ABN: 61 167 710 545

Environmental Impact Statement

for

Maroota Central Civil Quarry



July 2024

Prepared by:

RWCorkery&co

ACKNOWLEDGEMENT

R.W. Corkery & Co. acknowledge and pay our respects to the Traditional Custodians of the lands comprising NSW and Australia on which our projects are located. We appreciate the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

ABN: 61 167 710 545

Environmental Impact Statement

for

Maroota Central Civil Quarry

Prepared for:

Central Civil (NSW) Pty Ltd
ABN: 61 167 710 545

Telephone: 0499 010 000
Email: sarkis@centralcivilnsw.com.au

Suite 3b, Building 4
256b New Line Road
DURAL NSW 2158

Prepared by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Telephone: (02) 9985 8511
Email: admin@rwcorkery.com
Postal: PO Box 1796
CHATSWOOD NSW 2057

Sydney | Orange | Townsville

Sydney
Suite 12.01, 1-5 Railway Street
CHATSWOOD NSW 2067

Orange
62 Hill Street
ORANGE NSW 2800

Ref No. 1055/02 July 2024

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Author's Certification

for the submission of an Environmental Impact Statement prepared in accordance with the *Environmental Planning and Assessment Act 1979*.

a) EIS prepared by:

name: Samuel Rosek
qualifications: B.Sc. (Palaeobiology)
address: Suite 12.01, North Tower
1-5 Railway Street
CHATSWOOD NSW 2067

b) Development application by:

applicant name: Central Civil (NSW) Pty Ltd
applicant address: Suite 3b, Building 4,
256b New Line Road
DURAL NSW 2158

c) Application Number: PAN-435864

d) Address/land details:

Properties to be developed Land Description:

Lot Number	Deposited Plan
1 and 2	609224
Unnamed Crown road reserve	

e) Project Outline: The proposal involves the development and operation of the Maroota Central Civil Quarry. Annual production and transportation would be a maximum of 30,000 tonnes per year.

f) Assessment of Environmental Impact: The assessment of environmental impacts of this project includes the matters referred to in the Secretary's Environmental Assessment Requirements provided to the Applicant on 2 December 2022 under Part 8, Division 2 of the *Environmental Planning and Assessment Regulation 2021*.

g) Declaration: I, Samuel Thomas Rosek, hereby declare that I have overseen the preparation of the contents of this assessment and to the best of my knowledge:

i) this EIS has been prepared in accordance with the requirements of Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2021;*

ii) the document contains all available information that is relevant to the environmental assessment of the proposed development; and

iii) that the information contained in the document is neither false nor misleading.

Signature: _____

Name: Samuel Rosek Date: 19 July 2024

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Appendix 5 Noise and Vibration Impact Assessment prepared by Muller Acoustic Consulting Pty Ltd

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Executive Summary

This *Environmental Impact Statement* (EIS) has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd ("the Applicant"), to support a development application submitted to Hornsby Shire Council ("Council") for the proposed development and operation of the Maroota Central Civil Quarry ("the Quarry"). The "Quarry Site" is located within Lots 1 and 2 DP609224 (owned by the Applicant) as well an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (see **Figure ES1**).

The Applicant is seeking development consent for the establishment and operation of extraction operations within the Quarry Site. These activities are collectively referred to as "the Proposal".

The Proposal is classified as "Designated Development" and "Regional Development" and therefore requires development consent to be issued by the Sydney North Planning Panel. In order to obtain development consent, the development application for the Proposal needs to be accompanied by an EIS. The Proposal is also classified as "Integrated Development" as it would require an Environmental Protection Licence under the *Protection of the Environment Operations Act 1997* for the proposed mobile crushing operations, a permit under Section 138 of the *Roads Act 1993* and an activity approval for disturbance within 40m of waterfront land under the *Water Management Act 2000*.

The EIS has been prepared in accordance with Secretary's Environmental Assessment Requirements (EAR 1741) which were accompanied by additional assessment requirements provided by various State government agencies and Hornsby Shire Council.

Description of the Proposal

The principal resources proposed to be extracted at the Quarry have been identified as a generally massive, cross-bedded, relatively homogenous quartz arenite within the Hawkesbury Sandstone, a unit deposited during the Middle Triassic (approximately 247.2 to 242.0 million years ago). The Applicant conservatively estimates that the estimated available resource is approximately 575,000 tonnes of material to be recovered during the life of the Proposal.

The Applicant is seeking development consent for the following activities.

i) Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone, friable sandstone and select and general fill.

ii) Crushing and screening of friable sandstone and sandstone off-cuts using a mobile processing plant for use in on-site road and track maintenance and production of select and general fill.

iii) Importation of up to 30,000tpa of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation in the latter stages of the Quarry life.

iv) Product transportation and material importation involving a maximum of 3 laden heavy vehicle movements per hour, or 10 laden heavy vehicle movements per day, with an average of 4 laden heavy vehicle movements per day.

v) Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.

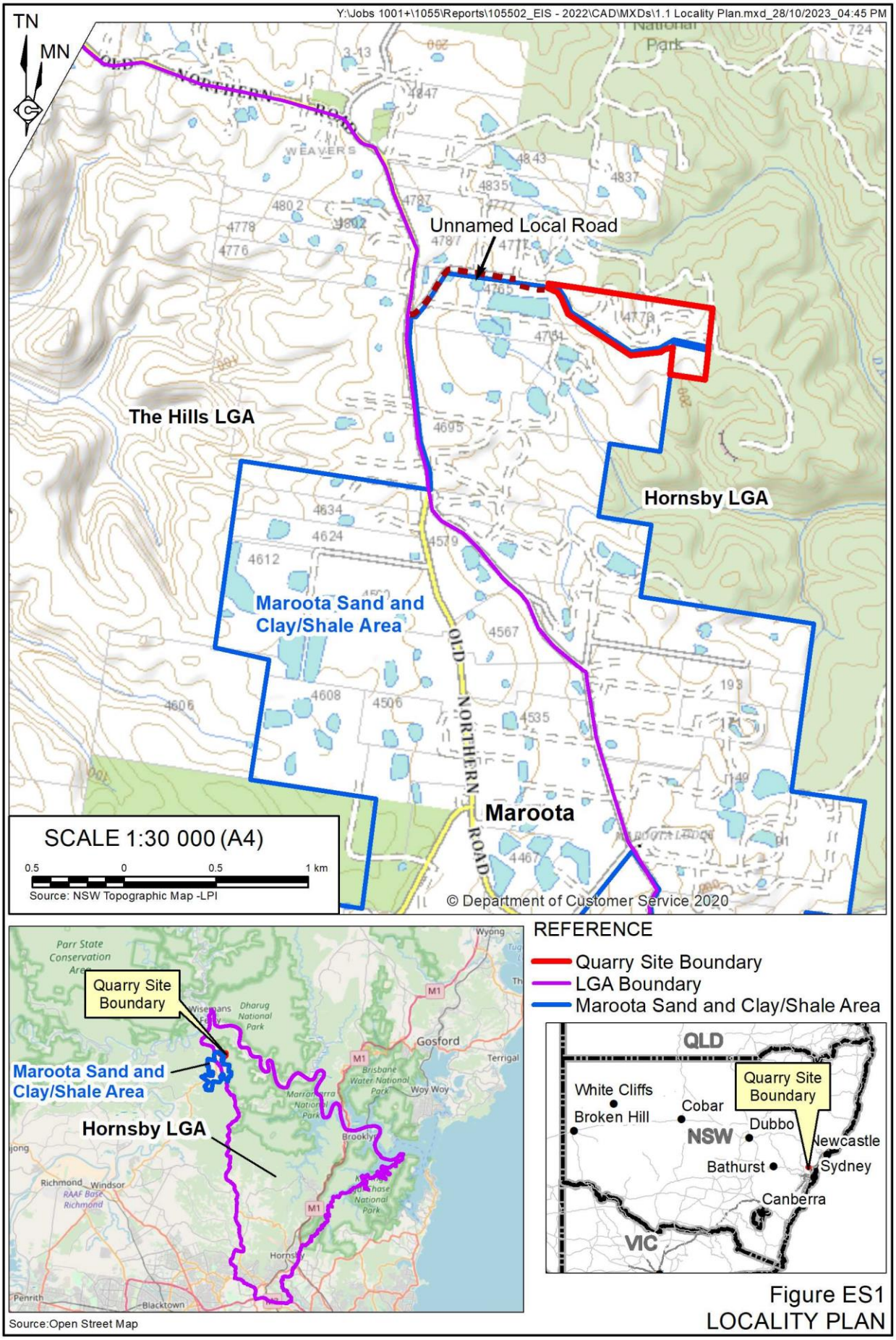


Figure ES1
LOCALITY PLAN

vi) Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

The principal components and the respective areas within the Quarry Site are as follows (see **Figure ES2**).

- Extraction Area (3.40ha)
- Office, Amenities and Parking Area (0.18ha)
- Site Access Road (660m / 0.55ha)

Approximately 0.36ha of land within the Quarry Site is already disturbed, i.e. the former sandstone extraction areas and the existing track.

The Quarry Site covers a total area of 23.33ha of which up to approximately 4.13ha would be disturbed throughout the life of the Quarry.

Extraction would be undertaken in a staged manner (Stages 1 and 2) using a combination of conventional excavation, load and haul methods for overburden and friable sandstone. Sandstone logs and flagging stones would be extracted using excavators equipped with cutting wheels. Extracted sandstone would, if required, be loaded into a mobile crusher using a front-end loader. Crushed material would be screened, subjected to secondary crushing as required, and stockpiled within the Extraction Area. Crushed materials would be used for on-site track and Site Access Road maintenance or sold as select or general fill. Operation of the mobile crusher would be undertaken on a campaign basis and would be confined to within the Extraction Area.

The Applicant proposes to utilise the Unnamed Local Road between the Quarry Site and Old Northern Road, a State Road. All unladen Quarry-related heavy vehicles would turn right onto the Unnamed Local Road from Old Northern Road. All laden heavy vehicles would turn left from the Unnamed Local Road into Old Northern Road. Quarry-related heavy vehicles would be restricted to the section of Old Northern Road to the south of the intersection. From the intersection of Old Northern Road and Wisemans Ferry Road, Quarry-related heavy vehicles would utilise the State road network. **Figure ES3** displays the indicative transport routes for the Proposal.

The transportation of VENM to the Quarry Site would be the responsibility of the operator delivering the material and subject to approval for that operation, including traffic generation. However, opportunities may arise for material to be backloaded in a Quarry vehicle. While this approach would be beneficial, as it would minimise heavy vehicle trips, it is noted that this would be rare. Notwithstanding, during campaigns of VENM importation, the Applicant would limit the number of product trucks despatched from the Quarry Site to ensure that the maximum number of 10 laden heavy movements per day is not exceeded.

The Applicant proposes to rehabilitate the Quarry Site to create a free draining final landform that is suitable for biodiversity conservation. Emphasis would be placed upon progressive rehabilitation of completed areas within the Quarry Site.

Assessment and Management of Key Environmental Issues

The components and features of the existing environment within and surrounding the Quarry Site have been studied in detail and the Proposal has been designed to avoid or minimise environmental risks and impacts as much as is considered reasonable and feasible.

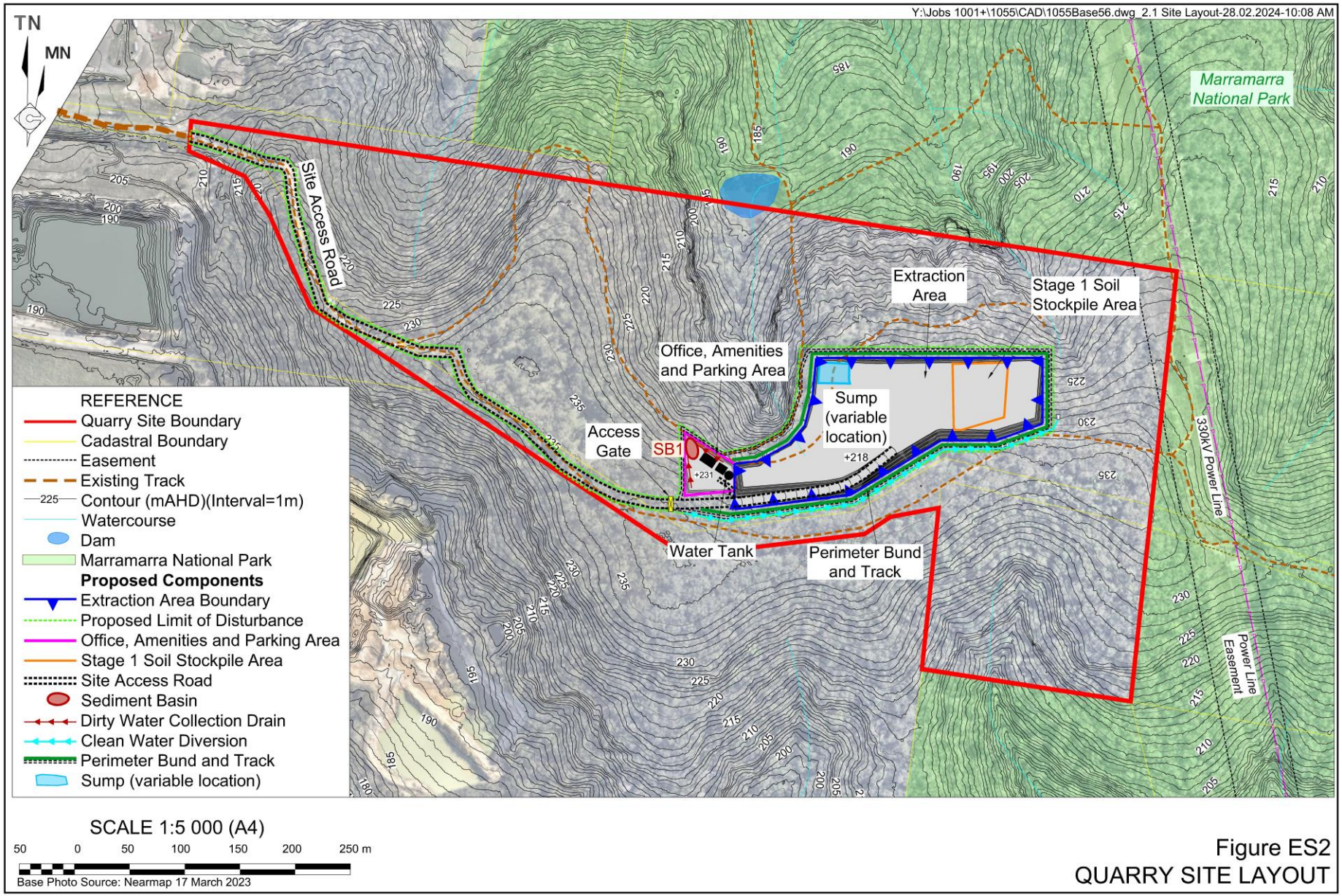
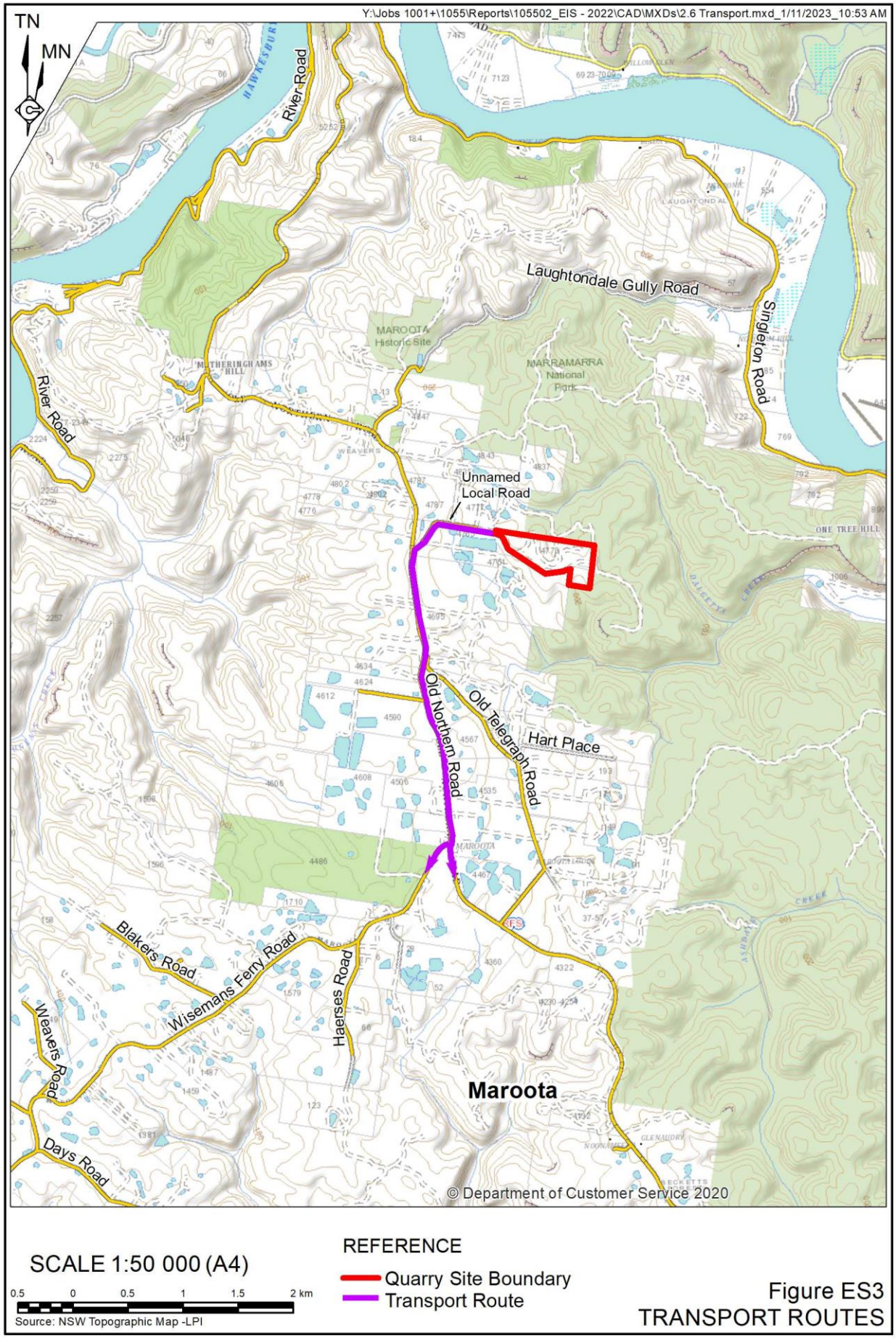


Figure ES2
QUARRY SITE LAYOUT


Y:\Jobs 1001+\1055\Reports\105502_EIS - 2022\CAD\MXDs\2.6 Transport.mxd_1/11/2023_10:53 AM
TN
MN
River Road
Laughtondale Gully Road
Singleton Road
MAROOTA Historic Site
MARRAMARRA National Park
Unnamed Local Road
Old Northern Road
Old Telegraph Road
Hart Place
Blakers Road
Wisemans Ferry Road
Haerses Road
Weavers Road
Days Road
Maroota
© Department of Customer Service 2020
SCALE 1:50 000 (A4)
0.5 0 0.5 1 1.5 2 km
Source: NSW Topographic Map -LPI
REFERENCE
Quarry Site Boundary
Transport Route
Figure ES3
TRANSPORT ROUTES

Impacts within the Quarry Site

The key residual impact of the Proposal would be the removal of approximately 3.77ha of native vegetation, all of which is in moderate condition. A total of 703 species credits and 76 ecosystem credits would be offset in accordance with the Biodiversity Offset Scheme. A Biodiversity Development Assessment Report (BDAR) prepared for the Proposal (Ecoplanning, 2023) has concluded that potential direct (residual) impacts would be suitably offset and potential indirect impacts would be managed through the implementation of measures to avoid or mitigate potential risks.

There would be no serious and irreversible impacts (SAII) or significant impacts to matters of national environmental significance (MNES) as a result of the Proposal.

No Aboriginal or historic heritage sites were recorded during archaeological surveys undertaken to inform the EIS. As such, it has been assessed that there is a low likelihood that the Proposal would adversely harm cultural heritage items or sites (Biosis, 2023a) or historic heritage items or sites (Biosis, 2023b).

The Proposal includes the use of a sediment basin and collection drains to manage potentially sediment-laden runoff. The sediment basin would be designed to accommodate predicted runoff resulting from a 90th percentile 5-day rainfall event. The Applicant would implement a closed water management system to ensure no sediment-laden runoff leaves the Quarry Site or enters Marramarra National Park. It is noted that the Extraction Area has been designed to be internally draining to avoid the risk of sediment-laden discharge off site.

Given the lack of Groundwater Dependent Ecosystems within or immediately surrounding the Quarry Site, and that groundwater monitoring undertaken within the Quarry Site has established that the average standing water level within the vicinity of the Extraction Area approximately 47.1mbgl (i.e. >30m below the proposed maximum depth of extraction), it is considered unlikely that groundwater would be intercepted through extraction activities. As a result, it is considered that the Quarry would not impact groundwater used by surrounding residents/land users nor result in contamination of these groundwater resources.

Assuming the implementation of appropriate soil management measures, the residual impacts associated with soil removal, handling, storage and re-use would be negligible. In addition, the Proposal would not result in significant impacts to any surrounding agriculture.

Amenity Impacts

Residual amenity impacts beyond the Quarry Site associated with the Proposal include the generation of traffic, dust and noise.

Assessment of potential traffic-related impacts has determined that, under the Proposal, the Quarry would operate with acceptable impacts on the surrounding road network, particularly given the existence of acceleration and deceleration lanes at the intersection of Old Northern Road and the Unnamed Local Road. Traffic operations for the Proposal have been planned to include a maximum of 3 laden truck movements per hour and 10 laden truck movements per day. The Road Transport Assessment undertaken for the Proposal (TTPP, 2023) concluded that the level of service would remain good on the surrounding road network during peak hours with the combined effects of traffic growth and additional Proposal-generated traffic. Furthermore, there would be no significant impacts on fire trails as a result of the Proposal.

The Air Quality Impact Assessment undertaken for the Proposal (Northstar, 2023) concluded that the Proposal is predicted to comply with all impact assessment criteria for annual average concentrations of TSP, $PM_{2.5}$, PM_{10} deposited dust and respirable crystalline silica. The assessment of 24-hour average $PM_{2.5}$ and 24-hour average PM_{10} applying a Level 2 Contemporaneous Assessment has indicated that there would be no additional exceedances of the assessment criteria as a result of the Proposal (i.e. there would be no exceedances of the criteria other than those predicted by background emissions alone). The Greenhouse Gas (GHG) assessment concluded that average Scope 1 emissions from the Proposal would represent approximately <0.0002% of Australian and <0.0006% of NSW GHG emissions which represents a very minor proportion of global GHG emissions.

The Noise Assessment undertaken for the Proposal (MAC, 2023) concluded that operational noise attributable to activities within the Quarry Site and road traffic noise generated by product transportation and material importation would be within nominated limits and would have minimal impacts at surrounding residences and upon Marramarra National Park.

The Proposal would also result in other negligible adverse impacts principally relating to visual amenity and socio-economic impacts. However, these adverse impacts would be countered by the positive impacts, including economic benefits from the operation of the Quarry in the manner proposed.

Conclusion

The Proposal has been designed to permit the efficient extraction of sandstone resources within the Quarry Site. The Proposal incorporates a range of management and mitigation measures to ensure all relevant statutory goals and criteria, environmental objectives and reasonable community expectations are satisfied.

This document and the range of specialist consultant studies undertaken have identified that the Proposal should proceed because it would:

- contribute towards satisfying the demand for Quarry products required for construction, infrastructure and landscaping projects within the Hornsby LGA and the broader Greater Sydney Region;
- have a minimal and manageable impact on the biophysical environment;
- satisfy sustainable development principles; and
- result in a net benefit for the local community, the Hornsby LGA and the State of NSW.

Section 1

Introduction

PREAMBLE

This section introduces the proposed development and operation of the Maroota Central Civil Quarry. This section provides:

- *an outline of the scope and format of the document;*
- *an introduction to the Applicant, Central Civil (NSW) Pty Ltd;*
- *relevant background information about the proposed Quarry;*
- *an overview of the historic quarrying operations;*
- *the intended approach to environmental management and documentation for the proposed Quarry; and*
- *the personnel involved in the design of the Quarry, document preparation and specialist consultant investigations and assessments.*

1.1 Scope

This *Environmental Impact Statement* (EIS) has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd ("the Applicant"), to support a development application submitted to Hornsby Shire Council ("Council") for the proposed development and operation of the Maroota Central Civil Quarry ("the Quarry").

The "Quarry Site" is located within Lots 1 and 2 DP609224 (owned by the Applicant), as well as an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (see **Figure 1.1** and **Figure 1.2** in Section 1.3.2).

The Applicant is seeking approval for the development and operation of the Quarry ("the Proposal") which would include the following.

- Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of up to 30,000tpa of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 laden heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

1.2 Format of The Report

The information presented in this document covers all aspects of the proposed development, operation, rehabilitation and environmental monitoring of the Quarry. The document has been structured to address the assessment requirements nominated by the Secretary of the Department of Planning and Environment (DPE), Council and other State government agencies.

This EIS has been assembled in a single volume with seven sections of text, as well as a glossary, references section and a set of appendices. The format of the EIS is as follows.

Section 1: introduces the Quarry and the Applicant and provides background information relevant to the application, the Quarry Site and historic operations. The section concludes with information on the management of investigations undertaken during the preparation of the EIS.

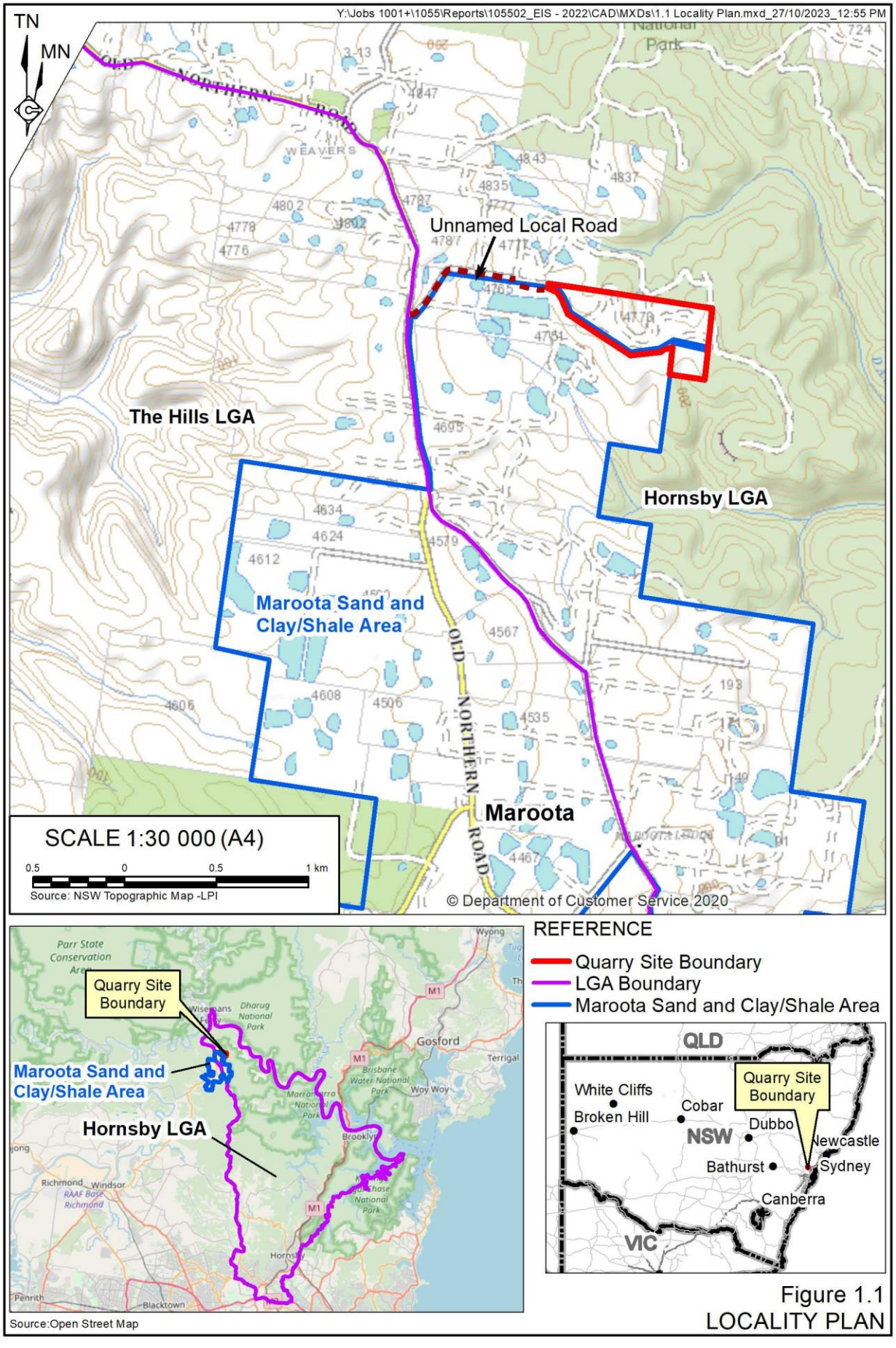


Figure 1.1
LOCALITY PLAN

Section 2: provides a description of the Quarry including the objectives of the Proposal, an overview of the proposed activities, approvals required, need for the Quarry and reviews the geology, resources and proposed Quarry products. Section 2 also describes the proposed operations including extraction and processing operations. Finally, an overview is provided of the progressive rehabilitation strategy and indicative final landform and land use.

Section 3: reviews the planning and legislative requirements of the Quarry including State Environmental Planning Policies and local planning instruments.

Section 4: presents the environmental setting of the Quarry Site, including information on topography, drainage, meteorology, land ownership, surrounding residences and land uses.

Section 5: provides an assessment of potential environmental impacts of the Quarry and, for each matter identified, the existing environment, proposed mitigation and management, assessment of potential impact and maintenance/monitoring requirements.

Section 6: provides a compilation of the environmental management and monitoring measures for the Quarry.

Section 7: evaluates the Proposal in terms of biophysical, economic and social considerations, and the goals and guidelines of Ecologically Sustainable Development and the Objects of the *Environmental Planning and Assessment Act 1979*. A conclusion is provided for the EIS.

Section 8: lists the various source documents referred to for information and data used during the preparation of the EIS.

Appendices: present the following additional information and the specialist consultant technical assessments undertaken to support the development application.

1. The Secretary's Environmental Assessment Requirements (SEARs) and requirements of the consulted government agencies.
2. The coverage of requirements listed in the SEARs and provided by government agencies.
3. Road Transport Assessment prepared by The Transport Planning Partnership Pty Ltd.
4. Air Quality Impact Assessment prepared by Northstar Air Quality Pty Ltd.
5. Noise Assessment prepared by Muller Acoustic Consulting Pty Ltd.
6. Sediment Basin Storage Requirement Calculations prepared by R.W. Corkery & Co. Pty Ltd.
7. Biodiversity Development Assessment Report and Koala Assessment Report prepared by Ecoplanning Pty Ltd.
8. Aboriginal Cultural Heritage Assessment prepared by Biosis Pty Ltd.
9. Historic Heritage Assessment prepared by Biosis Pty Ltd
10. Vegetation Management and Restoration Plan prepared by R.W. Corkery & Co. Pty Ltd.
11. Preliminary Site Access Road Civil Plans prepared by Duncan Priestley Civil Engineering Pty Ltd.

1.3 The Applicant and the Quarry Site

1.3.1 The Applicant

The Applicant is Central Civil (NSW) Pty Ltd, an Australian owned and operated demolition and civil engineering company based in Dural, NSW. The Applicant is managed by an executive committee who are the driving force in the Company's growth, expansion and commercial strategies whilst maintaining a strong system of controls including quality, environmental and risk management.

The Company has 10 years' experience and it's diversified contracting services include closure studies and decommissioning, deconstruction and demolition, waste management and resource recovery, civil engineering and construction, landscaping and external works, site remediation, materials solution management, rehabilitation and revegetation.

The Applicant has an excellent record of environmental management, with no environmental-related notices or orders since the Company's inception in 2014.

The Applicant is committed to operate the Quarry in a manner that achieves the objectives set out in Section 2.1.1 and in a manner that is transparent and consistent with its responsibilities and landholder and neighbour.

1.3.2 The Quarry Site

The Quarry Site is located on rural land within Lots 1 and 2 DP609224, which are entirely owned by Applicant, and an unnamed Crown road reserve. The Quarry Site includes all proposed activities and covers a total area of approximately 23.33ha of which 4.13ha would be disturbed throughout the life of the Quarry. The proposed Extraction Area would be located fully within Lot 1 DP609224.

The Quarry Access Road provides access to the Quarry Site and would be partly located on Lot 1 DP609224 and the unnamed Crown road reserve which provides access to Dalgetys Creek Fire Trail and the Marramarra National Park. It is noted that the Applicant has lodged a Road Closure application to Crown Lands with an intention to purchase the unnamed Crown road (see Section 1.8.2).

Figure 1.2 displays the boundary of the Quarry Site and its access together with the land titles within and immediately surrounding the Quarry Site.

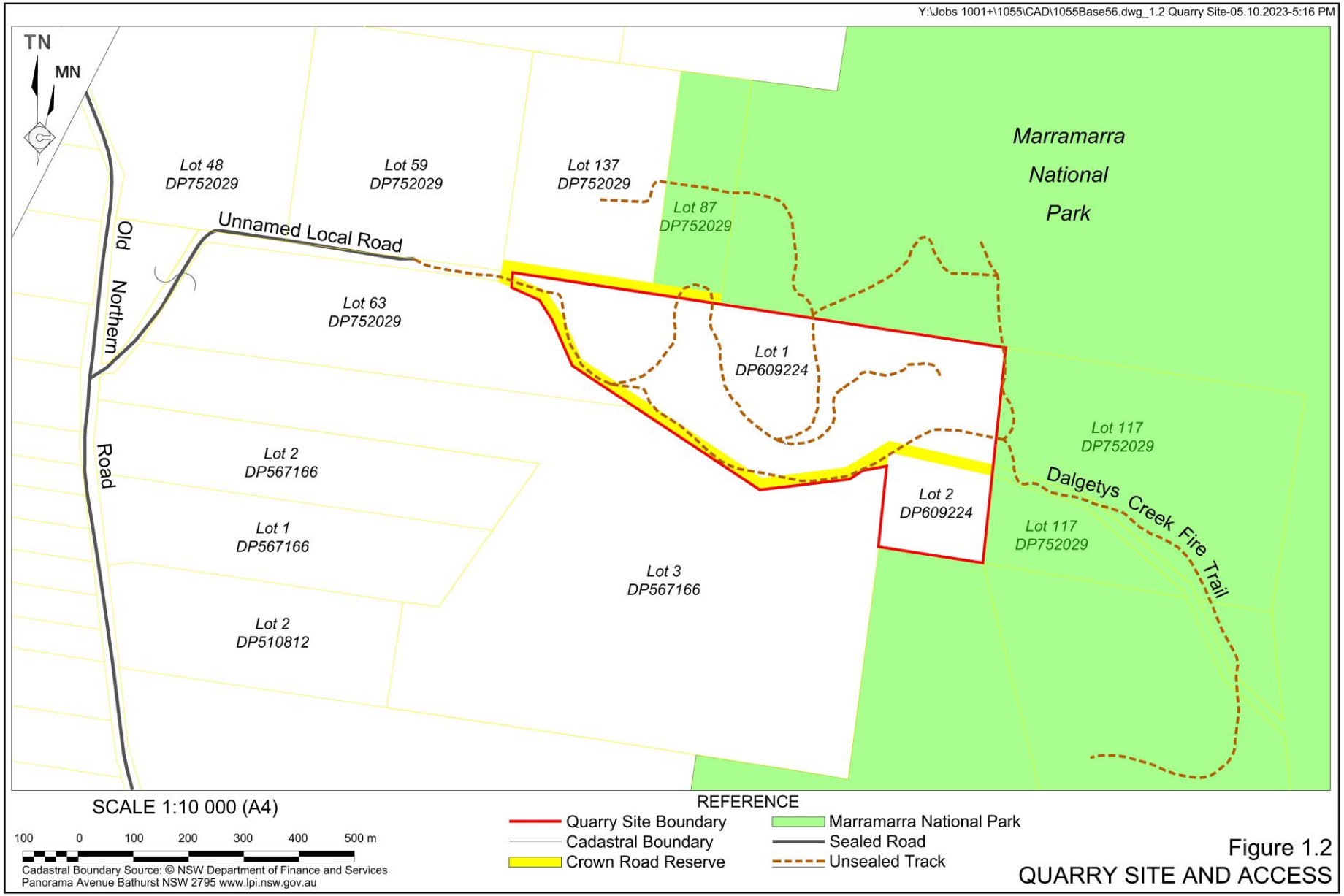


Figure 1.2
QUARRY SITE AND ACCESS

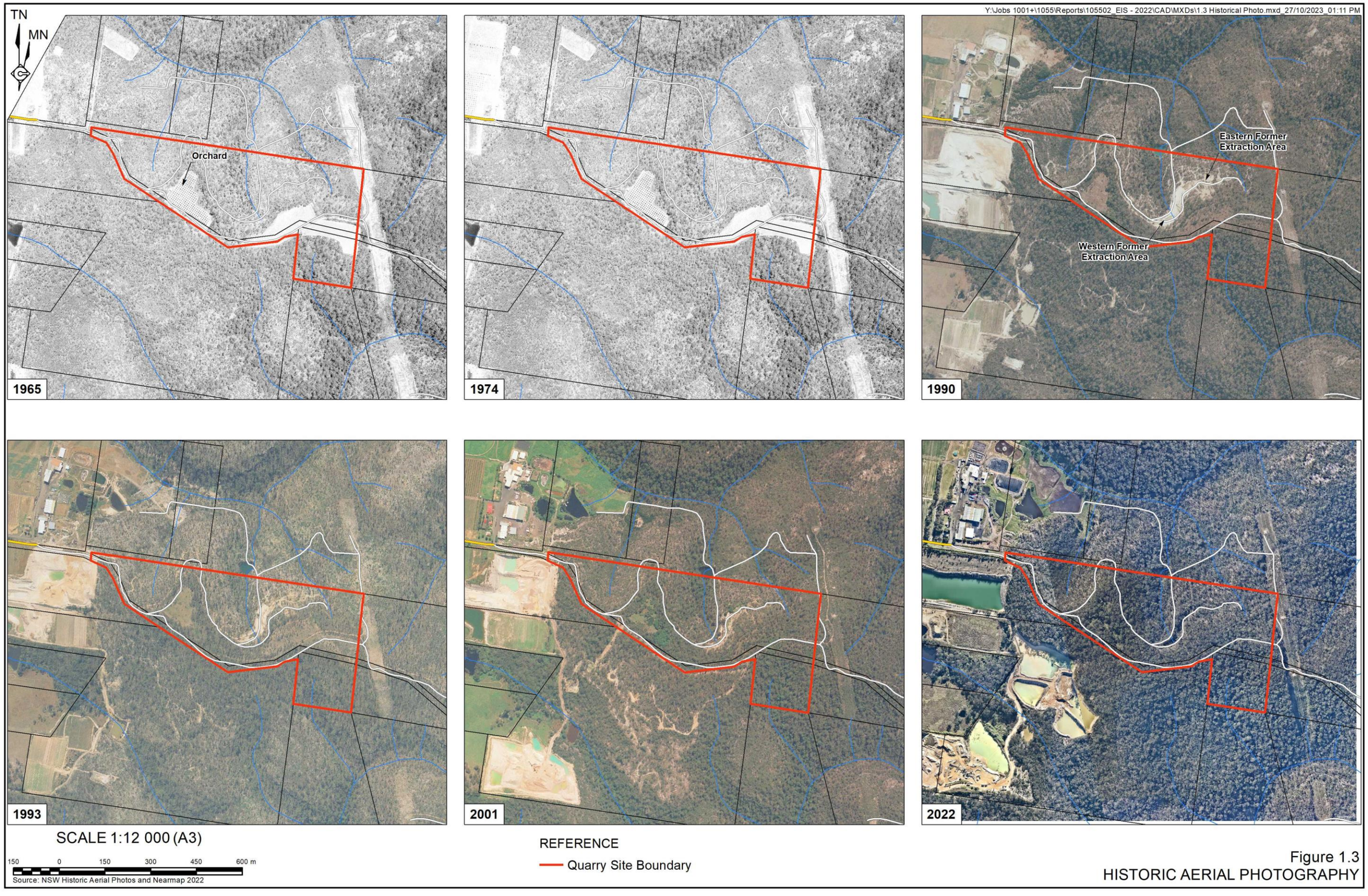
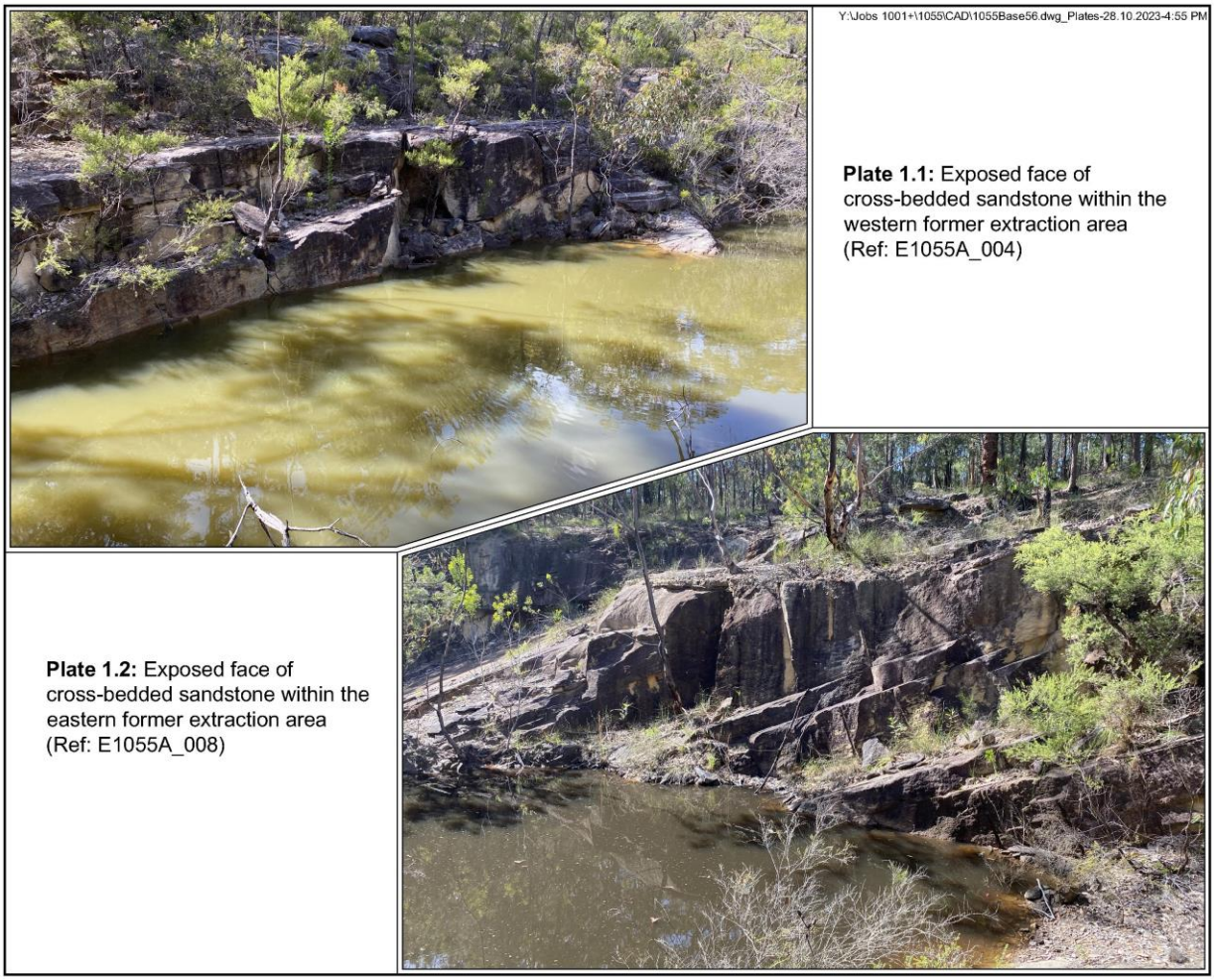


Figure 1.3
HISTORIC AERIAL PHOTOGRAPHY

1.4 Background to the Proposal

Two former extraction areas with exposed faces of predominately cross-bedded sandstone up to 4m in height (see **Plates 1.1** and **1.2**) were identified by the Applicant during an initial inspection of the property, now referred to as the Quarry Site. Review of the publicly available NSW Historic Imagery from 1965 identifies clearing of land for agricultural purposes and the establishment of an orchard within the south-western portion of the Quarry Site. Imagery from 1974 shows further clearance of an access trail, as well as a dam on the northern border of the Quarry Site. Images from 1990 reveal extensive disturbance and an extraction operation within the Quarry Site, which is also present in images taken in 1993 (see **Figure 1.3**). Images from 2001 show revegetation in areas previously cleared, with the previous extraction areas still visible. It is noted that this disturbance precedes the Applicant's tenure of the Quarry Site and as such, it is possible that operations were undertaken without formal approvals. Based on the information available, these operations comprised the clearing of approximately 600m^2 of vegetation, extraction of sand materials and dimension stone and the establishment of a number of access tracks within the Quarry Site.



Geological field inspections of the former extraction areas and limited drilling undertaken by the Applicant and RWC determined that the exposed sandstone was suitable for extraction as sandstone logs, flagging stone and friable sandstone. As a result, the Applicant undertook initial market research and established there is a considerable demand for these products in local markets.

1.5 Need for the Proposal

The need for products produced from the sandstone extracted from the Quarry Site has been demonstrated through the sale of sand and sandstone products from the Maroota area since the 1990s, with the area now firmly established as a key supply of sand and sandstone products for the Sydney metropolitan area.

Under the Proposal, the Quarry would provide a range of sandstone products for use in the Hornsby Local Government Area (LGA) and the broader Greater Sydney Region.

1.6 Consideration of Alternatives

The following alternatives were considered during the design of the Proposal.

- Extraction Area

  The proposed extraction area was originally designed to encompass an area to the north of the former extraction areas at an elevation of approximately 210m AHD. Following field inspections undertaken by RWC and the Applicant, it was determined that the originally proposed location was unsuitable. This decision was made to:

  – minimise impacts to native vegetation to the greatest extent practicable;

  – minimise the risks of potential groundwater intersection during extraction operations;

  – maximise the offset distance to the boundary with Marramarra National Park; and

  – allow for the ongoing efficient recovery of resource.

- Transportation Rates

  Initially a transportation rate of up to 50,000tpa was considered by the Applicant to allow for flexibility in meeting future market demands. However, a review of forecast market demands indicated that the proposed maximum extraction rate or 30,000tpa would effectively balance the need for operational flexibility whilst minimising potential impacts on the surrounding road network.

1.7 Environmental Management and Documentation

1.7.1 Environmental Management

As the landowner, the Applicant would be responsible for ongoing environmental compliance and management of the Quarry, including the assessment of the extent of implementation of the commitments made in this document (see Section 6) and the conditions of the development consent and/or licence conditions. The Quarry Manager would be responsible for day-to-day on-site supervision including the integrated implementation of all environmental safeguards identified in this document, and all additional documentation as developed throughout the life of the Quarry.

1.7.2 Environmental Documentation

In the event development consent is granted, the Applicant would assemble a comprehensive *Environmental Management Plan* for the ongoing management of the relevant environmental issues at the Quarry. The Plan would comprise separate sections relating to:

- vegetation clearing and biodiversity management;
- traffic management, including a Driver's Code of Conduct;
- air quality management;
- noise management;
- soil and water management;
- waste management;
- an unexpected finds protocol for Aboriginal objects;
- rehabilitation management; and
- complaints management.

1.8 Consultation

1.8.1 Surrounding Landowners

The Applicant intends to have an open-door policy for complaints, questions and feedback from its fence-line neighbours and the local community regarding environmental performance of the Quarry. The Applicant visited or contacted five neighbours during the preparation of the EIS to explain the proposed operations and discuss any potential Quarry-related issues. There were no issues identified during the consultation phase.

The Applicant also plans to visit neighbours during the exhibition period for the EIS to discuss the Proposal in more detail and any concerns regarding the proposed operation of the Quarry.

1.8.2 Government Agencies

A *Background Paper* was prepared and distributed to the Department of Planning and Environment in November 2022. SEARs (EAR 1741) were received on 2 December 2022 and included assessment requirements from the following government agencies.

- Department of Planning and Environment
- Department of Planning and Environment – Water
- National Parks and Wildlife Service
- Heritage NSW
- Hornsby Shire Council

A copy of the SEARs are available in **Appendix 1** and **Appendix 2** presents where each matter identified in the SEARs has been addressed.

In addition, the Applicant met with representatives of Hornsby Shire Council on 5 July 2023 for a formal pre-lodgement meeting. Hornsby Shire Council provided written feedback on 7 July 2023. Matters raised during this meeting included the requirement for the Applicant to address the *Hornsby Development Control Plan 2013*, clarification around several post-approval submission requirements and the requirement for the Applicant to pay a development contribution fee. A copy of Hornsby Shire Council's written feedback is provided in **Appendix 1** and a summary of where each of the matters raised are addressed is provided in **Appendix 2**.

Crown Lands were provided with a full copy of the EIS on 29 February 2024 which accompanied an application for Landowner's Consent for the lodgement of the proposed development application, subject to the imposition of a condition of deferred commencement with respect to works within the unnamed Crown road reserve. Concurrent with the application for Landowner's Consent, the Applicant also lodged a Road Closure application to Crown Lands with an intention to purchase the unnamed Crown road subject to the grant of appropriate easements to allow ongoing access to the Marramarra National Park as well as the easement associated with the 330kV Munmorah to Sydney West transmission line beyond the eastern boundary of the Quarry Site. Landowner's Consent for the lodgement of the proposed development application was granted by Crown Lands on 19 April 2024, with a copy provided in **Appendix 1**.

1.9 Management of Investigations

The preparation of this document has involved a study team managed by Mr Samuel Rosek, B.Sc. (Palaeobiology), G.Dip.CB., Environmental Consultant with RWC. Mr Rosek was assisted by Ms Leilani Banerjee, B.Sc.(Hons) (Earth Sciences), Graduate Environmental Consultant with RWC. Mr Mitchell Bland, B.Sc.(Hons), MEconGeol., LLB(Hons)., Managing Director of RWC and Mr Rob Corkery, Principal Environmental Consultant provided internal peer reviews of the documentation.

Information concerning the proposed operations was provided by Mr Sarkis Elias (Managing Director of Central Civil NSW Pty Ltd) and Mr Greg Banks (General Manager of Central Civil NSW Pty Ltd).

Materials physical properties testing and analysis was undertaken by Stone Initiatives and Materials Testing Group Pty Ltd.

A range of environmental investigations has been undertaken to assess the potential environmental impacts of the Quarry and identify practical operational safeguards and measures. These studies were undertaken by a team of specialist consultants managed by RWC including the following companies and key individuals.

- The Transport Planning Partnership – Road Transport Assessment
  - Ms Penny Dalton, B.E.Civil (Hons)
- Northstar Air Quality – Air Quality Assessment
  - Dr Martin Doyle, Ph.D, B.Sc. (Hons)

- Muller Acoustic Consulting – Noise Assessment
  - Mr Rod Linnett, B.Sc.
- Ecoplanning Pty Ltd – Biodiversity Development Assessment Report
  - Mr Brendan Fletcher, B.A., J.A., M.Env.Mgt. (Conservation)
- Ecoplanning Pty Ltd – Koala Assessment Report
  - Ms Sarah Cardenzana, B.Sc.
- Biosis Pty Ltd – Aboriginal Cultural Heritage Assessment
  - Ms Crystal Garabedian, B.A. (Hons), B.Sc.
  - Ms Molly Crissell, B.Archaeology.
- Biosis Pty Ltd – Historical Heritage Assessment
  - Ms Crystal Garabedian, B.A. (Hons), B.Sc.
  - Ms Charlotte Allen, B.Archaeology.

Section 2

Description of the Proposal

PREAMBLE

This section describes the proposed Quarry operations including:

- *the objectives of the Proposal;*
- *a summary of required approvals and licences;*
- *a review of local geology, resources and proposed Quarry products;*
- *the proposed extraction and processing activities to be undertaken within the Quarry Site;*
- *the proposed transportation regime for the delivery of Quarry products and receipt of VENM;*
- *the proposed management of production by-products and non-production wastes;*
- *the proposed infrastructure, utilities and services that would be used within the Quarry Site as well as proposed employment, hours of operation and life of the Quarry; and*
- *the proposed rehabilitation of areas that would be disturbed within the Quarry Site throughout the life of the Quarry.*

The Proposal is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of all activities proposed throughout the life of the Quarry, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment.

2.1 Introduction

2.1.1 Objectives

The Applicant's principal objectives in the development and operation of the Quarry would be as follows.

- To provide a source of high-quality sandstone products for use in the Hornsby LGA and the broader Greater Sydney Region.
- To maximise resource recovery within the defined Extraction Area.
- To develop and operate the Quarry in an environmentally responsible manner to meet all relevant criteria and satisfy reasonable community expectations.
- To create a final landform that is safe, stable and provides for a final land use of nature conservation.
- To positively contribute to local employment and economic investment.
- To achieve the above objectives in a cost-effective manner to ensure the Quarry is financially viable and to provide a return on investment for the Applicant.

2.1.2 Approvals Required

Based upon the current design and understanding of relevant environmental issues, the Proposal would require the following approvals, permits and licences.

- Development consent in accordance with the provisions of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).
- The Proposal is classified as an "extractive industry." Clause 26 of Schedule 3 of the *Environmental Planning & Assessment Regulation 2021* (EP&A Reg) identifies relevant thresholds for "Designated Development" for extractive industries. The Proposal would exceed the following identified thresholds.
  - Land disturbance of more than 2ha.
  - The Quarry Site is located within 40m of an environmentally sensitive area of State significance, namely the Marramarra National Park.
  - The Quarry Site is located within 500m of another extractive industry.

  As a result, the Proposal is classified as Designated Development.
- In addition, as Designated Development for the purpose of extractive industry, the Quarry is also classified as "Regionally Significant Development" under Clause 7 of Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning SEPP) and therefore the consent authority for the development application will be by the Sydney North Regional Planning Panel.

  In order to obtain development consent, the development application needs to be accompanied by an EIS (this document).

- An Environmental Protection Licence (EPL) under the *Protection of the Environment Operations Act* (POEO Act) for the scheduled activity "Crushing, grinding and separating" for the proposed mobile crushing operations. The issuing authority would be the Environmental Protection Authority (EPA).
- A Controlled Activity Approval under Section 91(1) of the *Water Management Act 2000* (WM Act) due to disturbance within 40m of waterfront land.
- A permit under Section 138 of the Roads Act 1993 (Roads Act) to permit the proposed upgrades to the unnamed local road providing access to the Quarry Site from Old Northern Road. Hornsby Shire Council would be the issuing authority for the required permit.

The Proposal is also classified as "Integrated Development" under Section 4.46 of the EP&A Act as it would require approvals issued under the POEO Act, WM Act and Roads Act.

Finally, the Applicant notes that access and compensation agreements would not be required for access, use and disturbance of Crown Land for Quarry-related activities, given that the Applicant has lodged a Road Closure application with an intention to purchase the unnamed Crown Road (see Section 1.8.2).

2.2 Quarry Site Layout

The Quarry Site layout displayed in **Figure 2.1** incorporates the following components.

- Extraction Area (3.40ha)

  The Extraction Area would be developed in two stages from west to east to a maximum depth of 218m AHD. All product extraction, processing, stockpiling and despatch activities would be undertaken within the Extraction Area. Soil and mulch stockpiling would also be undertaken in this area. The Extraction Area would include a 5m perimeter zone to allow for the construction of a perimeter safety bund, tracks and erosion and sediment control infrastructure.

- Office, Amenities and Parking Area (0.18ha)

  The area immediately west of the Extraction Area would be profiled through the use of cut and fill methods to an elevation of approximately 231m AHD. A demountable office, water tank, workshop and portable amenities incorporating chemical or pump out toilet facilities would be established within this area. This area would also be utilised for light and heavy vehicle parking as well as equipment storage throughout the life of the Quarry.

- Site Access Road (660m / 0.55ha)

  The existing track to the proposed Extraction Area would be widened to provide the Site Access Road to permit two heavy vehicles to pass within the Quarry Site. The road would have an unsealed surface for its entire length and, together with road side drainage, would have a maximum width of 8m.

The total area to be designated as the Quarry Site would be approximately 23.33ha of which the maximum area of operational disturbance would be approximately 4.13ha. Approximately 3.77ha of remnant native vegetation would be disturbed during the development of the Quarry. The remaining 0.36ha of land incorporates existing tracks and the two former extraction areas within the Quarry Site.

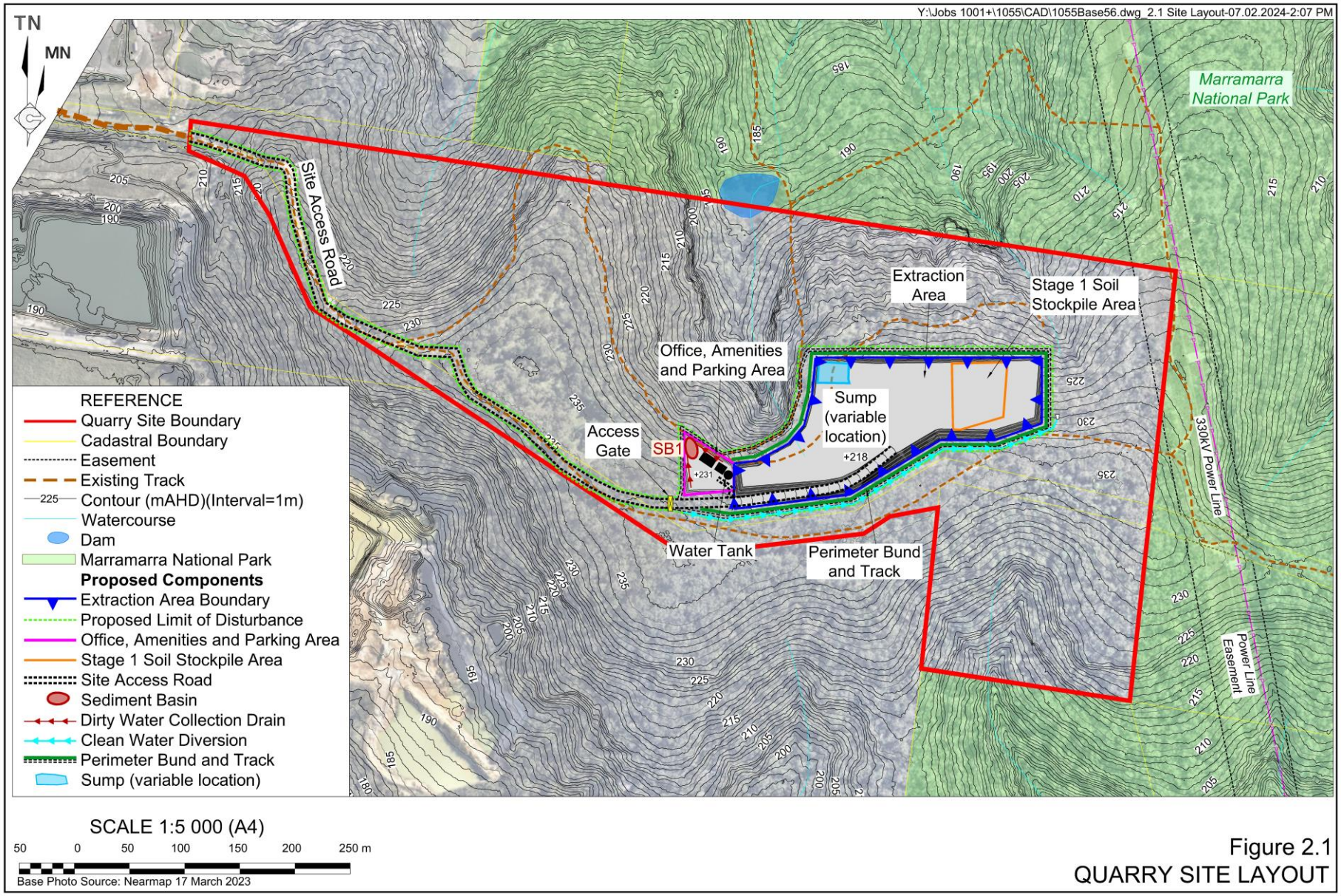


Figure 2.1
QUARRY SITE LAYOUT

2.3 Resources and Products

2.3.1 Regional Geology

The geology of the Maroota area is described by Etheridge (1980), Hopkins and Ross (1996), Russell (2001) and Lawson and Webb (2018). In summary, the principal units of economic interest in the Maroota area include the Triassic-aged Hawkesbury Sandstone which is unconformably overlain by the Tertiary-aged Maroota Tertiary Sand.

The Hawkesbury Sandstone is a generally massive, cross-bedded, relatively homogeneous quartz arenite with a tightly cemented fine to coarse-grained matrix. In the vicinity of Maroota, the unit is 150m to 200m thick. The upper sections of the Hawkesbury Sandstone in places are friable and capable of being extracted using free-dig techniques and being broken down into the constituent sand grains. Within the Maroota area, sandstone outcrop exhibiting well developed, steeply dipping jointing are commonly extracted to produce flagging stone.

The Tertiary Sand is an unconsolidated to partly consolidated, poorly sorted, fine to coarse grained fluvial sand with local clay and gravel lenses. The Tertiary Sand may be up to 50m thick in places with clay lenses up to 13m thick (**Figure 2.2**).

2.3.2 Quarry Site Geology and Resources

Two small former extraction areas are present within the Quarry Site, with exposed faces of predominately cross-bedded, massive sandstone of up to 4m high (see Section 1.4). Further massive sandstone beds outcrop downslope of the easternmost former extraction area with a thickness of approximately 8m to 10m.

Preliminary exploration drilling results based on three drillholes have confirmed that the outcropping sandstone units are present to a depth of at least 218m AHD (**Figure 2.2**).

The Applicant has established a resource for the Quarry based on the following.

- The design of the Extraction Area presented in Section 2.5.2.
- An average overburden thickness of 2m.
- An average density of the intersected sandstone of 2.4t/m^3.

Based on the above, the estimated available resource is approximately 240,000 bank (or *in situ*) cubic metres (bcm) or 575,000t.

2.3.3 Products

The principal products produced at the Quarry would be sandstone logs (**Plate 2.1**), flagging stone (**Plate 2.2**), and select and general fill. Sandstone logs and flagging stone would be used principally for landscaping and other works, while material not suitable for production of logs or flagging stone (i.e. friable sandstone) would be sold as general or select fill.

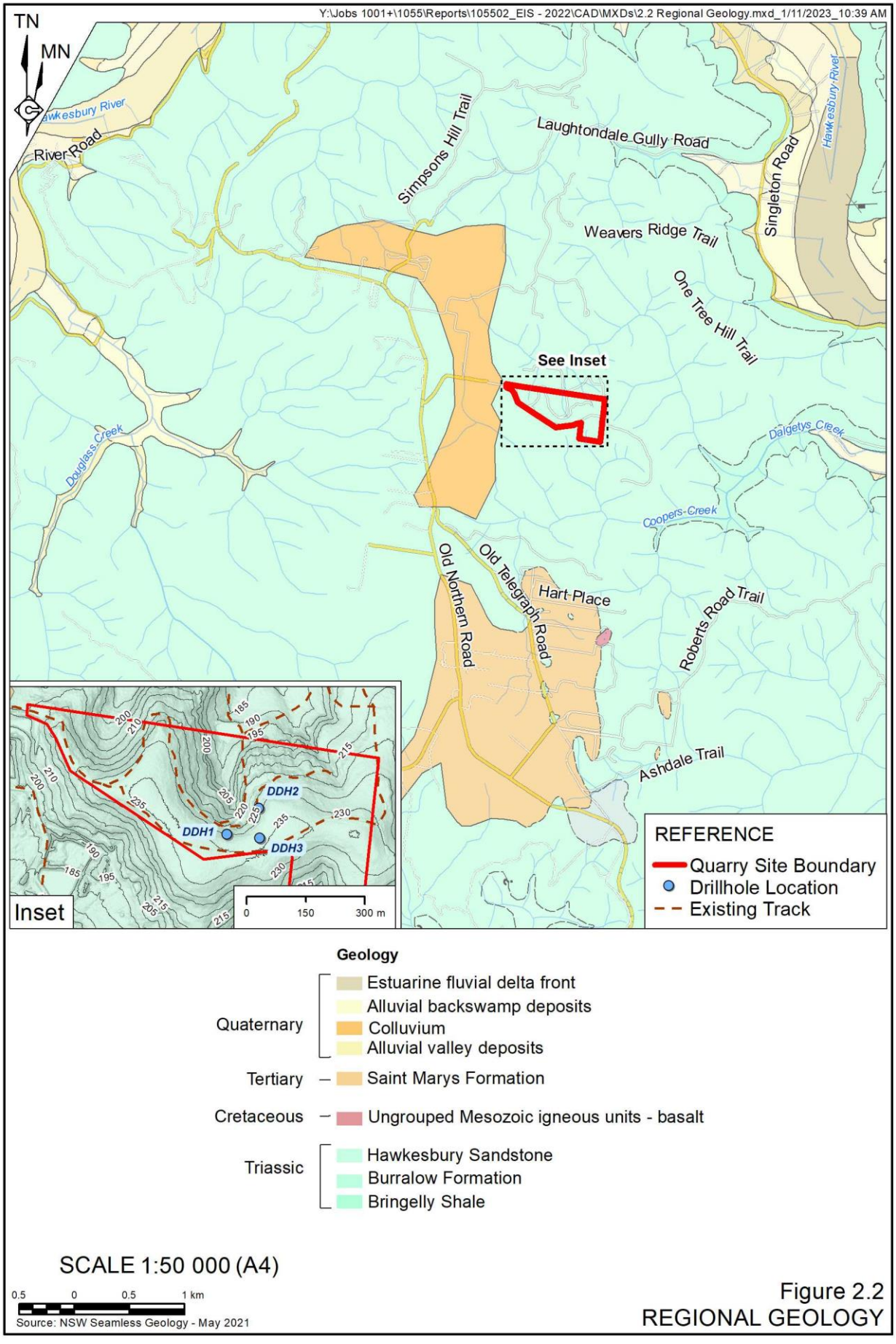


Figure 2.2
REGIONAL GEOLOGY



Plate 2.1 Typical sandstone log used for landscaping purposes (Ref: E1055D_001)



Plate 2.2 Flagging stone (Ref: E1055D_002)

As sandstone products produced would be "all in" products, no blending would be required and no production by-products (e.g. processing fines) would be permanently stored on site. Overburden not required for the construction of the perimeter safety bund would be sold as general fill or stockpiled for use in progressive rehabilitation.

2.4 Site Establishment Activities

2.4.1 Introduction

A range of activities would be undertaken to enable the progressive development of the Quarry. The principal activities would be as follows.

1. The marking out of all component areas to be disturbed with highly visible and permanent markers.
2. Construction and/or installation of water management infrastructure including dirty water collection drains, clean water diversions, an energy dissipator and a sediment basin (SB1) (see **Figure 2.1**).
3. Vegetation clearing and soil removal within the areas approved for disturbance to enable the development of the Extraction Area and other areas required for Quarry operations.
4. Construction of the perimeter safety bund using overburden pushed up from within the footprint of the proposed Extraction Area.
5. Installation of the workshop, demountable office and portable amenities, including chemical or pump out toilets.
6. Roadworks and track upgrades to ensure safe and ongoing access to the Quarry Site.

Site establishment activities are anticipated to occur over a period of between three and six months. Heavy equipment such as excavators required for the site establishment activities would be transported to the Quarry Site on low loaders or similar, and remain on-site throughout the period they are needed prior to transportation from the Quarry Site.

2.4.2 Component Mark Out

Prior to the commencement of any vegetation clearing or earthworks, the Applicant would commission a surveyor to survey and physically mark out the approved areas of disturbance using appropriately labelled, highly visible and permanent survey markers such as yellow painted concrete posts. Survey markers would be positioned at the corners of key component areas and along boundaries at distances / spacing that allows visibility of the next marker. All on-site personnel or contractors would be made aware of the approved areas of disturbance and the significance of not disturbing any area beyond the approved areas.

2.4.3 Construction of Water Management Infrastructure

The Extraction Area would be internally draining with all runoff ultimately reporting to a sump located on the floor of the Extraction Area. The Proposal has the benefit of the former extraction areas providing existing sumps for the proposed Extraction Area, thereby minimising the risks of sediment-laden runoff during the establishment of the Extraction Area.

During the early stages of development, a sediment basin (SB1) would be constructed within the Office, Amenities and Parking Area to collect and manage sediment-laden runoff within this area. SB1 would be constructed in accordance with the requirements of *Managing Urban Stormwater* Volumes 1 and 2E (Landcom, 2004 and DECC, 2008) to provide a minimum total capacity of 31m^3 comprising a sediment storage zone of at least 4m^3 and a water settlement zone of at least 27m^3.

Dirty water collection drains would be constructed to convey sediment-laden runoff from areas of operational disturbance within the Office, Amenities and Parking Area to SB1. These drains would be constructed along the northern and western boundaries of the Office, Amenities and Parking Area to prevent sediment-laden runoff entering undisturbed areas. A clean water diversion would also be constructed around the southern perimeter of the Extraction Area. The construction of all erosion and sediment controls would be completed prior to the commencement of vegetation clearing and soil stripping.

Water collected within the sump and SB1 would be used for dust suppression. In order to maintain a minimum capacity of 31m^3, excess water within SB1 would be pumped to the sump within the Extraction Area, as required.

2.4.4 Vegetation Clearing

A total of approximately 3.77ha of remnant native vegetation would be progressively removed to permit the establishment of the Extraction Area and associated areas of operational disturbance. All vegetation clearing would be undertaken in accordance with a Vegetation Clearing Protocol which would be included within the *Environmental Management Plan* for the Quarry.

Vegetation would be cleared within the defined areas of disturbance using an excavator and/or bulldozer, as required. Felled trees would either be removed and stored within the Stage 1 Stockpile Area or completed areas of the Extraction Area for habitat restoration, timber production or mulched and emplaced within rehabilitation areas to enhance habitat. A number of larger tree trunks would be retained for use in rehabilitation and habitat improvement which would be stored in the vicinity of the perimeter bund prior to emplacement.

2.4.5 Soil Removal

The Applicant would remove up to approximately 0.3m of topsoil, where present, focussing upon the recovery of seed-bearing material. The soil recovered would be placed initially within the designated Stage 1 Soil Stockpile Area. Soil and select vegetation removed during subsequent clearing campaigns (i.e. Stage 2) would be stockpiled within completed sections of the Extraction Area for later use in rehabilitation.

Soil would be stripped only once sediment controls have been established and soil stripping operations would not be undertaken when rainfall is predicted.

2.4.6 Construction of Perimeter Safety Bund

A safety bund would be progressively constructed around the perimeter of the proposed Extraction Area by pushing up overburden. The surface of completed sections of the bund would be stabilised (either with a sprayed polymer or soil/grass) to ensure a safe, secure and non-polluting final landform is achieved.

2.4.7 Installation of Office and Amenities

The area immediately west of the Extraction Area would be profiled through the use of cut and fill methods to achieve a flat floor with an elevation of approximately 231m AHD prior to the establishment of a workshop, demountable office, water tank and portable amenities incorporating chemical or pump out toilet facilities. A dedicated light vehicle parking area would also be fenced off adjacent to the office to provide adequate parking for Quarry personnel and visitors to the Quarry Site. This area would also be utilised for heavy vehicle parking, as required, as well as equipment storage throughout the life of the Quarry.

2.4.8 Roadworks

Upgrades to the intersection of the unformed Unnamed Local Road and the Site Access Road would be undertaken during the initial stages of development to ensure the safety and efficiency of the local road network. These works would indicatively include the installation of "GIVE WAY" controls on all three legs of the intersection. All works would be completed in consultation with Camilleri Stockfeeds and to the satisfaction of Council.

In addition, the existing track within the Quarry Site would be widened to achieve a width suitable for two heavy vehicles to pass. Taking into account roadside drainage, the disturbed area would be a minimum of 8m wide for its length from the intersection of the Unnamed Local Road and the Site Access Road to the Extraction Area. A secured (combination lock or equivalent) gate would also be installed along the Site Access Road (see **Figure 2.1**).

The Applicant engaged Duncan Priestley Civil Engineering Pty Limited to prepare a preliminary design for the proposed Site Access Road. The design is presented as **Figure 2.3** and the full design report is presented as **Appendix 11**.

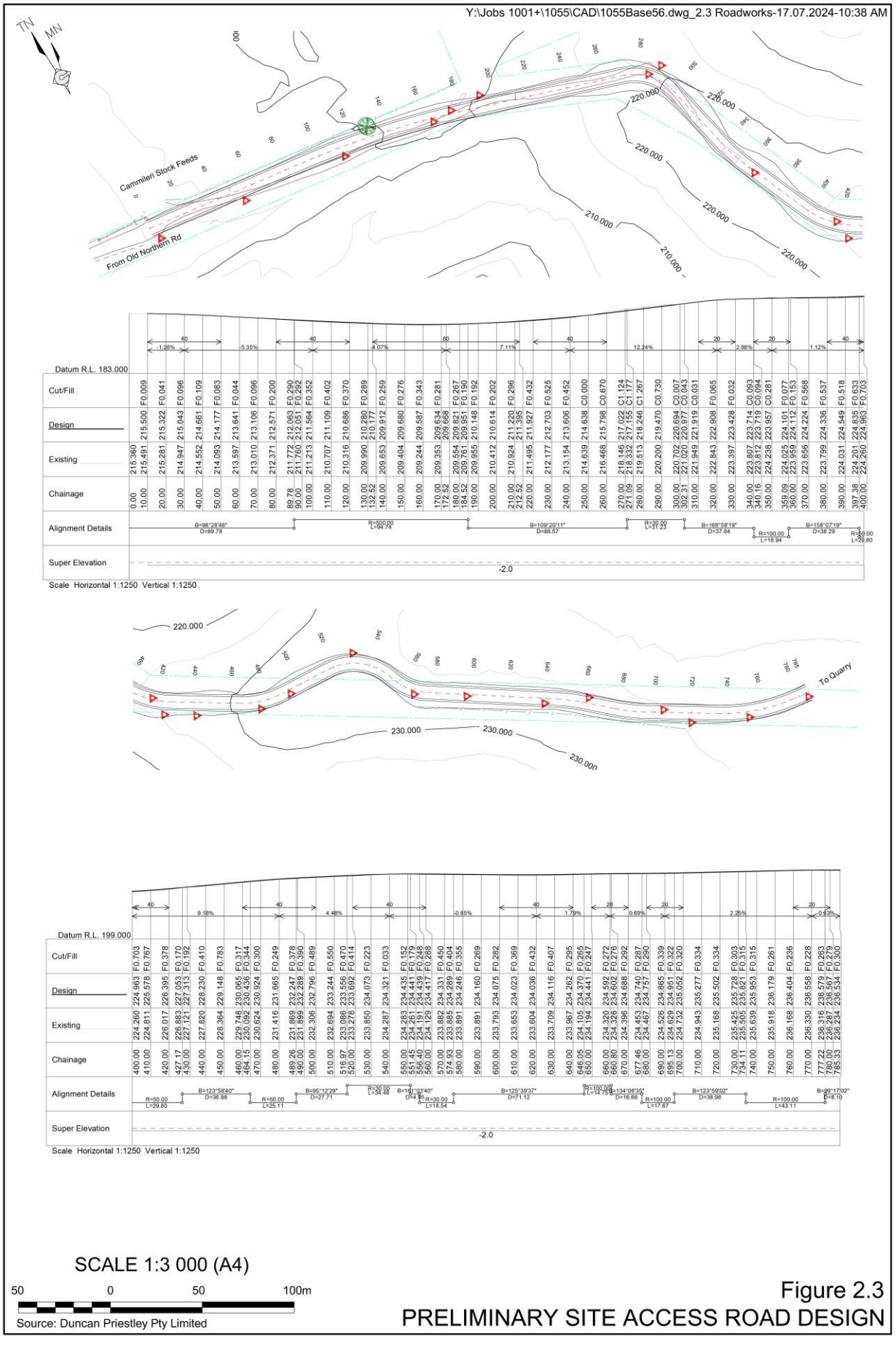


Figure 2.3
PRELIMINARY SITE ACCESS ROAD DESIGN

2.5 Extraction Operations

2.5.1 Introduction

Extraction operations would be undertaken using a combination of conventional excavation, load and haul methods for overburden and friable sandstone. Sandstone logs and flagging stones would be extracted using excavators equipped with cutting wheels. This subsection presents information relating to the proposed extraction operations including design features, extraction sequence, extraction methods, equipment used and extraction rates.

2.5.2 Design Features

The indicative design features identified in **Table 2.1** would be adopted for the Proposal. It is noted that these parameters would be subject to modifications based on factors such as localised geological or geotechnical conditions.

Table 2.1
Indicative Design Features

Parameter	Value
Operational Face Height	2m to 10m
Operational Bench Width	Variable
Face Angle	60° to 90°
Maximum Haul Ramp Gradient	1:10 (V:H)
Haul Ramp Width	8m
Source: Central Civil (NSW) Pty Ltd	

2.5.3 Extraction Sequence

Figures 2.4 and **2.5** display the indicative extraction sequence and cross sections through the Extraction Area throughout the life of the Quarry. Whilst it is envisaged that extraction would proceed generally in accordance with the staging displayed on these figures, staging would be subject to modifications based on factors such as localised geological conditions and product demand.

Stage 1

Stage 1 extraction operations would involve the progressive development of benches up to 10m high within the Extraction Area to a depth of 218m AHD to cover an area of approximately 1.6ha (**Figure 2.4**). A haul ramp would be constructed along the southwestern edge of the Extraction Area to provide vehicular access to the floor of the Extraction Area.

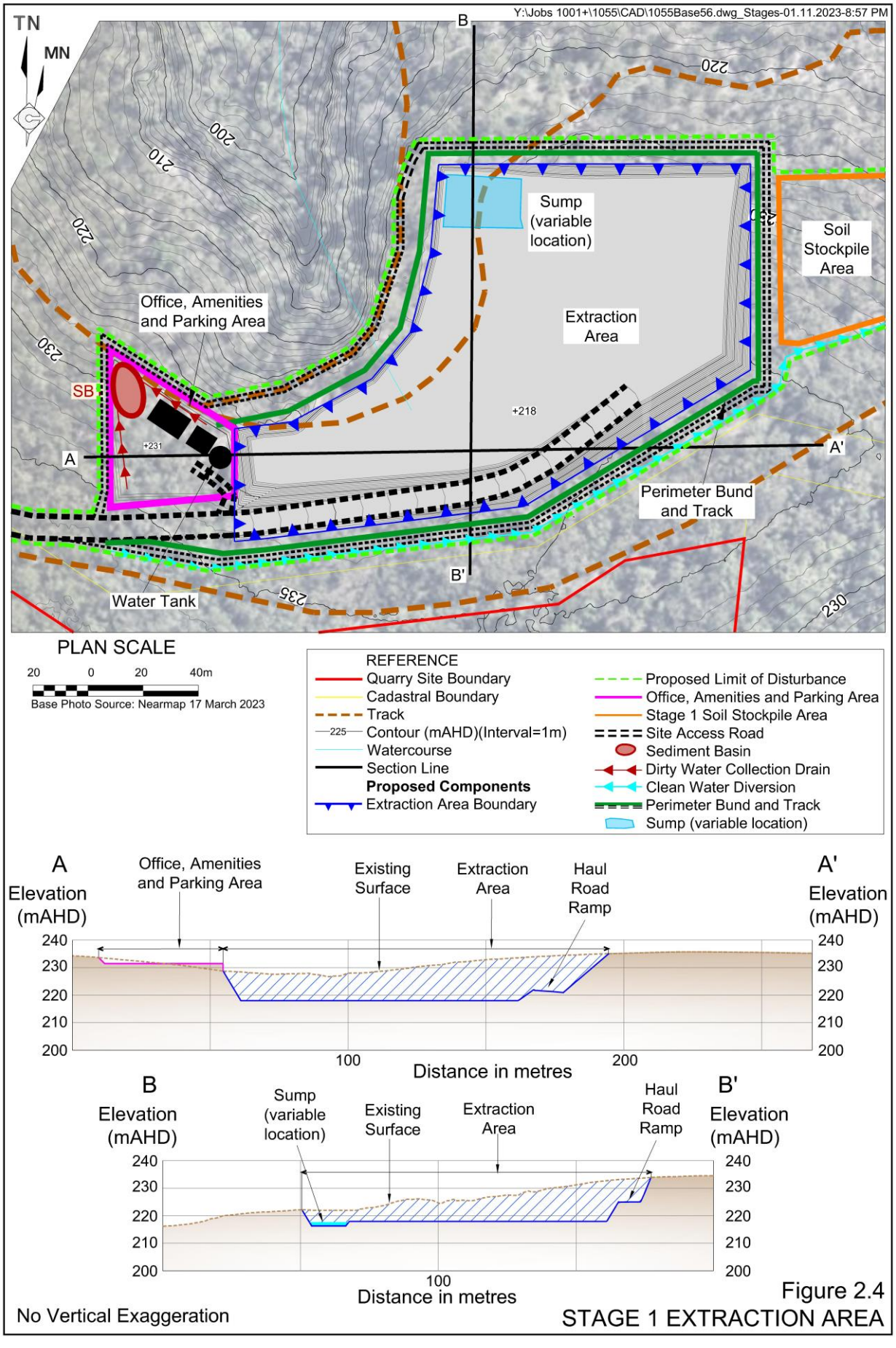


Figure 2.4
STAGE 1 EXTRACTION AREA

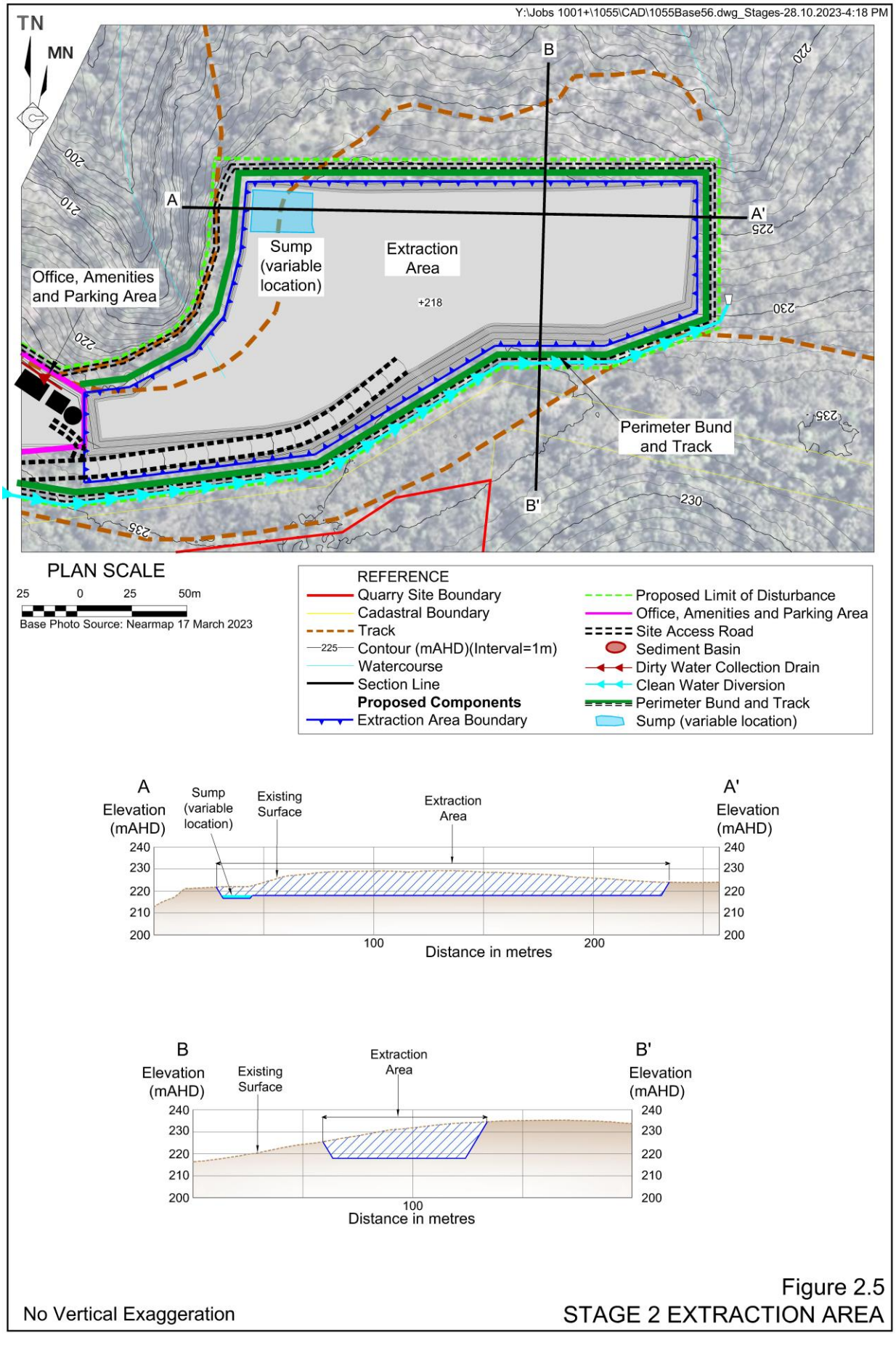


Figure 2.5
STAGE 2 EXTRACTION AREA

During the progression of the Stage 1 Extraction Area, overburden would be progressively pushed up to the edge of the active Extraction Area using a bulldozer or excavator to provide access to the targeted resource. Overburden would be used to construct the perimeter safety bund, with excess overburden material sold as fill or placed/stored for rehabilitation purposes. Following the removal of overburden, the targeted resource would be extracted using an excavator-mounted wheel cutter or similar and would be transported directly from the Quarry Site for use in landscaping or engineering projects or for further off-site processing. Material unsuitable for use as sandstone logs or flagging stone (i.e. friable sandstone) would be transported from the Quarry Site and sold as general fill or for further processing to recover contained sand.

Stage 2

Stage 2 extraction operations would involve the continued progressive development of the Extraction Area to the east (**Figure 2.5**). The development of Stage 2 would ultimately extend the footprint of the Extraction Area to cover a cumulative area of approximately 3.4ha, including the Perimeter Safety Bund and Track.

2.5.4 Extraction Method

Select and General Fill

Overburden and material unsuited for flagging stone and sandstone logs (i.e. friable sandstone) as well as off cuts from production of flagging stone would be extracted and processed on a campaign basis (see Section 2.6) to produce select and general fill. This material would be extracted using conventional free dig techniques using an excavator or similar. Material would be immediately loaded into road trucks for transportation off site or stockpiled for later sale or use in rehabilitation operations.

Flagging Stone Extraction and Splitting

Extraction of flagging stone would be undertaken using an excavator equipped with cutting wheels and a hammer. The extracted blocks would be further processed into flagging stone on the floor of the Extraction Area using an excavator equipped with twin header rock grinders or by hand prior to packing onto pallets for despatch.

Sandstone Log Extraction

Sandstone logs would similarly be extracted using an excavator equipped with cutting wheels and a hammer. Sandstone log sawing would generally be undertaken in benches reflecting the dimensions of the required logs. The cut logs would be stockpiled within the Extraction Area to allow for additional minor trimming, washing and grading or placed directly onto road trucks for despatch.

2.5.5 Production Rate

Despatch of products from the Quarry Site would not exceed 30,000t per annum. This rate has been selected based on the inferred resource, anticipated demand and allows for peaks in some years.

2.5.6 Mobile Equipment

Table 2.2 lists the range of equipment proposed to be used within the Quarry Site. The Applicant intends to use this equipment throughout the proposed life of the Quarry, noting that equipment may be replaced with similar models, as required.

It is conservatively estimated that the mobile equipment would use up to approximately 1,000L of diesel per day based on an extraction and processing rate of 30,000tpa.

Table 2.2
Mobile Equipment Fleet

Equipment	Number	Use/Activity
D8 Bulldozer	1	Earthmoving, vegetation clearing, construction of safety perimeter bund (campaign basis)
All Terrain Forklift	1	Moving sandstone blocks and pallets of flagging stone, loading pallets onto trucks
Front-end Loader	1	Loading mobile crusher (campaign basis) and product trucks, stockpile management
Excavator (35t) with attachments: • Hammer • Wheel Cutter • Twin Header Rock Grinder • Bucket • Fork	2	Resource extraction, cutting of sandstone logs and flagging stone, transfer of cut sandstone to temporary stockpile area
Water Cart (15,000L)	1	Dust suppression activities within Extraction Area and Site Access Road
Mobile Crusher	1	Crushing of sandstone for on-site tracks and Site Access Road maintenance, production of select and general fill

2.6 Processing Operations

2.6.1 Mobile Crushing Operations

The Applicant would utilise a mobile processing plant which would be transported to the Quarry Site for crushing campaigns, as required. The mobile processing plant would comprise a horizontal impactor crusher, or equivalent.

Operation of the mobile plant would be confined to within the Extraction Area. The mobile processing equipment would either be diesel powered or would be powered by portable generators. The Applicant would ensure that all mobile processing equipment would be maintained in accordance with the manufacturer's recommendations and less noisy equipment would be selected in favour of more noisy equipment, where practicable.

Extracted sandstone would, if required, be loaded into the crusher using a front-end loader. Crushed material would be screened, subjected to secondary crushing as required, and stockpiled within the Extraction Area. Crushed materials would be used for on-site track and Site Access Road maintenance or sold as select or general fill.

2.6.2 Flagging Stone and Sandstone Log Processing

Extracted flagging stone and sandstone log blocks would, if required, be processed within the Extraction Area using an excavator equipped with twin header rock grinders or a wheel cutter.

2.6.3 Operating Capacity and Rates

The mobile processing plant would have a maximum capacity of approximately 90t of products per hour. For the purposes of this assessment, a maximum daily production rate of 900t[1] has been assumed. However, it is recognised that crushing operations would likely occur on a campaign basis with lower average daily production rates.

2.7 Importation of VENM

2.7.1 Importation Campaigns and Quantities

Importation of VENM to the Quarry Site would occur on a campaign basis and would be wholly dependent on the generation of materials at construction sites in the Sydney metropolitan area. It is not possible to accurately predict the timing or scale of VENM importation on a monthly or annual basis.

For the purposes of the development consent, the Applicant proposes that no more than 30,000tpa of VENM would be imported each calendar year once importation commences. VENM would primarily be sourced from the Applicant's civil projects and network of industry contacts, as well as from local developments and transfer stations.

2.7.2 Material Classification and Documentation

For the purposes of material classification and ongoing management, VENM is classified under Clause 50 of Schedule 1 of the *Protection of the Environment Operations Act 1997* as follows.

> "VENM - means natural material (such as clay, gravel, sand, soil or rock fines) that
>
> a) has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities, and
>
> b) that does not contain any sulfidic ores or soils or any other waste.
>
> VENM includes excavated natural material that meets such criteria for VENM as may be approved for the time being pursuant to an EPA Gazettal notice."

The supplier (generator) of the VENM imported to the Quarry Site would be responsible for providing the necessary materials classification certificates and any other documentation required for materials classification and supply. The Applicant would be responsible for ensuring that suitable records are maintained including the following.

- Records of dates and quantities of material received including the name and address of the supplier.

[1] Based on a throughput of 90t per hour and a 10-hour workday i.e., from 7:00am to 5:00pm.

- Certification of classification for any material supplied as VENM.

All records would be maintained for a minimum of six years. The Applicant would also ensure that any records maintained for this activity are available for review on request by Council or relevant government authorities.

2.7.3 Use and Timing of Importation of VENM

Imported VENM would be used to backfill the Extraction Area to establish the proposed final landform (see Section 2.13). As a result, importation operations would not commence until sections of the Stage 1 Extraction Area have been completed and are no longer required for stockpiling or processing-related operations. Importation operations would therefore be expected to commence later in the life of the Quarry and would continue following completion of extraction operations until the Extraction Area is fully rehabilitated.

2.8 Access, Traffic and Material Transportation

2.8.1 Quarry Site Access

Access for all vehicles to the Quarry Site would via the Site Access Road which provides vehicular access from the unnamed local road off Old Northern Road.

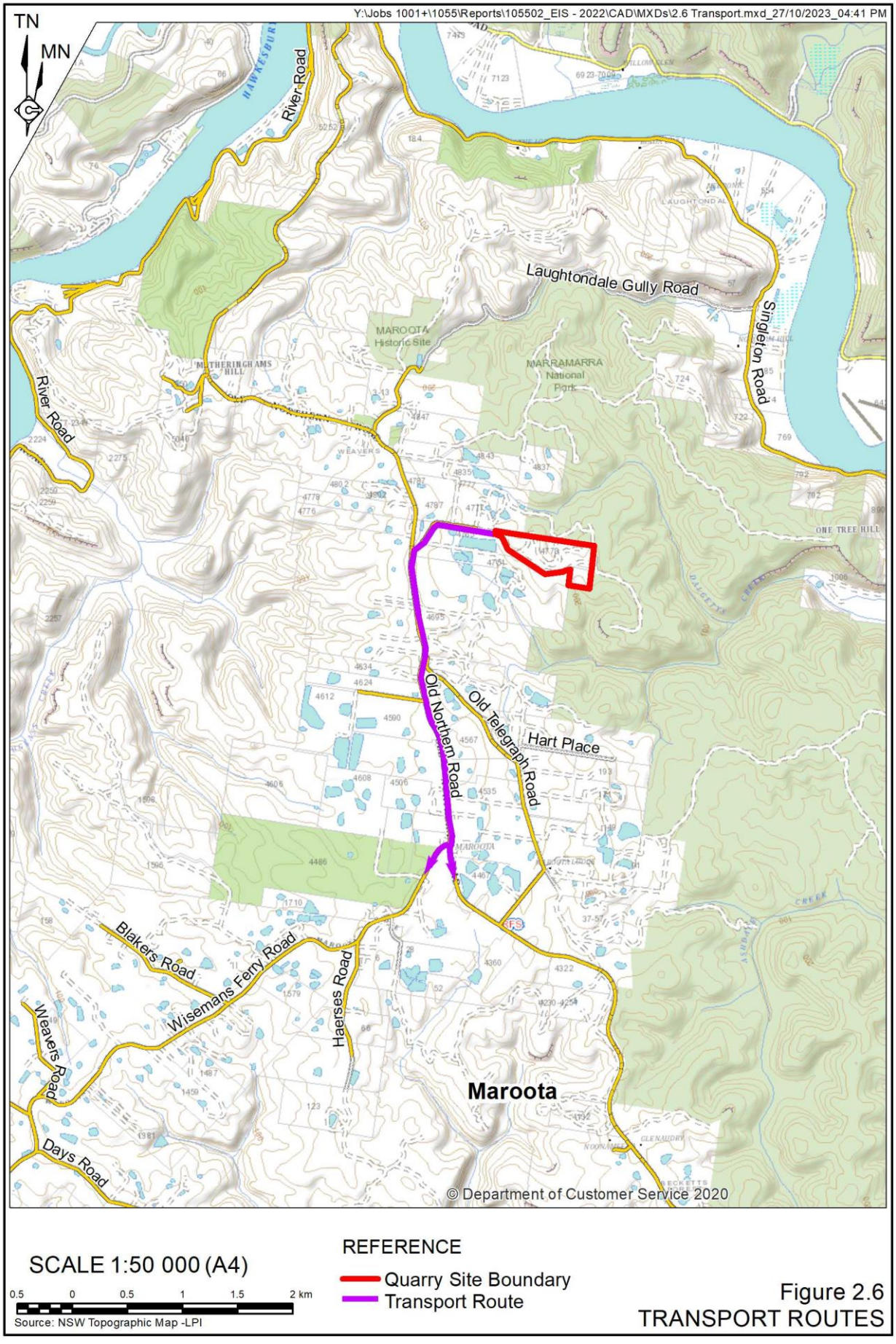
2.8.2 Laden Transport Routes

Figure 2.6 displays the transport routes which would be used by heavy vehicles to access the Quarry Site. All vehicles would utilise the Unnamed Local Road between the Quarry Site and Old Northern Road, a State Road. All unladen Quarry-related heavy vehicles would turn right onto the Unnamed Local Road from Old Northern Road. All laden heavy vehicles would turn left from the Unnamed Local Road into the Old Northern Road. All Quarry-related heavy vehicles would be restricted to the section of Old Northern Road to the south of the intersection.

From the intersection of Old Northern Road and Wisemans Ferry Road, Quarry-related heavy vehicles would utilise the State road network. All heavy vehicle movements along Old Northern Road would be restricted between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.

2.8.3 Traffic Types and Levels

The largest vehicle that would access the Quarry Site would be truck and dog trailers with a maximum capacity of approximately 38t, with the average load being approximately 32t. Sandstone logs would generally be despatched from the Quarry Site on flat-bed trucks. It is noted that smaller quantities of products would periodically be despatched using other heavy vehicle configurations, however, for the purposes of this assessment truck and dog trailers are relied upon.


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TN
MN
River Road
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Singleton Road
MAROOTA Historic Site
MUTHERINGHAMS HILL
NARRAMARRA National Park
ONE TREE HILL
Old Northern Road
Old Telegraph Road
Hart Place
Blakers Road
Wisemans Ferry Road
Haerses Road
Weavers Road
Days Road
Maroota
© Department of Customer Service 2020
SCALE 1:50 000 (A4)
0.5 0 0.5 1 1.5 2 km
Source: NSW Topographic Map -LPI
REFERENCE
Quarry Site Boundary
Transport Route
Figure 2.6
TRANSPORT ROUTES

Traffic levels would vary substantially on a daily basis throughout the life of the Quarry based on market demands. **Table 2.3** presents the anticipated laden heavy vehicle movements generated by the Quarry.

Table 2.3
Laden Heavy Vehicle Movements

Annual Production Rate	Daily Laden HV Movements		Maximum Hourly Laden HV Movements
	Average[1]	Maximum	
30,000tpa	4	10	3

Note 1: Heavy vehicle movements have been rounded up for conservatism. Actual average daily averages based on 30,000tpa would be 3.35.

The transportation of VENM to the Quarry Site would be the responsibility of the operator delivering the material and subject to approval for that operation, including traffic generation. However, opportunities may arise for material to be backloaded in a Quarry vehicle. While this approach would be beneficial, as it would minimise heavy vehicle trips, it is noted that this would be rare. Notwithstanding, during campaigns of VENM importation, the Applicant would limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the number of movements identified in **Table 2.3** are not exceeded.

2.9 Waste Management

2.9.1 Introduction

The SEARs identify "*waste management*" as a key issue for assessment in the EIS, requiring that all potential waste streams are identified and management arrangements described. The SEARs and the requirements of relevant government agencies are included in full as **Appendix 1**.

Wastes would primarily be managed in accordance with a Waste Management Plan which would be incorporated with the *Environmental Management Plan* for the Quarry.

The following subsections provide an overview of waste streams that would be generated within the Quarry, approximate volumes and methods of disposal or management.

2.9.2 Production By-products

Based on an average overburden thickness of 2m, it is anticipated that the Quarry would generate approximately 46,000 loose cubic meters of overburden throughout the life of the Quarry. As the Quarry would produce "all in" sandstone products, no production by-products (e.g. processing fines) would be permanently stored on site. Overburden not required for the construction of the perimeter safety bund would be sold as select or general fill or stockpiled for use in progressive rehabilitation activities.

2.9.3 Non-Production Wastes

Non-production wastes generated through the proposed operational activities would be negligible, with all wastes stored in lidded bins on site and periodically removed to a licenced waste facility for appropriate disposal or, in the case of scrap steel, to a steel recycling facility.

Any waste oils and tyres generated during operations and machinery servicing on site would be removed from site as soon as practicable and disposed of appropriately.

2.10 Infrastructure, Utilities and Services

The Applicant would install a demountable office, portable amenities, including chemical or pump out toilets, and workshop within the Office, Amenities and Parking Area to the west of the Extraction Area.

There are currently no utilities or services which service the Quarry Site. An enclosed generator would be used to generate power as required. Communications would be via mobile phone and/or two-way radio. Potable water would be bought to the Quarry Site in 20L containers or similar.

A self-bunded trailer or similar would be used to transport diesel to the Quarry Site, as required. No diesel would be stored permanently on site. Small quantities of oils and fuel for pumps and generators would be stored on-site on bunded pallets, with precaution taken to prevent spills.

2.11 Employment

It is anticipated that four full time-equivalent staff would be employed at the Quarry including a Supervisor and three Operators. Additional personnel (e.g. bulldozer operator and crushing and screening personnel) would also work on site during periods of peak production.

It anticipated that the Quarry would also provide employment for 2 to 4 truck drivers depending on demand. It is anticipated that an average of 3 truck drivers would be employed throughout the life of the Quarry.

2.12 Hours of Operation and Quarry Life

Table 2.4 lists the proposed hours of operation for the range of activities that would be undertaken at the Quarry Site throughout the life of the Quarry.

Based on an annual extraction and production rate of 30,000tpa, it is anticipated that the Quarry would operate for approximately 19.2 years. However, approval is being sought for extraction for a period of 20 years to account for peaks and troughs in demand. Approval for a further 10 years to permit sufficient time for importation of VENM to complete rehabilitation operations is also sought. As a result, development consent is sought for a period of 30 years.

As noted in Section 2.8.2, all heavy vehicle movements along Old Northern Road would be restricted between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.

Table 2.4
Proposed Hours of Operation

Activity	Monday to Friday	Saturdays	Sundays or Public Holidays
Site development and construction	7:00am – 5:00pm	7:00am – 1:00pm	Nil
Extraction operations	7:00am – 5:00pm	7:00am – 1:00pm	Nil
Product despatch	7:00am – 5:00pm	7:00am – 1:00pm	Nil
Maintenance (non-audible)	24 hours / day	24 hours / day	Nil

2.13 Rehabilitation

2.13.1 Introduction

The Applicant's objectives for rehabilitation are centred on creating a final landform that is safe, secure, non-polluting, stable and suitable for biodiversity conservation. The specific objectives for the long-term rehabilitation program are to:

- provide a low-maintenance, geotechnically stable and safe landform with minimal erosion; and
- establish native vegetation similar to that currently within and surrounding the Quarry Site, as far as practicable.

Emphasis would be placed upon progressive rehabilitation of completed areas within the Quarry Site, including in those areas previously disturbed and no longer required.

Figure 2.7 displays the indicative final landform for the Quarry. A *Vegetation Management and Restoration Plan* prepared in accordance with the *Guidelines for the preparation of Vegetation Management and Restoration Plans 2008* (Hornsby Shire Council, 2008) detailing the proposed rehabilitation of the Quarry Site is provided as **Appendix 10**. A summary of the general methodologies which would be implemented to achieve the final landform is provided in the following subsections.

2.13.2 Extraction Area

Imported VENM and stockpiled topsoil and/or overburden (depending on availability) would be placed on all final or terminal benches with an emphasis on creating a landform with a roughened surface to contain the bulk of rain falling on the benches and to provide a suitable substrate for the growth of endemic native vegetation. Overburden would be progressively placed on each bench once activities cease in that area prior to seeding. Terminal faces would be partly covered with material retained on the benches towards the end of extraction of each bench. The Extraction Area floor would be backfilled to an elevation of 223m AHD and the Perimeter Safety Bund would be removed along the northern and western boundaries of the Extraction Area to ensure that the area is free draining.

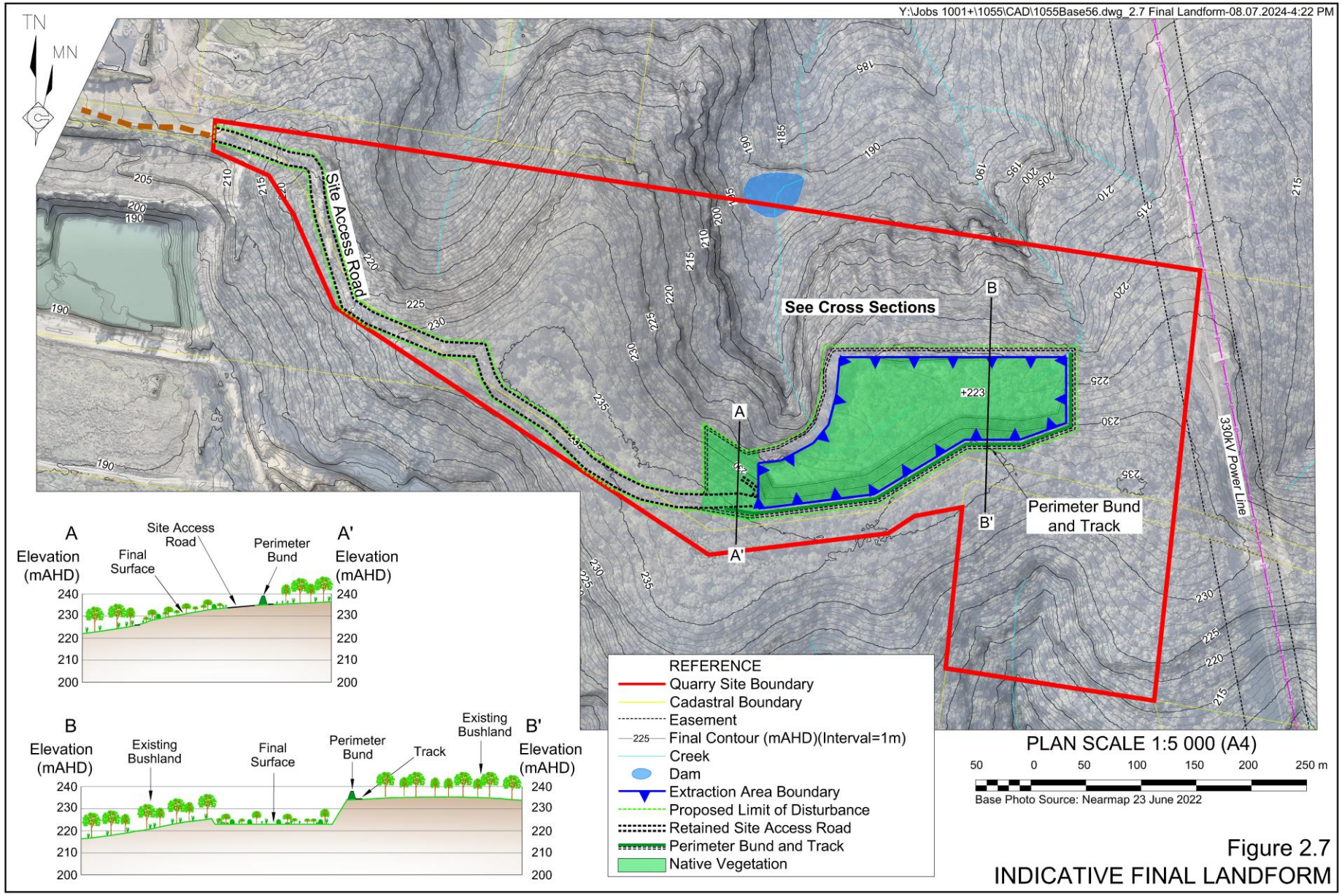


Figure 2.7
INDICATIVE FINAL LANDFORM

Unsealed internal tracks, ramps and safety bunds along the southern and eastern Extraction Area boundaries would be retained following the cessation of operations to provide for ongoing, safe access to the Extraction Area for rehabilitation and maintenance activities.

2.13.3 Operational Disturbance Area

Following the cessation of extraction, all infrastructure, including the demountable office, portable amenities and workshop, would be removed from the Quarry Site. It is proposed that compacted areas of operational disturbance would be ripped prior to being covered with soil and mulch, where available, and seeded and/or planted using native vegetation endemic to the area. It is proposed that the Site Access Road would be retained following the life of the Quarry to provide ongoing access for rehabilitation and maintenance activities and any subsequent land uses on the property.

2.13.4 Final Land Uses

It is intended that the Quarry Site would be retained principally for biodiversity conservation purposes. The success of rehabilitation and revegetation would be reviewed for a period of two years following completion of quarrying activities with additional soil, seed or tube stock added where revegetation is less successful.

It is noted that preferences for final land use can change over time and it is therefore acknowledged that as the Quarry approaches closure, the final land use would be re-visited in consultation with Council.

2.14 Biodiversity Offset Strategy

2.14.1 Introduction

The Proposal would involve the removal of approximately 3.77ha of native vegetation and would trigger the entry requirements for the Biodiversity Offset Scheme. As such, a Biodiversity Development Assessment Report (BDAR) has been prepared by Ecoplanning Pty Ltd (Ecoplanning, 2023) and is included as **Appendix 7**. The following subsections describe the Biodiversity Offset Strategy for the Proposal with further assessment of biodiversity values provided in Section 5.5.

2.14.2 Impacts Requiring Offsetting

Ecoplanning (2023) has identified that impacts to native vegetation would be expected through the direct clearing of approximately 3.77ha of native vegetation. The direct clearing and subsequent development of the proposed area of disturbance would represent a permanent impact, or loss, of this native vegetation and habitat.

2.14.3 Impacts Not Requiring Offsetting

Impacts to those areas identified as "cleared land", comprising the former Extraction Areas and existing tracks, would not require offsetting.

2.14.4 Credit Calculations

Following the implementation of all practical measures to avoid or mitigate impacts to native vegetation, it is estimated that the Quarry would result in the removal of approximately 3.77ha of native vegetation which is considered a residual impact of the Quarry. The ecosystem credits required to offset the residual impacts of the Quarry are provided in **Table 2.5** and the species credits are provided in **Table 2.6**. It is proposed that the required offsets would be met in a staged manner commensurate with the schedule of extraction operations (**Figure 2.8**).

Table 2.5
Ecosystem Credits Required for Biodiversity Offset

Plant Community Type	Condition	Area Disturbed (ha)		Credits Required	
		Stage 1	Stage 2	Stage 1	Stage 2
PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	0.08	-	1	-
PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	1.19	0.24	25	5
PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	1.91	0.35	38	7
Total		**3.18***	**0.59***	**64**	**12**
* Subject to rounding errors					
Source: Ecoplanning (2023) – Compiled from Section 8					

Table 2.6
Species Credits Required for Biodiversity Offset

Species	Credits Required	
	Stage 1	Stage 2
Cercartetus nanus / Eastern Pygmy-possum (Fauna)	80	15
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)	122	23
Darwinia fascicularis subsp. *oligantha* (Flora)	18	-
Myotis macropus / Southern Myotis (Fauna)	80	15
Pimela curviflora var. *curviflora* (Flora)	80	15
Pseudophryne australis / Red-crowned Toadlet (Fauna)	4	11
Tetratheca glandulosa (Flora)	80	15
Vespadelus troughtoni / Eastern Cave Bat (Fauna)	122	23
Total	**586**	**117**
Source: Ecoplanning (2023) – Compiled from Section 8		

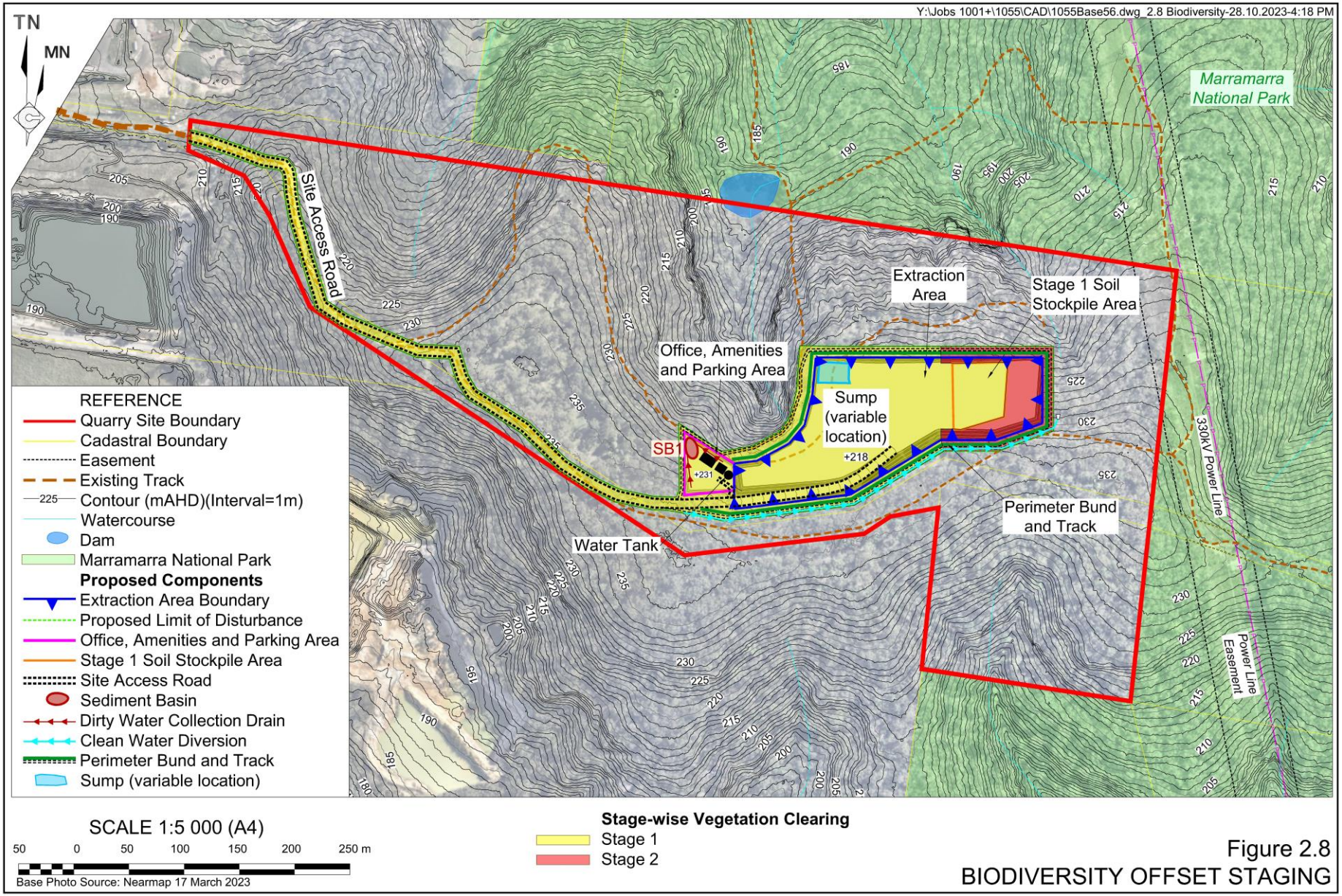


Figure 2.8
BIODIVERSITY OFFSET STAGING

2.14.5 Securing Biodiversity Credits

It is currently envisaged that most ecosystem credits associated with the Proposal would be offset by entering into a Biodiversity Stewardship Agreement (BSA), however, the Applicant may also choose to offset credits through payment into the Biodiversity Conservation Fund (BCF) or by purchasing credits on the open market. Species credit species would need to be offset by payment into the BCF or by purchasing credits on the open market.

Section 3

Legislative and Planning Context

PREAMBLE

This section presents the legislative and planning context within which the Quarry would operate and describes the relevant environmental issues raised within these instruments that need to be addressed within the EIS. Relevant NSW State environmental planning legislation and local government planning instruments are included in the review as well as additional policies and guidelines that are relevant to the Proposal.

3.1 Introduction

A range of legislation and planning instruments apply to the Proposal. These pieces of legislation and statutory instruments were reviewed to identify which environmental aspects require consideration in the EIS. In addition, the SEARs identified a number of guideline documents that could potentially be of assistance during the preparation of the EIS (see **Appendix 1**). A brief summary of the relevant legislation or planning instrument is provided in the following subsections. The relevance of planning instruments to specific environmental issues has been addressed in the relevant specialist consultant assessments (see **Appendices 3** to **9**) and considered in Section 5 of this document.

3.2 Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) covers "matters of national environmental significance" (MNES) that include:

- world heritage properties;
- wetlands listed under the Ramsar Convention;
- listed threatened species and ecological communities;
- listed migratory species protected under international agreements;
- nuclear actions;
- the Commonwealth marine environment; and
- National heritage places.

Under the EPBC Act, if a project has the potential to have a significant impact on a matter of national environmental significance, it is required to be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment as to whether it represents a "controlled action" and therefore requires approval from the Minister for the Environment.

An assessment of potential biodiversity impacts is presented in Section 5.5 and in Ecoplanning (2023) which is included as **Appendix 7**.

As no matters of environmental significance will be impacted by the Proposal, it is not required to be referred to DCCEEW.

3.3 NSW Legislation

The key NSW legislation relating to the approvals and licences required for the Proposal are identified and discussed as follows.

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Water Management Act 2000* (WM Act)

- *Biodiversity Conservation Act 2016* (BC Act)
- *National Parks and Wildlife Act 1974* (NP&W Act)
- *Roads Act 1993* (Roads Act)

Environmental Planning and Assessment Act 1979

The EP&A Act provides the framework for the assessment and determination of development in NSW and is administered by the Department of Planning and Environment (DPE).

Approximately one half of the Quarry Site is zoned RU1 – Primary Production, with the remainder zoned E3 – Environmental Management under the *Hornsby Local Environment Plan 2013* (see Section 3.5.1). Extractive industries are permissible with development consent in each of these zones, with permissibility under the E3 zone by virtue of Clause 2.9(3) of the *State Environmental Planning Policy (Resources and Energy) 2021*. Development consent for the Quarry is being sought in accordance with Part 4, Division 4.3 of the EP&A Act and will need to be evaluated in accordance with Section 4.15 of the EP&A Act.

As an extractive industry which would disturb an area greater than 2ha, the Proposal is classified as "designated development" under Clause 26 of Schedule 3 of the *Environmental Planning and Assessment Regulation 2021*. As designated development for the purpose of an extractive industry, the application is also classified as Regionally Significant Development under Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021* and the consent authority for the application will be the Sydney North Planning Panel in accordance with Section 4.5(b) of the EP&A Act.

The Proposal is also classified as "integrated development" under Division 4.8 of the EP&A Act because it would require the following approvals in addition to the development consent.

- An Environmental Protection Licence under the *Protection of the Environment Operations Act 1997*.
- Controlled Activity Approval under Section 91(1) of the *Water Management Act 2000*; and
- A Section 138 approval under the *Roads Act 1993*.

As a result, the application will be referred to the EPA, Water NSW and Transport for NSW and in accordance with Section 4.47(3) of the EP&A Act, Council must obtain general terms of approval from these agencies prior to approving the application. Any development consent issued must be consistent with those general terms of approval.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides the environmental protection framework for regulation and reduction of pollution and waste in NSW as well as for monitoring of environmental quality. The POEO Act is administered by the Environment Protection Authority (EPA), which issues environment protection licences (EPLs) for a number of scheduled activities.

The proposed operation of a mobile crushing plant in the manner outlined in this document is classified as a "Scheduled Activity" under Clause 16 of Schedule 1 of the POEO Act and is therefore required to operate in accordance with an EPL. As noted above, Council will refer the development application to the EPA and seek general terms of approval.

Under Clause 39(2)(e) of Schedule 1 of the POEO Act, the proposed importation of VENM to the Quarry Site for use in rehabilitation is not a scheduled activity and is therefore exempt from the licensing requirements of Section 48 of the POEO Act.

Furthermore, as the Quarry would be an extractive industry operating below the threshold of 30,000t per annum, the extractive activities proposed are not classified as a "Scheduled Activity". This notwithstanding, the regulation of pollution in NSW is regulated by the EPA through the POEO Act and the Proposal may be subject to environment protection notices or other actions in accordance with the Act.

Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides clear arrangements for controlling land-based activities that affect the quality and quantity of the State's water resources.

It provides for four types of approval, namely:

- *water use approval (Section 89) – which authorises the use of water at a specified location for a particular purpose, for up to 10 years;*
- *water management work approval (Section 90) – which authorises the construction and use of specified water supply, drainage and flood works;*
- *controlled activity approval (Section 91(2)) – which authorises works carried out within 40m of waterfront land; and*
- *aquifer interference activity approval (Section 91(3)) – which authorises interference of an aquifer.*

The Proposal would require a controlled activity approval under Section 91(2) of the WM Act to permit the establishment of the Extraction Area within 40m of waterfront land, namely two unnamed first order watercourses which flows north into Dalgetys Creek (see Section 4.1).

The WM Act contains provisions for basic landholder rights which entitle the owner or occupier of a landholding to take water without the need for a water access licence or approval under the harvestable rights provisions of the WM Act. Harvestable rights may only occur in nominated areas and the capacity of the water supply work (or works) is within a designated harvestable rights volume. Where the capacity of a water supply work (or works) exceeds the harvestable right, a water access licence to that meets the excess volume must be obtained. The Quarry Site is located within a harvestable rights order area and has a maximum harvestable rights dam capacity of approximately 1.87ML. Water collected under harvestable rights may be used for the Proposal, however, as noted in Section 2.4.3, water collected within the sump and SB1 would be used for dust suppression.

Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The Applicant has considered opportunities to minimise impacts to native vegetation for the Quarry. An assessment of potential biodiversity impacts is presented in Section 5.5 and in Ecoplanning (2023) which is included as **Appendix 7**.

Residual impacts to biodiversity would include removal of approximately 3.77ha of native vegetation. This impact triggers the Biodiversity Offset Scheme and therefore the residual impacts have been assessed in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR) prepared by Ecoplanning (2023). Residual impacts to biodiversity values would be offset in accordance with the BC Act (Section 2.14).

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) aims to manage and conserve nature, objects, places and features that have ecological and cultural value. The NP&W Act is administered and enforced by Heritage NSW within the Department of Premier and Cabinet and DPE.

Aboriginal places and objects are protected under the NP&W Act. An Aboriginal Heritage Impact Permit (AHIP) is required for consent to destroy, deface or damage an identified Aboriginal object or Aboriginal place. No Aboriginal places or objects of significance have been identified within the Quarry Site. Aboriginal cultural heritage is further addressed in Section 5.6.

Roads Act 1993

The *Roads Act 1993* (Roads Act) applies to public roads in NSW, and depending upon the type of road, is administered by Transport for NSW (TfNSW) or local council. Consent is required under Section 138 of the Roads Act for works or structures that disturb the surface of a public road, connect a road to a classified road or any other activity in a road reserve managed by TfNSW or Council.

A permit under the Roads Act would be required to undertake the proposed roadworks to establish the Site Access Road and the intersection of the Unnamed Local Road and Site Access Road. Hornsby Shire Council would be the issuing authority for the required permit.

3.4 State Environmental Planning Policies

State Environmental Planning Policy (Planning Systems) 2021

One of the purposes of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) is to provide the basis for development to be declared "regionally significant development" and to further confer the function of a regional planning panel to determine development applications. As designated development for the purpose of extractive industry, the Proposal is classified as regional development under the Planning Systems SEPP and therefore determination of the application will be by the Sydney North Planning Panel.

State Environmental Planning Policy (Resources and Energy) 2021

The *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP) was gazetted on 1 March 2022 to consolidate the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) and the *Sydney Regional Environmental Plan No. 9 – Extractive Industries (No 2 – 1995)* (Extractive Industries SEPP) as part of a broader administrative consolidation of SEPPs by the NSW Government.

The primary function of the Resources and Energy SEPP is to provide proper management, orderly and economic use and development of land containing mineral, petroleum and extractive material resources and to establish appropriate planning controls to encourage ecologically sustainable development through environmental assessment and sustainable management.

The Resources and Energy SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that the consent authority must consider when assessing a new or modified proposal for an extractive operation, and where these have been addressed in this document, is provided in **Table 3.1**.

It is noted that the Quarry Site is not located within land described in Schedule 4 of the Resources and Energy SEPP (see **Figure 1.1**) and therefore Section 3.9 of the Resources and Energy SEPP does not apply.

Table 3.1
Application of SEPP (Resources and Energy) 2021

Relevant SEPP Clause	Description	EIS Section / Comments
2.17: Compatibility of proposed mine, petroleum production or extractive industry with other land uses	Consideration is given to: • The existing uses and approved uses of land in the vicinity of the development; • The potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and • Any ways in which the development may be incompatible with any of those existing, approved or preferred land uses. • The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared. • Measures proposed to avoid or minimise any incompatibility are considered.	The existing and approved uses of land within the Quarry Site are primary production and biodiversity conservation. The Proposal would not be incompatible with land uses surrounding the Quarry Site as demonstrated by numerous other extractive operations adjacent to conservation zones. Measures proposed to minimise any incompatibility include ensuring the consideration of the *Developments adjacent to National Parks and Wildlife Service lands Guidelines* (see Section 3.6.1).
2.18: Consideration of the voluntary land acquisition and mitigation policy	Consideration is given to any applicable provisions of the voluntary land acquisition and mitigation policy, in particular: • Any applicable provisions of the policy for the mitigation or avoidance of noise or particulate matter impacts outside the land on which the development is to be caried out; and • Any applicable provisions of the policy relating to the developer making an offer to acquire land affected by those impacts. To avoid doubt, the obligations of a consent authority under this section extend to any application to modify a development consent for State significant development for the purposes of mining, petroleum production or extractive industry. This section extends to applications made, but not determined, before the commencement of this section.	The Air Quality Assessment (see Section 5.2) determined that the Quarry would be unlikely to result in significant additional dust emissions from the Quarry Site and would not result in a discernible change to air quality at the nearest privately-owned residences. The Noise Assessment (see Section 5.3) determined that the Proposal would be unlikely to result in significant noise from the Quarry Site. Noting the above, activities within the Voluntary Land Acquisition and Mitigation Policy (VLAMP) does not apply to the Proposal as it is not a State Significant Development. Further considerations under the VLAMP are not required.

Table 3.1 (Cont'd)
Application of SEPP (Resources and Energy) 2021

Relevant SEPP Clause	Description	EIS Section / Comments
2.19: Compatibility with mining, petroleum production or extractive industry	Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible. Measures taken by the Applicant to avoid or minimise any incompatibility are considered. The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.	The Proposal would allow for the extraction of sandstone resources in a manner that would ensure that the maximum benefit is obtained from the target resource throughout the approved life of the Quarry. This is considered to be in the public benefit. An assessment of the social and economic impacts, including the public benefits of the Proposal, is provided in Section 5.10.
2.20: Natural resource and environmental management	Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure: • impacts on significant water resources, including surface and groundwater resources, are avoided or minimised; • impacts on threatened species and biodiversity are avoided or minimised; and • greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.	Sections 5.4.3 and 5.4.2 address matters related to surface water and groundwater respectively. Section 5.5 addresses matters relating to biodiversity. The Proposal would not result in a significant amount of greenhouse gas emissions (see Section 5.2).
2.21: Resource recovery	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	The Proposal would ensure that the maximum benefit is obtained from the target resource throughout the proposed life of the Quarry.
2.22: Transportation	The following transport-related issues are considered. • The transport of some or all of the materials from the site by means other than public road. • Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools. • The preparation of a code of conduct for the transportation of materials on public roads.	Section 5.1 addresses matters related to transportation.

State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) was gazetted on 1 March 2022 to consolidate the *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP), the *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33) and the *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) as part of a broader administrative consolidation of SEPPs by the NSW Government.

The Resilience and Hazards SEPP aims to manage the development of hazardous and offensive industries, or potentially hazardous and offensive industries. Without the implementation of appropriate impact minimisation measures, these industries would (or potentially would) pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment. Additionally, the Resilience and Hazards SEPP aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. In particular, this policy requires consideration of whether a development requires a consent for remediation works or not and, where warranted, requires that remediation works meet certain standards and notification requirements.

The hazardous substances and dangerous goods to be held or used within the Quarry Site are required to be identified and classified in accordance with the risk screening method contained within the document entitled *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (DP&I, 2011).

Hazardous materials are defined within DP&I (2011) as substances falling within the classification of the *Australian Code for Transportation of Dangerous Goods by Road and Rail* (Dangerous Goods Code), (National Transport Commission, 2011). The only substance required for the Quarry relevant to this policy is diesel.

The Proposal would involve the use of diesel fuel, a Class 3 C1 combustible liquid, and small amounts of other hydrocarbons including lubricating oils and combustible liquids. However, a self-bunded trailer or similar would be used to transport diesel to the Quarry Site, as required. As no diesel would be stored permanently on site and would be kept away from other Class 3 flammable liquids, the Resilience and Hazards SEPP does not require that diesel be considered further.

As the areas proposed for disturbance within the Quarry Site have previously been used only for extractive industry, agricultural uses or passive biodiversity conservation, the Applicant is satisfied that no contaminated land occurs on the Quarry Site. The Resilience and Hazards SEPP is therefore not considered further in this document.

State Environmental Planning Policy (Primary Production) 2021

The *State Environmental Planning Policy (Primary Production) 2021* (Primary Production SEPP) was gazetted on 1 March 2022 to consolidate the *State Environmental Planning Policy (Primary Production and Rural Development) 2019* (Primary Production and Rural Development SEPP), and the *State Environmental Planning Policy No. 8 (Central Coast Plateau Areas)* (SEPP 8) as part of a broader administrative consolidation of SEPPs by the NSW Government.

The aims of the Primary Production SEPP are to facilitate development on rural land that is orderly and economic, promotes the social, economic and environmental welfare of the State and avoids land use conflicts with existing agriculture. It also allows government authorities to identify State significant agricultural land and ensure the ongoing viability of agriculture in the State.

The Proposal is considered with respect to these aims.

- The land that would be affected by the Proposal has not been identified as State or regionally significant agricultural land by Schedule 1 of the Primary Production SEPP.
- The Proposal would not remove any land currently managed for intensive agriculture, as there is no land used for agriculture directly surrounding the Quarry Site.
- The protection of the land that is the subject of the Proposal would not provide any public benefit. In fact, the employment and local economic stimulus that would be generated by the Proposal is considered to be of wider public benefit.

As a result, the Primary Production SEPP is not considered further in this document.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) was gazetted on 1 March 2022 to consolidate a number of existing SEPPs including *State Environmental Planning Policy (Koala Habitat Protection) 2020* and *State Environmental Planning Policy (Koala Habitat Protection) 2021* as part of a broader administrative consolidation of SEPPs by the NSW Government.

The Biodiversity and Conservation SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. The Hornsby LGA is identified in Schedule 2 of the Biodiversity and Conservation SEPP as one of the LGAs to which considerations of Koala habitat apply.

An assessment of the potential for Koala habitat, including review of feed trees and Koala presence, has been undertaken by Ecoplanning. The results of the assessment are presented in Section 5.5.5.5 and Ecoplanning (2023). In summary, Ecoplanning (2023) determined that the Proposal would have low or no impact on Koala or Koala habitat.

State Environmental Planning Policy (Transport and Infrastructure) 2021

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) was gazetted on 1 March 2022 to consolidate the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP), the *State Environmental Planning (Educational Establishments and Childcare Facilities) 2017* (Education and Childcare SEPP), the *State Environmental Planning Policy (Major Infrastructure Corridors) 2020* (Major Infrastructure and Corridors SEPP) and the *State Environmental Planning Policy (Three Ports) 2013* (Three Ports SEPP) as part of a broader administrative consolidation of SEPPs by the NSW Government.

The aim of the Transport and Infrastructure SEPP is to facilitate the effective delivery of infrastructure across NSW. The Transport and Infrastructure SEPP identifies, amongst other things, the matters to be considered in the assessment of development adjacent to particular types of infrastructure, relevantly including the following. The following also includes a justification as to why the Transport and Infrastructure SEPP is not relevant to the Proposal.

- Electricity Transmission (Part 2.3, Division 5).

  The Quarry Site is located approximately 130m west of the 330 kV Munmorah to Sydney West high voltage electrical transmission line, however, the Quarry does not trigger any of the criteria within Section 2.47 of the Transport and Infrastructure SEPP.

- Gas Pipeline Infrastructure (Part 2.3, Division 12A).

  The Quarry Site is not located adjacent to a gas pipeline.

- Railways (Part 2.3, Division 15, Subdivision 2).

  The Quarry Site is not located in proximity to a railway corridor.

- Roads (Part 2.3, Division 17).

  The Quarry Site does not front onto and is not located immediately adjacent to a classified road or within a road corridor identified in Schedule 2 of the Transport and Infrastructure SEPP. As a result, Sections 2.116 to 2.121 are not relevant to the Quarry. Similarly, the traffic generated by the Quarry would not exceed the threshold of 200 vehicles per day to be classified as Traffic-generating Development and Section 2.122 is not relevant to the Quarry.

Based on the above, the Transport and Infrastructure SEPP is not considered further in this document.

3.5 Local Planning Issues

3.5.1 Hornsby Local Environmental Plan 2013

3.5.1.1 Land Zoning Objectives

The *Hornsby Local Environmental Plan 2013* (Hornsby LEP) provides guidance to development in the Hornsby LGA by encouraging the proper management, development and conservation of natural resources and the built environment. The Quarry Site is located on land zoned RU1 – Primary Production and C3 – Environmental Management under the Hornsby LEP (**Figure 3.1**). Extractive industries are permissible with development consent in each of these zones, with permissibility under the C3 zone by virtue of Clause 2.9(3) of the Resources and Energy SEPP.

The objectives of these zones and how the Quarry has been designed to satisfy these objectives are described in the following subsections.

3.5.1.2 RU1 – Primary Production

To encourage sustainable primary industry production by maintaining and enhancing the natural resource base

The proposed use of the land for extractive industry provides productive use of the natural resource within the Quarry Site. As land that would be disturbed under the Quarry has historically been used for extractive industry and is currently used for passive biodiversity conservation, it is expected that the Proposal would not adversely impact upon agricultural resources. Following the completion of the Quarry, the land would be rehabilitated to provide for passive biodiversity conservation.

To encourage diversity in primary industry enterprises and systems appropriate for the area

The Proposal would provide for the supply of Quarry products for use in construction and infrastructure projects throughout the Hornsby LGA and the broader Greater Sydney Region. This industry, i.e. an extractive industry, would operate alongside a variety of primary industry enterprises within the Hornsby LGA and assist to maintain the economic diversity of the area.

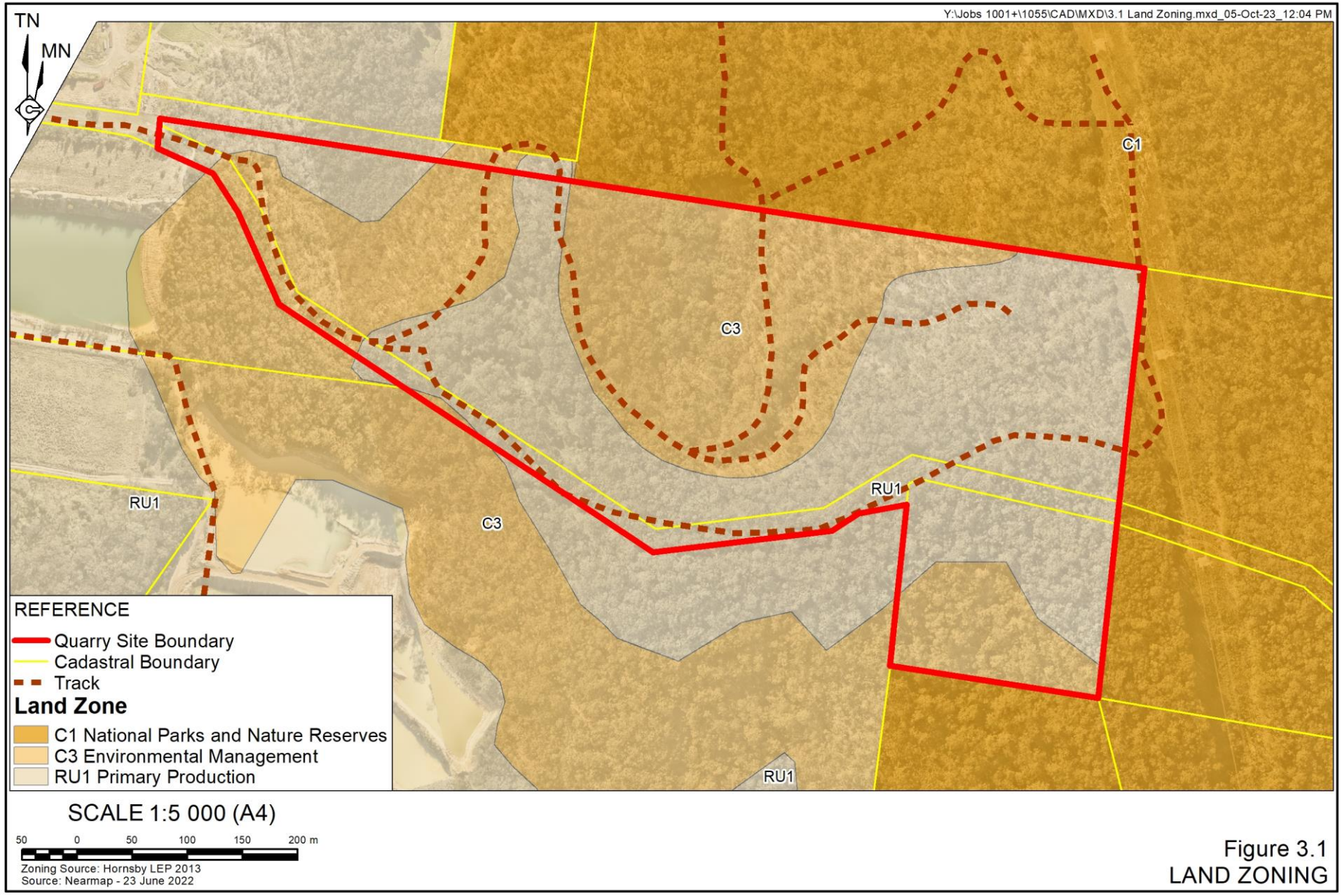


Figure 3.1
LAND ZONING

To minimise the fragmentation and alienation of resource lands

The Proposal would aim to minimise impact on land by only disturbing what is necessary for production and would not result in the fragmentation or alienation of resource lands.

To minimise conflict between land uses within this zone and land uses within adjoining zones

The land immediately surrounding the Quarry Site is zoned as either RUI (Primary Production), E3 (Environmental Management), and C1 (National Parks and Nature Reserves). It is intended that the Quarry Site would be retained principally for biodiversity conservation purposes which would complement the existing surrounding ecosystems. Therefore, there is a minimal risk of land use conflicts.

To encourage land uses that support primary production, including low-scale and low-intensity tourist and visitor accommodation and the provision of farm produce direct to the public

The Quarry Site is located within an area of elevated, vegetated terrain principally suited for passive biodiversity conservation. This is demonstrated by the Land and Soil Capability (LSC) of the Quarry Site (LSC Class 6) which has been identified as land which has very high to severe limitations and is restricted to low-impact land uses such as grazing, forestry and nature conservation. It is therefore considered that the Quarry Site is strategically located to minimise any potentially adverse impacts on agricultural land.

To ensure that development does not unreasonably increase the demand for public infrastructure, services of facilities

No tourist or visitor accommodation is located in the area immediately surrounding the Quarry Site. As such, the proposed operation of the Quarry would not impact upon the achievement of this objective.

3.5.1.3 C3 – Environmental Management

To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values

It is noted that no threatened ecological communities, Aboriginal sites, objects or areas of archaeological potential have been identified within the Quarry Site (see Sections 5.5 and 5.6, respectively). Notwithstanding, the Quarry Site has been designed to minimise disturbance of land zoned C3 under the Hornsby LEP, where practicable. Furthermore, the management and mitigation measures which would be implemented would ensure that any impacts to the remainder of land zoned C3 within the Quarry Site would be minimised to greatest extent practicable.

To provide for a limited range of development that does not have an adverse effect on those values

Extractive industries are permissible with development consent in land zoned C3 under the Hornsby LEP by virtue of Clause 2.9(3) of the Resources and Energy SEPP. Notwithstanding, the Quarry Site has been designed to minimise disturbance of land within this zone, where practicable.

To protect the natural environment of steep lands and floodplains within the catchment of the Hawkesbury River

The Quarry Site has been designed to minimise disturbance to areas containing steep slopes, where practicable, as well as utilisation of areas that have been historically disturbed (see Section 1.4). In addition, the Quarry would utilise a closed water management system to ensure nil discharge from the Quarry Site would enter the Hawksbury River catchment.

3.5.2 Hornsby Development Control Plan 2013

The *Hornsby Development Control Plan 2013* (Hornsby DCP) provides controls for proposed developments within the Hornsby LGA.

It is noted that the Quarry Site is not located within land described in Schedule 4 of the Resources and Energy SEPP (see **Figure 1.1**) and by extension, land to which the controls for extractive industries identified in the Hornsby DCP apply.

Notwithstanding, at the request of Council, Table A2.3 in **Appendix 2** identifies where each of the controls for extractive industry identified in the Hornsby DCP are addressed.

3.5.3 Hornsby Local Strategic Planning Statement

The *Hornsby Local Strategic Planning Statement* lists a range of planning priorities to guide land use decisions across the Hornsby LGA. The following priorities and actions are relevant to the Quarry.

Responding to climate change with an active strategy to reduce carbon emissions and manage energy, waste and water efficiently

The Proposal aims to minimise its carbon footprint by using energy-efficient equipment where possible and operate in an environmentally responsible manner to meet all relevant criteria and satisfy reasonable community expectations.

In order to minimise production waste, excess overburden that is not required for the construction of safety bunds or use in progressive rehabilitation activities would be despatched and sold as select or general fill. Non-production wastes generated through the proposed operational activities would be negligible, with any wastes stored in lidded bins on site and periodically removed by a licenced waste contractor for appropriate disposal.

The proposed implementation of a closed water management system would ensure nil discharge from the Quarry Site would enter the Hawksbury River catchment.

Supporting sustainable economic growth based on the Shire's built and natural assets, infrastructure and locational advantages

The Proposal would provide a local supply of extractive materials to infrastructure and landscaping works across the LGA. This supply of local materials would reduce the transport time, cost, and associated environmental impacts required to continue developing Greater Sydney in alignment with the State-wide post-COVID focus on economic recovery through increased utilisation of the construction industry.

3.6 Other Environmental Policies, Guidelines and Plans

The SEARs require that in assessing the identified key assessment requirements, reference be made to any relevant guideline documents. In addition, a number of the government agencies consulted in relation to the Quarry also required reference to other environment guideline documents. Where appropriate, the relevant guidelines are addressed in the relevant section(s) of this report, including the Appendices.

3.6.1 Developments adjacent to National Parks and Wildlife Service lands Guidelines

The Quarry Site is located adjacent to the Marramarra National Park and therefore the *Developments adjacent to National Parks and Wildlife Service lands Guidelines* have been considered. The issues summarised in Section 2 of the Guidelines are outlined below in **Table 3.2**.

Table 3.2
Application of Developments adjacent to National Parks and Wildlife Service lands Guidelines

Issue	Aim	Recommended approach	EIS Section / Comments
2.1 Erosion and sediment control	To prevent erosion and the movement of sediment onto NPWS land.	• Keep clearance of native vegetation to a minimum • Areas of retained vegetation are fenced off during construction • Areas of bare soil and stockpiles are managed to prevent erosion during construction • Disturbed areas are rehabilitated and appropriately stabilised as soon as possible following construction • Appropriate controls should be applied in accordance with the appropriate guidelines. • Land and water management (such as sediment basins and flocculation) may be required where longer periods of disturbance or larger or steeper areas of land will be disturbed.	No clearing of vegetation would be undertaken beyond the boundaries of the proposed areas of disturbance. A closed water management system and a range of erosion and sediment controls would be implemented throughout the life of the Quarry (see Section 5.4.3).

Table 3.2 (Cont'd)
Application of Developments adjacent to National Parks and Wildlife Service lands Guidelines

Issue	Aim	Recommended approach	EIS Section / Comments
2.2 Stormwater runoff	Nutrient levels are minimised, and stormwater flow regimes and patterns mimic natural levels before reaching NPWS land, to ensure no detrimental change to hydrological regimes.	• Incorporate stormwater detention and water quality systems • Water sensitive urban design (WSUD) principles should be applied to developments in catchments upstream from wetlands. • Stormwater should be diverted to council stormwater systems or to infiltration and subsurface discharge systems within the development site. • The discharge of stormwater to NPWS land, where the quantity and quality of stormwater differs from natural levels, must be avoided. • Infrastructure associated with stormwater treatment must not be located on NPWS land and any stormwater outlets should disperse the flow at pre-development levels. Landowners and development proponents are responsible for ensuring that all tanks, storage areas and associated infrastructure are appropriately sized and maintained to ensure that there is no unauthorised overflow onto NPWS land. • Developments proximate to parks should not result in any net increase in pollutant levels discharged to NPWS land.	A closed water management system and a range of erosion and sediment controls would be implemented throughout the life of the Quarry to ensure potential sedimentation risks are minimised to greatest extent practicable (see Section 5.4.3)
2.3 Wastewater	There are no adverse impacts on NPWS land due to wastewater from nearby development.	• Disposal systems should be designed and operated to the highest standards. • Wastewater management infrastructure must not be located on NPWS land. Also (with the same exception), • There must be no discharge of wastewater to NPWS land, including nutrient or pathogen export from effluent disposal areas.	The proposed closed water management system will prevent any water used on site from reaching NPWS land.
2.4 Pests, weeds and edge effects	Adjoining or nearby development does not: • lead to increased impacts from invasive species (weeds and pests), domestic pets and stock • facilitate unmanaged visitation, including informal tracks, resulting in negative impacts on cultural or natural heritage values • lead to impacts associated with changes to the nature of the vegetation surrounding the park	• Consideration of an appropriate buffer, vegetated where possible, or setback between any development and NPWS land. • Where managed effectively, a buffer may minimise the impact to the natural and cultural values of NPWS parks, • Where there is no buffer, consideration should be given to developing appropriate conditions or land management practices that minimise the potential edge effects from development. • During construction works adjoining parks, the boundary of the NPWS park and any buffer will require demarcation using a visually obvious barrier such as temporary fencing or flicker tape to reduce the risk of accidental encroachments. • For proposals involving boundary fencing, NPWS has established policies and procedures to guide the choice of suitable fencing and cost-sharing arrangements. • Retention of existing native vegetation where appropriate. This will assist in reducing edge effects, as well as retaining wildlife corridors and minimising the isolation of NPWS parks.	The Quarry Site has been designed to ensure a minimum buffer of 85m between all Quarry Site components and the boundary of Marramarra National Park would be maintained throughout the life of the Quarry.

Table 3.2 (Cont'd)
Application of Developments adjacent to National Parks and Wildlife Service lands Guidelines

Issue	Aim	Recommended approach	EIS Section / Comments
2.5 Fire and the location of asset protection zones	All asset protection measures are within the development area, and there is no expectation for NPWS to change its fire management regime for the land it manages.	• Consider an assessment of the fire risk in accordance with the bushfire guidelines and ensure that the provisions of the Rural Fires Act 1997 and section 4.14 of the Environmental Planning and Assessment Act 1979 are implemented in the area proposed for development. • Further consultation with the NSW Rural Fire Service may be required. • Appropriately designed fire protection zones and firefighting access should be located on the land where development is proposed. • Fencing to be erected between the boundary of the property and NPWS land should be of non-combustible material and designed for the intended purpose • Factors such as disruption to wildlife movements and impacts on fire suppression activities should always be considered.	Planning for bushfire protection, emergency management and evacuation procedures would be managed in accordance with the Quarry's *Emergency Management Plan*, which would be prepared should the Quarry be approved.
2.6 Boundary encroachments and access through NPWS land	No pre-construction, construction or post-construction activity occurs on land managed by NPWS. Any access that does occur must be legally authorised and comply with park management objectives.	• Where land involved in a proposal shares a common boundary with NPWS land the boundary has been accurately surveyed to ensure there is no encroachment on NPWS land as a result of the proposed development. • NPWS land is not to be used: – to access development sites – to store materials, equipment, workers' vehicles or machinery – for maintenance access after development. • Measures, such as temporary fencing of 'no-go' areas during construction or installation of permanent, wildlife-compatible fencing should be considered, and will require NPWS approval if they are proposed to be located along the site boundary.	The Quarry Site has been designed to ensure a minimum buffer of 85m between all Quarry Site components and the boundary of Marramarra National Park would be maintained throughout the life of the Quarry. No activities are proposed to be undertaken within Marramarra National Park throughout the life of the Quarry.
2.7 Visual, odour, noise, vibration, air quality and amenity impacts	There is no reduction of amenity on NPWS land due to adjacent development.	• Take into account the visual (including lighting), noise, odour and air quality impacts of development adjacent to NPWS land to ensure that they do not affect the amenity or public enjoyment of the land. • Some types of developments, such as quarries and road works, can result in particularly significant impacts (for example noise and dust). Large-scale developments of this type are likely to need detailed site-specific management plans.	All relevant environmental factors, including potential amenity impacts, are addressed in Section 5.

Table 3.2 (Cont'd)
Application of Developments adjacent to National Parks and Wildlife Service lands Guidelines

Issue	Aim	Recommended approach	EIS Section / Comments
2.8 Threats to ecological connectivity and groundwater-dependent ecosystems	Native vegetation and other flora and fauna habitats that provide a linkage, buffer, home range or refuge role on land that is adjacent to parks are maintained and enhanced, where possible. Groundwater-dependent ecosystems in NPWS land are protected	• Vegetation, waterways and water bodies close to NPWS land that exhibit ecological connectivity should be retained, protected and, where necessary, rehabilitated. • Consider the corridor values, or connective importance, of any vegetation (not only trees) and waterways or water bodies and possible impacts from the proposed development. • For proposals involving the extraction of groundwater, NPWS recommends that consent authorities obtain and consider a comprehensive assessment of any potential impacts that may occur to groundwater-dependent ecosystems in NPWS lands.	Section 5.5 addresses matters related to biodiversity on site, and Section 5.4.2 considers impacts on groundwater.
2.9 Cultural heritage	Areas and sites of heritage value on NPWS land, including Aboriginal cultural heritage, are protected.	• Consideration to potential impacts of nearby development on the heritage values of NPWS land. In particular, this includes: – Aboriginal heritage values on NPWS land which can, but do not always, include areas declared as an Aboriginal Place – Historic heritage values, especially any areas or specific places listed on the State Heritage Register – World heritage or national heritage values.	Section 5.6 addresses matters related to Aboriginal and cultural heritage.
2.10 Access to parks	Adjacent developments do not compromise public and NPWS access to parks.	• Road networks and landform modifications in new subdivisions should be designed to ensure that they accommodate current access points to parks. • The storage of materials, equipment, workers' vehicles or machinery should not block or impede access to park roads and fire trails. • The location of temporary fencing should be considered with regard to the access to park roads and fire trails. • Consideration should be given to the planning for strategic or tactical fire trails proximate to the development. • The Fire Access and Fire Trail (FAFT) plan and the NPWS reserve fire management strategy for the park should be consulted as to the location of such trails. • Once designated under the relevant FAFT plan, strategic fire trails cannot be closed under Section 62ZI of the Rural Fires Act 1997, with closure encompassing obstruction or impacts that do not allow for the proper use of the fire trail.	Matters relating to traffic and transportation, including fire trails, are addressed in Section 5.1.

Section 4

Environmental Setting

PREAMBLE

This section describes the environmental setting within and surrounding the Quarry Site.

Emphasis in this section is placed on providing information about the environmental features that would contribute to or influence the assessment of a wide range of other environmental parameters. Information is provided on the regional and Quarry Site topography, meteorology, land ownership, land uses, bush fire hazards and services.

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

4.1 Topography and Drainage

The Quarry Site is located on the central east coast of NSW within the Yengo Subregion of the Sydney Basin Bioregion which is characterised by a benched sandstone plateau with steep slopes into narrow valleys with low cliff lines as well as the Hawkesbury River gorge (NPWS, 2003).

Figure 4.1 presents the regional topography and drainage features surrounding the Quarry Site. The Quarry Site is located within the Hawkesbury River Catchment with the Hawkesbury River located approximately 2.4km east-northeast of the Quarry Site at its closest point.

Figure 4.2 presents the topography and drainage within the Quarry Site. Topography within the Quarry Site is variable, with the southern portion of the Quarry Site comprising an east-west orientated ridge with an elevation of approximately 230m AHD. Slopes steeply descend to the north towards the adjacent Marramarra National Park. Three first order watercourses drain northwards from within the Quarry Site towards Dalgetys Creek. One historic dam is located at the northern extent of the Quarry Site, with the embankment located within the adjoining Marramarra National Park.

It is noted that the natural landform within the Extraction Area has been modified through historical extractive operations. Two small former extraction areas are present within the Extraction Area (**Figure 4.2**), with exposed faces of predominately cross-bedded sandstone of up to 4m high. Further massive sandstone beds outcrop downslope of the easternmost former extraction area with a thickness of approximately 8m to 10m. Both former extraction areas are internally draining with no surface water discharged to the surrounding environment.

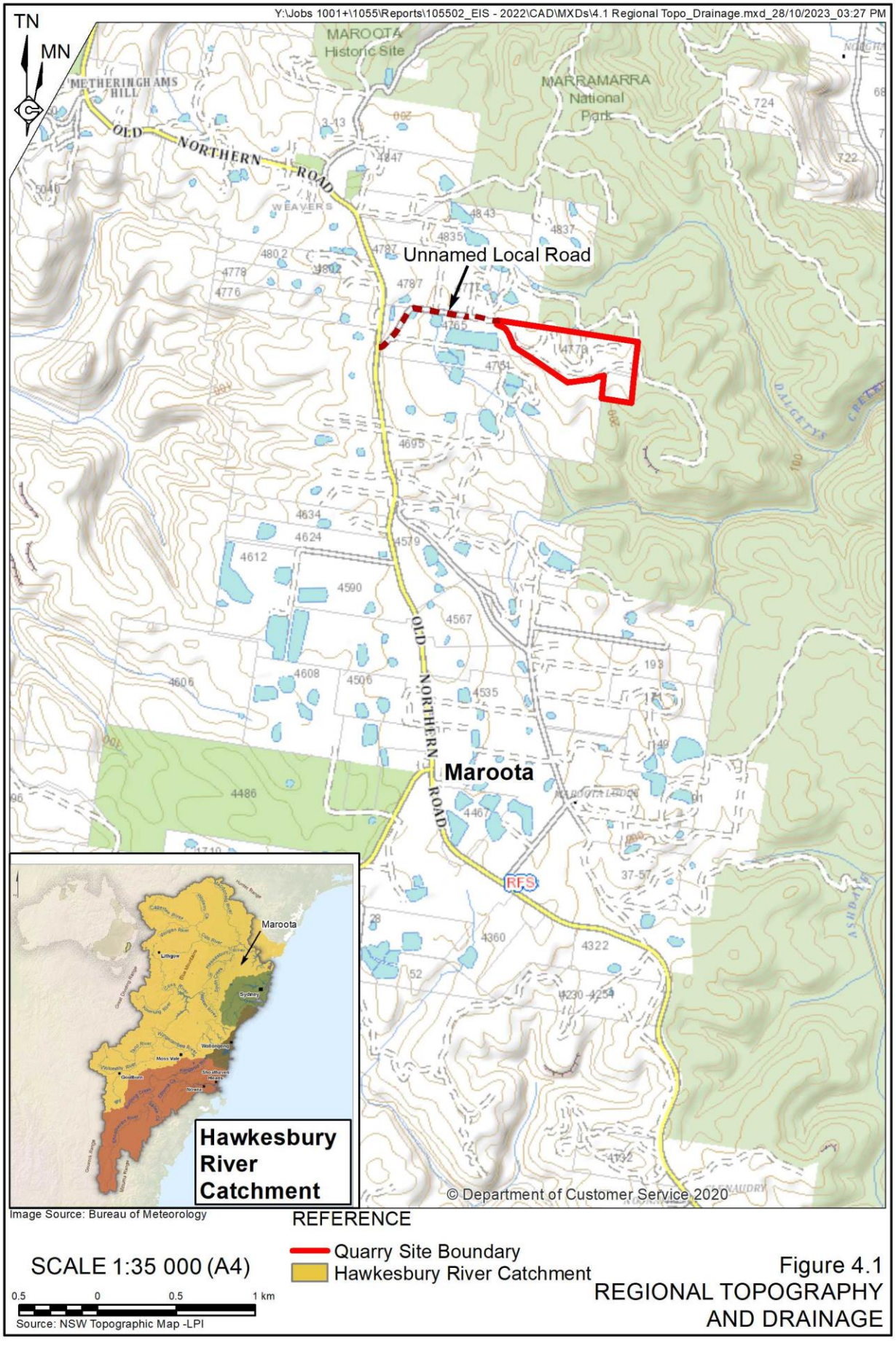
4.2 Meteorology

4.2.1 Introduction

Meteorological conditions have the potential to influence a range of Quarry-related impacts at surrounding residences and environment. This subsection provides a brief overview of the meteorological conditions in the area surrounding the Quarry Site, focusing particularly on those aspects of the climate that are likely to influence the potential Quarry-related environmental impacts.

Rainfall data was sourced from the closest meteorological station to the Quarry Site with similar elevations, i.e. the Bureau of Meteorology (BOM) station number 061375 (Mangrove Mountain AWS) located approximately 33.4km from the Quarry Site. However, evaporation data is not available at this station and representative data has been sourced from BOM station number 067021 (Richmond - UWS Hawkesbury) located approximately 19.4km from the Quarry Site.

Table 4.1 provides a summary of the climate data which is discussed further in the following subsections.


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TN
MN
MAROOTA Historic Site
MARRAMARRA National Park
METHERINGHAMS HILL
OLD NORTHERN ROAD
WEAVERS
Unnamed Local Road
Maroota
OLD NORTHERN ROAD
RFS
Maroota
Hawkesbury River Catchment
© Department of Customer Service 2020
Image Source: Bureau of Meteorology
REFERENCE
Quarry Site Boundary
Hawkesbury River Catchment
SCALE 1:35 000 (A4)
0.5 0 0.5 1 km
Source: NSW Topographic Map -LPI
Figure 4.1
REGIONAL TOPOGRAPHY AND DRAINAGE

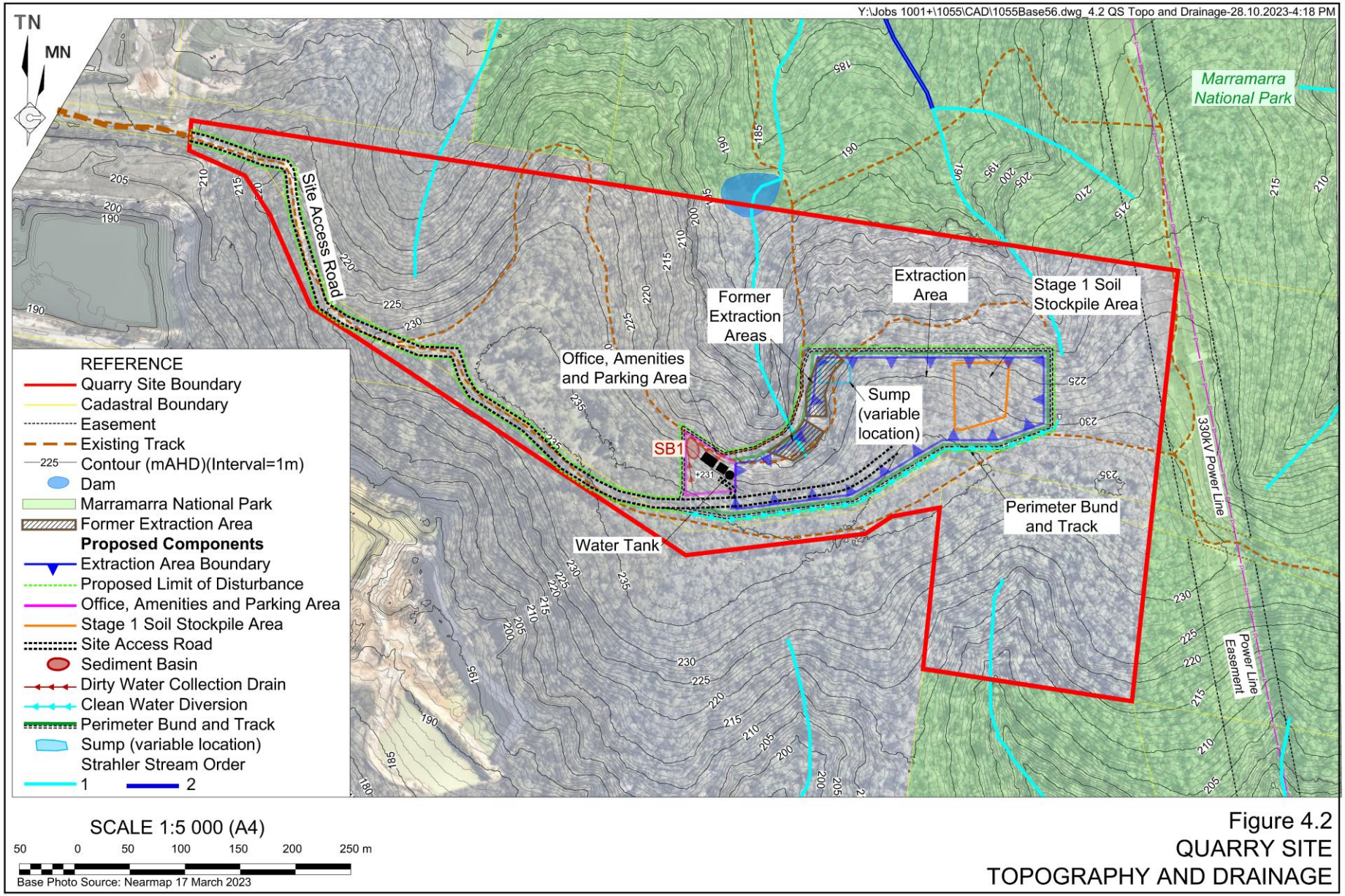


Figure 4.2
QUARRY SITE
TOPOGRAPHY AND DRAINAGE

Table 4.1
Climate Data Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature (°C)[1] – mean based on period from 1994 - 2023													
Mean maximum	27.4	26.7	24.7	22.1	18.9	16.0	15.7	17.5	20.6	22.9	24.5	26.4	22.0
Mean minimum	17.0	16.8	15.3	12.1	9.0	7.1	5.9	6.5	9.1	11.5	13.6	15.3	11.6
Rainfall (mm)[1] – mean based on period from 1994 - 2023													
Mean rainfall	104.7	147.0	159.3	79.4	78.3	106.0	64.6	61.6	67.5	81.5	93.9	87.8	1127.9
Highest monthly rainfall	243.4	371.0	619.0	261.0	318.8	609.6	549.8	198.8	207.4	260.0	231.0	221.0	1917.8
Lowest monthly rainfall	20.2	23.8	16.0	9.6	5.8	0.0	1.0	1.2	2.0	12.4	4.2	0.4	724.6
Mean number of rain days	13.4	13.8	14.9	13.0	13.0	13.5	11.1	8.3	9.4	11.5	12.9	12.0	146.8
Highest daily rainfall	169.4	126.4	130.0	90.2	100.0	293.6	170.2	189.0	105.4	97.6	63.8	100.0	293.6
Evaporation (mm)[2] – mean based on period from 1973 - 2021													
Mean monthly evaporation	182.9	137.2	1240	90.0	65.1	51	58.9	83.7	114.0	142.6	156.0	176.7	2498.1
Note: mean monthly evaporation is based on sum of mean daily evaporation.													
Source: 1 Bureau of Meteorology Station: Mangrove Mountain AWS (Station No. 061375) 2 Bureau of Meteorology Station: Richmond - UWS Hawkesbury (Station No. 067021)													

4.2.2 Temperature

Temperature patterns follow seasonal expectations with higher mean temperatures during the summer months of December to February and lowest temperatures during winter. The mean maximum temperature varies between 15.7°C and 27.4°C while the mean minimum temperature varies between 5.9°C and 17.0°C.

4.2.3 Rainfall and Evaporation

Mean annual rainfall is 1127.9mm, with rainfall distributed relatively evenly throughout the year with a slightly drier period during July to September. Mean monthly rainfall varies between a maximum of 159.3mm in March and a minimum of 61.6mm in August. Rainfall is typically infrequent with less rain days experienced during winter months.

The estimated mean evaporation at the Quarry Site is approximately 208.2mm per month throughout the year or 2,498.1mm per year. Mean monthly evaporation varies between 182.9mm January and 51mm in June. The estimated mean monthly evaporation is higher than mean monthly rainfall in all months resulting in an annual moisture deficit.

4.2.4 Wind

CSIRO prognostic meteorological model TAPM was configured with three year's data between 2018 and 2021 to identify prevailing annual wind conditions at the Quarry Site for the purpose of predicting dust dispersion patterns. **Figure 4.3** displays the wind rose predicted by the model for 2020 which is considered representative of the general wind trend across the three-year period.

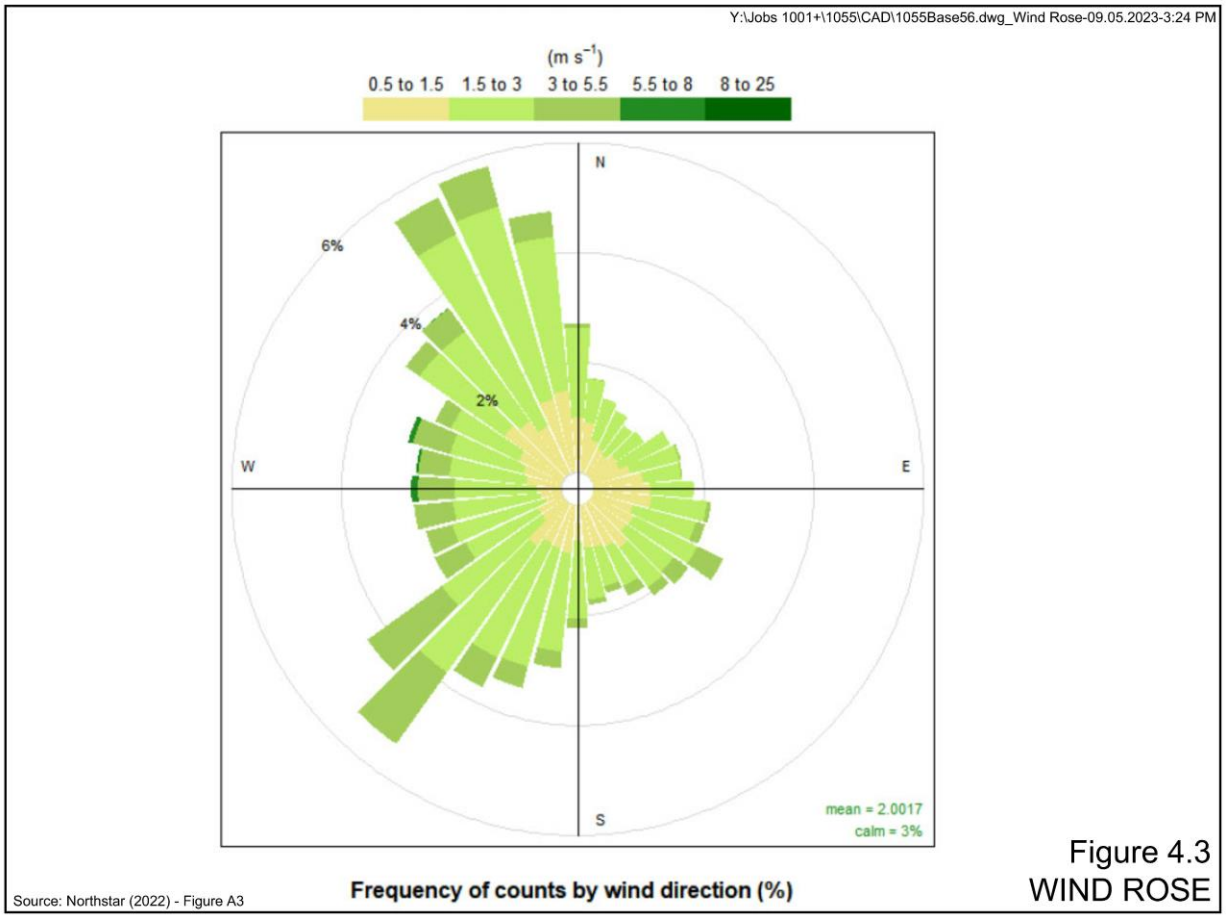


Figure 4.3
WIND ROSE

Prevailing winds experienced at the Quarry Site predominantly originate from southwesterly and northeasterly directions with wind speeds most frequently ranging between 1.5m/s and 5.5m/s.

4.3 Land Ownership and Surrounding Residences

4.3.1 Land Ownership

The land on which the Quarry Site is situated is owned by the Applicant, with the exception of the Crown Road Reserve running parallel to the southern boundary of Lot 1 DP6069224. **Figure 4.4** displays the land ownership within a 2km radius from the centre of the Quarry Site. The distances from the closest privately-owned residences to operational areas within the Quarry Site are presented in **Table 4.2**. It is noted that Applicant has lodged a Road Closure application with an intention to purchase the unnamed Crown Road (see Section 1.8.2).

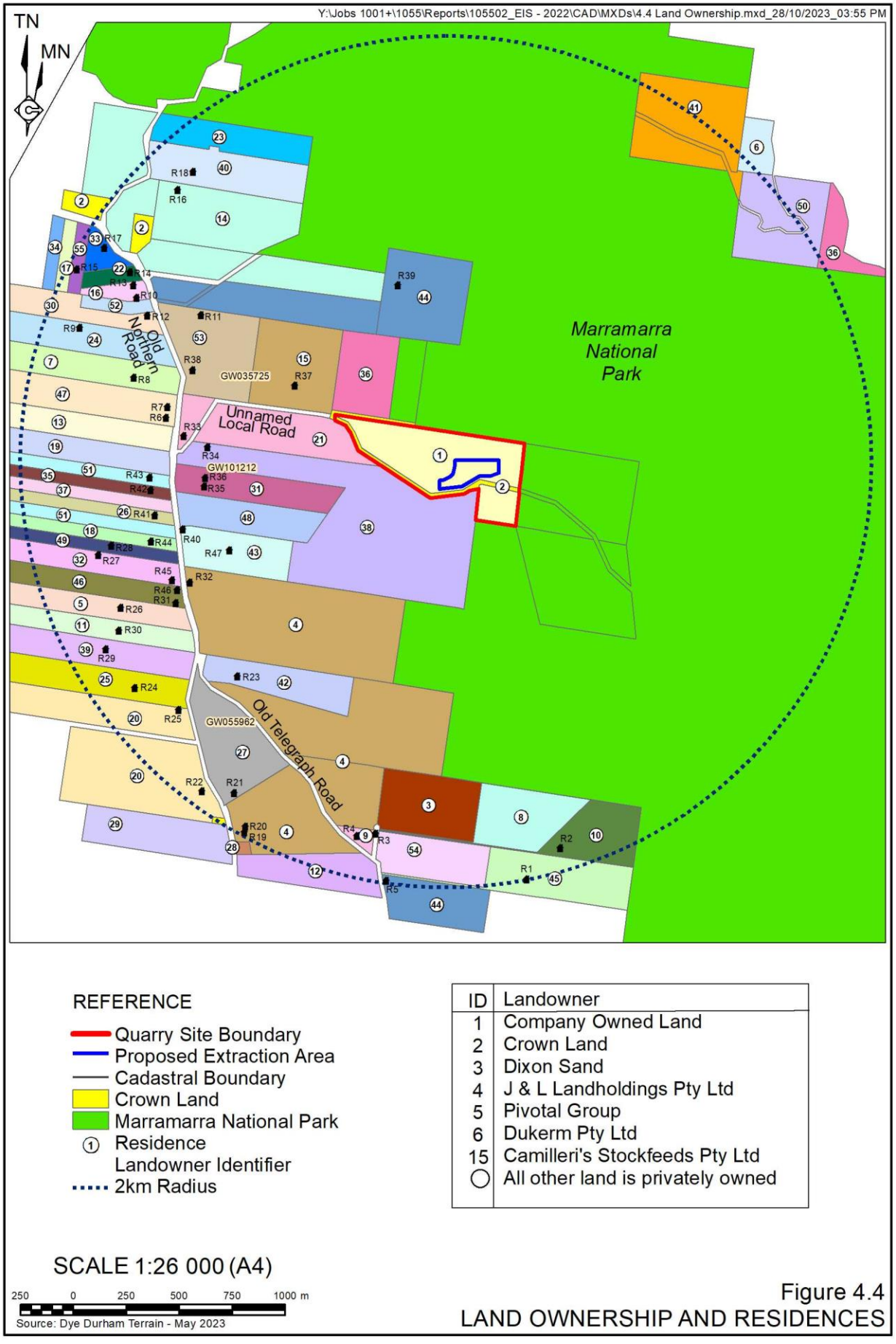


Figure 4.4
LAND OWNERSHIP AND RESIDENCES

Table 4.2
Proximity of Surrounding Residences to Operational Areas of the Quarry Site

Identifier Residence	Distance (m)	Identifier Residence	Distance (m)	Identifier Residence	Distance (m)
R1	1,880	R19	1,863	R37	817
R2	1,770	R20	1,836	R38	1,277
R3	1,653	R21	1,731	R39	870
R4	1,682	R22	1,813	R40	1,225
R5	1,865	R23	1,299	R41	1,348
R6	1,323	R24	1,717	R42	1,362
R7	1,329	R25	1,612	R43	1,368
R8	1,522	R26	1,604	R44	1,383
R9	1,844	R27	1,640	R45	1,333
R10	1,669	R28	1,570	R46	1,327
R11	1,370	R29	1,745	R47	1,070
R12	1,582	R30	1,653	Marramarra National Park[1]	117
R13	1,714	R31	1,355	R35	1,109
R14	1,761	R32	1,258	R36	1,107
R15	1,979	R33	1,225	R37	817
R16	1,827	R34	1,105	R38	1,277
R17	1,924	R35	1,109		
R18	1,839	R36	1,107		

Note: The SEARs requested that Marramarra National Park be treated as a sensitive receiver for the purposes of assessing potential noise impacts. The closest downslope point of Marramarra National Park to operational areas of the Quarry Site was selected for this purpose.

4.3.2 Land Uses

The Quarry Site has a designated land use of "other minimal use" under the Australian Land Use and Management (ALUM) classification system with the area currently used for passive biodiversity conservation.

Land uses surrounding the Quarry Site predominantly comprise extractive industry, meat processing, large lot, rural and general residential properties, as well as nature conservation within the adjacent Marramarra National Park.

4.4 Bush Fire Hazard

The RFS mapping tool, accessed on 2 February 2023, identifies that the Quarry Site is located within a designated bush fire prone area. Further consideration of bush fire hazard is provided in Section 5.9.2.

4.5 Services

A "Dial Before You Dig" search, conducted on 13 January 2023, confirmed that there are no services within the boundaries of the Quarry Site (**Figure 4.5**). It is noted that the 60m wide easement for the 330kV Munmorah to Sydney West power transmission line traverses the northeastern section of the Quarry Site, however, the transmission line itself is located just beyond the Quarry Site boundary.

