacts are minimised.
- Rehabilitation using existing topsoil, subsoil and species selection. This would assist the re-establishment of a vegetation community with a similar composition to the vegetation community that occurs within undisturbed sections of the Project Site at present.

### Management and Operational Safeguards

The framework for ongoing environmental management, operational performance and rehabilitation of the Project Site would be provided through the project approval. An annual report would be prepared which would report on the progress of the operation and provide an opportunity to review the effectiveness of the environmental management strategies adopted. In addition:

- the proposed mitigation measures and management procedures would be regularly reviewed and modified where necessary in light of environmental monitoring results and feedback received from government agencies, surrounding residents, employees and other interested parties;
- surface water, noise, deposited dust levels would be monitored at locations potentially most affected by the Project in order to ensure the continued compliance of the operation with goals outlined in this document;
- the recommendations outlined in the Surface Water Assessment, summarised in Section 5.2.4 would be adopted to minimise any impact on water quality or quantity exiting the Project Site. Wherever possible, areas not required for extraction or associated activities would remain vegetated to assist in minimising erosion and reducing the suspended sediment load in surface water flowing through the Project Site; and
- topsoil and subsoil would be stripped, stockpiled and re-spread in accordance with the procedures outlined in Section 2.4.5. A record would be maintained of the location, volume and date of creation of all soil stockpiles.

### Rehabilitation and Subsequent Land Use

Long term adverse impacts on the environment would be avoided through:

- progressive rehabilitation of the recreated landform and other disturbed areas within the Project Site, including shaping of the final landform, spreading of subsoil and topsoil and reseeding or replanting with species as described in Sections 2.4.5 and 2.11.

### Conclusion

The precautionary principle has been considered and adopted throughout all stages of the design and assessment of the Project. The approach adopted, including initial assessment, initial design, consultation, risk analysis, specialist environmental assessment, design modification and safeguard design, provides a high degree of certainty that the Project would not result in any major unforeseen impacts.

### 7.2.2.3 Social Equity

Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes both inter-generational (between generations) and intra-generational (within generations) equity considerations.

Equity within generations requires that the economic and social benefits of the development be shared equitably among all members of the community. Equity between generations requires that the present generation pass onto the next generation an environment that does not limit the ability of future generations to attain a quality of life at least equal to that of current generation.

Both elements of social equity are addressed through the design of the Project itself, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed. Examples of matters relating to social equity that are relevant to the various stages of the proposed development are listed below.

#### Project Objectives

The main objective of the Project is the economically viable recovery of the scarce clay/shale resource from the Project Site to ensure continued long-term provision of raw material for the production of a unique and highly sought after construction product, and the survival of the Bowral Brick Plant, while minimising the Project-related impacts on the environment within and surrounding the Project Site. This would provide a benefit to the entire community through reduced construction costs and continued employment at the brick plant. In addition, the Proponent intends to maintain an open and honest relationship with the members of the surrounding community through ongoing consultation addressing issues of concern in the event they arise.

The Proponent intends to ensure inter-generational equity by ensuring that the clay/shale resource is not sterilised. This objective would be upheld with the company's intentions to apply for further development approval when this project is near completion, to maximise the utility of the total 8 million tonne resource. Inter-generational equity is also provided by the Proponent developing a land use that returns more than 50% of the disturbed land to its pre-extraction land use. Furthermore, the Project would sustain the viability of the Bowral Brick Plant and increase the opportunities for future economic activity in the Bowral and New Berrima areas, both directly and indirectly.

#### Design Safeguards

The Project has been designed to maintain inter-generational equity in regard to ensuring that the components of the existing biological, social and economic environment which are available to existing generations would also be available to future generations. Examples include the following:

- The proposed extraction area has been designed to ensure that surface water quality and flows are not impaired.
- The rehabilitation of the Project Site has been designed to provide a landform and land use for future generations similar to that used by the existing local community.

- The extraction area has been set back 730m from the Wingecarribee River to avoid disturbance to riparian vegetation adjacent to Wingecarribee River and to avoid disturbance to native vegetation and sensitive habitats.

### Management and Operational Safeguards

The Proponent recognises that all members of the local community should benefit appropriately from the Project either directly or indirectly. In order to ensure a realistic distribution of benefits, the Proponent would continue to consult with the local community and maintain a pro-active approach to issues of interest. This dialogue would also include a system to record, manage and respond to any complaints relating to the operation.

The Proponent has, and would continue to ensure, inter- and intra-generational equity through the following management and operational safeguards.

- Management of the extraction, transportation and rehabilitation operations to ensure that Project-related impacts on residents and other members of the public in the vicinity of the Project Site are minimised.
- Consultation with local community stakeholders to ensure the Project does not have a significant negative impact on the facilities, services and amenity of the area surrounding the Project Site.

### Rehabilitation and Subsequent Land Use

Rehabilitation would be undertaken in such a manner to ensure that the soil/substrate profile is similar to the existing profile, and that re-establishment of the vegetation communities would be similar to the existing communities in adjacent land and would not be compromised by an incompatible soil/substrate profile. Alternatively, should the Proponent pursue a development approval to further develop the total resource the amenity bunds and other features of the final landform would be suitable for the extraction of the clay/shale for future generations. The proposed final land use would provide for future use of the Project Site, either in an economic capacity as pastoral land or for additional extraction.

### Conclusion

The principle of social equity has been addressed throughout the site selection, design, operation and rehabilitation of the Project. The Project would contribute to the economic activity in the vicinity of the Project Site, being the Bowral Brick Plant and the proposed quarry, and provide competitively priced bricks for the public and would result in the long-term preservation of the existing land use. As a result, the benefits of the Project would be distributed throughout the local community. The Proponent would adopt a pro-active approach to identifying and addressing any concerns identified by the local community or its members.

The Project was also designed such that elements of the existing environment available to this generation, including water flows and quality, would continue to be available to future generations.

### 7.2.2.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term. Details of how the Project has been designed to achieve compliance with these principles are set out below.

#### Identification of Project Objectives

The Proponent is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not significantly adversely affect biological diversity or ecological integrity. As such, the Project has been designed to:

- avoid, as far as practicable, negative impacts on threatened flora and fauna; and
- increase the long-term biodiversity of the Project Site through the establishment of rehabilitated areas vegetated with native species and the establishment of a native tree forest. It is noted that there is very limited biodiversity on the existing Project Site, it being comprised almost entirely of introduced pastures.

#### Design of Project Components

The Proponent, on advice from the specialist consultancies commissioned to assist with the design and to assess most of the impact of the Project, has provided for the conservation of biological diversity and ecological integrity through the following design elements.

- Water management structures have been designed and would be constructed to ensure that only water within DECCW specified criteria leaves the Project Site and enters the Wingecarribee River.
- Progressive rehabilitation of the Project Site would include an increase in native trees and shrubs (on the benches of the final landform).

#### Integration of Safeguards and Procedures

The Proponent would prepare and implement weed eradication programs, as required to maximise the conservation of biological diversity and ecological integrity on and surrounding the Project Site.

#### Rehabilitation and Subsequent Land Use

The final landform has been designed to provide for some ongoing commercial activity, however, a significant proportion of the Project Site and final landform would be rehabilitated to native vegetation and entered into long-term conservation through the biodiversity offset strategy.

#### Conclusion

The Project addresses the principle of conservation of biological diversity and ecological integrity through the minimisation of disturbance to areas of native vegetation, and the establishment of some areas of native vegetation. Should threatened species be identified within those areas of the Project Site to be disturbed, these would be relocated or managed

appropriately in consultation with DECCW or a suitably qualified professional. Weed eradication programs would be implemented as appropriate and would further assist in addressing the principle of sustainable development.

#### 7.2.2.5 Improved Valuation and Pricing of Environmental Resources

The Proponent's principal objective is to operate the Project in a profitable, safe and environmentally responsible manner, which demonstrates that an appropriate value has been placed on elements of the existing environment.

**Design of Project Components and Integration of Safeguards and Procedures**

The extent of research, planning and design of environmental safeguards and mitigation measures to prevent irreversible damage to environmental resources, other than the clay/shale product to be extracted, is evidence of the value placed by the Proponent on these resources.

**Rehabilitation and Subsequent Land Use**

The design of the final landform to integrate ongoing commercial activities with the establishment of some native vegetation illustrates the value placed by the Proponent on both the commercial elements of the Project Site and improving the ecological value of the site.

**Conclusion**

The value placed by the Proponent on environmental resources is evident in the identification of Project objectives, extent of site-specific research, planning and environmental safeguards and measures to be implemented to prevent irreversible damage to the environment on and surrounding the Project Site. It is planned that the income received from the sale of the quarry products would be sufficient to enable the Proponent to achieve an acceptable profit level whilst undertaking all environmentally-related tasks and meeting all commitments in all approvals, licences and permits and those made to the local community.

## 7.3 ALTERNATIVES

### 7.3.1 Introduction

The General Requirements within the Director-General's Requirements (**Appendix 2**) nominates that the *Environmental Assessment* needs to include coverage of the "alternatives considered" during the formulation of the Project. The following subsections outline the feasible alternatives considered during the preparation of the *Environmental Assessment* with respect to alternative quarry sites (Section 7.3.2), alternative transportation (Section 7.3.3) and alternative locations of the brick plant (Section 7.3.4).

### 7.3.2 Alternative Quarry Sites

The following four sites were subjected to preliminary investigations and constraints assessments and considered inferior to the resource on the "Mandurama" property.

- Lots 12 and 4, corner of Douglas and Carribee Roads, Moss Vale West were subject to exploratory drilling. Preliminary ecological investigations identified approximately 10.5ha of an Endangered Ecological Community on the site, namely Southern Highlands Shale Woodland. This presented a significant constraint because the trees in the site are considered to be of high conservation value. The proposed site was also considered too small and land zoning issues prevailed.
- Old Hume Highway, Bendooley Hill, Bowral was subjected to exploratory drilling but found to present too much overburden to make extraction cost effective and environmentally responsible.
- Chesley Park, Berrima Road, Moss Vale was subjected to exploratory drilling and found to be too expensive for purchase, presented too much sandstone and land zoning issues prevailed.
- McVitty Grove, Welby was subjected to exploratory drilling but found to be too small a site and on environmentally sensitive zoned land. Issues with road transportation were also evident.

