THE AUSTRAL BRICK COMPANY PTY LIMITED

ABN: 52 000 005 550

Environmental Assessment to Support a Section 75W Modification of PA08_0212

for the

New Berrima Clay/Shale Quarry

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

May 2015

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EXECUTIVE SUMMARY

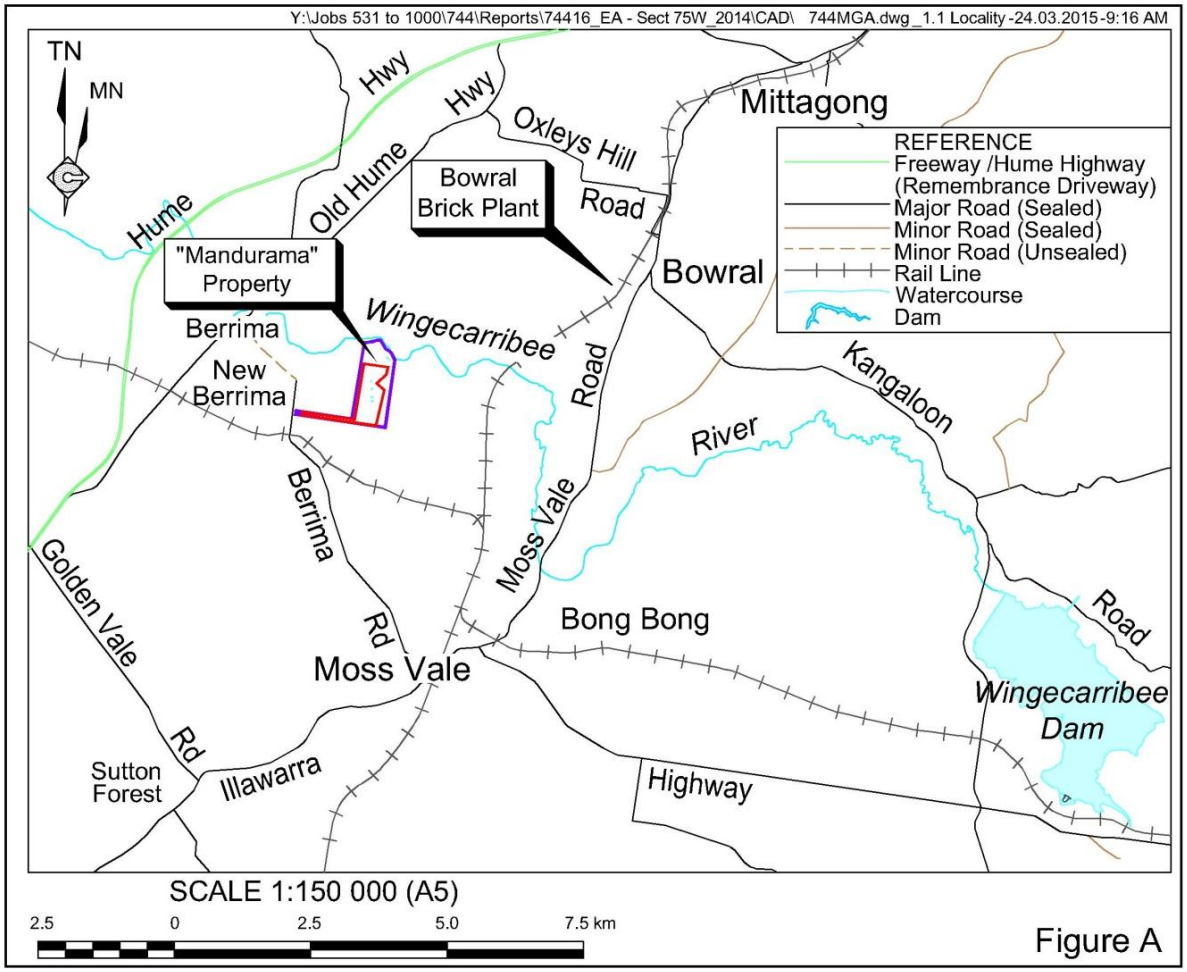
Introduction

This Environmental Assessment has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of The Austral Brick Company Pty Limited (the Proponent) to support an application to modify Project Approval PA08_0212 (the "Proposed Modification").

The New Berrima Clay/Shale Quarry (the "Project") was granted Project Approval PA08_0212 under delegation from the Minister for Planning and Infrastructure on 6 July 2012 with all extraction operations to occur within the "Mandurama' property that is owned by the Proponent (see **Figure A**). No construction or extraction operations have been undertaken within the Project Site since PA08_0212 was granted.

The application area for the purposes of the Proposed Modification has not changed from that approved within PA08_0212 but incorporates a modification to the approved extraction area boundary based upon a detailed drilling program undertaken in 2014 (i.e. post PA08_0212 approval) in which a higher quality clay/shale resource has been defined.

The Project is an 'approved project' under the (now repealed) Part 3A of the *Environmental Planning & Assessment Act 1979*. As a result, the Project is a 'transitional Part 3A Project' in accordance with Clause 2(1)(a) of Schedule 6A of the Act and Part 3A of the Act, as in force immediately before the repeal of that Part, continues to apply to the Project. This modification application is accordingly made under Section 75W of the EP&A Act.



This summary outlines the Proponent, provides relevant background to the Proposed Modification and presents an overview of the Proposed Modification's design, operational safeguards and predicted Project-related impacts on the surrounding environment.

The Proponent

The Proponent, The Austral Brick Company Pty Ltd, 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 Australia wide, including the Bowral Brick Plant, located 6km northwest of the Project Site.

Proposal Objectives and Description

The Proponent's objectives in modifying PA08_2012 are as follows:

i) secure access to high quality clay/shale resources.

ii) maintain the level of production at an average of approximately 120 000 tonnes per annum.

iii) design the modified extraction area and undertake activities in a manner that limits the potential for direct line of sight from surrounding residences;

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

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

vi) maximise the recovery of the natural resource.

This Proposed Modification would include the following components or activities, as shown in **Figure B.**

- Relocate the extraction area to a location within the clay/shale resource boundary providing access to higher quality materials than the approved extraction area.
- Construct appropriately located visibility barriers (constructed progressively).
- Relocate and replace surface water management / sedimentation dams and related-water diversion structures.

Consultation

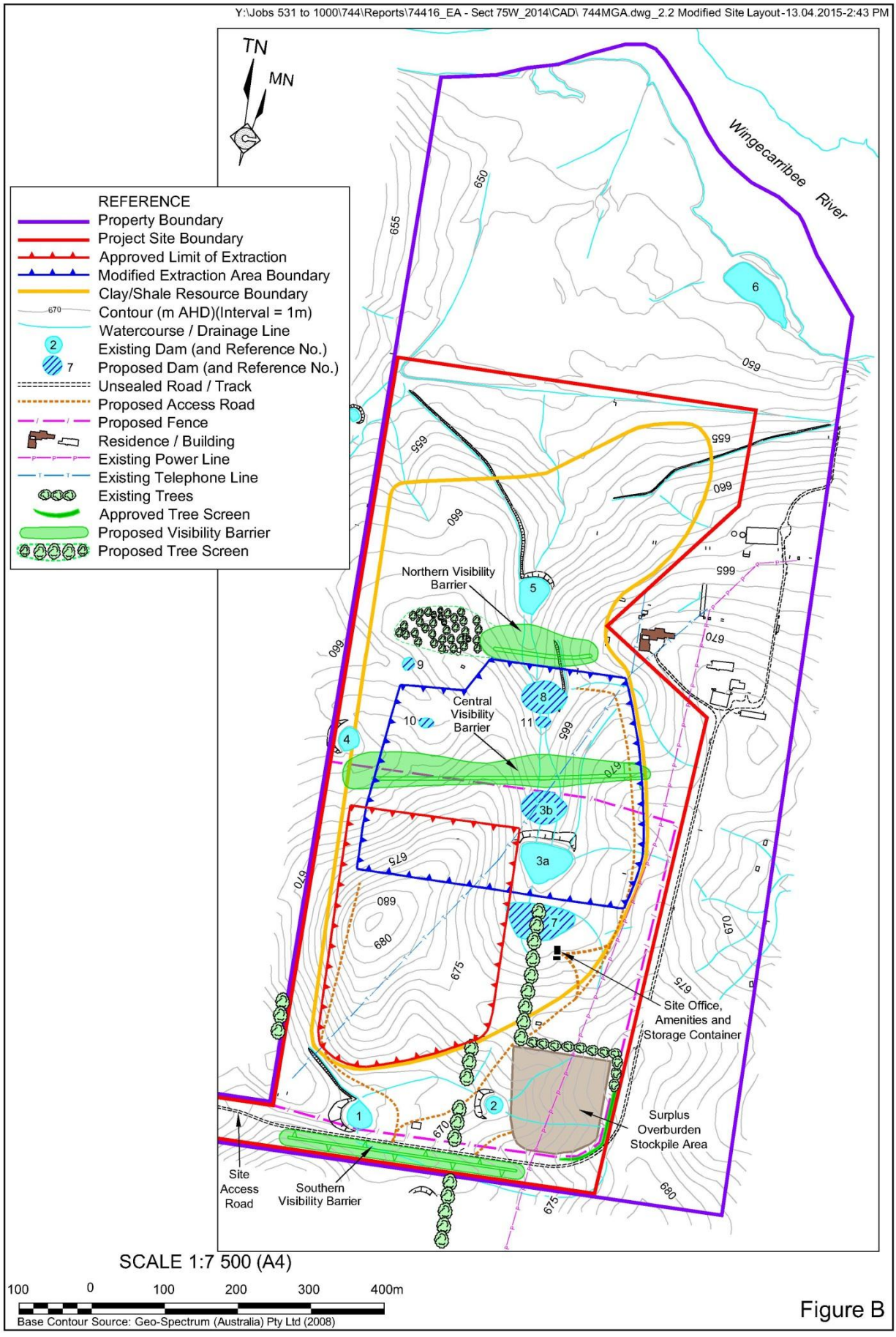
The Proponent and its consultants consulted with relevant government agencies and authorities during the planning phase of the Proposed Modification.

Environmental Safeguards and Impacts

The following presents an overview of the range of additional residual impacts on the biophysical environment should the Proposed Modification proceed.

Visual Amenity

The Proposed Modification has the potential for occupants of residences located to the north of the Project Site to view certain activities during the initial construction and operational stages. However, the design of the modified extraction area and the construction of visibility barriers both initially and throughout the life of the Quarry has been shown to significantly reduce the potential for the Project to impact upon visual amenity issues for the identified residences.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TN
MN
REFERENCE
Property Boundary
Project Site Boundary
Approved Limit of Extraction
Modified Extraction Area Boundary
Clay/Shale Resource Boundary
Contour (m AHD)(Interval = 1m)
Watercourse / Drainage Line
Existing Dam (and Reference No.)
Proposed Dam (and Reference No.)
Unsealed Road / Track
Proposed Access Road
Proposed Fence
Residence / Building
Existing Power Line
Existing Telephone Line
Existing Trees
Approved Tree Screen
Proposed Visibility Barrier
Proposed Tree Screen
Wingecarribee River
Northern Visibility Barrier
Central Visibility Barrier
Site Office, Amenities and Storage Container
Surplus Overburden Stockpile Area
Site Access Road
Southern Visibility Barrier
SCALE 1:7 500 (A4)
100 0 100 200 300 400m
Base Contour Source: Geo-Spectrum (Australia) Pty Ltd (2008)

Figure B

The proposed construction of the visibility barriers and establishment of vegetation similar to surrounding areas has demonstrated that the Proposal would have an overall negligible effect on the local visual amenity.

Noise

Revised noise modelling by Spectrum (2015) identified that noise levels arising from the Proposed Modification would remain below the relevant noise criterion at all times, with the exception of a potential 2dB(A) exceedance at Residence R2 under a northeast wind scenario during construction of the Southern and Central Visibility Barrier.

Noise levels have been calculated to remain below the relevant noise criterion at all times under certain meteorological conditions, with minor increases in noise levels of between 1dB(A) or 2dB(A) at a limited number of residences, with residences located towards the south noting an overall decrease in noise levels as a result of the Proposed Modification.

Air Quality

A qualitative air quality assessment undertaken by SLR Consulting (2015), based upon the original air quality assessment undertaken in 2010, identified that air quality levels as a result of the Proposed Modification would not result in an increase in deposited dust and particulate matter levels during construction and operational phases.

Surface Water

The Proposed Modification would not result in adverse impacts on the surface water environment within and surrounding the Project Site, with all water required for the Project to be sourced from on-site dams under the property's maximum harvestable right capacity.

Flora and Fauna

The Proposed Modification would not have a significant impact on any NSW *Threatened Species Conservation Act 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* listed species, population or community.

Others

Further to the above, the residual impacts associated with soil and land capability, groundwater, Aboriginal and European heritage, bushfire and traffic and transportation would be negligible and effectively not change from those outlined in the 2010 *Environmental Assessment*.

Project Evaluation and Justification

The Proposed Modification has been evaluated and justified principally through consideration of its potential impacts on the environment and potential benefits to the local and wider community.

Through a consideration of the principles of ecologically sustainable development, the evaluation has found that, with the implementation of the proposed operational controls, safeguards and/or mitigation measures, the Proposal would be undertaken with an acceptable risk.

Further, the design of the Proposed Modification has addressed each of the sustainable development principles, and on balance, it is concluded that the Proposed Modification achieves a sustainable outcome for the local and wider environment.

Conclusion

The Proposed Modification has been designed to address the potential issues identified by the Proponent, raised by the government agencies and against the principles of ecologically sustainable development.

The Proposed Modification would provide for, as a result of detailed geological testing, high quality materials to be extracted from the modified extraction area and provide the Bowral brick manufacturing plant with sufficient, locally-sourced resources to continue to make varied brick products and continue in generating ongoing employment opportunities and maintaining stimulus to the local economies.

In light of the above conclusions included throughout this *Environmental Assessment*, it is assessed that the Proposed Modification could be constructed and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

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1. INTRODUCTION

1.1 SCOPE

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited (RWC) on behalf of The Austral Brick Company Pty Limited (the Proponent) to support an application to modify Project Approval PA08_0212 (the "Proposed Modification").

The New Berrima Clay/Shale Quarry (the "Project") was granted Project Approval PA08_0212 under delegation from the Minister for Planning and Infrastructure on 6 July 2012 to extract clay/shale from a resource within the "Mandurama" property (Lot 1, DP414246) near New Berrima for transportation and use principally at the Proponent's Bowral Brick Plant.

Figure 1.1 presents the location of the "Mandurama" property, located 1.5km east of New Berrima and 1.5km northeast of the Berrima Cement Works which wholly encompasses the Project Site, including the extraction area, site access road and all other ancillary components, referred to collectively as the "Project Site". This document focuses on the relocation of the extraction area (the "modified extraction area") and a section of the internal access road.

The Proposed Modification would enable the Proponent to commence extraction of raw materials suitable for brick manufacture and limit the proportion of non-brick making material to be extracted within the extraction area. As a result the relocation of the extraction area, minor amendments would occur to the Project Site layout, which are outlined in Section 2.

This application to modify PA08_0212 is being made under Section 75W of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). As the Project is considered a "transitional Part 3A Project", as defined in Schedule 6A of the EP&A Act, Section 75W applies to the Project, despite the wider repeal of Part 3A of the EP&A Act.

The information contained in this document relates only to those components of the approved Project that would be the subject of the Proposed Modification. Aspects of the Project that would not be modified would continue to be undertaken in accordance with the following.

- Project approval PA08_0212 and its associated conditions and appendices.
- The *Environmental Assessment* dated December 2010 (RWC, 2010).

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, which is the Proponent's parent company is a publicly listed company 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.

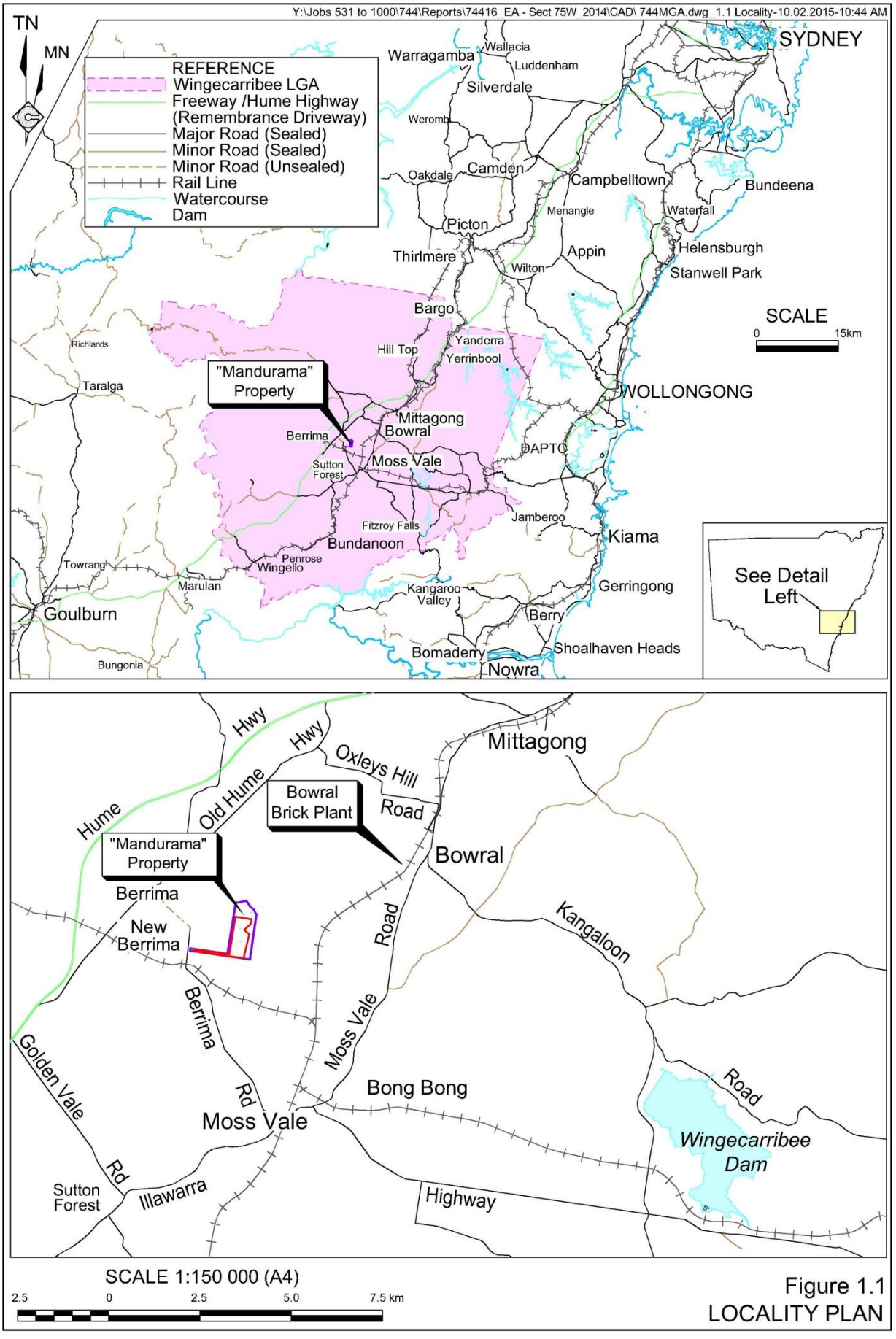

Figure 1.1
LOCALITY PLAN

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

1.3 DOCUMENT FORMAT

This *Environmental Assessment* has been compiled in a single volume and includes five sections of text and a set of Appendices as follows.

Section 1: Introduces the Proposed Modification, the scope of this document and the Proponent and provides relevant background information. An overview of the key approved components within the Project Site is also provided.

Section 2: Describes the Proposed Modification in sufficient detail to enable the application for modification of a Project Approval to be assessed and determined.

Section 3: Describes the consultation undertaken by the Proponent with the relevant stakeholders and outlines the planning issues related to the Proposed Modification.

Section 4: Describes and evaluates the anticipated or predicted impacts associated with the Proposed Modification.

Section 5: This section concludes with an evaluation of the Proposed Modification focusing on the changes that have been proposed.

References: Lists the various source documents referred to for information and data used during the preparation of the *Environmental Assessment*.

Appendices: Present the following additional information.

- **Appendix 1** – Application to Modify PA08_0212.
- **Appendix 2** – Government Agency Consultation and Assessment Requirements.
- **Appendix 3** – 2014 Geological Drilling Summary.
- **Appendix 4** – Acoustic Assessment.
- **Appendix 5** – Air Quality Assessment.
- **Appendix 6** – Surface Water Assessment.

1.4 BACKGROUND TO THE PROPOSED MODIFICATION

1.4.1 Introduction

The following subsections provide an overview of:

- the project approval, licences and leases required by the Proponent;
- the recent drilling activities that have resulted in this Proposed Modification being submitted; and
- the key components of the currently approved project.

1.4.2 Approvals, Licences and Leases

Table 1.1 presents the details of the project approval, licences and leases held or required to be held by the Proponent in relation to the New Berrima Clay/Shale Quarry.

Table 1.1
New Berrima Quarry Approvals and Licences

Issuing / Responsible Authority	Consent/ Approval Number	Date of Issue	Expiry	Comments
Project Approval – NSW EP&A Act				
Department of Planning and Environment (under delegation)	PA08_0212	6 July 2012	6 July 2042	Not yet commenced operations.
Environment Protection Licence				
Environment Protection Authority (EPA)	Not Yet Sought	-	-	An application for an EPL will be lodged following the receipt of the Proposed Modification approval and the completion of the relevant management plans.
Mineral Authorities				
Minister for Resources and Energy	Austral is currently in discussion with DRE regarding the need for a Mineral Owners Mining Lease.			

It is recognised that although PA08_0212 was granted approval in 2012, work has not yet commenced at the New Berrima Quarry. A range of draft Management Plans are close to completion and it is envisaged that these plans would be updated and finalised following PA08_0212 being modified to reflect the modified Project. These management plans, as listed in PA08_0212 comprise the following.

- *Noise Management Plan.*
- *Air Quality Management Plan.*
- *Water Management Plan.*
- *Transport Management Plan.*
- *Aboriginal Heritage Management Plan.*
- *Landscape Management Plan.*

1.4.3 Updated Resource Assessment

As a result of additional geological and resource drilling activities undertaken throughout 2014 to accurately define the internal extraction stages, the Proponent established that the geological data relied upon for the 2010 *Environmental Assessment* (RWC, 2010) was inaccurate / incomplete. As a result of this observation, further drilling was undertaken in 2014 within the Clay/Shale Resource Boundary on the "Mandurama" property to more accurately define the resources suited for initial extraction, resulting in the Proposed Modification seeking to slightly amend the location of the approved extraction area to provide access to higher quality material with less overburden encountered in the first 10 years of operation.