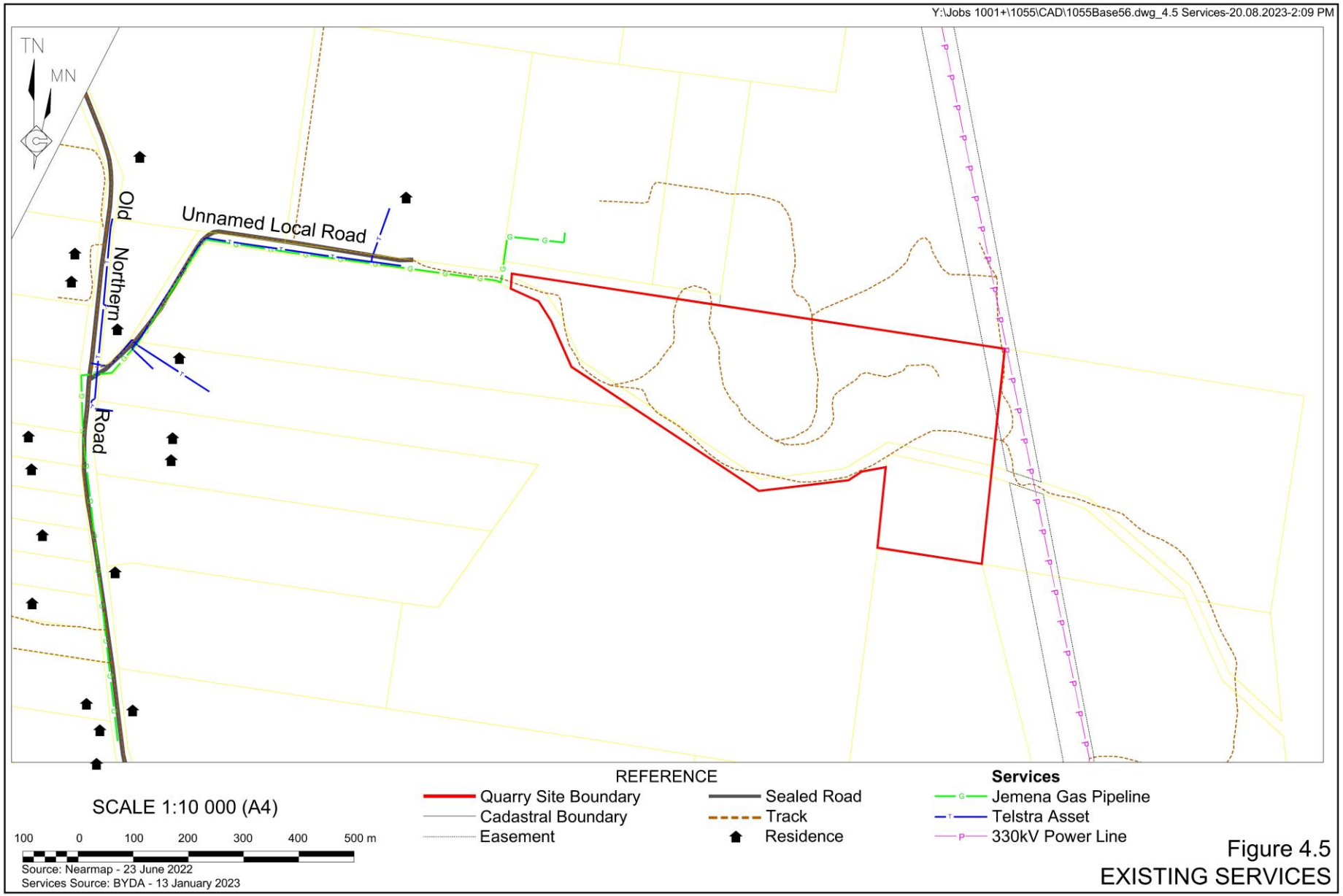


Figure 4.5
EXISTING SERVICES

Section 5

Environmental Features, Safeguards and Impacts

PREAMBLE

This section describes the specific environmental features of the Quarry Site and its surrounds that would or may be affected by the Proposal. Information on existing conditions, proposed management and mitigation measures and potential impacts the Proposal may have following the implementation of these measures is presented for all relevant issues.

5.1 Traffic and Transport

5.1.1 Introduction

The SEARs for the Proposal require an assessment of potential impacts associated with traffic and transportation including:

- accurate predictions of the road traffic generated by the construction (site establishment) and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;
- an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;
- a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;
- evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and
- a description of access roads, specifically in relation to nearby Crown roads and fire trails.

In addition, assessment requirements relating to traffic were received from the National Parks and Wildlife Service and Hornsby Shire Council. **Appendix 2** presents a summary of where all relevant assessment requirements have been addressed in the EIS.

The following subsections describe the transport setting of the Quarry Site and provide a summary of the Road Transport Assessment (RTA) prepared by The Transport Planning Partnership (TTPP, 2023) (**Appendix 3**), and describes the management and mitigation measures to be implemented by the Applicant.

5.1.2 Existing Road Transport Environment

5.1.2.1 Introduction

This subsection provides an overview of the existing road transport environment to be used by heavy and light vehicles travelling to and from the Quarry. An overview of the existing road conditions and traffic levels is provided as well as a summary of road safety on the surrounding road network.

5.1.2.2 Road Network

The road network used by vehicles travelling to and from the Quarry Site is displayed in **Figure 5.1**. The proposed routes use both State and local roads with the route varying depending on the direction of travel.

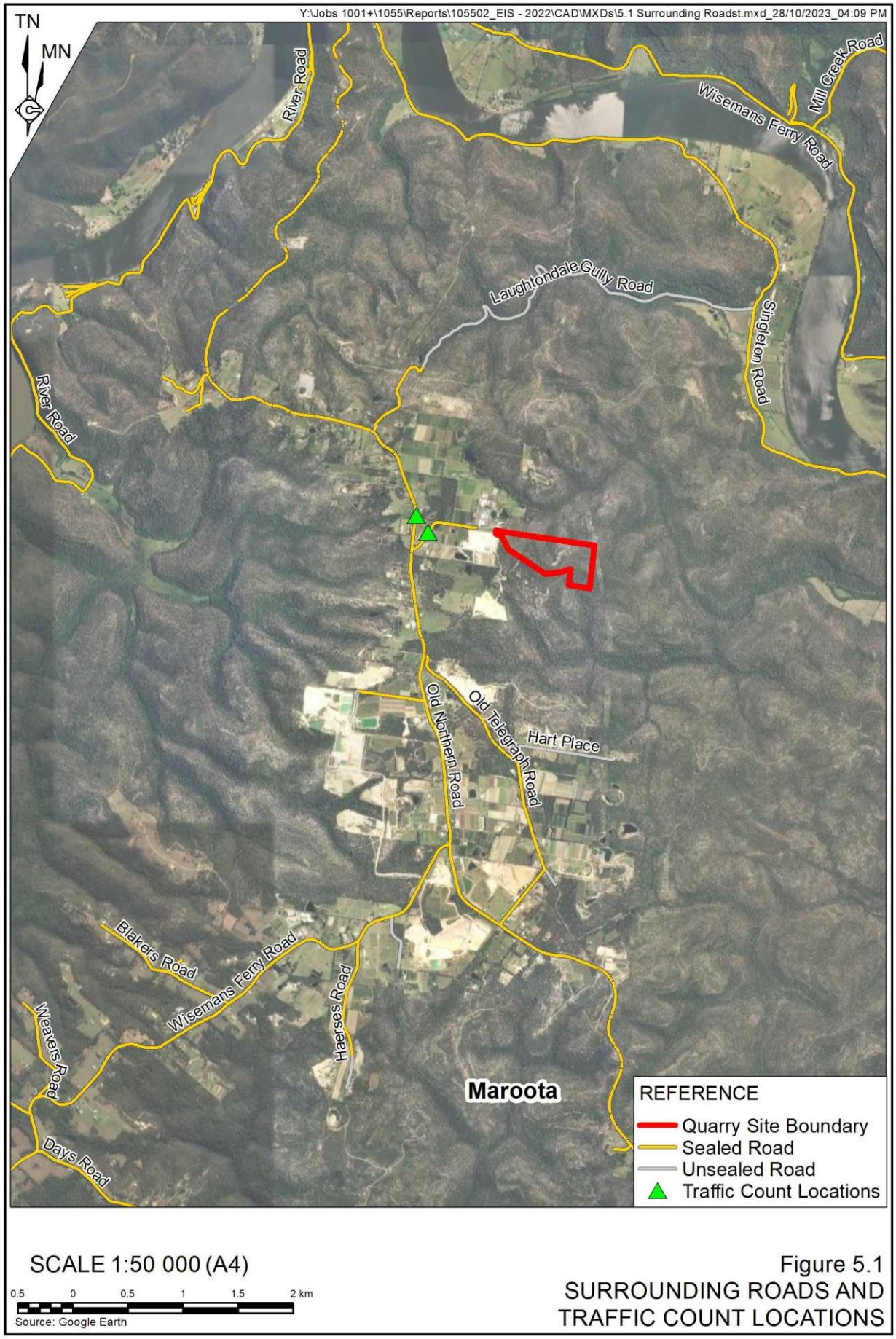


Figure 5.1
SURROUNDING ROADS AND TRAFFIC COUNT LOCATIONS

Old Northern Road

Old Northern Road is a sealed and divided State Road that provides a link between Wisemans Ferry and Baulkham Hills via Maroota, Forest Glen, Glenorie, Kenthurst, Middle Dural, Dural and Castle Hill. In the vicinity of the Quarry Site, Old Northern Road has a single travel lane in each direction and a posted speed limit of 80km/h.

Old Northern Road is utilised by a number of extractive operations and is an approved 26m B-double route to the south of its intersection with the Unnamed Local Road that provides access to the Quarry Site.

Unnamed Local Road

The Unnamed Local Road is a sealed two-way road with a posted speed limit of 60km/h and provides access to the PF Formation Pit 5 & 15 Quarry, located approximately 100m from the Old Northern Road intersection, as well as a limited number of rural residential properties and Camilleri Stockfeeds which is located at the eastern end of the sealed section of the Unnamed Local Road.

Approximately 350m from the intersection with Old Northern Road, advisory speed signs of 45km/h and 25km/h are placed ahead of a bend which leads to a one-lane, two-way stretch of road approximately 200m in length. Painted edgelines and two-way barrier centrelines are in the vicinity of the bend.

The one-lane, two-way section of the Unnamed Local Road is approximately 5m wide and operates for one-way-at-a-time traffic only, with “GIVE WAY” signs and linemarking at both ends, requiring drivers to give way to any vehicle already in that section. Sightlines are satisfactory, with drivers at each end of or within the one-lane two-way section being easily able to observe the presence of vehicles travelling in the opposing direction. As vehicular access for Camilleri Stockfeeds is located east of the single lane section, all traffic associated with that development uses that part of the road when entering or exiting.

Quarry Access Road

The existing track which is proposed to be upgraded to form the Quarry Access Road for the Proposal is an informal single lane gravel and dirt track which extends east of the sealed section of the Unnamed Local Road.

5.1.2.3 Intersections

At its intersection with the Unnamed Local Road, Old Northern Road is widened to provide a deceleration lane for vehicles turning right into the Unnamed Local Road, and an acceleration lane for vehicles turning left out of the Unnamed Local Road. These allow vehicles to turn in and out of the Unnamed Local Road clear of northbound through traffic on Old Northern Road.

TTPP (2023) considers that sight distance at the intersection of Old Northern Road with the Unnamed Local Road is satisfactory, with drivers approaching the Unnamed Local Road able to observe a vehicle waiting in the side road from a distance exceeding 200m in each direction.

The access to the Camilleri Stockfeeds property is located at the eastern end of the sealed section of the Unnamed Local Road. Non-standard warning signs are installed along the Unnamed Local Road approximately 30m ahead of the Camilleri Stockfeeds access advising that approaching trucks (entering via left turn) must give way to exiting trucks (exiting via right turn). Outbound drivers are also provided with a "GIVE WAY" line marking located approximately 18m north of the Camilleri Stockfeeds access. TTPP (2023) notes that this is an atypical priority, requiring inbound drivers to be able to observe outbound vehicles and to stop clear of the path of the exiting vehicle. There is currently no indication given to inbound drivers regarding where to stop on the Unnamed Local Road to remain clear of the path of an outbound vehicle. TTPP (2023) notes that inbound and outbound vehicles cannot turn concurrently, as the small radius of the northwestern corner of the Unnamed Local Road requires articulated vehicles entering Camilleri Stockfeeds to travel on the incorrect side of the Unnamed Local Road. The sealed surface of the Unnamed Local Road is widened on the southern side opposite the Camilleri Stockfeeds access, which generally reflects the outer wheel path of exiting articulated vehicles.

5.1.2.4 Traffic Volumes

Daily Traffic Volumes

Traffic counts were commissioned by TTPP to establish traffic volumes and vehicle types using the existing road network over the period 14 October to 20 October 2022 at the following locations.

- Unnamed Local Road – east of Old Northern Road
- Old Northern Road – north of Unnamed Local Road

Table 5.1 presents a summary of the daily traffic volumes at the surveyed locations. It is noted that the survey location on the Unnamed Local Road was located north of the entrance to the PF Formation Pit 5 & 15 Quarry, and therefore did not capture traffic movements associated with that operation. Survey results demonstrate that traffic conditions are notably different between weekdays and weekends. Weekend traffic volumes on the Unnamed Local Road are distinctly lower than on weekdays, while traffic volumes on Old Northern Road are higher on weekends when compared to weekdays.

Table 5.1
Surveyed Traffic Volumes

Road and Location	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Unnamed Local Road	135	145	131	165	119	38	19
Old Northern Road	1,446	1,592	1,608	1,597	1,626	1,728	1,782
Source: TTPP (2023) – Modified after Table 2.1							

Table 5.2 presents the average weekday composition of traffic including light vehicles (e.g. cars, motorcycles) and heavy vehicles (e.g. rigid and articulated trucks). The results demonstrate that light vehicles make up a significant proportion of vehicles travelling on the surveyed roads.

Table 5.2
Surveyed Average Traffic Volumes and Composition (vehicles per day)

Day	Light	Heavy	Total
Unnamed Local Road			
Average Weekday	72	67	139
Saturday	25	13	38
Sunday	15	4	19
Old Northern Road			
Average Weekday	1,258	316	1,574
Saturday	1,562	166	1,728
Sunday	1,639	143	1,782
Source: TTPP (2023) – Modified after Table 2.2			

Peak Hour Traffic Volumes

The surveyed temporal distribution of traffic along Old Northern Road and the Unnamed Access Road is detailed in Section 2.6.1 of TTPP (2023). In summary, traffic distribution on Old Northern Road shows distinct morning and afternoon peak periods on weekdays, with a single early afternoon peak period on weekends. Traffic distribution on the Unnamed Local Road shows a distinct peak during the afternoon and a smaller peak during the morning period.

It is noted that over the proposed hours of operation of the Quarry, Old Northern Road carried an average of approximately 110 vehicles per hour while the Unnamed Local Road carried an average of fewer than 9 vehicles per hour.

5.1.2.5 Intersection Level of Service

The former Roads and Traffic Authority's (RTA) *Guide to Traffic Generating Development* (RTA, 2002) identifies the metrics for establishing intersection performance using the Level of Service (LoS). The LoS metric varies and is based on the average vehicle and the type of intersection control (i.e. signalised, roundabout or signed). LoS ranges from A (good operation) to F (oversaturated).

Based on the surveyed traffic volumes, TTPP (2023) assessed the LoS of the intersection of Old Northern Road and the Unnamed Local Road using SIDRA modelling software, with the results provided in **Table 5.3**.

Table 5.3
Peak Period Intersection Performance: Existing Level of Service

Intersection	Level of Service (LoS)	
	AM	PM
Old Northern Road / Unnamed Local Road	A	A
Source: TTPP (2023) – Modified after Table 2.5		

Results demonstrate that the intersection operates at a good level of service (LoS A) with spare capacity and short delays to vehicles.

5.1.2.6 Road Safety

Road crash information was obtained from Transport for NSW between the period January 2017 and December 2021 for the road network servicing the Quarry Site. Throughout the period investigated, a total of 75 crashes were recorded, all of which occurred on Old Northern Road between Castle Hill Road and Wisemans Ferry. In summary:

- One crash involved an articulated vehicle and five crashes involved a large rigid truck;
- speeding was nominated as a contributing factor in 14 crashes; and
- fatigue was nominated as a contribute factor in two crashes.

It is noted that no crashes were recorded at or near the intersection of the Unnamed Local Road and Old Northern Road, and no crashes were recorded along the Unnamed Local Road.

The road crash history does not highlight any clustering of crashes that might suggest an inherent concern with the design of the roads servicing the Quarry Site.

5.1.2.7 Fire Trails

NSW RFS has advised that the Dalgetys Creek Fire Trail is located immediately east of the Quarry Site (see **Figure 1.2**), is accessed via the Crown road reserve from the Unnamed Local Road and provides access to Marramarra National Park as well as the easement associated with the 330kV Munmorah to Sydney West transmission line beyond the eastern boundary of the Quarry Site.

As discussed in Section 1.3.2, the Quarry Access Road would follow part of the existing track along the Crown road reserve and continue to provide access between the Unnamed Local Road and Dalgetys Creek Fire Trail.

5.1.3 Predicted Changes to Traffic Environment

5.1.3.1 Developments in the Maroota Area

Other developments in the Maroota area already impact traffic conditions on those roads servicing the Quarry. The following key proposed or approved projects have been identified and have been considered in forecast cumulative traffic volumes.

- PF Formation Pit 5 & 15 Quarry
- Camilleri Stockfeeds

Section 2.7 of TTPP (2023) provides a review of the predicted traffic volume contributions for each of the above developments.

5.1.3.2 Baseline Future Traffic Volumes

Changes to existing traffic conditions can be expected to occur which are not directly attributable to any specific development. For the purposes of TTPP (2023), an average growth rate of 2% per annum was assumed which would increase the background peak hourly and daily traffic volumes over time. TTPP (2023) considers that this is a conservatively high estimate, given that a survey conducted in 2007 recorded an average of 1,774 vehicles per weekday on Old Northern Road while the surveys conducted during the preparation of TTPP (2023) recorded an average of 1,574 (i.e. an 11.3% decrease over a 15-year period).

5.1.3.3 Quarry Contribution to Future Traffic Volumes

Section 2.7.3 presents the anticipated daily traffic volumes for the Quarry. The forecast distribution of traffic generated by the Quarry during Site Establishment activities and operations is presented in **Tables 5.4** and **5.5** respectively.

Table 5.4
Daily Distribution of Quarry Generated Traffic – Site Establishment

Traffic Generator	Inbound		Outbound		Total Movements
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	
Employees	9	-	9	-	24
Visitors / Deliveries	-	3	-	3	
Source: TTPP (2023) – Modified after Table 3.1					

Table 5.5
Daily Distribution of Quarry Generated Traffic – Operations

Traffic Generator	Inbound		Outbound		Total Movements
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	
Monday to Friday					
Employees	4	-	4	-	34
Visitors / Deliveries	1	2	1	2	
Product Transport	-	10	-	10	
Saturday					
Employees	4	-	4	-	32
Visitors / Deliveries	1	1	1	1	
Product Transport	-	10	-	10	
Source: TTPP (2023) – Modified after Table 3.3					

As noted in Section 2.8.3, during campaigns of VENM importation, the Applicant would limit the number of product trucks despatched from the Quarry Site to ensure that the maximum number of 10 laden heavy movements per day is not exceeded. Therefore, for the purposes of

assessing Quarry generated traffic, it is considered that heavy vehicle movements associated with importation of VENM have been included in the maximum number of heavy vehicles travelling to and from the Quarry Site as identified in **Table 5.5**.

It is noted that the traffic volumes identified in these tables incorporate maximum Quarry generated traffic volumes for all hours of operation, however, this would not occur in reality.

5.1.4 Management and Mitigation Measures

5.1.4.1 Design Features

As identified in Section 2.4.8, the Applicant would complete upgrades to the intersection of the Unnamed Local Road and Site Access Road at the entrance to the Camilleri Stockfeeds during the initial stages of development to ensure the safety and efficiency of the local road network. These works would include installation of "GIVE WAY" controls on all three legs of the intersection.

In addition, the Site Access Road would be widened to achieve a width suitable for two heavy vehicles to pass. Taking into account roadside drainage, the disturbed area would be a maximum of 8m wide for its length from the intersection of the Unnamed Local Road and the Site Access Road to the Extraction Area.

5.1.4.2 Operational Safeguards and Management Measures

In order to ensure that the traffic and transport impacts of the Proposal are minimised, the following management and mitigation measures would be implemented.

- The proposed upgrades to the intersection of the Unnamed Local Road and Site Access Road and widening of the Site Access Road to achieve a minimum width of 8m, which would be undertaken during the Site Establishment phase. The proposed intersection upgrades would be undertaken in consultation with Camilleri Stockfeeds in order to minimise any inconvenience during the construction period and to ensure minimal interruptions to that operation.
- Monitoring and maintenance, as required, of vegetation on the northern side of the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access to ensure sightlines are maintained between eastbound and southbound drivers.
- Establish appropriate easements along the Site Access Road to ensure ongoing and uninterrupted access to areas east of the Quarry Site for NSW Rural Fire Service and any other authorities that may require use of this road.
- A Driver's Code of Conduct, identifying required driver behaviour and enforcement mechanisms for drivers of heavy vehicles (including subcontractors) regularly accessing the Quarry Site, would be developed and enforced to minimise risks to other road users, including school buses.

- All heavy vehicle movements along Old Northern Road would be restricted between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.
- A comprehensive *Environmental Management Plan* for the ongoing management of relevant environmental issues at the Quarry would be developed which would comprise a separate section in relation to Traffic Management.
- Adopt and implement a complaints management system which would be maintained to ensure that all traffic and transportation related complaints are dealt with through investigation and implementation of corrective treatments.

5.1.5 Assessment of Impacts

5.1.5.1 Road Network

In the event maximum haulage associated with the Proposal coincides with peak baseline demands, TTPP (2023) concludes future traffic volumes on Old Northern Road would remain below 190 vehicles per hour on the average weekday, and below 240 vehicles per hour on Saturday. Furthermore, peak volume on the Unnamed Local Road would remain below 30 vehicles per hour over the average weekday, and below 15 vehicles per hour on Saturday.

5.1.5.2 Intersections

Operating Conditions

TTPP (2023) concludes that the cumulative peak hourly traffic volumes would remain well below the threshold volumes for analysis under the Proposal. As such, there are no capacity concerns regarding the operation of the intersections.

Geometry

TTPP (2023) notes that the Site Access Road would form an eastward extension of the Unnamed Local Road and is therefore not considered a formal "intersection". Notwithstanding, the width of the Site Access Road and the Unnamed Local Road would be adequate to accommodate the path of two heavy vehicles passing along their lengths and as such, no formal assessment of swept paths is warranted.

TTPP (2023) also notes that peak traffic demands associated with the Quarry at the intersection of the Unnamed Local Road with the Camilleri Stockfeeds access would be sufficiently low that the existing basic intersection treatment would continue to be adequate to meet these demands with no requirement for auxiliary lanes. Notwithstanding, given the atypical priority of this intersection and the fact that the small radius of the northwestern corner of the Unnamed Local Road requires articulated vehicles entering Camilleri Stockfeeds to travel on the incorrect side of the Unnamed Local Road, TTPP (2023) recommends installation of "GIVE WAY" controls on all three legs of the intersection.

TTPP (2023) concludes that the existing layout of the intersection of the Unnamed Local Road and Old Northern Road would provide adequate capacity to accommodate the additional demands generated by the Quarry, therefore, no upgrades are required.

Sight Distances

Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection. TTPP (2023) notes that monitoring and maintenance of vegetation on the northern side of the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access may be required to ensure sightlines are maintained between eastbound and southbound drivers.

TTPP (2023) concludes that sight distances available at the remainder of the key intersections would continue to meet the SISD requirements under the Quarry.

Level of Service

TTPP (2023) demonstrates that the LOS on the surrounding road network would remain good (LOS A) under the combined effects of regional developments, background traffic growth and additional Quarry-generated traffic. The intersection of Old Northern Road and the Unnamed Local Road is predicted to maintain its LOS A classification and drivers would experience only minor delays as a result of interaction with other traffic.

5.1.5.3 Road Safety

TTPP (2023) concludes that the review of the road crash history of the road network surrounding the Quarry Site (see Section 5.1.2.6) does not highlight any clustering of crashes that might suggest an inherent concern with the design of the road at that location that may be exacerbated by the increased traffic demands of the Proposal.

5.1.5.4 Fire Trails

As noted in Section 2.4.8, the existing track along the Crown road reserve would be incorporated into the Site Access Road and widened to a minimum width of 8m, thereby retaining access to Dalgetys Creek Fire Trail to the east of the Quarry Site. Furthermore, the Applicant would establish appropriate easements along the Site Access Road to provide the NSW Rural Fire Service and any other authorities that require use of this road to ensure ongoing and uninterrupted access for all relevant parties.

5.1.6 Conclusion

TTPP (2023) concludes that the transportation of up to 30,000tpa of Quarry products from the Quarry, involving a maximum of 3 laden truck movements per hour and 10 laden truck movements per day, would be accommodated on the surrounding road network with acceptable impacts on the capacity, efficiency and safety of the road network. Furthermore, there would be no significant impacts on fire trails as a result of the Proposal.

5.2 Air Quality

5.2.1 Introduction

The SEARs for the Proposal require the EIS to include an assessment of the likely air quality impacts of the development in accordance with the NSW Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. This assessment is required to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the Quarry and/or road haulage.

The assessment requirements identified by Council were also considered during the preparation of the air quality assessment. A summary of the SEARs and requirements of Council are included in **Appendix 2** together with a record of where each requirement is addressed in the EIS.

An Air Quality Impact Assessment (AQIA) for the Quarry was undertaken by Northstar Air Quality Pty Ltd (Northstar). The resulting report is presented as **Appendix 4** and is hereafter referred to as Northstar (2023).

The following subsections provide a summary of Northstar (2023) describing the existing air quality environment, potential emission sources and the criteria adopted for the AQIA. This is followed by an overview of the proposed ongoing operational control measures that would be implemented by the Applicant. Finally, the assessment methodology and results are reviewed and the residual air quality impacts of the Proposal considered following the adoption of safeguards and management measures.

5.2.2 The Existing Environment

5.2.2.1 Sensitive Receivers

The Air Quality Impact Assessment (Northstar, 2023) considers potential impacts to air quality at 50 receptor locations principally to the northwest, west and southwest of the Quarry Site. It is noted that this assessment included three additional receptors[1] which are located beyond the boundaries of the 2km radius presented on **Figure 4.4** for data validation purposes.

5.2.2.2 Meteorological Environment

The weather experienced within a given area can govern the generation, dispersion and eventual fate of pollutants in the atmosphere. The general meteorological conditions of the surrounding area were reviewed using observational data from the Mangrove Mountain and Richmond RAAF automatic weather station (AWS) and site-specific meteorological parameters required for the AQIA (Northstar, 2023) were generated using meteorological modelling using TAPM and CALMET software. A full description of the modelling exercise, methods and input data used to establish site-specific meteorological conditions is presented in Appendix A of Northstar (2023).

A description of the wind data relied upon in this assessment is provided in Section 4.2.4.

[1] See Figure 6 of Northstar (2023) for receptor locations R48, R49 and R50.

5.2.2.3 Air Quality Environment

Regional Air Quality

The existing air quality experienced in the area surrounding the Quarry Site was determined by examining measurements obtained from regional Air Quality Monitoring Network (AQMN). Northstar (2023) identified the following two AQMS within a 35km radius of the Quarry Site.

- Richmond AQMS – operated by NSW DPE
- Maroota Public School TEOM – established in accordance with conditional requirements of Environment Protection Licence (EPL) 3916 and EPL 12513 for the Old Northern Road and Haerses Road Quarries operated by Dixon Sand Pty Ltd.

In addition, publicly available deposited dust monitoring results were sourced from a monitoring location operating under the conditional requirements of EPL 3829 within Lot 2 DP510812 at the PF Formation Pit 5 & 15 Quarry located adjacent to the Quarry Site.

A combination of data from the monitoring stations identified above was used to determine background regional pollutant concentrations. **Table 5.6** presents a summary of the background air quality used in the air quality impact assessment.

Table 5.6
Summary of Background Air Quality Used in the AQIA

Pollutant	Averaging Period	Value	Notes
PM_{10}	24-hour	Daily varying	The 24-hour maximum PM_{10} in 2020 at Maroota Public School was measured to be 151.8µg/m^3
	Annual	15.3µg/m^3	
$PM_{2.5}$	24-hour	Daily varying	The 24-hour maximum $PM_{2.5}$ in 2020 at Richmond was measured to be 93.0µg/m^3
	Annual	8.4µg/m^3	
TSP	Annual	34.2µg/m^3	Estimated on TSP:PM_{10} ratio of 2.2434:1
Dust Deposition	Annual	2.1g/m^{2}month	As recorded at the PF Formation Pit 5 & 15 Quarry
Source: Northstar (2023) – Modified after Table 8			

Cumulative Impacts

Northstar (2023) undertook a desktop study to determine the potential for cumulative impacts from particulate generating operations conducted in proximity to the Quarry Site. This assessment is presented in full in Section 4.5 of Northstar (2023). In summary, it was determined that, as the PM_{10} air quality data adopted for the purposes of the AQIA was sourced from Maroota Public School which is located in an area close to a number of sand extraction operations, regional background air quality data would appropriately account for any potential cumulative impacts associated with surrounding land uses.

5.2.3 Criteria for Assessment

Table 5.7 presents the air quality criteria listed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2017a) which were adopted for the Quarry. It is noted that the criteria are intended to minimise any potential impacts to human health and amenity.

Table 5.7
Air Quality Assessment Criteria

Pollutant	Averaging period	Criterion	Notes
PM_{10}	24 hours	$50\mu g/m^{3(a)}$	Numerically equivalent to the AAQ NEPM[(b)] standards and goals.
	1 year	$25\mu g/m^3$	
$PM_{2.5}$	24 hours	$25\mu g/m^3$	
	1 year	$8\mu g/m^3$	
TSP	1 year	$90\mu g/m^3$	
Deposited Dust	1 year[(c)]	$2g/m^2$/month	Assessed as insoluble solids as defined by AS 3580.10.1
	1 year[(d)]	$4g/m^2$/month	
Respirable Crystalline Silica	1 year	$3\mu g/m^3$	Applicable to the PM_{10} size fraction in accordance with South Australia EPA guidelines.
Notes: (a): micrograms per cubic metre (b): National Environment Protection (Ambient Air Quality) Measure (c): maximum increase in deposited dust level (d): maximum total deposited dust level			
Source: Northstar (2023) - Table 2			

5.2.4 Potential Sources of Air Contaminants

The following potential sources of operational emissions were considered by Northstar (2023).

- Particulate emissions from cutting of sandstone logs and flagging stone.
- Particulate emissions from extraction of friable sandstone.
- Unloading and handling of materials.
- Crushing and screening of friable sandstone.
- Management of product stockpiles.
- Loading of product trucks with products.
- Wheel-generated particulate emissions from the transportation of products off site.
- Emissions from vehicle and equipment exhausts.
- Wind erosion of disturbed areas.

5.2.5 Assessment Methodology

Using the site-specific meteorological file generated, air dispersion modelling was used to simulate the dispersion of particulate matter associated with the sources outlined in Section 5.2.4, A range of emissions controls, including the use of a water truck to dampen roads during dry conditions, were included in the modelling assessment. Modelling was performed using the NSW EPA approved CALPUFF atmospheric dispersion model in 3-dimensional (3-D) mode.

An assessment of the impacts of activities at the Quarry Site was undertaken to characterise the likely day-to-day operation of the Quarry. This assessment relied upon average and likely maximum operational characteristics to assess the Quarry against longer term (annual average) and shorter term (24-hour) criteria for particulate matter. One operational scenario was selected for dispersion modelling (immediately following commencement of extraction operations) as presented in **Figure 5.2**. It is noted that this scenario was selected as this stage was considered to be representative of the progressive development of the Quarry and would involve extraction operations at the existing ground surface. The modelling scenario provides an indication of the air quality impacts of the activities being performed as part of the Proposal. The regional background air quality was added to these impacts to represent the air quality which may be expected within the area surrounding the Quarry Site.

As the background data for 24-hour $PM_{2.5}$ and PM_{10} used for the assessment includes periods when the standard assessment criteria are exceeded (i.e. the criteria is exceeded within any assumed background level, regardless of the operation of the Quarry), Northstar (2023) assessed 24-hour average $PM_{2.5}$ and PM_{10} using the Level 2 Contemporaneous Assessment Method provided in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022). In this approach, the measured background concentrations for each day over a representative year are added to the corresponding predicted incremental particulate matter concentrations from the Quarry to establish the number of additional days (if any) in a representative year when the criteria would be exceeded as a result of the proposed changes. Northstar (2023) performed the air quality impact assessment based on air quality and meteorological data from the year 2020 which was determined to be most representative for the area.

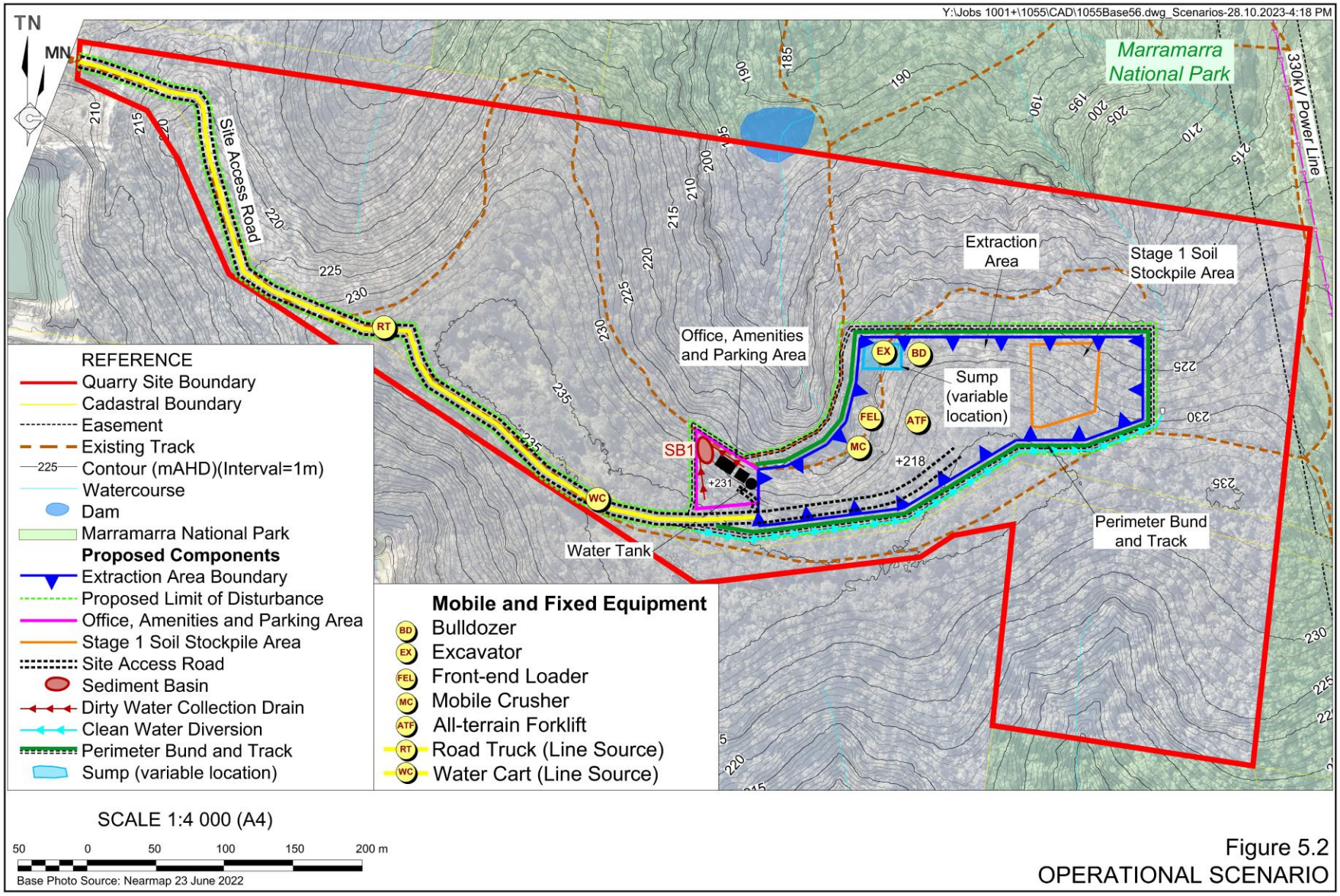


Figure 5.2
OPERATIONAL SCENARIO

5.2.6 Management and Mitigation Measures

The Applicant would employ the following best practice mitigation measures to ensure that dust impacts are minimised.

- Misting water sprays would be used on crushers and screens, when operational.
- All unsealed internal roads would be surfaced with appropriate materials to limit dust lift-off, as required.
- Unsealed roads, including the Site Access Road to the intersection with Camilleri Stockfeeds, and unformed tracks and/or surfaces utilised by vehicles (e.g. tracks used by product transport trucks within the Quarry Site) would be watered, as required.
- Appropriate care would be taken to avoid spillage during loading.
- Load size would be limited, as appropriate, to ensure materials do not extend above truck sidewalls.
- All laden transport trucks carrying select and general fill product from the Quarry Site would be fully covered.
- All vehicles travelling on internal unsealed roads or unformed tracks within the Quarry Site would be limited to a speed no greater than 40km/h.
- Adopt and implement a complaints management system which would be maintained to ensure that all air quality related complaints are dealt with through investigation and implementation of corrective treatments.

5.2.7 Assessment of Impacts

Particulate Matter – Annual Average

Table 5.8 summarises the annual average predicted particulate matter and deposited dust concentrations at the receiver locations. The results of the dispersion modelling indicate that the annual average $PM_{2.5}$ criterion is predicted to be exceeded at all receiver locations, however, Northstar (2023) notes that these exceedances are a result of high background particulate matter concentrations (i.e. background concentrations of $PM_{2.5}$ are approximately 105% of the annual average criterion). The incremental contribution associated with Quarry operations is minimal ($\leq$ 0.4% of the criterion). It is therefore considered that changes to particulate matter concentrations directly attributable to the Proposal would be minor.

Table 5.8
Summary of Annual Average Particulate Matter Concentrations

Emission Type	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)		TSP ($\mu g/m^3$)		Dust Deposition (g/m^2/month)	
Criteria	*25*		*8*		*90*		*4*	
Receiver[1]	Quarry	Cumulative	Quarry	Cumulative	Quarry	Cumulative	Quarry	Cumulative
R1	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R2	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R3	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R4	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R5	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R6	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R7	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R8	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R9	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R10	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R11	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R12	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R13	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R14	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R15	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R16	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R17	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R18	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R19	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R20	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R21	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R22	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R23	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R24	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R25	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R26	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R27	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R28	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R29	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R30	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R31	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R32	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R33	0.1	15.4	<0.1	8.5	0.4	34.6	<0.1	2.2
R34	0.1	15.4	<0.1	8.5	0.3	34.5	<0.1	2.2
R35	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R36	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R37	0.1	15.4	<0.1	8.5	0.2	34.4	<0.1	2.2
R38	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R39	<0.1	15.4	<0.1	8.5	0.1	34.3	<0.1	2.2
R40	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R41	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R42	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R43	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R44	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R45	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R46	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R47	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R48	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R49	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2
R50	<0.1	15.4	<0.1	8.5	<0.1	34.3	<0.1	2.2

Note 1: See Figure 6 of Northstar (2023) for receptor locations.

Source: Northstar (2023) – Modified After Tables 17 to 18

Particulate Matter – Maximum 24-hour

Table 5.9 summarises the maximum incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations at surrounding receiver locations.

Table 5.9
Predicted Maximum Incremental 24-hour PM_{10} and $PM_{2.5}$ Concentrations

Receiver[1]	Maximum incremental 24-hour average concentration (µg/m³)		Receiver[1]	Maximum incremental 24-hour average concentration (µg/m³)	
	PM_{10}	$PM_{2.5}$		PM_{10}	$PM_{2.5}$
R1	0.8	0.3	R26	0.5	0.2
R2	0.5	0.2	R27	0.5	0.2
R3	0.5	0.3	R28	0.5	0.2
R4	0.6	0.3	R29	0.4	0.2
R5	0.6	0.3	R30	0.5	0.2
R6	1.2	0.5	R31	0.8	0.4
R7	1.1	0.5	R32	0.9	0.4
R8	0.7	0.3	R33	1.7	0.6
R9	0.4	0.2	R34	1.3	0.6
R10	0.6	0.3	R35	1.2	0.5
R11	0.8	0.4	R36	1.2	0.6
R12	0.6	0.3	R37	1.3	0.6
R13	0.5	0.3	R38	1.0	0.5
R14	0.5	0.2	R39	1.2	0.6
R15	0.4	0.2	R40	0.9	0.4
R16	0.4	0.2	R41	0.8	0.4
R17	0.4	0.2	R42	0.9	0.4
R18	0.4	0.2	R43	0.9	0.4
R19	0.6	0.3	R44	0.7	0.4
R20	0.6	0.3	R45	0.8	0.4
R21	0.6	0.3	R46	0.8	0.4
R22	0.6	0.3	R47	1.0	0.5
R23	0.8	0.4	R48	<0.1	<0.1
R24	0.4	0.2	R49	0.2	0.1
R25	0.6	0.3	R50	0.5	0.3
Note 1: See Figure 6 of Northstar (2023) for receptor locations.					
Source: Northstar (2023) – Modified After Table 19					

The worst-case incremental outcome of modelled predictions for 24-hour PM_{10} and 24-hour $PM_{2.5}$ for the Quarry would be an incremental impact up to 1.7 µg/m³ for PM_{10} predicted to occur at one receiver location (R33) and 0.6 µg/m³ for $PM_{2.5}$ predicted to occur at five receiver locations (R33, R34, R36, R37 and R39). The Level 2 Contemporaneous Assessment of cumulative 24-hour PM_{10} and 24-hour $PM_{2.5}$ indicated that there would be no additional exceedances of the assessment criteria as a result of the Proposal (i.e. there would be no exceedances of the criteria other than those predicted by background concentrations alone).

A comprehensive list of assessment results at residences in the vicinity of the Quarry Site is presented in Section 6 of Northstar (2023).

Respirable Crystalline Silica

Given the quartz-rich nature of the sandstone resource proposed to be extracted, the AQIA also considered potential impacts associated with Respirable Crystalline Silica (RCS). Based on the assumption that 95% of modelled annual average PM_{10} impacts would be RCS, impacts were predicted to represent approximately 3% of the relevant criterion.

Greenhouse Gas Assessment

A quantitative assessment of greenhouse gas (GHG) emissions generated by the Proposal was undertaken by Northstar (2023) with emissions compared to national and State totals. Scope 1 emissions associated with the Proposal would represent <0.0002% of Australian and <0.0006% of NSW emissions totals for 2022. It is anticipated that emissions would likely be reduced further through the implementation of a maintenance program for all plant and equipment.

5.2.8 Conclusion

The results of the AQIA undertaken by Northstar (2023) based on consideration of one operational scenario concluded that the Proposal is predicted to comply with all impact assessment criteria for annual average concentrations of TSP, $PM_{2.5}$, PM_{10} and deposited dust.

The assessment of 24-hour average $PM_{2.5}$ and 24-hour average PM_{10} applying a Level 2 Contemporaneous Assessment has indicated that there would be no additional exceedances of the assessment criteria as a result of the Proposal.

The GHG assessment concluded that average Scope 1 emissions from the Proposal would represent approximately <0.0002% of Australian and <0.0006% of NSW GHG emissions which represents a very minor proportion of global GHG emissions.

Considering the above, Northstar (2023) notes that changes to particulate matter and deposited dust concentrations directly attributable to the Proposal would be minor.

5.3 Noise and Vibration

5.3.1 Introduction

The SEARs require the EIS to include an assessment of the potential impacts of the Proposal on noise, including:

- construction and operational noise and off-site transport noise impacts of the development in accordance with the relevant guidelines;
- reasonable and feasible mitigation measures to minimise noise emissions;
- monitoring and management measures; and
- consideration of Marramarra National Park as a 'sensitive receiver' for the purposes of the noise assessment, noting that it should not be considered a buffer for excessive noise during the Quarry's operations.

In addition, assessment requirements relating to noise were received from the National Parks and Wildlife Service and Hornsby Shire Council. **Appendix 2** presents a summary of where all relevant assessment requirements have been addressed in the EIS.

A Noise Assessment (NIA) for the Proposal was undertaken by Muller Acoustic Consulting Pty Ltd (MAC). The resulting report is presented as **Appendix 5** and is hereafter referred to as MAC (2023). The following subsections provide a summary of the NIA and describe the operational safeguards and management measures to be implemented by the Applicant.

5.3.2 The Existing Environment

5.3.2.1 Sensitive Receivers

MAC (2023) considers potential impacts to the existing noise environment at 47 privately-owned residences within 2km of the Quarry Site boundary, as well as the adjacent Marramarra National Park. **Figure 4.4** present details of the properties considered in the NIA whilst **Table 4.2** lists the distance between each receiver and the closest proposed operational area.

5.3.2.2 Meteorological Environment

Rather than undertaking a detailed analysis of the significance of noise enhancing conditions, MAC (2023) relied upon a standard set of noise enhancing meteorological conditions identified within Fact Sheet D of the *NSW Noise Policy for Industry* (NPI) (EPA, 2017b). These parameters are presented in **Table 5.10.**

Table 5.10
Meteorological Parameters

Assessment Condition[1]	Temperature	Wind Speed[2]/ Direction	Relative Humidity	Stability Class[2]
Day	20°C	3m/s all directions	50%	D
Note 1: Day – the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays Note 2: Implemented using CONCAWE meteorological corrections.				
Source: MAC (2023) – Modified after Table 25				

5.3.2.3 Existing Acoustic Environment

In order to quantify the existing noise environment in the vicinity of the Quarry Site, unattended noise monitoring was conducted between 13 and 24 October 2022 at two locations surrounding the Quarry Site (**Figure 5.3**). Supplemental operator attended noise monitoring was also undertaken on 13 October 2022 to quantify ambient background noise levels. Noise levels were continuously monitored at 15-minute intervals and the data analysed to determine the Rating Background Level (RBL) and the long-term average noise level at each location.

Monitoring results were used to classify receiver types in accordance with the NPI. In summary, receivers in close proximity to Old Northern Road are affected by road traffic noise and were therefore classified as "suburban residential" receivers. Receivers not affected by road traffic noise were classified as "rural residential" receivers. Marramarra National Park was classified as a "passive recreation" receiver type.

Noise monitoring results are presented in detail in Section 4 of MAC (2023). In summary, the dominant ambient noise sources recorded during operator attended monitoring were birds, windblown vegetation, passing heavy vehicles, distant industrial noise and occasional aircraft.

5.3.3 Criteria for Assessment

5.3.3.1 Construction Noise Criteria

The Noise Management Levels (NMLs) for each receiver type in the vicinity of the Quarry Site over standard construction hours[2] are presented below in **Table 5.11**.

Table 5.11
Construction Noise Criteria

Receiver	Adopted RBL (dB L_{A90})	NML (dB $L_{Aeq(15min)}$)
Suburban Residential	37	47 (RBL+10dB(A))
Rural Residential	35	45 (RBL+10dB(A))
Passive Recreation	N/A	60
Source: MAC (2023) – Modified after Table 14		

Site establishment or construction activities would be restricted to those activities identified in Section 2.4.

[2] 7am to 6pm Monday to Friday, 8am to 1pm Saturdays and no activities on Sundays and / or public holidays.

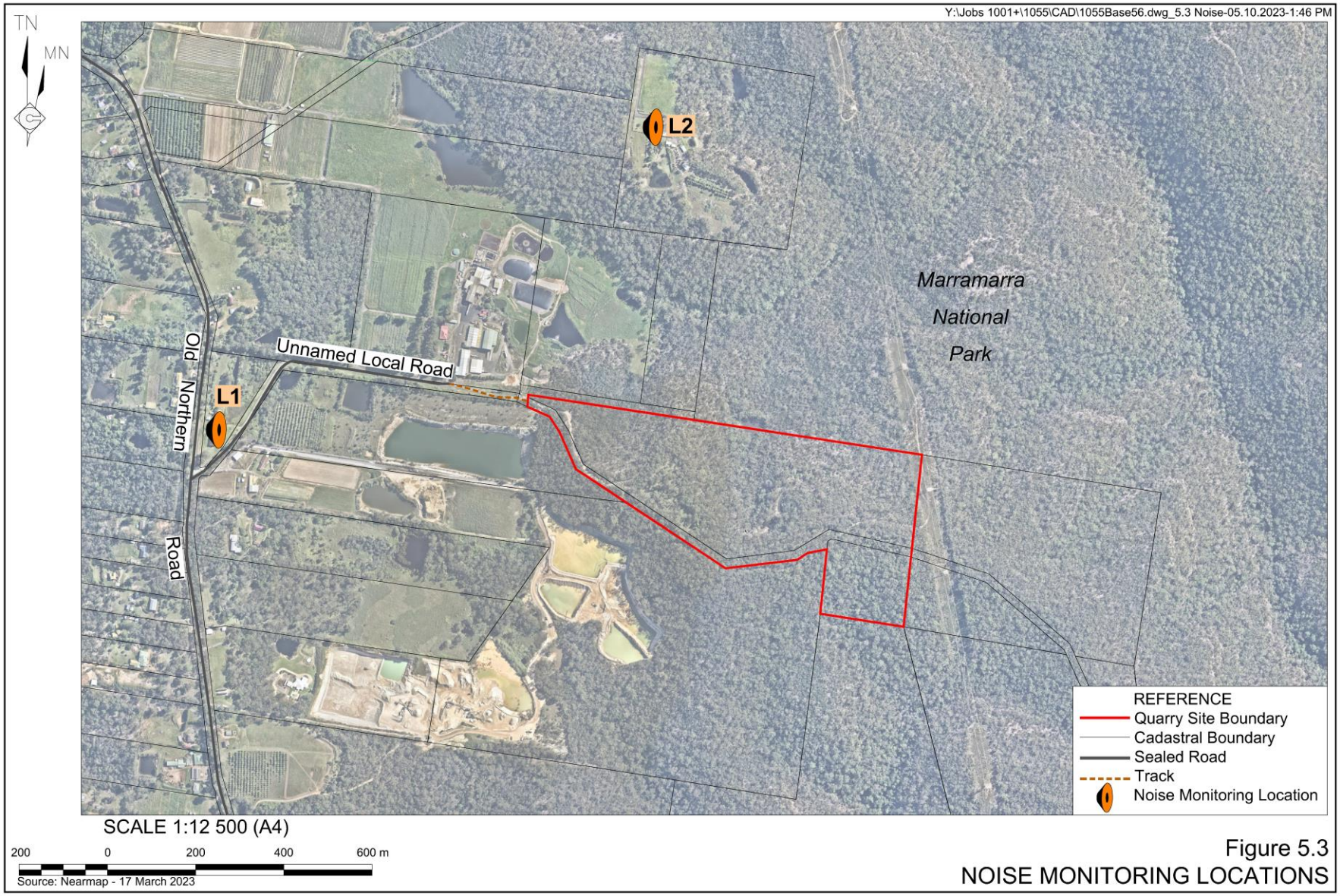


Figure 5.3
NOISE MONITORING LOCATIONS

5.3.3.2 Operational Noise Criteria

Intrusiveness Criteria

The Project Intrusiveness Noise Levels (PINL) criteria limit Equivalent Continuous Noise Level (Leq) from an industrial source to a value of 'background plus 5dB' averaged over a 15-minute period. That is, the RBL for the time period, plus 5dB(A). The RBL (L_{A90}) is defined as the overall single figure background level representing each assessment period and only applies to residential receivers. The intrusiveness criteria for the Quarry are identified in **Table 5.12**.

Table 5.12
Intrusiveness Noise Criteria

Receiver	Period[1]	PINL (dB $L_{Aeq(15min)}$)
Suburban Residential	Day	42
	Evening	42
	Night	35
Rural Residential	Day	40
	Evening	36
	Night	35
Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm; Night - the remaining periods.		
Source: MAC (2023) – Modified after Table 11		

Amenity Criteria

The Project Amenity Noise Levels (PANL) criteria aim to protect against excessive noise in situations where an area is becoming increasingly developed. The criteria are based on the nature of the receiver area and existing levels of industrial noise. The amenity criteria for the Quarry are identified in **Table 5.13**.

Table 5.13
Amenity Noise Criteria

Receiver Type	Period[1]	PANL (dB $L_{Aeq(15min)}$)
Suburban Residential	Day	53
	Evening	43
	Night	38
Rural Residential	Day	48
	Evening	43
	Night	38
Passive Recreation	When in use	48
Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening – the period from 6pm to 10pm; Night - the remaining periods.		
Source: MAC (2023) – Modified after Table 12		

Project Noise Trigger Levels

The Project Noise Trigger Levels (PNTLs) are the lower of the intrusiveness or amenity criteria and are the project-specific criteria against which the Quarry is required to be assessed. The PNTLs adopted for the Quarry are, therefore, the intrusiveness criteria for residential receivers and amenity criteria for Marrramarra National Park.

5.3.3.3 Road Traffic Noise Criteria

In accordance with the NSW *Road Noise Policy* (RNP), the noise and vibration impact assessment has adopted the "Freeway/arterial/sub-arterial road" category for the designated transport routes, consistent with their classification as "principal haulage routes".

MAC (2023) notes that functional classification of Old Northern Road and Wisemans Ferry Road is "Collector Road" in accordance with the *Roads and Maritime Noise Criteria Guideline* (RMS, 2015), however, the RNP does not provide separate criteria for "Collector Roads" and applies the sub-arterial category to all roads that are not classified as local roads.

The criteria adopted for the Quarry are identified in **Table 5.14** based upon the noise over a 15-hour period, i.e. from 7:00am to 10:00pm.

Table 5.14
Road Traffic Noise Assessment Criteria

Road Category	Road(s)	Assessment Criteria	Increase Criteria
Freeway/arterial/sub-arterial	Unnamed Local Road, Old Northern Road, Wisemans Ferry Road	60dB $L_{Aeq(15hr)}$	Existing traffic $L_{Aeq(15hr)}$ + 12dB
Source: MAC (2023) – Modified after Tables 16 and 17			

5.3.4 Management and Mitigation Measures

5.3.4.1 Noise Design and Operational Safeguards

The Applicant is committed to minimising the noise generated by extraction, processing and transport activities through the implementation of the following operational noise controls and management measures.

- All hours of operation presented in Section 2.12 would be strictly adhered to.
- The maximum number of laden truck movements would be limited to 3 per hour and 10 per day.
- All drivers would be required to sign a Driver's Code of Conduct requiring a high standard of driver performance, avoidance of using exhaust brakes in built-up areas and travel at the required speeds.
- All equipment on the Quarry Site would be regularly serviced to ensure sound power levels of each item remains at or below that nominated for noise modelling purposes.
- Where practicable, "quiet" practices would be adopted when operating equipment (i.e. positioning idling trucks in appropriate areas).

5.3.5 Assessment Methodology

5.3.5.1 Inputs and Assumptions

Construction Scenario

Noise emissions associated with the site establishment activities described in Section 2.4 were assessed by MAC (2023). It is assumed that these activities would be completed using the same equipment that would be used for extraction operations.

Operational Scenario

In order to assess the noise impacts for the operation of the Quarry, two operational scenarios were considered by MAC (2023). The scenarios chosen are consistent with Stage 1 and Stage 2 extraction operations as described in Section 2.5.3. Both scenarios are representative of the worst-case noise generating operational activities throughout the progressive development of the Quarry. It is noted that noise emissions associated with the importation, placement and shaping of VENM would be comparable within both scenarios.

Noise Sources

The sound power levels of the equipment used in the Site Establishment and operational scenarios are provided in **Table 5.15.**

Table 5.15
Noise Source Sound Power Levels

Noise Source / Item	Number	Individual Sound Power level	Sound Power Level dB $LA_{eq(15min)}$	Source Height[1]
Construction				
Bulldozer (CAT D8)	1	108	108	1.5m
Excavator (35t)	1	104	104	1.5m
Front end Loader	1	109	109	1.5m
Operation				
Bulldozer (CAT D8)	1	108	108	1.5m
Front end Loader	1	109	109	1.5m
Excavator (35t)	1	104	104	1.5m
All Terrain Forklift/ Telehandler	1	108	108	1.5m
Road Truck[2] (2 movements per hour)	1	101	101	1.5m
Mobile Crusher	1	116	116	1.5m

Note 1: Height above the relative ground or building below source.

Note 2: Modelled as a moving point source with adjustments for length of travelled path, velocity and number of movements in a 15-minute period.

Source: MAC (2023) – Modified after Table 23

Road Transport Conditions

The following inputs/assumptions were included in the assessment of road transport noise levels.

- The closest residences to the transport routes are located approximately 15m from Old Northern Road and/or Wisemans Ferry Road.
- At maximum production, up to 10 laden trucks per day and 3 laden trucks per hour could utilise a given transport route (i.e. a total of 20 truck movements per day and 6 truck movements per hour).

5.3.5.2 Construction and Operational Noise Assessment

Predictive noise modelling was undertaken by MAC (2023) using DGMR (iNoise, Version 2022.01) software to quantify noise emissions from the operational activities identified in Sections 2.5.3 and 5.3.5.1, as well as the Site Establishment activities identified in Section 2.4. The model incorporated a three-dimensional terrain map, noise source data, ground type, attenuation from barriers and atmospheric information to predict noise levels at the nearest potentially impacted residences.

5.3.5.3 Road Traffic Noise Assessment

MAC (2023) undertook an assessment of road traffic noise using iNoise modelling software. Calculations were completed to represent traffic flows from the Quarry at an offset distance of 15m for receivers adjacent to the Unnamed Local Road, Old Northern Road and/or Wisemans Ferry Road using the Traffic Noise Model developed by the United States Department of Transport, *Federal Highway Administration Low Volume Calculation Tool*.

5.3.6 Assessment of Impacts

5.3.6.1 Predicted Construction Noise Levels

Predicted noise levels for the modelled construction scenario are provided in **Table 5.16**. All modelled results are below the adopted criteria (see Section 5.3.3.1).

Table 5.16
Predicted Construction Noise Levels

Page 1 of 3

Receiver ID[1]	Predicted Noise Level dB $LA_{eq(15min)}$ Daytime[2]				Daytime PNTL dB $LA_{eq(15min)}$
	Road	Dam	Clearing	Bund	
R1	<35	<35	<35	<35	42
R2	<35	<35	<35	<35	42
R3	<35	<35	<35	<35	42
R4	<35	<35	<35	<35	42
R5	<35	<35	<35	<35	42
R6	<35	<35	<35	<35	42
R7	<35	<35	<35	<35	42

Table 5.16 (Cont'd)
Predicted Construction Noise Levels

Receiver ID[1]	Predicted Noise Level dB $LA_{eq(15min)}$ Daytime[2]				Daytime PNTL dB $LA_{eq(15min)}$
	Road	Dam	Clearing	Bund	
R8	<35	<35	<35	<35	40
R9	<35	<35	<35	<35	40
R10	<35	<35	<35	<35	42
R11	<35	<35	<35	<35	40
R12	<35	<35	<35	<35	42
R13	<35	<35	<35	<35	42
R14	<35	<35	<35	<35	42
R15	<35	<35	<35	<35	40
R16	<35	<35	<35	<35	40
R17	<35	<35	<35	<35	42
R18	<35	<35	<35	<35	40
R19	<35	<35	<35	<35	42
R20	<35	<35	<35	<35	42
R21	<35	<35	<35	<35	42
R22	<35	<35	<35	<35	42
R23	<35	<35	<35	<35	42
R24	<35	<35	<35	<35	40
R25	<35	<35	<35	<35	42
R26	<35	<35	<35	<35	40
R27	<35	<35	<35	<35	42
R28	<35	<35	<35	<35	42
R29	<35	<35	<35	<35	40
R30	<35	<35	<35	<35	40
R31	<35	<35	<35	<35	42
R32	<35	<35	<35	<35	42
R33	<35	<35	<35	<35	42
R34	<35	<35	<35	<35	42
R35	<35	<35	<35	<35	42
R36	<35	<35	<35	<35	42
R37	<35	<35	<35	<35	40
R38	<35	<35	<35	<35	42
R39	<35	<35	<35	<35	40
R40	<35	<35	<35	<35	42
R41	<35	<35	<35	<35	42
R42	<35	<35	<35	<35	42
R43	<35	<35	<35	<35	42
R44	<35	<35	<35	<35	42

Table 5.16 (Cont'd)
Predicted Construction Noise Levels

Receiver ID[1]	Predicted Noise Level dB $LA_{eq(15min)}$ Daytime[2]				Daytime PNTL dB $LA_{eq(15min)}$
	Road	Dam	Clearing	Bund	
R45	<35	<35	<35	<35	42
R46	<35	<35	<35	<35	42
R47	<35	<35	<35	<35	42
Marramarra National Park	<35	<35	<35	<35	48

Note 1: See Figure 4.4 for receiver locations.

Note 2: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Source: MAC (2023) – Modified after Table 27

5.3.6.2 Predicted Operational Noise Levels

Predicted noise levels for the two modelled scenarios are provided in **Table 5.17**. All modelled results are below the adopted criteria (see Section 5.3.3.2).

Table 5.17
Predicted Operational Noise Levels

Receiver ID[1]	Predicted Noise Level dB $LA_{eq(15min)}$ Daytime[2]		Daytime PNTL dB $LA_{eq(15min)}$
	Stage 1	Stage 2	
R1	<35	<35	42
R2	<35	<35	42
R3	<35	<35	42
R4	<35	<35	42
R5	<35	<35	42
R6	<35	<35	42
R7	<35	<35	42
R8	<35	<35	40
R9	<35	<35	40
R10	<35	<35	42
R11	<35	35	40
R12	<35	<35	42
R13	<35	<35	42
R14	<35	<35	42
R15	<35	<35	40
R16	<35	<35	40
R17	<35	<35	42
R18	<35	<35	40
R19	<35	<35	42
R20	<35	<35	42

Table 5.17 (Cont'd)
Predicted Operational Noise Levels

Receiver ID[1]	Predicted Noise Level dB $LA_{eq(15min)}$ Daytime[2]		Daytime PNTL dB $LA_{eq(15min)}$
	Stage 1	Stage 2	
R21	<35	<35	42
R22	<35	<35	42
R23	<35	<35	42
R24	<35	<35	40
R25	<35	<35	42
R26	<35	<35	40
R27	<35	<35	42
R28	<35	<35	42
R29	<35	<35	40
R30	<35	<35	40
R31	<35	<35	42
R32	<35	35	42
R33	35	36	42
R34	36	37	42
R35	36	35	42
R36	36	36	42
R37	37	38	40
R38	<35	35	42
R39	36	37	40
R40	35	35	42
R41	<35	<35	42
R42	<35	<35	42
R43	<35	<35	42
R44	<35	<35	42
R45	<35	<35	42
R46	<35	<35	42
R47	37	37	42
Marramarra National Park	42	44	48

Note 1: See Figure 4.4 for receiver locations.
Note 2: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays

Source: MAC (2023) – Modified after Table 26

5.3.6.3 Predicted Road Traffic Noise Levels

Predicted traffic noise levels at the closest residential receptors adjacent to the product transport routes were calculated to determine the potential impacts of heavy vehicles travelling to and from the Quarry. **Table 5.18** presents a summary of the predicted operational road traffic noise levels at the closest residences to the respective roads. In all cases, the predicted noise levels would be below the adopted criteria.

Table 5.18
Predicted Road Noise Levels

Offset from Road	Period	Assessment Criteria dB $LA_{eq(15hr)}$	Calculated Traffic Noise dB $LA_{eq(15hr)}$
15m	Day	60	50.1
Source: MAC (2023) – Modified after Table 28			

5.3.7 Monitoring

5.3.7.1 Noise Monitoring

Given that the Quarry is not predicted to result in any exceedances of the relevant assessment criteria, monitoring of noise is not proposed. However, should any substantiated complaint(s) relating to noise be received, the Applicant would commission an independent noise assessment to establish the actual levels and compliance with the criteria set out in Section 5.3.3.

5.3.8 Conclusion

Based on the predictive assessments undertaken by MAC (2023), operation of the Quarry in the manner proposed is not expected to exceed the criteria adopted for the construction, operational and road traffic noise assessments.

Noise impacts are, therefore, not predicted to constrain the Proposal.

5.4 Water Resources

5.4.1 Introduction

The SEARs require the EIS to include an assessment of the potential impacts of the Quarry on water, including:

- a detailed site water balance and an assessment of any licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo;
- an assessment of potential impacts on the quality and quantity of existing surface and groundwater resources, including a detailed assessment of the proposed water discharge quantities and quality against receiving water quality and flow objectives; and
- a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts.

In addition, Hornsby Shire Council, DPE Water and the National Parks and Wildlife Service included water-related issues for assessment that included explicit consideration of a closed water management system.

The following subsections describe the groundwater and surface water settings of the Quarry. As part of the assessment process for surface water, R.W. Corkery & Co. Pty Limited prepared a report quantifying the sediment basin storage requirements for the Quarry. The resulting report is presented as **Appendix 6** and is hereafter referred to as RWC (2023).

5.4.2 Groundwater

5.4.2.1 Existing Environment

Hydrogeological Setting

The Quarry Site overlies the Sydney Basin Central Groundwater Source which is managed under the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023*. The Sydney Basin Central Groundwater Source is an extensive porous rock groundwater system which extends from the main arm of the Hawkesbury River to the north and by the Nepean River to the west and south. The majority of Sydney's population is within this groundwater source and bores are generally evenly distributed across its area (NSW Office of Water, 2011).

Surrounding Groundwater Users

Registered groundwater bores within the vicinity of the Quarry Site are displayed on **Figure 5.4** indicating that the closest registered groundwater bore is located approximately 497m to the southwest of the Quarry Site boundary (GW101689). It is noted the majority of bores located to the south of the Quarry Site (i.e. south of the intersection of Old Northern Road and Old Telegraph Road) are associated with the Maroota Tertiary Sands Groundwater Source, and therefore are within a separate hydrostratigraphic unit to the Quarry, i.e. the Quarry Site is underlain by Hawkesbury Sandstone (see Section 2.3.1).

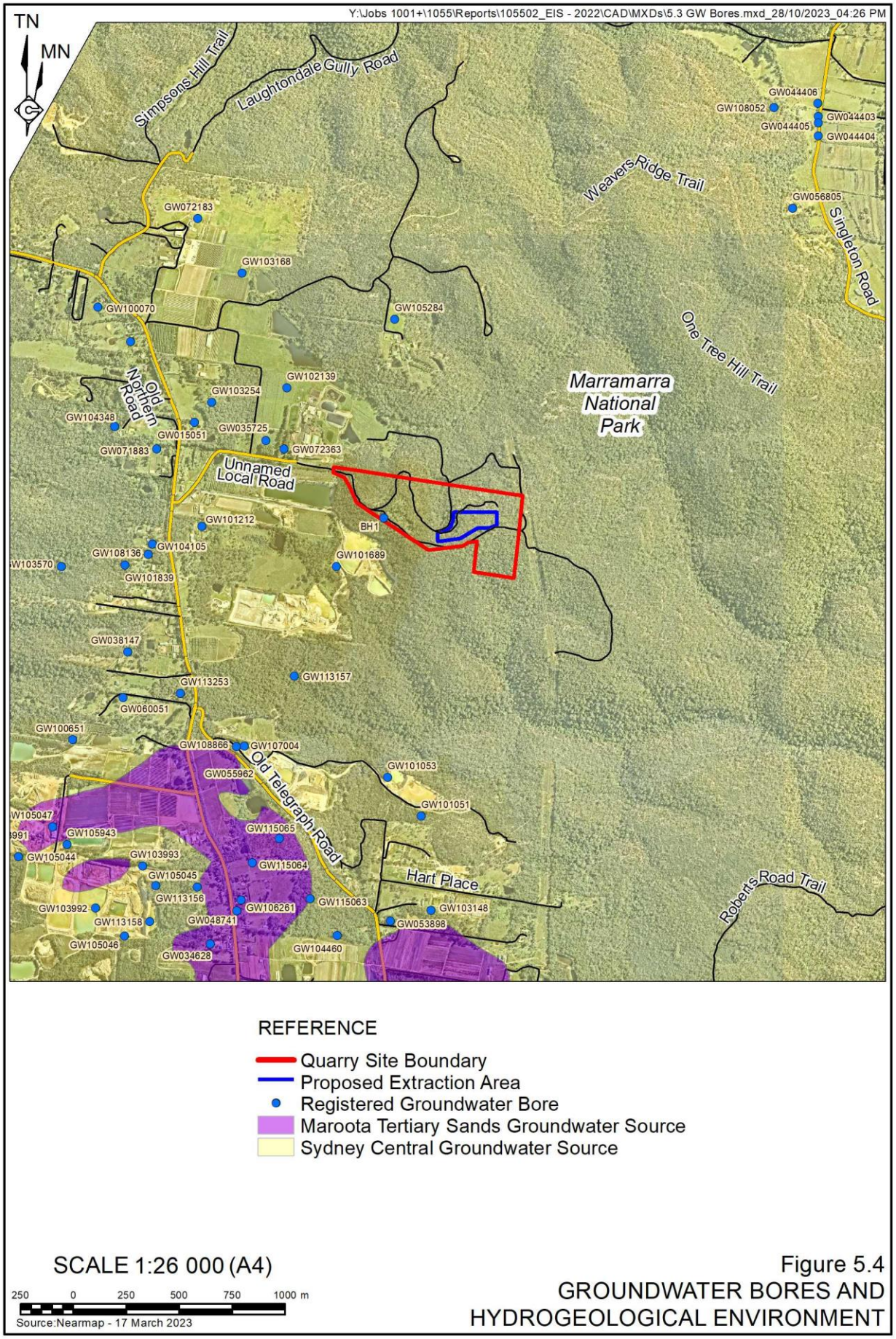
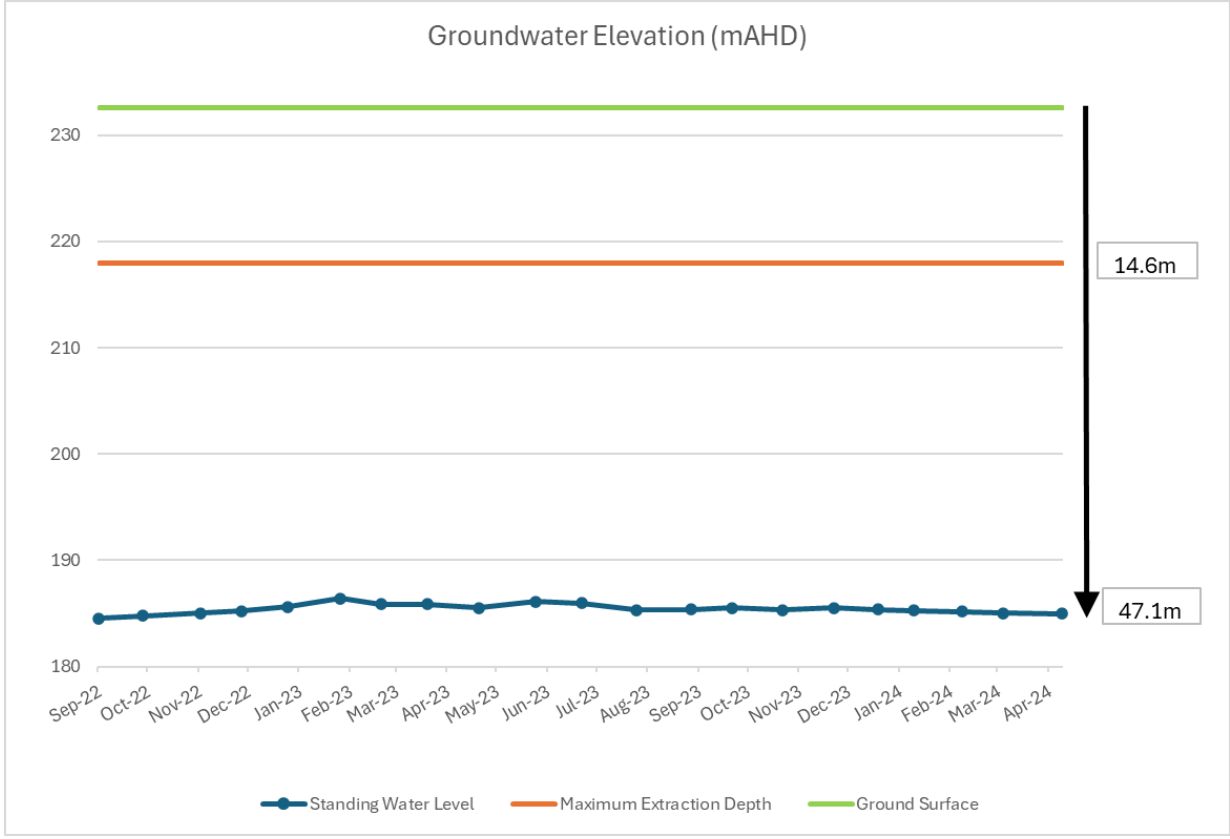


Figure 5.4
GROUNDWATER BORES AND HYDROGEOLOGICAL ENVIRONMENT

Groundwater Levels

Three drill holes were drilled by the Applicant in a preliminary exploration program undertaken within the Quarry Site. Holes were drilled to a maximum depth of approximately 11m below ground level (mbgl) (i.e. approximately 1m below proposed maximum extraction depth of 218m AHD) with no groundwater intersected.

One groundwater monitoring bore was installed in September 2022 by PF Formation Pty Limited along the southern extent of the Quarry Site boundary (refer to BH1 on **Figure 5.4**), approximately 328m west of the proposed Extraction Area. It is noted that BH1 comprises part of the groundwater monitoring network for the adjoining PF Formation Pit 5 & 15 Quarry. Monthly monitoring of this groundwater bore undertaken by PF Formation Pty Limited (refer **Graph 5.1**) has established that the average standing water level within this bore is approximately 47.1mbgl (i.e. >30m below the proposed limit of extraction).



Graph 5.1
Groundwater Elevation (mAHD)

Data Source: PF Formation Pty Limited

Groundwater Dependent Ecosystems

The Bureau of Meteorology Atlas of Groundwater Dependent Ecosystems (GDEs) identifies that no terrestrial or aquatic GDEs are present within or immediately surrounding the Quarry Site.

5.4.2.2 Management and Mitigation Measures

Due to the absence of encountering groundwater during drilling activities, specific management and mitigation measures in relation to groundwater are not considered to be required for the Quarry. Notwithstanding, in accordance with Section 2.5.3 of the Hornsby DCP, the Applicant proposes to monitor the standing water level within BH1 on a quarterly basis to ensure that extraction operations are confined to a minimum of 2m above the high wet weather groundwater level.

In addition, the Applicant would ensure that appropriate management and mitigation measures are implemented in relation to the handling and storage of hydrocarbons to manage the risk of groundwater contamination (see Section 5.9.3) and would visually monitor for any signs of groundwater inflow during extraction operations (see Section 5.4.2.4).

5.4.2.3 Assessment of Impacts

Given that the average standing water level within BH1 is approximately 47.1mbgl (i.e. >30m below the proposed maximum depth of extraction), it is considered unlikely that groundwater would be intercepted through extraction activities. As a result, it is considered that the Quarry would not constrain groundwater used by surrounding residents/land users nor result in contamination of these groundwater resources.

5.4.2.4 Monitoring

Whilst it is anticipated that groundwater inflow to the extraction area would not occur, the Applicant proposes monitor the standing water level within BH1 on a quarterly basis to ensure that extraction operations are confined to a minimum of 2m above the high wet weather groundwater level. In addition, the Applicant would visually monitor extraction faces for groundwater inflows. Should it be established that sustained inflow is occurring, the Applicant would arrange for a water access licence to cover groundwater inflow.

5.4.2.5 Conclusion

As it is anticipated that groundwater would not be intersected as part of the Quarry's operations, and by extension, it is considered that the Proposal would have negligible impacts on groundwater and surrounding groundwater users.

5.4.3 Surface Water

5.4.3.1 Existing Environment

Regional Setting

The Quarry Site is located within the Yengo Subregion of the Sydney Basin Bioregion with surface water resources managed under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023*.

Quarry Site Topography and Drainage

An overview of the regional and Quarry Site topography and drainage is presented in Section 4.1. Three first order watercourses drain northwards from within the Quarry Site towards Dalgetys Creek (see Section 4.2). One historic dam straddles the northern boundary of the Quarry Site and the adjoining Marramarra National Park, with the embankment of the dam located within the National Park.

Flood Risk

The Quarry Site is not located within a flood planning area and is not at risk of flooding. As such, flood risks are not considered further in this assessment.

5.4.3.2 Management and Mitigation Measures

5.4.3.2.1 Surface Water Management Objectives

The proposed water management system for the Quarry has been developed in a manner that enables the:

- efficient recovery and use of natural water resources;
- effective management of available storage volumes that prevents uncontrolled discharge to receiving environments; and
- effective water quality management strategies that prevent discharge of sediment-laden water to receiving environments.

5.4.3.2.2 Catchments and Surface Water Management

Figure 5.5 displays representative catchments within the Quarry Site and the proposed water management structures that would be constructed and/or excavated to separate "clean" and "dirty" surface water runoff. An overview of each Quarry catchment and its management is provided below.

Extraction Area – Sediment-laden Runoff

The Extraction Area would be internally draining with all runoff reporting to the sump. Sediment-laden runoff during Site Establishment and initial extraction operations would be managed though the installation of silt-stop fencing during development, as required. It is anticipated that the Extraction Area would be internally draining by the completion of Site Establishment activities, with the two former extraction areas within the Quarry Site essentially acting as sumps.

As discussed in Section 2.4.3, the perimeter safety bund would convey sediment-laden runoff from within this area to the sump while a clean water diversion would be constructed around the southern perimeter of the Extraction Area.

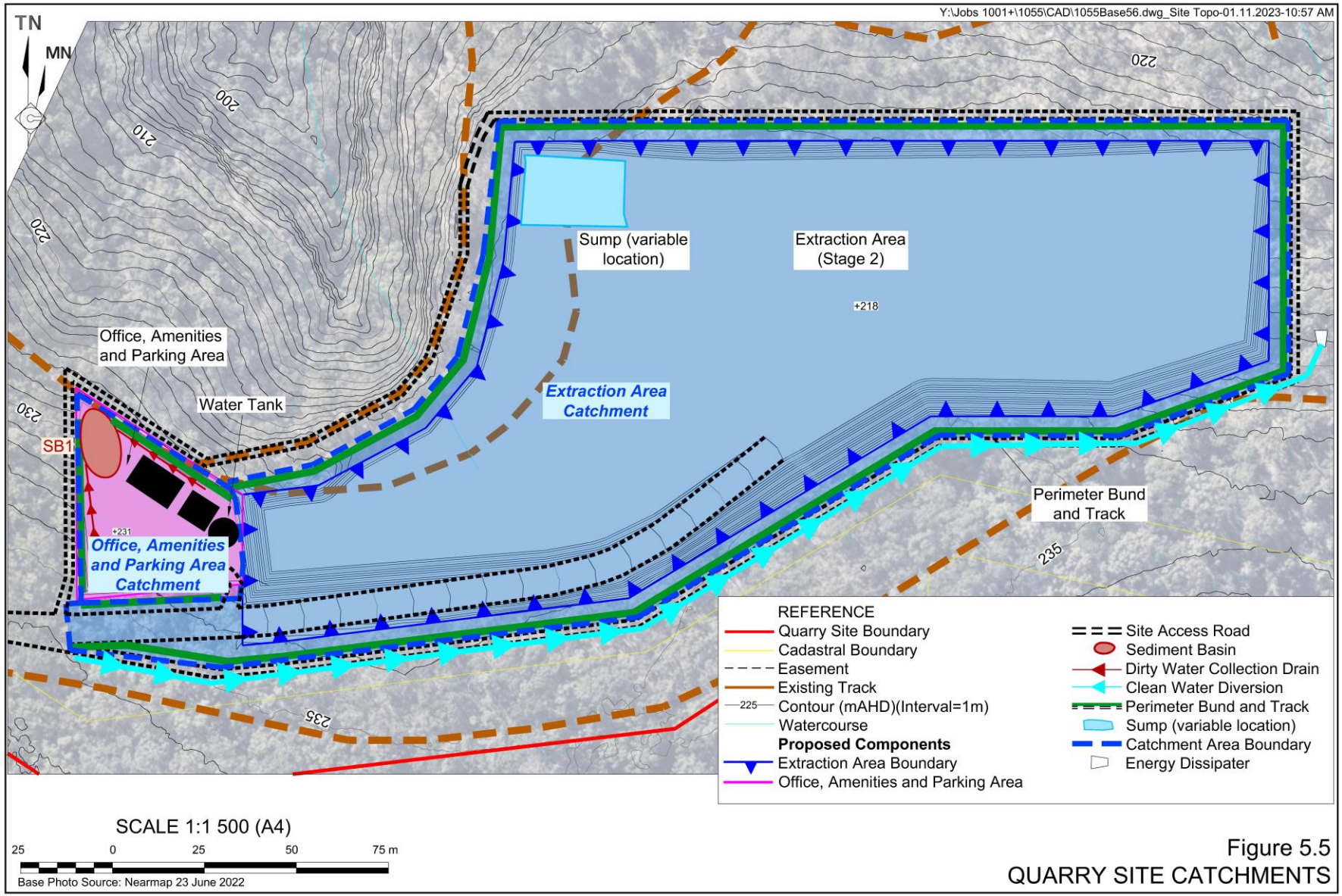


Figure 5.5
QUARRY SITE CATCHMENTS

Office, Amenities and Parking Area – Sediment-laden Runoff

As discussed in Section 2.4.3, a permanent sediment basin (SB1) would be constructed within the northwestern section of the Office, Amenities and Parking Area to collect and manage sediment-laden runoff from within this area. The sediment basin storage capacity calculations (RWC, 2023) applied estimates of rainfall and erosion data, the soil hydrologic group and the catchment area to determine the required capacity for SB1. The capacity comprises the minimum settlement and storage requirements for 90th percentile 5-day rainfall event i.e. 52.7mm (the design rainfall event specified in Volume 2E of the Blue Book for standard receiving environments (Landcom, 2004). The assumptions and final calculations used are included in **Appendix 6** and a summary of the results provided in **Table 5.19**.

Table 5.19
Settlement and Storage Volume Requirements

Sediment Basin	Water Settlement Zone (m^3)	Sediment Storage Zone (m^3)	Total (m^3)
SB1	27	4	31

SB1 would be maintained such that it would continue to meet capacity requirements. This would involve excavation of sediment when this exceeds the identified sediment storage zone and stabilisation of drainage and sediment basin walls. Excess water within SB1 would be pumped to the sump within the Extraction Area, as required.

As discussed in Section 2.4.3, dirty water collection drains would be constructed along the northern and western boundaries of the Office, Amenities and Parking Area to convey sediment-laden runoff from within this area to SB1 and to prevent sediment-laden runoff entering the adjacent areas of undisturbed vegetation.

Undisturbed Areas – Clean Runoff

The perimeter safety bund and clean water diversion would be the principal mechanisms by which clean water runoff would be diverted to adjacent areas of undisturbed vegetation. It is noted that the construction of this bund would be staged and reflect the progressive enlargement of the Extraction Area.

5.4.3.3 Water Use

Water usage at the Quarry has been conservatively estimated as follows noting that the volumes presented assume that dust suppression would be required on all operating days. Reduced application rates to account for wet weather and periods of lower production have not been considered.

- 0.9ML[3] per annum for misting sprays on the processing plant.
- 9.0ML[4] per annum for application on internal haul roads and unformed tracks.

[3] Based on the application of 3,000L x 300 operating days per annum.
[4] Based on the application of 30,000L (i.e. 2 x water cart loads) x 300 operating days per annum.

Based on the above, dust suppression would require no more than 33kL per day throughout the life of the Quarry. Assuming an average of 300 operational days, water use requirements are not expected to exceed 10ML per year.

It is proposed that runoff collected within SB1 and the Quarry Sump would be used to contribute towards meeting the water demand. It is noted that as the principal purpose of the Quarry Sump is for sediment control, with no contributing catchment, the sump would not contribute to the maximum harvestable rights dam capacity for the Quarry Site.

In the event that additional water is required for dust suppression, water would be carted in for make-up water supplies.

5.4.3.4 Assessment of Impacts

Assuming the adoption of the management and mitigation measures detailed in Section 5.4.3.2, it is anticipated that there would be a low likelihood that sediment-laden water would be discharged to the surrounding environment. The proposed sediment basin SB1 would provide sufficient capacity to manage predicted runoff resulting from a 90th percentile 5-day rainfall event and, combined with the Quarry Sump, storage volume to provide water for use by the water cart for dust suppression on unsealed areas of the Quarry Site, if required.

5.4.3.5 Monitoring

Due to the low risk of sediment-laden discharge to the surrounding environment, regular surface water monitoring is not proposed. However, the Applicant would undertake inspections of all structures to ensure stability and sediment storage capacity is maintained after any significant rainfall event. Where it is required, the Applicant would implement measures to remove any excess sediment and/or debris and repair the sediment basin and control structures.

5.4.3.6 Conclusion

It is considered that the Quarry would have negligible impacts on surface water given the proposed management and mitigation measures.

5.5 Biodiversity

5.5.1 Introduction

The SEARs for the Proposal identified biodiversity as a key issue requiring that the EIS include:

- accurate predictions of any vegetation clearing on site;
- a detailed assessment of the likely biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems, undertaken in accordance with Sections 7.2 and 7.7 of the *Biodiversity Conservation Act 2016* (BC Act); and
- a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.

In addition, assessment requirements relating to biodiversity values were provided by the National Parks and Wildlife Service and Hornsby Shire Council. A Biodiversity Development Assessment Report (BDAR) for the Proposal has been prepared by Ecoplanning Pty Ltd (Ecoplanning) which is referred to as Ecoplanning (2023) and is presented as **Appendix 7**. The following subsections describe the setting of the Quarry and provide a summary of the BDAR and describes the management and mitigation measures to be implemented by the Applicant.

5.5.2 Assessment Methodology

5.5.2.1 Desktop Assessment

The following information sources were considered in preparation for field surveys of the Quarry Site. This information provided suitable background to inform the type and timing of surveys that would be required and to identify species likely to be present and potentially affected by the Proposal.

- BioNet Atlas
- BioNet Vegetation Classification
- Protected Matters Search Tool
- NSW Hydrography
- State Vegetation Type Map
- NSW threatened species profiles
- ePlanning Spatial Viewer
- Hornsby LEP

5.5.2.2 Field Surveys

Ecoplanning completed field surveys within the Quarry Site from 22 August 2022 to 12 July 2023 to validate predictions made based on the desktop assessment and to map potential habitats and identified species within the Quarry Site.

The survey methods are described in full in Sections 3.2.1, 4.3.3 and 4.3.6 of Ecoplanning (2023). In summary, the survey effort comprised:

- total of five survey plots consistent with the Biodiversity Assessment Methodology (BAM);
- general habitat searches to identify significant habitat features such as hollow-bearing trees;
- targeted threatened fauna transects;
- incidental threatened flora and fauna searches;
- search for scats / signs of habitat use;
- diurnal bird surveys;
- nocturnal bat and mammal spotlighting surveys;
- two x song meter acoustic recorders (42 days);
- two x Titley Anabat Express bat detectors (28 nights);
- 15 x motion-detecting cameras (42 days); and
- 20 x nest boxes (115 days).

5.5.3 Vegetation Communities and Threatened Species

5.5.3.1 Plant Community Types

Field surveys within the Quarry Site identified the following Plant Community Types (PCTs).

- PCT 3586 – Northern Sydney Scribbly Gum Woodland
- PCT 3616 – Sydney Hinterland Grey Gum Transition Forest
- PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest

A total of 3.77ha of native vegetation would be removed throughout the life of the Quarry, all of which is currently in moderate condition. **Figure 5.6** and **Table 5.20** present the vegetation types that would be removed during Quarry operations together with their respective areas. Ecoplanning (2023) notes that areas classified as PCT 3621 are located beyond the proposed limit of disturbance and would not be impacted by the Proposal.

Table 5.20
Vegetation Integrity Assessment

PCT	Condition	Area to be Cleared (ha)[1]	Number BAM Plots Completed	Vegetation Integrity Score
3586	Moderate	0.08	1	35.9
3616	Moderate	1.42	2	47.8
3622	Moderate	2.26	2	53.5
Note 1: Subject to rounding errors.				
Source: Ecoplanning (2023) – Modified after Table 3.8				

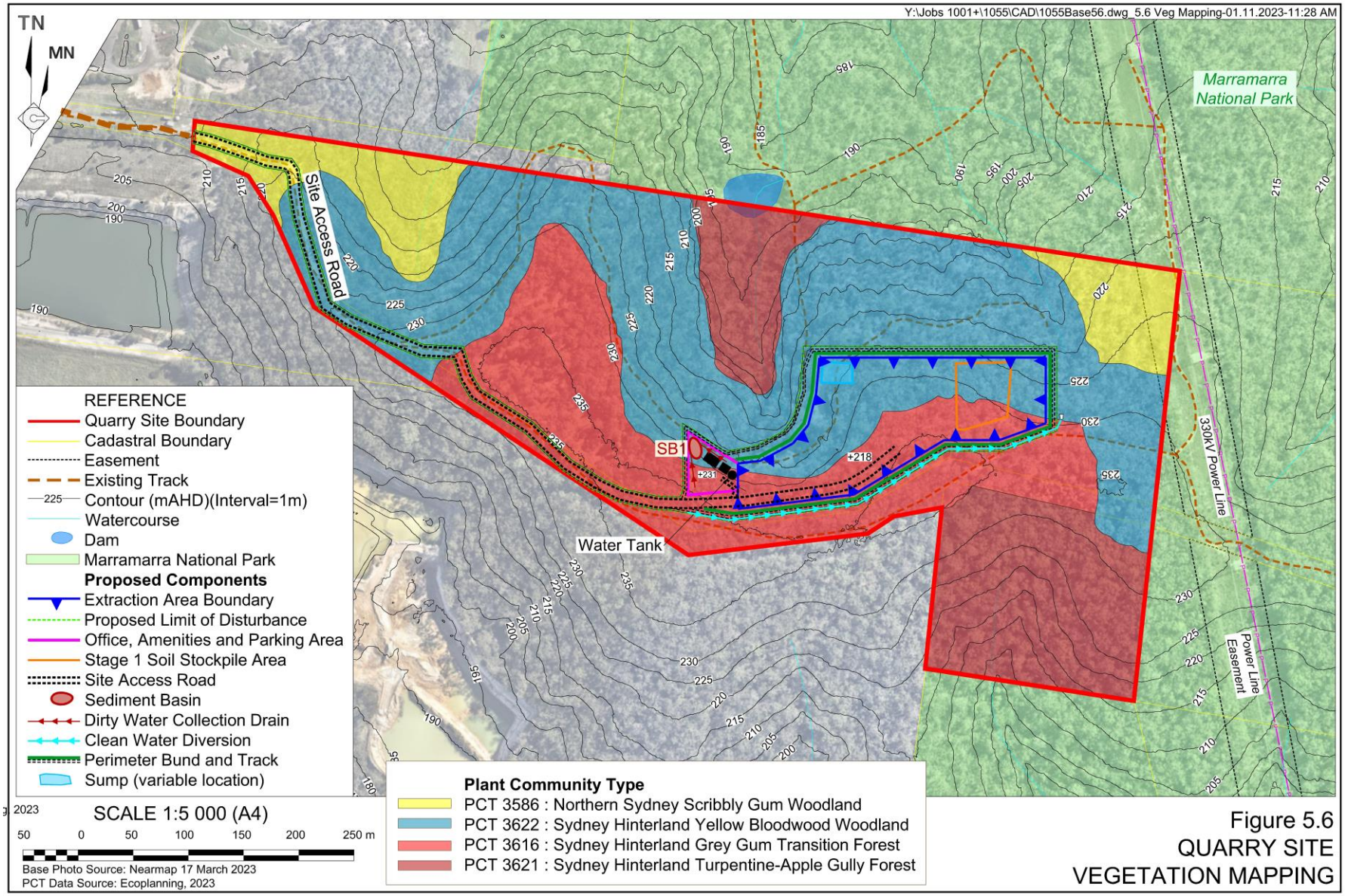


Figure 5.6
QUARRY SITE
VEGETATION MAPPING

5.5.3.2 Threatened Ecological Communities

No threatened ecological communities (TEC) listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified within the Quarry Site.

5.5.3.3 Threatened Species

Introduction

For the purpose of credit calculations, threatened species are listed as either ecosystem credit species or species credit species, where:

- an ecosystem credit species is a species whose likelihood of occurrence can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection; and
- a species credit species is a species whose likelihood of occurrence cannot be predicted by vegetation surrogates and/or landscape features and can be reliably detected by survey.

A total of 41 ecosystem credit species and 57 species credits species were either confirmed or assumed to frequent the Quarry Site. Complete listings of ecosystem and species credit species are provided in Tables 4.2 and 4.3 of Ecoplanning (2023).

Flora Species

The field surveys identified a total of 117 flora species, of which 114 are native flora species and three are exotic flora. A complete listing of flora species identified during field surveys is presented in Appendix A of Ecoplanning (2023). Whisky Grass (*Andropogon virginicus*), a high threat weed, was identified within the Quarry Site.

Of the individual flora species recorded, three are threatened species listed under the BC Act and/or EPBC Act as follows.

- *Darwinia fascicularis* subsp. *oligantha* – listed as an endangered population under the BC Act.
- *Pimela curviflora* var. *curviflora* – listed as vulnerable under the BC Act and the EPBC Act.
- *Tetratheca glandulosa* – listed as vulnerable under the BC Act.

The locations of these species are presented on **Figure 5.7**.

Fauna Species

The field surveys identified a total of 64 fauna species including:

- 28 species of bird;
- 22 species of mammal;
- 6 species of reptile; and
- 8 species of frog.

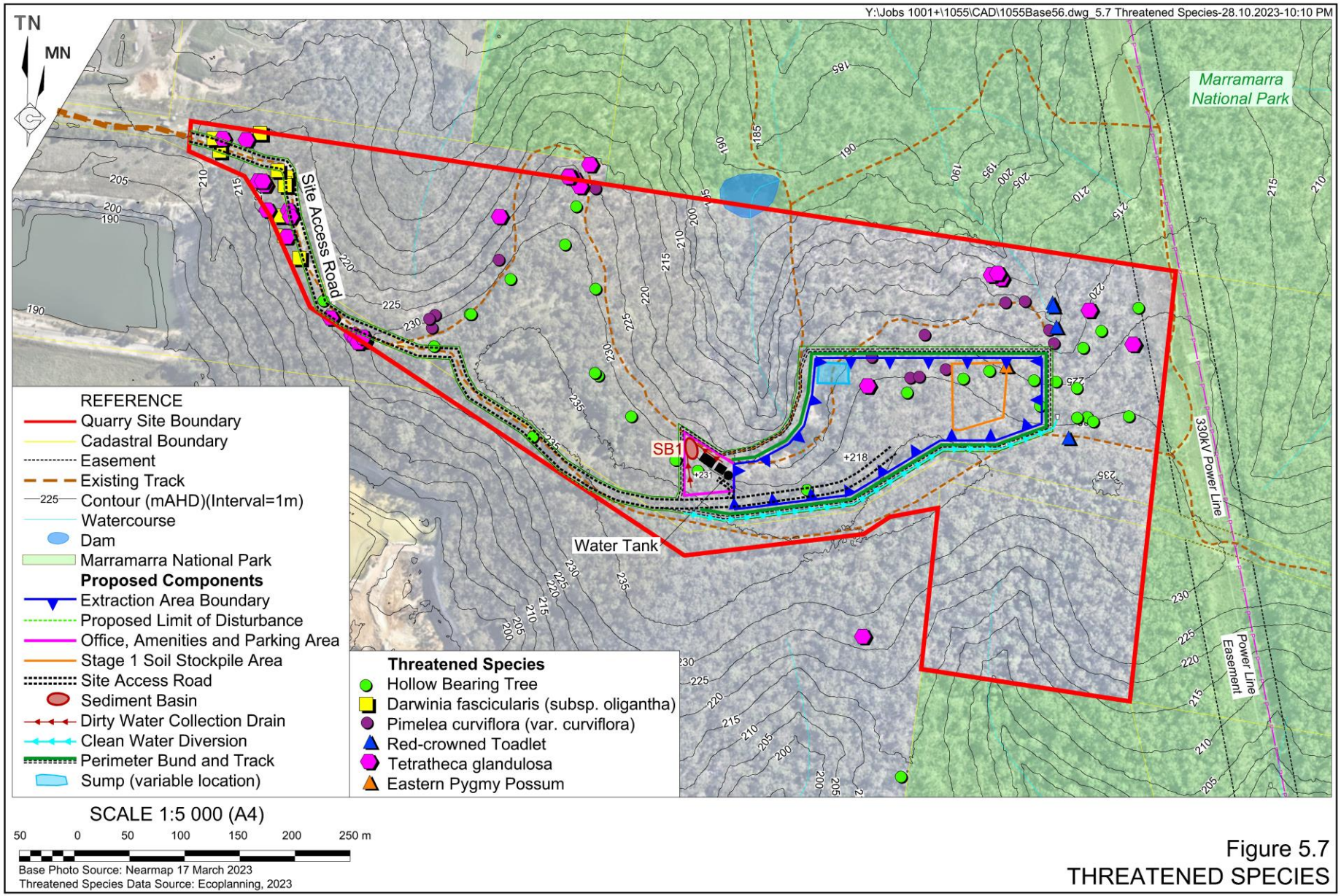


Figure 5.7
THREATENED SPECIES

A complete listing of fauna species identified during field surveys is presented in Appendix A of Ecoplanning (2023). Of the individual fauna species, eight are threatened species listed under the BC Act and/or EPBC Act.

Table 5.21 provides a summary of these species, their legal status and an overview of the survey results.

Table 5.21
Listed Fauna Recorded or Likely to be Present

Species	Legal Status	Overview of Survey Results / Comments
Bats		
Large Bent-winged Bat*	Vulnerable under the BC Act.	Large Bent-winged Bats are dual credit species, being ecosystem credit species for foraging purposes and species credit species for breeding habitat only. These species, although identified within the Quarry Site, are not required to be assessed as a species credit species as no breeding habitat (i.e. caves, derelict mines and other man-made structures) is present within the Quarry Site. In addition, although not preferred breeding habitat for this species, small crevices within sandstone outcrops were inspected and no evidence of breeding bats was identified.
Eastern Cave Bat	Vulnerable under the BC Act.	Possibly recorded during surveys. The species polygon for the Eastern Cave Bat includes all habitat within the Quarry Site within 2km of caves, scarps, cliffs, rock overhangs and disused mines. Therefore, the species polygon for the Eastern Cave Bat encompasses all areas of native vegetation within the Quarry Site.
Large-eared Pied Bat	Vulnerable under the BC Act and EPBC Act.	Recorded during surveys. The species polygon for the Large-eared Pied Bat includes all habitat within the Quarry Site within 2km of caves, scarps, cliffs, rock overhangs and disused mines. Therefore, the species polygon for the Large-eared Pied Bat encompasses all areas of native vegetation within the Quarry Site.
Little Bent-winged Bat*	Vulnerable under the BC Act.	Little Bent-winged Bats are dual credit species, being ecosystem credit species for foraging purposes and species credit species for breeding habitat only. These species, although identified within the Quarry Site, are not required to be assessed as a species credit species as no breeding habitat (i.e. caves, derelict mines and other man-made structures) is present within the Quarry Site. In addition, although not preferred breeding habitat for this species, small crevices within sandstone outcrops were inspected and no evidence of breeding bats was identified.
Southern Myotis	Vulnerable under the BC Act.	Recorded during surveys. The species polygon for the Southern Myotis includes all habitat within the Quarry Site that is within 200m of a waterbody with pools and/or stretches 3m or wider including rivers, creeks, billabongs, lagoons and dams. Therefore, the species polygon for the Southern Myotis encompasses all areas of native vegetation within the Quarry Site.
Birds		
Glossy Black-Cockatoo*	Vulnerable under the BC Act.	Recorded during surveys. However, Glossy Black-cockatoo is a species credit species for breeding only. The song meter recording was taken out of breeding season and no Glossy-Black-cockatoos were observed using hollows within the Quarry Site or otherwise engaging in breeding behaviour. Two stags capable of hosting breeding Glossy Black-cockatoos were observed during seasonal owl surveys, however, no Glossy Black-cockatoos were observed in these stags. Accordingly, no species polygon has been produced for this species.

Table 5.21 (Cont'd)
Listed Fauna Recorded or Likely to be Present

Species	Legal Status	Overview of Survey Results / Comments
Mammals		
Eastern Pygmy Possum	Vulnerable under the BC Act.	One Eastern Pygmy Possum was recorded with a camera and during spotlighting surveys within the eastern area of the Quarry Site. In addition, 20 nest boxes were installed for the period 4 November 2022 to 27 February 2023. However, no evidence of Eastern Pygmy Possum or other mammals was found in the nest boxes.
Frogs		
Red-crowned Toadlet	Vulnerable under the BC Act.	Recorded during every night of survey within the minor first-order watercourse located beyond the eastern boundary of the proposed Extraction Area.
*Not assessed as species credit species.		
Source: Ecoplanning (2023) – Compiled from Section 4		

5.5.4 Management and Mitigation Measures

The Applicant would implement the following management measures to avoid or mitigate the risk of residual adverse impacts on threatened species within the Quarry Site.

Vegetation Clearing

- Areas of proposed disturbance would be clearly marked prior to the commencement of clearing campaigns to minimise the potential for over clearing of vegetation.
- Vegetation would be removed in a manner that avoids damage to surrounding vegetation.
- The following procedures would be adopted to guide the clearing of all mature trees and any hollow-bearing trees.
  - Where necessary, a qualified or suitably experienced spotter-catcher would be engaged to undertake an initial assessment of the area to be cleared for threatened species.
  - All trees would be checked for the presence of nesting or roosting fauna before felling or pushing.
  - Clearing activities would cease if threatened fauna species are detected until after individuals have dispersed.
  - Felled mature trees would be relocated to defined storage areas within the Quarry Site or mulched to enhance habitat.
- Pre-clearance surveys would be undertaken under the supervision of a suitably qualified ecologist prior to disturbance of areas where individuals of *Darwinia fascicularis* are present.
- A barrier would be constructed around individuals of *Darwinia fascicularis* adjacent to the Site Access Road to ensure species are not impacted by use and maintenance of the Site Access Road.
- All personnel and contractors would be inducted and made aware that unauthorised clearing of native vegetation may have legislative consequences.

Fauna Management

- Fauna that has become displaced from vegetation clearing would be allowed to relocate to surrounding remnant vegetation.
- Vehicular access would be limited to formed and marked roads and tracks with speed limits restricted to 40km/h within the Quarry Site to limit the potential for vehicle trauma to wildlife.

Weed Management

- All mobile plant and vehicles would be cleaned of soil and weeds before entry to the Quarry Site.
- Weed control programs would be undertaken periodically to manage invasive species.

Soil Management

- Stripped soil would be placed directly onto rehabilitation areas or stockpiled for use in progressive rehabilitation activities to maximise the opportunity for retention of the natural seed stock.

Rehabilitation

- Disturbed areas within the Quarry Site would be revegetated as described in Section 2.13 and **Appendix 10**.
- Species used during rehabilitation operations would be consistent with vegetation community types located within and surrounding the Quarry Site.

Management measures that are described elsewhere in this EIS would also mitigate impacts to biodiversity values include the following.

- Erosion and sediment controls would be implemented to ensure no sediment-laden runoff leaves the Quarry Site.
- Non-production waste would be managed to limit the presence of feral animals and rubbish inadvertently entering areas of remnant vegetation.
- Operational activities would be limited to approved hours of operation.

5.5.5 Assessment of Impacts

5.5.5.1 Impacts to Native Vegetation

A total of 3.77ha of native vegetation would be removed under Quarry (see **Table 5.20**). The removal of native vegetation would be offset in accordance with the Biodiversity Offset Scheme under the BC Act (see Section 2.14). The area that would require clearing has been minimised as much as feasible through the design process.

5.5.5.2 Indirect Impacts

The principal impacts of the Proposal would be contained within the Quarry Site. Disturbance from operational activities would occur (e.g. noise and dust), however, these impacts would be minimised by implementing the management and mitigation measures identified in Section 5.5.4.

5.5.5.3 Serious and Irreversible Impacts

Ecoplanning (2023) identified that two of the fauna species present (or assumed present) within the Quarry Site, the Little Bent-winged Bat and Large Bent-winged Bat, required assessment for potential serious and irreversible impacts (SAII).

In accordance with *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018), breeding habitat is considered present if there is potential breeding habitat and breeding individuals of the target species. Breeding habitat for the Little Bent-winged Bat and Large Bent-winged Bat is defined as caves, scarps, cliffs, rock overhangs and disused mines. Although there are small crevices within sandstone outcrops within the Quarry Site, Ecoplanning (2023) notes that these are likely unsuitable as microbat breeding habitat. Notwithstanding, crevices were inspected with a torch during targeted surveys and no evidence of bat utilisation or occupancy was observed (see **Table 5.21**).

As a result, in accordance with OEH (2018), where a species is present but there is no breeding habitat, impacts to the species are not a potential SAII and standard species credits are generated to offset the impacts.

5.5.5.4 Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the Quarry should be referred to the Commonwealth Department Climate Change, Energy, the Environment and Water (DCCEEW).

A total of four federally-listed threatened species were determined to have the potential to be impacted by the Quarry. Ecoplanning (2023) determined that the Proposal would not have a significant impact on MNES or on the environment in general. A complete listing of species and habitats considered in relation to MNES is provided in Appendix C of Ecoplanning (2023).

5.5.5.5 Koala Habitat Assessment

As noted in Section 3.4, the Quarry is located within a Hornsby Shire, i.e. local government area to which Schedule 2 of the Biodiversity and Conservation SEPP applies and as such, an assessment of Koala habitat is required.

Ecoplanning (2023) recorded a number of trees species, including Black She-oak, Narrow-leaved Apple, Smooth-barked Apple, Yellow Bloodwood, Red Bloodwood, Scribbly Gum, Grey Gum, Narrow-leaved Stringybark and Turpentine within the Quarry Site, all of which are listed as Koala feed tree species under Schedule 2 of this SEPP. However, given that no evidence of the presence

or Koala use of the Quarry Site was identified during targeted surveys, Ecoplanning (2023) determined that the Proposal would have low or no impact on Koala or Koala habitat. A comprehensive Koala Assessment Report is provided within Ecoplanning (2023).

5.5.6 Conclusion

The Proposal would include the removal of 3.77ha of native vegetation, all of which is currently in moderate condition. This vegetation has the potential to provide habitat through foraging areas or breeding habitat. Residual impacts to native vegetation would be offset in accordance with the Biodiversity Offset Scheme (see Section 2.14).

It has been concluded that potential direct (residual) impacts would be suitably offset and potential indirect impacts would be managed through the implementation of measures to avoid or mitigate potential risks. There would be no significant impacts to SAII or MNES as a result of the Proposal.

5.6 Aboriginal and Historic Heritage

5.6.1 Introduction

The SEARs for the Proposal identified Aboriginal and historic heritage as key issues, requiring that the EIS include:

- an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and
- identification of Historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines.

In addition, assessment requirements relating to heritage were received from Heritage NSW. **Appendix 2** presents a summary of where all relevant assessment requirements have been addressed in the EIS.

The following subsections describe the setting of the Quarry and provides a summary of the Aboriginal Cultural Heritage Assessment (ACHA) prepared by Biosis Pty Ltd (Biosis) (Biosis, 2023a) (**Appendix 8**), the Historic Heritage Assessment (Biosis, 2023b) (**Appendix 9**) and describes the management and mitigation measures to be implemented by the Applicant.

5.6.2 Aboriginal Cultural Heritage

5.6.2.1 Ethnohistory

The Quarry Site is located at the border of three Aboriginal linguistic groups; the Darug, Darkinjung, and Guringai (Horton, 1994) and was traditionally inhabited by the Darkinjung people (Tindale, 1940; Tindale 1974). Darkinjung lands roughly extended from the Hawkesbury River northwards to Wollombi and to the southern drainage of the Hunter River. It has been suggested that the Darug tribe inhabited land within the Darkinjung boundaries and were situated at the mouth of the Hawkesbury River, the area in which the Quarry Site is situated (Tindale, 1974; Mathews, 1897). The Darkinjung people were bordered to the north by the Awabakal and Guringai people (Biosis, 2023a).

While information about Aboriginal life within and around the Quarry Site is scarce, some generalisations can be made from available writings and research that discusses Aboriginal Australia more broadly. Aboriginal people moved across the land in small family groups likely subsisting on plant food and the aquatic resources of creeks and rivers. Locally, this would include the resources of the Hawkesbury River. A variety of local terrestrial resources, including possum, kangaroo, snakes, and lizards, would also have been exploited (Atlas of Living Australia, 2022).

In addition, the Wisemans Ferry region would have provided an abundance of natural resources able to be utilised in a number of ways. These include the use of plant fibres twisted into string for the weaving of nets, baskets and fishing lines as well as for personal adornment. Large sheets

of bark would also have provided shelter in the form of gunyahs (Attenbrow, 2002). Animal products would also have been used for tool making and fashioning a myriad of utilitarian and ceremonial items, including the use of tail sinews to manufacture fastening cord and the utilisation of "bone points" as awls or piercers (Attenbrow, 2002).

5.6.2.2 Archaeological Context

Biosis (2023a) notes that the presence of several floral and faunal resources, coupled with the proximity of the Hawkesbury River and several of its tributaries, suggests that the area surrounding the Quarry Site would have provided Aboriginal people with reliable food, water, and raw material resources at all times of year.

The soil landscapes within the Quarry Site are defined on the *Soil Landscapes of Central and Eastern NSW* mapping (DPE, 2020) as Sydney Town and Disturbed Terrain. Biosis (2023a) notes that there is potential for subsurface artefact deposits within areas defined as Sydney Town landscapes, albeit in areas that have not been subject to disturbance such as vegetation clearance. Biosis (2023a) also notes that Aboriginal objects may exist within areas defined as Disturbed Terrain, however any potential deposits would not be *in situ*.

5.6.2.3 Aboriginal Community Involvement

Aboriginal Community Consultation

Relevant stakeholders from the Aboriginal community were identified using a process consistent with the *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010a). Following the completion of Steps 4.1.2 and 4.1.3 of these *Consultation Requirements*, 14 Aboriginal stakeholders registered as groups or individuals that may hold cultural knowledge relevant to determining the Aboriginal cultural values within the Quarry Site. The 14 registered Aboriginal stakeholders were as follows:

- A1 Indigenous Services
- Amanda Hickey Cultural Services
- Confidential Party 1
- Confidential Party 2
- Darug Custodian Aboriginal Corporation
- Didge Ngunawal Clan
- Ginninderra Aboriginal Corporation
- Gunya Aboriginal Cultural Heritage Services Pty Ltd
- Kamilaroi Yankuntjatjara Working Group
- Metropolitan Local Aboriginal Land Council (LALC)
- Murra Bidgee Mullangari Aboriginal Corporation
- Ros Locke
- Tocomwall Pty Ltd
- Yurwang Gundana Consultancy Cultural Heritage Services

The registered Aboriginal parties (RAPs) were sent a letter inviting them to register their interest in a process of community consultation to aid in determining the significance of Aboriginal object(s) and/or places in the vicinity of the Quarry Site. The purpose of the proposed methodology was to explain the Quarry and consultation process in detail, define the roles of the registered Aboriginal parties and the Applicant, identify any protocols for obtaining and using sensitive cultural information and to give the registered Aboriginal parties an opportunity to comment on the proposed assessment method and provide any relevant information on the cultural significance of the Quarry Site.

Feedback provided by RAPs on the survey methodology emphasised the importance that surveys were conducted appropriately, with specific concern regarding potential impacts to burials in sand bodies in the vicinity of the Quarry Site.

The draft ACHA was sent to all RAPs on 1 August 2023. A 28-day review period was provided. One comment was received from Kamilaroi Yankuntjatjara Working Group, who stated that they agreed with and support the recommendations of Biosis (2023a).

Aboriginal Community Involvement in the Assessment

The field survey was undertaken by Biosis on 3 April 2023 and 6 April 2023. One RAP representative, namely Raymond Weatherall of Metropolitan LALC, participated in the fieldwork.

5.6.2.4 Desktop Review and Predictive Model

A desktop search was conducted to identify any potential previously recorded heritage values within and immediately surrounding the Quarry Site. The results of this search are summarised in **Table 5.22**.

Table 5.22
Summary of Database Searches for Aboriginal Cultural Heritage

Database	Date	Search Area / Type	Comment
Aboriginal Heritage Information Management System (AHIMS)	18/11/2022	5x5km radius around site	99 Aboriginal sites were recorded within the search parameters. No sites were identified within the Quarry Site.
National Native Title Claims Search	18/11/2022	NSW	No Native Title Claims cover the Quarry Site.
Source: Biosis (2023a) – Compiled from Appendix 1			

The predictive model developed for the Quarry Site, based on the environmental context and results of the desktop review, indicated that a variety of site types may be located within the Quarry Site. These site types include grinding grooves, modified trees, artefact scatters and rock shelters.

Biosis (2023a) notes that predictive models developed for the region have a tendency to favour permanent watercourses as the locations of complex sites which have been continuously occupied, as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups. Given the

proximity of the Quarry Site to the Hawkesbury River and the presence of various sandstone outcrops, Biosis (2023a) concludes that it is likely that the Quarry Site was extensively utilised by Aboriginal groups.

5.6.3 Historic Heritage

A search of the following databases was undertaken during the preparation of Biosis (2023b).

- The National Heritage List
- The Commonwealth Heritage List
- State Heritage Register
- Heritage and Conservation Register
- Schedule 5 of the *Hornsby Local Environmental Plan 2013*
- Schedule 5 of *The Hills Local Environmental Plan 2019*

One historic heritage listing was identified in the vicinity of the Quarry Site as presented in **Table 5.23**.

Table 5.23
Summary of Historic Heritage Listings

Site Number	Site Name	Address / Property Description	Listing	Significance
A12	Old Northern Road	Old Northern Road between Dural and Wisemans Ferry. Located approximately 750m west of the Quarry Site.	Schedule 5 of *The Hills Local Environmental Plan 2019*	Local
Source: Biosis (2023b) – Modified after Table 1				

5.6.4 Survey and Results

5.6.4.1 Effective Survey Coverage

An archaeological survey of the Quarry Site was undertaken on 3 April 2023 and 6 April 2023 by Biosis and the RAP Raymond Weatherall (Metropolitan LALC – Cultural Sites Offer). Survey methods consisted of a meandering transect across the entirety of the Quarry Site.

Table 5.24 calculates the effective survey coverage within the Quarry Site including a breakdown of the ground surface visibility (GSV) and ground surface exposure (GSE). In summary, given the high density of ground obscuring vegetation and the presence of large rocky debris and sandstone outcropping, GSV and GSE were generally low throughout the survey with calculated averages of approximately 20% and 5%, respectively.

5.6.4.2 Aboriginal Sites

No sites or places of Aboriginal heritage, or potential archaeological deposits, were identified during surveys.

Table 5.24
Effective Survey Coverage within the Quarry Site

Survey Unit	Survey Unit Area (m^2)	Visibility (%)	Exposure (%)	Effective Coverage Area (m^2)	Effective Coverage (%)
Crest	13,988.41	20	15	419.65	3
Ridge	13,231.10	25	10	330.78	2.5
Slope	14,586.96	10	5	72.93	0.5
Valley	2,883.37	10	5	14.42	0.5
Source: Biosis (2023a) – Modified after Appendix 5					

5.6.4.3 Historic Heritage Sites

No historic heritage sites, archaeologically sensitive areas, or potential historical archaeological deposits were identified during surveys.

5.6.5 Management and Mitigation Measures

Given that no sites of heritage significance were identified within the Quarry Site, no specific management or mitigation measures are required. Notwithstanding, as a matter of best practice and in accordance with the recommendations of the RAPs, Biosis (2023a) and Biosis (2023b), the Applicant has committed to implement the following recommended measures throughout the life of the Quarry.

- Continued consultation with the registered Aboriginal parties, as required.
- All Quarry staff and personnel involved in activities with the potential to result in disturbance would be made aware of the legislation protecting sites and places of heritage significance and the associated penalties for disturbance of these sites. Work crews would also undergo cultural heritage induction to ensure they recognise Aboriginal artefacts that may be found within the Quarry Site.
- Should any unanticipated Aboriginal objects be encountered during works associated with the Proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist would provide further recommendations.
- Should unanticipated relics be discovered during works associated with the Quarry Site, work in the vicinity would cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

- If any suspected human remains are discovered during any activity, the following would be conducted:
    1. Immediately cease all work at that location and not further move or disturb the remains.
    2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
    3. Not recommence work at that location unless authorised in writing by Heritage NSW.

5.6.6 Significance Assessment

All Aboriginal objects located in NSW are afforded protection under the *National Parks and Wildlife Act 1974*, but decisions about appropriate management of individual artefacts or sites are usually based on their assessed significance as well as the likely impact in the context of the proposed development. *The Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) requires that a significance assessment be undertaken in accordance with the processes set out in the *Burra Charter* (Australia ICOMOS 1988, 1999). Cultural, scientific, aesthetic, and historical significance are identified as baseline elements of significance assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

Social or Cultural Value

The assessment of cultural or social value relates to the importance of a site or features to the relevant cultural group – in this case the Aboriginal community. Aspects of social value include assessment of sites, items, and landscapes that are traditionally significant or that have contemporary importance to the Aboriginal community. This importance involves both traditional links with specific areas, as well as an overall concern by Aboriginal people for their sites generally and the continued protection of these.

While the Quarry Site does not contain any tangible Aboriginal cultural values, feedback received from the RAPs indicates that the Quarry Site is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites.

Archaeological or Scientific Value

Assessing the archaeological or scientific value of a site involves placing it into a broader regional framework, as well as assessing the site's individual merits in view of current archaeological discourse. This type of value relates to the ability of a site to answer current research questions and is also based on a site's condition, content and representativeness.

No Aboriginal sites, objects or areas of archaeological potential were identified as part of this assessment. The Quarry Site therefore has **low** archaeological significance.

Aesthetic Value

Aesthetic value refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with the social values. It may consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use (Burra Charter 2013).

The Quarry Site has undergone historic disturbance, concentrated in the southern and central areas. However, it is noted that some areas of the Quarry Site have been subjected to lower levels of disturbance, and features vast sandstone outcropping, creeklines and maintains native vegetation. Therefore, the Quarry Site has moderate aesthetic significance.

Historic Value

Historic value refers to the associations of a place with a historically important person, event, phase, or activity in an Aboriginal community.

The Quarry Site is not known to have any historic associations. Therefore, this assessment has concluded that the Quarry Site has low historic significance.

5.6.7 Assessment of Impacts

Biosis (2023a) and Biosis (2023b) contend that there would be no impacts to Aboriginal cultural heritage or historic heritage under the current design of the Quarry. No sites or places of Aboriginal heritage or historic heritage are recorded on any databases or identified during field surveys. Furthermore, no sites are predicted to occur based on the archaeological potential of the Quarry Site.

5.6.8 Conclusion

No Aboriginal cultural or historic heritage sites or places have been identified and the Quarry Site is not considered to be archaeologically or historically significant. The Applicant would implement the management recommendations outlined in Biosis (2023a) and Biosis (2023b) to appropriately manage unknown sites that may be identified.

5.7 Soil and Land Resources

5.7.1 Introduction

The SEARs for the Proposal require the EIS to include an assessment of potential impacts to land resources, including:

- potential impacts on soils and land capability (including erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate);
- potential impacts on landforms (topography), paying particular attention to the long term geotechnical stability of any new landforms; and
- the compatibility of the development with other land uses in the vicinity of the development in accordance with the requirements of Section 12 of *State Environmental Planning Policy (Resources and Energy) 2021*.

In addition, assessment requirements relating to soils and land capability were received from the National Parks and Wildlife Service. **Appendix 2** presents a summary of where all relevant assessment requirements have been addressed in the EIS.

The following subsections present a summary of the land resources within the Quarry Site, identifying specific constraints and opportunities that might affect the proposed design, establishment, operation and post-operative rehabilitation of the Quarry.

5.7.2 Site Soils

Mitchell Landscapes

The Quarry Site comprises the following Mitchell Landscapes.

- Maroota Sands
- Hornsby Plateau

The soils of the Maroota Sands are represented by fluvial quartz sands with minor gravel and white clay along ridgelines associated with the Hawkesbury Sandstone, possessing well developed podsol profiles with limited yellow to grey texture-contrast profiles (Department of Environment and Climate Change, 2002). Within the Quarry Site, the Maroota Sands landscape is coincident with a minor area on the western boundary, immediately adjacent to the Site Access Road.

The soils of the Hornsby Plateau are represented by shallow uniform sands amongst rocky outcrops, deep gradational yellow soils on plateau areas, yellow texture-contrast soils along benches as well as deep uniform sands, organics sands and limited podsols in depositional areas (Department of Environment and Climate Change, 2002). The Hornsby Plateau landscape is coincident with the majority of the Quarry Site.

Australian Soil Classification

The Quarry Site contains Rudosols and Tenosols as defined by the Australian Soil Classification. These soil types are generally shallow, typically formed from materials that are quartz rich and low in clay. Rudosols and Tenosols have very low agricultural potential due to their low chemical fertility, poor structure and low water-holding capacity.

Land and Soil Capability

The Quarry Site comprises approximately 23.33ha of land with approximately 0.28ha of land classified as having a Land and Soil Capability (LSC) of Class 98 (not assessed) and the remainder of the Quarry Site land classified as having a LSC of Class 6. Class 98 (not assessed) land is generally associated with historical excavations or extraction areas. Class 6 is land is considered to have very high limitations, with land uses restricted to low impact activities such as low intensity grazing, forestry and nature conservation. Careful management of limitations is required for cropping and grazing to avoid land and environmental degradation. **Figure 5.8** displays the land and soil capability within and immediately surrounding the Quarry Site.

Acid Sulfate Soils

The Acid Sulfate Soils Risk Map maintained by DPE does not identify any occurrences of acid sulfate soils within the Quarry Site.

5.7.3 Management and Mitigation Measures

The Applicant's approach to soil stripping and stockpiling procedures have been discussed in Section 2.4.5. A summary of these and other soil management procedures and safeguards which would be implemented are provided as follows.

- Clearly mark areas for soil stripping and stockpiling.
- Refrain from stripping or placing soil during wet conditions.
- Strip soil from all areas of disturbance and place within designated rehabilitation areas or store in stockpiles no more than 2m high oriented parallel to the contours.
- Ensure that soil stockpiles are constructed with side slopes of 1:3 (V:H) or less.
- Ensure that the soil stockpile surfaces have a surface that is as 'rough' as possible, in a micro-scale, to assist in surface water runoff control and seed retention and germination.
- Spread seed of a suitable cover crop on all soil stockpiles to facilitate revegetation.
- Signpost soil stockpiles and limit operation of machinery on stockpiles to minimise compaction and further degradation of soil structure.

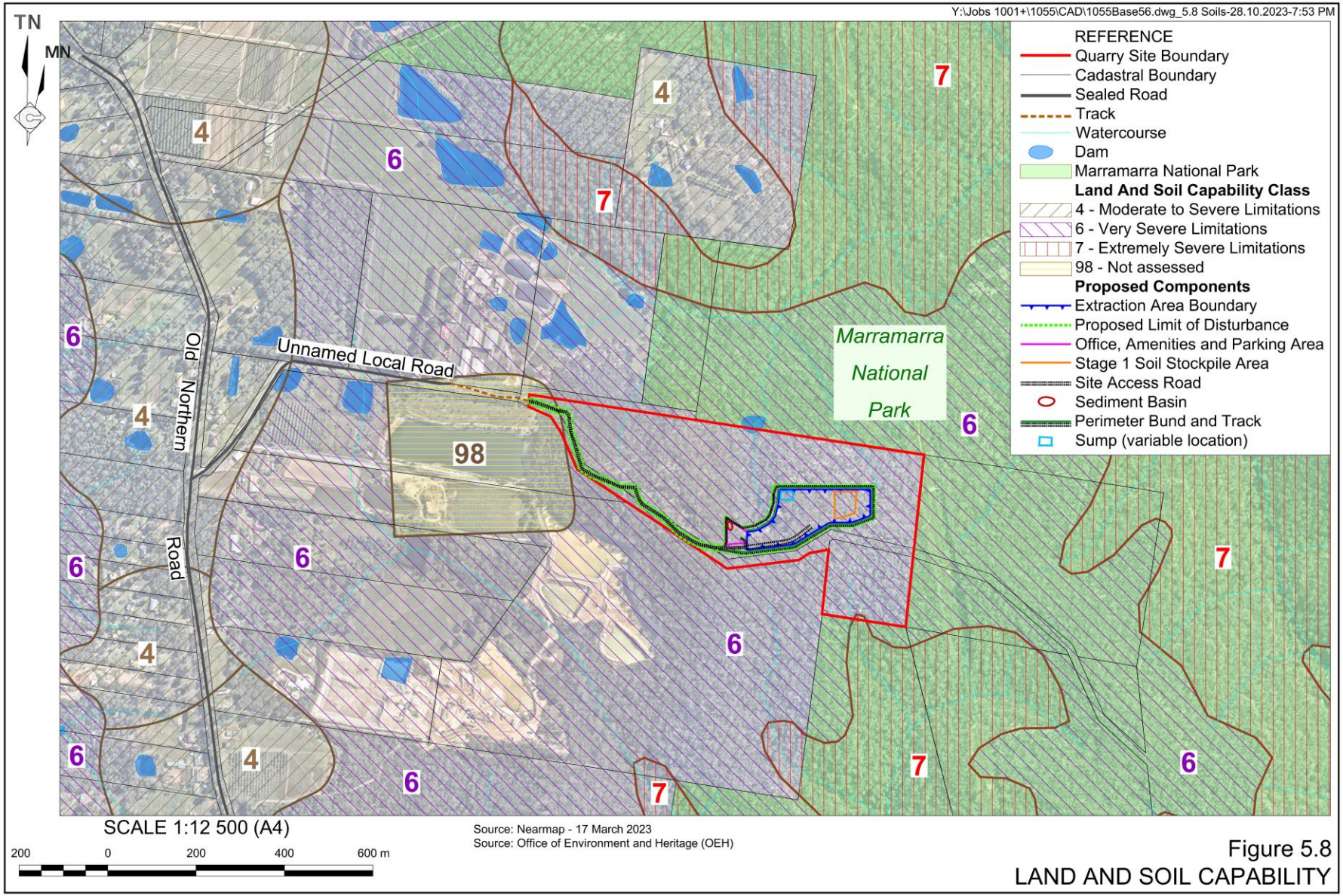


Figure 5.8
LAND AND SOIL CAPABILITY

5.7.4 Impact Assessment

Soils Resources and Land Capability

Adherence to the recommended soil stripping, handling, stockpiling procedures and other management practices, together with appropriate rehabilitation practices, would result in minimal impacts to soils and land and soil capability within the Quarry Site.

It is acknowledged that the Quarry would result in the disturbance of approximately 4.13ha of land, the majority of which is classified as LSC Class 6. Land within the Quarry Site is currently designated for "other minimal use" under the ALUM classification system with the area currently used for passive biodiversity conservation.

As such, it is considered that the Proposal would not result in significant impacts to agriculture.

Salinity

Due to the elevation of the Quarry Site and surrounding area and given the proposed implementation of a closed water management system, it is considered that the Proposal would not contribute to any salinity in the area, nor impact access and quality of groundwater from existing bores.

Erosion and Sediment Control

Section 5.4.3.2 describes the erosion and sediment control measures that would be implemented to manage sediment-laden water within the Quarry Site. It is considered that, with the implementation of these measures, and given the proposed closed water management system, the risk of erosion and off-site sedimentation would be minimal.

Land Uses and Management

As described in Section 4.3.2, the land surrounding the Quarry Site is principally used for extractive industry and large lot, rural residential properties as well as nature conservation. It is considered that the operation within the Quarry Site would be consistent with these land uses, given that the operational areas of the Quarry Site would be utilised for extractive industry and the remainder of the Quarry Site continuing to be maintained for passive biodiversity conservation.

Final Landform

Under the Proposal, the targeted resource would be extracted from the topographic feature which comprises part of the Hawkesbury Sandstone geological unit (as described in Section 2.3.1 and displayed on **Figure 2.2**). The progressive removal of these materials would result in changes to the existing topography and drainage. However, the Quarry would not substantially change the stability of the landform. Backfilling and emplacement of VENM within the completed Extraction Area would be undertaken to form a safe and stable free draining landform. Furthermore, and as described in Section 2.12.4, the Applicant proposes to develop a final landform that provides for passive biodiversity conservation that would blend with the surrounding landscape and remnant vegetation (the final landform is displayed on **Figure 2.7**).

5.8 Visibility

5.8.1 Introduction

The SEARs for the Proposal require the EIS to include an assessment of potential impacts to visual amenity, including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms.

The following subsection describes the visual environment and considers the visibility of the proposed activities throughout the life of the Quarry.

5.8.2 The Existing Visual Landscape

The existing visual landscape surrounding the Quarry Site varies significantly with the following features of the local setting.

- The Quarry Site is located on elevated terrain comprising an east-west orientated ridge, with slopes steeply descending northwards towards the adjacent Marramarra National Park (see **Figure 4.1**).
- The operational areas of the Quarry are largely surrounded by remnant native vegetation which provide an effective visual screen from public vantage points and surrounding residences. **Plate 5.1** presents a typical view of the vegetation surrounding the proposed operational disturbance area.
- The terrain surrounding the Quarry Site is topographically variable and principally comprises land used for extractive industry, general residential purposes, meat processing and nature conservation.
- Local roads are features of the local visual setting. Opportunities to view existing operations from local and State roads are limited. **Plates 5.2** and **5.3** present views from Old Northern Road and the unnamed local road towards the Quarry Site.
- A total of 47 residences are located within a 2km radius from the centre of the Quarry Site (see **Figure 4.4**). There is no visibility of operational areas of the Quarry Site from any surrounding residences.



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Plate 5.1: View taken from north of the Extraction Area towards Marramarra National Park
(Ref: E1055A_010)

Plate 5.2: View taken from Old Northern Road looking east towards the Quarry Site
(Ref: E11055D_014)





Plate 5.3: View taken from the Unnamed Local Road looking east towards the Quarry Site
(Ref: E11055D_016)

5.8.3 Management and Mitigation Measures

The Quarry has been designed to minimise potential impacts to visual amenity with any residual visual impacts to be mitigated through the implementation of a range of operational practices. The design and operational measures that would form part of the Proposal include the following.

- Remnant vegetation surrounding operational areas of the Quarry Site would be maintained to ensure views of Quarry operations from public vantage points and surrounding residences are shielded as far as practicable.
- The perimeter safety bund around the Extraction Area and terminal extraction faces would be progressively rehabilitated throughout the life of the Quarry to assist in providing a long-term acceptable final landform and to obtain the ecological benefits of retaining a range of native species within the final landform. Areas of operational disturbance beyond the extraction area (i.e. the Office, Amenities and Parking Area) would also be rehabilitated following the completion of operations.
- Campaign processing operations would be undertaken within the Extraction Area which would provide a topographic barrier between mobile processing equipment and any potential vantage points beyond the Quarry Site. The Extraction Area would also assist in containing any dust generated during processing. It is noted that product loading and despatch activities would also be restricted to within the Extraction Area.

5.8.4 Changes to Visual Amenity

The Proposal would result in the creation of a void covering approximately 3.4ha in the landscape. This modification to the landform would, however, be screened from vantage points surrounding the Quarry Site by remnant vegetation. The proposed rehabilitation of the Quarry Site has also been developed with an objective to minimise the visual intrusiveness of the operations and progressively generate a final landform which, to the greatest extent practicable, is in sympathy to the surrounding landforms and landscape.

5.8.5 Assessment of Impacts

There is no visibility from surrounding residences of the areas of the Quarry Site which would be disturbed, with the closest residence located approximately 817m to the north and screened by dense vegetation within Marramarra National Park. Residences to the west and south of the Quarry Site would be similarly shielded from views of the Quarry Site through a combination of topography, vegetation and existing infrastructure (i.e. the Camilleri Stockfeed Meat Processing Facility to the west and the PF Formation Pit 5 and Pit 15 Quarry to the south).

The visibility of the Quarry Site from public vantage points is similarly limited by existing vegetation, topography and existing infrastructure. It is considered that remnant vegetation together with the proposed mitigation measures would continue to effectively screen the Quarry Site from local vantage points for the life of the Quarry resulting in minimal impacts to visual amenity.

5.9 Public Safety Hazards

5.9.1 Introduction

The SEARs for the Proposal require the EIS to include an assessment of potential hazards, including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks, and the transport, storage, handling and use of any hazardous or dangerous goods.

The following subsections identify potential hazards associated with the Proposal and the management and mitigation measures that would be implemented to reduce any potential impacts.

5.9.2 Bush Fire Hazards

The Rural Fire Service (RFS) mapping tool, accessed on 2 February 2023, identifies the Quarry Site as being within a designated bush fire prone area. Section 4.14 of the EP&A Act details the requirement for developments located within bush fire prone land to conform to the specifications and requirements of the document entitled "*Planning for Bush Fire Protection*" (RFS, 2019).

As an extractive industry, the Proposal would be classified as "Other Development" in accordance with Section 8.3.6 of RFS (2019). As identified in Section 8.1 of RFS (2019), the following conditions must be met in order for the Quarry to comply with RFS (2019).

- Satisfy the objectives identified in Section 5.9.2.1 of this document.
- Consider any issues listed for the specific purpose for the Quarry set out in Chapter 8 of RFS (2019).
- Propose an appropriate combination of bush fire protection measures.

The following bush fire hazard assessment was prepared by RWC in satisfaction of the above conditions.

5.9.2.1 Bush Fire Management Objectives

The objectives of RFS (2019) are to:

- afford occupants of any building adequate protection from exposure to a bush fire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and residents is available;
- provide for ongoing management and maintenance of bush fire protection measures; and
- ensure that utility services are adequate to meet the needs of fire fighters.

It is noted that whilst no permanent buildings would be constructed within the Quarry Site, the above objectives have been considered in relation to the areas which would be most likely to be populated during operations, that is, within the Office, Amenities and Parking Area.

5.9.2.2 Assessment of Bush Fire Hazard

5.9.2.2.1 Hazard Identification and Mitigation Measures

It is recognised that some areas of the Quarry Site will remain vegetated and, therefore, it would be possible for bush fire to spread both within the Quarry Site and adjacent to the Quarry Site if management measures are not adopted to mitigate this hazard.

Various activities that may increase the risk of fire on the Quarry Site and transport route, and the controls proposed to limit the risk posed by these are presented in **Table 5.25**.

Table 5.25
Bushfire Hazard – Activities and Controls

Activity	Possible Ignition Source	Safeguards and/or Controls
Refuelling	Spilt fuel or dry grass ignited by spark.	• Refuelling undertaken within cleared areas of the Quarry Site. • Engines in all vehicles to be turned off during refuelling. • No smoking policy to be enforced in designated areas of the Quarry Site. • Fire extinguishers maintained within all site vehicles and mobile earthmoving equipment.
General Activities	Cigarettes, Rubbish, e.g. glass, metal.	• No smoking policy to be enforced in designated areas of the Quarry Site. • No throwing cigarette butts from product trucks along the Site Access Road. • Focus on housekeeping to be maintained by the Applicant. • Water cart available. • All site vehicles and mobile earthmoving equipment to carry a fire extinguisher.

In terms of potential impacts, the assets considered at risk include employees and the local community. In order to protect these assets, a proposed bush fire management plan would be documented in an *Environmental Management Plan* that would be prepared in consultation with the local RFS. The bush fire management section of the *Environmental Management Plan* would include the following.

- A review of bush fire hazards and identification.
- A summary of controls and management measures including fire response equipment and locations.
- Emergency contact details.
- Training requirements.

More general bush fire management measures to assist in the event of a local bush fire event are as follows.

- All employees would be trained in the proper use of the firefighting equipment on site.
- The 15,000L water cart used for dust suppression would be made available for firefighting purposes in the event of a bush fire.
- A protocol would be developed for restricting work in vegetated areas during high fire danger periods of the bush fire season (in accordance with the hazard category notifications).
- The local RFS would be consulted prior to each bush fire season to discuss the planned controls during the following season, status of access tracks, and equipment availability.
- The local RFS would be consulted regarding any controlled burns planned for asset protection and / or ecological management.
- Emergency and Evacuation Management Procedures would include procedures in the event of a local bush fire originating beyond the Quarry Site.

5.9.2.2.2 Asset Protection Zones

In accordance with Sections 8.3.5 and 8.3.6 of RFS (2019), a minimum Asset Protection Zone (APZ) of 10m would be maintained between any structures within the Office, Amenities and Parking Area and surrounding vegetation. The APZ would be maintained throughout the life of the Quarry to a standard such that the Office, Amenities and Parking Area is considered a safe working environment in which efforts can be undertaken to defend any structures before, during and after the passage of bush fire.

5.9.2.2.3 Assessment of Impacts

With the implementation of the proposed safeguards and controls, it is considered that the bush fire hazard associated with the Quarry would be acceptable and the Quarry would not significantly contribute to raising the risk of bush fires impacting the community, property or environmental assets.

5.9.3 Handling Storage and Disposal of Hydrocarbons

The specific hazard-related impacts that may result as a consequence of the Quarry relate primarily to the handling, storage and disposal of hydrocarbons. In order to minimise the potential for hydrocarbon contamination, the *Environmental Management Plan* which would be prepared should the Proposal receive development consent would incorporate the implementation of the following controls and safeguards.

- Hydrocarbons and hazardous materials would only be purchased from licensed suppliers for the transport of dangerous goods in accordance with *Dangerous Goods (Road and Rail Transport) Act 2008 No 95*.

- A self-bunded trailer or similar would be used to transport diesel to the Quarry Site, as required. No diesel would be stored permanently on site.
- Hydrocarbon waste would be removed from site and disposed of at a licenced waste facility.
- Hydrocarbon spill kits would be appropriately located within the Office, Amenities and Parking Area to ensure spill response and clean up can be carried out immediately following the detection of any spills.
- In the event of a hydrocarbon leak or spill, the Applicant would implement the following spill management procedure.
  - Phase 1 – Source Control: isolate the source of spill or leak and stop the leak either by maintenance or placing the leaking item within or over the fuel/oil storage area.
  - Phase 2 – Recovery: recover as much as possible at the source by pumping free hydrocarbon from the surface and excavating hydrocarbon-contaminated materials. Contaminated materials would be stockpiled on site under cover and on an impermeable surface, e.g. a high-density polyethylene sheet. This material would later be bio-remediated on site and/or transported to an approved waste facility.
  - Phase 3 – Remediation: transport the contaminated material to a facility licensed to accept and treat hydrocarbon contaminated material.
- Spills or leaks of other pollutants would be handled in accordance with the relevant Safety Data Sheet.

It is anticipated that with the proposed hydrocarbon management practices and the controls and safeguards, potential hazards as a result of hydrocarbon and hazardous materials to be used on the Quarry Site would be minimised.

5.10 Social and Economic

5.10.1 Introduction

The SEARs for the Quarry require the EIS to include an assessment of social and economic impacts, including an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the Proposal.

This subsection describes the existing social and economic setting of the Quarry with focus on population, employment, and employment by industry statistics. The potential social and economic costs and benefits associated with the Quarry and the mitigation and management measures that would be implemented by the Applicant along with any residual social and economic impacts are also described.

5.10.2 The Existing Social and Economic Setting

The Quarry Site is situated in the locality of Maroota within the Hornsby LGA. The area surrounding the Quarry Site is best described as rural with land uses principally comprising extractive industry, meat processing, large lot, rural and general residential properties, as well as nature conservation within the adjacent Marramarra National Park. A total of 46 residences are located within a 2km radius from the centre of the Quarry Site.

Communities surrounding the Quarry Site include the following.

- Adjoining Landowners – includes the owners of properties that adjoin the land owned by the Applicant.
- The Local Community – includes nearby landowners and residents who reside in the Maroota area are considered to have an interest in the Quarry due to their proximity to the Quarry Site.
- The Hornsby LGA Community – both residents and businesses within the Hornsby LGA who are considered to have an interest in the ongoing economic development and amenity of the Hornsby LGA.

The following subsections provide a brief overview of the social and economic setting in the Maroota Suburb and Locality (SAL) and the Hornsby LGA based on data provided in Australian Bureau of Statistics (ABS) 2021 Census data. These data are compared against ABS data for NSW.

5.10.2.1 Population

Table 5.26 presents the population statistics for the Maroota SAL, Hornsby LGA and NSW collected from the 2021 Census data available from the ABS (2021). The Maroota SAL population exhibit a trend common in many non-metropolitan areas, which is a lower proportion of the total population of young adult age and a higher proportion within the adult and retirement

age groups. This trend is commonly considered to be the result of young adults leaving non-metropolitan areas in search of further education or employment opportunities. The Hornsby LGA population closely mirrors the NSW demographic profile.

Table 5.26
Population Statistics (Maroota SAL, Hornsby LGA and NSW)

	Maroota SAL		Hornsby LGA		New South Wales	
Ages	**No.**	**%**	**No.**	**%**	**No.**	**%**
0-4 years	34	5.5	10,293	5.0	468,056	5.8
5-9 years	55	8.9	10,958	6.8	500,810	6.2
10-14 years	36	5.8	9,774	7.2	501,135	6.2
15-19 years	43	6.9	8,346	6.4	457,896	5.7
20-24 years	31	5.0	6,690	5.5	496,185	6.1
25-29 years	28	4.5	7,708	4.4	555,967	6.9
30-34 years	25	4.0	10,607	5.1	586,057	7.3
35-39 years	44	7.1	11,630	7.0	580,185	7.2
40-44 years	40	6.5	11,385	7.7	522,984	6.5
45-49 years	46	7.4	10,620	7.5	516,915	6.4
50-54 years	50	8.1	9,818	7.0	500,027	6.2
55-59 years	38	6.1	8,912	6.5	490,155	6.1
60-64 years	39	6.3	7,600	5.9	471,628	5.8
65-69 years	41	6.6	6,629	5.0	416,493	5.2
70-74 years	32	5.2	5,117	4.4	372,234	4.6
75-79 years	23	3.7	3,785	3.4	268,110	3.3
80-84 years	6	1.0	4,327	2.5	183,409	2.3
85 years +	9	1.5	10,293	2.9	183,895	2.3
Total	**620**	**100**	**151,806**	**100**	**8,072,141**	**100**
Median Age	41		41		39	

Source: Australian Bureau of Statistics – 2021 Census
Please note that the ABS makes small random adjustments to all cell values to protect the confidentiality of data. These adjustments may cause the sum of rows or columns to differ by small amounts from table totals.

5.10.2.2 Employment

Table 5.27 displays employment statistics for the Maroota SAL, Hornsby LGA and NSW collected from the ABS 2021 Census. The data indicate that as at 2021, Maroota SAL (62.8%) has a total labour force participation rate roughly equivalent to Hornsby LGA (63.5%) and higher than the State average for NSW (58.7%).

Table 5.27
Employment Statistics (Maroota SAL, Hornsby LGA and NSW)

	Maroota SAL		Hornsby LGA		NSW	
	No.	%[1]	No.	%[1]	No.	%[1]
Employed						
Full-time[2]	152	50.5	45,247	58.0	2,136,610	55.2
Part-time	101	33.1	22,812	29.2	1,151,660	29.7
Employed, away from work[3]	41	13.4	6,744	8.6	395,888	10.2
Unemployed	4	1.3	3,210	4.1	189,852	4.9
Total	**300**		**78,013**		**3,874,010**	
Labour Force Participation						
In the labour force	305		78,013		3,874,012	
Not in labour force	151		40,843		2,341,417	
Labour force status not stated	30		4,089		386,728	
Total Persons	**486**		**122,945**		**6,602,157**	
Labour force participation	**62.8%**		**63.5%**		**58.7%**	

Note 1: Indicates percentage of total labour force

Note 2: Employed, worked full-time is defined as having worked 35 hours or more in all jobs during the week prior to Census Night.

Note 3: Comprises employed persons who did not work any hours in the week prior to Census Night or did not state their hours of work.

Source: Australian Bureau of Statistics – 2021 Census
Please note that the ABS makes small random adjustments to all cell values to protect the confidentiality of data. These adjustments may cause the sum of rows or columns to differ by small amounts from table totals.

5.10.2.3 Industry of Employment

Table 5.28 displays the contribution of various industries to employment within Maroota SAL and the Hornsby LGA. Within the Maroota SAL, the Construction and the Agriculture, Forestry and Fishing industries contribute the most to employment, accounting for 17.3% and 17.0% of employment, respectively. Within the Hornsby LGA, the Health Care and Social Assistance industry contributes most to employment, accounting for approximately 15.1% of employment with the Professional, Scientific and Technical (13.8%) and Education and Training industries (11.0%) also significant sources of employment. Mining (including extractive industry) accounts for very a low proportion of employment within both Maroota SAL (4.0%) and Hornsby LGA (0.7%).

Table 5.28
Industry Employment Statistics (Maroota SAL, Hornsby LGA and NSW)

Industry	Maroota SAL		Hornsby LGA		NSW	
	No.	%	No.	%	No.	%
Agriculture, Forestry and Fishing	51	17.0	494	0.7	74,728	2.0
Mining	12	4.0	125	0.2	35,406	1.0
Manufacturing	14	4.7	3,317	4.4	201,654	5.5
Electricity, Gas, Water and Waste	0	0.0	550	0.7	35,584	1.0
Construction	52	17.3	4,949	6.6	315,520	8.6
Wholesale Trade	6	2.0	2,835	3.8	103,466	2.8
Retail Trade	19	6.3	5,830	7.8	331,486	9.0
Accommodation and Food	9	3.0	3,114	4.2	227,466	6.2
Transport, Postal and Warehousing	14	4.7	2,173	2.9	169,608	4.6
Information Media and Telecommunications	0	0.0	2,341	3.1	68,068	1.8
Financial and Insurance	5	1.7	5,952	8.0	193,679	5.3
Rental, Hiring and Real Estate	4	1.3	1,373	1.8	62,633	1.7
Professional, Scientific and Technical	12	4.0	10,318	13.8	326,595	8.9
Administrative and Support	13	4.3	2,004	2.7	117,988	3.2
Public Administration and Safety	13	4.3	3,603	4.8	222,909	6.1
Education and Training	22	7.3	8,234	11.0	322,236	8.7
Health Care and Social Assistance	26	8.7	11,319	15.1	529,176	14.4
Arts and Recreation	7	2.3	1,032	1.4	51,789	1.4
Other Services	11	3.7	2,282	3.1	125,380	3.4
Inadequately described/Not stated	10	3.3	2,966	4.0	168,787	4.6
Total	**300**	**100.0**	**78,013**	**100.0**	**3,684,158**	**100.0**

Source: Australian Bureau of Statistics – 2021 Census
Please note that the ABS makes small random adjustments to all cell values to protect the confidentiality of data. These adjustments may cause the sum of rows or columns to differ by small amounts from table totals.

5.10.3 Costs and Benefits of the Quarry

5.10.3.1 Social and Economic Costs

Impacts to the Lifestyle of Surrounding Landowners

The Quarry Site is situated within the northern area of the Hornsby LGA approximately 900m to the east of Old Northern Road. A number of residences are located within the area surrounding the Quarry Site, with the closest being R37 (approximately 817m to the northwest) and R39 (approximately 870m to the north). It is considered that dust and noise generated from on-site activities could potentially impact occupants of surrounding residences (without the implementation of recommended management and mitigation measures) although the presence of screening topography and vegetation as well as the large separation distances between the Quarry Site and the majority of surrounding residences are expected to minimise any potential impacts.

Impacts of Road Transport and Network

As discussed in Section 5.1, laden trucks departing the Quarry Site would utilise the Unnamed Local Road and Old Northern Road as the transport route. In the event that development consent is granted for the Quarry, the Applicant would negotiate a mechanism with Council to ensure that the local roadwork is suitably maintained.

Impacts to Tourism

The Quarry Site is not located near any vantage points and/or areas of touristic significance. The Proposal would not significantly alter topography and would have limited visibility from surrounding residences and roads. Hence, adverse impacts to the local tourism industry are highly unlikely.

5.10.3.2 Social and Economic Benefits

Significance of the Resource

As discussed in Section 2.3.2**,** the Applicant has identified approximately 575,000t of sandstone which it proposes to extract. The extraction of these materials would allow the Applicant to provide a source of sandstone products for use in construction, infrastructure and landscaping projects within the Hornsby LGA and the broader Greater Sydney Region throughout the life of the Quarry. This would positively impact the supply of these sandstone products in the Hornsby LGA and ensure competition in this sector is maintained.

Employment and Economic Stimulus

It is anticipated that the Applicant would spend approximately $1,697,000 on employee wages, machinery, materials and consumables and all other purchases per year to operate the Quarry in the manner outlined in this document. The majority of these purchases would be sourced from the Hornsby LGA and the broader Greater Sydney Region. The flow-on effects from employees living locally would also ensure ongoing contributions to other sectors, such as retail and healthcare, within the Hornsby LGA.

Tax Revenue

The Applicant would pay payroll tax to the State of NSW and income tax to the Federal government. A proportion of income taxes would be effectively received by the State of NSW and the local community through the Federal funding of infrastructure, health and education services.

5.10.4 Management and Mitigation Measures

The following management and mitigation measures would be implemented by the Applicant to ensure social and economic benefits arising from the Proposal are maximised and adverse impacts are minimised.

- Job opportunities at the Quarry would be advertised locally to ensure suitably qualified and experienced candidates from within the Hornsby LGA are considered for any available position.

- Locally based employees and contractors would be encouraged to participate in training and education programs.
- Preference would be given to contractors and suppliers of equipment, services, and consumables located within the Hornsby LGA, wherever practicable.
- Engage with fence line neighbours the local community to provide updates regarding Quarry activities, as required.
- Respond to community complaints in an expeditious and courteous manner.
- Implement the Driver's Code of Conduct to ensure that truck drivers remain aware of their responsibilities while driving.

5.10.5 Impact Assessment

The Proposal would positively impact the Hornsby LGA's economy through employment and the supply of sandstone products for use in construction, infrastructure and landscaping projects. The Quarry would also generate positive flow-on effects from employee wages to other services in the Greater Sydney Region which would lead to positive impacts on the economy within the Hornsby LGA. Sales from the Quarry would also ensure that competition in the supply of sandstone products is maintained.

The Applicant intends to maximise social and economic benefit and minimise any adverse effects from the Quarry by implementing the mitigation and management measures described in Section 5.10.4. Given the anticipated, albeit modest, social and economic benefits of the Proposal, and considering the proposed mitigation and management measures, it is assessed that the Proposal would provide benefits that outweigh any residual impacts.

Section 6

Summary of Environmental Management and Monitoring Measures

PREAMBLE

This section has been compiled to record the full range of environmental management and monitoring measures that would be adopted when developing and operating the Quarry. These measures are designed to effectively manage, mitigate, guide and monitor the operation of the Quarry throughout its entire operational life.

*The measures are presented in tabular form (**Table 6.1**) and record the respective objectives, actions and timing.*

*The actions in **Table 6.1** will be reviewed prior to the determination of the development application for the Proposal to remove any actions that duplicate draft conditions within the draft development consent.*

Table 6.1
Summary of Environmental Measures and Monitoring Measures

Desired Outcome	Action		Timing
1. Traffic and Transport			
Transport operations are undertaken with minimal impact on other road users and residents	1.1	Upgrade the Site Access Road and intersection of the Unnamed Local Road and Site Access Road.	Within 12 months of receipt of development consent
	1.2	Establish appropriate easements along the Site Access Road to ensure ongoing and uninterrupted access to areas to the east of the Quarry Site for NSW Rural Fire Service and any other authorities that may require use of this road.	Ongoing
	1.3	Restrict heavy vehicle movements along Old Northern Road between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.	Ongoing
	1.4	Implement a complaints management system to appropriately respond to any transport-related complaints received.	Ongoing
Ensure drivers are aware of their responsibilities within the Quarry Site and during transportation of raw materials	1.5	Ensure that the Driver's Code of Conduct is: • signed by all drivers employed or contracted by the Applicant; • is included in induction, re-induction and training processes; and • retained with drivers at all times during their travel to and from the Quarry.	Ongoing
2. Air Quality			
Site activities are undertaken without exceeding the nominated air quality criteria	2.1	Install and use misting sprays on the fixed processing plant.	Ongoing
	2.2	Water unsealed roads and unformed tracks and/or surfaces utilised by vehicles.	As required
	2.3	Ensure unsealed internal roads are appropriately constructed and surfaced to limit dust lift-off from transportation activities.	As required
	2.4	Limit traffic speeds on internal unsealed roads and unformed tracks within the Quarry Site to no greater than 40km/h to reduce dust lift-off.	Ongoing
	2.5	Limit traffic speeds on the Quarry Access Road to no greater than 40km/h to reduce dust lift-off.	Ongoing
	2.6	Restrict load size to ensure materials do not extend above truck sidewalls and ensure all trucks transporting select and general fill from the Quarry Site are fully covered.	Ongoing
	2.7	Implement a complaints management system to appropriately respond to any complaints received regarding operations within the Quarry Site.	Ongoing
3. Noise and Vibration			
All activities are undertaken in a manner such that noise emissions do not exceed the relevant criteria nor significantly impact on neighbouring landowners and/or residents	3.1	Strictly adhere to hours of operation.	Ongoing
	3.2	Limit the maximum number of laden truck movements to 3 per hour and 10 per day.	Ongoing
	3.3	Regularly service all equipment used on the Quarry Site to ensure the sound power level of each item remains at or below that nominated for noise modelling purposes.	Ongoing
	3.4	Adopt "quiet" practices when operating equipment, where practicable.	Ongoing

Table 6.1 (Cont'd)
Summary of Environmental Measures and Monitoring Measures

Desired Outcome	Action		Timing
4. Water Resources			
Separate clean water and sediment-laden water catchments	4.1	Ensure that the sediment basin (SB1) is constructed to minimum design requirements.	Prior to disturbance of the Office, Amenities and part of area footprint.
	4.2	Ensure that dirty water collection drains are constructed to convey sediment-laden runoff from areas of operational disturbance to the sediment basin and Extraction Area, as required.	Prior to disturbance of the Office, Amenities and Parking Area and Extraction Area footprints.
Capture of sediment-laden water flows from Quarry-related disturbance and prevention of uncontrolled discharge of sediment-laden water from the site	4.3	Maintain the structural integrity and capacity of sediment basin (SB1) to allow adequate volume for settlement and storage of sediments throughout the life of the Quarry.	Ongoing
	4.4	When required, excavate retained sediment from control structures and the sediment basin (SB1), placing removed sediment within the Extraction Area for incorporation in general fill products or for use in rehabilitation.	As required
Manage and/or monitor groundwater quality and levels.	4.5	Ensure that a groundwater monitoring program is developed and implemented to monitor water levels.	Ongoing
Prevent impacts of hydrocarbon spills on water resources	4.6	Ensure that all chemicals and hydrocarbons are stored in accordance with the manufacturer's specifications or the relevant Australian Standard.	Ongoing
5. Biodiversity			
Minimise impacts on native flora and fauna	5.1	Survey and clearly mark the proposed limit of disturbance in order to ensure that all remnant vegetation beyond this area is retained.	Prior to any vegetation clearing
	5.2	Undertake pre-clearance surveys under the supervision of a suitable qualified ecologist prior to disturbance where areas of *Darwinia fascicularis* are present.	Prior to any vegetation clearing
	5.3	Construct and maintain a barrier around individuals of *Darwinia fascicularis* adjacent to the Site Access Road to ensure species are not impacted.	Ongoing
Minimise or mitigate unavoidable impacts on native flora and fauna	5.4	Vegetation to be removed in a manner that avoids damage to surrounding vegetation.	Ongoing
	5.5	Adopt a procedure to ensure all trees to be cleared are inspected prior to clearing and encourage any fauna to vacate the area.	Ongoing
	5.6	Relocate felled mature trees to rehabilitation areas or mulch to enhance habitat.	Ongoing
	5.7	Directly transfer stripped soil materials onto rehabilitation areas or stockpile for use in progressive rehabilitation activities.	Ongoing
	5.8	Ensure that all personnel and contractors are inducted and made aware of the legislative consequences of unauthorised clearing.	Ongoing

Table 6.1 (Cont'd)
Summary of Environmental Measures and Monitoring Measures

Desired Outcome		Action	Timing
5. Biodiversity (Cont'd)			
Minimise or mitigate unavoidable impacts on native flora and fauna (Cont'd)	5.9	Ensure fauna displaced as a result of vegetation clearing is allowed to relocate to surrounding vegetation.	Ongoing
	5.10	Confine, where practicable, vehicular access to formed and marked roads and tracks and limit vehicle speeds to 40km/hr within the Quarry Site and on the Quarry Access Road to limit the potential for vehicle trauma to wildlife.	Ongoing
	5.11	Undertake regular weed control programs.	Ongoing and at appropriate time(s) of year.
Undertake rehabilitation of the Quarry Site to provide for long-term conservation of native flora and fauna	5.12	Ensure species used during rehabilitation operations are consistent with vegetation community types located within and surrounding the Quarry Site.	During rehabilitation activities
6. Cultural Heritage			
Minimise the potential for adverse Quarry-related impacts on Aboriginal and non-Aboriginal heritage values.	6.1	Consultation with the registered Aboriginal parties.	As required
	6.2	Include cultural heritage awareness in the site induction and staff training.	Ongoing for all personnel
	6.3	Cease all works in the immediate area in the event that items of cultural heritage significance are discovered within the Quarry Site. Council, Heritage NSW and other relevant parties would be contacted as soon as practical. If human remains are suspected the police will be contacted.	As required
7. Soil and Land Resources			
Prevent excessive soil deterioration during stripping and transportation	7.1	Avoid stripping or replacing soils during extremely wet conditions.	During soil stripping campaigns
Maximise the viability of soil resources for site rehabilitation	7.2	Construct soil stockpiles no more than 2m high with side slopes of 1:3 (V:H) or less and seed and fertilise if natural regeneration is unsuccessful.	During soil stripping campaigns
	7.3	Signpost soil stockpiles to limit the operation of machinery on stockpiles to minimise compaction.	Following each soil stripping campaigns
8. Visibility			
Reduce the impact of the Quarry on the visual amenity from public vantage points.	8.1	Maintain vegetation within and surrounding operational areas of the Quarry Site to shield activities as much as possible.	Ongoing
	8.2	Progressively rehabilitate all final or terminal benches to provide a long-term acceptable final landform.	Ongoing
	8.3	Rehabilitate areas of operational disturbance beyond the extraction areas (i.e. Office, Amenities and Parking Area).	Following completion of operations
	8.4	Confine all product loading and despatch as well as campaign processing operations within the Extraction Area to minimise visual impacts from surrounding residences, vantage points and the public road network.	During operations

Table 6.1 (Cont'd)
Summary of Environmental Measures and Monitoring Measures

Desired Outcome	Action		Timing
9. Public Safety Hazards			
Minimise the risk of fire ignition on the Quarry Site and transport route	9.1	Refuel mobile equipment within cleared areas of the Quarry Site.	Ongoing
	9.2	Ensure engines in all vehicles are turned off during refuelling.	Ongoing
	9.3	Enforce a no smoking policy in designated areas of the Quarry Site.	Ongoing
	9.4	Maintain fire extinguishers within all site vehicles and mobile earthmoving equipment.	Ongoing
	9.5	Enforce that no cigarette butts are thrown from product trucks along the product transport routes.	Ongoing
	9.6	Water cart available (and filled) in readiness of an event.	Ongoing
	9.7	Maintain an APZ of 10m between any structures within the Office, Amenities and Parking Area and surrounding vegetation.	Ongoing
Minimise the potential for hydrocarbon contamination.	9.8	Purchase hydrocarbons and hazardous materials from licensed suppliers for the transport of dangerous goods.	Ongoing
	9.9	Ensure hydrocarbon waste is disposed to a licenced waste facility.	Ongoing
	9.10	Ensure hydrocarbon spill kits are located in the demountable office to ensure spill response and clean up can be carried out immediately following the detection of any spills.	Ongoing
	9.11	Develop and implement a spill management procedure.	Ongoing
10. Social and Economic			
Consider local sources of service and supply contactors	10.1	Source local suppliers and service contractors from within the Hornsby LGA where it is practicable to do so.	Ongoing
Consider employment and training opportunities for locals	10.2	Advertise job opportunities at the Quarry within local newspapers and websites to ensure suitably qualified candidates from within the Hornsby LGA are considered for available positions.	Ongoing
	10.3	Encourage locally based employees and contractors to participate in training and education programs.	Ongoing
Minimise impacts on members of the local community	10.4	Implement a Driver's Code of Conduct to ensure the safety of all road users and communities through which product transport trucks would pass.	Ongoing
	10.5	Implement a complaint management procedure or protocol to ensure that any complaint received is dealt with decisively and appropriately.	Ongoing
	10.6	Engage with fenceline neighbours and the local community to provide updates regarding Quarry activities	As required

Section 7

Evaluation and Justification of the Proposal

PREAMBLE

This section concludes the assessment of the proposed quarry operation at Maroota. The residual impacts associated with the Proposal are evaluated through consideration of the principles of ecologically sustainable development (ESD).

A justification for the Proposal is then provided based on the residual impacts to the biophysical environment, the likely economic and social benefits that would be generated, the consequences of the Quarry not proceeding and an assessment against the objects of the EP&A Act.

7.1 Evaluation Of the Proposal

7.1.1 Residual Environmental Risk and Impacts

The Proposal has been designed to avoid or minimise environmental risks and impacts as much as is considered reasonable and feasible.

Residual impacts associated with extractive industries include the generation of noise, dust and traffic on the surrounding road network. Residual impacts associated with noise and dust would be minimal given the considerable distances between the Quarry Site and the closest residences, and the fact that there is a number of existing quarry operations in the area. It is acknowledged that traffic levels under the Proposal would result in an increase in heavy vehicle movements on the surrounding road network. However, TTPP (2023) has assessed that the level of service on the surrounding road network would remain good.

The Proposal may also result in other negligible adverse impacts principally relating to visual amenity and socio-economic impacts. However, these adverse impacts would be countered by the positive impacts, including economic benefits from the continued operation of the Quarry in the manner proposed.

The outcomes of this assessment indicate that impacts would remain well within the relevant guideline criteria and reasonable community expectations.

7.1.2 Ecologically Sustainable Development

Sustainable practices by industry, all levels of government and the community are recognised to be globally important for future prosperity and well-being. The principles of Ecologically Sustainable Development (ESD) are based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives.

Throughout the planning and design of the Proposal, the Applicant has endeavoured to address each of the sustainable development principles. The following subsections draw together the features of the Proposal that reflect the four principles of sustainable development, namely:

- the precautionary principle;
- the principle of intergenerational equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation, pricing and incentive mechanisms.

7.1.2.1 The Precautionary Principle

Preparation of the EIS has involved comprehensive technical assessment to examine the existing environment, predict possible impacts and recommend controls and mitigation measures in order to ensure that the level of impact is understood and so that the Proposal may be designed to ensure that it satisfies statutory requirements and reasonable community

expectations. This approach has ensured that an appropriate level of research and baseline investigations and environmental evaluation was undertaken during the assessment. The controls, safeguards and mitigation measures presented in the EIS have been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation caused by the proposed Quarry. In doing this, an anticipatory approach was taken to potential impacts, and where data was not available, a predictive assessment was completed using a conservative approach to likely scenarios and impacts.

Examples of where a precautionary approach has been taken include in the assessments of traffic, dust and noise impacts which have considered the potential worst case for operations in presented predicted impacts to ensure that design and operational controls account for this scenario. Overall, the impacts of the operation would be lower than those predicted in the assessments and reflect expected peaks in demand from customers.

7.1.2.2 Intergenerational Equity

Intergenerational equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. This provides for both inter-generational (between generations) and intra-generational (within generations) equity considerations. Equity between generations requires that the non-material wellbeing or "quality of life" of existing and future residents of the local community would be maintained throughout and beyond the life of the Quarry. Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community.

Both elements of social equity are addressed through the design of the Quarry such that the Applicant would continue the significant contribution to the economy within the Hornsby LGA and the broader Region. Consideration of potential impacts to cultural heritage through assessment of potential impacts to Aboriginal heritage and historic heritage has confirmed that the Proposal would not impact the cultural record of the local area.

Finally, rehabilitation of the Quarry Site at closure would provide for use of the land by future generations, namely as a conserved area.

7.1.2.3 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term.

The Biodiversity Development Assessment Report (BDAR) has addressed the potential impacts to the natural environment including for both flora and fauna. In designing the Quarry, the Applicant has minimised the disturbance of native vegetation and re-establishment of areas of native vegetation to ensure these values are maintained, where possible. The implementation of weed eradication programs would further assist in addressing the principle of sustainable development.

7.1.2.4 Improved Valuation and Pricing of Environmental Resources

The issues that form the basis of this principle relate to the acceptance that the "polluter pays", all resources are appropriately valued, cost-effective environmental stewardship is adopted and the adoption of user-pays principles based upon the full life cycle of the costs.

Consideration of this principle is demonstrated through the thorough assessment undertaken for the Quarry and commitment to ongoing management of the Quarry Site to limit residual environmental risks and impacts.

This principle is further demonstrated by the contribution levy that would be paid to the Hornsby Shire Council to assist with the maintenance of public facilities (including roads), as specified in the *Hornsby Shire Council Section 94 Contribution Plan 2010*.

7.2 Justification For the Proposal

7.2.1 Introduction

In assessing whether the development and operation of the Quarry is justified, consideration has been given both to biophysical and socio-economic factors including the predicted residual impacts on the local and wider environment and the potential benefits of the Proposal. This section also considers the consequences of the Proposal not proceeding.

7.2.2 Biophysical Considerations

Traffic and Transport

Transportation of up to 30,000tpa of Quarry products from the Quarry Site, involving a maximum of 3 laden truck movements per hour and 10 laden truck movements per day, would be accommodated on the surrounding road network with acceptable impacts on the capacity, efficiency and safety of the road network. Furthermore, there would be no significant impacts on fire trails as a result of the Proposal.

Air Quality

The results of the air quality assessment undertaken by Northstar (2023) based on consideration of a worst-case operational scenario have concluded that the Quarry is predicted to comply with all impact assessment criteria for annual average concentrations of TSP, $PM_{2.5}$, PM_{10} and deposited dust. The assessment of 24-hour average $PM_{2.5}$ and 24-hour average PM_{10} applying a Level 2 Contemporaneous Assessment has indicated that there would be no additional exceedances of the assessment criteria as a result of the Proposal.

The GHG assessment concluded that average Scope 1 emissions from the Quarry would represent approximately <0.0002% of Australian and <0.0006% of NSW GHG emissions which represents a very minor proportion of global GHG emissions.

Noise and Vibration

Operation of the Quarry in the manner and times proposed is not expected to exceed the criteria adopted for the operational and road traffic noise assessments. Noise impacts are, therefore, not predicted to constrain the Proposal.

Water Resources

It is considered that, with the proposed mitigation the development of a closed water management system, the Quarry would have negligible impacts on surface water and groundwater resources given the proposed management and mitigation measures. Additionally, an assessment has demonstrated that sufficient water would be available for dust suppression and other operational activities throughout the life of the Quarry.

Biodiversity

The Proposal would include the removal of 3.77ha of native vegetation, all of which is in moderate condition. This vegetation has the potential to provide habitat through foraging areas or breeding habitat. Residual impacts to native vegetation would be offset in accordance with the Biodiversity Offset Scheme.

It has been concluded that potential direct (residual) impacts would be suitably offset and potential indirect impacts would be managed through the implementation of measures to avoid or mitigate potential risks. There would be no significant impacts to SAII or MNES as a result of the Proposal.

Cultural

No Aboriginal cultural sites or places have been identified within the Quarry Site and accordingly is not considered to be archaeologically, aesthetically or historically significant. The Applicant would implement the management recommendations outlined in Biosis (2023a) and Biosis (2023b) to appropriately manage any sites that may be identified.

Soil and Land Resources

Adherence to the proposed soil stripping, handling, stockpiling procedures and other management practices, together with appropriate rehabilitation practices, would result in minimal impacts to soils and land and soil capability within the Quarry Site.

7.2.3 Economic and Social Considerations

The Proposal would provide for the extraction, processing, and despatch of Quarry products to end markets within the Hornsby LGA and the broader Sydney Region. The need for products produced from the sandstone extracted from the Quarry has been demonstrated through the sale of sandstone products such as sandstone logs from the Maroota area since the 1990s, with the area now firmly established as a key supply of sand and sandstone products for the Sydney metropolitan area.

The ongoing extraction of the targeted resource would ensure that downward pressure is exerted on costs associated with the supply of construction materials that will help to reduce the costs associated with construction and infrastructure projects. The Applicant's estimated annual

expenditure of approximately $1,697,000 would also have a modest, yet positive and direct and indirect economic benefits on local business and service providers. As the Proposal would provide for the ongoing employment of local persons, it would also contribute to the economic growth and resilience of the Hornsby LGA.

The Quarry incorporates a range of management and mitigation measures to ensure that the Quarry operates with only minor residual impacts. The Applicant would maintain an open-door policy regarding complaints, questions and feedback from the local community.

7.2.4 Consequences of not Proceeding with the Proposal

The consequences of not proceeding with the Proposal relate to the loss of employment opportunities. The Proposal would provide for the full time-equivalent employment of up to four personnel with an average of three truck drivers also employed throughout the life of the Quarry. Overall, it is anticipated that the Applicant would spend approximately $1,697,000 each year on wages, machinery servicing, consumables and all other purchases for the operation of the Quarry, the bulk of which would be spent within the Hornsby LGA or broader Sydney Region.

Furthermore, not proceeding with the Proposal would remove access to the resource that would be extracted by the Applicant and used to produce supply a range of sandstone products for the Sydney metropolitan area.

Should the Proposal not proceed, the minor impacts on the local biophysical environment would not eventuate.

It is considered that the benefits of the Proposal therefore outweigh the minor impacts on the environment that would result. The nominated consequences of not proceeding with the Proposal also weigh heavily in favour of the Proposal.

7.2.5 Objects of the Environmental Planning and Assessment Act 1979

Table 7.1 provides a short description of how the Quarry and this EIS have addressed and satisfy the objectives of the EP&A Act.

Table 7.1
Objects of the EP&A Act

Object	EIS Coverage
The objects of this Act are as follows:	
a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	It is considered that the Proposal would provide for the orderly and professional ongoing operation of the Quarry.

Table 7.1 (Cont'd)
Objects of the EP&A Act

Object	EIS Coverage
b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Final decisions on whether the Quarry is acceptable will be made by the Sydney North Planning Panel. However, as described in Section 7.1, the Applicant has undertaken detailed technical assessments to understand residual risks and impacts for the Quarry and to plan to avoid, minimise or mitigate these impacts as much as is reasonable and feasible. The principles of ecological sustainable development have been considered in the development of the Quarry (see Section 7.1.2).
c) to promote the orderly and economic use and development of land,	Development for the purpose of an extractive industry is considered a beneficial use of the land on which the Quarry is located.
d) to promote the delivery and maintenance of affordable housing,	While not directly relatable to the Proposal, it is considered that the provision of sandstone products from the Quarry would exert a downward force on construction material prices which may have a beneficial impact on housing development in the Hornsby LGA.
e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	Consideration of residual impacts to biodiversity values has been undertaken in accordance with the *Biodiversity Conservation Act 2016*. Direct disturbance of native vegetation and potential native fauna habitat has been minimised as much as possible to reduce the need for impacts to biodiversity values.
f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	The Proposal would not reduce the availability of any matters or sites of cultural heritage value for the general public.
g) to promote good design and amenity of the built environment,	The Quarry has been designed to incorporate a range of components, either excavated or constructed, that would achieve a good design and minimise impacts to amenity.
h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	All Quarry infrastructure would be constructed in a proper manner in order to facilitate the health and safety of its occupants.
i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	The EIS addresses assessment requirements including feedback from Council and relevant State government agencies. The Proposal would be determined by the Sydney North Planning Panel.

7.3 Conclusion

The Proposal has been designed to permit the efficient extraction of sandstone resources within the Quarry Site. The Proposal incorporates a range of design and operational mitigation measures to ensure all relevant statutory goals and criteria, environmental objectives and reasonable community expectations are satisfied.

This document and the range of specialist consultant studies undertaken have identified that the Proposal should proceed because it would:

- contribute towards satisfying the demand for Quarry products required for construction, infrastructure and landscaping projects within the Hornsby LGA and the broader Greater Sydney Region;

- have a minimal and manageable impact on the biophysical environment;
- satisfy sustainable development principles; and
- result in a net benefit for the local community, the Hornsby LGA and the State of NSW.

Section 8

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Section 9

Glossary of Technical Terms, Acronyms, Symbols and Units

Technical Terms

ABS - Australian Bureau of Statistics.

acid – substance with a pH less than 7.0; the lower the pH, the higher the corrosive ability of the substance.

acidic – having a pH less than 7.0.

acoustics – the science of sound and vibration.

ADGC – Australian Code for the Transport of Dangerous Goods by Road and Rail.

adverse weather conditions (in respect of noise and dust) – conditions, such as high wind, that assist the movement of dust or propagation of noise away from the mine towards receptors.

AEP – Annual Exceedance Probability. The probability of exceedance of a given discharge within a period of one year.

aesthetic significance – an item/area having visual or sensory appeal, landmark qualities and/or creative or technical excellence.

aggregates – fragments of crushed rock with a defined size.

agricultural resources – the land on which agriculture is dependent and the associated water resources (quality and quantity) that are linked to that land.

AHD - Australian height datum (in metres).

airblast overpressure – a shock wave from the blast transmitted through the air, normally measured in dB(Linear).

air pollutant - a substance in ambient atmosphere, resulting from the activity of man or from natural processes, causing adverse effects to man and the environment (also called "air contaminant").

air pollution - presence of air pollutants.

air pollution emissions inventory – all information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

air quality criteria – quantitative relationship between a pollutant's dose, concentration, deposition rate or any other air quality-related factors, and the related effects on receptors, e.g. humans, animals, plants, or materials. Air quality criteria serve as the scientific basis for formulating ambient air quality standards or objectives.

algorithm – a mathematical equation devised to solve a particular type of problem.

alkaline – having a pH greater than 7.0.

alkalinity – in water analysis a measure of the carbonates, bicarbonates, hydroxides and occasionally the borates, silicates and phosphates in the water.

alluvial – pertaining to material, such as sand or silt, deposited by running water (e.g. a creek or river).

alluvium – a general term for stream-deposited sediment (sand, silt, gravel, etc.) within stream beds or on flood plains or alluvial fans.

amenity – the desirability of an area.

ANFO – mixture of ammonium nitrate and fuel oil (diesel) used as an explosive.

ANZECC – Australian and New Zealand Environment and Conservation Council.

Applicant – person, organisation or company proposing to carry out an activity / seeking development consent (i.e. Argent (Kempfield) Pty Ltd.

approx. – approximately.

aquatic – pertaining to water.

aquatic – living in or on water, or concerning water.

aquifer – rock or sediment capable of holding and transmitting groundwater.

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past.

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

AS – Australian Standard.

atmospheric stability – a measure of turbulence which determines the rate at which the effluent is dispersed as it is transported by the wind.

attenuation – reduction in sound pressure levels between two locations.