### 7.3.3 Alternative Transportation

The Proponent undertook a preliminary assessment of the potential for the product clay/shale to be transported by rail to the Bowral Brick Plant but quickly identified issues with cost effectiveness and on-site logistics within the brick manufacturing plant made the alternative financially not feasible. Also transportation by rail presented a unique set of environmental issues relating to dust and noise and visual amenity impacts attributable to rail loading and unloading.

### 7.3.4 Alternative Locations of the Brick Plant

The Proponent considered the possibility of relocating the Bowral Brick Plant to a site closer to potential clay/shale resources in an effort to reduce impacts attributable to the transportation of the resource. The Company has recently upgraded its plant at Bowral at a cost of approximately $15 million. This upgrade has a potential life at least 25 to 30 years. Relocation of the brick plant would result in the loss of a considerable proportion of this investment and the initial capacity investment for the site. The Proponent however, has not discounted the possibility of relocating its brick plant at a time further in the future when the plant requires further upgrade and capital investment. It reviews the Proponent's view that the considerable benefits of continuing operations at the Bowral Brick Plant for outweigh the, comparatively low levels of impacts predicted throughout this document.

### 7.3.5 Not Proceeding with the Project

The consequences of not proceeding with the Project include the following.

- The recoverable clay/shale would not be extracted by the Proponent. Such an outcome would be contrary to the objectives of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* whose objectives include *"To provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State" and " To facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources."*
- The opportunity to establish a long term supply of clay/shale products would be foregone. This would place additional pressure on existing resources. It could lead to the development of other potentially less suitable sites. The Bowral Brick Plant would be required to source the scarce clay/shale from other sources. Previous investigations by the Proponent into alternative sources of these materials have highlighted the scarcity of the resource and/or the constraints with development of any identified alternative resources. Suitable sources may be identified at greater distances from the Bowral Brick Plant than the proposed quarry site and development at alternative sites may increase the cost of such material and the distance it has to be transported, resulting in higher construction costs and additional heavy vehicle traffic and greenhouse gas emissions.
- The building industry would lose an important source of architecturally accepted / sought after bricks.
- The Bowral Brick Plant would probably cease operations within approximately 5 years resulting in the loss of employment for its existing workforce.
- The loss of the opportunity to create up to 4 full-time equivalent positions directly involved in the quarry and transportation operations would be foregone.
- The disposable wages associated with the above positions would be foregone, a substantial portion of which would be otherwise spent within the Wingecarribee Local Government Area.
- The benefits flowing to the Wingecarribee Shire Council and the NSW and Commonwealth Governments through additional rates, royalties, taxes and contributions would be foregone.
- The various impacts identified throughout this document would not occur.

## 7.4 JUSTIFICATION OF THE PROJECT

In assessing whether the development and operation of the Project is justified, consideration has been given both to the predicted residual impacts on the local and wider environment and the potential benefits the Project would have for the Proponent, the Wingecarribee LGA, NSW and Australia. When considering the predicted residual impacts, a review of the proposed controls, safeguards and mitigation measures prepared by the Proponent was also undertaken to determine the emphasis placed on impact minimisation and the incorporation of the principles of ESD.

The Project would have a range of impacts on the biophysical and socio-economic environments. Section 5 of this document identified the potential residual impacts of the project, following the adoption of a number of design and operational procedures, mitigation measures and/or offset strategies. Assuming the commitments made by the Proponent in Section 6 are adhered to, these residual impacts are summarised as follows.

### Transportation

While the Project would increase the number of heavy vehicles using some local but predominantly regional and state roads, there is unlikely to be any detrimental impact on road safety given:

- the small contribution of the Project related traffic to all other traffic on the same roads;
- the high standard of the roads to be used;
- the proposed improvement to the intersection of Berrima Road and Taylor Avenue and the access to the Project Site from Berrima Road, constructed to RTA standards; and
- a Code of Conduct, stipulating safe driving practices at all times, has been successfully implemented to date for all the Proponent employees and truck drivers.

### Surface Water Resources

Assuming the construction and maintenance of the proposed water control structures, the Project would not have any adverse impact on local water quality.

### Noise

The Project has been designed with consideration given to minimising noise impacts on surrounding properties and noise modelling has predicted that with the implementation of noise controls (including the establishment of amenity bunds), operational noise levels would comply with the nominated criteria (based on measured rating background noise levels).

Furthermore, traffic noise criteria would not be exceeded.

### Flora and Fauna

Because the Project Site is largely comprised of improved pasture, the proposed quarry would not lead to the clearing of any native habitat or impacts on any threatened species.

### Visual Amenity

It has been assessed that with the implementation of the design features to provide visual screening, visual amenity impacts would be minimal.

### Air Quality

The air quality assessment concluded that assuming the implementation of the Project design features, operational safeguards and mitigation measures summarised in Section 5.7.5 the potential impact on air quality at surrounding residences would be minor and would not exceed the recommended air quality goals. Specifically, the air quality modelling determined:

- incremental monthly dust deposition rates are predicted to be well below the 2.0g/m$^2$/month at all assessment locations;
- the incremental contribution of the Project to maximum 24-hour average $PM_{10}$ concentrations are predicted to be less than the site specific goal 50µg/m$^3$ at all assessment locations;
- the annual average $PM_{10}$ concentrations are predicted to be less than the site specific goal 30µg/m$^3$ at all assessment locations;

### Soils and Land Capability

The management of the soil resource has been designed to ensure their proper handling and to provide the maximum opportunity for its re-use in the successful rehabilitation of the Project Site. The impact associated with topsoil/subsoil removal, storage and re-use is anticipated to be minimal.

### Groundwater Resources

It has been assessed that the groundwater impacts would be minimal.

### Topography

As a result of the proposed construction of amenity bunds and extraction and reshaping to create a final landform, the Project would result in localised modification of the Project Site topography. The long term rehabilitation of the Project Site incorporating landform reconstruction would create a final landform providing for ongoing agricultural use.

### Aboriginal Heritage

It has been assessed that, due to the absence of any identified Aboriginal sites or items and any Potential Aboriginal Deposits, impacts on Aboriginal heritage would be minimal.

### Cumulative

It is considered that there are not sufficiently significant impacts from sources other than the proposed Project to cause cumulative impacts on the biophysical or socio-economic environment.

## 7.5 CONCLUSION

The benefits of proceeding with the proposed New Berrima Clay/Shale Quarry are considered to outweigh the predicted impacts on the environment that would result if the Project is approved. The consequences of not proceeding with the Project also weigh heavily in favour of proceeding with the Project.

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# Section 8

# References

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# Section 9

# Glossary of Terms, Symbols and Acronyms

**Glossary of Technical Terms** – **Page 9 - 3**

**Glossary of Symbols** – **Page 9 - 7**

**Glossary of Acronyms** – **Page 9 - 9**

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# GLOSSARY

**archaeological** – relating to the scientific study of human history, particularly the relics and cultural remains of the distant past.

**attenuation** – reduction in sound pressure levels between two locations.

**average annual rainfall** – the average amount of rain to fall at a specific location over the period of 1 year (measured in millimetres).

**background level** – the concentration (deposition) level of a pollutant which must be added to the concentration (deposition) level of the modelled sources in order to obtain a total.

**background noise level** – the level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (eg sound from a particular noise source; or sound generated for test purposes).

**baseline data** – a body of information collected over time to define specific characteristics of an area (e.g. species occurrence or noise levels) prior to the commencement of an activity; baseline data allows any impacts arising from the activity to be identified by comparison with previously existing conditions.

**biological diversity/biodiversity** – a concept encompassing the diversity of indigenous species and communities occurring in a given region; biological diversity includes genetic diversity, which is the diversity of genes and genotypes within each species; species diversity, which is the variety of living species; and ecosystem diversity which is the diversity of the different types of communities formed by living organisms and the relations between them.

**biophysical** – relating to the biological and physical attributes of the environment.

**bore** – a cylindrical drill hole, sunk into the ground and from which water is pumped for use or monitoring purposes.

**bulldozer** – an item of tracked mobile earth moving equipment fitted with a front blade and with rear rippers used for pushing and ripping soil and rock.

**catchment area** – the area determined by topographic features within which rainfall will contribute to runoff at a particular point.

**conservation** – the management of resources in a way that will benefit both present and future generations.

**contamination** – The degradation of natural water quality as a result of man's activities. There is no implication of any specific limits, since the degree of permissible contamination depends upon the intended end use, or uses, of the water.

**concentration** – the amount of a substance, expressed as mass or volume, in a unit volume of air.

**diversion bank** – water management structure used to direct water away from particular areas (e.g. operational or ecologically sensitive areas).

**drainage line** – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

**dust** – particles of mostly mineral origin generated by erosion of surfaces and the removal and handling of materials.

**dust gauge** – instrument set up to record the rate of deposition of dust.

**ecology** – the relationship between living things and their environment.

**Ecologically Sustainable Development (ESD)** – using, conserving and enhancing the community's resources so that the ecological processes on which life depends, are maintained, and the total quality of life now and in the future, can be increased.

**ecosystem** – a functional unit of energy transfer and nutrient cycling in a given place. It includes all the relationships within the biotic community and between the biotic components of the system.

**electrical conductivity** – an estimate of the total dissolved salts within a solution (eg. soil solution or water body).

**emission** – a discharge of a substance (e.g. dust) into the environment.

**environment** – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists.

**ephemeral** – not permanent, refers to stream which flows only after rain.

**erosion** – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

**excavate** – to dig into natural material or fill using an excavator or other machinery.

**excavated material** – unweathered shale material extracted from within the extraction area by drill and blast methods for crushing and blending with blending and recycling materials to produce specialised and general quarry products.

**extraction** – the removal of extractive materials by excavation.

**fauna** – a general term for animals such as birds, reptiles, marsupials, fish etc.

**flora** – a general term for plants.

**front-end loader** – machine used to lift and place soil, earth, rocks, etc or to load products into trucks.

**gradient** – rate of change of a given variable (such as temperature or elevation) with distance.

**groundwater** – water contained in voids such as fractures and cavities in rocks and inter-particle spaces in sediments e.g. sand.