Details of the updated resource assessment are presented in Section 2.3.

1.4.4 Approved Activities

The approved Project is fully described in the *Environmental Assessment* that accompanied the original application for Project Approval (RWC, 2010), however, for completeness, the approved activities within the Project Site include the following as outlined on **Figure 1.2**.

- A site access road from Berrima Road to the extraction area, a distance of approximately 800m.
- An extraction area covering approximately 7.7ha to extract raw clay/shale materials.
- A water storage facility in the active extraction area to store surface water inflows to the extraction area.
- Re-development of two existing farm 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 visibility barriers which would minimise visual, noise and dust impacts, namely the combined Northern and Western Visibility Barriers and Southern Visibility Barrier. These barriers were intended to incorporate a proportion of the overburden recovered from the extraction area.
- 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.

It is noted that there are no modifications proposed to the transportation of the raw materials from the Project Site to the Bowral Brick Plant.

1.4.5 Status of the Project

The Project has not yet commenced any activities and furthermore has been put "on hold" as a result of the outcomes from the 2014 drilling program. The Proponent was well advanced with the preparation of the required management plans for the Project and completion of these plans has been set aside until a Proposed Modification approval is issued.

1.5 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 document has been assembled by Mr Chris Dickson (B.SC Phys Geog), an Environmental Consultant with the same company. Mr Corkery, undertook a review of the entire document.

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

The following Specialist Consultants were commissioned by the Proponent to prepare letter reports assessing the Proposed Modification and are included as appendices within this document.

- Surface Water Assessment: Strategic Environmental and Engineering Consulting (SEEC).
  Mr Mark Passfield (B.Sc (Eng. Geol) (Hons.) CPESC).
- Air Quality Assessment: SLR Consulting.
  Ms Kirsten Lawrence (BE (Hons)).
- Noise Assessment: Spectrum Acoustics.
  Dr Neil Pennington (PhD, B.Sc. (Physics), B.Math (Hons)).

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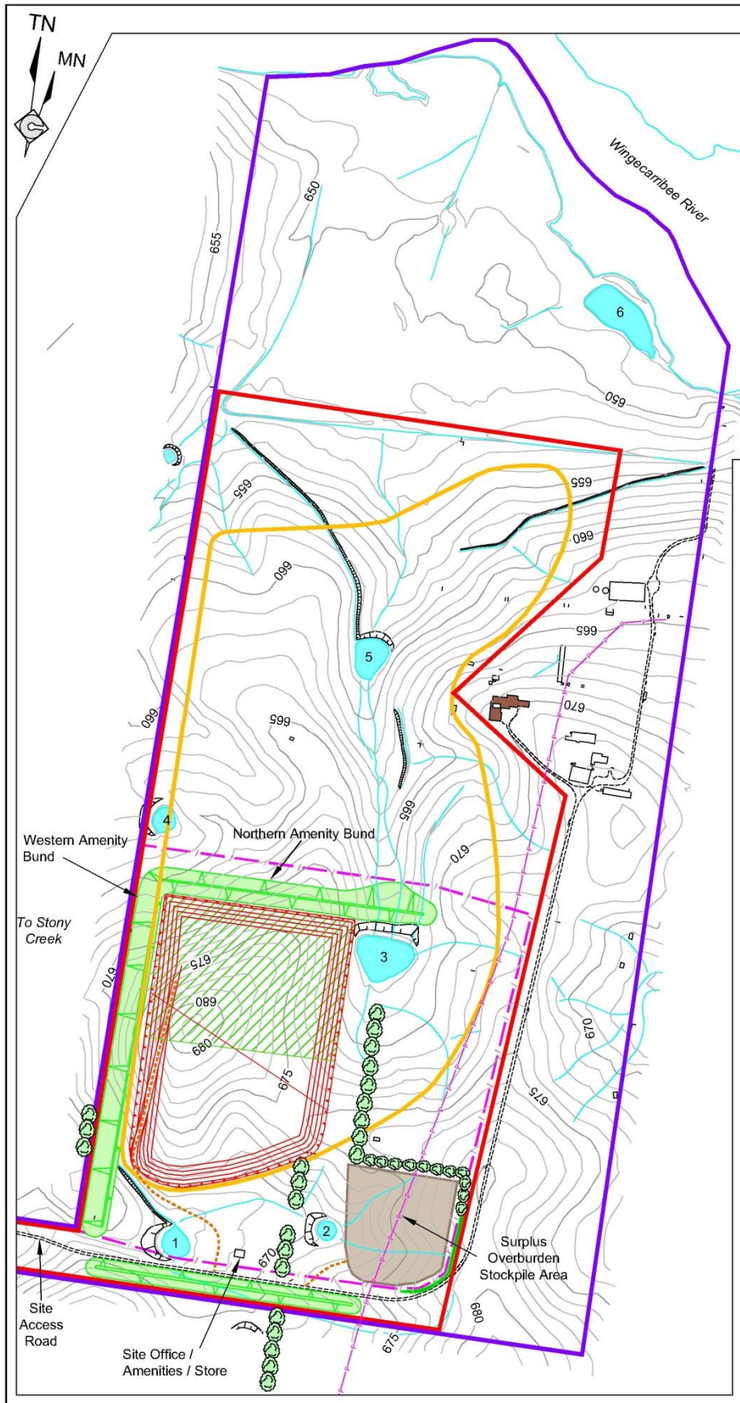

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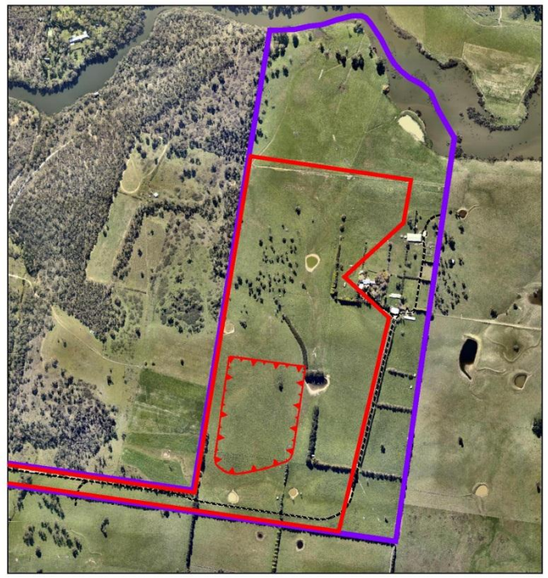
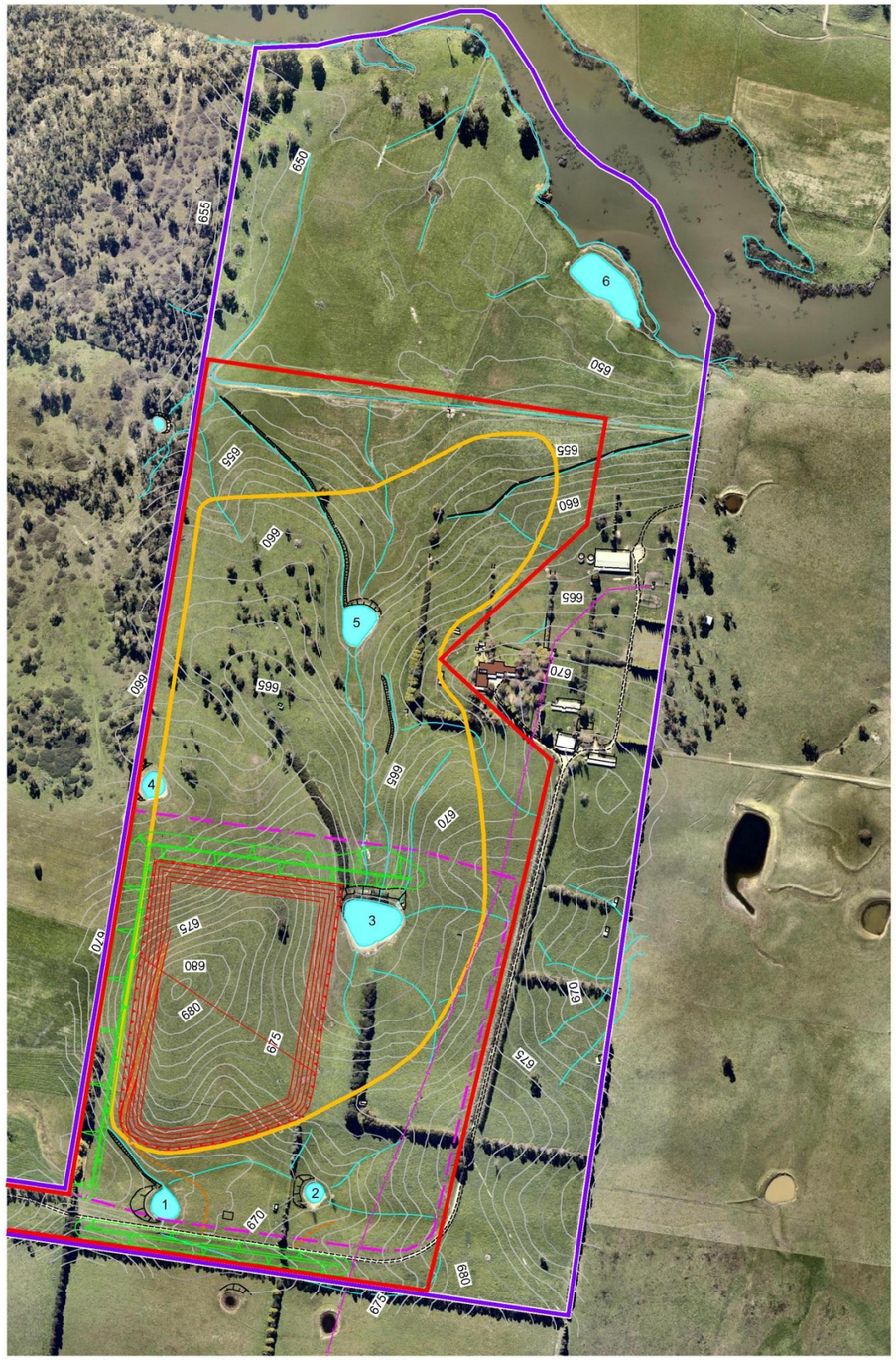
Base Contour Source: Geo-Spectrum (Australia) Pty Ltd (2008)



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



Base Photograph Source: Nearmap - Date of Photography: 22 May 2014

Figure 1.2
APPROVED SITE LAYOUT

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2. PROJECT DESCRIPTION

The information provided in this section focusses upon the proposed changes to the Project components of the Modified New Berrima Clay/Shale Quarry that collectively constitute the Proposed Modification. The Project components that would not change are not repeated. Rather, reliance is placed upon cross-referencing to the description of those components in the 2010 *Environmental Assessment* (RWC, 2010).

All figures within this section have been updated (where and if necessary) from those originally included within RWC (2010).

2.1 INTRODUCTION

This section of the document describes the following components of the proposed modified New Berrima Clay/Shale Quarry.

- An outline of the Project, approvals required and modifications required to Project Approval.
- The geological setting and resource.
- The design of the extraction area and proposed on-site operations.
- The proposed rehabilitation and final landform.

The proposed modified quarry design, operation and rehabilitation procedures described within this section reflect all geological and environmental constraints identified and recommendations provided 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 Proponent's application to modify PA08_0212.

2.2 OUTLINE OF THE PROJECT

2.2.1 Objectives

The Proponent's principal objectives for the Proposed Modification and the methods to achieve the objectives remain the same as those provided in RWC (2010).

2.2.2 The Project Site

The area which is the subject of the application for the Proposed Modification approval ("the Project Site") is the same as that nominated in the approved Project. 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 covers an area of 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.

The entire Project Site has previously been disturbed, principally for grazing, and is covered with pasture, comprising predominantly introduced pasture species and weeds. Five small farm dams are situated within the Project Site with one additional farm dam located on the property further north of the Project Site.

2.2.3 Overview of the Modified Project

This overview of the modified Project presents the components of the approved Project that would be modified and those that would not be modified. The following components (as outlined on **Figure 2.2**) would be modified.

- The extraction area would be relocated to an area within the clay/shale resource boundary but marginally to the north and northeast of the approved extraction area, thereby providing access to higher quality materials than the approved extraction area.
- The required visibility barriers would be constructed in areas required to effectively screen the activities within the relocated extraction area.
- The required surface water management / sedimentation dams and related-water diversion structures would be constructed in areas within and surrounding the relocated extraction area.

The following components would not change as a result of the Proposed Modification.

- Maximum extraction rate – 150 000tpa (*Condition 2(7)*).
- Hours of Operation (*Condition 3(6)*).

Day	Transport	Quarrying Operations
Monday – Friday	7:00am to 4:00pm	7:00am to 5:00pm
Saturday	8:00am to 1:00pm	8:00am to 1:00pm
Sundays and Public Holidays	None	None
Note: Maintenance activities may occur at any time provided they are inaudible at privately-owned residences		

- Transportation Rates – maximum of 150 000 tonnes of materials from the Project Site in any calendar year, 68 laden trucks from the Project Site in a day and 8 laden trucks from the Project Site in an hour (*Condition 2(8)*).
- Transportation Route (Figure 2.5 – RWC (2010)) (*Condition 2(9)*).

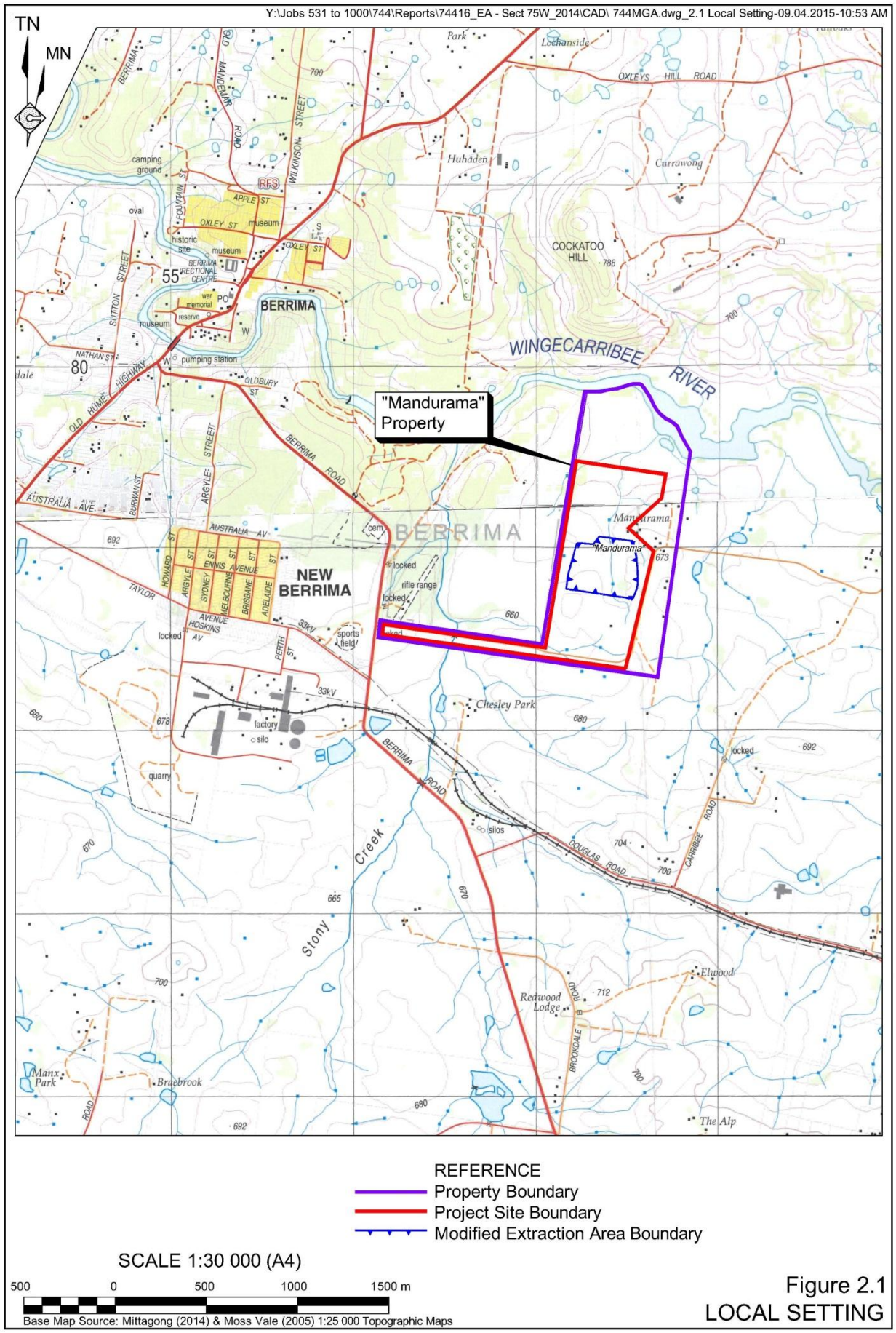

Figure 2.1
LOCAL SETTING

Further to the above, the following components of the Project design would also remain unchanged, with their approved, unchanged locations shown on **Figure 2.2**.

- Property Boundary, Project Site Boundary and Clay/Shale Resource Boundary.
- Site Access Road (from the Project Site boundary to the deviation to the modified extraction area).
- Surplus overburden stockpile area to be used initially as the storage area for surplus overburden and product clay/shale and topsoil in the longer term.
- Southern visibility barrier.

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 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.

2.2.4 Modifications Required

The Proponent anticipates that the modifications of the definitions outlined in **Table 2.1** and conditions outlined in **Table 2.2** would be required from those included in PA08_0212. The proposed additions are underlined and the proposed deletions are presented as ~~strikeouts~~. Text included in square brackets is for information only and is not proposed to be included in the Proposed Modification.

Table 2.1
Definitions to be Modified

Definition	
EA	• Environmental assessment of the project titled Environmental Assessment for the New Berrima Clay/Shale Quarry Project, Specialist Consultant Studies Compendium, dated December 2010, Response to Submissions for the New Berrima Clay/Shale Quarry, dated April 2011, and Response to the Submission from the Sydney Catchment Authority for the New Berrima Clay/Shale Quarry, dated May 2011, prepared by R. W. Corkery and Co Pty Limited; and • Environmental Assessment titled Environmental Assessment to Support a S75W Modification of PA08_0212, dated April 2015, prepared by R.W. Corkery and Co Pty Limited.
Department	Department of Planning and Environment.
~~Director-General~~ Secretary	Secretary of the Department of Planning and Environment
Minister	Minister for Planning, or delegate.

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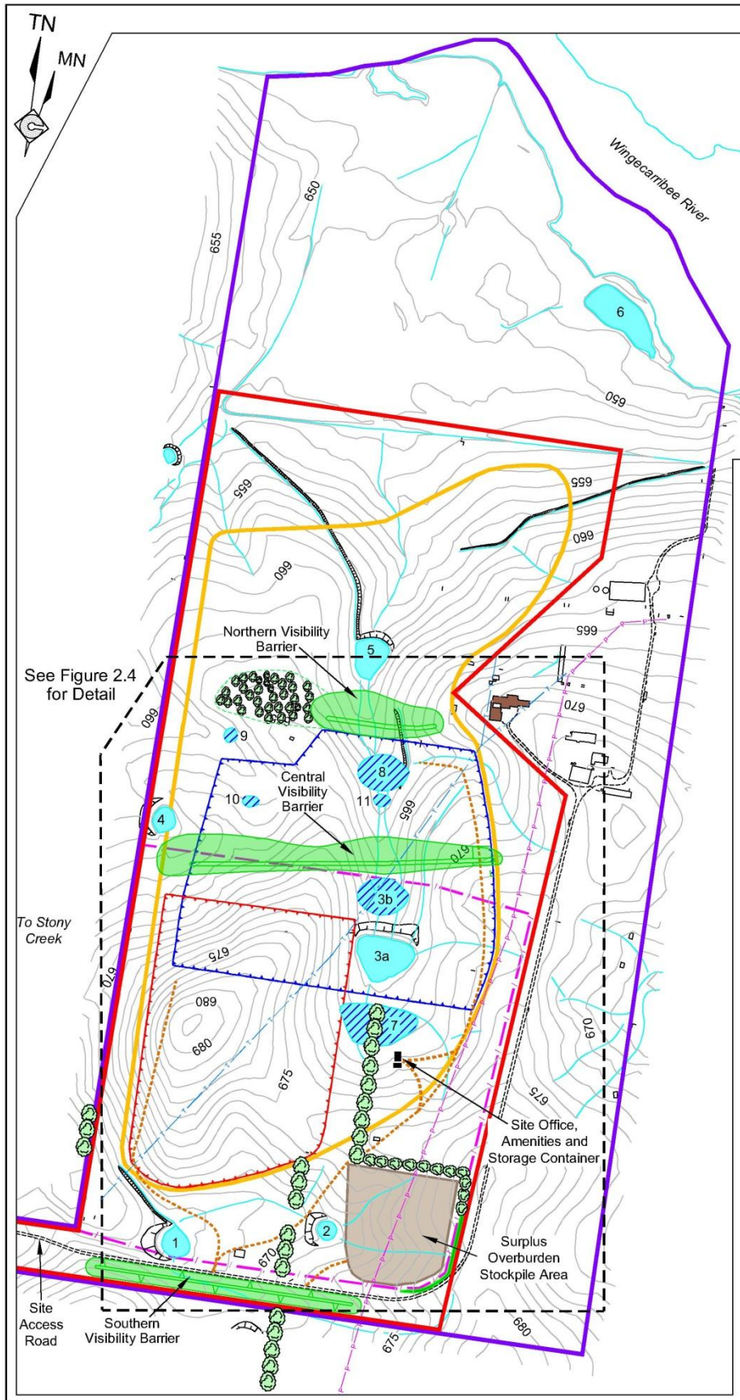