Average Recurrence Interval (ARI) - statistical period in years for a design storm event.

background – the conditions (e.g. noise levels, bird populations) already present in an area before the commencement of a specific activity (e.g. a mining operation).

background level – the concentration (deposition) level of a pollutant which must be added to the concentration (deposition) level of the modelled sources in order to obtain a total.

background dust level – dust level in the absence of mining and processing activities.

background noise level – noise level in the absence of mining and processing activity.

background noise levels – the level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (e.g. sound from a particular noise source; or sound generated for test purposes).

biodiversity – the full range of living things and the ecosystem in which they live.

biological diversity/biodiversity – a concept encompassing the diversity of indigenous species and communities occurring in a given region; biological diversity includes genetic diversity, which is the diversity of genes and genotypes within each species; species diversity, which is the variety of living species; and ecosystem diversity which is the diversity of the different types of communities formed by living organisms and the relations between them.

blasting – the operation of breaking rock by means of explosives.

bore – a well, usually of less than 20cm diameter, sunk into the ground and from which water is pumped.

buffer – a physical barrier / structure or width of land that encloses, partially encloses, or defines a particular environment. A buffer serves to minimise the impacts of non-desirable external influences on the adjoining environment.

bulldozer – an item of tracked mobile earth moving equipment fitted with a front blade and with rear rippers used for pushing and ripping soil and rock.

catch drains – drains used to intercept and redirect runoff.

catchment – the entire land area from which water (e.g. rainfall) drains to a specific water course or waterbody.

catchment area – the area determined by topographic features within which rainfall will contribute to runoff at a particular point.

community – a combination of plants that are dependent on their environment and influence one another and modify their own environment. They form together, with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region.

concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

concrete products – products manufactured primarily from Portland Cement concrete, these include bricks, blocks, pavers, pipes and box culverts and other precast concrete sections.

cone crusher – a type of crusher for reducing rock fragment size by means of appropriately positioned and spaced rotating or oscillating cones.

conservation – the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations, while maintaining its potential to meet the needs as aspirations of future generations.

contaminant – a chemical compound or element which has been introduced as a result of human activity. It is noted, however, that some chemical compounds and elements also occur naturally in water and sediments.

crusher – that part of an ore-processing plant where the ore is mechanically crushed into smaller pieces.

crushing – the mechanical process of reducing rock size usually by pressure or impact.

culvert – large pipe or channel carrying water underneath a structure (e.g. a road or railway track) or underneath the ground.

cumulative – increasing by successive additions.

day time period – the period from 7:00am to 6:00pm Monday to Saturday and 8:00am on Sundays and Public Holidays (where relating to noise).

dB – decibel, unit used to express sound intensity.

dB(A) - unit of measurement of human appreciation of noise level.

dB(A) – decibels, A-weighted scale; unit used for most measurements of environmental noise; the scale is based upon typical responses of the human ear to sounds of different frequencies.

decibel - unit expressing difference in power between acoustic signals.

density – 1. The mass of a substance (e.g. sediment) divided by its volume; water has a density of exactly 1 kilogram per litre; gold has a density of 19.3 kilograms per cubic metre. 2. The coverage of vegetation (e.g. trees) per unit of distance (along a linear transect) or unit of area (in an area transect).

development application – an application to the local council for approval of an activity deemed to require an approval prior to commencement.

Devonian - a period of geological time from 395 to 345 million years before present.

dispersibility – a characteristic of soils relating to their structural breakdown in water into individual particles.

dispersion/diffusion – a mixing process in which air motions mix a pollutant plume over an ever increasing volume, thereby diluting the concentration of the pollutant in the ambient air.

dispersion model – a set of mathematical equations relating to the release of air pollutant to the corresponding concentrations in the ambient atmosphere or deposition on the surface.

dispersion parameters – the parameters which describe the growth of the dimensions of a Gaussian plume as a function of travel distance of travel time. The dispersion parameters are classified according to diffusion turbulence conditions in the atmospheric boundary layer on the dispersion.

disseminated – spread widely, diffused.

drilling – the action of boring holes (usually less than 30cm in diameter and up to several kilometres deep) into the ground, typically to establish a water bore or to investigate the geology found at depth.

dust – particles of mostly mineral origin generated by erosion of surfaces and the mining and handling of materials.

dust concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

dust deposition – dust particles that settle out from the air – measured in grams per square metre per unit month (g/m^2/month).

ecology – the relationship between living things and their environment.

ecologically sustainable development (ESD) – using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future can be increased.

ecosystem – the totality of biological processes and interactions within a specified physical environment.

emission – a discharge of a substance (e.g. dust) into the environment.

emission factor – an expression for the rate at which a pollutant is generated as a result of some activity, divided by the level of that activity.

emissions inventory – an information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

environment – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists.

Environmental Impact Statement (EIS) – a formal description of a project and an assessment of its likely impact on the physical, social and economic environment. It includes an evaluation of alternatives and an overall justification of the project. The EIS is used as a vehicle to facilitate public comment and as the basis for analysing the project with respect to granting approval under relevant legislation.

EPA – Environment Protection Authority – the successor to the SPCC.

EP&A Act – Environmental Planning and Assessment Act 1979.

ephemeral – lasting only a short time.

ephemeral – not permanent, e.g. a stream that flows only seasonally or after rainfall or a lake that periodically dries out.

ephemeral stream – a water course that flows intermittently.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

evening period – the period from 6:00pm to 10:00pm (when relating to noise).

excavate – to dig into natural material or fill using an excavator or other machinery.

excavator – item of earth moving equipment fitted with a bucket on an articulated boom and used for digging material from a face in front of, or below the machine. An excavator would be used around the perimeter of the lakes.

exceedance probability – statistical probability that a given value will be exceeded by sample values.

existing air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates or air pollutants – also expressed as ambient air quality.

exotic – introduced or foreign, not native.

extraction – a term synonymous with quarrying.

face – sub-vertical quarry feature generally forming limits of benches.

fauna – a general term for animals (birds, reptiles, marsupials, fish etc.) particularly in a defined area or over a defined time period.

fines – material such as clay or silt sized particles.

flora – a general term for plant, particularly those found in a defined area or characteristic of a defined time period.

fluvial – pertaining to or produced by a river.

formation – a large stratigraphic sequence of rock beds (sandstone, shale, limestone, etc.) generally deposited over a distinct geological period (e.g. during a glacial period).

fragmentation – the extent to which rock is broken into small pieces by primary blasting.

front-end loader – machine used to lift and place soil, earth, rocks, etc. on a construction site.

Geographic Information System (GIS) - computer technology that can store, manipulate and display information in a spatial context.

geological time – the time periods over which geological processes such as sedimentation or erosion occur (generally from tens of thousands to hundreds of millions of years).

gradient – rate of change of a given variable (such as temperature or elevation) with distance.

Greenhouse effect – the heating of the earth's surface because outgoing long-wavelength radiation from the earth is absorbed and re-emitted by the carbon dioxide and water vapour in the lower atmosphere and eventually returns to the surface.

ground vibration – oscillatory motion of the ground caused by the passage of seismic waves originating from a blast.

groundwater – all waters occurring below the land surface; the upper surface of the soils saturated by groundwater in any particular area is called the water table.

groundwater dependent ecosystems – ecosystems that use groundwater as part of survival, and can potentially include wetlands, vegetation, springs, base flows, cave ecosystems, river pools and hanging swamps.

habitat – the place where an organism normally lives; habitats can be described by their floristic and physical characteristics.

heavy vehicle – a motor vehicle or trailer that has a gross vehicle mass greater than 4.5 tonnes. Also includes motor vehicles with seats for more than 12 adults.

heritage – the things of value which are inherited.

heritage significance – of aesthetic, historic, scientific, cultural, social, archaeological, natural or aesthetic value for past, present or future generations.

heritage study – a conservation study of an area. The study usually includes historical context report, an inventory of heritage items within the area and recommendations for conserving their significance.

infrastructure – the necessary buildings, roads and equipment associated with a quarrying operation.

inter-generational equity – the principle that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

interbedded – two or more types of sediment rock deposited alternately to build up a sequence.

inversion – generally used in meteorology with respect to an increase of temperature with height in contrast with the usual decrease of temperature with height in the troposphere. An inversion layer is distinguished by its large stability, which limits the turbulence and therefore the dispersion of pollutants.

invertebrates – commonly, animals without a backbone (jellyfish, worms, molluscs, etc.).

jaw crusher – a crusher which uses the pressure applied to the rock between the fixed and moving plate to reduce rock size.

landform – a specific feature of a landscape (such as a hill) or the general shape of the land.

LEP – local environmental plan.

light vehicle – a vehicle that has a gross vehicle mass of 4.5 tonnes or less.

lithology – refers to the general characteristics of sediments.

Local Environmental Plan (LEP) – a plan developed by a council to control development in part or all of their shire or municipality.

long-term – a period of time associated with annual air quality standards. Long-term models usually address pollutant concentrations over several seasons to one year.

mammal – animal of the class mammalia, distinguished by the presence of hair and mammary glands.

maximum instantaneous charge (MIC) – the maximum amount of explosives detonated during each delay during a blast.

metamorphic rock – rock type such as shale changed to rock type such as slate and phylitte by earth forces (heat, pressure, fluids, etc.).

migratory – passing, usually predictably (based on aquatic species), from one region or climate to another, for purposes of feeding, breeding, or other biological purposes.

mitigation measures – measures employed to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions).

mobile equipment – wheeled or tracked self-propelled equipment such as trucks and front-end loaders.

monitoring – the regular measurement of components of the environment to establish environmental standards are being met.

native title – Aboriginal land title which has survived European settlement.

natural – existing in, or formed by, nature (generally excludes anything obviously modified by human beings).

night-time period – the period from 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am on Sundays and Public Holidays (when relating to noise).

overburden – subsoil and decomposed rock overlying the main rock body that is not suitable for use in the final product.

particulate matter – small solid or liquid particles suspended in or falling through the atmosphere - sometimes expressed by the term particulates.

passive – performing a function without electrical or mechanical action or movement (e.g. a jar-and-funnel rain gauge).

perennial – refers to stream which has flow throughout the year.

perimeter safety bund – embankment constructed from soil and/or weathered rock to surround the Project Site or extraction area.

permeability – a material property relating to the ability of the material to transmit water.

pH – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral acid, and 14 is most basic (alkaline).

plant communities – groupings of plants that inhibit the same area.

pollution – the alteration of air, soil, or water as a result of human activities such that it is less suitable for any purpose for which it could be used in its natural state.

population – a group of organisms all of the same species occupying a particular area.

potable – water suitable for human consumption.

precautionary principle – a principle of ESD which states that decisions about any proposed development should be guided by careful management to avoid serious and irreversible damage to the environment.

precipitation – natural water phenomena producing quantities of water measurable by standard methods (e.g. rainfall, snow).

primary crusher – the first crusher through which the rock passes in the processing plant.

privately-owned residence – an occupied dwelling not owned or under an option to purchase by the Applicant or another resource company, or the subject of a purchase or lease agreement with the Applicant or by any other resource company – referred to as receptors when considered with the predicted noise and/or air quality impacts.

proactive – anticipating a situation and reacting to it before it occurs.

processing plant – a group of equipment used to clean and grade sand.

processing screen – the screen used for separate various sizes of material for further crushing or product screening.

product truck – a registered truck used for the delivery of products from the quarry to the customer.

progressive rehabilitation – rehabilitation of mine or disturbed areas as soon as practicable after they are released during the life of the mine.

Quary Site – the area of land which corresponds with the area of application for development consent and containing the Mining Lease Application area.

quantify – to determine the quantity or amount of a component in a substance.

quarry – an open pit from which construction materials are excavated.

Receptor – A privately-owned residence, community facility or enterprise at which noise and/or air quality is predicted as a result of modelling of the Proposal.

rehabilitation – the preparation of a final landform after quarrying and its stabilisation with grasses, trees and shrubs.

residual environmental impacts – impacts from an activity (e.g. mining) that remain after mitigation measures.

revegetated – an area that has been planted with trees, bushes and grasses after being disturbed.

revegetation – replacement of vegetation, principally grasses and legumes on areas disturbed by quarrying activities.

riparian – pertaining to or situated on the bank of a river or creek.

road base – road pavement usually made up of densely graded crushed rock in varying

runoff – that portion of the rainfall falling on a catchment area that flows from the catchment past a specified point.

runoff pond – containment structure for water which runs off the leach heaps.

run-of-mine (ROM) – ore or overburden in condition as loaded from open cut.

rutile – a mineral of composition TiO_2.

saline – water with elevated salt concentrations.

saline seep – a place where saline groundwater has reached the surface.

salinity – the dissolved content of water expressed in terms of milligrams per litre.

salinity – the total content of dissolved solids in groundwater, commonly expressed as parts of dissolved solids per million parts of solution, or milligrams of dissolved solids per litre of solution (mg/L); the significance of salinity depends on the nature as well as the amount of the dissolved solids.

sandstone – general term for sedimentary rock with grain size from 0.063mm to 2mm - grains may be minerals or rock fragments.

satellite imagery – computer-generated information obtained from orbiting satellites produced as photo-like mosaics (e.g. infra-red response, magnetic intensity).

scarify – to stir the soil without altering its form, or disturbing its sequence of layers.

screening – a process which separates crushed rock into various size fractions – this usually involves a mechanical vibration of the rock over a series of decks fitted with steel mesh, steel plate or polyurethane or rubber mats with fixed sized apertures.

secondary crusher – the second crusher from which rock passes to be further reduced in size.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sedimentary rocks – rocks formed from material derived from pre-existing rocks or by chemical precipitation.

sedimentation – process or rate of depositing of sediment.

settling velocity – speed at which particles settle out of a solution.

sight distance – the distance along the road visible to the driver. It is measured along the normal travelled path of a roadway from the driver's location (such as at an intersection) to a specified height above the roadway when the view is unobstructed by traffic.

silica – silicon dioxide (SiO_2).

social capital – the expected collective or economic benefits derived from the preferential treatment and cooperation between individuals and groups.

social cohesion – the bonds and relationships people have with their family, friends and the wider community.

social infrastructure – community facilities, services and networks which help individuals, families, groups and communities meet their social needs, maximise their potential for development and enhance community wellbeing.

source – the place where pollutants are emitted into the atmosphere. Sources may be point, area or line sources. Often the term "source" is used for a whole plant or an installation. In air pollution modelling, the terms "continuous source" and "instantaneous source" are used:

continuous source: source which emits pollution continuously over a time period much larger than the travel time to a point where the concentration is considered. Usually it is assumed that during this time period the emission is constant.

instantaneous source: source which emits pollution over a time period much short than the travel time of the emission to a point where its concentration is considered.

spatial – related to areal extent.

species – a taxonomic grouping of organisms that are able to interbreed with each other but not with members of other species.

specific gravity – the weight of any body or substance considered with regard to the weight of an equal bulk of pure water.

stable – used with respect to the atmospheric boundary layer, when the vertical temperature gradient is greater than the adiabatic lapse rate. Vertical air motions are suppressed. The turbulence intensity is low resulting in poor dispersion conditions.

stakeholder – person, group or organisation or company with an interest in an activity or outcome.

storage capacity – the maximum volume of liquid able to be retained in a container (e.g. a reservoir or lake).

stratigraphy – the succession and age of strata of rock and unconsolidated material.

stream order – defined by the Strahler steam order used to define stream size based upon a hierarchy of tributaries.

- **first order streams** – the smallest streams in a drainage network that have no tributary streams.
- **second order streams** – two first order streams unite to form a second order stream.
- **third order streams** – have second and first order streams as tributaries.
- **fourth, fifth, sixth, etc. orders** – reflect a similar approach to second or third order streams.

As the order of the stream increases, the discharge increases, the gradient decreases and the channel dimensions increase to accommodate discharge.

stripping – removal of vegetation and topsoil.

structure (soil) – the physical texture of the soil arising from the interrelationship between the grain size, composition, and organic nature of a soil.

Study Area – a defined area for the purposes of a specific area of environmental study.

stygofauna – aquatic invertebrates living within the groundwater systems. This includes 'obligate stygofauna' that represent endemic species that relate to particular regions or ecosystems only.

subsoil – the layer of soil lying below the topsoil; usually contains less organic matter and is less fertile.

temperature inversion – an increase in air temperature with height.

terrestrial – of or relating to the land, as distinct from air or water.

tertiary crusher – the third crusher through which rock passes to be reduced in size.

throughput – quantity of material (ore, chemicals, etc.) moving through a system (e.g. an ore processing plant).

topography – landform.

topography – the physical relief and contour of a region.

topsoil – the upper layer of soil, usually containing more organic material and nutrients than the subsoil beneath it.

total suspended particulates (TSP) – the mass of all particulate matter suspended in air.

transect – a line across a study area along which observations are made and changes can be observed (e.g. changes in vegetation).

unconsolidated – loose or soft, not compacted (particularly soil or sediment).

undulation – the gentle rise and fall or wave-like structure of a landscape.

uniform – similar or unvarying.

variability – degree or amount of change.

variable – not constant, subject to change (e.g. temperature, rainfall or population).

variance – statistical measure of the variation within a set of data, equal to the square of the standard deviation.

vegetated – covered with plants.

vehicle movement – a one-way trip.

vibration – oscillating movement.

visual amenity – attractiveness to the eye.

watercourse – stream or river, running water.

weed – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use.

wetland – swamp of damp area of land.

wind direction – the direction from which the wind, averaged over a certain period of time, is blowing.

wind erosion – wearing away of exposed soil, earth, or rock surfaces by the abrasive action of wind-blown particles (e.g. grains of sand).

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

Acronyms, Symbols and Units

~ – approximately.

ºC – degrees Celsius.

µg/g – micrograms per gram.

µg/L – micrograms per litre.

µg/m^3 – micrograms per cubic metre.

µm – micron, one millionth of a metre (one thousandth of a millimetre).

µS/cm – microsiemens per centimetre; a measure of conductivity.

% – percentage.

24-hour air quality standard – value of an air quality variable not to be exceeded when averaged over 24 hours.

72-hour rainstorm – total rainfall recorded over a 72-hour period.

100 year flood limit – predicted extent of a 1 in 100 year flood occurrence.

'000 t – multiples of one thousand tonnes.

< – less than.

≤ – less than or equal to.

> – greater than.

≥ – greater than or equal to.

95% exceedance – a value that is exceeded by 95% of sample values.

ABS – Australian Bureau of Statistics.

AEP – Annual Exceedance Probability.

AHD – Australian Height Data; in metres above mean sea level.

AHIMS – Aboriginal Heritage Information Management System.

ANFO – mixture of ammonium nitrate and fuel oil (diesel) used as an explosive.

ANZECC – Australian and New Zealand Environment and Conservation Council.

ARI – average recurrence interval.

AS – Australian Standard.

BOM – Bureau of Meteorology.

cm – centimetre (unit of measure).

CO_2 – carbon dioxide

dB – decibel, unit used to express sound intensity.

dB(A) – the unit of measurement of sound pressure level heard by the human ear, expressed in "A" scale.

dB(A) – decibels, A-weighted scale; unit used for most measurements of environmental noise; the scale is based upon typical responses of the human ear to sounds of different frequencies.

dB(Linear) – the measurement of sound pressure level in which the amplitudes of the sound signal, though all frequencies of the signal, are treated equally, i.e. not weighted.

DPIE – Department of Planning, Industry and Environment (NSW).

DP – Deposited Plan.

DPI – Department of Primary Industries (NSW)

EIS – Environmental Impact Statement.

EP&A Act – Environmental Planning and Assessment Act 1979 (NSW).

EP&A Regulation – Environmental Assessment and Planning Regulation 2000.

EPA – Environment Protection Authority (NSW).

EPL – Environment Protection Licence.

g – gram (= 0.001 kilogram).

g/m^2/month – grams per square metre per month unit for deposited dust.

GHG – greenhouse gas.

ha – hectare (100 m x 100 m).

kg – kilogram (weight measure).

kL – kilolitre (thousand litre).

km – kilometre (= 1 000 metres).

km^2 – square kilometres.

km/h – kilometres per hour.

L – litre.

LEP – Local Environmental Plan.

L_{A10} – sound level exceeded 10 per cent of the sampling time.

L_{A90} – sound level exceeded 90 per cent of the sampling time.

L_{Aeq} – the L_{Aeq} is the "equal energy" average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures.

$L_{Aeq\ 1\ hour}$ – the "equal energy" average noise level over 60 minutes – used for assessing impacts of motor vehicles.

$L_{Aeq\ T}$ – Sound level of continuous noise which emits the same energy as the fluctuation sound over a given time period (T).

L_{Amax} – the absolute maximum noise level measured in a given time interval.

L_{AN} – the A-weighted sound pressure level exceeded by N% of a given measured period.

LEP – Local Environmental Plan.

LGA – Local Government Area

m – metre.

m AHD – metres Australian Height Datum.

m BGL – metres below ground level.

m^2 – square metre.

m^3 – cubic metre.

mg – milligram (weight unit).

mg/L – milligrams per litre (parts per million).

mg TSS/L – milligrams of total suspended solids per litre.

mg Zn/kg – milligrams of zinc per kilogram.

MIC – Maximum Instantaneous Charge.

ML – megalitre.

mm – millimetre (= 0.001 metres).

pH – measurement indicating whether water or soil is acid or alkaline.

PM_{10} – particulate matter <10μm in diameter.

$PM_{2.5}$ - particulate matter <2.5μm in diameter.

ppm – parts per million.

SEPP – State Environmental Planning Policy.

t – tonnes.

t/m^3 – tonnes per cubic metre.

tpa – tonnes per annum.

tpd – tonnes per day

tph – tonnes per hour.

μg/m^3 – micrograms per cubic metre.

μm – micron (1 micron=0.001 millimetre).

µS/cm – micro seimens per centimetre.

V:H – vertical to horizontal ratio.

WSP – Water Sharing Plan.

Appendices

Appendix 1	Secretary's Environmental Assessment Requirements and Matters Identified for Consideration
Appendix 2	Coverage of Secretary's Environmental Assessment Requirements and Requirements of Consulted Government Agencies
Appendix 3	Road Transport Assessment *prepared by The Transport Planning Partnership Pty Ltd*
Appendix 4	Air Quality Assessment *prepared by Northstar Air Quality Pty Ltd*
Appendix 5	Noise Assessment *prepared by Muller Acoustic Consulting Pty Ltd*
Appendix 6	Sediment Basin Storage Requirement Calculations *prepared by R.W. Corkery & Co. Pty Limited*
Appendix 7	Biodiversity Development Assessment Report *prepared Ecoplanning Pty Ltd*
Appendix 8	Aboriginal Cultural Heritage Assessment *prepared by Biosis Pty Ltd*
Appendix 9	Historic Heritage Assessment *prepared by Biosis Pty Ltd*
Appendix 10	Vegetation Management and Restoration Plan *prepared by R.W. Corkery & Co. Pty Ltd*
Appendix 11	Site Access Road Civil Plans *prepared by Duncan Priestley Civil Engineering Pty Ltd*

Appendix 1

Secretary's Environmental Assessment Requirements and Matters Identified for Consideration

(Total No. of pages including blank pages = 32)

Department of Planning and Environment

Mr Sarkis Elias
Central Civil (NSW) Pty Ltd
Building 4 Suite 3B, 256b New Line Road
Dural, NSW 2158

Via email: info@centralcivilnsw.com.au

2 December 2022

Planning Secretary's Environmental Assessment Requirements Maroota Central Civil Quarry (EAR 1741)

Dear Mr Elias

I refer to your request for the Planning Secretary's Environmental Assessment Requirements (SEARS) for the above development, which is designated development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Please find attached a copy of the SEARs for the Environmental Impact Statement (EIS) for the development. These requirements have been prepared in consultation with relevant government agencies based on the information you provided. The agencies' comments are attached for your information (see **Attachment 2**). Please be advised that Council and Agency comments (Biodiversity Conservation Department and Transport for NSW) are pending and will be issued to you once received by the Department.

In your request for SEARs, you have also indicated that the proposal is classified as integrated development under section 4.46 of the EP&A Act. Please consult with any relevant agencies with respect to licence/approval requirements. If further integrated approvals are required, you must undertake your own consultation with the relevant public authorities and address their requirements in the EIS.

Community consultation must be undertaken during the preparation of the EIS. This process should provide the community with a clear understanding of the proposal and its potential impacts and include active engagement with the community regarding key issues of concern. The development application (DA) for the proposed development must be accompanied by clear evidence of the consent to the lodgement of the DA of all owners of land directly subject to the DA.

Please contact the consent authority at least two weeks before you submit your DA. This will enable the consent authority to:

- confirm the applicable fees; and
- determine the number of copies (hard-copy and digital) of the EIS that will be required for reviewing purposed.

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in additional to any approvals required under NSW legislation and it is your responsibility to contact the Commonwealth Department of Climate Change, Energy, the Environment and Water to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 1111).

You should also contact the Mine Safety branch of the NSW Resources Regulator in regard to matters relating to compliance with the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*.

If you have any enquiries about these requirements, please contact Paul Caruana on (02) 8229 2900 or paul-james.caruana@dpie.nsw.gov.au.

Yours sincerely,

JEvans

Jessie Evans
Director
Resource Assessments
as delegate for the Planning Secretary

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* and Part 8 Division 5 of *the Environmental Planning and Assessment Regulation 2021*.

Designated Development

EAR Number	EAR 1741
Proposal	The Maroota Central Civil Quarry Project would involve: • processing and dispatching up to 30,000 tonnes per annum of sandstone blocks and friable sandstone; • a project life of up to 30 years; • upgrade existing unsealed access tracks to permit access for heavy vehicle; • dispatching 3 laden heavy vehicle movements per day on average, with a maximum of 10; and • a disturbance area of approximately 18.1 hectare.
Location	4773 Old Northern Road, Maroota, Hornsby Shire Council. Lot 1 DP609224 Lot 2 DP609224
Applicant	Sarkis Elias Central Civil (NSW) Pty Ltd
Date of Issue	02/12/2022
Date of Expiry	02/12/2024
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in in Clauses 190, 192 and 193 of Part 8 Division 5 of the *Environmental Planning and Assessment Regulation 2021*. In particular, the EIS must include: • an executive summary. • a comprehensive description of the development, including: - a detailed site description and history of any previous quarrying on the site, including a current survey plan. - identification of the resource, including the amount, type, composition. - the layout of the proposed works and components (including any existing infrastructure that would be used for the development). - an assessment of the potential impacts of the development, as well as any cumulative impacts, including the measures that would be used to minimise, manage or offset these impacts. - a detailed rehabilitation plan for the site. - any likely interactions between the development and any existing/approved developments and land uses in the area, paying particular attention to potential land use conflicts with nearby residential development. - a list of any other approvals that must be obtained before the development may commence. - the permissibility of the development, including identification of the land use zoning of the site. - identification of sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways. • a conclusion justifying why the development should be approved, taking into consideration: – alternatives. – the suitability of the site. – the biophysical, economic and social impacts of the project, having regard to the principles of ecologically sustainable development; and – whether the project is consistent with the objects of the *Environmental Planning and Assessment Act 1979*; and • a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.

Consultation	In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers and any surrounding landowners that may be impacted by the development. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.
Key Issues	The EIS must assess the potential impacts of the proposal at all stages of the development, including the establishment, operation and decommissioning of the development. The EIS must address the following specific issues: • **Noise** – including: - a quantitative assessment of potential construction and operational noise and off-site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy* respectively; - details of reasonable and feasible mitigation measures to minimise noise emissions; and - monitoring and management measures that would minimise impacts. • **Air** – including an assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage. • **Water** – including: - a detailed site water balance and an assessment of any water licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; - an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and - a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts. • **Traffic & Transport** – including: - accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products; - an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State Road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads; - a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development; - evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and - a description of access roads, specifically in relation to nearby Crown roads and fire trails. • **Biodiversity** – if vegetation clearing is occurring, please include: - accurate predictions of any vegetation clearing on site; - a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the *Biodiversity Conservation Act 2016*; and - a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant. • **Heritage** – if there are new areas of disturbance, please include: - an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and - identification of Historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines listed in **Attachment 1**. • **Land Resources**– including an assessment of: - potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate); and

	- an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; and - consideration of the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Section 2.17 of *State Environmental Planning Policy (Resources and Energy) 2021*, including surrounding pastoral lands. • **Waste** – including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams. • **Hazards** – including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, storage, handling and use of any hazardous or dangerous goods. • **Visual** – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms. • **Social & Economic** – an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the project; and • **Rehabilitation** – including: - a detailed description including appropriate figures of the proposed final landform. - a detailed rehabilitation strategy including the measures that would be undertaken throughout the development and during quarry closure, - justification for the proposed final landform, taking into consideration the objectives of any relevant strategic land use plans or policies; and - potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc).
Environmental Planning Instruments	The EIS must take into account all relevant State Government environmental planning instruments, guidelines, policies, and plans. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies and plans that may be relevant to the environmental assessment of this development. During the preparation of the EIS you must also consult the Department's EIS Guideline – Extractive Industries – Quarries. This guideline is available at http://www.planning.nsw.gov.au/~/media/Files/DPE/Guidelines/extractive-industries-quarries-eis-guideline-1996-10.ashx. In addition, the EIS must assess the development against the *Hornsby Local Environmental Plan 2013* and any relevant development control plans/strategies.

ATTACHMENT 1

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

Many of these documents can be found on the following websites:
http://www.planning.nsw.gov.au
http://www.bookshop.nsw.gov.au
http://www.publications.gov.au

Environmental Planning Instruments, Policies, Guidelines & Plans

Environmental Planning Instruments - General	
	State Environmental Planning Policy (Resources and Energy) 2021
	State Environmental Planning Policy (Planning Systems) 2021
	State Environmental Planning Policy (Transport and Infrastructure) 2021
	Hornsby Local Environmental Plan 2013
Risk Assessment	
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
Land	
	State Environmental Planning Policy (Resilience and Hazards) 2021
	Agricultural Land Classification (DPI)
	Rural Land Capability Mapping (OEH)
	Soil and Landscape Issues in Environmental Impact Assessment (NOW)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)
	Guidelines for Consultants Reporting on Contaminated Sites (EPA)
	Agricultural Issues for Extractive Industry Development (DPI)
Water	
Groundwater	NSW Aquifer Interference Policy 2012 (NOW)
	NSW State Groundwater Policy Framework Document (NOW)
	NSW State Groundwater Quality Protection Policy (NOW)
	NSW State Groundwater Quantity Management Policy (NOW)
	Australian Groundwater Modelling Guidelines 2012 (Commonwealth)
	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	Guidelines for the Assessment & Management of Groundwater Contamination (EPA)
	Guidelines for groundwater quality protection in Australia: National Water Quality Management Strategy (Department of Agriculture and Water Resources, 2013)
Surface Water	NSW State Rivers and Estuary Policy (NOW)
	NSW Government Water Quality and River Flow Objectives (EPA)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom) and associated Volume 2E: Mines and Quarries (DECC)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control (EPA)
	Technical Guidelines: Bunding & Spill Management (EPA)
	A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
	NSW Guidelines for Controlled Activities (NOW)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)

Biodiversity	
	Biodiversity Assessment Method (OEH 2020)
	Guidance to assist a decision maker to determine a serious and irreversible impact (DPIE 2019)
	Policy and Guidelines for Aquatic Habitat Management and Fish Conservation (Fisheries, NSW)
	Policy and Guidelines for developments adjoining Department of Environment, Climate Change and Water (DECCW, 2010)
	NSW State Groundwater Dependent Ecosystem Policy (NOW)
	Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW)
Heritage	
	The Burra Charter (The Australia ICOMOS charter for places of cultural significance)
	Guide to investigation, assessing and reporting on Aboriginal cultural heritage in NSW (OEH) 2011
	Archaeological Assessment (1996)
	Assessing Significance for Historical Archaeological Sites and Relics (2009)
	Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH)
	Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (OEH)
	Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH)
	NSW Heritage Manual (OEH)
	Statements of Heritage Impact (OEH)
Noise	
	Approved methods for the measurement and analysis of environmental noise in NSW (EPA, 2022)
	Interim Construction Noise Guidelines (DECC, 2009)
	Noise Policy for Industry (EPA, 2017)
	NSW Road Noise Policy (DECCW, 2011)
	Assessing Vibration: a technical guideline (DEC 2006)
Air	
	POEO (Clean Air) Regulation 2021
	Approved methods for modelling and assessment of air pollutants in NSW (2022)
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA)
	Assessment and management of odour from stationary sources in NSW (DEC 2006)
	National Greenhouse Accounts Factors (Commonwealth)
Transport	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RMS) & relevant Austroads Standards
Hazards	
	State Environmental Planning Policy (Resilience and Hazards) 2021
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
	Planning for Bushfire Protection 2019 (RFS)
Resource	
	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 (JORC)
Waste	
	Waste Classification Guidelines (EPA, 2014)
	Protection of the Environment Operations (Waste) Regulation 2014
	Environmental Guidelines: Solid Waste Landfills, Second edition (EPA, 2016)
	Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes 1999 (EPA)
Rehabilitation	
	Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Strategic Framework for Mine Closure (ANZMEC-MCA)

ATTACHMENT 2

AGENCIES' CORRESPONDENCE

Attachment A

Water Take and Licensing

No.	Assessment Requirement	Relevant Policy/Guideline/Legislation
1	A detailed and consolidated site water balance.	
2	Description of all works/activities that may intercept, extract, use, divert or receive surface water and/or groundwater. This includes the description of any development, activities or structures that will intercept, interfere with or remove groundwater, both temporary and permanent.	NSW Aquifer Interference Policy, section 3 & 5 of the *Water Management Act 2000*, Water Sharing Plans Clause 24 of the *Water Management (General) Regulation 2018* Groundwater Guidelines- https://www.industry.nsw.gov.au/water/licensing-trade/major-projects
3	Details of all water take for the life of the project and post closure where applicable. This is to include water taken directly and indirectly, and the relevant water source where water entitlements are required to account for the water take. If the water is to be taken from an alternative source confirmation should be provided by the supplier that the appropriate volumes can be obtained.	Section 3 & 5 of the *Water Management Act 2000*, Water Sharing Plans Section 2 of the NSW Aquifer Interference Policy provides explanation of water take for aquifer interference activities
4	Details of Water Access Licences (WALs) held to account for any take of water where required, or demonstration that WALs can be obtained prior to take of water occurring. This should include an assessment of the current market depth where water entitlement is required to be purchased. Any exemptions or exclusions to requiring approvals or licenses under the *Water Management Act 2000* should be detailed by the proponent.	Water Sharing Plans Sections 3, 5, 60A & 60I of the *Water Management Act 2000* WAL must nominate a work to satisfy s60D of the *Water Management Act 2000* and this is completed by a dealing application under s71W of the *Water Management Act 2000* Exemptions or exclusions information: ○ Clause 21-23, 34-50, sch.1 and 4 *Water Management Regulation 2018* ○ Sections 4.41 and 5.23 of the *EP&A Act 1979* ○ Water licensing and works approvals exemptions - https://water.dpie.nsw.gov.au/licensing-and-trade/licensing/water-licensing-and-works-approvals-exemptions

Water Impacts

No.	Assessment Requirement	Relevant Policy/Guideline/Legislation
5	A description of groundwater conditions that provides an understanding of groundwater level across the site under a range of wet and dry conditions.	NSW Aquifer Interference Policy Groundwater Guidelines
6	Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, groundwater dependent ecosystems, and ground water levels; including measures proposed to reduce and mitigate these impacts.	*Water Management Act 2000* Part 1, Division 1, Section 5(2d; 4c) & Part 3 Div 2 Sect 97 *Water Management Act 2000* Part 1, Division 1, Section 5(4a;5a; 6a; 7a; 8a)) NSW Aquifer Interference Policy Groundwater Guidelines
7	Proposed surface and groundwater monitoring activities and methodologies.	Groundwater Guidelines NSW Water Quality and River Flow Objectives Australian and New Zealand fresh and marine water quality guidelines (ANZG 2018)

Assessment against Policy and Guidelines

No.	Assessment Requirement	Relevant Policy/Guideline/Legislation
8	Identification and impact assessment of all works/activities located on waterfront land including an assessment against Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	Guidelines for Controlled Activities on Waterfront Land (NOW 2012)
9	Assessment of project against relevant policies and guidelines	Water Sharing Plans, Floodplain Management Plans, NSW Aquifer Interference Policy, Guidelines for Controlled Activities on Waterfront Land (NOW 2012), Groundwater Guidelines

DOC22/980714-3

18 November 2022

Mr Paul-James Caruana
Assessment Officer
Resource Assessment
Department of Planning and Environment

Via paul-james.caruana@dpie.nsw.gov.au

SEARs1741 – Maroota Central Civil (Sandstone) Quarry Project
No Comment on Request for Environmental Assessment Requirements

Dear Mr Caruana

I refer to your request to the NSW Environment Protection Authority (EPA) to provide requirements for the preparation of the Environmental Impact Statement for the proposed Maroota Central Civil (Sandstone) Quarry Project within Lots 1 and 2 DP609224, Old Northern Road, Maroota.

Based on the information provided, the EPA has no comment on this proposal and no further consultation is required. This is because:

- the proposal does not constitute a Scheduled Activity under Schedule 1 of the *Protection of the Environment Operations Act* (1997) (POEO Act) and so, will not require an Environment Protection Licence under this Act.
- the proposal is not being undertaken by or on behalf of a NSW Public Authority, nor are there activities for which the EPA is the appropriate regulatory authority.
- the site is not being regulated by the EPA under the *Contaminated Land Management Act* (1997).

The EPA recommends that you consult with Hornsby Shire Council who will be the appropriate regulatory authority for the proposed development under the POEO Act if approved.

Please contact Heidi Naylor on 66402553 or email environmentprotection.planning@epa.nsw.gov.au if you wish to discuss this matter.

Yours sincerely

MITCHELL BENNETT
Unit Head -Statutory Planning

Phone 131 555
Phone +61 2 9995 5555
(from outside NSW)

TTY 133 677
ABN 43 692 285 758

Locked Bag 5022
Parramatta
NSW 2124 Australia

4 Parramatta Square
12 Darcy St, Parramatta
NSW 2150 Australia

info@epa.nsw.gov.au
www.epa.nsw.gov.au

Your ref: EARs 1741
Our ref: DOC22/1016481

Mr Paul-James Caruana
Assessment Officer, Resource Assessment
Department of Planning and Environment
Level 16, 4 Parramatta Square, 12 Darcy Street
PARRAMATTA NSW 2150

By email: paul-james.caruana@dpie.nsw.gov.au

Dear Mr Caruana

Request for Environmental Assessments Requirements (EARs1741) – Maroota Central Civil (Sandstone) Quarry Project

Thank you for your email dated 7 November 2022 inviting SEARs input from the Heritage Council of NSW on the above proposal.

The proposed project does not affect any known State Heritage Register (SHR) items.

It is recommended a historical archaeological assessment be prepared by a suitably qualified archaeologist in accordance with the guidelines Archaeological Assessment (1996) and Assessing Significance for Historical Archaeological Sites and Relics (2009).

This assessment should identify what relics, if any, are likely to be present, assess their significance and consider the impacts from the proposal on this potential archaeological resource. Where harm is likely to occur, it is recommended that the significance of the relics be considered in determining an appropriate mitigation strategy. If harm cannot be avoided in whole or part, an appropriate Research Design and Excavation Methodology should also be prepared to guide any proposed excavations or salvage programme.

If you have any further questions about this issue, please contact Jodi Cameron, Senior Assessments Officer (Historical Archaeology), Heritage NSW of the Department of Planning and Environment, on 95856498 or at jodi.cameron@environment.nsw.gov.au.

Yours sincerely

'Michael Ellis.

Michael Ellis
Manager Assessments
Heritage NSW
Department of Planning and Environment
As Delegate of the Heritage Council of NSW
28 November 2022

Your ref: EARs 1741
Our ref: DOC22/1020300

Mr Paul Caruana
Assessment Officer
Resource Assessment - DPE Planning
4 Parramatta Square, 12 Darcy St
PARRAMATTA NSW 2150

By email: paul-james.caruana@dpie.nsw.gov.au

Dear Mr Caruana

Thank you for your invitation to suggest input into the Environmental Assessment Requirements (EARs) for the proposed Maroota Central Civil (Sandstone) Quarry, located next to Marramarra National Park on Old Northern Road, Maroota.

I understand this proposal is designated and regionally significant development that will be assessed via an Environmental Impact Statement (EIS).

This letter is a response from the National Parks and Wildlife Service (NPWS), part of the Department of Planning and Environment's Environment and Heritage Group (EHG). We appreciate the opportunity to provide input to the EARs and the extension of time granted for our input. Please note that a separate response will not be provided by the EHG's Biodiversity and Conservation Division.

We have reviewed the document *Background Paper for the Maroota Central Civil Quarry* (prepared by RW Corkery &Co and dated November 2022). We understand that Central Civil (NSW) Pty Ltd (the Applicant) is proposing to:

- extract, process and despatch up to 30,000 tonnes of sandstone logs and friable sandstone per year
- upgrade existing unsealed access tracks to permit heavy vehicle access through the property
- remove vegetation from the site
- stockpile soil on site for future rehabilitation.

In response, we have identified critical matters that should be identified as assessment requirements.

Standard matters in **Attachment A** to this letter relate to biodiversity impacts, sedimentation and surface runoff controls, and traffic and access impacts.

Site-specific matters are listed in **Attachment B**. For this site, a crucial contextual consideration is its location immediately adjacent to Marramarra National Park. Approximately 40% of the project site's boundary is with the park and all watercourses on the project site drain into the park. The EIS must outline the buffers and other safeguards to protect the park from the quarry's operations.

Sedimentation impacts pose a key risk to creek lines in Marramarra National Park. Previous instances of quarry-generated sediment entering Coopers Creek have been recorded in the past year. As a known threat, explicit consideration of surface runoff, commentary around a closed water management system or water quality improvement controls, and remediation efforts of any uncontrolled discharges into park should be included in the EIS.

The EIS must also consider the cumulative impacts of this quarry, given there are other quarries adjacent to the park that are affecting the park's waterways.

The neighbouring section of Marramarra National Park is accessed via Dalgetys Creek Trail which, in part, traverses the project site and extends to the east of the project site boundary. This route must be recognised in the EIS as the only practical route of access to the neighbouring part of Marramarra National Park. It is used by both NPWS and Transgrid. It is not just as an 'existing track' – it is a registered Fire Trail.

Details of recommended guidance documents are provided in **Attachment C**.

If you have any further questions in relation to this matter, please contact Ms Janet Cavanaugh, Senior Project Officer (EIA Advisory) at janet.cavanaugh@environment.nsw.gov.au or on 0419 653 953.

Yours sincerely



Greg Kirby
Manager, North Western Sydney Area
National Parks and Wildlife Service

23 November 2022

Attachment A – Standard Environmental Assessment Requirements

Biodiversity

1. Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) and documented in a Biodiversity Development Assessment Report (BDAR) to accompany the EIS. The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s 6.12) and Biodiversity Conservation Regulation 2017 (cl 6.8).
2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.
3. The BDAR must include details of the measures proposed to address the offset obligation as follows:
   - the total number and classes of biodiversity credits required to be retired for the development
   - the number and classes of like-for-like biodiversity credits proposed to be retired
   - the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules
   - any proposal to fund a biodiversity conservation action
   - any proposal to make a payment to the Biodiversity Conservation Fund.
4. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.
5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s 6.10 of the Biodiversity Conservation Act.
6. The Department now has a template guideline for the production of BDARs titled 'Guidance for the Biodiversity Development Assessment Report Template' – see link in **Attachment C.**

Water and soils

1. The EIS must map the following features relevant to water and soils including:
   a. acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map)
   b. rivers, streams, wetlands, estuaries (as described in s 4.2 of the BAM)
   c. groundwater resources
   d. proposed intake and discharge locations.
2. The EIS must describe background conditions for any water resource likely to be affected by the development, including:
   a. existing surface water and groundwater resources both on and off the site
   b. hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations
   c. Water Quality Objectives (as endorsed by the NSW Government www.environment.nsw.gov.au/ieo/index.htm) – including for groundwater as appropriate – that represent the community's uses and values for the receiving waters, with particular attention to environmentally sensitive areas
   d. indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
3. The EIS must assess the impacts of the development on water quality, including:
   a. the nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved
   b. identification of proposed monitoring of water quality.
4. The EIS must assess the impact of the development on hydrology, including:
   a. water balance including quantity, quality and source
   b. effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas

c. effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems

d. impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches)

e. changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water

f. mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options

g. identification of proposed monitoring of hydrological attributes

h. cumulative impacts when impacts from other proposed or operational projects in the project's vicinity are considered.

Traffic and access

1. The EIS must provide a transport and accessibility impact assessment, which includes
   a. an analysis of the existing trail network, including the road hierarchy and those parties using trails to access off-site locations
   b. analysis of the impacts of the proposed development, including identification of potential access impacts and any cumulative impact from surrounding approved developments.
   c. measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery of any infrastructure improvements in accordance with relevant standards.

2. The EIS must provide a Construction Traffic Management Plan detailing predicted construction vehicle routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.

Attachment B – Project-specific environmental assessment requirements

Biodiversity

1. According to BioNet records, threatened species close to or known from the site include but are not limited to:
   a. One threatened fauna record (Powerful Owl).
   b. Several threatened flora records:
      - *Zieria involucrata* (Endangered)
      - *Tetratheca glandulosa* (Vulnerable)
      - *Darwinia fascicularis* (Endangered population)
      - *Asterolasia elegans* (Endangered)
      - *Acacia bynoeana* (Endangered)
2. The area of Marramarra National Park next to the proposal site forms part of the land declared to be an Asset of Intergenerational Significance under Part 12A of the *National Parks and Wildlife Act 1974* for *Asterolasia elegans* (AIS_E0_009). This warrants additional and specific consideration in the EIS.

Protected areas and their management

1. The EIS must consider the potential impacts to the adjacent Marramarra National Park. Of particular note, the EIS should consider all matters listed in the guidelines 'Developments adjacent to National Parks and Wildlife Service lands' (NPWS 2020).
   a. This consideration must recognise that all watercourses in the project site drain into the park and so should be considered part of the boundary interface with the park.
   b. The risks of sedimentation to the park's creek lines must be considered in detail, and appropriate buffers and safeguards identified. NPWS requests explicit consideration of a closed water management system to prevent discharge into the park's waterways. The EIS should propose reporting, monitoring and remediation triggers in the event of uncontrolled discharges.
   c. The EIS must also recognise that this section of park is accessed via Dalgetys Creek Trail – designated as a Cat 7 Tactical fire trail in the Fire Access Fire Trail Plan. This trail may deviate from its road reserve and traverse part of the development site. The EIS must consider the potential impacts of the proposed development on:
      i. NPWS's ongoing ability to access this section of park to carry out essential feral animal, weed and fire control programs as required under the park's statutory plan of management
      ii. Transgrid's access to their 330 kV powerline easement in the park.
   d. In assessing the potential impacts of noise, the park should be considered equivalent to a 'sensitive receiver'. It should not be considered a buffer for excessive noise during the proposal's operations.

Attachment C – Guidance material

Title	Web address
Relevant legislation	
Biodiversity Conservation Act 2016	https://legislation.nsw.gov.au/view/html/inforce/current/act-2016-063
National Parks and Wildlife Act 1974	https://legislation.nsw.gov.au/view/html/inforce/current/act-1974-080
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	www.legislation.gov.au/Series/C2004A00485
Biodiversity	
Biodiversity Assessment Method (OEH 2020)	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020
Guidance for the Biodiversity Development Assessment Report Template (DPE 2022) (Note: there is a word version of the template also on the webpage)	www.environment.nsw.gov.au/research-and-publications/publications-search/guidance-for-the-biodiversity-development-assessment-report-template
Guidance and criteria to assist a decision maker to determine a serious and irreversible impact (OEH 2017)	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development
Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)	www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
NSW Survey Guide for Threatened Frogs – A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020)	www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method	www.environment.nsw.gov.au/research-and-publications/publications-search/species-credit-threatened-bats-nsw-survey-guide-for-biodiversity-assessment-method
National parks and other NPWS reserves	
List of national parks	www.nationalparks.nsw.gov.au/visit-a-park
Plans of management and statements of management intent	www.environment.nsw.gov.au/Topics/Parks-reserves-and-protected-areas/Park-management/Park-plans-of-management-and-statements-of-management-intent
Developments adjacent to National Parks and Wildlife Service lands (NPWS 2020)	www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands
Revocation, recategorisation and road adjustment policy	www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-policies/revocation-recategorisation-and-road-adjustment
Fire trails	
Fire trail standards (RFS 2017) and Fire trail design, construction and maintenance manual (SCS 2017).	www.rfs.nsw.gov.au/plan-and-prepare/fire-trails

PRE-LODGEMENT MEETING ADVICE

Application No:	PL/30/2023
Proposal:	Pre-Lodgement - Extractive Industry - Maroota Central Civil Quarry
Property Description:	No. 4773 Old Northern Road, Maroota
Date of Meeting:	5 July 2023
Attendees:	Sarkis Elias – Central Civil (NSW)
	Samuel Rosek – R. W. Corkery & Co
	Mitchell Bland – R. W. Corkery & Co
Council Staff:	Madeleine Bayman, Senior Town Planner Development Assessments
	Matthew Miles, Team Co-ordinator Development Assessments

Please note that the following advice is indicative only and the site will be assessed again once a formal development application is lodged with Council. Any advice given may be revoked or further restrictions may be applied. A copy of this document should be included with any relevant applications to Council.

The following information/ matters were discussed at the meeting and are to be addressed as part of any Development Application lodged.

1. PLANNING CONTROLS

The application needs to address the requirements of the following Environmental Planning Instruments and Development Control Plan (DCP):

- Hornsby Local Environmental Plan 2013 (HLEP)
- Environmental Planning and Assessment Act 1979
- State Environmental Planning Policy (Biodiversity and Conservation) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Resources and Energy) 2021
- State Environmental Planning Policy (Transport and Infrastructure) 2021
- Hornsby Development Control Plan 2013 (HDCP)

2. INTEGRATED, DESIGNATED AND REGIONALLY SIGNIFICANT DEVELOPMENT

The application is considered designated development – an 'extractive industry' that would disturb more than 2ha of land.

The application is Regionally Significant Development and will be determined by the Sydney North Planning Panel.

The application constitutes integrated development and requires approval under section 91 (subsection 2) of the Water Management Act 2000. Pursuant to the Environmental Planning and Assessment Regulations 2021. A future development application will be referred to Water NSW for General Terms of Approval.

Should you require further information, please contact the Water NSW on phone: (02) 1800 353 104 and email: water.enquiries@dpi.nsw.gov.au.

3. PERMISSIBILITY

The site is zoned RU1 (Primary Production) and C3 (Environmental Living) under the Hornsby Local Environment Plan 2013. Extractive industries are permissible with development consent in each of these zones, with permissibility in the C3 zone under Clause 2.9(3) of the State Environmental Planning Policy (Resources and Energy) 2021.

It is noted that the site is not located within identified in Schedule 4 of the Resources and Energy SEPP and therefore Section 3.9 of this SEPP does not apply.

4. OPERATIONAL DETAILS

An Operational Plan of Management must be provided to Council for consideration and assessment. The Operational Plan of Management shall include, at minimum:

- An outline of all activities undertaken on site (including the various processes undertaken within the sandstone quarry and details of the various structures and machinery on site);
- Hours of operation, number of staff employed
- The location, time, duration and frequency of daily activities to be undertaken on the site;
- The type, size and quantity of products made, stored or transported;
- Loading and unloading facilities on site;
- Emergency procedures; and
- Complaints procedures.

The Operational Plan of Management must be consistent with the proposed plans and documentation submitted with the development application and incorporate the recommendations of the Acoustic Report.

5. HDCP REQUIREMENTS

The proposal should address the relevant controls within Part 1 General Controls and Part 2 Rural of the HDCP.

Refer to part 2.5 of the HDCP and the DA submission and Post DA submission requirements – A list of the reports required for DA lodgement under this part of the HDCP are listed under section 16 of this advice.

Part 2.5 of the HDCP refers extractive industries, more specifically, setbacks for access roads, transport requirements, water resource management, soil and water management, acoustic environment, air quality, mitigation and monitoring, extraction sequence and rehabilitation. Any variations to these requirements must be well justified and would be considered on its merits.

Any consent would be limited to a period of 20 years from the endorsed date of this consent. Any disturbed areas on the site, must be rehabilitated and completed within this period.

6. WATER AND DRAINAGE

A concept stormwater drainage plan, showing how it is intended to drain the subject site. This drainage pl proposal shall be prepared in accordance with Australian Rainfall and Runoff (1987), Hornsby Shire Council's Civil Works Specification 1999.

In non-urban areas, intensive rural activities should include water management systems designed to achieve water quality that complies with targets specific to aquatic ecosystem protection in south east Australian, lowland east flowing rivers that comply in accordance with *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).*

Development should have appropriate controls to stabilise and retain soil and sediments during the construction phase, designed in accordance with Landcom's Managing Urban Stormwater (2006) also known as The Blue Book and/or Council's water management guidelines.

Groundwater and Surface Water Management Plans must be submitted with a development application detailing how water will be sourced, stored, used, treated and recycled for use.

Requirements as per Water NSW advice provided.

7. TRAFFIC, PARKING AND ACCESS

Council's Development Engineer has provided the following points to consider when preparing the application:

- A survey plan to show the existing road access (location and dimensions) from the end of the existing road (outside of Camilleri's Stockfeed Pty Ltd) to the subject site must be prepared by a registered surveyor.
- This access road is owned by Crown Land and will be required to be upgraded to accommodate B-double heavy vehicles. Longitudinal sections of both sides of the road access should be submitted following Austroads Guidelines for road design.
- Engineering plans prepared by a suitably qualified civil engineer to upgrade the existing and proposed road access and access road within the site.

Traffic and Safety

- A Traffic and Parking Report prepared by a suitably qualified Traffic Engineer will be required. The report is to address, but not be limited to, the following issues:
- There is no parking rate for the Quarry development. Parking provision for the site should be analysed from a first-principal approach with the number of employees to the site and number of truck movement to/from the site.
- Turning path analysis for the largest vehicle to enter/exit the site

- Assessment of pavement impacts of development on the access road (unnamed).
- The existing driveway is used by a significant number of heavy vehicles including 25m long B-doubles. Any improvements to the driveway or other infrastructure to accommodate the B-double vehicles must be undertaken by the applicant/owner of property).
- All car parking must be constructed and operated in accordance with AS/NZS 2890.1:2004 Off-street car parking and AS 2890.2:2002 Off-street commercial vehicle facilities.
- 7. Any proposed landscaping and/or fencing must not restrict sight distance from the driveway to pedestrians and cyclists travelling along the footpath; see Figure 3.3 AS/NZS 2890.1:2004.
- The application will be referred to TfNSW for comment.

8. BIODIVERSITY

The proposed development description provided by the applicant is as follows:

- Existing unsealed access tracks would be upgraded to permit access for heavy vehicles and plant.
- Extraction operations would commence with removal of vegetation and limited quantities of soil and overburden.
- Vegetation would be chipped and removed from site.
- Soil would be stockpiled on site for use during rehabilitation operations. Overburden would be transported from the Project Site and sold as general fill or for further processing to recover contained sand.

A review of the NSW State Vegetation Type Map online resource identifies a number of plant community type (PCTs) as likely to be present, including the following.

- PCT3586 – Sydney Coastal Dry Sclerophyll Forests
- PCT3593 – Sydney Coastal Sandstone Bloodwood Shrub Forest
- PCT3621 – Sydney Hinterland Turpentine-Apple Gully Forest
- PCT3622 – Sydney Hinterland Yellow Bloodwood Woodland
- PCT4127 – Colo Plateau Dwarf Apple Heath-Woodland

Sedimentation impacts pose a key risk to creek lines in Marramarra National Park. Previous instances of quarry-generated sediment entering Coopers Creek have been recorded in the past year. As a known threat, explicit consideration of surface runoff, commentary around a closed water management system or water quality improvement controls, and remediation efforts of any uncontrolled discharges into park should be included in the EIS.

The EIS must also consider the cumulative impacts of this quarry, given there are other quarries adjacent to the site that are affecting local waterways.

Biodiversity Development Assessment Report (BDAR)

A Biodiversity Development Assessment Report (BDAR) will be required to be prepared as the threshold for entry into the NSW Biodiversity Offset Scheme (BOS) under the NSW Biodiversity Conservation Act 2016 (BC Act) will be exceeded.

There is a known local population of threatened Eastern Pygmy Possum (Cercartetus nanus) in the area. Other threatened plant and animal species have been recorded in the locality. According to BioNet records, other threatened species close to or known from the site include but are not limited to:

- Powerful Owl (Ninox strenua)
- Zieria involucrata (Endangered)
- Tetratheca glandulosa (Vulnerable)
- Darwinia fascicularis (Endangered population)
- Asterolasia elegans (Endangered)
- Acacia bynoeana (Endangered)

Detailed targeted flora and fauna surveys during the optimal detection period are required in accordance with the NSW Biodiversity Assessment Methodology.

The BDAR will identify all SAII entities recorded on-site. It will need to consider altering the development footprint to include an appropriate buffer from creeks, watercourse and ephemeral drainage lines, ground water dependent ecosystems and recorded threatened species/ significant habitat features.

Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) and documented in a Biodiversity Development Assessment Report (BDAR) to accompany the EIS.

The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s 6.12) and Biodiversity Conservation Regulation 2017 (cl 6.8).

The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.

The BDAR must include details of the measures proposed to address the offset obligation as follows:

- the total number and classes of biodiversity credits required to be retired for the development
- the number and classes of like-for-like biodiversity credits proposed to be retired
- the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules
- any proposal to fund a biodiversity conservation action
- any proposal to make a payment to the Biodiversity Conservation Fund.

If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.

The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s 6.10 of the Biodiversity Conservation Act.

Hornsby Development Control Plan (HDCP) identifies development controls which apply to all development withing Hornsby LGA. Part 1C.1 identifies the need to protect the environment and biodiversity values. The design of the development should aim to 'avoid, minimise and mitigate' impacts.

9. CONSTRUCTION MANAGEMENT PLAN

A Preliminary Construction Management Plan (PCMP) is required to be prepared by a suitably qualified environmental consultant in consultation with a qualified traffic engineer and submitted to Council under the DA.

The PCMP assists with the protection of the public, the environment, and Council's assets during all stages of construction works and must include the following:

a) *Description of the works*

i. A general description of the scope of works.

ii. Details of the extent of earthworks including quantities of excavated and imported material to be transported to and from the site.

iii. Details of any staging of works.

b) *Construction traffic and management*

i. The anticipated number and frequency of truck movements per day over the duration of the project (i.e., throughout demolition, earthworks, and construction phases) for fill importation and exportation. The number of trucks should correlate to the volume of fill material to be imported to/exported from the site.

ii. The vehicle traffic routes to and from the site, including any queuing locations. The vehicle routes should be identified on a plan attached to the PCMP.

iii. Size and types of construction vehicles to be used for importation and exportation of fill throughout the stages of works.

iv. Access and egress into the site, including any limitation on access for certain types of vehicles (determined via swept path analysis) due to site constraints.

v. Any required road closures/openings, work zones, crane permits, road occupancy licences and traffic control.

vi. Management measures to be implemented to minimise disruption to, and maintain the safety, of all road users.

c) *Pedestrian management*

i. Potential impacts on pedestrian movements. This includes consideration of locations or times where footpaths are heavily trafficked (e.g., school arrival and departure; commuter peaks).

ii. Management measures to be implemented to minimise disruptions to pedestrians and maintain safety.

d) *Car parking*

i. Impacts on on-street parking (e.g., use of work zones, construction access implications).

ii. Details of construction worker parking. Where limited car parking is available on site or nearby, details of alternative transport arrangements must be provided.

e) *Tree management and protection*

i. Trees to be removed and retained on site consistent with other lodged Plans, including tree protection measures.

f) *Stormwater Management*

i. Details of stormwater management and disposal during excavation and construction, consistent with other lodged Plans.

ii. Identification of existing watercourses.

iii. Sediment and erosion control measures.

g) *Noise and Vibration*

i. Expected sources of noise and vibration during demolition, earthworks, and construction at sensitive receiver locations.

ii. Duration of works that are expected to emit higher than average levels of noise and vibration (e.g., rock breaking and rock sawing).

iii. Details of mitigation measures to minimise noise and vibration impacts

h) *Waste Management*

i. Detail the reuse, recycling and disposal methods for all demolition and construction waste on site.

i) *Site plan*

A site plan which identifies the following information at each stage of the development:

i. Existing and proposed buildings

ii. Site boundaries

iii. Extent of proposed earthworks (i.e., excavation and fill importation locations, and cut and fill locations)

iv. Existing trees and vegetation to be removed and retained and tree protection measures (consistent with TPP if required to be submitted as part of the Development Application)

v. Vehicle access and egress

vi. On-site vehicle parking areas

vii. Proposed hard-stand areas for loading and unloading materials, including the location of cranes and concrete pumps

viii. Location of material storage on-site, stockpiles, site sheds, hoardings, waste storage

ix. Location of sediment control measures (consistent with Erosion and Sediment Control plans submitted as part of the Development Application)

x. Potential Work Zone locations

10. WASTE MANAGEMENT

A *Waste Management Plan Section One - Demolition Stage, Section Two - Design Stage, Section Three - Construction Stage* and *Section Four - Use and On-going Management* as applicable, covering the scope of this project is required to be submitted to Council in accordance with the requirements of Clause 1C.2.3 of the HDCP. Information on how to complete the Waste Management Plan is available in the *Waste Minimisation and Management Guide* (also available on Council's website). If the target of 60% waste to reuse or recycling will not be met, then please provide the reasons why this will be the case.

The *Waste Minimisation and Management Guide* (useful for completing the Waste Management Plan) and the Waste Management Plan Pro-forma can also be found on Council's web site at: https://www.hornsby.nsw.gov.au/_resources/documents/property/policies/Waste-Minimisation-and-Management-Guide.pdf

11. ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) prepared by a suitably qualified environmental consultant must be submitted to Council for review. The Plan must consider all stages of works associated with the proposed development and must detail the actions that will be taken to protect the environment for the duration of all works, and all responsible parties ensuring compliance with the Plan. The Plan should include but not be limited to:

- Water quality and soil management, including but not limited to sediment and erosion control measures.
- Air quality management.
- Noise and vibration management, including mitigation measures for rock sawing/rock breaking activities.
- Waste Management.
- Hazardous materials, oils, and chemical management.
- Unexpected finds protocol.

12. ACOUSTIC REPORT

An Acoustic Report must be prepared by a suitably qualified Acoustic Consultant and member of the Association of Australasian Acoustical Consultants (AAAC) and submitted to Council for review. The report must detail any changes to the predicted noise levels emitted from the proposed development *(including approved extraction area, ancillary stone handling shed and site amenities)* and any proposed noise attenuation measures to be implemented so that background levels (L90) are not exceeded by 5dB(A) when measured at any sensitive receiver locations. The report must be prepared in accordance with the NSW Environment Protection Authority's (EPA) Noise Policy for Industry and Draft Construction Noise Guideline.

13. AIR QUALITY ASSESSMENT REPORT

An Air Quality Assessment Report prepared by a suitably qualified environmental consultant is to be submitted to Council, given the proposed development is likely to, or capable of, generating air polluting emissions.

The report must assess the existing ambient air quality of the site and forecasted pollutant emission rates resulting from the proposed development and provide mitigation measures to ameliorate the potential impact of emissions from the site on nearby residences and sensitive receivers. The report must be prepared in accordance with the Environment Protection Authority's (EPA) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017)* and *Technical Framework: Assessment and management of odour from stationary sources in NSW (2006), the Protection of the Environment Operations Act 1997* and associated Regulations.

14. ARBORIGINAL HERITAGE AND ARCHEOLOGICAL RELICS

An Aboriginal Heritage and Archaeological Relic Assessment in accordance with the following guidelines and Heritage NSW advice to identify culturally modified trees; land that contains recorded Aboriginal objects (AHIMS database); or undisturbed land that contains certain landscape features, being land within 200m of waterways, or located within a sand dune system, or located on a ridge top, ridge line or headland, or located within 200m below or above a cliff face, or within 20m of or in a cave, rock shelter, or a cave mouth.

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (2011) by NSW Office of Environment and Heritage at www.environment.nsw.gov.au.
- NPWS Aboriginal Heritage and Information Management System (AHIMS) database at www.environment.nsw.gov.au.

15. DEVELOPMENT CONTRIBUTION

The development would be subject to Section 7.11 development contribution fees. The fees are based off tonnage – refer to Section 4.5 of Hornsby Shire Council Section 7.11 Development Contributions Plan 2020-2030.

16. DA SUBMISSION REQUIREMENTS

Please refer to Council's website and access Council's DA Submission Guideline for further advice regarding the details required for submission at: http://www.hornsby.nsw.gov.au/property/development-applications/lodging-an-application. This will include but is not limited to the below submission requirements:

Submission Requirements	**Notes**
Completed/ Signed Application Form including Owners Consent	Required from landowner. Owners Consent also required from Crown Lands who own the connecting road.
Detailed Cost Report	Required
Integrated Development Water NSW	Required - a referral fee and to the relevant integrated body, (+ $140 administration fee payable to Council) will be required to be paid if the proposal is integrated development under the Act.
Statement of Environmental Effects	Required
Environmental Impact Statement	Required as per SEARs and NPWS advice
Survey	Required
Existing Site Plan/ Demolition Plan	Required
Architectural Plans	Required (Site Plan, Floor Plans, Elevations & Sections) – including details of temporary structures such as offices.
Road/Driveway Engineering Plans	Required for road access upgrade and on-site vehicular/driveway access

Stormwater Concept Plan	Required
Groundwater Impact Assessment Report	Required
Water Management Plan	Required
Soil and Water Management Plan	Required
Plan of Operational Management - Extraction Program Plan	Required
Traffic and Parking Impact Assessment	Required
BCA and Access Report	Required
Acoustic Report	Required
Air Quality Report	Required
Waste Management Plan	Required, refer to HDCP, this addresses demolition, construction and on-going management phase.
Preliminary Construction Management Plan	Required
Environmental Management Plan	Required
Tree Survey	Required
Biodiversity Development Assessment Report	Required – refer to Council advice above and NPWS advice
Aboriginal and Archeological Relics Study	Required
Vegetation Management and Restoration Plan	Required
Rehabilitation Plan	Required

Please note, all DA lodgement is now through the ePlanning Portal. Instructions on how to lodge can be found at: https://www.hornsby.nsw.gov.au/property/build/application.

A fee quote based on the cost of works can be obtained from Council's Clerical Service on 9847 6760.

Officer:	Madeleine Bayman (ph. 9847 6683)
Date:	7 July 2023

Department of Planning, Housing and Infrastructure

File Ref: 24/01805
LOC No: 644986

Elias Sarkis
Building 4
Suite 3B/256B New Line Road
Dural NSW 2158

Friday, 19 April 2024

Dear Elias,

Consent of Owner for lodgement of a Development Application

Reference is made to your application for issue of Owner's Consent from the Department of Planning, Housing and Infrastructure – Crown Lands and Public Spaces (the department) to the making of a Development Application (DA) with Hornsby Shire Council in relation to development adjoining a Crown public road. The proposed development will utilise and upgrade the Crown public road for access.

Property Details:
Crown public road adjoining Lot 1 DP609224.

Description of Application:
Lodgment of a DA for development and operation of the Quarry, including:

- Extraction, processing and dispatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of up to 30,000tpa of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 laden heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

This Landowner's Consent relates to the proposed upgrade works to the site access track which is partially within a Crown road reserve. The existing track to the proposed Extraction Area would be widened to provide the Site Access Road to permit two heavy vehicles to pass within the Quarry Site. The road would have an unsealed surface for its entire length and, together with road side drainage, would have a maximum width of 8m.

Please note Crown Lands provides conditional consent to the lodgement of a development application which includes works within a Crown public road. If at the time of determination, the purchase of the Crown public road to Central Civil (NSW) Pty Ltd has not been completed, a deferred commencement condition must be applied to the consent requiring evidence that the purchase has been completed prior to the consent becoming operative.

After consideration of your application, consent is granted to the lodgement of a DA under the *Environmental Planning and Assessment Act 1979*, and other associated applications required under other legislation, for the proposal described above.

This consent is provided subject to the following:

1. This consent is given without prejudice so that consideration of the proposal may proceed under the *Environmental Planning and Assessment Act 1979*, and any other relevant legislation;

2. This consent does not imply the concurrence of the Minister, or the issue of any necessary lease, licence or other required approval under the *Crown Land Management Act 2016*; and does not prevent the department from making any submission;

3. This consent will expire after a period of 12 months from the date of this letter if not acted upon;

4. The Minister reserves the right to issue landowner's consent for the lodgement of applications for any other development proposals on the subject land concurrent with this landowner's consent;

5. Irrespective of any development consent or any approval given by other public authorities, any work or occupation of Crown land cannot commence without a current tenure from the department authorising such work or occupation.

This letter should be submitted to the relevant consent or approval authority in conjunction with this application and/or any other application.

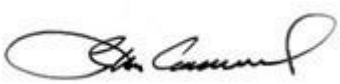
If any modifications are made to the application (whether in the course of assessment, by conditions of consent, or otherwise), it is your responsibility to ensure the modification remains consistent with this landowner's consent.

You are required to forward to the department a copy of any consent or other approval as soon as practical after that consent or approval is received.

This letter does not form part of the Owner's Consent, but it must be submitted to Council with the site layout plans marked 'X' and 'Y' as supporting documentation for the DA as it contains the requirements of the department.

If you require any further information, please contact our Parramatta Office on 1300 886 235.

Yours sincerely,



Glen Camenzuli
Area Manager - Metro
As Delegate of the Minister administering the *Crown Land Management Act 2016*.
Department of Planning, Housing and Infrastructure - Crown Lands and Public Spaces

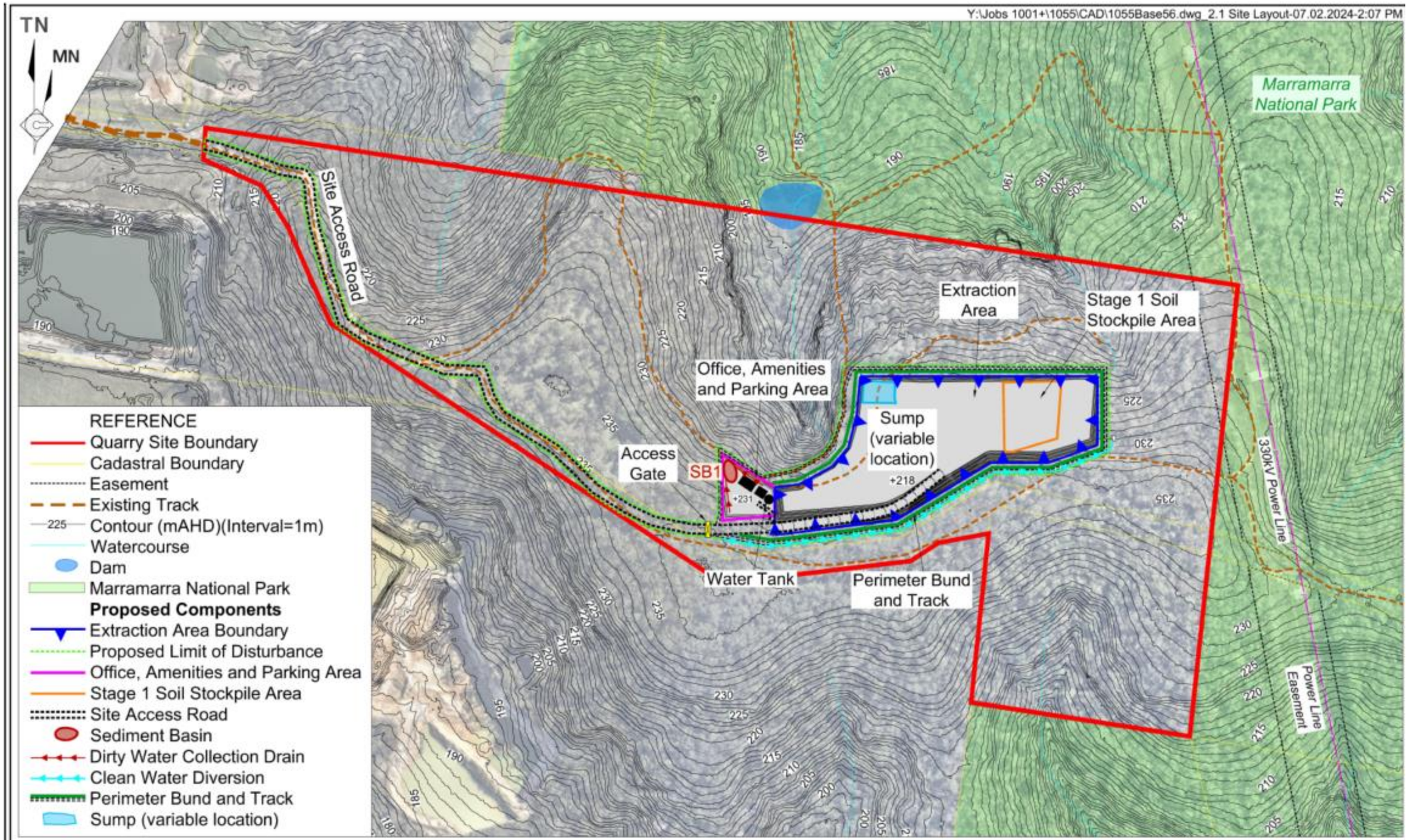


Figure 2.1
QUARRY SITE LAYOUT

Y:\Jobs 1001+\1055\CAD\1055Base56.dwg_1.2 Quarry Site-05.10.2023-5:16 PM

TN
MN

Lot 48
DP752029

Lot 59
DP752029

Lot 137
DP752029

Lot 87
DP752029

Marramarra
National
Park

Unnamed Local Road

Old Northern Road

Lot 63
DP752029

Lot 1
DP609224

Lot 117
DP752029

Lot 2
DP567166

Lot 2
DP609224

Dalgetys Creek Fire Trail

Lot 1
DP567166

Lot 117
DP752029

Lot 3
DP567166

Lot 2
DP510812

SCALE 1:10 000 (A4)

100 0 100 200 300 400 500 m

Cadastral Boundary Source: © NSW Department of Finance and Services
Panorama Avenue Bathurst NSW 2795 www.lpi.nsw.gov.au

REFERENCE

- Quarry Site Boundary
- Cadastral Boundary
- Crown Road Reserve
- Marramarra National Park
- Sealed Road
- Unsealed Track

Figure 1.2
QUARRY SITE AND ACCESS

Appendix 2

Secretary's Environmental Assessment Requirements and Matters Identified for Consideration

(Total No. of pages including blank pages = 34)

Table A2.1
Coverage of Secretary's Environmental Assessment Requirements in EIS

Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
GENERAL REQUIREMENTS	
The EIS must include: • an executive summary.	Summary
• a comprehensive description of the development, including:	1.3.2 and 1.4
– a detailed site description and history of any previous quarrying on the site, including a current survey plan.	
– identification of the resource, including the amount, type, composition.	2.3.2
– the layout of the proposed works and components (including any existing infrastructure that would be used for the development).	2.2
– an assessment of the potential impacts of the development, as well as any cumulative impacts, including the measures that would be used to minimise, manage or offset these impacts.	Section 5
– a detailed rehabilitation plan for the site.	2.13
– any likely interactions between the development and any existing/approved developments and land uses in the area, paying particular attention to potential land use conflicts with nearby residential development.	4.3.2
– a list of any other approvals that must be obtained before the development may commence.	2.1.2
– the permissibility of the development, including identification of the land use zoning of the site.	4.3.2
– identification of sensitive receivers likely to be affected by the development	4.3.1, Table 4.2, Figure 4.4
– using clear maps/plans, including key landform areas, such as conservation areas and waterways.	Noted
• a conclusion justifying why the development should be approved, taking into consideration:	1.5
– alternatives.	1.6
– the suitability of the site.	1.6, 7
– the biophysical, economic and social impacts of the project, having regard to the principles of ecologically sustainable development; and	Sections 5 and 7
– whether the project is consistent with the objects of the Environmental Planning and Assessment Act 1979; and	3.3
• a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.	Declaration
The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	1.8
• The EIS must take into account all relevant State Government environmental planning instruments, guidelines, policies, and plans. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies and plans that may be relevant to the environmental assessment of this development.	Section 3
• During the preparation of the EIS you must also consult the Department's EIS Guideline – Extractive Industries – Quarries.	Noted
• In addition, the EIS must assess the development against the Hornsby Local Environmental Plan 2013 and any relevant development control plans/strategies.	3.5, 3.6, Table A2.3

Table A2.1 (Cont'd)
Coverage of Secretary's Environmental Assessment Requirements in EIS

Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
KEY ISSUES	
The EIS must assess the potential impacts of the proposal at all stages of the development, including the establishment, operation and decommissioning of the development.	Noted
AIR	
• including an assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage.	5.2, Appendix 4
NOISE	
• a quantitative assessment of potential construction and operational noise and off-site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy* respectively;	5.3, Appendix 5
• details of reasonable and feasible mitigation measures to minimise noise emissions; and	5.3.4, 5.3.7
• monitoring and management measures that would minimise impacts.	5.3.4, 5.3.7
WATER	
• a detailed site water balance and an assessment of any water licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo;	5.4.3
• an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives;	5.4
• a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts.	5.4.2.2, 5.4.3.2
TRAFFIC AND TRANSPORT	
• accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;	5.1.2.4
• an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State Road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;	5.1, Appendix 3
• a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;	5.1.4
• evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and	1.8.2
• a description of access roads, specifically in relation to nearby Crown roads and fire trails.	5.1 generally, 5.1.5.4

Table A2.1 (Cont'd)
Coverage of Secretary's Environmental Assessment Requirements in EIS

Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
BIODIVERSITY	
• accurate predictions of any vegetation clearing on site;	5.5.4
• a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016; and	5.5.3, Appendix 7
• a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	5.5.4
HERITAGE	
• an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and	5.6.2
• identification of Historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines listed in Attachment 1.	5.6.3
LAND RESOURCES	
• potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate); and	5.7
• an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; and	5.4.3.2
• consideration of the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Section 2.17 of State Environmental Planning Policy (Resources and Energy) 2021, including surrounding pastoral lands.	3.4, Table 3.1
WASTE	
• including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams.	2.9
HAZARDS	
• including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, storage, handling and use of any hazardous or dangerous goods.	5.9
VISUAL AMENITY	
• including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms.	5.8
SOCIAL AND ECONOMIC	
• an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the project; and	5.10

Table A2.1 (Cont'd)
Coverage of Secretary's Environmental Assessment Requirements in EIS

Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
REHABILITATION	
• a detailed description including appropriate figures of the proposed final landform.	2.13, Figure 2.7
• a detailed rehabilitation strategy including the measures that would be undertaken throughout the development and during quarry closure,	2.13.2
• justification for the proposed final landform, taking into consideration the objectives of any relevant strategic land use plans or policies; and	2.13, 5.7.4
• potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds, etc).	2.13, 5.7.4

Table A2.2
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
PLANNING MATTERS		
Hornsby Shire Council (07/07/2023)	The application needs to address the requirements of the following Environmental Planning Instruments and Development Control Plan (DCP):	
	• Hornsby Local Environmental Plan 2013 (HLEP)	3.5.1
	• Environmental Planning and Assessment Act 1979	3.3
	• State Environmental Planning Policy (Biodiversity and Conservation) 2021	3.4
	• State Environmental Planning Policy (Planning Systems) 2021	3.4
	• State Environmental Planning Policy (Resilience and Hazards) 2021	3.4
	• State Environmental Planning Policy (Resources and Energy) 2021	3.4, Figure 3.1
	• State Environmental Planning Policy (Transport and Infrastructure) 2021	3.4
	• Hornsby Development Control Plan 2013 (HDCP)	Appendix 2
	The proposal should address the relevant controls within Part 1 General Controls and Part 2 Rural of the HDCP.	Appendix 2
NOISE		
National Parks and Wildlife Service (23/11/2022)	In assessing the potential impacts of noise, the park should be considered equivalent to a 'sensitive receiver'. It should not be considered a buffer for excessive noise during the proposal's operations.	4.3.1, 5.3, Appendix 4
Hornsby Shire Council (07/07/2023)	An Acoustic Report must be prepared by a suitably qualified Acoustic Consultant and member of the Association of Australasian Acoustical Consultants (AAAC) and submitted to Council for review. The report must detail any changes to the predicted noise levels emitted from the proposed development (including approved extraction area, ancillary stone handling shed and site amenities) and any proposed noise attenuation measures to be implemented so that background levels (L90) are not exceeded by 5dB(A) when measured at any sensitive receiver locations. The report must be prepared in accordance with the NSW Environment Protection Authority's (EPA) Noise Policy for Industry and Draft Construction Noise Guideline.	Appendix 4
WATER		
DPE – Water (02/12/23)	**Water Take and Licencing** A detailed and consolidated site water balance.	5.4.3
	Description of all works/activities that may intercept, extract, use, divert or receive surface water and/or groundwater. This includes the description of any development, activities or structures that will intercept, interfere with or remove groundwater, both temporary and permanent.	5.4
	Details of all water take for the life of the project and post closure where applicable. This is to include water taken directly and indirectly, and the relevant water source where water entitlements are required to account for the water take. If the water is to be taken from an alternative source confirmation should be provided by the supplier that the appropriate volumes can be obtained.	5.4.3.3

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
WATER (Cont'd)		
DPE – Water (02/12/23) (Cont'd)	**Water Impacts** A description of groundwater conditions that provides an understanding of groundwater level across the site under a range of wet and dry conditions.	5.4.2.1
	Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, groundwater dependent ecosystems, and ground water levels; including measures proposed to reduce and mitigate these impacts.	5.4.2.3, 5.4.3.4
	Proposed surface and groundwater monitoring activities and methodologies.	5.4.2.5, 5.4.3.5
	Assessment against Policy and Guidelines Identification and impact assessment of all works/activities located on waterfront land including an assessment against Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	3.3
	Assessment of project against relevant policies and guidelines	Section 3
Hornsby Shire Council (07/07/2023)	A concept stormwater drainage plan, showing how it is intended to drain the subject site. This drainage pl proposal shall be prepared in accordance with Australian Rainfall and Runoff (1987), Hornsby Shire Council's Civil Works Specification 1999.	2.4.3, Appendix 6
	In non-urban areas, intensive rural activities should include water management systems designed to achieve water quality that complies with targets specific to aquatic ecosystem protection in south east Australian, lowland east flowing rivers that comply in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).	2.4.3, Appendix 6
	Development should have appropriate controls to stabilise and retain soil and sediments during the construction phase, designed in accordance with Landcom's Managing Urban Stormwater (2006) also known as The Blue Book and/or Council's water management guidelines.	2.4.3, Appendix 6
	Explicit consideration of surface runoff, commentary around a closed water management system or water quality improvement controls, and remediation efforts of any uncontrolled discharges.	5.4.3.2, Appendix 6
BIODIVERSITY		
National Parks and Wildlife Service (23/11/2022)	Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) and documented in a Biodiversity Development Assessment Report (BDAR) to accompany the EIS. The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s 6.12) and Biodiversity Conservation Regulation 2017 (cl 6.8).	Appendix 7
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	5.5, Appendix 7

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
BIODIVERSITY (Cont'd)		
National Parks and Wildlife Service (23/11/2022) (Cont'd)	The BDAR must include details of the measures proposed to address the offset obligation as follows: 1. The total number and classes of biodiversity credits required to be retired for the development/project;	2.13, 2.14, 5.5, Appendix 7
	2. The number and classes of like-for-like biodiversity credits proposed to be retired;	
	3. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules;	
	4. Any proposal to fund a biodiversity conservation action;	
	5. Any proposal to conduct ecological rehabilitation (if a mining project);	
	6. Any proposal to make a payment to the Biodiversity Conservation Fund.	
	If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s 6.10 of the Biodiversity Conservation Act.	
	According to BioNet records, threatened species close to or known from the site include but are not limited to: a) One threatened fauna record (Powerful Owl).	Appendix 7
	b) Several threatened flora records: – *Zieria involucrata* (Endangered) – *Tetratheca glandulosa* (Vulnerable) – *Darwinia fascicularis* (Endangered population) – *Asterolasia elegans* (Endangered) – *Acacia bynoeana* (Endangered)	
	The area of Marramarra National Park next to the proposal site forms part of the land declared to be an Asset of Intergenerational Significance under Part 12A of the *National Parks and Wildlife Act 1974* for *Asterolasia elegans* (AIS_E0_009). This warrants additional and specific consideration in the EIS.	Appendix 7
Hornsby Shire Council (07/07/2023)	Detailed targeted flora and fauna surveys during the optimal detection period are required in accordance with the NSW Biodiversity Assessment Methodology.	Appendix 7
	The BDAR will identify all SAII entities recorded on-site. It will need to consider altering the development footprint to include an appropriate buffer from creeks, watercourse and ephemeral drainage lines, ground water dependent ecosystems and recorded threatened species/ significant habitat features.	1.6, Appendix 7
	Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) and documented in a Biodiversity Development Assessment Report (BDAR) to accompany the EIS.	5.5, Appendix 7

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
BIODIVERSITY (Cont'd)		
Hornsby Shire Council (07/07/2023) (Cont'd)	The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s 6.12) and Biodiversity Conservation Regulation 2017 (cl 6.8).	Appendix 7
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	Section 5.5, Appendix 7
	The BDAR must include details of the measures proposed to address the offset obligation as follows:	2.14, 5.5, Appendix 7
	• the total number and classes of biodiversity credits required to be retired for the development	
	• the number and classes of like-for-like biodiversity credits proposed to be retired	
	• the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules	
	• any proposal to fund a biodiversity conservation action	
	• any proposal to make a payment to the Biodiversity Conservation Fund.	
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s 6.10 of the Biodiversity Conservation Act.	
WATER AND SOILS IMPACTS		
National Parks and Wildlife Service (23/11/2022)	The EIS must map the following features relevant to water and soils including: a) Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).	5.7.2
	b) Rivers, streams, wetlands, estuaries (as described in s 4.2 of the Biodiversity Assessment Method).	Figure 4.2
	c) Groundwater resources	Figure 5.3
	d) Proposed intake and discharge locations.	Figure 5.4
	The EIS must describe background conditions for any water resource likely to be affected by the development, including: a) Existing surface water and groundwater resources both on and off the site	5.4.2.1 and 5.4.3.1
	b) Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.	5.4.3.2
	c) Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.	5.4.3.2
	d) Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.	5.4.3.2

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
WATER AND SOILS IMPACTS (Cont'd)		
National Parks and Wildlife Service (23/11/2022) (Cont'd)	The EIS must assess the impacts of the development on water quality, including: a) The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved.	5.4 generally
	b) Identification of proposed monitoring of water quality.	5.4.2.4 and 5.4.3.4
	The EIS must assess the impact of the development on hydrology, including: a) water balance including quantity, quality and source.	5.4.3
	b) effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.	5.4.3
	c) Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.	5.4.2.3 and 5.4.3.4
	d) Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).	5.4.2.3 and 5.4.3.4
	e) Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.	5.4.3.3
	f) Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.	2.4.3
	g) Identification of proposed monitoring of hydrological attributes	5.4.2.4 and 5.4.3.5
	h) Cumulative impacts when impacts from other proposed or operational projects in the project's vicinity are considered.	5.4.2.3, 5.4.3.3
	i) This consideration must recognise that all watercourses in the project site drain into the park and so should be considered part of the boundary interface with the park.	5.4.3 generally
	The EIS must consider the potential impacts to the adjacent Marramarra National Park. Of particular note, the EIS should consider all matters listed in the guidelines 'Developments adjacent to National Parks and Wildlife Service lands' (NPWS 2020). a) This consideration must recognise that all watercourses in the project site drain into the park and so should be considered part of the boundary interface with the park.	5.4.3 generally
	b) The risks of sedimentation to the park's creek lines must be considered in detail, and appropriate buffers and safeguards identified. NPWS requests explicit consideration of a closed water management system to prevent discharge into the park's waterways. The EIS should propose reporting, monitoring and remediation triggers in the event of uncontrolled discharges.	5.4.3

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
TRAFFIC AND ACCESS		
National Parks and Wildlife Service (23/11/2022)	The EIS must provide a transport and accessibility impact assessment, which includes: a) An analysis of the existing trail network, including the road hierarchy and those parties using trails to access off-site locations.	5.1.5 and Appendix 3
	b) Analysis of the impacts of the proposed development, including identification of potential access impacts and any cumulative impact from surrounding approved developments.	5.1.5 and Appendix 3
	c) Measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery of any infrastructure improvements in accordance with relevant standards.	5.1.4 and Appendix 3
	The EIS must provide a Construction Traffic Management Plan detailing predicted construction vehicle routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.	2.4.8
	The EIS must also recognise that this section of park is accessed via Dalgetys Creek Trail – designated as a Cat 7 Tactical fire trail in the Fire Access Fire Trail Plan. This trail may deviate from its road reserve and traverse part of the development site. The EIS must consider the potential impacts of the proposed development on: i) NPWS's ongoing ability to access this section of park to carry out essential feral animal, weed and fire control programs as required under the park's statutory plan of management	5.1.2.7 and 5.1.5.4
	ii) Transgrid's access to their 330 kV powerline easement in the park.	5.1.2.7
Hornsby Shire Council (07/07/2023)	A Traffic and Parking Report prepared by a suitably qualified Traffic Engineer will be required.	Appendix 3
	Parking provision for the site should be analysed from a first-principal approach with the number of employees to the site and number of truck movement to/from the site.	2.10
	Turning path analysis for the largest vehicle to enter/exit the site	Appendix 3
	Assessment of pavement impacts of development on the access road (unnamed).	5.1.5
	The existing driveway is used by a significant number of heavy vehicles including 25m long B-doubles. Any improvements to the driveway or other infrastructure to accommodate the B-double vehicles must be undertaken by the applicant/owner of property).	2.4.8
	All car parking must be constructed and operated in accordance with AS/NZS 2890.1:2004 Off-street car parking and AS 2890.2:2002 Off-street commercial vehicle facilities.	Appendix 3
	Any proposed landscaping and/or fencing must not restrict sight distance from the driveway to pedestrians and cyclists travelling along the footpath.	Noted

Table A2.2 (Cont'd)
Coverage of Issues Identified by Other Government Agencies for Consideration in EIS

Agency / Organisation	Summarised or Paraphrased Relevant Requirement	Relevant EIS Section(s)
HERITAGE		
Heritage NSW (28/11/2022)	It is recommended a historical archaeological assessment be prepared by a suitably qualified archaeologist in accordance with the guidelines Archaeological Assessment (1996) and Assessing Significance for Historical Archaeological Sites and Relics (2009).	5.6 and Appendix 8 & 9
AIR QUALITY		
Hornsby Shire Council (07/07/2023)	An Air Quality Assessment Report prepared by a suitably qualified environmental consultant is to be submitted to Council, given the proposed development is likely to, or capable of, generating air polluting emissions.	Appendix 4
	The report must assess the existing ambient air quality of the site and forecasted pollutant emission rates resulting from the proposed development and provide mitigation measures to ameliorate the potential impact of emissions from the site on nearby residences and sensitive receivers. The report must be prepared in accordance with the Environment Protection Authority's (EPA) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017) and Technical Framework: Assessment and management of odour from stationary sources in NSW (2006), the Protection of the Environment Operations Act 1997 and associated Regulations.	5.2.2
ABORIGINAL HERITAGE		
Hornsby Shire Council (07/07/2023)	An Aboriginal Heritage and Archaeological Relic Assessment in accordance with the following guidelines and Heritage NSW advice to identify culturally modified trees; land that contains recorded Aboriginal objects (AHIMS database); or undisturbed land that contains certain landscape features, being land within 200m of waterways, or located within a sand dune system, or located on a ridge top, ridge line or headland, or located within 200m below or above a cliff face, or within 20m of or in a cave, rock shelter, or a cave mouth. • Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (2011) by NSW Office of Environment and Heritage at www.environment.nsw.gov.au. • NPWS Aboriginal Heritage and Information Management System (AHIMS) database at www.environment.nsw.gov.au.	5.6 and Appendix 8 & 9

Table A2.3
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.1.1 Biodiversity	Prescriptive Measures	General	a. Development should seek to: – avoid potential adverse impact on biodiversity, – if that impact cannot be avoided, minimise that impact, or – if the impact cannot be minimised, to mitigate the impact.	Section 5.5.4 outlines the management and mitigation measures that will be implemented to minimise impact to biodiversity.
			b. A flora and fauna assessment is required for development that may impact on: – land mapped as Biodiversity on the HLEP Terrestrial Biodiversity Map, or – native vegetation which is habitat for species listed in Schedule 1, 1A or 2 of the *Threatened Species Conservation Act 1995*.	Section 5.5.3 addresses vegetation communities and threatened species.
			c. Development should avoid the fragmentation of existing native vegetation.	Section 2.4.4 addresses matters associated with vegetation clearing. Section 5.5.4 outlines the management and mitigation measures that will be implemented to minimise impact to biodiversity.
			d. Development should seek to retain unique environmental features of the site including: – rock outcrops, – wetlands and the like, – watercourses, drainage lines and riparian land, – groups of significant trees and vegetation, and – mature hollow trees and other fauna habitat features on the site.	Noted.

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

<table>
<tr><th>Relevant DCP Part</th><th>Development Control</th><th>Issue</th><th>Description</th><th>EIS Section / Comments</th></tr>
<tr><td rowspan="6">1C.1.1 Biodiversity (Cont'd)</td><td rowspan="6">Prescriptive Measures (Cont'd)</td><td rowspan="2">General (Cont'd)</td><td>e. Development should incorporate and maintain a buffer zone to significant flora and fauna. Development should not include buildings, structures and earthworks within the required buffer zone
<table>
<tr><th>Significant Vegetation Type</th><th>Minimum Buffer Zone (metres)</th></tr>
<tr><td>Endangered ecological communities and regionally significant bushland (as mapped in the HLEP Terrestrial Biodiversity Map</td><td>20m</td></tr>
<tr><td>Wetland or saltmarsh plant communities</td><td>20m</td></tr>
<tr><td>Populations of threatened flora species, habitat for threatened species, locally significant bushland, groups of remnant indigenous trees</td><td>10m</td></tr>
</table></td><td rowspan="2">No threatened ecological communities (TEC) listed under the Biodiversity Conservation Act 2016 (BC Act) or the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) have been identified within the Quarry Site. Where practicable, a 10m setback from populations of threatened flora species would be adopted. Residual impacts to native vegetation would be offset in accordance with the Biodiversity Offset Scheme.</td></tr>
<tr><td>f. Notwithstanding the buffers presented in the table above, certain native vegetation that is habitat for species listed in the Threatened Species Conservation Act may require larger buffer zones in order to avoid potential adverse impacts on biodiversity.</td></tr>
<tr><td rowspan="2">Landscaping adjacent to bushland</td><td>g. Fencing adjoining bushland should be designed to allow for the movement of native fauna, and limit predation on native wildlife by domestic animals. The use of barb wire fencing is not supported.</td><td>Existing fencing around the property would be maintained. No barb wire fencing would be used.</td></tr>
<tr><td>h. Where landscaping is proposed within the buffer zones, it should comprise trees, shrubs, understorey and groundcover species indigenous to the adjoining vegetation community</td><td>Noted.</td></tr>
<tr><td rowspan="2">Roadside Vegetation</td><td>i. Native vegetation along roadsides should be retained where possible as it provides fauna habitat, links bushland areas, and maintains the scenic qualities of the area.</td><td>All remnant vegetation within the Quarry Site beyond the boundaries of the proposed limit of disturbance would be retained.</td></tr>
<tr><td>j. Accessway crossings and utilities should be located and designed to minimise impacts on roadside vegetation.</td><td>Noted.</td></tr>
</table>

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

<table>
<tr><th>Relevant DCP Part</th><th>Development Control</th><th>Issue</th><th>Description</th><th>EIS Section / Comments</th></tr>
<tr><td>1C.1.1 Biodiversity (Cont'd)</td><td>Prescriptive Measures (Cont'd)</td><td>Riparian Areas (Cont'd)</td><td>o. Development should be designed and located to maintain an effective watercourse riparian zone comprising native vegetation.</td><td>Effective watercourse riparian zones have been maintained, where practicable. Notwithstanding, a Controlled Activity Approval under Section 91(1) of the Water Management Act 2000 (WM Act) due to disturbance within 40m of waterfront land will be required.</td></tr>
<tr><td rowspan="2">1C.1.2 Stormwater Management</td><td rowspan="2">Prescriptive Measures</td><td rowspan="2">Sediment and Erosion Control</td><td>a. Development should have appropriate controls to stabilise and retain soil and sediments during the construction phase, designed in accordance with Landcom's Managing Urban Stormwater (2006) also known as The Blue Book and/or Council's water management guidelines.</td><td>Section 5.4.3.2.2 outlines Catchments and Surface Water Management. SB1 would be constructed in accordance with the rainfall events specified in Volume 2E of the Blue Book for standard receiving environments.</td></tr>
<tr><td>b. Applicants should submit a plan with the development application according to the level of sensitivity and amount of disturbed area on the site as outlined below.
<table>
<tr><th>Development Scale</th><th>Submission Requirement</th></tr>
<tr><td>Less than 1,500m^2 of disturbed area</td><td>An Erosion and Sediment Control Plan (ESCP) prepared in accordance with Council's water management guidelines for all environmentally sensitive sites such as steep land (>20%),or works in the vicinity of waterways or bushland. See Note*</td></tr>
<tr><td>1,500m^2 to 2,500 m^2</td><td>An Erosion and Sediment Control Plan (ESCP) prepared in accordance with the Blue Book</td></tr>
<tr><td>More than 2,500m^2 of disturbed area</td><td>A Soil and Water Management Plan (SWMP) prepared in accordance with the Blue Book</td></tr>
<tr><td colspan="2">Note: For non-sensitive sites an Erosion and Sediment Control Plan may be required to be prepared as a condition of development consent, to be certified by the relevant accredited certifier.</td></tr>
</table></td><td>An Erosion and Sediment Control Plan (ESCP) would be included in the Environmental Management Plan (EMP) that would be prepared should development consent be received.</td></tr>
</table>

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.1.2 Stormwater Management (Cont'd)	Prescriptive Measures (Cont'd)	Water Hydrology	c. An on site stormwater management system that deals with detention, retention and discharge rates is required for all development involving external works to maintain environmental flow* rates in the receiving watercourses.	Sections 2.4.3 and 5.4.3.2.2 outline Catchments and Surface Water Management and include a closed water management system. Dirty water collection drains would be constructed to convey sediment-laden runoff from areas of operational disturbance within the Office, Amenities and Parking Area to SB1. These drains would be constructed along the northern and western boundaries of the Office, Amenities and Parking Area to prevent sediment-laden runoff entering undisturbed areas. A clean water diversion would also be constructed around the southern perimeter of the Extraction Area to prevent sediment-laden runoff entering the adjacent areas of undisturbed vegetation.
			d. An on-site detention (OSD) system, designed in accordance with the HSC Civil Works Specification, should be provided for the following types of development: – Subdivision, – Single dwellings where required by covenant, – Two or more dwellings, or – Non-residential developments with external alterations.	
			e. Natural flow paths within a site and the discharge point from the site should be retained and directed to its natural catchment.	As outlined in Section 5.4.3, the perimeter safety bund would convey sediment-laden runoff from within the Extraction Area to the sump while a clean water diversion would prevent "dirty" runoff entering the adjacent areas of undisturbed vegetation.
			h. On non urban properties, development should not prevent or significantly alter water flows to adjoining properties or natural ecosystems. Flows from impervious areas should be dispersed on-site to minimise erosion and impacts on adjoining properties.	
			Note: *Environmental flows are the flows of water in streams and rivers that are necessary to maintain aquatic ecosystems.	Noted

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.1.2 Stormwater Management (Cont'd)	Prescriptive Measures (Cont'd)	Water Quality	k. In non urban areas, intensive rural activities should include water management systems designed to achieve water quality that complies with targets specific to aquatic ecosystem protection in south east Australian, lowland east flowing rivers that comply in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).	Section 2.4.3 and 5.4.3 outline the proposed water management system.
			l. Chemical storage should be bunded and located away from watercourses, drainage lines or drainage pits which lead to the storm water system.	Section 5.9.3 outlines the proposed management measures for hydrocarbons. A self-bunded trailer or similar would be used to transport diesel to the Quarry Site, as required. No diesel would be stored permanently on site.
			Notes: Urban areas include business, industrial, special use and residential zones.	Noted.
1C.1.3 Watercourses	Prescriptive Measures	General	a. Existing natural drainage lines and water bodies on a site should be utilised as part of the major drainage network rather than piping stormwater flows.	As outlined in Section 5.4.3, the perimeter safety bund would convey sediment-laden runoff from within the Extraction Area to the sump while a clean water diversion would prevent "dirty" runoff entering the adjacent areas of undisturbed vegetation. The only watercourses to be disturbed are non-perennial minor streams for which a Controlled Activity Approval under Section 91(1) of the WM Act would be required. No discharge from the disturbed area is proposed.
			b. All work should not cause bed and bank instability and any bank stabilisation measures should preferably use soft engineering techniques	
			c. Watercourses should be linked with other areas of indigenous vegetation, wildlife corridors and/or natural or visually important site features.	
			d. Stormwater outlets proposed in the vicinity of a watercourse should: – point downstream for the final entry point of the structure, – be graded to the bed level of the stream, or just below any permanent water, and – be located to avoid existing native vegetation	
			e. The environmental flow characteristics of down stream watercourses should be maintained.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.1.3 Watercourses (Cont'd)	Prescriptive Measures (Cont'd)	General (Cont'd)	f. Watercourses should not be piped, filled, excavated, or relocated. In some instances, Council will permit these works to occur. In determining whether to retain or restore a watercourse, consideration should be given to the following: – the sustainability of actual or potential biodiversity and habitat, – the actual or potential ability of the watercourse to enhance water quality, – the actual or potential visual/aesthetic character of the watercourse, – the actual or potential recreational value of the watercourse, – the effect on the watercourse of the existing and likely future development in the catchment, – the effect on the catchment and existing development of any treatment to the watercourse, – the influence of previously altered sections on the watercourse, – the actual or potential influence of the watercourse on public health and safety, and – the mitigation of flooding and the hazard to property.	
		Riparian Areas	g. The design and location of any development should seek to maintain an effective riparian area and comply with best practice guidelines, that may require: – A core riparian zone (CRZ) that is the land within and adjacent to the channel. The width of the CRZ from the banks of the stream is determined by assessing the importance and riparian function of the watercourse, and – A vegetated buffer (VB) that protects the environmental integrity of the CRZ, with a minimum width of 10 metres.	All riparian land not within the proposed limit of disturbance will remain vegetated. The only watercourses to be disturbed are non-perennial minor streams for which a Controlled Activity Approval under Section 91(1) of the WM Act will be required.
			h. In addition, development should comply with any applicable Foreshore Building Line as prescribed by Clause 6.5 of the HLEP.	No development is proposed within the Foreshore Building Line.
			i. The riparian area should be fully vegetated with local native vegetation (trees, shrubs and groundcover species) at a density that would occur naturally. Species should be consistent with the existing native species present and Council's Riparian Species List.	All riparian land not within the proposed limit of disturbance will remain vegetated. The only watercourses to be disturbed are non-perennial minor streams for which a controlled activity approval will be required.
			j. A permanent physical barrier should be placed at the landward extent of the riparian area to prevent inadvertent damage to riparian vegetation where vehicle access to the riparian land, or mowing or slashing of vegetation may otherwise occur.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.1.3 Watercourses (Cont'd)	Prescriptive Measures (Cont'd)	Riparian Areas (Cont'd)	k. Any Bushfire Asset Protection Zone (APZ) should be measured from the asset to the outer edge of the vegetated buffer (VB). The APZ should contain managed land which should not be part of the CRZ or VB.	Matters relating to bushfire are addressed in Section 5.9.2.
			Notes: A watercourse includes a 'river' as defined in accordance with the Water Management Act 2000. A riparian area is a zone of vegetation in and around the banks of a watercourse, lake or estuary. This vegetation stabilises the banks and river bed and acts as a buffer restricting exotic species from entering the river. This is an essential element in retaining good water quality within a catchment area.	Noted
1C.2.1 Transport and Parking	Prescriptive Measures	General	a. Direct vehicular access to main roads should be avoided and/or access points consolidated.	The Quarry Site does not directly access a main road.
			b. For development (other than single dwelling houses on existing lots), vehicle access and parking should be designed to allow vehicles to enter and exit the site in a forward direction.	The Site Access Road would be widened to achieve a width suitable for two heavy vehicles to pass. Taking into account roadside drainage, the disturbed area would be a minimum of 8m wide for its length from the intersection of the Unnamed Local Road and the Site Access Road to the Extraction Area.
			c. Design and dimensions of car parks, loading areas and driveways should comply with AS2890.1 and AS2890.2.	As outlined in Appendix 3, the general layout of the carpark would be developed with respect to the relevant Australian Standard.
			d. Planning and design layout of parking areas for people with disabilities should be in accordance with AS2890.6 and AS1428.1.	
			e. Planning and design layout of loading and manoeuvring areas should be provided in accordance with AS2890.2 and: – preferably be located to the side or rear of buildings, – screened from view from local and main roads, and – located so that vehicles do not stand on any public road, footway, laneway or service road.	
			f. Planning and design layout of bicycle parking (rails, racks or lockers) should be designed in accordance with AS2890.3.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.2.1 Transport and Parking (Cont'd)	Prescriptive Measures (Cont'd)	Service Vehicles	k. On site loading and unloading areas for non-residential developments should be provided in accordance with the RTA Guide to Traffic Generating Development (2002).	All product loading, despatch and stockpiling activities would be undertaken within the Extraction Area.
			l. The on site loading and unloading area in a non residential development should incorporate provision for 1 car space and 1 motor cycle space for use by couriers, sited in a convenient location. Larger developments may require more.	The Office, Amenities and Parking Area would incorporate spaces for a minimum of 5 light vehicles.
			m. On site pick up and manoeuvring areas for waste collection vehicles should be provided in accordance with the waste collection provisions at Section 1C.2.3 of the DCP	Waste management measures are outlined in Section 2.9 and would be included in the EMP that would be prepared should development consent be received.
1C.2.3 Waste Management	Prescriptive Measures	Ongoing Waste Management Submission Requirements	k. A Waste Management Plan should be prepared in accordance with Council's guidelines and submitted with the development application, to address the generation of waste from the occupation of the development, and include: – an estimate of the amount of waste and recyclables to be generated, – identify the number of, and capacity of, waste storage bins and volume handling equipment required, – a site plan showing: ○ areas allocated for waste storage and recycling, ○ details of any volume handling equipment, ○ nomination of the waste collection point for the site, and ○ identification of the path of access for users and collection vehicles. – details of the on-going management of the storage and collection of waste, including responsibility for cleaning, transfer of bins between storage areas and collection point, maintenance of signage, and security of storage areas.	
1C.2.4 Effluent Disposal	Prescriptive Measures	Sewage	a. Areas that are not serviced by the Sydney Water reticulated sewerage system are required to dispose of wastewater using a NSW Health Department accredited Sewage Management Facility	As outlined in Section 2.10, amenities installed within the Quarry Site would include chemical or pump out toilets.
			b. An on site sewage management plan should be provided for applications involving new work in the unsewered areas of the shire, involving: – the subdivision of land, – the erection of new or enlarged habitable buildings, or – other work that requires modification to an existing on-site sewage management system.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.2.4 Effluent Disposal (Cont'd)	Prescriptive Measures (Cont'd)	Sewage (Cont'd)	c. The sewage management plan should demonstrate the existing and/or proposed system is sited and designed to: – prevent the spread of disease by micro-organisms, foul odours, the contamination of water, the degradation of soil and vegetation, and discourage insects and vermin, – ensure that persons do not come in contact with untreated sewage or effluent, – accommodate a suitable pump-out point and tanker standing location, where necessary, – minimise any adverse impacts on the amenity of the premises and surrounding lands, – protect water quality in watercourses, – maintain a buffer zone to significant flora and fauna and – comply with relevant Best Practice Guidelines.	As outlined in Section 2.10, amenities installed within the Quarry Site would include chemical or pump out toilets.
			Notes: The installation of any on site sewage management facility requires approval from Council under the Local Government Act (1993). An application to install an On Site Sewage Management Facility should be submitted when the Development Application is lodged.	Noted
1C.2.5 Noise and Vibration	Prescriptive Measures	Noise Generating Development	e. Development should be sited and designed so that noise is kept to a minimum and does not create offensive noise as defined by the Protection of the Environment Operations Act 1997	Section 5.3 and Appendix 5 address matters relating to noise.
			f. Noise generating developments should be accompanied by an acoustic report that demonstrates the development is sited and designed to: – minimise the effect of noise and vibration on surrounding sensitive landuses, and – comply with relevant State Government and Council guidelines.	
			g. The location and design of noise generating activities, such as loading and unloading areas, garbage collection areas, driveways, parking areas, active recreation areas, air conditioning or mechanical plants, should be sited away from adjacent sensitive landuses and/or screened by walls or other acoustic treatments.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
1C.2.5 Noise and Vibration (Cont'd)	Prescriptive Measures (Cont'd)	Noise Generating Development (Cont'd)	h. In addition to physical noise mitigation measures, noise impact management measures should be used to further limit potential noise impacts on sensitive landuses such as: – scheduled times to undertake noise generating activities and/or use of noise generating machinery, and – reasonable hours of operation including delivery hours.	
1C.2.6 Air Quality	Prescriptive Measures	General	b. Buffer zones should be provided between potentially air polluting activities and air quality sensitive landuses	Section 5.2 and Appendix 4 addresses matters relating to air quality, Section 5.2.2.1 outlines sensitive receivers, and Section 5.2.6 outlines management and mitigation measures.
		Air Quality Impacting Development	e. Any development that is likely to, or capable of, generating levels of air emissions exceeding the requirements of the Protection of the Environment Operations Act 1997 should incorporate appropriate measures to mitigate against air pollution.	
			f. Land uses that have the potential to generate offensive odour should be sited and designed to minimise odour impacts on adjoining land uses.	
1C.2.7Crime Prevention	Prescriptive Measures	Surveillance	a. Development should be designed to provide or enhance opportunities for effective surveillance by providing: – clear sight lines between public and private places, – effective lighting of public places, and – landscaping that makes places attractive but does not provide offenders with a place to hide or entrap victims.	As outlined in Section 2.4.8 a secured (combination lock or equivalent) gate would be installed along the Site Access Road, as well as maintaining existing fencing.
		Access Control	b. Development should be designed to incorporate physical or symbolic barriers to attract, channel or restrict the movement of people to clearly defined public spaces.	
1C.2.11 Signage	Prescriptive Measures	General	d. All commercial advertising should comply with the State Environmental Planning Policy (Industry and Employment) 2021 (Industry and Employment SEPP).	Noted.
1C.3.1 Bushfire	Prescriptive Measures	General	a. Development on land identified as bushfire prone on Council's Bushfire Prone Land Map should address the bush fire protection measures in the publication Planning for Bushfire Protection (2019).	The Quarry Site is within a designated bush fire prone area. Section 5.9.2 addresses matters relating to bushfire including a bush fire hazard assessment prepared in accordance with the requirements of the "*Planning for Bush Fire Protection*".
			b. Development should be located and designed to minimise the need for bushfire hazard reduction within native vegetation areas.	
			c. Bushfire Asset Protection Zones should be located entirely within the development site.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

<table>
<tr><th>Relevant DCP Part</th><th>Development Control</th><th>Issue</th><th>Description</th><th>EIS Section / Comments</th></tr>
<tr><td>1C.3.1 Bushfire (Cont'd)</td><td>Prescriptive Measures (Cont'd)</td><td>General (Cont'd)</td><td>d. Measures such as higher fire resistant construction standards, improved access and water supplies should be considered for infill developments where they would reduce the need for removal of significant native vegetation, provided the development still complies with Planning for Bushfire Protection (2019).</td><td></td></tr>
<tr><td rowspan="3">1C.3.2 Flooding</td><td rowspan="3">Prescriptive Measures</td><td rowspan="3">General</td><td>a. Where a development proposal is on land shown as 'Flood Planning areas' on the HLEP Flood Planning Map or is on other land at or below the flood planning level, a comprehensive flood study should be prepared by a qualified hydraulic engineer and is to be submitted with any development application on land that demonstrates that:
– The development addresses the provisions of Clause 6.3 of the HLEP, and
– The development complies with best practice.</td><td rowspan="3">As outlined in 5.4.3.1, the Quarry Site is not located within a flood planning area and is not at risk of flooding.</td></tr>
<tr><td>b. The overland flow path should not be built upon and should have minimal planting. Development is required to demonstrate that any overland flow is maintained for 1 in 100 year average recurrence interval (ARI) flood.</td></tr>
<tr><td>c. All potential pollutants that are stored or detained on-site (such as on-site effluent treatment facilities, chemicals or hazardous materials) should be stored 0.5 metres above 1 in 100 year ARI flood level. Details should be provided as part of any application.</td></tr>
<tr><td rowspan="2">2.5.1 Setbacks</td><td rowspan="2">Prescriptive Measures</td><td rowspan="2">Setbacks</td><td>– Extraction operations including internal access roads should be setback to comply with Table 2.5.1(a):
<table>
<tr><th>Feature</th><th>Setback</th></tr>
<tr><td>Adjoining property boundaries</td><td>10m (to include landscape buffer)</td></tr>
<tr><td>Public road</td><td>30m (to include a landscape buffer)</td></tr>
<tr><td>Land reserved under the National Parks and Wildlife Act 1974</td><td>40m (to include a vegetative buffer)</td></tr>
<tr><td>Site or relic of heritage, archaeological, geological, cultural significance</td><td>40m</td></tr>
<tr><td>Habitats of threatened species, populations and ecological communities</td><td>40m (to include a vegetative buffer)</td></tr>
<tr><td>Top bank of a watercourse</td><td>40m or otherwise to the requirements of the NSW Office of Water</td></tr>
<tr><td>Public or Community facility</td><td>100m</td></tr>
<tr><td>Residence not associated with extraction</td><td>100m</td></tr>
</table></td><td rowspan="2">A Controlled Activity Approval under Section 91(1) of the WM Act due to disturbance within 40m of waterfront land will be required. Where practicable, all other setback requirements would be adhered to.</td></tr>
<tr><td>– Where extraction is occurring on adjoining properties, the setbacks required by Table 2.5.1(a) may be reduced to provide an integrated final land form.</td></tr>
</table>

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.2 Transport	Prescriptive Measures	Access	a. Safe, controlled and limited access points to the road network should be provided.	Section 5.1 addresses matters relating to traffic and transportation including transport routes. Appendix 3 contains the Traffic Impact Assessment.
			b. Heavy vehicle routes on the local road network should be direct and avoid sensitive land uses. Where sensitive land uses can not be avoided the frequency and timing of heavy vehicles should be controlled.	
			c. Internal access should be no less than 20 metres wide (easement width).	
			d. The standard of construction of internal accessways should have regard to: – cross sectional characteristics, both typical of straight and on curves and bends, – horizontal and vertical alignment characteristics, – pavement and drainage proposals, – other technical parameters, and – vehicle grades not exceeding 6%.	
			e. Extractive operations should contribute to the maintenance of the road network as a result of road damage caused by heavy vehicles.	
	DA Submission Requirement	Transport	f. Documentation outlining anticipated heavy vehicle routes, loading and frequency associated with the extractive industry should be submitted with the application.	
	Post DA Submission Requirement	Transport	g. Certified weighbridge dockets and a log book to verify the frequency and timing of vehicle movements may be required as a condition of consent	Noted.
			Note: Designs of all access/ intersection points to the external road network should comply with the requirements of the Hornsby Shire Civil Works Design Specification and/or Roads and Maritime Services.	
2.5.3 Water Resources	Prescriptive Measures	Water	a. Proposals should employ extraction procedures capable of maintaining, monitoring and managing pre-existing surface drainage patterns and groundwater flow and water quality conditions.	Section 5.4.3 addresses matters related to surface water and section 5.4.2 addresses matters related to groundwater including an impact assessment, monitoring and mitigation measures. An EMP would be prepared following receipt of development consent which would cover water management.
			b. Extraction should not occur within 2 metres of the high groundwater level.	
	DA Submission Requirements	Groundwater	c. Proposals should be accompanied by a Groundwater Impact Assessment Report which should: – identify and classify aquifer systems on extraction sites, – identify all groundwater dependent users and environs at the site and within adjacent catchment areas, – assess vulnerability of groundwaters, – identify a freeboard level (to AHD) above high groundwater level capable of protecting groundwater flow patterns and water quality, – identify potential sources of impacts including seepage from tailing dams, and – outline procedures for protecting and monitoring groundwater flow and quality.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.3 Water Resources (Cont'd)	DA Submission Requirements (Cont'd)	Surface Water	d. Applications should be accompanied by a Water Management Plan which provides a framework for the identification, classification and management of artificial and natural surface and subsurface water cycles during all phases of clearing, extraction and rehabilitation including: – site investigations used to identify and classify catchment origin, drainage patterns, water flow and quality, – source, quantity and quality of water required to provide a reliable supply of water to the operations, procedures capable of maintaining natural surface water flow and quality conditions along downstream boundary alignments, – the design and likely impact of any temporary diversion of drainage patterns, – procedures for maintaining and monitoring water quality at downstream boundaries, – procedures for minimising importation of water, – procedures for maximising reuse/recycling of collected waters, particularly during extreme climatic conditions, – risks, safeguards and contingency plans for extreme climatic conditions and operational hazards including groundwater breach or contamination, – method of treating polluted and contaminated waters, – destination points for collected waters are retained within each extraction area/stage, – procedures for ensuring that contaminated waters are contained on-site during 1 in 100 year ARI storm events (1% AEP), – protection of significant site features and natural springs, and – procedures for monitoring groundwater flow, quality and recharge areas within catchments having regard to the Groundwater Impact Assessment Report.	Section 5.4.3 addresses matters related to surface water and section 5.4.2 addresses matters related to groundwater including an impact assessment, monitoring and mitigation measures. An EMP would be prepared following receipt of development consent which would cover water management.

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.3 Water Resources (Cont'd)	Post DA Submission Requirement (Cont'd)	Surface Water	e. An updated Water Management Plan may be required to be resubmitted annually to Council as a condition of consent. The report would be required to be prepared by a suitably qualified Environmental Consultant and demonstrate that: – the protection of water dependent features and ecosystems of the site and adjacent catchments, – the actual source, quantity and quality of water used by all aspects of the operation, – the effectiveness of the Water Management Plan in providing a framework for a complete balance for both artificial and natural surface and subsurface waters, – risks, safeguards and contingency plans for extreme climatic conditions and operational hazards including groundwater breach or contamination, – the results of monitoring water at downstream boundaries relative to the stage of extraction, – the results of monitoring of groundwater flow and quality within the extraction-site and adjacent catchment, – the advice and licensing requirements of state agencies including NSW Office of Water and the EPA, – recommendations to alter operational procedures to improve the performance of artificial and natural surface and subsurface water cycles, and – applications should include a determination of the likely impact upon groundwater and nominate an effective freeboard above the high groundwater level capable of protecting groundwater flow patterns and water quality on each extraction site. – Based on the above factors, the report should identify any adverse environmental impacts in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines, 2000), and outline any mitigation measures.	Section 5.4.3 addresses matters related to surface water and section 5.4.2 addresses matters related to groundwater including an impact assessment, monitoring and mitigation measures. An EMP would be prepared following receipt of development consent which would cover water management.
			Note: All bores and extraction operations which intercept the water table and/or require pumps should be licensed with the NSW Office of Water	Noted.
2.5.4 Soil And Water Management	Prescriptive Measures	Clearing	a. Vegetation should only be removed in stages to retain as much protective ground cover vegetation as possible.	Section 5.7.3 addresses matters relating to the management and mitigation measures of soil and land resources. Appendix 6 contains a report quantifying the sediment basin storage requirements for the Proposal.
			b. The natural vegetation outside the extraction site should be protected at all times by the installation and maintenance of sediment control devices.	
			c. Progressive clearing should be restricted to within the approved boundaries of the extraction area.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.4 Soil And Water Management (Cont'd)	Prescriptive Measures (Cont'd)	Topsoil and overburden removal	d. Topsoil and overburden stripping should not advance any more than 30 metres in front of the current extraction operation.	Section 5.7.3 addresses matters relating to the management and mitigation measures of soil and land resources. Appendix 6 contains a report quantifying the sediment basin storage requirements for the Proposal.
			e. Stockpiles should be located in low erosion hazard areas away from drainage lines and stabilised by vegetation and the use of silt fences.	
			f. Removed topsoil should be used for rehabilitation of previously disturbed areas in order to maintain the freshness of the topsoil. Topsoil removal should occur in two stages, organic matter and then the topsoil.	
			g. Where material is to be stored in stockpiles, the stockpile should be: – of one soil type; – kept flat and low to ensure survival of organic matter and aerobic organisms; – keep free of traffic and drainage lines; – not left for more than 14 days without a vegetation cover; – surrounded by sediment control devices, and – used as soon as possible (no longer than 12 months).	
			h. Stockpiles over 5 metres in height should be benched to ensure stability and incorporate internal drains. The batter slopes should be no steeper than 1:2 (v:h) for stable soils and 1:4(v:h) for highly erodible soils, to limit wind and water erosion.	
			i. Topsoil stripping should not be undertaken when soil is too wet or too dry to avoid compaction, loss of structure and viability of seeds.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.4 Soil And Water Management (Cont'd)	Prescriptive Measures (Cont'd)	Runoff Controls	j. Surface runoff from undisturbed areas should be diverted around proposed extraction/operation areas and returned to natural watercourses at non-erosive velocities. All channels should be designed to convey water at velocities less than 1.2m/s for vegetated channels and 0.4m/s for bare earth channels.	Section 5.4.3.2.2 addresses matters relating to catchment and surface water management. As outlined in Section 5.4.3, the perimeter safety bund would convey sediment-laden runoff from within the Extraction Area to the sump while a clean water diversion would prevent "dirty" runoff entering the adjacent areas of undisturbed vegetation. The only watercourses to be disturbed are non-perennial minor streams for which a Controlled Activity Approval under Section 91(1) of the WM Act will be required. No discharge from the disturbed area is proposed. An EMP would be prepared following receipt of development consent which would cover water management.
			k. All channels, waterways and detention structures should be designed to accommodate peak discharge of a 1 in 20 year average recurrence interval storm with appropriate freeboard margins (generally 750mm for catchments less than 15 hectares).	
			l. The long term stability of natural channels downstream of the study area should be maintained by ensuring that discharges from subcatchments remain the same.	
			m. Overland flow paths and spillways should be designed to ensure that flood waters and stormwater runoff, which exceeds the design capacity of channels, watercourses and structures, do not adversely affect adjoining lands.	
		Water Quality	n. Water quality at the downstream boundary of each development area will be required to be monitored monthly by the proponent. A report, including the results of the water sampling will be required to be prepared by a suitably qualified environmental consultant and submitted to Council annually. Should the results of the water sampling identify elevated levels compared with the ANZECC Guidelines 2000, the report must outline the mitigation measures undertaken at the development area to maintain water quality.	
		Sediment Control Devices	o. Wind breaks including vegetation, bund walls and stockpiles should be of sufficient height, length, orientation, location and permeability to be capable of reducing wind velocity across extraction areas.	
			p. Appropriate sediment control devices should be installed to prevent sediment moving off-site (these can include sediment fences, straw bales, sediment traps and sediment basins). Existing rural dams should be retained to serve as sediment basins and to reduce runoff during development.	
			q. All sediment and control dams should be sized to retain at least the equivalent volume of 10mm depth of runoff over the entire disturbed area they serve. The settling volume is to be provided as active storage with a minimum depth of 0.6 metres. A sediment storage volume of at least half this allowance is to be provided below the settling volume.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.4 Soil And Water Management (Cont'd)	Prescriptive Measures (Cont'd)	Sediment Control Devices (Cont'd)	r. The design of the sediment control dam should include details of the proposed dewatering method for the settling volume, spillway configuration and the design life of the structure.	Section 5.4.3.2.2 addresses matters relating to catchment and surface water management. As outlined in Section 5.4.3, the perimeter safety bund would convey sediment-laden runoff from within the Extraction Area to the sump while a clean water diversion would prevent "dirty" runoff entering the adjacent areas of undisturbed vegetation. The only watercourses to be disturbed are non-perennial minor streams for which a Controlled Activity Approval under Section 91(1) of the WM Act will be required. No discharge from the disturbed area is proposed. An EMP would be prepared following receipt of development consent which would cover water management.
			s. All water retaining structures should incorporate an impermeable barrier in the dam wall.	
			t. A sediment control dam should be located downstream of wet screening plants and the tailing dams. The structure is to have a sediment trapping capacity of at least half the volume of the largest tailing dam.	
			u. Batters of dams and detention basins should have a maximum gradient of 1 (vertical) in 4 (horizontal) and be vegetated immediately following construction. Prior to the establishment of this vegetative cover, sediment loss is to be controlled by the installation of catch drains and sediment traps along the downstream toe of the embankment. These should be maintained until such time as 80% vegetation cover is achieved on the batters.	
			v. Sedimentation dams associated with sediment control structures will require periodic removal of sediment. This material should be dried and utilised on landfill in rehabilitated landforms.	
	DA Submission Requirements	Soil and Water	y. A Soil and Water Management Plan (SWMP) should be submitted containing appropriate Best Management Practices that recognise site constraints and support ESD principles. The Plan should include: – Soil conservation and pollution/nutrient control measures to be installed prior to clearing and earthworks and maintained until landscaping measures are complete, – Protection measures for site access and exits, – Catchment drainage characteristics of existing and proposed drainage patterns, – Protection of existing overland flowpaths, watercourses, stormwater kerb inlets and drains, – Upslope clean surface runoff diversions around the disturbed areas, – Staggered site works to minimise disturbance,	An EMP would be prepared following receipt of development consent which would cover soil and water management.

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

<table>
<tr><th>Relevant DCP Part</th><th>Development Control</th><th>Issue</th><th>Description</th><th>EIS Section / Comments</th></tr>
<tr><td>2.5.4 Soil And Water Management (Cont'd)</td><td>DA Submission Requirements (Cont'd)</td><td>Surface Water</td><td>– Rehabilitation and stabilisation of the disturbed areas,
– Site investigations used to determine areas most and least suited to extraction operations, Clearing, grading and drainage plans for the site layout, including entry and exit points,
– Procedures and timing for installing and maintaining sediment devices for all phases of extraction,
– Procedures and timing for removal of the controls,
– Method of controlling water flow through the site,
– Procedures and timing for maintaining protective ground covers and long term stability of the site, and
– All natural features and environmentally sensitive areas (e.g. existing vegetation and watercourses).</td><td>An EMP would be prepared following receipt of development consent which would cover soil and water management.</td></tr>
<tr><td rowspan="5">2.5.5 Acoustic Environment</td><td rowspan="4">Prescriptive Measures</td><td rowspan="4">Noise</td><td>a. Effective noise control measures should be incorporated into extraction sites.</td><td rowspan="5">Section 5.3 and Appendix 5 address matters relating to noise.</td></tr>
<tr><td>b. The hours of operation of machinery and the transportation of materials should be in accordance with Table 2.5.5(a):
<table>
<tr><td>Weekday</td><td>Hours of Operation</td></tr>
<tr><td>Monday to Saturday inclusive</td><td>7am to 6pm</td></tr>
<tr><td>Sundays and Public Holidays</td><td>No work should occur</td></tr>
</table></td></tr>
<tr><td>c. Signs and barriers should be maintained at the point of access to ensure compliance with the hours of operation. The barriers should be kept locked except during authorised hours of operation.</td></tr>
<tr><td>d. The maximum average noise emission level of extraction should not exceed 5dB(A) above maximum average background noise levels.</td></tr>
<tr><td>DA Submission Requirements</td><td>Noise</td><td>e. An Acoustic Impact Assessment Report identifying and assessing the range of noise levels within the locality, the noise levels generated by the extractive operation and detailing proposed measures to ensure noise emission levels are within acceptable limits.</td></tr>
</table>

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.6 Air Quality	Prescriptive Measures	Air Quality	a. Access roads should be sealed at the entrance to extraction sites.	Section 5.2 and Appendix 4 addresses matters relating to air quality including assessment of impacts (5.2.7) and mitigation measures (5.2.6).
			b. Internal access roads should be sealed or watered on a regular basis for the purpose of dust suppression.	
			c. Dust suppression equipment should be fitted to processing equipment.	
			d. Stockpiles of material should be stabilised and maintained so as to prevent any dust nuisance.	
			e. Proponents should utilise wind activated water sprinkler systems to ensure extraction sites minimise dust generation particularly during periods of high wind and when sites are unattended.	
			f. Prior to leaving extraction sites, all laden trucks should have their payloads fully covered by suitable material to prevent spillage from the trucks onto roads and adjoining properties.	
			g. Proponents should provide details of effective measures proposed to be implemented to suppress dust generated from: – blasting, – removal of overburden, – site clearing, – extraction and haulage, – moving material onto and from stockpiles, – mobile earthmoving equipment, – blowoff from truck loads, and – crushing and screening procedures.	
			h. Proponents should ensure that blasting is not undertaken in strong wind and/or prolonged dry weather periods.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.6 Air Quality (Cont'd)	DA Submission Requirements	Air Quality	i. An Air Quality Assessment Report detailing: – meteorological conditions of the site and locality including temperature, humidity, wind and rain, – number and classification of emission sources and distance to potential receptors, – propensity for on-site and imported material to generate dust and odour, including washed sands, – gaseous emissions from vehicles and machinery including carbon monoxide, nitrogen oxides, hydrocarbons and particulate matters, – maximum acceptable increase for dust deposition over existing levels, – expected annual average dust concentration and deposition levels, – compliance with EPA criteria for dust deposition and concentration rates, and – recommendations, including suggested range of dust control measures.	The Air Quality Assessment undertaken by Northstar Air Quality Pty Ltd is provided as Appendix 4.
2.5.7 Mitigation and Monitoring	Prescriptive Measures	General	a. A framework should be established for the ongoing monitoring of an extractive operations environmental management practices and mitigation measures.	An EMP would be prepared following receipt of development consent which would cover air quality monitoring and management.
	DA Submission Requirements		b. An Environmental Management Plan should be submitted to Council outlining appropriate environmental management practices for the proposed extractive operation as well as establishing a framework for ongoing monitoring of the proposed practices	
			Note: The Environmental Management Plan should establish a Flora and Fauna Monitoring Program to verify the effectiveness of mitigation measures implemented.	
	Post DA Submission Requirement		c. An annually updated Environmental Management Plan may be required to be resubmitted to Council as a condition of consent, demonstrating that environmental management practices are being followed and specifying a timeframe for the implementation of any necessary remedial actions identified by monitoring.	
			Note: Applicants are advised to consult the publication titled Guidelines for the Preparation of Environmental Management Plans (2004) by the Department of Infrastructure, Planning and Natural Resources.	

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.8 Extraction Sequence	Prescriptive Measures	General	a. Applications should document the means to reduce the depth and area of extraction in locations most likely to have an impact upon groundwater, flora, fauna, archaeology, and other sensitive site features.	Section 2.5 presents information relating to the proposed extraction operations including design features, extraction sequence, extraction methods, equipment used and extraction rates.
	DA Submission Requirements		b. Applications should be accompanied by an Extraction Program Plan, which identifies an orderly sequence of extraction having regard to: – topographical and landscape areas of scenic or environmental sensitivity, – variations in the type, quantity and quality of the deposit over the entire development site, – location, area, depth of extraction unit/area, – the estimated volume of deposit of each extraction unit/area within the overall extraction program plan, and – expected duration/lifespan of each extraction unit/area.	
			Note: The Extraction Program Plan should be supplemented with scaled plans, profiles and cross sections for all phases and stages of the operation.	
2.5.9 Rehabilitation	Prescriptive Measures	Rehabilitation	a. Extraction areas should be progressively rehabilitated to reflect the topography, drainage characteristics and landscape quality of the surrounding terrain.	Section 2.13 addresses matters relating to rehabilitation. All final or terminal benches within the Extraction Area would be progressively revegetated to provide for the establishment of native vegetation endemic to the area. Stockpiled topsoil and/or overburden (where available) would be progressively placed on each bench once activities cease in that area prior to seeding.
			b. Vegetative cover incorporating native plants and grass covers and endemic species should be established at the earliest possible opportunity.	
			c. Stockpiles of clean topsoil & overburden should be appropriately formed and shaped to ensure the viability of the soil and seed source of the site/area for later re-spreading or backfilling.	
			d. Topsoil and overburden used as bund walls during extraction should be stabilised using appropriate native species and rehabilitation techniques under the direction of a qualified plant Ecologist or Landscape Architect and used as backfill only when not contaminated with exotic grasses or weeds.	
			e. The extraction area should only be backfilled with earth and rock materials sourced as a result of extraction. No solid waste or putrescible materials should be disposed of within the site.	
	DA Submission Requirements	Rehabilitation	a. A Vegetation Management and Restoration Plan (VMRP) should be submitted with the application.	An EMP would be prepared following receipt of development consent which would cover rehabilitation management.

Table A2.3 (Cont'd)
Coverage of the Hornsby Development Control Plan in EIS

Relevant DCP Part	Development Control	Issue	Description	EIS Section / Comments
2.5.9 Rehabilitation (Cont'd)	DA Submission Requirements (Cont'd)	Rehabilitation (Cont'd)	g. Applications should be accompanied by a Rehabilitation Plan outlining the rehabilitation program proposed to optimise sustainable future land use including: – details of the proposed future land use and final landform, – timeframe for rehabilitation works, – measures to maintain the viability of topsoil over time and to re-use this resource for site rehabilitation, – erosion control measures, – revegetation of disturbed areas in line with the Vegetation Management Restoration Plan, – weed management proposals, – final drainage patterns, and – identifying who will be responsible for undertaking any further remediation after operations cease.	Section 2.13 addresses matters relating to rehabilitation. Figure 2.7 shows the indicative final landform. Further details will be presented in the EMP which would be prepared following receipt of development consent.
			Note: Applicants are advised to consult Council's publication Guidelines for the preparation of Vegetation Management and Restoration Plans 2008. The collection, processing and storage of native seeds should utilise current best practice measures. Visit the Department of Environment, Climate Change and Water (DECCW) website www.or the FloraBank website www.florabank.org.au for further information on best practice in planning for seed collection.	Noted.

Appendix 3

Road Transport Assessment

prepared by
The Transport Planning Partnership Pty Ltd

(Total No. of pages including blank pages = 67)



Maroota Central Civil Sandstone Quarry Road Transport Assessment

Prepared for:

Central Civil (NSW) Pty Ltd

27 October 2023

The Transport Planning Partnership

Maroota Central Civil Sandstone Quarry Road Transport Assessment

Client: Central Civil (NSW) Pty Ltd

Version: Final

Date: 27 October 2023

TTPP Reference: 22264

Quality Record

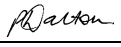
Version	Date	Prepared by	Approved by	Signature
Final	09/08/2023	PJD	PJD	

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ARRB (2020), *Unsealed Roads Best Practice Guide*.

Australian Trucking Association (2018), *Truck Impact Chart*.

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Lyle Marshall & Associates Pty Ltd (2008), *Report on Traffic and Transportation Requirements for Sand Extraction at Port Lot 3 DP567166 and Part Lot 2 DP510812 at Old Northern Road, Maroota*.

Transport for New South Wales (2022), https://roads-waterways.transport.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/ (23 September 2022)

1 Introduction

This report has been prepared on behalf of Central Civil (NSW) Pty Ltd (the Applicant) to present the findings of an assessment of the road transport implications of the proposed establishment and operation of the Maroota Central Civil Quarry (the Proposal) located at 4773 Old Northern Road, Maroota. The report is presented as follows:

- Section 1 describes the Proposal and the assessment requirements
- Section 2 describes the existing road transport environment in the vicinity of the site, including the road network, heavy vehicle routes, road safety history, and traffic demands.
- Section 3 quantifies the expected trip generation of the Proposal during the site establishment and operational stages.
- Section 4 assesses the impacts of the Proposal on the operation and safety of the road transport environment, and described recommended measures to mitigate impacts of the Proposal.
- Section 5 presents the conclusions of the study.

1.1 Description of the Proposal

The Proposal includes the establishment and operations of the Maroota Central Civil Quarry (the Quarry), which would include the following:

- extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone;
- crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance;
- importation of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry;
- product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day;
- progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation; and
- ongoing operations for a period of 30 years from the commencement of operations under the development consent.

The Quarry would operate between 7:00 am and 5:00 pm Monday to Friday and between 7:00 am and 1:00 pm on Saturday. It would not operate on Sundays or public holidays. The transport of quarry products would typically use semitrailers and truck and dog combinations,

with an average payload of 32 tonnes. Vehicular access for the Quarry would be via the Unnamed Local Road, with the Site Access Road to be constructed from the eastern end of that road. The Site Access Road would be an unsealed road with a maximum carriageway width of 8 m. Once operational, four full time equivalent people would be employed on-site each day.

Importation of Virgin Excavated Natural Material (VENM) to the Quarry Site would occur on a campaign basis and would be wholly dependent on the generation of materials at construction sites in the Sydney metropolitan area. It is not possible to accurately predict the timing or scale of VENM importation on a monthly or annual basis. Notwithstanding, the Applicant would limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the maximum number of 10 laden heavy vehicle movements per day is not exceeded. Therefore, for the purposes of assessing Quarry generated traffic, it is considered that heavy vehicle movements associated with importation of VENM have been included in the maximum number of heavy vehicles travelling to and from the Quarry Site.

1.2 Assessment Requirements

This assessment has been prepared with regard to the Secretary's Environmental Assessment Requirements relating to traffic and transport aspects of the Proposal, and Hornsby Shire Council advice regarding traffic and safety aspects of the Proposal, which are summarised in Table 1.1, which also indicates where each matter is addressed.

Table 1.1: Assessment Requirements

Traffic and Transport Requirement	Where Addressed
Secretary's Environmental Assessment Requirements	
• accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;	Section 3.1 Section 3.2
• an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State Road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;	Section 4
• a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;	Section 4.10
• evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and	EIS Section 1.8.2
• a description of access roads, specifically in relation to nearby Crown roads and fire trails.	Section 2.2
Hornsby Shire Council Advice	
A Traffic and Parking Report prepared by a suitably qualified Traffic Engineer will be required. The report is to address, but not be limited to, the following issues:	This document
• There is no parking rate for the Quarry development. Parking provision for the site should be analysed from a first-principal approach with the number of employees to the site and number of truck movement to/from the site.	Section 4.9
• Turning path analysis for the largest vehicle to enter/exit the site	Section 4.4 Section 4.5
• Assessment of pavement impacts of development on the access road (unnamed).	Section 4.6
• The existing driveway is used by a significant number of heavy vehicles including 25m long B-doubles. Any improvements to the driveway or other infrastructure to accommodate the B-double vehicles must be undertaken by the applicant/owner of property.	Noted
• All car parking must be constructed and operated in accordance with AS/NZS 2890.1:2004 Off-street car parking and AS 2890.2:2002 Off-street commercial vehicle facilities.	Section 4.9
• Any proposed landscaping and/or fencing must not restrict sight distance from the driveway to pedestrians and cyclists travelling along the footpath; see Figure 3.3 AS/NZS 2890.1:2004.	Section 4.4.1
• The application will be referred to TfNSW for comment.	Noted

For clarity, throughout this report, a trip is defined as a one way movement. A vehicle arriving at the site and departing the site generates two vehicle trips.

2 Road Transport Environment

2.1 Site Location

The Quarry Site is at 4773 Old Northern Road, Maroota, as presented in Figure 2.1. It is located on rural land within Lots 1 and 2 DP6092244, which is entirely owned by the Applicant, and an unnamed Crown road reserve, which lies generally along the southern boundary of the site. The site lies within the Hornsby Shire Local Government Area (LGA), with Old Northern Road forming the boundary between Hornsby (east side) and The Hills Shire (west side) LGAs in the vicinity of the site.

2.2 Road Network

The road network serving the site is briefly described below.

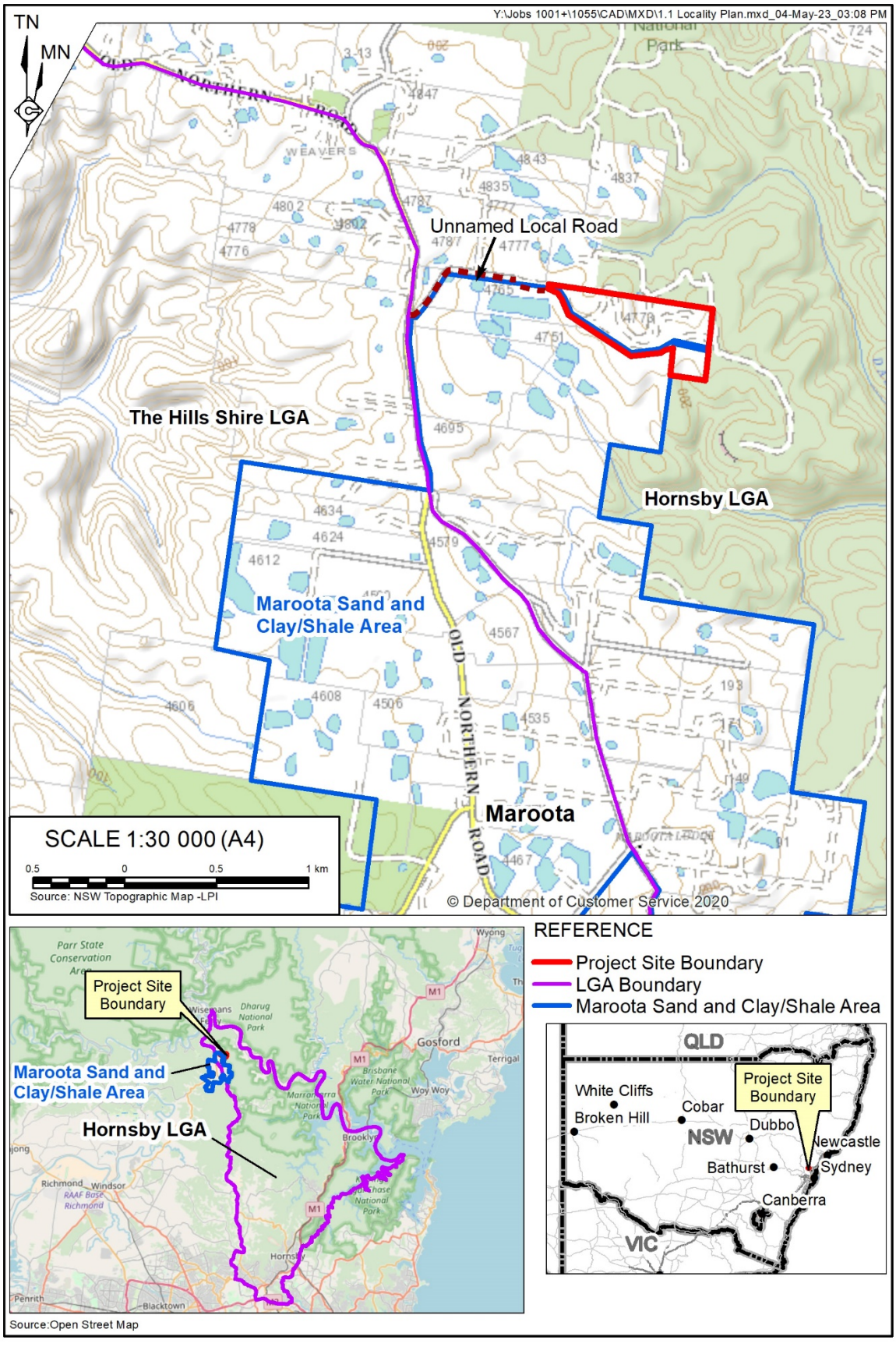
Old Northern Road is a State Road that provides a link between Wisemans Ferry and Baulkham Hills, via Maroota, Forest Glen, Glenorie, Kenthurst, Middle Dural, Dural and Castle Hill. In the vicinity of the Site, Old Northern Road has a single travel lane in each direction, and a posted speed limit of 80 kilometres per hour (km/h). To the north, heavy vehicle access is limited by a 15 tonne load limit at Gunderman.

Access to the Quarry Site from Old Northern Road is provided via an **Unnamed Local Road** that extends approximately 700 m from a priority-controlled T-intersection with Old Northern Road. At its intersection with the Unnamed Local Road, Old Northern Road is widened to provide a deceleration lane for vehicles turning right into the Unnamed Local Road, and an acceleration lane for vehicles turning right out of the Unnamed Local Road. These allow vehicles to turn in and out of the Unnamed Local Road clear of northbound through traffic on Old Northern Road.

Sight distance at the intersection of Old Northern Road with the Unnamed Local Road is satisfactory, with drivers approaching the Unnamed Local Road able to observe a vehicle waiting in the side road from a distance exceeding 200 m in each direction.

The Unnamed Local Road provides access to PF Formation Pit 5 & 15 Quarry which is located approximately 100 m from the Old Northern Road intersection, and to Camilleri Stockfeeds which is located at its eastern end, as well as access to a limited number of rural residential properties. The Unnamed Local Road is a sealed two-way road with a posted speed limit of 60 km/h, and advisory speed signs of 45 km/h then 25 km/h ahead of a bend and the narrowing of the road approximately 350 m from Old Northern Road to one-lane, two-way for approximately 200 m. It has painted edgelines (significantly faded in parts) and two-way barrier centrelines in the vicinity of the bend.

Figure 2.1: Locality Plan



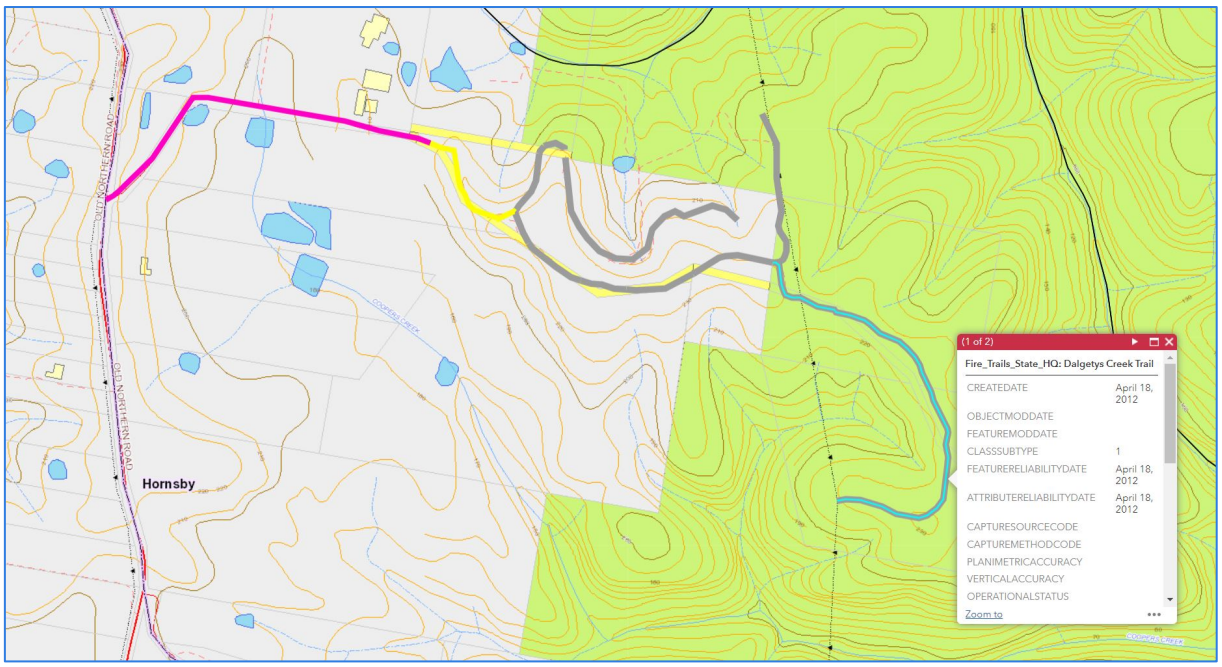
The one-lane, two-way section of the Unnamed Local Road is approximately 5.0 m wide, and operates for one-way-at-a-time traffic only, with "give way" signs and linemarking at both ends, requiring drivers to give way to any vehicle already in that section. Sightlines are good, with drivers at each end or within the one-lane two-way section being easily able to observe the presence of vehicles travelling in the opposing direction. As vehicular access for Camilleri Stockfeeds is located east of the single lane section, all of its traffic uses that part of the road when entering or exiting.

The Camilleri Stockfeeds private access lies on the northern side of the Unnamed Local Road, and is located at a crest in that road. All vehicles entering that site turn left from the Unnamed Local Road, and all vehicles exiting the site turn right on to the Unnamed Local Road. Non-standard warning signs are installed on the side of the Unnamed Local Road approximately 30 m ahead of the stockfeed access advising that approaching trucks (entering via left turn) must give way to exiting trucks, which is contrary to the expected priority. This atypical priority requires inbound truck drivers to be able to observe an outbound truck and react to stop clear of the path of the exiting vehicle. There is no indication given to the inbound drivers regarding where on the Unnamed Road that they need to stop their vehicle to remain clear of the path of an outbound truck. Exiting drivers from the Camilleri Stockfeeds site are also provided with a "give way" line prior to exiting the site, located approximately 18 m north of the fenceline. Thus the overall priority expectations at the existing intersection with the Unnamed Local Road are unclear. A check of the swept paths of vehicles at the intersection indicates that inbound and outbound trucks to/from Camilleri Stockfeeds cannot turn concurrently, with the major constraint being the small radius of the road on the north-west corner, that requires articulated vehicles entering the site to travel on the incorrect side of the Unnamed Local Road. The sealed surface of the Unnamed Local Road is widened on the southern side opposite the access to the stockfeed supplier, which generally reflects the outer wheel path of articulated vehicles exiting the site, noting as above that heavy vehicles cannot enter and exit concurrently.

The Quarry Site boundary is approximately 180 m east of the Camilleri Stockfeeds access. East of the Camilleri Stockfeeds, the Unnamed Local Road is an informal single lane gravel and dirt track providing access to the Proposal Site only.

NSW Rural Fire Service (Hornsby/Ku-ring-gai Fire Control Centre) has advised that the **Dalgety's Creek Fire Trail** is located immediately east of the site as shown in Figure 2.2, and is accessed via the Crown road reserve from the Unnamed Local Road. The existing track along the Crown road reserve within the Quarry Site provides access between the Unnamed Local Road and the fire trail, which links to the easement for the electricity transmission line to the east of the site.

Figure 2.2: Dalgety's Creek Fire Trail

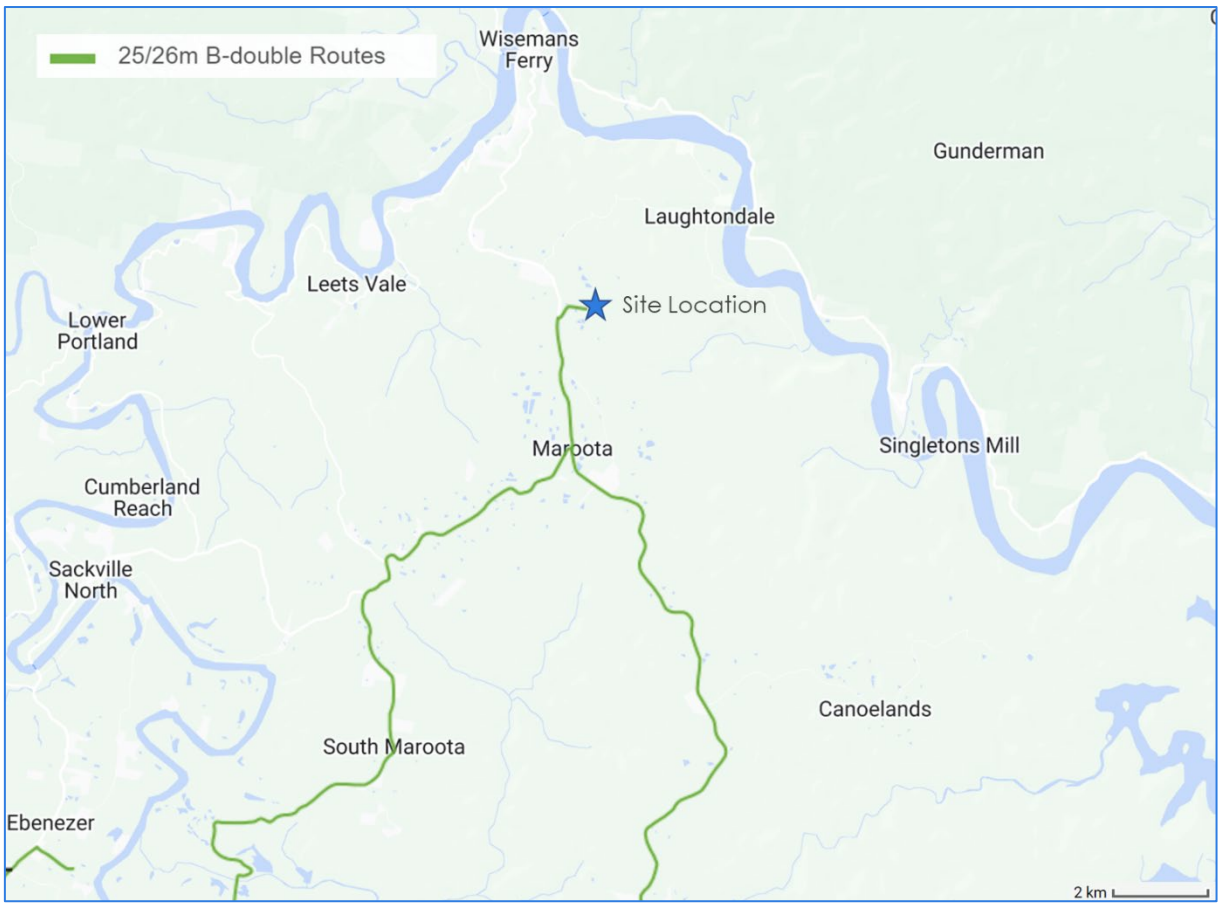


Source: NSW Rural Fire Service

2.3 Heavy Vehicle Access

Old Northern Road provides access to a number of quarries in the local region, and together with the Unnamed Local Road and Wisemans Ferry Road, is an approved route for B-doubles, as shown in Figure 2.3. To the south, the approved routes link the site to other approved routes in the region, such as Windsor Road at McGraths Hill, Pennant Hills Road at Pennant Hills, Castle Hill Road at West Pennant Hills and Showground Road at Castle Hill. To the north of the site, Old Northern Road is not an approved route for B-doubles, and heavy vehicle access is limited by a 15 tonne load limit on Old Northern Road at Gunderman.

Figure 2.3: Approved B-double Routes



Source: TfNSW (2022)

2.4 Road Safety

Road crash data for Old Northern Road and the Unnamed Local Road were obtained from the Transport for NSW Centre for Road Safety for the period of 1 January 2017 to 31 December 2021. Data collected over this period include crashes which conform to the national guidelines for reporting and classifying road vehicles crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.
- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

Over the five-year period reviewed:

- no crashes were reported at or near the intersection of the Unnamed Local Road and Old Northern Road;

- no crashes were reported on the Unnamed Local Road; and
- of the 75 crashes reported along Old Northern Road between Castle Hill Road and Wisemans Ferry:
  - one crash involved an articulated vehicle and five crashes involved a large rigid truck;
  - speeding was nominated as a contributing factor in 14 crashes; and
  - fatigue was nominated as a contributing factor in 2 crashes.

The road crash history does not highlight any specific poor safety history relating to the Unnamed Local Road, its intersection with Old Northern Road, or with the movement of heavy vehicles on Old Northern Road, being the primary access road for the Site.

2.5 School Buses

Busways operates school buses to and from Maroota Public School, which is located to the south of the Site. During the morning, Route 5114 approaches via Kearney Road and Wisemans Ferry Road then southbound on Old Northern Road to Roberts Road and Old Telegraph Road, then southbound on Old Northern Road to Canoelands Road, then returns northbound on Old Northern Road to the school. Route 5114 commences at 7:44 am from the Sackville North Fire Station, and departs the Canoelands Road Bush Fire Brigade Shed on the final leg of the trip at 8:32 am. Route 5112 departs 1222 River Road at 7:07 am, and travels via River Road, Sackville Ferry Road and Wisemans Ferry Road, then returns via Sackville Ferry Road to the Sackville North Fire Station for students to transfer to Route 5114.

During the afternoon, Route 5614 departs the school northbound via Old Northern Road past the Unnamed Local Road to the Maroota Bus Shelter (past Laughtondale Gully Road), then returns southbound past the Unnamed Local Road to Roberts Road and Old Telegraph Road, then southbound to Lot 4340, before returning northbound on Old Northern Road to Wisemans Ferry Road, accessing several local roads before accessing Sackville Ferry Road and return to Wisemans Ferry Road. Route 5614 departs the school at 3:05 pm, and arrives at the final destination on Wisemans Ferry Road at 3:48 pm. Students may transfer from Route 5614 to Route 5612 which departs Wisemans Ferry Road and Sackville Ferry Road at 4:07 pm to travel to 1222 River Road via Sackville Ferry Road and Wisemans Ferry Road.

School buses may therefore be present on the roads in the vicinity of the Site during the periods before and after school.

2.6 Traffic Survey Program

In order to quantify existing road network conditions in the vicinity of the Proposal, automatic tube count (ATC) surveys were undertaken over one week from Friday 14 October to Thursday 20 October 2022 (inclusive) at the following locations:

- Unnamed Local Road, 200m East of Old Northern Road, to the north of the vehicular access for the PF Formation Pit 5 & 15 Quarry; and
- Old Northern Road, 300m North of the Unnamed Local Road.

To consider traffic distribution associated with the Unnamed Local Road, an intersection turning movement survey was conducted at the intersection of the Unnamed Local Road with Old Northern Road during morning and evening peak periods on Thursday 20 October 2022[1].

2.6.1 Traffic Volumes

Table 2.1 summarises the peak hourly and daily traffic volumes recorded during the ATC survey period.

Table 2.1: Surveyed Traffic Volumes October 2022

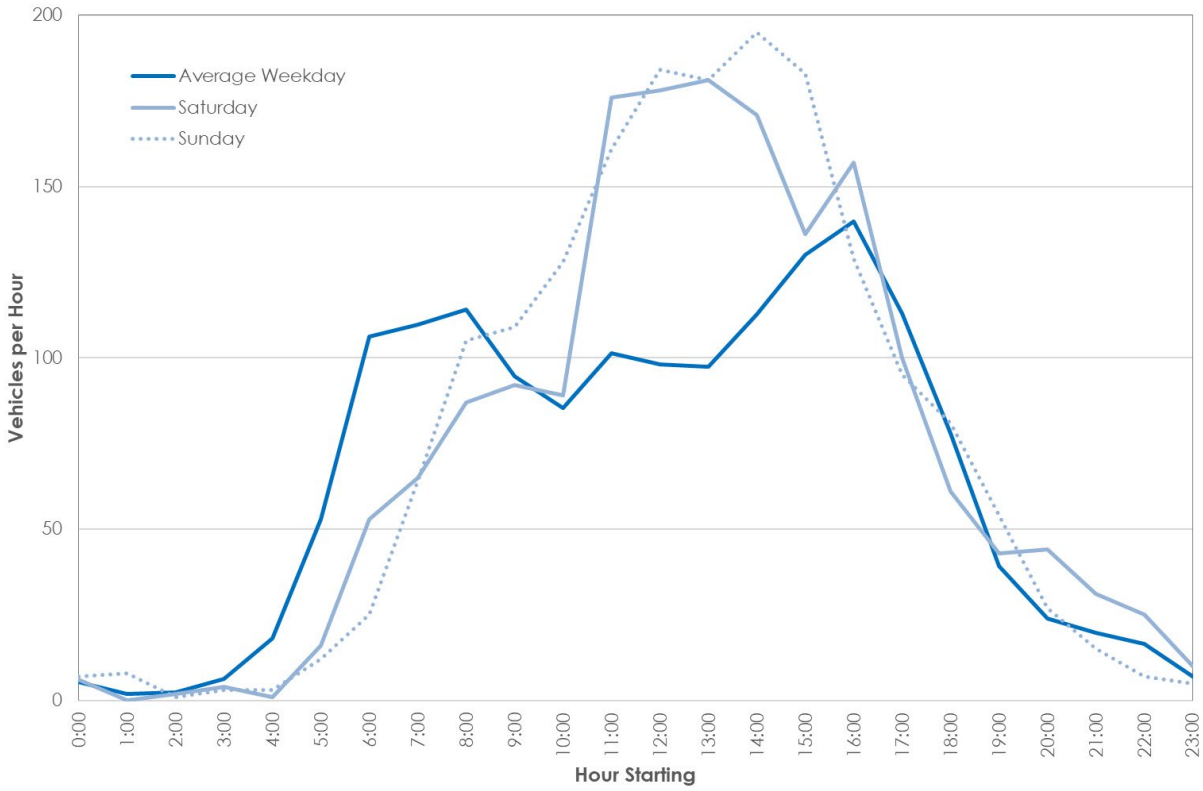
	AM Peak Hour		PM Peak Hour		Vehicles per Day
	Hour Start	Vehicles per Hour	Hour Start	Vehicles per Hour	
Unnamed Local Road – 200m East of Old Northern Road					
Monday	8:00	11	14:00	17	135
Tuesday	11:00	19	14:00	19	145
Wednesday	5:00	11	14:00	19	131
Thursday	5:00	13	14:00	22	165
Friday	5:00	11	13:00	19	119
Saturday	6:00	6	15:00	5	38
Sunday	5:00	5	15:00	4	19
Old Northern Road – 300m North of Unnamed Local Road					
Monday	6:00	118	16:00	134	1,446
Tuesday	6:00	124	16:00	156	1,592
Wednesday	8:00	138	15:00	142	1,608
Thursday	7:00	121	16:00	161	1,597
Friday	8:00 & 11:00	108	15:00	141	1,626
Saturday	11:00	176	13:00	181	1,728
Sunday	11:00	161	14:00	195	1,782

The survey results demonstrate that on both of the surveyed roads, weekday and weekend traffic volumes are notably different. On the Unnamed Local Road, weekend traffic volumes are distinctly lower than on weekdays, while on Old Northern Road, weekend traffic volumes are higher than those of the weekdays. The highest hourly traffic volumes typically occur during the afternoons on Old Northern Road.

[1] The survey periods did not coincide with school holidays, nor with ferry closures and road closures in the region that occurred as a result of flooding.

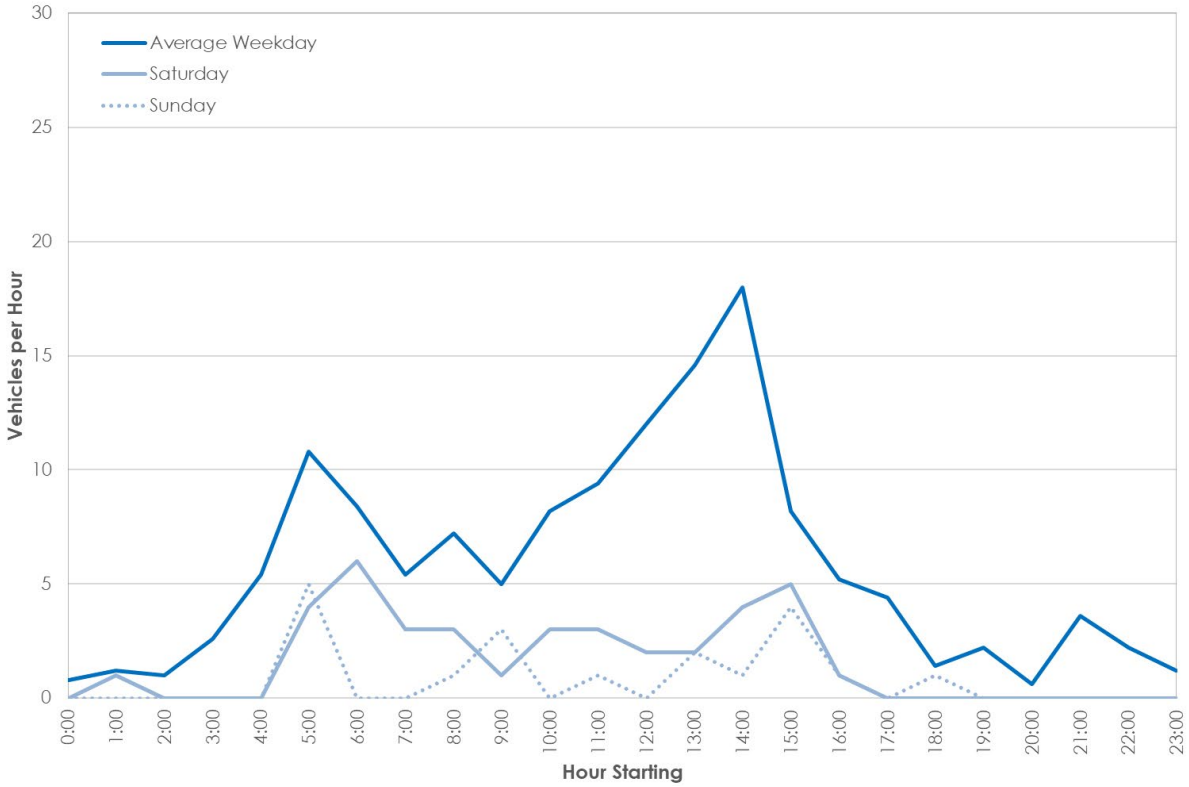
The surveyed temporal distribution of traffic on Old Northern Road is presented in Figure 2.4, which demonstrates that on weekdays, there is distinct morning and afternoon peak periods, while on weekend days, there is a significant single peak period through the middle of the day and afternoon. Over the Proposal's proposed operating hours (7:00 am to 6:00 pm weekdays and 7:00 am to 1:00 pm Saturdays), Old Northern Road carried an average of approximately 110 vehicles per hour north of the Unnamed Local Road.

Figure 2.4: Old Northern Road Traffic by Time of Day (vehicles per hour)



The surveyed temporal distribution of traffic on the Unnamed Local Road is presented in Figure 2.5, which demonstrates that over the average weekday, there is distinct peak during the afternoon, with a smaller peak during the morning. Over the Proposal's proposed operating hours (7:00 am to 6:00 pm weekdays and 7:00 am to 1:00 pm Saturdays), the Unnamed Local Road carried an average of fewer than nine vehicles per hour at the surveyed location.

Figure 2.5: Unnamed Local Road Traffic by Time of Day (vehicles per hour)



2.6.2 Traffic Composition

The ATCs collected details of the composition of the traffic based on the Austroads Vehicle Classification System. Under that system, light vehicles include motorcycles, cars, vans, four-wheel drives, and utilities (including those towing a trailer or caravan), heavy vehicles include heavy rigid trucks such as single unit trucks and buses, and articulated vehicles such as semi-trailers, rigid trucks with trailers, B-doubles and road trains where permitted. The surveyed composition of traffic using the ATC data is summarised in Table 2.2, which classifies the heavy vehicles as either rigid or articulated. These results separately consider the weekday and weekend day conditions.

Table 2.2: Surveyed Average Weekday Traffic Classification (vehicles per day)

Day	Light Vehicles	Heavy Rigid Vehicles	Articulated Vehicles	Total Vehicles	Percent Heavy Vehicles
Unnamed Local Road – 200m East of Old Northern Road					
Average Weekday	72	28	39	139	48.5
Saturday	25	3	10	38	34.2
Sunday	15	4	0	19	21.1
Old Northern Road – 300m North of Unnamed Local Road					
Average Weekday	1,258	255	61	1,574	20.1
Saturday	1,562	147	19	1,728	9.6
Sunday	1,639	123	20	1,782	8.0

2.6.3 Vehicle Speeds

The 85th percentile speed is the speed at or below which 85 percent of vehicles travel, and is commonly consistent with the posted speed limit. Over the surveyed week, the 85th percentile speed of vehicles on Old Northern Road north of the Unnamed Local Road was 80.64 km/h for southbound vehicles and 81.00 km/h for northbound vehicles. These are consistent with the posted speed limit of 80 km/h on Old Northern Road.

2.6.4 Intersection Turning Movements

The intersection survey period covered the busiest three hours on Old Northern Road during each of the morning and evening periods on Thursday 20 October 2022 during the proposed operating hours of the Proposal. The results of the intersection turning movements survey over the morning and evening periods are summarised in Table 2.3, and demonstrate that all heavy vehicles entering and exiting the Unnamed Local Road approached from and departed to the south. Over the six hour survey period, approximately 80 per cent of light vehicles that entered or exited the Unnamed Local Road approached from or departed to the south.

Table 2.3: Vehicle Turning Movements into and out of the Unnamed Local Road

	Light Vehicles	Heavy Rigid Vehicles	Heavy Articulated Vehicles	Total Vehicles
7:00am to 10:00am				
Left In to Unnamed Local Road	0	0	0	0
Right In to Unnamed Local Road	7	1	10	18
Left Out of Unnamed Local Road	3	1	12	16
Right Out of Unnamed Local Road	0	0	0	0
3:00pm to 6:00pm				
Left In to Unnamed Local Road	1	0	0	1
Right In to Unnamed Local Road	2	1	3	6
Left Out of Unnamed Local Road	9	2	3	14
Right Out of Unnamed Local Road	4	0	0	4

2.7 Other Local Traffic

As described in Section 2.2, the Unnamed Local Road provides access to Camilleri Stockfeeds at its eastern end, and to PF Formation Pit 5 & 15 Quarry approximately 100 m from the Old Northern Road intersection, as well as access to a limited number of rural residential properties. The traffic generated by the main two main developments using the Unnamed Local Road is discussed below.

2.7.1 PF Formation Pit 5 & 15 Quarry

The ATC survey on the Unnamed Local Road was located such that it did not include trips generated by the PF Formation Pit 5 & 15 Quarry. The modified development consent for the PF Formation Pit 5 & 15 Quarry (DA/578/2009/D) permits up to 35 truckloads to be removed from the site each day, averaged over one month. With the arrival of empty vehicles and departure of laden vehicles, the PF Formation Pit 5 & 15 Quarry would therefore be expected to generate up to 70 truck trips per day on weekdays and Saturdays. As this is averaged over one month, more than 70 truck trips may be generated on any one day.

Activities at PF Formation Pit 5 & 15 Quarry are permitted between 7:00 am and 6:00 pm Monday to Saturday inclusive. Condition 62 indicates that *"up to ten (10) laden vehicles can enter or leave the premises between 0600 and 0700 Monday to Saturday inclusive"*. It is assumed that this permits up to 10 heavy vehicle trips to and/or from the PF Formation Pit 5 & 15 Quarry between 6:00 am and 7:00 am[2].

On average (and noting this would be subject to variations on a day-to-day and hour-to-hour basis), it would be expected that the PF Formation Pit 5 & 15 Quarry generates approximately six heavy vehicle trips per hour (three inbound and three outbound) between 6:00 am and 6:00 pm on weekdays and Saturdays. Lyle Marshall (2008) indicates that almost all the quarry's heavy vehicles travel south on Old Northern Road.

2.7.2 Camilleri Stockfeeds

Due to its location, the ATC survey on the Unnamed Local Road captured traffic being generated by the Camilleri Stockfeeds development. The results indicate that, assuming all vehicles at the ATC location were associated with the stockfeeds site, over the survey period, the stockfeeds site generated between 119 and 165 vehicle trips per day (average 139) on weekdays, and 38 vehicle trips on Saturday. Its peak traffic generation typically occurred in the early afternoon, with a peak of 22 vehicles per hour recorded over the survey period. Over the average weekday, nearly half of all vehicle trips generated by the stockfeeds site were made by heavy vehicles, with more than half of those being articulated vehicles, including semitrailers, B-doubles and truck/trailer combinations.

TTPP notes that CSF Proteins conducted work on weekends at the site to replace a storm-damaged roof (CSF Proteins, 2023). That work commenced 23 July 2022 and was completed on 11 December 2022, hence the weekend traffic survey result captured in October 2022 may be atypically high due to that activity.

[2] Lyle Marshall & Associates (2008) quotes the equivalent conditions for Development Consent 725/94 as applied to operations at Part Lot 3 DP567166, as *"the operator will however be permitted to a maximum of ten (10) laden vehicles to enter and exit the subject site between the hours of 6:00am and 7:00am, Monday to Saturday, excluding Sundays and Public Holidays."* DA/578/2009 proposed no change to this condition, however the wording reported by Lyle Marshall (2008) suggests a total of 20 heavy vehicle movements were permitted (being 10 vehicles entering and 10 vehicles exiting), while the wording of DA/578/2009 suggests a total of 10 heavy vehicle movements are permitted.

2.8 Background Growth in Traffic

Background growth in traffic may be expected to occur that is unrelated to any specific development. Considering the nature of the Unnamed Local Road and the limited access it provides, no background growth is assumed to occur on the Unnamed Local Road.

For the purpose of this assessment, to estimate future traffic conditions on Old Northern Road, a compound growth rate of 2% per year has been applied to the surveyed traffic volumes over a period of ten years. This is considered to be a conservatively high estimate, noting that a survey conducted in 2007 (Lyle Marshall, 2008) found that Old Northern Road carried an average of 1,774 vehicles per weekday south of the Unnamed Local Road, while the recent survey (Table 2.1) found that it carried 1,574 vehicles per weekday north of the Unnamed Local Road. Allowing for traffic generated by the PF Formation Pit 5 & 15 Quarry and Camilleri Stockfeeds that uses Old Northern Road south of the Unnamed Local Road, the current volume south of the Unnamed Local Road is expected to be similar that surveyed in 2007.

2.9 Intersection Operation

The operation of the intersection of Old Northern Road with the Unnamed Local Road has been assessed using SIDRA INTERSECTION 9.1, an analysis program that determines characteristics of intersection operating conditions including the degree of saturation, average delays and intersection level of service. The degree of saturation, or x-value, is the ratio of the arrival rate of vehicles to the capacity. The average delay, expressed in seconds per vehicle, is measured over all movements at signalised intersections, and over the movement with the highest average delay at roundabout and priority intersections. Average vehicle delay is the measure of intersection performance defined by TfNSW. Table 2.4 presents the criteria adopted by TfNSW for assessing the level of service of intersections.

Table 2.4: Intersection Level of Service Criteria

Level of Service	Average Delay per Vehicle (seconds per vehicle)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2.5 presents a summary of the peak hour operating characteristics of the intersection as surveyed in October 2022, and with growth in through traffic on Old Northern Road as described in Section 0. Saturday peak hour demands at the intersection have been estimated based on the surveyed volumes on Old Northern Road and the Unnamed Local Access Road, with the addition of the average hourly truck trips generated by the PF Formation Pit 5 & 15 Quarry as described in Section 2.7.1.

Table 2.5: Intersection Operation Old Northern Road and Unnamed Local Road

	X-Value	Average Delay[A]	Level of Service
Surveyed Weekday 2022			
AM Peak 7:00am to 8:00am	0.04	7.0	A
PM Peak 3:45pm to 4:45pm	0.05	8.6	A
Baseline Future Weekday = Surveyed with Growth over 10 Years			
AM Peak 7:00am to 8:00am	0.05	9.6	A
PM Peak 3:45pm to 4:45pm	0.07	8.8	A
Estimated Saturday Peak Hours 2022			
11:00am to 12:00pm	0.05	9.6	A
1:00pm to 2:00pm	0.06	7.0	A
Baseline Future Saturday = Estimated with Growth over 10 Years			
11:00am to 12:00pm	0.07	9.9	A
1:00pm to 2:00pm	0.07	7.0	A

[A] *Seconds per vehicle for movement with the highest average delay per vehicle.*

The results demonstrate that during the morning and evening peak hours, the intersection operates at a good level of service, with spare capacity and short delays to vehicles. With background growth in traffic on Old Northern Road, conditions are forecast to remain good, with spare capacity and short delays to vehicles.