**habitat** – the place where an organism normally lives; habitats can be described by their floristic and physical characteristics.

**hydrocarbon** – any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen. Crude oil is essentially a complex mixture of hydrocarbons.

**hydrogeology** – the study of groundwater.

**impact** – the effect of human induced action on the environment.

**infrastructure** – the supporting installations and services that supply the needs of a project e.g. roads.

**landform** – a specific feature of a landscape (such as a hill) or the general shape of the land.

**migratory** – passing, usually predictably (based on aquatic species), from one region or climate to another, for purposes of feeding, breeding, or other biological purposes.

**mitigation measures** – measures implemented to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce noise emissions).

**monitoring** – the regular measurement of components of the environment to understand a feature of the environment and/or establish that environmental standards are being met.

**native** – said of an organism or group of organisms that is restricted to a particular region or environment. A local inhabitant of a place.

**particle size distribution** – the relative proportions of particles (e.g. in a sediment) that fall within specific size categories.

**particulate matter** – small solid or liquid particles suspended in or falling through the atmosphere - sometimes expressed by the term particulates.

**pH** – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral acid, and 14 is most basic (alkaline).

**precautionary principle** – 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.

**progressive rehabilitation** – rehabilitation of a disturbed area as soon as practicable after the final landform is achieved.

**quadrat** – a square plot of land being surveyed for flora species.

**rehabilitation** – the preparation of a final landform after disturbance and its stabilisation with grasses, trees and/or shrubs.

**resource** – an estimate of potentially usable material in a defined area based on preliminary geological information.

**revegetation** – replacement of vegetation, principally grasses and legumes on areas disturbed by quarrying activities.

**runoff** – that part of precipitation flowing to surface streams or dams.

**salinity** – the total content of dissolved solids in groundwater, commonly expressed as parts of dissolved solids per million parts of water (ppm), or milligrams of dissolved solids per litre of solution (mg/L); the significance of salinity depends on the nature as well as the amount of the dissolved solids.

**sandstone** - general term for sedimentary rock with grain size from 0.063mm to 2mm - grains may be minerals or rock fragments.

**silt** – sediment comprising most particles between 0.004 mm and 0.063 mm in diameter.

**silt-stop fencing** – fine mesh fencing normally installed downslope of a sediment source, designed to trap silt and sediment and allow the water to pass through.

**social equity** – embraces value concepts of justice and fairness so that the basic needs of all the sectors of society are met and there is a fairer distribution of costs and benefits to improve the well-being and welfare of the community, population or society.

**species** – a taxonomic grouping of organisms that are able to interbreed with each other but not with members of other species.

**species diversity** – a measure of the number of different species in a given area.

**stockpile** – a pile or mound used to store material, typically products.

**storage capacity** – the maximum volume of liquid able to be retained in a structure.

**stormwater** – surface water runoff reaching stream channels immediately after rainfall.

**subsoil** – surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts.

**surface waters** – all water flowing over, or contained on, a landscape (e.g. runoff, channels, ponds etc).

**suspended solids** – solids held in suspension by the turbulent flow of a fluid.

**sustainable development** – development that meets the needs of the present without compromising the ability of future generations to meet their needs.

**terrestrial** – of or relating to the land, as distinct from air or water.

**topography** – the physical relief and contour of an area.

**topsoil** – the surface layer of a soil profile containing the main percentage of organic material and viable life forms and seeds.

**total suspended solids** – a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit of volume (e.g. milligrams per litre).

**transect** – a fixed line along which observations are made of flora and fauna.

**tributary** – a stream or river that flows into a larger river or lake.

**visual amenity** – attractiveness to the eye.

**water quality** – degree or the lack of contamination of water.

**water table** – the upper limit of the saturated zone within a rock or sediment mass, generally at atmospheric pressure. It is characteristic of unconfined aquifers.

**weed** – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use.

**wildlife** – non-domesticated fauna.

**wind rose** – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

**woodland** – plant communities dominated by trees whose crowns shade less than 30% of the ground.

**worst-case scenario** – a sequence of events likely to result in the worst-case effects on the environment.

# SYMBOLS

| | | |
|---|---|---|
| ~ | – | approximately. |
| **bcm** | – | bank cubic metres. |
| **°C** | – | degrees Celsius. |
| **µg/L** | – | micrograms per litre. |
| **µg/m$^3$** | – | micrograms per cubic metre. |
| **µm** | – | micron, one millionth of a metre (one thousandth of a millimetre). |
| **µS/cm** | – | microsiemens per centimetre; a measure of electrical conductivity. |
| **%** | – | percentage. |
| **<** | – | less than. |
| ≤ | – | less than or equal to. |
| **>** | – | greater than. |
| ≥ | – | greater than or equal to. |
| **cm** | – | centimetre (unit of measure). |
| **dB(A)** | – | the unit of measurement of sound pressure level heard by the human ear, expressed in "A" scale. |
| **dS/cm** | – | decisiemens per centimetre; a measure of electrical conductivity. |
| **g** | – | gram (= 0.001 kilogram). |
| **g/m$^2$/month** | – | grams per square metre per month unit for deposited dust. |
| **ha** | – | hectare (100 m x 100 m). |
| **kg** | – | kilogram (weight measure). |
| **kL** | – | kilolitre (thousand litres). |
| **km** | – | kilometre (= 1 000 metres). |
| **km$^2$** | – | square kilometres. |
| **km/hr** | – | kilometres per hour. |
| **L** | – | litre. |
| **L/day** | – | litres per day. |
| **L/s** | – | litres per second. |
| **L/t** | – | litres per tonne. |
| **lcm** | – | loose cubic metres. |

| | | |
|---|---|---|
| **$L_{A10}$** | – | sound level exceeded 10 per cent of the sampling time. |
| **$L_{A90}$** | – | sound level exceeded 90 per cent of the sampling time. |
| **$L_{Aeq}$** | – | the $L_{Aeq}$ is the "equal energy" average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures. |
| **$L_{Aeq(1\ hour)}$** | – | the "equal energy" average noise level over 60 minutes – used for assessing impacts of motor vehicles. |
| **$L_{Aeq(T)}$** | – | Sound level of continuous noise which emits the same energy as the fluctuation sound over a given time period (T). |
| **$L_{Amax}$** | – | the absolute maximum noise level measured in a given time interval. |
| **$L_{AN}$** | – | the A-weighted sound pressure level exceeded by N% of a given measured period. |
| **m** | – | metre. |
| **m AHD** | – | metres Australian Height Datum. |
| **$m^2$** | – | square metre. |
| **$m^3$** | – | cubic metre. |
| **mg** | – | milligram (weight unit). |
| **mg/L** | – | milligrams per litre (parts per million). |
| **ML** | – | megalitre. |
| **mm** | – | millimetre (= 0.001 metres). |
| **$Mm^3$** | – | million cubic metres. |
| **Mt** | – | million tonnes (metric tonne = 1 000 kg). |
| **$PM_{2.5}$** | – | particulate matter <2.5μm in diameter. |
| **$PM_{10}$** | – | particulate matter <10μm in diameter. |
| **ppm** | – | parts per million. |
| **swl** | – | standing water level. |
| **t** | – | tonnes. |
| **TDS** | – | total dissolved solids |
| **$t/m^3$** | – | tonnes per cubic metre. |
| **tpa** | – | tonnes per annum. |
| **tpd** | – | tonnes per day. |
| **tph** | – | tonnes per hour. |
| **V** | – | volt. |

# ACRONYMS

| | |
|---|---|
| **AADT** | Annual Average Daily Traffic. |
| **ABS** | Australian Bureau of Statistics |
| **AEMR** | Annual Environmental Management Report |
| **AMMAAT** | Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW |
| **AHD** | Australian Height Datum; generally equivalent to mean sea level. |
| **ANZECC** | Australian and New Zealand Environment and Conservation Council |
| **ARI** | Average Recurrence Interval |
| **AS** | Australian Standard |
| **BoM** | Bureau of Meteorology |
| **DECC** | Department of Environment and Climate Change |
| **DECCW** | Department of Environment, Climate Change and Water |
| **DoP** | Department of Planning |
| **DPI** | Department of Primary Industries |
| **DWE** | Department of Water and Energy |
| **DEWHA** | Department of the Environment, Water, Heritage and the Arts |
| **EA** | Environmental Assessment |
| **EMP** | Environmental Management Plan |
| **EP&A Act** | Environmental Planning and Assessment Act 1979 (NSW) |
| **EPA** | Environment Protection Authority (NSW) |
| **EPBC Act** | Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) |
| **ESD** | Ecologically Sustainable Development |
| **I&I NSW** | Industry and Investment NSW |
| **INP** | Industrial Noise Policy |
| **LALC** | Local Aboriginal Land Council |
| **LEP** | Local Environmental Plan |
| **NEPC** | National Environment Protection Council |
| **NEPM** | National Environment Protection Manual |
| **NHMRC** | National Health and Medical Research Council |
| **NP&W Act** | National Parks and Wildlife Act 1974 (NSW) |
| **NPWS** | National Parks and Wildlife Service (NSW) |
| **RBL** | Rating background level |

| | |
|---|---|
| **REP** | Regional Environmental Plan |
| **RTA** | Roads and Traffic Authority |
| **SEPP** | State Environmental Planning Policy |
| **TSC Act** | Threatened Species Conservation Act 1995 (NSW) |
| **TSP** | Total Suspended Particulate matter |
| **V:H** | vertical is to horizontal |

# Appendices

(No. of pages including blank pages = 34)

Appendix 1 Major Project Application

Appendix 2 Coverage of Director-General's Requirements and Requirements of Other Government Agencies

Appendix 3 November 2009 Newsletter and Feedback Form

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# Appendix 1

# Major Project Application

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# Major project application

NSW GOVERNMENT
Department of Planning

Date duly made: ____/____/____ Project application no. _____

## 1. Before you lodge

This form is required to apply for the approval of the Minister to carry out a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* (the Act) applies.

Before lodging this application, it is recommended that you first consult with the Department of Planning (the Department) concerning your project.

A 'Planning Focus Meeting' may need to be held for this project involving the Department, relevant agencies, council or other groups identified by the Department. If a Planning Focus Meeting is held, the Department will issue the Director-General's requirements for the Environmental Assessment following the meeting.