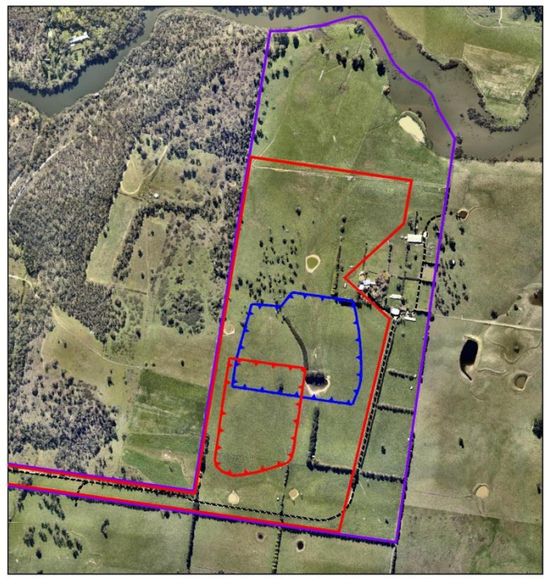

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- Modified Extraction Area Boundary
- Clay/Shale Resource Boundary
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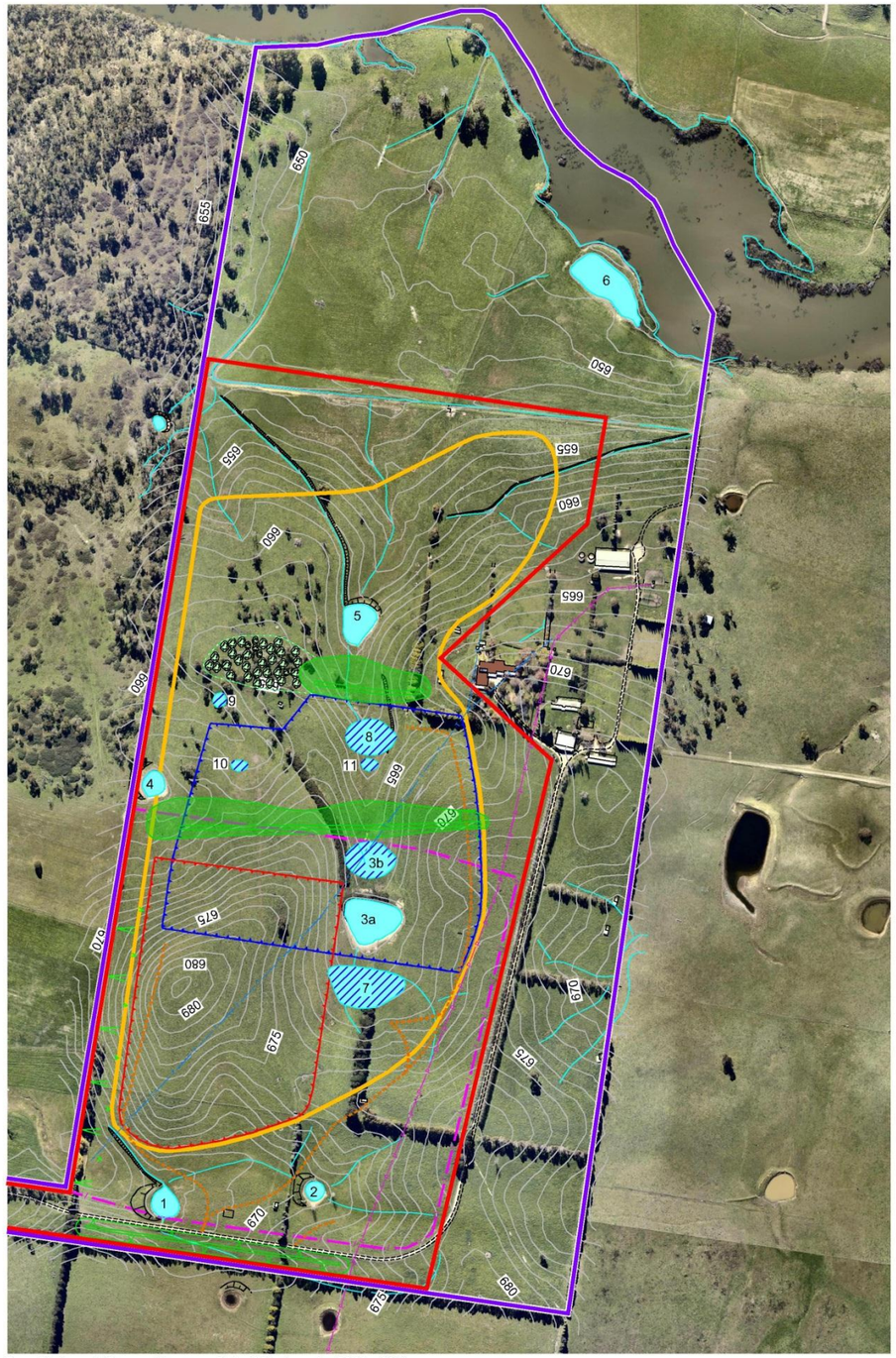
- Watercourse / Drainage Line
- Existing Dam (and Reference No.)
- Proposed Dam (and Reference No.)
- Unsealed Road / Track
- Proposed Access Road
- Proposed Fence
- Residence / Building
- Existing Power Line
- Existing Telephone Line
- Existing Trees
- Approved Tree Screen
- Proposed Visibility Barrier
- Proposed Tree Screen



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Base Contour Source: Geo-Spectrum (Australia) Pty Ltd (2008)

Base Photograph Source: Nearmap - Date of Photography: 22 May 2014

Figure 2.2
MODIFIED SITE LAYOUT

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Table 2.2
Conditions to be Modified

Condition	Proposed Modification
2(5)	The Proponent may carry out quarrying operations on the site until ~~31 March 2042~~ 30 June 2045. [Due to the non-commencement of activities following PA08_0212 being issued in March 2012, it is envisaged that work would begin following the modification of PA08_0212, effectively starting the 30 year consent from 30 June 2015].
2(6)	The Proponent shall not carry out any development in the extraction area below a level of ~~645~~ 640m AHD. [To extract the same volumes of product clay/shale as identified within the approved Extraction Area whilst minimising the requirement for a larger footprint than that required, it is proposed that extraction activities extend to an additional 5m, equalling a depth of 640m AHD]
3(13)	Riparian Buffer Distance - The Proponent shall maintain a minimum buffer distance of ~~730m~~ 515m (measured from the top of bank) between the modified extraction area and Wingecarribee River.
3(22)	~~Upon receiving a written request from the owner of existing residences 16 and 17 (see Figure 4 of APPENDIX A for residence location) the Proponent shall implement additional visual impact mitigation measures (such as landscaping treatments or vegetative screens) to reduce the visibility of these operations from the residence on the property.~~ ~~These mitigation measures must be reasonable and feasible, and they must be implemented as soon as practicable following the landowner's request.~~ ~~If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.~~ [It is envisaged that the proposed mitigation measures would not require this condition]
Appendix A	Various figures to be updated to reflect the changes to the extraction area.

2.2.5 Approvals Required

The Proposed Modification requires a modification to project approval PA08_0212 under Schedule 6A of the *Environmental Planning and Assessment Act 1979* as the Project Modification is considered a "transitional Part 3A Project", despite the wider repeal of Part 3A of the EP&A Act. As such, the Minister for Planning is the approval authority.

The following licences and approvals, additional to those encompassed by the project approval process, remain to be acquired following the issue of the Proposed Modification approval to allow the commencement of the project.

Environment Protection Licence (EPL) – Environment Protection Authority (EPA)

The application for an Environment Protection Licence is required under Section 47 of the *Protection of the Environment Operations Act 1997* and would reflect the Proposed Modification as outlined in this section.

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 Berrima Road and the site access road and Taylor Avenue.

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 continue to liaise with the Division of Resources and Energy on this matter to determine if it is required to lodge a Section 8 Notice of Intent to satisfy the provisions of Section 8 of the *Mining Act 1992*.

Further to the above, it is noted that the Proponent would rely upon a total of 11 dams throughout the life of the Project, all of which would be located on first or second order streams with no permanent flow. As such, the Proponent would not require a licence from NSW Office of Water for extraction of water from the dams, as these dams would comply with the Farm Dams Harvestable Rights Policy.

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.

2.3 GEOLOGY AND RESOURCES

2.3.1 Introduction

The following subsections provide an overview of the local geological setting, a summary of the 2014 drilling program that resulted in the requirement to modify PA08_0212, as well as a summary of the geological drilling results and revised estimates of the identified resource within the Project Site.

2.3.2 Geology

The Project Site is located close to the southwestern margin of the Sydney Basin where one of the main outcropping geological units is the Wianamatta Group with the Ashfield Shale overlying the widespread Hawkesbury Sandstone. The Ashfield Shale is the targeted resource suited to the production of dry pressed bricks at the Bowral Brick Plant.

2.3.3 Drilling Investigations

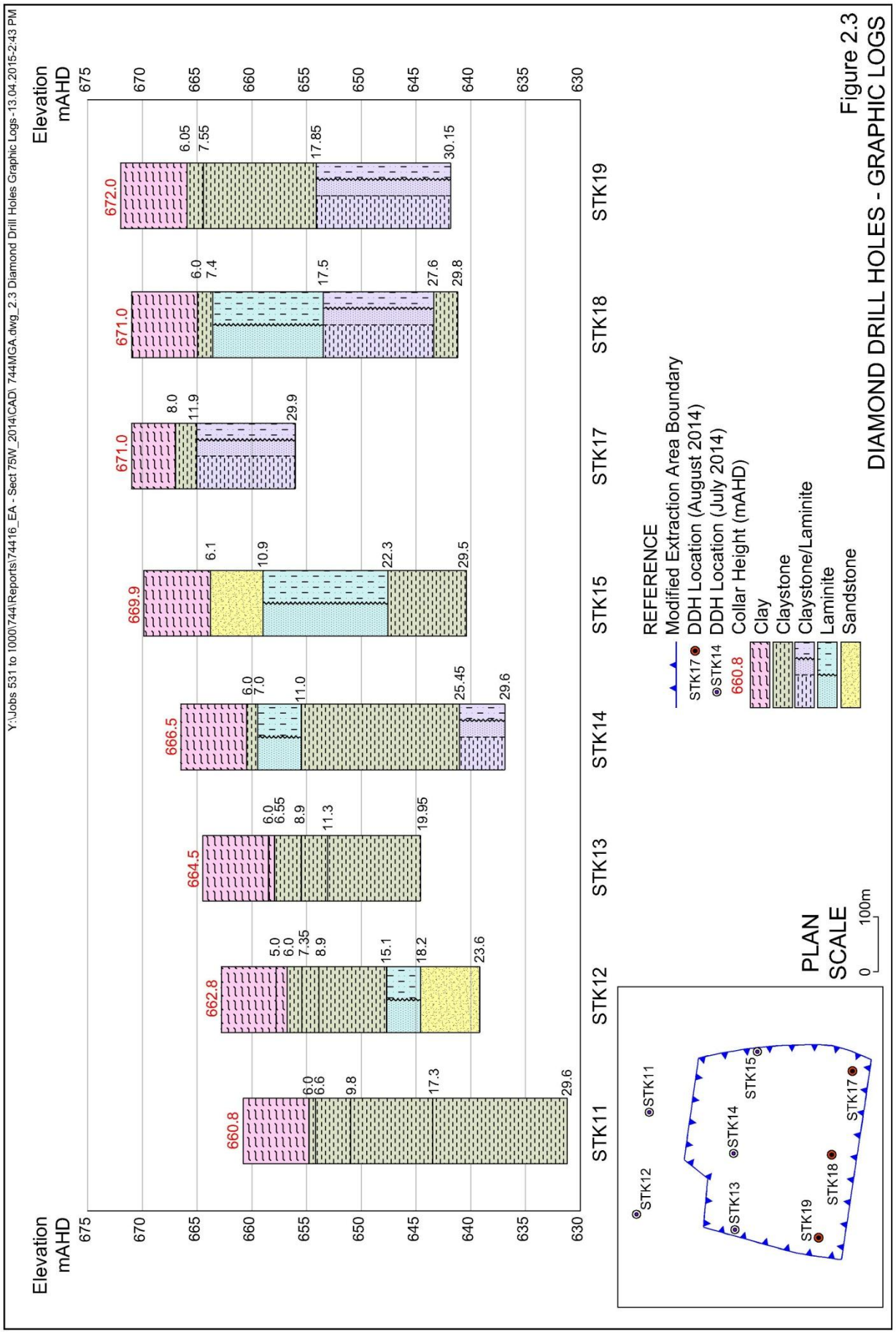
Geological investigations undertaken in 2014 assisted to more accurately define the boundary of the modified extraction area and the individual extraction stages within the clay/shale resource area. A total of eight diamond drill holes were drilled within or adjacent to the modified extraction area boundary.

Figure 2.3 shows the locations and graphic logs of the eight diamond drill holes and **Appendix 3** provides a brief description of the rock types encountered within each hole.

A typical profile through the modified extraction area comprises approximately 4m to 6m of clay, 2m to 3m of weathered claystone and between 15m and 30m of claystone that grades laterally to a laminite with occasional sandstone interbeds.

2.3.4 Resources

The 2014 drilling program has defined a resource of approximately 3.9 million tonnes of Ashfield Shale suitable for the extraction of product clay/shale for brick manufacture.


Y:\Jobs 531 to 1000\744\Reports\744 16_EA - Sect 75W_2014\CAD\ 744MGA.dwg_2.3 Diamond Drill Holes Graphic Logs - 13.04.2015 2:43 PM
Elevation mAHD
675
670
665
660
655
650
645
640
635
630
STK11
STK12
STK13
STK14
STK15
STK17
STK18
STK19
672.0
671.0
671.0
669.9
666.5
664.5
662.8
660.8
6.05 7.55 17.85 30.15
6.0 7.4 17.5 27.6 29.8
8.0 11.9 29.9
6.1 10.9 22.3 29.5
6.0 7.0 11.0 25.45 29.6
6.0 6.55 8.9 11.3 19.95
5.0 6.0 7.35 8.9 15.1 18.2 23.6
6.0 6.6 9.8 17.3 29.6
REFERENCE
Modified Extraction Area Boundary
STK17 DDH Location (August 2014)
STK14 DDH Location (July 2014)
660.8 Collar Height (mAHD)
Clay
Claystone
Claystone/Laminite
Laminite
Sandstone
PLAN
SCALE
0 100m
STK12
STK11
STK13
STK14
STK15
STK17
STK18
STK19
Figure 2.3
DIAMOND DRILL HOLES - GRAPHIC LOGS

2.4 MODIFIED SITE LAYOUT

The Project Site incorporates all areas of disturbance associated with the proposed Project-related activities and includes the following components (**Figure 2.4**).

- A site access road from Berrima Road to the extraction area, a distance of approximately 800m.
- An access road to the modified extraction area.
- An extraction area covering approximately 11.7ha.
- A new dam in the active extraction area to store surface water runoff within the modified extraction area.
- Use of four existing dams surrounding the extraction area 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.
- Visual amenity barriers which would minimise visual, noise and dust impacts.
- A native tree screen on the northwestern side of the modified extraction area.

2.5 MODIFIED EXTRACTION AREA

The modified extraction area has been designed to maximise the recovery of product clay/shale within the defined boundary in a safe and environmentally responsible manner. The key parameters for the design of the extraction area, based upon the Proponent's experience are as follows.

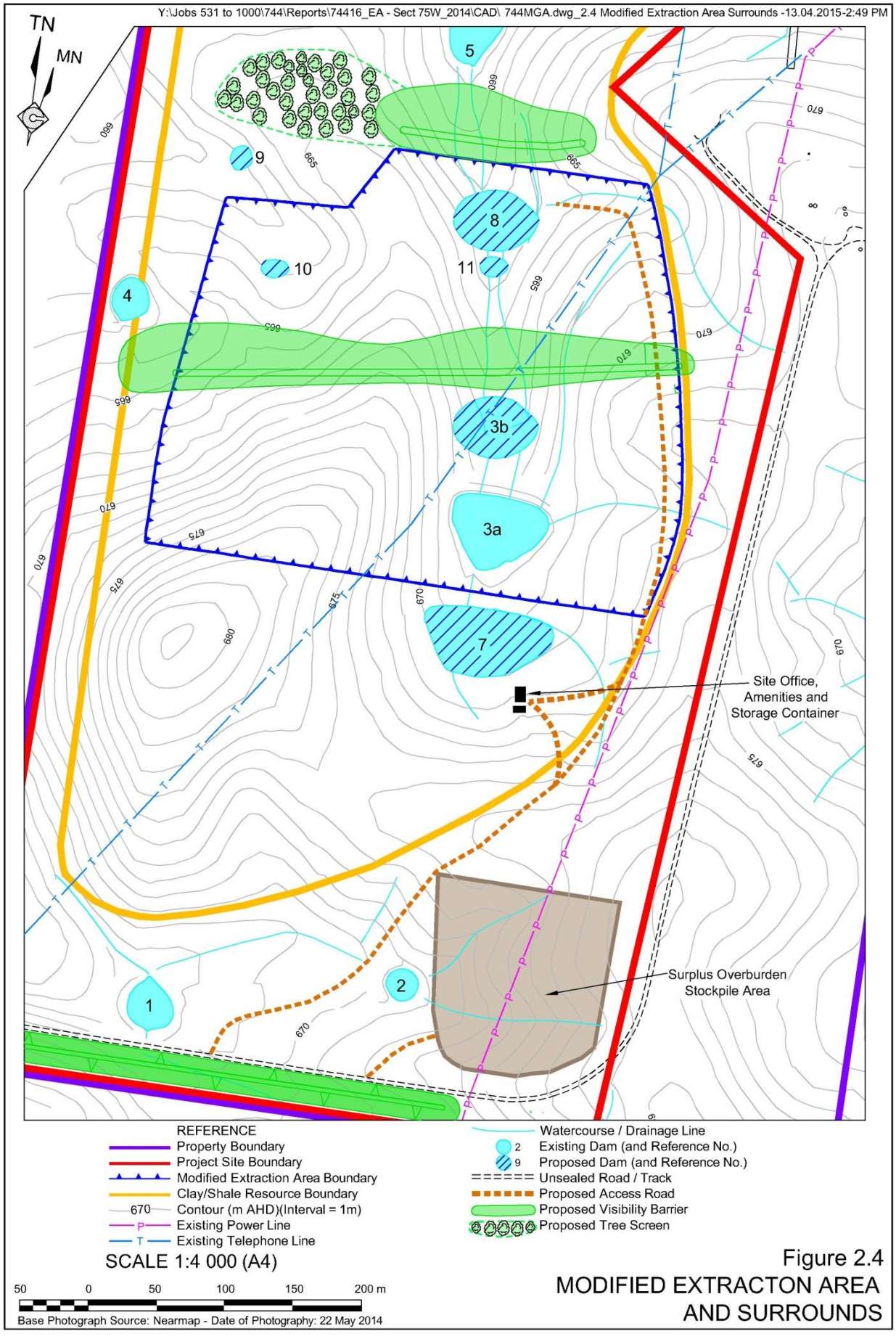
- Near horizontal benches at approximately 670m, 660m and 650m AHD.
- Operational bench width of 30m to 50m.
- Final bench width of 5m.
- An extraction floor positioned at approximately 640m AHD.
- Internal batters of approximately 70º to 75º.
- Internal road set at 10% grade and approximately 15m wide.
- A sump of up to 4m depth within the active extraction floor.

Figure 2.5 displays the final layout of the extraction area displaying these design parameters.

2.6 SITE ESTABLISHMENT

2.6.1 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.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TN
MN
5
9
8
10
11
4
3b
3a
7
2
1
Site Office, Amenities and Storage Container
Surplus Overburden Stockpile Area
REFERENCE
Property Boundary
Project Site Boundary
Modified Extraction Area Boundary
Clay/Shale Resource Boundary
670 Contour (m AHD)(Interval = 1m)
P Existing Power Line
T Existing Telephone Line
Watercourse / Drainage Line
2 Existing Dam (and Reference No.)
9 Proposed Dam (and Reference No.)
Unsealed Road / Track
Proposed Access Road
Proposed Visibility Barrier
Proposed Tree Screen
SCALE 1:4 000 (A4)
50 0 50 100 150 200 m
Base Photograph Source: Nearmap - Date of Photography: 22 May 2014
Figure 2.4
MODIFIED EXTRACTON AREA AND SURROUNDS

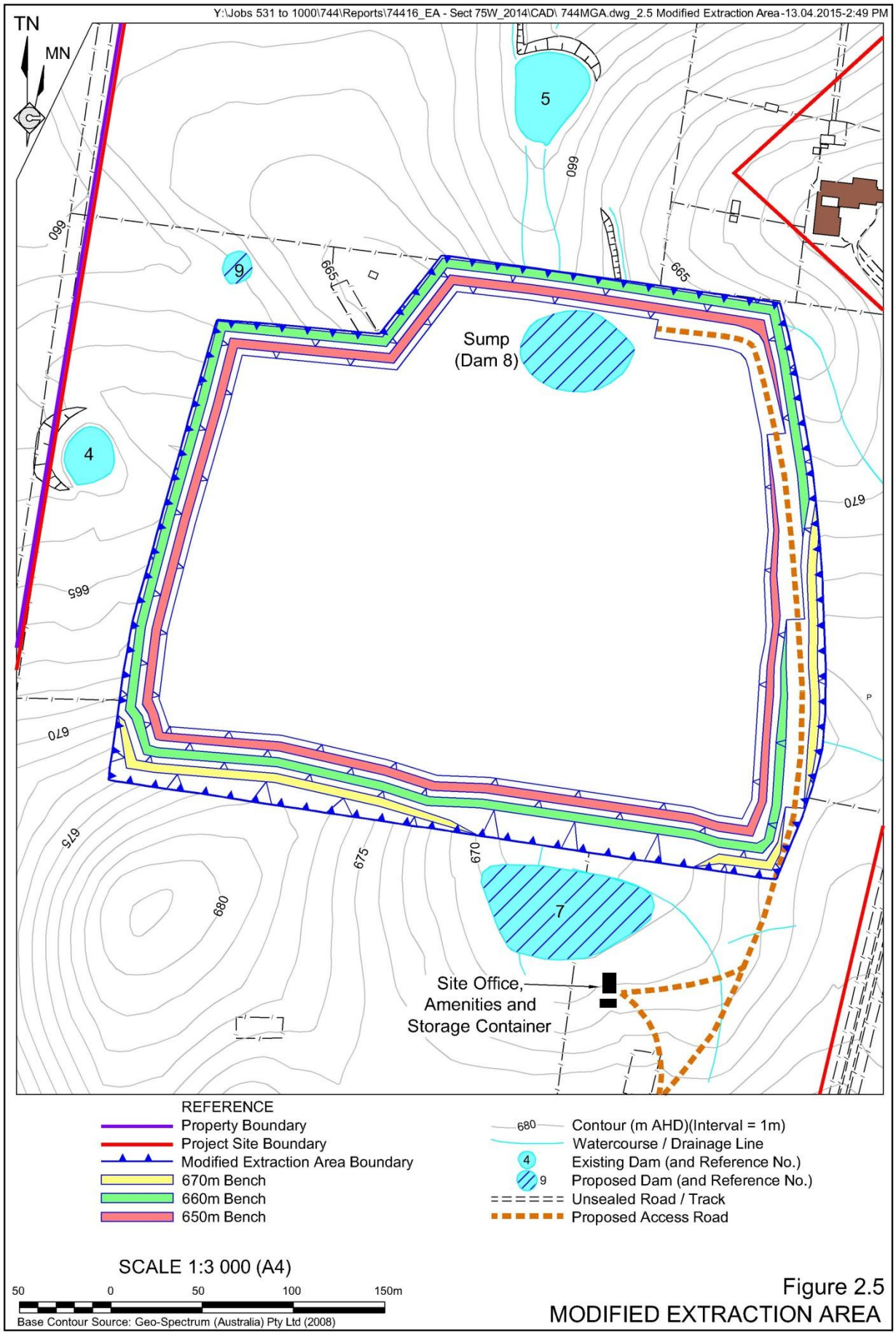

Figure 2.5
MODIFIED EXTRACTION AREA

2.6.2 Land Preparation

Land preparation activities would be undertaken, where practicable, on a campaign basis, with the area to be prepared limited to the area required for extraction-related activities during the subsequent 1 to 3 year period, whenever appropriate. The duration between land preparation campaigns would increase throughout the life of the quarry.