3 Traffic Generation of the Proposal

3.1 Site Establishment Activity Traffic Generation

Development of the site prior to the commencement of quarrying operations would include widening of the Site Access Road, site levelling, and establishment of facilities including a demountable office, water tank, portable amenities, vehicle parking and equipment storage areas. Site establishment activities would take place between 7:00 am and 5:00 pm on weekdays and between 7:00 am and 1:00 pm on Saturdays. No construction / site establishment activities would occur on Sundays or public holidays.

The site establishment activities are expected to occur over a period of between three and six months, and employ up to nine people. As a robust assessment, it is assumed that all workers would travel independently to and from the site each day. They would typically travel in light vehicles (e.g., passenger cars and light commercial vehicles including 4WDs and utilities). Heavy equipment such as excavators required for the establishment activities would be transported to site on low loaders or similar, and remain on-site throughout the period they are needed, then transported from the site. During the site establishment activities, it is anticipated that there would be a maximum of three deliveries on any one day, and may occur on weekdays or Saturdays. Deliveries would use a mix of vehicle types, with truck and dog combinations being the largest.

The site establishment activities would therefore be expected to generate up to:

- 18 light vehicle trips per day by the workforce; and
- 6 heavy vehicle trips per day for deliveries.

The workforce would arrive prior to the start of activity and depart after the end of activities each day, while the delivery trips would be spread throughout the day and may occur at any time during the construction hours. Table 3.1 summarises the traffic generation of the site establishment activity.

Table 3.1: Maximum Traffic Generation During Site Establishment

	Inbound		Outbound		Two Way Total
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	
6:00 am to 7:00 am (vehicles per hour)					
Employees	9	-	-	-	9
Visitors/Deliveries	-	-	-	-	
Site Establishment Hours – Weekday 7:00 am to 5:00 pm or Saturday 7:00 am to 1:00 pm (vehicles per hour)[A]					
Employees	-	-	-	-	2
Visitors/Deliveries	-	1	-	1	
Weekday 5:00 pm to 6:00 pm or Saturday 1:00 pm to 2:00 pm (vehicles per hour)					
Employees	-	-	9	-	9
Visitors/Deliveries	-	-	-	-	
Daily Total (vehicles per day)					
Employees	9	-	9	-	24
Visitors/Deliveries	-	3	-	3	

[A] *Peak hourly delivery traffic would not occur each and every hour throughout the day.*

Table 3.1 indicates that the site establishment activity would be expected to generate up to nine vehicle trips during its morning and evening peak hours, and up to 24 vehicle trips per day.

3.2 Operational Activity Traffic Generation

The Quarry would generate traffic as a result of the transport of quarry products, the movement of the workforce to and from the site each day, and miscellaneous deliveries and visitors. Each of these is discussed in this section.

3.2.1 Operational Product Haulage

The Proposal anticipates a maximum annual production rate of 30,000 tpa of material, to be processed on site and transported by road. The Quarry would use semitrailers and truck and dog combinations, with an average payload of 32 t. To estimate the potential traffic generation of quarry product transportation, Table 3.2 presents the average daily trips generated by the haulage of material at the proposed maximum annual production rate. This assumes continuous operation throughout 50 operating weeks per year, 10 hours per weekday and six hours per Saturday, i.e., total 2,800 operating hours per year.

Table 3.2: Proposal Material Haulage Trip Generation

	Maximum Production 30,000 tpa
Loads per year (32 t per load)	938
Average loads per operating hour	0.33
Average Vehicle Trips per Operating Hour	**0.67**
Average loads per Weekday	3.35
Average Vehicle Trips per Weekday	**6.7**
Average loads per Saturday	2.0
Average Vehicle Trips per Saturday	**4.0**

Table 3.2 demonstrates that on average, the maximum haulage would generate fewer than seven heavy vehicle trips per weekday, and four heavy vehicle trips per Saturday. This would vary from day-to-day as demand for product changes. The transportation of product from the Quarry is proposed to generate a maximum of 20 truck trips on any one day, made up of 10 inbound empty trips and 10 outbound laden trips.

As demonstrated in Table 3.2, product transport would generate fewer than one vehicle trip per hour. On a day on which the maximum of 20 truck trips occur, this would generate an average of 2.0 vehicle trips per hour (weekdays) or 3.3 vehicle trips per hour (Saturdays). To account for the variations in demands that would occur throughout the day, this assessment assumes that during a busy hour, product transport would generate a maximum of six vehicle trips, being three inbound trips and three outbound trips. This is considered to be a conservatively high estimate of the number of arrivals and departures that would be practically achievable within any one hour.

3.2.2 Operational Workforce Travel

Up to four workers would attend the Quarry each day. Assuming they each travel independently by car, they would generate up to eight vehicle trips per day, being four inbound trips in the morning, and four outbound trips in the evening. The workforce would typically arrive before transport of quarry products commences in the morning, and depart after transport of quarry products ceases.

3.2.3 Operational Visitors and Deliveries

The quarry operations would require regular deliveries (e.g. fuel and other consumables) throughout the life of the Proposal. For the purpose of this assessment, it has been assumed that on a busy weekday, two heavy vehicle deliveries would occur, generating four heavy vehicle trips per day. On a busy Saturday, it is assumed one heavy vehicle delivery would occur, generating two heavy vehicle trips per day. Deliveries would occur at any time throughout the Proposal operating hours.

The quarry operations would generate occasional visits by visitors. For the purpose of this assessment, it has been assumed that on a busy haulage weekday or Saturday, one visitor would attend the site, generating two light vehicle trips per day.

3.2.4 Total Operational Traffic Generation

The following assessment of the potential impacts of the Proposal focusses on peak operational periods, noting that the number of trips at other times may be significantly lower than those discussed here. The peak day traffic generation of the Proposal assumed for the purpose of this assessment is presented in Table 3.3.

Table 3.3: Maximum Traffic Generation on Peak Operating Days

	Inbound		Outbound		Two Way Total
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	
6:00 am to 7:00 am (vehicles per hour)					
Employees	4	-	-	-	7
Visitors/Deliveries	-	-	-	-	
Product Transport[A]	-	3	-	-	
Operating Hours – Weekday 7:00 am to 5:00 pm or Saturday 7:00 am to 1:00 pm (vehicles per hour)[B]					
Employees	-	-	-	-	10
Visitors/Deliveries	1	1	1	1	
Product Transport	-	3	-	3	
Weekday 5:00 pm to 6:00 pm or Saturday 1:00 pm to 2:00 pm (vehicles per hour)					
Employees	-	-	4	-	4
Visitors/Deliveries	-	-	-	-	
Product Transport	-	-	-	-	
Weekday Daily Total (vehicles per day)					
Employees	4	-	4	-	34
Visitors/Deliveries	1	2	1	2	
Product Transport	-	10	-	10	
Saturday Daily Total (vehicles per day)					
Employees	4	-	4	-	32
Visitors/Deliveries	1	1	1	1	
Product Transport	-	10	-	10	

[A] *Assumes empty trucks may start arriving in the 30mins prior to start of haulage.*
[B] *Peak hourly haulage, visitor and delivery traffic would not coincide during each and every operating hour.*

Table 3.3 indicates that the Proposal would be expected to generate up to 10 vehicle trips during any operating hour, and up to 34 vehicle trips per day on a weekday or 32 vehicles trips per day on a Saturday.

3.3 Traffic Distribution

Proposal-generated heavy vehicle trips (product haulage and deliveries) are typically expected to approach and depart the Unnamed Local Road to and from the south on Old Northern Road. On infrequent occasions, the destination for quarry products may lie locally to the north, however this would make up a very small proportion of total trips generated by the Quarry and has not been considered in detail in this assessment. The on-site workforce may be drawn from either the north or south of the Proposal Site, so may approach or depart in either direction, as suggested by the surveyed distribution of light vehicle trips at the intersection of Old Northern Road with the Unnamed Local Road (Table 2.3).

Table 3.4 summarises the estimated distribution of trips generated by the site establishment and operational activity of the Proposal throughout the day and by approach/departure direction on Old Northern Road.

Table 3.4: Distribution of Proposal-Generated Traffic

	Site Establishment				Operational			
	Inbound		Outbound		Inbound		Outbound	
	North	South	North	South	North	South	North	South
6:00 am to 7:00 am (vehicles per hour)								
Employees	2	7	-	-	1	3	-	-
Visitors/Deliveries	-	-	-	-	-	-	-	-
Product Transport[A]	-	-	-	-	-	(3)	-	-
Operating Hours – Weekday 7:00 am to 5:00 pm or Saturday 7:00 am to 1:00 pm (vehicles per hour)[B]								
Employees	-	-			-	-	-	-
Visitors/Deliveries	-	[1]	-	[1]	-	1 [1]	-	1 [1]
Product Transport	-	-	-	-	-	[3]	-	[3]
Weekday 5:00 pm to 6:00 pm or Saturday 1:00 pm to 2:00 pm (vehicles per hour)								
Employees	-	-	2	7	-	-	1	3
Visitors/Deliveries	-	-	-	-	-	-	-	-
Product Transport	-	-	-	-	-	-	-	-
Weekday Daily Total (vehicles per day)								
Employees	2	7	2	7	1	3	1	3
Visitors/Deliveries	[3]	-	[3]	-	-	1 [2]	-	1 [2]
Product Transport	-	-	-	-	-	[10]	-	[10]
Saturday Daily Total (vehicles per day)								
Employees	2	7	2	7	1	3	1	3
Visitors/Deliveries	[3]	-	[3]	-	-	1 [1]	-	1 [1]
Product Transport	-	-	-	-	-	[10]	-	[10]

5 = light vehicles [5] = heavy vehicles

[A] *Assumes empty trucks may start arriving in the 30mins prior to start of haulage.*

[B] *Peak hourly haulage, visitor and delivery traffic would not coincide during each and every operating hour.*

4 Impacts of the Proposal

4.1 Traffic Volumes

Figure 4.1 presents the traffic volumes on Old Northern Road south of PF Formation Pit 5 & 15 Quarry with the operational traffic forecast to be generated by the Proposal during the average weekday and Saturday. The baseline forecasts include background growth (Section 0) and the traffic expected to be generated by the PF Formation Pit 5 & 15 Quarry (Section 2.7.1). As the Proposal's maximum trip generation may occur during any time within its operating hours, this figure robustly illustrates conditions with maximum Proposal hourly trip generation occurring each and every operating hour (i.e., two visitor trips every operational hour during site establishment, and six haulage truck trips, two visitor trips, and two delivery trips in each and every operating hour). Such conditions are not realistic however demonstrate the volumes that may occur at any time during the operating hours.

Figure 4.1: Forecast Old Northern Road South with Proposal Traffic (vehicles per hour)

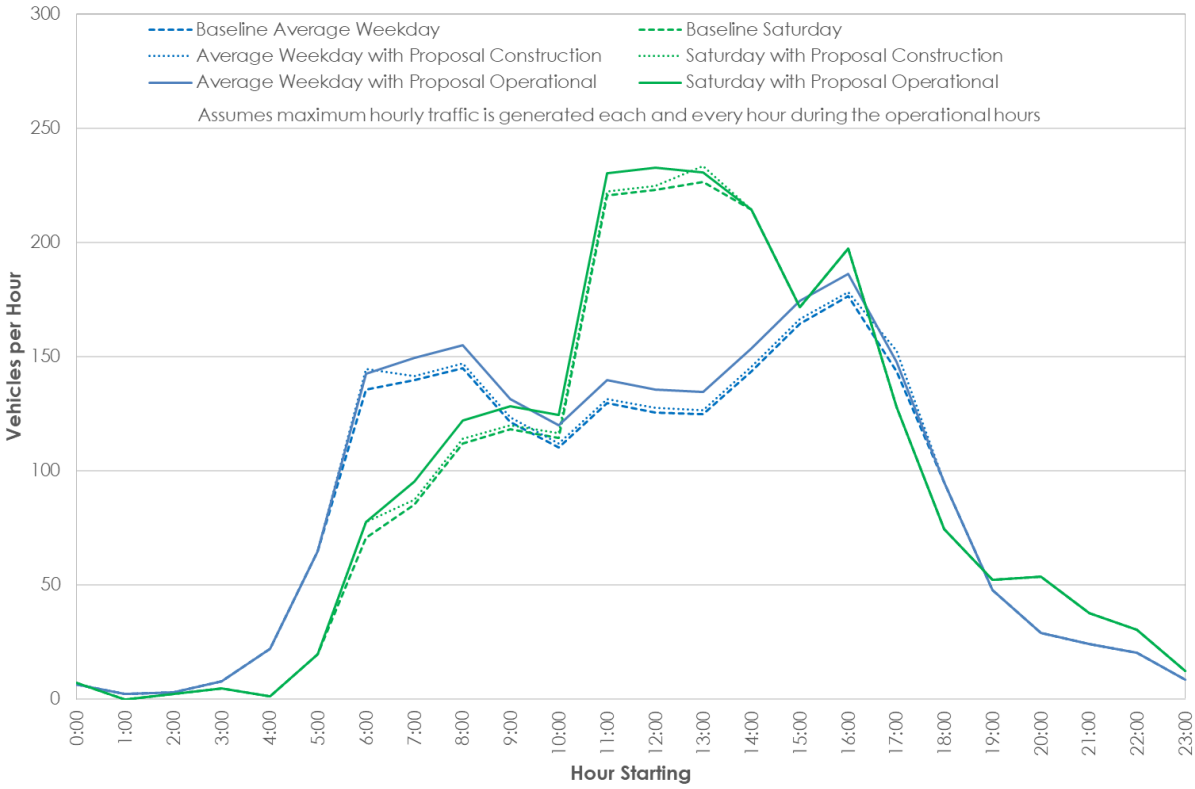


Figure 4.1 illustrates that the Proposal's impact on future hourly traffic on Old Northern Road would be minor. Should maximum haulage associated with the Proposal coincide with peak baseline demands on Old Northern Road, the future volume would remain below 240 vehicles per hour on Saturday, and below 190 vehicles per hour on the average weekday.

Similarly, Figure 4.2 presents the traffic volumes on the Unnamed Local Road north of PF Formation Pit 5 & 15 Quarry with the operational and site establishment traffic forecast to be generated by the Proposal during the average weekday and Saturday. As the Proposal's maximum trip generation may occur during any time within its operating hours, this figure robustly illustrates conditions with maximum hourly trip generation occurring each and every operating hour (i.e., two visitor trips every operational hour during site establishment, and six haulage truck trips, two visitor trips, and two delivery trips in each and every operating hour). Such conditions are not realistic however demonstrate the volumes that may occur at any time during the operating hours. six haulage truck trips, two visitor trips,

Figure 4.2: Forecast Unnamed Local Road with Proposal Traffic (vehicles per hour)

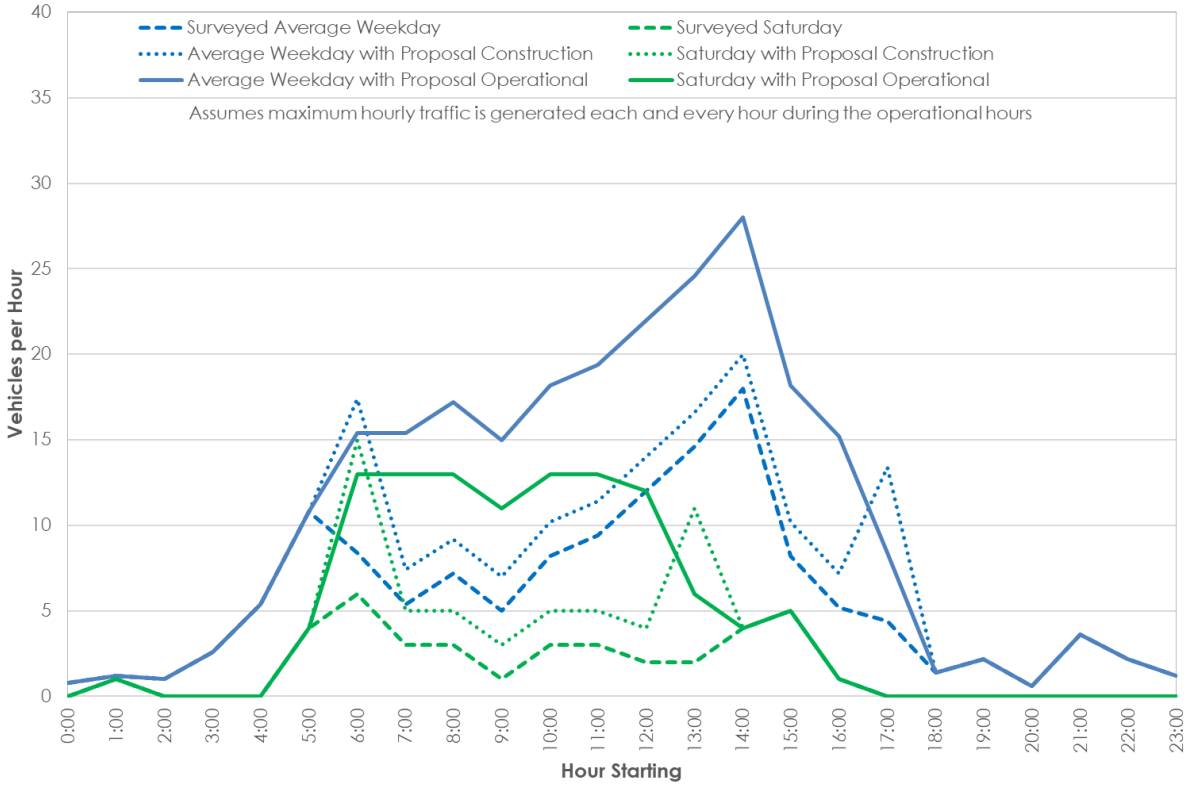


Figure 4.2 demonstrates that with the peak Proposal-generated traffic, the peak volume on the Unnamed Local Road would remain below 30 vehicles per hour over the average weekday, and below 15 vehicles per hour on Saturday.

4.2 Intersection Operation

The operation of the intersection of the Unnamed Local Road and Old Northern Road has been reassessed using SIDRA INTERSECTION to examine the impacts of the Proposal traffic on its peak hour operation. Table 4.1 presents a summary of the results, with more detailed results presented in Appendix C.

Table 4.1: Future Intersection Operation Old Northern Road and Unnamed Local Road

	X-Value	Average Delay[A]	Level of Service
Baseline Future Weekday			
AM Peak 7:00am to 8:00am	0.05	9.6	A
PM Peak 3:45pm to 4:45pm	0.07	8.8	A
Future Weekday Plus Proposal Operational Traffic			
AM Peak 7:00am to 8:00am	0.05	9.1	A
PM Peak 3:45pm to 4:45pm	0.07	8.5	A
Baseline Future Saturday			
11:00am to 12:00pm	0.07	9.9	A
1:00pm to 2:00pm	0.07	7.0	A
Future Saturday Plus Proposal Operational Traffic			
11:00am to 12:00pm	0.07	9.4	A
1:00pm to 2:00pm	0.08	7.0	A

[A] *Seconds per vehicle for movement with the highest average delay per vehicle.*

The results demonstrate that the additional traffic would have negligible impact on the operation of the intersection of Old Northern Road and the Unnamed Local Road.

At the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access, the Quarry traffic would travel eastbound and westbound through the existing intersection. Considering the traffic generated by the Quarry would be up to 10 vehicle trips in any operating hour (Table 3.3), and the Camilleri Stockfeeds site generates up to 22 vehicle trips in any one hour (Section 2.7.2), the peak traffic demands at that intersection would be sufficiently low that formal analysis of its operating conditions is not warranted. With a basic intersection layout (no auxiliary lanes), the intersection would operate at a good level of service, with spare capacity and short delays to vehicles.

4.3 One-Lane Two-Way Section of Unnamed Local Road

As described in Section 2.2, a section of the Unnamed Local Road operates as a one-lane, two-way road, with "give way" controls at each end. The section of road therefore requires drivers in both directions to check for opposing traffic before proceeding, with neither direction of movement having propriety over the other, rather it operates on a "first-in, first-served" basis.

The traffic survey results indicate that over the surveyed week, the one-lane section of the Unnamed Local Road carried an average of 8.6 vehicles per hour (two-way) during the proposed operating hours of the Proposal (7:00 am to 5:00 pm Monday to Friday and 7:00 am to 1:00 pm Saturday). These are the hours during which the Proposal's haulage trucks would add to the demand on that one-lane section of the Unnamed Local Road.

As a guide to the potential impacts of the increased demand on the operation of the one-lane, two-way section of the Unnamed Local Road, the probability of opposing vehicles occupying that road space concurrently has been considered. This is a simplistic assessment, noting that it assumes that only one vehicle occupies the one-lane section at any one time, i.e. assumes that two vehicles travelling in the same direction will not occupy the space concurrently.

Assuming an average vehicle travel speed of 40 km/h through the 200 m long one-lane section, the existing probability that a driver would need to wait for an opposing vehicle at least once over the 10 haulage hours proposed per weekday would be 60%. With the additional average demand generated by the Proposal's haulage truck (0.33 inbound and 0.33 outbound truck trips per hour, Table 3.2), the probability that a driver would need to wait for an opposing vehicle at least once over the 10 haulage hours proposed per weekday would be 66%.

The increase in the probability of a vehicle needing to wait at either end of the one-lane two-way section of the Unnamed Local Road throughout the day is minor, and the layout of this section of the road does not raise any safety or operational issues, as sight lines between opposing drivers are good, and the existing signage and linemarking clearly outlines the expectations for drivers in both directions.

4.4 Intersection Design

4.4.1 Site Access Road and Unnamed Local Road

The Site Access Road would form an eastward extension of the Unnamed Local Road, and so there would not be an "intersection" formed between the two roads. It is proposed that the 180 m section of the Unnamed Access Road between the Camilleri Stockfeeds access and the Site Access Road would be formed and maintained to the same standard proposed for the Site Access Road, which is discussed in Section 4.5.

As the Site Access Road would form an eastwards extension of the Unnamed Local Road along a straight alignment, the Proposal does not form an "intersection" with the Unnamed Local Road at which Proposal-generated vehicles would turn between the public road and the site access driveway. There is no footpath in the vicinity that would require consideration of sightlines between drivers and pedestrians, and landscaping would be maintained to ensure adequate visibility between drivers travelling in opposing directions. The width of the Site Access Road and Unnamed Local Road would each be adequate to accommodate the path of two heavy vehicles passing along their length and no formal assessment of vehicle swept paths is warranted.

4.4.2 Unnamed Local Road and Camilleri Stockfeeds Access

As described in Section 4.2, the peak traffic demands at the intersection of the Unnamed Local Road and Camilleri Stockfeeds access would be sufficiently low that a basic intersection treatment would be adequate to meet the peak hour demands, with no requirement for auxiliary lanes.

The layout of the intersection is however inadequate to accommodate the existing demands for simultaneous movements of trucks into and out of the Camilleri Stockfeeds access. This appears to have been historically managed via the non-standard signs on the Unnamed Local Road which warn inbound drivers to Camilleri Stockfeeds to give way to outbound trucks from Camilleri Stockfeeds, noting that outbound vehicles from Camilleri Stockfeeds are also required to give way. As the signage and priority are atypical and unclear, this has safety implications for drivers on the Unnamed Access Road and the Site Access Road once operational, as inbound heavy vehicles to Camilleri Stockfeeds may unexpectedly stop on the Unnamed Local Road, increasing the risk of rear-end crashes, or outbound trucks from Camilleri Stockfeeds may assume priority over through traffic to and from the Quarry, increasing the risk of conflicts.

Considering the existing constraints are associated with the substandard layout of the Camilleri Stockfeeds access at its approach to the Unnamed Access Road, it is recommended that with the extension of the eastern leg of the Unnamed Local Road to the Site Access Road, the intersection layout and management be reviewed in consultation with Camilleri Stockfeeds, and amended as required to ensure that it is adequate to safely accommodate the existing Camilleri Stockfeeds trucks, as well as the additional through movements by Quarry trucks.

This may include developing the intersection with “give way” or “stop” controls on all three legs of the T-intersection, located such that adequate sightlines are provided for all approaching drivers and that the swept paths of the relevant heavy vehicles turning to and from each leg can be accommodated when another vehicle is waiting. Under such an arrangement, outbound trucks from Camilleri Stockfeeds may be further instructed (with internal signage) to not enter the intersection when another vehicle is entering. This would remove any atypical requirements for vehicles travelling on the public road. Such an arrangement may require reduction or removal of vegetation that currently obstructs the sightline between an eastbound driver on the Unnamed Local Road and a southbound driver on the Camilleri Stockfeeds access.

4.4.3 Unnamed Local Access Road and Old Northern Road

As described in Section 4.2, the existing layout of the intersection of the Unnamed Local Road and Old Northern Road would provide adequate capacity to accommodate the additional demands generated by the Proposal, thus no upgrades are required to the intersection on capacity grounds.

The Proposal would increase the demand for vehicles to turn into and out of the Unnamed Local Road at Old Northern Road. Comparing the existing and forecast turning movement demands at the intersection against the Austroads warrants for major road intersection treatments for intermediate speed environments (Austroads, 2020), the demands would warrant a Basic Left-Turn (BAL) treatment and Right-Turn (BAR) treatment in Old Northern Road. The existing layout of the intersection includes a BAL and Auxiliary Right-Turn (AUR) treatment, so meets or exceeds the Austroads guideline, noting that the guideline is intended to apply primarily to construction of new intersections in greenfield conditions.

TTPP notes that the AUR treatment on Old Northern Road (created by the use of a short lane, where the median lane is shared between through and right turning vehicles, and the auxiliary kerbside lane allows through vehicles to pass a vehicle which has slowed to turn right) is no longer used for construction of new intersections in NSW. A channelised right turn treatment with a short turn bay (CHR(S) treatment) is preferred where practicable. As the review of the road crash history has indicated that no crashes have been reported at that intersection, and sight distances are satisfactory for the operating speeds on Old Northern Road, the existing AUR treatment is considered to be satisfactory with no upgrading required as a result of the Proposal.

4.5 Site Access Road

The Site Access Road would be a private access road constructed eastwards from the Unnamed Local Road. It is proposed to have an unsealed all-weather surface, minimum carriageway width of 8 m, and support low vehicle operating speeds.

The forecast peak demand of 32 vehicle trips per day (Section 3.2.4) would be able to be supported via a Class 4C access (ARRB, 2020) single lane two-way formed road with a minimum carriageway width of 4 m, with passing opportunities provided along its length. The proposed minimum 8 m width ensures that heavy vehicles would be able to pass each other at any location along the Site Access Road. The Site Access Road is generally consistent with a Class 4B minor unsealed road (ARRB, 2020), which are typically constructed as an all-weather two-way formed and gravelled road, and carry up to 150 vehicles per day.

The alignment of the Site Access Road minimises steep grades, which can increase erosion, and would not include any small radius horizontal curves that would impact sightlines between opposing drivers.

The Unnamed Local Road currently satisfactorily carries heavy vehicles (up to B-doubles) between Old Northern Road and the Camilleri Stockfeeds access. The Proposal would not introduce vehicles larger than those already in use on that route, so no formal assessment of the swept path of Proposal-generated vehicles is warranted. East of the Camilleri Stockfeeds access, the Unnamed Local Road and Site Access Road would be constructed to a width to adequately accommodate the concurrent movement of inbound and outbound heavy vehicles associated with the Proposal (the largest being truck and dog combinations). The

unsealed carriageway would be widened on bends as required to accommodate those movements, and no formal assessment of heavy vehicle swept paths on the Site Access Road is required.

The Site Access Road and the Unnamed Local Road east of the Camilleri Stockfeeds access would be maintained by Central Civil (NSW) Pty Ltd to ensure that the movements of light and heavy vehicles associated with the Quarry are safely accommodated at all times.

4.6 Pavement Impacts

TTPP has prepared an estimate of Equivalent Standard Axles (ESA) that may be generated by the Proposal on the Unnamed Local Road, based on the Australian Trucking Association's "Truck Impact Chart" (2018). This applies only to the sealed portion of the Unnamed Local Road east of the Camilleri Stockfeeds access. ATA (2018) indicates that a seven-axle truck and dog with a payload capacity of 33.6 t, which is considered to be representative of the trucks expected to be used for transport of quarry products, generates 1.64 ESA when empty and 6.15 ESA when fully loaded. The forecast demand for 938 loads per year (Table 3.2) would generate 7,307 ESA per annum, being 1,538 ESA for inbound empty trucks and 5,769 ESA by the outbound laden trucks. Should maximum production be maintained throughout the proposed 30-year life of the Proposal, it would generate a total of 219,210 ESA.

4.7 Road Safety

The review of the road crash history of the roads expected to be used by Proposal-generated vehicles did not identify any causation factors associated with the existing road network or heavy vehicles that may be exacerbated by increased traffic demands with the Proposal.

As discussed in Section 4.4.2 the safety risks associated with the existing substandard design of the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access would be reduced with amendments to the intersection to ensure priorities are clear, and that sight lines between approaching drivers are adequate.

4.8 Fire Trail Access

The existing access track via the Crown road reserve would be incorporated into the Site Access Road, and widened to a minimum of 8 m, as described in Section 4.5, retaining access to the Dalgety's Creek Fire Trail east of the Site. When a gate is installed at the Quarry entrance during the site establishment, keys or a combination lock code would be provided to the NSW Rural Fire Service and any other authorities that need to access the fire trail to access the power line easement.

4.9 Car Parking

Hornsby Development Control Plan does not have a specific requirement for car parking for a quarry development. Car parking would be provided to meet the demands of the workforce and visitors expected to be at the site on a day-to-day basis.

Once operational, car parking would be provided on-site for a minimum of five cars, which would meet the operational demands of the on-site workforce of up to four workers and one visitor who would attend the Quarry each day. It is proposed that a dedicated area is provided for car parking adjacent to the office and amenities area, which would have an unsealed surface, consistent with the Site Access Road. The detailed layout of the office, amenities and car parking area has not yet been developed, and would be designed to accommodate independent access to and from each of four parking spaces, with all vehicles able to enter and exit the site in a forward direction. The general layout would be developed with respect to the Australian Standard for off-street car parking (AS2890.1:2004) noting that as an unsealed car park, individual spaces would not be delineated by linemarking or pavement markers.

During the site establishment stage, workers' vehicles would be parked within the site, with most workers using their vehicle as part of the site establishment activities.

4.10 Mitigation Measures

The foregoing assessment has found that the Proposal would not require any specific road upgrades or management measures to accommodate its impacts on the safety or efficiency of the road network.

As described in Section 4.4.2, the existing layout of the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access is substandard, and it is recommended that with the extension of the Unnamed Local Road to the east of the access, the intersection be reviewed and amended in consultation with Camilleri Stockfeeds. As described in Section 4.4.2, this may include developing the intersection with "give way" or "stop" controls on all three legs of the T-intersection, with additional internal signage for drivers exiting Camilleri Stockfeeds to avoid potential conflicts between those outbound trucks and trucks entering Camilleri Stockfeeds. Some reduction or removal of vegetation that currently obstructs the sightline between an eastbound driver on the Unnamed Local Road and a southbound driver on the Camilleri Stockfeeds access may also be required.

It is recommended that a Driver's Code of Conduct be developed and implemented for drivers of heavy vehicles who regularly access the Quarry. Compliance with the Driver's Code of Conduct should form part of the employment or contract conditions of those drivers, with penalties for non-compliance, and include such matters as:

- observing the approved transport hours;

- adhering to posted speed limits;
- being alert to the presence of school buses, displaying courtesy near bus stops and slowing to 40 km/h when school bus lights are flashing;
- being prepared to give way when approaching the one-lane two-way section of the Unnamed Local Road;
- implementing safe driving practices in poor weather or poor visibility conditions, including suspension of transport operations if required;
- minimising the use of exhaust brakes near residential areas; and
- securing tailgates, chains and loose cables to minimise noise.

5 Conclusions

This study has examined the likely road transport implications of the proposed establishment and operation of the Maroota Central Civil Quarry located at 4773 Old Northern Road, Maroota. It is concluded that no specific measures or upgrades are required to mitigate the impacts of the Proposal on the capacity, safety and efficiency of the road network.

It is recommended that with the extension of the Unnamed Local Road to the Site Access Road, the intersection formed between the Camilleri Stockfeeds access and Unnamed Local Road be reviewed and amended in consultation with Camilleri Stockfeeds to reduce the risks associated with the existing substandard layout.

It is recommended that a Driver's Code of Conduct be developed and implemented for drivers of heavy vehicles who regularly access the Quarry, outlining behavioural expectations for those drivers. Compliance with the Driver's Code of Conduct should form part of the employment or contract conditions of those drivers, with penalties for non-compliance.

Appendix A

Photographs

Signage for Atypical Priority at Camilleri Stockfeeds Access from Unnamed Local Road



Facing East on Unnamed Access Road – Camilleri Stockfeeds Access on Left



Facing East on Unnamed Access Road – East of Camilleri Stockfeeds Access



Facing West on Unnamed Access Road – Stockfeeds Access on Right



Facing West on Unnamed Access Road – West of Stockfeeds Access



Facing West on Unnamed Access Road – Sightlines Along One-Lane Two-Way Section



Facing Northeast on Unnamed Access Road – Northeast of Quarry Access



Facing Southwest on Unnamed Access Road – Quarry Access on Left



Facing Northeast on Unnamed Access Road – Quarry Access on Right



Facing North on Old Northern Road at Unnamed Access Road



Unnamed Access Road at Old Northern Road



Facing South on Old Northern Road at Unnamed Access Road



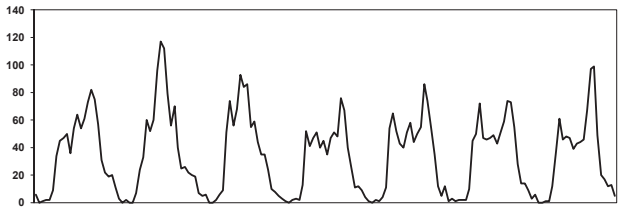
Appendix B

Traffic Surveys

Hourly Volume By Day (Speed and Classification)

Old Northern Road
300m north of private road
Maroota
Northbound - One Way Traffic

Site Number:	AC01
Client:	TTPP
LGA:	Hornsby Shire
Count Type:	Volume/Class/Speed
Coordinates:	-33.4335 150.9921



80
Posted Speed Limit

Day	Fri	Sat	Sun	Mon	Tue	Wed	Thu	7 day Average	Weekday Average
Time	14/10/22	15/10/22	16/10/22	17/10/22	18/10/22	19/10/22	20/10/22		
0:00	6	3	5	1	1	3	6	4	3
1:00	0	0	6	0	0	1	0	1	0
2:00	1	2	0	2	2	2	0	1	1
3:00	2	0	0	3	1	2	1	1	2
4:00	2	0	2	2	4	2	1	2	2
5:00	9	7	6	13	11	10	12	10	11
6:00	34	24	9	52	54	45	37	36	44
7:00	45	33	51	41	65	50	61	49	52
8:00	47	60	74	47	52	72	46	57	53
9:00	50	52	56	51	43	47	48	50	48
10:00	36	60	68	40	40	46	47	48	42
11:00	54	96	93	45	51	47	39	61	47
12:00	64	117	84	35	58	49	43	64	50
13:00	54	112	86	47	44	43	44	61	46
14:00	61	79	55	51	50	51	46	56	52
15:00	73	56	59	48	55	59	67	60	60
16:00	82	70	44	76	86	74	97	76	83
17:00	75	40	35	67	74	73	99	66	78
18:00	57	25	35	40	54	55	49	45	51
19:00	31	26	24	26	35	28	20	27	28
20:00	22	22	10	11	12	14	17	15	15
21:00	19	20	8	12	5	14	12	13	12
22:00	20	19	5	9	12	9	13	12	13
23:00	11	7	3	4	1	3	5	5	5
7am-7pm	698	800	740	588	672	666	686	693	662
24hr Total	855	930	818	723	810	799	810	821	799
Cars	753	859	784	588	671	677	685	717	698
Trucks	84	58	33	96	113	92	97	82	80
Artic.	18	6	5	29	38	31	28	22	22

SITE DETAILS
One Way Traffic

Speed Distribution	
> 40 km/hr	99.7%
> 50 km/hr	98.7%
> 60 km/hr	94.6%
> 70 km/hr	70.1%
> 80 km/hr	19.8%
> 90 km/hr	2.9%
> 100 km/hr	0.5%

Peak Survey Results		
AM	11:00	96
PM	12:00	117
24hr Volume		930
Cars		859
Trucks		113
Articulated		38
7am to 7pm Volume		800

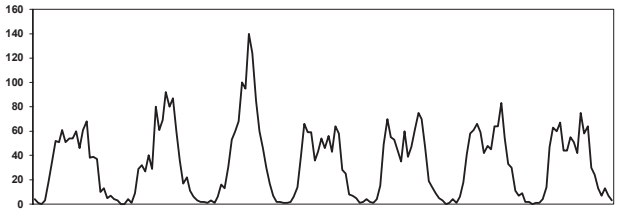
Avg Traffic Composition	
Cars	87.3%
Trucks	10.0%
Articulated	2.7%

Avg Speed Data (kph)	
85th Percentile	81.0
Mean	73.0
Minimum	17.0
Maximum	119.0
Std. Deviation	9.0

Hourly Volume By Day (Speed and Classification)

Old Northern Road
300m north of private road
Maroota
Southbound - One Way Traffic

Site Number:	AC01
Client:	TTPP
LGA:	Hornsby Shire
Count Type:	Volume/Class/Speed
Coordinates:	-33.4335 150.9921



80
Posted Speed Limit

Day	Fri	Sat	Sun	Mon	Tue	Wed	Thu	7 day Average	Weekday Average
Time	14/10/22	15/10/22	16/10/22	17/10/22	18/10/22	19/10/22	20/10/22		
0:00	4	3	2	1	4	1	0	2	2
1:00	1	0	2	1	2	4	1	2	2
2:00	0	0	1	2	1	1	1	1	1
3:00	3	4	3	6	4	6	4	4	5
4:00	18	1	1	14	15	18	14	12	16
5:00	34	9	6	39	49	41	47	32	42
6:00	52	29	16	66	70	58	63	51	62
7:00	51	32	13	59	55	61	60	47	57
8:00	61	27	31	59	53	66	67	52	61
9:00	51	40	53	36	44	59	44	47	47
10:00	54	29	60	43	35	42	44	44	44
11:00	54	80	68	54	60	48	55	60	54
12:00	60	61	100	46	39	45	51	57	48
13:00	46	69	95	56	47	64	42	60	51
14:00	61	92	140	43	62	64	75	77	61
15:00	68	80	124	64	75	83	58	79	70
16:00	38	87	85	58	70	54	64	65	57
17:00	39	60	60	28	47	33	30	42	35
18:00	37	36	46	25	19	30	24	31	27
19:00	10	17	30	8	14	11	13	15	11
20:00	13	22	17	7	9	7	7	12	9
21:00	5	11	7	5	5	9	13	8	7
22:00	7	6	2	1	3	2	7	4	4
23:00	4	3	2	2	0	2	3	2	2
7am-7pm	620	693	875	571	606	649	614	661	612
24hr Total	771	798	964	723	782	809	787	805	774
Cars	604	694	859	534	556	622	605	639	615
Trucks	144	88	91	158	187	149	155	139	134
Artic.	23	13	15	30	42	38	27	27	26

SITE DETAILS
One Way Traffic

Speed Distribution	
> 40 km/hr	99.3%
> 50 km/hr	97.3%
> 60 km/hr	88.0%
> 70 km/hr	60.3%
> 80 km/hr	18.2%
> 90 km/hr	2.9%
> 100 km/hr	0.6%

Peak Survey Results		
AM	11:00	80
PM	14:00	140
24hr Volume		964
Cars		859
Trucks		187
Articulated		42
7am to 7pm Volume		875

Avg Traffic Composition	
Cars	79.4%
Trucks	17.3%
Articulated	3.3%

Avg Speed Data (kph)	
85th Percentile	80.6
Mean	71.2
Minimum	11.0
Maximum	127.0
Std. Deviation	10.4

Hourly Volume By Day (Speed and Classification)

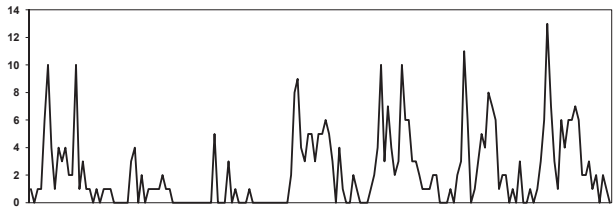
Unnamed Local Road

200m east of Old Northern Rd

Maroota

Eastbound - One Way Traffic

Site Number:	AC02
Client:	TTPP
LGA:	Hornsby Shire
Count Type:	Volume/Class/Speed
Coordinates:	-33.4349 150.9932



60

Posted Speed Limit

Day	Fri	Sat	Sun	Mon	Tue	Wed	Thu	7 day Average	Weekday Average
Time	14/10/22	15/10/22	16/10/22	17/10/22	18/10/22	19/10/22	20/10/22		
0:00	1	0	0	0	0	0	1	0	0
1:00	0	0	0	0	0	1	0	0	0
2:00	1	0	0	0	1	0	1	0	1
3:00	1	0	0	2	2	2	3	1	2
4:00	6	0	0	8	4	3	6	4	5
5:00	10	3	5	9	10	11	13	9	11
6:00	4	4	0	4	3	6	7	4	5
7:00	1	0	0	3	7	0	3	2	3
8:00	4	2	0	5	4	1	1	2	3
9:00	3	0	3	5	2	3	6	3	4
10:00	4	1	0	3	3	5	4	3	4
11:00	2	1	1	5	10	4	6	4	5
12:00	2	1	0	5	6	8	6	4	5
13:00	10	1	0	6	6	7	7	5	7
14:00	1	2	0	5	3	6	6	3	4
15:00	3	1	1	3	3	1	2	2	2
16:00	1	1	0	0	2	2	2	1	1
17:00	1	0	0	4	1	2	3	2	2
18:00	0	0	0	1	1	0	1	0	1
19:00	1	0	0	0	1	1	2	1	1
20:00	0	0	0	0	2	0	0	0	0
21:00	1	0	0	2	2	3	2	1	2
22:00	1	0	0	1	0	0	1	0	1
23:00	1	0	0	0	0	0	0	0	0
7am-7pm	32	10	5	45	48	39	47	32	42
24hr Total	59	17	10	71	73	66	83	54	70
Cars	24	10	7	32	34	35	37	26	33
Trucks	17	2	3	16	20	15	21	13	17
Artic.	18	5	0	22	20	16	25	15	20

SITE DETAILS
One Way Traffic

Speed Distribution	
> 40 km/hr	58.3%
> 50 km/hr	32.2%
> 60 km/hr	14.0%
> 70 km/hr	3.4%
> 80 km/hr	0.5%
> 90 km/hr	0.0%
> 100 km/hr	0.0%

Peak Survey Results		
AM	5:00	13
PM	13:00	10
24hr Volume		83
Cars		37
Trucks		21
Articulated		25
7am to 7pm Volume		48

Avg Traffic Composition	
Cars	47.2%
Trucks	24.8%
Articulated	28.0%

Avg Speed Data (kph)	
85th Percentile	58.7
Mean	44.2
Minimum	14.0
Maximum	81.0
Std. Deviation	12.3

Hourly Volume By Day (Speed and Classification)

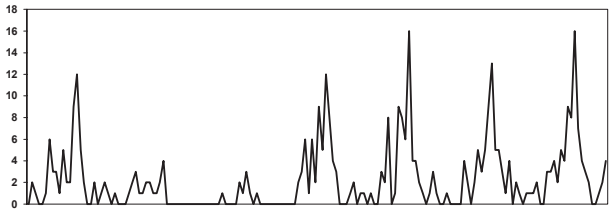
Unnamed Local Road

200m east of Old Northern Rd

Maroota

Westbound - One Way Traffic

Site Number:	AC02
Client:	TTPP
LGA:	Hornsby Shire
Count Type:	Volume/Class/Speed
Coordinates:	-33.4349 150.9932



60

Posted Speed Limit

Day	Fri	Sat	Sun	Mon	Tue	Wed	Thu	7 day Average	Weekday Average
Time	14/10/22	15/10/22	16/10/22	17/10/22	18/10/22	19/10/22	20/10/22		
0:00	0	0	0	0	1	0	1	0	0
1:00	2	1	0	0	1	1	1	1	1
2:00	1	0	0	0	0	0	1	0	0
3:00	0	0	0	0	1	0	2	0	1
4:00	0	0	0	0	0	0	0	0	0
5:00	1	1	0	0	0	0	0	0	0
6:00	6	2	0	2	3	4	3	3	4
7:00	3	3	0	3	2	2	3	2	3
8:00	3	1	1	6	8	0	4	3	4
9:00	1	1	0	1	0	2	2	1	1
10:00	5	2	0	6	1	5	5	3	4
11:00	2	2	0	2	9	3	4	3	4
12:00	2	1	0	9	8	5	9	5	7
13:00	9	1	2	5	6	9	8	6	7
14:00	12	2	1	12	16	13	16	10	14
15:00	5	4	3	8	4	5	7	5	6
16:00	2	0	1	4	4	5	4	3	4
17:00	0	0	0	3	2	3	3	2	2
18:00	0	0	1	0	1	1	2	1	1
19:00	2	0	0	0	0	4	0	1	1
20:00	0	0	0	0	1	0	0	0	0
21:00	1	0	0	1	3	2	1	1	2
22:00	2	0	0	2	1	1	2	1	2
23:00	1	0	0	0	0	0	4	1	1
7am-7pm	44	17	9	59	61	53	67	44	57
24hr Total	60	21	9	64	72	65	82	53	69
Cars	34	15	8	32	43	42	45	31	40
Trucks	7	1	1	8	14	8	15	8	10
Artic.	19	5	0	22	17	15	22	14	18

SITE DETAILS
One Way Traffic

Speed Distribution	
> 40 km/hr	62.7%
> 50 km/hr	21.7%
> 60 km/hr	4.8%
> 70 km/hr	0.3%
> 80 km/hr	0.0%
> 90 km/hr	0.0%
> 100 km/hr	0.0%

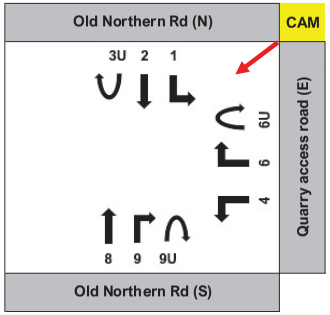
Peak Survey Results		
AM	11:00	9
PM	14:00	16
24hr Volume		82
Cars		45
Trucks		15
Articulated		22
7am to 7pm Volume		67

Avg Traffic Composition	
Cars	58.7%
Trucks	14.5%
Articulated	26.8%

Avg Speed Data (kph)	
85th Percentile	52.4
Mean	42.4
Minimum	10.0
Maximum	70.0
Std. Deviation	10.1

Report Type:	Classified Intersection Data - 15min
Geocounts Job ID:	1663511292632
Client Job Number:	n/a
Client Name:	TTPP
Location:	Maroota
Survey Site:	Old Northern Rd / private road (quarry access)
Survey Date:	**Thursday, 20th October 2022**
Site Coordinates:	-33.4362579, 150.9916547





	Light	Heavy Rigid	Heavy Artic	HV%
Total Vehicles AM:	**294**	**40**	**28**	**18.8%**
Total Vehicles PM:	**398**	**28**	**14**	**9.5%**

Approach	Old Northern Rd (N)												Quarry access road (E)												Old Northern Rd (S)											
Movement	Movement 1 (Left Turn)				Movement 2 (Through)				Movement 3U (U Turn)				Movement 4 (Left Turn)				Movement 6 (Right)				Movement 6U (U Turn)				Movement 8 (Through)				Movement 9 (Right Turn)				Movement 9U (U Turn)			
Time Interval	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**	Light	Heavy Rigid	Heavy Artic	**Total**
7:00 to 7:15	0	0	0	**0**	14	2	0	**16**	0	0	0	**0**	0	0	1	**1**	0	0	0	**0**	0	0	0	**0**	18	3	1	**22**	1	0	3	**4**	0	0	0	**0**
7:15 to 7:30	0	0	0	**0**	22	1	0	**23**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	13	2	0	**15**	0	0	1	**1**	0	0	0	**0**
7:30 to 7:45	0	0	0	**0**	10	0	1	**11**	0	0	0	**0**	0	0	3	**3**	0	0	0	**0**	0	0	0	**0**	4	2	1	**7**	1	1	1	**3**	0	0	0	**0**
7:45 to 8:00	0	0	0	**0**	9	1	0	**10**	0	0	0	**0**	0	0	3	**3**	0	0	0	**0**	0	0	0	**0**	15	2	1	**18**	0	0	1	**1**	0	0	0	**0**
8:00 to 8:15	0	0	0	**0**	17	2	0	**19**	0	0	0	**0**	1	0	2	**3**	0	0	0	**0**	0	0	0	**0**	7	2	0	**9**	2	0	1	**3**	0	0	0	**0**
8:15 to 8:30	0	0	0	**0**	15	2	1	**18**	0	0	0	**0**	0	0	3	**3**	0	0	0	**0**	0	0	0	**0**	15	2	0	**17**	0	0	0	**0**	0	0	0	**0**
8:30 to 8:45	0	0	0	**0**	18	0	0	**18**	0	0	0	**0**	0	1	0	**1**	0	0	0	**0**	0	0	0	**0**	10	2	0	**12**	0	0	0	**0**	0	0	0	**0**
8:45 to 9:00	0	0	0	**0**	14	2	0	**16**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	10	0	0	**10**	0	0	0	**0**	0	0	0	**0**
9:00 to 9:15	0	0	0	**0**	6	0	0	**6**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	8	4	0	**12**	0	0	1	**1**	0	0	0	**0**
9:15 to 9:30	0	0	0	**0**	8	1	0	**9**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	12	0	0	**12**	1	0	0	**1**	0	0	0	**0**
9:30 to 9:45	0	0	0	**0**	10	1	1	**12**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	10	1	0	**11**	1	0	2	**3**	0	0	0	**0**
9:45 to 10:00	0	0	0	**0**	11	5	0	**16**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	8	1	0	**9**	1	0	0	**1**	0	0	0	**0**
AM Total	0	0	0	**0**	154	17	3	**174**	0	0	0	**0**	3	1	12	**16**	0	0	0	**0**	0	0	0	**0**	130	21	3	**154**	7	1	10	**18**	0	0	0	**0**
15:00 to 15:15	0	0	0	**0**	16	2	0	**18**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	9	1	0	**10**	0	1	0	**1**	0	0	0	**0**
15:15 to 15:30	1	0	0	**1**	13	0	0	**13**	0	0	0	**0**	2	0	1	**3**	0	0	0	**0**	0	0	0	**0**	15	0	1	**16**	0	0	0	**0**	0	0	0	**0**
15:30 to 15:45	0	0	0	**0**	14	0	2	**16**	0	0	0	**0**	1	2	0	**3**	0	0	0	**0**	0	0	0	**0**	16	0	1	**17**	0	0	0	**0**	0	0	0	**0**
15:45 to 16:00	0	0	0	**0**	13	2	0	**15**	0	0	0	**0**	0	0	1	**1**	0	0	0	**0**	0	0	0	**0**	22	1	0	**23**	1	0	0	**1**	0	1	0	**1**
16:00 to 16:15	0	0	0	**0**	20	1	0	**21**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	18	1	1	**20**	0	0	1	**1**	0	0	0	**0**
16:15 to 16:30	0	0	0	**0**	14	2	1	**17**	0	0	0	**0**	2	0	0	**2**	0	0	0	**0**	0	0	0	**0**	22	3	0	**25**	0	0	0	**0**	0	0	0	**0**
16:30 to 16:45	0	0	0	**0**	12	2	0	**14**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	27	2	0	**29**	0	0	0	**0**	0	0	0	**0**
16:45 to 17:00	0	0	0	**0**	10	1	0	**11**	0	0	0	**0**	0	0	1	**1**	0	0	0	**0**	0	0	0	**0**	24	0	0	**24**	0	0	0	**0**	0	0	0	**0**
17:00 to 17:15	0	0	0	**0**	10	2	1	**13**	0	0	0	**0**	2	0	0	**2**	3	0	0	**3**	0	0	0	**0**	20	0	0	**20**	0	0	1	**1**	0	0	0	**0**
17:15 to 17:30	0	0	0	**0**	5	0	0	**5**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	15	1	0	**16**	1	0	0	**1**	0	0	0	**0**
17:30 to 17:45	0	0	0	**0**	7	0	1	**8**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	25	0	0	**25**	0	0	0	**0**	0	0	0	**0**
17:45 to 18:00	0	0	0	**0**	5	2	0	**7**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	30	1	0	**31**	0	0	1	**1**	0	0	0	**0**
PM Total	1	0	0	**1**	139	14	5	**158**	0	0	0	**0**	9	2	3	**14**	4	0	0	**4**	0	0	0	**0**	243	10	3	**256**	2	1	3	**6**	0	1	0	**1**

Appendix C

SIDRA Output Summaries

MOVEMENT SUMMARY

Site: 101 [ExAM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed AM peak hour 7-8am
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	65	19.4	65	19.4	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	9	77.8	9	77.8	0.012	9.4	LOS A	0.1	1.1	0.24	0.60	0.24	46.5
Approach			75	26.8	75	26.8	0.039	1.2	NA	0.1	1.1	0.03	0.08	0.03	73.3
East: Unnamed Road															
4	L2	All MCs	7	100.0	7	100.0	0.014	5.3	LOS A	0.1	1.3	0.26	0.44	0.26	38.0
6	R2	All MCs	1	0.0	1	0.0	0.014	4.4	LOS A	0.1	1.3	0.26	0.44	0.26	46.6
Approach			8	87.5	8	87.5	0.014	5.2	LOS A	0.1	1.3	0.26	0.44	0.26	38.9
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.035	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	63	8.3	63	8.3	0.035	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			64	8.2	64	8.2	0.035	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			147	22.1	147	22.1	0.039	1.0	NA	0.1	1.3	0.03	0.07	0.03	72.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [BaseAM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed AM peak hour 7-8am
10 Years of Growth at 2% pa
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	80	19.7	80	19.7	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	9	77.8	9	77.8	0.013	9.6	LOS A	0.1	1.1	0.27	0.60	0.27	46.4
Approach			89	25.9	89	25.9	0.048	1.0	NA	0.1	1.1	0.03	0.06	0.03	74.3
East: Unnamed Road															
4	L2	All MCs	7	100.0	7	100.0	0.015	5.6	LOS A	0.1	1.3	0.29	0.45	0.29	37.9
6	R2	All MCs	1	0.0	1	0.0	0.015	4.5	LOS A	0.1	1.3	0.29	0.45	0.29	46.5
Approach			8	87.5	8	87.5	0.015	5.5	LOS A	0.1	1.3	0.29	0.45	0.29	38.8
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.043	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	77	8.2	77	8.2	0.043	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			78	8.1	78	8.1	0.043	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			176	21.0	176	21.0	0.048	0.8	NA	0.1	1.3	0.03	0.06	0.03	73.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Organisation: TTPP - THE TRANSPORT PLANNING PARTNERSHIP | Licence: NETWORK / 1PC | Processed: Thursday, 27 July 2023 12:17:23 PM
Project: C:\Users\Penny.Dalton\OneDrive - TTPP\22264 Maroota Central Civil Sandstone Quarry\07 Modelling Files\Model \22264_sid_221111_Maroota.sip9

MOVEMENT SUMMARY

Site: 101 [ProposalOpAM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed AM peak hour 7-8am + 10 Years of Growth at 2% pa
With Proposal Operational Traffic
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	80	19.7	80	19.7	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	15	78.6	15	78.6	0.020	9.1	LOS A	0.1	1.8	0.27	0.59	0.27	48.1
Approach			95	28.9	95	28.9	0.048	1.4	NA	0.1	1.8	0.04	0.09	0.04	72.5
East: Unnamed Road															
4	L2	All MCs	13	91.7	13	91.7	0.023	6.7	LOS A	0.1	2.1	0.28	0.50	0.28	32.3
6	R2	All MCs	1	0.0	1	0.0	0.023	4.6	LOS A	0.1	2.1	0.28	0.50	0.28	49.2
Approach			14	84.6	14	84.6	0.023	6.6	LOS A	0.1	2.1	0.28	0.50	0.28	33.1
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.043	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	77	8.2	77	8.2	0.043	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			78	8.1	78	8.1	0.043	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			186	24.3	186	24.3	0.048	1.2	NA	0.1	2.1	0.04	0.09	0.04	69.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ExPM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed PM peak hour 3:45-4:45pm
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	102	8.2	102	8.2	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	2	50.0	2	50.0	0.002	8.6	LOS A	0.0	0.2	0.23	0.58	0.23	46.8
Approach			104	9.1	104	9.1	0.056	0.2	NA	0.0	0.2	0.00	0.01	0.00	78.8
East: Unnamed Road															
4	L2	All MCs	4	25.0	4	25.0	0.005	4.1	LOS A	0.0	0.2	0.21	0.43	0.21	42.8
6	R2	All MCs	1	0.0	1	0.0	0.005	4.5	LOS A	0.0	0.2	0.21	0.43	0.21	47.3
Approach			5	20.0	5	20.0	0.005	4.2	LOS A	0.0	0.2	0.21	0.43	0.21	43.6
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.040	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	71	11.9	71	11.9	0.040	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			72	11.8	72	11.8	0.040	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			181	10.5	181	10.5	0.056	0.3	NA	0.0	0.2	0.01	0.02	0.01	77.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\Penny.Dalton\OneDrive - TTPP\22264 Maroota Central Civil Sandstone Quarry\07 Modelling Files\Model \22264_sid_221111_Maroota.sip9

MOVEMENT SUMMARY

Site: 101 [BasePM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed PM peak hour 3:45-4:45pm
Growth at 2% pa for 10 Years
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	125	8.4	125	8.4	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	2	50.0	2	50.0	0.002	8.8	LOS A	0.0	0.2	0.26	0.58	0.26	46.7
Approach			127	9.1	127	9.1	0.068	0.2	NA	0.0	0.2	0.00	0.01	0.00	79.0
East: Unnamed Road															
4	L2	All MCs	4	25.0	4	25.0	0.005	4.2	LOS A	0.0	0.2	0.24	0.44	0.24	42.7
6	R2	All MCs	1	0.0	1	0.0	0.005	4.7	LOS A	0.0	0.2	0.24	0.44	0.24	47.2
Approach			5	20.0	5	20.0	0.005	4.3	LOS A	0.0	0.2	0.24	0.44	0.24	43.6
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.049	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	86	12.2	86	12.2	0.049	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			87	12.0	87	12.0	0.049	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			220	10.5	220	10.5	0.068	0.2	NA	0.0	0.2	0.01	0.02	0.01	77.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ProposalOpPM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Surveyed PM peak hour 3:45-4:45pm + Growth at 2% pa for 10 Years
With Proposal Operational Traffic
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	125	8.4	125	8.4	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	7	71.4	7	71.4	0.010	8.5	LOS A	0.0	0.9	0.29	0.57	0.29	48.1
Approach			133	11.9	133	11.9	0.068	0.5	NA	0.0	0.9	0.02	0.03	0.02	77.1
East: Unnamed Road															
4	L2	All MCs	9	55.6	9	55.6	0.014	6.4	LOS A	0.1	0.9	0.26	0.50	0.26	46.4
6	R2	All MCs	1	0.0	1	0.0	0.014	4.8	LOS A	0.1	0.9	0.26	0.50	0.26	51.9
Approach			11	50.0	11	50.0	0.014	6.2	LOS A	0.1	0.9	0.26	0.50	0.26	46.9
North: Old Northern Road N															
7	L2	All MCs	1	0.0	1	0.0	0.049	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.4
8	T1	All MCs	86	12.2	86	12.2	0.049	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.8
Approach			87	12.0	87	12.0	0.049	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.7
All Vehicles			231	13.7	231	13.7	0.068	0.6	NA	0.1	0.9	0.02	0.04	0.02	75.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ExSAT-AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 11am-12pm peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	102	4.1	102	4.1	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	6	66.7	6	66.7	0.009	9.6	LOS A	0.0	0.7	0.29	0.59	0.29	46.4
Approach			108	7.8	108	7.8	0.054	0.6	NA	0.0	0.7	0.02	0.03	0.02	76.7
East: Unnamed Road															
4	L2	All MCs	6	66.7	6	66.7	0.012	5.2	LOS A	0.0	0.7	0.29	0.46	0.29	36.6
6	R2	All MCs	2	0.0	2	0.0	0.012	4.8	LOS A	0.0	0.7	0.29	0.46	0.29	47.0
Approach			8	50.0	8	50.0	0.012	5.1	LOS A	0.0	0.7	0.29	0.46	0.29	38.8
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.051	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.2
8	T1	All MCs	84	20.0	84	20.0	0.051	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.6
Approach			86	19.5	86	19.5	0.051	0.2	NA	0.0	0.0	0.00	0.02	0.00	79.4
All Vehicles			203	14.5	203	14.5	0.054	0.6	NA	0.0	0.7	0.02	0.04	0.02	74.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [BaseSAT-AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 11am-12pm peak
Growth 2% pa for 10 Years
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	125	4.2	125	4.2	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	6	66.7	6	66.7	0.009	9.9	LOS A	0.0	0.7	0.32	0.60	0.32	46.2
Approach			132	7.2	132	7.2	0.066	0.5	NA	0.0	0.7	0.02	0.03	0.02	77.2
East: Unnamed Road															
4	L2	All MCs	6	66.7	6	66.7	0.012	5.5	LOS A	0.0	0.8	0.32	0.47	0.32	36.5
6	R2	All MCs	2	0.0	2	0.0	0.012	5.1	LOS A	0.0	0.8	0.32	0.47	0.32	46.8
Approach			8	50.0	8	50.0	0.012	5.4	LOS A	0.0	0.8	0.32	0.47	0.32	38.6
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.063	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.3
8	T1	All MCs	103	20.4	103	20.4	0.063	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.7
Approach			105	20.0	105	20.0	0.063	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.5
All Vehicles			245	14.2	245	14.2	0.066	0.5	NA	0.0	0.8	0.02	0.04	0.02	75.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ProposalOpSAT-AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 11am-12pm peak + Growth 2% pa for 10 Years
With Proposal Operational Traffic
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	125	4.2	125	4.2	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	12	72.7	12	72.7	0.017	9.4	LOS A	0.1	1.5	0.33	0.59	0.33	47.9
Approach			137	10.0	137	10.0	0.066	0.8	NA	0.1	1.5	0.03	0.05	0.03	75.7
East: Unnamed Road															
4	L2	All MCs	12	72.7	12	72.7	0.021	7.0	LOS A	0.1	1.5	0.33	0.52	0.33	36.9
6	R2	All MCs	2	0.0	2	0.0	0.021	5.2	LOS A	0.1	1.5	0.33	0.52	0.33	49.6
Approach			14	61.5	14	61.5	0.021	6.7	LOS A	0.1	1.5	0.33	0.52	0.33	38.4
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.063	7.0	LOS A	0.0	0.0	0.00	0.01	0.00	73.3
8	T1	All MCs	103	20.4	103	20.4	0.063	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	79.7
Approach			105	20.0	105	20.0	0.063	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.5
All Vehicles			256	16.9	256	16.9	0.066	0.9	NA	0.1	1.5	0.03	0.06	0.03	73.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ExSAT-PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 1pm-2pm peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	118	5.4	118	5.4	0.063	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	2	0.0	2	0.0	0.001	6.8	LOS A	0.0	0.0	0.18	0.58	0.18	47.5
Approach			120	5.3	120	5.3	0.063	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.0
East: Unnamed Road															
4	L2	All MCs	5	0.0	5	0.0	0.009	3.6	LOS A	0.0	0.2	0.23	0.45	0.23	47.4
6	R2	All MCs	5	0.0	5	0.0	0.009	4.8	LOS A	0.0	0.2	0.23	0.45	0.23	47.3
Approach			11	0.0	11	0.0	0.009	4.2	LOS A	0.0	0.2	0.23	0.45	0.23	47.3
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.043	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.2
8	T1	All MCs	73	15.9	73	15.9	0.043	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.6
Approach			75	15.5	75	15.5	0.043	0.2	NA	0.0	0.0	0.00	0.02	0.00	79.4
All Vehicles			205	8.7	205	8.7	0.063	0.4	NA	0.0	0.2	0.01	0.04	0.01	76.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [BaseSAT-PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 1pm-2pm peak
Growth 2% pa for 10 Years
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	143	5.1	143	5.1	0.076	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	2	0.0	2	0.0	0.001	6.9	LOS A	0.0	0.0	0.20	0.57	0.20	47.4
Approach			145	5.1	145	5.1	0.076	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.2
East: Unnamed Road															
4	L2	All MCs	5	0.0	5	0.0	0.009	3.7	LOS A	0.0	0.3	0.26	0.46	0.26	47.3
6	R2	All MCs	5	0.0	5	0.0	0.009	5.1	LOS A	0.0	0.3	0.26	0.46	0.26	47.2
Approach			11	0.0	11	0.0	0.009	4.4	LOS A	0.0	0.3	0.26	0.46	0.26	47.2
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.053	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.3
8	T1	All MCs	89	16.5	89	16.5	0.053	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.6
Approach			92	16.1	92	16.1	0.053	0.2	NA	0.0	0.0	0.00	0.02	0.00	79.5
All Vehicles			247	8.9	247	8.9	0.076	0.3	NA	0.0	0.3	0.01	0.03	0.01	77.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [ProposalOpSAT-PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Old Northern Road and Unnamed Road
Estimated 1pm-2pm peak + Growth 2% pa for 10 Years
With Proposal Operational Traffic
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Northern Road S															
2	T1	All MCs	143	5.1	143	5.1	0.076	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	All MCs	2	0.0	2	0.0	0.001	6.9	LOS A	0.0	0.0	0.20	0.57	0.20	47.4
Approach			145	5.1	145	5.1	0.076	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.2
East: Unnamed Road															
4	L2	All MCs	8	0.0	8	0.0	0.013	4.6	LOS A	0.0	0.3	0.25	0.49	0.25	49.3
6	R2	All MCs	6	0.0	6	0.0	0.013	5.5	LOS A	0.0	0.3	0.25	0.49	0.25	49.9
Approach			15	0.0	15	0.0	0.013	5.0	LOS A	0.0	0.3	0.25	0.49	0.25	49.5
North: Old Northern Road N															
7	L2	All MCs	2	0.0	2	0.0	0.053	7.0	LOS A	0.0	0.0	0.00	0.02	0.00	73.3
8	T1	All MCs	89	16.5	89	16.5	0.053	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	79.6
Approach			92	16.1	92	16.1	0.053	0.2	NA	0.0	0.0	0.00	0.02	0.00	79.5
All Vehicles			252	8.8	252	8.8	0.076	0.4	NA	0.0	0.3	0.02	0.04	0.02	76.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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The Transport Planning Partnership
Suite 402 Level 4, 22 Atchison Street
St Leonards NSW 2065

P.O. Box 237
St Leonards NSW 1590

02 8437 7800

info@ttpp.net.au

www.ttpp.net.au

Appendix 4

Air Quality Impact Assessment

prepared by Northstar Air Quality Pty Ltd

(Total No. of pages including blank pages = 80)

This document has been prepared for **R. W. Corkery & Co. Pty Limited** on behalf of **Central Civil (NSW) Pty Ltd** by:

Northstar Air Quality Pty Ltd,
Suite 1504, 275 Alfred Street, North Sydney, NSW 2060

northstar-env.com | Tel: 1300 708 590

Maroota Central Civil Quarry Proposal

Air Quality Impact Assessment

Addressee(s):	**R. W. Corkery & Co. Pty Limited**
Site Address:	**4773 Old Northern Road, Maroota NSW**
Report Reference:	**23.1001.FR1V1**
Date:	**9 August 2023**
Status:	**Final**

Quality Control

Study	Status	Prepared by	Checked by	Authorised by
INTRODUCTION	Final	Northstar Air Quality	GCG	MD
THE QUARRY	Final	Northstar Air Quality	GCG	MD
LEGISLATION, REGULATION AND GUIDANCE	Final	Northstar Air Quality	GCG	MD
EXISTING CONDITIONS	Final	Northstar Air Quality	GCG	MD
METHODOLOGY	Final	Northstar Air Quality	GCG	MD
AIR QUALITY IMPACT ASSESSMENT	Final	Northstar Air Quality	GCG	MD
GREENHOUSE GAS ASSESSMENT	Final	Northstar Air Quality	GCG	MD
MITIGATION AND MONITORING	Final	Northstar Air Quality	GCG	MD
CONCLUSION	Final	Northstar Air Quality	GCG	MD

Report Status

Northstar References		Report Status	Report Reference	Version
Year	Job Number	(Draft: Final)	(R*x*)	(V*x*)
23	1001	Final	R1	V1
Based upon the above, the specific reference for this version of the report is:				23.1001.FR1V1

Final Authority

This report must by regarded as draft until the above study components have been each marked as final, and the document has been signed and dated below.



Martin Doyle **9 August 2023**

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Non-Technical Summary

R.W Corkery & Co Pty Ltd has engaged Northstar Air Quality Pty Ltd on behalf of Central Civil (NSW) Pty Ltd , to perform an air quality impact assessment and greenhouse gas assessment for the proposed operation of the Maroota Central Civil Quarry, located at 4773 Old Northern Road in Maroota, NSW.

The assessment has been performed in accordance with the requirements of the NSW Environment Protection Authority Approved Methods for the Modelling and Assessment of Air Pollutants in NSW document and meets the requirements of the project specific Secretary's Environmental Assessment Requirements and requirements provided by Hornsby Shire Council.

The results of the assessment indicate that predicted incremental concentrations associated with operation of the Quarry at sensitive receptor locations are small, and no exceedances of the annual average Respirable Crystalline Silica, Total Suspended Particulate and PM_{10} criteria are predicted. Exceedance of the annual average $PM_{2.5}$ criterion is predicted at all receptor locations, due to the existing background concentration already exceeding that criterion. The predicted incremental contribution from the Quarry to that annual average concentration is predicted to be < 0.1 $\mu g \cdot m^{-3}$ at all receptor locations which indicates that the proposed approach to emissions management is suitable.

A range of management measures would be outlined in the Air Quality Management Plan to be developed for the Quarry, which would result in emissions of particulate matter being lower than those modelled within this assessment. It is noted that these unquantified reductions are not relied upon to demonstrate compliance with the air quality criteria.

In relation to greenhouse gas, the assessment indicates that direct emissions associated with the Quarry are estimated to contribute up to 0.0006% of NSW total GHG emissions in 2020, and up to 0.0002% of Australia's greenhouse gas emissions in 2022. The Applicant would implement a series of management measures to reduce emissions associated with operation the Quarry.

In conclusion, the Quarry can be operated to minimise the concentrations of air pollutants experienced within surrounding environment.

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1. INTRODUCTION

Northstar Air Quality Pty Ltd (Northstar) has been commissioned by R. W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd (the Applicant), to perform an air quality impact assessment (AQIA) to support a development application (DA) for the proposed operation of the Maroota Central Civil Quarry (the Quarry), located at 4773 Old Northern Road in Maroota, NSW (the Quarry Site).

This AQIA identifies and examines potential air quality impacts associated with operation of the Quarry, in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and identifies mitigation and monitoring requirements commensurate with those anticipated impacts.

1.1. Secretary Environmental Assessment Requirements

Planning Secretary's Environmental Assessment Requirements (SEARs) have been provided for the Quarry. Hornsby Shire Council has also provided requirements for the assessment of air quality. Table 1 provides a summary of the requirements relevant to this AQIA, and the section of this report in which they have been addressed.

Table 1 Coverage of SEARs and other Government Agency requirements

Authority	Requirement	Section
NSW DPE	An assessment of the likely air quality impacts of the development in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.	Section 6
	The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage.	Section 6
Hornsby Shire Council	An Air Quality Assessment Report prepared by a suitably qualified environmental consultant is to be submitted to Council, given the proposed development is likely to, or capable of, generating air polluting emissions.	This report
	The report must assess the existing ambient air quality of the site and forecasted pollutant emission rates resulting from the proposed development and provide mitigation measures to ameliorate the potential impact of emissions from the site on nearby residences and sensitive receivers.	Section 4 Section 5 Section 6 Section 8
	The report must be prepared in accordance with the Environment Protection Authority's (EPA) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2017) and Technical Framework: Assessment and management of odour from stationary sources in NSW (2006), the Protection of the Environment Operations Act 1997 and associated Regulations.	Section 6

1.2. Purpose of the Report

The purpose of this report is to undertake an assessment to understand the risks and potential impact on air quality resulting from the operation of the Quarry.

To allow assessment of the level of risk and impacts associated with the Quarry, this assessment has been performed in accordance with and with due reference to:

- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA, 2022);
- *Protection of the Environment Operations Act* 1997; and
- Protection of the Environment Operations (Clean Air) Regulation 2022.

2. THE QUARRY

2.1. Environmental Setting

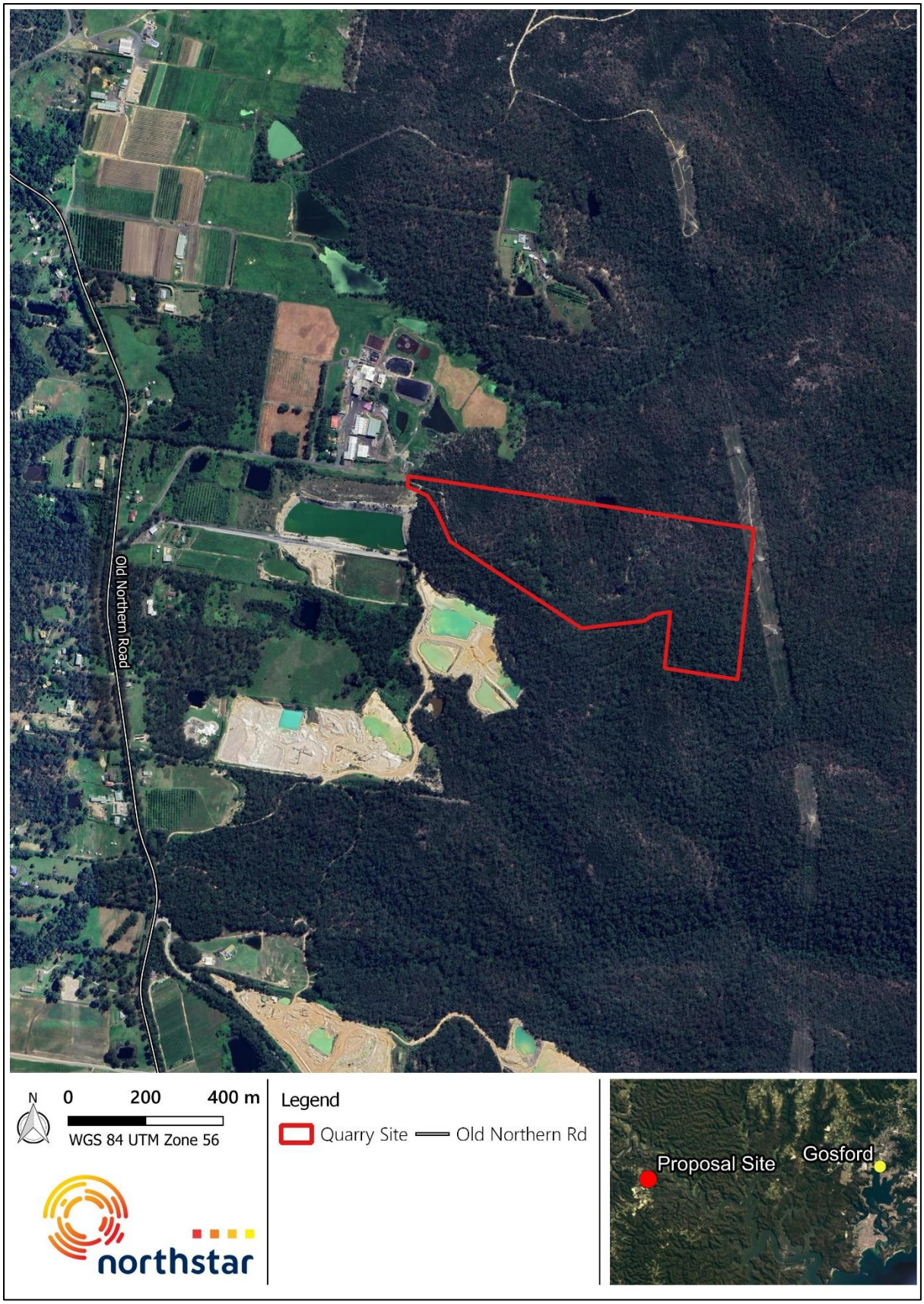
The Quarry Site is located at 4773 Old Northern Road in Maroota, NSW. A map showing the location of the Quarry Site is provided in Figure 1.

2.2. Overview

The Quarry refers to the establishment and operations of the Maroota Central Civil Quarry which would include the following.

- Extraction, processing and despatch of up to 30 000 tonnes per year ($t \cdot yr^{-1}$) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

Figure 1 Quarry Site location



Source: Northstar

2.3. Identification of Emissions to Atmosphere

The processes which may result in the emission of pollutants to air during operation of the Quarry would include:

- Cutting of sandstone logs and flagging stones;
- Extraction of friable sandstone;
- Transport of material from extraction area to processing area, with mobile crushing restricted to within the extraction area;
- Unloading and handling of material;
- Crushing and screening of friable sandstone;
- Loading of haul trucks, transport, unloading and storage of material;
- Movement of heavy vehicles transporting material offsite; and
- Wind erosion of stockpiles and exposed areas.

The specific air pollutants of interest associated with those activities include:

- Total suspended particulate (TSP);
- Particulate matter with an aerodynamic diameter of 10 micrometres (PM_{10});
- Particulate matter with an aerodynamic diameter of 2.5 micrometres ($PM_{2.5}$); and
- Respirable Crystalline Silica (RCS).

3. LEGISLATION, REGULATION AND GUIDANCE

3.1. NSW EPA Air Quality Criteria

State air quality guidelines adopted by the NSW EPA are published in the *'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'* (the Approved Methods (NSW EPA, 2022)) which has been consulted during the preparation of this assessment report.

The Approved Methods lists the statutory methods that are to be used to model and assess emissions of criteria air pollutants from stationary sources in NSW. Section 7.1 of the Approved Methods clearly outlines the impact assessment criteria for the Quarry. The criteria listed in the Approved Methods are derived from a range of sources (including NHMRC, NEPC, DoE, WHO and ANZECC). Where relevant to this AQIA (coincident with the potential emissions identified in Section 2.3), the criteria have been adopted as set out in Section 7.1 of NSW EPA (2017) which are presented in Table 2.

Table 2 NSW EPA air quality standards and goals

Pollutant	Averaging period	Units[(e)]	Criterion	Notes
Particulates (as PM_{10})	24 hours	$\mu g \cdot m^{-3}$ [(a)]	50	Numerically equivalent to the AAQ NEPM[(b)] standards and goals.
	1 year	$\mu g \cdot m^{-3}$	25	
Particulates (as $PM_{2.5}$)	24 hours	$\mu g \cdot m^{-3}$	25	
	1 year	$\mu g \cdot m^{-3}$	8	
Particulates (as TSP)	1 year	$\mu g \cdot m^{-3}$	90	
Particulates (as dust deposition)	1 year[(c)]	$g \cdot m^{-2} \cdot month^{-1}$	2	Assessed as insoluble solids as defined by AS 3580.10.1
	1 year[(d)]	$g \cdot m^{-2} \cdot month^{-1}$	4	

Notes: (a): micrograms per cubic metre of air (b): National Environment Protection (Ambient Air Quality) Measure
(c): Maximum increase in deposited dust level (d): Maximum total deposited dust level
(e) Gas volumes are expressed at 25°C (298 K) and at an absolute pressure of 1 atmosphere (101.325 kPa)

Given the nature of the material to be extracted at the Quarry Site, silica may be generated during extraction activities. NSW EPA do not provide air quality criteria for this pollutant, although EPA Victoria outline an annual average health-based air pollution assessment criterion (APAC) for RCS of 3 $\mu g \cdot m^{-3}$ (cumulative) (EPA Victoria, 2022) assessed as $PM_{2.5}$. Furthermore, South Australia EPA published an interim position paper in November 2022 in which an annual average criterion for RCS of 3 $\mu g \cdot m^{-3}$ has been adopted for mining and extractive industries (SA EPA, 2022). SA EPA have adopted the criterion to be applicable to the PM_{10} size fraction, which is acknowledged as being precautionary.

The SA EPA criterion is referenced in this assessment and calculates respirable crystalline silica by adjusting annual average PM_{10} modelling results on a *pro-rata* basis to account for the determined maximum free silica content of the extracted material (approximately 95 %). RCS is generally an occupational health and safety

issue (i.e. on-site) rather than an environmental issue (i.e. off-site) when considering quarrying activities but has been presented within this AQIA for completeness.

3.2. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations* (POEO) *Act* (1997) sets the statutory framework for managing air quality in NSW, including establishing the licensing scheme for major industrial premises and a range of air pollution offences and penalties.

Given that the proposed extractive activity at the Quarry Site would be performed at a rate of 30 000 $t \cdot yr^{-1}$, it would not be considered to be a scheduled activity (as per Schedule 1 of the POEO Act), and an Environment Protection Licence (EPL) would not be required to be obtained from NSW EPA.

3.3. Protection of the Environment (Clean Air) Regulation 2022

The Protection of the Environment Operations (POEO) (Clean Air) Regulation (2022) sets standards of concentration for emissions to air from both scheduled and non-scheduled activities. For the activities performed at the Quarry Site, the POEO (Clean Air) Regulation provides general standards of concentration for scheduled premises which are presented in Table 3 for the pollutants of relevance to this assessment.

Table 3 POEO (Clean Air) Regulation – General standards of concentration

Air Impurity	Activity	Standard of Concentration (Group 6)[(a)]
Solid particles (total)	Any activity or plant (except as listed below)	50 $mg \cdot m^{-3}$
	Any crushing, grinding, separating or materials handling activity	20 $mg \cdot m^{-3}$

Note: (a) Group 6 – pursuant to application made on or after 1 September 2005

Further to the requirements in Table 3 Part 4 Clause 15 of the POEO (Clean Air) Regulation requires that motor vehicles do not emit excessive air impurities which may be visible for a period of more than 10-seconds when determined in accordance with the relevant standard.

All vehicles, plant and equipment to be used either at the Quarry Site or to transport materials to and from the Quarry Site will be maintained regularly and in accordance with manufacturers' requirements, where these vehicles are under the operational control of the Applicant.

4. EXISTING CONDITIONS

4.1. Surrounding Land Sensitivity

4.1.1. Discrete Receptor Locations

Air quality assessments typically use a desk-top mapping study to identify 'discrete receptor locations', which are intended to represent a selection of locations that may be susceptible to changes in air quality. In broad terms, the identification of sensitive receptors, refers to places at which humans may be present for a period representative of the averaging period for the pollutant being assessed. Typically, these locations are identified as residential properties, although other sensitive land uses may include schools, medical centres, places of employment, recreational areas or ecologically sensitive locations.

It is noted that in addition to the identified 'discrete' receptor locations, the entire modelling area is gridded with 'uniform' receptor locations (see Section 4.1.2) that are used to plot out the predicted impacts, and as such the accidental non-inclusion of a location sensitive to changes in air quality does not render the AQIA invalid, or otherwise incapable of assessing those potential risks.

To ensure that the selection of discrete receptors for the AQIA are reflective of the locations in which the population of the area surrounding the Quarry Site reside, population density data has been examined. Population density data based on the 2021 census have been obtained from the Australian Bureau of Statistics (ABS) for a 1 square kilometre (km^2) grid, covering mainland Australia. Using a Geographical Information System (GIS), the locations of sensitive receptor locations have been confirmed with reference to their population densities.

For clarity, the ABS use the following categories to analyse population density (persons·km^{-2}):

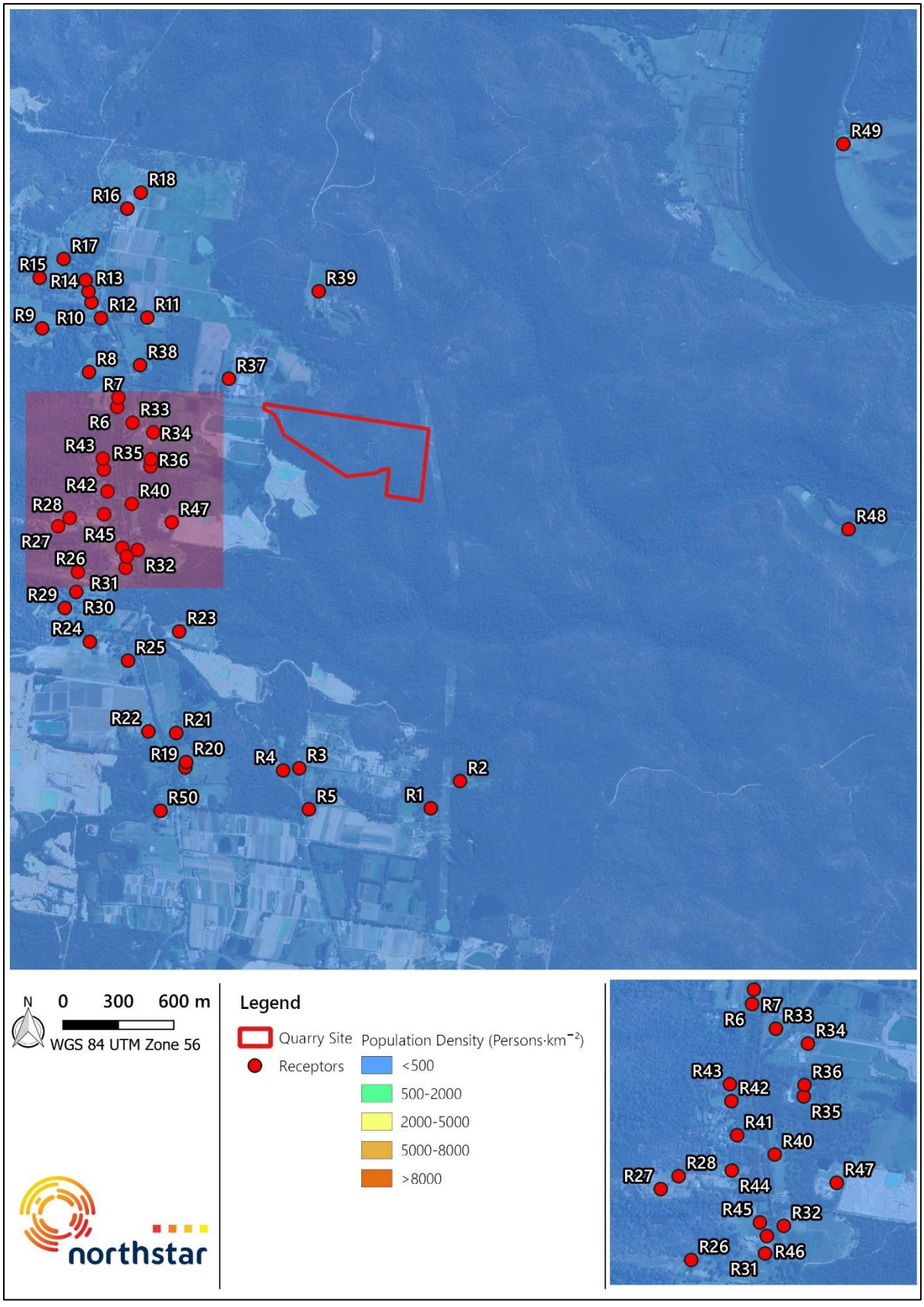
- Very high >8,000
- High >5,000
- Medium >2,000
- Low >500
- Very low <500
- No population 0

Using ABS data in a GIS, the population density of the area surrounding the Quarry Site are presented in Figure 2. The Quarry Site is located in an area of low to very low population density (between 0 and <500 persons·km^{-2}).

A number of residential, industrial, commercial and educational locations surrounding the Quarry Site have been identified and these receptors have been adopted for use within this AQIA as illustrated in Figure 2.

A full list of all receptor location including lot numbers, coordinates and associated land use types is provided in Appendix C.

Figure 2 Population density and sensitive receptors surrounding the Quarry Site



Source: Northstar

4.1.2. Uniform Receptor Locations

Additional to the sensitive receptors identified in Section 4.1.1, a grid of uniform receptor locations has been used in the AQIA to allow presentation of contour plots of predicted impacts.

4.2. Meteorology

The meteorology experienced within an area can govern the generation (in the case of wind-dependent emission sources), dispersion, transport and eventual fate of pollutants in the atmosphere. The meteorological conditions surrounding the Quarry Site have been characterised using data collected by the Australian Government Bureau of Meteorology (BoM) at a number of surrounding Automatic Weather Stations (AWS).

Two meteorological stations operated by BoM were identified within an approximate 30 km radius of the Quarry Site. A summary of the relevant AWS is provided in Table 4 below (listed by proximity).

Table 4 Details of meteorological monitoring surrounding the Quarry Site

Site name	Source	Approximate location		Approximate distance
		mE	mS	km
Mangrove Mountain AWS #61375	BoM	333 388	6 315 201	25.1
Richmond RAAF #67105	BoM	293 651	6 279 933	27.8

The meteorological conditions measured at the identified AWS are presented in Appendix A.

Data at Richmond RAAF for the period 2018-2021 have been analysed for use in this study. Generally, AQIA studies analyse meteorological data for a five-year period, however, PM_{10} measured at Maroota Public School is only available from 2018 (refer Section 4.3) and accordingly meteorological data for the period 2018-2021 has been considered in this study. $PM_{2.5}$ measurements from the Richmond air quality monitoring station (AQMS) have been adopted (refer Section 4.3) and correspondingly meteorological data from Richmond RAAF AWS has been examined in this study. The wind roses presented in Appendix A indicate that from 2018 to 2021, winds at Richmond RAAF show generally similar wind distribution patterns across the years assessed, with predominant south-westerly and north-easterly wind directions.

The majority of wind speeds experienced at the Richmond RAAF AWS between 2018 and 2021 are generally in the range 1.5 meters per second ($m \cdot s^{-1}$) to 5.5 $m \cdot s^{-1}$ with the highest wind speeds (greater than 8 $m \cdot s^{-1}$) occurring from west to north-westerly directions. Winds of this speed are rare and occur during 2.3 % of the observed hours during the years while calm winds (< 0.5 $m \cdot s^{-1}$) occur during 13.7 % of hours on average across the years 2018-2021.

An analysis of the correlation coefficients between each year for wind speed, wind direction and particulate matter data distribution was performed to select a representative year for the meteorological modelling (refer

Appendix A). Following this analysis, the year 2020 was selected as the most representative year for meteorological modelling.

To provide a characterisation of the meteorology which would be expected at the Quarry Site, a meteorological modelling exercise has also been performed.

A summary of the inputs and outputs of the meteorological modelling assessment, including validation of those outputs is presented in Appendix A.

4.3. Air Quality

The air quality experienced at any location will be a result of emissions generated by natural and anthropogenic sources on a variety of scales (local, regional and global). The relative contributions of sources at each of these scales to the air quality at a location, will vary based on a wide number of factors including the type, location, proximity and strength of the emission source(s), prevailing meteorology, land uses and other factors affecting the emission, dispersion and fate of those pollutants.

When assessing the impact of any particular source of emissions on the potential air quality at a location, the impact of all other sources of an individual pollutant, should also be assessed. These 'background' (sometimes called 'baseline') air quality conditions will vary depending on the pollutants to be assessed and can often be characterised by using representative air quality monitoring data.

Two AQMS have been identified within a 35 km radius of the Quarry Site, one operated by NSW Department of Planning and Environment (NSW DPE) at Richmond, and one established at the Maroota Public School under an operational condition (as required under the Environmental Protection Licence – 3916 and 12513) for the Old Northern Road and Haerses Road Quarries operated by Dixon Sand Pty Ltd. These locations (listed by proximity) are briefly summarised in Table 5. Data is available for the Maroota Public School TEOM from January 2018[1], with data from the Richmond AQMS available from 1992.

Table 5 Closest AQMS to the Quarry Site

AQMS location	Distance to site (km)	2020 data	Measurements		
			PM_{10}	$PM_{2.5}$	TSP
Maroota Public School TEOM	2.1 km	✓	✓	×	×
Richmond AQMS (NSW DPE)	31 km	✓	✓	✓	×

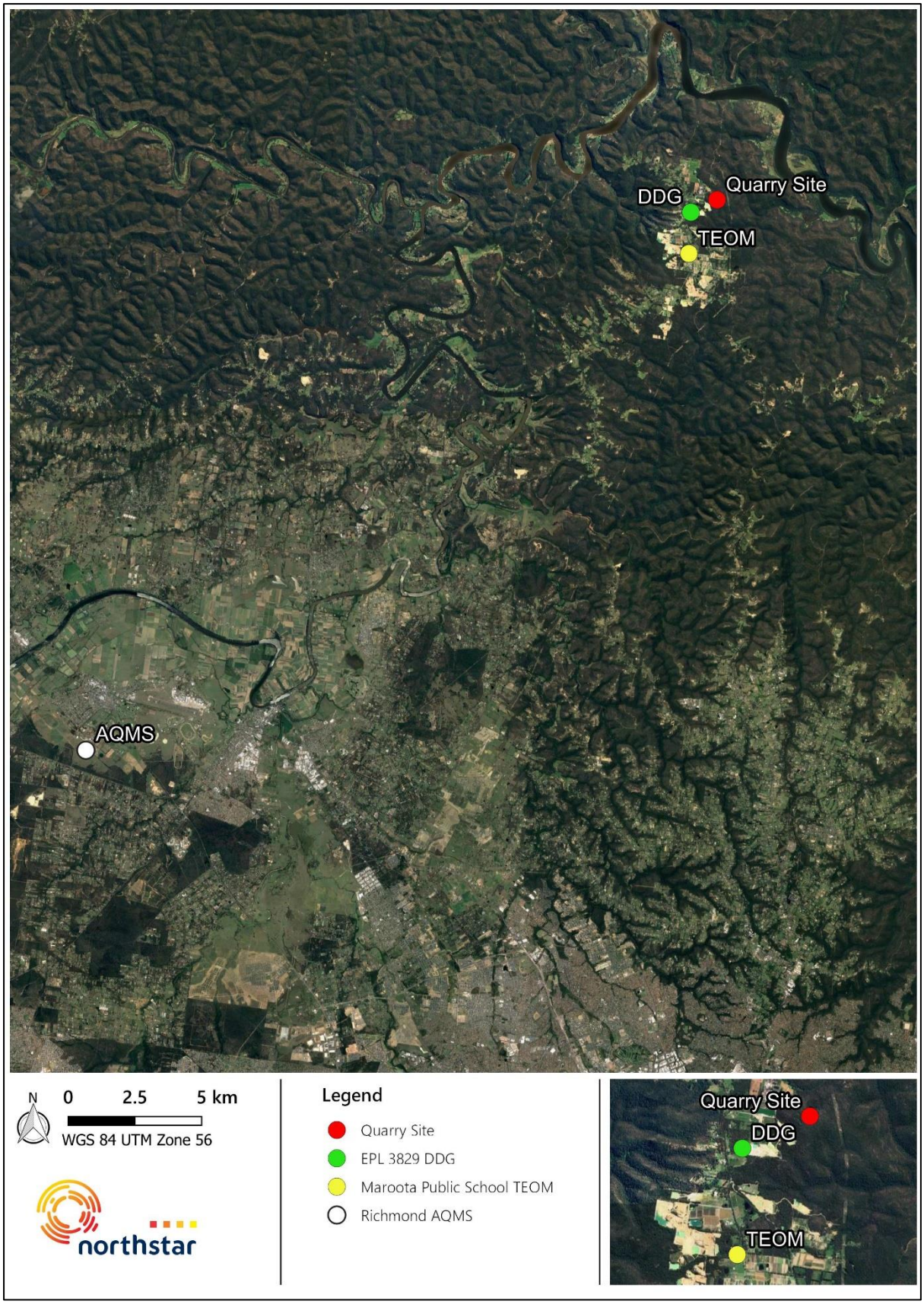
A representation of average 24-hour PM_{10} concentrations recorded at both the Richmond AQMS and Maroota Public School over the full calendar years 2018 to 2021 is presented in Figure 4. The measured PM_{10}

[1] http://www.dixonsand.com.au/epl-monitoring

concentrations at both locations follow a similar trend, with notable exceedances of the NSW EPA criterion during 2019 attributed to poor air quality resulting from a number of large bushfires affecting the Greater Sydney Region during this period.

Figure 5 presents an X-Y plot of the measured PM_{10} data over the same period, which confirms that the measured 24-hour values are well correlated, indicating that there is a large regional component to those particulate concentration measurements. Figure 5 also shows that the 24-hour PM_{10} concentrations measured at the Maroota Public School are marginally higher than those measured at Richmond, which would be anticipated given the nature of the area in which the monitoring equipment is located (refer Section 4.5).

Figure 3 Air quality monitoring surrounding the Quarry Site



Source: Northstar

An analysis of annual average PM_{10} concentrations measured at both sites (refer Table 6) shows that annual average concentrations are typically higher at Richmond than measured at Maroota Public School.

Figure 4 24-hour average PM_{10} concentrations, Maroota Public School and Richmond

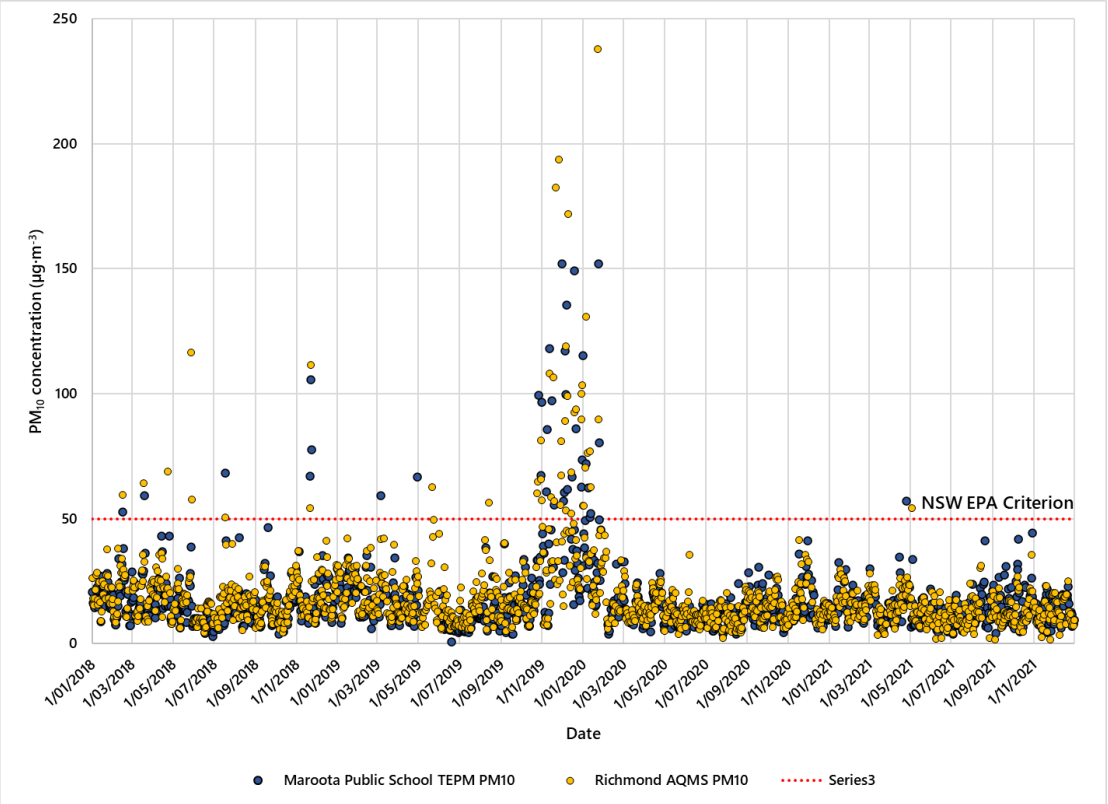


Figure 5 X-Y plot of 24-hour average PM_{10} concentrations, Maroota Public School and Richmond

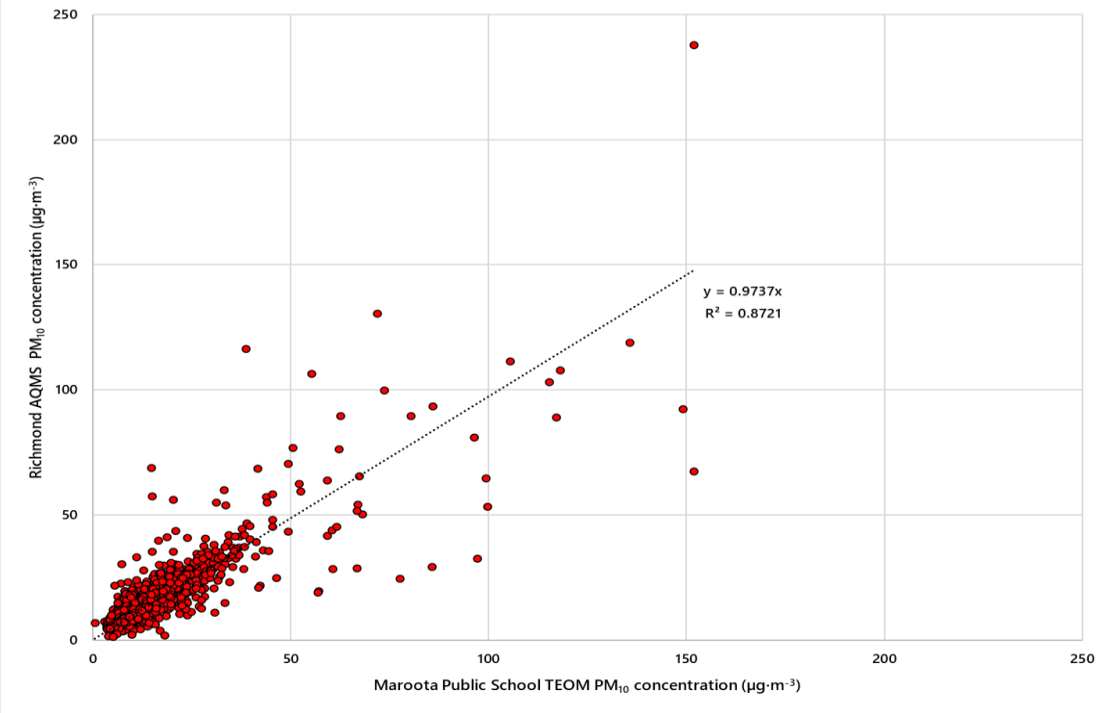


Table 6 Annual average PM_{10} concentrations - Maroota Public School and Richmond AQMS

Year	Annual average PM_{10} concentration ($\mu g \cdot m^{-3}$)	
	Maroota Public School	Richmond
2018	16.6	18.7
2019	21.3	24.2
2020	15.3	17.0
2021	13.9	13.6

For the purposes of this AQIA, PM_{10} concentrations as measured at the Maroota Public School have been adopted as background conditions, as they are measured in the vicinity of the Quarry Site and include some component of impact associated with the nearby extractive industries.

$PM_{2.5}$ concentrations are not measured at the Maroota Public School, and the measurements from the Richmond AQMS have been adopted. Given that the Richmond AQMS is located within an approximate 30 km radius from the Quarry Site, and recorded 24-hour PM_{10} concentrations following a similar trend to data measured at Maroota Public School, the use of recorded $PM_{2.5}$ data from Richmond is considered appropriate to represent background fine particulate concentrations near to the Quarry Site.

It is noted that none of the identified AQMS measure Total Suspended Particulate (TSP) which is of relevance to the expected emissions from the Quarry Site. Based upon long-term historic monitoring data, a numerical relationship between TSP and PM_{10} has been established for the NSW region. Based upon these data, a relationship between ambient concentrations of TSP: PM_{10} of 2.2434 : 1 is used to approximate background annual average TSP concentrations. This relationship is established and is used frequently to approximate background annual average TSP concentrations in similar locations (see Appendix B).

As discussed further in Section 4.5, eight Environment Protection Licences (EPL) are held by operators of extractive industries in the immediate area. Of those eight EPL, five require the performance of dust deposition monitoring. The closest operation which requires dust deposition monitoring is adjacent to the Quarry Site at the P. F. Formation Pty Ltd operation (EPL 3829, named as 'Pit 5 Quarry Site 4' by the operator) on Lot 63 DP752029, Lot 3 DP567166 and Lot 2 DP510812. One dust deposition gauge (DDG) is located to the western end of the pit within Lot 2 DP510812, marked as 'Josh's House' within the monitoring results[2]. Data for that DDG have been obtained and are presented in Table 7.

[2] https://pfformation.com.au/environmental-monitoring-results/

Table 7 Dust deposition monitoring – EPL 3829

Year	Insoluble solids ($g \cdot m^{-2} \cdot month^{-1}$)
2019 (June to December)	1.6
2020	2.1
2021	1.5

As noted in Section 4.2, an analysis of meteorological and particulate matter measurements was performed which indicated that data from the year 2020 was best correlated with average conditions, and this year has been selected for modelling purposes. It is noted that extension of the correlation coefficient analysis to include 2022 data still results in 2020 being the most representative year for dispersion modelling.

A summary of the air quality monitoring data and assumptions used in this assessment are presented in Table 8.

Table 8 Summary of background air quality used in the AQIA

Pollutant	Ave Period and Units	Measured Value	Notes
Particles (as TSP) (derived from PM_{10})	Annual $\mu g \cdot m^{-3}$	34.2	Estimated on a TSP:PM_{10} ratio of 2.2434 : 1
Particles (as PM_{10}) (Maroota Public School)	24-hour $\mu g \cdot m^{-3}$	Daily Varying	The 24-hour maximum for PM_{10} in 2020 was 151.8 $\mu g.m^{-3}$
	Annual $\mu g \cdot m^{-3}$	15.3	
Particles (as $PM_{2.5}$) (Richmond)	24-hour $\mu g \cdot m^{-3}$	Daily Varying	The 24-hour maximum for $PM_{2.5}$ in 2020 was 93.0 $\mu g.m^{-3}$
	Annual $\mu g \cdot m^{-3}$	8.4	
Dust deposition	Annual $g \cdot m^{-2} \cdot month^{-1}$	2.1	As measured at the P. F. Formation Pty Ltd 'Site 4' (EPL 3829)

Note: Reference should be made to Appendix B

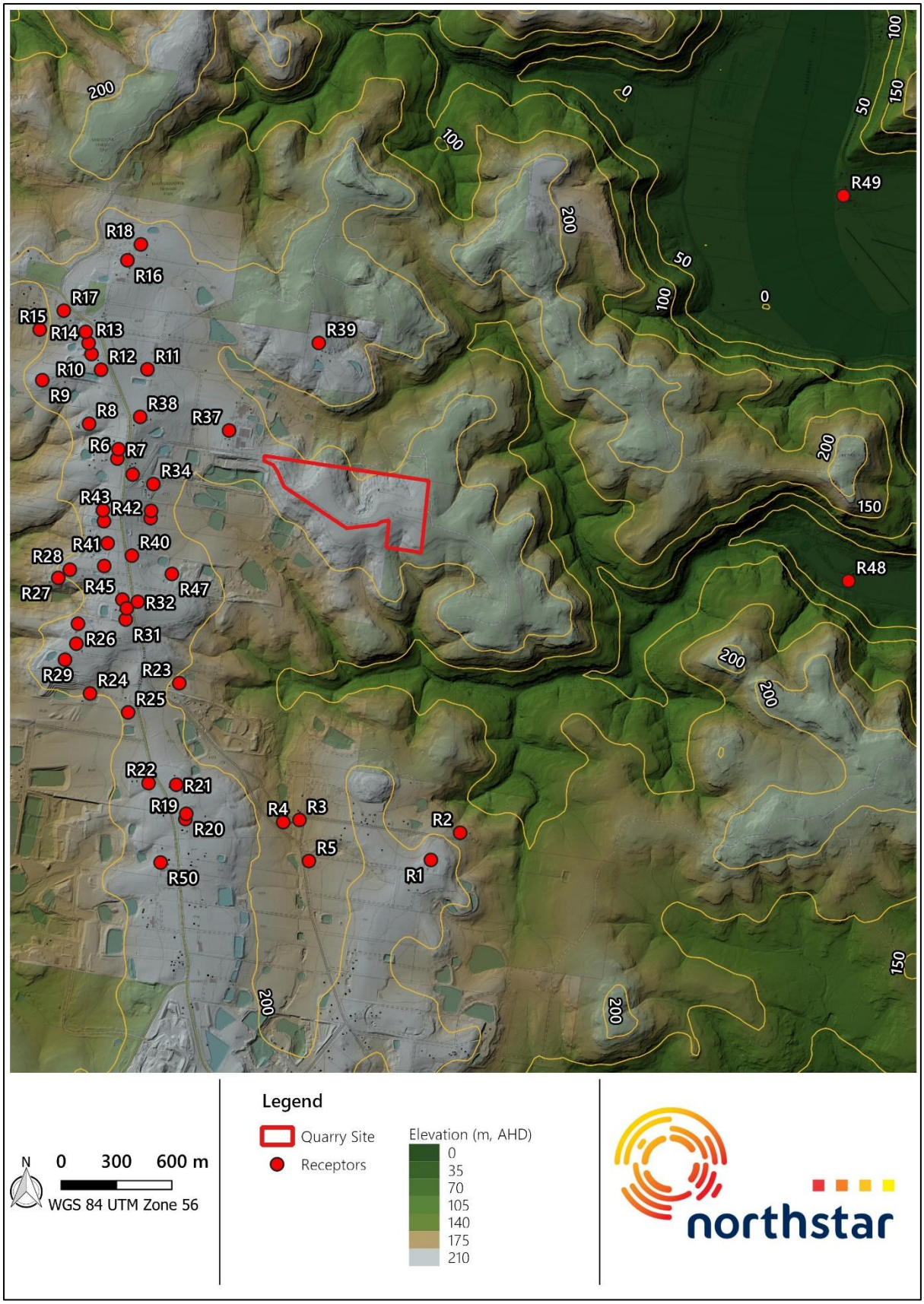
A number of AQMS in NSW metropolitan and regional population centres recorded particulate matter concentrations above the national standards on a number of days towards the end of 2019 and start of 2020. This was mainly driven by intense drought conditions and a high frequency of bushfires occurring across NSW in early 2020 (NSW DPIE, 2021).

The AQIA has been performed to assess the contribution of the Quarry to the air quality of the surrounding area.

4.4. Topography

The Quarry Site is situated on a ridge at approximately 230 m Australian Height Datum (AHD). The town of Maroota sits on a ridge running north-south at similar elevations. Elevations reduce to the west and east towards the Hawkesbury River. The complexity of the topography surrounding the Quarry Site has informed the approach to meteorological modelling (refer Section 5.1 and Appendix A).

Figure 6 3D representation of topography surround Quarry Site



Source: Northstar

4.5. Potential for Cumulative Impacts

The area surrounding the Quarry Site is historically known for sand extraction operations. As discussed briefly in Section 4.3, eight EPL are currently associated with extractive operations to the south of the Quarry Site, as shown in Table 9 and Figure 7. The Maroota Sandstone Quarry on Laughtondale Road does not hold an EPL which indicates that it operates below the relevant threshold of 30 000 $t \cdot yr^{-1}$ for a scheduled extractive activity, as defined in Schedule 1, Part 1, Clause 19 of the POEO Act. Table 9 includes the approved extraction/processing quantities associated with each EPL, and also the relevant quantity as reported through the relevant Annual Environmental Monitoring Review (AEMR) as available.

A review of the NSW DPE Major Quarry website confirms that none of the operations in Table 9 are awaiting determination on any proposed modifications to approved activities. One proposed activity, being the Maroota Friable Sandstone Extraction Proposal (SSD-10410), is currently undergoing assessment by the Department. That Proposal seeks approval for the extraction and processing of up to 500 000 $t \cdot yr^{-1}$ of friable sandstone and sand deposits at a location to the south of the Old Northern Road Quarry, west of Wisemans Ferry Road. The proponent is currently reviewing submissions received on the EIS.

In relation to the Quarry, it is shown in Figure 7 that all approved and proposed activities are located to the south of the Quarry Site. The air quality data adopted for use within this assessment, related to PM_{10} concentrations, is measured at the Maroota Public School which sits at the intersection of a number of operating extractive operations. However, analysis of that data (refer Section 4.3) indicates that it is similar to that measured at Richmond AQMS, and therefore, regional impacts are likely the dominant driver of particulate concentrations, rather than local influences.

Table 9 Approved and proposed extractive industries near to the Quarry Site

EPL	EPL holder / operator	Operation name	Approved / proposed extraction / processing	July 2017 to June 2018	July 2018 to June 2019	July 2019 to June 2020	July 2020 to June 2021
			$t \cdot yr^{-1}$				
3407	PF Formation Pty Ltd	Hitchcock Road Quarry	400 000	193 000	108 974	-	288 449
3829	PF Formation Pty Ltd	Pit 5 Quarry 'Site 4'©	250 000	-	-	-	192 312
3916	Dixon Sand Pty Ltd	Old Northern Road Quarry	500 000	-	370 891	378 959	425 945
6535	HB Maroota Pty Ltd	Roberts Road Quarry	>100 000 to 500 000[a]	-	-	-	-
10357	PF Formation Pty Ltd	Telegraph Road Quarry	250 000	-	-	-	65 557
12513	Dixon Sand Pty Ltd	Haerses Road Quarry	250 000[b]	-	-	62 303	54 019
21046	PF Formation Pty Ltd	Maroota Lodge Quarry	>100 000 to 500 000[a]				
21553	PF Formation Pty Ltd	Pit 3 Quarry	>100 000 to 500 000[a]				
-	Maroota Sandstone Quarry	Maroota Sandstone Quarry	-	No data available			
-	Deerubbin Local Aboriginal Land Council	Maroota Friable Sandstone Extraction Proposal	500 000	Proposed			

Note: (a) No documentation other than EPL could be sourced

(b) Modified in June 2022 to allow extraction and processing up to 495 000 $t \cdot yr^{-1}$ (MOD5)

(c) Assessment report currently being prepared for minor changes to development. No change in extraction quantity proposed.

Figure 7 Approved and proposed extractive industries near to the Quarry Site



Source: Northstar

The AQIA for the Maroota Friable Sandstone Extraction Proposal (TAS, 2021) has been reviewed to examine the potential impacts of particulate matter on the receptors selected for assessment within this AQIA. None of the receptors identified for assessment in TAS (2021) overlap with those selected for the Quarry Site, given the significant distance between the two Proposals (2.5 km).

The lowest predicted incremental impacts associated with the Maroota Friable Sandstone Extraction Proposal have been identified and are presented in Table 10. Given that those predicted impacts are less proximate to the Quarry Site than the receptors identified for assessment in this AQIA, the concentrations at the receptors are anticipated to be significantly lower in reality than presented in Table 10.

Table 10 Predicted incremental particulate impacts – Maroota Friable Sandstone Extraction Proposal

Parameter	Incremental impact (R44A)
24-hour maximum PM_{10}	1.8 $\mu g \cdot m^{-3}$
24-hour maximum $PM_{2.5}$	0.4 $\mu g \cdot m^{-3}$
Annual average TSP	0.4 $\mu g \cdot m^{-3}$
Annual average PM_{10}	0.2 $\mu g \cdot m^{-3}$
Annual average $PM_{2.5}$	<0.1 $\mu g \cdot m^{-3}$
Deposited dust	<0.1 $g \cdot m^{-2} \cdot month^{-1}$

It is noted that TAS (2021) also adopted PM_{10} data from the Maroota Public School TEOM to approximate existing particulate conditions in the area, which is consistent with the approach adopted within this AQIA.

4.6. Greenhouse Gas

Emissions of greenhouse gas (GHG) are tracked by the Commonwealth of Australia via the Australian National Greenhouse Accounts program which, combined with the reports and data submitted as part of the program, fulfills Australia's international and domestic reporting requirements. Carbon emission totals by State and Territory by year and by sector are reported in the 'State and Territory Greenhouse Gas Inventories' report each year. These data are used to:

- Meet Australia's reporting commitments under the United Nations Framework Convention on Climate Change (UNFCCC);
- Track progress against Australia's emission reduction commitments; and
- Inform policy makers and the public.

Data from the 2022 report for Australia (DISER, 2022) and NSW have been obtained for the purposes of this GHG assessment. These reports are the most recent available at the time of reporting.

Emissions of GHG from Australia in 2022 across all economic sectors were 486.9 million tonnes (Mt) carbon dioxide equivalent (CO_2-e). GHG emissions in NSW in 2020 were 141 Mt CO_2-e.

5. METHODOLOGY

5.1. Dispersion Modelling

A dispersion modelling assessment has been performed using the NSW EPA approved CALPUFF atmospheric dispersion model. The modelling has been performed in CALPUFF 3-dimensional (3-D) mode, adopting a 'No-Obs' meteorological modelling simulation, in accordance with NSW DPE guidance (Barclay & Scire, 2011) (please refer to Appendix B for further information). This approach allows the inclusion of topographical features which are present in the area surrounding the Quarry, as discussed in Section 4.4.

An assessment of the impacts of the operation of activities at the Quarry has been performed which characterises the likely day-to-day operation of the Quarry, approximating average operational characteristics which are appropriate to assess against longer term (annual average) criteria for particulate matter. The likely peak activities at the Quarry have also been characterised to allow comparison of potential impacts against shorter term (24-hour) criteria for particulate matter.

The modelling scenarios provide an indication of the air quality impacts of the operation of activities at the Quarry Site. Added to these impacts are background air quality concentrations (where available and discussed in Section 4.3 and Appendix B) which represent the air quality which may be expected within the area surrounding the Quarry Site, without the impacts of the Quarry itself.

The following provides a description of the determination of appropriate emissions of air pollutants resulting from the operation of the Quarry.

5.2. Emissions Estimation

The estimation of emissions from a process is typically performed using direct measurement or through the application of factors which appropriately represent the processes under assessment. This assessment has adopted emission factors for materials handling processes, movement of trucks on unpaved site roads, paved off-site roads, crushing and screening, and wind erosion contained within the US EPA AP-42 emission factor compendium (US EPA, 1995 and updates) to represent the emission of particulate matter resulting from the operations occurring at the Quarry Site as described in Section 2.3. These factors are appropriate for adoption in Australia and are routinely adopted in the assessment of operations of this nature.

An emission factor associated with sandstone log and flag cutting is not available in the US EPA AP-42 emission factor compendium, although recent work performed for the Dixon Sand Haerses Road Quarry (Zephyr, 2022) indicates that particulate emissions resulting from the use of rock saws on sandstone is calculated to be approximately 4 % greater than from using a bulldozer to rip that material. For the purposes of this assessment, emissions associated with the use of a rock saw to remove sandstone logs and flag cutting would be 10 % greater than from removing that material using a bulldozer ripping method.

5.3. Emissions Controls

Emission controls will be employed at the Quarry Site. The application of these controls results in quantifiable reductions in the quantity of particulate matter being emitted as part of the Quarry operation.

A summary of the emission reduction measures that would be adopted as part of the Quarry operation is presented in Table 11. These emission reductions are outlined in the NPI EETM for Mining (NPI, 2012) and relevant AP-42 documentation (US EPA, 1995).

Table 11 Summary of emission reduction methods adopted as part of Quarry operation

Emission control measure	Emission control efficiency (%)
Level 2 watering (2 $L \cdot m^{-2} \cdot hr^{-1}$) on unpaved roads	50
Limited vehicle speeds on unpaved roads	85
Limited vehicle speeds on paved roads	50

The above controls have been adopted in the performance of the AQIA. During the operation of the Quarry, it is likely that additional emission controls may be applied, such as watering of exposed areas, watering during materials processing etc. However, this AQIA has been performed to confirm that operation of the Quarry can be undertaken without resulting in exceedance of the relevant air quality criteria. Any additional controls applied would improve the situation as predicted through dispersion modelling.

5.4. Greenhouse Gas Assessment

The purpose of the greenhouse gas (GHG) assessment is to examine the potential impacts of the operation of the Quarry relating to emissions of GHG. A quantitative assessment of emissions is performed with direct emissions compared against total national and NSW GHG emissions for context (refer Section 4.6).

The scope of the GHG assessment is to provide a quantitative assessment of GHG emissions arising from the operation of the Quarry. This report does not provide a definitive quantification of GHG emissions arising from the Quarry operation but provides the general context of the likely quantum of emissions.

Opportunities for reduction of GHG emissions are discussed.

5.4.1. Emission Types

The Australian Government Department of the Environment (DoE) document, *National Greenhouse Accounts Factors* Workbook (Department of Climate Change, 2022), defines two types of GHG emissions, namely 'direct' and 'indirect' emissions (see Table 12). This assessment considers both direct emissions and indirect emissions resulting from the operation of the Quarry.

Table 12 Greenhouse gas emission types

Emission Type	Definition
Direct	Produced from sources within the boundary of an organisation and as a result of that organisation's activities (e.g. consumption of fuel in on-site vehicles)
Indirect	Generated in the wider economy as a consequence of an organisations' activities (particularly from its demand for goods and services), but which are physically produced by the activities of another organisation (e.g. consumption of purchased electricity)

5.4.2. Emission Scopes

The NGA Factors (Department of Climate Change, 2022) identifies two 'scopes' of emissions for GHG accounting and reporting purposes as shown in Table 13.

Table 13 Greenhouse gas emission scopes

Emission Scope	Definition
Scope 1	Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO_2-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal etc). These factors are used to calculate Scope 1 emissions
Scope 2	Indirect emission factors are used to calculate Scope 2 emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO_2-e per unit of electricity consumed. Scope 2 emissions are physically produced by the burning of fuels (coal, natural gas etc.) at the power station.

Note: Adapted from the NGA Factors Workbook (Department of Climate Change, 2022)

A third scope of emissions, Scope 3 emissions, are also recognised in some GHG assessments. The Greenhouse Gas Protocol (WRI, 2004) defines Scope 3 emissions as "other indirect GHG emissions":

> *Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Some examples of Scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.*

Scope 3 emissions related to the extraction and transport of fuels, and the use of fuels in employee transport have been considered.

5.4.3. Emission Source Identification

The geographical boundary set for this GHG assessment covers the Quarry Site and also includes the transport of product from the Quarry Site within the Greater Sydney region. All Scope 1, Scope 2 and Scope 3 emissions within the defined boundary have been identified and reported as far as possible.

The GHG emission sources associated with the operation of the Quarry have been identified through the review of the proposed broad activities as described in Section 2.2. The activities/operations being performed as part of the Quarry, which would have the potential to result in emissions of GHG are presented in Table 14 below.

Electricity will be generated through the use of diesel generators, with fuel consumption assessed as Scope 1 and Scope 3 emissions.

Table 14 Greenhouse gas emission sources

Quarry Component	Scope	Emission Source Description
Consumption of diesel fuel in mobile plant and equipment at the Quarry Site	1,3	Emissions from combustion of fuel (Scope 1) Emissions associated with the extraction and processing of fuel (Scope 3)
Consumption of diesel fuel/unleaded fuel for material transport purposes	1,3	Emissions from combustion of fuel (Scope 1) Emissions associated with the extraction and processing of fuel (Scope 3)
Consumption of diesel fuel/unleaded fuel for employee transport purposes	3	Emissions associated with the extraction and processing of fuel (Scope 3)

5.4.4. Emissions Estimation

Emissions of GHG from the sources identified in Table 14 have been calculated using activity data for the source per annum (i.e. per kilolitre, kL of diesel) and the relevant emission factor for each source.

The assumptions used in the calculation of activity data for the emission source and emission factors, are presented below.

Activity Data

The assumptions relating to activity (i.e. consumption) data are outlined in Table 15.

Table 15 Calculated activity data

Component	Assumptions	Activity	Units
Consumption of diesel fuel in mobile plant and equipment	Information provided by the Proponent indicates the diesel fuel use to be 1 000 kL per day for on-site plant and equipment, equivalent to 300 000 L per year	300	$kL \cdot yr^{-1}$
Consumption of purchased electricity	All proposed equipment will be diesel powered, therefore electricity usage is limited to office usage. - 15 $kWh \cdot day^{-1}$ = average electricity usage per person - 4 staff personnel on site - 6 days per week, 50 weeks per year of operations/usage	21 900	$kWh \cdot yr^{-1}$
Consumption of diesel fuel for material transport purposes	Laden trucks to transport material: - 10 daily maximum number to Greater Sydney region at distance of 100 km one-way 53.1 L per 100 km fuel efficiency (ABS, 2022)	318.6	$kL \cdot yr^{-1}$
Consumption of diesel fuel / unleaded fuel for employee transport purposes	Four employees (full-time) 300 days per year travel Return travel to Sydney region (local proximity - approximately 20 km one way)	6.1	$kL \cdot yr^{-1}$

Emission Factors

Emission factors used for the assessment of GHG emissions associated with the operation of the Quarry have been sourced from the NGA Factors ((Department of Climate Change, 2022) as outlined in Table 16.

Table 16 Greenhouse gas emission factors

Emission Scope	Emission Source	Emission Factor	Energy Content Factor
Scope 1	Diesel fuel for mobile plant and equipment and material transport	70.4 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}
Scope 2	Consumption of purchased electricity (NSW)	0.73 kg CO_2-e kWh^{-1}	-
Scope 3	Diesel fuel for mobile plant and equipment	17.3 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}
	Unleaded fuel for employee transport	18 kg CO_2-e·GJ^{-1}	34.2 GJ·kL^{-1}
	Diesel fuel for material transport	17.3 kg CO_2-e·GJ^{-1}	38.6 GJ·kL^{-1}

6. AIR QUALITY IMPACT ASSESSMENT

This section presents the results of the dispersion modelling assessment and uses the following terminology:

- Incremental impact – relates to the concentrations predicted as a result of the operation of the Quarry in isolation.
- Cumulative impact – relates to the incremental concentrations predicted as a result of the operation of the Quarry PLUS the background air quality concentrations discussed in Section 4.3.

The results are presented in this manner to allow examination of the likely impact of the Quarry in isolation and the contribution to air quality impacts in a broader sense.

In the presentation of results, the tables included shaded cells which represent the following:

Model prediction	Pollutant concentration / deposition rate less than the relevant criterion	Pollutant concentration / deposition rate equal to, or greater than the relevant criterion

6.1. Particulate Matter - Annual Average TSP, PM_{10} and $PM_{2.5}$

The predicted annual average particulate matter concentrations (as TSP, PM_{10} and $PM_{2.5}$) resulting from the operations at the Quarry Site are presented in Table 17.

Table 17 Predicted annual average TSP, PM_{10} and $PM_{2.5}$ concentrations

Receptor	Annual Average Concentration (µg·m^{-3})								
	TSP			PM_{10}			$PM_{2.5}$		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
Criterion	90			25			8		
Max. % of criterion	0.5	38.0	38.5	0.5	61.2	61.7	0.4	105.0	105.6
R1	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R2	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R3	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R4	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R5	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R6	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R7	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R8	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R9	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R10	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5

Receptor	Annual Average Concentration (µg·m^{-3})								
	TSP			PM_{10}			$PM_{2.5}$		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
R11	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R12	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R13	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R14	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R15	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R16	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R17	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R18	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R19	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R20	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R21	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R22	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R23	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R24	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R25	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R26	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R27	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R28	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R29	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R30	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R31	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R32	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R33	0.4	34.2	34.6	0.1	15.3	15.4	<0.1	8.4	8.5
R34	0.3	34.2	34.5	0.1	15.3	15.4	<0.1	8.4	8.5
R35	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R36	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R37	0.2	34.2	34.4	0.1	15.3	15.4	<0.1	8.4	8.5
R38	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R39	0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R40	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R41	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R42	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R43	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R44	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R45	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R46	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R47	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5

Receptor	Annual Average Concentration (µg·m^{-3})								
	TSP			PM_{10}			$PM_{2.5}$		
	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact	Incremental Impact	Background	Cumulative Impact
R48	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R49	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5
R50	<0.1	34.2	34.3	<0.1	15.3	15.4	<0.1	8.4	8.5

As outlined in Section 3.1, NSW EPA do not provide an air quality criterion for RCS, although the SA EPA criterion of 3 µg·m^{-3} has been applied to annual average PM_{10} modelling results, on a *pro-rata* basis, accounting for the determined maximum free silica content of the extracted material (approximately 95 %).

The maximum predicted annual average PM_{10} increment is 0.1 µg·m^{-3} and therefore the annual average incremental RCS concentration is calculated to be 0.095 µg·m^{-3} (assuming 95 % free silica content). For the purposes of this assessment, and in the absence of additional information, the background air quality environment is assumed to be silica free, and therefore the annual average RCS criterion of 3 µg·m^{-3} is not contributed to by any significant degree by the Quarry.

6.2. Particulate Matter - Annual Average Dust Deposition Rates

Table 18 presents the annual average dust deposition predicted as a result of operation of the Quarry.

Table 18 Predicted annual average dust deposition

Receptor	Annual Average Dust Deposition (g·m^{-2}·month^{-1})		
	Incremental Impact	Background	Cumulative Impact
Criterion	2	-	4
Max. % of criterion	0.1		51.3
R1	<0.1	2.1	2.2
R2	<0.1	2.1	2.2
R3	<0.1	2.1	2.2
R4	<0.1	2.1	2.2
R5	<0.1	2.1	2.2
R6	<0.1	2.1	2.2
R7	<0.1	2.1	2.2
R8	<0.1	2.1	2.2
R9	<0.1	2.1	2.2
R10	<0.1	2.1	2.2
R11	<0.1	2.1	2.2

Receptor	Annual Average Dust Deposition ($g \cdot m^{-2} \cdot month^{-1}$)		
	Incremental Impact	Background	Cumulative Impact
R12	<0.1	2.1	2.2
R13	<0.1	2.1	2.2
R14	<0.1	2.1	2.2
R15	<0.1	2.1	2.2
R16	<0.1	2.1	2.2
R17	<0.1	2.1	2.2
R18	<0.1	2.1	2.2
R19	<0.1	2.1	2.2
R20	<0.1	2.1	2.2
R21	<0.1	2.1	2.2
R22	<0.1	2.1	2.2
R23	<0.1	2.1	2.2
R24	<0.1	2.1	2.2
R25	<0.1	2.1	2.2
R26	<0.1	2.1	2.2
R27	<0.1	2.1	2.2
R28	<0.1	2.1	2.2
R29	<0.1	2.1	2.2
R30	<0.1	2.1	2.2
R31	<0.1	2.1	2.2
R32	<0.1	2.1	2.2
R33	<0.1	2.1	2.2
R34	<0.1	2.1	2.2
R35	<0.1	2.1	2.2
R36	<0.1	2.1	2.2
R37	<0.1	2.1	2.2
R38	<0.1	2.1	2.2
R39	<0.1	2.1	2.2
R40	<0.1	2.1	2.2
R41	<0.1	2.1	2.2
R42	<0.1	2.1	2.2
R43	<0.1	2.1	2.2
R44	<0.1	2.1	2.2
R45	<0.1	2.1	2.2
R46	<0.1	2.1	2.2
R47	<0.1	2.1	2.2
R48	<0.1	2.1	2.2
R49	<0.1	2.1	2.2

Receptor	Annual Average Dust Deposition ($g \cdot m^{-2} \cdot month^{-1}$)		
	Incremental Impact	Background	Cumulative Impact
R50	<0.1	2.1	2.2

6.3. Particulate Matter - Maximum 24-hour PM_{10} and $PM_{2.5}$

Presented in Table 19 are the maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations predicted to occur at the nearest sensitive receptors as a result of the operation of the Quarry. No background concentrations are included within this table.

Table 19 Predicted maximum incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations

Receptor	Maximum 24-hour average concentration ($\mu g \cdot m^{-3}$)	
	PM_{10}	$PM_{2.5}$
Criterion	50	25
Max. % of criterion	3.4	2.6
R1	0.8	0.3
R2	0.5	0.2
R3	0.5	0.3
R4	0.6	0.3
R5	0.6	0.3
R6	1.2	0.5
R7	1.1	0.5
R8	0.7	0.3
R9	0.4	0.2
R10	0.6	0.3
R11	0.8	0.4
R12	0.6	0.3
R13	0.5	0.3
R14	0.5	0.2
R15	0.4	0.2
R16	0.4	0.2
R17	0.4	0.2
R18	0.4	0.2
R19	0.6	0.3
R20	0.6	0.3
R21	0.6	0.3
R22	0.6	0.3
R23	0.8	0.4
R24	0.4	0.2
R25	0.6	0.3
R26	0.5	0.2
R27	0.5	0.2
R28	0.5	0.2
R29	0.4	0.2
R30	0.5	0.2
R31	0.8	0.4
R32	0.9	0.4
R33	1.7	0.6
R34	1.3	0.6
R35	1.2	0.5
R36	1.2	0.6

Receptor	Maximum 24-hour average concentration ($\mu g \cdot m^{-3}$)	
	PM_{10}	$PM_{2.5}$
R37	1.3	0.6
R38	1.0	0.5
R39	1.2	0.6
R40	0.9	0.4
R41	0.8	0.4
R42	0.9	0.4
R43	0.9	0.4
R44	0.7	0.4
R45	0.8	0.4
R46	0.8	0.4
R47	1.0	0.5
R48	<0.1	<0.1
R49	0.2	0.1
R50	0.5	0.3

The predicted maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations resulting from the operation of the Quarry, with background included are presented in Table 20 and Table 21 respectively.

The left side of the tables show the predicted concentration on days with the highest predicted cumulative impacts (typically driven by the highest regional background concentrations), and the right side shows the highest predicted cumulative concentration on days with the highest predicted incremental concentrations respectively. The results are presented in this way to demonstrate the maximum cumulative impacts (increment plus background) and the likely cumulative impacts on the day of the maximum increment. The table is presented as per section 11.2 of the Approved Methods (NSW EPA, 2022).

Table 20 Summary of contemporaneous impact and background – PM_{10}

Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$) – R34			Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$) – R33		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
23/01/2020	0.2	151.8	152.0	8/07/2020	1.7	12.4	14.1
24/01/2020	<0.1	80.5	80.6	18/06/2020	1.7	9.3	11.0
5/01/2020	<0.1	71.9	72.0	18/05/2020	1.7	13.2	14.9
8/01/2020	<0.1	62.2	62.3	28/03/2020	1.2	14.8	16.0
12/01/2020	<0.1	52.1	52.2	6/06/2020	1.1	15.0	16.1
11/01/2020	<0.1	50.6	50.7	10/06/2020	1.1	10.5	11.6
25/01/2020	0.3	49.5	49.8	12/07/2020	1.0	5.2	6.2
4/01/2020	0.2	49.4	49.6	11/03/2020	1.0	8.7	9.7
4/02/2020	0.4	45.4	45.8	22/02/2020	1.0	10.7	11.7
5/02/2020	0.4	45.4	45.8	6/02/2020	1.0	7.7	8.7
These data represent the highest Cumulative Impact 24-hour PM_{10} predictions (outlined in red) as a result of the operation of the Quarry.				These data represent the highest Incremental Impact 24-hour PM_{10} predictions (outlined in blue) as a result of the operation of the Quarry.			

The analysis indicates that no additional exceedances of the 24-hour average impact assessment criteria for PM_{10} are likely to occur as a result of the operation of the Quarry at any of the sensitive receptors.

The performance of the Quarry in itself, does not result in any additional exceedances of the maximum 24-hour average PM_{10} impact assessment criteria at the identified sensitive receptor locations.

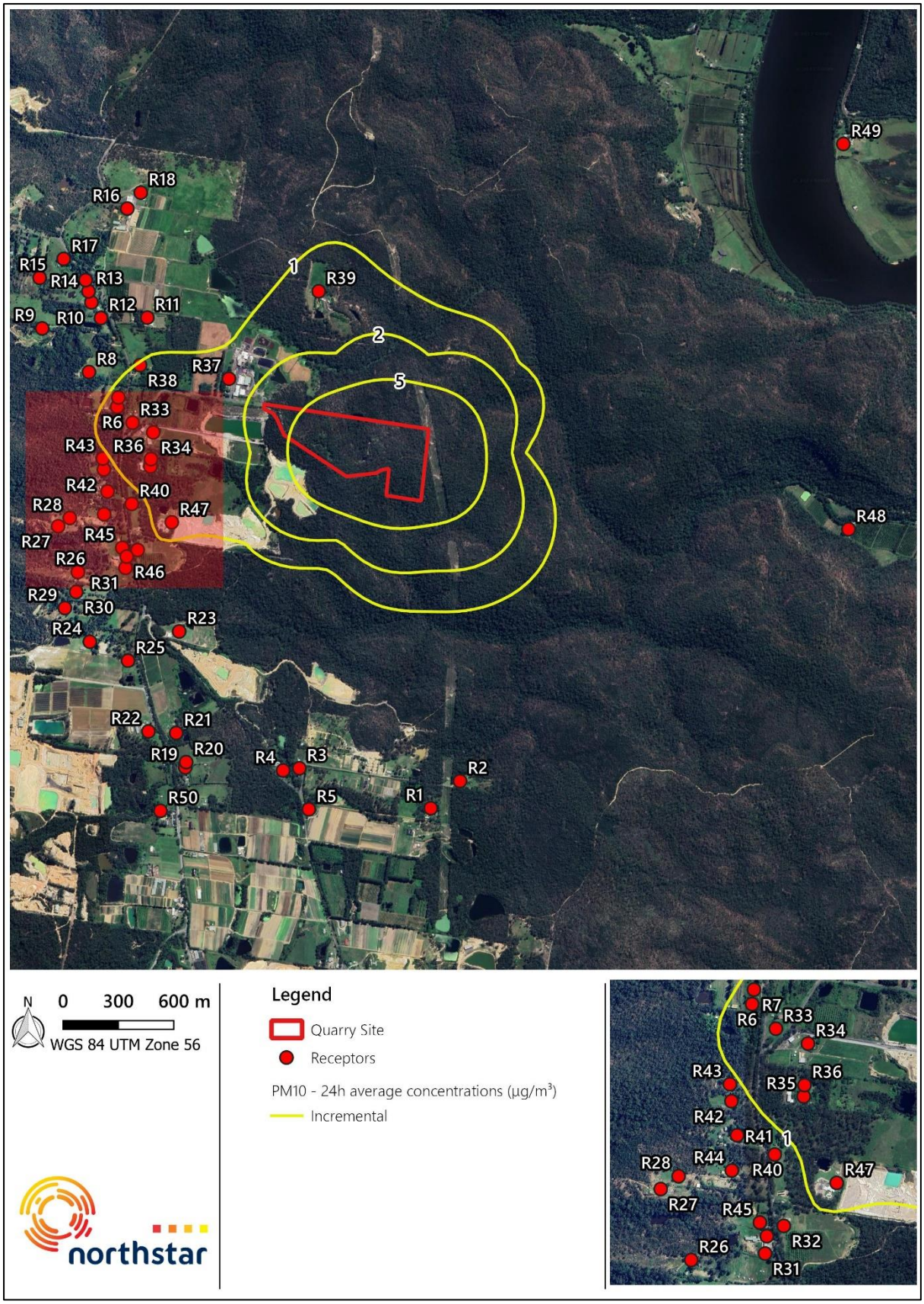
Table 21 Summary of contemporaneous impact and background – $PM_{2.5}$

Date	24-hour average $PM_{2.5}$ concentration ($\mu g \cdot m^{-3}$) – R39			Date	24-hour average $PM_{2.5}$ concentration ($\mu g \cdot m^{-3}$) – R33		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
5/01/2020	<0.1	93.0	93.1	8/07/2020	0.6	7.2	7.8
8/01/2020	<0.1	55.3	55.4	18/05/2020	0.6	10.2	10.8
11/01/2020	0.1	50.1	50.2	18/06/2020	0.6	6.8	7.4
12/01/2020	0.1	43.7	43.8	12/07/2020	0.4	8.0	8.4
7/06/2020	<0.1	36.3	36.4	6/06/2020	0.4	19.1	19.5
24/01/2020	<0.1	31.4	31.5	10/06/2020	0.3	7.5	7.8
2/01/2020	<0.1	29.3	29.4	28/03/2020	0.3	3.5	3.8
23/01/2020	<0.1	28.5	28.6	7/08/2020	0.3	11.4	11.7
13/01/2020	<0.1	27.0	27.1	6/02/2020	0.3	1.3	1.6
9/01/2020	0.1	24.7	24.8	11/03/2020	0.3	2.1	2.4
These data represent the highest Cumulative Impact 24-hour PM2.5 predictions (outlined in red) as a result of the operation of the Quarry.				These data represent the highest Incremental Impact 24-hour $PM_{2.5}$ predictions (outlined in blue) as a result of the operation of the Quarry.			

The performance of the Quarry in itself, does not result in any additional exceedances of the maximum 24-hour average $PM_{2.5}$ impact assessment criteria at the identified sensitive receptor locations.

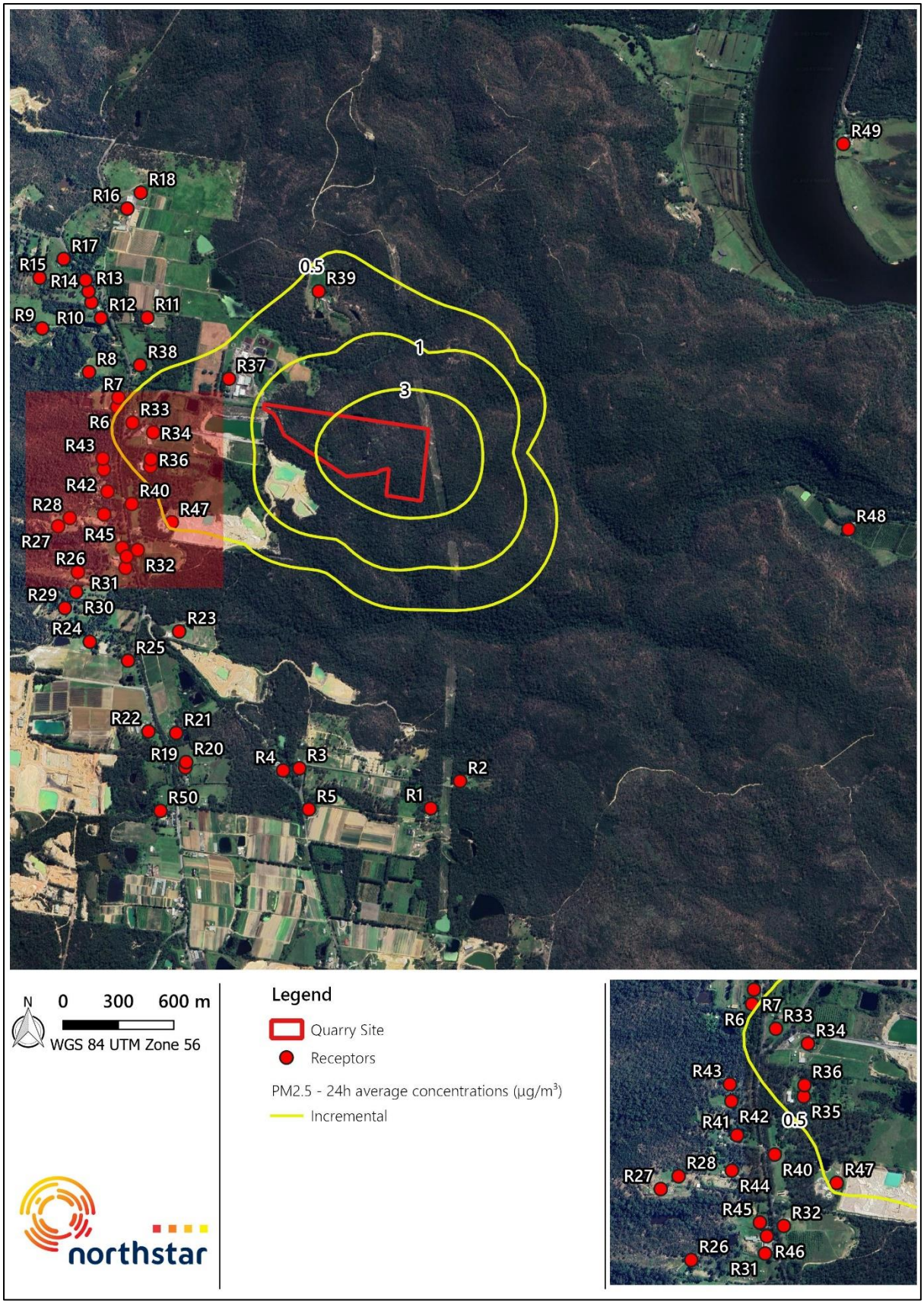
Contour plots of the predicted incremental 24-hour PM_{10} and $PM_{2.5}$ concentrations associated with the Quarry are presented in Figure 8 and Figure 9.

Figure 8 Maximum predicted incremental 24-hour average PM_{10} concentrations



Note 1: Criterion = 50 $\mu g \cdot m^{-3}$ (cumulative)

Figure 9 Maximum predicted incremental 24-hour average $PM_{2.5}$ concentrations



Note 1: Criterion = 25 $\mu g \cdot m^{-3}$ (cumulative)

7. GREENHOUSE GAS ASSESSMENT

This section presents the results of the GHG assessment, compares direct emissions totals with NSW and Australian totals, and provides a range of measures which might be considered to reduce GHG emissions.

7.1. Calculation of Emissions

Based on the activity data emission factors outlined in Section 5.2, Table 22 presents the calculated Scope 1, 2 and 3 GHG emissions associated with operation of the Quarry.

Table 22 Greenhouse gas emissions

Emission Scope	Emission Source	Emission Factor	Energy Content Factor	Activity Rate	Emissions (t CO_2-e $\cdot yr^{-1}$)
Scope 1	Diesel fuel for mobile plant and equipment	70.4 kg CO_2-e GJ^{-1}	38.6 GJ·kL^{-1}	300 kL·yr^{-1}	815.2
				Total Scope 1	**815.2**
Scope 2	Electricity	0.73 kg CO_2-e kWh^{-1}	-	21 900 kWh^{-1}	16.0
				Total Scope 2	**16.0**
Scope 3	Diesel fuel for mobile plant and equipment	17.3 kg CO_2-e GJ^{-1}	38.6 GJ·kL^{-1}	300 kL·yr^{-1}	200.3
	Diesel fuel for transport of materials	17.3 kg CO_2-e GJ^{-1}	38.6 GJ·kL^{-1}	318.6 kL·yr^{-1}	212.0
	Unleaded fuel for employee transport	18 kg CO_2-e GJ^{-1}	34.2 GJ·kL^{-1}	6.1 kL·yr^{-1}	3.8
	Consumption of purchased electricity	0.06 kg CO_2-e kWh^{-1}	-	21 900 kWh^{-1}	1.3
				Total Scope 3	**418.2**

A summary of calculated emissions is presented in Table 23. Based on the production and throughput rates, the total annual GHG emissions are estimated to be 1 249 t CO_2-e.

Table 23 Summary of GHG emissions

Emission Scope	Annual GHG Emissions (t CO_2-e·yr^{-1})
Scope 1	815
Scope 2	16
Scope 3	418
Total	**1 249**

7.2. Comparison with National Totals

A comparison of the calculated Scope 1 GHG emissions associated with the Quarry and NSW and Australia total emissions is presented in Table 24.

Table 24 Greenhouse gas emissions in context

Emission Scope	Quarry total (t CO_2-e·yr^{-1})	Emissions (Mt CO_2-e·yr^{-1})	
		Australia (2022) (excluding LULUCF) 486.9 Mt	NSW (2020) 141.0 Mt
Scope 1	815	< 0.0002%	< 0.0006%

Note: LULUCF = Land Use Land Use Change and Forestry

These data indicate that the operation of the Quarry would contribute up to 0.0006% of NSW total GHG emissions in 2020, and up to 0.0002% of Australia total GHG emissions in 2022.

8. MITIGATION AND MONITORING

8.1. Air Quality Mitigation

The results of the AQIA indicate that the Quarry can be operated to not result in any additional exceedances of the air quality criteria.

A summary of the emission reduction measures that would be adopted as part of the Quarry operation is presented in Table 25.

Table 25 Summary of emission reduction methods adopted as part of Quarry operation

Emission control measure	Emission control efficiency (%)
Level 2 watering (2 $L \cdot m^{-2} \cdot hr^{-1}$) on unpaved roads	50
Limited vehicle speeds on unpaved roads	85
Limited vehicle speeds on paved roads	50

The above controls have been adopted in the performance of the AQIA. During the operation of the Quarry, it is likely that additional emission controls may be applied, such as watering of exposed areas, watering during materials processing etc. However, this AQIA has been performed to confirm that operation of the Quarry can be undertaken without resulting in exceedance of the relevant air quality criteria. Any additional controls applied would result in further reductions in incremental impacts.

8.2. Greenhouse Gas Mitigation

Emissions of GHG resulting from the Quarry operation would be minimised to the maximum extent practical by consideration of the following measures:

- All vehicles/plant and machinery should be turned off when not in use and regularly serviced to ensure efficient operation, including the optimisation of tyre pressures;
- Truck routes and loading capacity should be designed to reduce the distance and effort required by the vehicles;
- Maintenance of roads in good condition to avoid meandering of vehicles;
- Reducing gradients around site where feasible; and
- Where possible, B5 fuel should be used in plant and equipment.

8.3. Monitoring

The results presented in this AQIA indicate that there would be no predicted additional exceedances of the adopted air quality criteria. It is not anticipated that any air quality monitoring would be required to be

performed, although it is recommended that regular audits are performed to ensure that the Quarry Site is implementing the air quality control measures appropriately, as outlined within this report.

9. CONCLUSION

RWC has engaged Northstar on behalf of the Applicant to perform an AQIA and GHGA for the proposed operation of the Maroota Central Civil Quarry, located at 4773 Old Northern Road in Maroota, NSW.

The AQIA has been performed in accordance with the requirements of the NSW Approved Methods document and meets the requirements of the SEARs and Hornsby Shire Council. The AQIA provides a detailed description of:

- the proposed activities which form the Quarry under a scenario which reflects activities during day-to-day and peak daily site operations.
- the legislative requirements which are required to met, including NSW EPA air quality criteria, POEO Act, and POEO (Clean Air) Regulations, and any policies and guidelines as they relate to air quality and greenhouse gas impacts of the Quarry.
- the existing conditions surrounding the Quarry Site, including the definition of sensitive receptor locations, prevailing meteorology and air quality, topography, and emissions of GHG in Australia in the year 2022 and NSW in the year 2020.
- the approach to assessment, including justification for the approach adopted.
- emissions controls proposed to be employed as part of the Quarry operation.
- predicted air quality impacts associated with the modelled scenario.
- additional air quality management and mitigation measures which may be employed to ensure that the environmental objectives associated with the Quarry are achieved.
- predicted emissions of GHG during a year of operations representative of high activity.
- air quality mitigation measures which would be employed as part of the Quarry operation.
- greenhouse gas mitigation and monitoring measures which would be employed as part of Quarry operation, with the aim of minimising those emissions.

The results of the AQIA indicate that predicted incremental concentrations associated with operation of the Quarry at sensitive receptor locations are small, and no exceedances of the annual average RCS, TSP and PM_{10} criteria are predicted. Exceedance of the annual average $PM_{2.5}$ criterion is predicted at all receptor locations, due to the existing background concentration already exceeding that criterion. The predicted incremental contribution from the Quarry to that annual average concentration is predicted to be < 0.1 $\mu g \cdot m^{-3}$ at all receptor locations which indicates that the proposed approach to emissions management is suitable.

A range of management measures would be outlined in the AQMP for the Quarry, which would result in emissions of particulate matter being lower than those modelled within this AQIA. It is noted that these unquantified reductions are not relied upon to demonstrate compliance with the air quality criteria.

In relation to greenhouse gas, the assessment indicates that direct emissions associated with the Quarry are estimated to contribute up to 0.0006% of NSW total GHG emissions in 2020, and up to 0.0002% of Australia's GHG emissions in 2022. The Applicant would implement a series of management measures to reduce

emissions of GHG associated with the Quarry, which will be continued to be applied during the operation of the Quarry.

In conclusion, the Quarry can be operated to minimise the concentrations of air pollutants on the surrounding environment.

10. REFERENCES

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APPENDIX A

Meteorology

As discussed in Section 4.2 a meteorological modelling exercise has been performed to characterise the meteorology of the Quarry Site in the absence of site-specific measurements. The meteorological monitoring has been based on measurements taken at a number of surrounding automatic weather stations (AWS) operated by the Bureau of Meteorology (BoM). A summary of the relevant monitoring sites is provided in Table A1.

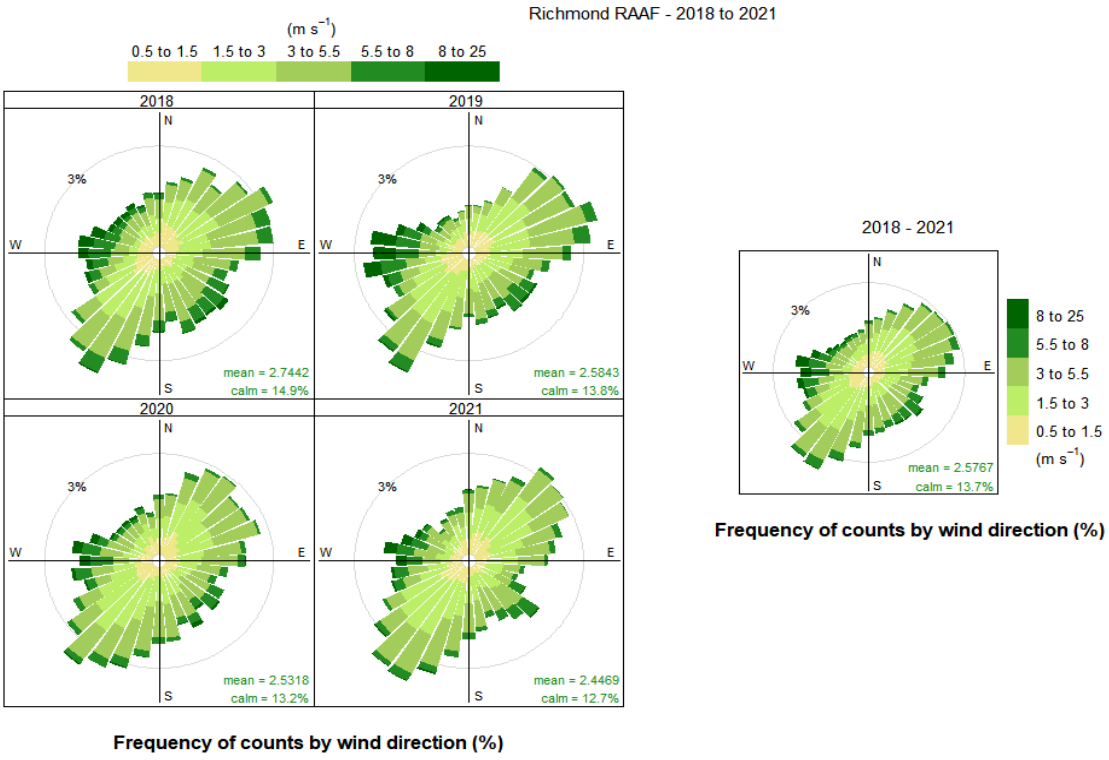
Table A1 Details of meteorological monitoring surrounding the Quarry Site

Site name	Source	Approximate location		Approximate distance
		mE	mS	km
Mangrove Mountain AWS #61375	BoM	333 388	6 315 201	25.1
Richmond RAAF #67105	BoM	293 651	6 279 933	27.8

Meteorological conditions at the Richmond RAAF have been examined to determine a 'typical' or representative dataset for use in dispersion modelling. Annual wind roses for the most recent years of data (2018 to 2021 [consistent with available air quality data]) are presented in Figure A1. The annual wind speed frequency distribution for the three-year period is presented in Figure A2.

The correlation coefficient between each year and the four-year period for the distribution of wind speed, wind direction, PM_{10} and $PM_{2.5}$ are summarised in Table A2. The correlation coefficients were ranked and aggregated to select the representative year for the meteorological modelling. The rankings are also presented in Table A2.

Figure A1 Annual wind roses 2018 to 2021, Richmond RAAF



The wind roses indicate that from 2018 to 2021, winds at the Richmond RAAF shows a predominant south-westerly and north-easterly wind direction. The majority of wind speeds experienced at the Richmond RAAF between 2018 and 2021 are generally in the range 1.5 meters per second ($m \cdot s^{-1}$) to 5.5 $m \cdot s^{-1}$ with the highest wind speeds (greater than 8 $m \cdot s^{-1}$) occurring from south-easterly and north-westerly directions. Winds of this speed occur during 2.3 % of the observed hours during the years while calm winds (< 0.5 $m \cdot s^{-1}$) occur during 13.7 % of hours on average across the years 2018-2021.

Figure A2 Annual wind speed and wind direction distributions Richmond RAAF, 2018-2021

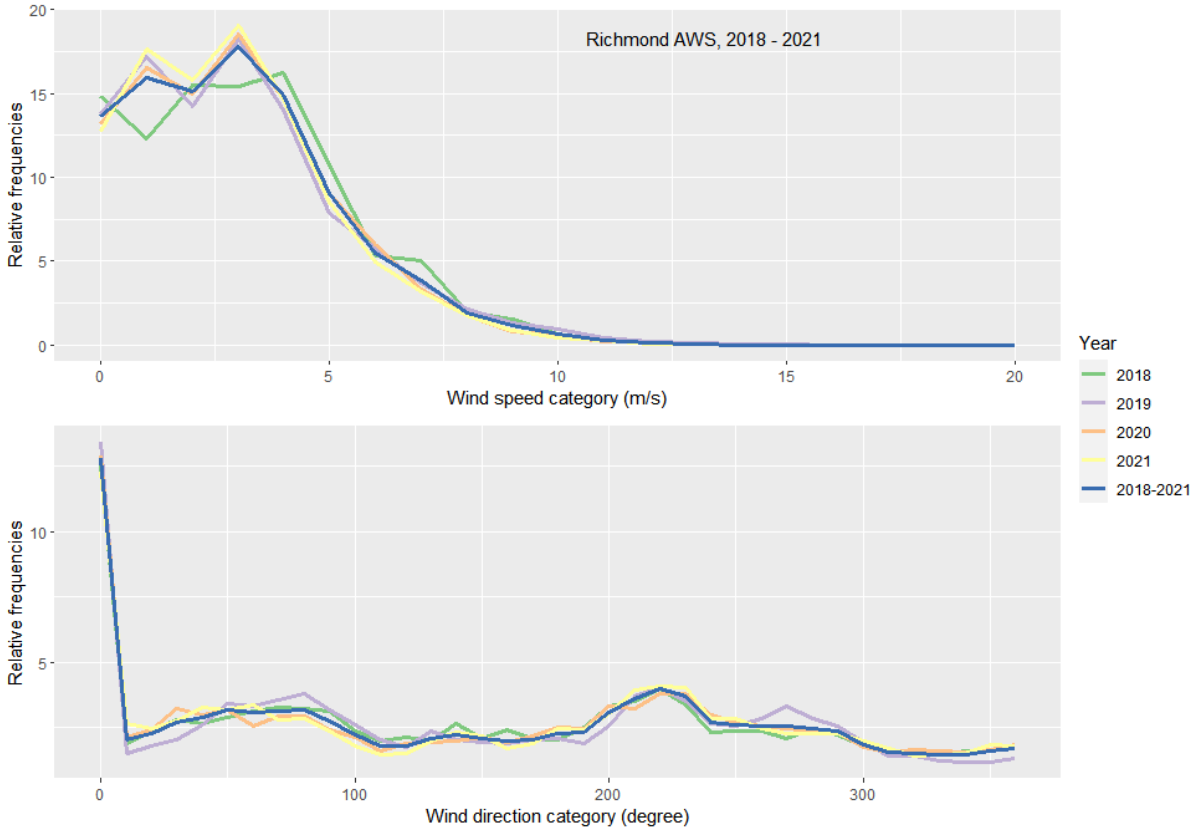


Table A2 Wind speed and wind direction distribution correlation coefficient Richmond RAAF, 2018-2021

Parameter	Wind speed		Wind direction		PM_{10}		$PM_{2.5}$		Aggregated rank
	Correlation	Rank	Correlation	Rank	Correlation	Rank	Correlation	Rank	
2018	0.985	4	0.993	2	0.989	4	0.991	1	3
2019	0.997	3	0.986	4	0.993	3	0.944	4	4
2020	0.999	1	0.993	1	0.995	2	0.987	2	1
2021	0.997	2	0.990	3	0.996	1	0.969	3	2
2018-2021	1	-	1	-	1	-	1	-	-

Wind speed observations for each year are well correlated against the wind speed over the four-year period, with each year having a correlation coefficient greater than 0.985. The year 2020 is the highest ranked for correlation against the wind speed over the four-year period.

Wind direction observations for each year are reasonably well correlated against the wind direction over the four-year period, with each year having a correlation coefficient greater than of 0.986. The year 2020 is the highest ranked for correlation against the wind direction over the four-year period.

Particulate matter concentrations for each year are also well correlated against particulate matter concentrations over the four-year period, with each year having a correlation coefficient greater than 0.944. The year 2021 is the highest rank for PM_{10} and the year 2018 is the highest rank for $PM_{2.5}$. The year 2020 is the second highest rank for both PM_{10} and $PM_{2.5}$.

The correlation coefficient analysis indicates that 2020 is the most representative year for meteorological modelling.

Meteorological Processing

The BoM data adequately covers the issues of data quality assurance, however it is limited by its location compared to the Quarry Site To address these uncertainties, a multi-phased assessment of the meteorology data has been performed.

In absence of any measured onsite meteorological data, site representative meteorological data for this Quarry was generated using the CALMET meteorological model in a format suitable for using in the CALPUFF dispersion model (refer Section 5.1).

CALMET is a meteorological model that develops wind and temperature fields on a three-dimensional gridded modelling domain. Associated two-dimensional fields such as mixing height, surface characteristics, and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field and thus the final wind field reflects the influences of local topography and current land uses.

In this study, CALMET has been run in no-observations (no-obs) mode using gridded prognostic data generated by The Air Pollution Model (TAPM, v 4.0.5), developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

TAPM predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate site-specific hourly meteorological observations at user-defined levels within the atmosphere.

The parameters used in TAPM and CALMET modelling are presented in Table A3.

Table A3 Meteorological parameters used for this study

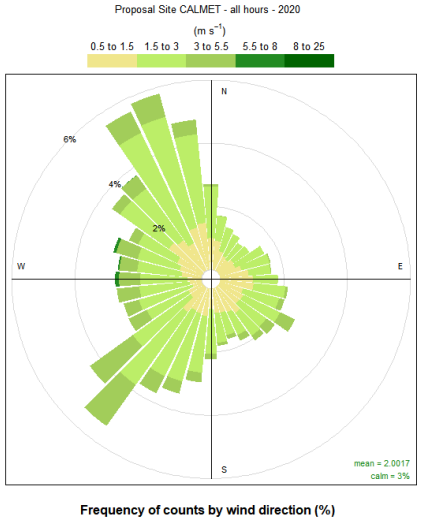
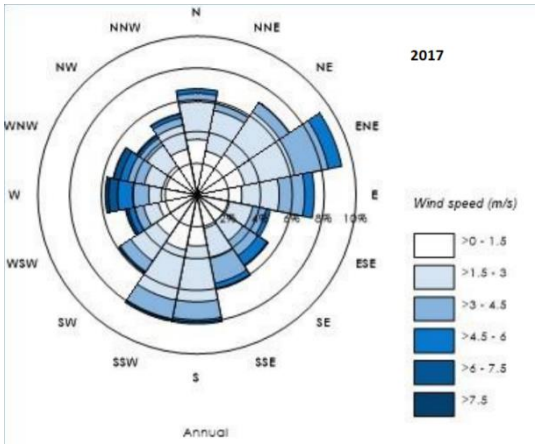
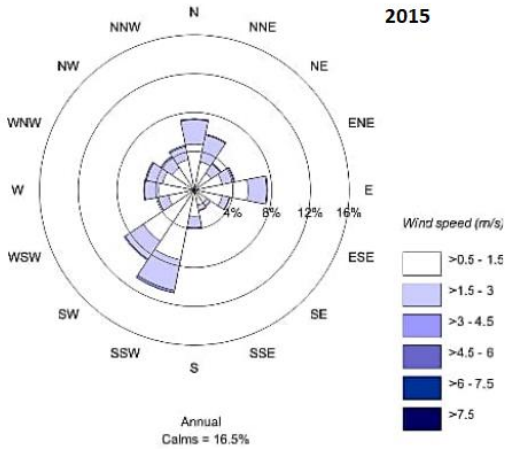
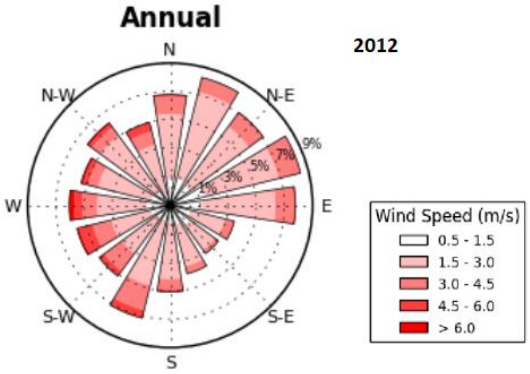
TAPM v 4.0.5	
Modelling period	1 January 2020 to 31 December 2020
Centre of analysis	305 698 mS, 6 291 323 mN (UTM Coordinates)
Number of grid points	40 x 40 x 25
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Terrain	AUSLIG 9 second DEM
Data assimilation	No data assimilation
CALMET	
Modelling period	1 January 2020 to 31 December 2020
South-West corner of analysis	286 200 mS, 6 272 200 mN (UTM Coordinates)
Meteorological grid domain (resolution)	38 km x 38 km (0.5 km grid spacing)
Vertical resolution (cell heights)	10 (0 m, 20 m, 40 m, 80 m, 160 m, 320 m, 640 m, 1200 m, 2000 m, 3000 m, 4000 m)
Data assimilation	No-obs approach using TAPM – 3D.DAT file

As mentioned in Section 4.5, a number of approved and proposed activities are located to the south of the Quarry Site. The AQIA for the Maroota Friable Sandstone Extraction Proposal (TAS, 2021), the AQIA for the Dixon Sand Haerses Road Quarry Modification (PEL, 2016) and the AQIA for the Hodgson Quarry Products Sand Extraction Roberts Road (WM, 2015) have been reviewed to examine the suitability of the meteorological modelling approach adopted within this AQIA. Table A4 presents the approach adopted in these studies and Figure A4 compares the CALMET generated meteorological data at the Quarry Site, and that generated in the studies. The data generated in PEL (2016) adopted site specific meteorological data, where TAS (2021) and WM (2015) applied data collected at BoM AWS at Richmond and Mangrove Mountain. The wind rose generated as part of this assessment agrees well with that generated in PEL (2016), which provides confidence that the meteorological conditions modelled as part of this assessment are appropriate.

Table A4 Meteorological modelling approach used for studies near to the Quarry Site

Study name	Model	Station Included	Year modelled
Maroota Friable Sandstone Extraction Proposal AQIA (TAS, 2021)	TAPM CALMET	Mangrove Mountain AWS Richmond RAAF	2017
Dixon Sand Haerses Road quarry Modification AQIA (PEL, 2016)	TAPM AERMET	Maroota Public School AWS	2015
Hodgson Quarry Products Sand Extraction Roberts Road AQIA (WM, 2015)	TAPM AERMET	Richmond RAAF	2012

Figure A3 Annual wind roses generated at the Quarry Site and near to the Quarry Site

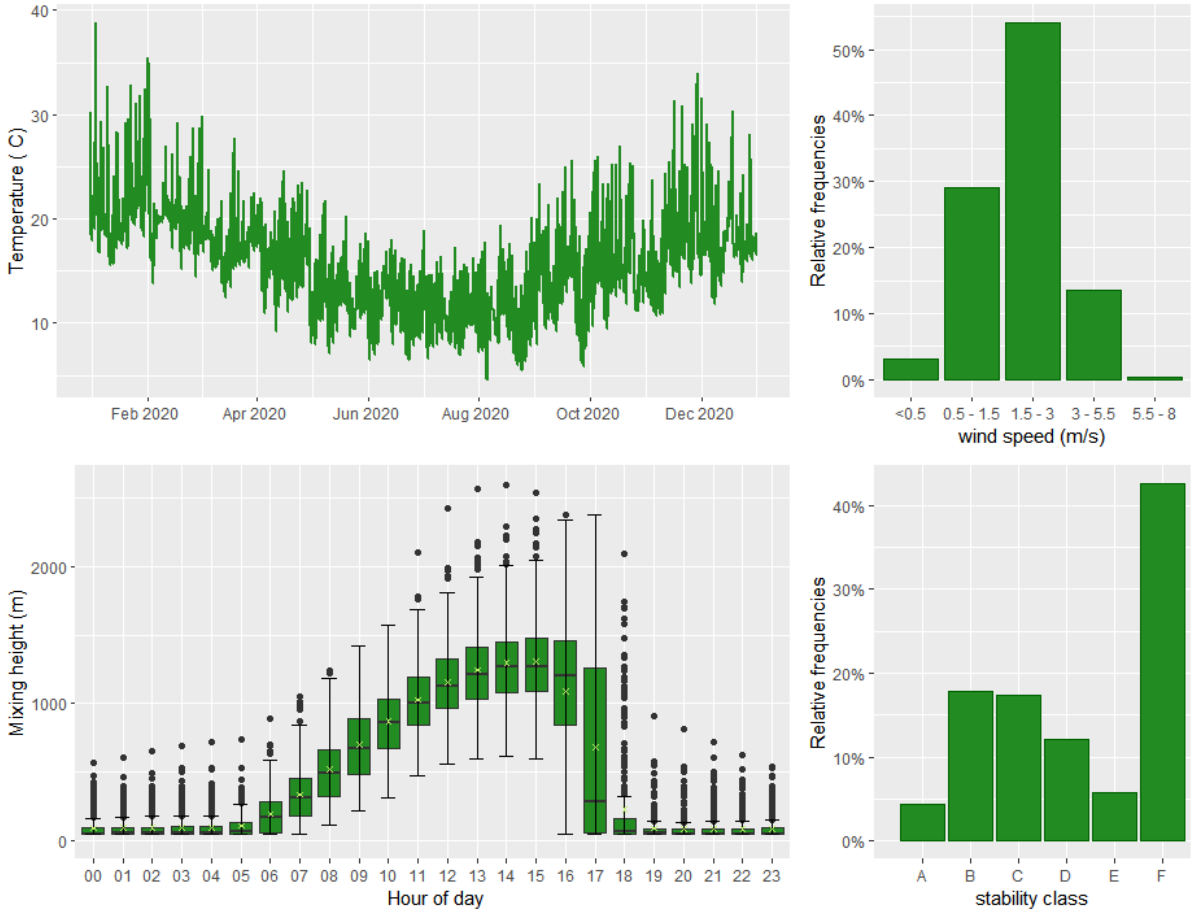
CALMET generated windrose 2020	Maroota Friable Sandstone Extraction Proposal AQIA (TAS, 2021)
	
Dixon Sand Haerses Road quarry Modification AQIA (PEL, 2016)	Hodgson Quarry Products Sand Extraction Roberts Road AQIA (WM, 2015)
	

As generally required by the NSW EPA the following provides a summary of the modelled meteorological dataset. Given the nature of the pollutant emission sources at the Quarry Site, detailed discussion of the humidity, evaporation, cloud cover, katabatic air drainage and air recirculation potential of the Quarry Site has not been provided. Details of the predictions of wind speed and direction, mixing height and temperature at the Quarry Site are provided below.

Diurnal variations in maximum and average mixing heights predicted by CALMET at the Quarry Site during 2020 period are illustrated in Figure A4.

As expected, an increase in mixing height during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and growth of the convective mixing layer.

Figure A4 Predicted mixing height, wind speed and stability class frequency at the Quarry Site –2020



APPENDIX B

Background Air Quality

Air quality is not monitored at the Quarry Site and therefore air quality monitoring data measured at a representative location has been adopted for the purposes of this assessment. Determination of data to be used as a location representative of the Quarry Site and during a representative year can be complicated by factors which include:

- the sources of air pollutant emissions around the Quarry Site and representative AQMS; and
- the variability of particulate matter concentrations (often impacted by natural climate variability).

Two AQMS have been identified within a 35 km radius of the Quarry Site, one operated by NSW DPE at Richmond, and one established at the Maroota Public School under an operational condition (as required under the Environmental Protection Licence – 3916 and 12513) for the Old Northern Road and Haerses Road Quarries operated by Dixon Sand Pty Ltd. These locations (listed by proximity) are briefly summarised in Data is available for the Maroota Public School TEOM from January 2018, with data from the Richmond AQMS available from 1992.

Table 5Data is available for the Maroota Public School TEOM from January 2018[3], with data from the Richmond AQMS available from 1992.

Table B1 Details of closest AQMS surrounding the Quarry Site

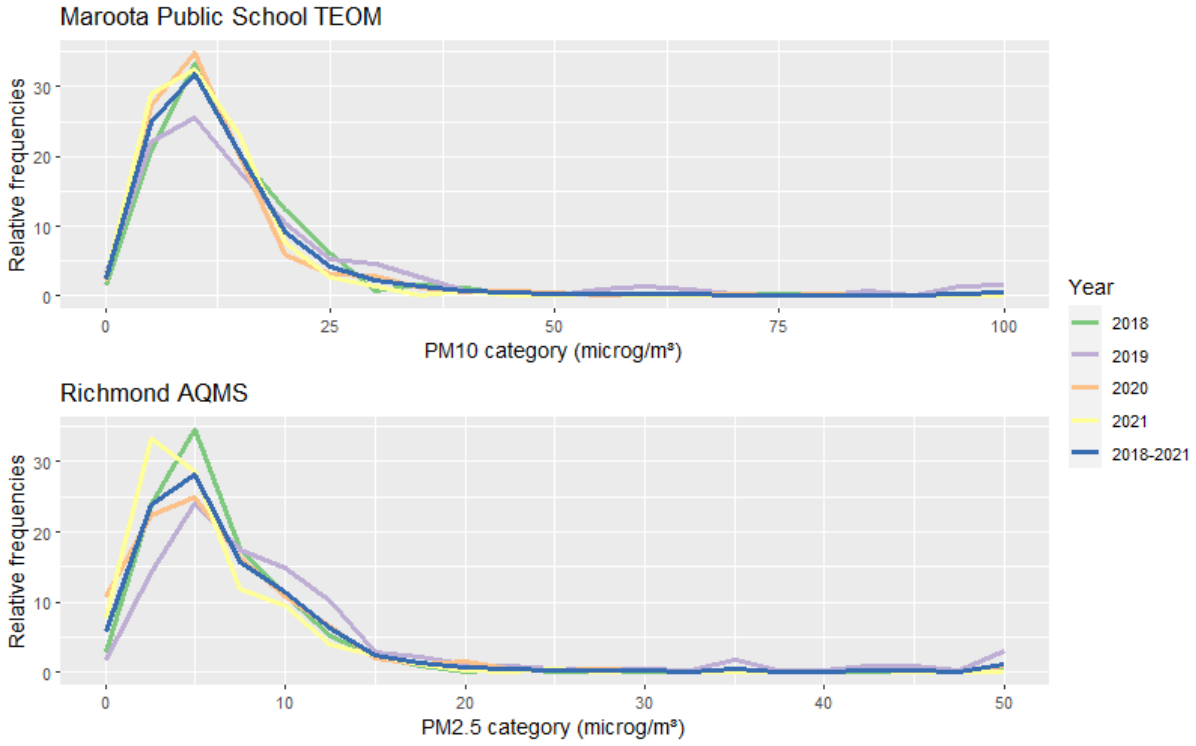
AQMS location	Distance to site (km)	2020 data	Measurements		
			PM_{10}	$PM_{2.5}$	TSP
Maroota Public School TEOM	2.1 km	✓	✓	×	×
Richmond AQMS (NSW DPE)	31 km	✓	✓	✓	×

As discussed in Section 4.3, PM_{10} concentrations measured at Maroota Public school and $PM_{2.5}$ concentrations measured at Richmond AQMS have been adopted for this study. An X-Y analysis comparing measured PM_{10} concentrations over the same period at Maroota Public School and Richmond AQMS shows that the data correlates well, and correspondingly it is considered to be appropriate to adopt $PM_{2.5}$ concentrations at Richmond AQMS for us in this study (refer Section 4.3).