**Disclosure statement**

Persons lodging applications are required to declare reportable political donations (including donations of or more than $1,000) made in the previous two years.

For more details, including a disclosure form, go to **www.planning.nsw.gov.au/donations**.

**Lodgement**

All applications must be lodged with the Director-General of the Department of Planning, by courier or mail. An electronic copy should also be emailed to the assessment contact officer assigned to the project.

NSW Department of Planning
Ground floor, 23-33 Bridge Street, Sydney NSW 2000
GPO Box 39 Sydney NSW 2001
DX 10181 Sydney Stock Exchange
Phone 1300 305 695

## 2. Details of the proponent

Company/organisation/agency: The Austral Brick Company
ABN: 52 000 005 550

☒ Mr ☐ Ms ☐ Mrs ☐ Dr ☐ Other

First name: Christopher
Family name: Bryant

Position: Property Project Manager

STREET ADDRESS

Unit/street no.: 738 - 780
Street name: Wallgrove Road
Suburb or town: Horsley Park
State: NSW
Postcode: 2164

POSTAL ADDRESS (or mark 'as above')

P.O. Box 6550
Suburb or town: Wetherill Park
State: NSW
Postcode: 1851

Daytime telephone: 02 9830 7879
Fax: 02 9821 2383
Mobile: 0410 422 306
Email: chris.bryant@australbricks.com.au

## 3. Identify the land you propose to develop

STREET ADDRESS (where relevant)

Unit/street no: 1

Street or property name: Berrima Road

Suburb, town or locality: New Berrima

Postcode: 2577

Local government area(s): Wingecarribee

State electorate(s): Goulburn

REAL PROPERTY DESCRIPTION

1/414246

Note: The real property description is found on a map of the land or on the title documents for the land. If you are unsure of the real property description, you should contact the Department of Lands.

Please ensure that you place a slash (/) to distinguish between the lot, section, DP and strata numbers. If the project applies to more than one piece of land, please use a comma to distinguish between each real property description.

OR detailed description of land attached: ☐

MAP: A map of the site and locality should also be submitted with this application.

## 4. Major project description and other requirements

Provide a brief title for your project:

New Berrima Clay/Shale Quarry

PROJECT APPROVAL

If you are applying for approval of a project, include in the project title, all significant components for which approval is being sought. If the application relates to part only of a project, the project title should reflect this.

Is the application for approval of a project? ☒ Yes ☐ No

Is the application related to part only of a project? ☐ Yes ☒ No

CONCEPT PLAN APPROVAL

If you are applying for approval of a concept plan, include in the project title, all components for which approval 'in concept' is being sought. If the application also relates to approval of a project, a description of this should also be included in the project title.

Is the application for approval of a Concept Plan? ☒ Yes ☐ No

Is a project application being made concurrently for all or part of the project? ☒ Yes ☐ No

**You are also required to provide a Project Description and address any matters required by the Director-General in accordance with section 75E or section 75M of the Act. Failure to do so may lead to your application being rejected.**

Is a Project Description attached? ☒ Yes ☐ No

Does the Project Description include any additional matters required by the Director-General under section 75E or section 75M of the Act? ☒ Yes ☐ No

Note: An electronic copy of the project description is also required as all applications must be provided on the Department's website. You should contact the Department on the correct electronic format.

ESTIMATED CAPITAL INVESTMENT VALUE

Please indicate the estimated capital investment value (CIV) of the project. The CIV includes all costs necessary to establish and operate the project, including the design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment (but excluding GST and land costs).

$200,000.00

EQUIVALENT FULL-TIME JOBS

Please indicate the number of jobs created by the project. This should be expressed as a proportion of full time jobs over a full year.

| | |
|---|---|
| Construction jobs (full-time equivalent) | 3 |
| Operational jobs (full-time equivalent) | 2 |

## 5. Approvals from State agencies

Does the project require any of the following: (tick all that are appropriate)

- ☐ an aquaculture permit under section 144 of the *Fisheries Management Act 1994*
- ☒ an approval under section 15 of the *Mine Subsidence Compensation Act 1961*
- ☒ a mining lease under the *Mining Act 1992*
- ☐ a production lease under the *Petroleum (Onshore) Act 1991*
- ☒ an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act)
- ☒ a consent under section 138 of the *Roads Act 1993*
- ☐ a licence under the *Pipelines Act 1967*

## 6. Landowner's consent or notification

As the owner(s) of the above property, I/we consent to this application being made on our behalf by the proponent.

| Land | Land |
|---|---|
| 1/414246 | |
| Signature: Bryant | Signature: |
| Name: Chris Bryant | Name: |
| Date: 17/11/08 | Date: |

Note: Under clause 8F of the *Environmental Planning and Assessment Regulation 2000* (the Regulation), certain applications for approval under Part 3A of the Act do not require the consent of the landowner, however, the proponent is required to give notice of the application:

- in the case of linear infrastructure projects, by notice in a newspaper circulating in the locality prior to the commencement of the public consultation period,
- in the case of mining or petroleum production projects, by notice in a newspaper circulating in the locality within 14 days of this application being made,
- in the case of critical infrastructure projects, to the owner of the land within 14 days of this application being made, and
- in other cases, to the owner of the land at any time before the application is made.

## 7. Political donation disclosure statement

Persons lodging applications are required to declare reportable political donations (including donations of or more than $1,000) made in the previous two years. Disclosure statements are to be submitted with your application or request.

Have you attached a disclosure statement to this application?

☒ Yes
☐ No

Note: For more details about political donation disclosure requirements, including a disclosure form, go to: **www.planning.nsw.gov.au/donations**.

## 8. Proponent's signature

As the proponent(s) of the project and in signing below, I/we hereby:

- provide a description of the project and address all matters required by the Director-General pursuant to section 75E and/or section 75M of the Act, and
- apply, subject to satisfying clause 8D of the Environmental Planning and Assessment Regulation, for the Director-General's environmental assessment requirements pursuant to Part 3A of the Act, and
- declare that all information contained within this application is accurate at the time of signing.

Signature: C Bryant

Name: Chris Bryant

Date: 17/11/08

In what capacity are you signing if you are not the proponent:

Name, if you are not the proponent:

# Appendix 2

# Coverage of Director-General's Requirements and Requirements of Other Government Agencies

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NSW GOVERNMENT
**Department of Planning**

**Major Project Assessment**
**Industry & Mining**
Phone: (02) 9228 6298
Fax: (02) 9228 6466
Email: kane.winwood @planning.nsw.gov.au
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Our ref: S08/01473

Mr Adam Davies
Property Development Manager
Austral Bricks Pty Ltd
PO Box 6550
WETHERILL PARK NSW 1851

Dear Mr Davies

**New Berrima Clay Shale Project**
**Director-General's Requirements**

The Department has received your application for the New Berrima Clay Shale Project.

I have attached a copy of the Director-General's requirements for the project. These requirements have been prepared in consultation with relevant agencies, and are based on the information that you have provided to date. I have also attached a copy of the agencies' comments for your information.

Please note that the Director-General may alter these requirements at any time.

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. It is your responsibility to contact the Department of the Environment, Water, Heritage and the Arts in Canberra (6274 1111 or http://www.environment.gov.au) to determine if the project will require an approval under the EPBC Act. The Commonwealth Government has accredited the NSW environmental assessment process, so if it is determined that an approval is required under the EPBC Act, please contact the Department immediately as supplementary Director-General's requirements may need to be issued.

I would appreciate it if you would contact the Department at least two weeks before you propose to submit your Environmental Assessment of the project. This will allow the Department to determine the:

- applicable fee (see Division 1A, Part 15 of the *Environmental Planning & Assessment Regulation 2000)*; and
- number of copies (hard-copy or CD-ROM) of the Environmental Assessment required for exhibition purposes.

Once it receives the Environmental Assessment, the Department will review it in consultation with the relevant agencies to determine if it adequately addresses the Director-General's requirements, and may require you to revise it prior to public exhibition.

The Department is required to make all the relevant information associated with the project publicly available on its website. Consequently, I would appreciate it if you would ensure that all the documents you subsequently submit to the Department are in a suitable format for the web, and arrange for an electronic version of the Environmental Assessment to be hosted on a suitable website during the exhibition period.

If you have any enquiries about these requirements, please contact Kane Winwood.

Yours sincerely

11.11.07

Chris Wilson
**Executive Director**
**Major Project Assessment**
As delegate of the Director-General

# Director-General's Requirements

**Section 75F of the *Environmental Planning and Assessment Act 1979***

| | |
|---|---|
| **Application Number** | MP 08_0212 |
| **Project** | The New Berrima Clay Shale Quarry Project, which includes:<br>• developing a clay and shale quarry and constructing associated site infrastructure;<br>• transporting up to 120 000 tonnes of extractive material per year by road to Bowral for processing; and<br>• progressively rehabilitating the site. |
| **Site** | Lot 1 DP 414246, Berrima Road, New Berrima. |
| **Proponent** | Austral Bricks Pty Ltd. |
| **Date of Issue** | 10 October 2008 |
| **General Requirements** | The Environmental Assessment of the project must include:<br>• an executive summary;<br>• a detailed description of the project, including the:<br>- need for the project;<br>- alternatives considered,<br>- likely staging of the project; and<br>- plans of any proposed building works;<br>• a risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment;<br>• a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment (see above), which includes:<br>- a description of the existing environment, using sufficient baseline data;<br>- an assessment of the potential impacts of all stages of the project, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below);<br>- a description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment;<br>• a statement of commitments, outlining all the proposed environmental management and monitoring measures;<br>• a conclusion justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the *Environmental Planning & Assessment Act 1979*;<br>• a signed statement from the author of the Environmental Assessment, certifying that the information contained within the document is neither false nor misleading. |
| **Key Issues** | • **Strategic –** assess the project against the strategic land use planning objectives for the area; including those contained in the draft *Wingecarribee Local Environmental Plan 2007* and the *Drinking Water Catchments Regional Environmental Plan No. 1.*<br>• **Transport –** including<br>- a detailed assessment of the potential impacts of the project on the safety and performance of the surrounding road network and entire transport route;<br>- a detailed description of any proposed road or intersection upgrades;<br>• **Visual –** concentrating on minimising the visibility of the site from the surrounding area, particularly from likely affected residences;<br>• **Noise –** a detailed assessment of the noise impacts associated with construction, quarry operation, and road traffic noise taking the entire proposed transport route into account; |

| | |
|---|---|
| | • **Soil & Water** – including a detailed description of the water management system for the site including water quality management, storm water management, erosion and sediment control and monitoring programs;<br>• **Air Quality;**<br>• **Biodiversity** – including a detailed assessment of the potential impacts of the project on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and regional wildlife habitat corridors;<br>• **Heritage** – both Aboriginal and non-Aboriginal;<br>• **Waste** – including a detailed description of the measures that would be implemented to minimise, reuse, recycle and dispose of any waste produced on site; and<br>• **Rehabilitation** – including a detailed description of the rehabilitation strategy for the site, taking into consideration any relevant strategic land use planning or resource management plans or policies |
| **References** | The environmental assessment of the key issues listed above must take into account relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this project. |
| **Consultation** | During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.<br><br>In particular you must consult with:<br>• Department of Environment and Climate Change;<br>• Department of Primary Industries;<br>• Department of Water and Energy;<br>• Department of Lands;<br>• Sydney Catchment Authority;<br>• Roads and Traffic Authority; and<br>• Wingecarribee Shire Council.<br><br>The consultation process and the issues raised must be described in the Environmental Assessment. |
| **Deemed Refusal Period** | 60 days |