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 and at intervals of approximately 100m around the margin of the boundary. The footprint of the central visibility barrier, surplus overburden stockpile area and site access road would also be marked out.
- 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 *Water Management Plan* based on undertakings described in Section 4.
- Drains would be constructed adjacent to the site access 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.

2.6.3 Infrastructure and Services

Two Telstra telephone lines traverse the "Mandurama" property, one of which traverses the modified extraction area (**Figure 2.4**). This would be relocated before any earthworks commence. The second line would be identified on the ground to ensure that it is not affected by the access road into the extraction area. In the event there is a potential conflict, this line would also be relocated.

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 extraction area within the protection of the existing windbreak. 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. 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 has been inspected and has been confirmed as suitable for use by heavy vehicles i.e. cattle trucks and quarry-related trucks.

The Proponent would upgrade the intersection of Berrima Road and the site access road 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.

2.6.4 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 visibility barrier. These trees are cotoneaster shrubs, pine trees which have been planted to form windbreaks and two *Eucalyptus botryoides* (Bangalay). The Flora Assessment (Geoff Cunningham Natural Resource Consultants, 2010a) determined that the two *E. botryoides* are not potential habitat trees or threatened species. All trees would be felled and either cut up for firewood or mulched and the mulch used on site.

2.6.5 Soil Stripping and Handling

Stripping of topsoil and subsoil would be undertaken in accordance with the recommendations of Geoff Cunningham Natural Resource Consultants (2010b). 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 visibility barriers. Stripping would not be conducted under the temporary structures such as the site office/amenities. 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.

The topsoil would be temporarily stockpiled for later dressing of the constructed visibility barriers. It is anticipated that there would be a surplus supply of topsoil during the stripping of Stage 5 because visibility barriers 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 visibility barriers, stockpiled for use in rehabilitation activities, or used for brick manufacture (subject to satisfying quality requirements).

2.7 EXTRACTION OPERATIONS

2.7.1 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 by scraper, the weathered shale would be pushed up with a

bulldozer and used in barrier construction, stockpiled in the surplus overburden stockpile area or stockpiled for despatch, as required. Topsoil would be stockpiled separately if not immediately required for barrier construction or rehabilitation. Weathered shale would be stockpiled separately from other inferior clays. Similarly, any sandstone encountered would be used in barrier construction or stockpiled for despatch or rehabilitation.

Based on an area of 18 000m^2 for Stage 1, an average topsoil depth of 15cm and an average overburden depth of 5m, approximately 2 700m^3 of topsoil and 90 000m^3 of overburden would need to be removed during Stage 1 to access the shale. The overburden would be clay and weathered shale and depending on its quality and suitability for brick manufacture, a proportion of the weathered shale and clay may be removed from site by truck. An additional 2 200m^3 of topsoil would be stripped from areas under the central visibility barrier and used following its construction or stockpiled for later use in rehabilitation. The surplus overburden stockpile area covers an area of approximately 1.5ha and has a capacity to store approximately 100 000m^3 of materials. It is anticipated that the construction of the central visibility barrier would require approximately 90 000m^3 of material and 3 000m^3 of topsoil, i.e. quantities approximately those to be recovered during the Stage 1 preparatory activities.

A temporary "wet weather" stockpile of product clay/shale would be established within the surplus overburden stockpile area. This would enable some transportation of product clay/shale during wet weather events that prevent road-registered trucks entering and departing from within 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 construction of the southern visibility barrier, 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 can be generated 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 within the active extraction area 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.

2.7.2 Visibility Barriers

Figure 2.4 displays the three visibility barriers that would be constructed throughout the life of the quarry. The barriers would be constructed progressively, dependent on the availability of the overburden materials removed from the extraction area.

- The central visibility barrier would be constructed during the initial establishment of the quarry with materials drawn from Stage 1 and sections of Stage 2.

- The northern visibility barrier would be constructed prior to the commencement of activities within Stage 5 with materials drawn from Stage 2.
- The southern visibility barrier would be constructed progressively in 50m sections as any sandstone or other unusable materials are encountered within the active extraction area.

The Southern Visibility Barrier would not be modified as part of this Proposal and would be constructed as outlined in RWC (2010).

Table 2.3 outlines the approximate dimensions and volumes of materials required for the three visibility barriers.

Table 2.3
Visibility Barrier Dimensions

Visibility Barrier	Height (m)	Base width (m)	Length (m)	Barrier Surface area (ha)	Approximate Volume of materials required (m^3)	Approximate Volume of topsoil required (m^3)
Central	8-12	30-45	420	1.5	90 000	3 000
Northern	8-9	35-50	160	0.7	32 000	1 200
Southern	4	20	350	0.7	14 000	1 200

The footprint of each visibility barrier 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 barrier and moderately compacted. A 150mm layer of topsoil would be placed on the surface of the barrier with mild compaction achieved using the tracks of a bulldozer.

The outside slopes and tops of the visibility barriers 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 barriers would be constructed to the heights nominated in **Table 2.3**. Barriers would have a top width of approximately 2m and a 1:1.5 (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.

2.7.3 Staging

The seven stages of extraction are shown in **Figure 2.6**. The first four stages would be undertaken within the southern section of the extraction area and Stages 5, 6 and 7 would be undertaken within the northern section of the extraction area. **Table 2.4** lists the estimated duration of each extraction stage and the approximate quantity of product clay/shale to be recovered.

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.

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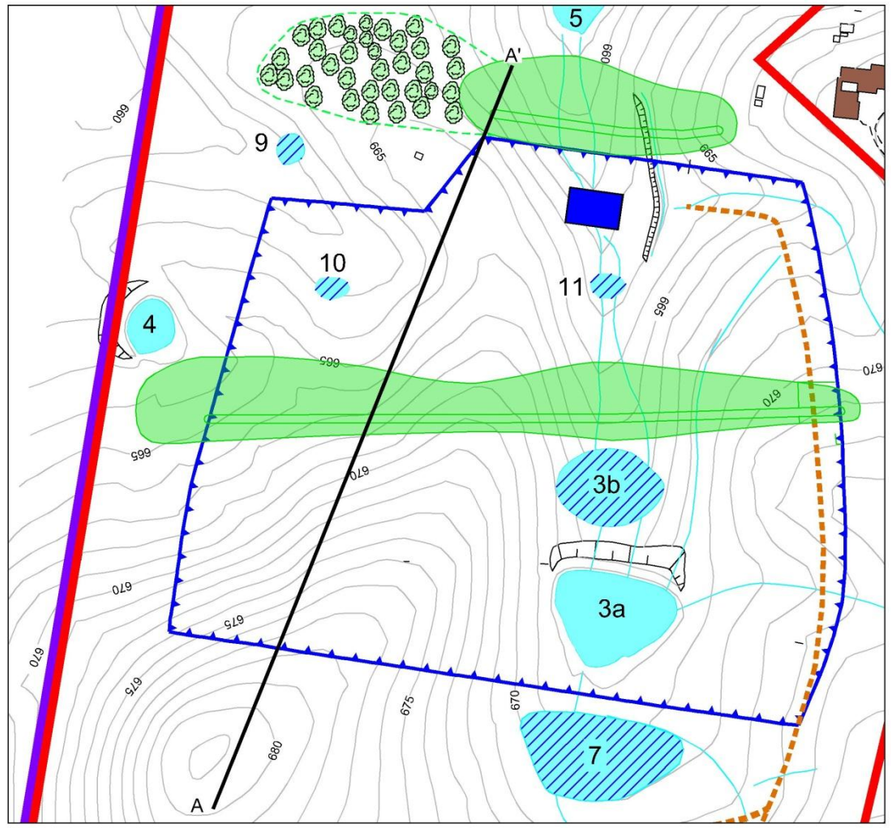
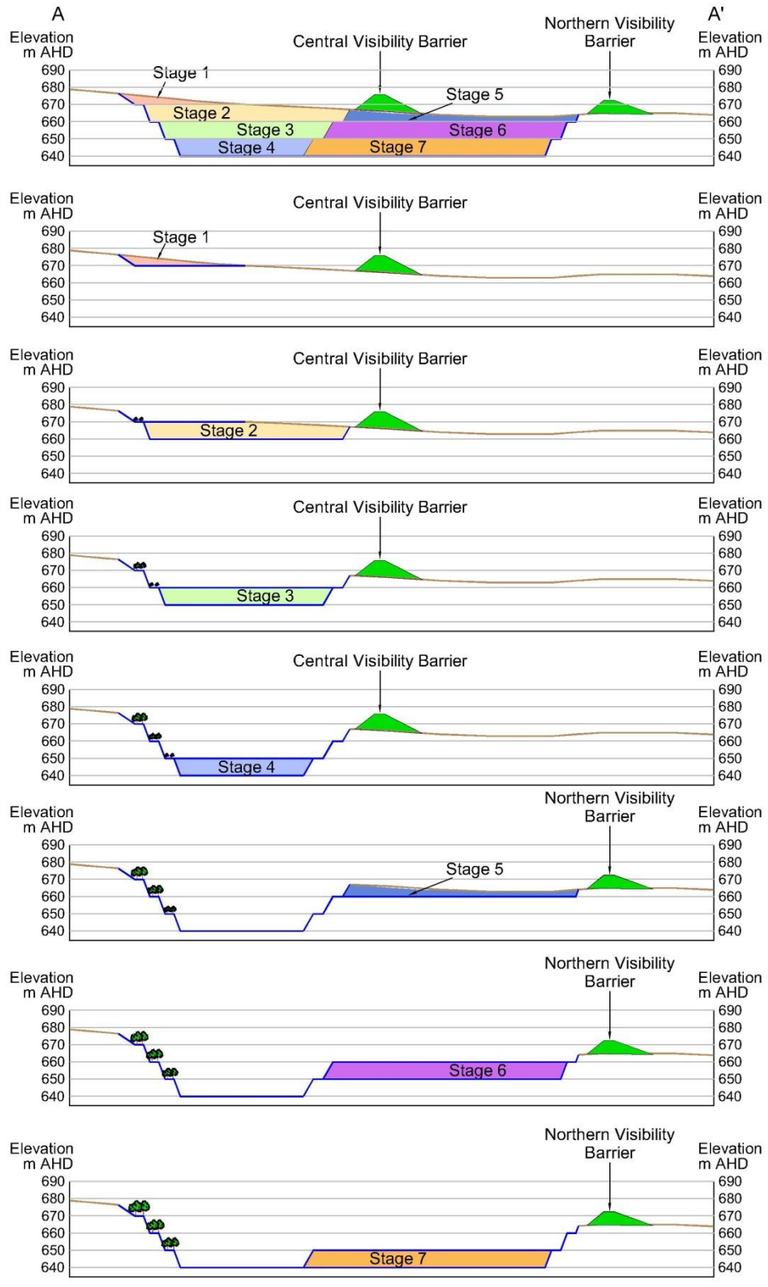
MN





REFERENCE

- Property Boundary
- Project Site Boundary
- Modified Extraction Area Boundary
- 670m Bench
- 660m Bench
- 650m Bench
- 680 Contour (m AHD)(Interval = 1m)
- Watercourse / Drainage Line
- 4 Existing Dam (and Reference No.)
- 7 Proposed Dam (and Reference No.)
- Unsealed Road / Track
- Proposed Access Road

SCALE 1:3 500 (A3)

50 0 50 100 150m

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

Figure 2.6
EXTRACTION STAGES

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Table 2.4
Duration and Quantities of Product Clay/Shale for Quarry Stages

Stage	Depth (to m AHD)	Approximate Extraction Period	Product Clay/Shale Quantities (t)
1	670	0.3 yrs	-
2	660	3.5 yrs	430 000
3	650	5 yrs	630 000
4	640	5 yrs	600 000
5	660	0.5 yrs	100 000
6	650	9 yrs	1 100 000
7	640	9 yrs	1 100 000

2.7.4 Equipment

The mobile equipment involved in the extraction operations would remain the same as that identified in RWC (2010) and include a scraper (e.g. Cat 637), a bulldozer (e.g. Cat D10), an articulated haul truck (e.g. Cat 740) and a front-end loader (e.g. Cat 966).

2.7.5 Campaign Duration

The extraction campaigns would not change from that identified in RWC (2010) and 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.

2.8 PRODUCT TRANSPORTATION

The approved transportation routes (RWC, 2010 – Figure 2.5) and approved traffic volumes would not change as a result of the Proposed Modification.

2.9 HOURS OF OPERATION

The approved hours of operation outlined in RWC (2010) would not change as a result of the Proposed Modification.

2.10 PROJECT LIFE

The revised quantity of recoverable product clay/shale within the modified extraction area is approximately 3.9 million tonnes. At an annual average production rate of 120 000t, the proposed extraction area would provide sufficient material for approximately 30 years. Due to the non-commencement of activities following PA08_0212 being issued in March 2012, it is envisaged that work would begin following the modification of PA08_0212, effectively starting the 30 year consent period from 30 June 2015.

It is noted that geological testing throughout the entire Project Site has identified a total resource of approximately 8 million tonnes of product clay/shale. The Proponent intends to re-apply for a further project approval towards the end of the 30 year operational life within the modified extraction area to continue to provide the product clay/shale from the Project Site to the Bowral Brick Plant.

2.11 WASTE MANAGEMENT

Management of production waste (i.e. overburden) and non-production waste (i.e. domestic, sewage / effluent and oil products) would not change as a result of the Proposed Modification.

2.12 UTILITIES AND SERVICES

The Proposed Modification 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 (2015) reviewed the water security for the proposed water supply and confirmed that the annual total water demand would be met 100% of the time from the harvestable right dam capacity of 1.54ML. No reliance would be placed upon the recovery of any groundwater from beneath the Project Site.

Refuelling, fuel storage and fuel usage would not change as a result of the Proposed Modification.

2.13 EMPLOYMENT AND ECONOMIC CONTRIBUTION

No changes to for employment levels, economic contributions or the capital investment value are anticipated as a result of the Proposed Modification.

2.14 SAFETY AND SECURITY

Safety and security measures would be undertaken in accordance with those outlined in RWC (2010), with no changes required to these measures as a result of the Proposed Modification.

2.15 SITE REHABILITATION

The Proponent would implement and adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site (as outlined in RWC, 2010 – Section 2.12) to ensure that, where practicable, areas where extraction and activities are completed are quickly shaped and vegetated to provide a stable landform.

Whilst noting the location of revised extraction area differs slightly from that approved in PA08_0212, the short term / long term rehabilitation objectives, creation of a final landform that would permit the ongoing extraction of identified resources and the proposed final land use would be undertaken in the same manner as identified in RWC (2010). 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.

The final landform would consist of a rectangular basin with a dam with a capacity of at least 2ML in the final sump location, collecting runoff from the 11.7ha internal area of the extraction area, as displayed on **Figure 2.7**.

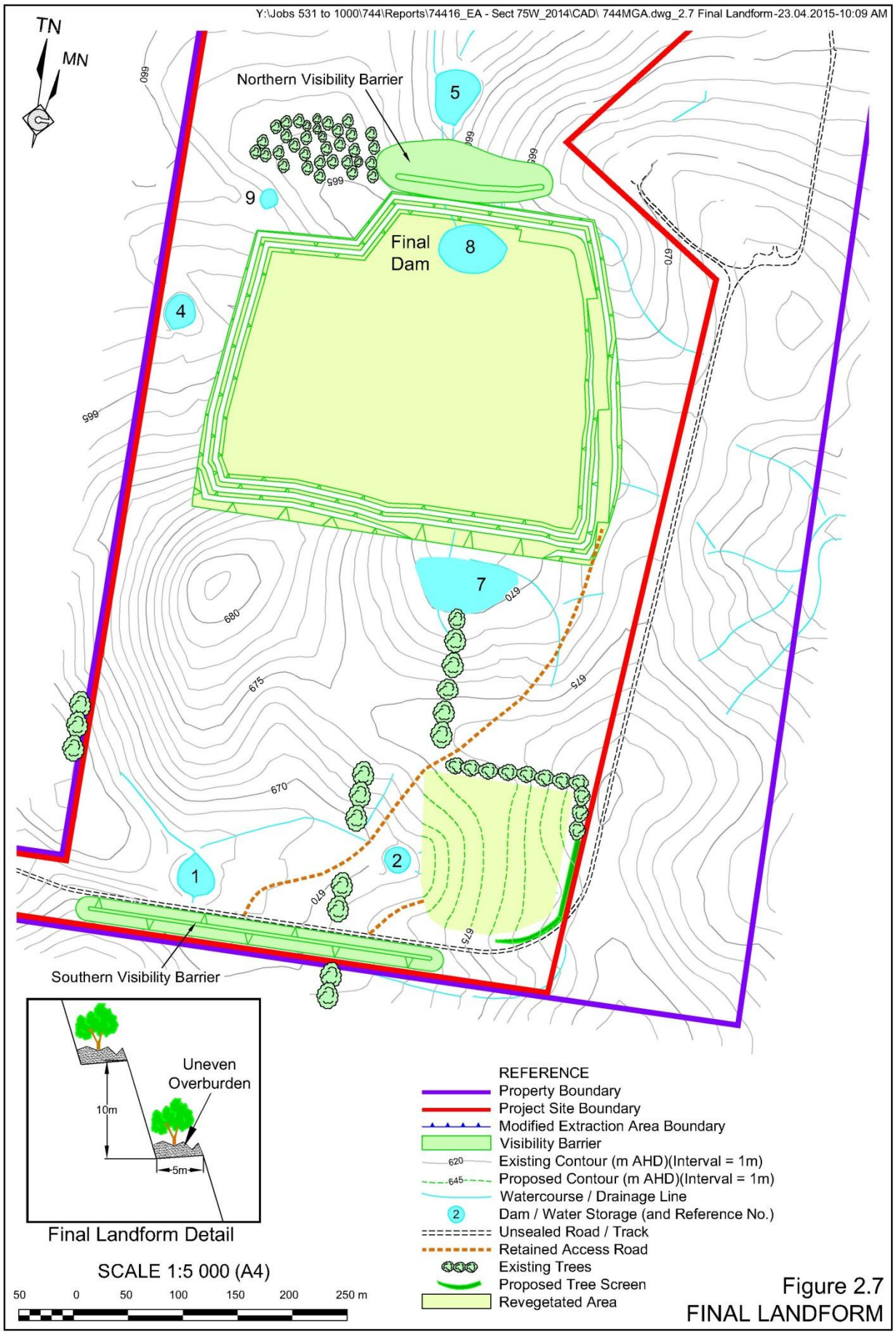

Figure 2.7
FINAL LANDFORM

It is noted that the retention or removal of the visibility barriers 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 remainder of the 8 million tonne resource on the property.

Further to the above, the Proponent would still commit to the rehabilitation monitoring, maintenance and reporting procedures outlined in RWC (2010), with the status of rehabilitation activities reported annually in each *Annual Review*.

3. CONSULTATION AND PLANNING ISSUES

3.1 INTRODUCTION

In order to undertake a comprehensive assessment of the Proposed Modification, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community. For this application, the Proponent has placed reliance on the previous discussions with the surrounding landowners as there is no substantive change in the location of the extraction area, the method of operations and the environmental issues remain comparable for the proposed modification. The following subsections provide a summary of the results of previous community consultation activities, consultation with government agencies and a review of relevant current planning legislation, plans and guidelines.

3.2 CONSULTATION

3.2.1 Introduction

Identification of environmental issues relevant to the Proposed Modification involved:

- Previous consultation with the local community and neighbouring landowners (Section 3.2.2); and
- recent consultation with State and local government agencies (Section 3.2.4).

3.2.2 Consultation with the Community and Neighbouring Landowners

The Proponent undertook two community consultation programs in 2008 and between November 2009 to January 2010 respectively, consulting the 24 property owners in the near vicinity of the Project Site, with the primary concerns relating to traffic, followed by noise, surface water and visual amenity.

It is envisaged that due to the minor proposed modification and the no proposed changes to traffic and transport-related issues that the community would not have any additional issues to be raised as noise, surface water and visual amenity is addressed within the document.

3.2.3 Consultation with Government Agencies

Following initial discussions with the Department of Planning and Environment (DPE) in August 2014, it was agreed that the Proponent should provide relevant background information to the DPE for circulation to the relevant agencies, seeking their requirements for matters to be included in this document. A response was provided by DPE on 17 December 2014, with the following agencies providing their agency's assessment requirements, with the dates received provided within the parenthesis.

- Department of Planning and Infrastructure (17 December 2014).
- Environment Protection Authority (19 January 2015).
- Office of Environment and Heritage (06 January 2015).

- NSW Office of Water (21 January 2015).
- Sydney Catchment Authority (07 January 2015).
- Wingecarribee Council (30 January 2015).
- Division of Resources and Energy (No response provided).

Appendix 2 presents copies of all correspondence received from the above agencies, while **Table 3.1** presents an overview of the requirements provided and where each requirement is addressed in this document.