PM data for the period 2018 to 2021 has been analysed. The annual frequency distribution for the four-year period is presented in Figure B1.

[3] http://www.dixonsand.com.au/epl-monitoring

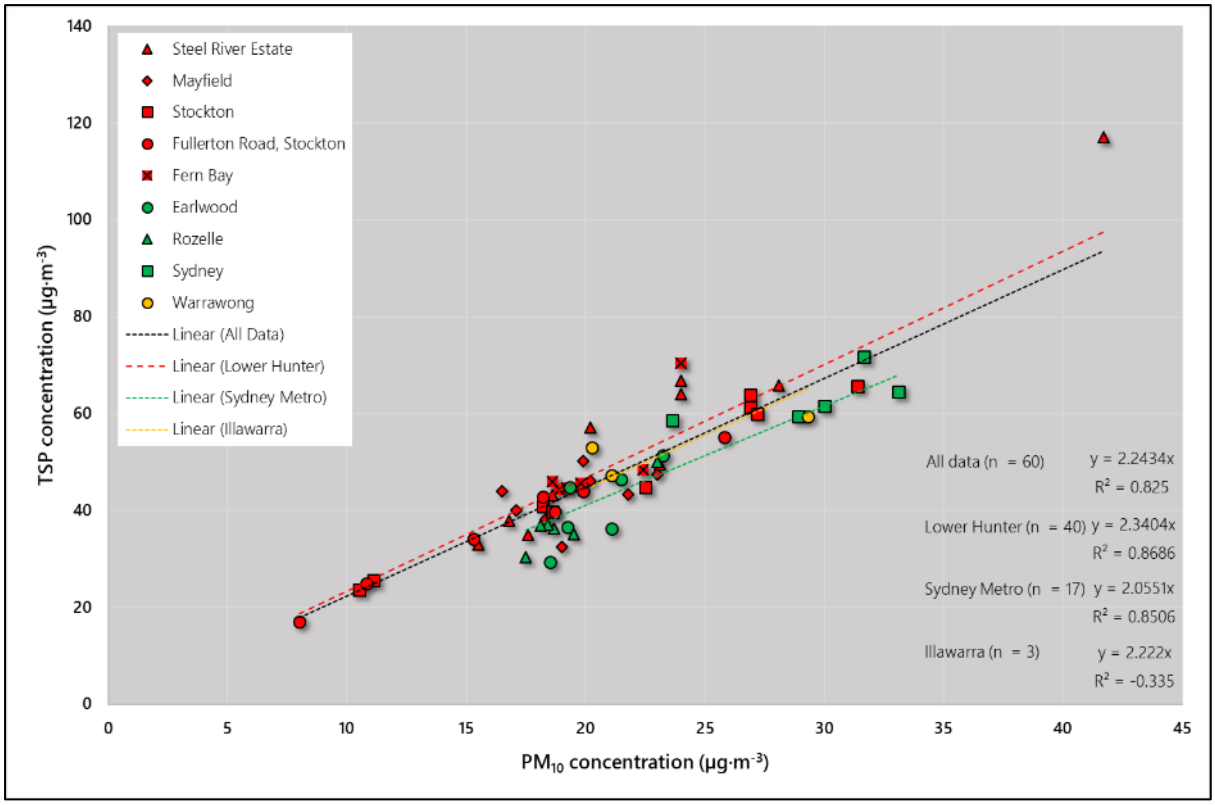
Figure B1 Annual distribution at the identified monitoring stations for PM_{10} and $PM_{2.5}$ (2018-2021)



The results of the correlation coefficient analysis for meteorological data and PM provided in Appendix A indicates that 2020 best represents the general trend over the four-year period and correspondingly, data for the year 2020 has been adopted for this AQIA.

Concentrations of TSP are not measured at any AQMS surrounding the Quarry Site. An analysis of co-located measurements of TSP and PM_{10} in the Lower Hunter (1999 to 2011), Illawarra (2002 to 2004), and Sydney Metropolitan (1999 to 2004) regions is presented in Figure B2. The analysis concludes that, on the basis of the measurements collected in all regions between 1999 to 2011, the derivation of a broad TSP:PM_{10} ratio of 2.2434 : 1 (i.e. PM_{10} represents ~43% of TSP) from the average of all studied locations is appropriate. In the absence of any more specific information, this ratio has been adopted within this AQIA, resulting in a background annual average TSP concentration of 34.2 $\mu g \cdot m^{-3}$ being adopted.

Figure B2 Co-located TSP and PM_{10} measurements, Lower Hunter, Sydney Metro and Illawarra



Summary statistics are for pollutants assessed are presented in Table B2.

Table B2 Background air quality statistics - 2020

Pollutant	TSP ($\mu g \cdot m^{-3}$)	PM_{10} ($\mu g \cdot m^{-3}$) Maroota Public School	$PM_{2.5}$ ($\mu g \cdot m^{-3}$) Richmond
Averaging Period	Annual	24-Hour	24-Hour
Data Points (number)	354	354	335
Mean	34.2	15.3	8.4
Standard Deviation	-	12.0	8.1
Skew[1]	-	5.6	5.2
Kurtosis[2]	-	51.2	42.3
Minimum	-	3.7	-0.7
Percentiles ($\mu g \cdot m^{-3}$)			
25	-	9.3	4.1
50	-	12.7	6.8
75	-	16.8	10.2
90	-	25.0	13.8
95	-	32.7	19.4
97	-	39.5	24.7

Pollutant	TSP ($\mu g \cdot m^{-3}$)	PM_{10} ($\mu g \cdot m^{-3}$) Maroota Public School	$PM_{2.5}$ ($\mu g \cdot m^{-3}$) Richmond
98	-	49.2	28.8
99	-	56.8	41.2
Maximum	34.2	151.8	93.0
Data Capture (%)	96.7	96.7	91.5

Notes: 1: Skew represents an expression of the distribution of measured values around the derived mean. Positive skew represents a distribution tending towards values higher than the mean, and negative skew represents a distribution tending towards values lower than the mean. Skew is dimensionless.

2: Kurtosis represents an expression of the value of measured values in relation to a normal distribution. Positive skew represents a more peaked distribution, and negative skew represents a distribution more flattened than a normal distribution. Kurtosis is dimensionless.

As outlined in Section 4.3 and Section 4.5, eight Environment Protection Licences (EPL) are held by operators of extractive industries in the immediate area. Of those eight EPL, five require the performance of dust deposition monitoring. The closest operation which requires dust deposition monitoring is adjacent to the Quarry Site at the P. F. Formation Pty Ltd operation (EPL 3829, named as 'Pit 5 Quarry Site 4' by the operator) on Lot 63 DP752029, Lot 3 DP567166 and Lot 2 DP510812. One dust deposition gauge (DDG) is located to the western end of the pit within Lot 2 DP510812, marked as 'Josh's House' within the monitoring results[4]. Data for that DDG have been obtained and are presented in Table B3.

Table B3 Dust deposition monitoring – EPL 3829

Year	Insoluble solids ($g \cdot m^{-2} \cdot month^{-1}$)
2019 (June to December	1.6
2020	2.1
2021	1.5

This study has adopted a conservative approach to this study and correspondingly, the value for background annual average dust deposition used in this study is 2.1 $g \cdot m^{-2} \cdot month^{-1}$ as measured at the identified monitor in 2020.

Graphs presenting the daily varying PM_{10} and $PM_{2.5}$ data recorded at the selected monitoring stations in 2020 are presented in Figure B3 and Figure B4, respectively.

[4] https://pfformation.com.au/environmental-monitoring-results/

Figure B3 PM_{10} measurements, Maroota Public School TEOM 2020

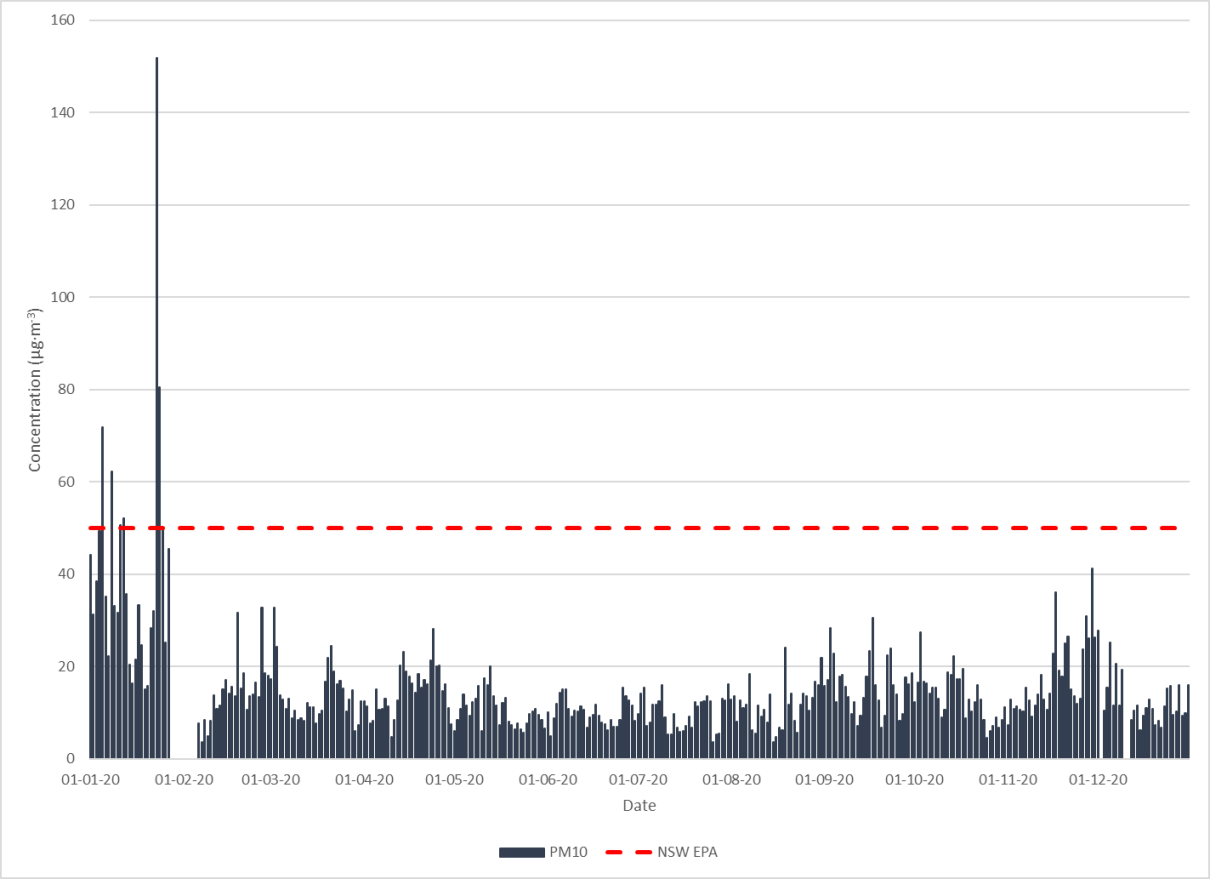
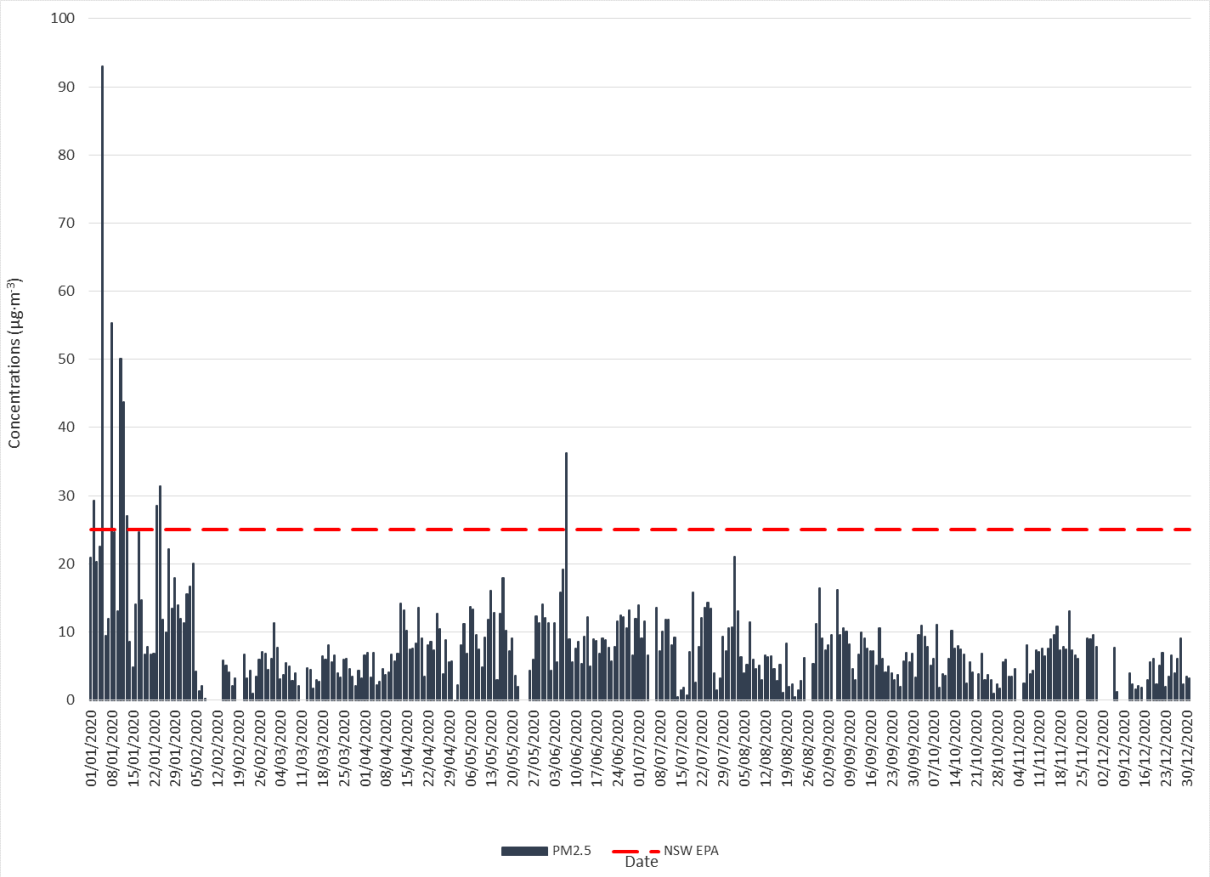


Figure B4 $PM_{2.5}$ measurements, Richmond AQMS 2020



APPENDIX C

Discrete Receptor Locations

A summary of the discrete receptor locations adopted for use in this study are provided below in Table C1.

Table C1 Receptor locations used in the AQIA

Receptor ID	Lot	Land use	Coordinates (UTM)		Notes
			mE	mS	
R1	Lot 2 DP 578207	Residential	314 964	6 296 521	
R2	Lot 4 DP 617014	Residential	315 123	6 296 669	
R3	Lot 1 DP 617014	Residential	314 251	6 296 738	
R4	Lot 140 DP 704512	Residential	314 163	6 296 726	
R5	Lot 11 DP 632550	Residential	314 302	6 296 515	
R6	Lot 94 DP 752025	Residential	313 262	6 298 699	
R7	Lot 94 DP 752025	Residential	313 269	6 298 750	
R8	Lot 4 DP 575553	Residential	313 109	6 298 888	
R9	Lot 3 DP 575553	Residential	312 855	6 299 125	
R10	Lot 11 DP 208801	Residential	313 123	6 299 266	
R11	Lot 48 DP75029	Residential	313 426	6 299 183	
R12	Lot 2 DP 575553	Residential	313 174	6 299 181	
R13	Lot 11 DP208801	Residential	313 107	6 299 326	
R14	Lot 10 DP 208801	Residential	313 091	6 299 387	
R15	Lot 8 DP 208801	Residential	312 841	6 299 399	
R16	Lot 9 DP 752029	Residential	313 317	6 299 775	
R17	Lot 9 DP 208801	Residential	312 972	6 299 502	
R18	Lot 1 DP 558045	Residential	313 390	6 299 861	
R19	Lot 1 DP 590937	Residential	313 632	6 296 743	
R20	Lot 1 DP 590937	Residential	313 636	6 296 771	
R21	Lot 1 DP 204159	Residential	313 583	6 296 929	
R22	Lot 117 DP 752025	Residential	313 432	6 296 938	
R23	Lot 12 DP 1005688	Residential	313 599	6 297 480	
R24	Lot 2 DP 595538	Residential	313 114	6 297 425	
R25	Lot 1 DP 595538	Residential	313 321	6 297 322	
R26	Lot 2 DP 621814	Residential	313 049	6 297 803	
R27	Lot 31 DP 609547	Residential	312 942	6 298 051	
R28	Lot 7 DP 39392	Residential	313 005	6 298 096	
R29	Lot 3 DP 595538	Residential	312 978	6 297 608	
R30	Lot 3 DP 621814	Residential	313 040	6 297 695	
R31	Lot 1 DP 621814	Residential	313 308	6 297 826	
R32	Lot 10 DP 752029	Residential	313 373	6 297 922	
R33	Lot 63 DP 752029	Residential	313 345	6 298 613	Within EPL 3829
R34	Lot 3 DP 567166	Residential	313 458	6 298 561	Within EPL 3829
R35	Lot 2 DP 567166	Residential	313 443	6 298 376	
R36	Lot 2 DP 567166	Residential	313 446	6 298 416	
R37	Lot 59 DP 752029	Commercial	313 869	6 298 852	
R38	Lot 48 DP 752029	Residential	313 386	6 298 925	

Receptor ID	Lot	Land use	Coordinates (UTM)		Notes
			mE	mS	
R39	Lot 79 DP 752029	Residential	314 356	6 299 326	
R40	Lot 2 DP 510812	Residential	313 341	6 298 173	
R41	Lot 4 DP 39392	Residential	313 210	6 298 240	
R42	Lot 2 DP 39392	Residential	313 190	6 298 359	
R43	Lot 1 DP 39392	Residential	313 184	6 298 419	
R44	Lot 6 DP 39392	Residential	313 191	6 298 116	
R45	Lot 31 DP 609547	Residential	313 289	6 297 934	
R46	Lot 1 DP 621814	Residential	313 314	6 297 886	
R47	Lot 2 DP 510812	Residential	313 558	6 298 073	Within EPL 3829
R48	Lot 39 DP 752029	Commercial	317 231	6 298 035	
R49	Lot 3 DP 259731	Residential	317 203	6 300 126	
R50	Maroota Public School	Educational	313 497	6 296 507	

APPENDIX D

Emissions Inventory

As outlined in Section 5.2, several operations to be performed as part of the Quarry have the potential to result in emissions of particulate matter. A detailed outline of the emission estimation techniques adopted to derive total emissions from the sources identified are presented in this appendix.

Activity Rates

Activity rates associated with each of the processes occurring as part of the Quarry during the scenario assessed are presented in Table D1.

Moisture content of all material has been taken to be 2 %, mean wind speed at the Quarry Site is predicted to be 1.9 $m \cdot s^{-1}$. Silt content of unpaved site roads has been assumed to be 7.1 % for sand and gravel processing (material storage area) (USEPA, 2006), and the silt loading of the paved access road is taken to be 8.2 $g \cdot m^{-2}$ (average for a quarry) (US EPA, 2011).

Although a higher silt loading on the paved road close to the Quarry Site entrance might be expected, it would be anticipated that by the time vehicles are moving proximate to sensitive receptor locations (receptor R33 in particular), any track out would have reduced significantly. The Applicant would be required to ensure that any track out onto public roads is minimised, and it is therefore expected that at locations beyond the site entrance, silt loading would be low.

Table D1 Activity rates

Description	Annual activity rate	Peak daily activity rate	Units	Hours	Notes
Cutting of sandstone logs	880	8	hrs	7 to 17	Applied a factor of 10/4 (2.5) to the max daily - reflects the peak:mean transport of material from site. Applied to most sources
Cutting of flagging stone	880	8	hrs	7 to 17	Assumed 2/3 of operational hours for sandstone cutting. Zephyr noted an emission factor similar to ripping with bulldozer, (4% increase), so a 10% increase has been adopted to be conservative
Extraction of friable sandstone	10 000	95	tonnes	7 to 17	
Loading of friable sandstone to mobile crusher	10 000	95	tonnes	7 to 17	
Crushing of friable sandstone	10 000	95	tonnes	7 to 17	
Screening of friable sandstone	10 000	95	tonnes	7 to 17	
Loading of processed friable sandstone to temporary stockpiles (immediately after screen)	10 000	95	tonnes	7 to 17	
Loading of processed friable sandstone to temporary stockpiles	10 000	95	tonnes	7 to 17	
Loading of processed friable sandstone to product trucks	10 000	95	tonnes	7 to 17	Assumed all 10 000 $t \cdot yr^{-1}$ leaving site rather than used on on-site road maintenance (conservative). "
Loading of sandstone logs and flagging stone to trucks	1 760	17	tonnes	7 to 17	
Bulldozer moving approx 5,700t of topsoil/overburden per year	792	3	hours	7 to 17	Assumed max of 3 hrs per day
Unloading of VENM	30 000	114	tonnes	7 to 17	

Description	Annual activity rate	Peak daily activity rate	Units	Hours	Notes
Bulldozer moving VENM	264	1	hours	7 to 17	Assumed max of 1 hr per day
Haulage of sandstone log and flags	112	0.9	VKT	7 to 17	Applied a factor of 10/4 (2.5) to the max daily - reflects the peak:mean transport of material from site.
Haulage of friable sandstone from extraction to mobile crusher	718	5.9	VKT	7 to 17	
Haulage of screened material to stockpiles	136	1.1	VKT	7 to 17	
Haulage of all material offsite (unpaved)	2 205	18.2	VKT	7 to 17	Assume average of 4 and max of 10 vehicles per day (includes import and export of material)
Haulage of all material offsite (paved)	2 144	17.7	VKT	7 to 17	This is an off-site road, but goes close to a number of residences.
Extraction area (wind erosion)	2.263	2.263	ha	24 hrs	Covers all extraction area and stockpiles

Bulldozing

The emissions of particulate matter from the bulldozing (overburden) process have been estimated using emission factors presented in Section 11.9-2 of AP-42 (Western Surface Coal Mining) (US EPA, 1998). The emission factor is:

$$EF_{TSP}\ (kg.hr^{-1}) = \frac{2.6 \times (s)^{1.2}}{(M)^{1.3}}$$

$$EF_{PM_{15}}\ (kg.hr^{-1}) = \frac{0.45 \times (s)^{1.5}}{(M)^{1.4}}$$

$$EF_{PM_{10}}(kg.hr^{-1}) = 0.75\ \times EF_{PM_{15}}$$

$$EF_{PM_{2.5}}\ (kg.hr^{-1}) = 0.105 \times EF_{TSP}$$

where:

$EF_{(kg \cdot hr^{-1})}$ = emission factor for particulate matter

$s_{(\%)}$ = silt content in %, by weight

$M_{(\%)}$ = moisture content of overburden in %, by weight

The quality rating for this emission factor is rated B for TSP, C for PM_{15}, D for PM_{10}, D for $PM_{2.5}$.

Note that this factor has been increased by 10% to approximate emissions from saw cutting of sandstone as per (Zephyr, 2022).

Excavators / Front-end Loaders

Emissions associated with all loading and unloading operations have been characterised using the factor outlined in AP-42 for Batch Drop processes (Section 13.2.4.3) (USEPA, 2006a). This equation is consistent with that associated with the use of excavators, shovels and front-end loaders outlined in the NPI EETM for Mining (NPI, 2012):

$$EF\ (kg \cdot tonne^{-1}) = k(0.0016)\ \frac{\left(\frac{U\ (m \cdot s^{-1})}{2.2}\right)^{1.3}}{\left(\frac{M\ (\%)}{2}\right)^{1.4}}$$

where:

$EF_{TSP\ (kg \cdot tonne^{-1})}$ = emission factor for total suspended particles

$EF_{PM_{10}\ (kg \cdot tonne^{-1})}$ = emission factor for total suspended particles

k_{TSP} = 0.74 for particles less than 30 micrometres aerodynamic diameter

$k_{PM_{10}}$ = 0.35 for particles less than 10 micrometres aerodynamic diameter

$k_{PM_{2.5}}$ = 0.053 for particles less than 2.5 micrometres aerodynamic diameter

U = mean wind speed (m·s^{-1})

M = material moisture content (% by weight)

The quality rating for this application is rated U (no rating).

Crushing

Emissions of particulate matter resulting from the processing of materials (crushing of friable sandstone) have been estimated using the emission factors presented in Section 11.19.2 of AP-42 (Crushed Stone Processing and Pulverised Mineral Processing) (US EPA, 2004).

No emission factors associated with primary or secondary crushing are available within AP-42 although emission factors for tertiary crushers can be used as an upper limit for primary or secondary crushing (US EPA, 2004).

$PM_{2.5}$ emission factors are not available for uncontrolled crushing sources in AP-42 although have been taken to be 10% of PM_{10} as per aggregate handling sources (MRI, 2006).

For uncontrolled tertiary crushing (and uncontrolled primary and secondary crushing):

$$EF_{TSP}\ (kg.tonne^{-1}) = 0.0027$$

$$EF_{PM_{10}}\ (kg.tonne^{-1}) = 0.0012$$

$$EF_{PM_{2.5}}\ (kg.tonne^{-1}) = 0.00012$$

The quality rating for these emission factors is: Tertiary Crushing (uncontrolled) = E & C (TSP & PM_{10} respectively).

Screening

Emissions of particulate matter resulting from the screening of material have been estimated using the emission factors presented in Section 11.19.2 of AP-42 (Crushed Stone Processing and Pulverised Mineral Processing) (US EPA, 2004).

$PM_{2.5}$ emission factors are not available for uncontrolled screening sources in AP-42 although have been taken to be 10 % of PM_{10} as per aggregate handling sources (MRI, 2006). The control efficiency used for screening is 91.2 % as calculated in AP-42 (US EPA, 2004).

For uncontrolled screening:

$$EF_{TSP}\ (kg.tonne^{-1}) = 0.0125$$

$$EF_{PM_{10}}\ (kg.tonne^{-1}) = 0.0043$$

$$EF_{PM_{2.5}}\ (kg.tonne^{-1}) = 0.00043$$

The quality rating for these emission factors is: screening (uncontrolled) = E & C (TSP & PM_{10} respectively).

Unpaved Roads

Emissions of particulate matter resulting from the movement of materials on unpaved roads have been estimated using the emission factors presented in Section 13.2.2 (Unpaved Roads) of AP-42 (USEPA, 2006).

$$EF_{(kg.VKT^{-1})} = 0.2819 \times k \times (\frac{s}{12})^{a} \times (\frac{W \times 0.907185}{3})^{b}$$

where:

$EF_{(kg.VKT^{-1})}$ = emission factor (kg per vehicle kilometre travelled) multiplied by 0.2819 to convert from lb per vehicle mile travelled

k = particle size multiplier (dimensionless)

s = surface material silt content (%)

W = mean vehicle weight (tons) multiplied by 0.907185 to convert from metric tonnes

The particle size multipliers for TSP, PM_{10} and $PM_{2.5}$ (k) are provided in (US EPA, 2006a) as 4.9, 1.5 and 0.15, respectively.

The quality rating for this application is rated B for TSP, B for PM_{10} and B for $PM_{2.5}$.

Paved Roads

Emissions of particulate matter resulting from the movement of materials on paved roads have been estimated using the emission factors presented in 13.2.1 (Paved Roads) of AP-42, (US EPA, 2011).

$$EF_{(g.VKT^{-1})} = k(sL)^{0.91}(W \times 0.907185)^{1.02}$$

where:

$EF_{(g.VKT^{-1})}$= emission factor (g per vehicle kilometre travelled)

k = particle size multiplier (dimensionless)

sL = road surface silt loading (g·m-2)

W = average weight (tons) of vehicles travelling the road multiplied by 0.907185 to convert to metric tonnes

The particle size multipliers for TSP, PM_{10} and $PM_{2.5}$ (k) are provided in (US EPA, 2011) as 3.23, 0.62 and 0.15, respectively.

The quality rating for this emission factors are A for TSP, A for PM_{10}, D for $PM_{2.5}$.

Wind Erosion (Exposed Areas)

Emissions of particulate matter resulting from the wind erosion of exposed areas have been estimated using the emission factors presented in Section 11.9-4 of AP-42 (Western Surface Coal Mining) (US EPA, 1998).

The emission factors within Table 11.9-4 have been adopted for the operations outlined above. The emission factor applies to the materials: seeded land, stripped overburden and graded overburden. The emission factor is:

$$EF_{TSP}\ (tonne.(hectare.year)^{-1}) = 0.85$$

where:

$EF_{TSP}\ (tonne.(hectare.year)^{-1})$= emission factor for total suspended particulate matter

PM_{10} and $PM_{2.5}$ emission factors are not available in AP-42 although have been taken to be 50% of TSP for PM_{10} and, 7.5% of TSP for $PM_{2.5}$ as per AP-42 section (13.2.5) for industrial wind erosion.

The quality rating for this emission factors is C.

Emissions inventories are presented overleaf.

Annual

Description	Emission Factor	Emission rate						Emission Controls	Controlled emission (kg.yr-1)		
		TSP	PM10	PM2.5	Units	Activity Rate	Units		TSP	PM10	PM2.5
Cutting of sandstone logs	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	880	hr	None	2,348.3	350.1	246.6
Cutting of flagging stone	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	880	hr	None	2,348.3	350.1	246.6
Extraction of friable sandstone	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	10,000	t	None	10.4	4.9	0.7
Loading of friable sandstone to mobile crusher	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	10,000	t	None	10.4	4.9	0.7
Crushing of friable sandstone	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	10,000	t	None	27.0	12.0	2.2
Screening of friable sandstone	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	10,000	t	None	125.0	43.0	3.0
Loading of processed friable sandstone to tempor	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	10,000	t	None	10.4	4.9	0.7
Loading of processed friable sandstone to tempor	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	10,000	t	None	10.4	4.9	0.7
Loading of processed friable sandstone to produc	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	10,000	t	None	10.4	4.9	0.7
Loading of sandstone logs and flagging stone to t	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	1,760	t	None	1.8	0.9	0.1
Bulldozer moving approx 5,700t of topsoil/overbu	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	792	hr	None	1,921.3	286.5	201.7
Unloading of VENM	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	30,000	t	None	31.3	14.8	2.2
Bulldozer moving VENM	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	264	t	None	0.3	0.1	0.0
Movement of sandstone log and flags	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	112	VKT	Watering 50%, limited speed (85%)	26.1	7.2	0.7
Movement of friable sandstone from extraction to	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	718	VKT	Watering 50%, limited speed (85%)	167.2	46.1	4.6
Movement of screened material to stockpiles	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	136	VKT	Watering 50%, limited speed (85%)	31.7	8.7	0.9
Movement of all material offsite (unpaved)	AP-42 Unpaved roads - Section 13.2.2	2.8E+00	7.7E-01	7.7E-02	kg·VKT-1	2,205	VKT	Watering 50%, limited speed (85%)	462.4	127.4	12.7
Movement of all material offsite (paved)	AP-42 Paved roads - Section 13.2.1	6.9E-01	1.3E-01	3.2E-02	kg·VKT-1	2,144	VKT	Limited speed (50%)	741.5	142.3	34.4
Extraction area	AP-42 - Wind erosion of exposed areas - annual - Table 11.9-4	8.5E+02	4.3E+02	6.4E+01	kg·ha-1·yr-1	2.3	ha	0	1,923.6	961.8	144.3
								TOTAL	**10,207.7**	**2,375.8**	**903.8**

Peak 24-hour

Description	Emission Factor	Emission rate						Emission Controls	Controlled emissions (kg.day-1)		
		TSP	PM10	PM2.5	Units	Activity Rate	Units		TSP	PM10	PM2.5
Cutting of sandstone logs	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	8	hr	None	22.2	3.3	2.3
Cutting of flagging stone	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	8	hr	None	22.2	3.3	2.3
Extraction of friable sandstone	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	95	t	None	0.1	0.0	0.0
Loading of friable sandstone to mobile crusher	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	95	t	None	0.1	0.0	0.0
Crushing of friable sandstone	AP-42 - Primary crushing - Table 11.19.2.1	2.7E-03	1.2E-03	2.2E-04	kg·t-1	95	t	None	0.3	0.1	0.0
Screening of friable sandstone	AP-42 - Screening - Table 11.19.2.1	1.3E-02	4.3E-03	3.0E-04	kg·t-1	95	t	None	1.2	0.4	0.0
Loading of processed friable sandstone to tempor	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	95	t	None	0.1	0.0	0.0
Loading of processed friable sandstone to tempor	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	95	t	None	0.1	0.0	0.0
Loading of processed friable sandstone to produc	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	95	t	None	0.1	0.0	0.0
Loading of sandstone logs and flagging stone to	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	17	t	None	0.0	0.0	0.0
Bulldozer moving approx 5,700t of topsoil/overbu	AP-42 - Bulldozing (Overburden) - Table 11.9-2	2.4E+00	3.6E-01	2.5E-01	kg·hr-1	3	hr	None	7.3	1.1	0.8
Unloading of VENM	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	114	t	None	0.1	0.1	0.0
Bulldozer moving VENM	AP-42 - Batch drop - Section 13.2.4.3	1.0E-03	4.9E-04	7.5E-05	kg·t-1	1	t	None	0.0	0.0	0.0
Movement of sandstone log and flags	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	1	VKT	Watering 50%, limited speed (85%)	0.2	0.1	0.0
Movement of friable sandstone from extraction to	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	6	VKT	Watering 50%, limited speed (85%)	1.4	0.4	0.0
Movement of screened material to stockpiles	AP-42 Unpaved roads - Section 13.2.2	3.1E+00	8.6E-01	8.6E-02	kg·VKT-1	1	VKT	Watering 50%, limited speed (85%)	0.3	0.1	0.0
Movement of all material offsite (unpaved)	AP-42 Unpaved roads - Section 13.2.2	2.8E+00	7.7E-01	7.7E-02	kg·VKT-1	18	VKT	Watering 50%, limited speed (85%)	3.8	1.1	0.1
Movement of all material offsite (paved)	AP-42 Paved roads - Section 13.2.1	6.9E-01	1.3E-01	3.2E-02	kg·VKT-1	18	VKT	Limited speed (50%)	6.1	1.2	0.3
Extraction area	AP-42 - Wind erosion of exposed areas - annual - Table 11.9-4	8.5E+02	4.3E+02	6.4E+01	kg·ha-1·yr-1	2.3	ha	0	5.3	2.6	0.4
								TOTAL	**70.9**	**13.9**	**6.4**

Appendix 5

Noise Assessment

prepared by
Muller Acoustic Consulting Pty Ltd

(Total No. of pages including blank pages = 86)

Noise Assessment

Maroota Central Civil Quarry
4773 Old Northern Road
Maroota, NSW

Prepared for: R.W. Corkery & Co. Pty Ltd
September 2023
MAC221612-01RP1V1

Muller Acoustic Consulting

Document Information

Noise Assessment

Maroota Central Civil Quarry

4773 Old Northern Road

Maroota, NSW

Prepared for: R.W. Corkery & Co. Pty Ltd

North Tower, Suite 12.01

1/5 Railway Street

Chatswood NSW 2067

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC221612-01RP1V1	26 September 2023	Rod Linnett		Oliver Muller	

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by R.W. Corkery & Co. Pty Ltd (RWC) to prepare a Noise Assessment (NA) to quantify emissions from the proposed Maroota Central Civil Quarry located at 4773 Old Northern Road, Maroota, NSW (the project).

The NA has quantified potential noise emissions from the operation and construction phases of the project and recommends reasonable and feasible noise controls where required. This assessment has been undertaken in accordance with the following documents:

- NSW Department of Environment and Climate Change (DECCW) – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017;
- NSW Department of Environment, Climate Change and Water (DECCW) – NSW Road Noise Policy (RNP), March 2011;
- NSW Department of Environment and Conservation (DEC) – NSW Environmental Noise Management – Assessing Vibration: a Technical Guideline (the NSW vibration guideline), February 2006;
- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- International Organisation for Standardisation (ISO) 9613-1:1993 (ISO9613:1) - Acoustics - Attenuation of Sound During Propagation Outdoors - Part 1: Calculation of the Absorption of Sound by the Atmosphere;
- International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation;
- ISO/TR 17534-3 - Acoustics — Software for the calculation of sound outdoors — Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1.
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures; and
- Standards Australia AS/NZS 2107:2016 (AS2107) – Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

1.1 Assessment Requirements

The NA has been prepared in accordance with the NSW DPIE's Secretary's Environmental Assessment Requirements (SEARs) for the project. The SEARs identify matters which must be addressed in the assessment and essentially form the project's terms of reference. Table 1 lists individual requirements relevant to this NA and where they are addressed in this report.

Table 1 Noise Related SEARs and Agency Requirements

SEAR	Section
A quantitative assessment of potential construction and operational noise and off-site transport noise impacts of the development in accordance with the:	
- *Interim Construction Noise Guideline*	Section 7.2
- *NSW Noise Policy for Industry*	Section 7.1
- *NSW Road Noise Policy*	Section 7.4
Details of reasonable and feasible mitigation measures to minimise noise emissions.	n/a
Monitoring and management measures that would minimise impacts.	n/a
National Parks and Wildlife Service - In assessing the potential impacts of noise, the park should be considered equivalent to a 'sensitive receiver'. It should not be considered a buffer for excessive noise during the proposal's operations.	Section 2.1.1, 7.1, 7.2

2 Project Description

2.1 Background

The project is located on rural land within Lots 1 and 2 DP609224, which are entirely owned by Applicant, and an unnamed crown road reserve at 4773 Old Northern Road, Maroota, NSW. The project site includes all proposed activities and covers a total area of approximately 23.33ha of which 4.37ha would be disturbed throughout the life of the project.

The project requires the construction and operation of the Maroota Central Civil Quarry which would include the following.

- extraction, processing and dispatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone;
- crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance;
- importation of Virgin Excavated Natural Material (VENM) for use in landscaping and progressive rehabilitation at the project;
- product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day;
- progressive and final rehabilitation of the Project to develop a final landform suitable for nature conservation; and
- ongoing operations for a period of 30 years from the commencement of operations under the development consent.

An area of 2.27ha will be developed in two stages from west to east to a maximum depth of 218m AHD. All product extraction, processing, stockpiling and despatch activities will be undertaken within the extraction area including imported VENM material stockpiles. The extraction area would include a 5m perimeter zone to allow for the construction of a perimeter safety bund, tracks and erosion and sediment control infrastructure.

An area of 0.18ha to the immediate west of the extraction area will be levelled to allow for a demountable office, water tank, workshop, light and heavy vehicle parking and amenities.

The existing site access road will be widened to 8m to allow two heavy vehicles to pass and will be unsealed. The existing entrance / exit to the Project will remain at its current location throughout the life of the project.

2.1.1 Receiver Review

A review of residential receivers in proximity to the project has been completed and are summarised in **Table 2. Figure 1** provides a locality plan showing the position of these receivers in relation to the project.

Table 2 Receiver Locations

Receiver	Receiver Type	Distance to Extraction Area, m	Coordinates (GDA94/MGA56)	
			Easting	Northing
R01	Suburban	1880	314963	6296520
R02	Suburban	1770	315122	6296667
R03	Suburban	1653	314250	6296737
R04	Suburban	1682	314162	6296725
R05	Suburban	1865	314302	6296514
R06	Suburban	1323	313262	6298698
R07	Suburban	1329	313268	6298749
R08	Rural	1522	313109	6298887
R09	Rural	1844	312855	6299123
R10	Suburban	1669	313122	6299265
R11	Rural	1370	313425	6299182
R12	Suburban	1582	313174	6299180
R13	Suburban	1714	313106	6299324
R14	Suburban	1761	313091	6299385
R15	Rural	1979	312841	6299398
R16	Rural	1827	313317	6299774
R17	Suburban	1924	312971	6299500
R18	Rural	1839	313390	6299860
R19	Suburban	1863	313631	6296741
R20	Suburban	1836	313636	6296770
R21	Suburban	1731	313582	6296928
R22	Suburban	1813	313431	6296937
R23	Suburban	1299	313598	6297479
R24	Rural	1717	313113	6297423
R25	Suburban	1612	313320	6297321
R26	Rural	1604	313048	6297802
R27	Suburban	1640	312942	6298050
R28	Suburban	1570	313004	6298095
R29	Rural	1745	312978	6297606
R30	Rural	1653	313039	6297693
R31	Suburban	1355	313307	6297824
R32	Suburban	1258	313373	6297921

Table 2 Receiver Locations				
Receiver	Receiver Type	Distance to Extraction Area, m	Coordinates (GDA94/MGA56)	
			Easting	Northing
R33	Suburban	1225	313345	6298612
R34	Suburban	1105	313457	6298559
R35	Suburban	1109	313442	6298374
R36	Suburban	1107	313445	6298414
R37	Rural	817	313868	6298850
R38	Suburban	1277	313386	6298924
R39	Rural	870	314355	6299325
R40	Suburban	1225	313341	6298171
R41	Suburban	1348	313209	6298238
R42	Suburban	1362	313189	6298358
R43	Suburban	1368	313184	6298417
R44	Suburban	1383	313191	6298115
R45	Suburban	1333	313289	6297933
R46	Suburban	1327	313313	6297885
R47	Suburban	1055	313554	6298074
PR1	Passive Recreation (National Park)	230	314961	6298579

2.1.2 Proposed Activities & Operating Hours

There are several key activities associated with the project that have the potential to generate acoustic impacts on nearby receivers. **Table 3** provides a summary of project noise sources and the assessment period in which they propose to occur.

Table 3 Activities and Operating hours[1]		
Activity/Operation	Typical Operating Times	NPI Assessment Period
Site Development and Construction	7am to 6pm (Monday to Saturday)	Daytime
Extraction Operations	7am to 6pm (Monday to Saturday)	Daytime
Product Despatch	7am to 6pm (Monday to Saturday)	Daytime
Maintenance (non-audible)	24 hours/ 7 days	All

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

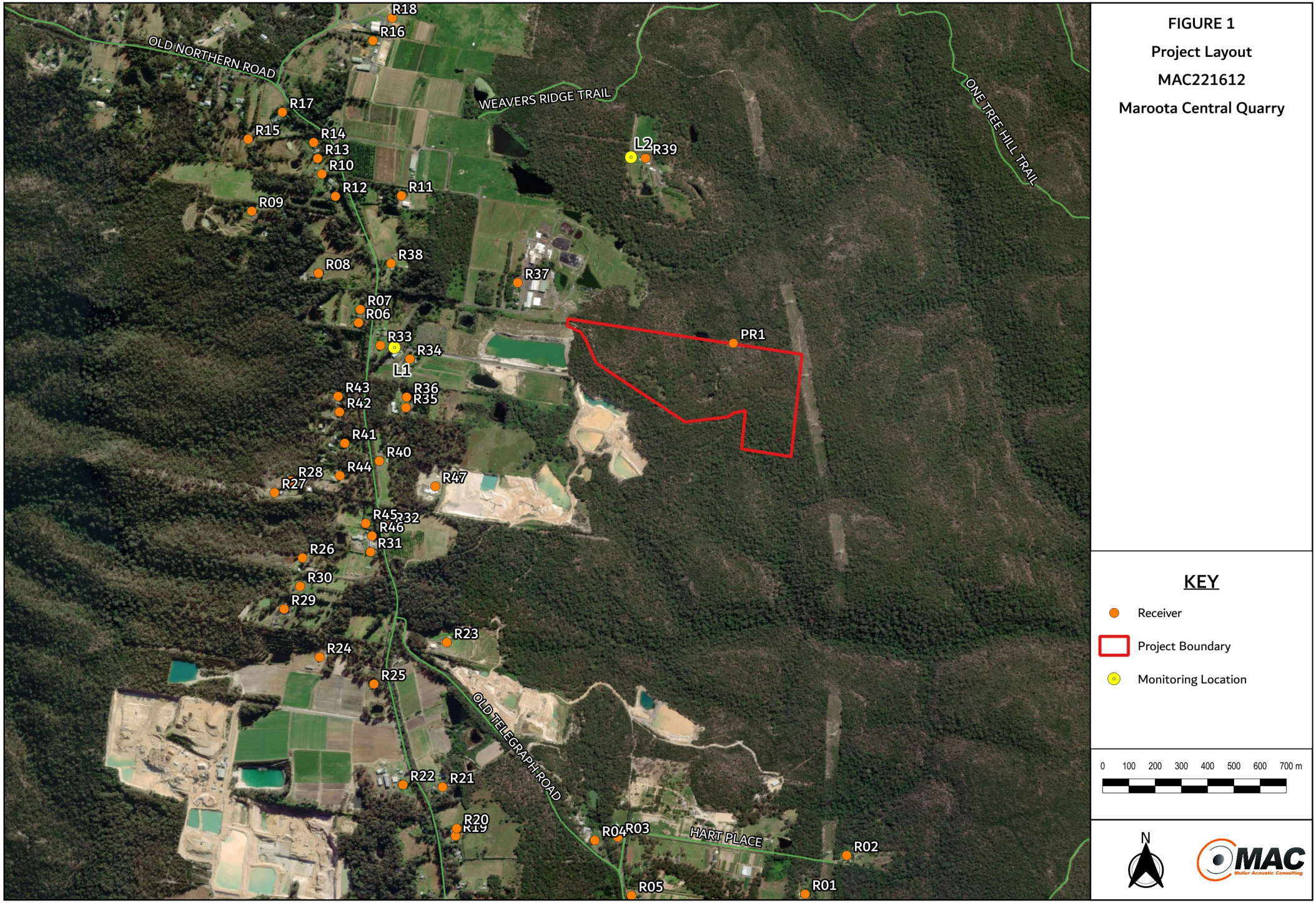


FIGURE 1

Project Layout

MAC221612

Maroota Central Quarry

KEY

- Receiver
- Project Boundary
- Monitoring Location

0 100 200 300 400 500 600 700 m

N

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3 Noise Policy and Guidelines

3.1 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

3.1.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

3.1.2 Rating Background Level (RBL)

The Rating Background Level (RBL) is a determined parameter from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period. The measured RBLs relevant to the project are contained in **Section 4**.

3.1.3 Project Intrusiveness Noise Level (PINL)

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

3.1.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended Amenity Noise Levels specified in Table 2.2 (of the NPI). The NPI defines two categories of Amenity Noise Levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "to ensure that industrial noise levels (existing plus new) remain within the recommended Amenity Noise Levels for an area, a Project Amenity Noise Level applies for each new source of industrial noise as follows":

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Where relevant this assessment has considered influences of traffic with respect to Amenity Noise Levels (ie areas where existing traffic noise levels are 10dB greater than the recommended Amenity Noise Level).

The recommended Amenity Noise Levels as per Table 2.2 of the NPI are reproduced in **Table 4**.

Table 4 Amenity Noise Levels

Receiver Type	Noise Amenity Area	Time of day[1]	Recommended Amenity Noise Level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended Amenity Noise Level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship - internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended Amenity Noise Levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

3.1.5 Maximum Noise Assessment Trigger Levels

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq(15min)}$ 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- L_{Amax} 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

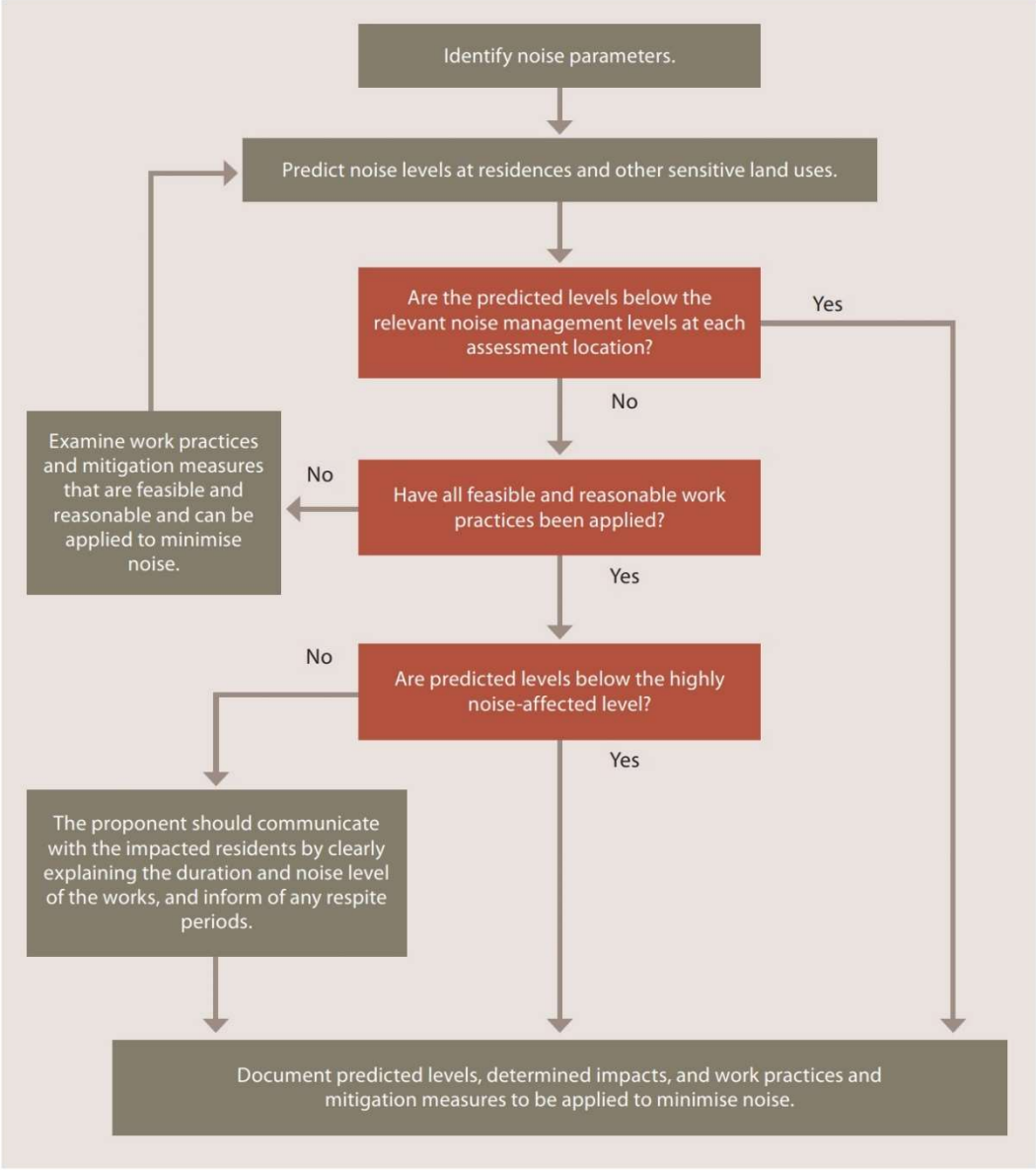
3.2 Interim Construction Noise Guideline

The ICNG sets out procedures to identify and address the impacts of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

- quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- qualitative, which is suited to short term infrastructure maintenance (< three weeks).

The qualitative assessment methodology is a more simplified approach that relies on noise management strategies. This NA has adopted a quantitative assessment approach which is summarised in **Figure 2.** The quantitative approach includes identification of potentially affected receivers, derivation of the construction noise management levels, quantification of potential noise impact at receivers via predictive modelling and, provides management and mitigation recommendations.

Figure 2 Quantitative Assessment Processes for Assessing and Managing Construction Noise



Source: Department of Environment and Climate Change, 2009.

3.2.1 Standard Hours for Construction

Table 5 presents the ICNG recommended standard hours for construction works.

Table 5 Recommended Standard Hours for Construction

Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

These recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction activities are anticipated to be undertaken during standard construction hours.

3.2.2 Construction Noise Management Levels

Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Levels (NML) and are important indicators of the potential level of construction noise impact. **Table 6** reproduces the ICNG Noise Management Level for residential receivers. The NML is determined by adding 10dB (standard hours) or 5dB for Out of Hours (OOH) to the Rating Background Level (RBL) for each specific assessment period.

Table 6 Noise Management Levels

Time of Day	Management Level LAeq(15min)[1]	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75dBA (HNA)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours.	Noise affected RBL + 5dB	A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG.

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

3.3 Road Noise Policy

The road traffic noise criteria are provided in the Road Noise Policy (RNP), 2011. The policy sets out noise criteria applicable to different road classifications for the purpose of quantifying traffic noise impacts. Road noise criteria relevant to this assessment are presented in detail in Section 5.4.

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4 Existing Environment

4.1 Unattended Noise Monitoring

To quantify the existing background noise environment of the area, unattended noise monitoring was conducted at the two nearest representative receiver locations to the project site. The selected monitoring locations are shown in **Figure 1** and are representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI.

The unattended noise survey was conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The measurements were carried out using two Svantek 977 noise analysers from Thursday 13 October 2022 to Monday 24 October 2022. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

The noise monitoring charts for the background monitoring assessment are provided in **Appendix B**. Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI. **Table 7** presents the results of long-term unattended noise monitoring at Location L1.

Table 7 Background Noise Monitoring Summary – L1 4765 Old Northern Road, Maroota

Date	Measured Background Noise Level (LA_{90}) dB ABL[1]			Measured dB $LA_{eq(period)}$		
	Day	Evening	Night	Day	Evening	Night
Thursday 13 October 2022	--	41	35	--	49	54
Friday 14 October 2022	38	39	30	57	49	51
Saturday 15 October 2022	33	34	26	54	45	51
Sunday 16 October 2022	32	37	28	49	49	56
Monday 17 October 2022	42	39	30	59	50	56
Tuesday 18 October 2022	37	35	31	60	49	56
Wednesday 19 October 2022	36	37	30	60	52	54
Thursday 20 October 2022	38	37	32	58	49	56
Friday 21 October 2022	37	38	34	56	50	54
Saturday 22 October 2022	36	38	28	54	47	50
Sunday 23 October 2022	32	38	30	48	48	56
L1 – RBL / Leq Overall	**37**	**38**	**30**	**57**	**49**	**55**

Note 1: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station at Richmond RAAF Site 67105.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Table 8 presents the results of long-term unattended noise monitoring at Location L2.

Table 8 Background Noise Monitoring Summary – L2 4837 Old Northern Road, Maroota

Date	Measured Background Noise Level (LA_{90}) dB ABL[1]			Measured dB $LA_{eq(period)}$		
	Day	Evening	Night	Day	Evening	Night
Thursday 13 October 2022	--	35	27	--	51	37
Friday 14 October 2022	33	35	32	44	40	38
Saturday 15 October 2022	29	32	25	44	45	39
Sunday 16 October 2022	27	34	27	56	49	38
Monday 17 October 2022	32	31	29	41	38	39
Tuesday 18 October 2022	30	29	29	41	49	36
Wednesday 19 October 2022	29	30	29	42	50	39
Thursday 20 October 2022	30	31	27	42	37	37
Friday 21 October 2022	29	31	28	40	52	37
Saturday 22 October 2022	29	33	22	42	52	42
Sunday 23 October 2022	24	30	22	41	43	37
L2 – RBL / Leq Overall	**29**	**31**	**27**	**47**	**48**	**38**

Note 1: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station at Richmond RAAF Site 67105.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Classification of residential receivers in the surrounding area have been determined by review of the measured RBLs and a tally of the features for each category described in Table 2.3 of the NPI. The overall tally of features and resulting classifications are provided in **Table 9**. The detailed assessment of receiver categories is provided in **Appendix C.** This classification is used in conjunction with the intrusiveness criteria to determine the limiting criteria.

Table 9 Determination of NPI Residential Receiver Category

Monitoring Location	Rural	Suburban	Urban
L1	1	3	0
L2	5	0	0

The analysis shows that receivers in proximity of the Old Northern Road are affected by road traffic noise and existing noise level are represented by monitoring location L1 and have been classified as Suburban receivers. Receivers that are more distant from the Old Northern Road are not affected by road traffic noise and are represented by monitoring location L2, have been classified as Rural receivers.

4.2 Operator Attended Noise Monitoring

To supplement the unattended noise assessment and to quantify the ambient noise environment in the community surrounding the operation, one 15-minute operator attended measurement was completed. The attended noise survey was conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise". The acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

The operator attended noise monitoring was conducted using a Svantek 971 noise analyser at the unattended noise monitoring locations (L1 & L2) on Thursday 13 October 2022 to quantify ambient background noise levels. The results of the short-term noise measurement and observations are summarised in **Table 10**.

Table 10 Operator-Attended Noise Survey Results

Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Location L1					
13/10/2022 11:33	82	63	41	WD: ENE WS: 1.5m/s 16°C	Birds 40-48 Traffic 56 -79 Heavy vehicle passby 70-82 Lawnmower ~40 Aircraft 40-43 Wind-blown vegetation 40-48
Location L2					
13/10/2022 12:12	66	45	35	WD: ENE WS: 2m/s 18°C	Wind-blown vegetation 40-48 Birds 42-66 Distant industrial noise ~30 Aircraft 40 MAC operator 66

5 Assessment Criteria

5.1 Operational Noise

5.1.1 Intrusiveness Noise Levels

The PINL are presented in **Table 11** and have been determined based on the RBL +5dBA and only apply to residential receivers.

Table 11 Project Intrusiveness Noise Levels

Location	Receiver Type & Receiver ID	Period[1]	Measured RBL dB LA_{90}	Adopted RBL dB LA_{90}	PINL dB $LA_{eq(15min)}$
L1	Suburban Residential	Day	37	37	42
		Evening	38	37[2]	42
		Night	30	30	35
L2	Rural Residential	Day	29	35[3]	40
		Evening	31	31	36
		Night	27	30[3]	35

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Where the evening RBL is greater than the daytime RBL, the daytime RBL is adopted; similarly, where the night-time RBL is greater than the evening RBL, the night-time RBL is adopted.

Note 3: Where this level is less than 35dBA for the day period, the rating background noise level is set to 35dBA; where the noise level is less than 30dBA for the evening and night periods, the rating background noise level is set to 30dBA.

5.1.2 Amenity Noise Levels and Project Amenity Noise Levels

The PANL for residential receivers and other receiver types (ie non-residential) potentially affected by the project are presented in **Table 12.**

Table 12 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	NPI Recommended ANL dB $LA_{eq(period)}$	ANL dB $LA_{eq(period)}$[2]	PANL dB $LA_{eq(15min)}$[3]
Residential	Suburban	Day	55	50	53
		Evening	45	40	43
		Night	40	35	38
Residential	Rural	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38
Passive Recreation	All	When in use	50	45	48

Table 12 Amenity Noise Levels and Project Amenity Noise Levels					
Receiver Type	Noise Amenity Area	Assessment Period[1]	NPI Recommended ANL dB $LA_{eq(period)}$	ANL dB $LA_{eq(period)}$[2]	PANL dB $LA_{eq(15min)}$[3]
Active Recreation	All	When in use	55	50	53
Commercial	All	When in use	65	60	63
Industrial	All	When in use	70	65	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level -5dB as there is other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

5.1.3 Project Noise Trigger Levels

The PNTL are the lower of either the PINL or the PANL. **Table 13** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

Table 13 Project Noise Trigger Levels					
Receiver Type	Noise Amenity Area	Assessment Period[1]	PINL dB $LA_{eq(15min)}$	PANL dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$
Residential	Suburban (L1)	Day	42	53	42
		Evening	42	43	42
		Night	35	38	35
Residential	Rural (L2)	Day	40	48	40
		Evening	36	43	36
		Night	35	38	35
Passive Recreation	All	When in Use	N/A	48	48
Active Recreation	All	When in Use	N/A	53	53
Commercial	All	When in Use	N/A	53	53
Industrial	All	When in Use	N/A	63	63
Industrial Interface	All	All	N/A	68	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5.2 Construction Noise

The relevant NMLs for standard construction hours are presented in **Table 14**.

Table 14 Construction Noise Management Levels

Receiver Type	Assessment Period[1]	Adopted RBL dB L_{A90}	NML dB $L_{Aeq(15min)}$
Suburban Residential (L1)	Standard Hours	37	47 (RBL+10dBA)
Rural Residential (L2)	Standard Hours	35	45 (RBL+10dBA)
Educational	When in use	N/A	45 (internal) 55 (external)[2]
Hospital Wards	When in use	N/A	45 (internal) 55 (external)[2]
Place of Worship	When in use	N/A	45 (internal) 55 (external)[2]
Active Recreation Areas	When in use	N/A	65 (external)
Passive Recreation Areas	When in use	N/A	60 (external)
Industrial Premises	When in use	N/A	75 (external)
Community Centres	When in use	N/A	Refer to AS2107 for maximum internal levels and specific use
Commercial Premises	When in use	N/A	70 (external)

Note 1: Refer to **Table 5** for Standard Recommended Hours for Construction.

Note 2: External level based on 10dB with windows open for adequate ventilation (ICNG).

5.3 Voluntary Land Acquisition and Mitigation Policy

The Voluntary Land Acquisition and Mitigation Policy (VLAMP, November 2018) describes the NSW Government's policy for voluntary mitigation and land acquisition actions undertaken to address noise impacts from State significant mining, petroleum and extractive industry developments. It aims to provide a balance between economic development and protecting the health, preserve amenity and control intrusive noise where potential impacts are identified.

The VLAMP provides guidance for consent authorities as to when voluntary mitigation or voluntary acquisition rights are to be applied to reduce operational noise impacts from a development on privately owned land. The policy does not apply to construction noise impacts, impacts from the public road or rail network or modifications to existing developments with legacy noise issues.

The VLAMP outlines methods to determine the significance of potential exceedances of relevant noise assessment criteria and identifies potential treatments for those exceedances (VLAMP Table 1) and has been reproduced in **Table 15**.

Voluntary Mitigation Rights

A consent authority should only apply voluntary land mitigation rights where, even with the implementation of best practice management at the mine site:

- the noise generated by the development would meet the requirements of Table 1 (VLAMP) such that the impacts would be characterised marginal, moderate or significant at any residence or privately owned land; or
- the development would increase the total industrial noise level at any residence on privately owned land by more than 1dBA and noise levels at the residence are already above the recommended Amenity Noise Levels in Table 2.2 of the NPI; or
- the development includes a private rail line, and the use of that private rail line would cause exceedances of the recommended acceptable levels in Table 6 of Appendix 3 of the RING by greater than or equal to 3dBA at any residences on privately owned land.

Table 15 Characterisation of Noise Impacts and Potential Treatments (VLAMP Table 1)

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Characterisation of impacts:	Potential treatment:
All time periods 0-2dBA	Not applicable	Impacts are considered to be negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls
All time periods 3-5dBA	< recommended Amenity Noise Level in Table 2.2 of the NPI; or > recommended Amenity Noise Level in Table 2.2 of the NPI, but the increase in total cumulative industrial noise level resulting from the development is >1dB	Impacts are considered to be marginal	Provide mechanical ventilation / comfort condition systems to enable windows to be closed without compromising internal air quality / amenity.

Table 15 Characterisation of Noise Impacts and Potential Treatments (VLAMP Table 1)			
If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Characterisation of impacts:	Potential treatment:
All time periods 3-5dBA	> recommended Amenity Noise Level in Table 2.2 of the NPI, and the increase in total cumulative industrial noise level resulting from the development is >1dB	Impacts are considered to be moderate	As for marginal impacts but also upgraded facade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
Day and evening >5dBA	< recommended Amenity Noise Levels in Table 2.2 of the NPI	Impacts are considered to be moderate	As for marginal impacts but also upgraded facade elements like windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
Day and evening >5dBA	> recommended Amenity Noise Levels in Table 2.2 of the NPI	Impacts are considered to be significant	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above.
Night >5dBA	Not applicable	Impacts are considered to be significant	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions above.

Voluntary Acquisition Rights

A consent authority should only apply voluntary land acquisition rights where, even with the implementation of best practice management at the mine site:

- the noise generated by the development would be characterised as significant, according to Table 1 (VLAMP), at any residence on privately owned land; or
- the noise generated by the development would contribute to exceedances of the acceptable noise levels plus 5dB in Table 2.2 of the NPI on more than 25% of any privately owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls; or
- the development includes a private rail line, and the use of that private rail line would cause exceedances of the recommended maximum criteria outlined in Table 6 of Appendix 3 of the RING by greater than or equal to 3dBA at any residences on privately owned land.

Impacts would be classified as significant where:

- during the **daytime** and **evening** periods, noise levels from the project are >5dBA above the PNTLs and the total cumulative industrial noise level is greater than the recommended Amenity Noise Levels in Table 2.2 of the NPI; or
- during the **night-time** period, noise levels from the project are >5dBA above the PNTLs.

5.4 Road Traffic Noise

Table 16 presents the road traffic noise assessment criteria reproduced from the RNP relevant to this assessment.

Table 16 Road Traffic Noise Assessment Criteria

Road category	Type of project/development	Assessment Criteria – dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/arterial/ sub-arterial Roads	Existing residences affected by additional traffic on freeways/arterial/sub-arterial roads generated by land use developments	60dB LAeq(15hr)	55dB LAeq(9hr)
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dB LAeq(1hr)	50dB LAeq(1hr)
School Classrooms	Proposed road projects and traffic generating developments	40dB LAeq(1hr) (internal) when in use	N/A
Hospital Wards		35dB LAeq(1hr) (internal)	35dB LAeq(1hr) (internal)
Places of Worship		40dB LAeq(1hr) (internal)	40dB LAeq(1hr) (internal)
Open Space (active use)		60dB LAeq(1hr)	N/A
Open Space (passive use)		55dB LAeq(1hr)	N/A
Isolated Residences in commercial or industrial zones		Refer to AS2107 for internal levels	
Mixed Use development		Each component to be considered separately	
Childcare Facilities		Sleeping rooms 35dB LAeq(1hr) (internal) Indoor play areas 40dB LAeq(1hr) (internal) Outdoor play areas 55dB LAeq(1hr) (external)	

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2dBA, which is generally accepted as the threshold of perceptibility to a change in noise level.

The road traffic noise criteria are provided in the RNP. For this assessment, the 'sub arterial road' category for the Old Northern Road and Wisemans Ferry Road. It is acknowledged that the functional classification of Old Northern Road and Wisemans Ferry Road are a 'Collector Road' in accordance with the Roads and Maritime Noise Criteria Guideline (April 2015). However, the RNP does not provide separate noise criteria for Collector Roads but applies the sub-arterial category to all roads that are not classified as local roads.

Section 2.2 of the RNP states "*some industries such as mines and extractive industries are, by necessity, in locations that are often not served by arterial roads. Heavy vehicles must be able to access these often more remote sites and this may mean travelling on local public roads. Good planning practice acknowledges this type of road use and develops ways of managing any associated adverse noise impacts. Principal haulage routes are distinct from private haul roads – further guidance on private haul roads is provided in Appendix C4. Where local authorities identify a 'principal haulage route', the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads*".

The unnamed road linking the project to the Old Northern Road is considered a principal haulage route as hence the noise criteria for the sub-arterial category applies.

5.4.1 Relative Increase Criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in **Table 17** due to the addition of road traffic generated by the development should be considered for mitigation.

Table 17 Increase Criteria for Residential Land Uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase, dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{Aeq,15hr}$ +12dB (external)	Existing traffic $L_{Aeq,9hr}$ +12dB (external)

Note: The relative increase criterion does not apply to road projects where the main subject road is a local road.

5.5 Vibration

Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: A Technical Guideline* (the guideline) provides guidance on determining effects of vibration on buildings occupants. The guideline does not address vibration induced damage to structures, blast induced vibration effects or structure borne noise effects.

British Standard BS 7385:Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2", gives guidance on the levels of vibration which building structures could be damaged. BS7385 also takes into consideration the frequency of the vibration which is critical when assessing the likelihood of building damage.

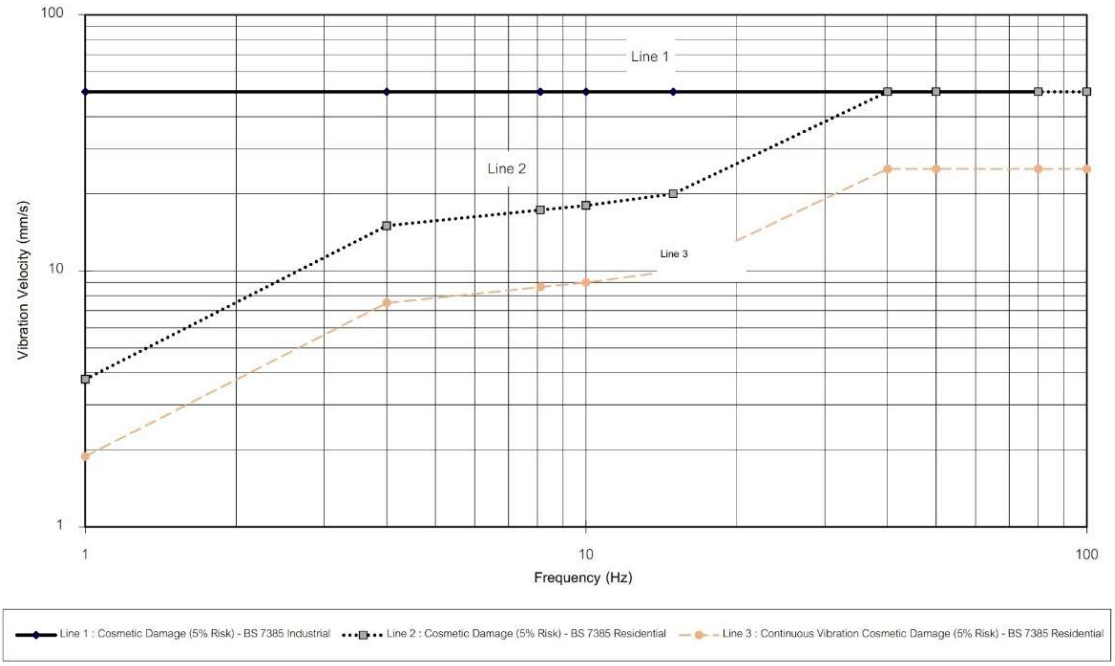
Guide values are set for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to result in a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and heavy commercial/industrial buildings are presented in **Table 18**, with a visual representation presented in **Figure 3**. Where sources of continuous vibration may give rise to dynamic magnification due to resonance, the values provided in **Table 18** should be reduced by 50%, this is especially the case with respect to Peak Particle Velocity (PPV) at lower frequencies.

Table 18 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Figure 3 – Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage



5.5.1 Human Comfort – Assessing Vibration a Technical Guideline

Humans are far more sensitive to vibration than is commonly realised and may detect vibration levels which are well below levels that may cause damage to buildings or structures. Assessing vibration: a technical guideline was published in February of 2006 by the DECC and is based on guidelines contained in BS 6472 – 1992, Evaluation of human exposure to vibration in buildings (1-80 Hz) and provides guidance on assessing vibration against human comfort.

The guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the guideline provides examples of the three vibration types and has been reproduced in **Table 19**.

Table 19 Examples of types of vibration (from Table 2.1 of the guideline)

Continuous Vibration	Impulsive Vibration	Intermittent Vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery)	Infrequent: Activities that create up to three distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (1990)	Trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer these would be assessed against impulsive vibration criteria.

5.5.2 Continuous Vibration

Appendix C of the guideline outlines acceptable criteria for human exposure to continuous vibration (1-80 Hz), the criteria are dependent on both the time of activity (usually daytime or night-time) and the occupied place being assessed. **Table 20** reproduces the preferred and maximum criteria relating to measured peak velocity.

Table 20 Criteria for Exposure to Continuous Vibration

Place	Time[1]	Peak Velocity (mm/s)	
		Preferred	Maximum
Critical working Areas (e.g. hospital operating theatres, precision laboratories)	Day or Night	0.14	0.28
Residences	Day	0.28	0.56
	Night	0.20	0.40
Offices	Day or Night	0.56	1.1
Workshops	Day or Night	1.1	2.2

Note: rms velocity (mm/s) and vibration velocity value (dB re 10^{-9} mm/s) values given for most critical frequency >8Hz assuming sinusoidal motion.

Note 1: Daytime is 7am to 10pm and Night-time is 10pm to 7am.

5.5.3 Impulsive Vibration

Appendix C of the guideline outlines acceptable criteria for human exposure to impulsive vibration (1-80 Hz), these criteria are dependent on both the time of activity (usually daytime or night-time) and the occupied place being assessed. Impulsive vibration (as defined in Section 2.1 of the guideline) is generally associated with infrequent activities that create up to three (3) distinct vibration events in an assessment period e.g. occasional dropping of heavy equipment, occasional loading and unloading. **Table 21** reproduces the preferred and maximum criteria relating to measured peak velocity.

Table 21 Criteria for Exposure to Impulsive Vibration

Place	Time[1]	Assessment Criteria	
		Peak Velocity (mm/s)	
		Preferred	Maximum
Critical working Areas (e.g. hospital operating theatres, precision laboratories)	Day or Night-time	0.14	0.28
Residences	Daytime	8.6	17.0
	Night-time	2.8	5.6
Offices	Day or Night-time	18.0	36.0
Workshops	Day or Night-time	18.0	36.0

Note 1: Daytime is 7am to 10pm and Night-time is 10pm to 7am.

5.5.4 Intermittent Vibration

Intermittent vibration (as defined in Section 2.1 of the guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Intermittent vibration is representative of activities such as impact hammering, rolling or general excavation work (such as an excavator tracking).

Section 2.4 of the Guideline provides acceptable values for intermittent vibration in terms of Vibration Dose Values (VDV) which requires the measurement of the overall weighted RMS (root mean square) acceleration levels over the frequency range 1-80 Hz. To calculate VDV the following formula (refer section 2.4.1 of the guideline) was used:

$$VDV = \left[\int_0^T a^4(t)dt \right]^{0.25}$$

Where VDV is the vibration dose value in $m/s^{1.75}$, a (t) is the frequency-weighted RMS of acceleration in m/s^2 and T is the total period of the day (in seconds) during which vibration may occur.

The Acceptable Vibration Dose Values (VDV) for Intermittent Vibration is reproduced in **Table 22**.

Table 22 Acceptable Vibration Dose Values (VDV) for Intermittent Vibration

Location	Daytime		Night-time	
	Preferred Value, m/s1.75	Maximum Value, m/s1.75	Preferred Value, m/s1.75	Maximum Value, m/s1.75
Critical Areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Note: Daytime is 7am to 10pm and Night-time is 10pm to 7am

Note: These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

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6 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2022) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

6.1 Assessment Scenarios

6.1.1 Operation

Operations Stage 1 – Extraction in the western pit extent to 218m AHD, processing (crushing and screening of friable sandstone using a mobile processing plant) and dispatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.

Operations Stage 2 – Extraction in the eastern pit extent to 218m AHD, processing (crushing and screening of friable sandstone using a mobile processing plant) and dispatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

6.1.2 Construction

Noise emission from road widening, dam construction, vegetation clearing & removal and bund construction have been assessed. These activities would be completed using the same equipment that is used for quarrying operations.

6.2 Sound Power Levels

Table 23 presents the Sound Power Level and quantities of equipment modelled in this assessment. It is noted that Sound Power Levels were sourced from manufacturer's specifications or from in-field measurements at similar project sites.

Table 23 Acoustically Significant Sources - Sound Power Levels dBA (re 10^{-12} Watts)

Item and number modelled per 15 minutes	Individual Sound Power Level	Modelled Sound Power Level dB LAeq(15min)	Source Height[1]
Operation			
Bulldozer (CAT D8) (x1)	108	108	1.5m
Front End Loader (x1)	109	109	1.5m
Excavator (x1)	104	104	1.5m
All Terrain Forklift/ Telehandler (x1)	108	108	1.5m
Road Truck[2] (2 movements per hour)	101	101	1.5m
Crusher (x1)	116	116	1.5m
Construction - Road			
Bulldozer (CAT D8) (x1)	108	108	1.5m
Excavator (x1)	104	104	1.5m
Construction - Dam			
Bulldozer (CAT D8) (x1)	108	108	1.5m
Excavator(x1)	104	104	1.5m
Construction - Clearing			
Bulldozer (CAT D8) (x1)	108	108	1.5m
Front End Loader (x1)	109	109	1.5m
Construction - Bunds			
Bulldozer (CAT D8) (x1)	108	108	1.5m
Excavator (x1)	104	104	1.5m

Note 1: Height above the relative ground or building below source.

Note 2: Modelled as a moving point source with adjustments for length of travelled path, velocity and number of movements in a 15-minute period.

6.3 Meteorological Analysis

Noise emissions can be influenced by prevailing weather conditions. Light stable winds (<3m/s) and temperature inversions have the potential to increase noise at a receiver.

Fact Sheet D of the NPI provides two options when considering meteorological effects:

- adopt the noise enhancing conditions for all assessment periods without an assessment of how often the conditions occur – a conservative approach that considers a source to receiver winds for all receivers and F class temperature inversions with wind speeds up to 2m/s at night; or
- determine the significance of noise enhancing conditions. This requires assessing the significance of temperature inversions (F and G Class stability categories) for the night-time period and the significance of light winds up to 3m/s for all assessment periods during stability categories other than E, F or G.

Standard meteorological conditions and noise-enhancing meteorological conditions as defined in Table D1of the NPI are reproduced in **Table 24**.

Table 24 Standard and Noise-Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard Meteorological Conditions	Day/evening/night: stability categories A–D with wind speed up to 0.5m/s at 10m AGL.
Noise Enhancing Meteorological Conditions	Daytime/evening: stability categories A–D with light winds (up to 3 m/s at 10m AGL). Night-time: stability categories A–D with light winds (up to 3m/s at 10m AGL) and/or stability category F with winds up to 2m/s at 10 m AGL.

A detailed analysis of the significance of noise enhancing conditions has not been undertaken and hence, the NPI noise enhancing meteorological conditions have been applied to the noise modelling assessment are presented in **Table 25**.

Table 25 Modelled Meteorological Parameters

Assessment Condition[1]	Temperature	Wind Speed[2]/ Direction	Relative Humidity	Stability Class[2]
Day	20°C	3m/s all directions	50%	D

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Implemented using CONCAWE meteorological corrections.

6.4 NPI Very Noise Enhancing Conditions

Fact Sheet D of the NPI also states:

> *'Noise limits derived for consents and licences will apply under the meteorological conditions used in the environmental assessment process, that is, standard or noise-enhancing meteorological conditions. For 'very noise-enhancing meteorological conditions' (see glossary[2]) a limit is set based on the limit derived under standard or noise-enhancing conditions (whichever is adopted in the assessment) plus 5dB. In this way a development is subject to noise limits under all meteorological conditions.'*

Essentially, this means a limiting criterion of PNTL +5dB is applicable for meteorological conditions outside that adopted in the assessment. In the context of the project, this means that the operation would need to comply with PNTL +5dB for any prevailing wind or temperature inversion conditions.

[2] Meteorological conditions outside of the range of either standard or noise-enhancing meteorological conditions as adopted in the noise impact assessment following the procedures in Fact Sheet D.

7 Noise Assessment Results

This assessment has quantified operational noise levels at the nearest representative receivers.

7.1 Operational Noise Assessment

Noise predictions from both extraction scenarios have been quantified at surrounding residential receivers and are presented in **Table 26** and as noise contours in **Figure 4** and **Figure 5.** Predicted noise levels satisfy the PNTLs at all identified receiver locations for both operational scenarios.

Table 26 Noise Predictions – Noise Enhancing Conditions[1]

Location	Predicted Noise Level dB LAeq(15min) Daytime		Daytime PNTL dB LAeq(15min)	Compliant
	Stage 1	Stage 2		
R01	<35	<35	42	✓
R02	<35	<35	42	✓
R03	<35	<35	42	✓
R04	<35	<35	42	✓
R05	<35	<35	42	✓
R06	<35	<35	42	✓
R07	<35	<35	42	✓
R08	<35	<35	40	✓
R09	<35	<35	40	✓
R10	<35	<35	42	✓
R11	<35	35	40	✓
R12	<35	<35	42	✓
R13	<35	<35	42	✓
R14	<35	<35	42	✓
R15	<35	<35	40	✓
R16	<35	<35	40	✓
R17	<35	<35	42	✓
R18	<35	<35	40	✓
R19	<35	<35	42	✓
R20	<35	<35	42	✓
R21	<35	<35	42	✓
R22	<35	<35	42	✓
R23	<35	<35	42	✓
R24	<35	<35	40	✓
R25	<35	<35	42	✓
R26	<35	<35	40	✓

Table 26 Noise Predictions – Noise Enhancing Conditions[1]				
Location	Predicted Noise Level dB LAeq(15min) Daytime		Daytime PNTL dB LAeq(15min)	Compliant
	Stage 1	Stage 2		
R27	<35	<35	42	✓
R28	<35	<35	42	✓
R29	<35	<35	40	✓
R30	<35	<35	40	✓
R31	<35	<35	42	✓
R32	<35	35	42	✓
R33	35	36	42	✓
R34	36	37	42	✓
R35	36	36	42	✓
R36	36	36	42	✓
R37	37	38	40	✓
R38	<35	35	42	✓
R39	36	37	40	✓
R40	35	35	42	✓
R41	<35	<35	42	✓
R42	<35	<35	42	✓
R43	<35	<35	42	✓
R44	<35	<35	42	✓
R45	<35	<35	42	✓
R46	<35	<35	42	✓
R47	37	37	42	✓
PR1	42	44	48	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Furthermore, emissions from the project satisfy the PNTL +5dB limit for very noise-enhancing meteorological conditions.

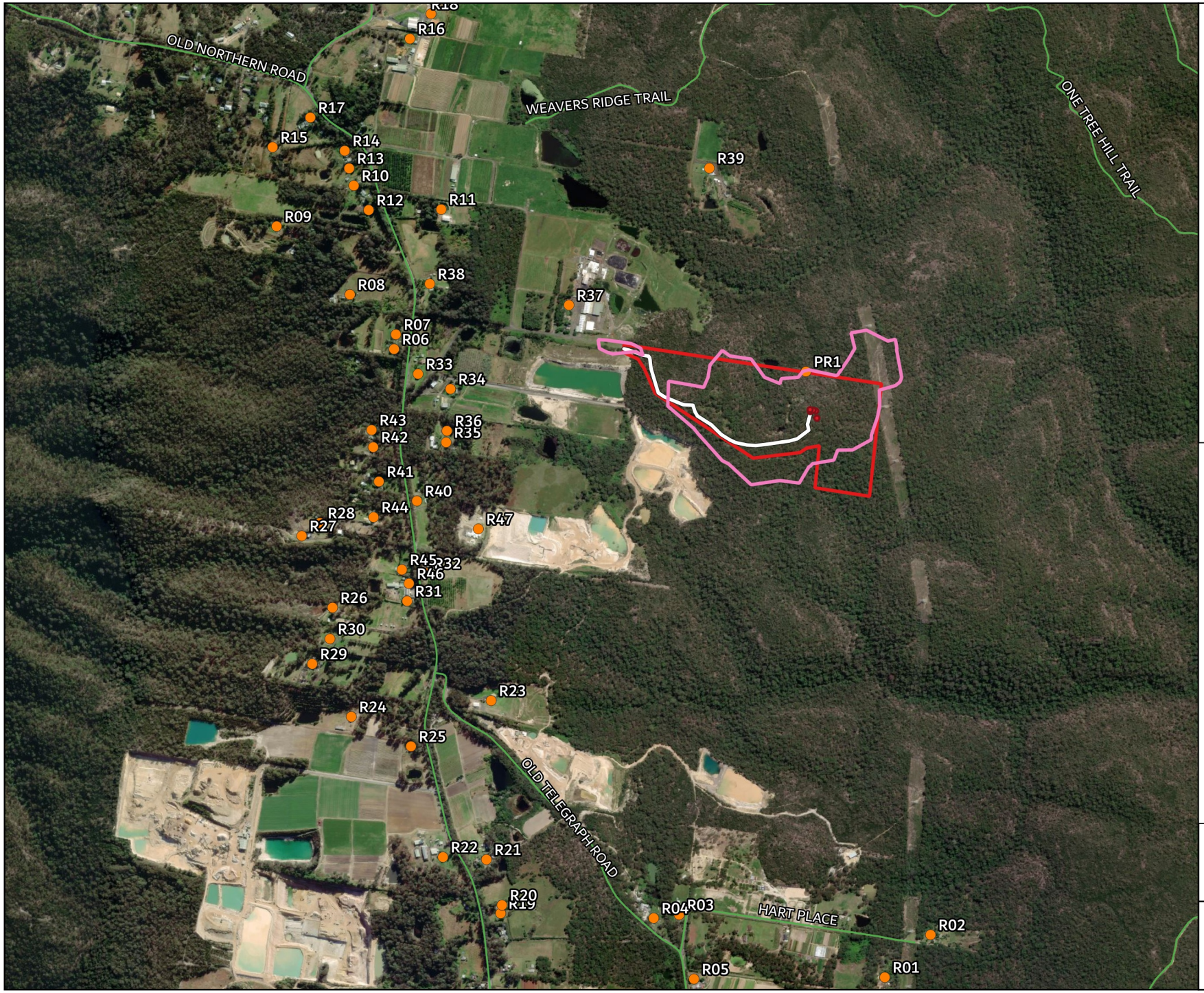


FIGURE 4

Predicted Noise Levels

Stage 1 Operations - Noise Enhancing Conditions

MAC221612

Maroota Central Quarry

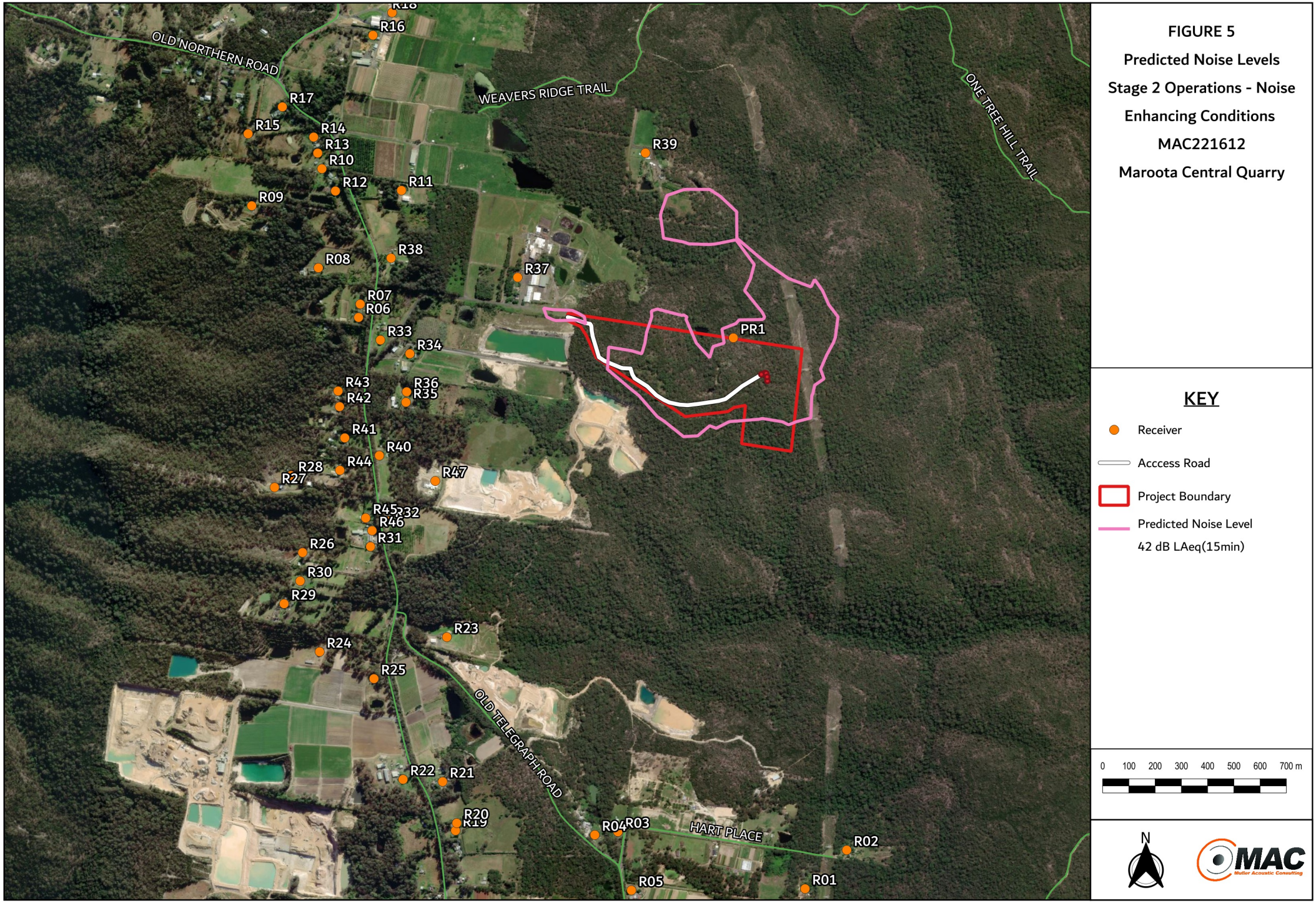
KEY

- Receiver
- Access Road
- Project Boundary
- Predicted Noise Level 42dB LAeq(15min)

0 100 200 300 400 500 600 700 m

N

MAC
Muller Acoustic Consulting


OLD NORTHERN ROAD
WEAVERS RIDGE TRAIL
ONE TREE HILL TRAIL
OLD TELEGRAPH ROAD
HART PLACE
R18
R16
R17
R15
R14
R13
R10
R12
R11
R09
R39
R38
R08
R37
R07
R06
PR1
R33
R34
R43
R42
R36
R35
R41
R40
R28
R44
R27
R47
R45
R32
R46
R31
R26
R30
R29
R23
R24
R25
R22
R21
R20
R19
R04
R03
R02
R05
R01
FIGURE 5
Predicted Noise Levels
Stage 2 Operations - Noise Enhancing Conditions
MAC221612
Maroota Central Quarry
KEY
Receiver
Acccess Road
Project Boundary
Predicted Noise Level
42 dB LAeq(15min)
0 100 200 300 400 500 600 700 m
N
MAC
Muller Acoustic Consulting

7.2 Construction Noise Assessment

Noise predictions from all construction scenarios have been quantified at surrounding residential receivers to the project site and are presented in **Table 27**. Predicted noise level satisfy the NMLs at all identified receiver locations.

Table 27 Noise Predictions – All Receivers

Location	Predicted Noise Level dB LAeq(15min)				NML dB LAeq(15min)	Compliant
	Road	Dam	Clearing	Bund		
R01	<35	<35	<35	<35	42	✓
R02	<35	<35	<35	<35	42	✓
R03	<35	<35	<35	<35	42	✓
R04	<35	<35	<35	<35	42	✓
R05	<35	<35	<35	<35	42	✓
R06	<35	<35	<35	<35	42	✓
R07	<35	<35	<35	<35	42	✓
R08	<35	<35	<35	<35	40	✓
R09	<35	<35	<35	<35	40	✓
R10	<35	<35	<35	<35	42	✓
R11	<35	<35	<35	<35	40	✓
R12	<35	<35	<35	<35	42	✓
R13	<35	<35	<35	<35	42	✓
R14	<35	<35	<35	<35	42	✓
R15	<35	<35	<35	<35	40	✓
R16	<35	<35	<35	<35	40	✓
R17	<35	<35	<35	<35	42	✓
R18	<35	<35	<35	<35	40	✓
R19	<35	<35	<35	<35	42	✓
R20	<35	<35	<35	<35	42	✓
R21	<35	<35	<35	<35	42	✓
R22	<35	<35	<35	<35	42	✓
R23	<35	<35	<35	<35	42	✓
R24	<35	<35	<35	<35	40	✓
R25	<35	<35	<35	<35	42	✓
R26	<35	<35	<35	<35	40	✓
R27	<35	<35	<35	<35	42	✓
R28	<35	<35	<35	<35	42	✓
R29	<35	<35	<35	<35	40	✓
R30	<35	<35	<35	<35	40	✓

Table 27 Noise Predictions – All Receivers						
Location	Predicted Noise Level dB LAeq(15min)				NML dB LAeq(15min)	Compliant
	Road	Dam	Clearing	Bund		
R31	<35	<35	<35	<35	42	✓
R32	<35	<35	<35	<35	42	✓
R33	<35	<35	<35	<35	42	✓
R34	<35	<35	<35	<35	42	✓
R35	<35	<35	<35	<35	42	✓
R36	<35	<35	<35	<35	42	✓
R37	43	<35	<35	<35	40	✓
R38	<35	<35	<35	<35	42	✓
R39	<35	<35	<35	<35	40	✓
R40	<35	<35	<35	<35	42	✓
R41	<35	<35	<35	<35	42	✓
R42	<35	<35	<35	<35	42	✓
R43	<35	<35	<35	<35	42	✓
R44	<35	<35	<35	<35	42	✓
R45	<35	<35	<35	<35	42	✓
R46	<35	<35	<35	<35	42	✓
R47	<35	<35	<35	<35	42	✓
PR1	<35	36	40	45	48	✓

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7.3 VLAMP Assessment

A review of noise contours (**Figure 4**) demonstrates that predicted project noise levels do not exceed the VLAMP criteria (40dB $LA_{eq(15min)}$ daytime) at any receiver location. Additionally, predicted project noise levels do not exceed the VLAMP criteria (50dB LAeq(period) daytime) on any privately owned vacant lands where there is an existing dwelling or where a dwelling could be built under existing planning controls. Hence, mitigation and/or acquisition rights are not applicable.

7.4 Road Traffic Noise Assessment

The main offsite haul route for the transportation of sales product is via Old Northern Road and/or Wisemans Ferry Road. The proposed worst-case transportation schedule would result in approximately 10 loads (average 38t) per day, resulting in 20 movements per day, or 2 movements per hour (7am to 6pm). The nearest residential dwelling on the Unnamed Road, Old Northern Road or Wisemans Ferry Road is approximately 15m from the road centre.

Predicted road traffic noise levels from the project are presented in **Table 28.** Calculations were completed to represent typical traffic flows from the project at an offset distance of 15m for receivers adjacent to the Unnamed Road, Old Northern Road or Wisemans Ferry Road using the Traffic Noise Model (TNM) by the United States Department of Transport, Federal Highway Administration Low Volume Calculation Tool.

Table 28 Operational Road Traffic Noise Levels

Offset from Road	Road Classification	Period	Speed, km/h	Assessment Criteria	Calculated Project Traffic Noise	Comply
15m	Arterial/ Sub Arterial/ Principal Haulage Route	Day	80	60dB LAeq(15hr)	50.1 dB LAeq(15hr)	Yes

7.5 Vibration Assessment

7.5.1 Construction and Vibration

A qualitative assessment of potential vibration impacts has been completed. Due to the nature of the works proposed and distances to potential vibration sensitive receivers, vibration impacts from the project would be negligible.

The Construction Noise & Vibration Strategy (CNVS) (V4.1 Transport for NSW, 2019) sets out safe working distances to achieve the human response criteria for vibration (refer **Table 29**). The key vibration generating source proposed to be used is a vibratory roller used for road construction. For a large vibratory roller, the Construction Noise Strategy sets a safe working distance of 100m to achieve the residential human response criteria for continuous vibration. Therefore, as the nearest receivers to the project are greater than 100m, human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural or cosmetic criteria for sensitive receivers will be achieved. Therefore, vibration impacts are not considered to be a significant issue and have not been considered further in this assessment.

7.5.2 Operational and Vibration

The major potential sources during operation of vibration would be ripping of the harder layers with a bulldozer. Generally, peak levels of vibration from ripping typically occurs as the dozer takes off to commence the ripping process.

Table 29 provides the minimum working distances from the CNVS for the use of various vibration intensive sources to nearby receivers to meet cosmetic damage and human response criteria. The minimum offset distance to the nearest residential receivers is approximately 600m. Hence, as the offset distance is greater than the minimum offset distance for even the largest item of plant, vibration impacts are not expected at any assessed receivers.

Table 29 Minimum Working Distances or Vibratory Plant (m)

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

Note: Source, CNVG (Roads and Maritime, 2016)

8 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment to quantify emissions from the proposed Maroota Central Civil Quarry located at 4773 Old Northern Road, Maroota, NSW.

The Noise Assessment has quantified potential noise emissions from the operation including the extraction, crushing, and dispatch of up to 30,000 tonnes per annum of sandstone products, the importation of VENM materials; and the construction activities including widening of the access road, clearing of vegetation, development of water storage facilities and earthen safety bunds.

The results of the Noise Assessment demonstrate that noise emissions from the operation would satisfy the relevant PNTLs at all assessed receivers for the proposed daytime operating hours required by the Noise Policy for Industry (NPI), 2017.

Modelled noise emissions from construction activities identify that predicted noise emissions are expected to satisfy the applicable construction management levels at all assessed receivers as required by the NSW Interim Construction Noise Guideline (ICNG), July 2009.

Road traffic noise emissions associated with the transportation of sandstone products and the importation of VENM materials are expected to satisfy the road traffic noise criteria are provided in the Road Noise Policy (RNP), 2011.

In summary, the Noise Assessment supports the Development Application and Environmental Impact Statement.

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Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

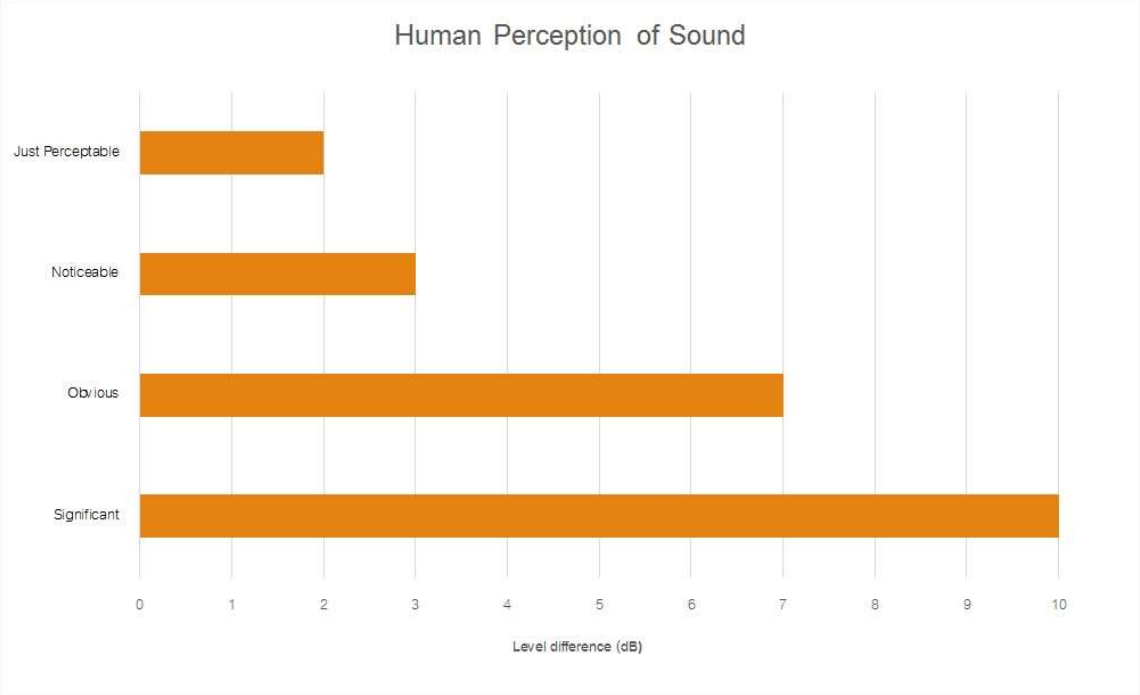
Table A1 Glossary of Acoustical Terms

Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmax	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by 10.log10 (W/Wo). Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound

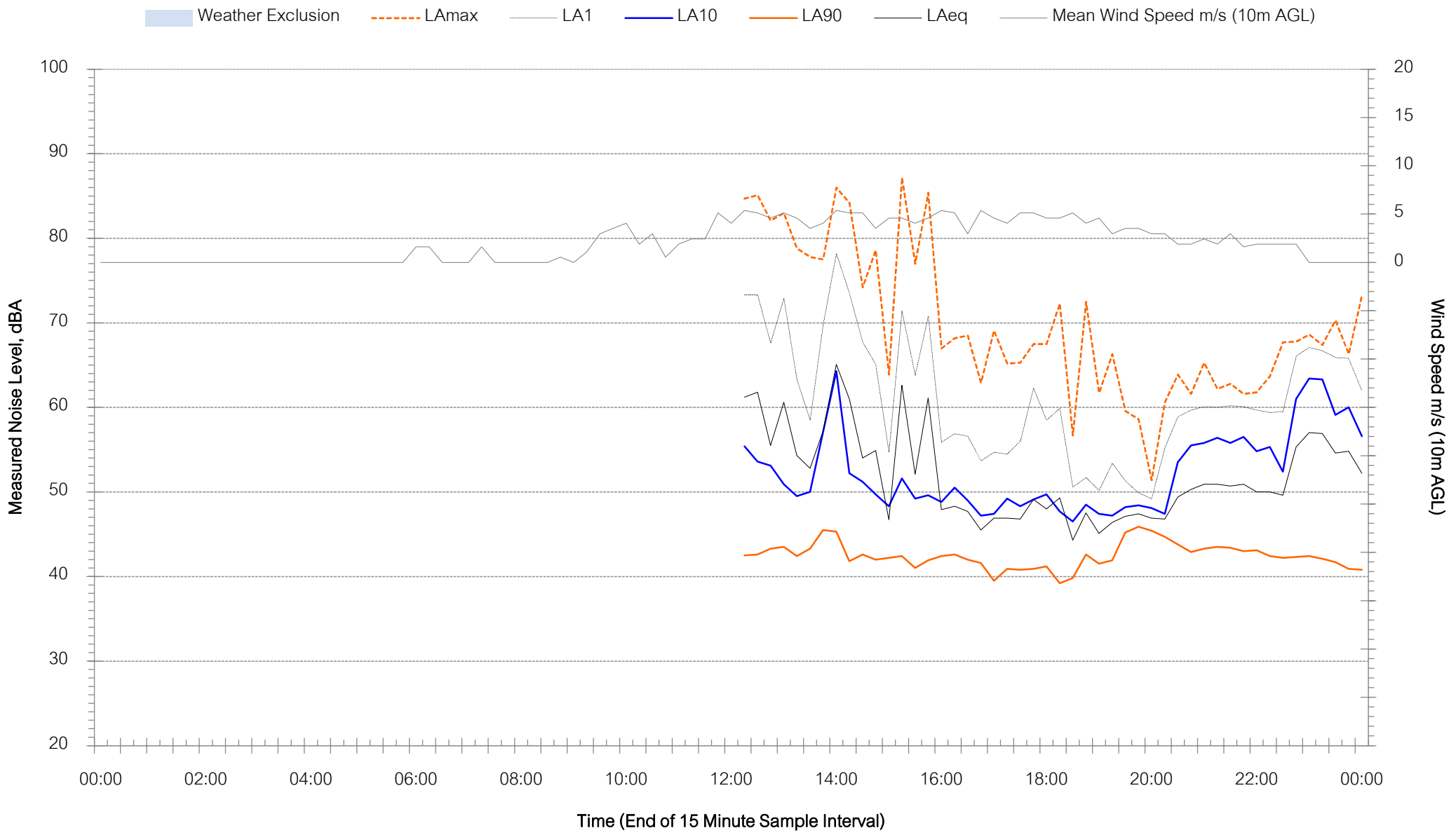


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Appendix B – Noise Monitoring Charts

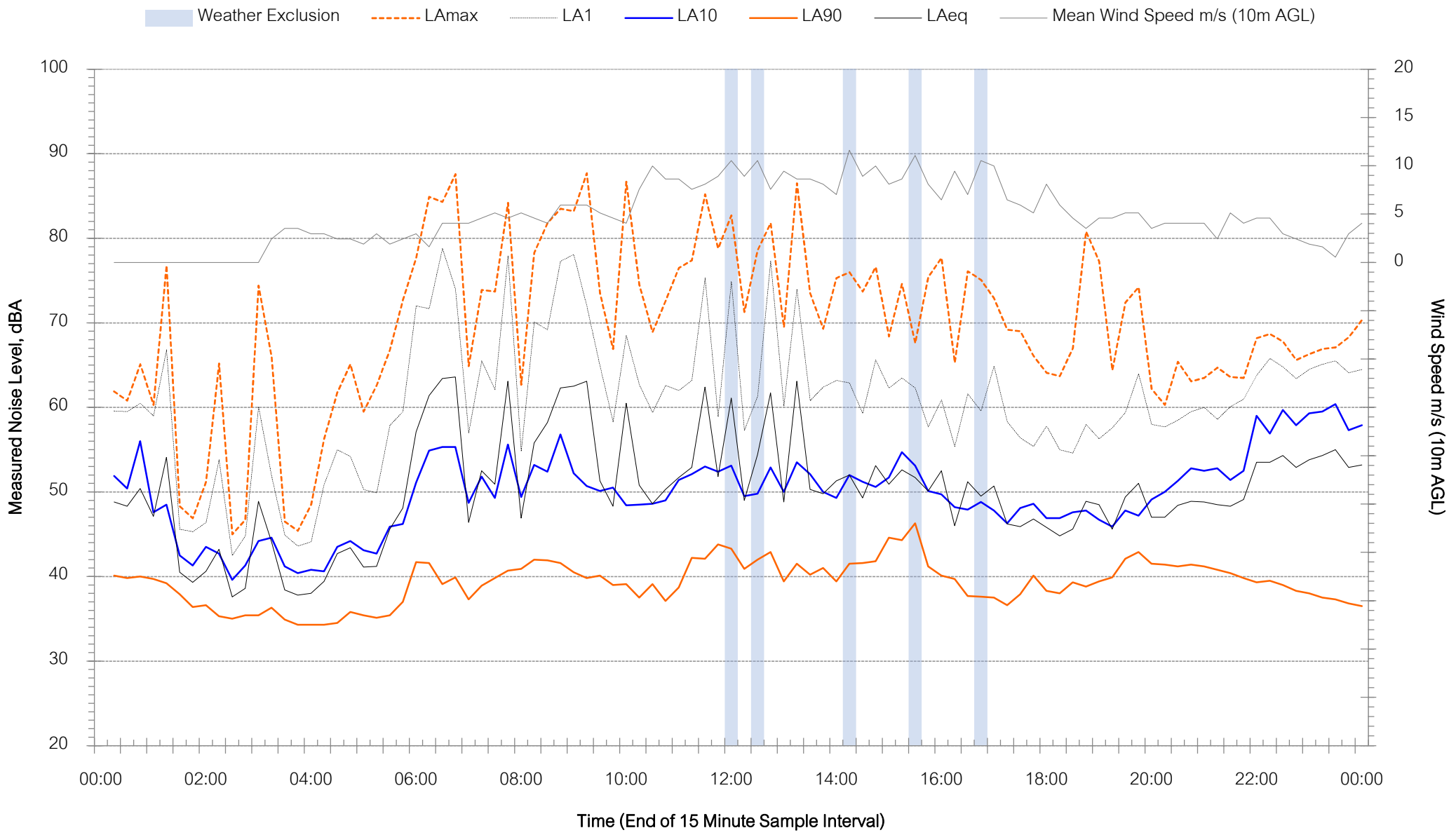
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Thursday 13 October 2022



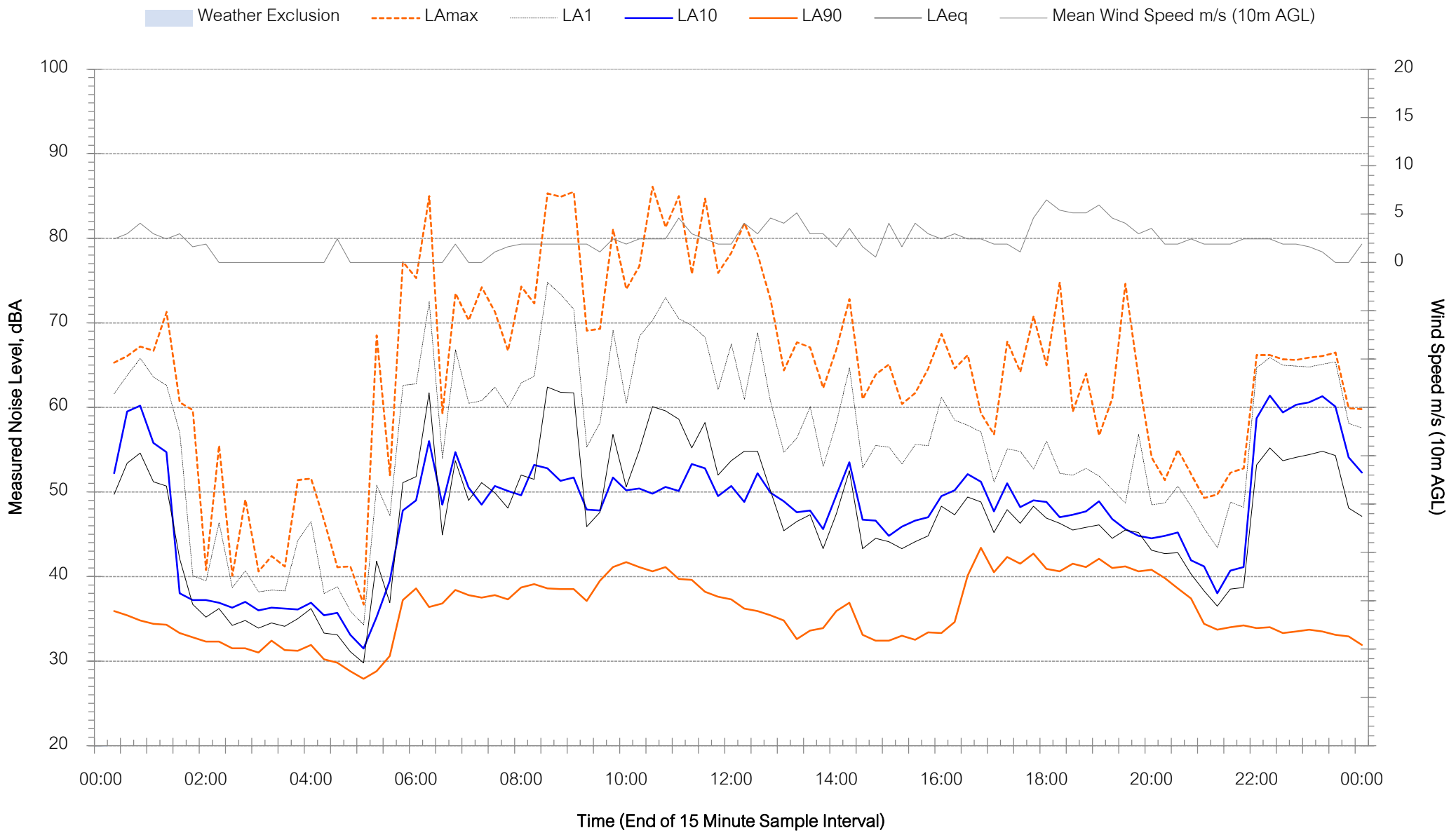
Background Noise Levels

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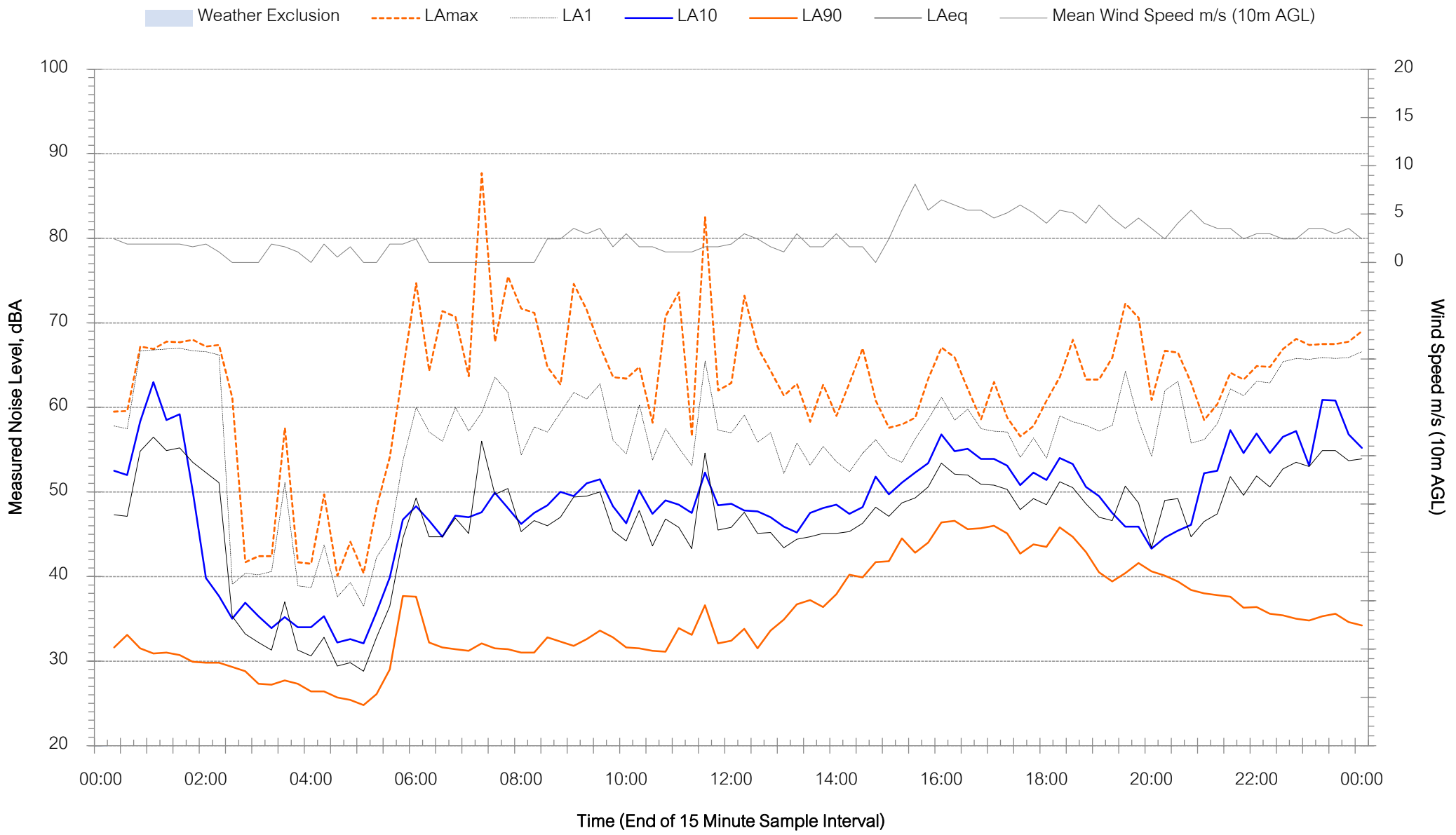
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Saturday 15 October 2022



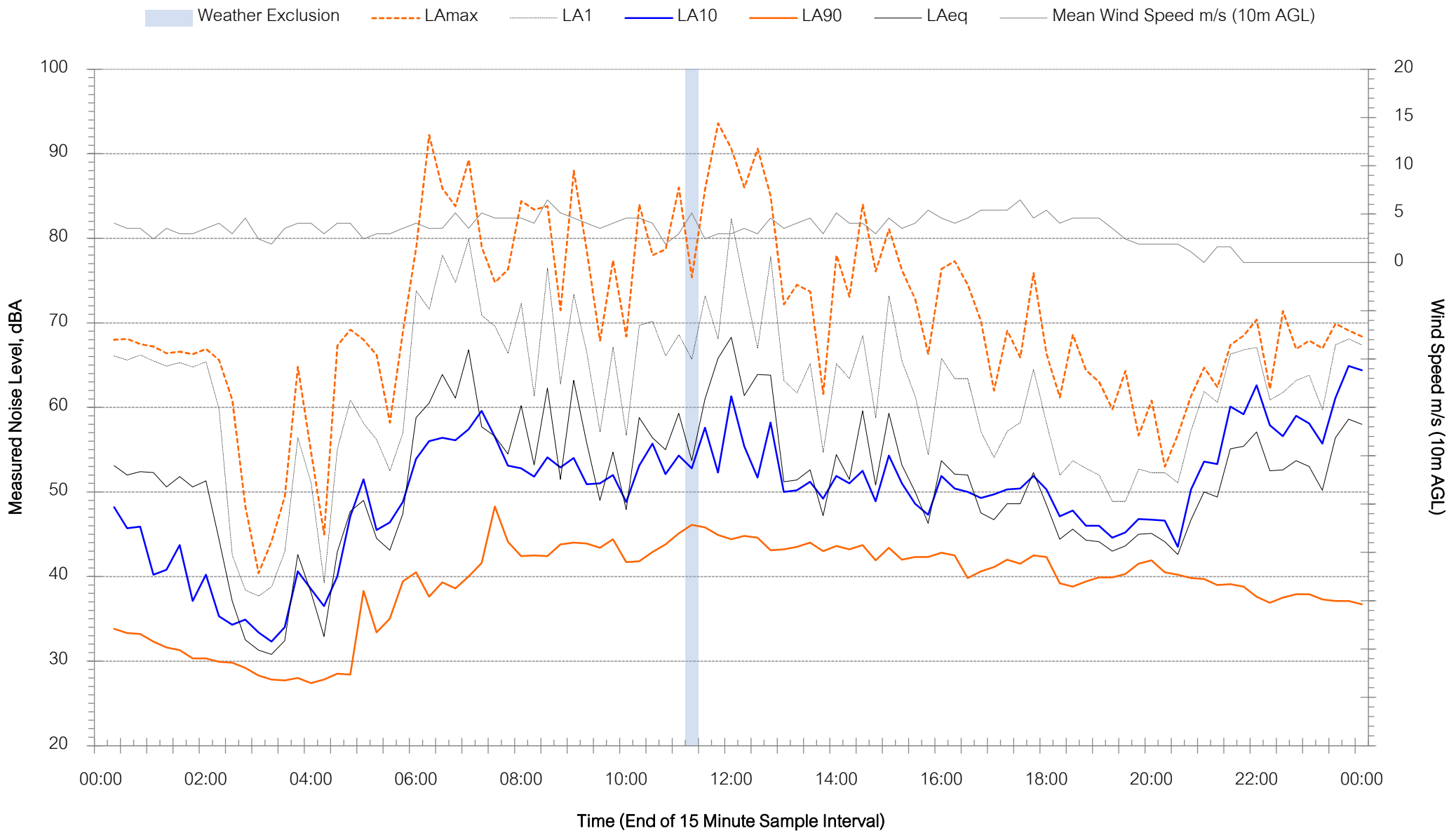
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Sunday 16 October 2022



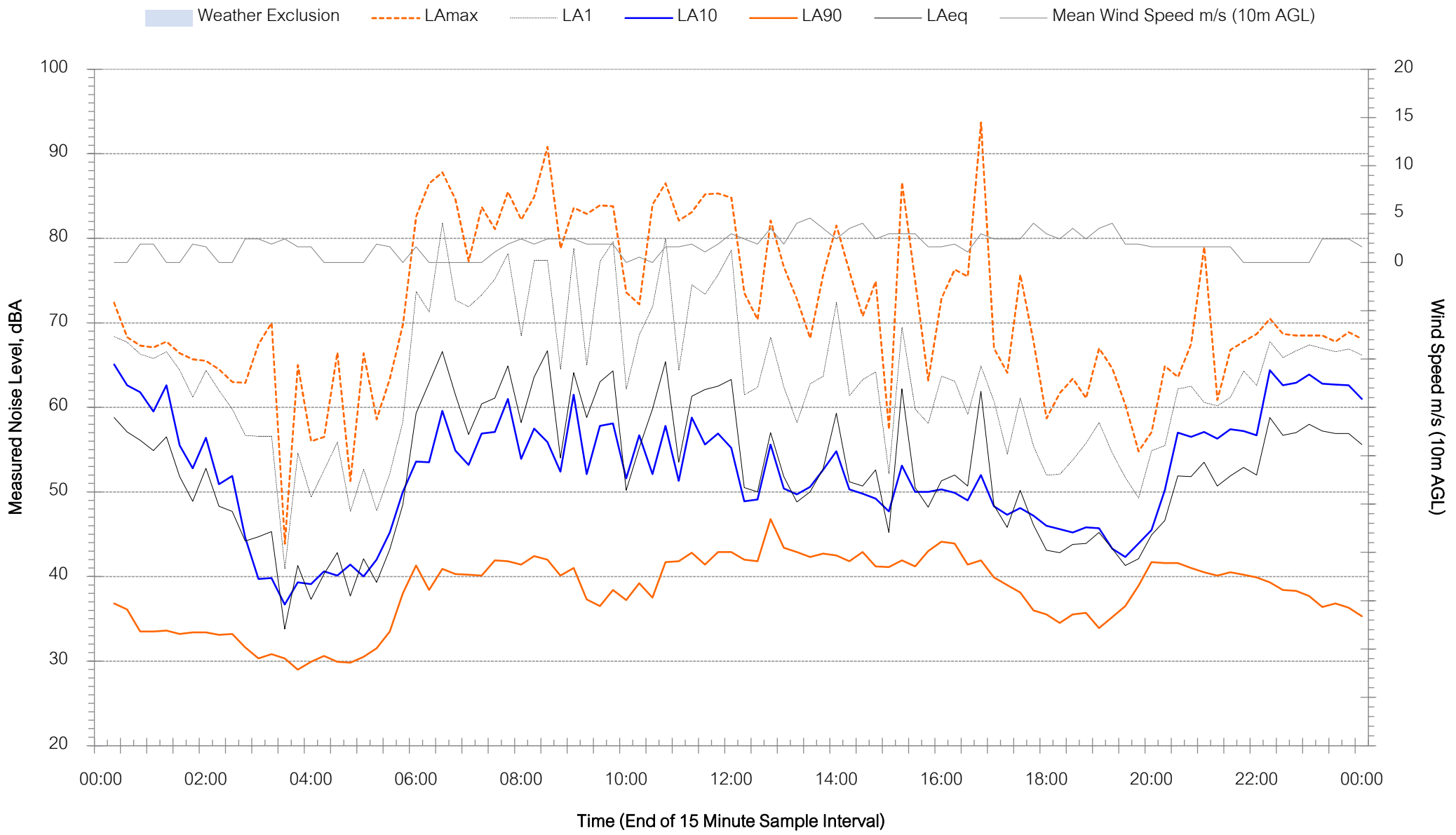
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Monday 17 October 2022



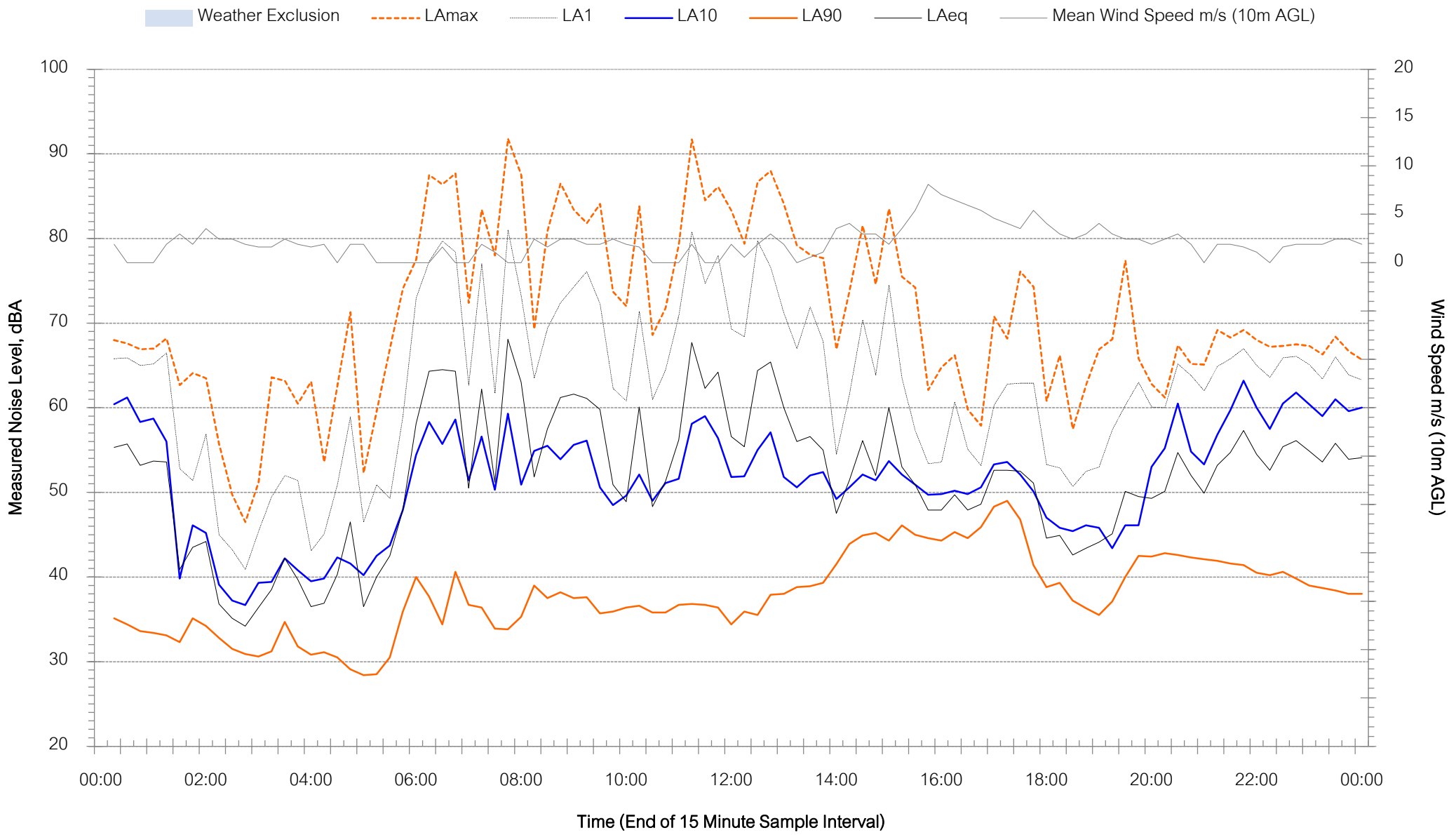
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Tuesday 18 October 2022



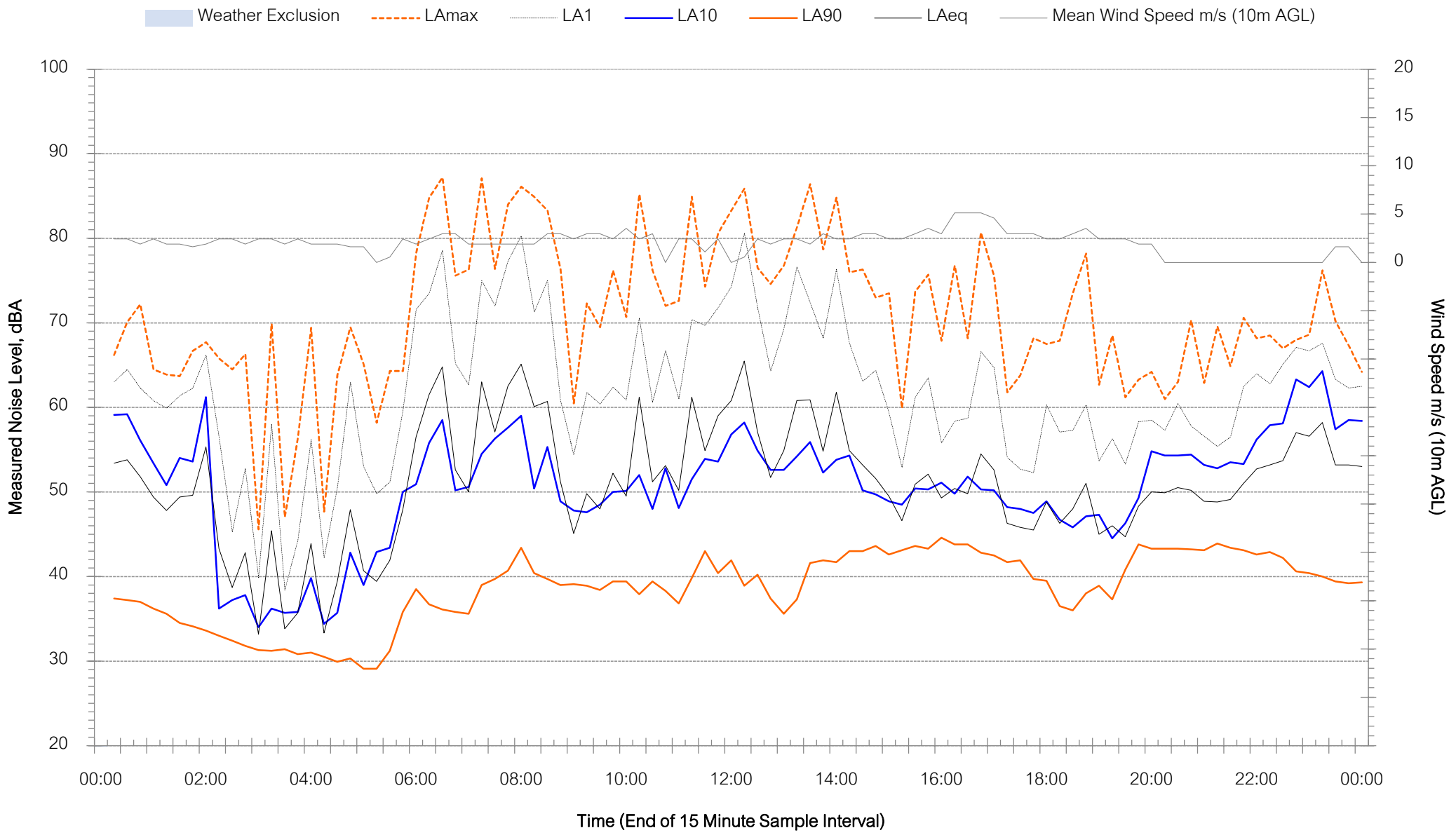
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Wednesday 19 October 2022



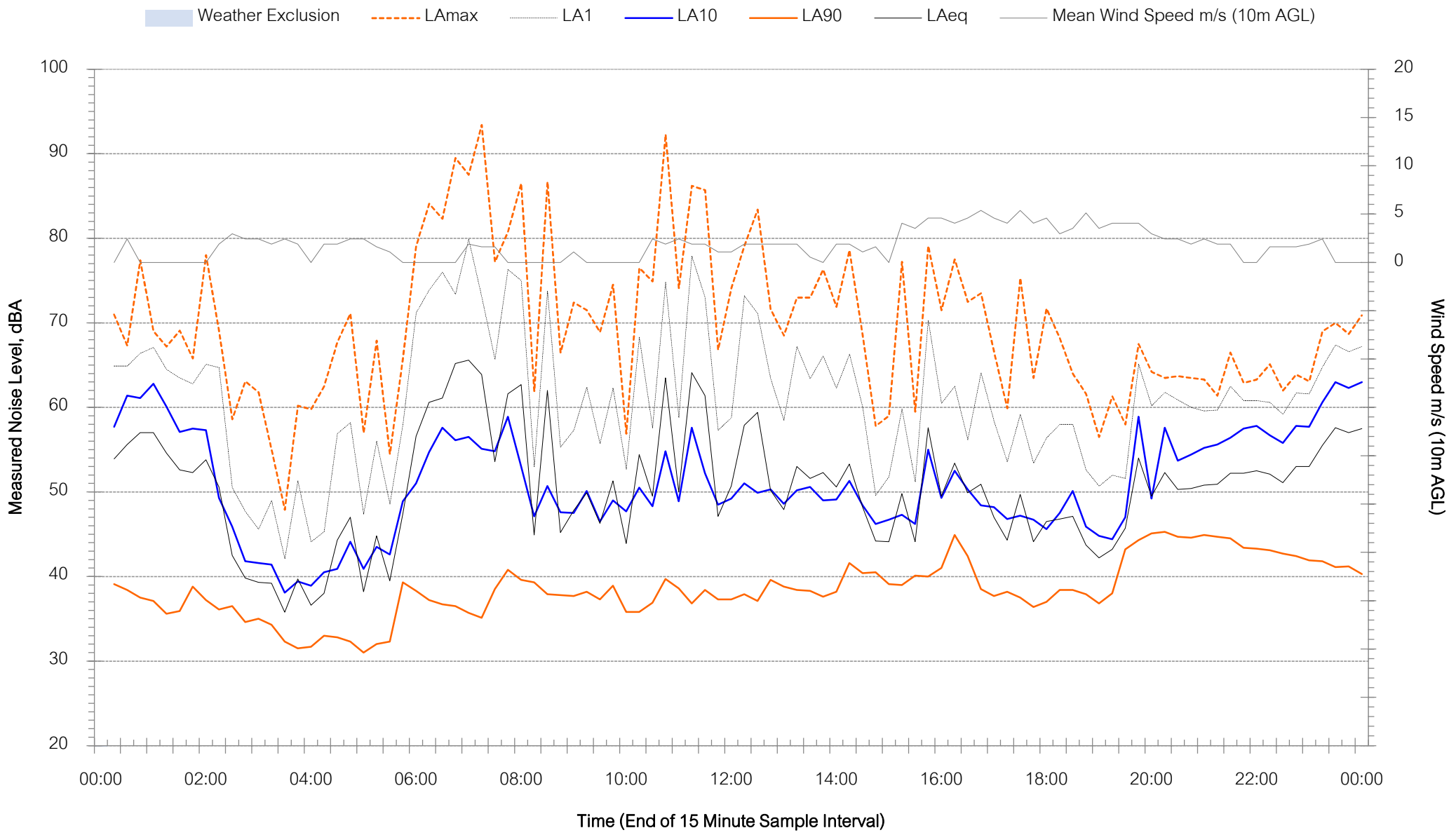
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Thursday 20 October 2022



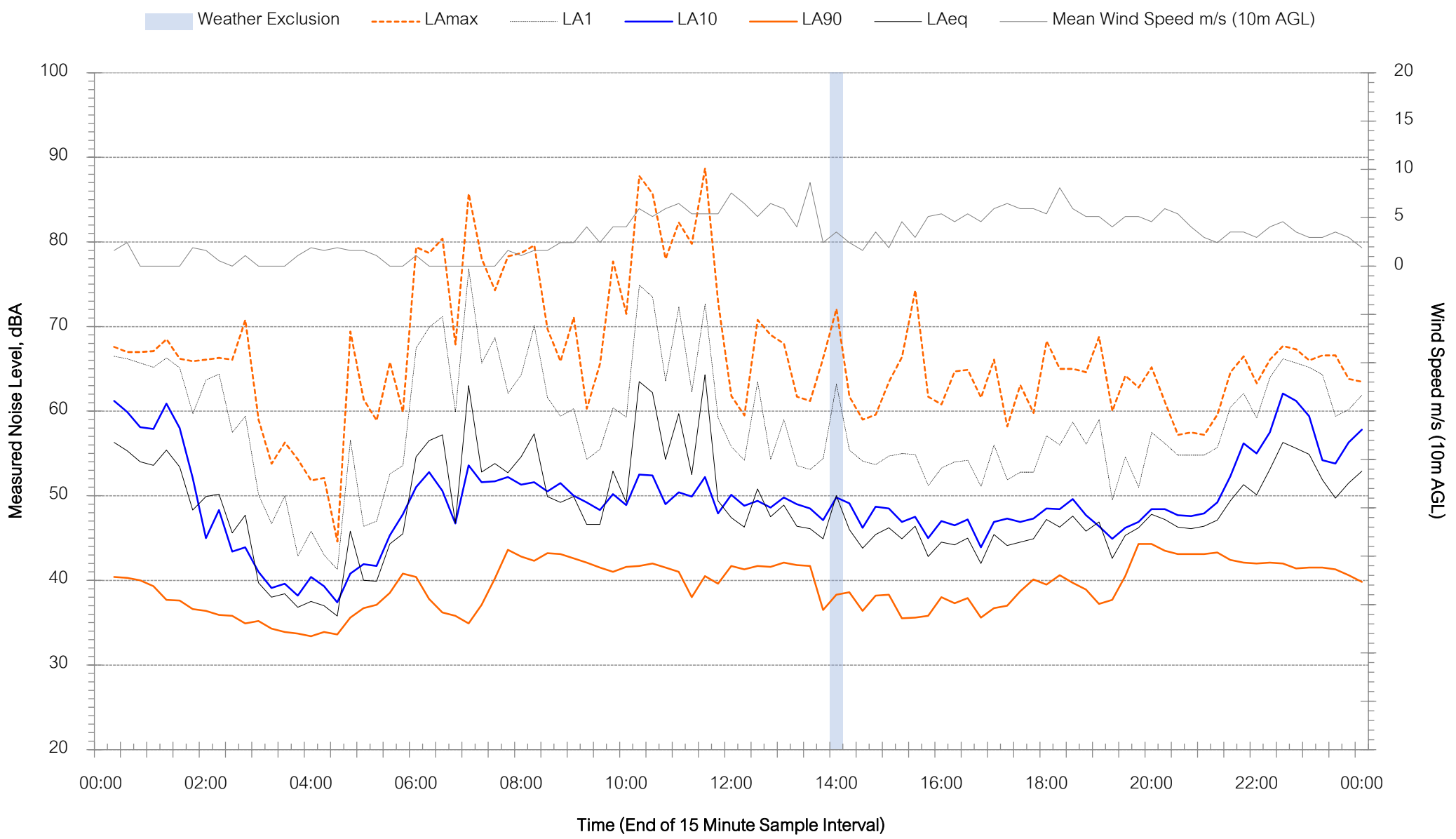
Background Noise Levels

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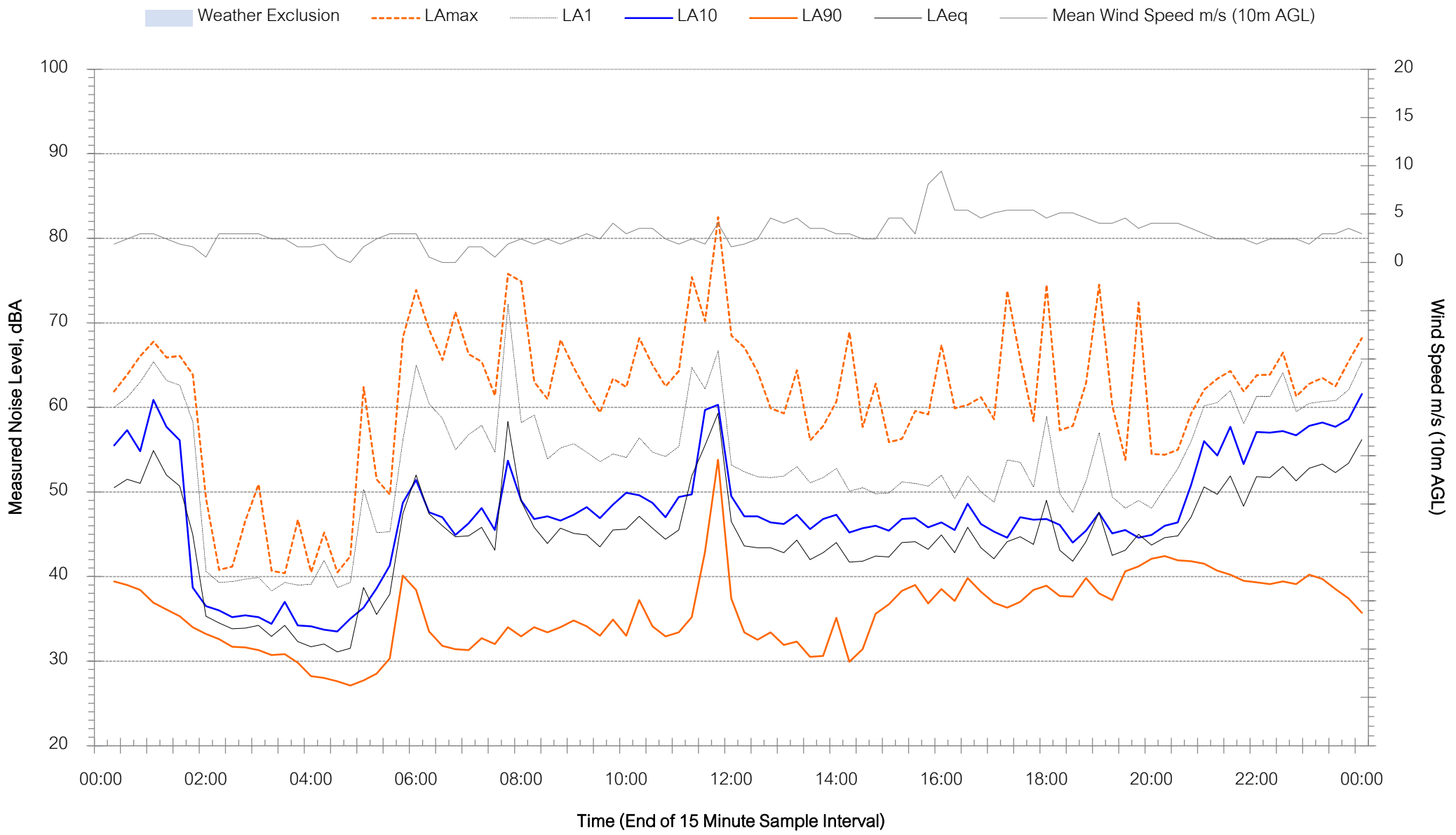
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Saturday 22 October 2022



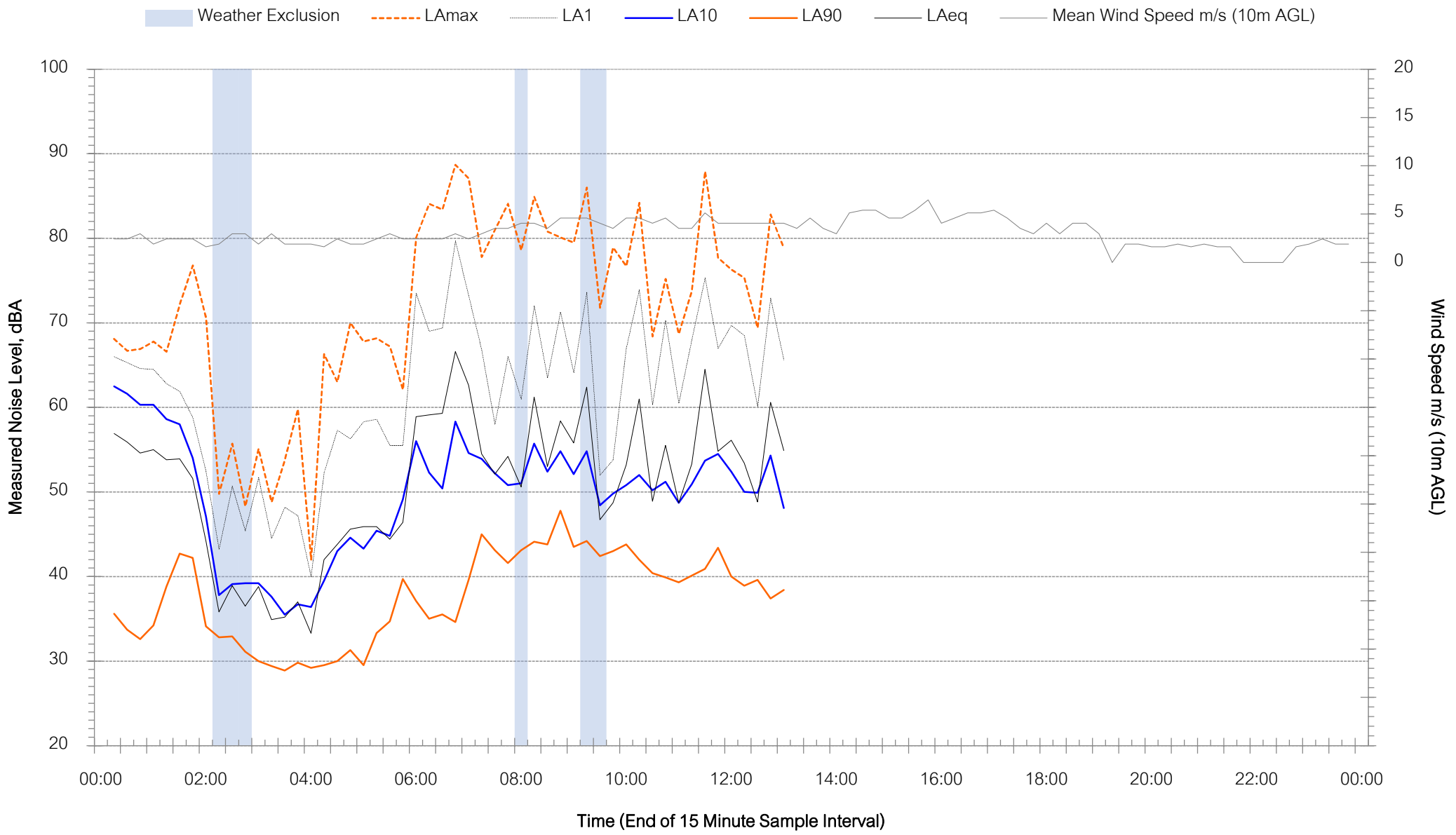
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L1 - Western Boundry, 4765 Old Northern Road, Maroota - Sunday 23 October 2022



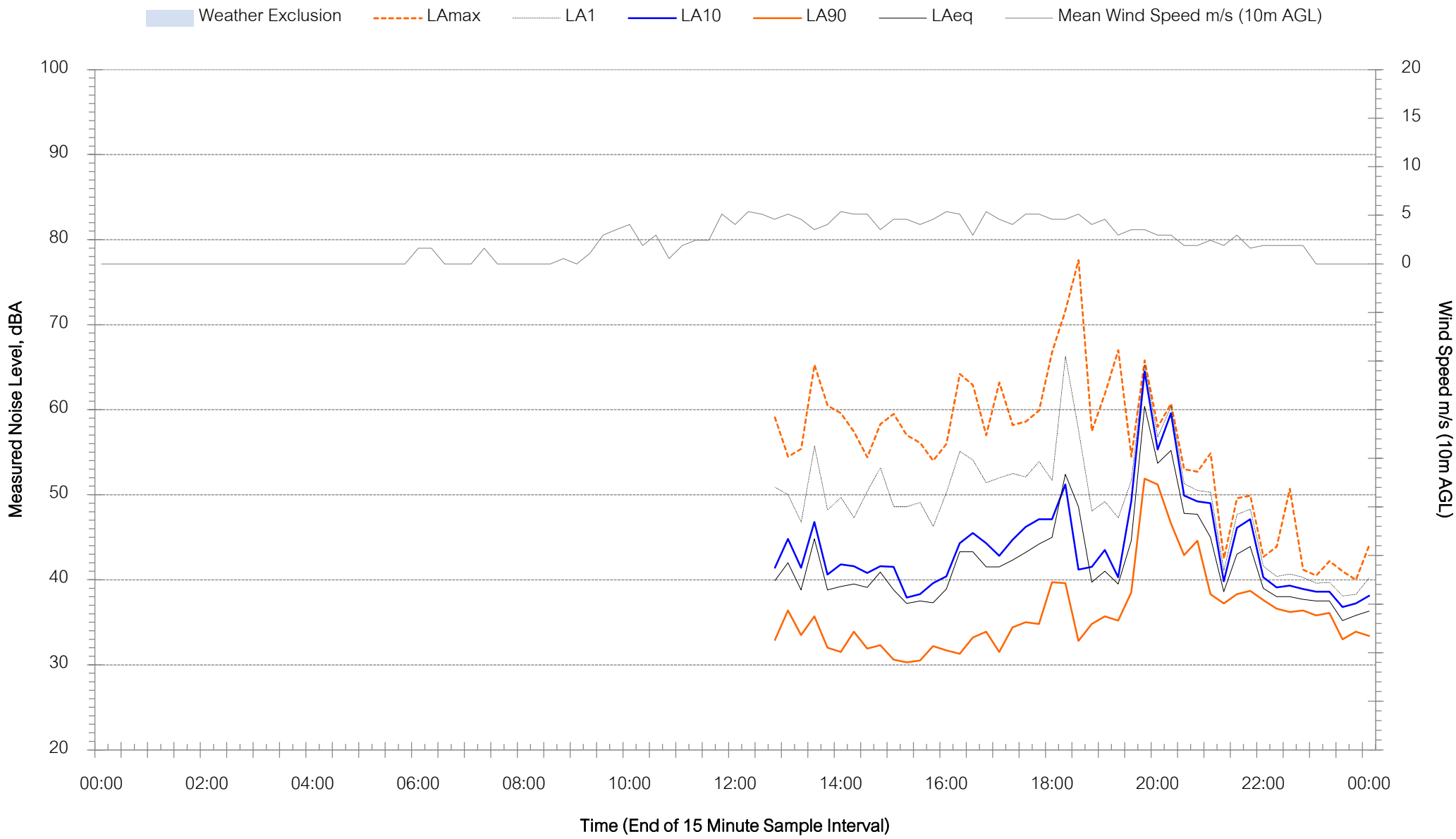
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Monday 24 October 2022



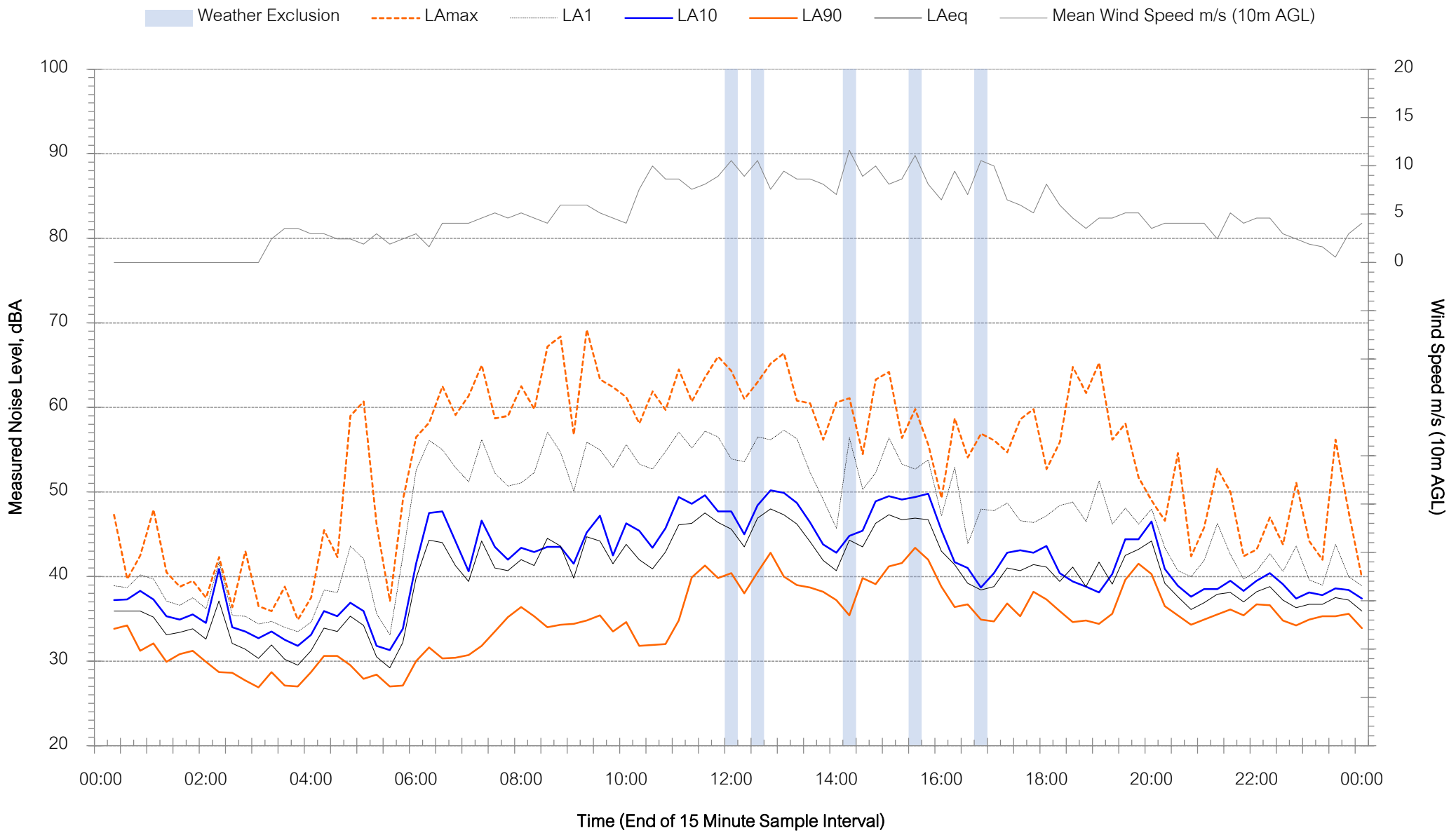
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Thursday 13 October 2022



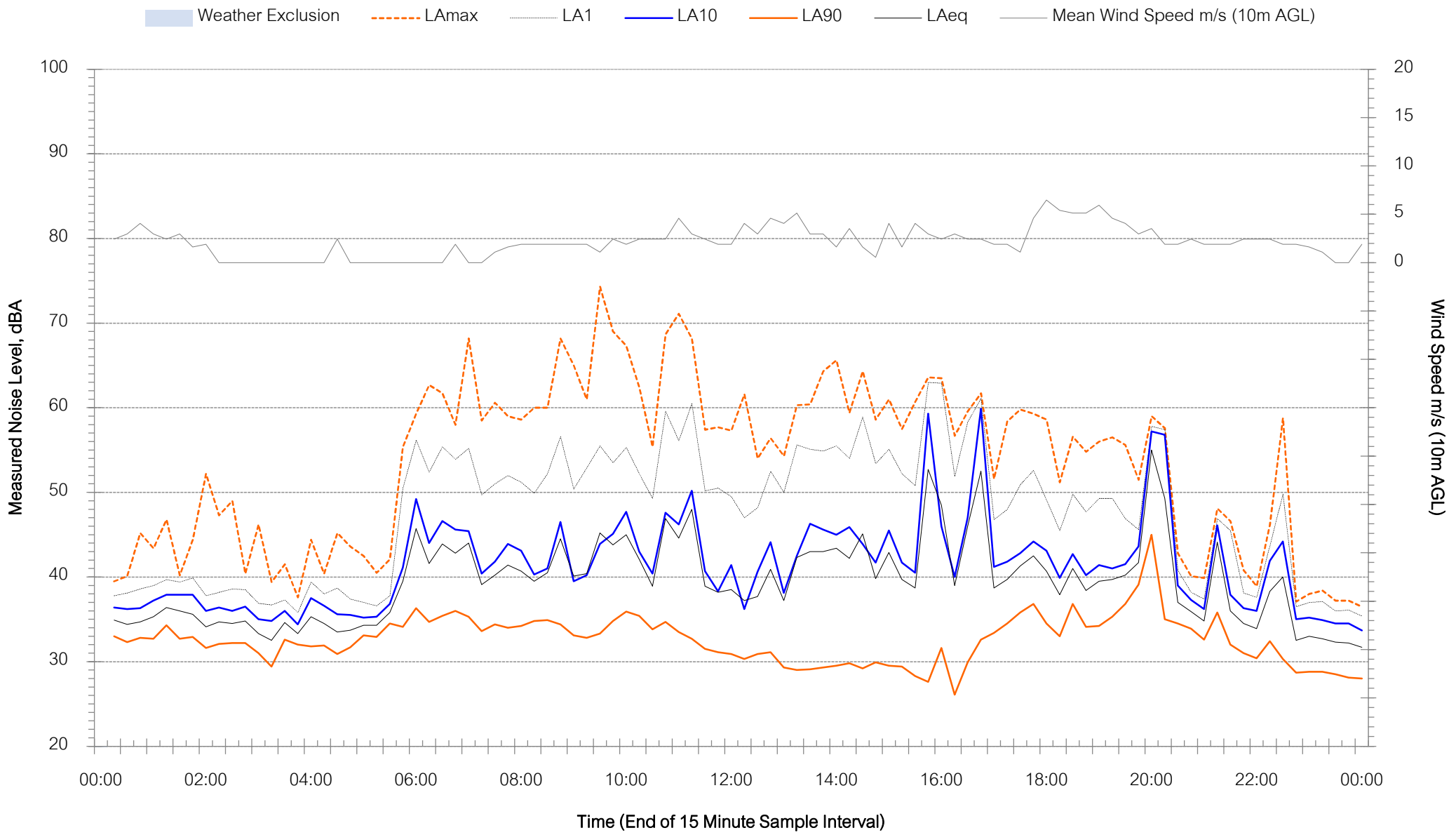
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Friday 14 October 2022



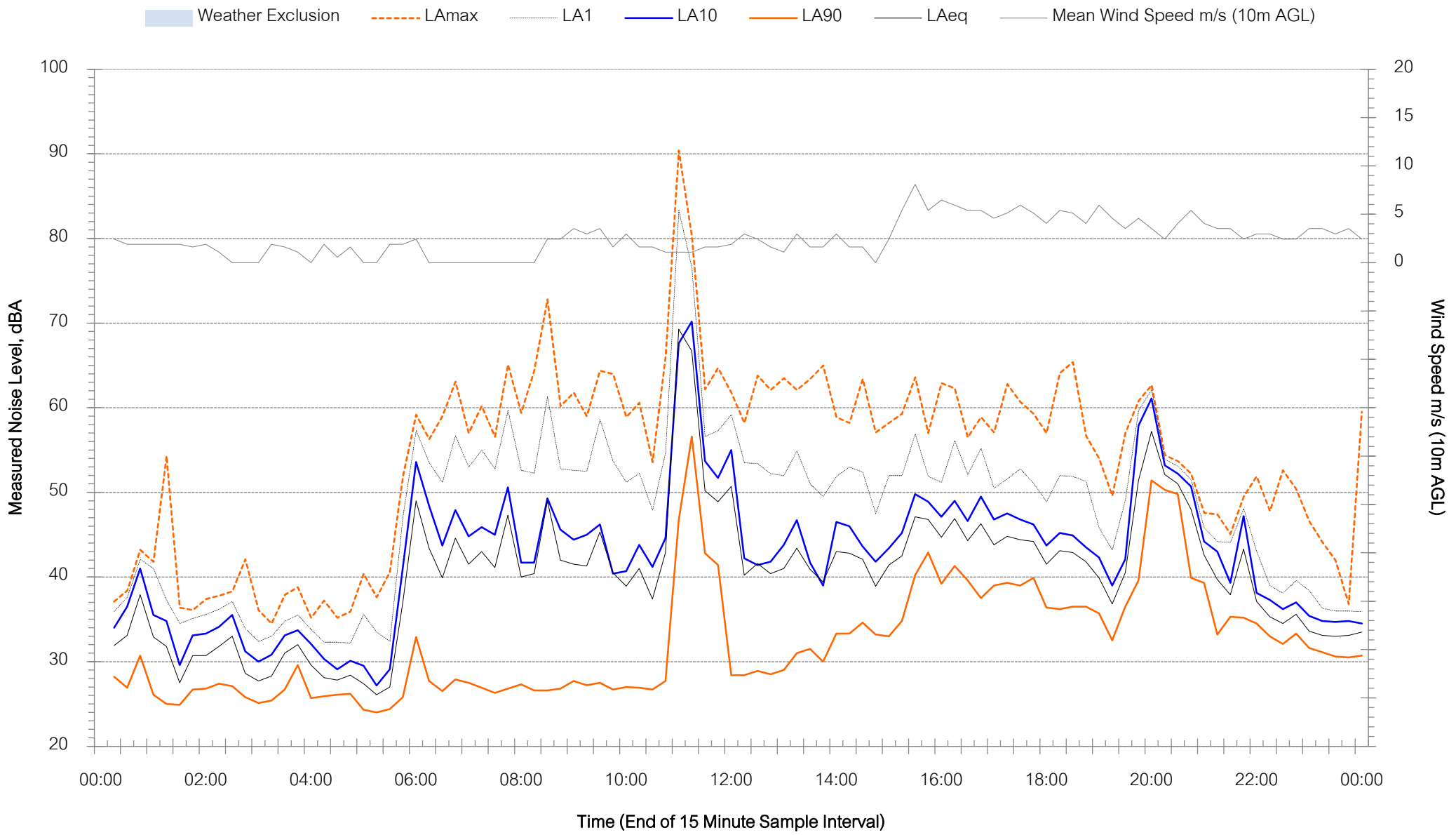
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Saturday 15 October 2022



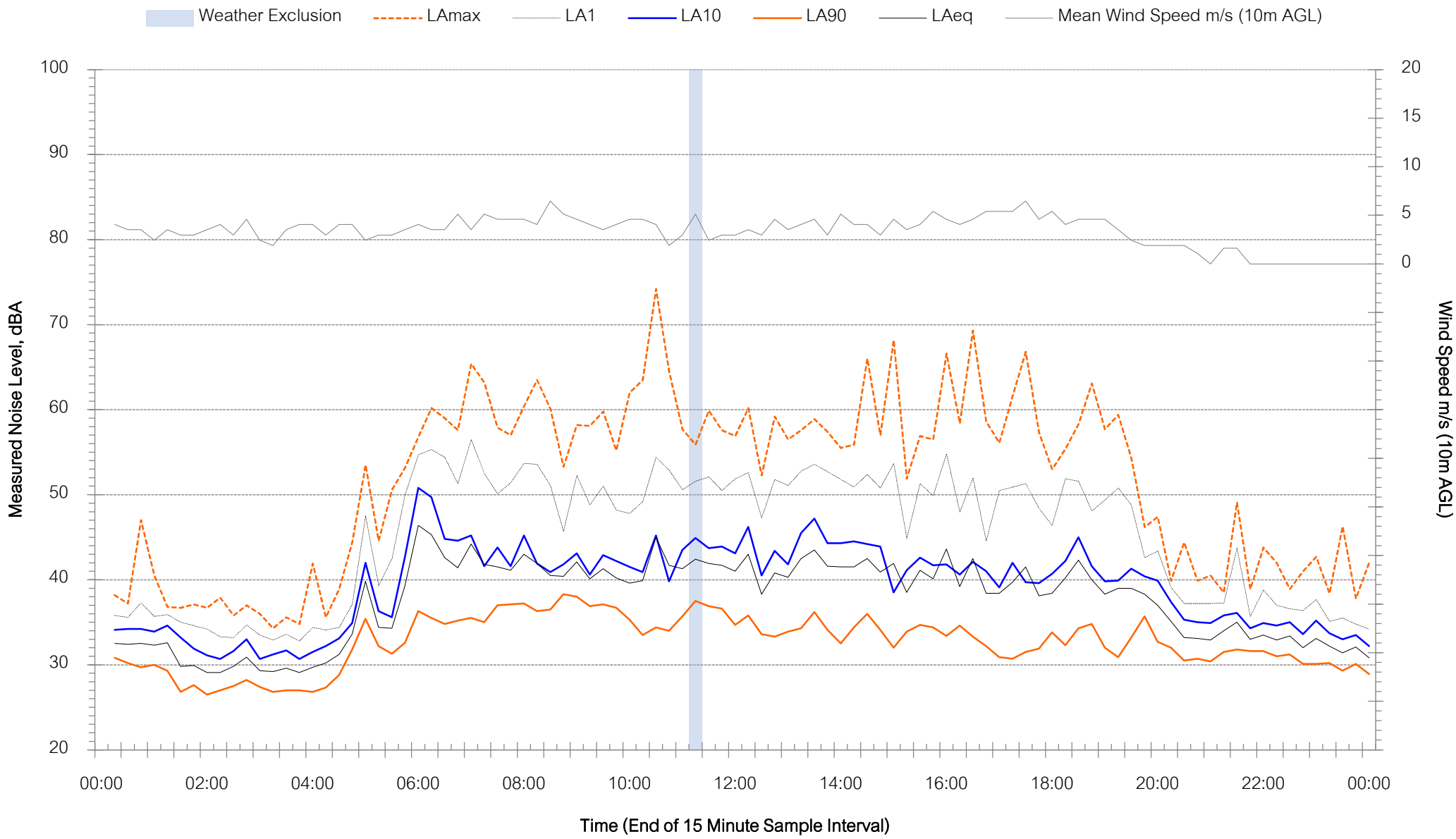
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Sunday 16 October 2022



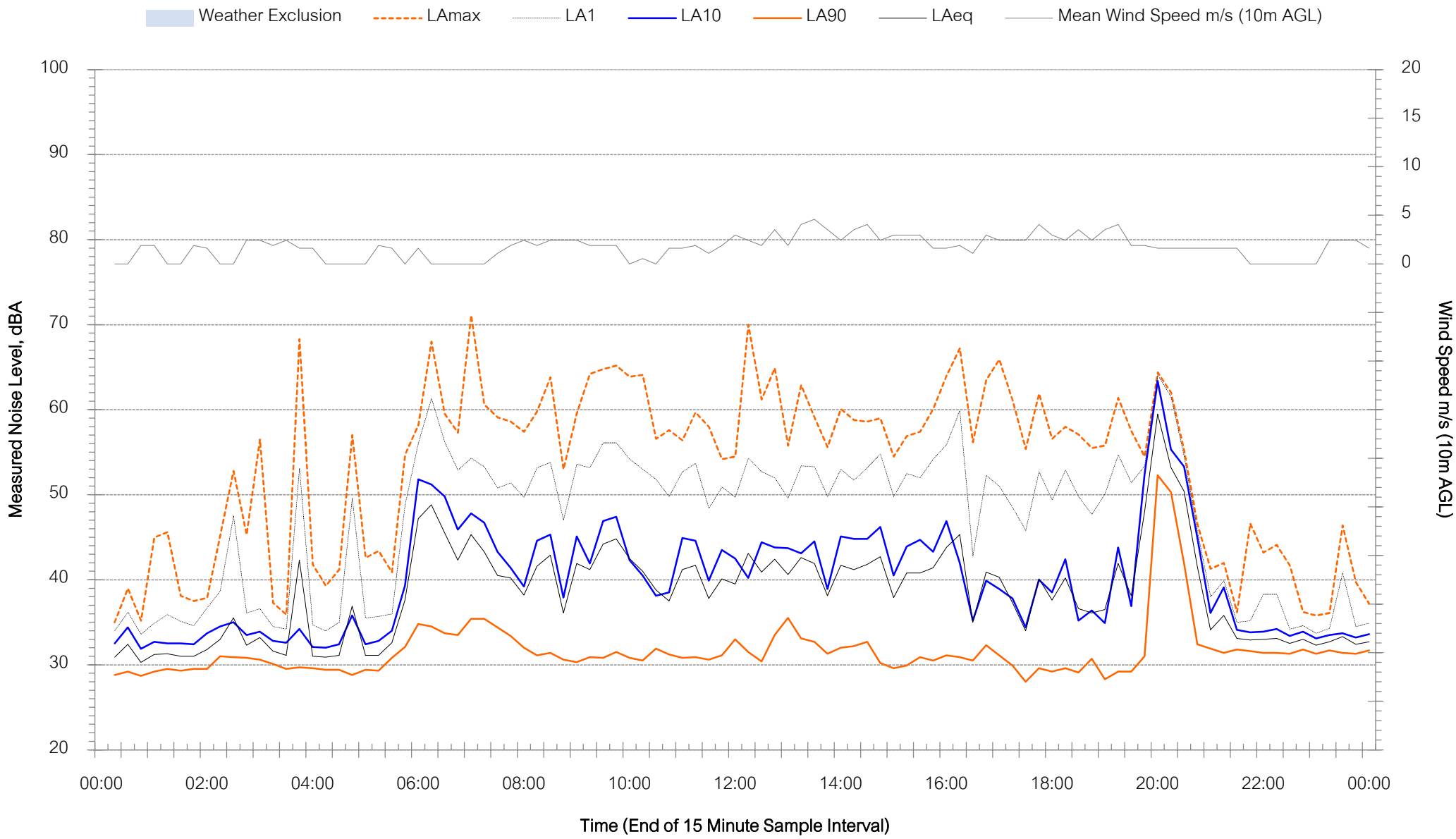
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Monday 17 October 2022



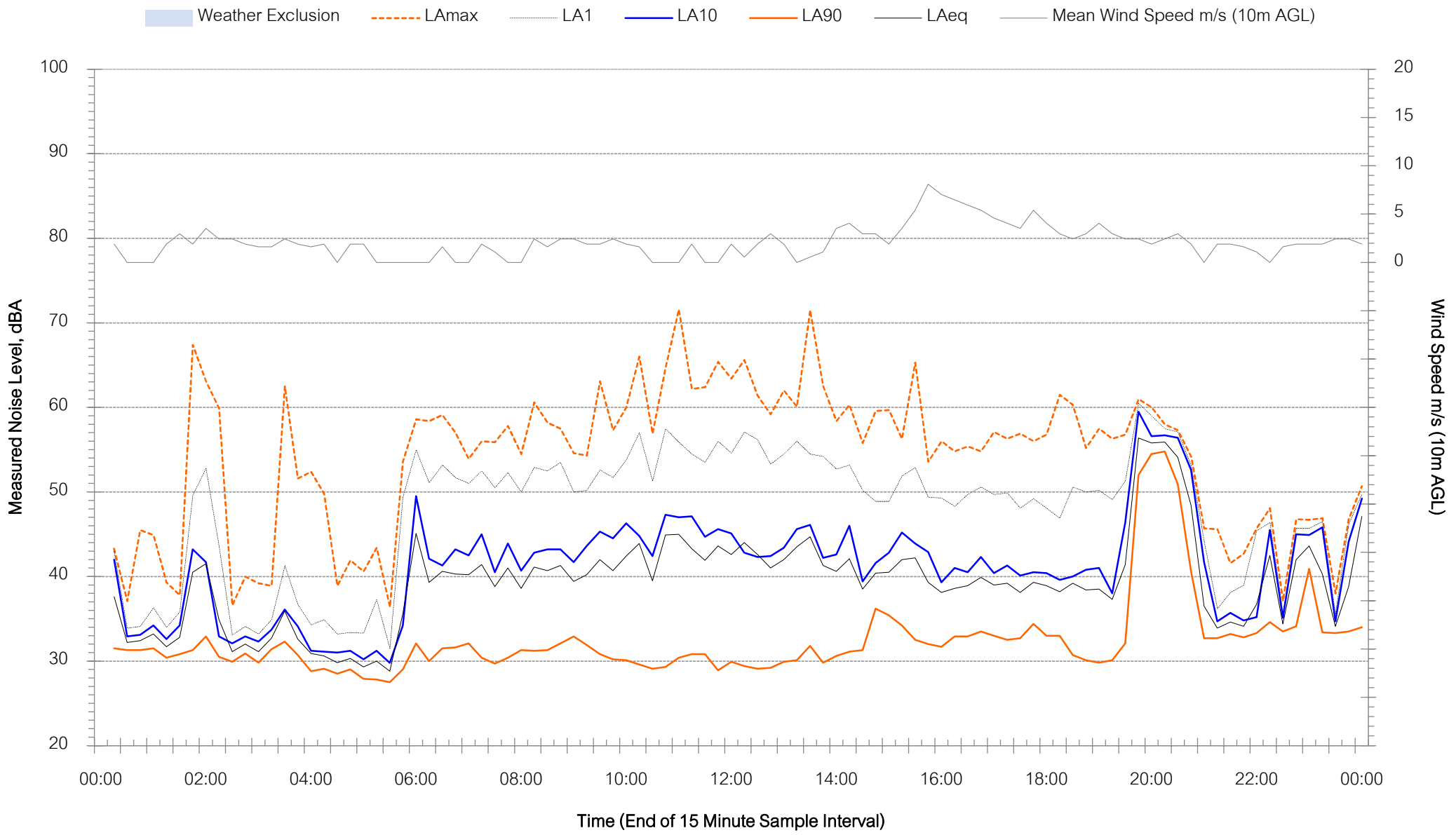
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Tuesday 18 October 2022



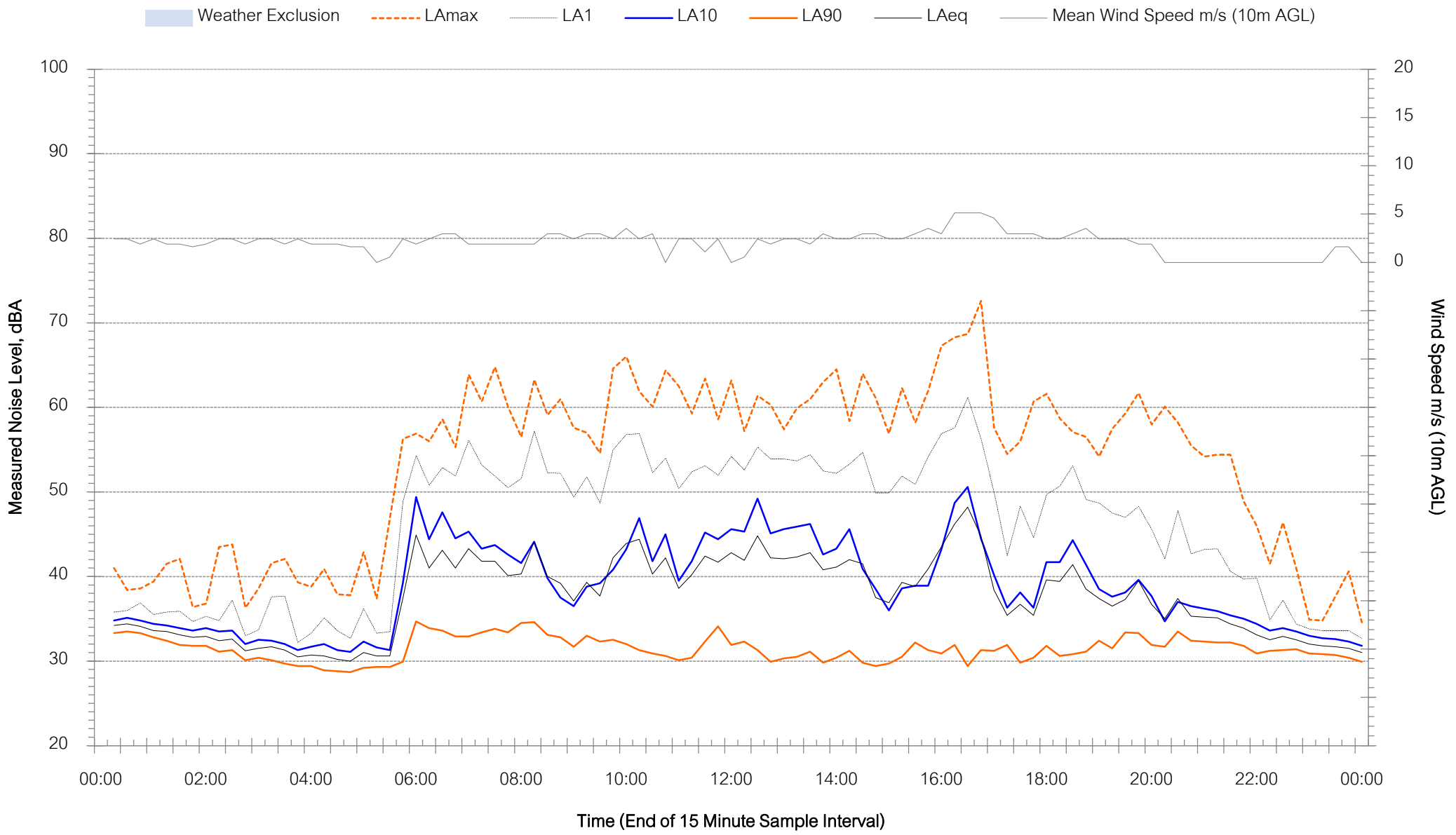
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Wednesday 19 October 2022



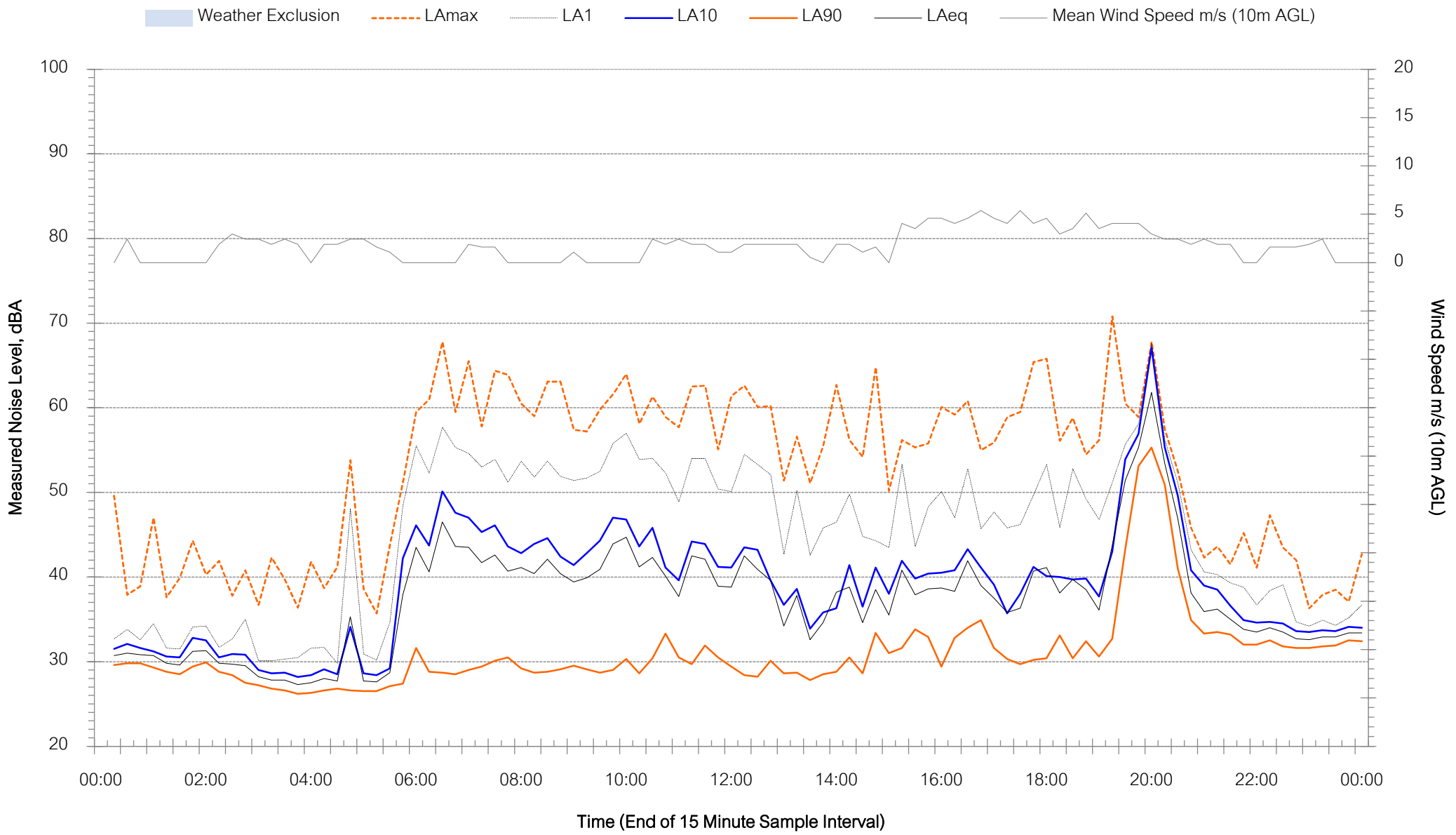
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Thursday 20 October 2022



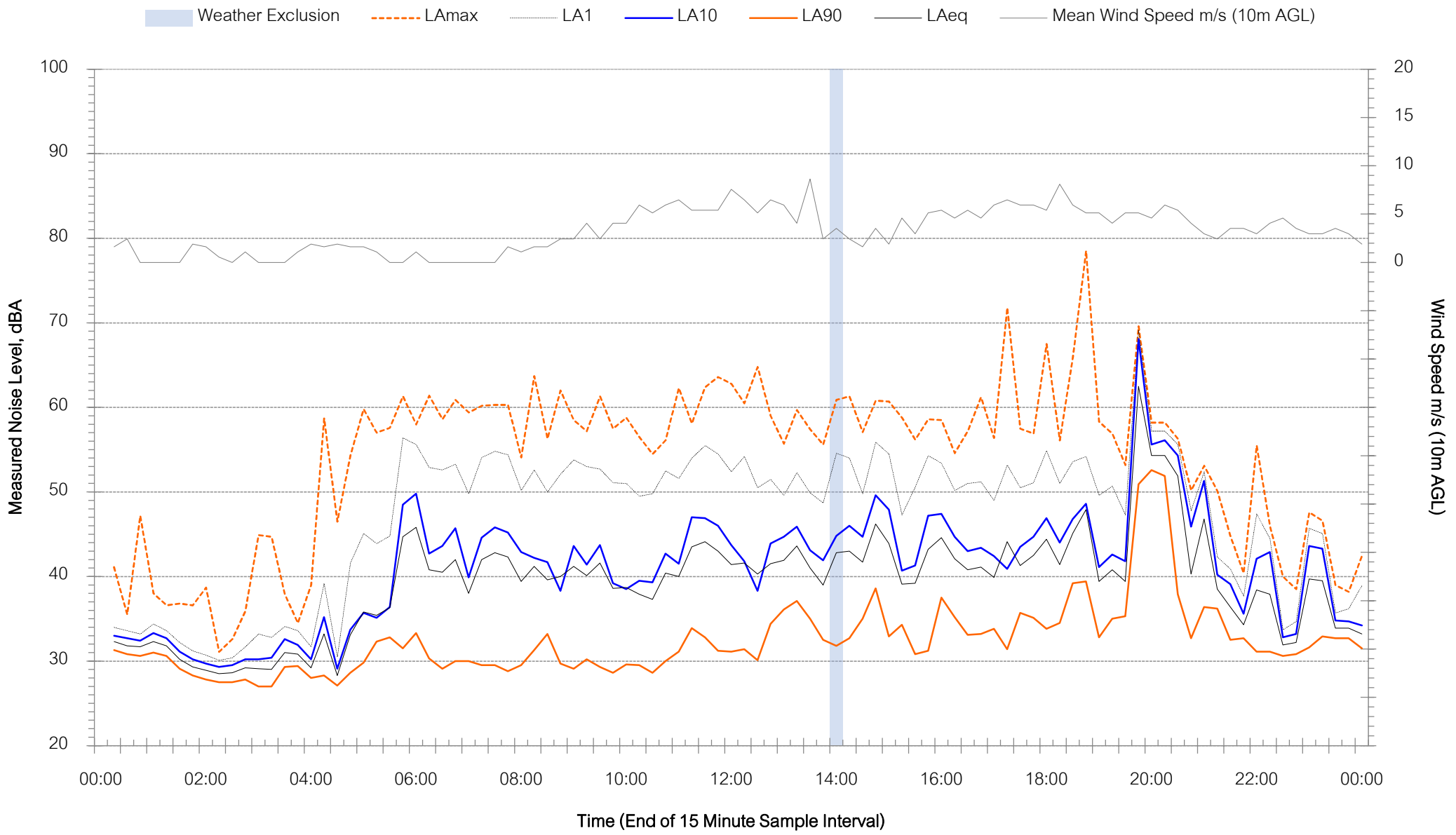
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Friday 21 October 2022



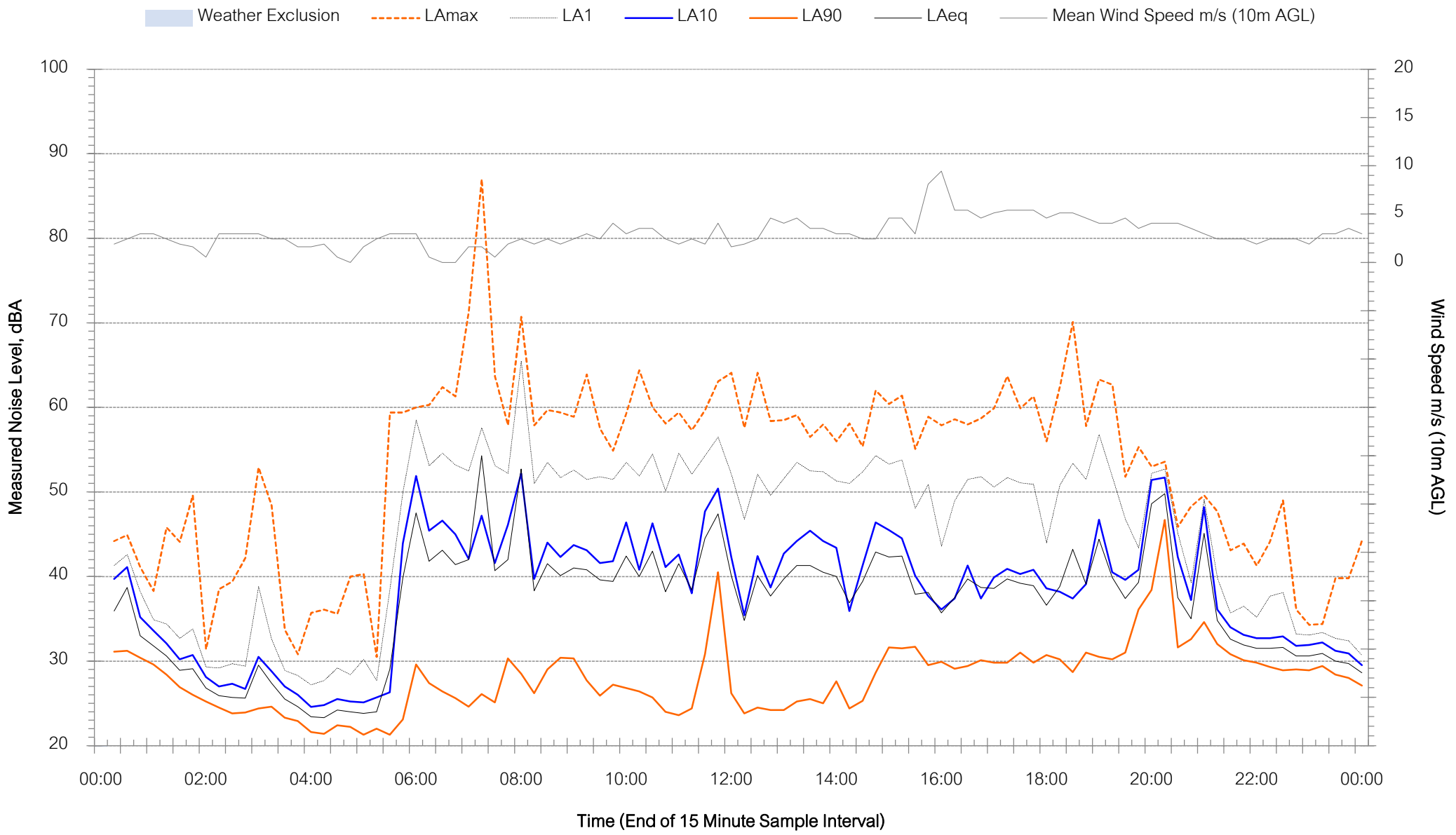
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Saturday 22 October 2022



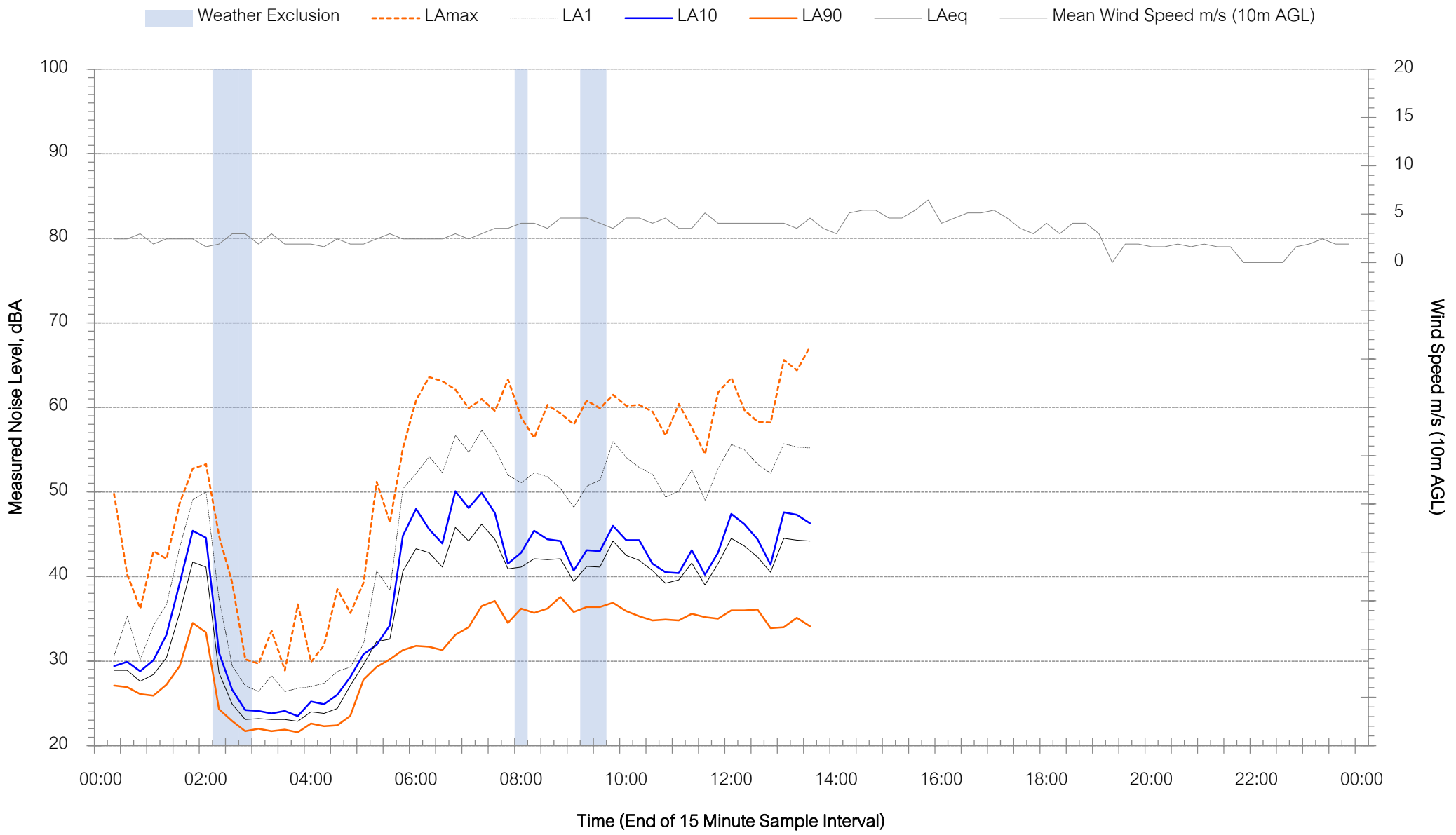
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Sunday 23 October 2022



Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Monday 24 October 2022



Appendix C – Determination of NPI

Receiver Category

Table C1 - Determination of NPI Residential Receiver Category

Location/ Catchment	Period	Measured RBL dB LA90(period)	Land Use Zone: RU1, RU2, RU4, R5, E4 — Rural	RU5, RU6, R2, R3, R4, E2, E3 — Suburban	R1, R4, B1, B2, B4 — Urban	Others — Commercial, Industrial	Typical Existing Background Noise Levels Table 2.3 NPI: RURAL Daytime <40 Eve <35 Night <30	SUBURBAN Daytime <45 Eve <40 Night <35	URBAN Daytime >45 Eve >40 Night >35	Rural Residential - an area with an acoustical environment that: is dominated by natural sounds.	having little or no road traffic noise	generally characterised by low background noise levels.	Settlement patterns would be typically sparse	Suburban Residential - an area that has: local traffic with characteristically intermittent traffic flows	or with some limited commerce or industry.	evening ambient noise levels defined by the natural environment and human activity.	Urban Residential- an area with an acoustical environment that: is dominated by 'urban hum' or industrial source noise	has through-traffic with characteristically heavy and continuous traffic flows during peak periods	is near commercial districts or industrial districts	has any combination of the above
Location 1	Day	37	✓				✓							✓	✓	✓				
	Evening	38																		
	Night	30																		
Location 2	Day	29	✓				✓			✓	✓	✓	✓							
	Evening	31																		
	Night	27																		
Location 3	Day																			
	Evening																			
	Night																			
Location 4	Day																			
	Evening																			
	Night																			

where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources

Assessment

Location	Rural	Suburban	Urban	Rural - RBL	Suburban - RBL	Urban - RBL	Rural - Description				Suburban - Description			Urban - Description			
Location 1	1	**3**	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0
Location 2	**5**	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0
Location 3	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Location 4	**0**	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting

Appendix 6

Sediment Basin Storage Requirement Calculations

prepared by

R.W. Corkey & Co. Pty Limited

(Total No. of pages including blank pages = 9)

1. Sediment Basin Calculations

1.1 Basin Type

Based on the sediment type generated in the disturbed catchment, the basin should be designed as a Type F (Water Retention) Basin. These are also referred to as 'fill and spill' structures as they are designed to retain all in-flows to allow for settlement of sediment before the water is used for dust suppression activities or pumped to an alternative storage, as required.