# Policies, Guidelines & Plans

| Aspect | Policy /Methodology |
|---|---|
| **Risk** | |
| | AS/NZS 4360:2004 Risk Management (Standards Australia) |
| | HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia) |
| **Strategic Plans** | |
| | Draft Sydney-Canberra Corridor Regional Strategy (DOP) |
| **Transport** | |
| | Guide to Traffic Generating Development (RTA) |
| | Road Design Guide (RTA) |
| **Noise** | |
| | NSW Industrial Noise Policy (DECC) |
| | Environmental Criteria for Road Traffic Noise (NSW EPA) |
| | Environmental Noise Control Manual (DECC) |
| | Assessing Vibration: A Technical Guideline (DECC) |
| **Soil and Water** | |
| *Soil* | Rural Land Capability Mapping (DLWC) |
| | Agricultural Land Classification (DPI) |
| | State Environmental Planning Policy No. 55 – Remediation of Land |
| | Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (DOP) |
| *Surface Water* | National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ) |
| | National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ) |
| | Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC) |
| | State Water Management Outcomes Plan |
| | NSW Government Water Quality and River Flow Environmental Objectives (DECC) |
| | Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC) |
| | Drinking Water Catchments Regional Environmental Plan No. 1 |
| | Managing Urban Stormwater: Soils & Construction (Landcom) |
| | Managing Urban Stormwater: Treatment Techniques (DECC) |
| | Managing Urban Stormwater: Source Control (DECC) |
| | Floodplain Management Manual (DNR) |
| | Floodplain Risk Management Guideline (DECC) |
| | A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH) |
| | Technical Guidelines: Bunding & Spill Management (DECC) |
| *Groundwater* | National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC) |
| | NSW State Groundwater Policy Framework Document (DLWC) |
| | NSW State Groundwater Quality Protection Policy (DLWC) |
| | NSW State Groundwater Quantity Management Policy (DLWC) Draft |
| **Air Quality** | |
| | Protection of the Environment Operations (Clean Air) Regulation 2002 |
| | Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC) |
| | Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC) |

| | |
|---|---|
| **Biodiversity** | |
| | Draft Guidelines for Threatened Species Assessment under Part 3A of the Environmental Planning and Assessment Act 1979 (DEC) |
| | NSW Groundwater Dependent Ecosystem Policy (DLWC) |
| | State Environmental Planning Policy No. 44 – Koala Habitat Protection |
| **Heritage** | |
| Aboriginal | Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC) |
| | NSW Heritage Manual (NSW Heritage Office & DUAP) |
| Non- Aboriginal | The Burra Charter (The Australia ICOMOS charter for places of cultural significance) |
| **Waste** | |
| | Waste Classification Guidelines (DECC) |
| **Rehabilitation** | |
| | Strategic Framework for Mine Closure (ANZMEC & Minerals Council of Australia) |
| | Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia) |
| | Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia) |

**Table A2-1**
**Director-General's Requirements from Relevant *Environmental Assessment* Sections**
**(Department of Planning – 21 November 2008)**



| Paraphrased Requirement | Relevant EA Section |
|---|---|
| **GENERAL** | |
| The *Environmental Assessment* of the Project must include: | |
| • an executive summary; | ES |
| • a detailed description of all components of the project including the: | |
| - need for the project; | 7.4 |
| - alternatives considered; | 7.3 |
| - likely staging of the project; and | 2.1 – 2.11 |
| - plans of any proposed building works; | Not Applicable |
| • a risk assessment of the potential environment impacts of the project, identifying the key issues for further assessment; | 3.5, 3.6 |
| • a detailed assessment of the key issues specified below and any other significant issues identified in the risk assessment (see above), which includes: | |
| - a description of the existing environment, using sufficient baseline data; | 4.5 |
| - an assessment of the potential impacts of all stages of the project, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below); | 5 |
| - a description of the measures that would be implemented to avoid, minimise, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment; | 5 |
| • a statement of commitments, outlining all the proposed environmental management and monitoring measures; | 6 |
| • a conclusion justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the *Environmental Planning and Assessment Act 1979*; and | 7.4 |
| • a signed statement from the author of the Environmental Assessment certifying that the information contained within the document is neither false nor misleading. | Page iii |
| **STRATEGIC** | |
| Assess the project against the strategic land use planning objectives for the area, including those contained in the draft *Wingecarribee Local Environmental Plan 2007* and the *Drinking Water Catchments Regional Environmental Plan No. 1*. | 3.3 |
| **TRANSPORT** | |
| A detailed assessment of the potential impacts of the project on the safety and performance of the surrounding road network and entire transport route. | 5.1, Part 1, SCSC |
| A detailed description of any proposed road or intersection upgrades. | 5.1, Part 1 SCSC |
| **VISUAL** | |
| Concentrating on minimising the visibility of the site from the surrounding area, particularly from likely affected residences. | 5.6 |
| **NOISE** | |
| A detailed assessment of the noise impacts associated with construction, quarry operation, and road traffic noise taking the entire proposed transport route into account. | 5.3, Part 3 SCSC |
| **SOIL AND WATER** | |
| A detailed description of the water management system for the site including water quality management, storm water management, erosion and sediment control and monitoring programs. | 5.2, Part 2 SCSC |

**Table A2-1 (Cont'd)**
**Director-General's Requirements from Relevant *Environmental Assessment* Sections**
**(Department of Planning – 21 November 2008)**



| Paraphrased Requirement | Relevant EA Section |
|---|---|
| **BIODIVERSITY** | |
| Include a detailed assessment of the potential impacts of the project on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats and regional wildlife habitat corridors. | 5.4, 5.5. Parts 4 and 5 SCSC |
| **HERITAGE** | |
| Both Aboriginal and non-Aboriginal. | 5.10, Part 8 SCSC |
| **WASTE** | |
| Include a detailed description of the measures that would be implemented to minimise, reuse, recycle and dispose of any waste produced on site. | 2.8 |
| **REHABILITATION** | |
| Include a detailed description of the rehabilitation strategy for the site, taking into consideration any relevant strategic land use planning or resource management plans or polices. | 2.11 |
| **REFERENCES** | |
| The environmental assessment of the key issues listed above must take into account relevant guidelines, policies and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies and plans that may be relevant to the environmental assessment of this project. | 3.3 |
| **CONSULTATION** | |
| During the preparation of the *Environmental Assessment*, you should consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.<br>In particular you should consult with:<br>• Department of Environment and Climate Change;<br>• Department of Primary Industries;<br>• Department of Water and Energy;<br>• Department of Lands;<br>• Sydney Catchment Authority<br>• Roads and Traffic Authority; and<br>• Wingecarribee Shire Council.<br>The consultation process and the issues raised must be described in the *Environmental Assessment*. | 3.2.2 |