Table 3.1
Government Agency Requirements for EA

Page 1 of 3

Requirements	Section of EA
Department of Planning and Environment	
The Department considers the EA should include:	
1. A justification for the alterations to the approved layout	2.3.3
2. A summary of how the impacts would change as result of the revised layout	Section 4
3. A noise impact assessment of the revised operations, including the construction to the proposed visibility barrier, in accordance with the NSW Industrial Noise Policy.	4.4 Appendix 4
4. A visual assessment of the revised layout and final landform on nearby receivers.	4.3
5. An assessment of the proposed final landform detailing how it would be integrated in the surrounding landscape, including appropriately detailed diagrams and cross sections.	2.14.3
6. An assessment of the impacts of the revised layout of water resources, including consideration of any application Water Sharing Plans and an assessment of potential impacts on groundwater in accordance with the *NSW Aquifer Interference Guidelines.*	3.3.4, 4.6, 4.7
7. A description of the measures proposed to avoid, mitigation and/or offset the impacts of the proposal.	Section 4
The EA should also include details of consultation with the adjacent landowners, local community and relevant government agencies.	3.2.2, 3.2.3
Environment Protection Authority	
The following key environmental issues that should be addressed as part of the assessment include:	
1. Project details – Assess the Proposal in its local and regional environmental context including surrounding land uses, planning zonings and potential sensitive receptors.	Section 4
2. Licensing requirements	2.2.5
3. Water quantity and quality – The environmental outcomes of the project should be to	
a. Ensure no pollution of surface water or groundwater	4.6.4, 4.7
b. Outline wastewater capture and recycling processes.	4.6.3
c. Consistency with any relevant Statement of Joint Intent established by the Healthy Rivers Commission.	3.3.4
d. Outline if the Proposal contributes to the protection or achievement over time of River Flow Objectives and Water Quality Objectives.	4.6, RWC (2010)

Table 3.1 (Cont'd)
Government Agency Requirements for EA

Requirements	Section of EA
Environment Protection Authority (Cont'd)	
4. Air Quality	
– The environmental outcomes for the project should be managed to ensure:	
a. Unacceptable impacts do not occur on human health or the environment	4.5.3
b. No offensive odours are caused or permitted from the premises	NA
c. Emissions of dust from the premises are prevented or minimised	4.5.3
d. All relevant guidelines in regards to ambient air quality are satisfied.	4.5, RWC (2010)
5. Noise and Vibration	
– The assessment should include but not be limited to:	
a. Identification and assessment of all potential noise sources, including construction and operational noise assisted with quarrying or processing activities.	4.4.3
b. Identification of all sensitive receptors.	4.4.2
c. Outline the proposed hours of construction and operational activities.	2.9.1
d. An assessment of compliance with project specific noise levels	4.5.3
e. An assessment of the potential impacts of any transport noise	RWC (2010)
f. Outline proposed noise mitigation, monitoring and management measures.	4.5.4
6. Waste and Chemicals	
– The environmental outcomes of the project should be to ensure waste is managed:	
a. In accordance with the principles of the waste hierarchy	2.10
b. The handling, processing and storage of all materials used at the premises	2.10
c. To reuse of all wastes generated are maximised.	2.10.1
d. To ensure land pollution does not occur.	2.10.3
Office of Environment and Heritage	
The project modification should approximately consider:	
• 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 corridors.	4.9
• Heritage – both Aboriginal and non-Aboriginal.	4.10, 4.11
• Soils and Water – including a detailed description of the water management, stormwater management, erosion and sediment control and monitoring programs.	4.6, 4.7, 4.8
NSW Office of Water	
Assess the potential impacts on surface water (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, wetlands, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.	
• existing and proposed surface and groundwater monitoring activities and methodologies.	4.6.4, 4.7.4
• Include a detailed and consolidated site water balance;	4.6.3.2

Table 3.1 (Cont'd)
Government Agency Requirements for EA

Requirements	Section of EA
NSW Office of Water (Cont'd)	
• Include details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction.	4.6.3.1
• Assess potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.	4.5.5, 4.6.5
Water Sharing Plans	
The proposal is located within the area covered by the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources and the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources and should be addressed.	2.2.5
Licensing Considerations	
The EA is required to provide:	
• Identification of water requirements for the life of the project in terms of both volume and timing.	4.6.3
• Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source.	2.11, 4.6.3
• Explanation of how the required water entitlements will be obtained.	4.6.3
• Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc.).	4.6.5
• Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing.	NA
• Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages.	4.6
• Details on the location, purpose, size and capacity of any new proposed dams/storages.	4.6
• Applicability of any exemptions under the *Water Management (General) Regulation 2011* to the project.	NA
Sydney Catchment Authority	
Assess the potential impacts on water quality, including an update of relevant parts of the Water Cycle Management Study, Stormwater Management Plan and Soil and Water Management Plan, to show that a neutral of beneficial effect on water quality of receiving waters (surface and groundwater).	4.6, 4.7, 4.8
Wingecarribee Council	
Council does not have any further comments to those provided by the Department of Planning and Environment.	NA
Division of Resources and Energy	
None Provided.	NA

3.3 REVIEW OF PLANNING ISSUES

3.3.1 Introduction

A number of State and regional planning instruments apply to the Proposed Modification. These planning instruments were reviewed to identify any environmental aspects requiring consideration in this document. This subsection provides a brief summary of each of the relevant planning instruments. It is noted that none of the respective planning instruments have been modified since the 2010 EA was prepared.

3.3.2 Commonwealth Planning Issues

The *Environment Protection and Biodiversity Conservation Act 1999* is the only commonwealth planning issue of relevance to the Proposed Modification and is discussed in Section 4.9.

3.3.3 State Planning Issues

3.3.3.1 Introduction

The only NSW State legislation that is applicable to the Proposed Modification is the *Environmental Planning and Assessment Act 1979* and the applicability of Project as a transitional Part 3A Project, in which Part 3A of the Act continues to apply irrespective of the repeal of that Part on 8 April 2011, in accordance with the requirements of Clause 2(1)(a) of Schedule 6A of the Act.

Other State legislation and planning policies that were previously addressed in RWC (2010) and do not require further comment with respect to the Proposed Modification are as follows.

- State Environmental Planning Policy (Major Development) 2005
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
- State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
- State Environmental Planning Policy No. 44 – Koala Habitat Protection
- Drinking Water Catchments Regional Environmental Plan No. 1
- Wingecarribee Local Environmental Plan 2010
- Healthy Rivers Commission

3.3.3.2 Application of Part 3A of the EP&A Act

In order to ensure that the Project is classified as a transitional Part 3A Project in which a modification could be applied for under Section 75W of the EP&A Act, the Proponent sought legal advice from the Marsdens Law Group on 21 November 2014, with the following advice confirming the applicability that the application for the Proposed Modification can be made under Section 75W.

"It is clear that the proposed modification is one that involves a change to a condition of the project approval. It would also seem that the environmental consequences of the proposed change, beyond those which have already been the subject of assessment, would be limited to potential visual impacts at the residences located approximately 1.5km - 1.8km to the north (due to the surface area to be disturbed by excavating being increased and shifted approximately 250m to the north) given that:

- the project would be for exactly the same purpose and would take place within the same lot that is subject of the current approval;
- the area of extraction remains within the same lot and overlaps the area originally approved;
- the area of extraction is within the area identified in original approval as the Clay/Shale Resource Boundary;
- the proposed modified area of extraction avoids any native trees;
- the method of extraction and haul route for trucks would remain the same;
- the hours of operation would not be changed;
- the maximum annual rate of extraction would not change;
- the total tonnage of material to be extracted and transported annually and over the life of the project would not change; and
- the controls relating to noise and environmental management would remain in place.

It is also noted by the Court of Appeal that the purpose of conferring the modification power on the Minister may be to permit the decision-making authority to have regard to matters such as State and regional planning significance, *"being matters which stand above and beyond developments having limited local impact or insignificant impact at a regional or State level"*. Accordingly, it seems that it would be open to the Minister to have regard to the State and regional planning significance of the development as proposed to be modified in considering what might constitute an acceptable modification of the approval.

Even if Section 75W was limited in scope to changing the terms of an existing approval without "radical transformation" it is highly unlikely in our view that the proposed change to the location and surface area of the extraction area within Lot 1 DP 414246 would be considered to constitute a "radical transformation" of the terms of the approval because the project would continue to be for the same purpose and be carried out on the same land by the same methods that are authorised by the current project approval. The project would also be limited to processing and transporting the same total tonnage of material that was subject of the *Environmental Assessment* referred to in condition 2 of Schedule 2 of the original approval.

Conclusion

In our opinion, for the reasons set out above, it would be reasonably open to the Minister, after carrying out an evaluative judgment of the proposed modification to the project approval, to conclude that the proposed modification is within the scope of the modification power conferred by Section 75W of the EP&A Act."

A copy of the complete Marsdens Law Group correspondence was provided to DPE on 21 November 2014, and confirmed by DPE via return correspondence on 17 December 2014 (via DPE's assessment requirements – see **Appendix 2**) that *…'the proposal can be assessed as a modification of the Part 3A project approval of the New Berrima Quarry (PA08_0212) under Section 75W of the Environmental Planning and Assessment Act 1979'*

3.4 ENVIRONMENTAL ISSUE PRIORITISATION

Based upon the minor changes to the approved development and the comparatively low environmental impacts anticipated as a result of the Proposed Modification, the prioritisation of the environmental aspects has remained the same as presented in the 2010 EA.

1. Visual Amenity.
2. Noise.
3. Air Quality.
4. Surface Water.
5. Groundwater.
6. Soil and Land Capability.
7. Ecology.
8. Aboriginal Heritage.
9. European Heritage.
10. Bushfire.
11. Traffic and Transportation.
12. Socio-Economic.

The above order of priority has been relied upon to establish the order in which each issue is addressed in Section 4 of this *Environmental Assessment*.

4. ASSESSMENT OF KEY ENVIRONMENTAL ISSUES

4.1 INTRODUCTION

Section 4 of RWC (2010) provided a range of background information in relation to aspects of the environment within and surrounding the Project Site. That section also provides an assessment of anticipated impacts associated with the Project as it was then proposed. This section similarly provides an assessment of anticipated changes to impacts that would result from the Proposed Modification. The structure of this section broadly reflects the structure of Section 4 of RWC (2010). Where no changes to the approved level of impacts are anticipated, a brief explanation as to why that is the case has been provided rather than repeating all text from the 2010 EA.

Finally, the following background information that has not changed significantly since RWC (2010) was finalised and as such, it is not repeated here.

- Climate.
- Local and regional geology.
- Surrounding community.

4.2 ENVIRONMENTAL SETTING

4.2.1 Topography and Drainage

The local topography is illustrated on **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.

The Project Site is located on the northern side of a low topographic rise overlooking the Wingecarribee River valley to the north, (**Figure 4.2**). Stony Creek, a tributary of the Wingecarribee River crosses the site access road approximately 800m to the west of the extraction area. A small unnamed ephemeral watercourse bisects the Project Site, also flowing towards the Wingecarribee River after periods of heavy rain. Two small farm dams are located on this ephemeral watercourse. Elevations in the Project Site descend from a little over 680m AHD near the southwestern corner of the extraction area, down to 640m AHD on the northern boundary.

4.2.2 Land Ownership and Surrounding Residences

Figure 4.3 presents the updated land ownership details and non-project related residences within and immediately surrounding the Project Site. It is noted that four properties displayed on **Figure 4.3** have changed ownership since 2010. The distances from each of the residences to the nearest side of the extraction area are listed in **Table 4.1**.

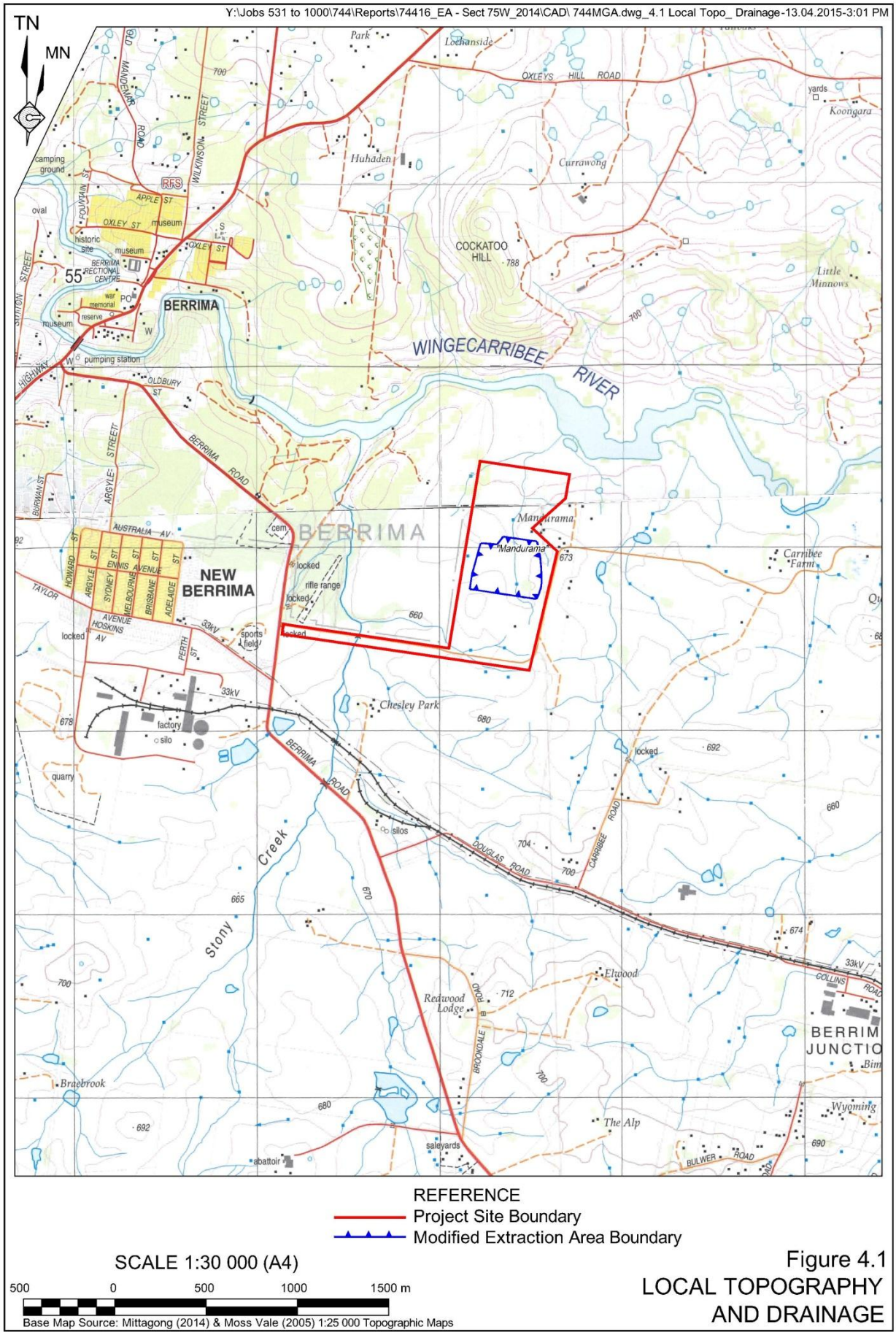

Figure 4.1
LOCAL TOPOGRAPHY AND DRAINAGE

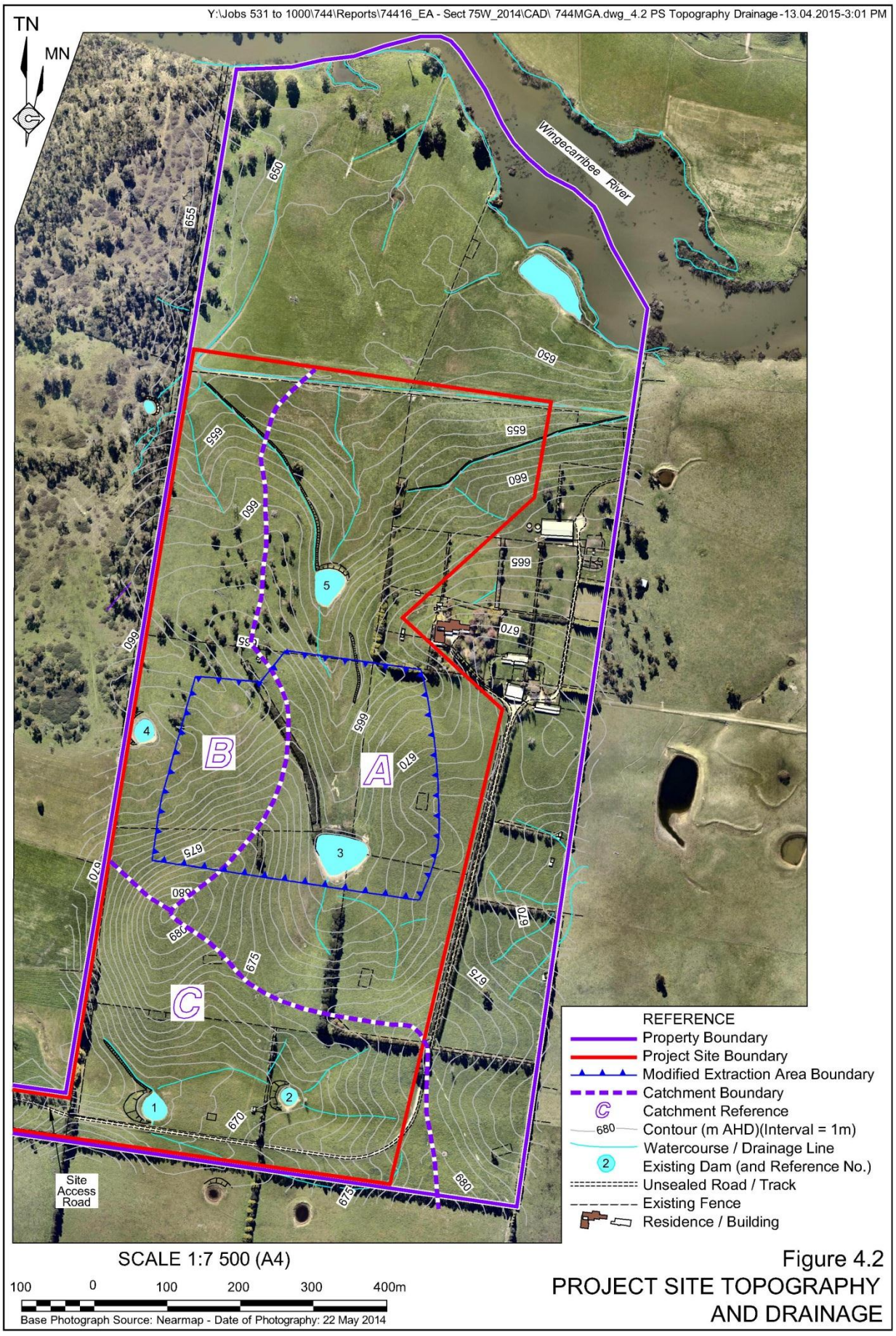

Figure 4.2
PROJECT SITE TOPOGRAPHY AND DRAINAGE

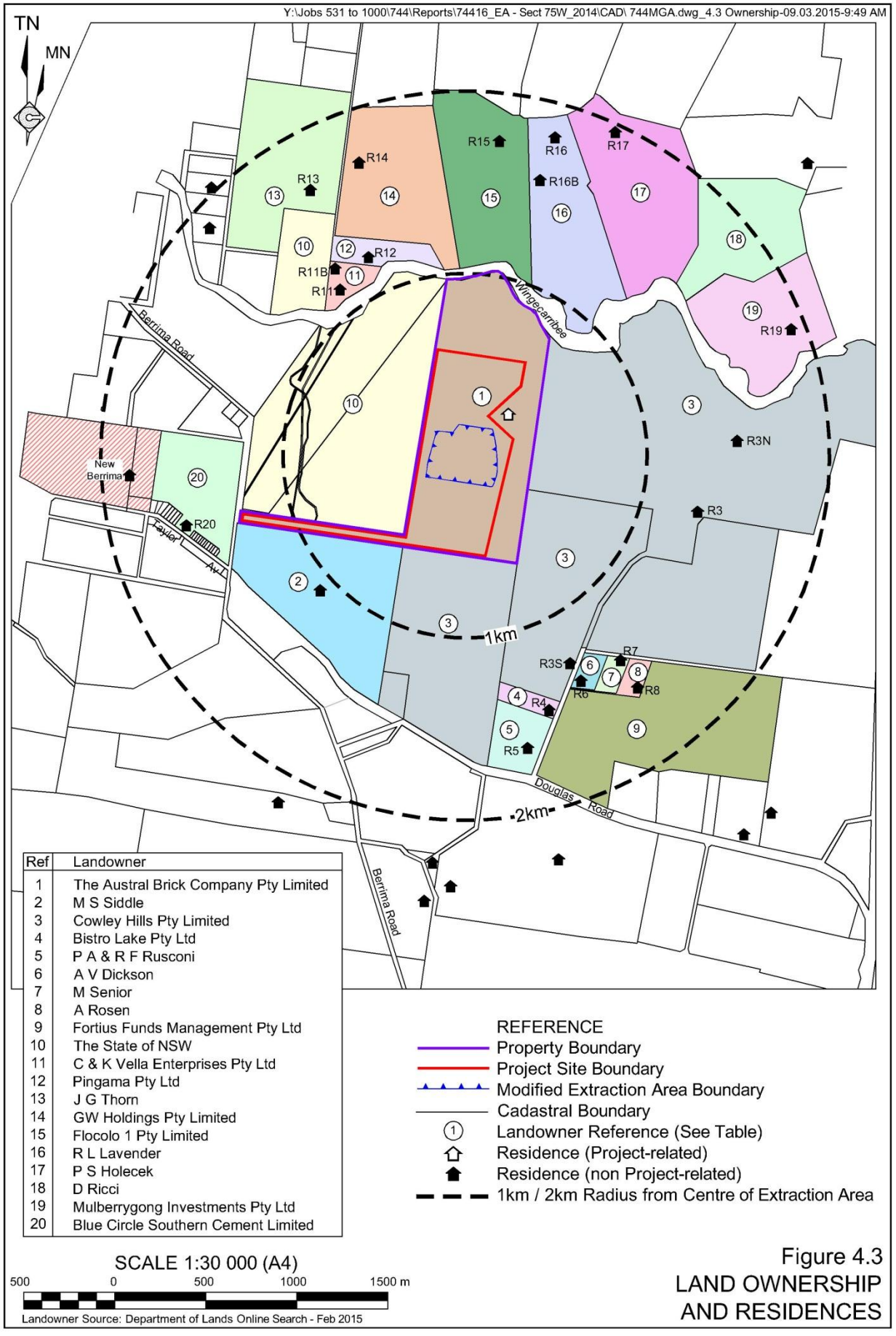
Y:\Jobs 531 to 1000\744\Reports\74416_EA - Sect 75W_2014\CAD\ 744MGA.dwg_4.3 Ownership-09.03.2015-9:49 AM
TN
MN
R13
R14
R15
R16
R16B
R17
R12
R11B
R11
R19
R3N
R3
R20
R3S
R7
R6
R8
R4
R5
New Berrima
Berrima Road
Wingecarribee
Taylor
Av
Douglas Road
1km
2km
Ref Landowner
1 The Austral Brick Company Pty Limited
2 M S Siddle
3 Cowley Hills Pty Limited
4 Bistro Lake Pty Ltd
5 P A & R F Rusconi
6 A V Dickson
7 M Senior
8 A Rosen
9 Fortius Funds Management Pty Ltd
10 The State of NSW
11 C & K Vella Enterprises Pty Ltd
12 Pingama Pty Ltd
13 J G Thorn
14 GW Holdings Pty Limited
15 Flocolo 1 Pty Limited
16 R L Lavender
17 P S Holecek
18 D Ricci
19 Mulberrygong Investments Pty Ltd
20 Blue Circle Southern Cement Limited
REFERENCE
Property Boundary
Project Site Boundary
Modified Extraction Area Boundary
Cadastral Boundary
Landowner Reference (See Table)
Residence (Project-related)
Residence (non Project-related)
1km / 2km Radius from Centre of Extraction Area
SCALE 1:30 000 (A4)
500 0 500 1000 1500 m
Landowner Source: Department of Lands Online Search - Feb 2015
Figure 4.3
LAND OWNERSHIP
AND RESIDENCES

Table 4.1
Land Ownership and Residences

Ref*	Landowner	Distance from Residence to nearest side of the Extraction Area (km)
1	The Austral Brick Company Pty Limited	Not applicable
2#	M.S. Siddle	0.9km
3	Cowley Hills Pty Ltd	R3 – 1.1km,
		R3N – 1.3km
		R3S – 1.1km
4#	Bistro Lake Pty Ltd	1.3km
5	P.A. & R.F. Rusconi	1.5km
6	A.V. Dickson	1.2km
7	M. Senior	1.2km
8#	A. Rosen	1.4km
9	Fortius Funds Management Pty Ltd	No residence
10	The State of NSW (Crown Land)	No residence
11	C & K Vella Enterprises Pty Ltd	11 – 0.9km
		11B – 1.1km
12	Pingama Pty Ltd	1.0km
13#	J. G. Thorn	1.5km
14	G.W. Holdings Pty Ltd	1.5km
15	Flocolo Pty Ltd	1.6km
16	R.L. Lavender	16 – 1.6km
		16B – 1.4km
17	P. S. Holecek	1.8km
18	D. Ricci	No residence
19	Mulberrygong Investments Pty Ltd	1.7km
20	Blue Circle Southern Pty Ltd	1.3km

* See **Figure 4.3**
# Indicates change in land ownership since RWC (2010)

4.2.3 Land Use

Land within the Project Site is still currently used for agricultural purposes and as such is under pasture and grazed by beef cattle. Adjacent properties to the east and south area also used for grazing. Surrounding properties to the north are generally 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. The land to the west of the Project Site is Crown Land used for both grazing and as a rifle firing range.