1.2 Catchment Size

The Quarry Site will be managed with two catchment areas (see **Figures A** and **B**), as follows.

- Extraction Area Catchment (Dirty Water)

  The catchment will be internally draining with all sediment-laden runoff ultimately reporting to the Quarry Sump or infiltrating to the underlying water table.

- Office, Amenities and Parking Area Catchment (Dirty Water)

  Sediment-laden runoff within this catchment will be managed by a sediment basin. The total effective catchment area directing runoff to the sediment basin is 0.2ha. The capacity requirements for the sediment basin for this catchment are detailed in the following sections.

1.3 Rainfall Data

Volume 2E of the Blue Book identifies that the design rainfall event to be used to determine the sediment storage and water settlement zones as either:

- 5-day 90th percentile event for standard receiving environments; or
- 5-day 95th percentile for sensitive receiving environments.

A 'sensitive' receiving environment is defined by Volume 2E of the Blue Book as "*one that has a high conservation value, or supports human uses of water that are particularly sensitive to degraded water quality*". At this stage it is assumed that the receiving environment does not fit this definition. Therefore, the design rainfall event to be used to determine storage and settlement criteria is the **5-day 90th percentile event**.

Rainfall data was extracted for the site from SILO (scientific data for landowners) database. The calculated 5-day 90th percentile event from SILO data is **52.7mm**. Similarly, the Blue Book Table 6.3a gives the rainfall depth of a 5-day 90th percentile event for the nearest town (i.e. Wilberforce) as **46.7mm**.

1.4 Erosion Data

1.4.1 Rainfall Erosivity (R-Factor)

The rainfall erosivity (R-factor) of a location influences the likely soil loss (erosion). The Quarry Site has a higher R-Factor of 2370 which was calculated using the following formula (Landcom, 2004) where S is the 2-year ARI, 6-hour ARI rainfall event (mm) i.e. 10.4mm.

$$R = 164.74(1.1177)^{S} S^{0.6444}$$

1.4.2 Erodibility (K) Factor

A conservative K-factor of **0.05** is adopted in line with the recommendations of Volume 2E of the Blue Book.

1.4.3 Length / Gradient (LS) Factor

The local topography in surrounding of the disturbance area is generally steep. However, within disturbed area it is less than five percent (< 5 %), with the length of slopes within each catchment generally between 60m and 80m. There is currently no plan to bench these slopes to modify the LS Factor. The slope length, gradients and LS Factors have been calculated for the catchment is as follows:

- Catchment gradient = 5%, length = 80m – LS Factor = 1.19

1.5 Soil Hydrologic Group and Runoff Coefficients

For cleared catchments, i.e. those without significant vegetation or other cover likely to slow the flow of water and reduce runoff, the runoff coefficient is largely a factor of the permeability and saturation of the soil or surface. Appendix F of Landcom (2004) identifies four Soil Hydrologic Groups, derived by USDA (1993) through consideration of infiltration and permeability characteristics.

- Group A: very low runoff potential. Water moves into and through these soil materials relatively quickly, when thoroughly wetted. Usually, they consist of deep (>1.0m), well-drained sandy loams, sands or gravels. They shed runoff only in extreme storm events.
- Group B: low to moderate runoff potential. Water moves into and through these soil materials at a moderate rate when thoroughly wetted. Usually, they consist of moderately deep (>0.5m), well-drained soils with medium, loamy textures or clay loams with moderate structure. They shed runoff only infrequently.

- Group C: moderate to high runoff potential. Water moves into and through these soil materials at slow to moderate rates when thoroughly wetted. Usually, they consist of soils that have:
  - moderately fine (clay loam) to fine (clay) texture;
  - weak to moderate structure; and/or
  - a layer near the surface that impedes free downward movement of water.

  They regularly shed runoff from moderate rainfall events.
- Group D: very high runoff potential. Water moves into and through these soils very slowly when thoroughly wetted. Usually, they consist of soils:
  - that are fine-textured (clay), poorly structured, surface-sealed or have high shrink/swell properties, and/or
  - with a permanent high water table, and/or
  - with a layer near the surface that is nearly impervious.

  They shed runoff from most rainfall events.

Considering the catchment for which sediment basin is required, the catchment is considered most likely representative of Soil Hydrologic Group A. That is also supported by the Soil Profile Report of the nearest location given on NSW soil and land information system (Ref: Profile 316 (1000133) at 314505E, 6300990N (MGA Zone 56)). That report provides the soil hydrology as a profile is moderately permeable, no free water, run on is moderate and runoff is very high which represents Soil Hydrologic Group A.

With reference to Table F2 of the Blue Book, the volumetric runoff coefficient (C_v) for the 5-day 90th percentile rainfall event for the catchments will be 0.28 (~28% of rainfall accumulates as runoff).

1.6 Settlement and Storage Volume Requirements

Considering the likely volume of runoff and sediment load under a 5-day 90th percentile rainfall event, **Table A** provides the minimum water settlement and sediment storage zone requirements for the sediment basin. The capacity of the Sediment Retention Basin for the Office, Amenities and Parking Area Catchment (SB1) will be consistent throughout the Quarry's operational lifespan, given the stable catchment area of approximately 0.2ha. In alignment with the Blue Book's recommendations, the total volume provision for SB1 is set at 31m³. This comprises a sediment storage zone of 4m³ and a settling zone designed to accommodate 27m³ of water. The capacity of the Quarry Sump is determined by the extent of the Extraction Area. During Stage 1 extraction operations, the operational disturbance for the Extraction Area is projected to be about 2ha, as illustrated in **Figure A**. This area is anticipated to expand to 2.87ha during Stage 2, as shown in **Figure B**. In line with the Blue Book's recommendations, the Quarry Sump's volume for Stage 1 is set at 349m³. As the Extraction Area reaches its full development in Stage 2, the volume requirement will increase to approximately 491m³.

Table A
Settlement and Storage Volume Requirements

Basin	Water Settlement Zone (m^3)	Sediment Storage Zone (m^3)	Total (m^3)
Sediment Basin 1 (SB1) – Office, Amenities and Parking Area Catchment	27	4	31
Quarry Sump – Stage 1	301	48	349
Quarry Sump – Stage 2	424	67	491

The worksheet used estimate these minimum capacities are provided as **Attachment 1**.

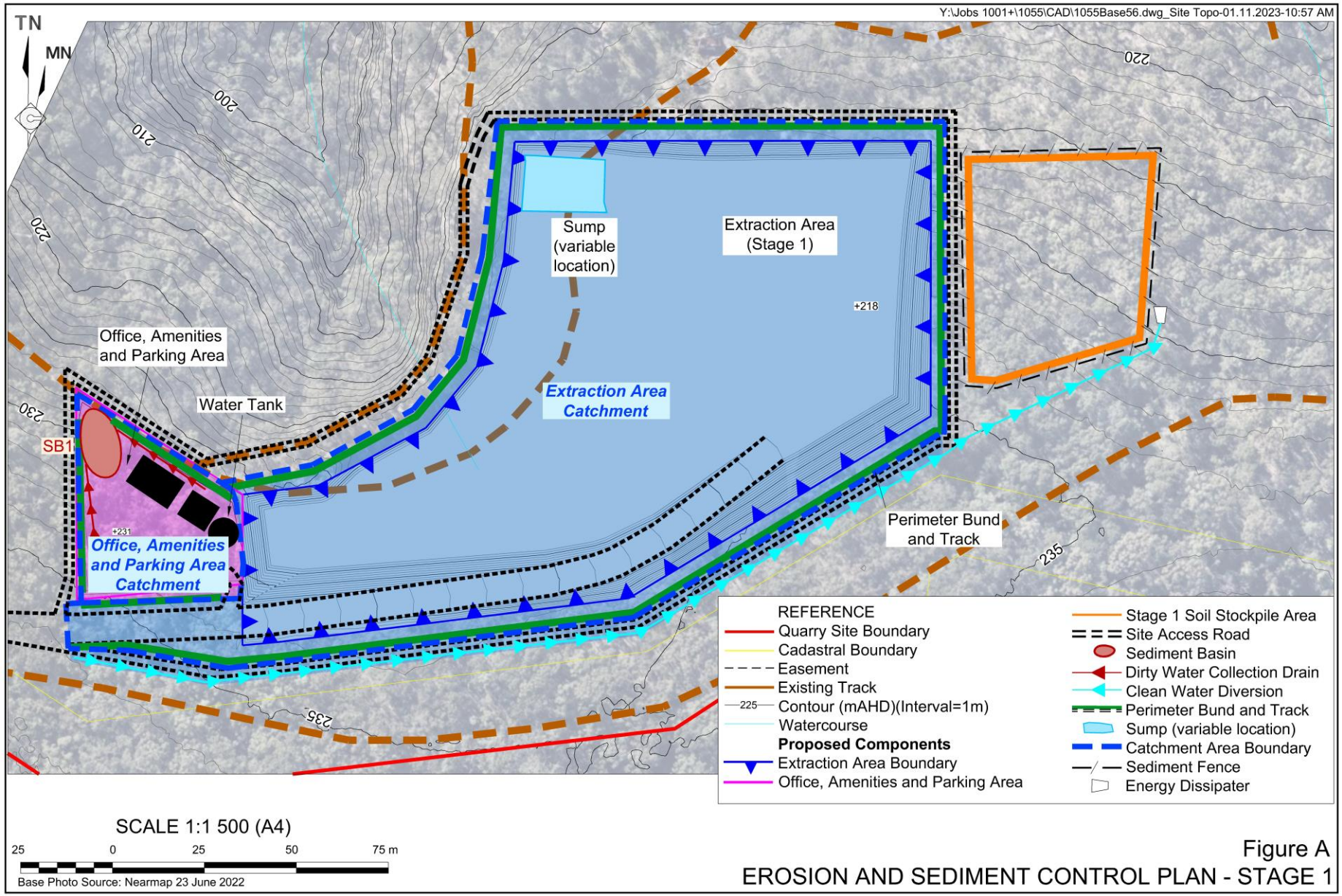


Figure A
EROSION AND SEDIMENT CONTROL PLAN - STAGE 1

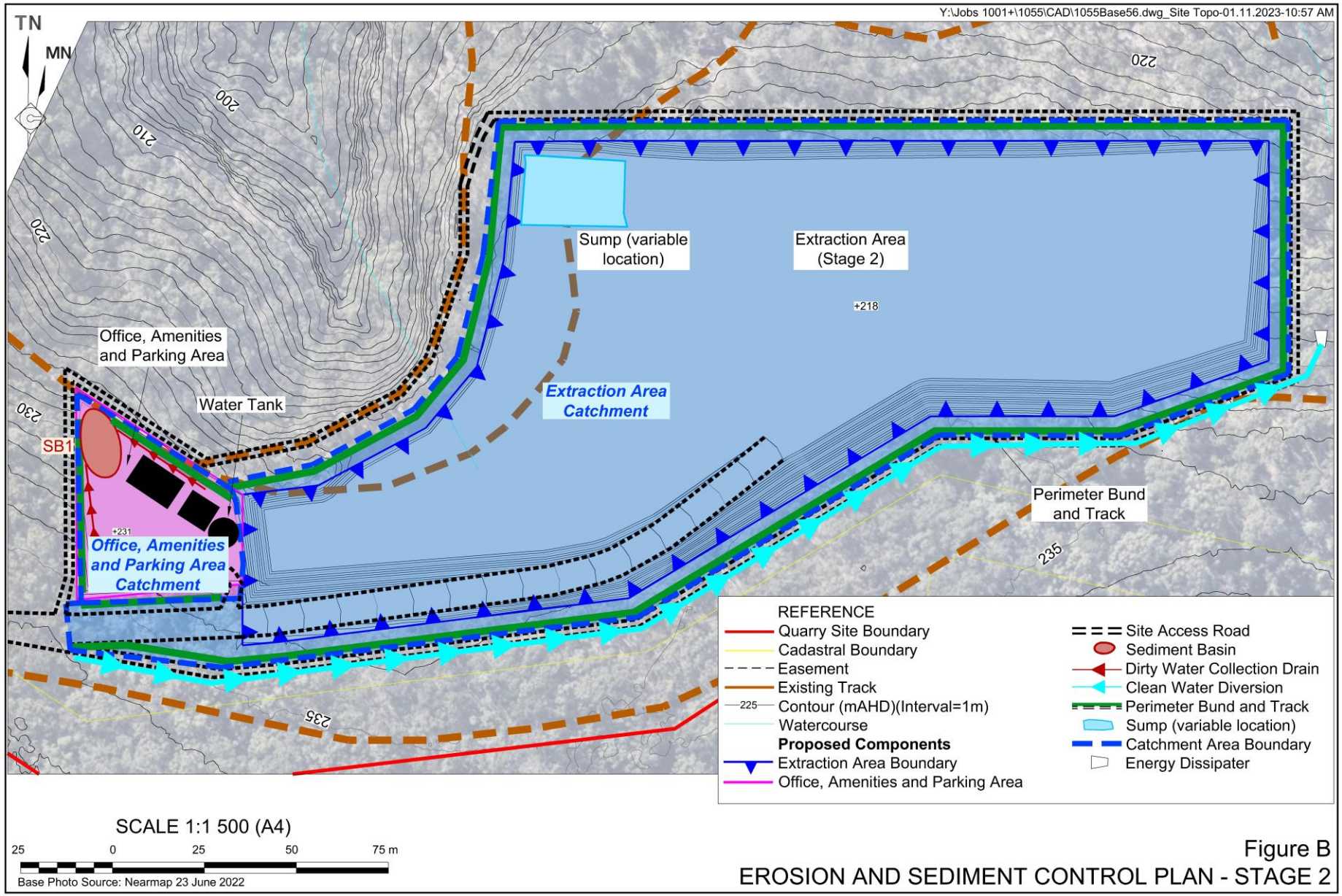


Figure B
EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

Attachment 1

Erosion Hazard and Sediment Basin Calculations

(Total No. of pages including blank pages = 2)

1. Erosion Hazard and Sediment Basins

Site Name: Maroota Central Civil Quarry

Site Location:

Precinct/Stage: Stage 1 AND 2

Other Details:

Site area	Sub-catchment or Name of Structure						Notes
	SB1	S-1	S-2				
Total catchment area (ha)	0.185	2.04	2.875				
Disturbed catchment area (ha)	0.185	2.04	2.875				

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	F	F	F				From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)							Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							E.g. enter 10 for dispersion of 10%
% of whole soil dispersible							See Section 6.3.3(e). Auto-calculated
Soil Texture Group	F	F	F				Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	5	5	5				See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	90	90	90				
x-day, y-percentile rainfall event (mm)	52.7	52.7	52.7				
Rainfall R-factor (if known)							Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)	10.4	10.4	10.4				

RUSLE Factors

Rainfall erosivity (*R*-factor)	2370	2370	2370				Auto-filled from above
Soil erodibility (*K*-factor)	0.05	0.05	0.05				
Slope length (m)	80	80	80				
Slope gradient (%)	5	5	5				RUSLE LS factor calculated for a high rill/interrill ratio.
Length/gradient (*LS*-factor)	1.19	1.19	1.19				
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	2	2	2				Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.28	0.28	0.28				See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	183	183	183				
Soil Loss Class	2	2	2				See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	141	141	141				Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	4	48	67				See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	27	301	424				See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	31	349	491				

Appendix 7

Biodiversity Development Assessment Report

prepared by Ecoplanning Pty Ltd

(Total No. of pages including blank pages = 194)

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Biodiversity Development Assessment Report



4773 Old Northern Road, Maroota

Maroota Central Civil Quarry

Prepared for: Central Civil (NSW) Pty Ltd

1 November 2023 Version: 1.0

PROJECT NUMBER	2022-158			
PROJECT NAME	Biodiversity Development Assessment Report			
PROJECT ADDRESS	4773 Old Northern Road, Maroota			
PREPARED FOR	Central Civil (NSW) Pty Ltd			
AUTHOR/S	Brendan Fletcher			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Brian Towle		1.0	1 November 2023
ACKNOWLEDGEMENTS	All photographs and figures were made by Ecoplanning staff, unless otherwise referenced.			
BDAR CERTIFICATION	This BDAR has been certified by Brian Towle, Accredited Assessor No. 17057, in accordance with the BC Act, BC Reg and BAM.			
LICENCES	**Scientific Licence**		SL101557	
	Bionet Sensitive Species Data Licence		1115	
	Animal Research Authority Ethics Licence		Fauna Surveys and Monitoring (16/346)	
	Scientific Collection - Aquatic		P19/0009-1.0 & OUT19/2602	

This report should be cited as: 'Ecoplanning (2023). Biodiversity Development Assessment Report– 4773 Old Northern Road, Maroota. Prepared for Central Civil (NSW) Pty Ltd.'

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Glossary and abbreviations

Acronym	Description
AHD	Australian Heigh Datum
AOBV	Area of Outstanding Biodiversity Value
BAAS	Biodiversity Accredited Assessment System
BAM	Biodiversity Assessment Method
BAMC	BAM calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Reg	*Biodiversity Conservation Regulation 2017*
BCD	Biodiversity Conservation Division
BCF	Biodiversity Conservation Fund
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BOPC	Biodiversity Offsets Payment Calculator
BOS	Biodiversity Offset Scheme
BVC	BioNet Vegetation Classification
BV Map	Biodiversity Values Map
CEEC	Critically endangered ecological community
CSSTF	Cumberland Shale Sandstone Transition Forest
DA	Development Application
DBH	Diameter at breast height
DAWE	NSW Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DECC	NSW Department of Environment and Climate Change (now DPE)
DECCW	NSW Department of Environment, Climate Change and Water (now DPE)
DFSI	NSW Department of Finance, Services and Innovation

Acronym	Description
DIWA	The Directory of Important Wetlands in Australia
DoEE	Commonwealth Department of the Environment and Energy (now DCCEEW)
DotE	Commonwealth Department of the Environment (now DCCEEW)
DPE	NSW Department of Planning and Environment (formerly DPIE)
DPIE	NSW Department of Planning, Industry and Environment (now DPE)
EARs	Environmental Assessment Requirements
EEC	Endangered ecological community
EMP	Environmental Management Plan
EP&A Act	NSW *Environment Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Assessment
ha	hectares
HBT	Hollow-bearing tree
HTW	High Threat Weed
IBRA	Interim Biogeographic Regionalisation of Australia
KAR	Koala Assessment Report
KPoM	Koala Plan of Management
LEP	Local Environment Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NRAR	NSW Natural Resources Access Regulator
NTSSC	NSW Threatened Species Scientific Committee
NPWS	NSW National Parks and Wildlife Services
OEH	NSW Office of Environment and Heritage (now DPE)
PCT	Plant Community Type
RGBDT	Royal Botanic Gardens and Domain Trust

Acronym	Description
RTA	NSW Roads & Traffic Authority
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
SHTW	Sydney Hinterland Transition Woodland
SAT	Spot Assessment Technique
TBDC	NSW Threatened Biodiversity Profile Data Collection
TEC	Threatened Ecological Community
tpa	Tonnes per annum
TSSC	Commonwealth Threatened Species Scientific Committee
VI	Vegetation integrity
WM Act	NSW *Water Management Act 2000*
WoNS	Weeds of National Significance

1 Introduction

1.1 Background

Ecoplanning have been engaged by Central Civil (NSW) Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a development application (DA) for the proposed Maroota Central Civil Quarry (the Proposal) at 4773 Old Northern Road (Lots 1 and 2 // DP 609224), Maroota, NSW (**Figure 1.1**).

This BDAR has been prepared by Brian Towle, an Accredited Person (BAAS 17057) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). The BDAR has been prepared following steps outlined in the BAM and all credit calculations have been undertaken using the BAM Calculator (BAMC) in case number 00035067/BAAS17057/22/00035068.

1.2 Biodiversity Offset Scheme triggers

The BC Act establishes the biodiversity assessment requirements for proposed developments and land use change. The BC Act includes a mandatory framework for addressing impacts on biodiversity from development and clearing. The framework includes the Biodiversity Offsets Scheme (BOS) and assessment methodologies such as the BAM. Where the BOS is triggered, a BDAR is required and the BAM must be applied. Triggers for the BOS are:

- exceeding the native vegetation clearing threshold (based on minimum lot size)
- direct impacts occur on land included in the Biodiversity Values Map (BV Map; DPE 2023a)
- significant impact on threatened species or ecological communities (or their habitat).

The BOS is triggered for the Proposal because the native vegetation clearing threshold is exceeded. For the purpose of determining the native vegetation clearing threshold, the applicable minimum lot size for Lots 1 and 2 // DP 609224 is 10 ha. The native vegetation clearing threshold for land with a minimum lot size of less than 40 ha but not less than 1 ha is 0.5 ha or more. The amount of native vegetation clearing proposed is 3.77 ha, which exceeds the applicable threshold of 0.5 ha.

Because the native vegetation clearing threshold is exceeded, a BDAR is required.

1.3 The subject land

The land to which the BDAR applies is the ***subject land***, which the BAM defines as land subject to a development, activity, clearing, biodiversity or a biodiversity stewardship proposal. (**Figure 1.1**). The subject land comprises part of Lot 1 // DP 609224, plus an unnamed Crown Road reserve, at 4773 Old Northern Road, Maroota. The area of subject land is approximately 4.13 ha. No impacts to existing biodiversity values are proposed outside the subject land.

In addition to the subject land, this BDAR refers to the ***study area*** for the Proposal. The study area includes all areas of the subject land as well as lands surrounding the subject land within Lots 1 and 2 // DP 609224 that are within the land held by Central Civil (NSW) Pty Ltd. Portions of the study area were surveyed prior to the determination of the final impact area, and these surveys inform the assessment in this BDAR. The total area of the study area is 23.33 ha.

The subject land is located within the Hornsby Local Government Area (LGA). Most of the subject land is zoned RU1 – Primary Production (**Figure 1.2**). A portion of the subject land is zoned C3 – Environmental Management.

The subject land is located approximately 700 m east of Old Northern Road. It is bordered by a quarry on the south and east, a utilities easement to the east and Marramarra National Park to the north.

1.4 The Proposal

The Proposal is for the establishment and operations of the Maroota Central Civil Quarry, which would include the following:

- Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of Virgin Excavated Natural Material for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.

Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

The Proposal includes an Extraction Area; an Office, Amenities and Parking Area; and a Site Access Road (**Figure 1.3**). The extraction area is an area of 2.27 ha which would be developed in two stages from west to east to a maximum depth of 218 m Australian Heigh Datum (AHD). All product extraction, processing, stockpiling and despatch activities would be undertaken within the Extraction Area. Soil and mulch stockpiling would also be undertaken in this area. The Extraction Area would include a 5m perimeter zone to allow for the construction of a perimeter safety bund, tracks and erosion and sediment control infrastructure.

For the Office, Amenities and Parking Area, an area of 0.18 ha to the immediate west of the Extraction Area which would be flattened via cut and fill methods to a height of approximately 231 m AHD. A demountable office, water tank, workshop and portable amenities incorporating chemical or pump out toilet facilities would be established within this area. This area would also be utilised for light and heavy vehicle parking as well as equipment storage throughout the life of the Quarry.

The existing Site Access Road would be widened to permit two heavy vehicles to pass. The road would have an unsealed surface for its entire length and, together with roadside drainage, would have a maximum width of 8 m.

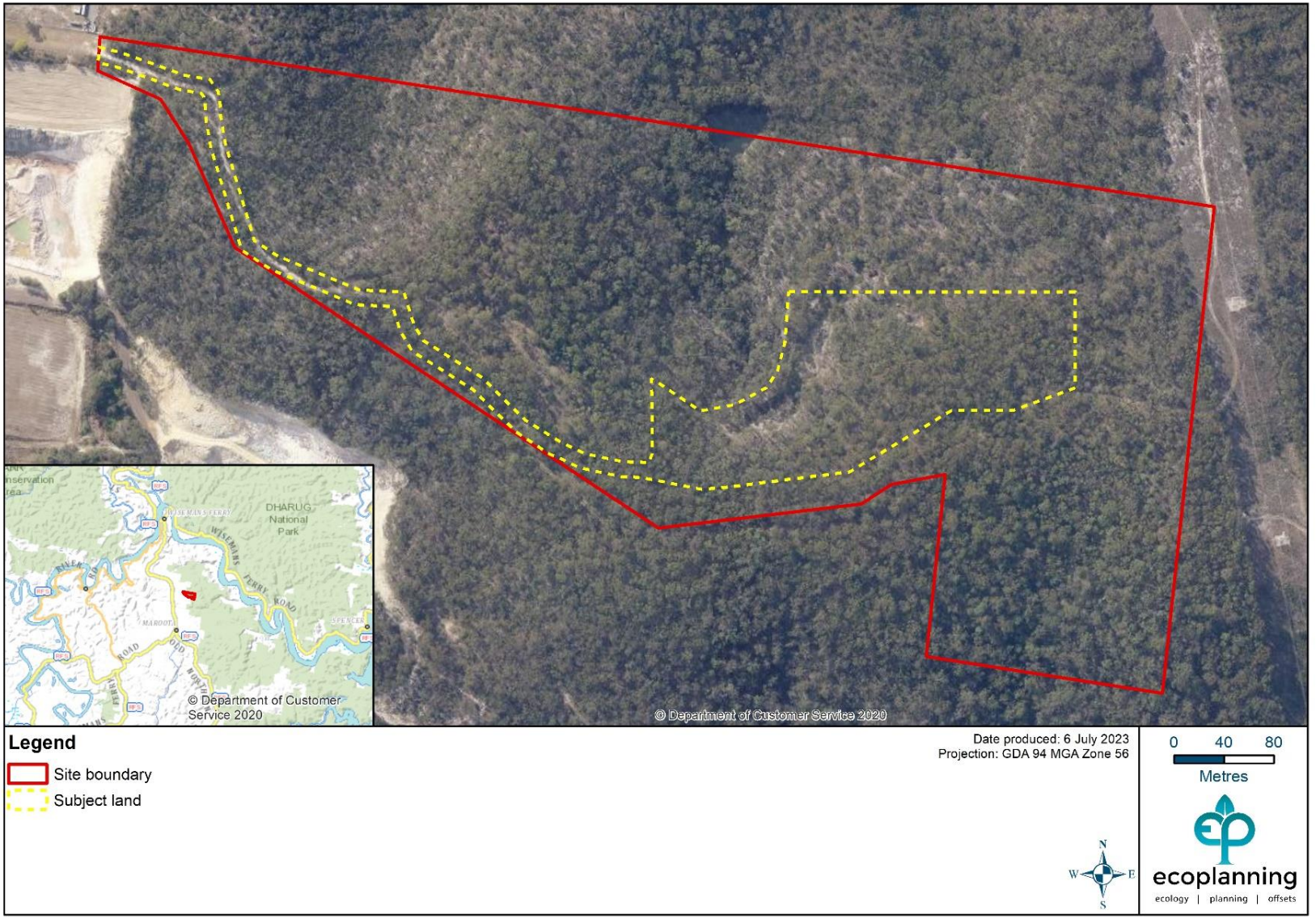


Figure 1.1: Location of the subject land

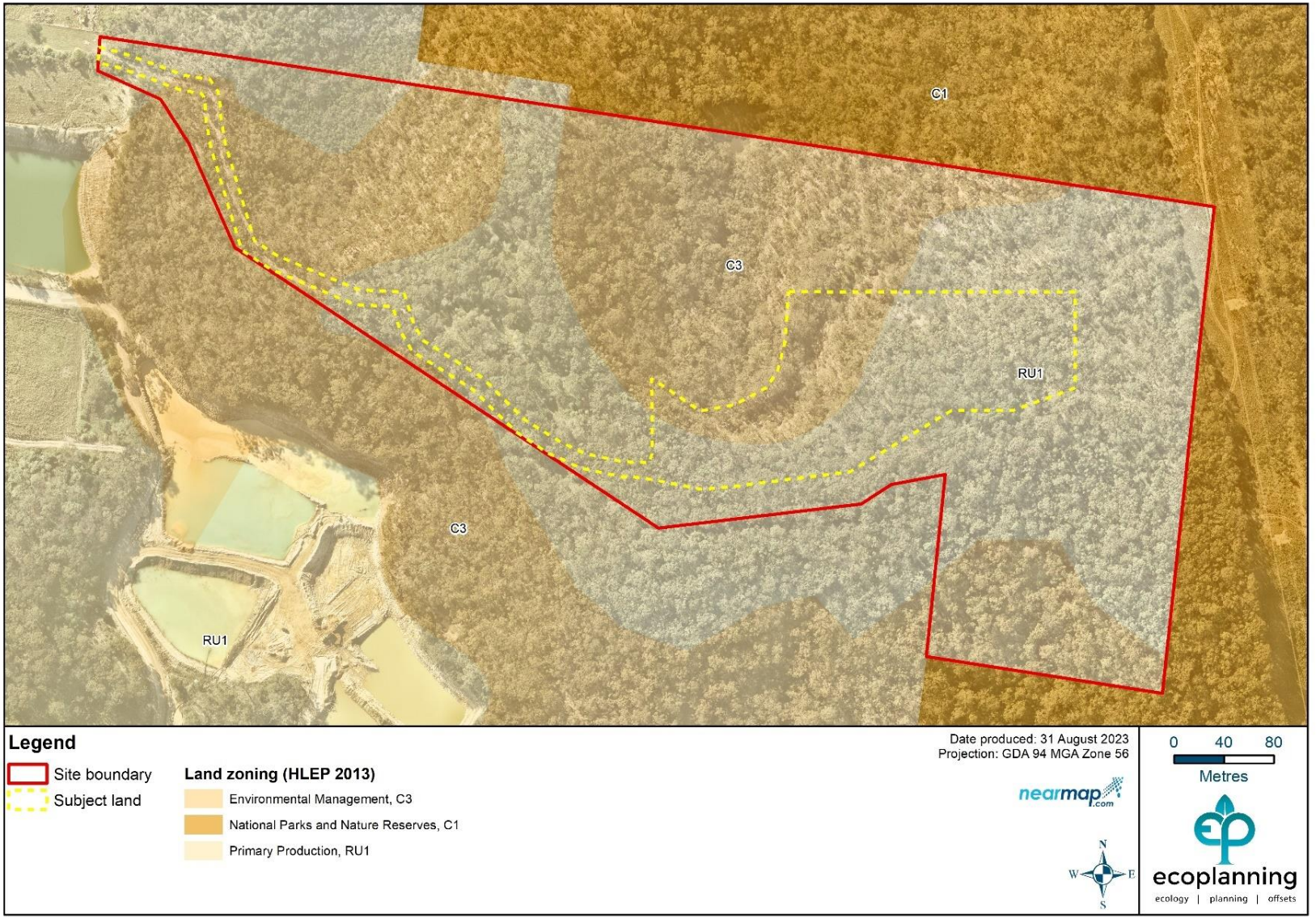


Figure 1.2: Zoning of the subject land

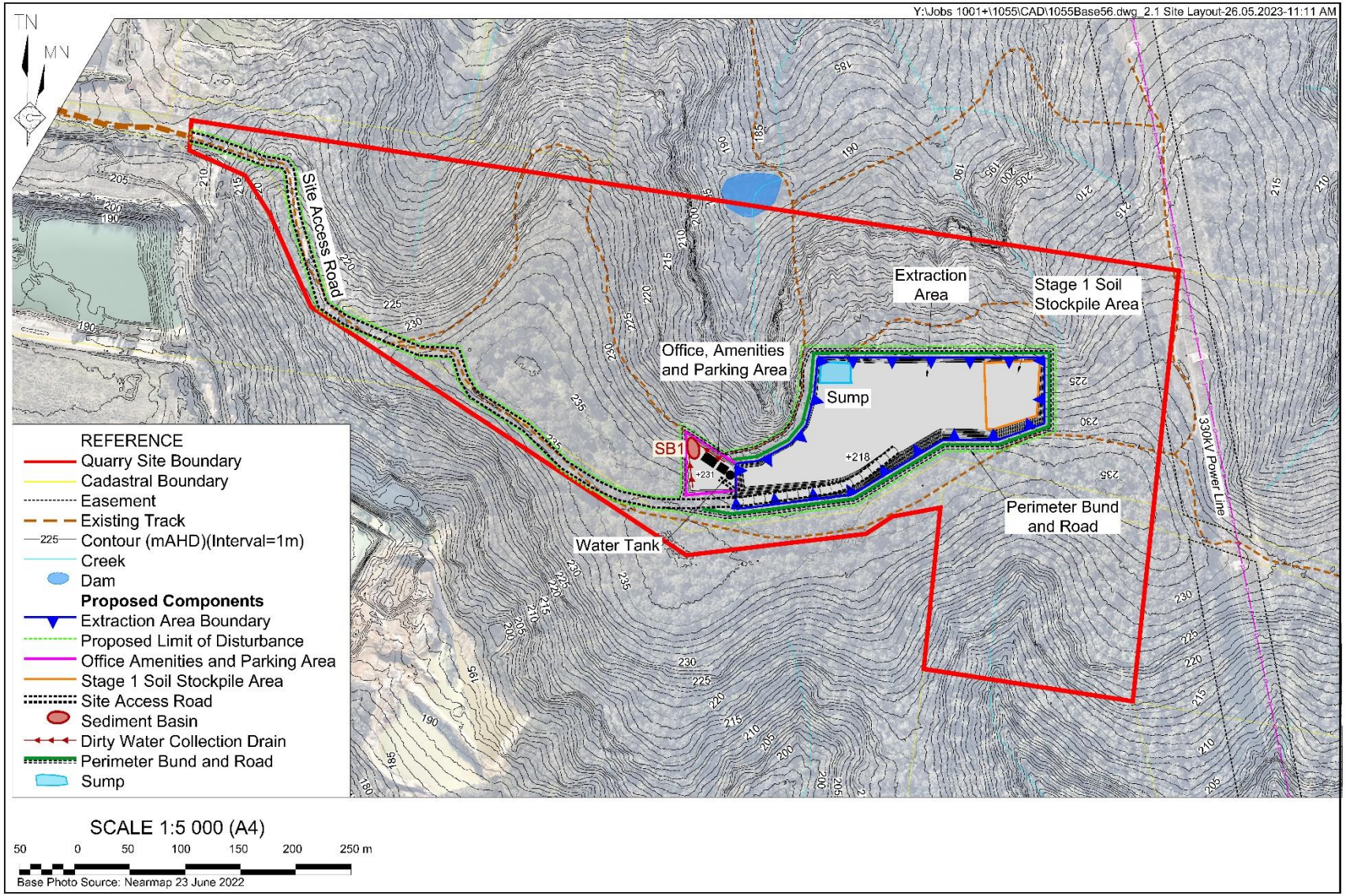


Figure 1.3: The Proposal

1.5 Planning context

The Proposal is classified as an 'extractive industry'. Clause 26 of Schedule 3 of *the Environmental Planning & Assessment Regulation 2021* identifies relevant thresholds for "Designated Development" for extractive industries. The Proposal would exceed the following identified thresholds.

- Land disturbance of more than 2 ha.
- The Quarry Site is located within 40 m of an environmentally sensitive area of State significance, namely the Marramarra National Park.
- The Quarry Site is located within 500 m of another extractive industry.

As a result, the Proposal is classified as Designated Development.

In addition, as Designated Development for the purpose of extractive industry, the Proposal is also classified as 'Regionally Significant Development under Clause 7 of Schedule 6 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning SEPP) and therefore the consent authority for the development application will be by the Sydney North Regional Planning Panel.

Because the Proposal is classified as Designated Development, Environmental Assessment Requirements (EARs) were set for the project by the National Parks and Wildlife Service (NPWS) on 23 November 2022 and the Department of Planning and Environment (DPE) on 2 December 2022. **Table 1.1** sets out the EARs relevant to biodiversity assessment and where the requirements have been addressed in this BDAR.

Table 1.1: EARs – Biodiversity

Biodiversity		**Where addressed**
DPE	Accurate predictions of any vegetation clearing on site;	**Section 3.2**
	A detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016; and	**Sections 3, 4, 5, 6**
	A detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	**Sections 5, 7**
NPWS	Biodiversity impacts related to the proposed development are to be assessed in accordance with the Biodiversity Assessment Method 2020 (BAM) and documented in a Biodiversity Development Assessment Report (BDAR) to accompany the EIS. The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016	This document.

Biodiversity		Where addressed
	(s 6.12) and Biodiversity Conservation Regulation 2017 (cl 6.8).	
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	**Sections 5, 7, 8**
	The BDAR must include details of the measures proposed to address the offset obligation as follows: 1. The total number and classes of biodiversity credits required to be retired for the development/project; 2. The number and classes of like-for-like biodiversity credits proposed to be retired; 3. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; 4. Any proposal to fund a biodiversity conservation action; 5. Any proposal to conduct ecological rehabilitation (if a mining project); Any proposal to make a payment to the Biodiversity Conservation Fund.	**Section 8**
	If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	n/a
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s 6.10 of the Biodiversity Conservation Act.	**Section 1.1**
	According to BioNet records, threatened species close to or known from the site include but are not limited to:	**Section 4**
	One threatened fauna record (Powerful Owl).	**Section 4**
	a. Several threatened flora records: ○ Zieria involucrata (Endangered) ○ Tetratheca glandulosa (Vulnerable) ○ Darwinia fascicularis (Endangered population ○ Asterolasia elegans (Endangered) ○ Acacia bynoeana (Endangered)	**Section 4**

1.6 Literature and database review

A site-specific literature and database review was undertaken for the subject land prior to undertaking the field survey and the preparation of this report, which included the following sources:

- BioNet Atlas (DPE 2023b)
- BioNet Vegetation Classification (DPE 2023c)
- Protected Matters Search Tool (DCCEEW 2023a)
- NSW Hydrography (DFSI 2016)
- State Vegetation Type Map (DPE 2022a)
- NSW threatened species profiles (DPE 2023d)
- ePlanning Spatial Viewer (DPE 2023e)
- Hornsby LEP (2013).

The following policies and guidelines were considered in the preparation of this report:

- The EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines (DotE 2013)
- Biodiversity Assessment Method (DPIE 2020a)
- Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE 2020b)
- Biodiversity Assessment Method 2020 Operational Manual – Stage 2 (DPE 2023f).

2 Landscape context

2.1 Identifying landscape features

In accordance with the BAM, a number of features are assessed within and surrounding the subject land and within a 1,500 m buffer around the subject land (**Figure 2.1**). These landscape features are used to identify biodiversity values that are important for the subject land and inform the assessment of habitat suitability of the subject land for threatened species. Other features, such as rivers, streams, estuaries and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate.

2.1.1 IBRA regions and subregions

The Interim Biogeographic Regionalisation of Australia (IBRA, DoEE 2012) is a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the NSW Sydney Basin IBRA region (version 7.0) and within the Yengo IBRA subregion (version 7.0).

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located within the Hornsby Plateau Landscape. This was entered into the BAM calculator as the dominant Mitchell Landscape. Directly to the west of the subject land, and within 1,500 m buffer, is the Maroota Sands Mitchell Landscape.

The Hornsby Plateau landscape is described as (DECC 2002):

> *Benched hill slopes and steep hills with narrow flat-topped ridges and broader plateau tops on horizontal Triassic quartz sandstone with occasional conglomerate and thin discontinuous shales. Isolated thicker shales and areas of 'laterite' development on plateaus. General elevation 0 to 220m, local relief 30 to 120m. Shallow uniform sands amongst rock outcrops. Deep gradational yellow earths on some plateau areas, yellow texture-contrast soils on benches, deep uniform sands, organic sands and limited podsols in depositional areas. Very diverse vegetation related to site and soil conditions. Crests and ridges, scribbly gum (*Eucalyptus haemostoma*), red bloodwood (*Corymbia gummifera*), brown stringybark (*Eucalyptus capitellata*), silvertop ash (*Eucalyptus sieberi*) and old man banksia (*Banksia serrata*) with a high proportion of Proteaceae and Acacia in the understorey. Slopes; smoothbarked apple (*Angophora costata*), Sydney peppermint (*Eucalyptus piperita*), yellow bloodwood (*Corymbia eximia*), Leptospermum sp., and forest oak (*Allocasuarina torulosa*); protected valley floors with rainforest elements including turpentine (*Syncarpia glomulifera*), Sydney blue gum (*Eucalyptus saligna*), blackbutt (*Eucalyptus pilularis*), water gum (*Tristaniopsis laurina*), coachwood (*Ceratopetalum apetalum*), cabbage-tree palm (*Livistona australis*). Extensive wet and dry heaths on plateau, Sydney blue gum, blackbutt, turpentine tall forest on thicker shale ridge tops with deep gradational red clay loam to clay soil.*

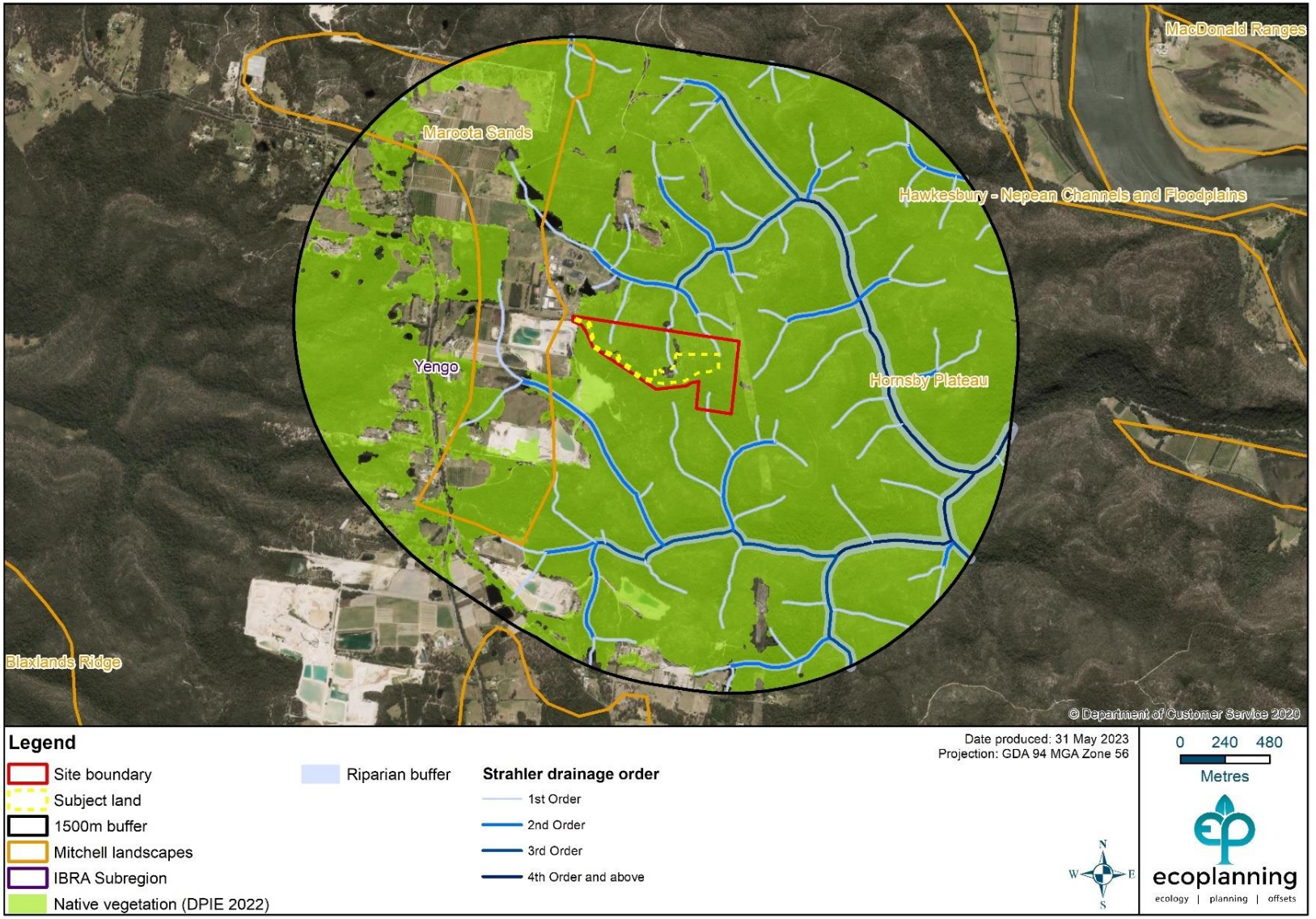


Figure 2.1: Landscape features within 1,500 m assessment circle

2.1.3 Soil landscapes

The subject land lies mostly within the 'Sydney Town' soil landscape (**Figure 2.2**). The Sydney Town soil landscape comprises low hills on Hawkesbury Sandston and Narrabeen Group Terrigal Formation (sandstone-quartz, siltstone/mudstone, shale and claystone) with local relief 20 – 90 m, slopes 5 – 25 % and rock outcrops covering 2 – 10 % of ground. Vegetation consists of cleared ground and remnant open woodland, usually dry sclerophyll forest. The dominant soil materials comprise yellow and grey kandosols, tenosols, rudosols, and yellow and grey kurosols. A small portion of the west end of the subject land is in the Disturbed Terrain soil landscape. This landscape refers to areas that are extensively disturbed by human activity, where landfill includes soil, rock, building and waste materials.

2.1.4 Other features

Rivers, streams and estuaries

Rivers, streams and wetlands located within the 1,500 m assessment circle of the subject land, including the associated riparian buffers calculated in accordance with Appendix E of the BAM, are shown in **Figure 2.1**.

Within the subject land there is one mapped first-order watercourse in the central portion, and the riparian buffer of another first-order stream in the north-east corner (**Figure 2.1**). However, field validation of these first-order streams showed that neither lies within the subject land, with no defined bank or channel observed within the subject land. The western stream begins north of the subject land, and the eastern stream is just to the east of the subject land. Each of these streams drains to the north into Dalgety's Creek, which then flows east to the Hawkesbury River.

Most watercourses found within the 1,500 assessment buffer are also within the Dalgety's Creek catchment, and all are within the larger Hawkesbury River catchment.

Local and important wetlands

Under the BAM, a ***Local Wetland*** is defined as an area of land that is wet by surface water or groundwater, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle). An ***Important Wetland*** is a wetland listed under the Directory of Important Wetlands of Australia (Environment Australia 2001) or an area included under the State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021.

No important wetlands are present within the subject land. Within the main body of the subject land there is a former extraction area that holds water and is fringed by aquatic vegetation. This former extraction area could be considered a local wetland.

Habitat connectivity

Desktop analysis was undertaken to identify connectivity of different areas of habitat that may serve as movement corridors for threatened species across their range. Native vegetation in the subject land and surrounding 1,500 m assessment buffer is part of a large extent of native vegetation including Marramarra National Park and extending north and east to the

Hawkesbury River (**Figure 2.1**). To the west of the subject land, the Old Northern Road corridor marks a gap in the continuous native vegetation, but to the west of the road corridor there is also a large expanse of native vegetation.

Areas of geological significance and soil hazard features

No designated areas of geological significance (including karst, caves, crevices and cliffs) have been identified within the subject land and 1,500 m assessment circle. The subject land itself is comprises a broad, relatively flat ridgetop sloping down to the north and south. On the slopes to the north, and within the subject land, sandstone outcrops are common and extensive.

Areas of outstanding biodiversity value

Areas of outstanding biodiversity value (AOBVs) as defined under the BC Act are currently limited to areas that were previously declared as critical habitat under the *Threatened Species Conservation Act 1995.* No declared areas of outstanding biodiversity value as defined under the BC Act have been identified within the subject land or the 1,500 m assessment circle.

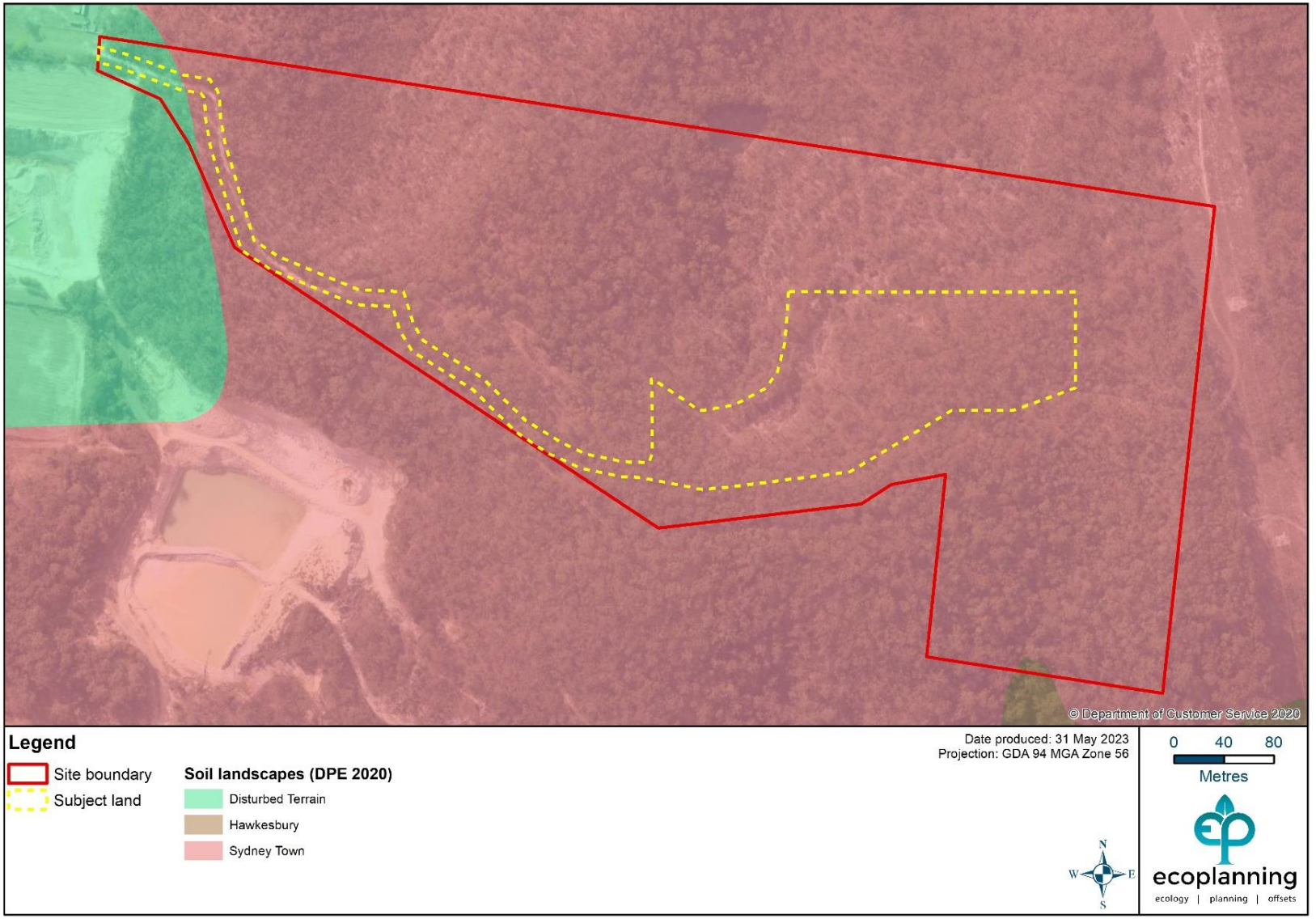


Figure 2.2: Soil landscapes

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 of the BAM, native vegetation cover must be estimated for a 1,500 m buffer around the subject land to determine the landscape context of the subject land (**Figure 2.1**).

The total area of the 1,500 m buffer around the subject land is 1,079 ha, with the area of native vegetation mapped within the buffer being 886 ha. This is a native vegetation cover of 82% and this value was entered into the BAM calculator.

2.2.2 Assessing patch size

Section 4.3.2 of the BAM defines patch size as "*an area of native vegetation that*:

a) *occurs on the development site or biodiversity stewardship site, and*

b) *includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems).*

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site."

Under the BAM, patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha. Patch size was calculated for the vegetation within the subject land using the field validated map of vegetation types and the updated native vegetation extent data based on the mapping of DPE (2022). As stated above, native vegetation within the subject land is part of a large extent of native vegetation extending to the Hawkesbury River. In accordance with section 5.3.2 of the BAM, the patch size for all vegetation zones within the subject land was assigned as being within the >100 ha class. A patch size of 101 ha was entered into the BAM Calculator for all vegetation zones.

3 Native vegetation

3.1 NSW State Vegetation Type Mapping

Existing vegetation mapping for the subject land and study area has been reviewed. The NSW State Vegetation Type Map (DPE 2022a) identifies one native vegetation community within the subject land (**Figure 3.1**):

- PCT 3593 – Sydney Coastal Sandstone Bloodwood Shrub Forest.

This PCT is not associated with any threatened ecological community (TEC) listed under the BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The State Vegetation Type Map identifies several PCTs within the study area for the Proposal but outside the subject land:

- PCT 3586 – Northern Sydney Scribbly Gum Woodland
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest
- PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland
- PCT 4127 – Colo Plateau Dwarf Apple Heath-Woodland.

None of these PCTs are associated with a TEC listed under the BC Act or the EPBC Act.

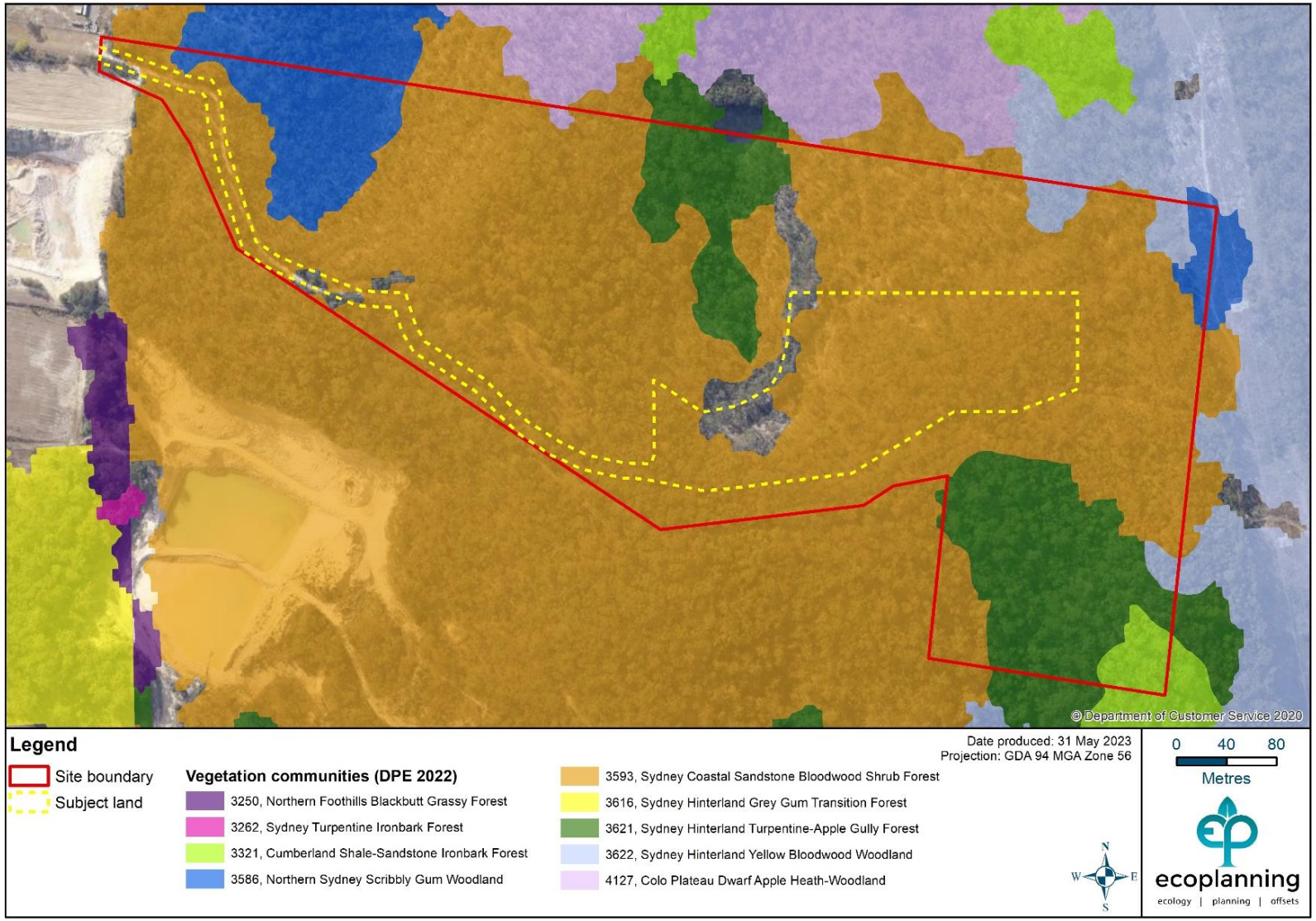


Figure 3.1: NSW State Vegetation Type Mapping (DPE 2022a)

3.2 Field-validated vegetation mapping

3.2.1 Method

Assessment and mapping of vegetation on the subject land was undertaken on 22 August 2022 by Liz Norris (Senior Ecologist) and Brendan Fletcher (Consultant Ecologist) and on 7 June 2023 by Ben Brown (Ecologist). The areas within the subject land were traversed while recording the vegetation structure and dominant species within each structural layer. Field survey was conducted to identify the extent of native vegetation, validate PCT boundaries and map the extent of vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

3.2.2 Vegetation extent and native species

A total of 3.77 ha within the 4.13 ha of subject land was identified as supporting native vegetation. Areas that did not support native vegetation do not require further assessment, except where they represent habitat for threatened species. For the subject land of this proposal, the areas that do not support native vegetation are limited to a small area of open water associated within the former extraction area and areas cleared for two existing access roads, which were estimated to be 4.5 m wide.

Most of the native vegetation was in a moderate condition with canopy, mid-storey and groundcover species represented. Trees were mature, but generally not large, indicating that vegetation has been removed in the past. There were scattered areas of more intensive disturbance, such as both maintained and partially overgrown tracks and a small flat area infested with Whiskey Grass that may have once been occupied by a structure. On the ridgetop, the canopy was dominated by *Eucalyptus punctata* (Grey Gum), with *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) and *Syncarpia glomulifera* (Turpentine) also represented. On the slope below the ridgetop, *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) were co-dominant. In the northwest and northeast corners of the study area, in areas with extensive sandstone outcropping, the canopy was dominated by *Eucalyptus haemastoma* (Scribbly Gum) with a subcanopy of *Angophora hispida* (Dwarf Apple). On the south-facing sloping in Lot 2 // DP 609224 and within the north-facing gully in Lot 1 // DP 609224, outside the subject land but within the study area, the canopy was dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Sydney Red Gum) and *S. glomulifera*.

A total of 117 flora species were identified in the subject land, of which 114 were native and 3 were exotic (**Appendix A**). The nomenclature in this report follows the Flora of NSW (Harden 1990-2002) and updates provided in PlantNET (RBGDT 2023).

3.2.3 Identification of PCTs

The identification of PCTs for each vegetation community was undertaken in accordance with the NSW PCT classification as described in the NSW BioNet Vegetation Classification (DPE 2023c).

Vegetation within the subject land was also assessed against the final determinations for TECs listed under the BC Act and EPBC Act to determine whether the vegetation within the subject land formed part of any TEC.

Based on the species identified during traverses of the study area, and informed by regional vegetation mapping, three PCTs were identified within subject land:

- PCT 3586 – Northern Sydney Scribbly Gum Woodland
- PCT 3616 – Sydney Hinterland Grey Gum Transition Forest
- PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland.

Northern Sydney Scribbly Gum Woodland was selected for the scrubby areas in the northeast and northwest corner of the study area. Sydney Hinterland Grey Gum Transition Forest was selected for the ridgetop vegetation community dominated by *Eucalyptus punctata* (Grey Gum). Sydney Hinterland Yellow Bloodwood Woodland was selected for the slope community co-dominated by *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood).

A fourth PCT was identified within the study area but not within the subject land:

- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest.

This PCT was selected for the north-facing gully and south-facing slope dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine). This PCT was mapped but not further assessed in this BDAR because it will not be impacted by the Proposal.

None of the PCTs identified within the subject land or study area is associated with a threatened ecological community listed under the BC Act or the EPBC Act.

Field-validated vegetation mapping is shown in **Figure 3.2**.

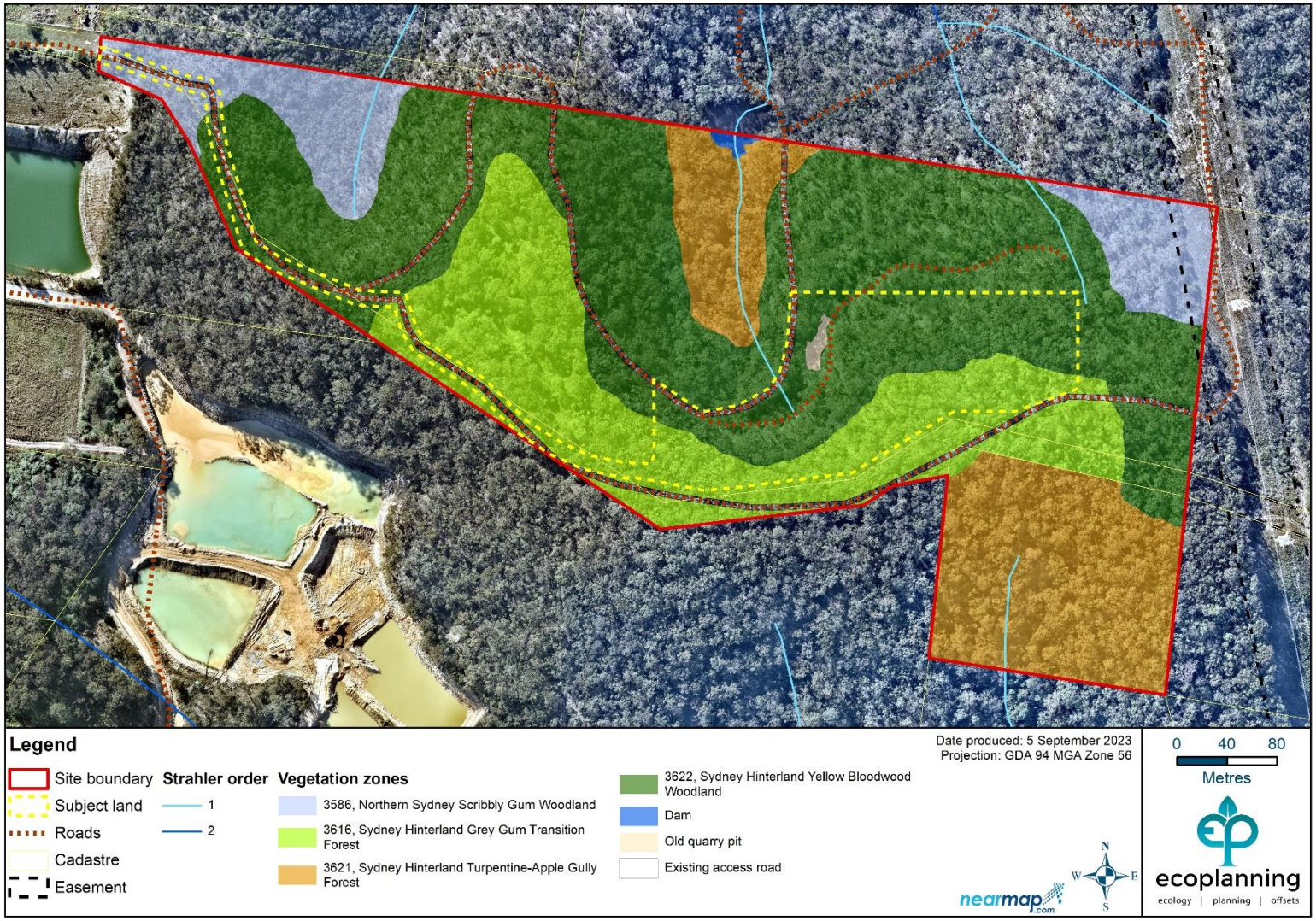


Figure 3.2: Field-validated vegetation

3.2.4 Vegetation zones and condition classes

All PCTs were assigned a single condition class: Moderate. A summary of the vegetation zones within the subject land is provided in **Table 3.1**.

Table 3.1: Details of vegetation communities recorded within the subject land

Vegetation zone	PCT	Vegetation formation and class	Condition class	BC Act	EPBC Act	Area in subject land (ha)
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Dry Sclerophyll Forests (Shrubby sub-formation) and Sydney Coastal Dry Sclerophyll Forests	Moderate	-	-	0.08
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Dry Sclerophyll Forests (Shrubby sub-formation) and Sydney Hinterland Dry Sclerophyll Forests	Moderate	-	-	1.42
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Dry Sclerophyll Forests (Shrubby sub-formation) and Sydney Hinterland Dry Sclerophyll Forests	Moderate	-	-	2.26
4	Existing access roads and former extraction area	-	-	-	-	0.36
					Total	4.13

3.2.5 Other PCTs considered

Determination of the most appropriate PCTs for vegetation communities within the study area used the BioNet Vegetation Classification database to identify PCT types which matched the geographic distribution (based upon IBRA subregions), vegetation formation and floristics of vegetation within the study area, together with previous vegetation mapping. An initial filtering was carried out based on the IBRA Bioregion (Sydney) and Subregion (Yengo) and the LGA (Hornsby), and the species occurring within the BAM plots conducted. A further filtering was carried out based on general geographical and landscape position and community descriptions. In general, Sydney Coastal Forests were eliminated and Sydney Hinterland Forest or Woodland PCTs were retained on the basis that community descriptions for Sydney Hinterland communities were better fit for the native vegetation within the subject land, although an exception was made for PCT 3587, Northern Sydney Scribbly Gum Woodland, as this PCT is mapped in the area and is known to occur extensively in the Sydney Hinterland.

Filtering yielded a list of the following potential PCTs for the three vegetation communities identified in the subject land:

- PCT 3586 – Northern Sydney Scribbly Gum Woodland
- PCT 3616 – Sydney Hinterland Grey Gum Transition Forest
- PCT 3617 – Sydney Hinterland Peppermint-Apple Forest
- PCT 3619 – Sydney Hinterland Enriched Sandstone Bloodwood Forest
- PCT 3620 – Sydney Hinterland Turpentine Apple-Gully Forest
- PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland.

PCTs 3617 and 3620 were eliminated from consideration due to the absence of *Eucalyptus piperita* (Sydney Peppermint) and the comparatively small numbers of *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine) within the subject land, and because these two vegetation communities are found in gullies rather than upon ridgetops or slopes.

The remaining three PCTs (3586, 3616, 3619 and 3622) were assessed in detail against the scrubby vegetation community identified as PCT 3586 – Northern Sydney Scribbly Gum Woodland, the ridgetop vegetation community identified as PCT 3616 – Sydney Hinterland Grey Gum Transition Forest and the slope vegetation community identified as PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland. In addition, for PCT 3616, PCT 3321 – Cumberland Shale – Sandstone Ironbark Forest was also considered due to its floristic, geographical and landscape similarity to PCT 3616.

Alternatives to PCT 3586 – Northern Sydney Scribbly Gum Woodland

For the community identified as PCT 3586 – Northern Sydney Scribbly Gum Woodland, PCT 3616, 3619 and 3622 and PCT 3321 were all rejected as alternatives due to dominance of *Eucalyptus haemastoma* (Scribbly Gum) and *Angophora hispida* (Dwarf Apple) in the canopy and the comparative lack of canopy species that are dominant in the rejected vegetation communities.

Alternatives to PCT 3616 – Sydney Hinterland Grey Gum Transition Forest

For the ridgetop community identified as PCT 3616 – Sydney Hinterland Grey Gum Transition Forest, PCT 3619 and PCT 3622 were rejected as alternatives due to the comparative lack of bloodwood species on the ridgetop and a better representation of diagnostic grasses and forbs in the selected PCT as compared to the PCTs 3619 and 3622.

However, the ridgetop community (PCT 3616) had a strong floristic overlap with PCT 3321 – Cumberland Shale – Sandstone Ironbark Forest. PCT 3321 was ultimately rejected because of the complete absence of ironbark species, a key component of PCT 3321, from the area mapped as PCT 3616. In addition, PCT 3321 often has substantial cover of *Bursaria spinosa* (Blackthorn) and *Leucopogon juniperinus* (Prickly Beard-heath) while PCT 3616 does not; both key diagnostic species for PCT 3321 were absent from the ridgetop vegetation community within the study area. Finally, plot data was entered into 'Tozer *et al.* (2010) Vegetation Analysis Tool' (Hager and Steenbeeke 2018) (the Tozer Tool), which analyses species lists for BAM plots against vegetation communities by Tozer *et al.* (2010), to provide an additional check against these observations. The plot data was then compared to Tozer vegetation communities DSF p146 – Sydney Hinterland Transition Woodland (SHTW), a vegetation

community related to PCT 3616, and GW p2 - Cumberland Shale Sandstone Transition Forest (CSSTF), a vegetation community related to PCT 3321. Results are provided in **Table 3.2**. Although minimum species numbers to achieve a fully valid result were not obtained, results were considerably stronger for DSF p146 (PCT 3616) than for GW p2 (PCT 3321).

Table 3.2: Comparison of DSF p146 (PCT 3616) with GW p2 (PCT 3321)

Plot	Map unit assessed	Min. total species required	Total species	Criteria met?	Min. positive diagnostic species required	Number of positive diagnostic species recorded	Criteria met?	Percentage of total species that are positive diagnostic species
1	DSF p146 (SHTW)	42	41	No	31	30	No	97%
1	GW p2 (CSSTF)	39	41	Yes	26	16	No	62%

Alternatives to PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland

For the slope community identified as PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland, PCT 3616 and PCT 3321 were rejected as alternatives due to much stronger representation of tree and shrub species characteristic of PCT 3619 and PCT 3622 in the study area than for PCTs 3616 and 3321. However, distinguishing between PCT 3619 and PCT 3622 on the basis of number of diagnostic species was difficult; the floristics of the slope plots conformed well to both PCTs. Ultimately, PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland was chosen over PCT 3619 – Sydney Hinterland Enriched Sandstone Bloodwood Forest on the basis of dominant tree species. In the slope plots carried out within the study area, *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) were roughly co-dominant. This conforms with PCT 3622, as *C. eximia* and *C gummifera* are the most frequently occurring trees, occurring in 78% of PCT plots for *C. eximia* and 68% of plots for *C. gummifera*. However, it is inconsistent with PCT 3619, where *C. gummifera* is present in 85% of plots but *C. eximia* is present in only 9%. For this reason, PCT 3622 was selected for the slope vegetation community within the subject land.

3.3 Vegetation community descriptions and condition classes

Descriptions of the vegetation communities present within the subject land are provided in the following sections. Excerpts from the BioNet Vegetation Classification profile are presented for each of the PCTs identified within the subject land, with species recorded in the PCT within the subject land listed in bold, in order to provide a baseline for a 'typical' occurrence of the PCT. Following the BioNet profile, descriptions of the PCT and other vegetation communities as observed within the subject land are provided.

3.3.1 PCT 3586: Northern Sydney Scribbly Gum Woodland

BioNet profile of PCT 3586

Table 3.3: BioNet plant community type profile (DPE 2023c) – Northern Sydney Scribbly Gum Woodland

Plant community type (PCT)	PCT 3586 – Northern Sydney Scribbly Gum Woodland
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Coastal Dry Sclerophyll Forests
Upper stratum (Trees)	***Eucalyptus haemastoma* (Scribbly Gum)**, ***Angophora hispida* (Dwarf Apple)**, ***Banksia serrata* (Old-man Banksia)**, ***Corymbia gummifera* (Red Bloodwood)**, ***Allocasuarina littoralis* (Black She-oak)**
Middle stratum (Shrubs)	***Leptospermum trinervia* (Flaky-barked Tea-tree)**, ***Banksia ericifolia* (Heath-leaved Banksia)**, ***Platysace linearifolia***, ***Lambertia formosa* (Mountain Devil)**, ***Banksia oblongifolia* (Fern-leaved Banksia)**, *Acacia suaveolens* (Sweet Wattle), ***Hakea dactyloides* (Finger Hakea)**, ***Grevillea buxifolia* (Grey Spider Flower)**, *Leucopogon microphyllus*, ***Boronia ledifolia* (Showy Boronia)**, ***Petrophile pulchella* (Conesticks)**, *Hakea teretifolia* (Needlebush), ***Bossiaea scolopendria***, ***Epacris pulchella* (Wallum Heath)**
Ground stratum (Grasses, ferns, forbs, climbers and vines)	***Cyathocaeta diandra***, ***Lepyrodia scariosa***, ***Entolasia stricta* (Wiry Panic)**, ***Lomandra glauca* (Pale Mat-rush)**, ***Anisopogon avenaceus* (Oat Speargrass)**, ***Actinotus minor* (Lesser Flannel-flower)**, ***Dampiera stricta***, *Patersonia sericea* (Silky Purple-flag), *Xanthosia tridentata* (Rock Xanthosia), ***Xanthorrhoea media* (Grass Tree)**
Descriptive attributes	A mid-high to tall, rarely very tall, sclerophyll woodland with a diverse heathy shrub layer found on Hawkesbury sandstone ridgetops on the coastal and hinterland parts of the Hornsby plateau, northern Sydney. The tree canopy very frequently consists of a sparse to mid-dense cover of ***Eucalyptus haemastoma*** commonly with ***Corymbia gummifera***, ***Angophora hispida*** and/or ***Banksia serrata***. ***Allocasuarina littoralis*** commonly occurs in the upper stratum in the Lane Cove area which may suggest a history of disturbance. A diverse and dense shrub layer is always present and includes ***Banksia ericifolia***, ***Banksia oblongifolia***, ***Banksia serrata***, ***Leptospermum trinervium***, ***Grevillea buxifolia*** and ***Petrophile pulchella***. Other common shrubs include ***Platysace linearifolia***, ***Lambertia formosa*** and *Acacia suaveolens*. The ground layer very frequently includes a sparse cover of grasses, forbs and sedges including ***Actinotus minor***, ***Cyathochaeta diandra***, ***Lepyrodia scariosa*** and ***Entolasia stricta***. This PCT occurs extensively throughout the sandstone national parks north and south of the Hawkesbury River at elevations of between 40-290 metres asl and with a mean annual rainfall above 900 mm, extending west to the Maroota area. With increasing rock outcrop and decreasing soil depth, this PCT grades into the sandstone heath PCT 3807.
Full reference details	Connolly, D., Binns, D., Turner, K., Hager, T., Lyons, M., Magarey, E. (in prep.) A revised classification of Plant Community Types for eastern New South Wales. NSW DPIE, Parramatta.

Estimate remaining pre-European extent	85% (15% cleared)
TEC Name (Listing status)	N/A

* Species occurring within this PCT in the subject land are in **bold**.

PCT 3586 as found in the subject land

PCT 3586, Northern Sydney Scribbly Gum Woodland, occurs within the subject land around the access road at the entrance to the site and in the northeastern corner of the study area. Canopy coverage is sparse, but *Eucalyptus haemastoma* (Scribbly Gum) is the dominant tree with a subcanopy of *Angophora hispida* (Dwarf Apple) (**Figure 3.3**). The shrub layer is dense, with thickets of *Banksia* species and *Petrophile pulchella* (Conesticks) in places (**Figure 3.4)**. Other shrub species include *Grevillea buxifolia* (Grey Spider Flower), *Lambertia formosa* (Mountain Devil), *Epacris pulchella* (Wallum Heath) and *Hakea sericea* (Needlebush). Ground layer species include *Lepyrodia scariosa*, *Cyathochaeta diandra* and *Lomandra filiformis* (Wattle Mat-rush).



Figure 3.3: PCT 3586 with *Eucalyptus haemastoma* (Scribbly Gum) and *Angophora hispida* (Dwarf Apple)



Figure 3.4: PCT 3586 with Banksia shrub layer

3.3.2 PCT 3616: Sydney Hinterland Grey Gum Transition Forest

BioNet profile of PCT 3616

Table 3.4: BioNet plant community type profile (DPE 2022c) – Sydney Hinterland Grey Gum Transition Forest

Plant community type (PCT)	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Upper stratum (Trees)	***Eucalyptus punctata* (Grey Gum)**, ***Corymbia gummifera* (Red Bloodwood)**, ***Allocasuarina littoralis* (Black She-oak)**, ***Angophora bakeri* (Narrow-leaved Apple)**, ***Syncarpia glomulifera* (Turpentine)**
Middle stratum (Shrubs)	***Phyllanthus hirtellus* (Thyme Spurge)**, ***Persoonia linearis* (Narrow-leaved Geebung)**, ***Leptospermum trinervium* (Flaky-barked Tea-tree)**, *Pimelea linifolia* (Slender Rice Flower), *Lissanthe strigosa* (Peach Heath), ***Acacia ulicifolia* (Prickly Moses)**, ***Acacia linifolia* (White Wattle)**, ***Banksia spinulosa* (Hairpin Banksia)**, *Exocarpos strictus* (Pale-fruit Ballart), ***Kunzea ambigua* (Tick Bush)**, *Acacia terminalis* (Sunshine Wattle), ***Persoonia levis* (Broad-leaved Geebung)**, *Grevillea mucronulata*, *Hakea sericea* (Needlebush), ***Bossiaea obcordata* (Spiny Bossiaea)**
Ground stratum (Grasses, ferns, forbs, climbers and vines)	***Entolasia stricta* (Wiry Panic)**, *Lomandra obliqua*, ***Themeda triandra* (Kangaroo Grass)**, ***Lomandra multiflora* (Many-flowered Mat-rush)**, ***Lepidosperma laterale***, ***Aristida vagans* (Threeawn speargrass)**, ***Panicum simile* (Two-colour Panic)**, ***Lomandra filiformis* (Wattle Mat-rush)**, ***Austrostipa pubescens***, ***Microlaena stipoides* (Weeping Grass)**, ***Cyathochaeta diandra***, ***Pomax umbellata***, *Dianella revoluta* (Blueberry Lily), *Goodenia hederacea* (Forest Goodenia), ***Cheilanthes sieberi***, ***Billardiera scandens* (Hairy Apple Berry)**
Landscape position	A shrubby sclerophyll woodland or open forest with a grassy ground cover found on enriched Hawkesbury or Mittagong sandstone ridges, thin shale caps or lenses on crests or slopes on the margins of the Cumberland Plain, western Sydney. The tree canopy very frequently includes a high cover *of* ***Eucalyptus punctata*** commonly in association with ***Corymbia gummifera*** and one or more species of stringybarks, of which *Eucalyptus oblonga* and ***Eucalyptus sparsifolia*** are most frequent. A sparse cover of smaller trees commonly includes ***Allocasuarina littoralis* and** occasionally ***Angophora bakeri***. The shrub layer is sparse and characterised by sclerophyll shrubs. ***Persoonia linearis*** is very frequently recorded, commonly with ***Leptospermum trinervium***, *Lissanthe strigosa* and ***Acacia linifolia***. A combination of grass species is common and may include one or more of ***Themeda triandra***, ***Aristida vagans***, ***Microlaena stipoides***, ***Panicum simil****e* and ***Austrostipa pubescens***. Small shrubs such as ***Phyllanthus hirtellus*** are very frequent.

Full reference details	Connolly, D., Binns, D., Turner, K., Hager, T., Lyons, M., Magarey, E. (in prep.) A revised classification of Plant Community Types for eastern New South Wales. NSW DPIE, Parramatta;
Estimate remaining pre-European extent rounded to nearest 5%	40% (60% cleared)
TEC Name (Listing status)	No associated TEC*

* Species occurring within this PCT in the subject land are in **bold**.

3.3.3 PCT 3616 as found in the subject land

PCT 3616, Sydney Hinterland Grey Gum Transition Forest, occurs on the ridgetop in the southern portion of the subject land. *Eucalyptus punctata* (Grey Gum) is the dominant tree species, with *Syncarpia glomulifera* (Turpentine) and *Eucalyptus sparsifolia* (Narrow-leaved. PCT 3616 also occurring, at times in small thickets. The shrub layer is somewhat sparse, with species including *Persoonia linearis* (Narrow-leaved Geebung), *Exocarpos strictus* (Dwarf Cherry), *Acacia suaveolens* (Sweet Wattle) and *Dodonaea triquetra* (Large-leaf Hop-bush). Grasses were diverse with good coverage. Species included *Entolasia stricta* (Wiry Panic), *Themeda triandra* (Kangaroo Grass), *Imperata cylindrica* (Blady Grass) and *Microlaena stipoides* (Weeping Grass).



Figure 3.5: PCT 3616 dominated by *Eucalyptus punctata* (Grey Gum)



Figure 3.6: PCT 3616 with grassy ground layer

Plant community type profile of PCT 3622

Table 3.5: BioNet plant community type profile (DPE 2023c) – Sydney Hinterland Yellow Bloodwood Woodland

Plant community type (PCT)	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Trees	***Corymbia eximia* (Yellow Bloodwood)**, ***Corymbia gummifera* (Red Bloodwood)**, ***Angophora bakeri* (Narrow-leaved Apple)**, ***Eucalyptus punctata* (Grey Gum)**, ***Eucalyptus sparsifolia* (Narrow-leaved Stringybark)**
Shrubs	***Leptospermum trinervium* (Flaky-barked Tea-tree)**, ***Phyllanthus hirtellus* (Thyme Spurge)**, ***Persoonia linearis* (Narrow-leaved Geebung)**, *Acacia ulicifolia* (Prickly Moses), *Persoonia levis* (Broad-leaved Geebung), ***Platysace linearifolia, Monotoca scoparia*, *Acacia linifolia* (White Wattle)**, ***Grevillea buxifolia* (Grey Spider Flower)**, ***Banksia spinulosa* (Hairpin Banksia)**, ***Lambertia formosa* (Mountain Devil)**, ***Acacia suaveolens* (Sweet Wattle)**
Ground stratum (Grasses, ferns, forbs, climbers and vines)	***Lomandra obliqua, Entolasia stricta* (Wiry Panic)**, ***Lomandra glauca*** (Pale Mat-rush), *Caustis flexuosa* (Curly Wig), *Anisopogon avenaceus* (Oat Speargrass), ***Lepidosperma laterale*, *Lomandra multiflora subsp. multiflora* (Man-flowered Mat-grass)**, *Themeda triandra* (Kangaroo Grass), *Hovea linearis*, ***Pomax umbellata, Dampiera stricta*, *Dianella revoluta* (Blueberry Lily)**, *Patersonia sericea* (Silky Purple-flag), ***Pteridium esculentum* (Common Bracken)**, *Lindsaea microphylla* (Lacy Wedge Fern), *Lindsaea linearis* (Screw Fern), ***Xanthorrhoea media* (Grass Tree)**, ***Billardiera scandens* (Hairy Apple Berry)**
Description	A mid-high to tall dry heathy woodland found on exposed rocky ridges and slopes on Hawkesbury sandstone plateaus of the north and north-western Sydney hinterland. The tree canopy very frequently includes a high cover of ***Corymbia eximia*** and ***Angophora bakeri***, the latter abundant on the shallowest soils. These are occasionally accompanied or replaced by ***Eucalyptus punctata***, ***Corymbia gummifera*** and ***Eucalyptus sparsifolia***. A mid-dense shrub layer almost always includes ***Leptospermum trinervium***, very frequently ***Persoonia linearis*** and commonly ***Banksia spinulosa***, ***Grevillea buxifolia*** and *Persoonia levis*. The ground layer is patchy and sometimes broken by sandstone outcrops, however, very frequently includes the small shrub ***Phyllanthus hirtellus*** along with the grass ***Entolasia stricta*** and graminoids ***Lomandra obliqua*** and ***Lomandra glauca***. This PCT has an elevation range of 30-470 masl and a mean annual rainfall of 760-1130 mm. It extends from the lower Blue Mountains above the Nepean River and becomes widespread on the plateaus above the Hawkesbury, Colo and Macdonald rivers. Northern outliers occur on residual Hawkesbury sandstone peaks and knolls along the Hunter Range.
Full reference details	Connolly, D., Binns, D., Turner, K., Hager, T., Lyons, M., Magarey, E. (in prep.) A revised classification of Plant Community Types for eastern New South Wales. NSW DPIE, Parramatta
Estimate remaining pre-European	98% (1.62% cleared)

extent rounded to the nearest 5%	
TEC Name (Listing status)	No associated TEC

Species identified within the subject land are indicated in **bold**.

3.3.4 PCT 3622 as found in the subject land

PCT 3622 occurs in the subject land as the ridgetop slopes down to the north. Tree species are co-dominated by *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) and also include *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus haemastoma* (Scribbly Gum) (**Figure 3.7**). The shrub layer is very diverse, with *Phyllanthus hirtellus* (Thyme Spurge), *Persoonia linearis* (Narrow-leaved Geebung), *Exocarpos cupressiformis* (Native Cherry), *Persoonia levis* (Broad-leaved Geebung), *Platysace linearifolia, Monotoca scoparia, Acacia linifolia* (White Wattle), *Grevillea buxifolia* (Grey Spider Flower), *Banksia spinulosa* (Hairpin Banksia), *Lambertia formosa* (Mountain Devil) and others. The ground layer, where not interrupted by sandstone outcrops, is dominated by *Entolasia stricta* (Wiry Panic), with good coverage of *Austrostipa pubescens* and *Themeda triandra* (Kangaroo Grass) (**Figure 3.8**).

3.4 Threatened Ecological Communities

The three PCTs identified within the subject land, PCTs 3586, 3616 and 3622, are not associated with any listed threatened ecological community (TEC) within the BioNet Vegetation Classification.

Final determinations of the predicted TECs were assessed against the vegetation communities identified with the subject land. It was confirmed that none of these TECs are present within the subject land.

3.5 Weeds

Few weeds were identified within the subject land, and they were generally sparse. The one exception to this general rule was an area to the northeast of the former extraction area where there was an infestation of *Andropogon virginicus* (Whisky Grass). This was the only High-Threat Weed recorded within the subject land.



Figure 3.7: PCT 3622 – *Corymbia eximia* (Yellow Bloodwood) and shrub layer



Figure 3.8: PCT 3622: Banksia and sandstone outcrops

3.6 Hollow-bearing trees

Twelve hollow-bearing trees (HBTs) were recorded within the subject land, and 28 HBTs were recorded within the study area. HBTs ranged from small hollows <10 cm in diameter to large hollows >20 cm in diameter (**Figure 3.9**). The large hollows were often within stags. Hollows were concentrated in the less disturbed areas of the site that have been less extensively cleared in the recent past (see **Section 5.1**), either outside or on the periphery of the subject land.

3.7 Vegetation integrity scores

Five vegetation integrity (VI) survey plots were completed in the subject land. Two plots were located in PCT 3616, two in PCT 3622 and one in PCT 3586.

The VI plots were conducted within areas that represented the structure and condition of the community present within the subject land. The location of each assessment area was chosen to encompass:

- canopy representative of the PCT within the area to be impacted, and
- groundcover representative of the PCT within the area to be impacted.

VI scores were calculated based on the VI survey plots. The VI scores for each vegetation zone are shown in **Table 3.6** and are representative of a condition score out of 100. The field data sheets for the plots are in Appendix **B**.

Survey effort and BAM plots are shown in **Figure 3.10**.

Table 3.6: Vegetation integrity scores

Veg zone	PCT	Condition class	Area in ha	Vegetation integrity score
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	0.08	35.9
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	1.42	47.8
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	2.26	53.5

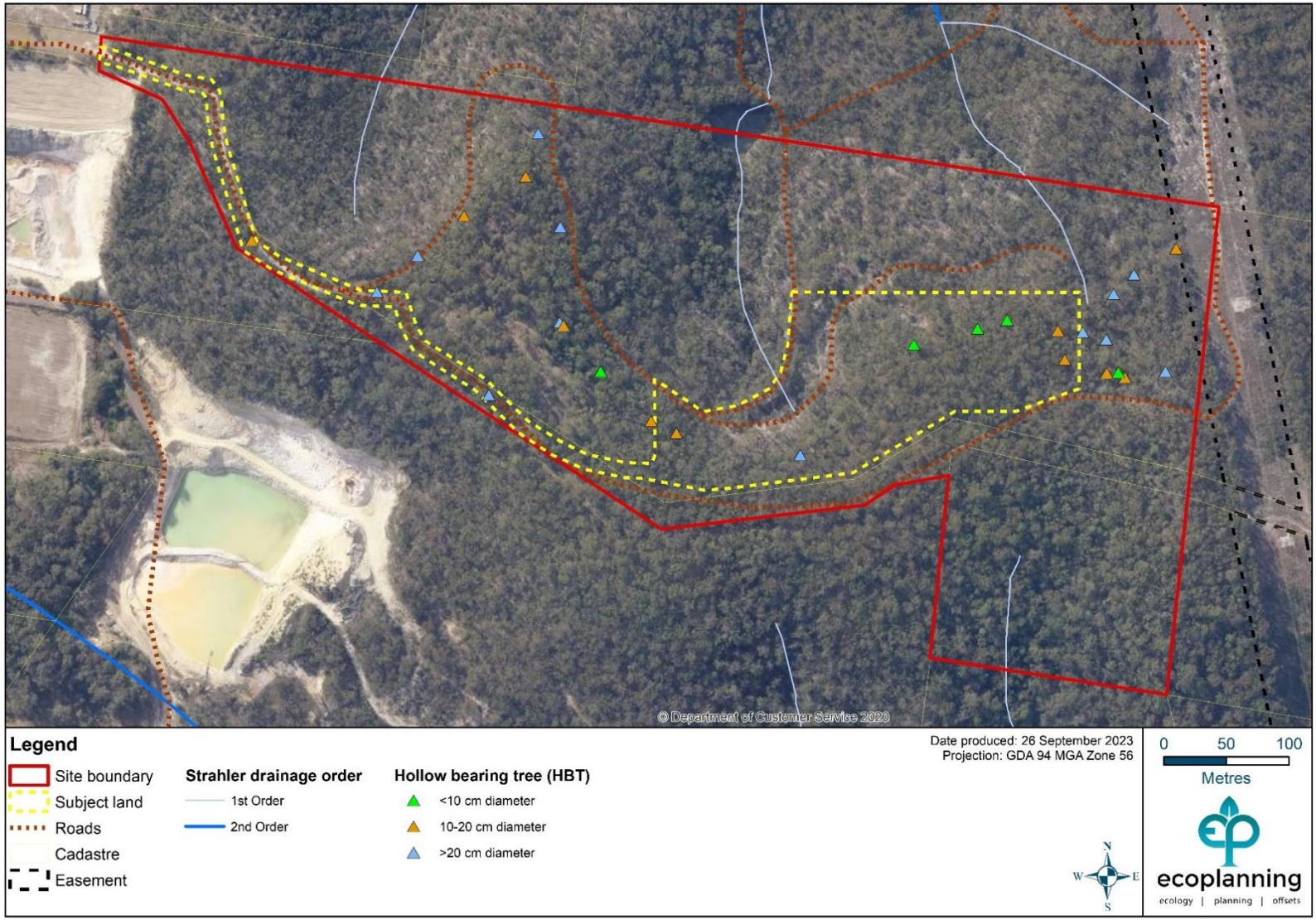


Figure 3.9: HBTs within the subject land and study area

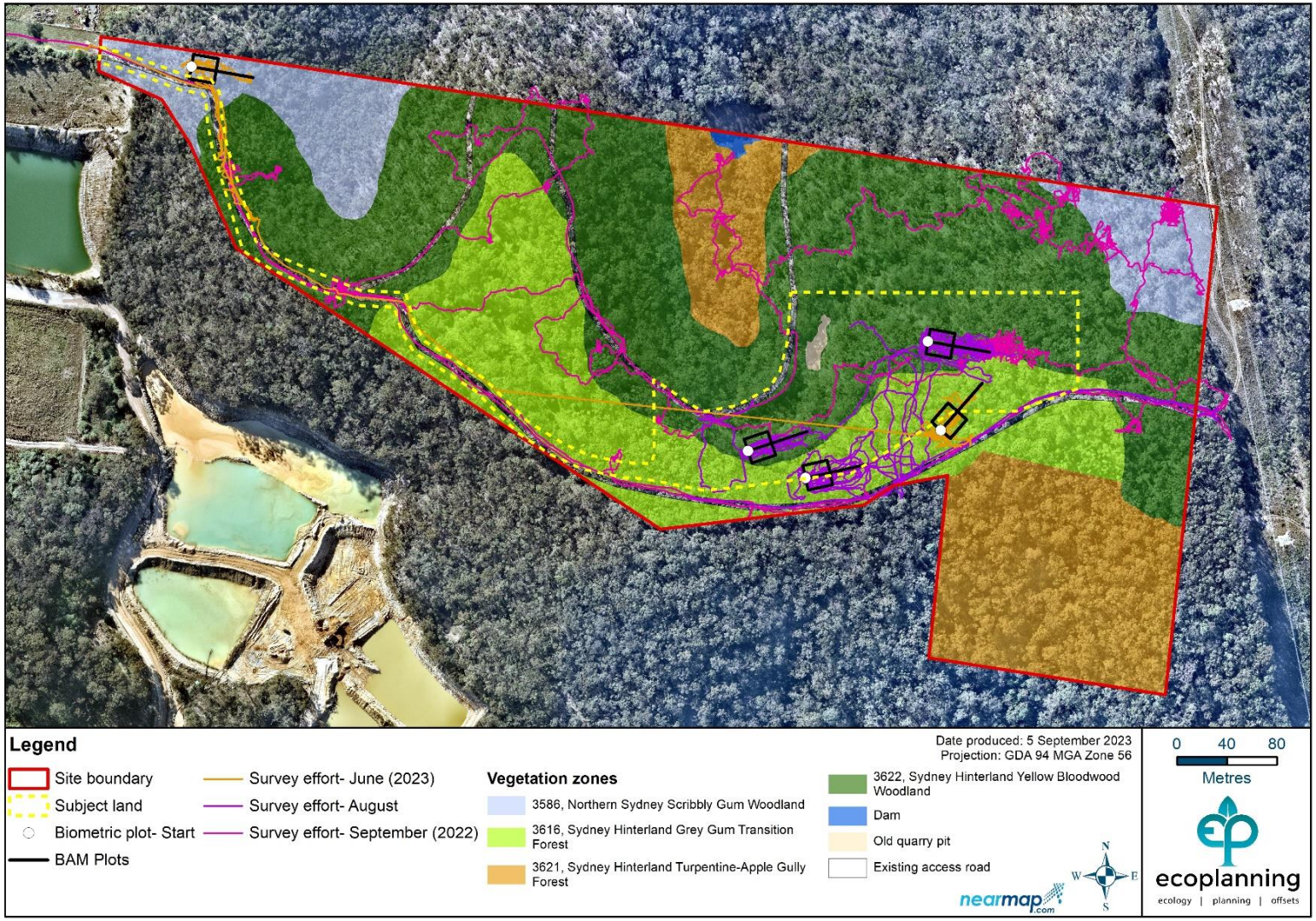


Figure 3.10: BAM plots and survey effort

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, ecosystem and species credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as ecosystem credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identified as species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the study area.

Some threatened species are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the study area, and the results of the targeted surveys for candidate threatened species.

4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species including the IBRA subregion in which the study area occurs (Yengo IBRA subregion),
- the species is associated with any of the PCTs identified within the study area,
- the native vegetation cover within the assessment area including the 1,500 m assessment circle around the subject and is equal to or greater than the minimum required for the species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species,
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM calculator. The PCTs identified within the study area, patch size, and native vegetation cover, as outlined in Section 3 of BAM (2020), were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated.

Selected ecosystem credit species and species credit species are predicted following assessment of geographic and habitat features in the credit calculator, such as site location (IBRA subregion), PCTs and their condition, patch size, and area of vegetation within the assessment circle. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment.

4.2 Ecosystem credit species

The BAM credit calculator initially predicted 42 ecosystem credit species to occur. Six predicted ecosystem credit species required further assessment of habitat constraints before being confirmed as an ecosystem credit species. **Table 4.1** outlines the habitat constraints for these species and whether each species is confirmed as an ecosystems credit species.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credit species

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as an ecosystem credit species
Calyptorhynchus lathami Glossy Black-Cockatoo	1. Other 2. Presence of *Allocasuarina* and *Casuarina* species	-	Yes
Ephippiorhynchus asiaticus Black-necked Stork	1. Swamps 2. Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps	-	Yes
Halieaeetus leucogaster	1. Waterbodies 2. Within 1 km of rivers, lakes, large dams or creeks, wetland and coastlines	-	Yes
Grantiella picta Painted Honeyeater	1. Other 2. Mistletoes present at a density of greater than five mistletoes per hectare	-	No – Mistletoes were not identified within the study area.
Ixobrychus flavicollis Black Bittern	1. Waterbodies 2. Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	-	Yes
Petaurus australis Yellow-bellied Glider	1. Hollow bearing trees 2. Hollows >25 cm in diameter	-	Yes

After the habitat constraints were considered, the 41 species listed in **Table 4.2** were retained as ecosystem credit species. As outlined above, targeted surveys are not required for these ecosystem species and impacts to these species are assessed in conjunction with impacts to PCTs.

Table 4.2: Ecosystem credit species predicted on site

Scientific Name / Common Name	BC Act status*	EPBC Act status*	Sensitivity to Gain Class
Anthochaera phrygia Regent Honeyeater (Foraging)	CE	CE	High
Artamus cyanopterus Dusky Woodswallow	V	-	Moderate
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	V	-	Moderate
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	V	-	High
Chthonicola sagittata Speckled Warbler	V	-	High
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V	-	High
Daphoenositta chrysoptera Varied Sittella	V	-	Moderate
Dasyurus maculatus Spotted-tailed Quoll	V	E	High
Ephippiorhyncus asiaticus Black-necked Stork	E	-	Moderate
Falsistrellus tasmaniensis **Eastern False Pipistrelle**	V	-	High
Glossopsitta pusilla Little Lorikeet	V	-	High
Haliaeetus leucogaster White-bellied Sea-Eagle	V	-	High
Hieraaetus morphnoides Little Eagle (Foraging)	V	-	Moderate
Hirundapus caudacutus White-throated Needletail	-	V	High
Hoplocephalus bungaroides Broad-headed Snake (Foraging)	E	V	High
Ixobrychus flavicollis Black Bittern	V	-	Moderate
Lathamus discolor Swift Parrot (Foraging)	E	CE	Moderate

Scientific Name / Common Name	BC Act status*	EPBC Act status*	Sensitivity to Gain Class
Lophoictinia isura Square-tailed Kite (Foraging)	V	-	Moderate
Melanodryas cucullata Hooded Robin (south-eastern form)	V	-	Moderate
Melithreptus gularis Black-chinned Honeyeater (eastern subspecies)	V	-	Moderate
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	V	-	High
Miniopterus australis **Little Bent-winged Bat (Foraging)**	V	-	High
Miniopterus orianae oceanensis **Large Bent-winged Bat (Foraging)**	V	-	High
Neophema pulchella Turquoise Parrot	V	-	High
Ninox connivens Barking Owl (Foraging)	V	-	High
Ninox strenua Powerful Owl (Foraging)	V	-	High
Pachycephala olivacea Olive Whistler	V	-	Moderate
Pandion cristatus Eastern Osprey (Foraging)	V	-	Moderate
Petaurus australis Yellow-bellied Glider	V	-	High
Petroica boodang Scarlet Robin	V	-	Moderate
Petroica phoenicea Flame Robin	V	-	Moderate
Phoniscus papuensis Golden-tipped Bat	V	-	High
Pomatostomus temporalis temporalis Grey-crowned Babbler (eastern subspecies)	V	-	Moderate
Pseudomys novaehollandiae New Holland Mouse	-	V	High

Scientific Name / Common Name	BC Act status*	EPBC Act status*	Sensitivity to Gain Class
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	V	V	High
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V	-	High
Scoteanax rueppellii Greater Broad-nosed Bat	V	-	High
Stagonopleura guttata Diamond Firetail	V	-	Moderate
Tyto novaehollandiae **Masked Owl (Foraging) (possible)**	V	-	High
Tyto tenebricosa Sooty Owl (foraging)	V	-	High
Varanus rosenbergi Rosenberg's Goanna	V	-	High

* CE- Critically Endangered; E- Endangered, V- Vulnerable, **Bold** = recorded within the study area.

4.3 Species credit species

The BAM credit calculator initially predicted 72 species credit species to occur (referred to as 'candidate species' within the BAM).

4.3.1 Habitat constraints, geographic limitations and habitat assessment

Species credit species, like ecosystem credit species, may require further assessment of specified habitat constraints or geographic limitations before being confirmed as a species credit species.

In addition, a predicted candidate species can be considered unlikely to occur within the study area (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area. If an assessor considers a predicted candidate species is unlikely to occur, the species can be removed from the candidate list and does not require further assessment on the study area (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the study area (or specific vegetation zones) must be documented.

The vegetation within the subject land has been disturbed by past clearing (**Section 5.1**), resulting in a lack of habitat features required for some candidate threatened species. Based on the habitat constraints, absence of microhabitats and the disturbed nature of portions of the site, a number of species have been excluded from further assessment (considered unlikely to use the subject land in accordance with Sections 5.2.2 and 5.2.3 of the BAM).

Of the 72 species credit species predicted by the BAM calculator to occur within the study area,15 species were excluded from further consideration because their habitat constraints were not present, they were not within their geographic limitations or the species were considered to be unlikely to occur due to degraded habitat.

The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the study area are provided in **Table 4.3**.

Table 4.3: Candidate species credit species and habitat assessments

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Acacia bynoeana Bynoe's Wattle	E	V	High		*Acacia bynoeana* occurs on sandy soils in dry sclerophyll forest and is known from approximately 30 sites. **Maintained**.
Acacia gordonii	E	E	High	1. Rocky areas 2. Sandstone outcrops, ridgetops, spurs or within 200 m	*Acacia gordonii* has a distribution that includes Maroota. It grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops. **Maintained**.
Acacia pubescens Downy Wattle	V	V	High		*Acacia pubescens* occurs on alluviums, shales and shale/sandstone intergrades, concentrated in the Bankstown-Fairfield-Rookwood and Pitt Town. **Excluded**: The subject land does not contain alluvium and is not in the area of Bankstown-Fairfield-Rookwood or Pitt Town.
Ancistrachne maidenii	V	-	High	-	*Ancistrachne maidenii* is restricted to northern Sydney around the St Albans – Mt White – Maroota – Berowra areas and to the Shannon Creek area south-west of Grafton. Populations occur in distinct bands in areas associated with a transitional geology between Hawkesbury and Watagan soil landscapes. **Maintained**: The subject land does not include a transition between the Hawkesbury and Watagan soil landscapes but the species is maintained due to the location of the subject land in Maroota.
Anthochaera phrygia Regent Honeyeater (Breeding)	CE	CE	High	1. Other 2. As per mapped areas	The Regent Honeyeater inhabits dry open forest and woodland and riparian forests of River She-oak. There are only two known breeding areas in NSW, in the Capertee Valley and the Bundara-Barraba regions. **Excluded**: The subject land is not part of the species Important Area Map.
Asterolasia elegans	E	E	Moderate		*Asterolasia elegans* is a tall, thin shrub to 3 m, with lance-shaped leaves and large, white flowers. It occurs in the north of Sydney in the Hills, Hawkesbury and Hornsby LGAs, on Hawkesbury sandstone in sheltered gullies. It is known from only seven populations. **Maintained.**

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Burhinus grallarius Bush Stone-curlew	E	-	High	1. Fallen/standing dead timber including logs	In NSW, the Bush Stone-curlew is found mainly on the western slopes and plains, in the Riverina, and on the Central and North Coasts. It in habits dry sclerophyll forests with fallen logs and standing dead timber. **Maintained**.
Callistemon linearifolius	V	-	Moderate		*Callistemon linearifolius* is distributed from the Georges River to the Hawkesbury, with populations on the Hornsby Plateau. It grows in dry sclerophyll forest. **Maintained**.
Callocephalon fimbriatum Gang-gang Cockatoo	V	E	High	1. Hollow bearing trees 2. Eucalypt tree species with hollows >9 cm	The Gang-gang Cockatoo occurs in tall mountain forests and woodlands in spring and summer and dry sclerophyll forests in autumn and winter. Nests in hollows >10 cm. **Maintained**.
Callocephalon fimbriatum – endangered population Gang-gang Cockatoo in the Hornsby and Ku-ring-gai Local Government Areas	EP	-	High	1. Hornsby and Ku-ring-gai Local Government Areas	**Maintained**.
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	V	-	High	1. Hollow bearing trees 2. Living or dead tree with hollows greater that 15cm diameter and greater than 8m above ground.	The Glossy Black-Cockatoo is a small black-brown cockatoo with a large bill and a small crest. It inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. **Maintained**.
Cercartetus nanus Eastern Pygmy-possum	V	-	High	-	Eastern Pygmy-possums feed on nectar from banksias, grevilleas and eucalypts, preferentially in heathlands. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Chalinolobus dwyeri Large-eared Pied Bat	V	V	Very High	1. Cliffs 2. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	The Large-eared Pied Bat roosts in caves and crevices and is found in dry open forest close to roosts or in well-timbered areas containing gullies. Breeding habitat for the species includes rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts and derelict concrete buildings. **Maintained**.
Darwinia biflora	V	V	High		Darwinia biflora has been recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde LGAs. It occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. **Maintained**.
Darwinia fascicularis subsp. *oligantha* – endangered population Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	EP	-	High	1. Other 2. Sandstone areas or within 100 m 3. Hills and Hornsby LGAs (as amended from the Determination)	The endangered population of this small shrub is restricted to the Maroota area and is known from only three populations. It occurs around rock platforms and in rocky heath associated with friable sandstone shallow soils. **Maintained**.
Darwinia peduncularis	V	-	High	1. Rocky areas 2. Within 50 m of rocky areas	*Darwinia peduncularis* is a spreading shrub to 1.5 m high that grows on or near rocky outcrops. **Maintained**.
Deyeuxia appressa	E	E	High		*Deyeuxia appressa* is known from only two records, one from 1920 south of Bankstown and the other from 1941 in Killara. It has not been collected in more than 60 years. It is an erect perennial grass to 0.9 m high. **Excluded**: There has never been a record near the subject land.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Dillwynia tenuifolia	V	-	Moderate		Occurs on the Cumberland Plain, often in association with gravel soils and *Eucalyptus fibrosa.* **Excluded**: There are no *E. fibrosa* within the subject land and the subject land is not within an area of shale-gravel transition.
Dillwynia tenuifolia Sieber ex D.C. in the Baulkham Hills Local Government Area Dillwynia tenuifolia – endangered population	E	-	High	The Hills LGA (as amended from the Determination)	**Excluded**: The subject land is not within the Hills LGA.
Epacris purpurascens var. *purpurascens*	V	-	Moderate		*Epacris purpurascens* var. *purpurascens* is a stocky *Epacris* found in a variety of shale-influenced habitats in the Sydney Basin. **Maintained**.
Eucalyptus sp. *Cattai*	CE	CE	High	-	*Eucalyptus* sp. *Cattai* is a small, often mallee-form tree with thick, fibrous, furrowed bark and lance-shaped leaves. It occurs in the Hills LGA in scrub, heath and low woodland on sandy soils. **Maintained**: The subject land is not within the Hills LGA, but is adjacent to the boundary.
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea	V	V	High		*Grevillea parviflora* subsp. *parviflora* is distributed throughout the Sydney Basin with sizeable populations around Picton, Appin and Bargo and in the Hunter at in the Cessnock - Kurri Kurri area. Separate populations are also known from Putty to Wyong and Lake Macquarie on the Central Coast. It grows in sandy or light clay soils usually over thin shales. **Maintained**.
Grevillea parviflora subsp. *supplicans*	E	-	High		*Grevillea parviflora* subsp. *supplicans* is a low shrub with a restricted distribution in north-west Sydney including the Maroota area. It grows on thin soils above massive sandstone. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	V	-	Hgih	1. Other 2. Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines	The White-bellied Sea-Eagle is a large eagle that feeds on fish and breeds in large stick nests in emergent eucalypts. **Maintained**.
Heleioporus australiacus Giant Burrowing Frog	V	V	Moderate		The Giant Burrowing Frog is a large frog that is found in heath, woodland and open dry sclerophyll forest on a variety of soil types. **Maintained**.
Hibbertia procumbens Spreading Guinea Flower	E	-	High	1. Within Yengo National Park	The Spreading Guinea Flower is known only from locations in the former Gosford and Wyong local government areas. **Excluded**: The subject land is not within Yengo National Park or the former Gosford or Wyong LGAs.
Hibbertia puberula	E	-	High		*Hibbertia puberula* is a small shrub that occurs on sandy soils. **Maintained**.
Hibbertia spanantha Julian's Hibbertia	CE	CE	High		*Hibbertia spanantha* is a hibbertia that grows in the Lucas Heights and Glenorie soil landscapes on the shale/sandstone transition in Ku-ring-gai, Ryde and Hornsby LGAs. All known populations are in the Lane Cove catchment. **Excluded**: The subject land is not located in the species' preferred soil landscapes or in the Lane Cove catchment.
Hibbertia superans	E	-	High		*Hibbertia superans* occurs from Baulkham Hills to south Maroota. It grows on sandstone ridgetops near the shale/sandstone interface. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Hieraatus morphnoides Little Eagle (Breeding)	V	-	Moderate	1. Other 2. Nest trees – live (occasionally dead) large old trees within vegetation)	The Little Eagle breeds in stick nests in large emergent eucalypts. **Maintained**.
Hoplocephalus bungaroides Broad-headed Snake (Breeding)	E	V	Very High	1. Rocky areas 2. Including escarpments, outcrops and pagodas within the Sydney Sandstone geologies	The Broad-headed Snake is confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups. It shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring, and moves to crevices or hollows in large trees in summer (Webb and Shine 1997). **Maintained**.
Kunzea rupestris	V	V	High	1. Rocky areas 2. Hawkesbury sandstone rock platforms or within 50 m	*Kunzea rupestris* is a clonal shrub about 1.5 m high that occurs in the Maroota – Sackville – Glenorie area. It grows in shallow depressions on large sandstone outcrops. **Maintained**.
Lasiopetalum joyceae	V	V	Moderate		*Lasiopetalum joyceae* is a shrub to 2 m that occurs on shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. **Maintained**.
Lathamus discolor Swift Parrot (Breeding)	E	CE	Moderate	1. Other 2. As per mapped areas	The Swift Parrot breeds in Tasmania in spring and summer and migrates to south-eastern Australia in autumn and winter. **Excluded**: The subject land is not on the Swift Parrot Important Area map.
Leptospermum deanei				1. Waterbodies 2. Or within 100 m of freshwater or estuarine streams	*Leptospermum deanei* is a shrub to 5 m that occurs in sandy alluvial soil or sand over sandstone in Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Leucopogon fletcheri subsp. *fletcheri*	E	-	High	1. Other 2. Slopes nearby rock areas or within 50 m rocky areas 3. Weathered laterite over sandstone on sandstone ridges, outcrops	*Leucopogon fletcheri* subsp. *fletcheri* is restricted to north-western Sydney within the Hills, Hawkesbury and Blue Mountains LGA. **Maintained**: The subject land is not within any of the LGAs where the species is found, but it is closely adjacent to the Hills LGA.
Litoria booroolongensis Booroolong Frog	E	E	High	-	The Booroolong Frog generally occurs along the western-flowing streams of the Great Dividing Range and lives along permanent streams with fringing vegetation cover. **Excluded**: The subject land is not located within the main portion of the species' range and does not contain a permanent stream. No records of the species were found in a search of a 10 x 10 km area centred on the subject land (DPE 2023c).
Litoria littlejohni Littlejohn's Tree Frog	V	V	High	-	Littlejohn's Tree Frog occurs on the plateaus and eastern slopes of the Great Dividing Range, with most records at high altitude. Breeding habitat is the upper reaches of permanent streams and perched swamps, and non-breeding habitat is heath-based forests and woodlands. **Maintained.**
Lophoictinia isura Square-tailed Kite	V	-	Moderate	1. Other 2. Nest trees	The Square-tailed Kite breeds in stick nests in large emergent eucalypts. **Maintained**.
Macropus parma Parma Wallaby	V	V	High		The Parma Wallaby is a small wallaby that occurs in moist eucalypt forest from Gosford to near Tenterfield. **Excluded**: The subject land is south of the species' current range.
Melaleuca deanei Deane's Paperbark	V	V	Very high	-	Dean's Paperbark is a shrub to 3 m with flaky park and smooth leaves to 25 x 6 mm. It occurs in northern and southern populations, with the northern population including the Gosford, Hawkesbury, Blue Mountains, Hills, Hornsby, Ku-ring-gain, Warringah and Ryde LGAs. Generally occurs in ridgetop woodland but occasionally in heath on sandstone. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Melaleuca groveana Grove's Paperbark	V	-	High	-	Grove's Paperbark is found in coastal districts north of Yengo National Park, with a disjunct population near Torrington. **Excluded**: The subject land is south of Yengo National Park.
Meridolum corneovirens Cumberland Plain Land Snail	E	-	High		The Cumberland Plain Land Snail Livers in Cumberland Plain Woodland under litter of bark, leaves and logs. **Maintained**.
Micromyrtus blakelyi	V	V	Moderate	1. Other 2. Skeletal soil, rocky areas 3. Hawkesbury sandstone rock platforms and outcrops or within 50 m	*Micromyrtus blakelyi* is a low shrub with a distribution from north of Maroota to Cowan. It grows in cracks and depressions on sandstone platforms. **Maintained**.
Miniopterus australis Little Bent-winged Bat (Breeding)	V	-	Very High	1. Caves 2. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' 3. Observation type 'E nest roost.' 4. with numbers of individuals >500 5. or from the scientific literature	The Little Bent-winged Bat roosts in caves, tunnels, tree hollows, abandoned mines and similar sheltered locations. There are only five known nursery sites in Australia. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	V	-	Very High	1. Caves 2. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' 3. Observation type code 'E nest-roost' 4. with numbers of individuals >500	The Large Bent-winged Bat roosts primarily in caves in colonies of 100 to 150,000 individuals. **Maintained**.
Mixophyes balbus Stuttering Frog	E	V	Very High		The Stuttering Frog is a large frog growing to 8 cm in length. It occurs along the east coast of Australia from southern Queensland to north-eastern Victoria along streams in hilly territory within rainforest and wet and dry sclerophyll forest. **Maintained**.
Mixophyes iteratus Giant Barred Frog	E	E	Moderate	1. Other 2. Land within 50 m of semi permanent and permanent drainages	The Giant Barred Frog is a large frog found along freshwater streams in moist riparian habitats such as rainforest or wet sclerophyll forest. **Maintained**.
Myotis macropus Southern Myotis	V	-	High		The Southern Myotis roosts within bridges, caves and artificial structures within 200 m of a riparian zone. They forage over streams and pools. **Maintained**.
Ninox connivens Barking Owl (Breeding)	V	-	High	1. Hollow bearing trees 2. Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground	The Barking Owl nests in hollows that are 20 cm or greater in diameter and more than 4 m above ground. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Ninox strenua Powerful Owl (Breeding)	V	-	High	1. Hollow bearing trees 2. Living or dead trees with hollow greater than 20 cm diameter	The Powerful Owl nests in hollows that are 20 cm or greater in diameter. **Maintained**.
Olearia cordata	V	V	Moderate		*Olearia cordata* is a small shrub with a distribution that includes the Hornsby Plateau. It grows in dry sclerophyll forest on sandstone ridges. **Maintained**.
Pandion cristatus Eastern Osprey (Breeding)	V	-	Moderate	1. Other 2. Presence of stick-nests in living and dead trees (>15 m) or artificial structures within 100 m of a floodplain for nesting	The Eastern Osprey is a large bird of prey that fishes over open water and breeds in stick-nests high in emergent trees. **Maintained**.
Persoonia hirsuta	E	E	High		*Persoonia hirsuta* is a spreading shrub with hairy young branchlets. It occurs in woodlands and dry sclerophyll forest on sandstone or rarely on shale. **Maintained**.
Petauroides volans Greater Glider	-	V	High	1. Hollow bearing trees 2. Null | N/A	The Greater Glider shelters in tree hollows with a preference for large hollows in large, old trees. **Maintained**.
Petaurus norfolcensis Squirrel Glider	V	-	High		The Squirrel Glider inhabits mature or old growth forest with a midstorey. **Maintained**.
Petrogale penicillata Brush-tailed Rock-wallaby	E	V	Very High	3. Other 4. Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliffline	The Brush-tailed Rock-wallaby occupies rocky escarpments, outcrops and cliffs, often facing north. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Phascogale tapoatafa Brush-tailed Phascogale	V	V	High		The Brush-tailed Phascogale is a tree-dwelling marsupial that lives in dry sclerophyll forests with sparse groundcover. **Maintained**.
Phascolarctos cinereus Koala	E	E	High	1. Other 2. Presence of koala use trees – refer to Survey Comments field in TBDC	The Koala is an arboreal marsupial that feeds on the leaves of Eucalypt species. **Maintained**.
Pimelea curviflora var. curviflora	V	V	High		*Pimelea curviflora* var. *curviflora* is a small shrub with yellow flowers that occurs in north-western Sydney on shale-sandstone transition soils on ridgetops and upper slopes. **Maintained**.
Pomaderris brunnea Brown Pomaderris	E	E	High		*Pomaderris brunnea* occurs in a very limited area around the Colo, Nepean and Hawkesbury Rivers. It grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. **Excluded**: The subject land is not within the area where the species occurs and does not contain moist woodland or alluvial soils.
Pommerhelix duralensis Dural Land Snail	E	E	High		The Dural Land Snail is a medium-sized snail with a brown shell. It occurs on the margins of the Cumberland Plain in areas of the shale-sandstone interface. **Maintained**.
Pseudophryne australis Red-crowned Toadlet	V	-	Moderate		The Red-crowned Toadlet is a small frog with red patched. It is found in small watercourses below sandstone ridges. **Maintained**.
Pteropus poliocephalus Grey-headed Flying-fox (GHFF) (Breeding)	V	V	High	1. Other 2. Breeding camps	The Grey-headed Flying-fox breeds in large camps. **Excluded**: No camp is recorded or was observed within the subject land.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Rhizanthella slateri Eastern Australian Underground Orchid	V	E	High		*Rhizanthella slateri* is an orchid with an underground stem and with flowering head that may mature below the soil surface or extend to 2 cm above the ground. It is known from fewer than 10 locations. **Maintained**.
Rhodamnia rubescens	CE	CE	Very High		*Rhodamnia rubescens* is a shrub or small tree found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest on volcanic and sedimentary soils. **Maintained**.
Seringia denticulata – endangered population Seringia denticulata in the Hawkesbury local government area	EP	-	High	Colo River area between Lower Portland and Morans Rock and near Gees Lagoon	*Seringia denticulata* is a hairy shrub with a disjunct population in the Hawkesbury LGA. **Excluded**: The subject land is not within Hawkesbury LGA.
Tetratheca glandulosa	V	-	High		*Tetratheca glandulosa* is a spreading shrub with dark pink flowers. It occurs in areas of shale-sandstone transition in north-western Sydney. **Maintained**.
Tyto novaehollandiae Masked Owl (Breeding)	V	-	High	1. Hollow bearing trees 2. Living or dead trees with hollows greater than 20cm diameter	The Masked Owl nests in hollows that are 20 cm or greater in diameter. **Maintained**.
Tyto tenebricosa Sooty Owl (Breeding)	V	-	Very High		The Sooty Owl is a medium-sized owl that occurs in rainforest and moist eucalypt forests. **Maintained**.
Velleia perfoliata	V	V	High		*Velleia perfoliata* is a small herb with spoon-shaped leaves. It occurs on Hawkesbury sandstone shelves in the Hawkesbury region. **Maintained**.

Scientific name / Common name	BC Act status	EPBC Act status	Sensitivity to Gain claim	BAMC Habitat constraints / Geographic limitations	Rationale
Vespadelus troughtoni Eastern Cave Bat	V	-	Verh High	1. Caves 2. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.	The Eastern Cave Bat is a small chestnut-brown bat. It is usually found in dry open forest and woodland, near cliffs or rocky overhangs. **Maintained**.
Zieria involucrata	E	V	High		*Zieria involucrata* is a small shrub with hairy, white flowers. It occurs on Hawkesbury sandstone in north-west Sydney. **Maintained**.

4.3.2 Determining presence or absence of candidate species credit species

After habitat assessment, 57 species credit species were confirmed as candidate species. Under Section 5.2.4 of the BAM, presence or absence of these species within the subject land must be confirmed by survey or expert report, or the presence of the species may be assumed. Targeted surveys for species credit species were undertaken in accordance with Section 5.3 of the BAM, including undertaking surveys during the nominated survey period specified for each candidate species and in accordance with *OEH threatened species survey guidelines* and requirements of BioNet. The survey effort, timing and locations for threatened flora and fauna are outlined in the following sections.

Targeted survey for flora and for spring-summer fauna was carried out over a larger area than the subject land because a final footprint had not yet been determined. As a result, survey effort for most species exceeds the required survey effort both in area covered and in hours spent.

Species not identified as candidate species for further assessment do not require formal site survey, however, informal survey was opportunistically conducted while surveying for other threatened species.

4.3.3 Targeted surveys - flora

Targeted surveys for candidate threatened flora species were conducted by Liz Norris (Senior Ecologist) in accordance with the relevant guidelines *Surveying threatened plants and their habitats* (DPIE 2020d). Targeted surveys were undertaken over the following dates:

- 7 person hours (20 September 2022)
- 5 person hours (26 September 2022)
- 3 person hours (27 September 2022)
- 5 person hours (9 January 2023)

Targeted surveys initially involved identification of areas of potential habitat for candidate threatened flora species within the subject land. Areas of suitable habitat were then surveyed along parallel field-traverses with approximately 10 m spacing, consistent with the requirements of DPIE (2020d) for herbs and forbs in open vegetation. Areas of exotic grassland and cleared land were not assessed as areas of potential habitat for threatened flora, however, these areas were still traversed in accordance with DPIE (2020d).

The nominated survey period for candidate threatened flora species is shown in **Table 4.4**. The timing of the flora surveys is in accordance with the survey requirements for all candidate threatened flora species except for two species: *Hibbertia puberula* Hibbertia) and *Leptospermum deanei*. Survey for *Hibbertia puberula* is considered sufficient because it flowers from October to December, sometimes into January, survey dates of 26-27 September and 9 January bracket this time period, and the species is reasonably identifiable without flowers. Similarly, survey for *Leptospermum deanei* is considered sufficient because it is a large shrub and survey was carried out on 26-27 September, near the beginning of the survey window in October and November.

Survey effort is shown in **Figure 4.1**.

Table 4.4: Survey periods – threatened flora

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acacia bynoeana Bynoe's Wattle	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Acacia gordonii	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ancistrachne maidenii	Y	Y	Y	Y								Y
Asterolasia elegans									Y	Y		
Callistemon linearifolius	Y									Y	Y	Y
Darwinia biflora	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Darwinia peduncularis	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Darwinia fascicularis subsp. *oligantha* – endangered population Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Epacris purpurascens var. *purpurascens*									Y	Y		
Eucalyptus sp. *Cattai*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Grevillea parviflora subsp. *parviflora*							Y	Y	Y	Y		
Grevillea parviflora subsp. *supplicans*							Y	Y	Y	Y		
Hibbertia puberula										Y	Y	Y
Kunzea rupestris	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lasiopetalum joyceae								Y	Y	Y		
Leptospermum deanei										Y	Y	
Leucopogon fletcher subsp. *fletcheri*								Y	Y			
Melaleuca deanei Deane's Paperbark	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Melaleuca groveana Grove's Paperbark	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Micromyrtus blakelyi	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Olearia cordata	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Persoonia hirsuta Hairy Geebung	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pimelea curviflora var. *curviflora*	Y	Y	Y							Y	Y	Y
Rhizanthella slateri Eastern Australian Underground Orchid									Y	Y	Y	
Rhodamnia rubescens Scrub Turpentine	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tetratheca glandulosa								Y	Y	Y	Y	
Velleia perfoliata									Y	Y	Y	
Zieria involucrata	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Y = allowable survey months. Blue indicates months in which surveys were conducted.

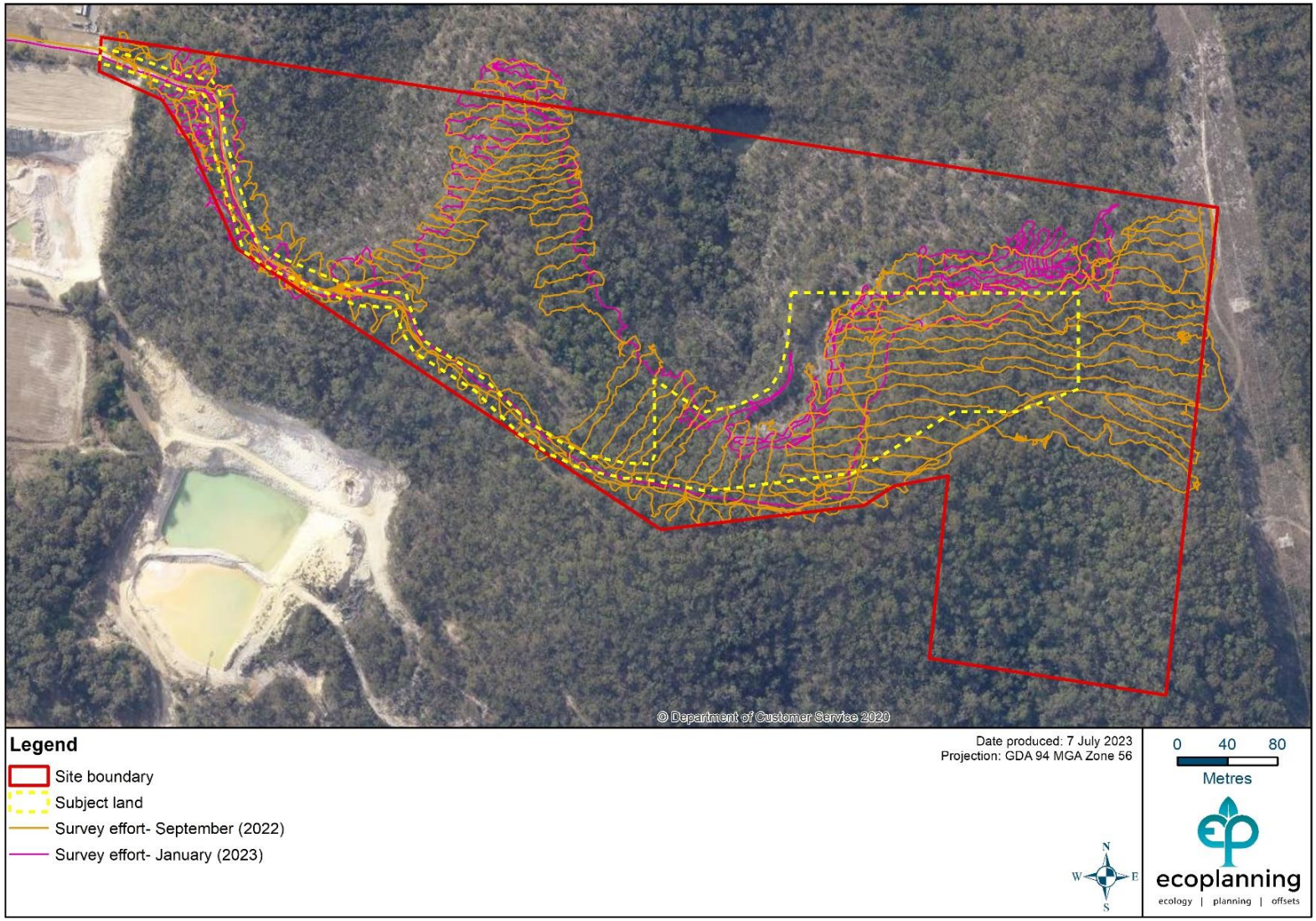


Figure 4.1: Survey effort – threatened flora

4.3.4 Targeted survey results – flora

Three threatened flora species were recorded within the subject land during the targeted surveys.

- *Darwinia fascicularis* subsp. *oligantha* endangered population – listed as an endangered population under the BC Act
- *Pimelea curviflora* var. *curviflora,* listed as vulnerable under the BC Act and the EPBC Act
- *Tetratheca glandulosa*, listed as vulnerable under the BC Act.

Apart from these three species, no other threatened flora species were recorded within the subject land.

Darwinia fascicularis subsp*. oligantha* endangered population

Darwinia fascicularis subsp. *oligantha* was recorded at seven sites within the subject land. Individuals at these sites may be removed by the Proposal. An additional three sites were recorded outside the subject land, but within the study area, with three individuals at one of those sites. These sites will not be impacted by the Proposal.

Darwinia fascicularis subsp. *oligantha* is classified as a 'count' species, meaning a species that is assessed by the number of individuals impacted. The number of individuals that will be impacted by the Proposal is nine. In addition, for count species, a species polygon is required to be established by adding a 30 m buffer around individuals. The species polygon for *Darwinia fascicularis* subsp. *oligantha* is shown at **Figure 4.2**.

Pimelea curviflora var. *curviflora*

Pimelea curviflora var. *curviflora* was recorded at four sites within the subject land, with six individuals at one of those sites. Individuals at these sites will be removed by the Proposal. An additional 10 sites were recorded outside the subject land, but within the study area, with seven individuals at one of those sites. These sites will not be impacted by the Proposal.

P. curviflora var. *curviflora* is classified by the BioNet Atlas as an 'area' species, i.e. a species that is assessed by the amount of habitat impacted. All of the subject land, except for the area of the existing access road, is considered to be habitat for this species. A species polygon for *P. curviflora* var. *curviflora* is shown at **Figure 4.3**.

Tetratheca glandulosa

Tetratheca glandulosa was recorded at eight sites within the subject land, with three individuals at one of those sites. Individuals at these sites will be removed by the Proposal. Another 15 sites were recorded outside the subject land, but within the study area, with 2 individuals at one site, 2 individuals at another site, 3 individuals at a site 4 individuals at a site, and 10 individuals at one site. These sites will not be impacted by the Proposal.

T. glandulosa is also classified by the BioNet Atlas as an area species. All of the subject land, except for the area of the existing access road, is considered to be habitat for this species. A species polygon for *T. glandulosa* is shown at **Figure 4.4**.

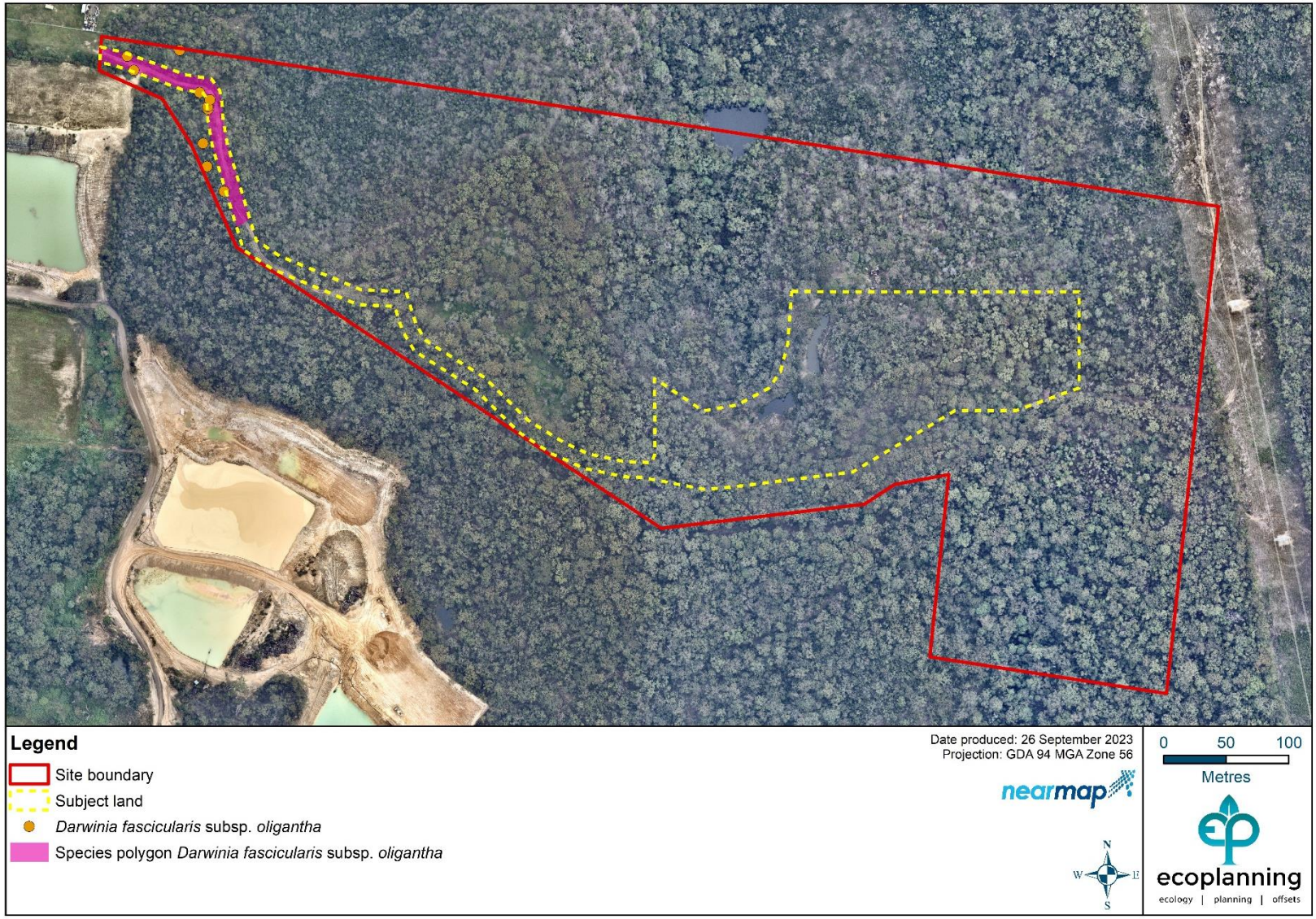


Figure 4.2: Species polygon for *Darwinia fascicularis* subsp. *oligantha* endangered population



Figure 4.3: Species polygon for *Pimelea curviflora* var. *curviflora*

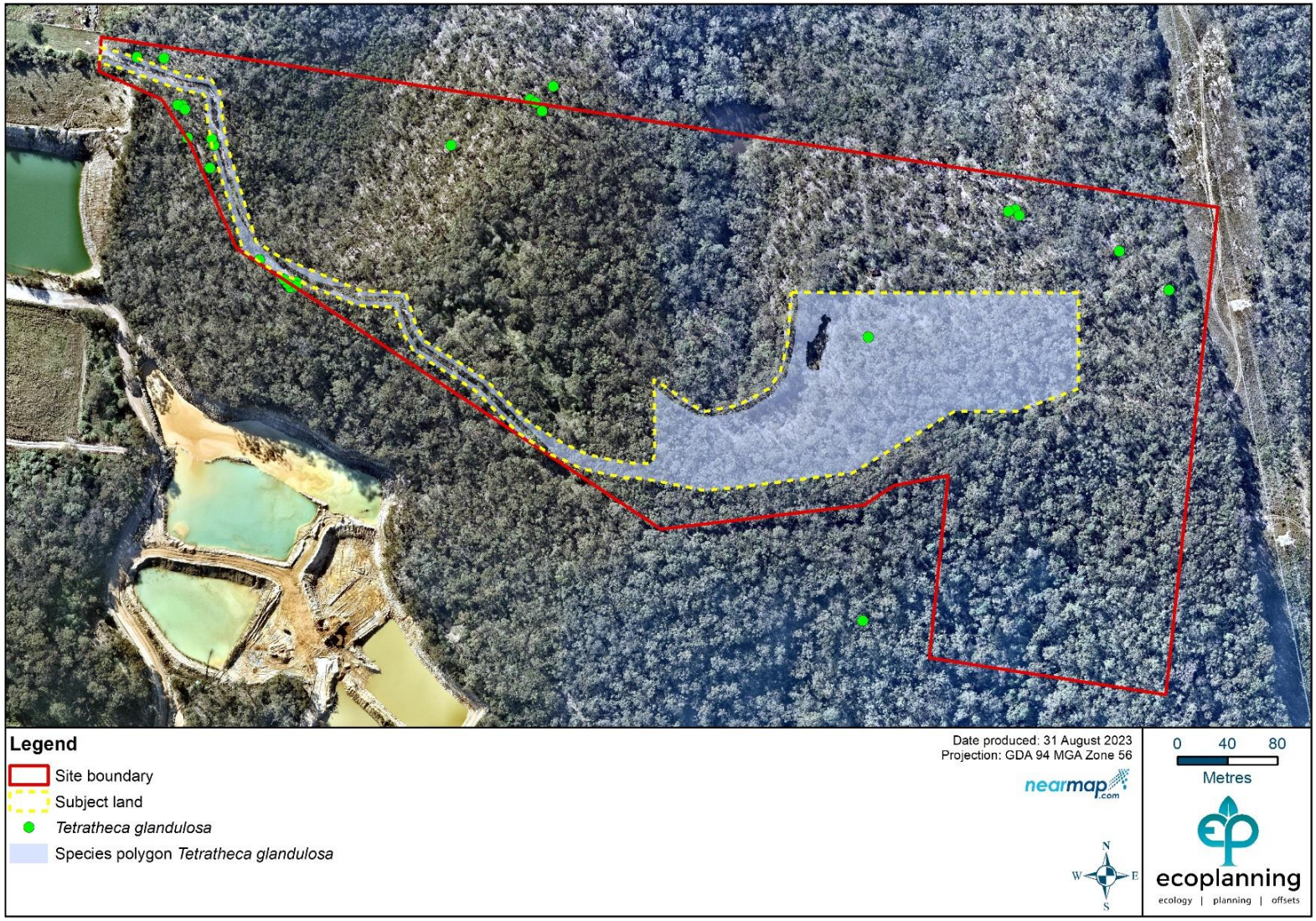


Figure 4.4: Species polygon for *Tetratheca glandulosa*

4.3.5 Targeted surveys - fauna

Targeted surveys for candidate threatened fauna species requiring further assessment and their associated survey periods are outlined for each of the candidate threatened fauna species below (**Table 4.5**). Survey effort for fauna species surveyed from September 2022 to February 2023 is shown in **Figure 4.5**. Survey effort for fauna species surveyed from May to July 2023 is shown in **Figure 4.6**. Survey effort and results for species grouped by category are described in the section below.

Table 4.5: Survey periods for threatened fauna

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Burhinus grallarius Bush Stone-curlew	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Callocephalon fimbriatum Gang-gang Cockatoo	Y									Y	Y	Y
Callocephalon fimbriatum – endangered population Gang-gang Cockatoo in the Hornsby and Ku-ring-gai Local Government Areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Cercartetus nanus Eastern Pygmy-possum	Y	Y	Y							Y	Y	Y
Chalinolobus dwyeri Large-eared Pied Bat	Y										Y	Y
Haliaeetus leucogaster White-bellied Sea-Eagle							Y	Y	Y	Y	Y	Y
Heleioporus australiacus Giant Burrowing Frog	Y	Y	Y	Y	Y				Y	Y	Y	Y
Hieraatus morphnoides Little Eagle (Breeding)								Y	Y	Y		
Hoplocephalus bungaroides Broad-headed Snake (Breeding)								Y	Y			
Litoria littlejohni Littlejohn's Tree Frog							Y	Y	Y	Y	Y	
Lophoictinia isura Square-tailed Kite	Y								Y	Y	Y	Y
Meridolum corneovirens Cumberland Plain Land Snail	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Miniopterus australis Little Bent-winged Bat (Breeding)	Y	Y										Y

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Y	Y										Y
Mixophyes balbus Stuttering Frog	Y	Y	Y						Y	Y	Y	Y
Mixophyes iteratus Giant Barred Frog	Y	Y	Y							Y	Y	Y
Myotis macropus Southern Myotis	Y	Y	Y							Y	Y	Y
Ninox connivens Barking Owl (Breeding)					Y	Y	Y	Y	Y	Y	Y	Y
Ninox strenua Powerful Owl (Breeding)					Y	Y	Y	Y				
Pandion cristatus Eastern Osprey				Y	Y	Y	Y	Y	Y	Y	Y	
Petauroides volans Greater Glider	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Petaurus norfolcensis Squirrel Glider	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Petrogale penicillata Brush-tailed Rock Wallaby	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Phascogale tapoatafa Brush-tailed Phascogale	Y	Y	Y	Y	Y	Y						Y
Phascolarctos cinereus Koala	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pommerhelix duralensis Dural Land Snail	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pseudophrnye australis Red-crowned Toadlet	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tyto novaehollandiae Masked Owl (Breeding)					Y	Y	Y	Y				
Tyto tenebricosa Sooty Owl (Breeding)				Y	Y	Y	Y	Y				
Vespadelus troughtoni Eastern Cave Bat	Y										Y	Y

Note: Y = allowable survey months. Blue indicates months in which surveys were conducted.

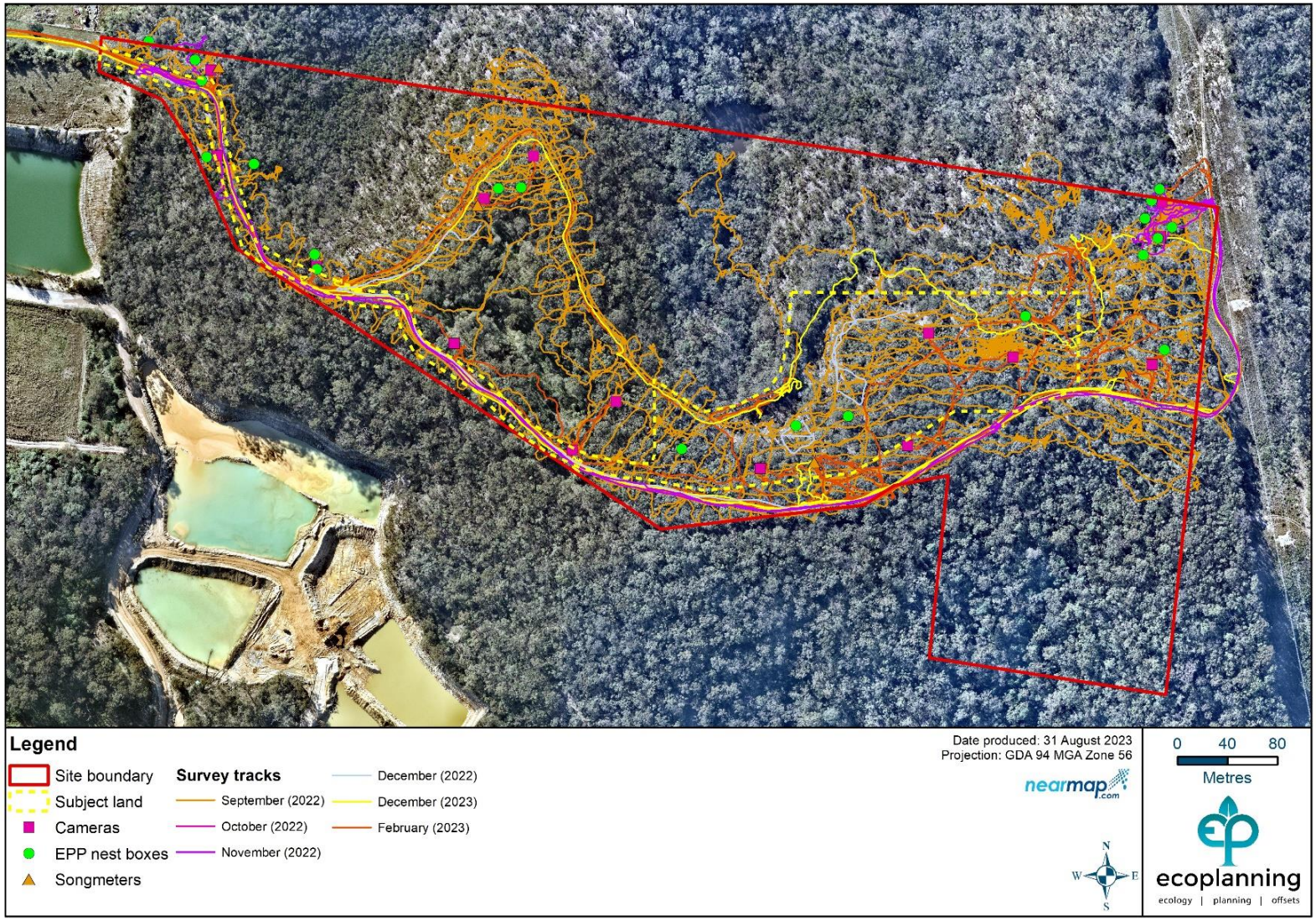


Figure 4.5: Survey effort – threatened fauna, spring 2022 – summery 2023

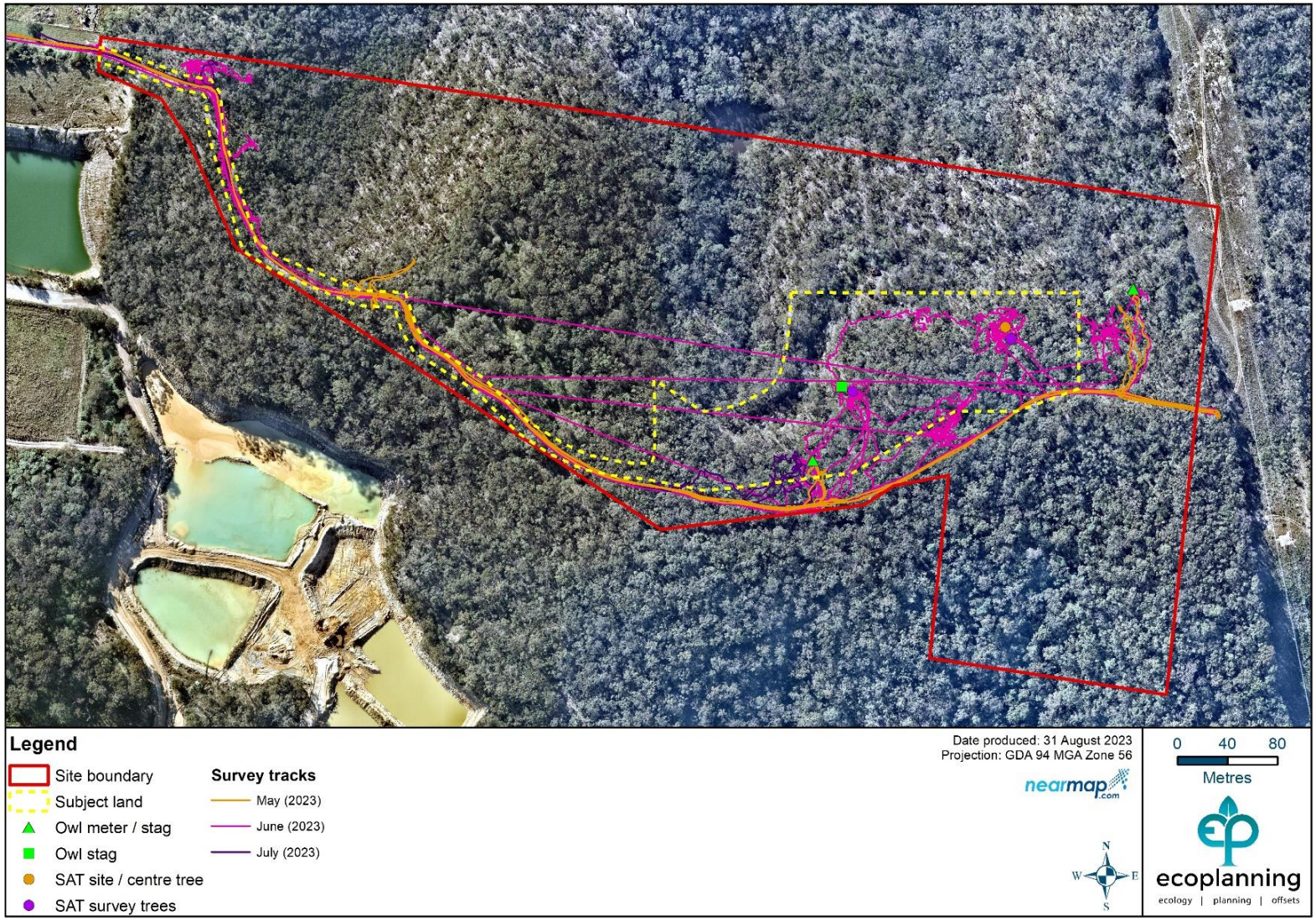


Figure 4.6: Survey effort – threatened fauna, winter 2023

4.3.6 Targeted survey effort and results – fauna

Reptiles

Targeted survey was undertaken for a single reptile species, the Broad-headed Snake (*Hoplocephalus bungaroides*), for three hours on 20 September 2022.

Survey was carried out by turning over rocks and slabs on sandstone outcrops, inspecting crevices within sandstone outcrops and shelves using a torch and turning over logs and bark located on outcrops.

No Broad-headed Snakes were recorded. Reptiles incidentally recorded within the subject land are listed in **Appendix A**.

Invertebrates

Targeted survey for two invertebrates, the Dural Land Snail (*Pommerhelix duralensis*) and the Cumberland Plain Land Snail (*Meridolum corneovirens*), was undertaken for three hours on 20 September 2022.

Survey was carried out by searched under rocks and leaf litter in conjunction with reptile surveys, and by searching litter and curled up bark shed beneath eucalypts.

Incidental survey was also carried out in conjunction with Spot Assessment Technique (SAT) searches for Koala scat undertaken on 13 June and 12 July 2023.

No threatened snails were recorded.

Raptors (stick-nest search)

Targeted survey was undertaken for the following raptors for three hours on 26 September 2022:

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Little Eagle (*Hieraatus morphnoides*)
- Square-tailed Kite (*Lophoictinia isura*)
- Eastern Osprey (*Pandion cristatus*).

Survey was carried out by searching for stick nests in conjunction with a HBT survey.

No stick nests were recorded.

Diurnal birds

Targeted survey was undertaken for the following diurnal bird species:

- Bush Stone-curlew (*Burhinus grallarius*)
- Gang-gang Cockatoo (*Callocephalon fimbriatum*)
- Gang-gang Cockatoo in the Hornsby and Ku-ring-gai Local Government Areas - endangered population (*Callocephalon fimbriatum*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

Targeted survey for all diurnal birds was carried out for three person hours in conjunction with an HBT survey for three hours on 26 September 2022. No threatened bird species were recorded.

Two song meters were set out for the period 16 January 2023 – 27 February, a total of 42 survey days, recording for 5 minutes on the hour. The song meters were relocated within the study area on 6 February 2023 to obtain data from more locations (**Figure 4.5**).

A single threatened bird species was recorded, Glossy Black-cockatoo (*Calyptorhynchus lathami*). However, Glossy Black-cockatoo is a species credit species for breeding only. The song meter recording was taken out of breeding season, and no Glossy-Black-cockatoos were observed using hollows within the subject land or otherwise engaging in breeding behaviour. Two stags capable of hosting breeding Glossy Black-cockatoos were watched for owl surveys; however, no Glossy Black-cockatoos were observed in these stags. Accordingly, no species polygon has been produced for this species.

In addition to this targeted survey effort, surveyors were present within the study area during daylight hours over many hours and days carrying out other field survey tasks, such as setting out cameras and nest boxes and doing vegetation surveys. During these times, birds observed incidentally were recorded. Hours and days of relevant survey are as follows:

- 22 August 2022 (14 person hours)
- 20 September 2022 (12 person hours)
- 4 November 2022 (2 person hours)
- 9 December 2022 (2 person hours)
- 23 December 2022 (2 person hours)
- 16 January 2022 (2 person hours)
- 6 February 2022 (2 person hours)
- 21 February 2023 (2 person hours)
- 27 February 2023 (2 person hours).

No threatened bird species were recorded during these field surveys. Bird species recorded within the subject land, whether incidentally or as part of targeted survey, are listed in **Appendix A**.

Microbats

Targeted survey was undertaken for the following species:

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Little Bent-winged Bat (*Miniopterus australis)* (breeding)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) (breeding)
- Southern Myotis (*Myotis macropus*)
- Eastern Cave Bat (*Vespadelus troughtoni*).

Little Bent-winged Bat and Large Bent-winged Bat are species credit species for breeding habitat only, and both species have specialised breeding requirements, with habitat constraints listed within the BAM calculator as caves, tunnels, culverts or other structures known or suspected to be used for breeding. The subject land does not include such habitat features. However, because there are sandstone outcrops with small crevices that potentially could serve as habitat for microbats, crevices within sandstone outcrops and shelves were

inspected in conjunction with Broad-headed Snake surveys. No breeding habitat for microbats was recorded.

Two Titley Anabat Express bat detectors were installed from 9 December 2022 to 23 December 2022 (28 survey nights). The total survey effort of 28 nights meets the survey requirements specified in *'Species credit' bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018). The detectors were set to record before sunset and stop after dawn and in a position that maximised the likelihood of recording bats in accordance with (OEH 2018).

Targeted surveys resulted in a total of 15 microbat species being recorded as 'definite', 'probable' or 'possible' species occurring in the subject land (**Table 4.6**). Ten of the species recorded are not threatened species. No further assessment of non-threatened microbat species is required.

Table 4.6: Microbats identified within the subject land

Scientific name	Common name	Biodiversity credit class	Confidence level
Chalinolobus dwyeri	**Large-eared Pied Bat**	**Species**	**Definite**
Ozimops planiceps	Southern Free-tailed Bat		Definite
Chalinolobus gouldii	Gould's Wattled Bat		Definite
Ozimops ridei	Ride's Free-tailed Bat		Definite
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat		Definite
Vespadelus darlingtoni	Large Forest Bat		Definite
Vespadelus regulus	Southern Forest Bat		Definite
Miniopterus orianae oceanensis	**Large Bent-winged Bat**	**Species (breeding) / Ecosystem**	**Possible**
Vespadelus vulturnus	Little Forest Bat		Definite
Chalinolobus morio	Chocolate Wattled Bat		Definite
Vespadelus troughtoni	**Eastern Cave Bat**	**Species**	**Possible**
Miniopterus australis	**Little Bent-winged Bat**	**Species (breeding) / Ecosystem**	**Definite**
Myotis macropus	**Southern Myotis**	**Species**	**Definite**
Nyctophilus sp.	Long-eared Bat		Possible
Rhinolophus megaphyllus	Eastern Horseshoe Bat		Definite

Threatened species are in **bold**.

Two of the species identified, Little Bent-winged Bat and Large Bent-winged Bat, are dual credit species, being ecosystem credit species for foraging purposes and species credit species for breeding habitat only. These species, although identified within the subject land, do not need to be assessed as a species credit species because their breeding habitat of caves, derelict mines and other man-made structures are not present on the site. In addition,

small crevices within sandstone outcrops, although not preferred breeding habitat for the two species, were inspected and no evidence of breeding bats was identified.

The following three species identified within the subject land are species credit species for both foraging and breeding habitat:

- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Myotis macropus* (Southern Myotis)
- *Vespadelus troughtoni* (Eastern Cave Bat).

Of these species, Large-eared Pied Bat and Southern Myotis were considered to be definite identifications. Eastern Cave Bat was considered to be possible identification. Presence of this latter species has been assumed.

Species polygons have been prepared for these species in accordance with Section 5.2.5 of the BAM and OEH (2018).

The species polygon for the Large-eared Pied Bat is to include all habitat on the subject land where the subject land is within 2 km of caves, scarps, cliffs, rock overhangs and disused mines. This encompasses all areas of native vegetation within the subject land. The species polygon for Large-eared Pied Bat is at **Figure 4.7**.

The species polygon for the Southern Myotis includes all habitat on the subject land where the subject land is within 200 m of a waterbody with pools/ stretches 3 m or wider including rivers, creeks, billabongs, lagoons, dams, and other waterbodies on the subject land. The species polygon for Southern Myotis is at **Figure 4.8**.

The species polygon for the Eastern Cave Bat, like that for Large-eared Pied Bat, includes all habitat on the subject land where the subject land is within 2 km of caves, scarps, cliffs, rock overhangs and disused mines. The species polygon for the Eastern Cave Bat is at **Figure 4.9**.