**Table A2-2**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| | **GENERAL** | |
| Department of Water and Energy (02/10/08) | The EA is required to take into account the following NSW Government policies, as applicable: | |
| | • NSW Groundwater Policy Framework Document - General; | NA |
| | • NSW Groundwater Quantity Management Policy; | NA |
| | • NSW Groundwater Quality Protection Policy; | NA |
| | • NSW Groundwater Dependant Ecosystem Policy; | NA |
| | • NSW State Rivers and Estuaries Policy; | NA |
| | • NSW Wetlands Management Policy | NA |
| | • NSW Farm Dams Policy | Part 2 SCSC |
| Department of Environment and Climate Change (03/10/08) | Details are required on the location of the proposed development including the affected environment to place the proposal in its local and regional environmental context including surrounding land uses, planning zones, potential sensitive receptors, surface and sub-surface areas/features of conservation significance and environmental sensitivity. These should include areas containing natural and cultural heritage values. | 2,3 |
| | Describe mitigation and management options that will be used to prevent, control, abate or mitigate identified environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment. | 5 |
| | **NOISE AND VIBRATION** | |
| Department of Environment and Climate Change (03/10/08) | The development must be designed in accordance with the NSW Government's *Industrial Noise Policy*. The assessment should include but need not be limited to: the location of all sensitive receptors, and assessment of the background noise, proposed project specific noise limits, the potential impact of any transport noise, and the proposed hours of operation. | 5.3, Part 3 SCSC |
| | The EA must clearly outline the noise mitigation measures the Proponent intends to apply to the project to ensure that there are no adverse impacts from noise. | 5.3.6 |
| | **ECOLOGY** | |
| Department of Environment and Climate Change (03/10/08) | A field survey of the site should be conducted in accordance with the draft Threatened Biodiversity Survey and Assessment Guidelines. The report must include a map of the areas surveyed. Areas not included in the survey should be accompanied by reasons for their omission. | 5.4, 5.5 Parts 4 and 5 SCSC |
| | Likely impacts on threatened species and their habitat need to be assessed, evaluated and reported on. | 5.4, 5.5 Parts 4 and 5 SCSC |
| | Flora surveys should include, but not necessarily be limited to the following species:<br>Small flower Grevillea — Mittagong Geebung<br>Bynoe's Wattle — Camden Woollybutt<br>Cambage Kunzea — Silky Pomaderris | 5.4, Part 4 SCSC |
| | Fauna surveys should include, but not necessarily be limited to the following species:<br>Koala — Giant Dragonfly<br>Blue-billed Duck — Gang-gang Cockatoo<br>Freckled Duck | 5.5 Part 5 SCSC |
| | The report must clearly map and quantify the area of foraging, roosting, feed and nesting trees proposed to be removed and/or modified. | NA |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| **ECOLOGY (Cont'd)** | | |
| Department of Environment and Climate Change (03/10/08) | A description of any remnant endangered ecological communities (EEC) on site should be provided including a description of their condition, disturbance history and recovery capacity. This report must clearly map and quantify the area of any EEC proposed to be removed and/or modified. | 5.4, Part 4 SCSC |
| | There is potential for Southern Highlands Shale Woodland and the White Box Yellow Box Blakely's Red Gum Woodland listed EECs under the *Threatened Species Conservation Act 1995* (NSW) to occur within the vicinity of the development. Consideration should also be given to any EECs listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). | 5.4, Part 4 SCSC |
| | A description should also be included of any other ecological communities on site that will be impacted as a result of the proposal. This should include an assessment of the habitat value of the community for threatened species. | 5.4, Part 4 SCSC |
| | A description should be provided of the actions that will be taken to avoid or mitigate impacts or compensate for unavoidable impacts of the project on threatened species and their habitat. The EA should also assess any impacts, including measures to avoid and mitigate impacts on any threatened species associated with the sitting and construction of any access roads and infrastructure provision. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented. | 5.4.4, 5.54 |
| | The EA needs to clearly state whether it meets each of the key thresholds set out in Step 5 of the draft *Guideline for Threatened Species Assessment*. | Parts 4 and 5 SCSC |
| **AIR QUALITY** | | |
| Department of Environment and Climate Change (03/10/08) | Ensure sensitive receptors are protected from any adverse impacts from dust and odour. | 5.7, Part 6 SCSC |
| | The EA should address options to minimise fugitive dust emissions from stockpiles and areas of the quarry that have been disturbed and are likely to remain bare which may include progressive rehabilitation. | 5.7.5 |
| **SURFACE WATER** | | |
| Department of Water and Energy (02/10/08) | If a water supply is required, the source/availability of a sustainable water supply needs to be addressed in the EA. | Part 2 SCSC |
| | The location and estimated capacity of every dam must be shown. Any capacity of the total of all dams on the property greater than the MHRDC may require a licence. | Part 2 SCSC |
| | The EA should provide details on:<br>• any existing surface water and groundwater licences under the Water Act 1912 on the subject property;<br>• the purpose of the existing licences;<br>• the water supply source(s) for the proposal;<br>• volumes of water to be used;<br>• The function and location of all existing and proposed storages/ponds on the site; and<br>• The design layout, pumping and storage capacities, all associated earthworks and infrastructure works must be clearly shown and explained. | 2.1.4<br>2.1.4<br>5.2<br>5.2, Part 2 SCSC<br>5.2, Part 2 SCSC<br>2.3 |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| | **SURFACE WATER (Cont'd)** | |
| Department of Water and Energy (02/10/08 | If the proposal includes water management structures/dams, the EA needs to provide details on the following:<br>• any existing structure(s) (date of construction, location, purpose, size and capacity, the legal status/approval for existing structure/s);<br>• any proposal to change the purpose of existing structure/s;<br>• if any remedial work is required to maintain the integrity of the existing structure/s;<br>• size and storage capacity of the structure/s;<br>• calculation of the Maximum Harvestable Right Dam Capacity (MHRDC);<br>• if the structure/s is affected by flood flows;<br>• any proposal for shared use, rights and entitlement of the structure/s; and<br>• if the proposed development has the potential to bisect the structure/s. | 5.2, Part 2 SCSC<br>Part 2 SCSC<br>Part 2 SCSC<br>5.2.2<br>Part 2 SCSC<br>Part 2 SCSC<br>NA<br>NA |
| Department of Environment and Climate Change (03/10/08) | The goal of the project should ensure:<br>• There is no pollution of waters (including surface and groundwater);<br>• Polluted water is captured on the site and directed to reticulated sewer where available or else collected, treated and beneficially reused, where this is safe and practicable to do so;<br>• There is consistency with any relevant Statement of Joint Intent established by the Healthy Rivers Commission; and<br>• It contributes to the protection or achievement over time of River Flow Objectives and Water Quality Objectives. | 5.2.5<br>5.2.4<br>NA<br>5.2.5 |
| | An assessment needs to be provided in the EA demonstrating how the above objectives will be achieved. The proponent should confirm in the EA the catchment that the development occurs in to determine the requirements that should apply. The EA should clearly identify any sensitive areas nearby and provide details on any potential impact this proposal may have on these areas including any associated mitigation measures. | Part 2 SCSC |
| | **GROUNDWATER** | |
| Department of Water and Energy (02/10/08) | The Environmental Assessment (EA) needs to provide details on:<br>• the source/availability of a sustainable water supply. The Environmental Assessment needs to address how a water supply will be sourced for the proposal due to the Hawkesbury-Nepean surface water licence embargo. Commercial groundwater extraction in the Parish of Bong Bong is also similarly embargoed;<br>• the protection of groundwater;<br>• the protection of watercourses and riparian corridors. | 5.11 |
| | The EA should identify groundwater issues and potential degradation to the groundwater source and provide the following details:<br>• the predicted highest groundwater table at the site;<br>• any works likely to intercept, connect with or infiltrate the groundwater sources;<br>• a description of the flow directions and rates and physical and chemical characteristics of the groundwater source; | 5.11 |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| | **GROUNDWATER (Cont'd)** | |
| Department of Water and Energy (02/10/08) | • the predicted impacts of any final landform on the groundwater regime; | 5.11 |
| | • the existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts; | 5.11 |
| | • an assessment of the quality of the groundwater for the local groundwater catchment; | NA |
| | • how the proposed development will not potentially diminish the current quality of groundwater, both in the short and long term; | 5.11 |
| | • measures for preventing groundwater pollution so that remediation is not required; | 5.11.4 |
| | • protective measures for any groundwater dependent ecosystems (GDEs); | NA |
| | • proposed methods of the disposal of waste water and approval from the relevant authority; and | 5.11 |
| | • the results of any models or predictive tools used. | NA |
| | Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:<br>• any proposed monitoring programs, including water levels and quality data;<br>• reporting procedures for any monitoring program including mechanism for transfer of information;<br>• an assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal;<br>• identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category); | NA |
| Department of Water and Energy (02/10/08) | • description of the remedial measures or contingency plans proposed; and | 5.11.4 |
| | • any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period. | NA |
| Sydney Catchment Authority (23/09/08) | The SCA considers water quality issues should be comprehensively considered in the assessment process and that this planning instrument establishes appropriate assessment criteria. The SCA considers that the environmental assessment of the quarry proposal and the proposed transport route must include an assessment of whether the proposal will have a 'neutral or beneficial effect on water quality' as per the following:<br>• Consider the Drinking Water Catchments Regional Environmental Plan No. 1 and have regards to the water quality objectives detailed in the plan; | 5.2<br><br>Section 6, Part 2, SCSC |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



<table>
<tr><th>Government Authority</th><th>Paraphrased Requirement</th><th>Relevant EA Section</th></tr>
<tr><td colspan="3">GROUNDWATER (Cont'd)</td></tr>
<tr><td>Sydney Catchment Authority (23/09/08)</td><td>• Contain relevant studies and plans (eg Water Cycle Management Study, Stormwater Management Plan, Erosion and Sediment Control Plan and/or Soil and Water Management Plan) that address the following:<br>• Identification of potential impacts on water quality and likely pollutants of concern (surface and groundwater) during construction, operation and decommissioning stages of the quarry;<br>• Identification of potential impacts on the development of water supply dams, groundwater and the relocation of watercourses and drainage lines. If there is no impact on groundwater a justification as to how this conclusion has been reached needs to be provided.<br>• Details of water quality protection measures during construction, operation and decommissioning stages of the quarry along with the performance criteria for each measure and an assessment of whether the water quality measures are sustainable for the periods for which they are expected to be in place.<br>• With regards to soil and water management at the quarry site, critical structures such as Water Quality Control Ponds (WQCPs) and sedimentation basins should be designed, constructed and maintained to accommodate a 1 in 100 year ARI 24 hour event. Similarly other dams and water management structures should be designed, constructed and maintained to accommodate a 1 in 20 year ARI event. Justification for any deviation from this should be provided.<br>• Determine and state whether a neutral of beneficial effect on water quality of receiving waters (surface and groundwater) will occur during construction, operation and decommissioning stages of the quarry.</td><td>The requested plans would be proposed as part of the Site Water Management Plan in the event the Project is approved.<br><br>(See Section 6 of Part 2 of SCSC)</td></tr>
<tr><td></td><td>• In the event that water will be discharged from the site the SCA recommends that the proponent be required to meet the water quality guidelines identified below for the operation and decommissioning stages of the project which have been derived from the SCA (2006) Water Quality Monitoring Report 2005-2006 and the Healthy Rivers Commission Guidelines (1998). Any monitoring program for surface and groundwater quality would need to include these parameters.</td><td>5.2, Part 2 SCSC</td></tr>
<tr><td></td><td>
<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Dissolved Oxygen (% saturation)</td><td>90 - 110</td></tr>
<tr><td>pH (pH unit)</td><td>6.5 – 8.0</td></tr>
<tr><td>Turbidity (NTU)</td><td>25</td></tr>
<tr><td>Total phosphorous (mg/L)</td><td>0.05</td></tr>
<tr><td>Total nitrogen (mg/L)</td><td>0.5</td></tr>
</table>
</td><td></td></tr>
</table>