4.3 VISUAL AMENITY

4.3.1 Introduction

An assessment of visual amenity has been undertaken for the Proposed Modification, drawing information from RWC (2010) and the description of the modified extraction area presented in Section 2 of this document to determine the potential impact of the Proposed Modification on the existing visual amenity. The following subsections present an assessment of visual amenity-related impacts that would arise from the Proposed Modification.

4.3.2 Existing Environment

The existing visual amenity currently surrounding the Project Site is typical of rural areas in the Southern Tablelands, with the outlook from most rural residences and other vantage points including land used for agriculture, nature conservation, transportation or other infrastructure.

The visibility of the modified extraction area is shielded from the south, east and west by the natural topography and the existing natural vegetation and/or tree windrows. The proposed extraction area is visible from a number of properties on the northern side of the Wingecarribee River albeit that the views are restricted by vegetation near the respective residences.

4.3.3 Potential Impacts

The occupants of the residences that have the potential to be visually affected the most by the Proposed Modification due to their location are those occupants of Residences 12 and 16B (as displayed on **Figure 4.3**) and located 1.5km and 1.4km respectively from the modified extraction area. These residences whilst not being closest to the Project Site, do have the potential for direct line of sight during the site establishment phase and Stage 1 of the Proposal.

Figure 4.4 presents an updated series of representative sections from Residences 12 and 16B (with Residence 16B a previously assessed vantage point in RWC (2010)), with the focus being from the north over the revised visibility barrier and modified extraction area. **Plate 1** displays the view towards the revised extraction area from Residence 17 (also a residence previously assessed in RWC, 2010).

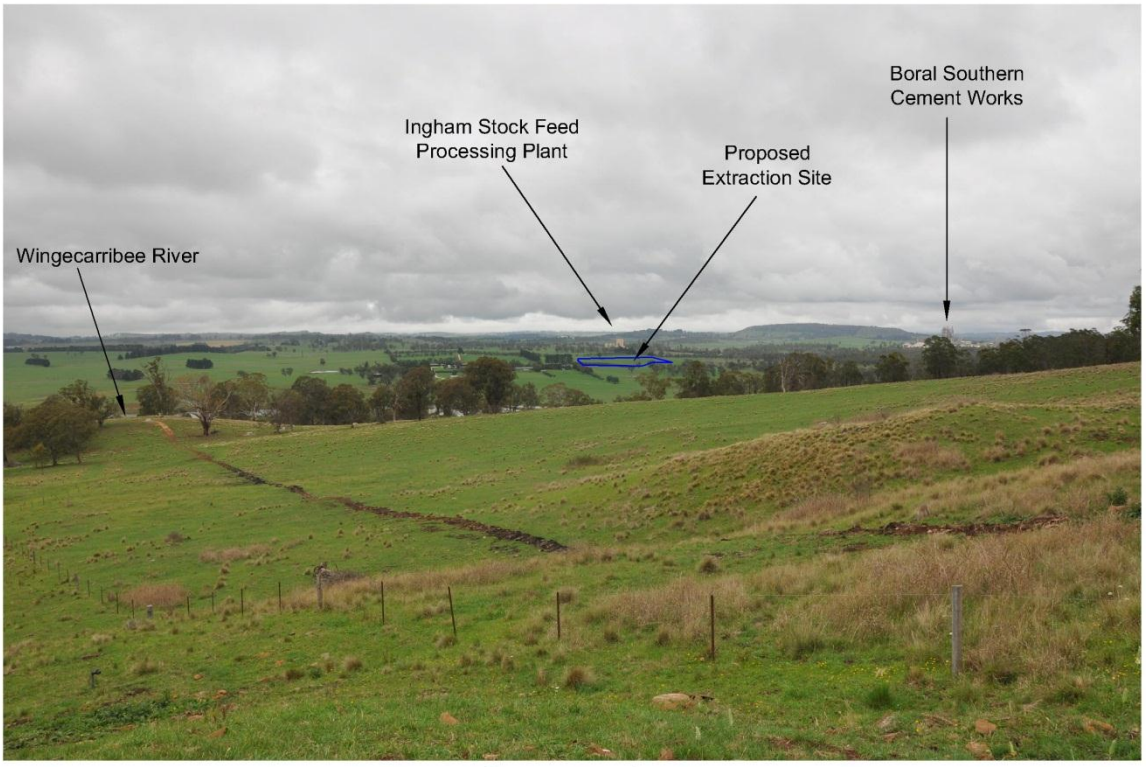

Plate 1 : View to the South towards the proposed extraction area from Residence 17 (Ref: E744E-025)

Table 4.2 lists all landowners with on-site residences as identified in Section 4.2.2 and provides their respective distances to the extraction area and assesses the potential for direct line-of-sight to the extraction area from the residences during operational stages of the Project. It is recognised that some residences may have potential direct line of sight to the construction of the visibility barriers during the site establishment and construction stage, however, these activities would be a short-term and relatively small scale.

Table 4.2
Visibility from Surrounding Residence to Extraction Area

Ref*	Landowner	Distance from Residence to nearest side of the Extraction Area (km)	Comments
2#	M.S. Siddle	0.9km	Closest private residence to extraction area. No direct line of sight due to natural topography
3	Cowley Hills Pty Ltd	R3 – 1.1km,	No direct line of sight due to natural topography and vegetation
		R3N – 1.3km	
		R3S – 1.1km	No direct line of sight due to natural topography
4#	Bistro Lake Pty Ltd	1.3km	No direct line of sight due to natural topography and Southern Visibility Barrier
5	P.A. & R.F. Rusconi	1.5km	
6	A.V. Dickson	1.2km	No direct line of sight due to natural topography
7	M. Senior	1.2km	
8#	A. Rosen	1.4km	
11	C & K Vella Enterprises Pty Ltd	11 – 0.9km	No direct line of sight due to natural topography and Central and Southern Visibility Barrier
		11B – 1.1km	
12	Pingama Pty Ltd	1.0km	
13#	J. G. Thorn	1.5km	Direct line of sight possible during site establishment and construction stage and Stage 1. No direct line of sight from Stage 2 onwards due to visibility barriers
14	G.W. Holdings Pty Ltd	1.5km	
15	Flocolo Pty Ltd	1.6km	No direct line of sight due to natural topography and vegetation
16	R.L. Lavender	16 – 1.6km	Direct line of sight possible during site establishment and construction stage and Stage 1. No direct line of sight from Stage 2 onwards due to visibility barriers
		16B – 1.4km	
17	P. S. Holecek	1.8km	
19	Mulberrygong Investments Pty Ltd	1.7km	No direct line of sight due to natural topography
20	Blue Circle Southern Pty Ltd	1.3km	
* See **Figure 4.3**			

It is recognised that the majority of residences on the northern side of the Wingecarribee River are screened from the modified extraction area by vegetation and/or natural topography. In some cases, viewers may be able to see the modified extraction area but only at a considerable (>2km) distance.

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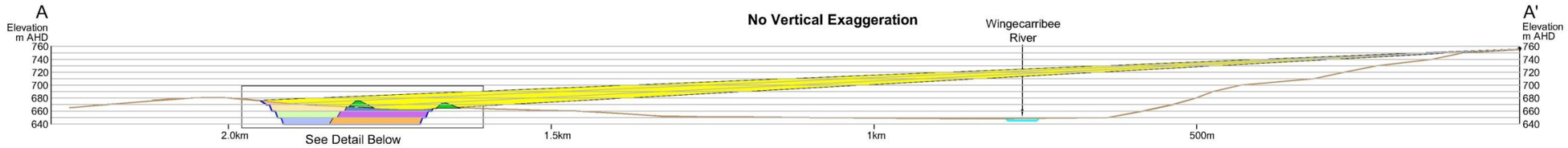
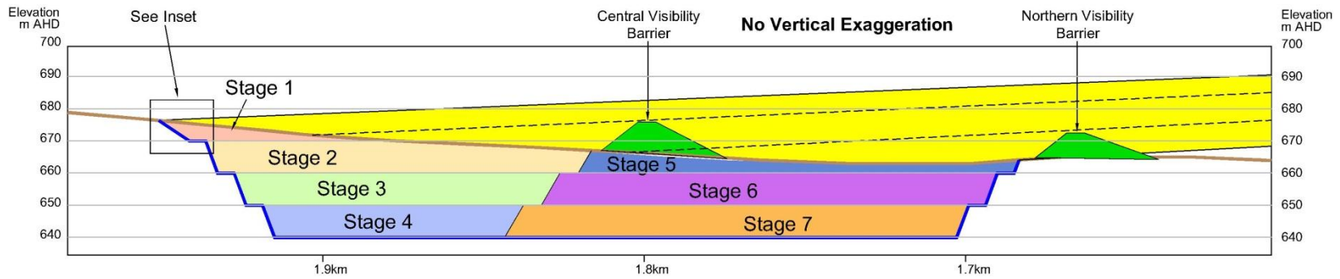
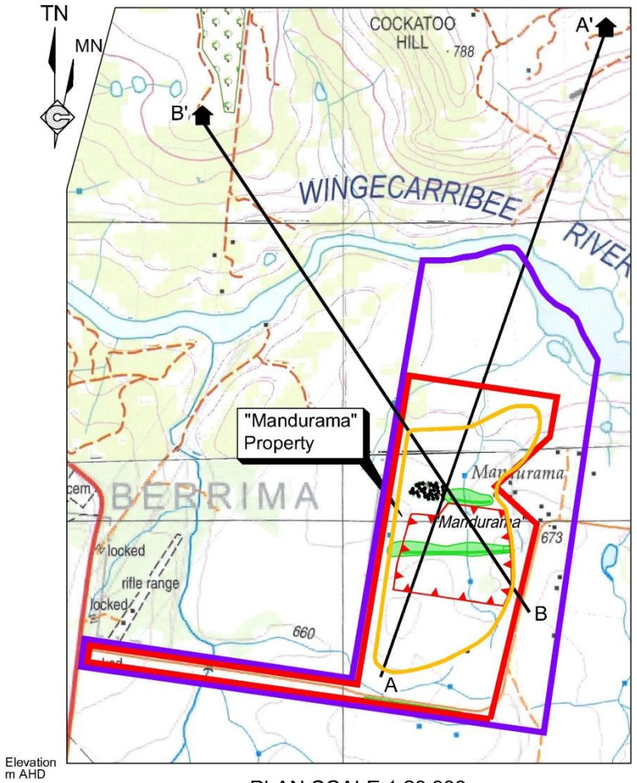






PLAN SCALE 1:20 000

200 0 200 400 600 800 1000 m

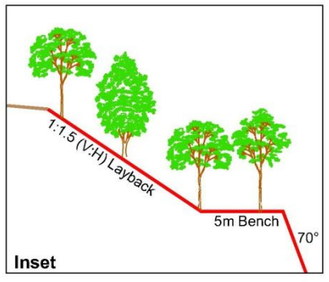
SECTION A-A' & B-B' SCALE

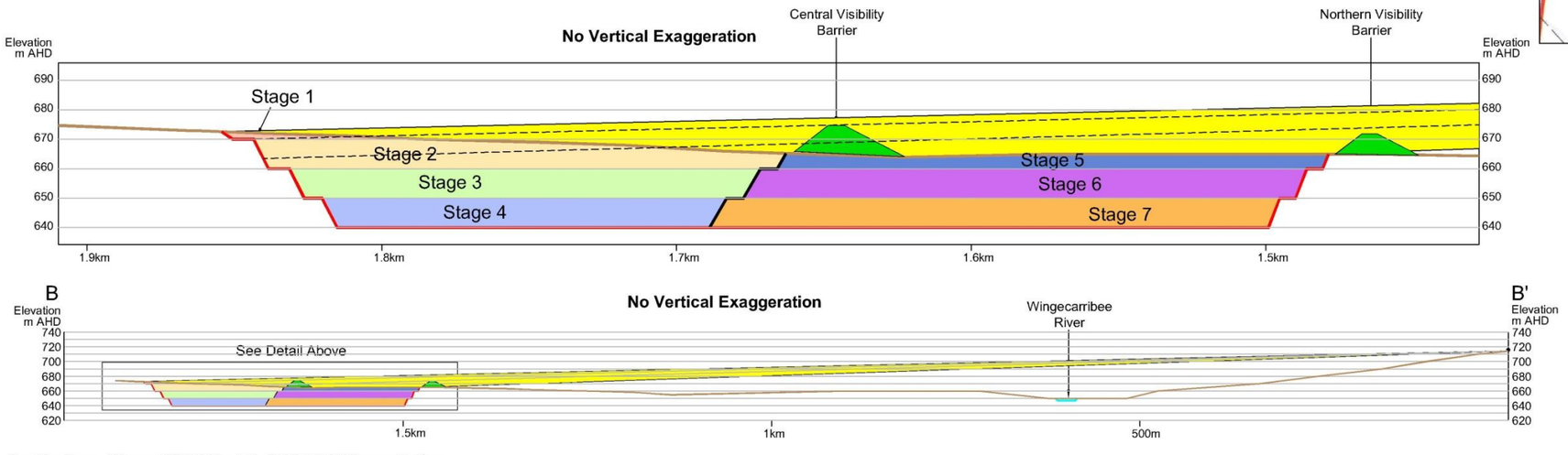
100 0 100 200 300 400m

DETAIL SECTION SCALE

0 25 50 75 100m

REFERENCE
- Property Boundary
- Project Site Boundary
- Modified Extraction Area Boundary
- Clay/Shale Resource Boundary
- Residence
- Sight Line Arc





Base Map Source: Mittagong (2014) & Moss Vale (2005) 1:25 000 Topographic Maps

Figure 4.4
VISIBILITY SECTIONS

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4.3.4 Management and Mitigation Measures

The following management and mitigation measures would be undertaken to reduce visibility to the modified extraction area and overall reduce the potential for visual amenity impacts on the identified residences.

- The construction of the 4m-12m high visual amenity barriers throughout the life of the Project (Central – site establishment stage, Northern – prior to the commencement of activities within Stage 5 and Southern – constructed progressively in 50m sections) would ensure limited direct line of sight to active extraction areas.
- All outside slopes and tops of the visibility barriers would be revegetated with a quick growing cover crop for rapid stabilisation and a seed mix of native grasses and indigenous shrubs and known to have high establishment success.
- Following the removal of material to construct the central visibility barrier, the 670m AHD bench would be rehabilitated with overburden placed on the bench and revegetated.
- The central visibility barrier batter would be shaped, laid back to a 1:5 (V:H) slope, spread with topsoil from active areas within the extraction area and planted with fast growing shrubs and trees to minimise the visibility of the highwall from the residences to the north (see Inset on **Figure 4.4**).
- A native tree screen would be established during the first two years of the Project on the northwestern side of the extraction area.
- The overall quarry design ensures that the extraction of Stages 2 to 7 would be topographically lower than the visual amenity barriers and shielded from direct line of sight.

4.3.5 Assessment of Impacts

The Proposed Modification would slightly change the visual landscape from the approved site layout through the disturbance of approximately 4ha of additional land to that current approved, however the revised quarry design, establishment of amenity bunds and proposed vegetation screening and rehabilitation would ensure that the overall visual impacts remain virtually the same as currently approved for the occupants of the residences to the north of the Project Site, with no changes anticipated for any other surrounding residences.

4.4 NOISE

4.4.1 Introduction

Spectrum Acoustics developed a noise model and assessed potential impacts to support the original development application for the Project (Spectrum, 2010). Spectrum Acoustics was engaged to revise the noise model and to assess the changes to the noise environment based on the Proposed Modification. The resulting letter report presenting the revised noise assessment is presented in **Appendix 4** and is referred to hereafter as Spectrum (2015). The following subsections present an overview of the results of that report.

4.4.2 Existing Environment and Assessment Criteria

Table 4.3 outlines the noise criteria prescribed in *Condition 3(4)* of PA08_0212 in which the Proposed Modification would need to comply with during the construction and operational stages of the Project.

Table 4.3
Project Noise Criteria

Receiver	$L_{Aeq\ (15\ mins)}$ dB(A)
Construction Stage (includes construction of visual amenity bunds)	
R2	43
All other receivers	38
Operational Stage	
All receivers	38
Source: Modified after Table 1 of PA08_0212	

4.4.3 Assessment Methodology

The noise assessment methodology used a point calculation mode of the Environmental Noise Model, utilised by Spectrum (2010) to assess the anticipated impacts associated with the Proposed Modification. The same meteorological conditions were considered within the revised noise modelling and are repeated as follows.

- Neutral conditions of 20°C, 70% relative humidity and a 10°C/100m lapse rate (typical calm conditions).
- 3m/s winds from the west
- 3m/s winds from the northeast.

For the purposes of the Proposed Modification, Spectrum (2015) assessed one construction and one operational noise scenario both of which would occur during the daytime period.

- Scenario 1 – site establishment/construction operations.
- Scenario 2 – operations.

These scenarios are broadly similar to those described in RWC (2010) and assessed in Spectrum (2010), with the exception that relevant noise sources have been relocated slightly towards the north to reflect the modified extraction area.

4.4.4 Management and Mitigation Measures

All management and mitigation measures identified in RWC (2010) would continue to be implemented.

In addition, to account for the potential noise exceedance at R2 during construction of the northern bund under a northeast wind condition (see Section 4.4.5), the Proponent would ensure that all no construction operations occur under these wind conditions.

4.4.5 Assessment of Impacts

Table 4.4 presents the results of the noise assessment for Scenario 1. For comparison, the predicted noise levels provided in Spectrum (2010) are also presented in parenthesis.

Table 4.4
Scenario 1 - Predicted Construction Noise Levels

		Meteorological Condition					
		Southern/Central Visibility Barrier			Northern Visibility Barrier		
Ref	Landowner	Calm	W wind	NE wind	Calm	W wind	NE wind
R2	M.S. Siddle	39 (40)	33 (36)	45 (47)	31 (34)	27 (31)	35 (38)
R3	Cowley Hills Pty Ltd	23 (20)	32 (30)	20 (<20)	24 (25)	33 (35)	<20(<20)
R4	Bistro Lake Pty Ltd	23 (24)	34 (35)	30 (30)	26 (30)	31 (35)	28 (32)
R5	P.A. & R.F. Rusconi	25 (25)	35 (35)	30 (30)	28(28)	32 (32)	30 (30)
R6	A.V. Dickson	25 (25)	34 (33)	26 (25)	25(25)	34 (34)	26 (26)
R7	M. & R.K. Senior	25 (25)	32 (32)	25 (25)	27(27)	34 (34)	28 (28)
R8	P.R. Rosen	24 (22)	31(30)	22 (20)	25(25)	33 (33)	26 (26)
R11	C. & K. Vella Enterprises Pty Ltd	36 (35)	36 (35)	36 (35)	36 (35)	34 (35)	35 (35)
R12	Pingama Pty Ltd	34 (35)	35 (35)	35 (35)	36 (35)	35 (35)	35 (35)
R13	J.G. Thorn	30 (30)	30 (30)	30 (30)	36 (35)	32 (32)	32 (31)
R14	G.W. Holdings Pty Ltd	30 (30)	30 (30)	30 (30)	36 (35)	33 (32)	32 (31)
R15	Flocolo Pty Ltd	29 (29)	27 (27)	24 (24)	30 (28)	29 (28)	29 (30)
R16	R.L. Lavender	29 (29)	27 (27)	24 (24)	29 (28)	29 (28)	30 (30)
R17	P. Holecek	29 (29)	27 (27)	24 (24)	30 (28)	30 (28)	31 (30)
R19*	Mulberrygong Investments Pty Ltd	20	29	<20	21	30	<20

Note: * Indicates not assessed within Spectrum (2010) as this is a new residence built since 2010.
Source: Modified after Spectrum (2015) – Table 1

Spectrum (2015) notes that the noise levels for this scenario differ by 1dB(A) to 2dB(A) and remain within the daytime construction noise criterion of 43dB(A),$L_{eq(15minute)}$ with the exception of a minor 2dB(A) exceedance at R2. It is noted that this exceedance would only occur for a short duration when bund construction is nearest to the receiver and only under a northeast wind scenario. Predominant conditions in the area are westerly winds resulting in noise levels below the criterion.

It is important to also note that the occupants of a number of residences will experience decreased noise levels as a result of the Proposal.

Table 4.5 presents the results of the noise assessment for Scenario 2.

The results in **Table 4.5** highlight that operational noise levels from extraction activities within the revised extraction area would be well below the daytime operational noise criterion of 38dB(A),$L_{eq(15minute)}$ at surrounding receivers.