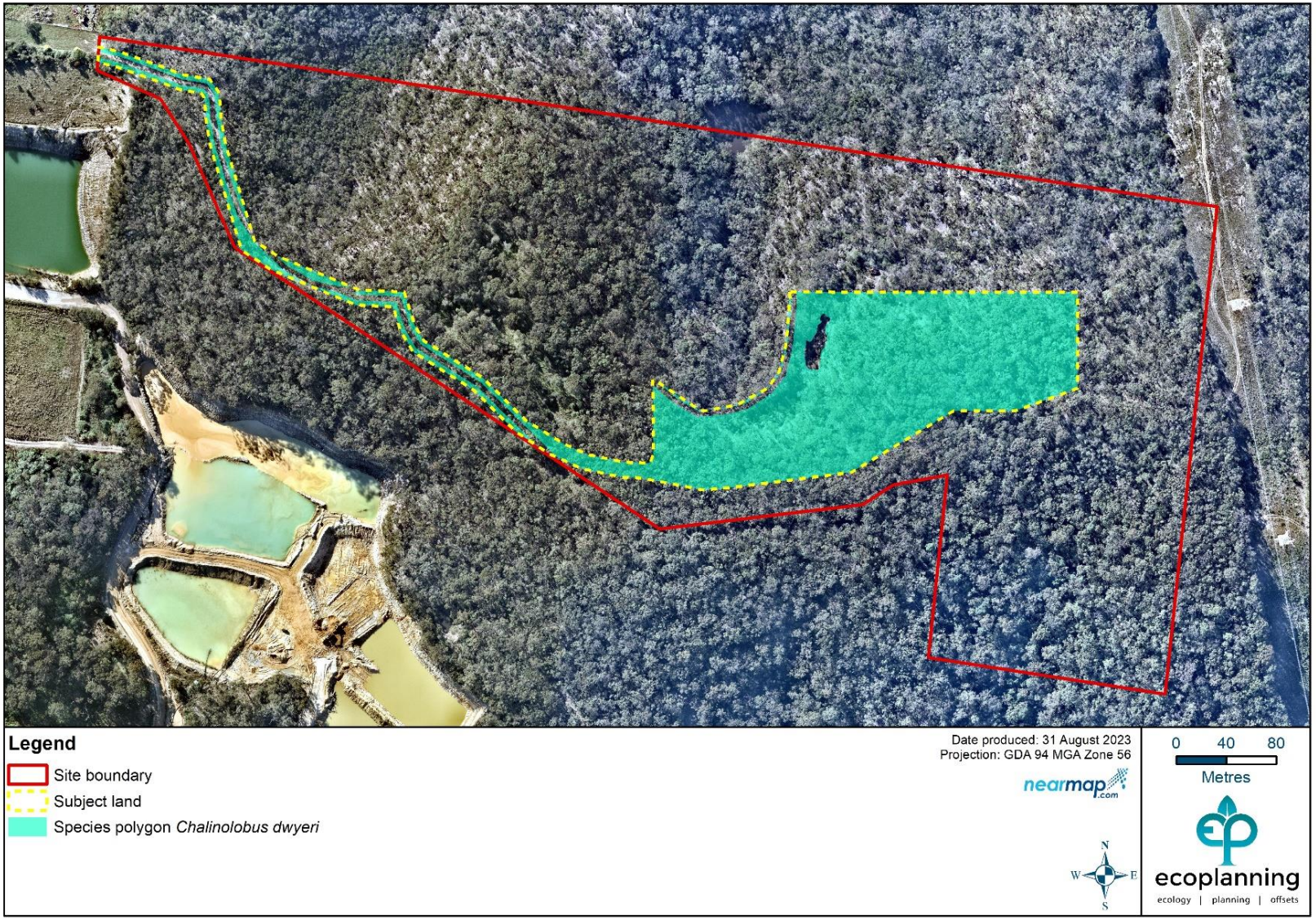


Figure 4.7: Species polygon for Large-eared Pied Bat



Figure 4.8: Species polygon for Southern Myotis



Figure 4.9: Species polygon for Eastern Cave Bat

Mammals (excluding microbats)

Targeted survey was undertaken for the following species:

- Eastern Pygmy-possum (*Cercartetus nanus*)
- Greater Glider (*Petauroides volans*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Brush-tailed Rock Wallaby (*Petrogale penicillata*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Koala (*Phascolarctos cinereus*).

The primary survey method for these species was the installation of 15 motion-detecting cameras within the study area from 16 January to 27 February (**Figure 4.5**). One threatened species was recorded with a camera in the far eastern portion of the study area, the Eastern Pygmy Possum (*Cercartetus nanus*). Non-threatened species recorded by camera are listed in **Appendix A**.

Spotlighting was also undertaken for the nocturnal arboreal mammals (all mammals except Brush-tailed Rock Wallaby) on the following dates:

- 26 October 2022 (1 person hour)
- 27 October 2022 (2 person hours)
- 31 January 2023 (1 person hour)
- 1 February 2023 (1 person hour)
- 6 February 2023 (1 person hour)
- 27 February 2023 (1 person hour).

One threatened species was recorded by spotlighting, again an Eastern Pygmy Possum, this time in the eastern portion of the subject land. Non-threatened species recorded by spotlighting are listed in **Appendix A**.

Two song meters were set out for the period 16 January 2023 – 27 February, a total of 42 survey days, recording for 5 minutes on the hour. Although the song meters were primarily targeted to threatened birds, they are capable of picking up vocalisations of mammals such as Koalas and Greater Gliders and did pick up vocalisations of a non-threatened mammal (Sugar Glider (*Petaurus breviceps*). No threatened mammals were recorded.

In addition to these methods, for the Eastern Pygmy Possum, 20 nest boxes were installed for the period 4 November 2022 to 27 February 2023. No evidence of Eastern Pygmy Possum or other mammals was found in the nest boxes.

For the only diurnal mammal on the list, the Brush-tailed Rock Wallaby, incidental survey was undertaken in conjunction with other daylight activities on the following dates:

- 22 August 2022 (14 person hours)
- 20 September 2022 (12 person hours)
- 26 September 2022 (5 person hours)
- 4 November 2022 (2 person hours)
- 9 December 2022 (2 person hours)
- 23 December 2022 (2 person hours)
- 16 January 2022 (2 person hours)
- 6 February 2022 (2 person hours)

- 21 February 2023 (2 person hours)
- 27 February 2023 (2 person hours).

The Brush-tailed Wallaby was not recorded

For the Koala, in addition to spotlighting and song meters, searches for Koala scat and scratchings were carried out according to the Spot Assessment Technique (SAT) set out in the *Koala* (Phascolarctos cinereus) *Biodiversity Assessment Method Survey Guide* (DPE 2022b). The standard method for SAT surveys is to select survey locations using a 150 m grid for suitable habitat ≤50 ha, then to mark the centre tree nearest each grid intersection, and finally to survey for scat within a prescribed area surrounding that centre tree and the 29 nearest trees of any species surrounding the centre tree. Where the standard method is employed, the total number of SAT sites required for an area of suitable habitat equals the number of hectares divided by 2.25 for 150 m grid spacing, with a minimum of three SAT sites for areas of suitable habitat ≤5 ha.

The total number of SAT surveys carried out was three (**Figure 4.6**). No Koala scat or scratchings were detected during SAT surveys. Scat was identified for the Brush-tailed Possum (*Trichosura vulpecula* and an unidentified macropod, probably a Swamp Wallaby (*Wallabia bicolor*). Additional details regarding Koala survey can be found in the accompanying Koala Assessment Report (KAR) (Ecoplanning 2023).

Apart from Eastern Pygmy Possum, no threatened mammals were recorded within the subject land or study area. A species polygon for Eastern Pygmy Possum is at **Figure 4.10**.

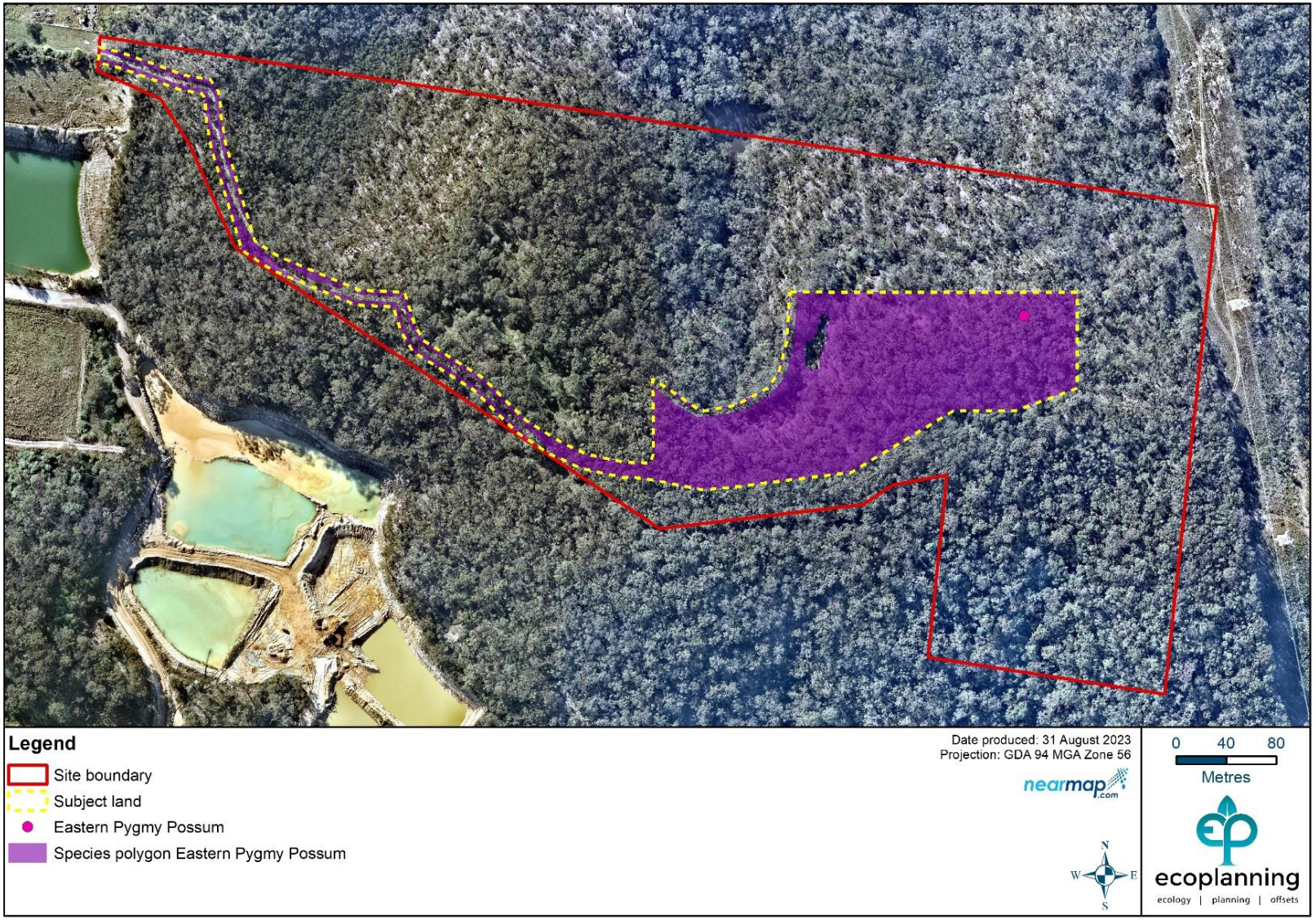


Figure 4.10: Species polygon for the Eastern Pygmy Possum

Frogs

Targeted survey was undertaken for the following species:

- Giant Burrowing Frog (*Heleioporus australiacus*)
- Littlejohn's Tree Frog (*Litoria littlejohni*)
- Stuttering Frog (*Mixophyes balbus*)
- Giant Barred Frog (*Mixophyes iteratus*)
- Red-crowned Toadlet (*Pseudophryne australis*).

For the Giant Burrowing Frog, the survey method was spotlighting along the ground on nights following significant precipitation. Spotlighting was undertaken on the following eight evenings:

- 26 October 2022 (1.5 person hours)
- 27 October 2022 (1.5 person hours)
- 31 January 2023 (1.5 person hours)
- 1 February 2023 (1.5 person hours)
- 2 February 2023 (1.5 person hours)
- 6 February 2023 (1.5 person hours)
- 21 February 2023 (1.5 person hours)
- 27 February 2023 (1.5 person hours).

The October surveys were within one week of rainfall totalling 22.8 cm at Richmond weather station (067105). The 31 January and 1, 2, and 6 February 2023 surveys were within one week of rainfall totalling 51.4 cm. The 21 February 2023 survey was within two days of rain totalling 9.5 cm. The 27 February 2023 survey was within one week of a rainfall event total 50.2 cm.

No Giant Burrowing Frogs were recorded.

The remaining frog species were surveyed through visual inspection of potential habitat using a torch and call playback. These surveys were carried out on the following six evenings:

- 26 October 2022 (1.5 person hours)
- 27 October 2022 (1.5 person hours)
- 31 January 2023 (1.5 person hours)
- 1 February 2023 (1.5 person hours)
- 2 February 2023 (1.5 person hours)
- 6 February 2023 (1.5 person hours).

Frogs were surveyed at the former extraction area filled with water and the mapped extent of the watercourse in the western portion of the subject land.

One threatened frog was recorded, the Red-crowned Toadlet (*Pseudophryne australis*). This species was recorded on every night of survey in the small watercourse just to the east of the subject land. No other threatened frog species were recorded. Non-threatened species recorded by spotlighting are listed in **Appendix A**.

In addition to spotlighting survey and call playback, two song meters were set out for the period 16 January 2023 – 27 February, a total of 42 survey days, recording for 5 minutes

on the hour. Although the song meters were primarily targeted to threatened birds, they are capable of picking up vocalisations of frogs. No threatened frog species were recorded. Non-threatened species recorded by song meter are listed in **Appendix A**.

The species polygon for Red-crowned Toadlet is to align with aquatic habitats linked to the record and include a 100 m buffer from the top of the bank (DPIE 2020e). A species polygon for the Red-crowned Toadlet within the subject land is at **Figure 4.11**.

Owls

Targeted survey was undertaken for the following species:

- Barking Owl (*Ninox connivens*)
- Powerful Owl (*Ninox strenua*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*).

All these species are species credit species for breeding only.

Survey was conducted by watching the three stags with hollows sufficiently large (>20 cm in diameter) to host breeding owls that were identified in or within 100 m of the subject land. Those stags are shown in (**Figure 4.6**).

Stag-watching was undertaken from approximately 10 minutes before sunset until total darkness, approximately 90-100 minutes per night. Each night two of the three trees was watched (except 12 July, when only one tree was watched), and each tree was watched a total of three nights. Nights of survey were as follows:

- 24 May 2023 (3.5 person hours)
- 1 June 2023 (3.5 person hours)
- 7 June 2023 (3.5 person hours)
- 13 June 2023 (3.5) person hours
- 12 July 2023 (1.75 person hours).

No breeding owls were recorded. However, on two evenings, 1 June 2023 and 7 June 2023, an owl, possibly but not definitively identified as a Masked Owl, flew over the subject land. This owl did not alight within view of the observers and did not utilise the stags at any time.

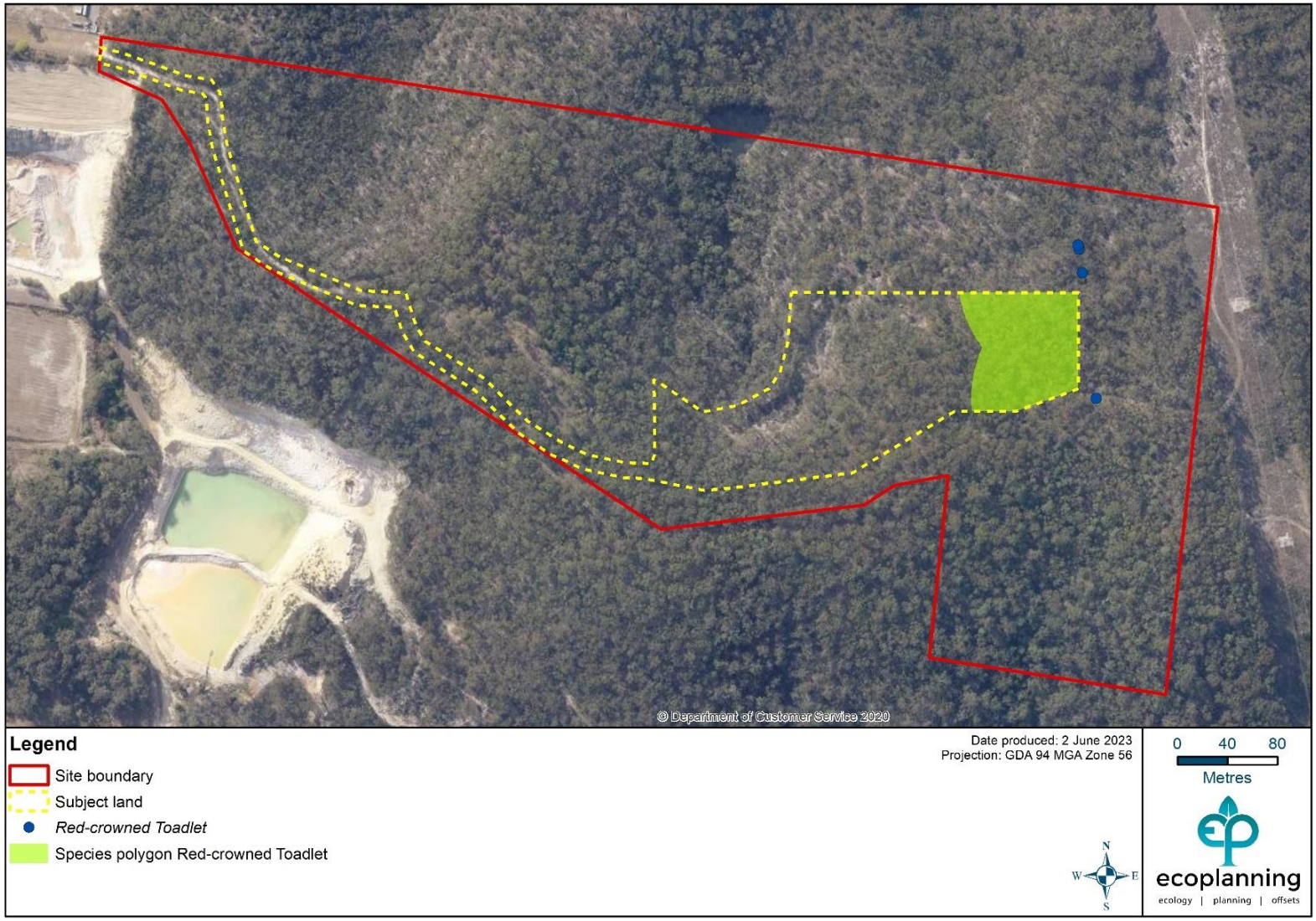


Figure 4.11: Species polygon for Red-crowned Toadlet

4.4 Identifying potential prescribed biodiversity impacts on threatened species

Prescribed biodiversity impacts are defined under Clause 6.1 of the *Biodiversity Conservation Regulation 2017* (BC Reg) and Section 6 of the BAM 2020 and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. The presence of biodiversity values prescribed by the BC Reg 2017 and BAM 2020 have been considered in context of the subject land below (**Table 4.7**).

Table 4.7: Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs, rocks and other geological features of significance, (ii) human-made structures, (iii) non-native vegetation,	Part of the subject land to be impacted consists of a relatively level ridgetop that does not contain cliffs, crevices, rocks and other geological areas of significance. However, the northern part of the subject land does contain areas of sandstone outcrops and crevices as it slopes away from the ridge. These crevices were inspected for evidence of threatened species during field survey, namely Broad-headed Snake (*Hoplocephalus bungaroides*), Little Bent-winged Bat (*Miniopterus australis*) and Large Bent-winged Bat (*Miniopterus orianae oceanensis*). No evidence of threatened species was identified. The Proposal will impact on the sandstone outcrops and crevices. There are no existing buildings within the subject land. There is little non-native vegetation will be impacted by the proposal. Non-native vegetation is predominantly comprised of exotic grasses in limited numbers, and its habitat value for threatened species is limited.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range (impacts of development on movement of threatened species that maintains their lifecycle – BC reg),	The subject land has not been formally identified as providing connectivity between areas of habitat for threatened species that facilitates the movement of that threatened species across its range. The Proposal located in an area of extensive native vegetation and high connectivity. Although the Proposal will clear native vegetation, it will not isolate one patch of native vegetation from another or establish a substantial obstacle to movement for threatened species in the surrounding landscape.

Prescribed Biodiversity Impacts	Presence within the Subject Land
(c) the impacts of development on movement of threatened species that maintains their lifecycle,	The subject land has not been identified as providing movement for threatened species that maintains their lifecycle. The Proposal is located in an area of extensive native vegetation and high connectivity. Although the Proposal will clear native vegetation, it will not isolate one patch of native vegetation from another or establish a substantial obstacle to movement for threatened species in the surrounding landscape.
(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	There are no natural watercourses within the subject land. The nearest natural watercourses are a small first-order watercourse to the east of the subject land and two first-order watercourses to the north, all of which drain to the north. There is also a former extraction area within the subject land that holds water and is fringed by aquatic vegetation. There will be no direct impacts to natural watercourses, as all of these are outside the subject land. There could be minor impacts on the watercourses north of the Proposal from altered run-off patterns and erosion, but these will be minimised through the implementation of erosion and sediment control measures included within a Environmental Management Plan (EMP), including mitigation measures to prevent runoff leaving the site.
(e) the impacts of wind turbine strike on threatened and protected animals,	Not applicable to this subject land.
(f) the impacts of vehicle strike on threatened species or fauna that are part of a threatened ecological community.	An existing access road is within the subject land, which will be widened to provide access to permit two heavy vehicles to pass. The existing access road is approximately 4-5 m in width and will be widened to approximately 8 m. Product transportation and material importation will involve a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day. Although the average number of daily trips is small, the increase in traffic, and in type of traffic, will cause a minor increased potential for vehicle strike. Any vehicle movement on site will be managed and potential impacts to fauna will be mitigated during construction by the EMP.

Prescribed Biodiversity Impacts	Presence within the Subject Land
	Potential impacts to threatened flora along the sides of the road will be minimised by the construction of fencing or bollards to prevent unintentional impacts to threatened flora on the sides of the road.

5 Avoiding and minimising impacts on native vegetation during project planning

In accordance with Section 7 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. The BAM identifies two key areas of project planning to avoid and minimise direct, indirect and prescribed impacts:

- proposal location – locating the development away from the highest biodiversity values
- proposal design – retaining biodiversity values through design features that limit vegetation clearing or reduce the amount of development within the footprint.

5.1 Avoiding and minimising impacts through project location

Section 7.1.1 of the BAM provides some examples of avoiding or minimising impacts from clearing native vegetation and threatened species habitat by locating the proposal in areas:

a) lacking biodiversity values
b) where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low VI score)
c) that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or a TEC or a PCT that is highly cleared
d) outside of the buffer area around breeding habitat features such as nest trees.

In relation to a) and b), although the subject land does not lack in biodiversity values or have low VI scores, the location of the Proposal has been carefully selected to minimise impacts on biodiversity values.

First, the Proposal is located in an area that has been extensively disturbed in the recent past and contains mostly regrowth vegetation. As can be seen in **Figure 5.1**, taken in 1990, much of the subject land was entirely cleared as recently as 33 years ago, and the remainder was heavily disturbed. The former extraction area that is now filled with water is visible, and it appears that there is another area of open water on the ridge. Much of the ridgetop was fully or partially cleared, and large areas were bare ground. The site was fragmented with dirt tracks throughout the subject land and beyond into areas that will not be impacted by the Proposal. As of 1994, the subject land had revegetated to some extent but was still largely cleared and heavily disturbed (**Figure 5.2**).

Second, the Proposal is located in the part of the study area where native vegetation and threatened species habitat is likely in the poorest condition. Although plots were not carried out in the parts of the study area that will not be impacted to allow direct comparison of VI scores, it is likely that native vegetation within the area of recent disturbance (i.e. within the subject land) is in worse condition than native vegetation in those areas that have been less disturbed. In addition, habitat features that may be taken as surrogates for habitat condition, such as HBTs, occur more frequently within the study area outside the subject land than within the area of impact (**Figure 3.9**).

Third, the Proposal is located to minimise impacts on threatened species. Most records of *Pimelea curviflora* var. *curviflora* and *Tetratheca glandulosa* are located outside the subject land. Although a number of *Darwinia fascicularis* subsp. *oligantha* records are within the subject land, as discussed below, the access road has been located to avoid individuals where

feasible. Further moving and/or adjusting the width the road is not feasible as the existing track is currently utilised by Rural Fire Services and Transgrid to access Marramarra National Park and the transmission line within the easement east of the study area. Ongoing and unobstructed access for these parties is critical, hence the requirement for the road to be widened to allow two heavy vehicles to pass simultaneously (i.e., if required, a quarry truck and a fire truck could both use the road at the same time). While the subject land is within the species polygon for Red-crowned Toadlet (**Figure 4.11**) and impacts to the buffer area will be offset, all records of the species are outside the subject land and the watercourse where the species occurs will not be directly impacted.

In relation to c), the subject land is not within any Important Habitat map, nor do any TECs occur within the subject land. None of the PCTs that will be directly impacted have extremely high levels of clearing, and for two of the PCTs (3586 and 3622), the level of clearing is comparatively low. The percentage of PCT 3586 that has been cleared is 14.99%, for PCT 3616 is 61.88% and for PCT 3622 it is 1.62%.

In relation to d), the Proposal avoids most of the large trees within the study area that have large hollows (>20 cm DBH) or could potentially serve as nest trees. Targeted survey recorded no nest trees for raptors within the subject land at the current time and no owls or large cockatoos using the HBTs with large hollows in or near the subject land.

5.2 Avoiding and minimising impacts to threatened species through project design

Avoiding impacts to all threatened species recorded in the study area is not practical given the footprint of the proposal. However, the Proposal has been designed to avoid and minimise impacts to *Darwinia fascicularis* subsp. *oligantha* near the Site Access Road that will be widened for the Quarry.

There are currently nine individuals of *Darwinia fascicularis* subsp. *oligantha* within the subject land, all of them along the Site Access Road near the entrance to the site. All of these nine individuals would be removed if the Site Access Road were constructed according to the original project design. However, the road widening at the recorded location of *Darwinia fascicularis* subsp. *oligantha* has been adjusted to avoid directly impacting those individuals occurring along the existing Site Access Road. Retained individuals along the widened road would also be protected from subsequent impacts by placing a barrier between these plants and the access road.

5.3 Avoiding and minimising prescribed biodiversity impacts during project planning

As described in **Section 4.4**, no impacts are anticipated from the Project for most categories of prescribed biodiversity impact. For those categories where minimal impacts are anticipated, as with impacts to native vegetation, such as risk to fauna from vehicle strike and erosion from construction activities, impacts of the Project can be minimised through a EMP (**Section 7.1**). Potential impacts to threatened flora along the sides of the road will be minimised by placing fencing, bollards or other suitable structures to create a barrier between these plants and the widened access road.

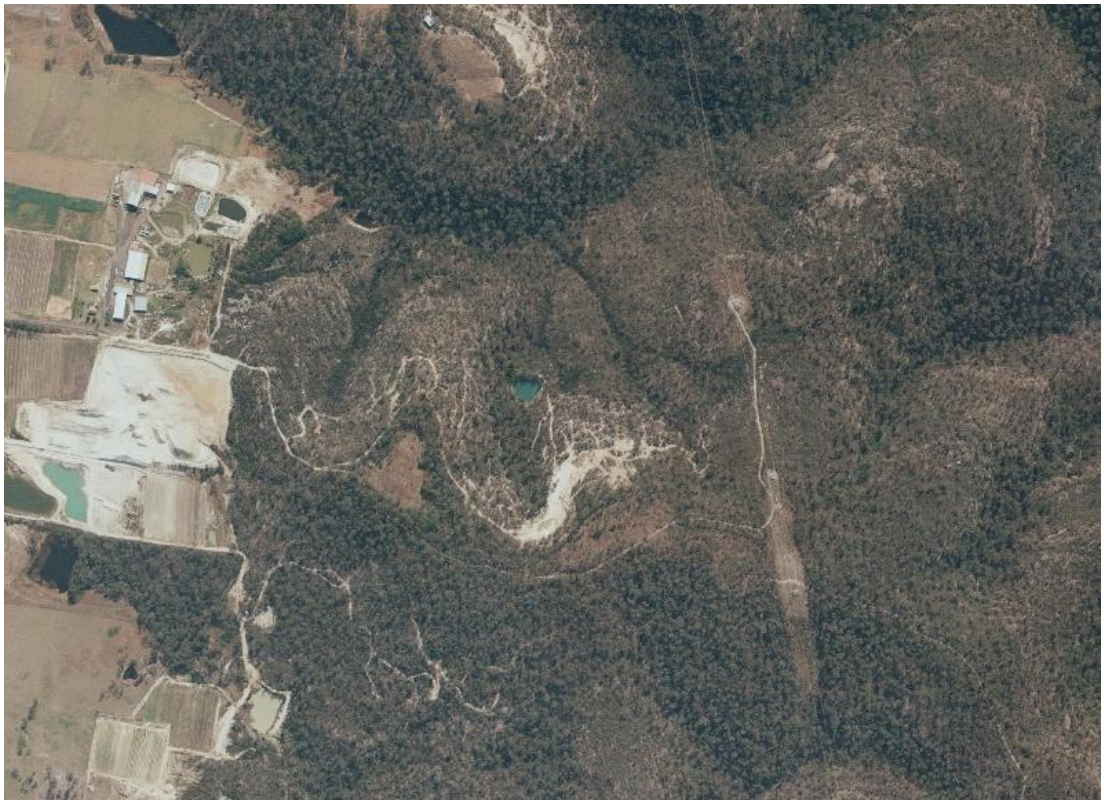


Figure 5.1: The subject land as of 1990 (NSW Spatial Services 2023)



Figure 5.2: The subject land as of 1994 (NSW Spatial Services 2023)

6 Assessing impacts

6.1 Assessment of impacts BAM

6.1.1 Impacts to native vegetation communities

The Proposal will include direct impacts to 3.77 ha of native vegetation. The details of areas impacted and loss of vegetation integrity are provided in **Table 6.1**.

Table 6.1: Native vegetation impacts

Veg zone	PCT	Condition class	Area in ha	Vegetation integrity score before development	Vegetation integrity score after development
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	0.08	35.9	0
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	1.42	47.8	0
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	2.26	53.5	0

6.1.2 Impacts to threatened species

Impacts to ecosystem credit species are accounted for through impacts to associated native vegetation community. Eight threatened species credit species (three flora species and five fauna species) were identified within the subject land:

- *Darwinia fascicularis* subsp. *oligantha* endangered population
- *Pimelea curviflora* var. *curviflora*
- *Tetratheca glandulosa*
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Myotis macropus* (Southern Myotis)
- *Vespadelus troughtoni* (Eastern Cave Bat)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Pseudophryne australis* (Red-crowned Toadlet).

Species polygons for these species are shown in **Figure 4.2** to **Figure 4.4** and **Figure 4.7** to **Figure 4.11**. Areas of impact for area species are summarised in **Table 6.2**. Individuals impacted for count species are summarised in **Table 6.3**.

Table 6.2: Impacts to threatened area species

Threatened species	Area impacted for PCT 3586 (ha)	Area impacted for PCT 3616 (ha)	Area impacted for PCT 3622 (ha)	Total area impacted (ha)
Pimelea curviflora var. curviflora	0.08	1.42	2.26	3.77*
Tetratheca glandulosa	0.08	1.42	2.26	3.77*
Chalinolobus dwyeri (Large-eared Pied Bat)	0.08	1.42	2.26	3.77*
Myotis macropus (Southern Myotis)	0.08	1.42	2.26	3.77*
Vespadelus troughtoni (Eastern Cave Bat)	0.08	1.42	2.26	3.77*
Cercartetus nanus (Eastern Pygmy-possum)	0.08	1.42	2.26	3.77*
Pseudophryne australis (Red-crowned Toadlet)	0.00	0.28	0.49	0.77

* Subject to rounding errors.

Table 6.3: Impacts to threatened count species

Threatened species	Individuals impacted for PCT 3586	Individuals impacted for PCT 3616	Individuals impacted for PCT 3622	Total individuals impacted
Darwinia fascicularis subsp. *oligantha* a	8	0	1	9

6.1.3 Indirect impacts on native vegetation

It is difficult to quantify indirect impacts of the Proposal, but these may include impacts such as noise, vibration, light spill, erosion and the introduction of exotic species. Given the existence of other quarrying facilities and industrial activities surrounding the Quarry, impacts such as noise and light are expected to have relatively minor impacts on biodiversity values of the subject land and adjacent areas over and above impacts occurring from on-going local operations. Other indirect impacts, including erosion, impacts to water quality and the introduction of weed species, are considered avoidable impacts which can be managed as part of a EMP and sediment control plan. For example, washing down of equipment will occur in already cleared locations, and the control of runoff from the site should limit the spread of weed and garden species propagules from the site. Sediment and erosion controls will be put in place according to best practices (Landcom 2004) and documented within a sediment

control plan. The additional risk of introduction of pests, weeds, or pathogens is limited as these impacts are already present within the subject land due to on-going disturbance.

Indirect impacts with potential to occur as a result of the Project have been described in **Table 6.4**. Further information regarding mitigation measures which would aim to avoid any indirect impacts are included in **Section 7**.

6.1.4 Assessing prescribed biodiversity impacts

Prescribed impacts relevant to the proposal are described in **Table 4.7** and in accordance with Section 8.3 of the BAM.

6.1.5 Serious and Irreversible Impacts (SAII)

The breeding habitats of two bat species recorded within the subject land, Little Bent-winged Bat and Large Bent-winged Bat, are listed as potential SAII. According to *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018), breeding habitat is considered present on the subject land if there is potential breeding habitat and breeding individuals of the target species. Breeding habitat is considered to be caves, scarps, cliffs, rock overhangs and disused mines. Although there are small crevices within sandstone outcrops within the subject land, these are likely unsuitable as microbat breeding habitat, and in any event crevices were inspected with a torch as part of targeted surveys and no evidence of bat utilisation was observed (**Section 4.3.6**). Per OEH (2018), where there is no breeding habitat within the subject land but the species is present, impacts to the species are not a potential SAII and standard species credits are generated to offset the impacts.

Table 6.4: Assessment of indirect impacts on native vegetation

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	The subject land borders areas of native vegetation that will be retained following construction of the Proposal. Potential impacts to these areas will be avoided through control measures outlined in the EMP. Construction activities in proximity to vegetation expected to be retained presents a risk of inadvertent impacts including accidental vegetation damaged during works, etc. The consequence of inadvertent impacts to nearby vegetation is considered high without any control measures in place. However, with the implementation of relevant mitigation measures and the EMP (**Section 7.1**), the probability of indirect impacts occurring is considered low.	Retained native vegetation surrounding the subject land	Ongoing during works	Throughout the construction phase	Ongoing during operations
Reduced viability of adjacent habitat due to edge effects	The subject land borders extensive areas of native vegetation. Although the Proposal will increase the area of edge, and consequently edge effects, around the boundary of clearing, the additional edge effects are not expected to reduce the viability of adjacent habitat substantially. The total area of native vegetation extends to the Hawkesbury and the additional edge effects will be minor in this context.	Retained native vegetation surrounding the subject land	Ongoing during works	Throughout the construction phase	Ongoing during operations
Reduced viability of adjacent habitat due to noise, dust or light spill	Indirect impacts from noise, dust and light spill on nearby habitat is considered low. Construction impacts will be temporary. It is anticipated that construction and operations will be restricted to daytime, therefore artificial light spill is unlikely to occur. Some dust and noise spill	Retained native vegetation and habitat surrounding the subject land	Ongoing during works	Throughout the construction phase, and to a lesser degree	Ongoing during operations

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
	may be experienced during works; however, it is anticipated this will be minor.			following construction	
Transport of weeds and pathogens from the site to adjacent vegetation	There is potential to transport weeds and pathogens to the retained vegetation during construction and occupation; however, exotic species are already apparent throughout areas adjoining native vegetation. Weed management measures within the EMP will be implemented during construction and operations to reduce the risk of pathogens and weeds invading the retained vegetation areas.	Retained native vegetation surrounding the Subject Land	Ongoing during works	Throughout the construction phase	Ongoing during works
Loss of breeding habitats	The Project is not expected to result in any indirect loss of breeding habitats located adjacent to the development site.	NA	NA	NA	NA
Trampling of threatened flora species	Individuals of one threatened species, *Darwinia fascicularis* subsp. *oligantha* – endangered population are in or adjacent to the subject land. Some of the *D. fascicularis* will removed, and some will be retained. Retained trees will be protected by protective fencing, bollards or other suitable barriers (**Section 7.2**).	Retained threatened plants within an exclusion zone adjacent to the subject land	Ongoing during works	Throughout the construction phase	Temporary
Increase in predatory species populations	The Project is not expected to result in any increase in predatory species populations.	NA	NA	NA	NA
Increase in pest animal populations	The Project is not expected to result in any increase in predatory species populations.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Increased risk of fire	The development could result in a minor increased risk of fire from increased traffic and the quarry operations.	NA	NA	NA	NA
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	No specialist breeding or foraging habitat was identified during field survey. The Project is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA

6.2 Assessment of impacts (non-BAM)

Matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the Proposal. Potential impacts on Matters of National Environmental Significance (MNES) in accordance with the EPBC Act have been addressed below. Impacts relating to state and local planning and environmental instruments are addressed as well.

6.2.1 Matters of National Environmental Significance

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where Matters of National Environmental Significance (MNES) may be affected. Under the Act, any action which 'has, will have, or is likely to have a significant impact on a matter of MNES' is defined as a 'controlled action', and requires approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), which is responsible for administering the EPBC Act.

The process includes an assessment for listed threatened species and ecological communities that will be affected by the proposed action (one of the MNES). The Commonwealth has developed Significant Impact Guidelines (DotE 2013) that outline a number of criteria to aid in assessing impacts on MNES and help decide whether or not a referral to the Commonwealth is required.

A search of the EPBC Protected Matters Search Tool was undertaken to identify any MNES within 10 km of the subject land. The search identified nine TECs with potential to occur within the subject land, 91 threatened species and 38 migratory species.

Field survey did not identify any TECs within the subject land (**Section 3.4**). Most threatened and migratory species listed as MNES were either surveyed for and found not to be present or considered unlikely to be present due to habitat limitations.

Four MNES were considered either to be present or potentially to be present:

- *Pimelea curviflora* var. *curviflora*
- *Calyptorhynchus lathami lathami* (Glossy Black-Cockatoo)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Pimelea curviflora var. *curviflora* and Large-eared Pied Bat were both identified within the subject land during targeted surveys. Glossy-Black-Cockatoo was not identified for breeding purposes during targeted surveys, so did not generate species credits, but it was identified by song meter for foraging purposes. The EPBC Act listing for Glossy Black-Cockatoo is not limited to breeding habitat, so it is considered present for purposes of MNES assessment. Similarly, Grey-headed Flying-fox was not recorded within the subject site but is considered likely to use the subject land for foraging purposes, so it is considered potentially present for purposes of MNES assessment.

Potential impacts to the four MNES considered either to be present or potentially present were assessed in accordance with the Significant Impact Guidelines (DotE 2013). The assessments concluded that the Proposal is unlikely to significantly impact these species (**Appendix C**).

A referral is not required as the Proposal is unlikely to have a significant impact on any of the MNES considered to be potentially present.

No other MNES were considered relevant to the proposal.

6.2.2 Water Management Act

The *Water Management Act 2000* (WM Act) requires that any watercourses or riparian lands that may be affected by development be identified as waterfront lands. Under the WM Act, any works within 40 m from the top bank of a watercourse will trigger a requirement for a controlled activity approval on waterfront land, and development is required to comply with applicable riparian buffer requirements under the *Guidelines for Controlled Activities on Waterfront Land* (Controlled Activity Guidelines) (NRAR 2018).

A desktop analysis identified two first-order streams in the subject land, draining in a northerly direction (**Figure 2.1**). Field validation of these first-order streams showed that the western stream begins north of the subject land, and the eastern stream is just to the east of the subject land. Although neither of these watercourse lies within the subject land, works constructed for the proposal will be within 40 m of both watercourses. As a result, the Proposal will require a controlled activity approval.

6.2.3 State Environmental Planning Policy (SEPP) – Biodiversity and Conservation 2021 – Chapter 4 Koala habitat protection

Chapter 4 (Koala Habitat Protection 2021) of the Biodiversity and Conservation SEPP 2021 (formerly Koala SEPP 2021) governs the assessment of the impacts of development on Koalas in NSW. The policy aims to encourage the conservation and management of Koala habitat to ensure populations remain in their present range and the trend of population decline is reversed. As Hornsby LGA is among the LGAs to which Chapter 4 applies, this SEPP applies to the subject land.

Under Chapter 4, where there is a Koala Plan of Management (KPoM) that applies to the site, the development application must be consistent with the approved KPoM. However, there is no approved KPoM that applies to the subject land and therefore Clause 4.9 of the SEPP applies. This clause states that before a council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on Koalas or Koala habitat. It goes on to state that if the council is satisfied that the development is likely to have low or no impact on Koalas or Koala habitat, the council may grant consent to the development application.

Nine known Koala use trees, as per schedule 4 of the SEPP, have been identified within the subject land, *Allocasuarina littoralis* (Black She-oak), *Angophora bakeri* (Narrow-leaved Apple), *Angophora costata* (Smooth-barked Apple), *Corymbia eximia* (Yellow Bloodwood), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus haemastoma* (Scribbly Gum), *Eucalyptus punctata* (Grey Gum), *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) and *Syncarpia glomulifera* (Turpentine). The proposed development within the subject land will impact these Koala use trees.

To assess whether Koalas may occur within the subject land, field survey was undertaken according to the BAM Survey Guideline for Koala (DPE 2022b) (**Section 4.3.6**). Koala scat surveys using the SAT technique and spotlighting were undertaken. No evidence of Koala use of the subject land was identified; accordingly, it is concluded that the proposed development will have low or no impact on Koalas or Koala habitat. Further detail on Koala survey undertaken and the application of Chapter 4 of the Biodiversity and Conservation SEPP to the

proposed development is in the accompanying Koala Assessment Report (Ecoplanning 2023). It was concluded that the Proposal is unlikely to have any impact on Koalas or currently occupied Koala habitat.

6.2.4 Hornsby LEP

Clause 6.4 of the Hornsby LEP, Terrestrial biodiversity, provides that Council must consider whether any Proposal within land included on the Terrestrial Biodiversity Map is likely to have an adverse impact on flora and fauna on the land and other biodiversity values. There is no land included within the Terrestrial Biodiversity Map within the subject land.

7 Mitigation and management of impacts

Whilst all impacts to biodiversity cannot be avoided by the Project, the mitigation measures proposed below will assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical.

7.1 Environmental Management Plan (EMP)

7.1.1 Site management and construction controls

A site-specific EMP will be developed prior to construction taking place and implemented over the life of the project. The EMP will incorporate adaptive management principles and be a live, working document subject to ongoing change and updated to respond to specific requirements. The EMP will outline management actions to avoid inadvertently causing additional impacts to those described in this BDAR (**Table 7.1**). Management actions include an appropriate erosion and sedimentation control plan to avoid and minimise impacts on surrounding watercourses and measures for weed control. Any management actions should follow best practice protocols such as Landcom (2004) or the RTA Biodiversity Guidelines (2011).

Table 7.1: Proposed mitigation measures

Identifier	Mitigation action	Development phase	Outcome	Timing	Responsibility
E01	A EMP will be prepared prior to clearing of native vegetation and removal of existing buildings within the subject land. The EMP would include the following: • Preparation of maps to clearly identify construction limits. • Erosion and sediment control actions in accordance with the Blue Book (Landcom 2004) to be implemented during construction phases. • Updates to avoid and minimise indirect impacts to ecological communities located adjacent to the subject land. • Any required updates to the site induction procedure	Pre-construction	Flora and fauna would be managed in accordance with the requirements of the EMP; prevention of over clearing of vegetation; prevention of weed establishment and invasion.	Pre-construction and construction	Construction contractor
E02	Site inductions during construction to include a briefing regarding the possible local fauna of the site and protocols to be undertaken if fauna are encountered.	Construction	Prevents fauna injury/mortality	Construction	Construction contractor
E03	Prior to the commencement of clearing, a pre-clearing survey will be conducted to confirm the absence of any nesting fauna within the trees to be removed.	Construction	Prevents fauna injury/mortality	Pre-construction	Project manager
E04	Routine maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise or air pollution.	Construction	Minimises disruption to fauna foraging,	Construction	Construction contractor

Identifier	Mitigation action	Development phase	Outcome	Timing	Responsibility
			nesting or roosting behaviours		
E05	If any animal is injured during the clearing process, contact the relevant local wildlife rescue agency (e.g. WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible minimise stress to the animal and reduce the risk of further injury by: • Handling fauna with care and as little as possible. • Covering larger animals with a towel or blanket and placing in a large cardboard box. • Placing small animals in a cotton bag, tied at the top. • Keeping the animal in a quiet, warm, ventilated and dark location.	Construction / Operation	Prevents fauna injury/ mortality	Pre-construction, construction and operation	Construction contractor

7.1.2 Pre-clearance protocols

It is possible that fauna, such as common birds, arboreal mammals and reptiles, may be present within the subject land at the time of construction. Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing and demolition to mitigate and avoid potential harm or injury to these individuals. These protocols should be included in the EMP. They should include, as a minimum:

- Pre-clearance surveys of native vegetation and buildings,
- Clearing supervision and soft-felling techniques where habitat trees are required to be removed.

Habitat trees are those that are providing sheltering or breeding habitat for fauna and include, but are not limited to, tree hollows, hollow branches, decorticating bark and/or stick nests. Soft felling techniques should be adaptive depending on site species conditions and reduce the chance of injury to fauna.

Soft-felling techniques as part of vegetation clearing encourages fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft-felling techniques should be adaptive depending on site species conditions and reduce the chance of injury to fauna.

The proposed development manager should develop a clearing procedure in co-ordination with the proposed development ecologist. This clearing procedure should specifically guarantee the protection of any fauna present in HBTs shown in **Figure 3.9**. The clearing procedure should also include notifying WIRES or a local vet clinic prior to clearing, marking any other habitat trees identified, staged vegetation removal, and a plan for the relocation of any fauna and salvageable habitat features. General features of vegetation clearance protocols for prior to, during and after vegetation removal are provided below.

Prior to vegetation removal

- Identify and mark trees for removal using pink flagging tape. HBTs and hollow-bearing stags set to be removed should be marked with an “H” using spray paint or tagged with high visibility tape.
- Conduct a pre-clearance survey within one week of vegetation clearing. The pre-clearance survey is to be conducted by the engaged ecologist.
    - The following information is to be collected from trees and stags set to be removed during the pre-clearance survey: tree location (GPS coordinates/drop pin), tree species, tree height, number of hollows, size of hollow/s, hollow/s entrance (side/top/slit), hollow/s entrance diameter (cm) and hollow/s height.
    - The pre-clearance survey must also include a spotlight survey of the vegetation to be removed. During the spotlight survey likely fauna to be affected will be identified.
- Conduct a preclearance survey of vegetation to be removed immediately prior to vegetation removal to identify any fauna inhabiting trees set to be removed.

During vegetation removal

- A suitably qualified ecologist is to be on site during the removal/felling of all habitat trees (HBTs and hollow-bearing stags), for the purpose of handling and relocating displaced fauna.
- Tapping/nudging of HBTs and hollow-bearing stags using heavy machinery immediately prior to the proposed removal. If no animals emerge from the tree 1 minute after shaking or nudging, tap/nudge the tree again. If no animals emerge from the tree after another minute, then the tree will be felled and slowly lowered to the ground, if possible.
- If an animal emerges from a HBT or hollow-bearing stag following shaking or nudging of the tree, then at least 30 minutes will be allowed for the animal to leave the tree. If the animal comes to the ground, or when it is on the lower trunk, attempts will be made to capture the animal using a net. Captured animals will be immediately transferred to a suitably sized cotton bag and checked for obvious injury during the transfer process.
- Captured animals will be placed in individual bags unless they are a family group to which separation would risk the survival of the young (i.e., lactating female with young).
- HBTs and hollow-bearing stags must be felled carefully in sections using a “cherry picker” or crane if necessary to allow the rescue of native fauna. Hollow-bearing sections must be carefully lowered to the ground so as not to injure native fauna and then inspected by the proposed development ecologist.
- Once the tree has been felled, a search will be made of the branches around the tree for any fleeing fauna. Hollows should be inspected with a torch or inspection camera for the presence of any animals. Attempts will be made to capture any fleeing fauna with a net, and animals inside hollows should be extracted by hand. Captured animals will be immediately transferred to a suitably sized cotton bag and checked for obvious injury during the transfer process.
- Injured, shocked or immature captured animals will be placed in a cotton bag secured at the top. Bags will be wrapped in appropriate insulating material such as blankets and placed in a quiet, warm and preferably dark place until the wildlife carer can collect them. Details on the location of the capture and proposed release areas will be provided to the wildlife carer.
- Uninjured animals will be released in similar habitat, such as the wooded area to the west of the subject land as soon as practicable (on dusk for nocturnal species).
- In the event that fauna requires euthanasia this should be performed by a veterinarian or performed in accordance with the Code of Practice for Injured, Sick and Orphaned Protected Fauna (OEH 2011).

After vegetation removal

- The environmental consultant must provide a written report to Council (email to Council’s Threatened Species Officer acceptable) detailing any fauna detected as a result of the clearing works. The report is to be submitted within 10 days of commencement of clearing works.

Appropriate hollow-bearing segments are to be selected and relocated sensitively under the guidance and supervision of the ecologist. Care is to be taken to not impact the integrity of the vegetation to be retained during this process.

7.2 Mitigating impacts to retained threatened flora

There are currently nine individuals of *Darwinia fascicularis* subsp. *oligantha* within the subject land, all of them along the Site Access Road near the entrance to the site. As discussed in **section 5**, moving and/or adjusting the width the road is not feasible as the existing track is currently utilised by Rural Fire Services and Transgrid to access Marramarra National Park and the transmission line within the easement east of the subject land. Ongoing and unobstructed access for these parties is critical, hence the requirement for the road to be widened to allow two heavy vehicles to pass simultaneously (i.e. if required, a quarry truck and a fire truck could both use the road at the same time). Additionally, if the road alignment was to be adjusted away from the existing access track, it would require additional clearing of vegetation along the entire 8 m width, rather than approximately 2 m either side of the existing track.

Notwithstanding the above, mitigation measures are to be put in place to avoid and mitigate impacts to the nine *Darwinia fascicularis* subsp. *oligantha* individuals including having an ecologist on site / concurrent with pre-clearing surveys to ensure 8 m width avoids directly impacting *Darwinia fascicularis* subsp. *oligantha* individuals wherever practicable. Additionally, a barrier between the retained plants and the widened access road it to be constructed to avoid accidental, or subsequent, impacts during maintenance and use of the widened access road.

8 Offset requirements and credit calculations

A biodiversity offset requirement for residual impacts of a Project must be calculated in accordance with section 10.1 and section 10.2 of the BAM. The following section outlines the credit requirements for the Project to achieve the 'no net loss standard' established by the BAM.

BAM Calculator reports on credit calculations and payment requirements are at **Appendix D**.

8.1 Vegetation community impacts that require offsetting

Section 9.2.1 of the BAM indicates that the following vegetation zones require offsets:

- vegetation zones that have a vegetation integrity score ≥15 where the PCT is representative of an endangered (EEC) or critically endangered ecological community (CEEC)
- a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community
- a vegetation zone that has a vegetation integrity score ≥20.

No vegetation zone within the subject land is representative of an EEC or CEEC. However, all vegetation zones are associated with threatened species habitat, and thus have a threshold of ≥17. All native vegetation zones within the subject land have a vegetation integrity score of greater than 17, and therefore, require offsetting (**Figure 8.1**). Areas impacted and vegetation integrity scores for vegetation zones requiring offsetting are in **Table 8.1**.

Table 8.1: Vegetation zones assessed that require an offset

Veg zone	PCT	Condition class	Area (ha)	Vegetation integrity score before development
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	0.08	35.9
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	1.42	47.8
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	2.26	53.5



Figure 8.1: Native vegetation impacts requiring offset

8.2 Vegetation community impacts that do not require offsetting or further assessment

Impacts of the Project on vegetation within areas of exotic vegetation, planted native vegetation that does not conform with a PCT, or infrastructure and cleared land do not require further assessment or offsetting.

8.3 Threatened species impacts

8.3.1 Area species

Area species are threatened species that are assessed and offset by area of habitat. Offsets are required for impacts to habitat within the subject land for seven area species:

- *Pimelea curviflora* var. *curviflora*
- *Tetratheca glandulosa*
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Myotis macropus* (Southern Myotis)
- *Vespadelus troughtoni* (Eastern Cave Bat)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Pseudophryne australis* (Red-crowned Toadlet).

For Southern Myotis, the offset was calculated by including all native vegetation within 200 m of a waterbody, in accordance with '*Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018), which was equivalent to all native vegetation within the subject land (see **Figure 4.8**). For the Red-crowned Toadlet, the offset was calculated by including all native vegetation within a 100 m buffer of the records, in accordance with *The NSW Survey Guide for Threatened Frogs* (DPIE 2020e) (**Figure 4.11**). For all other area species, all areas of native vegetation within the subject land were included (**Figure 4.3**, **Figure 4.4**, **Figure 4.7**, **Figure 4.9**, **Figure 4.10**). Areas of offset for all threatened species are summarised in **Table 8.2**.

8.3.2 Count species

Count species are threatened species that are assessed and offset according to the number of individuals impacted. Offsets are required for impacts to a single count species, *Darwinia fascicularis* subsp. *oligantha* – endangered population. There are nine *D. fascicularis* subsp. *oligantha* within the subject land, and for the purposes of calculating impacts it has been assumed that all of them will be cleared under the Proposal. Notwithstanding the above, mitigation measures are to be put in place to avoid and mitigate impacts to the nine *Darwinia fascicularis* subsp. *oligantha* individuals. These include having an ecologist on site / concurrent with pre-clearing surveys to ensure the road widening avoids directly impacting *Darwinia fascicularis* subsp. *oligantha* individuals wherever practicable. Additionally, a barrier between the retained plants and the widened access road it to be constructed to avoid accidental, or subsequent, impacts during maintenance and use of the widened access road.,

Table 8.2: Area of offset for 'area' species credit species

Veg zone	PCT	Area of offset for *Pimelea curviflora* var. *curviflora*	Area of offset for *Tetratheca glandulosa*	Area of offset for Large-eared Pied Bat	Area of offset for Southern Myotis	Area of offset for Eastern Cave Bat	Area of offset for Eastern Pygmy Possum	Area of offset for Red-crowned Toadlet
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	0.08	0.08	0.08	0.08	0.08	0.08	0.00
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	1.42	1.42	1.42	1.42	1.42	1.42	0.28
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	2.26	2.26	2.26	2.26	2.26	2.26	0.49

8.4 Credit calculations and classes

8.4.1 Ecosystem credits

The proposed vegetation clearing and offset requirements for the project have been divided into two stages (**Figure 8.2**). The area of vegetation disturbance associated with each stage are shown in **Table 8.3**. The ecosystem credit offset requirements are shown in **Table 8.4**. A total of 76 ecosystem credits (64 in Stage 1, 12 in Stage 2) are required to offset the biodiversity impacts associated with both stages of the Project.

Table 8.3: Area of each PCTs within the disturbance stages

Vegetation Zone	PCT	Condition class	Area (ha)		
			Stage 1	Stage 2	Total
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	0.08	0.00	**0.08***
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	1.19	0.237	**1.42***
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	1.91	0.352	**2.26***
		Total	**3.18***	**0.59***	**3.77***

* Rounding errors may apply

Table 8.4: Offset requirements for each stage of the Project

Vegetation Zone	PCT	Condition class	Ecosystem credits		
			Stage 1	Stage 2	Total
1	PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	1	-	**1**
2	PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	25	5	**30**
3	PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	38	7	**45**
		Total	**64**	**12**	**76**

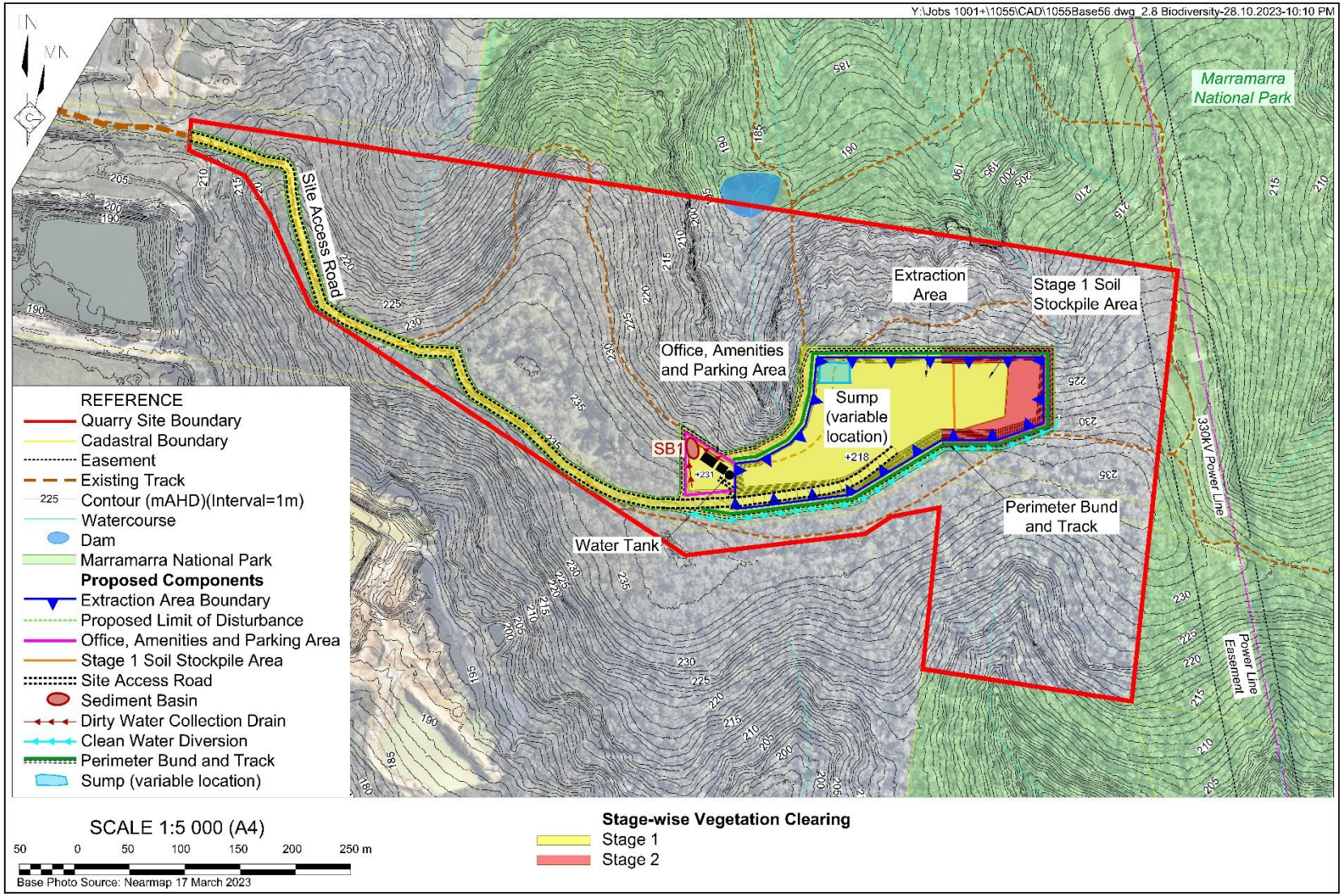


Figure 8.2: The stages of biodiversity impacts associated with the Proposal

The following offset rules apply for the credit class for PCT 3586:

- Sydney Coastal Dry Sclerophyll Forests. This includes PCTs 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598,
- in the following subregions – Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemia and Wyong, or any IBRA subregion that is within 100 km of the outer edge of the impacted site,
- containing hollow bearing trees – No.

The following offset rules apply for the credit class for PCT 3616:

- Sydney Hinterland Dry Sclerophyll Forests. This includes PCTs 621, 3609, 3616,
- in the following subregions – Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemia and Wyong, or any IBRA subregion that is within 100 km of the outer edge of the impacted site,
- containing hollow bearing trees – No.

The following offset rules apply for the credit class for PCT 3616:

- Sydney Hinterland Dry Sclerophyll Forests. This includes PCTs 621, 3609, 3616,
- in the following subregions – Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemia and Wyong, or any IBRA subregion that is within 100 km of the outer edge of the impacted site,
- containing hollow bearing trees – No.

8.4.2 Species credits

The species credit offset requirements are shown in **Table 8.4**. A total of 703 species credits (586 in Stage 1, 117 in Stage 2) are required to offset the biodiversity impacts associated with both stages of the Project.

Species	Impacts			Species credits		
	Stage 1	Stage 2	Total	Stage 1	Stage 2	Total
Cercartetus nanus (Eastern Pygmy-possum)	3.18	0.59	3.77	80	15	**95**
Chalinolobus dwyeri (Large-eared Pied Bat)	3.18	0.59	3.77	122	23	**145**
Darwinia fascicularis subsp. *oligantha*	9*	0	9	18	0	**18**
Myotis macropus (Southern Myotis)	3.18	0.59	3.77	80	15	**95**
Pimelea curviflora var. *curviflora*	3.18	0.59	3.77	80	15	**95**
Pseudophryne australis (Red-crowned Toadlet).	0.18	0.59	0.77	4	11	**15**

Species	Impacts			Species credits		
	Stage 1	Stage 2	Total	Stage 1	Stage 2	Total
Tetratheca glandulosa	3.18	0.59	3.77	80	15	**95**
Vespadelus troughtoni (Eastern Cave Bat)	3.18	0.59	3.77	122	23	**145**
Total				**586**	**117**	**703**

* unit of measure is number of individuals

The following offset rules apply for like-for-like options for Eastern Pygmy-possum:

- *Cercartetus nanus* (Eastern Pygmy-possum) in any IBRA region in NSW.

The following offset rules apply for like-for-like options for Large-eared Pied Bat:

- *Chalinolobus dwyeri* (Large-eared Pied Bat) in any IBRA region in NSW.

The following offset rules apply for like-for-like options for *Darwinia fascicularis* subsp. *oligantha* – endangered population:

- *Darwinia fascicularis* subsp. *oligantha* – endangered population in the Baulkham Hills and Hornsby LGA in any IBRA region in NSW.

The following offset rules apply for like-for-like options for Southern Myotis:

- *Myotis macropus* (Southern Myotis) in any IBRA region in NSW.

The following offset rules apply for like-for-like options for *Pimelea curviflora* var. *curviflora*:

- *Pimelea curviflora* var. *curviflora* in any IBRA region in NSW.

The following offset rules apply for like-for-like options for Red-crowned Toadlet:

- *Pseudophryne australis* (Red-crowned Toadlet) in any IBRA region in NSW.

The following offset rules apply for like-for-like options for *Tetratheca glandulosa*:

- *Tetratheca glandulosa* in any IBRA region in NSW.

The following offset rules apply for like-for-like options for Eastern Cave Bat:

- *Vespadelus troughtoni* (Eastern Cave Bat) in any IBRA region in NSW.

8.4.3 Payment calculations

The Biodiversity Offsets Payment Calculator (BOPC) was replaced by the BCF Charge System on 17 October 2022. The new BCF Charge System is now be used to determine the amount a proponent may pay into the BCF to meet a biodiversity offset obligation. The Biodiversity Conservation Trust (BCT) is responsible for administering the new charge

system. More information about the new charge system, including how to request a quote from the BCT, is available on the BCT website: https://www.bct.nsw.gov.au/info/biodiversity-conservation-fund-charge-system

The proponent may wish to purchase credits available on the market or may wish to pursue other offset sites as required. A final decision on how the credits will be secured will be made as the Project progresses.

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Appendix A Flora and fauna inventories

Flora inventory

Family	Scientific Name	Common Name	Growth Form	Native/Exotic
Anthericaceae	*Laxmannia gracilis*	Slender Wire Lily	Forb (FG)	Native
Apiaceae	*Actinotus helianthi*	Flannel Flower	Forb (FG)	Native
	Actinotus minor	Lesser Flannel Flower	Forb (FG)	Native
	Platysace linearifolia		Shrub (SG)	Native
	Xanthosia pilosa	Woolly Xanthosia	Shrub (SG)	Native
	Xanthosia tridentata	Rock Xanthosia	Forb (FG)	Native
Apocynaceae	*Parsonsia straminea*	Common Silkpod	Other (OG)	Native
Asphodelaceae	*Dianella caerulea*	Blue Flax-lily	Forb (FG)	Native
	Dianella prunina		Forb (FG)	Native
	Dianella revoluta	Blueberry Lily	Forb (FG)	Native
Asteraceae	*Cyanthillium cinereum*	Little Ironweed		Native
	Hypochaeris radicata	Catsear		Exotic
	Lagenophora sp.		Forb (FG)	Native

Asteraceae	*Lagenophora stipitata*	Common Lagenophora	Forb (FG)	Native
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine	Other (OG)	Native
Campanulaceae	*Lobelia purpurascens*	Whiteroot	Forb (FG)	Native
	Wahlenbergia communis	Tufted Bluebell	Forb (FG)	Native
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	Tree (TG)	Native
Cyperaceae	*Cyathochaeta diandra*		Grass & grasslike (GG)	Native
	Lepidosperma laterale	Variable Sword-sedge	Grass & grasslike (GG)	Native
	Schoenus ericetorum		Grass & grasslike (GG)	Native
	Schoenus melanostachys	Black Bog-rush	Grass & grasslike (GG)	Native
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	Fern (EG)	Native
Dilleniaceae	*Hibbertia linearis*		Shrub (SG)	Native
	Hibbertia sp.		Shrub (SG)	Native
Elaeocarpaceae	***Tetratheca glandulosa***		Shrub (SG)	Native
Ericaceae	*Acrotriche divaricata*		Shrub (SG)	Native
	Leucopogon muticus	Blunt Beard-heath	Shrub (SG)	Native
	Monotoca scoparia		Shrub (SG)	Native
	Woollsia pungens		Shrub (SG)	Native

Fabaceae (Faboideae)	*Bossiaea obcordata*	Spiny Bossiaea	Shrub (SG)	Native
	Daviesia acicularis		Shrub (SG)	Native
	Daviesia sp.		Shrub (SG)	Native
	Dillwynia sp.		Shrub (SG)	Native
	Glycine clandestina	Twining glycine	Other (OG)	Native
	Gompholobium sp.		Shrub (SG)	Native
	Hovea linearis		Forb (FG)	Native
	Hovea sp.		Forb (FG)	Native
	Phyllota phylicoides	Heath Phyllota	Shrub (SG)	Native
	Pultenaea ferruginea		Shrub (SG)	Native
	Pultenaea paleacea	Chaffy Bush-pea	Shrub (SG)	Native
Fabaceae (Mimosoideae)	*Acacia linifolia*	White Wattle	Shrub (SG)	Native
	Acacia myrtifolia	Red-stemmed Wattle	Shrub (SG)	Native
	Acacia parramattensis	Parramatta Wattle	Tree (TG)	Native
	Acacia suaveolens	Sweet Wattle	Shrub (SG)	Native
	Acacia ulicifolia	Prickly Moses	Shrub (SG)	Native
Goodeniaceae	*Dampiera stricta*		Forb (FG)	Native

	Scaevola ramosissima	Purple Fan-flower	Forb (FG)	Native
Lamiaceae	*Hemigenia purpurea*		Shrub (SG)	Native
Lauraceae	*Cassytha pubescens*	Downy Dodder-laurel	Other (OG)	Native
	Cassytha spp.		Other (OG)	Native
Lomandraceae	*Lomandra cylindrica*		Grass & grasslike (GG)	Native
	Lomandra filiformis			Native
	Lomandra longifolia	Spiny-headed Mat-rush	Grass & grasslike (GG)	Native
	Lomandra multiflora	Many-flowered Mat-rush		Native
	Lomandra obliqua		Grass & grasslike (GG)	Native
Myrtaceae	*Angophora bakeri*	Narrow-leaved Apple	Tree (TG)	Native
	Angophora costata	Sydney Red Gum	Tree (TG)	Native
	Angophora hispida	Dwarf Apple	Tree (TG)	Native
	Corymbia eximia	Yellow Bloodwood	Tree (TG)	Native
	Corymbia gummifera	Red Bloodwood	Tree (TG)	Native
	Darwinia fascicularis* subsp. *oligantha		Shrub (SG)	Native
	Eucalyptus haemastoma	Broad-leaved Scribbly Gum	Tree (TG)	Native
	Eucalyptus punctata	Grey Gum	Tree (TG)	Native

	Eucalyptus sparsifolia	Narrow-leaved Stringybark	Tree (TG)	Native
	Kunzea ambigua	Tick Bush	Shrub (SG)	Native
	Leptospermum parvifolium		Shrub (SG)	Native
	Leptospermum trinervium	Slender Tea-tree	Shrub (SG)	Native
	Syncarpia glomulifera	Turpentine	Tree (TG)	Native
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	Shrub (SG)	Native
Picrodendraceae	*Micrantheum ericoides*		Shrub (SG)	Native
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry	Other (OG)	Native
	Bursaria spinosa	Native Blackthorn	Shrub (SG)	Native
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues		Exotic
	Veronica plebeia	Trailing Speedwell	Forb (FG)	Native
Poaceae	*Andropogon virginicus*	Whisky Grass		High Threat
	Anisopogon avenaceus	Oat Speargrass	Grass & grasslike (GG)	Native
	Aristida benthamii	Three-awned spear grass	Grass & grasslike (GG)	Native
	Aristida ramosa	Purple Wiregrass	Grass & grasslike (GG)	Native
	Aristida sp.		Grass & grasslike (GG)	Native
	Aristida vagans	Threeawn Speargrass	Grass & grasslike (GG)	Native

	Austrostipa pubescens		Grass & grasslike (GG)	Native
	Dichelachne micrantha	Shorthair Plumegrass	Grass & grasslike (GG)	Native
	Digitaria longiflora		Grass & grasslike (GG)	Native
	Echinopogon caespitosus	Bushy Hedgehog-grass	Grass & grasslike (GG)	Native
	Entolasia stricta	Wiry Panic	Grass & grasslike (GG)	Native
	Eragrostis brownii	Brown's Lovegrass	Grass & grasslike (GG)	Native
	Imperata cylindrica	Blady Grass	Grass & grasslike (GG)	Native
	Microlaena stipoides	Weeping Grass	Grass & grasslike (GG)	Native
	Panicum simile	Two-colour Panic	Grass & grasslike (GG)	Native
	Paspalidium distans		Grass & grasslike (GG)	Native
	Paspalidium sp.		Grass & grasslike (GG)	Native
	Themeda triandra		Grass & grasslike (GG)	Native
Proteaceae	*Banksia ericifolia*	Heath-leaved Banksia	Shrub (SG)	Native
	Banksia serrata	Old-man Banksia	Tree (TG)	Native
	Banksia spinulosa	Hairpin Banksia	Shrub (SG)	Native
	Grevillea buxifolia	Grey Spider Flower	Shrub (SG)	Native
	Hakea sericea	Needlebush	Shrub (SG)	Native

	Isopogon sp.		Shrub (SG)	Native
	Lambertia formosa	Mountain Devil	Shrub (SG)	Native
	Lomatia silaifolia	Crinkle Bush	Shrub (SG)	Native
	Persoonia linearis	Narrow-leaved Geebung	Shrub (SG)	Native
	Petrophile pulchella	Conesticks	Shrub (SG)	Native
	Xylomelum pyriforme	Woody Pear	Shrub (SG)	Native
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair	Fern (EG)	Native
	Cheilanthes sieberi	Rock Fern	Fern (EG)	Native
Rubiaceae	*Opercularia diphylla*	Stinkweed	Forb (FG)	Native
	Pomax umbellata	Pomax	Forb (FG)	Native
Rutaceae	*Boronia ledifolia*	Sydney Boronia	Shrub (SG)	Native
	Eriostemon australasius		Shrub (SG)	Native
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	Shrub (SG)	Native
	Exocarpos strictus	Dwarf Cherry	Shrub (SG)	Native
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush	Shrub (SG)	Native
Scrophulariaceae	*Eremophila sturtii*	Turpentine Bush	Shrub (SG)	Native
Thymelaeaceae	***Pimelea curviflora* var. *curviflora***		Shrub (SG)	Native

Xanthorrhoeaceae	*Xanthorrhoea media*		Other (OG)	Native
	Xanthorrhoea sp.		Other (OG)	Native

Threatened species are in **bold**.

Fauna inventory

Class	Scientific name	Common name	Native/ Exotic	Observation Type
Amphibia	*Crinia signifera*	Common Eastern Froglet	Native	O, W, S
	Limnodynastes dumerii	Eastern Banjo Frog	Native	O
	Limnodynastes peronii	Striped Marsh Frog	Native	O, W, S
	Litoria peronii	Peron's Tree Frog	Native	W, S
	Litoria quiritatus	Screaming Tree Frog	Native	S
	Litoria tyleri	Tyler's Tree Frog	Native	O, W, S
	Litoria verreauxii	Whistling Tree Frog	Native	S
	Pseudophryne australis	**Red-crowned Toadlet**	Native	O, W
Aves	*Acanthiza lineata*	Striated Thornbill	Native	O
	Acanthiza pusilla	Brown Thornbill	Native	S
	Anthochaera chrysoptera	Little Wattlebird	Native	W, S

Class	Scientific name	Common name	Native/ Exotic	Observation Type
	Aquila audax	Wedge-tailed Eagle	Native	O
	Cacatua galerita	Sulphur-crested Cockatoo	Native	O, W
	Calyptorhynchus lathami	**Glossy Black-cockatoo**	Native	S
	Coracina novaehollandiae	Black-faced Cuckooshrike	Native	S
	Cormobates leucophaea	White-throated Treecreeper	Native	S
	Corvus coronoides	Australian Raven	Native	O, W
	Craticus torquatus	Grey Butcherbird	Native	S
	Dacelo novaeguineae	Kookaburra	Native	O, W, S
	Eopsaltria australis	Eastern Yellow Robin	Native	O, S
	Gymnorhina tibicen	Australian Magpie	Native	O, W, S
	Malurus sp.	Unidentified Fairy-wren species	Native	S
	Manorina melanophrys	Bell Miner	Native	W, S
	Meliphaga lewinii	Lewin's Honeyeater	Native	O, S
	Pachycephala pectoralis	Golden Whistler	Native	S
	Pachycephala rufiventris	Rufous Whistler	Native	S
	Philemon citreogularis	Little Friarbird	Native	S

Class	Scientific name	Common name	Native/ Exotic	Observation Type
	Platycercus elegans	Crimson Rosella	Native	O
	Platycercus eximius	Eastern Rosella	Native	O
	Psophodes olivaceus	Eastern Whipbird	Native	W, S
	Rhipdura albiscapa	Grey Fantail	Native	O, S
	Rhipidura leucophrys	Willie Wagtail	Native	O
	Sericornis frontalis	White-browed Scrubwren	Native	W
	Trichoglossus moluccanus	Rainbow Lorikeet	Native	O, W, S
	Vanellus miles	Masked Lapwing	Native	S
	Zandra funerea	Yellow-tailed Black-cockatoo	Native	S
Mammalia (excluding microbats)	*Antechinus stuartii*	Brown Antechinus	Native	O, C
	Cercartetus nanus	**Eastern Pygmy-possum**	Native	O, C
	Petaurus breviceps	Sugar Glider	Native	O, C, S
	Pseudocheirus peregrinus	Ringtail Possum	Native	O
	Rattus fuscipes	Australian Bush Rat	Native	C
	Trichosurus vulpecula	Brushtail Possum	Native	O, C
	Wallabia bicolor	Swamp Wallaby	Native	O, C

Class	Scientific name	Common name	Native/ Exotic	Observation Type
Mammalia (microbats)	***Chalinolobus dwyeri***	**Large-eared Pied Bat**	Native	B
	Ozimops planiceps	Southern Free-tailed Bat	Native	B
	Chalinolobus gouldii	Gould's Wattled Bat	Native	B
	Ozimops ridei	Ride's Free-tailed Bat	Native	B
	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Native	B
	Vespadelus darlingtoni	Large Forest Bat	Native	B
	Vespadelus regulus	Southern Forest Bat	Native	B
	Miniopterus orianae oceanensis	**Eastern Bent-winged Bat**	Native	B
	Vespadelus vulturnus	Little Forest Bat	Native	B
	Chalinolobus morio	Chocolate Wattled Bat	Native	B
	Vespadelus troughtoni	**Eastern Cave Bat**	Native	B
	Miniopterus australis	**Little Bent-winged Bat**	Native	B
	Myotis macropus	**Southern Myotis**	Native	B
	Nyctophilus sp.	Long-eared Bat	Native	B
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	Native	B
Reptilia	*Cryptophis nigrescens*	Eastern Small-eyed Snake	Native	O

Class	Scientific name	Common name	Native/ Exotic	Observation Type
	Diplodactylus vittatus	Eastern Stone Gecko	Native	O
	Intellagama lesueurii	Eastern Water Dragon	Native	O
	Morelia spilota	Diamond Python	Native	O
	Pygopus lepidopodus	Common Scaly-foot	Native	O
	Underwoodisaurus milii	Barking Gecko	Native	O

Threatened species are in **bold.** Observation type: O = observed, W = heard, B = bat detector, C = motion-sensitive camera, S = song meter.

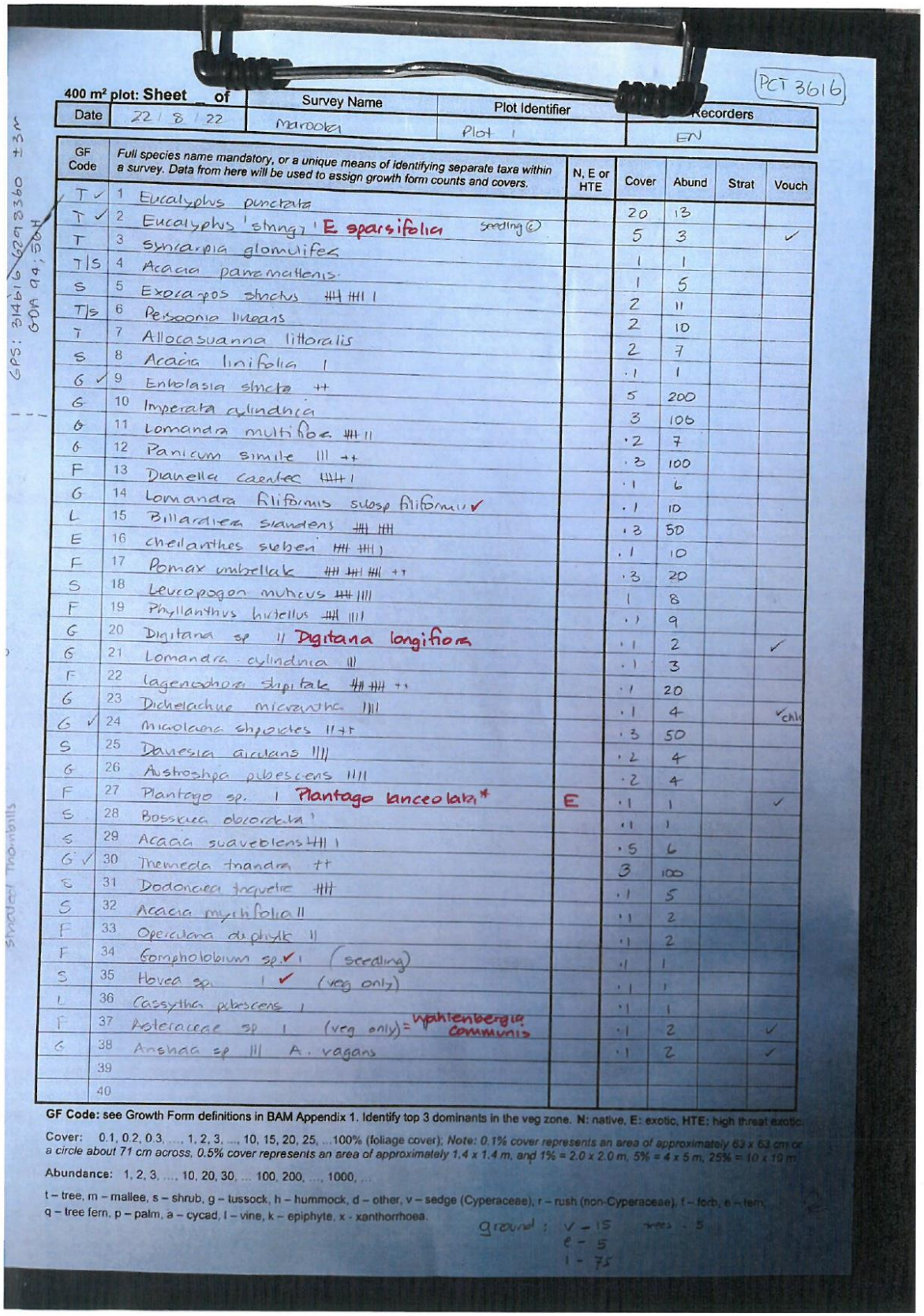
Appendix B Plot data

Plot No.	PCT	Area (ha)	Patch Size	Condition class	Zone	Easting	Northing	Bearing
1	3616	1.42	101	Moderate	56	314616	6298360	64
2	3622	2.26	101	Moderate	56	314717	6298468	100
3	3622	1.97	101	Moderate	56	314516	6298371	60
4	3586	0.08	101	Moderate	56	314131	6298684	101
5	3616	1.42	101	Moderate	56	314731	6298396	41

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
1	4	11	10	6	1	2
2	5	15	10	5	0	3
3	5	15	10	4	0	2
4	3	20	10	9	2	2
5	3	10	8	4	1	3

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	29	6.3	12.2	0.8	0.1	0.4
2	22.1	8	15.6	0.5	0	2.2
3	20.5	4.7	21.2	0.4	0	0.4
4	14	14.3	5	1.1	0.6	0.3
5	17.5	9.7	37.8	0.5	0.1	0.4

Plot No.	Function									
	Large trees (>50 cm)	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree stem 5-9 cm	Tree stem 10-19 cm	Tree stem 20-29 cm	Tree stem 30-49 cm	Tree regen	High threat exotic
1	0	0	89	3.1	Y	Y	Y	Y	Y	0
2	1	1	74	28.8	Y	Y	Y	Y	Y	0.1
3	1	1	76	15.3	N	Y	Y	N	Y	0
4	0	0	50	10	Y	Y	Y	Y	Y	0
5	0	0	60	25	Y	Y	Y	Y	Y	0



400 m² plot: Sheet _ of

Date	Survey Name	Plot Identifier	Recorders
22/8/22	Maroota	Plot 1	EN

PCT 3616

GPS: 314616 6298360 ±3m GDA 94; 50H

GF Code		Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
T ✓	1	Eucalyphus punctata		20	13		
T ✓	2	Eucalyphus 'stringy' E. sparsifolia seedling ⓒ		5	3		✓
T	3	Syncarpia glomulifera		1	1		
T/S	4	Acacia parramattensis		1	5		
S	5	Exocarpos strictus |||||			2	11		
T/s	6	Persoonia linearis		2	10		
T	7	Allocasuanna littoralis		2	7		
S	8	Acacia linifolia		.1	1		
G ✓	9	Enbolasia stricta ++		5	200		
G	10	Imperata cylindrica		3	106		
G	11	Lomandra multiflora |||||			.2	7		
G	12	Panicum simile ||| ++		.3	100		
F	13	Dianella caerulea ||||		.1	6		
G	14	Lomandra filiformis subsp filiformis ✓		.1	10		
L	15	Billardiera scandens ||||| |||||		.3	50		
E	16	cheilanthes sieberi ||||| |||||		.1	10		
F	17	Pomax umbellata ||||| ||||| ||||| ++		.3	20		
S	18	Leucopogon muticus ||||| ||||		1	8		
F	19	Phyllanthus hirtellus ||||| ||||		.1	9		
G	20	Digitaria sp ‖ Digitaria longiflora		.1	2		✓
G	21	Lomandra cylindrica |||		.1	3		
F	22	Lagenophora stipitata ||||| ||||| ++		.1	20		
G	23	Dichelachne micrantha ||||		.1	4		✓chlo
G ✓	24	Microlaena stipoides ||+		.3	50		
S	25	Daviesia arcuata ||||		.2	4		
G	26	Austrostipa pubescens ||||		.2	4		
F	27	Plantago sp. 1 Plantago lanceolata*	E	.1	1		✓
S	28	Bossiaea obcordata		.1	1		
S	29	Acacia suaveolens |||||		.5	6		
G ✓	30	Themeda triandra ++		3	100		
S	31	Dodonaea viscosa |||		.1	5		
S	32	Acacia myrtifolia ‖		.1	2		
F	33	Opercularia diphylla ‖		.1	2		
F	34	Gompholobium sp. ✓1 (seedling)		.1	1		
S	35	Hovea sp. 1 ✓ (veg only)		.1	1		
L	36	Cassytha pubescens 1		.1	1		
F	37	Asteraceae sp 1 (veg only) = Hypochoeris communis		.1	2		✓
G	38	Anshaa sp ||| A. vagans		.1	2		✓
	39						
	40						

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic

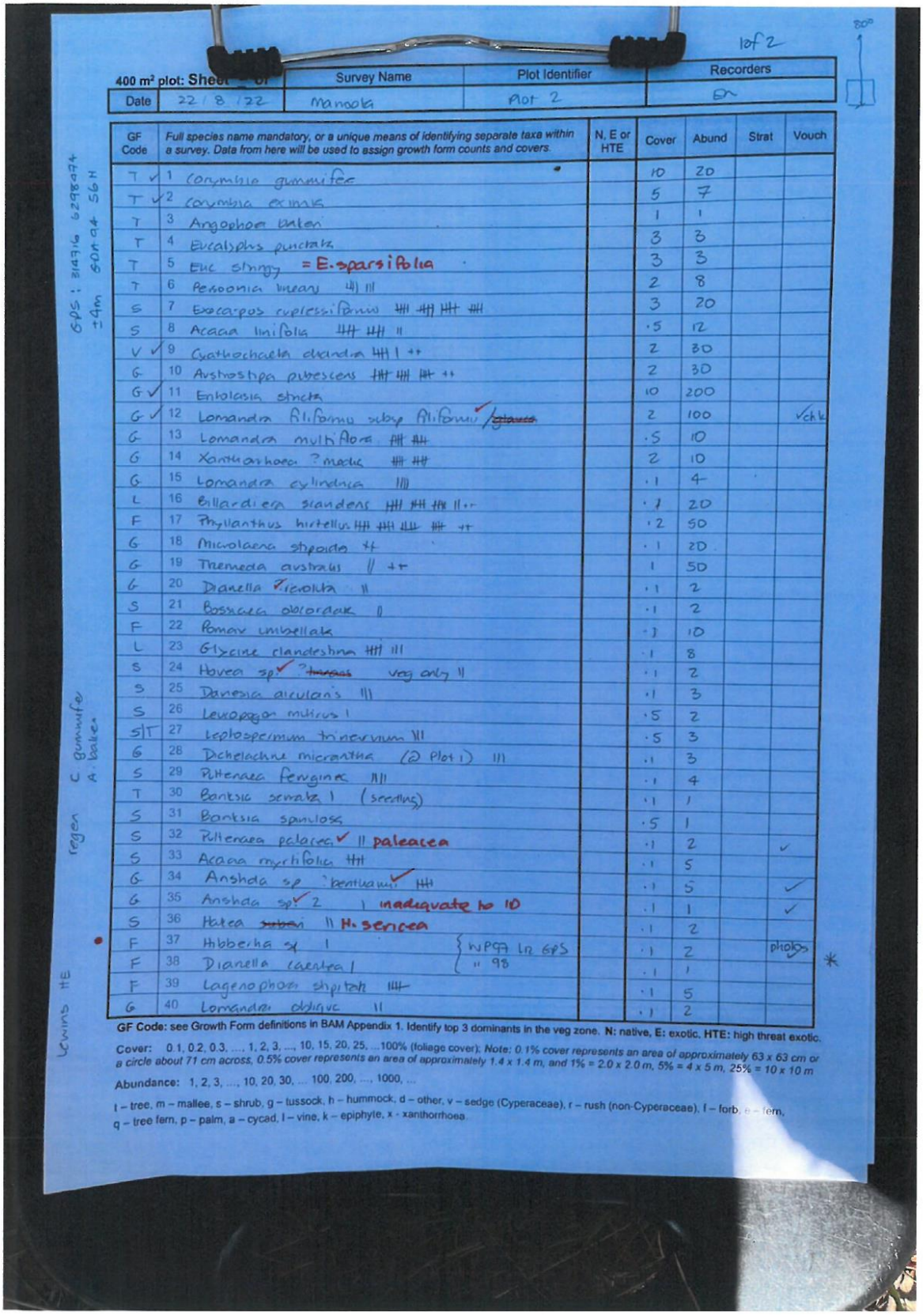
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

t – tree, m – mallee, s – shrub, g – tussock, h – hummock, d – other, v – sedge (Cyperaceae), r – rush (non-Cyperaceae), f – forb, e – fern, q – tree fern, p – palm, a – cycad, l – vine, k – epiphyte, x - xanthorrhoea.

ground: V - 15 trees - 5
E - 5
I - 75

Shovel Transhills



1 of 2

400 m² plot: Sheet – of

Survey Name	Plot Identifier	Recorders
Maroota	Plot 2	EK

Date: 22/8/22

GPS: 21 H 629497 6260474 ±4m 56m a4

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
T ✓	1 Corymbia gummifera		10	20		
T ✓	2 Corymbia eximia		5	7		
T	3 Angophora hispida		1	1		
T	4 Eucalyptus punctata		3	3		
T	5 Euc stringy = E. sparsifolia		3	3		
T	6 Persoonia linearis 4 III		2	8		
S	7 Exocarpos cupressiformis IIII IIII IIII IIII		3	20		
S	8 Acacia linifolia IIII IIII II		.5	12		
V ✓	9 Cyathochaeta diandra IIII I ++		2	30		
G	10 Austrostipa pubescens IIII IIII IIII ++		2	30		
G ✓	11 Entolasia stricta		10	200		
G ✓	12 Lomandra filiformis subsp filiformis ~~glauca~~		2	100		✓chk
G	13 Lomandra multiflora IIII IIII		.5	10		
G	14 Xanthorrhoea ? media IIII IIII		2	10		
G	15 Lomandra cylindrica III		.1	4		
L	16 Billardiera scandens IIII IIII IIII II++		.1	20		
F	17 Phyllanthus hirtellus IIII IIII IIII IIII ++		.2	50		
G	18 Microlaena stipoides ++		.1	20		
G	19 Themeda australis II ++		1	50		
G	20 Dianella revoluta II		.1	2		
S	21 Bossiaea obcordata II		.1	2		
F	22 Pomax umbellata		.1	10		
L	23 Glycine clandestina IIII III		.1	8		
S	24 Hovea sp ✓ ? ~~fungus~~ veg only II		.1	2		
S	25 Daviesia arcuata III		.1	3		
S	26 Leucopogon muticus I		.5	2		
S/T	27 Leptospermum trinervium III		.5	3		
G	28 Dichelachne micrantha (2 Plot 1) III		.1	3		
S	29 Pultenaea fenginea III		.1	4		
T	30 Banksia serrata I (seedling)		.1	1		
S	31 Banksia spinulosa		.5	1		
S	32 Pultenaea palacea ✓ II **paleacea**		.1	2		✓
S	33 Acacia myrtifolia IIII		.1	5		
G	34 Anshda sp 'bentwaw' ✓ IIII		.1	5		✓
G	35 Anshda sp ✓ 2 I **inadequate to ID**		.1	1		✓
S	36 Hakea ~~subsp~~ II **H. sericea**		.1	2		
F	37 Hibbertia sp I { WP97 LR GPS " 98		.1	2		photo
F	38 Dianella caerulea I		.1	1		
F	39 Lagenophora stipitata IIII		.1	5		
G	40 Lomandra obliqua II		.1	2		

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

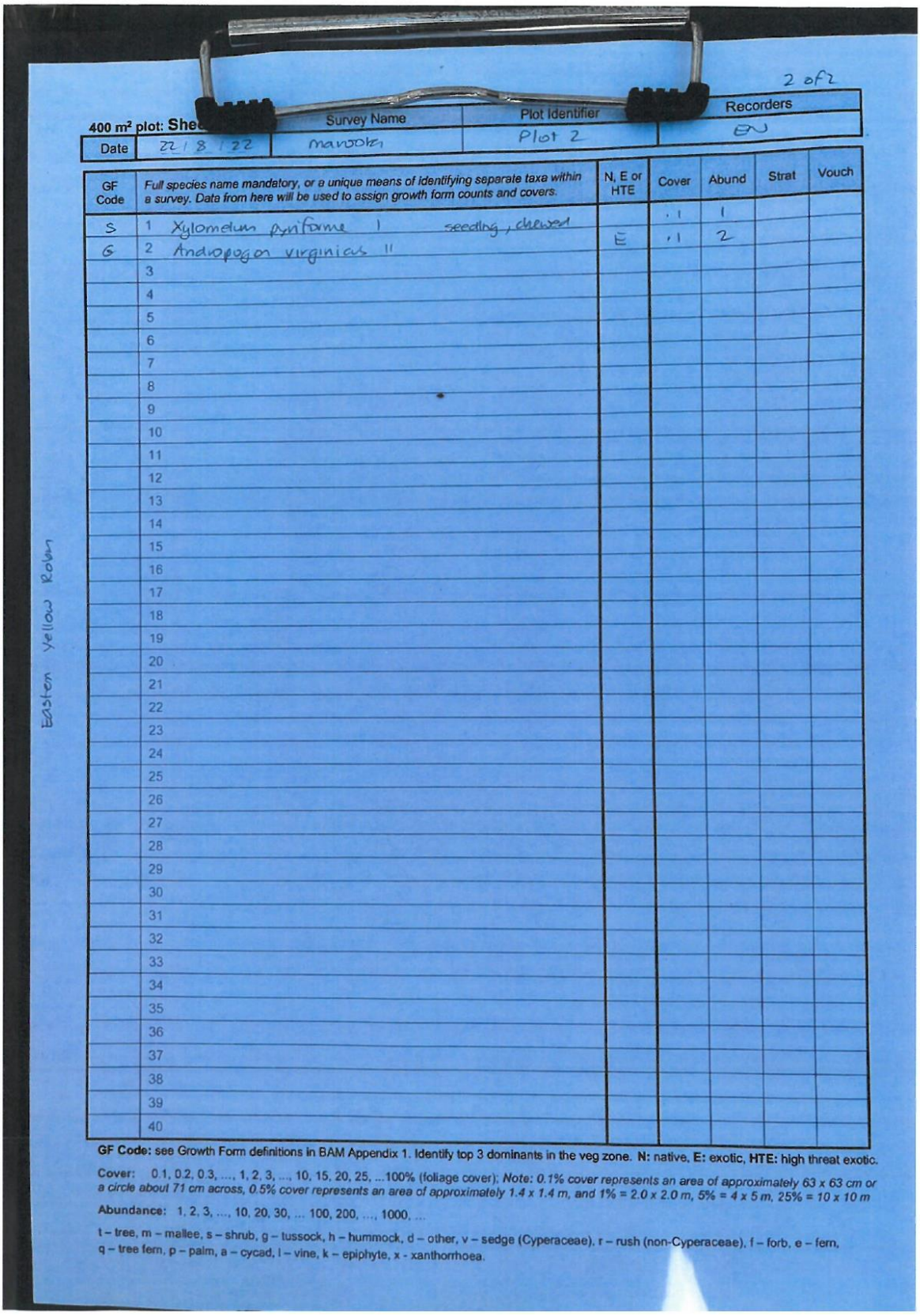
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

t – tree, m – mallee, s – shrub, g – tussock, h – hummock, d – other, v – sedge (Cyperaceae), r – rush (non-Cyperaceae), f – forb, e – fern, q – tree fern, p – palm, a – cycad, l – vine, k – epiphyte, x – xanthorrhoea

Lewins HE

regen C. gummifera A. baker



2 of 2

400 m² plot: She

Survey Name	Plot Identifier	Recorders
Maroota	Plot 2	EW

Date: 22/8/22

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
S	1 Xylomelum pyriforme		.1	1		
	seedling, chewed					
G	2 Andropogon virginicus	E	.1	2		
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
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	27					
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	36					
	37					
	38					
	39					
	40					

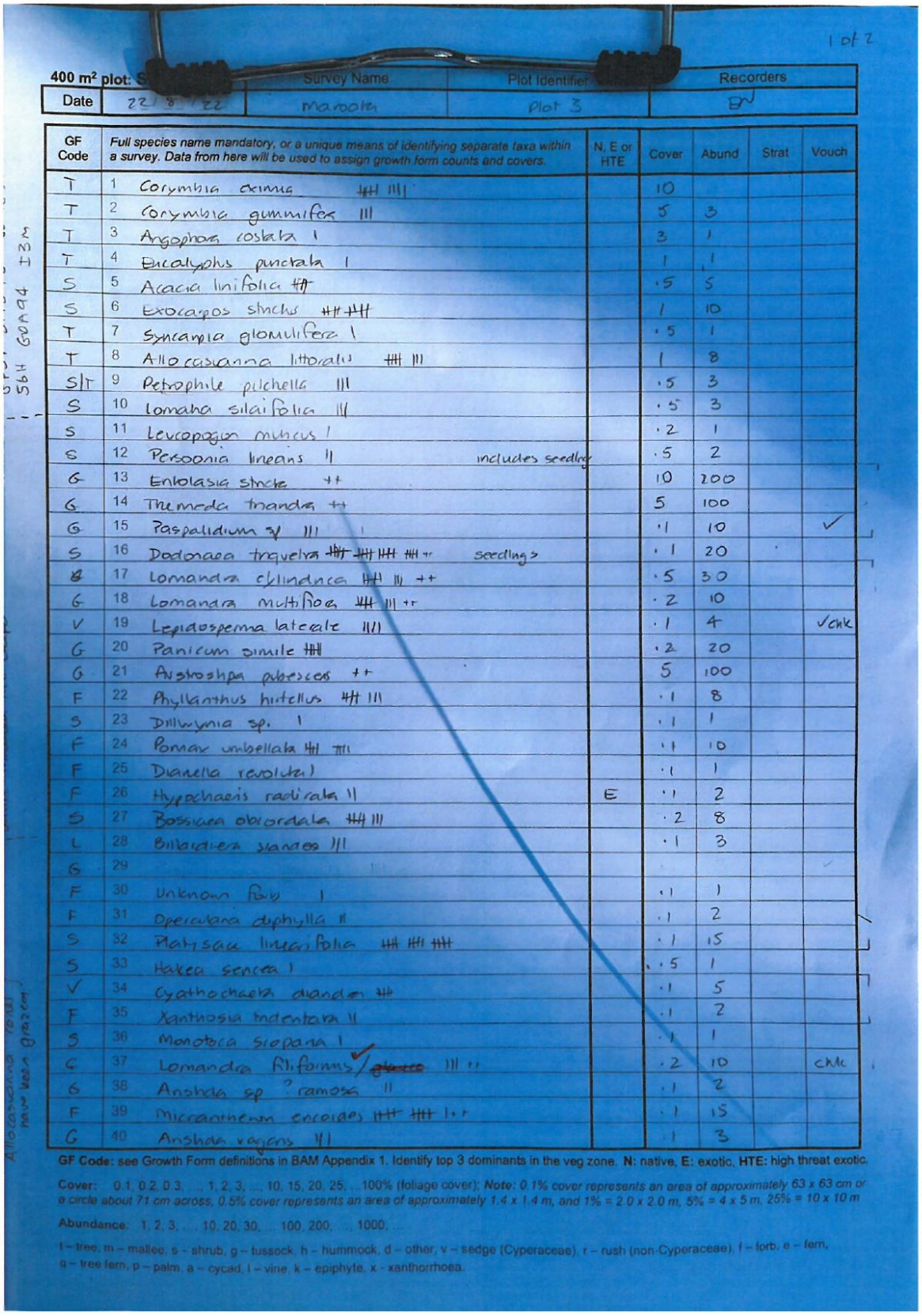
Eastern Yellow Robin

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

t – tree, m – mallee, s – shrub, g – tussock, h – hummock, d – other, v – sedge (Cyperaceae), r – rush (non-Cyperaceae), f – forb, e – fern, q – tree fern, p – palm, a – cycad, l – vine, k – epiphyte, x - xanthorrhoea.



1 of 2

400 m² plot: S

Date	Survey Name	Plot Identifier	Recorders
22/8/22	Maroota	Plot 3	EW

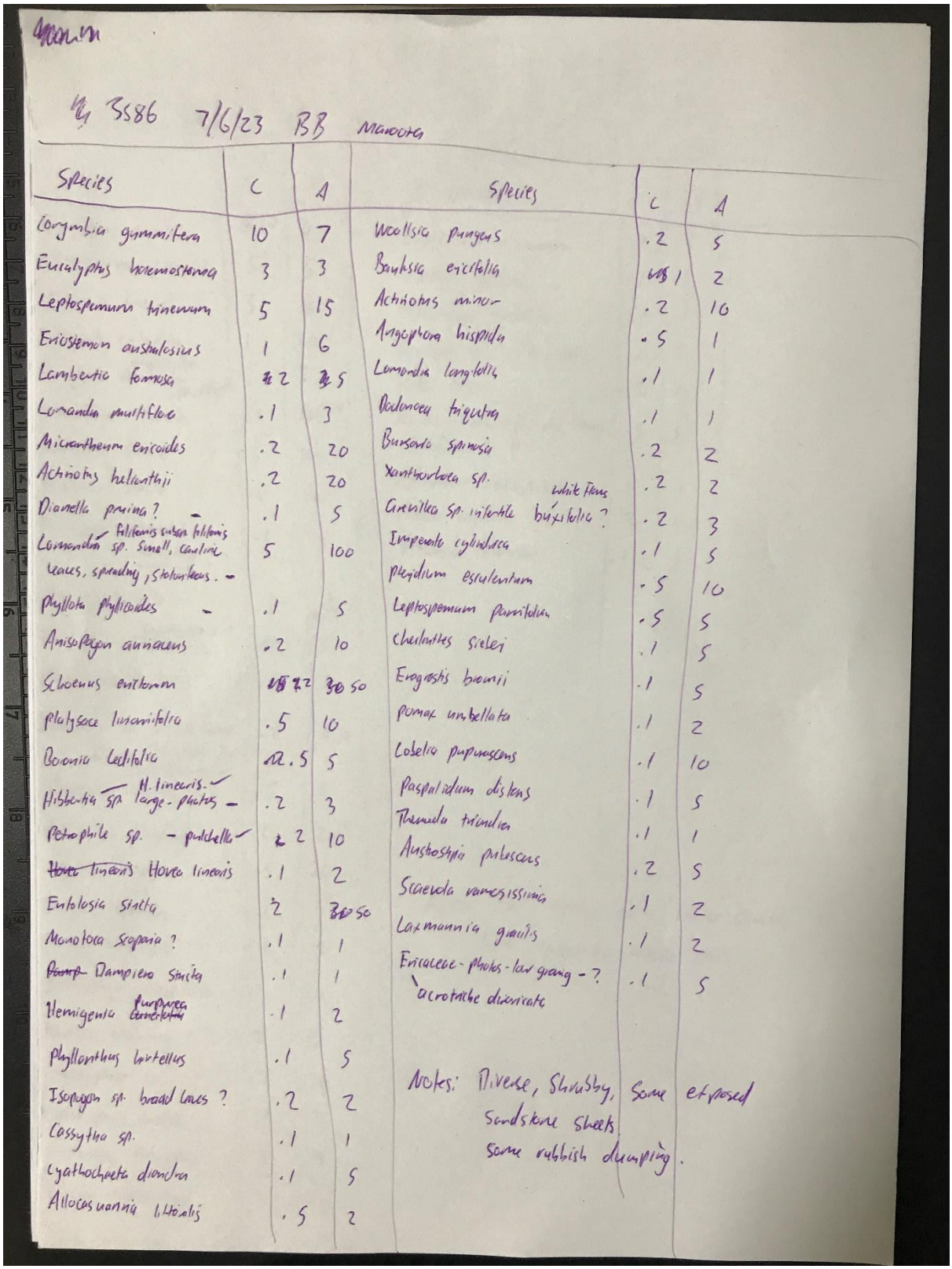
GF Code		Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
T	1	Corymbia eximia		10			
T	2	Corymbia gummifera		5	3		
T	3	Angophora costata		3	1		
T	4	Eucalyptus punctata		1	1		
S	5	Acacia linifolia		.5	5		
S	6	Exocarpos strictus		1	10		
T	7	Syncarpia glomulifera		.5	1		
T	8	Allocasuarina littoralis		1	8		
S/T	9	Petrophile pulchella		.5	3		
S	10	Lomatia silaifolia		.5	3		
S	11	Leucopogon muticus		.2	1		
S	12	Persoonia linearis	includes seedlings	.5	2		
G	13	Entolasia stricta		10	200		
G	14	Themeda triandra		5	100		
G	15	Paspalidium sp.		.1	10		✓
S	16	Dodonaea triquetra	seedlings	.1	20		
S	17	Lomandra cylindrica		.5	30		
G	18	Lomandra multiflora		.2	10		
V	19	Lepidosperma laterale		.1	4		✓chk
G	20	Panicum simile		.2	20		
G	21	Austrostipa pubescens		5	100		
F	22	Phyllanthus hirtellus		.1	8		
S	23	Dillwynia sp.		.1	1		
F	24	Pomax umbellata		.1	10		
F	25	Dianella revoluta		.1	1		
F	26	Hypochaeris radicata	E	.1	2		
S	27	Bossiaea obcordata		.2	8		
L	28	Billardiera scandens		.1	3		
G	29						
F	30	Unknown forb		.1	1		
F	31	Opercularia diphylla		.1	2		
S	32	Platysace linearifolia		.1	15		
S	33	Hakea sericea		.5	1		
V	34	Cyathochaeta diandra		.1	5		
F	35	Xanthosia tridentata		.1	2		
S	36	Monotoca scoparia		.1	1		
G	37	Lomandra filiformis/~~glauca~~		.2	10		chk
G	38	Anisopogon sp ? ramosus		.1	2		
F	39	Microtheca ericoides		.1	15		
G	40	Anisopogon avenaceus		.1	3		

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ... 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ... 10, 20, 30, ... 100, 200, ... 1000, ...

l – tree, m – mallee, s – shrub, g – tussock, h – hummock, d – other, v – sedge (Cyperaceae), r – rush (non-Cyperaceae), f – forb, e – fern, q – tree fern, p – palm, a – cycad, l – vine, k – epiphyte, x – xanthorrhoea.



3586 7/6/23 BB Maroota

Species	C	A
Corymbia gummifera	10	7
Eucalyptus haemastoma	3	3
Leptospermum trinervium	5	15
Eriostemon australasius	1	6
Lambertia formosa	~~2~~ 2	~~5~~ 5
Lomandra multiflora	.1	3
Micrantheum ericoides	.2	20
Actinotus helianthii	.2	20
Dianella prunina ?	.1	5
Lomandra filiformis subsp filiformis sp. Small, caulinic leaves, spreading, stoloniferous.	5	100
Phyllota phylicoides	.1	5
Anisopogon avenaceus	.2	10
Schoenus ericetorum	~~10~~ ~~2~~ 2	~~30~~ 50
Platysace linearifolia	.5	10
Boronia ledifolia	~~2~~ .5	5
Hibbertia spa H. linearis. large-plants	.2	3
Petrophile sp. - pulchella	~~2~~ 2	10
~~Hovea linearis~~ Hovea linearis	.1	2
Entolasia stricta	~~2~~ 2	~~30~~ 50
Monotoca scoparia ?	.1	1
~~Dampiera~~ Dampiera stricta	.1	1
Hemigenia purpurea	.1	2
Phyllanthus hirtellus	.1	5
Isopogon sp. broad leaves ?	.2	2
Cassytha sp.	.1	1
Cyathochaeta diandra	.1	5
Allocasuarina littoralis	.5	2

Species	C	A
Woollsia pungens	.2	5
Banksia ericifolia	~~1~~ 1	2
Actinotus minor	.2	10
Angophora hispida	.5	1
Lomandra longifolia	.1	1
Dodonaea triquetra	.1	1
Bursaria spinosa	.2	2
Xanthorrhoea sp. white flow	.2	2
Grevillea sp. intertile buxifolia ?	.2	3
Imperata cylindrica	.1	5
Pteridium esculentum	.5	10
Leptospermum parvifolium	.5	5
Cheilanthes sieberi	.1	5
Eragrostis brownii	.1	5
Pomax umbellata	.1	2
Lobelia purpurascens	.1	10
Paspalidium distans	.1	5
Thysanella triandra	.1	1
Aristostipa pubescens	.2	5
Sciaevola ramosissima	.1	2
Laxmannia gracilis	.1	2
Ericaceae - plants - low growing - ? Acrotriche divaricata	.1	5

Notes: Diverse, Shrubby, Some exposed Sandstone sheets
Some rubbish dumping.

Appendix C Assessments of significance

COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act Matters of National Environmental Significance Significant Impact Guidelines (DotE 2013) set out 'Significant Impact Criteria' which identify the steps to determine if a proposed action is likely to have a significant impact on Matters of Environmental Significance (MNES). If the following assessments identify a potential impact on an MNES, a referral is required.

Pimelea curviflora var. *curviflora* – vulnerable species

Pimelea curviflora var. *curviflora* is a subshrub or undershrub 10-40 cm in height (with more mature stems often found intertwining amongst grasses and forbs (OEH 2019; Ecoplanning 2021). The flowers are red to yellow in colour with long, coarse hairs on the outside. It grows amongst dense foliage such as grasses and sedges, prefers full sun to part shade and can be easily outcompeted by other shrubs. Flowering occurs typically between October to May with peaks in March and December.

P. curviflora var. *curviflora* is restricted to the Sydney Basin IBRA bioregion and to the IBRA sub-regions of Cumberland, Illawarra, Pittwater and Yengo. It is found in the Hawkesbury, The Hills, Hornsby, Northern Beaches, Ryde, Paramatta, Blacktown, Penrith, Wollondilly, Wollongong and Shellharbour Local Government areas. The majority of records are located within the Yengo and Pittwater sub-regions with scattered records in the northern and southern areas of the Cumberland sub-region.

Pimelea curviflora var. *curviflora* was recorded at four sites within the subject land, with six individuals at one of those sites. Individuals at these sites will be removed by the Proposal. An additional 10 sites were recorded outside the subject land, but within the study area, with seven individuals at one of those sites. These sites will not be impacted by the Proposal.

An action is considered likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

An important population is considered a population that is necessary for a species' long-term survival and recovery. As of 1998 approximately 20 populations of the *P. curviflora* var. *curviflora* had been identified across its range, ranging from a few plants to more than 300 plants, but no formal designation of an important population has been made. However, DPE's BioNet Atlas shows 394 records from Sydney Basin IBRA region since 1 January 1990, with a substantial number in the Maroota area (31 records in a 10 km x 10 km radius centred on the subject land). The plants within the subject land comprise a relatively small proportion of the overall and local population of the species.

The proposed action is unlikely to lead to a significant long-term decrease in the size of an important population. Ten of the 14 sites where the species was recorded within the study area are outside the subject land and will not be impacted, and the species can persist and

reproduce in these locations. Within the context of 372 records of the species in the Sydney Basin IBRA region since 1 January 1990, the impacts to the species will not be significant. It is unlikely that the Proposal will lead to a long-term decrease in the size of the population of *P. curviflora* var. *curviflora*.

- ***Reduce the area of occupancy of an important population***

P. curviflora var. *curviflora* occurs within the Sydney Basin with a concentration of populations in The Hills, Blacktown, Hornsby, Parramatta and Warringah LGAs. The proposed development would result in a slight reduction in the area of occupancy of the species, but the species would be retained within the study area. The reduction in the area of occupancy (geographical extent) of the species will be minimal.

- ***Fragment an existing important population into two or more populations***

P. curviflora var. *curviflora* appears to occur in scattered populations. As the proposed development will result in 3.77 ha of native vegetation removed that includes habitat suitable for the species, which will not disconnect any large vegetation patch from another, the proposed development would not fragment the existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Critical habitat has not been identified for *P. curviflora* var. *curviflora*. Generally, the species occurs on low nutrient sandy soils, shaley to lateritic soils over sandstone, and shale/sandstone transition soils on ridgetops and upper slopes in woodland vegetation.

However, as mentioned, most sites where *P. curviflora* var. *curviflora* was recorded recorded will not be affected by the Proposal. When considered within the context of 394 records of the species in the Sydney Basin IBRA region since 1 January 1990 and populations protected in reserves such as Wollemi National, Maroota Ridge State Conservation Area, Muogomarra Nature Reserve, Marra Marra National Park, Ku-ring-gai National Park, Garigal National Park, Sydney Harbour National Park and Lane Cove National Park, such an impact would be unlikely to have a significant adverse impact on habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of an important population***

P. curviflora var. *curviflora* identified within the study area will be preserved at 10 of the 14. In addition, as a limited area of native vegetation that includes suitable habitat is proposed to be removed (3.77 ha), the proposed development is unlikely to significantly affect critical habitat.

- ***Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

A limited area of native vegetation that includes suitable habitat is proposed to be removed (3.77 ha) for the proposed development. The proposed development is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to significantly decline. Within the context of 394 records of the species in the Sydney Basin IBRA region since 1 January 1990 and populations protected in reserves such as Wollemi National, Maroota Ridge State Conservation Area, Muogomarra Nature Reserve, Marra Marra National Park, Ku-ring-gai National Park, Garigal National Park, Sydney Harbour

National Park and Lane Cove National Park, such an impact would be unlikely to have a significant adverse impact on habitat critical to the survival of the species.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

The proposed action would not result in an invasive species becoming established in the habitat present within the subject land and study area. There are invasive species already present within the subject land but the proposed action would not cause new species to become established.

- ***Introduce disease that may cause the species to decline, or***

It is unlikely that the proposed action would introduce disease that may cause the species to decline. However, the proposed works would not cause a new disease to be introduced into the population.

- ***Interfere substantially with the recovery of the species.***

The proposed action is unlikely to interfere substantially with the recovery of the species. The retention of the individual plants within the subject land means they will remain part of the local and overall populations and can contribute to the recovery of the species.

Conclusion

A referral is not recommended for *P. curviflora* var. *curviflora*. The proposed development will not result in a significant impact on the species given that:

- Ten of the 14 sites where the species was recorded within the study area are outside the subject land and will not be impacted, and the species can persist and reproduce in these locations.
- The proposed development will only remove a small area of potential.
- The works will not isolate an area of known habitat from other interconnecting areas of potential habitat for these species.

Therefore, the proposed works do not represent a significant impact with regard to this species.

Grey-headed Flying-fox (GHFF) *(Pteropus poliocephalus)* – vulnerable species

Grey-headed Flying-fox occurs within 200 km of the eastern coastline of Australia, from Rockhampton in Queensland to Adelaide in South Australia. They have a preference for subtropical and temperate rainforest, tall sclerophyll forests and woodlands, as well as heaths and swamps. Roosting areas are often selected upon their proximity to a regular food source (within 20 km), often in gullies, close to water, or in vegetation with a dense canopy. This species roosts communally in large, established camps which support several thousand individuals. The GHFF can travel up to 50 km from camp to forage (typically <20 km), where they feed on nectar and pollen from *Eucalyptus, Banksia* and *Melaleuca* spp., as well as the fruits of native and exotic species. The nearest GHFF camp is approximately 25 km away at Windsor (DCCEEW 2023).

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***lead to a long-term decrease in the size of an important population of a species***

An important population is considered a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are key source populations either for breeding or dispersal; populations that are necessary for maintaining genetic diversity; and/or populations that are near the limit of the species range.

The GHFF is considered to consist of one national population due to the constant genetic exchange and movement between camps throughout the geographic distribution. Hence the individuals in the locality are part of an important population.

The proposed action is unlikely to lead to a long-term decrease in the size of an important population. There are no camps in the subject land and no camps would be indirectly impacted by the proposed action. The nearest known occupied camp is in Windsor approximately 25 km away (DCCEEW 2023).

The proposed action would not directly or indirectly cause mortality of individuals. No GHFF camps were identified in the subject land during field assessment and the use of the subject land for foraging would be limited. The removal of 84 native trees is unlikely to cause foraging stress in the locality such that the population size would decrease.

- ***reduce the area of occupancy of an important population***

The GHFF occupies most areas in their distribution in an irregular pattern due to seasonal and geographic variation in foraging resources. The proposed action would reduce the area available to forage for this species by clearing 3.77 ha of native vegetation but would not reduce the area the species could occupy at a given time. The species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park.

- ***fragment an existing important population into two or more populations***

P. poliocephalus is thought to have a large home range, typically within 15km of roost sites (DCCEEW 2001). As the species is highly mobile and no breeding habitat occurs within the subject land, the proposed development is unlikely to fragment an existing important population into two or more populations.

- ***adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of the Grey-headed Flying-fox is outlined in the Draft National Recovery Plan (DECCW 2009). Foraging habitat must meet at least one of the following criteria the be critical habitat:

- Productive during winter and spring when food bottlenecks have been identified
- Known to support populations of >30,000 individuals within an area of 50 km radius (the maximum foraging distance of an adult)
- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May)

- Productive during the final stages of fruit development and ripening in commercial crops affected by GHFF (months vary between regions)
- Known to support a continuously occupied camp

The subject land would not meet the definition of critical habitat for this species.

- ***disrupt the breeding cycle of an important population***

The proposed development is unlikely to disrupt the breeding cycle of an important population. There are no camps in the subject land and no camps would be indirectly impacted by the proposed action. The nearest known occupied camp is in Windsor approximately 25 km away (DCCEEW 2023).

- ***modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

The vegetation within the subject land is highly degraded due to the disturbed nature of the site and does not likely function as important foraging habitat for the species. The proposed action would reduce the area available to forage for this species by clearing 3.77 ha of native vegetation but would not reduce the area the species could occupy at a given time. The species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park.

- ***result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

The proposed action would not result in an invasive species becoming established in the foraging habitat within the subject land. Invasive species are already present within the subject land, with the control and removal of these species to be managed through the site-specific EMP.

- ***introduce disease that may cause the species to decline, or***

It is unlikely that the proposed action would introduce disease that may cause the species to decline. Due to the highly mobile nature of the species, the transportation of disease may occur through a population by individuals moving through a large geographic range.

- ***interfere substantially with the recovery of the species.***

The National Recovery Plan for the species lists the following objectives relevant to the proposed development:

- Identify, protect and increase native foraging habitat that is critical to the survival of the Grey-headed Flying-fox.
- Identify, protect and increase roosting habitat of Grey-headed Flying-fox camps.

No GHFF camps were identified in the subject land during field assessment and the use of the subject land for foraging would be limited. Due to the quality of this habitat and its proximity to high quality habitat nearby, the proposed action will not interfere with the above recovery objectives for the species.

Conclusion:

The proposal will not result in a significant impact on GHFF given that:

- the proposed action will only remove a relatively small area of potential foraging habitat.
- the proposed action will not isolate an area of known habitat from other interconnecting areas of potential habitat for these species.
- the works will not impact a known GHFF camp.

Therefore, the proposed works do not represent a significant impact with regard to this species and a referral to the Minister is not recommended for GHFF.

South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) – vulnerable species

The South-eastern Glossy Black-cockatoo is a small cockatoo that occupies open forest and woodlands where stands of *Casuarina* and *Allocasuarina* species are present. It depends on large hollow-bearing trees for nest sites, with hollows generally greater than 15 cm in diameter and more than 8 m above the ground.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***lead to a long-term decrease in the size of an important population of a species***

There are currently no listed important populations of Glossy Black-cockatoo. The subject land could function as foraging habitat due to the presence of *Casuarina* and *Allocasuarina* species. However, it is unlikely to be highly preferred foraging habitat, as these are non-dominant canopy or sub-canopy species within the subject land. Extensive field survey resulted in one record of the species, by song meter, and did not identify any breeding Glossy Black-cockatoos.

The subject land constitutes approximately 3.77 ha of potential Glossy Black-cockatoo habitat. Given that only a small amount of potential foraging habitat is to be impacted, it is unlikely that the proposed action would lead to a long-term decrease in the size of a population.

- ***reduce the area of occupancy of an important population***

The species area of occupancy is approximately 40,000 km² (DCCEEW 2022). The proposal will reduce the potential area of occupancy of this species through the direct removal of 3.77 ha of potential foraging and breeding habitat. Although *Casuarina* and *Allocasuarina* species are present within the subject land, it is unlikely to be highly preferred habitat as these species are not dominant. In addition, the species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park. As such, the subject land does not provide the ideal habitat for this species and the Proposal is unlikely to significantly reduce the area of occupancy of this species.

- ***fragment an existing important population into two or more populations***

There are currently no listed important populations of *C. lathami lathami*. *C. lathami lathami* is a highly mobile species and no foraging habitat occurs within the subject land, therefore the

proposed development is unlikely to fragment an existing important population into two or more populations.

- ***adversely affect habitat critical to the survival of a species***

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat for this species. Although *Casuarina* and *Allocasuarina* species are present within the subject land, it is unlikely to be highly preferred habitat as these species are not dominant. In addition, the species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park. As such, Proposal is unlikely to adversely affect habitat critical to the survival of the species.

- ***disrupt the breeding cycle of an important population***

Glossy Black-cockatoo is dependent on large hollows to breed. Field survey did not record any Glossy Black-cockatoos using hollows within the subject land during breeding season. Therefore, the proposed development is unlikely to 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***

The proposal will reduce the potential area of occupancy of this species through the direct removal of 3.77 ha of potential foraging and breeding habitat. Although *Casuarina* and *Allocasuarina* species are present within the subject land, it is unlikely to be highly preferred habitat as these species are not dominant. In addition, the species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park. In these circumstances, the Proposal is unlikely to further 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 action would not result in an invasive species becoming established in the foraging habitat within the subject land. Invasive species are already present within the subject land, with the control and removal of these species to be managed through the site-specific EMP.

- ***introduce disease that may cause the species to decline, or***

The movement of machinery and importation of material as part of the proposed development may introduce diseases and pathogens into the subject land. However, with adherence to appropriate biosecurity measure this unlikely to be significant as to introduce disease that may cause the species to decline.

- ***interfere substantially with the recovery of the species.***

The proposed action is unlikely to interfere substantially with the recovery of the species. The proposal will reduce the potential area of occupancy of this species through the direct removal of 3.77 ha of potential foraging and breeding habitat. Although *Casuarina* and *Allocasuarina* species are present within the subject land, it is unlikely to be highly preferred habitat as these

species are not dominant. In addition, the species would be able to continue foraging in the locality in retained habitat such as within Marramarra National Park.

Conclusion:
The proposal will not result in a significant impact on the Glossy Black-cockatoo given that:

- The proposed action will not lead to the long term decrease in the population
- the proposed action will not impact on the breeding cycle of this species,
- the proposed action would not affect preferred habitat (e.g., further fragment the surrounding landscape or remove essential habitat), and
- the proposed action would not fragment an existing population.

Therefore, the proposed works do not represent a significant impact with regard to this species and a referral to the Minister is not recommended.

Large-eared Pied Bat Chalinolobus dwyeri – vulnerable species

The Large-eared Pied Bat is a small to medium-sized bat with long ears that is found in areas with extensive cliffs and caves from Rockhampton in Queensland to Bungonia in the Southern Highlands. It roosts in caves, crevices in cliffs and old mine workings.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***lead to a long-term decrease in the size of an important population of a species***

All populations of *Chalinolobus dwyeri* are considered important due to their likely role in maintaining population connectivity and genetic diversity necessary for the evolutionary potential of the species.

The Project would remove up to 3.77 ha of suitable foraging habitat for the species. The Project area does not contain suitable breeding habitat for *C. dwyeri*, however, breeding habitat may be present within the surrounding rocky landscape. In addition, the surrounding landscape, including Marramarra National Park, contains high quality foraging habitat for the species such that the Proposal unlikely to lead to a long-term decrease in the size of an important population of the species.

- ***reduce the area of occupancy of an important population***

The species extent of occurrence is approximately 570,000 km² based on the distribution range. The area of occupancy is approximately 9,120 km² (Threatened Species Committee 2012). The Project would result in the loss of 3.77 ha of suitable foraging habitat, however, additional habitat exists nearby. No breeding habitat would be impacted as part of the Project, therefore, it is unlikely to significantly reduce the area of occupancy of the important population.

- ***fragment an existing important population into two or more populations***

C. dwyeri isa thought to have a large home range, with the vegetation on site likely forming part of the species greater foraging habitat. As the species is highly mobile and no breeding habitat occurs within the Project area, the Project is unlikely to fragment an existing important population into two or more populations.

- ***adversely affect habitat critical to the survival of a species***

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat for this species.

- ***disrupt the breeding cycle of an important population***

C. dwyeri is dependent on caves or cave-like structures to breed, none of which occur on or within the Project area or would be impacted by the Project. Therefore, the Project is unlikely to 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***

The Project would remove up to 3.77 ha of suitable foraging habitat for the species. However,the surrounding landscape, including Marramarra National Park, contains high quality foraging habitat for the species. The Project area does not contain suitable breeding habitat for *C. dwyeri*. Therefore, the Project is unlikely to 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 action would not result in an invasive species becoming established in the foraging habitat within the subject land. Invasive species are already present within the subject land, with the control and removal of these species to be managed through the site-specific EMP.

- ***introduce disease that may cause the species to decline, or***

The movement of machinery and importation of material as part of the Project may introduce diseases and pathogens into the Project area. However, with adherence to appropriate biosecurity measure this unlikely to be significant as to introduce disease that may cause the species to decline.

- ***interfere substantially with the recovery of the species.***

The following recovery objectives have been identified for *C. dwyeri*:

- Identify priority roost and maternity sites for protection.
- Implement conservation and management strategies for priority sites, especially as the species has narrow habitat requirements (sandstone overhangs and higher productive landscapes).
- Management of the species should focus on the protection and enhancement of higher fertility soils.
- Educate the community and industry to understand and participate in the conservation of the Large-eared Pied Bat.
- Research to augment biological and ecological data to enable conservation management.
- Collect genetic data throughout the distribution of the Large-eared Pied Bat.
- Reassess status of and threats to the Large-eared Pied Bat following targeted survey and research.

The Project will not interfere with any of the above recovery objectives. The Project area does not contain any priority roosts or maternity roosts nor is it considered a priority site.

Conclusion:
The proposal will not result in a significant impact on the vulnerable Large-eared Pied Bat given that:

- the proposed action will only remove a relatively small area of potential foraging habitat.
- the proposed action will not isolate an area of known habitat from other interconnecting areas of potential habitat for these species.
- the works will not impact breeding habitat.

Therefore, the proposed works do not represent a significant impact with regard to this species and a referral to the Minister is not recommended for the Large-eared Pied Bat.

Appendix D BAM calculator reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00035067/BAAS17057/22/00035068

Proposal Name
4773 Old Northern Road Maroota

BAM data last updated *
22/06/2023

Assessor Name
Brian Towle

Assessor Number
BAAS17057

BAM Data version *
61

Proponent Names

Report Created
07/11/2023

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
07/11/2023

BOS entry trigger
BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Vespadelus troughtoni / Eastern Cave Bat

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3586-Northern Sydney Scribbly Gum Woodland	Not a TEC	0.1	0	1	1
3616-Sydney Hinterland Grey Gum Transition Forest	Not a TEC	1.4	0	30	30
3622-Sydney Hinterland Yellow Bloodwood Woodland	Not a TEC	2.3	45	0	45

3586-Northern Sydney Scribbly Gum Woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests <50%	3586_Intact_stage1	No	1	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

3616-Sydney Hinterland Grey Gum Transition Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 621, 3609, 3616	Sydney Hinterland Dry Sclerophyll Forests >=50% and <70%	3616_Intact_stage1	No	25	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 621, 3609, 3616	Sydney Hinterland Dry Sclerophyll Forests >=50% and <70%	3616_Intact_stage2	No	5	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3622-Sydney Hinterland Yellow Bloodwood Woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests <50%	3622_Intact_stage1	Yes	38	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Sydney Hinterland Dry Sclerophyll Forests This includes PCT's: 612, 621, 624, 1614, 1631, 1666, 1667, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3625, 3626, 3627	Sydney Hinterland Dry Sclerophyll Forests <50%	3622_intact_stage2	Yes	7	Yengo, Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Cercartetus nanus / Eastern Pygmy-possum	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	95.00

Chalinolobus dwyeri / Large-eared Pied Bat	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	145.00
Darwinia fascicularis subsp. oligantha - endangered population / Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	**3586_Intact_stage1**	9.0	18.00
Myotis macropus / Southern Myotis	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	95.00
Pimelea curviflora var. curviflora / Pimelea curviflora var. curviflora	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	95.00
Pseudophryne australis / Red-crowned Toadlet	**3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	0.8	15.00

Tetratheca glandulosa / Tetratheca glandulosa	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	95.00
Vespadelus troughtoni / Eastern Cave Bat	**3586_Intact_stage1, 3616_Intact_stage1, 3622_Intact_stage1, 3616_Intact_stage2, 3622_intact_stage2**	3.8	145.00

Credit Retirement Options

Like-for-like credit retirement options

Cercartetus nanus / Eastern Pygmy-possum	Spp	IBRA subregion
	Cercartetus nanus / Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Darwinia fascicularis subsp. oligantha - endangered population / Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	Spp	IBRA subregion
	Darwinia fascicularis subsp. oligantha - endangered population / Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	Any in NSW

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Pimelea curviflora var. curviflora / Pimelea curviflora var. curviflora	Spp	IBRA subregion
	Pimelea curviflora var. curviflora / Pimelea curviflora var. curviflora	Any in NSW
Pseudophryne australis / Red-crowned Toadlet	Spp	IBRA subregion
	Pseudophryne australis / Red-crowned Toadlet	Any in NSW
Tetratheca glandulosa / Tetratheca glandulosa	Spp	IBRA subregion
	Tetratheca glandulosa / Tetratheca glandulosa	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	Spp	IBRA subregion
	Vespadelus troughtoni / Eastern Cave Bat	Any in NSW

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Koala Assessment Report



4773 Old Northern Road, Maroota

Maroota Central Civil Quarry

Prepared for: Central Civil (NSW) Pty Ltd

1 November 2023 Version: 1.0

PROJECT NUMBER	2022-158			
PROJECT NAME	Koala Assessment Report			
PROJECT ADDRESS	4773 Old Northern Road, Maroota			
PREPARED FOR	Central Civil (NSW) Pty Ltd			
AUTHOR/S	Sarah Cardenzana			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Brian Towle		1.0	1 November 2023
LICENCES	**Scientific Licence**		SL101557	
	Bionet Sensitive Species Data Licence		1115	
	Animal Research Authority Ethics Licence		Fauna Surveys and Monitoring (16/346)	
	Scientific Collection - Aquatic		P19/0009-1.0 & OUT19/2602	

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ECOPLANNING PTY LTD | 428 PRINCES HIGHWAY WOONONA NSW 2517 | P: (02) 4244 2736

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Glossary and abbreviations

Acronym	Description
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
DA	Development Application
DPE	NSW Department of Planning and Environment (formerly DPIE; OEH)
DPIE	NSW Department of Planning, Industry and Environment (now DPE)
EPBC Act	Commonwealth *Environmental Planning and Biodiversity Conservation Act 1999*
KAR	Koala Assessment Report
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage (now DPE)
PCT	Plant Community Type
SAT	Spot Assessment Technique
SEPP	State Environmental Planning Policy

1 Introduction

1.1 Purpose of report

Ecoplanning have been engaged by Central Civil (NSW) Pty Ltd to prepare a Koala Assessment Report (KAR) to accompany a development application (DA) for the proposed Maroota Central Civil Quarry (the Proposal) at 4773 Old Northern Road (Lots 1 and 2 // DP 609224), Maroota, NSW (**Figure 1-1**). The purpose of the report is to assess the potential impacts of the Proposal on Koalas and Koala habitat in accordance with the provisions of the *State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021* (the SEPP).

This KAR should be read in conjunction with the Biodiversity Development Assessment Report (BDAR; Ecoplanning 2023) prepared for the DA.

1.2 Site description

The proposed development is located within two lots (Lots 1 and 2 // DP 609224) at 4773 Old Northern Road, Maroota. The ***study area*** for this KAR includes all land within the lots listed above, comprising an area of 23.33 ha (**Figure 1-1**). The whole of the study area has been assessed to understand whether the property contains suitable Koala habitat.

Direct impacts on Koalas and Koala habitat would be limited to land that is subject to the Proposal (the development footprint), referred to as the ***subject land*** **(Figure 1-1)**. The subject land comprises part of Lot 1 // DP 609224, plus an unnamed Crown Road reserve, at 4773 Old Northern Road, Maroota. The area of the subject land is approximately 4.13 ha. No impacts to existing biodiversity values are proposed outside the subject land.

The subject land is located within the Hornsby Local Government Area (LGA). Most of the subject land is zoned RU1 – Primary Production (**Figure 1-2**). A smaller portion of the subject land is zoned C3 – Environmental Management.

The subject land is located approximately 700 m east of Old Northern Road. It is bordered by a quarry to the south and east, a utilities easement to the east and Marramarra National Park to the north.

1.3 Summary of the proposal

The Proposal is for the establishment and operations of the Maroota Central Civil Quarry, which would include the following:

- Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of Virgin Excavated Natural Material for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day.

- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.

Ongoing operations will occur for a period of 30 years from the commencement of operations under the development consent.

The Proposal includes an Extraction Area; an Office, Amenities and Parking Area; and a Site Access Road (**Figure 1-3**). The Extraction Area is an area of 2.27 ha which would be developed in two stages from west to east to a maximum depth of 218 m Australian Heigh Datum (AHD). All product extraction, processing, stockpiling and despatch activities would be undertaken within the Extraction Area. Soil and mulch stockpiling would also be undertaken in this area. The Extraction Area would include a 5 m perimeter zone to allow for the construction of a perimeter safety bund, tracks and erosion and sediment control infrastructure.

For the Office, Amenities and Parking Area, an area of 0.18 ha to the immediate west of the Extraction Area which would be flattened via cut and fill methods to a height of approximately 231 m AHD. A demountable office, water tank, workshop and portable amenities incorporating chemical or pump out toilet facilities would be established within this area. This area would also be utilised for light and heavy vehicle parking as well as equipment storage throughout the life of the Quarry.

The existing Site Access Road would be widened to permit two heavy vehicles to pass. The road would have an unsealed surface for its entire length and, together with roadside drainage, would have a maximum width of 8 m.

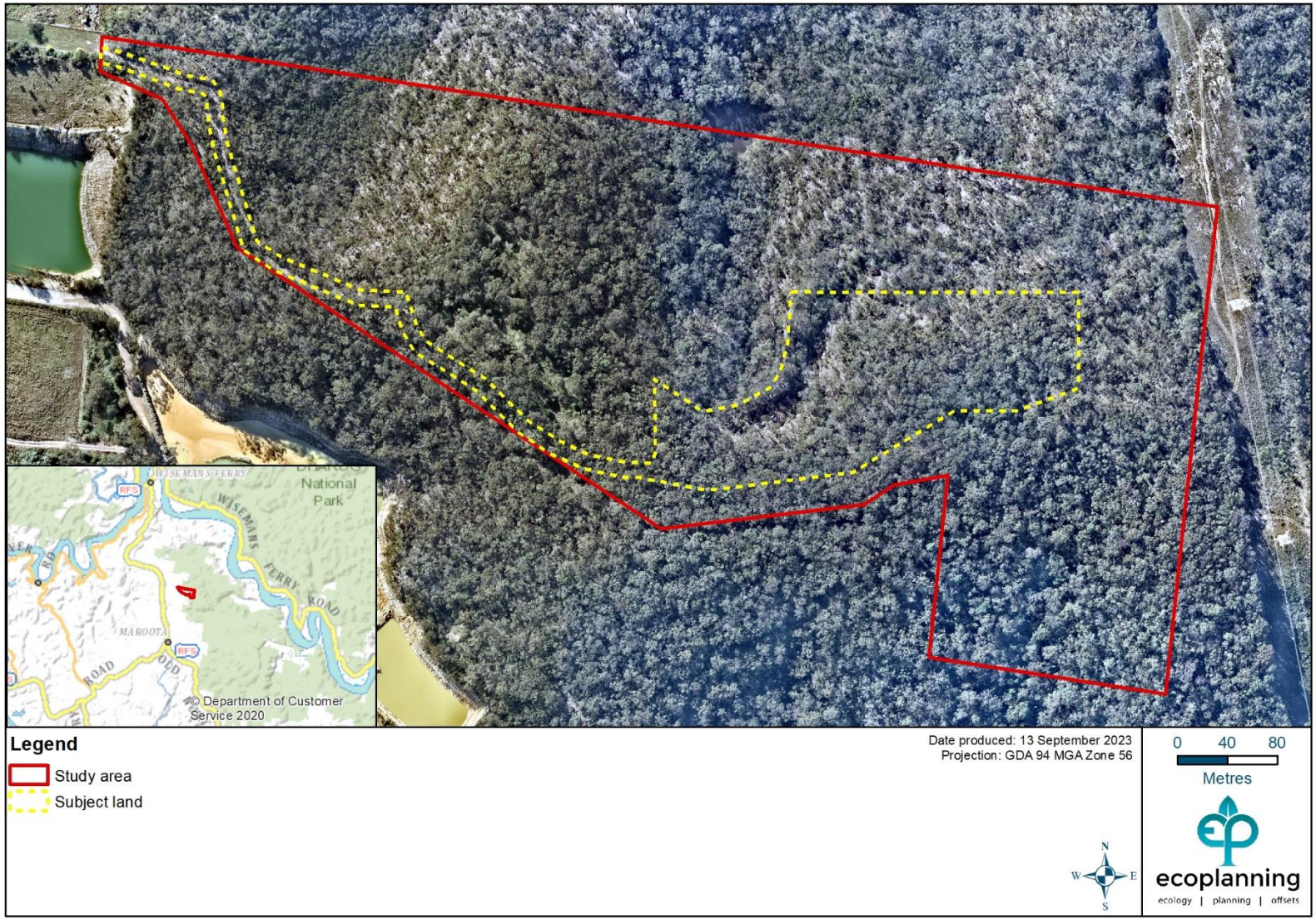


Figure 1-1: The location of the subject land and study area.

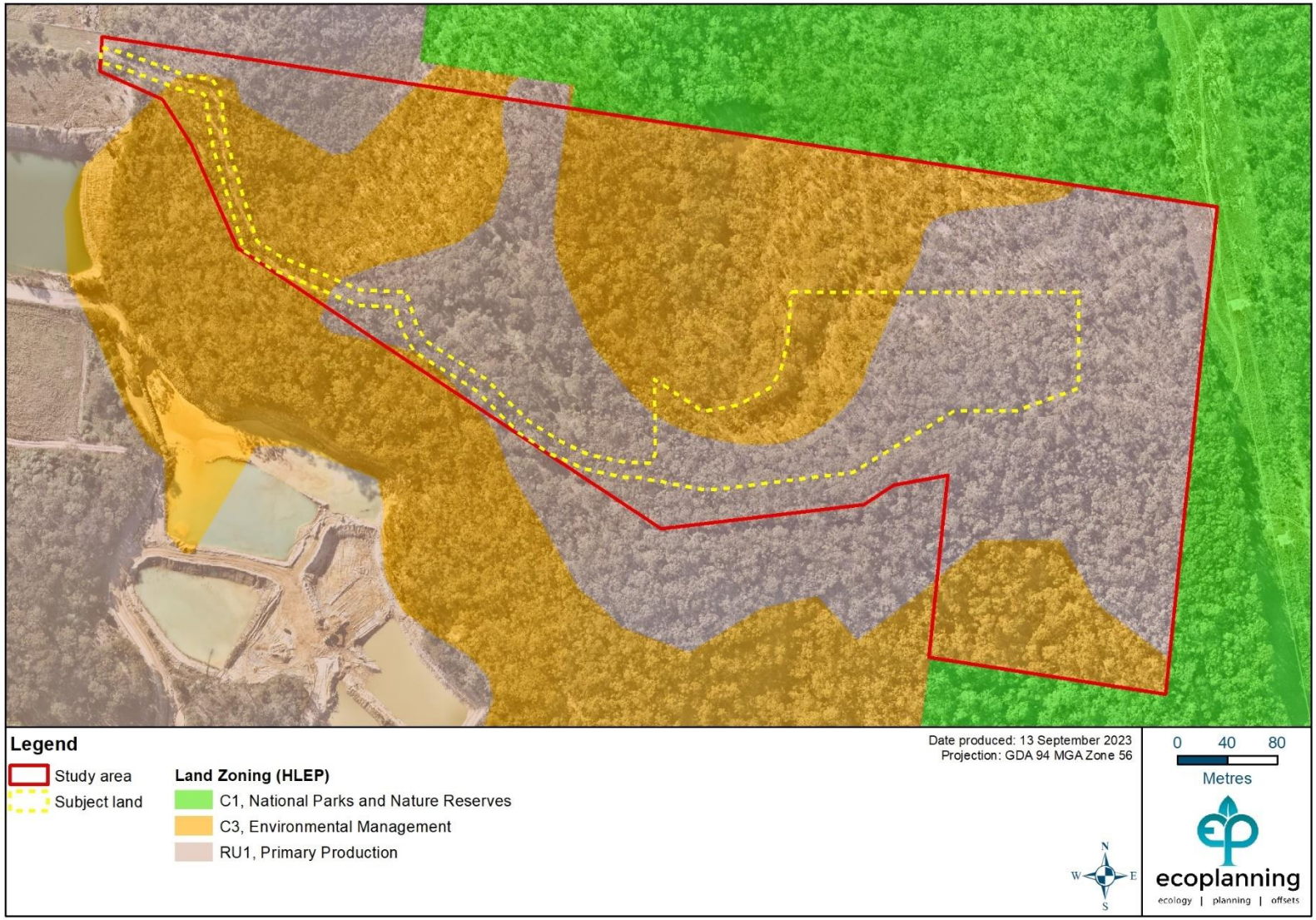


Figure 1-2: Zoning of the subject land and study area.

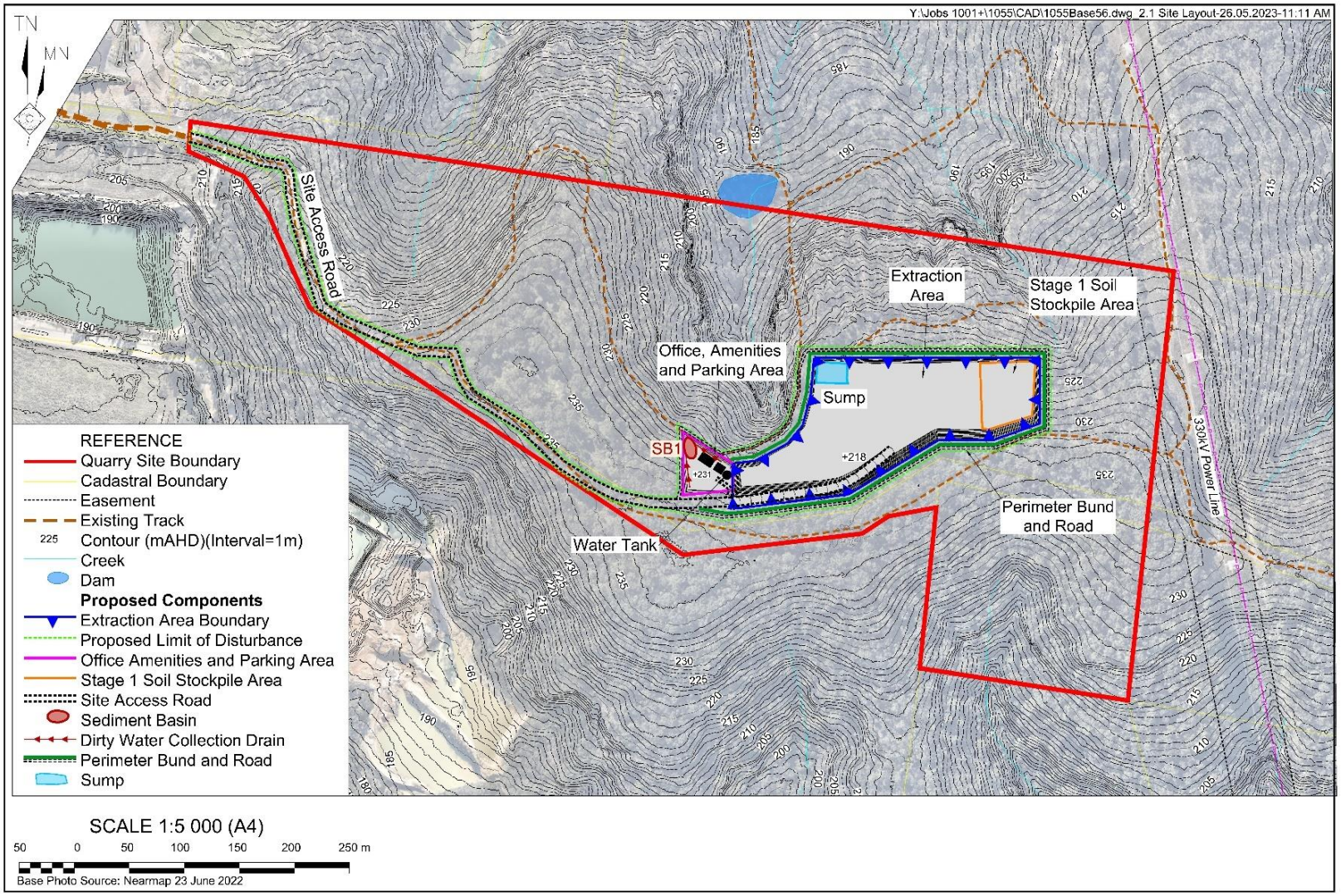


Figure 1-3: The Proposal.

2 Legislative context

2.1 State Environmental Planning Policy (SEPP) – Biodiversity and Conservation 2021 – Chapter 4 Koala habitat protection

Chapter 4 (Koala Habitat Protection 2021) of the Biodiversity and Conservation SEPP 2021 (formerly Koala SEPP 2021) governs the assessment of the impacts of development on Koalas in NSW. The policy aims to encourage the conservation and management of Koala habitat to ensure populations remain in their present range and the trend of population decline is reversed. As Hornsby LGA is among the LGAs to which Chapter 4 applies, this SEPP applies to the study area.

Under Chapter 4, where there is a Koala Plan of Management (KPoM) that applies to the site, the development application must be consistent with the approved KPoM. However, there is no approved KPoM that applies to the study area and therefore Clause 4.9 of the SEPP applies. This clause states that before a council may grant consent to a development application, the council must assess whether the development is likely to have any impact on Koalas or Koala habitat. If the council is satisfied that the development is likely to have low or no impact on Koalas or Koala habitat, the council may grant consent to the development application.

Ten known Koala use trees, as per schedule 4 of the SEPP, have been identified within the subject land: *Allocasuarina littoralis* (Black She-oak), *Angophora bakeri* (Narrow-leaved Apple), *Angophora costata* (Smooth-barked Apple), *Corymbia eximia* (Yellow Bloodwood), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus haemastoma* (Scribbly Gum), *Eucalyptus punctata* (Grey Gum), *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) and *Syncarpia glomulifera* (Turpentine). The Proposal will impact these Koala use trees. Therefore, as the development is likely to have a higher level of impact on Koalas or Koala habitat than 'low or no impact', the council must consider a Koala Assessment Report (KAR) for the development in deciding whether to grant consent.

This KAR has been prepared in accordance with the SEPP. It addresses the principles and criteria outlined in the *Koala SEPP 2021 Factsheet – Development applications* (DPIE 2021). Five key principles are listed:

1. Understand Koala habitat values.
2. Avoid intensifying land use in Koala habitat areas through appropriate landscape planning and site selection.
3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas.
4. Minimise potential direct impacts to Koalas though Koala sensitive design.
5. Implement best practice measures for the management of identified risks to Koalas.

Sections 3 and 4 of this KAR provide information on the native vegetation within the study area and the Koala survey carried out within the study area to understand the Koala habitat values present (principle 1). Section 5 describes the measures taken to address key principles 2-5.

3 Understanding Koala habitat values – native vegetation

This assessment of the Koala habitat values of the study area is informed by the definition of *core Koala habitat* within the SEPP, which in turn includes a reference to *highly suitable habitat*. *Highly suitable habitat* is where 15% or greater of the total number of trees within any Plant Community Type (PCT) are regionally relevant species listed in Schedule 2 of the SEPP. This section first describes the PCTs that occur within the study area, then assesses whether those PCTs include highly suitable habitat.

3.1 Plant Community Types

A total of 3.77 ha within the 4.13 ha of subject land was identified as supporting native vegetation. Areas that did not support native vegetation are limited to a small area of open water associated with the former extraction area, and areas cleared for two existing access roads, which were estimated to be 4.5 m wide.

The following PCTs were identified and mapped within the study area (**Table 3-1**; **Figure 3-1**):

- *PCT 3586 – Northern Sydney Scribbly Gum Woodland*: occurs within the study area around the access road at the entrance to the site and in the northeastern corner. Canopy coverage is sparse, but *Eucalyptus haemastoma* (Scribbly Gum) is the dominant tree with a subcanopy of *Angophora hispida* (Dwarf Apple).
- *PCT 3616 – Sydney Hinterland Grey Gum Transition Forest:* occurs on the ridgetop in the southern portion of the study area. *Eucalyptus punctata* (Grey Gum) is the dominant tree species, with *Syncarpia glomulifera* (Turpentine) and *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) also occurring, at times in small thickets.
- *PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest:* occurs in the north-facing gully and south-facing slope. Tree species are dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata (*Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine).
- *PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland:* occurs in the study area as the ridgetop slopes down to the north. Tree species are co-dominated by *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) and also include *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus haemastoma* (Scribbly Gum).

All PCTs within the subject land were assigned a single condition class: Moderate. The fourth PCT identified within the study area but not within the subject land (PCT 3621) does not have a condition class assigned, as this was mapped but not further assessed in the BDAR because it will not be impacted by the Proposal.

Additional details on native vegetation communities identified within the subject land are provided in the BDAR (Ecoplanning 2023).

Table 3-1: Native vegetation communities within the study area and subject land.

Plant Community Types (PCTs)	Condition class (within the subject land)	BC Act	EPBC Act	Area in study area (ha)	Area in subject land (ha)
PCT 3586 – Northern Sydney Scribbly Gum Woodland	Moderate	-	-	2.23	0.08
PCT 3616 – Sydney Hinterland Grey Gum Transition Forest	Moderate	-	-	5.17	1.42
PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest	*	-	-	4.18	0
PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland	Moderate	-	-	10.82	2.26
Total				22.41	3.77
Existing access roads and former extraction area				0.92	0.36

*Condition class not assessed as this PCT was located outside the subject land.

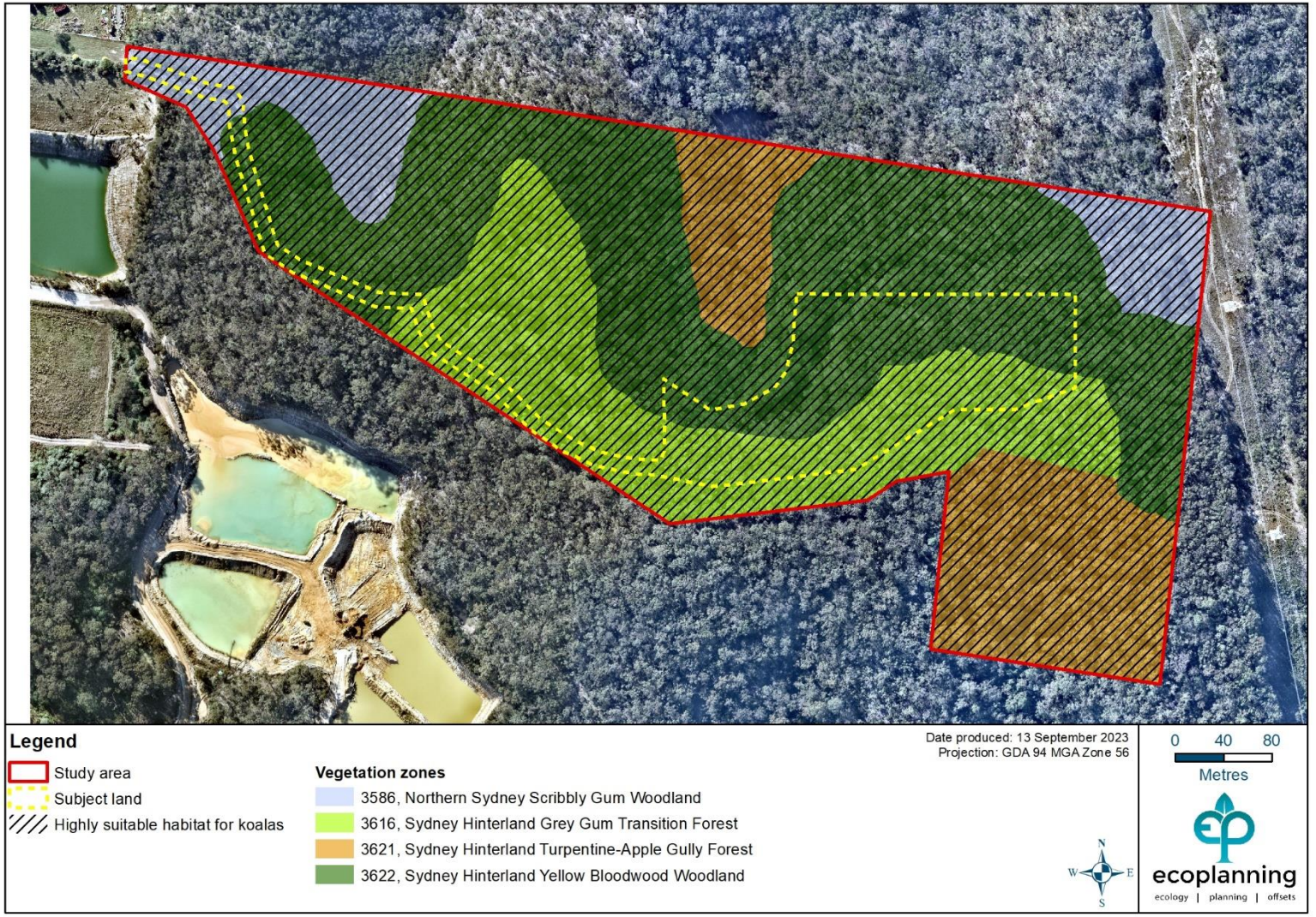


Figure 3-1: Vegetation zones within the study area and areas of highly suitable koala habitat (as defined within the SEPP).

3.2 Highly suitable habitat

All four PCTs within the study area contain regionally relevant species (as per the SEPP). The analysis below indicates that all four PCTs contain koala use species that comprise >15% of the total number of trees within the vegetation zone, and as such, all zones are classified as highly suitable habitat (**Figure 3-1**).

PCT 3586 – Northern Sydney Scribbly Gum Woodland is dominated by *Eucalyptus haemastoma* (Scribbly Gum) with a subcanopy of *Angophora hispida* (Dwarf Apple). Other tree species occurring within the zone include *Banksia serrata* (Old-man Banksia), *Corymbia gummifera* (Red Bloodwood) and *Allocasuarina littoralis* (Black She-oak). *Eucalyptus haemastoma, Corymbia gummifera* and *Allocasuarina littoralis* are listed as a koala use tree species for the Central Coast Koala Management Area (Schedule 3 of the SEPP). As these species comprised >15% of the total number of trees within the vegetation zone, the vegetation zone is considered highly suitable habitat.



Plate 3-1: PCT 3586 with *Eucalyptus haemastoma* (Scribbly Gum) and *Angophora hispida* (Dwarf Apple).

PCT 3616 – Sydney Hinterland Grey Gum Transition Forest: is dominated by *Eucalyptus punctata* (Grey Gum), with *Syncarpia glomulifera* (Turpentine) and *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) also occurring, at times in small thickets. Other tree species occurring within the zone include *Allocasuarina littoralis* (Black She-oak) and *Angophora costata* (Sydney Red Gum). These tree species are all listed as koala use tree species for the Central Coast Koala Management Area (Schedule 3 of the SEPP). As these species comprised >15% of the total number of trees within the vegetation zone, the vegetation zone is considered highly suitable habitat.



Plate 3-2: PCT 3616 dominated by *Eucalyptus punctata* (Grey Gum).

PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest is dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine). These tree species are all listed as koala use tree species for the Central Coast Koala Management Area (Schedule 3 of the SEPP). As these species comprised >15% of the total number of trees within the vegetation zone, the vegetation zone is considered highly suitable habitat.



Plate 3-3: PCT 3621 dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine).

PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland: is co-dominated by *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) and also include *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus punctata* (Grey Gum), *Eucalyptus haemastoma* (Scribbly Gum), *Eucalyptus sparsifolia* (Narrow-leaved Stringybark), *Angophora costata* (Sydney Red Gum), *Allocasuarina littoralis* (Black She-oak) and *Syncarpia glomulifera* (Turpentine). These tree species are all listed as koala use tree species for the Central Coast Koala Management Area (Schedule 3 of the SEPP). As these species comprised >15% of the total number of trees within the vegetation zone, the vegetation zone is considered highly suitable habitat.



Plate 3-4: PCT 3622 – *Corymbia eximia* (Yellow Bloodwood) and shrub layer

Table 3-2 summarises the dominant canopy tree species within the study area and the qualitative evidence of Koala use within the Central Coast (as per OEH 2018). Several dominant species within the study area are of high use or significant use for Koalas within the Central Coast KMA.

Table 3-2: Dominant tree species within the study area and their documented use within the Central Coast KMA (as per OEH 2018).

Scientific Name	Common Name	Koala use within the Central Coast KMA.
Angophora costata	Sydney Red Gum	Low use
Angophora hispida	Dwarf Apple	No sourced evidence of use
Corymbia eximia	Yellow Bloodwood	High use
Corymbia gummifera	Red Bloodwood	Significant use
Eucalyptus haemastoma	Scribbly Gum	Low use
Eucalyptus piperita	Sydney Peppermint	Significant use
Eucalyptus punctata	Grey Gum	Regional high use
Eucalyptus sparsifolia	Narrow-leaved Stringybark	Irregular use
Syncarpia glomulifera	Turpentine	High use

4 Understanding Koala habitat values – field survey

4.1 Koala survey

To further understand the Koala habitat values within the site, a Koala survey was undertaken in accordance with *Koala (Phascolarctos cinereus) - Biodiversity Assessment Method Survey Guide* (DPE 2022a). The survey involved spotlighting, the Spot Assessment Technique (SAT) and the deployment of motion-detecting camera.

Spotlighting was undertaken for nocturnal arboreal mammals (including Koala) on the following dates (**Figure 4-1**):

- 26 October 2022 (1 person hour)
- 27 October 2022 (2 person hours)
- 31 January 2023 (1 person hour)
- 1 February 2023 (1 person hour)
- 6 February 2023 (1 person hour)
- 27 February 2023 (1 person hour).

One threatened species was recorded during spotlighting, an Eastern Pygmy Possum, within the eastern portion of the subject land. Non-threatened species recorded by spotlighting are listed in **Appendix A**. No koalas were recorded during spotlighting efforts.

Fifteen motion-detecting cameras were deployed within the study area from 16 January to 27 February (**Figure 4-1**). One threatened species was recorded with a camera in the far eastern portion of the study area, the Eastern Pygmy Possum (*Cercartetus nanus*). Non-threatened species recorded by camera are listed in **Appendix A**. No koalas were recorded on motion-detecting cameras.

Searches for Koala scats and scratchings were carried out according to the SAT set out in the *Koala* (Phascolarctos cinereus) *Biodiversity Assessment Method Survey Guide* (DPE 2022a). The standard method for SAT surveys is to select survey locations using a 150 m grid for suitable habitat ≤50 ha, then to mark the centre tree nearest each grid intersection, and finally to survey for scat within a prescribed area surrounding that centre tree and the 29 nearest trees of any species surrounding the centre tree. Where the standard method is employed, the total number of SAT sites required for an area of suitable habitat equals the number of hectares divided by 2.25 for 150 m grid spacing, with a minimum of three SAT sites for areas of suitable habitat ≤5 ha.

The total number of SAT surveys carried out was three (**Figure 4-1**). No Koala scat or scratchings were detected during SAT surveys. Scat was identified for the Brush-tailed Possum (*Trichosura vulpecula*) and an unidentified macropod, probably a Swamp Wallaby (*Wallabia bicolor*).

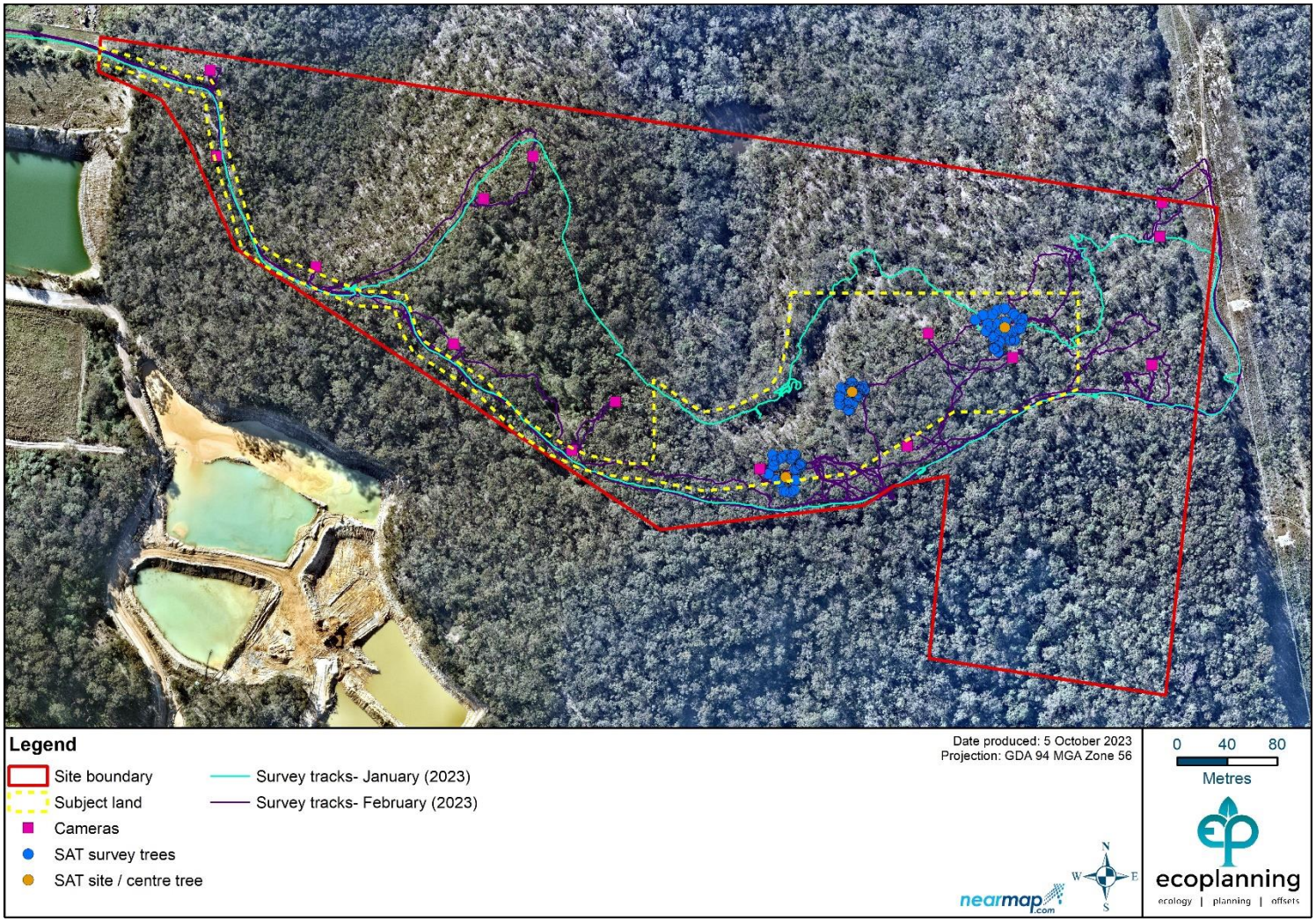


Figure 4-1: Survey effort undertaken within the study area.

5 Threats, development controls and mitigation measures

This Section of the report addresses the following avoidance, minimisation and mitigation principles outlined in the *Koala SEPP 2021 Factsheet – Development applications* (DPIE 2021):

- Principle 2 - Avoid intensifying land use in Koala habitat areas through appropriate landscape planning and site selection.
- Principle 3 - Encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas.
- Principle 4 - Minimise potential direct impacts to Koalas through Koala sensitive design.
- Principle 5 - Implement best practice measures for the management of identified risks to Koalas.

The targeted survey revealed no evidence of Koala use or presence within the study area. Nonetheless, the study area contains highly suitable Koala habitat. In addition, the native vegetation within the study area is well connected to other areas of native vegetation within the locality, including Marramarra National Park. There is therefore potential that Koalas may intermittently use the study area for passage, but it is unlikely to have a resident population. A set of measures, described below, have been adopted to avoid intensifying land use in Koala habitat areas, encourage the proper conservation and management of areas of natural vegetation, minimise potential direct impacts to Koalas, and implement best practice measures to manage risks to Koalas.

5.1 Avoidance and minimisation

Although the subject land does not lack in biodiversity values, the location of the Proposal has been carefully selected to minimise impacts on biodiversity values, including impacts on Koalas. No Koalas or evidence of Koalas were documented during extensive targeted surveys of the study area.

The Proposal is located in an area that has been extensively disturbed in the recent past and contains mostly regrowth vegetation. As can be seen in **Figure 5-1**, taken in 1990, much of the subject land was entirely cleared as recently as 33 years ago, and the remainder was heavily disturbed. The former extraction area that is now filled with water is visible, and it appears that there is another area of open water on the ridge. Much of the ridgetop was fully or partially cleared, and large areas were bare ground. The site was fragmented with dirt tracks throughout the subject land and beyond into areas that will not be impacted by the Proposal. As of 1994, the subject land had regenerated to some extent but was still largely cleared and heavily disturbed (**Figure 5-2**).

The Proposal is located in the part of the study area where native vegetation and threatened species habitat is likely in the poorest condition. Although plots were not carried out in the parts of the study area that will not be impacted to allow direct comparison of VI scores, it is likely that native vegetation within the area of recent disturbance (i.e. within the subject land) is in worse condition than native vegetation in those areas that have been less disturbed.

Of the 22.41 ha of native vegetation within the study area that comprises highly suitable Koala habitat, 3.77 ha will be impacted by the proposed development, equating to 16.8%.

The location of the Proposal within areas of historically disturbed vegetation and an area with no evidence of Koala use, addresses the following key principles of DPIE (2021):

- Principle 2 - Avoid intensifying land use in Koala habitat areas through appropriate landscape planning and site selection.
- Principle 3 - Encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas.
- Principle 4 - Minimise potential direct impacts to Koalas through Koala sensitive design.

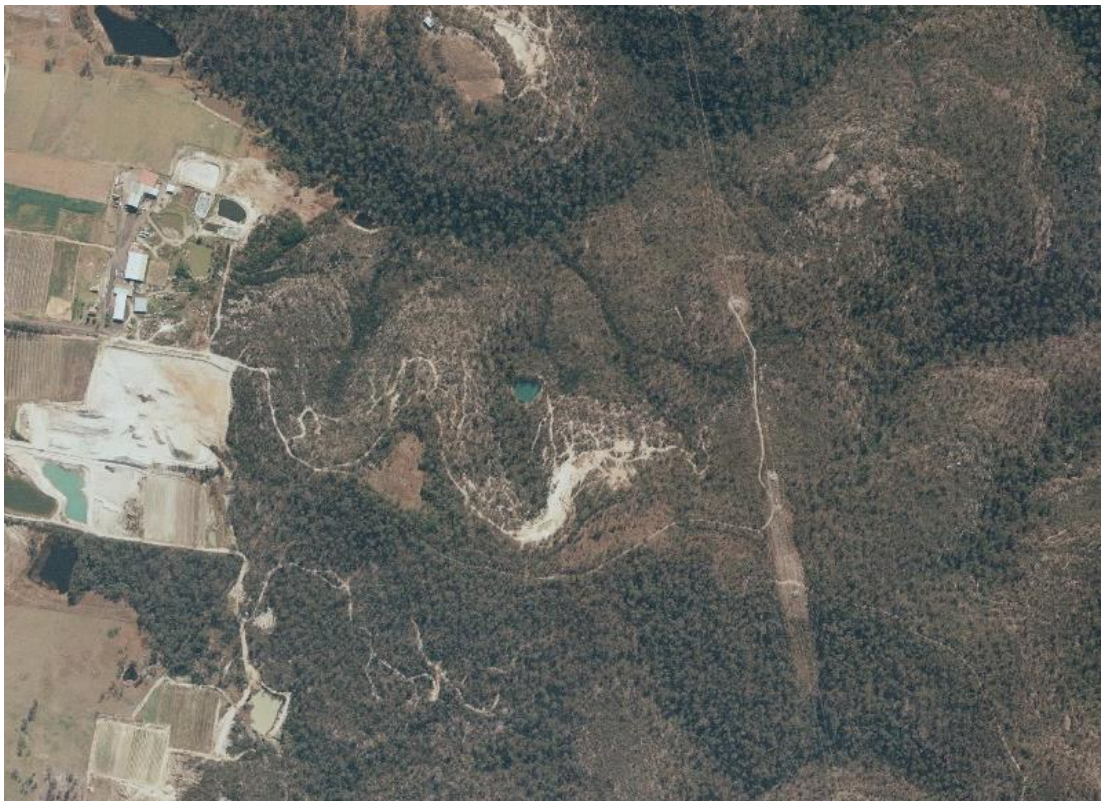


Figure 5-1: The subject land as of 1990 (NSW Spatial Services 2023)



Figure 5-2: The subject land as of 1994 (NSW Spatial Services 2023)

5.2 Mitigation and management of impacts

Although it is unlikely that Koalas will be impacted by the proposed development due to the avoidance and minimisation measures discussed above, and the lack of evidence of their presence within the subject land, several mitigation measures have been adopted as a precaution to avoid any inadvertent impacts. The mitigation measures discussed below should be read in conjunction with Section 7 of the BDAR (Ecoplanning 2023).

5.2.1 Fencing

Any fencing installed within the subject land should be designed so that it does not impede the movement of Koalas. Accessible fencing should include:

- Mesh or wooden fences with horizontal slats with a minimum of 1 cm gaps between each slat.
- A wooden plank can be placed on top to make a Koala friendly walkway.
- For pre-existing sheet metal fences, wooden poles can be placed at 45 degrees on either side of the fence to make a bridge.
- Otherwise, the height of the fence may be increased by 30 cm so that Koalas can pass easily underneath (LLS 2019).

The use of fencing that will not impede Koala movement, and the potential requirement for exclusion fencing, address the following key principles of DPIE (2021):

- Principle 4 - Minimise potential direct impacts to Koalas through Koala sensitive design.
- Principle 5 - Implement best practice measures for the management of identified risks to Koalas.

5.2.2 Protection of Koalas from disturbance during construction

Pre-clearance survey

The proposed development requires the removal of 3.77 ha of highly suitable Koala habitat within the subject land. A pre-clearance survey of Koala use trees (listed in Schedule 2 of the SEPP) should be undertaken immediately prior to construction to ensure no Koalas are present on site. On the morning of any tree clearing, clearing must not commence until the area proposed for clearing has been inspected for the presence of Koalas by a suitably qualified ecologist and approval given and documented. Approval to proceed with clearing is only valid for the day on which the inspection is undertaken.

Should a Koala be found on site, clearing and/or earthworks as part of the consent from Council must be temporarily suspended within a range of 25 m from any tree which is concurrently occupied by a Koala and must not resume until the Koala has moved from the tree of its own volition.

A qualified ecologist will be present on site during any approved clearing.

Koala encounters

If construction personnel encounter a Koala within the site, they should alert the construction manager immediately and all work should cease. To avoid stress to the animal(s), the Koala should be left to vacate the area under their own volition. An ecologist should inspect the area to confirm Koala absence before re-commencing construction and should provide approval in writing.

The adoption of measures to protect Koalas during construction addresses the following key principle of DPIE (2021):

- Principle 5 - Implement best practice measures for the management of identified risks to Koalas.

6 Conclusion

This KAR has been prepared to understand the potential Koala habitat values present within the study area for the proposed development. The KAR found that the study area and subject land contained highly suitable habitat as defined under the SEPP. The Proposal will result in the removal of 3.77 ha (16.8%) of highly suitable Koala habitat within the study area. This area has been extensively disturbed in the recent past and exhibits the lowest quality native vegetation within the study area.

To determine whether the study area contained evidence of Koala occupancy or use, a Koala survey was conducted. No evidence of Koalas was observed during the targeted survey, which involved spotlighting, the Spot Assessment Technique (SAT) and the deployment of motion-detecting cameras. It is therefore unlikely that a resident population of Koalas occur within the study area.

Although it was deemed unlikely that Koalas would utilise the study area, as a precaution, several mitigation measures have been adopted to avoid any inadvertent impacts. This includes adopting accessible Koala fencing (or alternatively exclusion fencing where threats are present) and undertaking a pre-clearance survey of Koala use trees (listed in Schedule 2 of the SEPP) prior to their removal.

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Appendix A Flora and fauna inventories

Appendix Table A.1: Flora inventory. Threatened species are in bold.