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| | **GROUNDWATER (Cont'd)** | |
| Sydney Catchment Authority (23/09/08) | The Environmental Assessment needs to detail information regarding the following:<br>• Provide details of the practices proposed to ensure materials transported from site do not spill (as solid, liquid or dust);<br>• Provide details of an incident management plan that would be followed in the event of an incident (eg truck accident releasing fuel etc);<br>• Provide details of any proposed offsets like Riparian Improvement adjacent to Wingecarribee River. | 5.2.4<br>Not Yet Applicable<br>NA |
| | **ABORIGINAL HERITAGE** | |
| Department of Environment & Climate Change (03/10/08) | The assessment needs to address the following:<br>• The EA should address and document the information requirements set out in the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation involving a full heritage assessment and consultation with the Aboriginal community. | 5.10, Part 8 SCSC |
| | • The EA needs to clearly demonstrate that effective community consultation with Aboriginal communities has been undertaken in determining and assessing impacts, developing options and making final recommendations. | 5.10.2 |
| | • Identify the nature and extent of Aboriginal cultural heritage values across the site through comprehensive surveys. | 5.10.2 |
| | • Undertake an assessment of the Aboriginal sites identified within the project area. This must include consideration of both archaeological values and Aboriginal cultural heritage values and comply with the principles set out in the Burra Charter | 5.10 |
| | • Undertake archaeological excavations to verify the presence of Aboriginal sires in areas assessed as being of archaeological and/or cultural sensitivity. | NA |
| | • Report all new sites to the DECC to comply with s91 of the NPW Act using the DECC site card, and 3 copies (2 hard copy and 1 disc) of the final assessment report. | NA |
| Department of Environment & Climate Change (03/10/08) | Describe the measures that will be taken to avoid and/or mitigate impacts of the project on Aboriginal cultural heritage values. | 5.10.5 |
| | **CROWN LAND** | |
| Department of Lands (25/11/08) | The Department requests that all aspects of the development proposal be designed to have no impact towards the adjoining Crown reserve. | 5 |
| | **TRAFFIC** | |
| Wingecarribee Shire Council (26/09/05) | The upgrade to the intersection of Taylor's Avenue and Berrima Road should be limited to median installation and reprioritising the intersection to favour the Berrima Rd – Taylor Avenue path. Widening should be limited to that required to ensure accommodation of swept path for B-doubles. | NA, (5.1.5) |
| | The environmental assessment consider the possibilities of land owners collaborating to combine access point. | NA |
| | The environmental assessment to include a proper analysis of two key alternative scenarios, being transport of material by train to the existing brick yard and relocation of the brick works to the source of the material. | 7.3 |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| **VISUAL** | | |
| Wingecarribee Shire Council (26/09/05) | The environmental assessment must include a thorough visual assessment with mitigation measures considered. Buffer areas would need to be established, with plantings being in place and well established prior to any extraction commencing. | 5.6 |
| **WATERCOURSES AND RIPARIAN LANDS** | | |
| Department of Water and Energy (02/10/08) | The EA should identify any watercourses at the site, or in the vicinity of the site and their associated riparian corridors which may potentially be impacted by the proposal and address how the watercourses and riparian corridors at the site will be protected and enhanced. | 5.2 |
| | The riparian corridors should be protected and/or enhanced with native riparian vegetation. | NA |
| | The EA should provide on a scaled plan, details on the location of:<br>a. the watercourses at the site<br>b. top of bank<br>c. the riparian corridors, including the Core Riparian Zone (CRZ) and vegetated buffers<br>d. any Asset Protection Zones<br>e. the footprint of the proposed development and any other areas of disturbance<br>f. any proposed revegetation of the riparian corridors<br>g. land uses associated with the proposal which are proposed to be located adjacent to the riparian corridor (eg roads, basins and any other works adjacent to the riparian corridor) | 2.3<br>2.3<br>NA<br>NA<br>2.3<br>NA<br>2.3 |
| | The EA needs to provide details on any watercourses and riparian corridors that may be affected by the proposal and the rehabilitation of these watercourses to mimic natural systems and the rehabilitation of vegetated riparian corridors. | NA |
| Department of Lands (25/11/08) | The proposed extraction should have no adverse affect on the bed or bank of the Wingecarribee River and or the associated riparian lands and water quality within, both upstream and downstream of the site. | 5.2 |
| **ZONING** | | |
| Wingecarribee Shire Council (26/09/05) | Under the draft Wingecarribee Local Environmental Plan 2007, that has been placed on public exhibition, the subject land is proposed to be zoned E3 Environmental Management. In this zone extractive industries are not permissible. In this regard, the proposal is at odds with Council's stated strategic planning objectives for the area. | 3.3.3 |
| **ENVIRONMENTAL OFFSETTING** | | |
| Wingecarribee Shire Council (26/09/05) | Department of Natural Resources Riparian Corridor Management Study would be a significant offsetting opportunity. Furthermore, the augmentation of a vegetated corridor from this riparian area to the Crown land to the west of the proposed site would further enhance an offsetting opportunity and provide further community benefit. | NA |
| **PLANNING AND STATUTORY** | | |
| Department of Environment & Climate Change (03/10/08) | Proposed development requires an Environment Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO) if approval is granted. | 2.1.4 |

**Table A2-2 (Cont'd)**
**Requirements from Other Government Agencies from Relevant *Environmental Assessment* Sections**



| Government Authority | Paraphrased Requirement | Relevant EA Section |
|---|---|---|
| | **WETLANDS** | |
| Department of Water and Energy (02/10/08) | The EA should provide on a scaled plan, details on the location of:<br>a. any wetlands on the subject property<br>b. buffer setbacks around the wetlands<br>c. any Asset Protection Zones<br>d. the footprint of the proposed development and any other areas of disturbance | NA |
| | **WASTE AND CHEMICALS** | |
| Department of Water and Energy (02/10/08) | The goal of the project should be to ensure waste is managed:<br>• In accordance with the principles of the waste hierarchy and cleaner production; | 2.8 |
| | • The handling, processing and storage of all materials used at the premises does not have negative environmental or amenity impacts; | 2.4.3 |
| | • The beneficial reuse of all wastes generated at the premises are maximised where it is safe and practical to do so; and | 2.8 |
| | • No waste disposal occurs on site except in accordance with an EPL. | 2.8 |
| | The proposed waste management of this material should be assessed against the Protection of the Environment (Waste) Regulation. | 2.8 |

# Appendix 3

# November 2009 Newsletter and Feedback Form

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CHILDREN'S CANCER INSTITUTE AUSTRALIA

4 November 2009

Dear Sir or Madam

The Austral Brick Co Pty Ltd is the owner and operator of the Bowral Brick Plant, the company's sole dry press brick manufacturing plant in NSW. The principal raw material used in the manufacture of the dry pressed bricks at the plant is Ashfield shale. For over 80 years, Ashfield shale has been extracted adjacent to the Bowral Brick Plant however the remaining resources are limited and likely to be exhausted within the next 5 - 8 years.

In light of the impeding exhaustion of the Ashfield shale at the Bowral Brick Plant, we embarked on an exploration program throughout the Southern Highlands during 2005 to 2007 to identify a suitable replacement source of Ashfield shale. We recently acquired a 100ha property approximately 1.5km east of New Berrima that contains the necessary raw material. We are in the process of preparing an application to the NSW Department of Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* to develop an extraction operation on the property.

Community consultation is essential to the assessment process and Austral Bricks informed neighbours of the proposal and invited comments last August. However the proposal has changed as a result of consultation with government agencies and once again we invite you to comment on the proposal as described in the accompanying newsletter. A feedback form and reply paid envelope are provided for your convenience.

If you require further information about the proposal please do not hesitate to contact myself on 02 9830 7879 or Lisa Aspinall of RW Corkery and Company on 02 9985 8511.

Yours faithfully

pp Chris Bryant
Lisa Aspinall

# New Berrima Clay/Shale Quarry Newsletter 1 November 2009

This newsletter is intended to provide an update for the neighbours of the proposed New Berrima Clay/Shale Quarry.

## Project Status

In July of 2008, after considerable investigation of prospective sites, Austral Brick Company Pty Ltd requested the NSW Department of Planning to consider the proposed New Berrima Clay/Shale Quarry at Lot 1, DP 414246 for assessment under Part 3A of the *Environmental Planning and Assessment Act 1979*. The proposal involved the extraction of approximately 120 000t per annum (tpa) of structural clay from a total resource of 8 million tonnes, from an extraction area of approximately 26.7ha for a period of 65 years. In August 2008 an information letter was sent to residents and landowners in the immediate vicinity of the proposed quarry, inviting their questions and comments. In September 2008 a Planning Focus Meeting was conducted at which various government agencies provided comments, recommendations and requirements. As a result of this consultation process, the proposal has been amended to involve the extraction of up to approximately 150 000tpa from an extraction area of approximately 8ha for a period of 30 years.

## Need for the Project

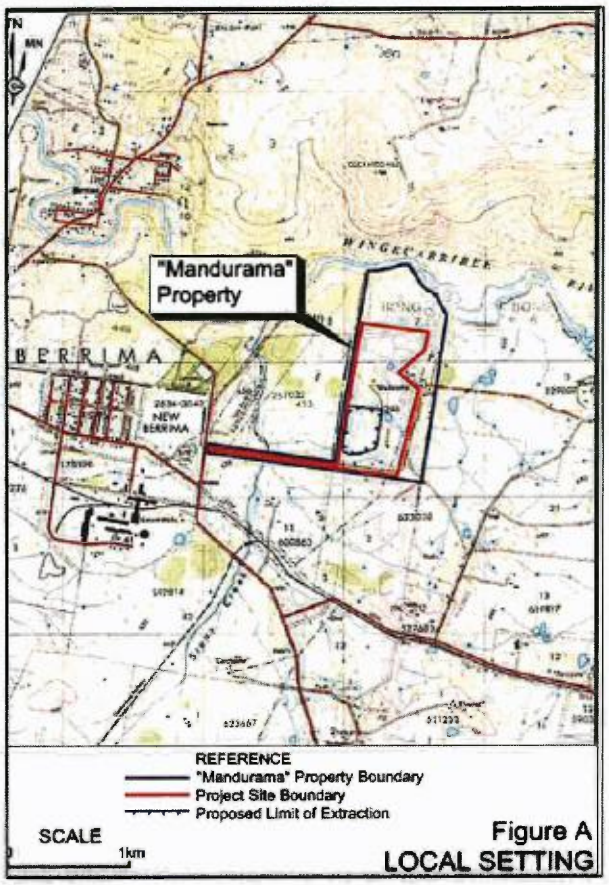
The Austral Brick Company Pty Ltd is the owner and operator of the Bowral Brick Plant, the Company's sole dry press brick manufacturing plant in NSW. The bricks produced at Bowral are in considerable demand and provide an important building material throughout NSW and beyond. The principal raw material used in the manufacture of the dry pressed bricks at the plant is Ashfield Shale, the material underlying many Sydney suburbs and which was first used to manufacture the billions of bricks manufactured throughout Sydney until 2003 when the Eastwood Brick Plant closed down. This was the last of over 20 dry-pressed brick plants to close since the early 1980's. The Ashfield Shale has been extracted from adjacent to the Bowral Brick Plant for over 80 years, however, the remaining resources are limited and likely to be exhausted within about 5 years. The clay/shale resource at New Berrima would provide a high quality supply of structural clay close to the brickworks. Preliminary assessments suggest that extraction of the resource from this location would be able to be achieved with minimal impact on the environment and community.