Table 4.5
Scenario 2 - Predicted Operational Noise Levels

Ref	Landowner	Meteorological Condition		
		Calm	W wind	NE wind
R2	M.S. Siddle	28	28	32
R3	Cowley Hills Pty Ltd	<20	26	<20
R4	Bistro Lake Pty Ltd	<20	21	21
R5	P.A. & R.F. Rusconi	<20	22	22
R6	A.V. Dickson	<20	23	<20
R7	M. & R.K. Senior	<20	22	<20
R8	P.R. Rosen	<20	22	<20
R11	C. & K. Vella Enterprises Pty Ltd	21	22	<20
R12	Pingama Pty Ltd	22	21	<20
R13	J.G. Thorn	22	<20	<20
R14	G.W. Holdings Pty Ltd	21	<20	<20
R15	Flocolo Pty Ltd	22	22	21
R16	R.L. Lavender	22	21	20
R17	P. Holecek	21	21	20
R19*	Mulberrygong Investments Pty Ltd	20	<20	23

Note: * Indicates not assessed within Spectrum (2010) as this is a new residence built since 2010.
Source: Modified after Spectrum (2015) – Table 2

As a result of revised noise modelling undertaken by Spectrum (2015), noise levels have been calculated to remain below the relevant noise criterion at all times under certain meteorological conditions, with minor increases in noise levels of between 1dB(A) or 2dB(A) at a limited number of residences, with residences located towards the south noting an overall decrease in noise levels as a result of the Proposed Modification.

4.5 AIR QUALITY AND ENERGY

4.5.1 Introduction

The air quality assessment for the Proposed Modification was undertaken by SLR Consulting (SLR) and is reproduced in full as **Appendix 5** of this document and is referred to as SLR (2015). The assessment includes a comparison between the approved and proposed activities to determine the potential impacts of the Proposed Modification at the surrounding privately-owned residences in the vicinity of the Project Site.

4.5.2 Existing Environment

The existing environment surrounding the Project Site has not substantially changed since the original assessment undertaken by SLR (then "Heggies) in 2010 (Heggies, 2010), with the Project Site situated in a semi-rural area dominated by agriculture and livestock operations.

Due to the status of the Project, i.e. no construction activities have yet occurred, no air quality monitoring has been undertaken in the area surrounding the Project Site, with the current air quality assessment criteria as outlined within *Condition 3(9)* of PA08_0212 and repeated in **Table 4.6,** still valid for the Proposed Modification.

Table 4.6
Air Quality Criteria

Air Quality Parameter	Averaging Period	Assessment Criteria
PM_{10}	24-hour	50 µg/m^3
	Annual	30 µg/m^3
TSP	Annual	90 µg/m^3
Deposited Dust	Annual	Maximum incremental increase of 2g/m^2/month.
		Maximum Total of 4g/m^2/month
Source: Modified after Table 3 of PA08_0212		

4.5.3 Assessment of Impacts

4.5.3.1 Emissions Inventory Comparison

Within the original air quality assessment (Heggies, 2010), the emission factors were sourced from the published 2001 National Pollution Inventory (NPI). Since 2010, the emission factors have been updated to the current document NPI document, "*Emission Estimation Technique Manual (EETM) for Mining* (NPI, 2012), with all source types between the 2001 and 2010 inventory's having modified emissions factors, with the exception of bulldozer operations.

The result of these changes are specifically outlined in SLR (2015) but in summary, has resulted in an overall decrease in predicted emissions, based upon the updated emissions factors.

4.5.3.2 Proposed Changes in Emissions Inventory

The activity data used in the emissions calculations for the Proposed Modification has been reviewed by SLR and updated where required to reflect the modified extraction area layout. Specifically, the updates within the emissions inventory are as follows.

- Scraper emissions have been estimated based on 18 000m^2 being cleared to a depth of 15cm over a three month period (Stage 1).
- The distance travelled by haul trucks carrying product from the excavation area off-site has been increased by 20% to account for the slightly longer distance to the northern side of the excavation area.
- The distance travelled by haul trucks carrying overburden from the revised excavation area to the stockpile surplus overburden area has been increased from 0.6km to 0.8km.

4.5.3.3 Comparison of Results

The following discussion provides a qualitative assessment of the likely impacts on the off-site TSP, PM_{10} and deposited dust levels predicted in Heggies (2010), based on the changes in the emission inventory for the proposed activities as outlined in SLR (2015).

Annual Average TSP and PM_{10} Concentrations

Maximum off-site annual average TSP and PM_{10} concentrations predicted at the nearest sensitive receptors (R3N, R19) in Heggies (2010) were well below the relevant criteria levels. Given this, and the significant decrease in the estimated total Project Site annual emission rates for TSP and PM_{10}, it is expected that the off-site annual average concentrations presented in Heggies (2010) would be conservative over-estimates of actual impacts.

Furthermore, whilst noting that extraction would occur further north than previously assessed, the combined emission estimates for these sources (specifically, the scraper, bulldozer and truck loading emissions) have decreased by approximately 50% for both TSP and PM_{10} as a result of the 2012 revised emission factors. Based upon this, "it is predicted that this reduction in the estimated extraction-related emission rates would be expected to more than compensate for the estimated increase in emissions at all surrounding sensitive receptors."

The additional distance of truck movements travelling to the extraction area have been also predicted to still remain well below the relevant annual average TSP and PM_{10} criteria at all sensitive receptors.

24-hour PM_{10} Concentrations

In Heggies (2010), modelling of 24-hour average PM_{10} concentrations indicated the potential for exceedances of the relevant OEH criterion of 50µg/m^3 at two sensitive receptors (R3N and R19) located to the northeast of the Project Site. A review of the background dataset utilised determined that these exceedances were associated with a day when the background 24-hour average PM_{10} concentration at the Oakdale monitoring station (located 50km north of the Project Site) was abnormally high (49.2 µg/m^3). The predicted incremental impacts associated with the proposed on-site activities on this day were very low (e.g. 1.4µg/m^3 at R19).

As a result of the revised emissions inventory calculations, the proposed on-site activities would result in a slight decrease in the estimated total peak hourly emission rates for PM_{10}. On this basis, it would be expected that the maximum off-site 24-hour PM_{10} concentrations would decrease slightly. Accounting for the location of modified extraction area in regards to R3N and R19, the combined hourly emission estimates for these sources have decreased by approximately 40% for both TSP and PM_{10} as a result of the revised emission factors. These reductions would be expected to more than compensate for the estimated increase in emissions due to the additional truck movements within the Project Site.

The additional distance of truck movements travelling to the extraction area have been also predicted to still remain well below the relevant 24-hour PM_{10} criteria at all sensitive receptors.

Monthly Dust Deposition Rates

Given the significant decrease in the estimated total Project Site annual emission rates for TSP, it is expected that the off-site annual average monthly deposition rates calculated at being below the nominated criteria as presented in Heggies (2010), would be conservative over-estimates of actual impacts and remain well below criteria levels.

4.5.4 Management and Mitigation Measures

It is proposed that all management and mitigation measures within RWC (2010) would remain unchanged and be implemented along with the following management measures outlined in **Table 4.7**.

Table 4.7
Proposed Air Quality Management Measures

Source	Control Procedures	Personnel Responsible
General	• Visually inspect operations for visible dust and adjust operations to reduce visible dust.	Quarry supervisor
Clearing Operations	• Disturb only the minimum area necessary for quarrying and related operations.	Quarry Supervisor
	• Maintain water sprays/water truck on stockpiles to minimise the generation of dust, as required.	Quarry Supervisor All personnel
Soil Stripping	• Maintain water sprays/water truck on stockpiles to minimise the generation of dust, as required.	Quarry Supervisor All personnel
Topsoil Stockpiles	• Revegetate long term topsoil stockpiles.	Quarry Supervisor
Loading of clay/shale	• Minimise the drop heights between front-end loader buckets and truck carrying quarry materials.	Quarry Supervisor and Equipment Operators
Internal Roads	• All unsealed roads and trafficked areas will be watered, as required, to minimise the generation of dust.	Quarry Supervisor
	• Enforce a speed limit of 40 km/hr on the site access road and 20 km/hr on all unsealed roads within the Site.	All personnel
	• All roads will have edges clearly defined with marker posts or equivalent to control their locations.	Quarry Manager
	• Development of minor roads or tracks will be limited and the locations of these clearly defined.	Quarry Manager
	• Obsolete roads will be ripped and re-vegetated.	Quarry Manager
Product Stockpiles	• Maintain product handling areas / stockpiles in a moist condition as required to minimise wind-blown and traffic-generated dust.	Quarry Manager
Transportation Product	• Maximise truck capacities to reduce the number of movements necessary to transport products.	Quarry Manager
	• Cover all loads with tarps prior to leaving site.	Quarry Supervisor
Rehabilitation	• Establish the interim or final landform as soon as areas become available for rehabilitation.	Quarry Manager
	• Revegetate interim or final landforms as soon as conditions are favourable.	Quarry Manager
	• Apply dust suppressants if conditions are not favourable for the establishment of vegetation.	Quarry Supervisor

4.5.5 Assessment of Impacts

The Proposed Modification has the potential to increase the air quality emissions at sensitive receptors. However, SLR (2015) has calculated that as a result of the revised emission inventory when compared to the previous 2010 air quality assessment, as well as the implementation of the proposed management measures, the identified sensitive receptors would not be adversely affected as a result of the Proposed Modification.

4.6 SURFACE WATER

4.6.1 Introduction

A revised surface water assessment for the Proposed Modification was undertaken by Strategic Environmental and Engineering Consulting (SEEC) and is reproduced in full as **Appendix 6** of this document and is referred to as SEEC (2015). The assessment includes a comparison between the approved and proposed activities to determine the potential impacts of the Proposed Modification.

4.6.2 Existing Environment

A description of the regional, local and Project Site drainage is provided in Section 5.2 of RWC (2010) and remains unchanged from the time that document was prepared. Furthermore, reliance upon water quality and soil testing undertaken within RWC (2010) has been utilised in regards to surface water quality and soil characteristics including for erodibility, sediment basin sizing and dispersion.

The modified extraction area is situated within Catchments A and B, as outlined on **Figure 4.5,** with all surface water flowing in a northerly direction, eventually reaching the Wingecarribee River via undefined watercourses within and adjacent to the Project Site. Catchment C is located upstream of the modified extraction area and would not be impacted upon by the Proposed Modification.

The Project Site includes five existing farm dams (numbered 1 to 5) and are shown on **Figure 4.5**.

4.6.3 Revised Water Management Structures and Water Usage Calculations

4.6.3.1 Water Management Structures and Harvestable Rights Capacity

Whilst it is noted that the catchments within the Project Site have not changed, the location of the revised extraction area requires revised clean water and dirty water sediment dams to be sized and constructed, along with an updated calculation of harvestable rights capacity for the entire Mandurama Property.

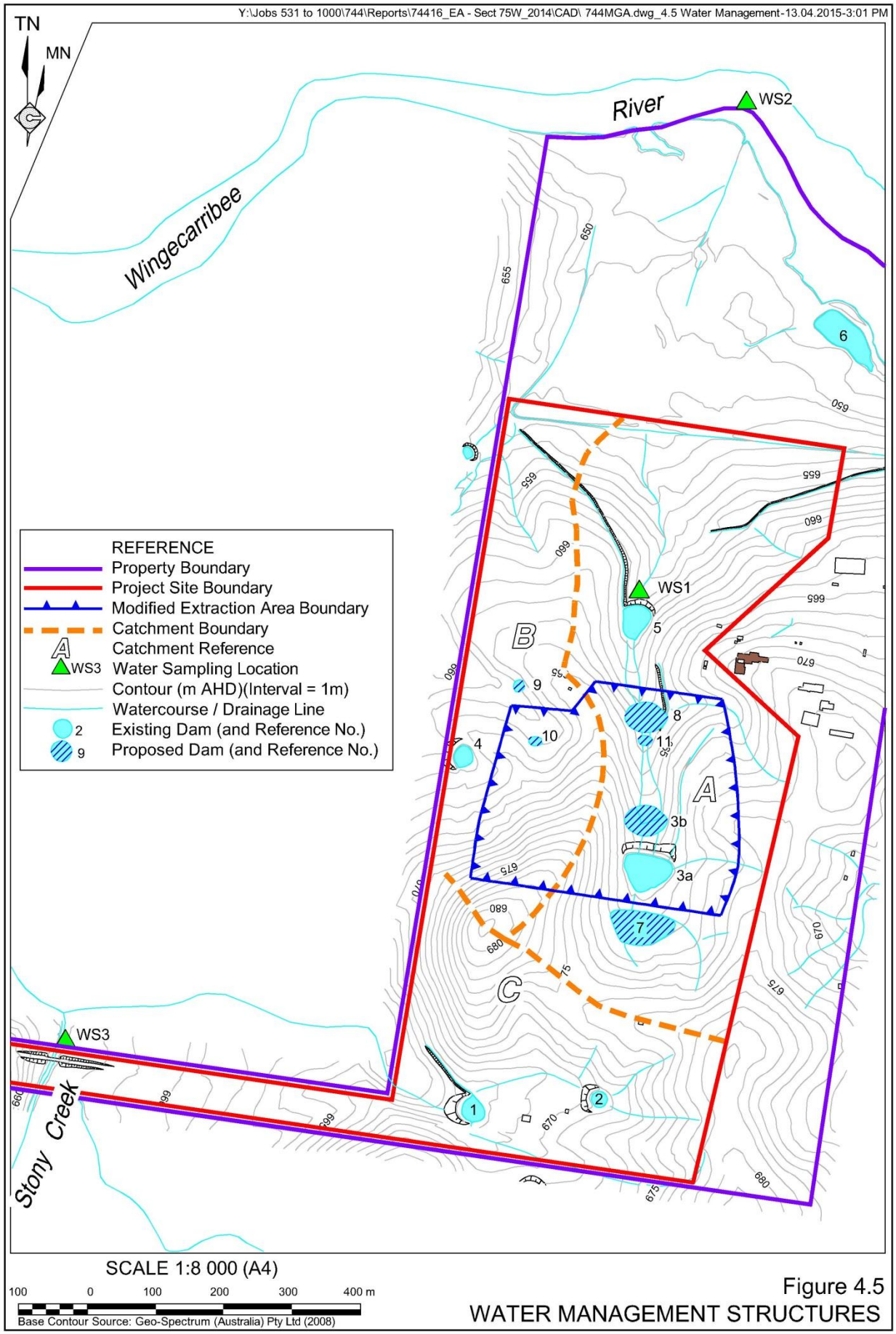


Figure 4.5
WATER MANAGEMENT STRUCTURES

Revised clean water and dirty water sedimentation dams have been designed by SEEC throughout the construction and operational stages of the Project, with a required total of 11 sediment basins outlined in **Table 4.8** and shown on **Figure 4.5**. **Table 4.8** defines the new dams required as a result of the Proposed Modification and also outlines the total volumes of each dam that would be included within the harvestable rights capacity for the Project Site, with further detail outlined in Section 5.2 of SEEC (2015), noting that dams or basins constructed for the purposes of maintaining water quality (e.g. sedimentation basins) are exempt from the harvestable right calculation. Overall, based upon the 100.2ha area of the Proponent's property, the maximum harvestable right capacity equates to, and remains at, 8.52ML, with the Proposed Modification utilising all 8.52ML through the combined quarry-related and agricultural activities to occur on the Mandurama property.

Table 4.8
Revised Water Management Structures

Dam ID*	Establish Stage 1	Operation Stage 1	Establish Stage 2	Operation Stage 2	Size (ML)	Management / Water Usage	Harvestable Rights Volume allowance (ML)
1#	Dirty	Clean	Clean	Clean	Existing (1.43ML)	Sediment dam during Stage 1 establishment No management or re-use when clean	2.12 (when combined with Dam 4)
2	Dirty	Dirty	Dirty	Dirty	Increased to 1.8ML	Sediment dam for all stages	0
3	Dirty	NA (removed)	NA (removed)	NA (removed)	Existing (4.45ML)	Sediment dam during Stage 1 establishment then decommissioned (moved to 3b)	0
3b#	Dirty	Dirty	Dirty	Dirty	(0.6ML) during Stage 1 establishment 2ML sump size for remaining stages	Sediment dam during Stage 1 establishment and active Quarry Sump for remaining stages. Average of approximately 20% of volume capacity pumped to Dam 7 (Remaining water infiltrated, evaporated or released (after flocculation if required).	0 (included in Dam 7 calculations)
4	Dirty	Clean	Dirty	Clean	Enlarged to 1.4ML	Sediment dam during both establishment stages No management or re-use when clean	0 (see Dam 1)
5	Clean	Clean	Dirty	Clean	Existing (2.36ML)	Sediment dam when dirty (Stage 2 establishment) No management or re-use when clean	2.36
6	Clean	Clean	Clean	Clean	Existing (2.50ML)	Not related to the Project Site operations (farm use)	2.50
7#	Dirty	Dirty	Dirty	Dirty	6.94 (Total)	Maintain 5.4ML volume for storm capture. Additional 1.54ML volume used for dust suppression Washdown water	1.54 (water also sourced from Dam 3b and Dam 8)

Table 4.8 (Cont'd)
Revised Water Management Structures

Dam ID*	Establish Stage 1	Operation Stage 1	Establish Stage 2	Operation Stage 2	Size (ML)	Management / Water Usage	Harvestable Rights Volume allowance (ML)
8#	NA	NA	NA	Dirty	Undefined sump size.	Sediment dam during Stage 2 operations. Average of 20% of volume capacity pumped to Dam 7 (Remaining water infiltrated, evaporated or released (after flocculation if required).	0 (see Dam 3b)
9#	NA	NA	Dirty	NA	0.64	Sediment dam during Stage 2 establishment then decommissioned	0
10#	Dirty	NA	NA	NA	0.23	Sediment dam during Stage 1 establishment then decommissioned.	0
11#	Dirty	NA	NA	NA	0.40	Sediment dam during Stage 1 establishment then decommissioned.	0
Total							**8.52ML**

* See **Figure 4.5**
\# Indicates new/revised dam to that outlined in RWC (2010)
Source: SEEC (2015) – Modified after Table 8

All sediment basins have been appropriately sized based upon the 5-day, 85 percentile rainfall events in accordance with DECC (2008) and Landcom (2004) with the exception of Dam 2 sized to capture 5-day, 95 percentile rainfall events due to its extended operational life (i.e. greater than 3 years). Furthermore, Dam 7 has been sized to contain a total of 6.94ML, taking into account the capture of a 24 hour/100 year storm event (totalling 5.4ML) and providing an allowance for an additional 1.54ML for dust suppression sourced from within the extraction area (Dam 3b and Dam 8) throughout the life of the Project. It is noted that this additional 1.98ML may remain with the sump on the extraction floor.

4.6.3.2 Water Balance

The revised water balance takes into account the following three demands for water:

- Staff requirements;
- Dust suppression; and
- Equipment wash down, if required.

Ablutions would be supplied by imported potable water with no on-site water used for this purpose.

Based upon the following assumptions and the information outlined within RWC (2012), the average demand for dust suppression would total a maximum of 17kL/day (on dry operational days), with water sourced from Dam 7 (1.54ML capacity at any one time) for this purpose.

Equipment wash down amounts, if required, would be minimal based upon the campaign nature of the Project, with a likely rate of 2 000L/day per operational day (assumed 90 days per year). Water for this purpose would also be sourced from Dam 7.

Section 5.4.3 of SEEC (2015) confirms that the Project does not require make up water based upon the amount of water available within Dam 7 and the water requirements of the Proposed Modification.

4.6.4 Management and Mitigation Measures

Commitments made previously regarding the management of surface water within the Project Site and described within RWC (2010) would remain, with a log maintained showing re-use and pumping volumes to demonstrate to the consent authorities that the harvestable right is not being exceeded. No additional management or mitigation measures are required.

4.6.5 Assessment of Impacts

The revised surface water management structures, to be constructed as a direct result of the Proposed Modification, have been designed in accordance with the appropriate sizing methods to ensure that the design of the revised extraction area would not impact the downstream environment whilst ensuring that the Project utilises its maximum harvestable rights capacity. No licences are required for any water sharing plans as all water sourced for the Project would be utilised from the Proponent's maximum harvestable rights capacity.

The proposed management and mitigation measures outlined in RWC (2010) would continue to be implemented throughout the life of the Project, resulting in negligible surface water-related impacts on the local or surrounding environment.

4.6.6 Monitoring

The program of surface water monitoring recorded within RWC (2010), as well as those conditions outlined within the required Environment Protection Licence would be maintained.

4.7 GROUNDWATER

4.7.1 Introduction

An assessment of groundwater has been undertaken for the Proposed Modification, drawing information from RWC (2010) to determine the potential impact of the Proposed Modification on the existing groundwater table. The following subsections present an assessment of groundwater-related impacts as a result of the Proposed Modification.

4.7.2 Existing Environment

As outlined within RWC (2010), exploratory drilling completed in 2008 did not intercept groundwater when drilling to elevations of approximately 630m AHD, 10m below the proposed limit of extraction. Similar observations were made with the 2014 drilling which extended to elevations of 635m AHD.

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.

4.7.3 Assessment Methodology

It is proposed that clay/shale would be extracted to approximately 640m AHD. Since groundwater was not encountered at this elevation during drilling investigations, 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 also has no intention of using any groundwater for activities associated with the proposed quarry.

4.7.4 Management and Mitigation Measures

No management of mitigation measures are proposed as it is considered that groundwater would not be intercepted by the Proposal.

4.7.5 Assessment of Impacts

It is determined that there would be no impacts on groundwater.

4.8 SOIL AND LAND CAPABILITY

4.8.1 Introduction

An assessment of soil and land capability has been undertaken for the Proposed Modification, drawing information from RWC (2010) to determine the potential impact of the additional soil disturbed. The following subsections present an assessment of soil-related impacts as a result of the Proposed Modification.

4.8.2 Existing Environment

The relocation of the extraction area would disturb the following Soil Management Units (SMU) as described and outlined within Geoff Cunningham Natural Resource Consultants (2010b).

- Approximately 5.6ha of SMU 1 (see **Figure 4.6)**, a soil management unit summarised in RWC (2010) as "*occurring on the midslopes, lower slopes and drainage depressions … 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*."

- Approximately 5.0ha of SMU 2 (see **Figure 4.6)**, a soil management unit summarised in RWC (2010) as "*occurring 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 4.6 also outlined the Land and Soil Capability class utilising the Land and Soil Capability (LSC) system currently in use in NSW (as of September 2012), building upon the former 'rural land capability classification system' used by the Soil Conservation Service of NSW that was used in RWC (2010). Land defined as Class 3 'Moderate limitations' and Class 4 'Moderate to severe limitations' exist within the revised extraction area, indicating that the land in suitable for grazing purposes but not medium to extensive agriculture.

4.8.3 Management and Mitigation Measures

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 2.14.

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

iii) To ensure that the soil profile on the final landform is adequate to support the final land uses proposed in Section 2.14.4.

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

Soil would be managed with the same mitigation measures as outlined within Section 5.9 of RWC (2010), in accordance with the recommendations of Geoff Cunningham Natural Resource Consultants (2010b) and as outlined in Section 2.6.5.

It is important to note that in addition to RWC (2010) and Geoff Cunningham Natural Resource Consultants (2010b), topsoil would be preferentially transferred directly to active rehabilitation areas on the visual amenity barriers during Stage 1 of the Proposed Modification.

4.8.4 Assessment of Impacts

The management procedures for the topsoil and subsoil resource as set out in Section 5.9 of RWC (2010) and Section 4.4.3 have been designed to ensure their proper handling and to provide the maximum opportunity for their 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 based upon the Proposed Modifications.

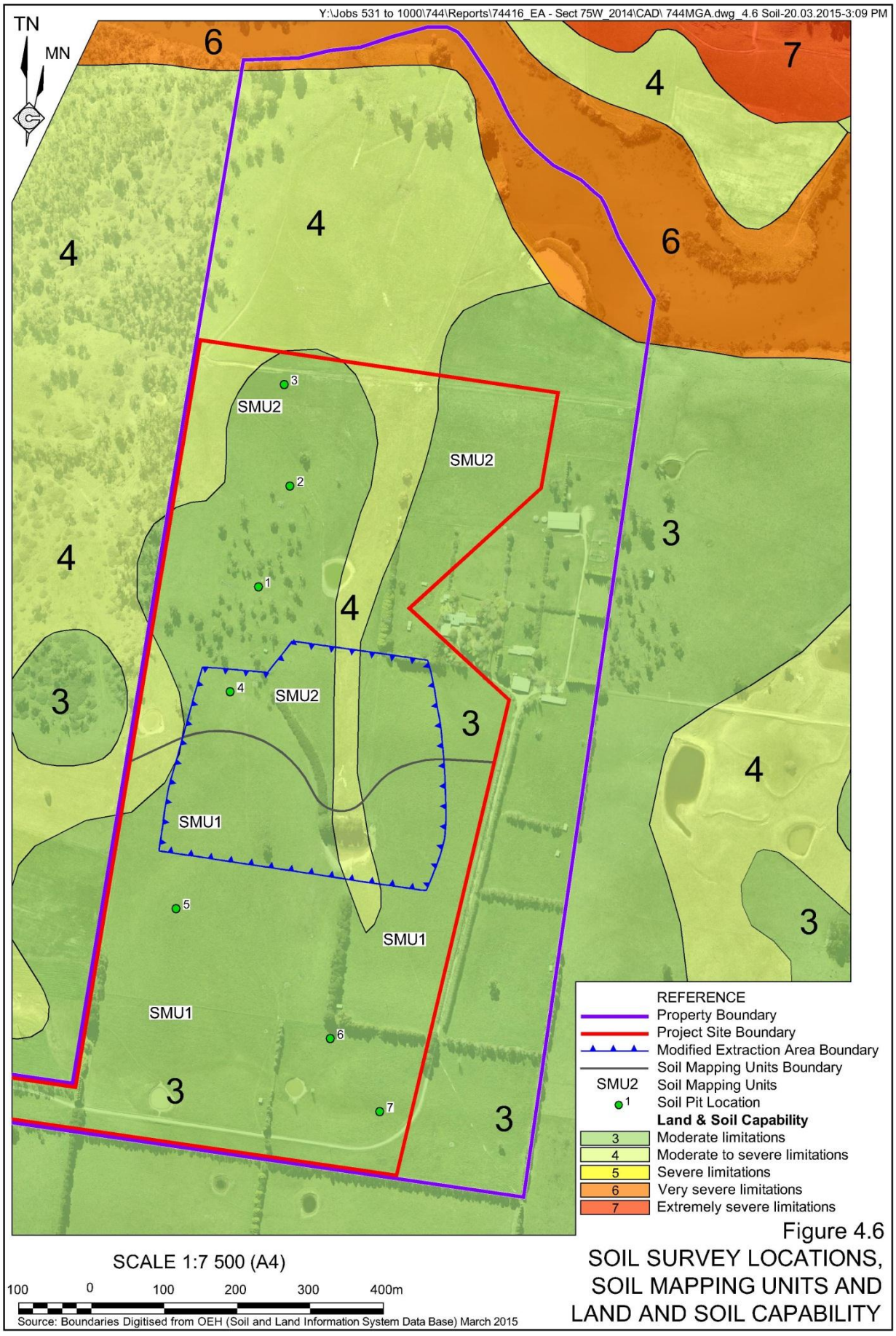


Figure 4.6
SOIL SURVEY LOCATIONS, SOIL MAPPING UNITS AND LAND AND SOIL CAPABILITY

Assuming the final landform is created as described in Section 2.12 and presented on **Figure 2.8**, with shallow slopes over the completed floor of the extraction area, a cover of topsoil, retained water storages, growth of and vegetation to suit the final land use, it is considered likely that the capability of much of the final landform within the floor of the extraction area would approximate that of the pre-quarry environment and could be used for grazing purposes. Approximately 3.2ha of the final landform would comprise extraction faces and benches which would not be suitable for agriculture.

Overall, the management of soil would be suitable managed throughout the life of the Project and utilised in a manner that would enable similar pre-extraction grazing and agricultural activities to occur following rehabilitation.

4.9 FLORA AND FAUNA

4.9.1 Introduction

A Flora Assessment to support the original application for Project Approval was undertaken by Geoff Cunningham Natural Resource Consultants over the entire Project Site and is referenced as Geoff Cunningham Natural Resource Consultants (2010a).

A Fauna Assessment to support the original application for Project Approval was undertaken by Aquila Resource Consultants (Aquila) and is referenced as Aquila (2010).

The following subsections consider the potential flora and fauna impacts resulting from the Proposed Modification and the management measures proposed to be maintained and/or implemented.

4.9.2 Existing Environment

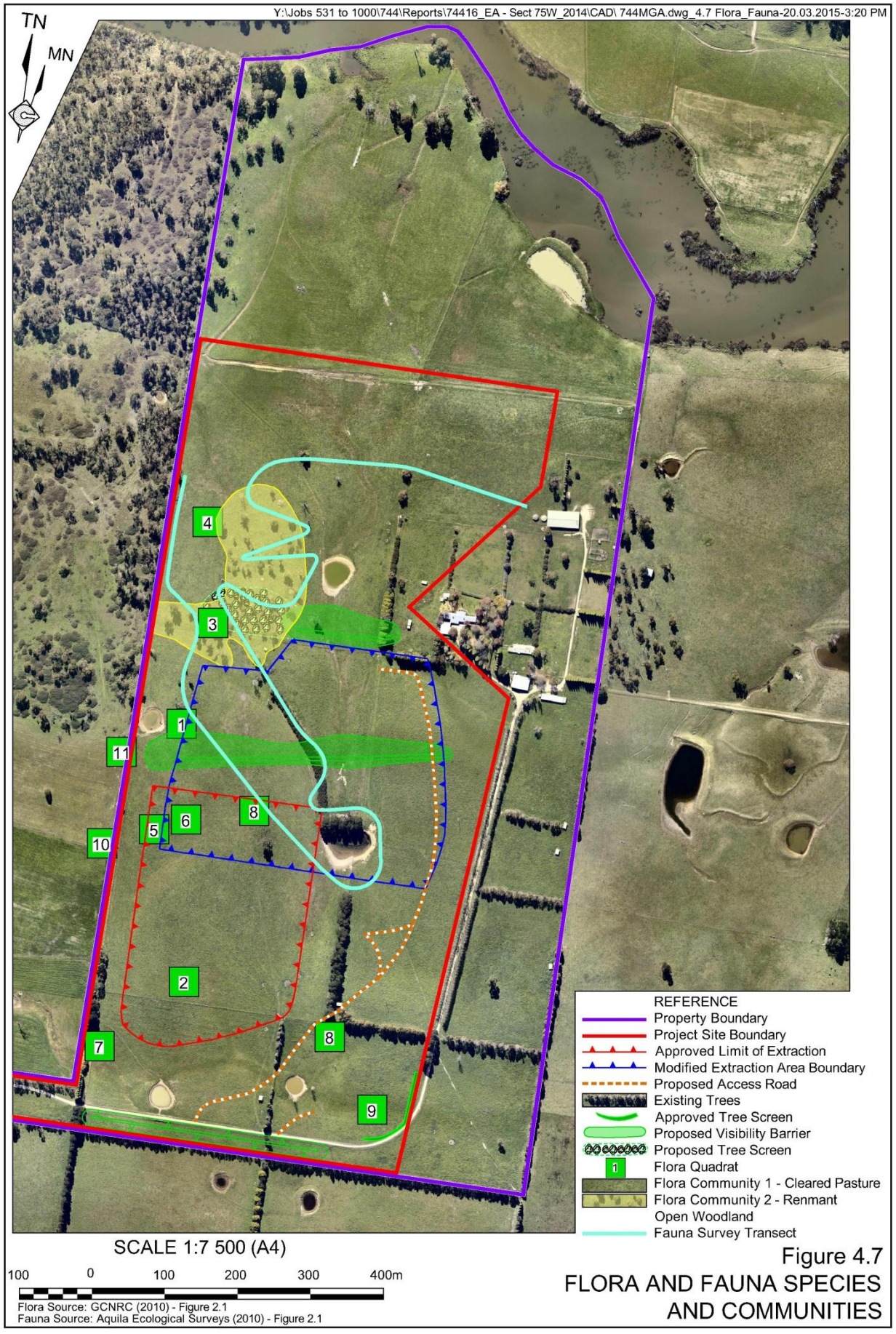
Flora

The vegetation communities within the Project Site identified by Geoff Cunningham Natural Resource Consultants (2010a) as the result of field surveys and literature reviews are displayed on **Figure 4.7** and identified as two separate communities, namely.

- Community 1 – Cleared Pastureland Community; and
- Community 2 – Remnant Open Woodland Community

Community 1 is the dominant vegetation community within the Project Site. It is almost completely cleared of trees and shrubs and sown with ryegrass with a range of weeds evident within the groundcover. A small number of established eucalypts occur within the Project Site but are not native to Berrima area. A row of non-indigenous trees traverse the relocated extraction area.

A total of 10.6ha of Community 1 would be disturbed by the Proposed Modification.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REFERENCE
Property Boundary
Project Site Boundary
Approved Limit of Extraction
Modified Extraction Area Boundary
Proposed Access Road
Existing Trees
Approved Tree Screen
Proposed Visibility Barrier
Proposed Tree Screen
1
Flora Quadrat
Flora Community 1 - Cleared Pasture
Flora Community 2 - Renmant
Open Woodland
Fauna Survey Transect
SCALE 1:7 500 (A4)
100 0 100 200 300 400m
Flora Source: GCNRC (2010) - Figure 2.1
Fauna Source: Aquila Ecological Surveys (2010) - Figure 2.1
Figure 4.7
FLORA AND FAUNA SPECIES AND COMMUNITIES

Community 2 is an open woodland remnant in the centre of the Project Site (and revised extraction 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 2010 survey quadrats). The groundcover is comprised of a mixture of the ground cover species listed for Community 1, with few native groundcover species present.

None of the area of Community 2 would be disturbed by the Proposed Modification.

Fauna

The fauna survey conducted by Aquila (2010) identified the presence of common native species such as Willie Wagtail (*Rhipidura fuliginosa*), Australian Magpie (*Gymnorhina tibicens*), Eastern Rosellas (*Platycercus eximius*), Australian Raven (*Corvus coronoides*), Maned Duck (*Chenonetta jubata*) and Australasian Grebe (*Tachybaptus novaehollandiae*).

No threatened fauna species was detected during the field survey. It is considered unlikely that any of the threatened species listed in as occurring within the surrounding regional (5km) area would inhabit the Project Site due to lack of suitable vegetation.

Weeds

Two of the nineteen groundcover species recorded within the Project Site 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 NSW Trade and Investment – Department of Primary Industries website (27 February 2015) indicates that there are no noxious weed species within the Project Site.

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 Project Site.

It is considered that the Project Site still does not contain any potential Koala habitat because the 2010 field surveys did not identify any Koala feed trees, with no dominant trees being recently established within the Project Site since 2010.

Threatened Species and Communities

Searches of the following databases originally completed by Geoff Cunningham Natural Resource Consultants (2010a) and Aquila (2010), were again searched on 25 February 2015 using a 10km by 10km search area to determine if any additional threatened species had been added to the databases and could potentially be impacted by the Proposed Modification.

- NPWS Flora Atlas.
- DEWHA Protected Matters Search Tool.
- PlantNet/Flora Online (BioNet).

Table 4.9 presents the additional threatened species added to the above databases since Geoff Cunningham Natural Resource Consultants (2010a) and Aquila (2010) and identified as potentially occurring within the Project Site. **Table 4.9** also identifies the habitat requirements for each species sourced from the Office of Environment and Heritage threatened species website and whether such habitat exists within the Project Site. For those species for which habitat exists within the Project Site, further assessment is provided in Section 4.9.4.

Table 4.9
Additional Listed Species with Potential to Occur within the Project Site

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Species	Act and Classification	Habitat Requirement	Habitat Potentially Present in Project Site
Terrestrial Flora			
Hoary Sunray (*Leucochrysum albicans var. tricolor*)	EPBC (Endangered)	Occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega and Goulburn, with a few scattered localities know from beyond this region. Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Highly dependent on the presence of bare ground for germination.	Yes
Terrestrial Fauna			
Birds			
Regent Honeyeater *(Anthochaera Phrygia)*	EPBC (Endangered)	Regent Honeyeaters occur mainly in dry box ironbark open-forest and woodland areas inland of the Great Dividing Range, particularly favouring those on the wettest, most fertile soils, such as along creek flats and broad river valleys	No
Eastern Bristlebird (*Dasyornis brachypterus*)	EPBC (Endangered)	The Eastern Bristlebird inhabits low dense vegetation in a broad range of habitat types including sedgeland, heathland, swampland, shrubland, sclerophyll forest and woodland, and rainforest. The Eastern Bristlebird is found in habitats with a variety of species compositions, but are defined by a similar structure of low, dense, ground or understorey vegetation	No
Australian Painted Snipe (*Rostratula australis*)	EPBC (Endangered)	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.	No
Frogs			
Stuttering Frog / Southern Barred Frog (*Mixophyes balbus)*	EPBC (Vulnerable)	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	No
Littlejohn's Tree Frog, Heath Frog (*Litoria littlejohni)*	EPBC (Vulnerable)	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground	No
Giant Burrowing Frog (*Heleioporus australiacus*)	EPBC (Vulnerable)	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat of this species is generally soaks or pools within first or second order streams.	No

Table 4.9 (Cont'd)
Additional Listed Species with Potential to Occur within the Project Site

Species	Act and Classification	Habitat Requirement	Habitat Potentially Present in Project Site
Terrestrial Fauna (Cont'd)			
		Mammals	
Large-eared Pied Bat, Large Pied Bat (*Chalinolobus dwyeri*)	EPBC (Vulnerable)	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	No
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus*)	EPBC (Endangered)	Spotted-tailed quolls live in various environments including forests, woodlands, coastal heathlands and rainforests. They are sometimes seen in open country, or on grazed areas and rocky outcrops. They are mainly solitary animals, and will make their dens in rock shelters, small caves, hollow logs and tree hollows.	No
Southern Brown Bandicoot (*Isoodon obesulus*)	EPBC (Endangered)	Southern Brown Bandicoots (eastern) are known to inhabit a variety of habitats including heathland, shrubland, sedgeland, heathy open forest and woodland and are usually associated with infertile, sandy and well drained soils, but can be found in a range of soil types. Within these vegetation communities they typically inhabit areas of dense ground cover which contains understorey vegetation structure with 50–80% average foliage density in the 0.2–1 m height range	No
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	EPBC (Vulnerable)	This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks	No
Long-nosed Potoroo (*Potorous tridactylus tridactylus*)	EPBC (Vulnerable)	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	No
New Holland Mouse (*Pseudomys novaehollandiae*)	EPBC (Vulnerable)	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	No
		Migratory Fauna	
Swift Parrot (*Lathamus discolour)*	EPBC (Endangered)	Key habitats for the species on the coast and coastal plains of New South Wales include Spotted Gum (*Corymbia maculata*), Swamp Mahogany (*E. robusts*), Red Bloodwood (*Eucalyptus gummifera*) and Forest Red Gum (*E. tereticornis*) forests These tree species provide foraging and roosting habitat for the species. It is noted that breeding occurs exclusively in Tasmania	No

Source: NSW OEH - http://www.environment.nsw.gov.au/threatenedspeciesapp/profile
Australian Commonwealth Department of the Environment
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl

The Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion Endangered Ecological Community (EEC) was listed as an endangered ecological community within the *Environment Protection and Biodiversity Conservation Act 1999* by the Threatened Species Scientific Committee in 2011.

Whilst this EEC is noted as occurring within the vicinity of the Project Site, this community has been determined not to exist within the Project Site due to the cleared nature of the revised extraction area and the lack of required Eucalypt and associated vegetation within the Project Site to constitute this community.

It is also confirmed that the critically endangered White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as Critically Endangered within the schedules of the EPBC Act) does not occur within the Project Site, as outlined within since Geoff Cunningham Natural Resource Consultants (2010a).

4.9.3 Management and Mitigation Measures

All management and mitigation measures identified in RWC (2010) would continue to be implemented. In addition, all sediment controls for the revised extraction area (see Section 4.6.4) would be fully implemented to minimise the potential for damage to downstream habitats from the Project Site.

4.9.4 Assessment of Impacts

Table 4.10 presents an assessment of the anticipated impacts on species identified in **Table 4.9** as having the potential to occur in the vicinity of the Project Site and having habitat available in the Project Site.

The Proposed Modification has been determined that no significant adverse impact would occur on any flora or fauna species, population or communities listed within the schedules of the TSC Act or EPBC Act.

4.10 ABORIGINAL HERITAGE

4.10.1 Introduction

An assessment of Aboriginal Heritage has been undertaken for the Proposed Modification, drawing information from RWC (2010) to determine the potential impact of the additional landscape disturbed. The following subsections present an assessment of heritage-related impacts as a result of the Proposed Modification.

Table 4.10
Additional Commonwealth (EPBC) Listed Species – Impact Assessment

Species: Hoary Sunray (*Leucochrysum albicans var. tricolor*)	
Habitat Requirement: Occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega and Goulburn, with a few scattered localities know from beyond this region. Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Highly dependent on the presence of bare ground for germination.	
Criteria (Endangered Species)	
An action is likely to have a significant impact on a vulnerable species if there is a real change or possibility that it will:	
• lead to a long-term decrease in the size of an important population of a species.	The habitat of the Hoary Sunray has the potential to occur within the Project Site but would not be impacted upon by the Proposed Modification due to no known individuals or populations to occur within the Project Site and the relatively small area of disturbance (12 hectares) within a significantly larger area with similar or better habitat in the surrounding area.
• reduce the area of occupancy of an important population.	
• fragment an existing important population into two or more populations.	
• adversely affect habitat critical to the survival of a species.	
• disrupt the breeding cycle of an important population.	
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	The Proposed Modification would not contribute to an invasive species becoming established.
• introduce disease that may cause the species to decline, or	The Proposed Modification would not contribute to introduction of a disease that may cause the species to decline.
• interfere substantially with the recovery of the species.	The Proposed Modification would not interfere substantially with the recovery of the species.
Summary: As the habitat for the Hoary Sunray would not be impacted upon by the Proposed Modifications, no associated impacts are anticipated.	

4.10.2 Existing Environment

A review of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 24 February 2015, reconfirming the results from the 2010 survey that no sites have been identified occurring within the Project Site. Two sites were noted as being 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 and have been determined as not being located within any areas of disturbance resulting from the Proposed Modification.

4.10.3 Consultation

It is envisaged that the consultation previously undertaken as part of the original application for Development Consent in 2010 by the Project archaeologist (Archaeological Surveys and Report Pty Limited (ASR)) is sufficient for the Proposed Modification as extensive field studies were undertaken over the entire Project Site, which includes the revised extraction area. Furthermore,

no Aboriginal heritage sites, items or relics were located during the extensive 2010 field surveys, with the predictive model included in the 2010 report by (ASR, 2010) identifying that sites are not likely to be located within the vicinity of the extraction area based upon the lack of easily accessible water and previous historical disturbance (grazing) within the Project Site.

Notwithstanding the above, the Registered Aboriginal Parties involved in the 2010 field work undertaken as part of the original application for Development Consent, would be provided a digital copy of this document for their records.

4.10.4 Management and Mitigation Measures

The Proponent would ensure that the measures identified in Section 5.10.5 of RWC (2010) would continue to be implemented throughout the life of the Project.

4.10.5 Assessment of Impacts

It is determined that there would be no impacts on Aboriginal Heritage.

4.11 EUROPEAN CULTURAL HERITAGE

Based on the Risk Analysis undertaken within RWC (2010) and the identification of no European Heritage items within the Project Site, the potential impacts upon European heritage are extremely unlikely.

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 closest 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 revised extraction area with no impacts on European cultural heritage anticipated as a result of the Proposed Modification.

4.12 BUSHFIRE

The Proposed Modification would not result in additional infrastructure being constructed in the vicinity of vegetated areas. The revised extraction area and all infrastructure would be constructed in cleared land.

During the land preparation activities, portable firefighting equipment would be positioned around the construction site to limit the potential for operating machinery to ignite spot fires within the surrounding ground cover vegetation.

As a result, the Proposed Modification would not result in an increase in the risk of bushfire within the Project Site and no additional bushfire-related impacts are anticipated to those previously assessed in RWC (2010).

4.13 TRAFFIC AND TRANSPORTATION

The Proposed Modification would result in no change to the approved transportation routes or volumes identified in Section 2.8.3 and 2.8.4 respectively. Similarly, no change to the approved hours of transportation are proposed and therefore, it has been determined that no additional traffic or transport-related impacts would occur as the result of the Proposal.

4.14 SOCIO-ECONOMIC

The socio-economic impacts of the Proposed Modification would include the following.

- Provide accessibility to a higher quality clay/shale resource for the ongoing manufacture of dry pressed bricks at the Bowral Brick Plant.
- Direct employment of 4 persons during both the construction and operational phases of the Project, as well as some employment for local contractors and service companies providing mechanical, technical and ancillary services.
- Expenditure of an approximately $8 million per year in the local and regional economy over the life of the Project.
- Improved extraction material efficiencies and therefor Project robustness and maximising benefits for the community and surrounding businesses.

As a result of the above, the Proponent contends that the Proposed Modification would result in an overall net benefit change to the socio-economic benefit when compared with the approved Project.

5. JUSTIFICATION OF THE PROPOSED MODIFICATION

This *Environmental Assessment* has been prepared to assist in the assessment of the likely environmental impacts associated with the revised extraction area within the Mandurama Property, New Berrima.

The Proposed Modification would permit high quality materials to be extracted from the revised extraction area and provide the Bowral brick making plant with sufficient, locally-sourced resources to continue to make varied brick products.

It is concluded the Proposed Modification would not result in any significant environmental impacts, particularly in those environmental areas which have the potential to be impacted upon, that is, being:

- Visual Amenity;
- Noise;
- Air quality; and
- Surface Water.

The Proposed Modification therefore, would allow for up to 150 000tpa of clay/shale products to be extracted from the modified extraction area within the Project Site, whilst not imposing any significant environmental impacts upon local residents and sensitive receivers.

6. REFERENCES

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