## The Project

### Extraction

The Project Site is located on the southern side of the Wingecarribee River with a narrow 0.9km long access to Berrima Road. Figure A shows the 8ha extraction area, within the 52ha project site, within the 100ha "Mandurama" property. Clay/shale extraction would be undertaken in either two or three campaigns each year with the topsoil stockpiled, the overburden/clay used to create amenity bunds, and the clay/shale ripped and pushed up into stockpiles. Clay/shale would be stockpiled within the footprint of the extraction

area for transportation to Bowral. Machinery in use would include a front end loader, a scraper, a bulldozer and a haul truck.




### Transportation

The clay/shale would be loaded into haul trucks and transported to the Bowral Brick Plant. The proposed transportation route is shown in **Figure B**. Up to approximately 2 500t of raw material would be transported each week. This would involve an average of 17 loads a day for 5 days a week. However Austral Bricks recognises that following periods of wet weather the transportation schedule may have to increase to up to seven days a week and/or up to 68 loads per day. This would allow the brick plant to quickly accumulate raw material which it had not been able to access during wet weather, thus enabling the brick plant to remain operational.

### Employment

Each extraction campaign would involve one machinery operator (full time) and a quarry manager (part time) for a period of 4 to 6 weeks, 2 to 3 times per year. Transportation will involve up to four contracted truck drivers. Overall, the extraction and transportation of the product clay/shale will employ approximately 4 fulltime equivalent positions.

### Working Hours

The proposed hours of operation are presented in **Table 1**.

**Table 1: Proposed Hours of Operation**

| Activity | Monday to Friday | Saturday | Sunday |
|---|---|---|---|
| Extraction Operations | 7:00am – 5:00pm | 7:00am – 2:00pm | nil |
| Product Clay/Shale Despatch | 7:00am – 4:00pm | 7.00am - 4.00pm if required due to special circumstances | 8.00am - 4.00pm if required due to special circumstances |
| Repairs & Maintenance | 6:00am – 6:00pm | 7:00am – 6:00pm | 8:00am – 6:00pm |

### Rehabilitation

The extraction area would be progressively rehabilitated. Quarry walls would be backfilled and revegetated as extraction benches are completed. The final landform would be an open basin sown with pasture for grazing. Quarry walls would be revegetated with native trees and shrubs.

## Environmental Assessment

The *Environmental Assessment* is being managed by Environmental Consultants, RW Corkery and Co., and has commenced with the investigations by Specialist Consultants in the areas of noise, traffic, air quality, flora, fauna, Aboriginal heritage, soils, and surface and groundwater. The assessment will also include potential impacts on visual amenity and socio-economic factors.

After assessment of adequacy by the Department of Planning, the *Environmental Assessment* will be on exhibition for comment. This is expected to occur early 2010.

## Mitigation Measures

An Environmental Management Plan would be developed to manage all environmental risks, including excessive noise, dust, spills, soil

erosion, water and land contamination, weeds and pests. Amenity bunds would be constructed on the northern, western and southern sides of the extraction area. These would serve to reduce visual amenity, noise and dust impacts on neighbours and the general community. Soil and erosion control methods would be employed to guard against soil loss and sedimentation of creeks and waterways. A Truck Driver Protocol would be developed to manage the disturbance and safety issues associated with the transportation of the clay/shale to Bowral.

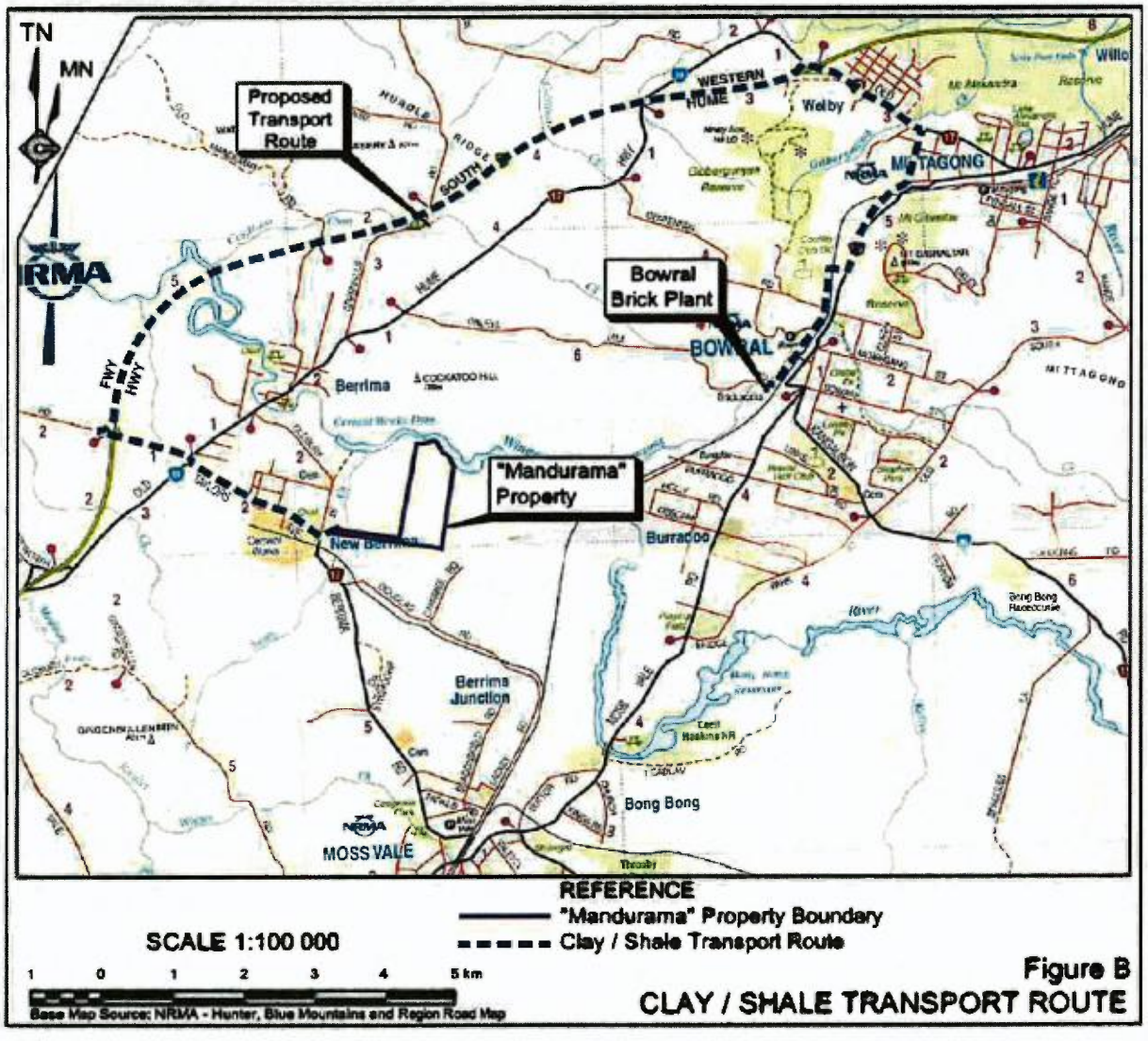



Figure B
CLAY / SHALE TRANSPORT ROUTE

## Further Information

A community feedback form is available for interested community members to provide their comments regarding this proposal. For further information the following may be contacted:

Mr Chris Bryant, The Austral Brick Company Pty Ltd, 02 9830 7879.

Ms Lisa Aspinall, RW Corkery & Co Pty Ltd, 02 9985 8511.

# AUSTRAL BRICK CO PTY LTD

## NEW BERRIMA
## PROPOSED CLAY/SHALE QUARRY

***COMMUNITY FEEDBACK FORM***

**Dear Landholder/Resident,**

**It would be greatly appreciated if you could take a moment to review the attached information and provide any feedback or comments using the reply paid envelope provided. Alternatively, please contact Lisa Aspinall of RW Corkery & Co Pty Ltd on 02 9985 8511.**

**Date:** _____

**1. Name:** _____ ☐ **Owner** ☐ **Tenant**

**2. Property Address:** _____ **Tel:** _____

_____ **Email:** _____

**2. Mailing Address:** _____

**3. How long have you lived at this address?** _____

**4. Your Land Use(s) / Activity(ies) on your land?:** _____

_____

_____

**5. Concerns/comments regarding proposed quarry operations:**

_____

_____

_____

_____

_____

_____

**5. Comments regarding the proposed road transportation:**

**7. Are you prepared to allow monitoring of noise, dust, surface water and/or groundwater on your property should it be recommended by independent experts:**

☐ Yes ☐ No ☐ More information required

**8. Are you interested in receiving:**

| | | |
|---|---|---|
| An electronic copy of the Environmental Assessment (CD) | ☐ Yes | ☐ No |
| Ongoing information about the Project | ☐ Yes | ☐ No |

**9. Other comments / concerns:**

PLEASE RETURN IN THE ATTACHED REPLY-PAID ENVELOPE