Family	Scientific Name	Common Name	Native/Exotic
Anthericaceae	*Laxmannia gracilis*	Slender Wire Lily	Native
Apiaceae	*Actinotus helianthi*	Flannel Flower	Native
	Actinotus minor	Lesser Flannel Flower	Native
	Platysace linearifolia		Native
	Xanthosia pilosa	Woolly Xanthosia	Native
	Xanthosia tridentata	Rock Xanthosia	Native
Apocynaceae	*Parsonsia straminea*	Common Silkpod	Native
Asphodelaceae	*Dianella caerulea*	Blue Flax-lily	Native
	Dianella prunina		Native
	Dianella revoluta	Blueberry Lily	Native
Asteraceae	*Cyanthillium cinereum*	Little Ironweed	Native
	Hypochaeris radicata	Catsear	Exotic
	Lagenophora sp.		Native
Asteraceae	*Lagenophora stipitata*	Common Lagenophora	Native
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine	Native
Campanulaceae	*Lobelia purpurascens*	Whiteroot	Native
	Wahlenbergia communis	Tufted Bluebell	Native
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	Native
Cyperaceae	*Cyathochaeta diandra*		Native
	Lepidosperma laterale	Variable Sword-sedge	Native
	Schoenus ericetorum		Native
	Schoenus melanostachys	Black Bog-rush	Native
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	Native
Dilleniaceae	*Hibbertia linearis*		Native

Family	Scientific Name	Common Name	Native/Exotic
	Hibbertia sp.		Native
Elaeocarpaceae	***Tetratheca glandulosa***		Native
Ericaceae	*Acrotriche divaricata*		Native
	Leucopogon muticus	Blunt Beard-heath	Native
	Monotoca scoparia		Native
	Woollsia pungens		Native
Fabaceae (Faboideae)	*Bossiaea obcordata*	Spiny Bossiaea	Native
	Daviesia acicularis		Native
	Daviesia sp.		Native
	Dillwynia sp.		Native
	Glycine clandestina	Twining glycine	Native
	Gompholobium sp.		Native
	Hovea linearis		Native
	Hovea sp.		Native
	Phyllota phylicoides	Heath Phyllota	Native
	Pultenaea ferruginea		Native
	Pultenaea paleacea	Chaffy Bush-pea	Native
Fabaceae (Mimosoideae)	*Acacia linifolia*	White Wattle	Native
	Acacia myrtifolia	Red-stemmed Wattle	Native
	Acacia parramattensis	Parramatta Wattle	Native
	Acacia suaveolens	Sweet Wattle	Native
	Acacia ulicifolia	Prickly Moses	Native
Goodeniaceae	*Dampiera stricta*		Native
	Scaevola ramosissima	Purple Fan-flower	Native
Lamiaceae	*Hemigenia purpurea*		Native
Lauraceae	*Cassytha pubescens*	Downy Dodder-laurel	Native

Family	Scientific Name	Common Name	Native/Exotic
	Cassytha spp.		Native
Lomandraceae	*Lomandra cylindrica*		Native
	Lomandra filiformis		Native
	Lomandra longifolia	Spiny-headed Mat-rush	Native
	Lomandra multiflora	Many-flowered Mat-rush	Native
	Lomandra obliqua		Native
Myrtaceae	*Angophora bakeri*	Narrow-leaved Apple	Native
	Angophora costata	Sydney Red Gum	Native
	Angophora hispida	Dwarf Apple	Native
	Corymbia eximia	Yellow Bloodwood	Native
	Corymbia gummifera	Red Bloodwood	Native
	Darwinia fascicularis* subsp. *oligantha		Native
	Eucalyptus haemastoma	Broad-leaved Scribbly Gum	Native
	Eucalyptus punctata	Grey Gum	Native
	Eucalyptus sparsifolia	Narrow-leaved Stringybark	Native
	Kunzea ambigua	Tick Bush	Native
	Leptospermum parvifolium		Native
	Leptospermum trinervium	Slender Tea-tree	Native
	Syncarpia glomulifera	Turpentine	Native
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	Native
Picrodendraceae	*Micrantheum ericoides*		Native
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry	Native
	Bursaria spinosa	Native Blackthorn	Native
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	Exotic

Family	Scientific Name	Common Name	Native/Exotic
	Veronica plebeia	Trailing Speedwell	Native
Poaceae	*Andropogon virginicus*	Whisky Grass	High Threat
	Anisopogon avenaceus	Oat Speargrass	Native
	Aristida benthamii	Three-awned spear grass	Native
	Aristida ramosa	Purple Wiregrass	Native
	Aristida sp.		Native
	Aristida vagans	Threeawn Speargrass	Native
	Austrostipa pubescens		Native
	Dichelachne micrantha	Shorthair Plumegrass	Native
	Digitaria longiflora		Native
	Echinopogon caespitosus	Bushy Hedgehog-grass	Native
	Entolasia stricta	Wiry Panic	Native
	Eragrostis brownii	Brown's Lovegrass	Native
	Imperata cylindrica	Blady Grass	Native
	Microlaena stipoides	Weeping Grass	Native
	Panicum simile	Two-colour Panic	Native
	Paspalidium distans		Native
	Paspalidium sp.		Native
	Themeda triandra		Native
Proteaceae	*Banksia ericifolia*	Heath-leaved Banksia	Native
	Banksia serrata	Old-man Banksia	Native
	Banksia spinulosa	Hairpin Banksia	Native
	Grevillea buxifolia	Grey Spider Flower	Native
	Hakea sericea	Needlebush	Native
	Isopogon sp.		Native

Family	Scientific Name	Common Name	Native/Exotic
	Lambertia formosa	Mountain Devil	Native
	Lomatia silaifolia	Crinkle Bush	Native
	Persoonia linearis	Narrow-leaved Geebung	Native
	Petrophile pulchella	Conesticks	Native
	Xylomelum pyriforme	Woody Pear	Native
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair	Native
	Cheilanthes sieberi	Rock Fern	Native
Rubiaceae	*Opercularia diphylla*	Stinkweed	Native
	Pomax umbellata	Pomax	Native
Rutaceae	*Boronia ledifolia*	Sydney Boronia	Native
	Eriostemon australasius		Native
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	Native
	Exocarpos strictus	Dwarf Cherry	Native
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush	Native
Scrophulariaceae	*Eremophila sturtii*	Turpentine Bush	Native
Thymelaeaceae	***Pimelea curviflora* var. *curviflora***		Native
Xanthorrhoeaceae	*Xanthorrhoea media*		Native
	Xanthorrhoea sp.		Native

Appendix Table A.2: Fauna inventory.

Class	Scientific name	Common name	Native/ Exotic	Observation Type
Amphibia	*Crinia signifera*	Common Eastern Froglet	Native	O, W, S
	Limnodynastes dumerii	Eastern Banjo Frog	Native	O
	Limnodynastes peronii	Striped Marsh Frog	Native	O, W, S
	Litoria peronii	Peron's Tree Frog	Native	W, S
	Litoria quiritatus	Screaming Tree Frog	Native	S
	Litoria tyleri	Tyler's Tree Frog	Native	O, W, S
	Litoria verreauxii	Whistling Tree Frog	Native	S
	Pseudophryne australis	**Red-crowned Toadlet**	Native	O, W
Aves	*Acanthiza lineata*	Striated Thornbill	Native	O
	Acanthiza pusilla	Brown Thornbill	Native	S
	Anthochaera chrysoptera	Little Wattlebird	Native	W, S
	Aquila audax	Wedge-tailed Eagle	Native	O
	Cacatua galerita	Sulphur-crested Cockatoo	Native	O, W
	Calyptorhynchus lathami	**Glossy Black-cockatoo**	Native	S
	Coracina novaehollandiae	Black-faced Cuckooshrike	Native	S
	Cormobates leucophaea	White-troated Treecreeper	Native	S
	Corvus coronoides	Australian Raven	Native	O, W
	Craticus torquatus	Grey Butcherbird	Native	S
	Dacelo novaeguineae	Kookaburra	Native	O, W, S
	Eopsaltria australis	Eastern Yellow Robin	Native	O, S
	Gymnorhina tibicen	Australian Magpie	Native	O, W, S
	Malurus sp.	Unidentified Fairy-wren species	Native	S
	Manorina melanophrys	Bell Miner	Native	W, S
	Meliphaga lewinii	Lewin's Honeyeater	Native	O, S

Class	Scientific name	Common name	Native/ Exotic	Observation Type
	Pachycephala pectoralis	Golden Whistler	Native	S
	Pachycephala rufiventris	Rufous Whistler	Native	S
	Philemon citreogularis	Little Friarbird	Native	S
	Platycercus elegans	Crimson Rosella	Native	O
	Platycercus eximius	Eastern Rosella	Native	O
	Psophodes olivaceus	Eastern Whipbird	Native	W, S
	Rhipdura albiscapa	Grey Fantail	Native	O, S
	Rhipidura leucophrys	Willie Wagtail	Native	O
	Sericornis frontalis	White-browed Scrubwren	Native	W
	Trichoglossus moluccanus	Rainbow Lorikeet	Native	O, W, S
	Vanellus miles	Masked Lapwing	Native	S
	Zandra funerea	Yellow-tailed Black-cockatoo	Native	S
Mammalia (excluding microbats)	*Antechinus stuartii*	Brown Antechinus	Native	O, C
	Cercartetus nanus	**Eastern Pygmy-possum**	Native	O, C
	Petaurus breviceps	Sugar Glider	Native	O, C, S
	Pseudocheirus peregrinus	Ringtail Possum	Native	O
	Rattus fuscipes	Australian Bush Rat	Native	C
	Trichosurus vulpecula	Brushtail Possum	Native	O, C
	Wallabia bicolor	Swamp Wallaby	Native	O, C
Mammalia (microbats)	***Chalinolobus dwyeri***	**Large-eared Pied Bat**	Native	B
	Ozimops planiceps	Southern Free-tailed Bat	Native	B
	Chalinolobus gouldii	Gould's Wattled Bat	Native	B
	Ozimops ridei	Ride's Free-tailed Bat	Native	B
	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Native	B

Class	Scientific name	Common name	Native/ Exotic	Observation Type
	Vespadelus darlingtoni	Large Forest Bat	Native	B
	Vespadelus regulus	Southern Forest Bat	Native	B
	Miniopterus orianae oceanensis	**Eastern Bent-winged Bat**	Native	B
	Vespadelus vulturnus	Little Forest Bat	Native	B
	Chalinolobus morio	Chocolate Wattled Bat	Native	B
	Vespadelus troughtoni	**Eastern Cave Bat**	Native	B
	Miniopterus australis	**Little Bent-winged Bat**	Native	B
	Myotis macropus	**Southern Myotis**	Native	B
	Nyctophilus sp.	Long-eared Bat	Native	B
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	Native	B
Reptilia	*Cryptophis nigrescens*	Eastern Small-eyed Snake	Native	O
	Diplodactylus vittatus	Eastern Stone Gecko	Native	O
	Intellagama lesueurii	Eastern Water Dragon	Native	O
	Morelia spilota	Diamond Python	Native	O
	Pygopus lepidopodus	Common Scaly-foot	Native	O
	Underwoodisaurus milii	Barking Gecko	Native	O

Threatened species are in **bold.** Observation type: O = observed, W = heard, B = bat detector, C = motion-sensitive camera, S = song meter.

Appendix 8

Aboriginal Cultural Heritage Assessment

prepared by Biosis Pty Ltd

(Total No. of pages including blank pages = 486)



Maroota Central Civil Quarry Project: Aboriginal Cultural Heritage Assessment

FINAL REPORT

Prepared for RW Corkery & Co Pty Ltd

6 September 2023

Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

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Prepared by:	Molly Crissell Crystal Garabedian
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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AR	Archaeological report
Biosis	Biosis Pty Ltd
BOM	Bureau of Meteorology
BP	Before present
CBD	Central business district
Central Civil	Central Civil Pty Ltd
Consultation requirements	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a)
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
GSV	Ground Surface Visibility
Heritage Act	*Heritage Act 1977*
Heritage NSW	Heritage NSW, Department of Planning and Environment
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
NNTT	National Native Title Tribunal
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NTSCORP	Native Title Services Corporation
PAD	Potential Archaeological Deposit
RAPs	Registered Aboriginal Parties

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RWC	RW Corkery & Co Pty Ltd
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Study area	4773 Old Northern Road, Maroota, New South Wales (Lot 1 and Lot 2 DP609224)
VENM	Virgin excavated natural material

Summary

Biosis Pty Ltd (Biosis) was commissioned by RW Corkery & Co Pty Ltd (RWC), on behalf of Central Civil Pty Ltd (Central Civil), to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 and Lot 2 DP609224) (the study area). The proposed study area (Figure 3) is located on rural land within Lots 1 and 2 DP609224 and an unnamed Crown road reserve. The Quarry Site includes all proposed activities and covers a total area of approximately 23.33 hectares of which, 4.37 hectares would be disturbed throughout the life of the Quarry.

The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values.

Consultation

The Aboriginal community was consulted regarding the heritage management of the project throughout its lifespan. Consultation has been undertaken as per the process outlined in the Department of Environment, Climate Change and Water (DECCW) document, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b) (consultation requirements). The appropriate government bodies were notified, and advertisements placed in the *Hawkesbury Gazette* newspaper (11 January 2023), which resulted in the following Aboriginal organisations registering their interest (Table 1):

Table 1 List of registered Aboriginal parties and group contact

No.	Organisation	Contact person
1	A1 Indigenous Services	Carolyn Hickey
2	AHCS	Amanda Hickey
3	Confidential Party 1	-
4	Confidential Party 2	-
5	Darug Custodian Aboriginal Corporation	Justine Coplin
6	Didge Ngunawal Clan	Lilly Carrol
7	Ginninderra Aboriginal Corporation	Krystle Carroll-Elliott
8	Gunya Aboriginal Cultural Heritage Services Pty Ltd	Adam Gunther
9	Kamilaroi Yankuntjatjara Working Group	Phil Khan
10	Metropolitan Local Aboriginal Land Council	Raymond Weatherall
11	Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson

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No.	Organisation	Contact person
12	Ros Fogg	Ros Fogg
13	Tocomwall Pty Ltd	Scott Franks
14	Yurwang Gundana Consultancy Cultural Heritage Services	Merekai Bell

A search conducted by the Office of the Registrar, *Aboriginal Land Rights Act 1983,* listed no Aboriginal Owners with land within the study area. A search conducted by the National Native Title Tribunal (NNTT) on 18 November 2022 listed no Registered Native Title Claims, Unregistered Claimant Applications or Registered Indigenous Land Use Agreements within the study area.

Upon registration, the Aboriginal parties were invited to provide their knowledge on the study area and on the proposal provided in project information and methodology. The responses identify the study area as an area of moderate significance. Responses from the Registered Aboriginal Parties (RAPs) are included in Appendix 3.

A site officer from Metropolitan Local Aboriginal Land Council (LALC) participated in the archaeological survey. Comments made by Raymond Weatherall of Metropolitan LALC [10] included the following:

- The study area has been disturbed to varying degrees throughout.
- The study area appeared to be historically cleared and contained minimal mature vegetation.
- The study area lacked characteristics that would suggest this area was intensely occupied by Aboriginal groups.

The outcome of the consultation process was that the RAPs considered the study area to have a high level of cultural significance:

- Phil Khan of Kamilaroi Yankuntjatjara Working Group [9] responded on 9 February 2023:

  > *The study area is highly significant to our people for tens of thousands of years our people have cared for country and we continue to do so. With the vast ecosystems that make up the environment, that's rich with flora and fauna allowing Aboriginal people to thrive, with rich water ways that were utilised for daily activates. For this reason we would like to agree with your methodology we support your report, we look forward to furthering consultation on this project.*

The results of the consultation process are included in this document.

The recommendations that resulted from the consultation process are provided below.

Results

The ACHA assessment undertook background research for the proposed study area. Key considerations arising from the background research include:

- There are 99 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register within a five kilometre radius of the study area. None of these AHIMS sites are located within the study area. The most common site types in the local area include art, grinding groove and artefact sites.

- The Sydney Town soil landscape underlays most of the study area and is characterised as an erosional landscape that has increased soil movement potential when subjected to higher levels of disturbance.
- A review of historical aerial photographs paired identified that disturbance has occurred various areas throughout the study area, being concentrated in the central and southern portions of the study area.
- The study area can be classed as an undulating slope, with steep slopes, ridgelines, and flat crests in the south, and sloping towards valley in the northern portion.
- Previous assessments in the area have found Aboriginal art and rock shelter sites are the most common site types in the area (McDonald 1986, Corkill 1994, Total Earth Care 2008).

An archaeological survey was conducted on 3 April and 6 April 2023 by Crystal Garabedian (Biosis—Heritage Consultant), Bronte Baonza (Biosis—Graduate Heritage Consultant) and Raymond Weatherall (Metropolitan LALC—Cultural Sites Offer). The pedestrian survey consisted of a meandering transect throughout the extent of the study area. The survey identified portions of the study area that have been relatively undisturbed, with isolated disturbances associated with agricultural practices and land clearance. No previously unrecorded Aboriginal cultural heritage sites were identified during the archaeological survey and no areas of archaeological potential were identified. While the study area does not contain any tangible Aboriginal cultural values, the consultation received indicates that the study area is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites.

The previous ground disturbances, nature of the soil landscapes and typical soil depths found within the landforms in the study area, combined with distance from permanent, higher-order water sources and lack of other markers of human occupation in the sandstone outcrops, suggests there is low potential for intact, subsurface deposits to be located within the study area. This assessment was supported by the cultural sites officer, Raymond Weatherall, who attended the archaeological survey.

Management recommendations

Prior to any development impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area being assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal parties

As per the consultation requirements, it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

Recommendation 3: Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to any unexpected Aboriginal objects. The heritage induction should include the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.

- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Planning and Environment (Heritage NSW). Should any unanticipated Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act 1977* (Heritage Act). Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

1 Introduction

1.1 Project background

Biosis has been commissioned by RWC on behalf of Central Civil to undertake an ACHA for the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota, NSW (Lot 1 and Lot 2 DP609224) (Figure 1 and Figure 2). The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an EIS. The project will involve small-scale extraction operation to produce up to 30,000 tonnes per annum of sandstone logs and related products, along with upgrades to site access and infrastructure (Figure 3).

This report details the investigation, consultation and assessment of Aboriginal cultural heritage undertaken for the study area. The Archaeological Report (AR) in Appendix 5 details the findings of the archaeological investigations conducted as part of the ACHA. As required under Section 2.3 of the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

There are 99 Aboriginal cultural heritage sites and one Aboriginal place have registered with the AHIMS register within the vicinity of the study area (Figure 4). None of these AHIMS sites are located within the study area.

1.2 Study area

The study area and proposed Quarry Site (Figure 3) are located within Lots 1 and 2 DP609224, as well as an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (Figure 1). The Quarry Site includes all proposed activities and covers a total area of approximately 23.33 hectares of which 4.37 hectares would be disturbed throughout the life of the Quarry. The study area is adjacent to Marramarra National Park and is situated within a forested landscape. The study area and the surrounding landscape includes dense vegetation.

The study area is within the:

- Hornsby Shire Local Government Area (LGA).
- Parish of Frederick.
- County of Cumberland (Figure 2).

1.3 Proposed development

The proposed development refers to the establishment and operations of the Maroota Central Civil Quarry which would include the following.

- Extraction, processing, and despatch of up to 30,000 tonnes per annum of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.

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- Importation of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of four heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent. (Figure 3).

1.4 Planning approvals

The project will be assessed under Schedule 3 of the EP&A Regulation as a Designated Development, which will require an EIS. Other relevant legislation and planning instruments that will inform this assessment include:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010.*
- *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP).
- *Hornsby Local Environmental Plan 2013* (LEP).
- *Hornsby Development Control Plan 2013* (DCP).

This ACHA has been conducted to satisfy Requirement 19 of the Secretary's Environmental Assessment Requirements (SEARs).

Table 2 Relevant Planning SEARs for the ACHA

Issue and Assessment Requirements	Documentation
19. Aboriginal Cultural Heritage • Provide an Aboriginal Cultural Heritage Assessment Report prepared in accordance with relevant guidelines, identifying, describing and assessing any impacts on any Aboriginal cultural heritage values on the land.	Aboriginal Cultural Heritage Assessment Report

1.5 Restricted and confidential information

Appendix 1 in the Archaeological Report contains AHIMS information which is confidential and not to be made public. This is clearly marked on the title page for the Attachment.

1.6 Aboriginal cultural heritage

1.6.1 General description

According to Allen and O'Connell (2003), Aboriginal people have inhabited the Australian continent for the last 50,000 years. New evidence out of the Northern Territory has pushed this date back with the Malakanunja II rock shelter dated at around 65,000 years BP (before present) (Clarkson et al. 2017).

The timing for the human occupation of the Sydney Basin is still uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with a cultural/archaeological deposit at Parramatta, which was dated to 30,735 ± 407 before present (BP) (JMCHM 2005a).

Without being part of the Aboriginal culture and the productions of this culture, it is not possible for non-Aboriginal people to fully understand the meaning of site, objects and places to Aboriginal people – only to move closer towards understanding this meaning with the help of the Aboriginal community. Similarly, definitions of Aboriginal culture and cultural heritage without this involvement constitute outsider interpretations.

With this preface Aboriginal cultural heritage broadly refers to things that relate to Aboriginal culture and hold cultural meaning and significance to Aboriginal people (DECCW 2010a, p.3). There is an understanding in Aboriginal culture that everything is interconnected. In essence Aboriginal cultural heritage can be viewed as potentially encompassing any part of the physical and/or mental landscape, that is, 'Country' (DECCW 2010a, p.iii).

Aboriginal people's interpretation of cultural value is based on their 'traditions, observance, lore, customs, beliefs and history' (DECCW 2010a, p.3). The things associated with Aboriginal cultural heritage are continually and actively being defined by Aboriginal people (DECCW 2010a, p.3). These things can be associated with traditional, historical or contemporary Aboriginal culture (DECCW 2010a, p.3).

1.6.2 Tangible Aboriginal cultural heritage

Three categories of tangible Aboriginal cultural heritage may be defined:

- Things that have been observably modified by Aboriginal people.
- Things that may have been modified by Aboriginal people, but no discernible traces of that activity remain.
- Things never physically modified by Aboriginal people (but associated with Dreamtime Ancestors who shaped those things).

1.6.3 Intangible Aboriginal cultural heritage

Examples of intangible Aboriginal cultural heritage would include memories of stories and 'ways of doing', which would include language and ceremonies (DECCW 2010a, p.3).

1.6.4 Statutory

Currently Aboriginal cultural heritage, as statutorily defined by the NPW Act, consists of objects and places which are protected under Part 6 of the Act.

Aboriginal objects are defined as:

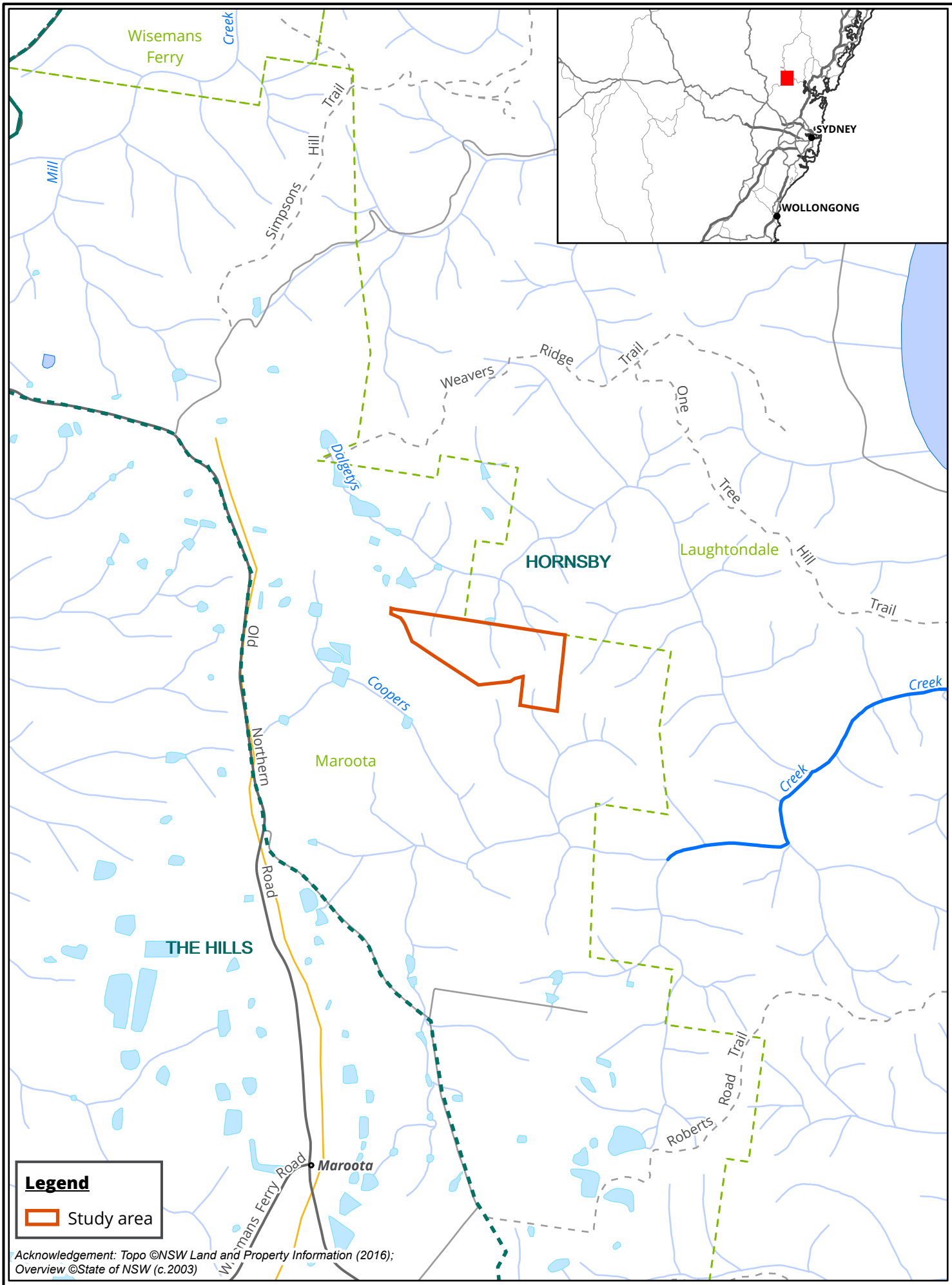
> *any deposit, object or material evidence…relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains*

Aboriginal places are defined as a place that is or was of special Aboriginal cultural significance. Places are declared under section 84 of the NPW Act.

1.6.5 Values

Aboriginal cultural heritage is valued by Aboriginal people as it is used to define their identity as both individuals and as part of a group (DECCW 2010a, p.iii). More specifically it is used:

- To provide a:
  - '*Connection and sense of belonging to Country*' (DECCW 2010a, p.iii).
  - Link between the present and the past (DECCW 2010a, p.iii).
- As a learning tool to teach Aboriginal culture to younger Aboriginal generations and the general public (DECCW 2010a, p.3).
- As further evidence of Aboriginal occupation prior to European settlement for people who do not understand the magnitude to which Aboriginal people occupied the continent (DECCW 2010a, p.3).



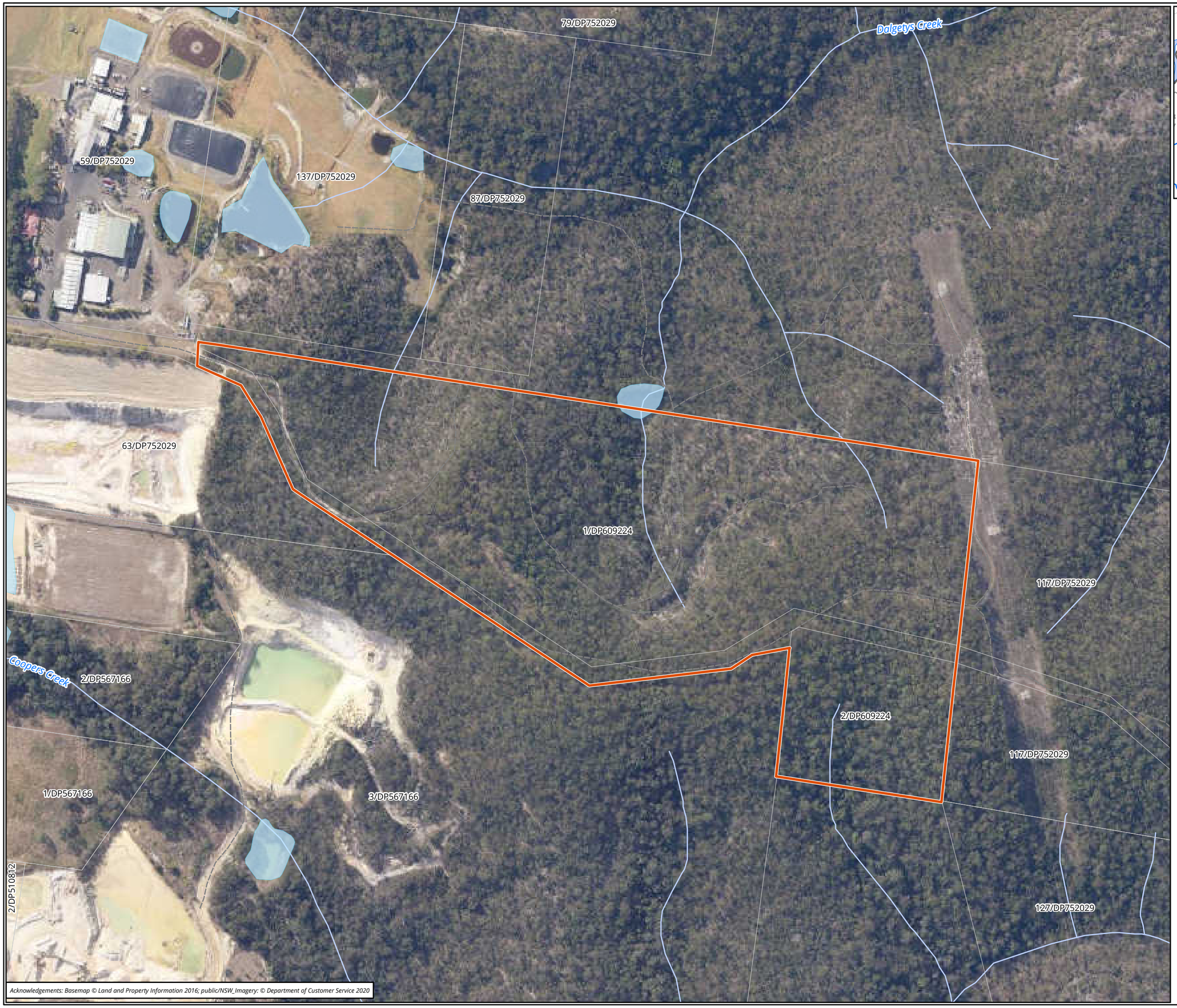
biosis

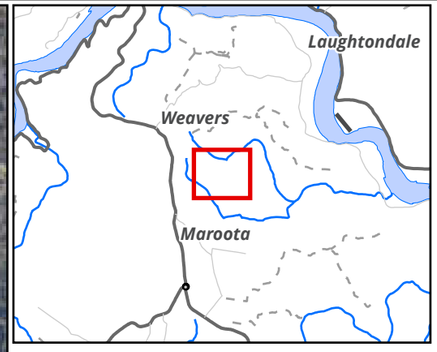
Figure 1 Location of the study area

Matter: 37704
Date: 30 May 2023,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\
37704_MarootQuarry

0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56

N





Legend

- Study area
- Lot

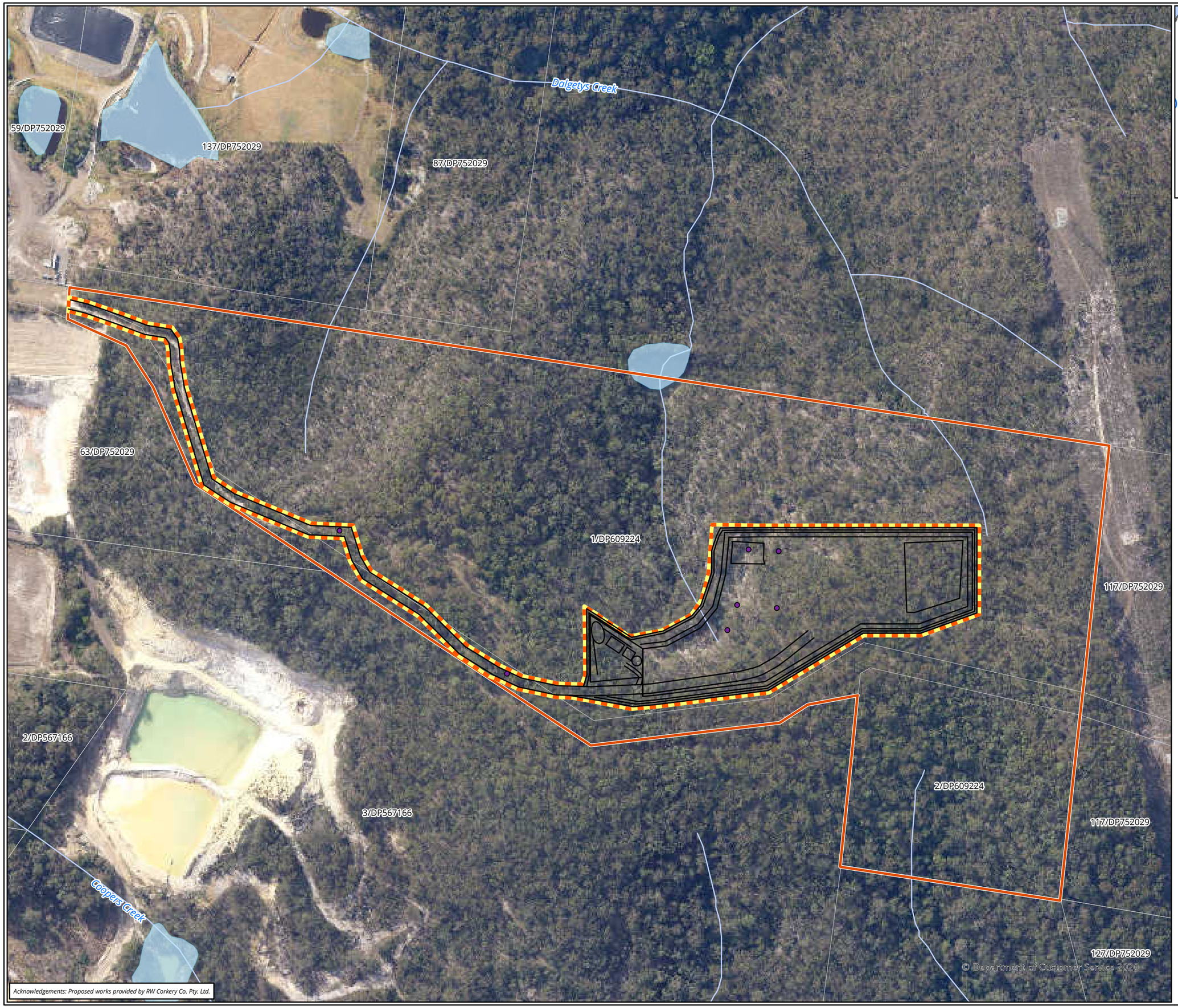
Figure 2 Study area detail

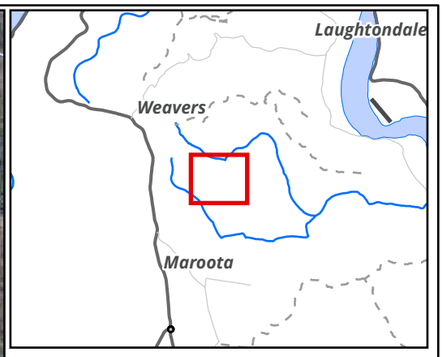
0 50 100 150 200 N

Metres
Scale: 1:4,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F2_StudyArea





Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Figure 3 Proposed works

0 30 60 90 120

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F3_ProposedWorks

2 Study area context

This section discusses the study area regarding its landscape, environmental and Aboriginal cultural heritage context. This section should be read in conjunction with the AR attached in Appendix 5. The background research has been undertaken in accordance with the Code.

2.1 Geology, topography and hydrology

The Hornsby Plateau undulates between the Macdonald ranges located to the north of the study area and extends east to the Watagan Mountains. The geological formation within the study area is Hawkesbury sandstone, which comprises medium- to coarse-grained quartz sandstone with minor shale and laminite lenses. This landscape is characterised by rugged and very steep hills, benched hill slopes with narrow flat topped ridges and broader plateau tops on horizontal Triassic quartz sandstone with occasional conglomerate and thin discontinuous shales (Mitchell 2002, pp. 112). Valleys within this area contain tributaries of the Hawkesbury River that dissect the rugged Hawkesbury Sandstone sediments (Murphy 1993, pp. 2). The study area can be classed as an undulating slope, with steep slopes, ridgelines, and flat crests in the south, and sloping towards valley in the northern portion.

Stream order and topography are recognised as factors which helps the development of predictive modelling in Aboriginal archaeology in the Cumberland Plain. Predictive models which have been developed for the region have a tendency to favour permanent water courses as the locations of complex sites that have been continuously occupied, as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups (JMCHM 2000, p.19).

The study area is situated within a complex hydrological system, with watercourses within the study area including three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 245 metres north-east of the study area at its closest point. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of ninth-order, perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point. The proximity of the study area to the Hawkesbury River suggests the presence of Aboriginal sites or objects.

Full details on topography and hydrology can be found in the AR in Appendix 5.

2.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation, and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The study area is predominantly located within the Sydney Town soil landscape, with disturbed terrain existing in the western most portion. It is topographically characterised by undulating to rolling hills and moderately inclined slopes on quartz sandstone along the edge of the Somersby Plateau. The slope gradient of this soil landscape ranges from 5–25%. Sandstone benches occasionally occur and are often exposed along narrow incised drainage lines. The soils within the landscape are highly permeable, and strongly acidic with very low fertility, and are subject to permanent waterlogging and present a very high erosion hazard.

Full details on soil characteristics can be found in the AR in Appendix 5.

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2.3 Climate and rainfall

Rainfall data was sourced from the closest meteorological station to the study area with similar elevation i.e., the Bureau of Meteorology (BOM) station number 061375 (Mangrove Mountain AWS) located approximately 33.4km from the study area. However, evaporation data is not available at this station and representative data has been sourced from BOM station number 067021 (Richmond - UWS Hawkesbury) located approximately 19.4km from the study area. Table 3 provides a summary of the climate data which is discussed further in the following subsections:

Table 3 Climate Data Summary - BoM

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature (°C)[1]—mean based on period from 1994–2023													
Mean maximum	27.4	26.7	24.7	22.1	18.9	16.0	15.7	17.5	20.6	22.9	24.5	26.4	22.0
Mean minimum	17.0	16.8	15.3	12.1	9.0	7.1	5.9	6.5	9.1	11.5	13.6	15.3	11.6
Rainfall (mm)[1]—mean based on period from 1994–2023													
Mean rainfall	104.7	147.0	159.3	79.4	78.3	106.0	64.6	61.6	67.5	81.5	93.9	87.8	1127.9
Highest monthly rainfall	243.4	371.0	619.0	261.0	318.8	609.6	549.8	198.8	207.4	260.0	231.0	221.0	1917.8
Lowest monthly rainfall	20.2	23.8	16.0	9.6	5.8	0.0	1.0	1.2	2.0	12.4	4.2	0.4	724.6
Mean number of rain days	13.4	13.8	14.9	13.0	13.0	13.5	11.1	8.3	9.4	11.5	12.9	12.0	146.8
Highest daily rainfall	169.4	126.4	130.0	90.2	100.0	293.6	170.2	189.0	105.4	97.6	63.8	100.0	293.6
Evaporation (mm)[2]—mean based on period from 1973 – 2021													
Mean monthly evaporation	182.9	137.2	1240	90.0	65.1	51	58.9	83.7	114.0	142.6	156.0	176.7	2498.1

Source: [1] **Bureau of Meteorology Station: Mangrove Mountain AWS (Station No. 061375)**
[2] **Bureau of Meteorology Station: Richmond—UWS Hawkesbury (Station No. 067021)**

Note: mean monthly evaporation is based on sum of mean daily evaporation.

Temperature patterns follow seasonal expectations with higher mean temperatures during the summer months of December to February and lowest temperatures during winter. The mean maximum temperature varies between 15.7 and 27.4 degrees Celsius while the mean minimum temperature varies between 5.9 and 17.0 degrees Celsius.

Mean annual rainfall is 1127.9 millimetres, with rainfall distributed relatively evenly throughout the year with a slightly drier period during July to September. Mean monthly rainfall varies between a maximum of 159.3 millimetres in March and a minimum of 61.6 millimetres in August. Rainfall is typically infrequent with less rain days experienced during winter months.

The estimated mean evaporation at the Quarry Site is approximately 208.2 millimetres per month throughout the year, or 2498.1 millimetres per year. Mean monthly evaporation varies between 182.9 millimetres January

and 51 millimetres in June. The estimated mean monthly evaporation is higher than mean monthly rainfall in all months resulting in an annual moisture deficit.

Based on modern climate data it is likely the study area would have provided a temperate area with high average rainfalls. This would likely reflect an abundance of resources and water sources making it likely the area was occupied. This would also suggest the presence of Aboriginal sites is highly likely as a result.

2.4 Landscape resources

The Wisemans Ferry region would have provided an abundance of natural resources able to be utilised in a variety of ways by Aboriginal people. Plant fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was also used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002, pp. 113–114).

The Sydney Town soil landscape contains mostly uncleared tall eucalypt open-forest and closed forest in sheltered gullies. On steep slopes with a southerly aspect, Watagan soils commonly foster species including scribbly gum *Eucalyptus haemastoma*, brown stringybark *E. capitellata*, red bloodwood *Corymbia gummifera*, smooth-barked apple *Angophora costata*, Sydney peppermint *E. piperita* and old man banksia *Banksia serrata*. Common understorey shrubs include grey spider flower *Grevillea* spp., drumsticks *Isopogon* spp. and flaky-barked tea-tree *Leptospermum attenuatum*. Poorly drained areas support scrubland of heath banksia *B. ericifolia* and dagger hakea *Hakea teretifolia* (Murphy 1993, pp. 41).

Animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are often an abundant part of the archaeological record. Brush-tailed Possums were highly prized for their fur and could be fashioned into a cloak (Attenbrow 2002, pp. 117). Native Fauna likely to have been present in the area include but are not limited to: Australian Brush Tail Possum *Trichosurus vulpecula*, Short-beaked Echidna *Tachyglossus aculeatus*, Swamp Wallaby *Wallabia bicolor*, Rainbow Lorikeet *Trichoglossus moluccanus*, Kookaburra *Dacelo novaeguineae*, Australian Magpie *Cracticus tibicen*, Water Dragon *Intellagama lesueurii,* Eastern Blue-Tongue *Tiliqua scincoides*.

2.5 European land use history

Historical aerial imagery allows for modern developments and land use to be identified within the study area. Table 4 summarises the development of the study area with reference to the historical aerials.

Table 4 Summary of historical aerials

Aerial	Description
1960 (Photo 2)	Aerial imagery from 1960 shows that portions of the study area have been cleared of large vegetation. This vegetation clearance has been limited to the south-west and south-east of the study area, with a small section in the north-east. Within the southern portion there appears to be an orchard and in south-west portion, the land appears to have been cleared for agricultural purposes. Access tracks have been constructed on the north-west and south-east portions.
1965 (Photo 2)	Aerial imagery from 1965 shows that portions of the study area have been extensively cleared of large vegetation. This vegetation clearance has been limited to the south-west and south-east of the study area, with a small section in the north-east. Within the south-west portion,

Aerial	Description
	the land appears to have been cleared for agricultural purposes. Access tracks have been constructed on the north-west and south-east portions.
1974 (Photo 3)	Aerial imagery from 1974 shows that limited changes have occurred within the study area. The cleared land has been maintained and an artificial dam has been constructed along the northern border. There is now an access track that connects the dam with the cleared portion in the south-east.
1983 (Photo 4)	Aerial imagery from 1983 shows that limited changes have occurred within the study area . A small structure now exists within the cleared section within the south-west.
1993 (Photo 5)	Aerial imagery from 1993 shows that vegetation clearance has occurred within the central portion of the study area. The grass in this area appears to have been removed with exposed soils visible on the aerial.
Current (Figure 2)	Little change has occurred within the study area from 1994.

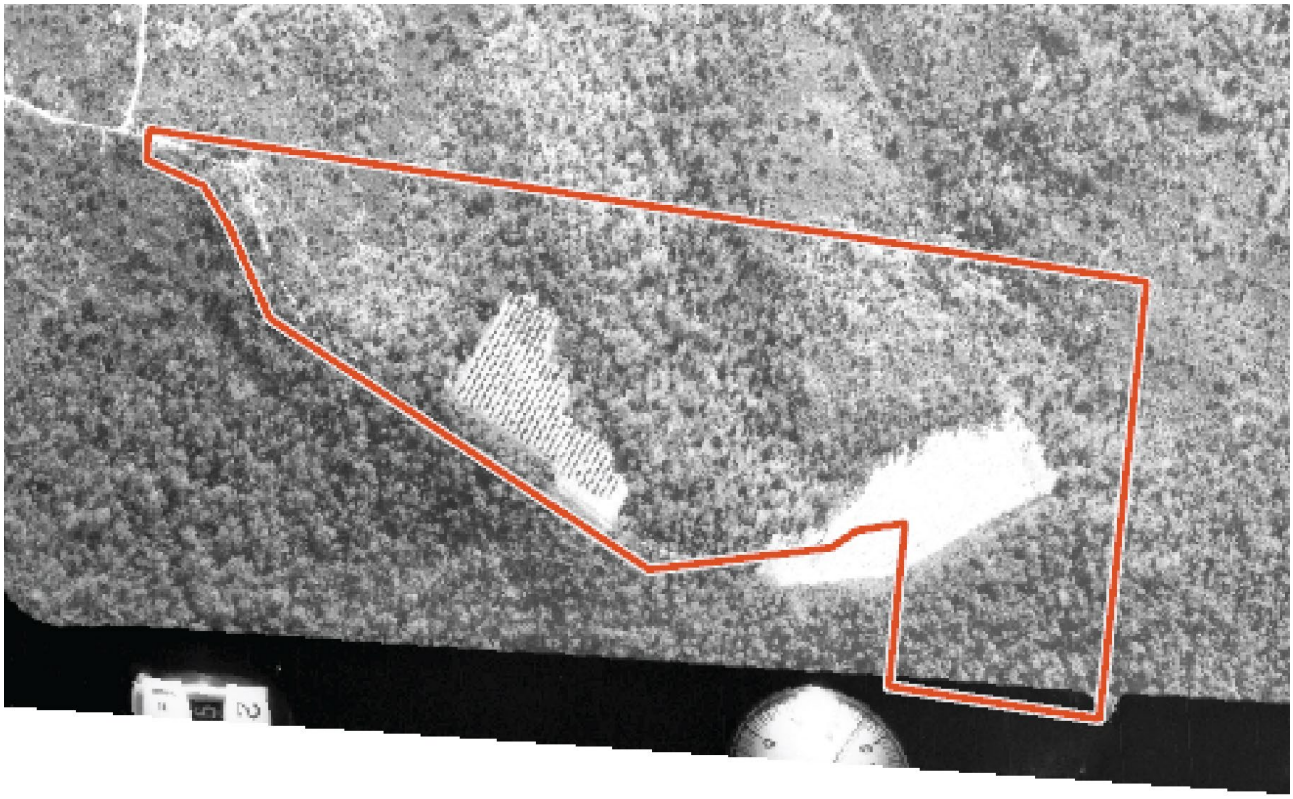


Photo 1 Aerial photograph dated to 1960, study area shown in red (Source: NSW Spatial Services)

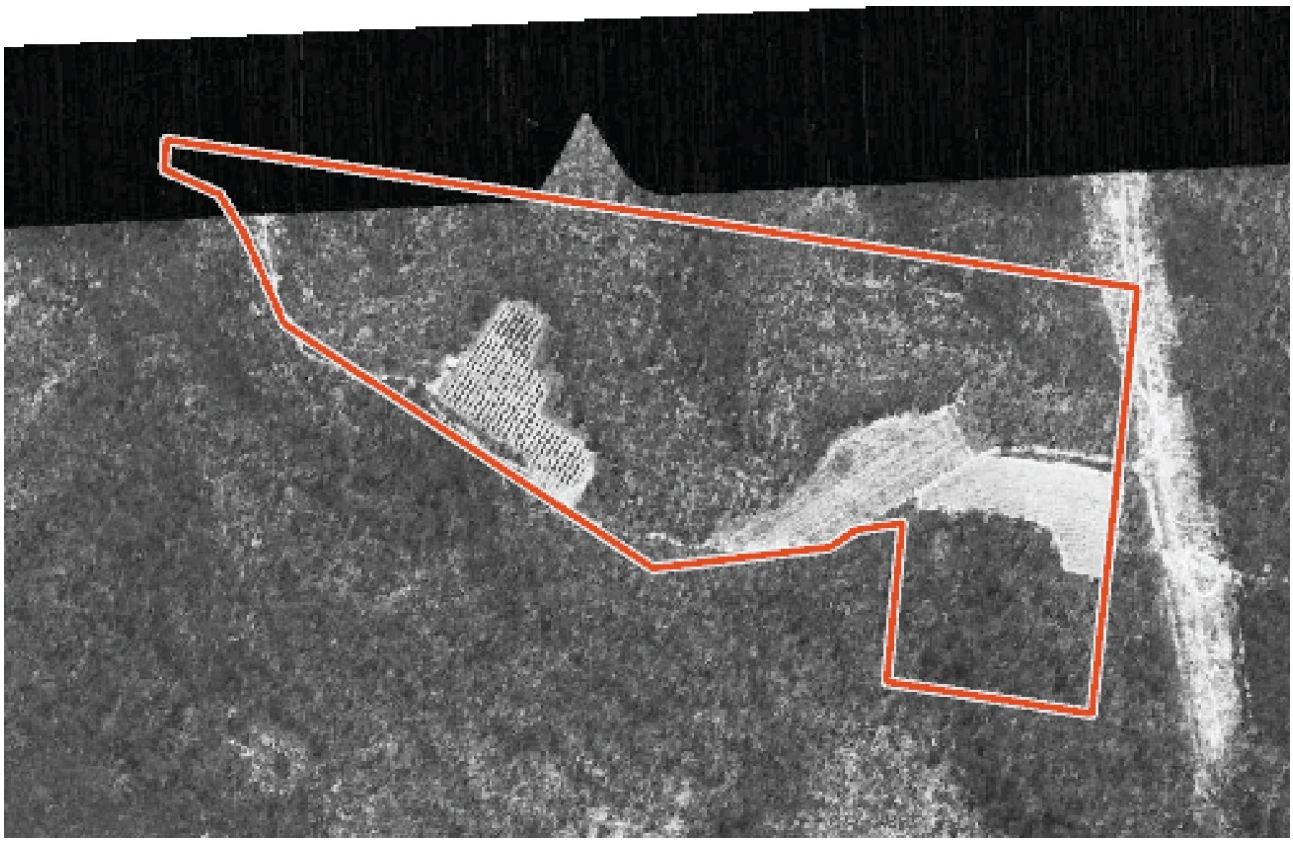


Photo 2 **Aerial photograph dated to 1965, with the study area indicated by the red boundary (Source: NSW Spatial Services)**



Photo 3 **Aerial photograph dated to 1974, with the study area indicated by the red boundary (Source: NSW Spatial Services)**



Photo 4 **Aerial photograph dated to 1983, with the study area indicated by the red boundary (Source: NSW Spatial Services)**

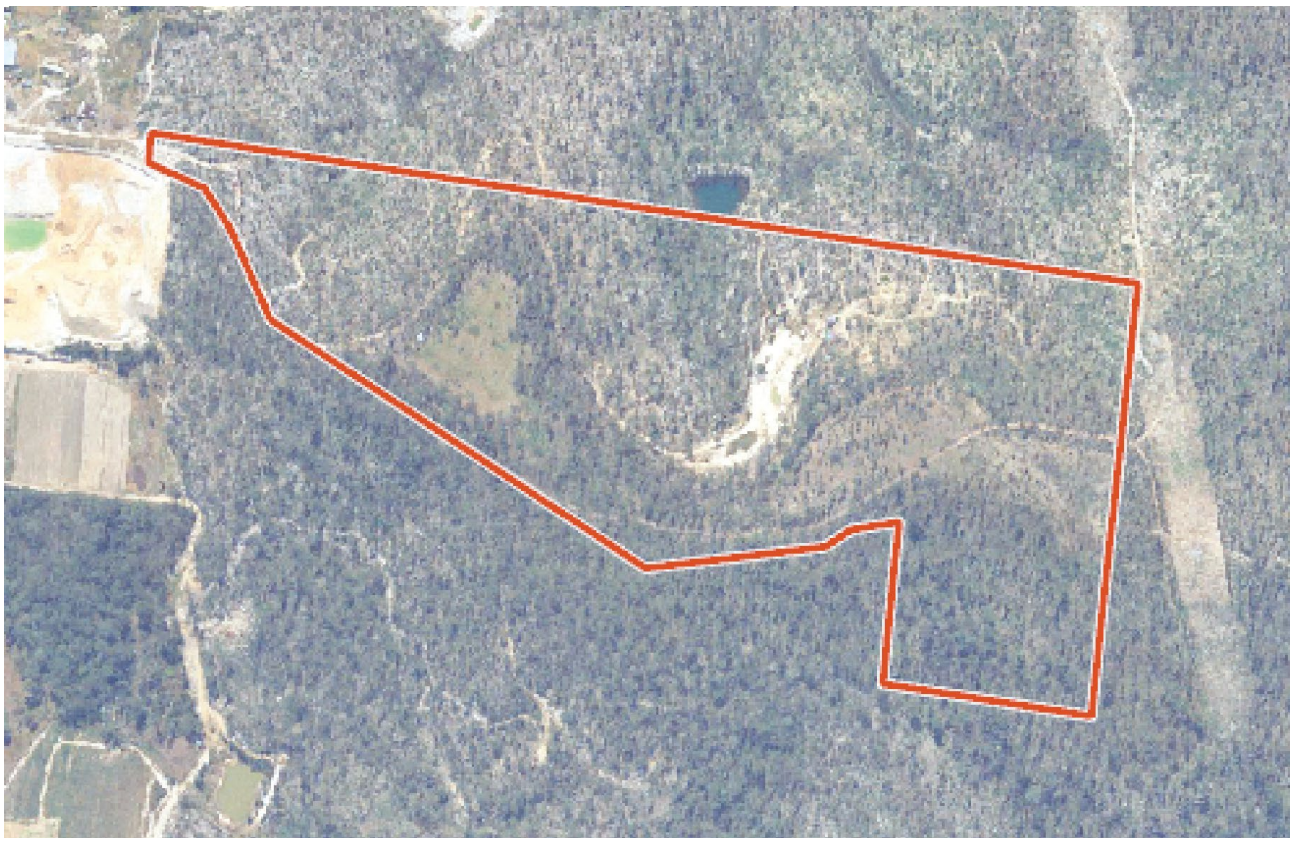


Photo 5 **Aerial photograph dated to 1993, with the study area indicated by the red boundary (Source: NSW Spatial Services)**

3 Aboriginal cultural heritage context

3.1 Ethnohistory

It is generally accepted that Aboriginal people have inhabited the Australian landmass for the last 65,000 years (Clarkson et al. 2017). Dates of the earliest occupation of the continent by Aboriginal people are subject to continued revision as more research is undertaken. The timing for the human occupation of the Sydney Basin is still uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with a cultural/archaeological deposit at Parramatta, which was dated to 30,735 ± 407 BP (JMCHM 2005c, JMCHM 2005d).

Archaeological evidence of Aboriginal occupation of the Cumberland Plain indicates that the area was intensively occupied from approximately 4000 years BP (Dallas 1982). Such 'young' dates are probably more a reflection of the conditions associated with the preservation of this evidence and the areas that have been subject to surface and sub-surface archaeological investigations, rather than actual evidence of Aboriginal occupation prior to this time. The majority of excavated shelter and open sites in the region however yield much younger dates of around 3000 years BP (Attenbrow 1987, Keotigg 1985, McDonald 1985),

At the time of initial European occupation of the Sydney region, systematic ethnographic studies of Aboriginal society were not carried out; however, observations from individuals at the time can be compiled to suggest something of Aboriginal lifeways before European occupation. Attenbrow (2010) and McDonald (2008) have compiled various observations. It is known that people lived in family groups, consisting of one or two adult males, their wives, and their dependants (young and old). It is also known that people belonged to named groups, which were tied to places, and that people in different areas spoke different dialects.

While information about Aboriginal life within the study area is scarce, some generalisations can be made from available writings and research that discusses Aboriginal Australia more broadly. Aboriginal people moved across the land in small family groups likely subsisting on plant food and the aquatic resources of creeks and rivers. In the Hawkesbury area, this would include the resources of the Hawkesbury River. A variety of local terrestrial resources, including possum, kangaroo, snakes, and lizards, would also have been exploited (Atlas of Living Australia 2022).

The study area is located at the boarder of three Aboriginal linguistic groups; the Darug, Darkinjung, and Guringai (Horton 1994). According to Tindale, the study area was traditionally inhabited by the Darkinjung people (Tindale 1940, Tindale 1974, p.193). Darkinjung lands roughly extended from the Hawkesbury River northwards to Wollombi and to the southern drainage of the Hunter River. It has been suggested that the Darug tribe inhabited land within the Darkinjung boundaries and were situated at the mouth of the Hawkesbury River; the study area falls within this area (Tindale 1974, p.193, Mathews 1897, p.1). According to Tindale, the Darkinjung people were bordered to the north by the Awabakal and Guringai people.

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. It is for this reason the boundaries of Aboriginal groups in the region cannot be easily defined. It is also highly likely that Aboriginal group boundaries were highly mobile and overlapped within some areas. The inherent bias of the class and cultures of these authors necessarily affect such documents. They were also often describing a culture that they did not fully understand—a culture that was in a heightened state of disruption given the arrival of European settlers and disease. Early written records can, however, be used in conjunction with archaeological information and surviving oral histories from members of the Aboriginal community to gain a picture of Aboriginal life in the region.

After the arrival of European settlers, the movement of Aboriginal people became increasingly restricted. European expansion along the Cumberland Plain was swift and soon there had been considerable loss of land to agriculture. Death, starvation and disease as a result of European arrival were some of the disrupting factors that led to a reorganisation of the social practices of Aboriginal communities after European contact occurred. The formation of new social groups and alliances were made as Aboriginal people sought to retain some semblance of their previous lifestyle.

3.2 Interpretation of past Aboriginal land use

The presence of several floral and faunal resources, along with the proximity of the Hawkesbury River and several of its tributaries, suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year round. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*. The geological formations present within the study area also indicate that rock shelters could be present within the study area. These rock shelters would have provided Aboriginal people with shelter from the elements. It is therefore likely the study area was extensively utilised by Aboriginal people in the past and evidence of their occupation in the form of artefact scatters, isolated artefacts, open camp sites, grinding grooves, rock engravings, and PADs may be present within the study area as a result.

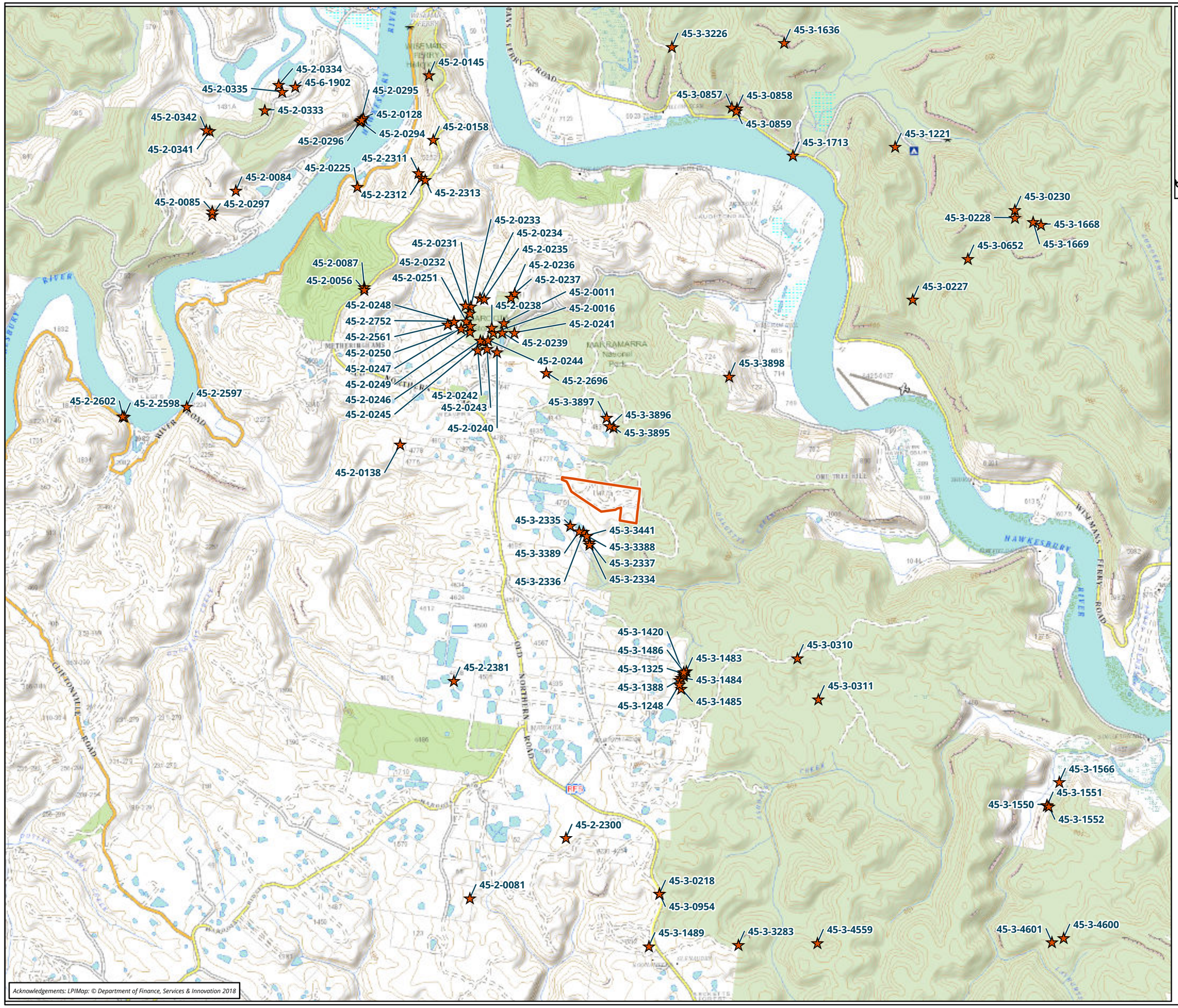
An archaeological survey was conducted on 3 April 2023 and 6 April 2023 by Crystal Garabedian (Biosis—Heritage Consultant), Bronte Baonza (Biosis—Graduate Heritage Consultant) and Raymond Weatherall (Metropolitan LALC—Cultural Sites Offer). The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility combined with a low number of exposures. No previously unrecorded Aboriginal cultural heritage sites were identified during the archaeological survey and no areas of archaeological potential were identified. However, the lack of surface material does not indicate that there is an absence of archaeological deposits. This is instead likely attributable to the limited exposure and areas of disturbance seen during the archaeological survey, rather than an absence of Aboriginal occupation of the area.

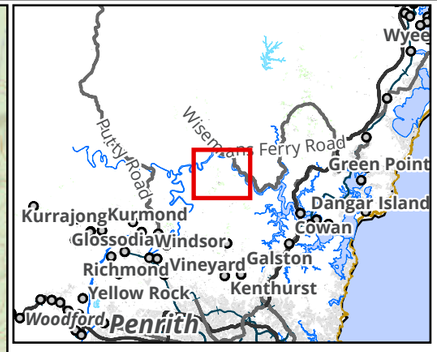
The flat crest on top of the steep ridgeline presents as the most favourable landform within the study area, occurring in the southern portion. As is evident in the historic aerials (Photo 1 to Photo 4) within this region, previous clearing of all large vegetation has occurred for use of the area as an orchard. During the archaeological survey, the vegetation in this area was dominated by low lying grassy vegetation and shrubs, with some larger, but juvenile, trees scattered throughout. The cultural sites officer, Raymond Weatherall, who attended the survey also commented on the unexpected presence of plant species in this area, including reed plants that usually exist near water ways, and suggested that this was likely the result of lots of movement around the site.

This area is also located within the erosional Sydney Town soil landscape. The levels of disturbance from agricultural activities within this area would have removed or displaced sub-surface archaeological deposits. This assessment is consistent with other studies that have conducted investigations in disturbed landscapes within the Maroota region (Harris 1979, Corkill & Edgar 1999). Throughout the study area there were sandstone outcrops; however, none were significant in size enough to act as a shelter or habitation structure. These outcrops were also inspected for grinding grooves and rock art; however, the surface of the sandstone did not contain any Aboriginal features of this nature. Corkill (1994b, pp. 7) suggested that the presence of several Aboriginal art sites and few engraving sites within the Maroota State Forest could indicate a lack in preference for engraving as the primary mode of art in this region. In a study area with similar topography to

the current Biosis study area, located approximately 2.6 kilometres south-west, Corkill (1989) noted that engravings are rare on the west side of the Maroota ridge, where the current study area is.

The previous ground disturbances, nature of the soil landscapes and typical soil depths found within the landforms in the study area, combined with distance from permanent, higher-order water sources and lack of other markers of human occupation in the sandstone outcrops suggests there is low potential intact, subsurface deposits to be located within the study area. This assessment was supported by Raymond Weatherall, cultural sites officer, who attended the archaeological survey.





Legend

- Study area
- AHIMS

NOT TO BE MADE PUBLIC

Figure 4 Aboriginal sites located in the study area and vicinity

0 500 1,000 1,500

Metres

Scale: 1:40,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 30 May 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry, Layout: 37704_ACHA_F4_AHIMS

4 Aboriginal community consultation

Consultation with the Aboriginal community has been undertaken in compliance with the consultation requirements as detailed below. A consultation log of all communications with RAPs is provided in Appendix 1.

4.1 Stage 1: Notification of project proposal and registration of interest

4.1.1 Identification of relevant Aboriginal stakeholders

In accordance with the consultation guidelines, Biosis notified the following bodies regarding the proposal:

- Hornsby Shire Council.
- Heritage NSW.
- NSW Native Title Services Corporation Limited (NTSCORP Limited).
- Office of the Registrar, Aboriginal Land Rights Act 1983 of Aboriginal Owners.
- National Native Title Tribunal (NNTT).
- Greater Sydney Local Land Services.
- Metropolitan LALC.

A list of known Aboriginal stakeholders in the Maroota was provided by Heritage NSW (a copy of this responses is provided in Appendix 2 and include:

- A1 Indigenous Services
- Amanda Hickey Cultural Services
- Aragung Aboriginal Cultural Heritage Site Assessments
- B.H. Heritage Consultants
- Badu (Murrin Clan/Peoples)
- Barking Owl Aboriginal Corporation
- Biamanga (Murrin Clan/Peoples)
- Bidjawong Aboriginal Corporation
- Bilinga (Murrin Clan/Peoples)
- Butucarbin Aboriginal Corporation
- Clive Freeman
- Cullendulla (Murrin Clan/Peoples)
- Darug Aboriginal Cultural Heritage Assessments
- Darug Boorooberongal Elders Aboriginal Corporation
- Darug Custodian Aboriginal Corporation
- Darug Land Observations
- Dharug (Murrin Clan/Peoples)
- Dhinawan Culture & Heritage Pty Ltd
- Didge Ngunawal Clan
- DJMD Consultancy
- Eric Keidge
- Ginninderra Aboriginal Corporation
- Goobah Development PTY LTD (Murrin Clan/Peoples)
- Goodradigbee Cultural & Heritage Aboriginal Corporation
- Gulaga
- Gunjeewong Cultural Heritage Aboriginal Corporation

- Gunya Aboriginal Cultural Heritage Services PTY LTD
- Gunyuu (Murrin Clan/Peoples)
- Guringai Tribal Link Aboriginal Corporation
- Jerringong (Murrin Clan/Peoples)
- Julia Narayan
- Kamilaroi Yankuntjatjara Working Group
- Metropolitan Local Aboriginal Land Council
- Minnamunnung
- Mundawari Heritage Consultants
- Munyunga (Murrin Clan/Peoples)
- Mura Indigenous Corporation
- Murra Bidgee Mullangari Aboriginal Corporation
- Murramarang (Murrin Clan/Peoples)
- Murrumbul (Murrin Clan/Peoples)
- Ngambaa Cultural Connections
- Nundagurri (Murrin Clan/Peoples)
- Pemulwuy (Murrin Clan/Peoples)
- RAW Cultural Healing
- Thauaira
- Thoorga Nura
- Tocomwall Pty Ltd
- Waawaar Awaa Aboriginal Corporation
- Wailwan Aboriginal Group
- Walbunja (Murrin Clan/Peoples)
- Walgalu (Murrin Clan/Peoples)
- Wingikara (Murrin Clan/Peoples)
- Woka Aboriginal Corporation
- Wori Wooilywa
- Wullung (Murrin Clan/Peoples)
- Wurrumay Pty Ltd
- Yerramurra (Murrin Clan/Peoples)
- Yurwang Gundana Consultancy Cultural Heritage Services

A search conducted by the Office of the Registrar, *Aboriginal Land Rights Act 1983* (NSW) listed no Aboriginal Owners with land within the study area. A search conducted by the NNTT listed no Registered Native Title Claims, Unregistered Claimant Applications or Registered Indigenous Land Use Agreements within the study area.

4.1.2 Public notice

In accordance with the consultation guidelines, a public notification was placed in the *Hawkesbury Gazette* newspaper (11 January 2023).

The advertisement invited Aboriginal people who hold cultural knowledge to register their interest in a process of community consultation to provide assistance in determining the significance of Aboriginal object(s) and/or places in the vicinity of the study area. A copy of the public notice is provided in Appendix 2.

4.1.3 Registration of Aboriginal parties

Aboriginal groups identified in Section 4.1.1 were sent a letter inviting them to register their interest in a process of community consultation to aid in determining the significance of Aboriginal object(s) and/or places in the vicinity of the study area. In response to the letters and public notice, a total of 14 groups registered their interest in the project. Responses to registration from Aboriginal parties are provided in Appendix 3. A full list of Aboriginal parties who registered for consultation is provided below:

Table 5 List of registered Aboriginal parties

No.	Organisation	Contact person
1	A1 Indigenous Services	Carolyn Hickey
2	AHCS	Amanda Hickey
3	Confidential Party 1	-
4	Confidential Party 2	-
5	Darug Custodian Aboriginal Corporation	Justine Coplin
6	Didge Ngunawal Clan	Lilly Carrol
7	Ginninderra Aboriginal Corporation	Krystle Carroll-Elliott
8	Gunya Aboriginal Cultural Heritage Services Pty Ltd	Adam Gunther
9	Kamilaroi Yankuntjatjara Working Group	Phil Khan
10	Metropolitan Local Aboriginal Land Council	Raymond Weatherall
11	Murra Bidgee Mullangari Aboriginal Corporation	Ryan Johnson
12	-	Ros Locke
13	Tocomwall Pty Ltd	Scott Franks
14	Yurwang Gundana Consultancy Cultural Heritage Services	Merekai Bell

4.2 Stage 2 and Stage 3: Presentation of information about the proposed project and gathering information about cultural significance

On 25 January 2023, Biosis provided RAPs with details about the proposed development works (project information pack) and the project methodology pack outlining the proposed ACHA process and methodology for this project. RAPs were given 28 days to review and prepare feedback on the proposed methodology. A copy of the project information pack is provided in Appendix 3.

Murra Bidgee Mullangari Aboriginal Corporation [11] and Yurwang Gundana Consultancy Cultural Heritage Services [14] responded by confirming their support of the proposed methodology.

Phil Khan of Kamilaroi Yankuntjatjara Working Group [9] responded on 9 February 2023:

> *The study area is highly significant to our people for tens of thousands of years our people have cared for country and we continue to do so. With the vast ecosystems that make up the environment, that's rich with flora and fauna allowing Aboriginal people to thrive, with rich water ways that were utilised for daily activates. For this reason we would like to agree with your methodology we support your report, we look forward to furthering consultation on this project.*

4.2.1 Information gathered during fieldwork

During archaeological survey, comments made by Raymond Weatherall of Metropolitan LALC [10] included the following:

- The study area has been disturbed to varying degrees throughout.
- The study area appeared to be historically cleared and contained minimal mature vegetation.
- The study area lacked characteristics that would suggest this area was intensely occupied by Aboriginal groups.

4.3 Stage 4: Review of draft ACHA report

A copy of the draft ACHA and the proposed testing methodology were provided to RAPs on 1 August 2023 for review and comment. RAPs were given 28 days to provide comments in accordance with consultation requirements. One response was received as detailed below, and a record of all correspondence is provided in Appendix 4.

Kamilaroi Yankuntjatjara Working Group [9] responded by email on 29 August 2023 stating that they agree and support the recommendations in the ACHA and also recommend that a RAP be present during earthworks.

Biosis responded by email on 29 August 2023 requesting further information given the scope of works is an ongoing mining operation how could monitoring be best applied in this scenario. Kamilaroi Yankuntjatjara Working Group [9] responded by phone on 30 August 2023 agreeing that given the nature of the ongoing mine operation, monitoring during the proposed works was not a viable option and agreed with the recommendations in the report.

5 Aboriginal cultural significance assessment

The two main values addressed when assessing the significance of Aboriginal sites are cultural values to the Aboriginal community and archaeological (scientific) values. This report will assess the cultural values of Aboriginal sites in the study area. Details of the scientific significance assessment of Aboriginal sites in the study area are provided in the AR in Appendix 5.

5.1 Introduction to the assessment process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia International Council on Monuments and Sites (ICOMOS) *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 2013) (the Burra Charter). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values are provided as background and include:

- **Historical significance** (evolution and association) refers to historic values and encompasses the history of aesthetics, science, and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, a historic figure, event, phase, or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives *in situ*, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.
- **Aesthetic significance** (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural, and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.
- **Social significance** (contemporary community esteem) refers to the spiritual, traditional, historical, or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods, or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.
- **Scientific significance** (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place, or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

The cultural and archaeological significance of Aboriginal and historic sites and places is assessed based on the significance values outlined above. As well as the Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Australian

Government, Heritage NSW and the Heritage Branch, and the NSW Department of Planning and Environment. The relevant sections of these guidelines are presented below.

These guidelines state that an area may contain evidence and associations which demonstrate one or any combination of the Burra Charter significance values outlined above in reference to Aboriginal heritage. Reference to each of the values should be made when evaluating archaeological and cultural significance for Aboriginal sites and places.

In addition to the previously outlined heritage values, the Heritage NSW *Guidelines to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that 'the significance of individual features is derived from their inter-relatedness within the cultural landscape'. This means that sites or places cannot be 'assessed in isolation' but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places, and (for example) natural resources in the cultural landscape the stories behind the features can be told. The context of the cultural landscape can unlock 'better understanding of the cultural meaning and importance' of sites and places.

Although other values may be considered – such as educational or tourism values – the two principal values that are likely to be addressed in consideration of Aboriginal sites and places are the cultural/social significance to Aboriginal people and their archaeological or scientific significance to archaeologists and the Aboriginal community. The determinations of archaeological and cultural significance for sites and places should then be expressed as statements of significance that preface a concise discussion of the contributing factors to Aboriginal cultural heritage significance.

5.2 Cultural (social significance) values

Cultural or social significance refers to the spiritual, traditional, historical and/or contemporary associations and values attached to a place or objects by Aboriginal people. Aboriginal cultural heritage is broadly valued by Aboriginal people as it is used to define their identity as both individuals and as part of a group (DECCW 2010a, p.iii). More specifically it provides:

- A '*connection and sense of belonging to Country*' (DECCW 2010a, p.iii).
- A link between the present and the past (DECCW 2010a, p.3).
- A learning tool to teach Aboriginal culture to younger Aboriginal generations and the general public (DECCW 2010a, p.3).
- Further evidence of Aboriginal occupation prior to European settlement for people who do not understand the magnitude to which Aboriginal people occupied the continent (DECCW 2010a, p.3).

It is acknowledged that Aboriginal people are the primary determiners of the cultural significance of Aboriginal cultural heritage. During consultation the following information was provided by RAPs regarding the cultural values of the study area.

- Justine Coplin of Darug Custodian Aboriginal Corporation [5]

  > *…The Maroota area is an area that our group has a vast knowledge of, we have worked and lived in for many years, this area is significant to the Darug people due to the connection of sites and the continued occupation…*

- Phil Khan of Kamilaroi Yankuntjatjara Working Group [9] responded on 9 February 2023:

The study area is highly significant to our people for tens of thousands of years our people have cared for country and we continue to do so. With the vast ecosystems that make up the environment, that's rich with flora and fauna allowing Aboriginal people to thrive, with rich water ways that were utilised for daily activates. For this reason we would like to agree with your methodology we support your report, we look forward to furthering consultation on this project.

While the study area does not contain any tangible Aboriginal cultural values, the consultation received indicates that the study area is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites.

5.3 Historic values

Historic significance refers to associations a place or object may have with a historically important person, event, phase or activity to the Aboriginal and other communities. The study area is not known to have any historic associations. Therefore, this assessment has concluded that the study area has low historic significance.

5.4 Archaeological (scientific significance) values

An archaeological scientific assessment was undertaken for the study area and is presented in detail as part of the attached Archaeological Report (Appendix 5). No Aboriginal sites, objects or areas of archaeological potential were identified as part of this assessment. The study area therefore has low archaeological significance.

5.5 Aesthetic values

The study area has been historically used for agricultural use. The landscape of the study area is closely linked with Aboriginal cultural values and provides a context for Aboriginal sites that gives a strong sense of place. The Maroota Aboriginal community strongly identifies with the broader landscape of the study area. The study area has been impacted by prior agricultural practices and land clearance in some areas, concentrated in the southern and central portions. However, some portions of the study area have been subjected to lower levels of disturbance, and features vast sandstone outcropping, creeklines and maintains native vegetation. These areas were noted in the northern portion and in the southern most portion of the study area, in Lot 2 DP609224. Therefore, the study area has moderate aesthetic significance.

5.6 Statement of significance

The significance of sites was assessed in accordance with the following criteria:

- Requirements of the Code.
- The Burra Charter.
- *Guide to Investigating and Reporting on Aboriginal Heritage.*

The combined use of these guidelines is widely considered to represent the best practice for assessments of Aboriginal cultural heritage. The identification and assessment of cultural heritage values includes the four values of the Burra Charter: social, historical, scientific, and aesthetic values. The resultant statement of significance has been constructed for the study area based on the significance ranking criteria assessed in Table 6.

5.6.1 Statement of significance for the study area

No Aboriginal sites, objects or areas of archaeological potential were identified as part of this assessment. Within the areas containing landforms which may have been favourable for Aboriginal occupation and artefact preservation, disturbance from previous land use has occurred. This disturbance was from agricultural practices, and previous land modifications and extraction operations, that would have removed or displaced any archaeological deposits. The study area also appeared to be absent of mature vegetation and has been cleared entirely of large vegetation in some areas. No rockshelters or significant overhangs were identified along the ridgelines or near watercourses. The surface of the sandstone did not contain any Aboriginal features including grinding grooves or rock art. The background research coupled with the archaeological survey has resulted in the entire study area being assessed as having low archaeological potential. This assessment was also confirmed by cultural sites officer, Raymond Weatherall, who attended the archaeological survey.

The study area therefore has low research potential, scientific significance or representativeness associated with it. This assessment has therefore determined that study area has low archaeological significance. This site is not connected to any historical event or personage and therefore possesses low historical significance. The study area has moderate aesthetic significance, which was determined by the scenic value in the vast sandstone outcropping, creeklines and native vegetation. The cultural significance for the study area has been assessed as containing high potential, based on consultation with the RAPs.

Table 6 Significance assessment criteria for the study area

Criteria	Ranking
Cultural—discussions with the local Aboriginal communities reflect that the site is high in value.	High
Historical—the site is not connected to any historical event or personage.	Low
Scientific— the study area does not contain any archaeological sites, and the archaeological survey did not identify any Aboriginal sites or objects. Therefore, study area has low scientific value.	Low
Aesthetic—the site is located in Maroota. It has been impacted by agricultural practices however still features scenic value in the vast sandstone outcropping, creeklines and native vegetation.	Moderate

6 Development limitations and mitigation measures

The proposed future development will consist of a sandstone quarry, with the area of impact approximately 4.37 hectares. The potential impact of these works on Aboriginal heritage is presented below.

6.1 Proposal details

The Proposal refers to the establishment and operations of the Maroota Central Civil Quarry which would include the following.

- Extraction, processing, and despatch of up to 30,000 tonnes per annum of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of VENM for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of four heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

6.2 Ecologically Sustainable Development

One of the primary aims of the NPW Act is the 'conservation of objects places and features … of cultural value within the landscape, including … places, objects and features of significance to Aboriginal people …' ((s.2A(1)(b)(i)). The *Operational Policy: Protecting Aboriginal Cultural Heritage (Version 2)* (State of NSW and Office of Environment and Heritage NSW 2011) provides guidance to proponents in term of Ecologically Sustainable Development (ESD).

ESD has been defined in Part 3, 6. (2) Objective of the Authority of the *Protection of the Environment Administration* Act 1991 (NSW). This outlines that the ESD requires the integration of economic and environmental considerations (including cultural heritage) in the decision-making process. In regard to Aboriginal cultural heritage, ESD can be achieved by applying the principle of intergenerational equity and the precautionary principle.

> ***Intergenerational equity***
>
> *The principle of intergenerational equity states that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – for the benefit of future generations.*
>
> *In terms of Aboriginal cultural heritage, intergenerational equity can be considered in terms of the 'cumulative impacts' of any proposal to Aboriginal objects and places. For example, if few Aboriginal objects and places remain in a region (because of harm authorised under previous AHIPs), fewer*

opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places.

Information about the significance of Aboriginal cultural heritage values associated with the Aboriginal objects and places proposed to be harmed will be relevant to the consideration of intergenerational equity and an understanding of the cumulative impacts of a proposal.

Where there is uncertainty, the precautionary principle should also be followed (see below).

The precautionary principle

The precautionary principle states that the lack of full scientific certainty about the threat of harm should not be used as a reason for not taking measures to prevent harm from occurring.

In applying the precautionary principle, decisions should be guided by:

- *a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment (which includes cultural heritage)*
- *an assessment of the risk-weighted consequences of various options.*

The precautionary principle is relevant to Heritage NSW consideration of potential harm to Aboriginal cultural heritage where:

- *the proposal involves a risk of serious or irreversible harm to Aboriginal objects or places or to the value of those objects or places, and*
- *there is a lot of uncertainty about the significance of Aboriginal cultural heritage values of the Aboriginal objects or places proposed to be harmed.*

Where this is the case, a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce harm to the Aboriginal objects/place (State of NSW and Office of Environment and Heritage NSW 2011, pp. 26).

The results of this assessment did not identify tangible Aboriginal cultural heritage values within the study area. However, as identified in the background research and through Aboriginal community consultation, the region surrounding the study area, particularly to the east, contains several sites, landforms and landscapes that are significant to local Aboriginal groups. These sites and landscapes will not be directly impacts by the proposed works. Therefore, this assessment has been able to further our knowledge of Aboriginal archaeology in the area, by highlighting the environmental and cultural significance of the surrounding landscape and how this may have been intertwined with the current study area.

6.3 Assessment of impacts to the study area

The study area does not contain any recorded Aboriginal sites and has been assessed as having low archaeological potential due to existing disturbances within the study area. The proposed works will therefore not impact on any Aboriginal archaeological values (Figure 5).

A summary of the impacts of the proposed works to the study area is presented in Table 7 and Table 8 below.

Table 7 Summary of sub-surface impacts of proposed works

Proposed works	Impacts to potential archaeological deposits (Yes/No)
Establishment of a sandstone quarry	No—there will be no impacts to potential archaeological deposits by the works as these are unlikely to exist within the study area. Should the proposed development be approved, the works will result in physical disturbances across the study area. However, as no Aboriginal cultural values are present across the site, the works will not impact on Aboriginal archaeological values. While the study area does not contain any tangible Aboriginal cultural values, the consultation received indicated that the study area is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites.

Table 8 Summary of potential archaeological impacts to the study area

Study area potential	Significance	Type of harm	Degree of harm	Consequence of harm
Low	Nil	None	None	No consequence: the study area is unlikely to contain any Aboriginal sites, objects, or areas of archaeological potential. A heritage induction for all site workers and contractors should be undertaken to prevent any unintentional harm to Aboriginal sites located within the study area and its surrounds. An unexpected finds protocol should be put in place if unanticipated Aboriginal objects or remains are uncovered during the proposed works.

6.4 Management and mitigation measures

Ideally, heritage management involves conservation of sites through the preservation and conservation of fabric and context within a framework of 'doing as much as necessary, as little as possible' (Marquis-Kyle & Walker 1994, p.13). In cases where conservation is not practical, several options for management are available. For sites, management often involves the salvage of features or artefacts, retrieval of information through excavation or collection (especially where impact cannot be avoided) and interpretation.

Consideration has been given to the principles of ESD to minimise impacts. Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy and should be implemented where practicable. As part of the management and mitigation measures for the proposed works, an ACHA including archaeological survey and consultation with the Aboriginal community was undertaken. This was done to determine the presence and nature of any potential Aboriginal sites so that appropriate management could be undertaken. The assessment did not identify any Aboriginal sites or objects; therefore, the study area has been assessed as having low archaeological potential. However, this assessment has positively contributed to our knowledge of Aboriginal land use in the area and will be available for future generations to build on in line with inter-generational equity principles. The proposed works will avoid impacts to any known Aboriginal sites. Consultation undertaken has resulted in the following management strategies.

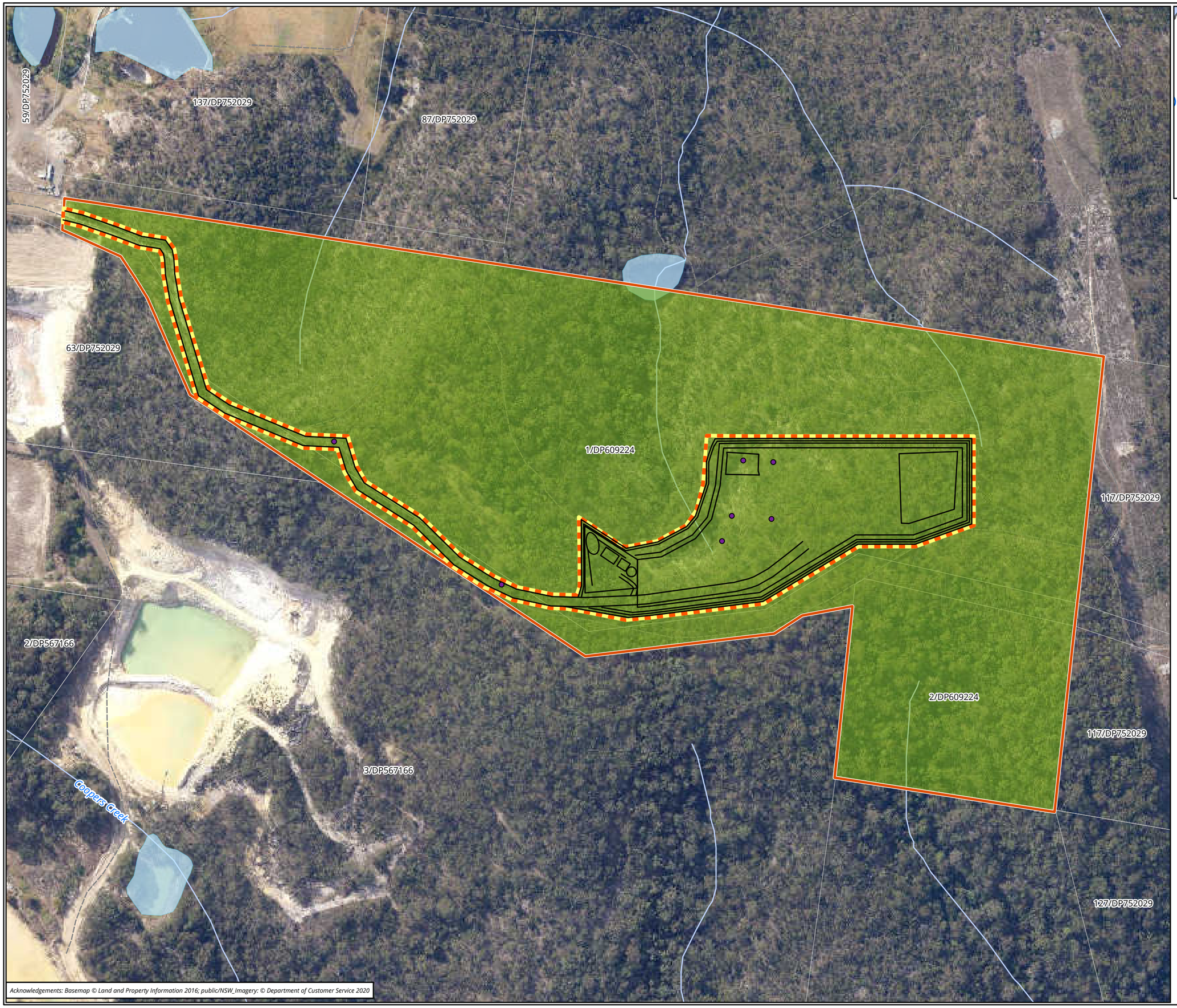
6.4.1 No further archaeological work required

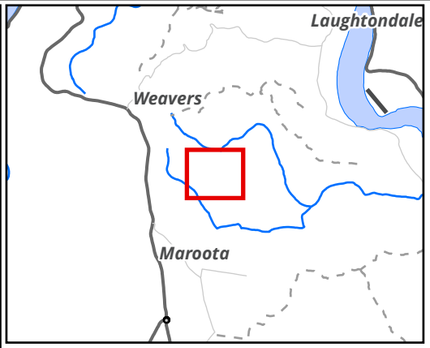
No further archaeological work is recommended for the study area. The study area has been assessed as having low archaeological potential and no further investigations are required in this area. This recommendation is conditional upon the recommendations outlined in this report.

6.4.2 Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to Aboriginal sites located within the study area and its surrounds. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.





Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Archaeological potential

- Low

Figure 5 Assessment of archaeological potential

0 30 60 90 120

Metres
Scale: 1:3,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: CG, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F5_ArchPot

7 Recommendations

The recommendations below respond specifically to the wishes of the RAPs. Recommendations regarding the archaeological value of the site, and the subsequent management of Aboriginal cultural heritage is provided in the AR (Appendix 5).

Prior to any development impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area being assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal parties

As per the consultation requirements, it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

Recommendation 3: Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to any unexpected Aboriginal objects. The heritage induction should include the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any unanticipated Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the Heritage Act. Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

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Appendices

Appendix 1 Consultation log

Stage 1 – Notification of project proposal and registration of interest

Step 1- Identification of Aboriginal people/parties with an interest in the proposed study area.

Organisation contacted	Date and type of contact	Date and type of response	Response details
Hornsby Shire Council	17/112022	-	-
Heritage NSW	17/112022	28/112022, email	Provided RAP list.
Native Title Services CORP Limited	17/112022	-	-
Office of the Registrar, Department of Aboriginal Affairs	17/112022	-	-
NNTT	17/112022	18/112022, email	No registered title holders or claimants.
Greater Sydney Local Land Services	17/112022	17/112022, email	Suggested Biosis reach out to Heritage NSW for contact list.
Metropolitan LALC	17/112022	23/112022, email	Requested call regarding project information.

Step 2- Public advertisement

The public notice was published in the *Hawkesbury Gazette* on the 11 January 2023. A copy of the advertisement is provided in Appendix 2.

Step 3- Registration of interest.

The registration period ran from the 20 December 2022 to 25 January 2023. Leeway was given to Aboriginal parties/groups who provided responses shortly after the close of this period and they have been registered as Aboriginal parties for consultation.

Organisation contacted	Date and type of contact	Date and type of response	Response details
A1 Indigenous Services	20/12/2022, email	-	-
Amanda Hickey Cultural Services	20/12/2022, email	-	-
Aragung Aboriginal Cultural Heritage Site Assessments	20/12/2022, email	-	-
B.H. Heritage Consultants	20/12/2022, email	-	-
Badu (Murrin Clan/Peoples)	20/12/2022, email	-	-
Barking Owl Aboriginal	20/12/2022, email	-	-

Organisation contacted	Date and type of contact	Date and type of response	Response details
Corporation			
Biamanga (Murrin Clan/Peoples)	20/12/2022, email	-	-
Bidjawong Aboriginal Corporation	20/12/2022, email	-	-
Bilinga (Murrin Clan/Peoples)	20/12/2022, email	-	-
Butucarbin Aboriginal Corporation	20/12/2022, email	-	-
Clive Freeman	20/12/2022, email	-	-
Cullendulla (Murrin Clan/Peoples)	20/12/2022, email	-	-
Darug Aboriginal Cultural Heritage Assessments	20/12/2022, registered post	-	-
Darug Boorooberongal Elders Aboriginal Corporation	20/12/2022, email	-	-
Darug Custodian Aboriginal Corporation	20/12/2022, email	28/12/2022, email	*Registered for the project.* *Our group is a non- profit organisation that has been active for over forty years in Western Sydney, we are a Darug community group with over three hundred members. The main aim in our constitution is the care of Darug sites, places, wildlife and to promote our culture and provide education on the Darug history.* *The Maroota area is an area that our group has a vast knowledge of, we have worked and lived in for many years, this area is significant to the Darug people due to the connection of sites and the continued occupation. Our group has been involved in all previous assessments and works in this area as a traditional owner Darug group for the past 40 plus years.* *People from other mobs should be respectful of our country and people if they are not respectful that the Darug are the knowledge holders then they are not cultural, therefore should not be involved on cultural heritage on Darug land.* *Therefore, we would like to register our interest for full consultation and involvement in the above project area.* *Our Country is the traditional land of the Darug*

Organisation contacted	Date and type of contact	Date and type of response	Response details
			people, who speak the Darug language. *Our Country isn't defined or identified by government bodies and their agencies.* *These agencies and bodies do not support the people of our Country and are not the traditional custodians and therefore should not be in a position to speak for the Darug people, Darug land or Darug knowledge.* *Maintaining cultural protocols is fundamental in obtaining knowledge and invoking discussion for Country. To speak directly to and consult with the people of traditional lands, in this case the Darug people, is necessary to maintain correct protocol and acquire accurate knowledge.* *It is culturally inappropriate for any Non-Darug person or group/s to speak on Darug cultural heritage.* *Darug people are the only people that have the authority to speak for Darug Country, and hence should be the only peoples that can and must speak for Darug Country.* *Would like stand alone intangible cultural values assessment done on this project.*
Darug Land Observations	20/12/2022, email	-	-
Dharug (Murrin Clan/Peoples)	20/12/2022, email	-	-
Dhinawan Culture & Heritage Pty Ltd	20/12/2022, email	-	-
Didge Ngunawal Clan	20/12/2022, email	20/12/2022, email	Registered for the project.
DJMD Consultancy	20/12/2022, email		
Eric Keidge	20/12/2022, registered post	-	-
Ginninderra Aboriginal Corporation	20/12/2022, email	-	-
Goobah Development PTY LTD (Murrin Clan/Peoples)	20/12/2022, email	-	-
Goodradigbee Cultural & Heritage Aboriginal Corporation	20/12/2022, email	-	-
Gulaga	20/12/2022, email	-	-
Gunjeewong Cultural	20/12/2022, email	-	-

Organisation contacted	Date and type of contact	Date and type of response	Response details
Heritage Aboriginal Corporation			
Gunya Aboriginal Cultural Heritage Services PTY LTD	20/12/2022, email	-	-
Gunyuu (Murrin Clan/Peoples)	20/12/2022, email	-	-
Guringai Tribal Link Aboriginal Corporation	20/12/2022, email	-	-
Jerringong (Murrin Clan/Peoples)	20/12/2022, email	-	-
Julia Narayan	20/12/2022, email	-	-
Kamilaroi Yankuntjatjara Working Group	20/12/2022, email	03/01/2023, email	Registered for the project.
Metropolitan Local Aboriginal Land Council	20/12/2022, email	20/12/2022, email	Registered for the project.
Minnamunnung	20/12/2022, registered post	-	-
Mundawari Heritage Consultants	20/12/2022, email	-	-
Munyunga (Murrin Clan/Peoples)	20/12/2022, email	-	-
Mura Indigenous Corporation	20/12/2022, email	-	-
Murra Bidgee Mullangari Aboriginal Corporation	20/12/2022, email	13/02/2023, email	Late registration for the project.
Murramarang (Murrin Clan/Peoples)	20/12/2022, email	-	-
Murrumbul (Murrin Clan/Peoples)	20/12/2022, email	-	-
Ngambaa Cultural Connections	20/12/2022, email	-	-
Nundagurri (Murrin Clan/Peoples)	20/12/2022, email	-	-
Pemulwuy (Murrin Clan/Peoples)	20/12/2022, email	-	-
Thauaira	20/12/2022, email	-	-
Thoorga Nura	20/12/2022, email	-	-

Organisation contacted	Date and type of contact	Date and type of response	Response details
Tocomwall Pty Ltd	20/12/2022, email	20/12/2022, email	Registered for the project.
Waawaar Awaa Aboriginal Corporation	20/12/2022, email	-	-
Wailwan Aboriginal Group	20/12/2022, email	-	-
Walbunja (Murrin Clan/Peoples)	20/12/2022, email	-	-
Walgalu (Murrin Clan/Peoples)	20/12/2022, email	-	-
Wingikara (Murrin Clan/Peoples)	20/12/2022, email	-	-
Woka Aboriginal Corporation	20/12/2022, email	-	-
Wori Wooilywa	20/12/2022, email	-	-
Wullung (Murrin Clan/Peoples)	20/12/2022, email	-	-
Wurrumay Pty Ltd	20/12/2022, email	-	-
Yerramurra (Murrin Clan/Peoples)	20/12/2022, email	-	-
Yurwang Gundana Consultancy Cultural Heritage Services.	20/12/2022, email	20/12/2022, email	Registered for the project.
RAW Cultural Healing	20/12/2022, email	-	-
Ros Locke	-	17/1/2023, phone	Registered for the project.

Stage 2 and 3– Presentation of information about the proposed project and gathering information about cultural significance

Step 1- Provision of project information and methodology pack

A copy of the information and methodology pack is provided in Appendix 3 and a copy of the covering email is provided following.

No.	Organisation contacted	Date and type of contact	Date and type of response	Response details
1	A1 Indigenous Services	25/01/2023, email	-	-
2	AHCS	25/01/2023, email	-	-
3	Confidential Party 1	25/01/2023,	-	-

No.	Organisation contacted	Date and type of contact	Date and type of response	Response details
		email		
4	Confidential Party 2	25/01/2023, email	-	-
5	Darug Custodian Aboriginal Corporation	25/01/2023, email	-	-
6	Didge Ngunawal Clan	25/01/2023, email	-	-
7	Ginninderra Aboriginal Corporation	25/01/2023, email	-	-
8	Gunya Aboriginal Cultural Heritage Services Pty Ltd	25/01/2023, email	-	-
9	Kamilaroi Yankuntjatjara Working Group	25/01/2023, email	09/02/2023, email	*The study area is highly significant to our people for tens of thousands of years our people have cared for country and we continue to do so. With the vast ecosystems that make up the environment, that's rich with flora and fauna allowing Aboriginal people to thrive, with rich water ways that were utilised for daily activates. For this reason we would like to agree with your methodology we support your report, we look forward to furthering consultation on this project.*
10	Metropolitan Local Aboriginal Land Council	25/01/2023, email	-	-
11	Murra Bidgee Mullangari Aboriginal Corporation	13/02/2023, email (late registration)	13/02/2023, email	*Thank you, I have read the project information and methodology for the above project, and I endorse the recommendations made.*
12	Ros Locke	25/01/2023, email	-	-
13	Tocomwall Pty Ltd	25/01/2023, email	-	-
14	Yurwang Gundana Consultancy Cultural Heritage Services	25/01/2023, email	20/02/2023, email	*Yurwang Gundana agrees with the report and wishes to be a part of the fieldwork*

Step 2- Field survey

Organisation contacted	Date and type of contact	Date and type of response	Response details
Metropolitan Local Aboriginal Land Council	06/03/2023, pers comms	06/03/2023, pers comms	• *The study area has been disturbed to varying degrees throughout.* • *The study area appeared to be historically cleared and contained minimal mature vegetation.* • *The study area lacked characteristics that would suggest this area was intensely occupied by Aboriginal groups.*

Stage 4 – Review of draft report

No.	Organisation contacted	Date and type of contact	Date and type of response	Response details
1	A1 Indigenous Services	01/08/2023, email	-	-
2	AHCS	01/08/2023, email	-	-
3	Confidential Party 1	01/08/2023, email	-	-
4	Confidential Party 2	01/08/2023, email	-	-
5	Darug Custodian Aboriginal Corporation	01/08/2023, email	-	-
6	Didge Ngunawal Clan	01/08/2023, email	-	-
7	Ginninderra Aboriginal Corporation	01/08/2023, email	-	-
8	Gunya Aboriginal Cultural Heritage Services Pty Ltd	01/08/2023, email	-	-
9	Kamilaroi Yankuntjatjara Working Group	01/08/2023, email	29/08/2023, email	*Thank you for your Draft ACHAR & AR regarding Maroota Quarry, we would like to agree and support your recommendations, we also recommend that an Aboriginal RAP be present during earthworks. We look forward to working alongside you on this project.*

No.	Organisation contacted	Date and type of contact	Date and type of response	Response details
		29/08/2023, email	29/08/2023, email	Biosis response: *Thank you for taking the time to read over the ACHA and I really appreciate your feedback. The scope of works for the proposed development is an ongoing mining operation. With your recommendation for monitoring, did you have any ideas as to how that might look within the scope of works? Given the nature of the works, monitoring for the entire operation of the project may not be feasible, but if you can provide some more detail I can discuss this with you further.*
		30/08/2023, phone	30/08/2023, phone	Phone call between Stefanie from Kamilaroi Yankuntjatjara Working Group and Biosis: Discussed the ongoing mining operation, the length of the proposed works and the limited impact area. Kamilaroi Yankuntjatjara Working Group agreed that given the nature of the ongoing mine operation, monitoring during the proposed works was not a viable option and agreed with the recommendations in the report.
10	Metropolitan Local Aboriginal Land Council	01/08/2023, email	-	-
11	Murra Bidgee Mullangari Aboriginal Corporation	01/08/2023, email	-	-
12	Ros Locke	01/08/2023, email	-	-
13	Tocomwall Pty Ltd	01/08/2023, email	-	-
14	Yurwang Gundana Consultancy Cultural Heritage Services	01/08/2023, email	-	-

Appendix 2 Stage 1: Notification of project proposal and registration of interest

20 December 2022

Yurwang Gundana Consultancy Cultural Heritage Services.
Merekai Bell
PO Box 5628
SOUTH WINDSOR NSW 2756

Dear Merekai,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis is assisting RW Corkery with consultation with the Aboriginal community to inform the ACHA. Consultation with the Aboriginal community for this assessment will be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) (consultation requirements).

The purpose of Aboriginal community consultation is to provide sufficient information for the assessment of Aboriginal cultural heritage values and to assist the Secretary of the Department of Planning, Industry and Environment (DPIE) in their consideration and determination of the application. The project will be undertaken in accordance with the *National Parks and Wildlife Act 1974*.

Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.

If you wish to register your interest please provide your contact details in writing via post or email by **5:00pm 17 January 2023 to:**

Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

In accordance with section 4.1.3 (a) of the consultation requirements, the proponent details for this project are as follows:

Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

Please note that as per 4.1.5 of the consultation requirements, the contact details of all registered Aboriginal parties for this project will be forwarded through to Heritage NSW, Department of Planning and Environment (Heritage NSW) and Metropolitan Local Aboriginal Land Council (LALC). If you do not want your details forwarded on to Heritage NSW and LALC please notify Biosis at the time of your registration.

If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Yerramurra (Murrin Clan/Peoples)
Robert Parson

Dear Robert,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Wurrumay Pty Ltd
Kerrie and Vicky Slater
89 Pyramid Street
Emu Plains NSW 2750

Dear Kerrie and Vicky ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Wullung (Murrin Clan/Peoples)
Lee Bood
54 Blackwood Street
Gerringong NSW 2534

Dear Lee,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Email: sam@rwcorkery.com

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If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Wori Wooilywa
Daniel Chalker
261 Mockingbird Rd
Pheasants Nest NSW 2574

Dear Daniel,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Woka Aboriginal Corporation
Steven Johnson
145 Carnarvon road
Schofields NSW 2762

Dear Steven,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Wingikara (Murrin Clan/Peoples)
Hayley Bell

Dear Hayley,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

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Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Walgalu (Murrin Clan/Peoples)
Ronald Stewart

Dear Ronald,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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14/17-27 Power Avenue
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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Walbunja (Murrin Clan/Peoples)
Hika Te Kowhai
15 Renee Crescent
MORUYA HEADS NSW 2537

Dear Hika,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Waawaar Awaa Aboriginal Corporation
Rodney and Barry Gunther
15 Bungonia Street
Prestons NSW 2170

Dear Rodney and Barry ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Wailwan Aboriginal Group
Philip Boney

Dear Philip,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Guringai Tribal Link Aboriginal Corporation
Tracey Howie
PO Box 4061
WYONGAH NSW 2259

Dear Tracey,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Thoorga Nura
John Carriage
50B Hilltop Crescent
Surf Beach 2536 NSW

Dear John,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Thauaira
Shane Carriage

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Tocomwall Pty Ltd
Scott Franks
Po box 145
Miranda NSW 1490

Dear Scott,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

RAW Cultural Healing
Raymond Weatherall
PO Box N74
Campbelltown North NSW 2560

Dear Raymond,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Kamilaroi Yankuntjatjara Working Group
Phil Khan
78 Forbes Street
Emu Plains NSW 2750

Dear Phil,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Pemulwuy (Murrin Clan/Peoples)
Pemulwuy Johnson
14 Top Place
Mt Annan

Dear Pemulwuy,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Ashley Bridge
Project Archaeologist

20 December 2022

Darug Boorooberongal Elders Aboriginal Corporation
Paul Hand
PO.Box 14
Doonside NSW 2767

Dear Paul,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Metropolitan Local Aboriginal Land Council
Nathan Moran
PO Box 1103
Strawberry Hills NSW 2016

Dear Nathan,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Nundagurri (Murrin Clan/Peoples)
Newton Carriage

Dear Newton,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Yurwang Gundana Consultancy Cultural Heritage Services.
Dean Bell
PO Box 5628
SOUTH WINDSOR NSW 2756

Dear Dean,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Ngambaa Cultural Connections
Kaarina Slater
6 Natchez Cresent
Greenfield Park NSW 2176

Dear Kaarina,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Murrumbul (Murrin Clan/Peoples)
Mark Henry

Dear Mark,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Murramarang (Murrin Clan/Peoples)
Roxanne Smith

Dear Roxanne,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Murra Bidgee Mullangari Aboriginal Corporation
Darleen and Ryan Johnson
PO Box 3035 Rouse Hill NSW 2155

Dear Darleen and Ryan,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Munyunga (Murrin Clan/Peoples)
Kaya Dawn Bell

Dear Kaya,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Mundawari Heritage Consultants
Dean Delponte
245 Ash road
Prestons NSW 2170

Dear Dean,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

B.H. Heritage Consultants
Nola Hampton
95 Mount Ettalong Road
Umina Beach 2257 NSW

Dear Nola,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Darug Custodian Aboriginal Corporation
Justine Coplin
PO Box 81
Windsor NSW 2756

Dear Justine,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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14/17-27 Power Avenue
Alexandria
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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Julia Narayan
Julia Narayan

Dear Julia,

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Bidjawong Aboriginal Corporation
James Carroll
22 McKinley Place
Cherrybrook NSW 2126

Dear James,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Jerringong (Murrin Clan/Peoples)
Joanne Anne Stewart
2/10 Burnett Avenue
Gerringong NSW 2534

Dear Joanne,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Aragung Aboriginal Cultural Heritage Site Assessments
Jamie Eastwood
33 Bulolo Drive
Whalan NSW 2770

Dear Jamie ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

B.H. Heritage Consultants
Ralph Hampton
184 Captain Cook Drive
Willmot 2770 NSW

Dear Ralph ,

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Gunyuu (Murrin Clan/Peoples)
Kylie Anne Bell

Dear Kylie,

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Gunya Aboriginal Cultural Heritage Services PTY LTD
Adam Gunther
15 Bungonia Street
Prestons NSW 2170

Dear Adam,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Gunjeewong Cultural Heritage Aboriginal Corporation
Shayne Dickson
2 Rutherford street
Blacktown 2148

Dear Shayne,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Gulaga
Wendy Smith

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Goodradigbee Cultural & Heritage Aboriginal Corporation
Caine Carroll
1 Morilla Road
East Kurrajong NSW 2758

Dear Caine,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Goobah Development PTY LTD (Murrin Clan/Peoples)
Basil Smith
66 Grantham Road
Batehaven NSW 2536

Dear Basil,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Ginninderra Aboriginal Corporation
Krystle Carroll
PO BOX 3143
Grose Vale NSW 2754

Dear Krystle ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Ginninderra Aboriginal Corporation
Steven Johnson
PO BOX 3143
Grose Vale NSW 2754

Dear Steven,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Didge Ngunawal Clan
Lillie Carroll
33 Carlyle Crescent
Cambridge Gardens NSW 2747

Dear Lillie,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Dhinawan Culture & Heritage Pty Ltd
Stephen Fields

Dear Stephen,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Dharug (Murrin Clan/Peoples)
Andrew Bond

Dear Andrew,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Darug Land Observations
Jamie and Anna Workman
PO Box 173
Ulladulla NSW 2539

Dear Jamie and Anna ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

DJMD Consultancy
Darren Duncan

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Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Cullendulla (Murrin Clan/Peoples)
Corey Smith

Dear Corey,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Clive Freeman
Clive Freeman
6 Dhugan Close
Wreck Bay Aboriginal Community JBT 2540

Dear Clive,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

A1 Indigenous Services
Carolyn Hickey
10 Marie Pitt Place
Glenmore Park NSW 2745

Dear Carolyn ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Butucarbin Aboriginal Corporation
Jennifer Beale
PO Box E18
Emerton NSW 2770

Dear Jennifer,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

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Tel: 0455 255 044
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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Goobah Development PTY LTD (Murrin Clan/Peoples)
Basil Smith
66 Grantham Road
Batehaven NSW 2536

Dear Basil,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Bilinga (Murrin Clan/Peoples)
Simalene Carriage

Dear Simalene,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Bidjawong Aboriginal Corporation
James Carroll
22 McKinley Place
Cherrybrook NSW 2126

Dear James,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Biamanga (Murrin Clan/Peoples)
Seli Storer

Dear Seli,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Barking Owl Aboriginal Corporation
Mrs Kulakowski
2-65/69 Wehlow Street
Mt Druitt

Dear Mrs,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Badu (Murrin Clan/Peoples)
Karia Bond
11 Jeffery Place
Moruya NSW 2537

Dear Karia,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Amanda Hickey Cultural Services
Amanda Hickey
57 Gough Steet
Emu Plains NSW 2750

Dear Amanda ,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Mura Indigenous Corporation (icn:8991)
Phillip Carroll
11 Nargal Street
Flinders NSW 2529

Dear Phillip,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Darug Aboriginal Cultural Heritage Assessments
Gordon Morton
Unit 9
6 Chapman Avenue Chatswood NSW 2067

Dear Gordon,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Eric Keidge
Eric Keidge
11 Olsson Close
Hornsby Heights NSW 2077

Dear Eric,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

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Yours sincerely



Ashley Bridge
Project Archaeologist

20 December 2022

Minnamunnung
Aaron Broad
1 Waratah Avenue
Albion Park Rail NSW 2527

Dear Aaron,

RE: Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis is assisting RW Corkery with consultation with the Aboriginal community to inform the ACHA. Consultation with the Aboriginal community for this assessment will be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) (consultation requirements).

The purpose of Aboriginal community consultation is to provide sufficient information for the assessment of Aboriginal cultural heritage values and to assist the Secretary of the Department of Planning, Industry and Environment (DPIE) in their consideration and determination of the application. The project will be undertaken in accordance with the *National Parks and Wildlife Act 1974*.

Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.

If you wish to register your interest please provide your contact details in writing via post or email by **5:00pm 17 January 2023 to:**

Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

In accordance with section 4.1.3 (a) of the consultation requirements, the proponent details for this project are as follows:

Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

Please note that as per 4.1.5 of the consultation requirements, the contact details of all registered Aboriginal parties for this project will be forwarded through to Heritage NSW, Department of Planning and Environment (Heritage NSW) and Metropolitan Local Aboriginal Land Council (LALC). If you do not want your details forwarded on to Heritage NSW and LALC please notify Biosis at the time of your registration.

If you have any queries regarding the project, please do not hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

LIST OF ABORIGINAL STAKEHOLDERS FOR THE DEPARTMENT of PLANNING and ENVIRONMENT (DPE) SOUTHERN REGION HELD BY DPE FOR THE PURPOSES OF THE OEH *ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010*

These lists are provided to proponents in accordance with section 4.1.2 of the *Aboriginal Cultural Heritage Consultation Requirements* for *Proponents 2010* (the "Consultation Requirements") which commenced on 12 April 2010.

The consultation process involves getting the views of, and information from, Aboriginal people and reporting on these. It is not to be confused with other field assessment processes involved in preparing a proposal and an application. Consultation does not include the employment of Aboriginal people to assist in field assessment and/or site monitoring. Aboriginal people may provide services to proponents through a contractual arrangement however, this is separate from consultation. The proponent is not obliged to employ those Aboriginal people registered for consultation. Consultation as per these requirements will continue irrespective of potential or actual employment opportunities for Aboriginal people.

A copy of the Consultation Requirements can be found on the OEH website at:
http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf.

Under the Consultation Requirements; a proponent is required to provide Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places as relevant to the proposed project area, with an opportunity to be involved in consultation. Section 3.3.1 of the Consultation Requirements states that Aboriginal people who can provide this information are, based on Aboriginal lore and custom, the traditional owners or custodians of the land that is the subject of the proposed project.

The Consultation Requirements also state that:

> *Traditional owners or custodians with appropriate cultural heritage knowledge to inform decision making who seek to register their interest as an Aboriginal party are those people who:*
> - *continue to maintain a deep respect for their ancestral belief system, traditional lore and custom*
> - *recognise their responsibilities and obligations to protect and conserve their culture and heritage and care for their traditional lands or Country*
> - *have the trust of their community, knowledge and understanding of their culture, and permission to speak about it.*

Please note: the placement of an organisation's name on any OEH Aboriginal stakeholder list for the Consultation Requirements does not override a proponent's requirement to also advertise in the local newspaper and to seek from other sources the names of any other Aboriginal people who may hold cultural knowledge as required under clause 60 of the National Parks and Wildlife Regulation 2019.

How to use this list

1. **Contact the organisations/individuals who have indicated an interest in the relevant LGA/s and invite them to register an interest in your project**

Do not reproduce the attached list in publicly available reports and other documents. Your report should only contain the names of the organisations and individuals who you have invited to register an interest in your project and those who have registered as stakeholders for your project.

Last updated November 2022

Aboriginal Stakeholders – Hornsby Local Government Area.

1	A1 Indigenous Services	Carolyn Hickey	cazadirect@live.com	-	0411 650 057	-	10 Marie Pitt Place, Glenmore Park, NSW, 2745	-
12	Amanda Hickey Cultural Services	Amanda Hickey	amandahickey@live.com.au	-	0434 480 588	-	57 Gough Steet, Emu Plains, NSW, 2750	-
18	Aragung Aboriginal Cultural Heritage Site Assessments	Jamie Eastwood	James.eastwood@y7mail.com	(02) 9832 3732	0427 793 334	-	33 Bulolo Drive, Whalan, NSW, 2770	-
28	B.H. Heritage Consultants	Ralph Hampton ; Nola Hampton	hamptonralph46@gmail.com kinghampton77@gmail.com	-	RH: 0435 785 138 NH: 0401 662 531	-	184 Captain Cook Drive, Willmot, 2770, NSW 95 Mount Ettalong Road, Umina Beach, 2257, NSW	Nola and Ralph would BOTH like to be notified of all projects
30	Badu (Murrin Clan/Peoples)	Karia Lea Bond	baduchts@gmail.com	-	0476 381 207	-	11 Jeffery Place, Moruya, NSW, 2537	-
38	Barking Owl Aboriginal Corporation	Mrs Jody Kulakowski (Director)	barkingowlcorp@gmail.com	-	0426 242 015	-	2-65/69 Wehlow St. Mt Druitt	-
48	Biamanga (Murrin Clan/Peoples)	Seli Storer	biamangachts@gmail.com	-	-	-	-	-
49	Bidjawong Aboriginal Corporation	James Carroll	jrcarroll888@gmail.com bidjawong@gmail.com	-	0433 224 324	-	22 McKinley Place Cherrybrook NSW 2126	Prefer email contact
51	Bilinga (Murrin Clan/Peoples)	Simalene Carriage	bilingachts@gmail.com	-	-	-	-	-

83	Butucarbin Aboriginal Corporation	Jennifer Beale	butuheritage@gmail.com	(02)9832 7167	-	-	PO Box E18, Emerton, NSW 2770	Preferred contact via email
98	Clive Freeman	Clive Freeman	clive.freeman@y7mail.com	(02) 4442 1117	0437 721 481	-	6 Dhugan Close Wreck Bay Aboriginal Community JBT 2540	-
118	Cullendulla (Murrin Clan/Peoples)	Corey Smith	cullendullachts@gmail.com	-	-	-	-	-
131	Darug Aboriginal Cultural Heritage Assessments	Gordon Morton	-	(02) 9410 3665	0422 865 831	-	Unit 9, 6 Chapman Avenue, Chatswood, NSW 2067	-
133	Darug Boorooberongal Elders Aboriginal Corporation	Paul Hand (chairperson)	paulhand1967@gmail.com	-	0456 786 738	-	PO.Box 14 Doonside NSW 2767	-
134	Darug Custodian Aboriginal Corporation	Justine Coplin	justinecoplin@optusnet.com.au	-	0414 962 766	-	PO Box 81, Windsor NSW 2756	-
135	Darug Land Observations	Jamie Workman; Anna Workman; Anna O'Hara	daruglandobservations@gmail.com	-	0418 494 951 0413 687 279	-	PO Box 173, Ulladulla, NSW 2539 PO Box 2006 Bendelong NSW 2539	-
147	Dharug (Murrin Clan/Peoples)	Andrew Bond	dharugchts@gmail.com	-	-	-	-	-
149	Dhinawan Culture & Heritage Pty Ltd	Stephen Fields	dhinawan.ch@gmail.com	-	0411 232 285	-	-	-

151	Didge Ngunawal Clan	Lillie Carroll ; Paul Boyd	didgengunawalclan@yahoo.com.au	-	0426 823 944 ; 0450 616 404	-	33 Carlyle Crescent Cambridge Gardens NSW 2747	-
154	DJMD Consultancy	Darren Duncan	darrenjohnduncan@gmail.com	-	0410 510 397	-	-	-
166	Eric Keidge	Eric Keidge	-	-	0431 166 423	-	11 Olsson Close Hornsby Heights NSW 2077	-
189	Ginninderra Aboriginal Corporation	Steven Johnson; Krystle Carroll	Ginninderra.corp@gmail.com	-	0406 991 221	-	PO BOX 3143 Grose Vale NSW 2754	-
197	Goobah Development PTY LTD (Murrin Clan/Peoples)	Basil Smith	goobahchts@gmail.com bunjil.smith@gmail.com	-	0405 995 725	-	66 Grantham Road, Batehaven NSW, 2536	confirm email
199	Goodradigbee Cultural & Heritage Aboriginal Corporation	Caine Carroll	goodradigbee1@outlook.com	-	0410 974 236	-	1 Morilla Road, East Kurrajong NSW 2758	-
202	Gulaga	Wendy Smith	gulagachts@gmail.com	-	-	-	-	-
219	Gunjeewong Cultural Heritage Aboriginal Corporation	Shayne Dickson	gunjeewongculturalheritage21@hotmail.com	-	0421 636 474	-	2 Rutherford street Blacktown 2148	-
221	Gunya Aboriginal Cultural Heritage Services PTY LTD	Adam Gunther	gunya.ach@gmail.com	-	0492 232 606	-	15 Bungonia Street Prestons NSW 2170	-
222	Gunyuu (Murrin Clan/Peoples)	Kylie Ann Bell	gunyuuchts@gmail.com	-	-	-	-	-

225	Guringai Tribal Link Aboriginal Corporation	Tracey Howie	tracey@guringai.com.au	-	0404 182 049	-	PO Box 4061 WYONGAH NSW 2259	-
265	Jerringong (Murrin Clan/Peoples)	Joanne Anne Stewart	jerringong@gmail.com	-	0422 800 184	-	2/10 Burnett Avenue Gerringong NSW 2534	-
277	Julia Narayan	-	juliaannnarayan2018@gmail.com	-	0466 304 750	-	-	-
280	Kamilaroi Yankuntjatjara Working Group	Phil Khan	philipkhan.acn@live.com.au	-	0434 545 982	-	78 Forbes Street, Emu Plains, NSW 2750	-
355	Metropolitan Local Aboriginal Land Council	Nathan Moran	officeadmin@metrolalc.org.au	(02) 8394 9666	-	-	PO Box 1103 Strawberry Hills NSW 2016	-
365	Minnamunnung	Aaron Broad	-	-	0402 526 888	-	1 Waratah Avenue, Albion Park Rail NSW 2527	-
381	Mundawari Heritage Consultants	Dean Delponte	mundawari.hc@gmail.com	-	0413 186 133	-	245 Ash Road Prestons NSW 2170	-
384	Munyunga (Murrin Clan/Peoples)	Kaya Dawn Bell	munyungachts@gmail.com	-	-	-	-	-
385	Mura Indigenous Corporation (icn:8991)	Phillip Carroll	mura.indigenous@bigpond.com	-	0448 824 188	-	11 Nargal Street Flinders NSW 2529	-
390	Murra Bidgee Mullangari Aboriginal Corporation	Darleen Johnson ; Ryan Johnson	murrabidgeemullangari@yahoo.com.au	-	0490 051 102 0475 565 517 0497 983 332	-	PO Box 3035 Rouse Hill NSW 2155	-

391	Murramarang (Murrin Clan/Peoples)	Roxanne Smith	murramarangchts@gmail.com	-	-	-	-	-
395	Murrumbul (Murrin Clan/Peoples)	Mark Henry	murrumbul@gmail.com	-	-	-	-	-
411	Ngambaa Cultural Connections	Kaarina Slater	ngambaaculturalconnections@hotmail.com	-	0422 729 117 0421 061 893	-	6 Natchez Cresent, Greenfield Park NSW 2176 Unit 29,11 Phillip Street St Marys NSW 2760	-
438	Nundagurri (Murrin Clan/Peoples)	Newton Carriage	nundagurri@gmail.com	-	-	-	-	-
461	Pemulwuy (Murrin Clan/Peoples)	Pemulwuy Johnson	pemulwuyd@gmail.com	-	0425 066 100	-	14 Top Place, Mt Annan	-
525	Thauaira	Shane Carriage	thauairachts@gmail.com	-	-	-	-	-
533	Thoorga Nura	John Carriage (Chief Executive Officer)	thoorganura@gmail.com	-	0401 641 299	-	50B Hilltop Crescent, Surf Beach, 2536, NSW	-
542	Tocomwall Pty Ltd	Scott Franks	scott@tocomwall.com.au	-	0404 171 544	-	Po box 145, Miranda NSW 1490	-
563	Waawaar Awaa Aboriginal Corporation	Rodney Gunther Barry Gunther	Waawaar.awaa@gmail.com	-	RG: 0410580962 BG: 0451 176 473	-	15 Bungonia Street Prestons NSW 2170	-

565	Wailwan Aboriginal Group	Philip Boney	waarlan12@outlook.com	-	0436 483 210	-	-	-
567	Walbunja (Murrin Clan/Peoples)	Hika Te Kowhai	walbunja@gmail.com	-	0402 730 612	-	15 Renee Crescent MORUYA HEADS NSW 2537	-
568	Walgalu (Murrin Clan/Peoples)	Ronald Stewart	walgaluchts@gmail.com	-	-	-	-	-
598	Wingikara (Murrin Clan/Peoples)	Hayley Bell	wingikarachts@gmail.com	-	-	-	-	-
607	Woka Aboriginal Corporation	Steven Johnson	wokacorp@yahoo.com	-	0406 991 221	-	145 Carnarvon Road Schofields NSW 2762	-
611	Wori Wooilywa	Daniel Chalker	woriwooilywa@gmail.com	-	0409 006 216	-	261 Mockingbird Rd Pheasants Nest NSW 2574	-
615	Wullung (Murrin Clan/Peoples)	Lee-Roy James Boota	wullunglb@gmail.com	-	0403 703 942	-	54 Blackwood Street, Gerringong, NSW, 2534	-
616	Wurrumay Pty Ltd	Kerrie Slater; Vicky Slater	wurrumay@hotmail.com	-	0421 077 521	-	89 Pyramid Street, Emu Plains NSW 2750	-
623	Yerramurra (Murrin Clan/Peoples) and Taste of Tradition Native Aboriginal Corporation	Robert Parson	yerramurra@gmail.com	-	-	-	-	-
631	Yurwang Gundana Consultancy Cultural Heritage Services.	Dean Bell ; Merekai Bell	ngunawal56@outlook.com Yurwang.Gundana.C.H.S@outlook.com	-	0419 142 862	-	PO Box 5628 SOUTH WINDSOR NSW 2756	-

635	RAW Cultural Healing	Raymond Weatherall	RAW.CulturalHealing@hotmail.com		0411 962 602		8 Rosslyn Dr, Claymore NSW 2559 PO Box N74, Campbelltown North NSW 2560

From: OEH HD Heritage Mailbox
To: Ashley Bridge
Subject: Automated Response
Date: Thursday, 17 November 2022 2:08:27 PM
Attachments: image003.png
image001.png

Thank you for contacting Heritage NSW. We will respond to your email as soon as possible. In the interim, please see the below information regarding some of our common enquiries, which may assist you.

Heritage Act 1977 – s139(4) Exceptions

Heritage NSW no longer accepts s139(4) applications as the new archaeological exceptions process is now live. Information on the new process, including how to self-assess your works may be found here s139(4)Exceptions - Self Assessment.

Heritage Management System (HMS) is now live

HMS is a new digital system for lodging Heritage Act applications and searching heritage information. Go to the Heritage NSW website for more information and to access the Heritage Management System

Applications and Section 170 notifications

If you have submitted an application under the Heritage Act 1977 or the National Parks and Wildlife Act 1974, or a section 170 notification, it will first be reviewed for completeness and then allocated to the appropriate assessment team or officer. An officer will contact you if any additional information is required. The completeness check is generally completed within 7-14 business days.

We aim to process applications or notifications within the timeframes below:

Application/Notification type	**Timeframe (Commences once an application or notification is complete)**
Planning Proposals Section 140 Permits Section 4.55 Modifications	21 days
Integrated Development Applications	If advertised: 21 days following receipt of submissions, or advice there were no submissions, or If not advertised: 40 days
Section 60 Application (fast track) Section 60 Applications (standard/ major works)	21 days 40 days (or 60 days if advertised)
Section 90 Aboriginal Heritage Impact Permit (AHIP)	60 days
Section 170 notifications – local heritage items Section 170 notifications – state heritage/SHR items Section 170 registers and heritage asset management strategies	14 days 40 days As advised/ negotiated with an agency's single point of contact

Nominations for listing under the Heritage Act 1977 (State Heritage Register)

A completed nomination form must accompany your application. The application form is available on our website (Nominate listing on the state heritage register). SHR Nominations are considered by the State Heritage Register Committee who will decide whether the nomination will proceed to the next stage of assessment.

Nominations for Aboriginal Place listings under the National Parks and Wildlife Act 1974

Nominations are allocated to the relevant team within 2 business days. An officer will contact

you if any additional information is required. The Aboriginal Place proposal form is available on our website: Nominating an aboriginal place

Aboriginal Cultural Heritage (ACH) Conservation and Repatriation

Programs supported by Heritage NSW include the ACH Conservation and Repatriation of Aboriginal ancestors and objects. This work is managed by staff located across NSW. Enquiries into these programs are sent to the relevant team within 2 business days. Please send any enquiries to heritagemailbox@environment.nsw.gov.au and one of our staff will respond to you directly. Please advise us of any requests to modify our projects or timeframes to better accommodate your needs.

Please visit our website at Heritage NSW for further information.

Sincerely,

Customer Concierge Team.
Environment and Heritage.
Department of Planning and Environment
T (02 9873 8500 E Heritagemailbox@environment.nsw.gov.au
4 Parramatta Square, 12 Darcy St
Parramatta NSW 2150
Working days Monday to Friday, 09:00am - 05:00pm

Website Facebook Instagram LinkedIn

We acknowledge the traditional custodians of the land and pay respects to Elders past, present and emerging.

Please consider the environment before printing this email.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment, Energy and Science.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: HSC-General
To: Ashley Bridge
Subject: Hornsby Shire Council Automated Response
Date: Thursday, 17 November 2022 2:08:15 PM

Thank you for your email received today. This is an automated response to advise that your email has been received and will be managed in accordance with relevant Council procedures. Please do not reply to this email.
Hornsby Shire Council

From: LLS Admin GreaterSydney Mailbox
To: Ashley Bridge
Subject: Re: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Date: Thursday, 17 November 2022 2:12:59 PM
Attachments: image678817.png
image056648.png
image077551.png
image116895.png
Outlook-NSW Govern.png
Outlook-fxldd0z0.png
Outlook-oixvifuu.png
Outlook-ui53xn3i.png
Outlook-1gugmkpk.png

Dear Ashley

Thank you for your recent letter seeking assistance to identify Aboriginal stakeholder organisations and persons who may hold an interest in Country at the project area designated in your correspondence.

Greater Sydney Local Land Services (GS LLS) acknowledges that Local Land Services (formerly as Catchment Management Authorities) has been listed in Section 4.1.3.(g) of the Aboriginal Cultural Heritage Consultation requirements for proponents 2010, to support Part 6, of the NSW National Parks and Wildlife Act 1974 as a source of information to obtain the 'names of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places'.

GS LLS understands and respects the significant role and values that tangible and intangible Aboriginal Cultural Heritage holds for First Nations/Aboriginal people with Country. GS LLS also partners with many First Nations communities on Caring for Country projects that aim to protect and enhance those tangible and intangible values in Country including Aboriginal Cultural Heritage. GS LLS considers Aboriginal Cultural Heritage matters in relation to its role in land management and considers cultural heritage issues in the context of Natural Resource Management.

However, GS LLS feels that it is not a primary source of contact for First Nations (Aboriginal) communities or persons that may inform or provide comment on development or planning issues.

GS LLS strongly recommends you contact Heritage NSW to seek their advice on all-inclusive contact lists of persons and organisations who 'speak for Country' and that may assist with your investigation.

Regards

Customer Service Team
Local Land Services | Greater Sydney
Department of Regional NSW

Telephone 02 4724 2100

Level 4, 2-6 Station Street Penrith
PO Box 4515 WESTFIELD PENRITH

Office Hours: 8.30am - 4.30pm

E: admin.greatersydney@lls.nsw.gov.au | **W:** www.lls.nsw.gov.au

NSW GOVERNMENT **Department of Regional NSW**

You can also get in touch with us is through our online enquiry form

How would you rate our service today?

Your opinion is valuable and will help us improve our service

Greater Sydney Local Land Services acknowledges we operate in and deliver services throughout Country of First Nations people in the Greater Sydney Region. We recognise and respect Elders and cultural knowledge holders, past and present, while acknowledging the unique and diverse enduring cultures and histories of all First Nations people.
Always was and always will be Aboriginal land.

From: Ashley Bridge <abridge@biosis.com.au>
Sent: Thursday, 17 November 2022 2:07 PM
To: LLS Admin GreaterSydney Mailbox <admin.greatersydney@lls.nsw.gov.au>
Subject: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies

Good afternoon,

Biosis is currently undertaking an Aboriginal Cultural Heritage Assessment for RW Corkery, for the proposed sandstone quarry development at 4773 Old Northern Road, Maroota, New South Wales.

As per section 4.1 of the consultation requirements, Biosis is seeking to identify Aboriginal people who may have an interest in the study area and hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Maroota area. If you could please provide any groups via a return email by 5:00pm 1 December 2022, it would be greatly appreciated.

Kind regards,
Ashley Bridge
Project Archaeologist

0437 689 734
(02) 9101 8721
abridge@biosis.com.au



Leaders in Ecology and Heritage Consulting

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
We pay our respects to the Traditional Custodians and Elders past, present and future, and honour their connection to the land and ongoing contribution to society.

The information transmitted including attachments is intended only for the person or entity to which it is addressed and may contain copyright material, or information that is confidential or is exempt from disclosure by law. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon this information by persons or entities other than the intended recipient is strictly prohibited. If you received this in error, please contact the sender and delete the material from your computer. The views expressed in this email are those of the sender except where the sender expressly and with authority states them to be the views of Biosis Pty Ltd. Biosis Pty Ltd does not represent that this email is free of errors, viruses or interference. When using email to communicate with Biosis Pty Ltd, access to that information by Biosis Pty Ltd personnel is strictly limited and controlled.

From: Barry Gunther on behalf of EES HD ACH REGS Mailbox
To: Ashley Bridge
Subject: FW: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Date: Friday, 18 November 2022 10:45:26 AM
Attachments: image249147.png
image791461.png
image387558.png
image999485.png
PDFMailer.pdf

Hi Ashley,
Could you confirm the LGA the attached project is in please -4773 Old Northern Road, Maroota, New South Wales .
Regards
Barry

From: Ashley Bridge <abridge@biosis.com.au>
Sent: Thursday, 17 November 2022 2:08 PM
To: OEH HD Heritage Mailbox <HERITAGEMailbox@environment.nsw.gov.au>
Subject: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Good afternoon,

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Kind regards,
Ashley Bridge
Project Archaeologist

0437 689 734
(02) 9101 8721
abridge@biosis.com.au

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: Geospatial Search Requests
To: Ashley Bridge
Subject: RE: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Date: Thursday, 17 November 2022 2:45:53 PM

Your email has been received and is being actioned. For information regarding timeframes and what you will receive in response please refer to our website at this address: http://www.nntt.gov.au/assistance/Geospatial/Pages/Geospatial_Searches.aspx

Geospatial Searches

National Native Title Tribunal | Perth

Email: GeospatialSearch@nntt.gov.au **| www.nntt.gov.au**

From:	Barry Gunther
To:	Crystal Garabedian
Cc:	Ashley Bridge
Subject:	DPE Aboriginal stakeholder list for the Maroota Central Civil Sandstone Quarry.
Date:	Monday, 28 November 2022 1:21:49 PM
Attachments:	Aboriginal Stakeholder list request Lots Maroota Central Civil Sandstone Quarry.docx PDFMailer.pdf Aboriginal Stakeholder List- Hornsby Local Government Area - LIST OF ABORIGINAL STAKEHOLDERS FOR THE DEPARTMENT of PLANNING and ENVIRONMENT.docx

Hi Crystal,

Please find attached the DPE Aboriginal stakeholder list for the Maroota Central Civil Sandstone Quarry.

regards

Barry Gunther, Aboriginal Senior Assessment Officer
Environment and Heritage – Heritage NSW
Department of Planning and Environment
T: 02 9995 6830 | barry.gunther @environment.nsw.gov.au
Heritage.nse.gov.au and dpie.nsw.gov.au
Locked Bag 5020
Parramatta NSW 2124

NSW GOVERNMENT Heritage NSW **Department of Planning and Environment**
Please lodge all Applications to Heritagemailbox@environment.nsw.gov.au
Website Facebook Instagram LinkedIn

The Heritage Management System is live from 31 May. More information is available here

I acknowledge and respect the traditional custodians and ancestors of the lands I work across.

Heritage NSW and coronavirus (COVID-19)

Heritage NSW has taken steps to protect the safety, health and wellbeing of our staff, communities and customers. Whilst our offices remain open, we have put in place flexible working arrangements for our teams across NSW and continue to adapt our working arrangements as necessary. Face-to-face meetings and field work/site visits with our customers are subject to rules on gatherings and social distancing measures. We thank you for your patience and understanding at this time.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment, Energy and Science.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: Barry Gunther
To: Ashley Bridge
Subject: FW: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Date: Monday, 28 November 2022 11:22:10 AM
Attachments: image249147.png
image791461.png
image387558.png
image999485.png
PDFMailer.pdf

Hi Ashley,
Can you confirm the LGA the attached project is in please and include the LGA in future Stage 1 notices.
Regards

Barry Gunther, Aboriginal Senior Assessment Officer
Environment and Heritage – Heritage NSW
Department of Planning and Environment
T: 02 9995 6830 | barry.gunther @environment.nsw.gov.au
Heritage.nse.gov.au and dpie.nsw.gov.au
Locked Bag 5020
Parramatta NSW 2124

NSW GOVERNMENT Heritage NSW **Department of Planning and Environment**
Please lodge all Applications to Heritagemailbox@environment.nsw.gov.au
Website Facebook Instagram LinkedIn

The Heritage Management System is live from 31 May. More information is available here

I acknowledge and respect the traditional custodians and ancestors of the lands I work across.

Heritage NSW and coronavirus (COVID-19)
Heritage NSW has taken steps to protect the safety, health and wellbeing of our staff, communities and customers. Whilst our offices remain open, we have put in place flexible working arrangements for our teams across NSW and continue to adapt our working arrangements as necessary. Face-to-face meetings and field work/site visits with our customers are subject to rules on gatherings and social distancing measures. We thank you for your patience and understanding at this time.

From: Tanya Pelz <tanya.pelz@environment.nsw.gov.au> **On Behalf Of** OEH HD Heritage Mailbox
Sent: Thursday, 17 November 2022 2:19 PM
To: EES HD ACH REGS Mailbox <ACHREGS@environment.nsw.gov.au>
Subject: FW: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Hi Team
RAPs request attached.
Regards
Tanya

From: Ashley Bridge <abridge@biosis.com.au>
Sent: Thursday, 17 November 2022 2:08 PM
To: OEH HD Heritage Mailbox <HERITAGEMailbox@environment.nsw.gov.au>
Subject: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Good afternoon,

Biosis is currently undertaking an Aboriginal Cultural Heritage Assessment for RW Corkery, for the proposed sandstone quarry development at 4773 Old Northern Road, Maroota, New South Wales.

As per section 4.1 of the consultation requirements, Biosis is seeking to identify Aboriginal people who may have an interest in the study area and hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Maroota area. If

you could please provide any groups via a return email by 5:00pm 1 December 2022, it would be greatly appreciated.

Kind regards,

Ashley Bridge
Project Archaeologist

0437 689 734
(02) 9101 8721
abridge@biosis.com.au



Leaders in Ecology and Heritage Consulting

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
We pay our respects to the Traditional Custodians and Elders past, present and future, and honour their connection to the land and ongoing contribution to society.

The information transmitted including attachments is intended only for the person or entity to which it is addressed and may contain copyright material, or information that is confidential or is exempt from disclosure by law. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon this information by persons or entities other than the intended recipient is strictly prohibited. If you received this in error, please contact the sender and delete the material from your computer. The views expressed in this email are those of the sender except where the sender expressly and with authority states them to be the views of Biosis Pty Ltd. Biosis Pty Ltd does not represent that this email is free of errors, viruses or interference. When using email to communicate with Biosis Pty Ltd, access to that information by Biosis Pty Ltd personnel is strictly limited and controlled.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment, Energy and Science.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From:	Cultural Heritage
To:	Ashley Bridge
Cc:	Nathan Moran; Operations Manager
Subject:	Re: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Date:	Wednesday, 23 November 2022 1:48:12 PM
Attachments:	image844476.png image407544.png image332390.png image634930.png

Hi Ashley,

My name is Rowena Welsh-Jarrett, I am the Cultural Heritage Officer at Metropolitain Local Aboriginal Land Council.

I have been forwarded your email from our Bookings team. Can you please contact me on 0477788883 to discuss further.

Kind Regards,
Rowena.

From: Bookings MLALC <bookings@metrolalc.org.au>
Sent: Thursday, November 17, 2022 3:13 PM
To: Cultural Heritage <culturalheritage@metrolalc.org.au>
Cc: Nathan Moran <nmoran@metrolalc.org.au>
Subject: FW: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies

---

From: Ashley Bridge <abridge@biosis.com.au>
Sent: Thursday, 17 November 2022 3:07 PM
To: Metro LALC <metrolalc@metrolalc.org.au>
Subject: 37704 - Maroota Quarry - Stage 1 consultation - Notification to Agencies
Good afternoon,

Biosis is currently undertaking an Aboriginal Cultural Heritage Assessment for RW Corkery, for the proposed sandstone quarry development at 4773 Old Northern Road, Maroota, New South Wales.

As per section 4.1 of the consultation requirements, Biosis is seeking to identify Aboriginal people who may have an interest in the study area and hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Maroota area. Should the LALC wish to register, could you please provide confirmation via a return email by 5:00pm 1 December 2022.

Kind regards,
Ashley

Ashley Bridge
Project Archaeologist

0437 689 734
(02) 9101 8721
abridge@biosis.com.au



Leaders in Ecology and Heritage Consulting

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From:	Barry Gunther
To:	Crystal Garabedian
Cc:	Ashley Bridge
Subject:	DPE Aboriginal stakeholder list for the Maroota Central Civil Sandstone Quarry.
Date:	Monday, 28 November 2022 1:21:50 PM
Attachments:	Aboriginal Stakeholder list request Lots Maroota Central Civil Sandstone Quarry.docx PDFMailer.pdf Aboriginal Stakeholder List- Hornsby Local Government Area - LIST OF ABORIGINAL STAKEHOLDERS FOR THE DEPARTMENT of PLANNING and ENVIRONMENT.docx

Hi Crystal,

Please find attached the DPE Aboriginal stakeholder list for the Maroota Central Civil Sandstone Quarry.

regards

Barry Gunther, Aboriginal Senior Assessment Officer
Environment and Heritage – Heritage NSW
Department of Planning and Environment
T: 02 9995 6830 | barry.gunther @environment.nsw.gov.au
Heritage.nse.gov.au and dpie.nsw.gov.au
Locked Bag 5020
Parramatta NSW 2124

NSW GOVERNMENT Heritage NSW **Department of Planning and Environment**

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Website Facebook Instagram LinkedIn

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

17 November 2022

Heritage NSW, Department of Planning and Environment
PO Box 644
Parramatta NSW 2124

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis is assisting RW Corkery with consultation with the Aboriginal community to inform the ACHA. Consultation with the Aboriginal community for this assessment will be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) (consultation requirements).

The purpose of Aboriginal community consultation is to provide sufficient information for the assessment of Aboriginal cultural heritage values and to assist the Secretary of the Department of Planning, Industry and Environment (DPIE) in their consideration and determination of the application. The project will be undertaken in accordance with the *National Parks and Wildlife Act 1974*.

As per section 4.1 of the consultation requirements, Biosis is seeking to identify Aboriginal people who may have an interest in the study area and hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Maroota area. If you could please provide contact details for any such Aboriginal people or organisations by **1 December 2022 at 5pm** it would be greatly appreciated.

In accordance with section 4.1.3 (a) of the consultation requirements, please note that the relevant client contact for this project is:

Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

All correspondence regarding provision of names and contact details of Aboriginal people who may hold cultural knowledge relevant to the study area should be provided in writing by **1 December 2022 at 5pm** to:

Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project please don't hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

Office of the Registrar Aboriginal Land Rights Act 1983
PO Box 5068
Parramatta NSW 2124

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project please don't hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

Native Title Services Corporation Limited
PO Box 2105
Strawberry Hills NSW 2012

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Biosis Pty Ltd
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Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project please don't hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

Hornsby Shire Council
PO Box 37
Hornsby NSW 1630

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Sam Rosek
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Tel: 0455 255 044
Email: sam@rwcorkery.com

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Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project please don't hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

Greater Sydney Local Land Services
PO Box 4515
Westfield Penrith 2750

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

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Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

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Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

Metropolitian Local Aboriginal Land Council
PO Box 1103
Strawberry Hills NSW 2012

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis is assisting RW Corkery with consultation with the Aboriginal community to inform the ACHA. Consultation with the Aboriginal community for this assessment will be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) (consultation requirements).

The purpose of the Aboriginal community consultation is to provide sufficient information for the assessment of Aboriginal cultural heritage values and to assist the Secretary of the Department of Planning, Industry and Environment (DPIE) in their consideration and determination of the application. The project will be undertaken in accordance with the *National Parks and Wildlife Act 1974*.

As per section 4.1 of the consultation requirements, Biosis wish to invite Metropolitan Local Aboriginal Land Council to register an interest in the project. Biosis is also seeking to identify Aboriginal people who may have an interest in the study area and hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Maroota area. If you could please provide contact details for any such Aboriginal people or organisations by **1 December 2022 at 5pm** it would be greatly appreciated.

In accordance with section 4.1.3 (a) of the consultation requirements, please note that the relevant client contact for this project is:

Central Civil (NSW) Pty Ltd
Sam Rosek
Environmental Consultant
Tel: 0455 255 044
Email: sam@rwcorkery.com

All correspondence regarding your registration of interest and provision of names and contact details of Aboriginal people who may hold cultural knowledge relevant to the study area should be provided in writing by **1 December 2022 at 5pm** to:

Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project please don't hesitate to contact Crystal on the details above, or alternatively the main office number on (02) 9101 8700.

Yours sincerely



Ashley Bridge
Project Archaeologist

17 November 2022

National Native Title Tribunal
Level 17, Law Courts Queens square
Sydney NSW 2000

Dear Sir or Madam,

RE: Maroota Central Civil Sandstone Quarry: Aboriginal Cultural Heritage Assessment, Notification to Agencies

Our Ref: Matter 37704

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Biosis Pty Ltd
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cgarabedian@biosis.com.au

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Yours sincerely



Ashley Bridge
Project Archaeologist

From: RAW Cultural Healing
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Tuesday, 20 December 2022 2:53:17 PM
Attachments: image828164.png
image152442.png
image775204.png

Can You register RAW CULTURAL HEALING as a RAP for this Project Please
Raymond Weatherall
0411962602

Sent from Outlook for Android

From: Crystal Garabedian <CGarabedian@biosis.com.au>
Sent: Tuesday, December 20, 2022 1:07:02 PM
To: RAW.CulturalHealing@hotmail.com <RAW.CulturalHealing@hotmail.com>
Subject: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation

Good afternoon,

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.

If you wish to register your interest please provide your contact details in writing via post or email by 5:00pm 17 January 2023 to:
Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project, please do not hesitate to contact me on the details above, or alternatively the main office number on (02) 9101 8700.

Kind regards,
Crystal Garabedian
Crystal Garabedian She/Her
Archaeologist

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au



Artwork: *Flowering Gum* by Anthony Walker. Click on the banner to find out more about this piece.

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
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From: Darleen Johnson
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Friday, 10 February 2023 5:20:45 AM
Attachments: 37704.Stage1.2.Sent.Email.pdf
image457332.png
image578727.png
image082581.png

Hi Crystal
Please register our company for the above project, we have been doing aboriginal cultural heritage projects for over 26 years.
Kind regards
Ryan Johnson
0460839128

On Tuesday, 20 December 2022 at 01:07:23 pm AEDT, Crystal Garabedian <cgarabedian@biosis.com.au> wrote:

Good afternoon,

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.

If you wish to register your interest please provide your contact details in writing via post or email by 5:00pm 17 January 2023 to:
Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project, please do not hesitate to contact me on the details above, or alternatively the main office number on (02) 9101 8700.

Kind regards,
Crystal Garabedian
Crystal Garabedian She/Her
Archaeologist

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au



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Positions Vacant

TRANSPORT & LOGISTICS
NSW – SYDNEY (PERMANENT)
High Reach Forklift Driver/ Storeman – Glendenning

We are a storage & distribution business based in the Glendenning area. We are offering an opportunity for an experienced forklift driver to join our busy and expanding team.

This is a full time role and duties would include:
- Forklift Driving
- Order picking and Despatch
- Loading and Unloading of trucks
- Other warehouse duties

You will have good written and verbal communication skills and be self-motivated. You must also have a current drivers licence, forklift licence and own transport. A Dangerous Goods Licence would be an advantage. Applicants who can start immediately would be preferred. Above award wages to the right Applicant.

Applicants must email their Resume and Covering letter to: applicantschl@gmail.com



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ACM

Positions Vacant

Richmond Community Services Inc.

MANAGER VACANCY

Due to a senior staff member upcoming retirement, Richmond Community Services Inc. has an exciting vacancy coming up 2023 for a Manager of a thriving NGO - based in Richmond, NSW. This is an opportunity to become a leading member of a highly proactive and dedicated team - starting work with us in early 2023. Please note: CV's/ Resumes will not be accepted. Applicants must meet the selection criteria and fill in the RCSI bespoke application form which can be requested from admin@rcsi.ngo.org.au 02 4588 3501.

Essential
1. Tertiary qualifications in management and community services and demonstrable extensive experience of successful management in the NGO sector
2. Demonstrable experience of project management, successful funding applications and fundraising, experience of successful marketing NGO activities to ensure access - particularly for the disadvantaged
3. Demonstrable experience of Financial Management across a range of disciplines including preparation of budgets, budget monitoring, preparation for annual audit, accountability to funders, wages and payroll, online banking, asset management, working with a variety of different funders
4. Demonstrable very high-level IT skills including all MS Office programs, Internet and email, Facebook and other social media, providing day to day support to staff and working with a server, telecommunications, reporting via online portals and interactive PDF formats
5. Demonstrable experience in community development and program development, working in partnerships with other organisations, developing joint projects and working with networks and interagencies
6. Demonstrable experience of human resources management, providing staff supervision, including one-on-one sessions and performance appraisals, working with a multi-disciplinary team
7. Demonstrable experience of working with an NGO volunteer management committee
8. Demonstrable experience of developing policies and procedures
9. Demonstrable experience of working with volunteers and management of volunteers
10. Understanding of social policy and commitment to social justice
11. Understanding of current WHSIM requirements
12. Flexibility around tasks and working in a small NGO

Desirable
1. Tertiary qualifications and experience in related discipline - such as counselling/social welfare
2. Experience of working with DoCJ, DOHA and DSS funded services
3. Experience with DEX reporting
4. Experience of updating and maintaining a website

Closing date: 12noon 3rd February 2023, interviews 14th - 16th February, start end of February/early March 2023.
This position is offered at SCHADS award Grade 7.1 with salary sacrifice options. For an application pack please email: admin@rcsi.ngo.org.au or call 02 4588 3501 Mon - Thurs

Positions Vacant

Barber Wanted

Must be experienced

Part-time position.

02 9627 5751

TRANSPORT & LOGISTICS
NSW – SYDNEY (PERMANENT)
HR Driver – Glendenning

We are a storage & distribution business based in the Glendenning area. We are offering an opportunity for an experienced driver who holds a current HR Licence to join our busy and expanding team.

This is a full time role and duties would include:
- Local Pickups & Deliveries
- Minimum Hr Licence
- Minimum 5 Years' Experience
- Road Ranger Experience
- Load Restraint Experience
- Current RMS Demerit Point & Conviction Report
- Experienced Licensed Forklift Driver an advantage
- Current Dangerous Goods Licence an advantage
- Good written and verbal communication skills
- Applicants who can start immediately would be preferred.

Applicants must email their Resume, RMS Report and Covering letter to:
applicantschl@gmail.com

TRANSPORT & LOGISTICS
NSW – SYDNEY (PERMANENT)
MC Interstate Driver – Glendenning

We are a storage & distribution business based in the Campbelltown area. We are offering an opportunity for an experienced driver who holds a current minimum MC Licence to join our busy and expanding team.

This is a full time role and duties would include:
- Interstate with Occasional Local Work
- Minimum MC Licence
- Minimum 5 Years' Experience
- Road Ranger Experience
- Load Restraint Experience
- Current RMS Demerit Point & Conviction Report
- Experienced Licensed Forklift Driver an advantage.
- Current Dangerous Goods Licence
- Good written and verbal communication skills
- Applicants who can start immediately would be preferred.

Applicants must email their Resume, RMS Report and Covering letter to:
applicantschl@gmail.com

NOTICES

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www.addirect.com.au
E: classifieds@hawkesburygazette.com.au
P: 02 4588 0880

Deaths & Funerals

MALCOLM, Donald Peter
12.06.1943 ~ 02.01.2023

Dearly loved by family & friends.

"Remembered With Love"

Family and friends are invited to attend Donald's funeral service to be held at the graveside in the Castlebrook Cemetery, Rouse Hill on **Friday 13th January 2023, commencing at 10:00am.**

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Public Notices

NOTIFICATION AND REGISTRATION OF ABORIGINAL INTERESTS

Biosis is undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224), within the Hornsby Local Government Area on behalf of RW Corkery and Central Civil (Sam Rosek, Email: sam@rwcorkery.com).

The project will be assessed as State Significant Development under Part 4.36 of the Environmental Planning and Assessment Act 1979.

In accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010). Biosis invites Aboriginal people who hold cultural knowledge in determining the significance of Aboriginal object(s) and/or places in the vicinity of the above area to register their interest in a process of community consultation.

The purpose of Aboriginal community consultation is to provide sufficient information for the assessment of Aboriginal cultural heritage values, and to assist the Secretary of the Department of Planning, Industry and Environment in their consideration and determination of the application.

To register an interest in this project please contact Crystal Garabedian (Email: cgarabedian@biosis.com.au, Address: 14/17-27 Power Avenue Alexandria NSW, Tel: (02) 9101 8700). Please note that the name of each group that registers for consultation on this project will be provided to Heritage NSW and the Local Aboriginal Land Council unless the group specifies that they do not want their details released.

REGISTRATIONS MUST BE RECEIVED BEFORE 5:00pm, 17 January 2023

Building Material and Suppliers

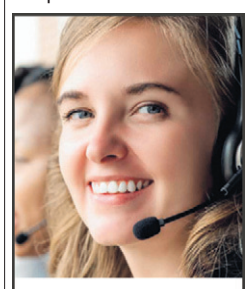
1 TONNE CONCRETE BLOCKS. Interlocking or plain. 1200x600x600. Delivery available. Call Dave 0412 062 582

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From: Scott Franks
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Tuesday, 20 December 2022 1:27:28 PM

Crystal,

Thank you for the notification. Can you please register our interest in this project. Please advise me if you need any further information.

Regards
Scott Franks

Consultant
Tocomwall Pty Ltd
scott@tocomwall.com.au
0404 171544

Breach of Confidentiality
This email and any files transmitted with it are confidential and intended solely for the use of the individual to whom they are addressed. If you have received this email in error please notify the sender. This message contains confidential information and is intended only for the individual named. If you are not the named addressee you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. If you are not the intended recipient you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited. *Although the company has taken reasonable precautions to ensure no viruses are present in this email, the company cannot accept responsibility for any loss or damage arising from the use of this email or attachments.*

On 20 Dec 2022, at 1:07 pm, Crystal Garabedian <CGarabedian@biosis.com.au> wrote:

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Alexandria
cgarabedian@biosis.com.au

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Kind regards,
Crystal Garabedian
Crystal Garabedian She/Her
Archaeologist

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(02) 9101 8727
CGarabedian@biosis.com.au

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<37704.Stage1.2.Sent.Email.pdf>

From: yurwang gundana
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Tuesday, 20 December 2022 1:14:27 PM
Attachments: image591327.png
image324688.png
image459618.png

Yuma, I hope you are doing well

Yurwang Gundana would like to register for the above project and any future fieldwork that may happen

Thanks
Merekai Bell
Yurwang Gundana Cultural Heritage Services

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From: Crystal Garabedian <CGarabedian@biosis.com.au>
Sent: Tuesday, December 20, 2022 1:06:56 PM
To: Yurwang.Gundana.C.H.S@outlook.com <Yurwang.Gundana.C.H.S@outlook.com>
Subject: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation

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Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

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Kind regards,
Crystal Garabedian
Crystal Garabedian She/Her
Archaeologist

0456 625 253
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CGarabedian@biosis.com.au



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From: Adam Gunya
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Tuesday, 17 January 2023 6:37:31 PM
Attachments: image903971.png
image426907.png
image929505.png
CGU Public Liability insurance Certificate of Currency.pdf
226716401_-_Standard_Template_-_CERTIFICATE_OF_CURRENCY_-_168749422.pdf

---

Hi Crystal,

Please register me for the Aboriginal Cultural Heritage Assessment for the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota.

I have been vaccinated for Covid.

I would like to be involved in any proposed fieldwork opportunities.

Name and contact details of the organisation registering:

- Company:GUNYA ABORIGINAL CULTURAL HERITAGE SERVICES PTY LTD
- Contact Name: Adam Gunther
- email: gunya.ach@gmail.com
- Mobile: 0492 232 606

Insurances attached for future reference.

regards

Adam Gunther

On Tue, Dec 20, 2022 at 1:07 PM Crystal Garabedian <CGarabedian@biosis.com.au> wrote:

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> Biosis Pty Ltd
> 14/17-27 Power Avenue
> Alexandria
> cgarabedian@biosis.com.au
>
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>
> Kind regards,
> Crystal Garabedian
> **Crystal Garabedian** She/Her
> Archaeologist
>
> 0456 625 253
> (02) 9101 8727
> CGarabedian@biosis.com.au
>
> 
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> Artwork: *Flowering Gum* by Anthony Walker. Click on the banner to find out more about this piece.
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From: Amanda De Zwart
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Monday, 16 January 2023 11:26:26 AM
Attachments: image954944.png
image203898.png
image771143.png

Hi Crystal

Thank you for the email
AHCS would like too Formally register a interest in this project

AHCS Holds strong cultural knowledge to determine Aboriginal heritage and artefacts and holds Cultural knowledge to the land

If there is anything you need please feel free to contact me
Mobile 0434 480 558
Email amandahickey@live.com.au

Have a great day

Amanda AHCS

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From: Crystal Garabedian <CGarabedian@biosis.com.au>
Sent: Tuesday, December 20, 2022 1:07:21 PM
To: amandahickey@live.com.au <amandahickey@live.com.au>
Subject: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation

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From: lilly carroll
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Tuesday, 20 December 2022 1:20:37 PM
Attachments: image016187.png
image657657.png
image809445.png

Hi Crystal

DNC would like to register an interest into Maroota, central civil sandstone quarry project

Kind regards
Paul Boyd & Lilly Carroll
Directors DNC
0426823944

Sent from Yahoo Mail for iPhone

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> The information transmitted including attachments is intended only for the person or entity to which it is addressed and may contain copyright material, or information that is confidential or is exempt from disclosure by law. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon this information by persons or entities other than the intended recipient is strictly prohibited. If you received this in error, please contact the sender and delete the material from your computer. The views expressed in this email are those of the sender except where the sender expressly and with authority states them to be the views of Biosis Pty Ltd. Biosis Pty Ltd does not represent that this email is free of errors, viruses or interference. When using email to communicate with Biosis Pty Ltd, access to that information by Biosis Pty Ltd personnel is strictly limited and controlled.

From: Ginninderra Aboriginal Corporation
To: Crystal Garabedian
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date: Wednesday, 21 December 2022 7:17:39 PM
Attachments: image355732.png
image410208.png
image590661.png
37704.Stage1.2.Sent.Email.pdf

Hi Crystal,

Thank you for your email. Please register Ginninderra Aboriginal Corporation for the above-mentioned project.

Kind regards,

Krystle Carroll-Elliott
Ginninderra Aboriginal Corporation
M: 0451016224
E: Ginninderra.corp@gmail.com

We acknowledge the Traditional Owners of Country throughout Australia and recognise their connection to land, water, and community. We pay our respects to them, their cultures, and to Elders past and present.

> On 20 Dec 2022, at 1:08 pm, Crystal Garabedian <CGarabedian@biosis.com.au> wrote:
>
> Good afternoon,
>
> Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.
>
> Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.
>
> If you wish to register your interest please provide your contact details in writing via post or email by 5:00pm 17 January 2023 to:
> Crystal Garabedian
> Biosis Pty Ltd
> 14/17-27 Power Avenue
> Alexandria
> cgarabedian@biosis.com.au
>
> If you have any queries regarding the project, please do not hesitate to contact me on the details above, or alternatively the main office number on (02) 9101 8700.
>
> Kind regards,
> Crystal Garabedian
> **Crystal Garabedian** She/Her
> Archaeologist
>
> 0456 625 253
>
> (02) 9101 8727
>
> CGarabedian@biosis.com.au



Artwork: *Flowering Gum* by Anthony Walker. Click on the banner to find out more about this piece.

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
We pay our respects to the Traditional Custodians and Elders past, present and future, and honour their connection to the land and ongoing contribution to society.

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From:	justinecoplin@optusnet.com.au
To:	Crystal Garabedian
Subject:	reg of interest Maroota Central Civil Sandstone Quarry
Date:	Wednesday, 28 December 2022 2:27:37 PM
Attachments:	reg of interest Maroota Central Civil Sandstone Quarry.pdf

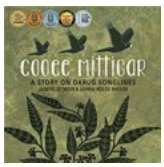
Warami Crystal

I have put a request in my register of interest.

DARUG CUSTODIAN
ABORIGINAL CORPORATION

Didyurigura
Justine Coplin

Budyari Ngami Darug Nurawa
Walama Ngyini Bud Bud dali Darug Nura



Explore Dyarubbin Digital story map
Visit Dyarubbin Exhibition
Read Dictionary of Sydney - Dyarubbin project
Listen Yarramundi and the people of Dyarubbin - The History Listen - ABC Radio National

Appendix 3 Stage 2: Presentation of information about the proposed project and Stage 3: Gathering information about cultural significance

From:	Crystal Garabedian
To:	philipkhan.acn@live.com.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:22 PM
Attachments:	37704.Stage2.3.Sent.pdf

Good afternoon,

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

presented in this letter to Biosis by 5:00pm 22 February 2023 either by email, phone or return mail.
Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	wokacorp@yahoo.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:21 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	cazadirect@live.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:20 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	amandahickey@live.com.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:20 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	gunya.ach@gmail.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:19 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	scott@tocomwall.com.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:18 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	justinecoplin@optusnet.com.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:17 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	"maz_lolli@yahoo.com.au"
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:16 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	"didgengunawalclan@yahoo.com.au"
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:15 PM
Attachments:	37704.Stage2.3.Sent.pdf

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presented in this letter to Biosis by 5:00pm 22 February 2023 either by email, phone or return mail.
Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	Ginninderra.corp@gmail.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:14 PM
Attachments:	37704.Stage2.3.Sent.pdf

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presented in this letter to Biosis by 5:00pm 22 February 2023 either by email, phone or return mail.
Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	Yurwang.Gundana.C.H.S@outlook.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:13 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	metrolalc@metrolalc.org.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:13 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	rosfogg@bigpond.net.au
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:11 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	RAW.CulturalHealing@hotmail.com
Subject:	37704 - RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota
Date:	Wednesday, 25 January 2023 2:04:23 PM
Attachments:	37704.Stage2.3.Sent.pdf

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Please address feedback to:
Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Kind regards,
Crystal Garabedian

From:	Crystal Garabedian
To:	Darleen Johnson
Subject:	RE: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation
Date:	Monday, 13 February 2023 1:21:54 PM
Attachments:	image001.png image002.png image003.png image067293.png image054841.png image609475.png image167797.png 37704.Maroota.Quarry.2.3.DFT01.20230120.pdf
Importance:	High

Hi Darleen and Ryan,

Thank you for registering your interest in the Maroota Central Civil Sandstone Quarry project. We have already sent out the Stage 2 and 3 consultation for this project but can still accept the registration and I have attached the document to this email.

It would be appreciated if you would provide feedback on the project information and methodology presented in this letter by **5:00pm 22 February 2023** either by email, phone or return mail. If you need more time, please let me know as soon as possible.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au

Leaders in Ecology and Heritage Consulting

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
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From: Darleen Johnson <murrabidgeemullangari@yahoo.com.au>
Sent: Friday, 10 February 2023 5:18 AM
To: Crystal Garabedian <CGarabedian@biosis.com.au>
Subject: Re: 37704 - Maroota Central Civil Sandstone Quarry – Invitation to Register for Aboriginal Community Consultation

Hi Crystal
Please register our company for the above project, we have been doing aboriginal cultural heritage projects for over 26 years.
Kind regards
Ryan Johnson
0460839128

On Tuesday, 20 December 2022 at 01:07:23 pm AEDT, Crystal Garabedian <cgarabedian@biosis.com.au> wrote:

Good afternoon,

Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery Co. Pty Ltd (RW Corkery), on behalf of Central Civil (NSW) Pty Ltd (Central Civil) to inform the development and operation of the Maroota Central Civil Sandstone Quarry at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 DP 609224) (the project). The project would be classified and assessed as a Designated Development under Part 3 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Once a constraints assessment has been completed, it is likely that the development application would be accompanied by an Environmental Impact Statement (EIS), classing the proposed works as a State Significant Development (SSD) under Part 4.36 of the EP&A Act.

Biosis on behalf of Central Civil therefore wish to invite Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s)/and or Places in the vicinity of the study area, to register their interest in the project outlined above.

If you wish to register your interest please provide your contact details in writing via post or email by 5:00pm 17 January 2023 to:
Crystal Garabedian
Biosis Pty Ltd
14/17-27 Power Avenue
Alexandria
cgarabedian@biosis.com.au

If you have any queries regarding the project, please do not hesitate to contact me on the details above, or alternatively the main office number on (02) 9101 8700.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Archaeologist

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au



Artwork: *Flowering Gum* by Anthony Walker. Click on the banner to find out more about this piece.

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
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20 January 2023

Ros

Dear Ros,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

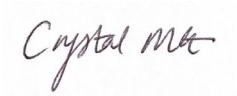
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
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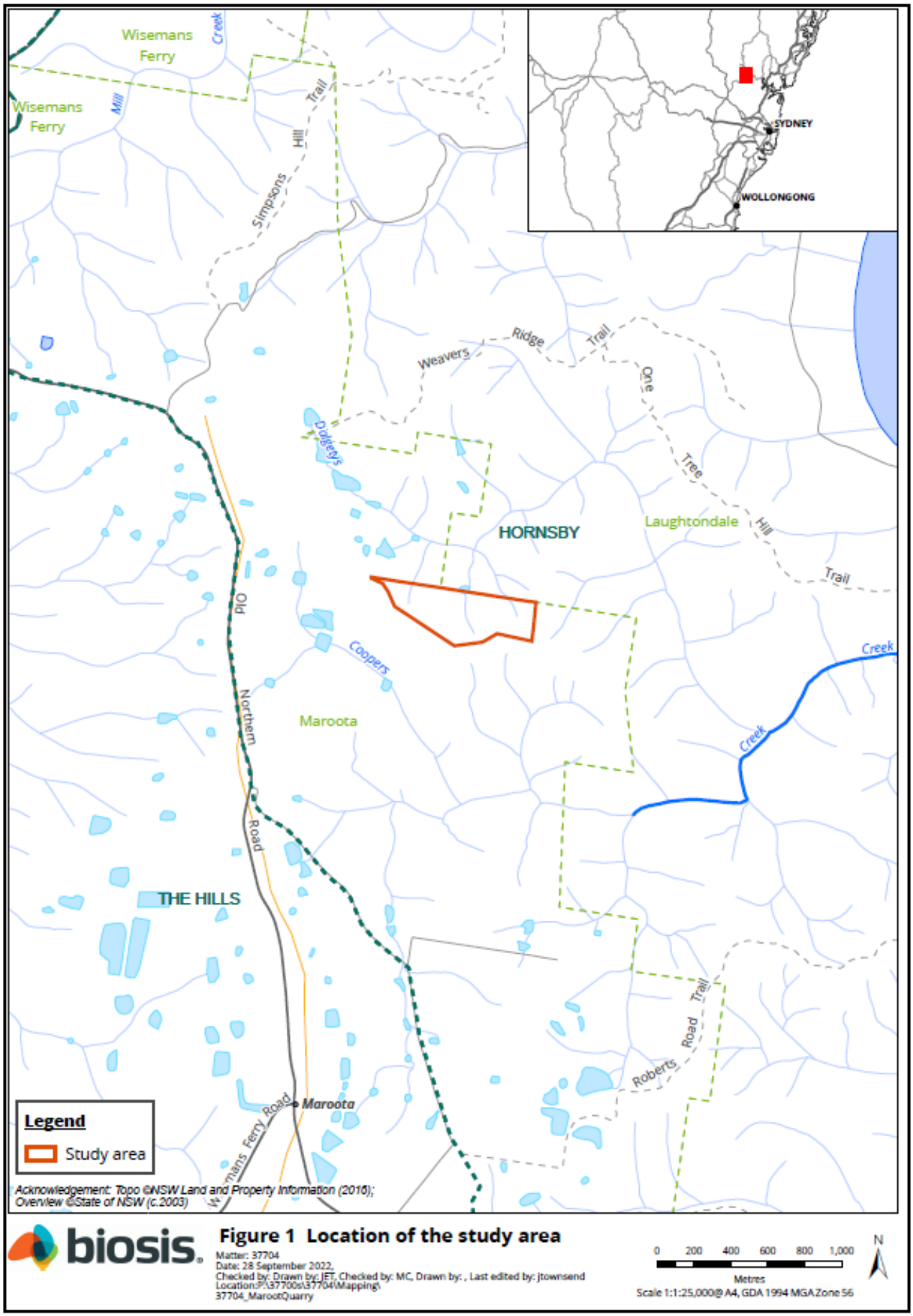
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Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

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- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


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Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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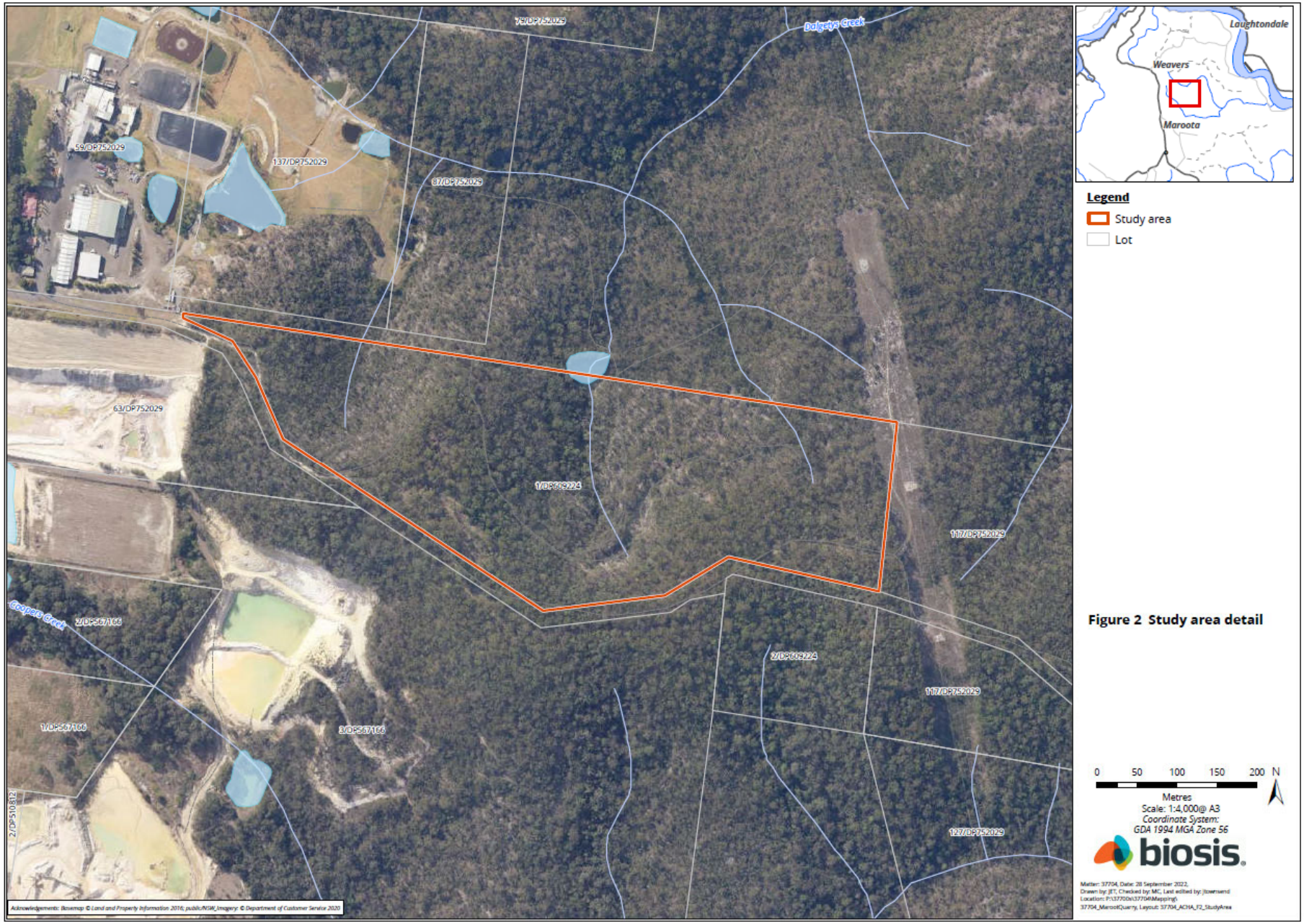
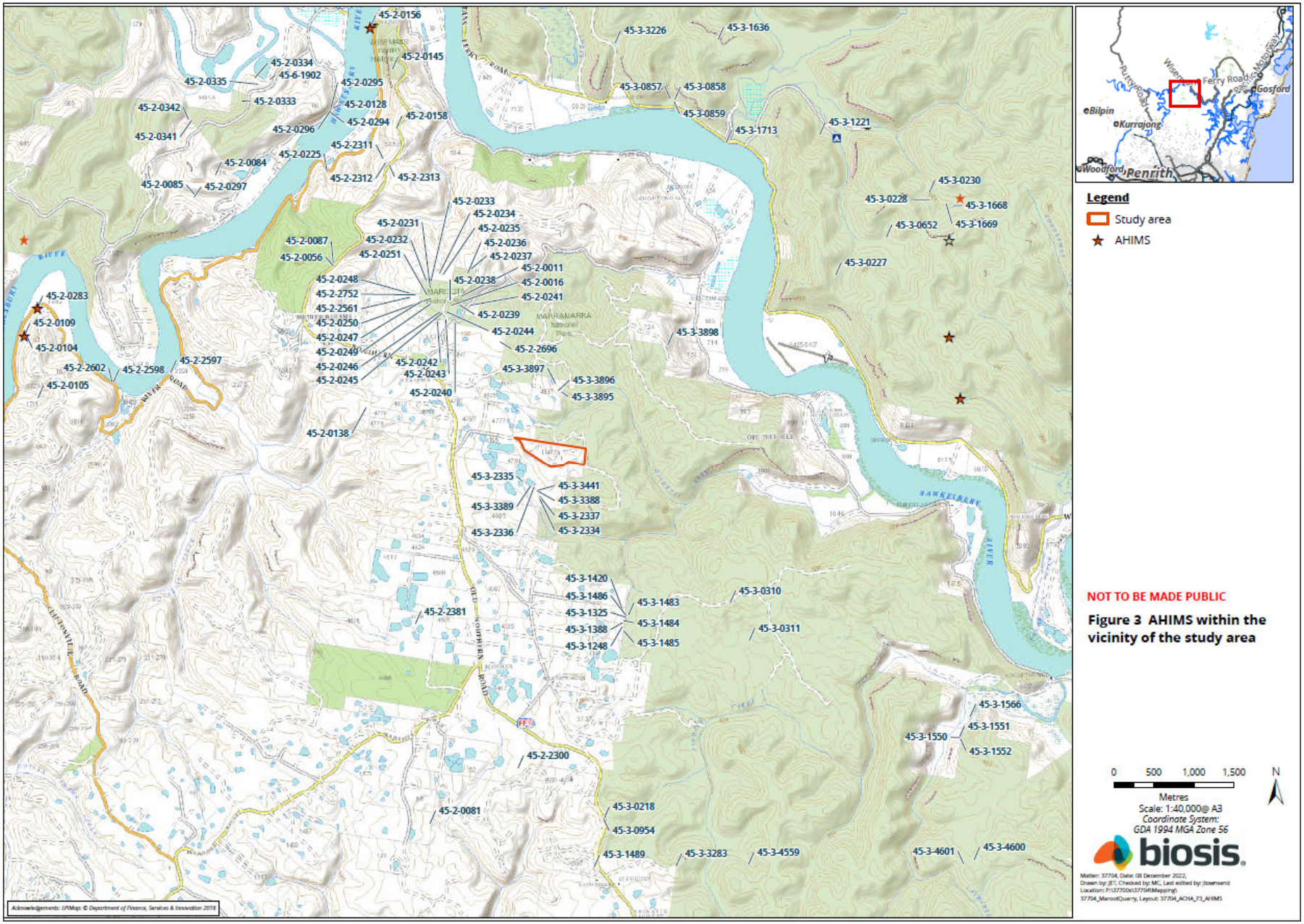


Figure 2 Study area detail


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45-3-3283
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45-3-4601
45-3-4600
Ferry Road
Gosford
Bilpin
Kurrajong
Woodford
Penrith
Legend
Study area
AHIMS
NOT TO BE MADE PUBLIC
Figure 3 AHIMS within the vicinity of the study area
0
500
1,000
1,500
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Metres
Scale: 1:40,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56
biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

Consultation with the Aboriginal community

This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

Artefact Heritage 2018. *Rezoning and subdivision of 109 Darkes Road, Kembla Grange*, Report to NewQuest Property Pty Ltd.

Biosis Pty Ltd 2015. *Lot 1, DP 825516, Farmborough Heights NSW. Aboriginal Cultural Heritage Assessment for Proposed Rezoning*, Report to Plannex Environmental Planning.

DECCW 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, New South Wales Government Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Metropolitian Local Aboriginal Land Council
PO Box 1103
Strawberry Hills NSW 2012

Dear Sir or Madam,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

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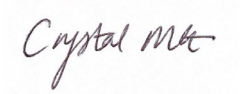
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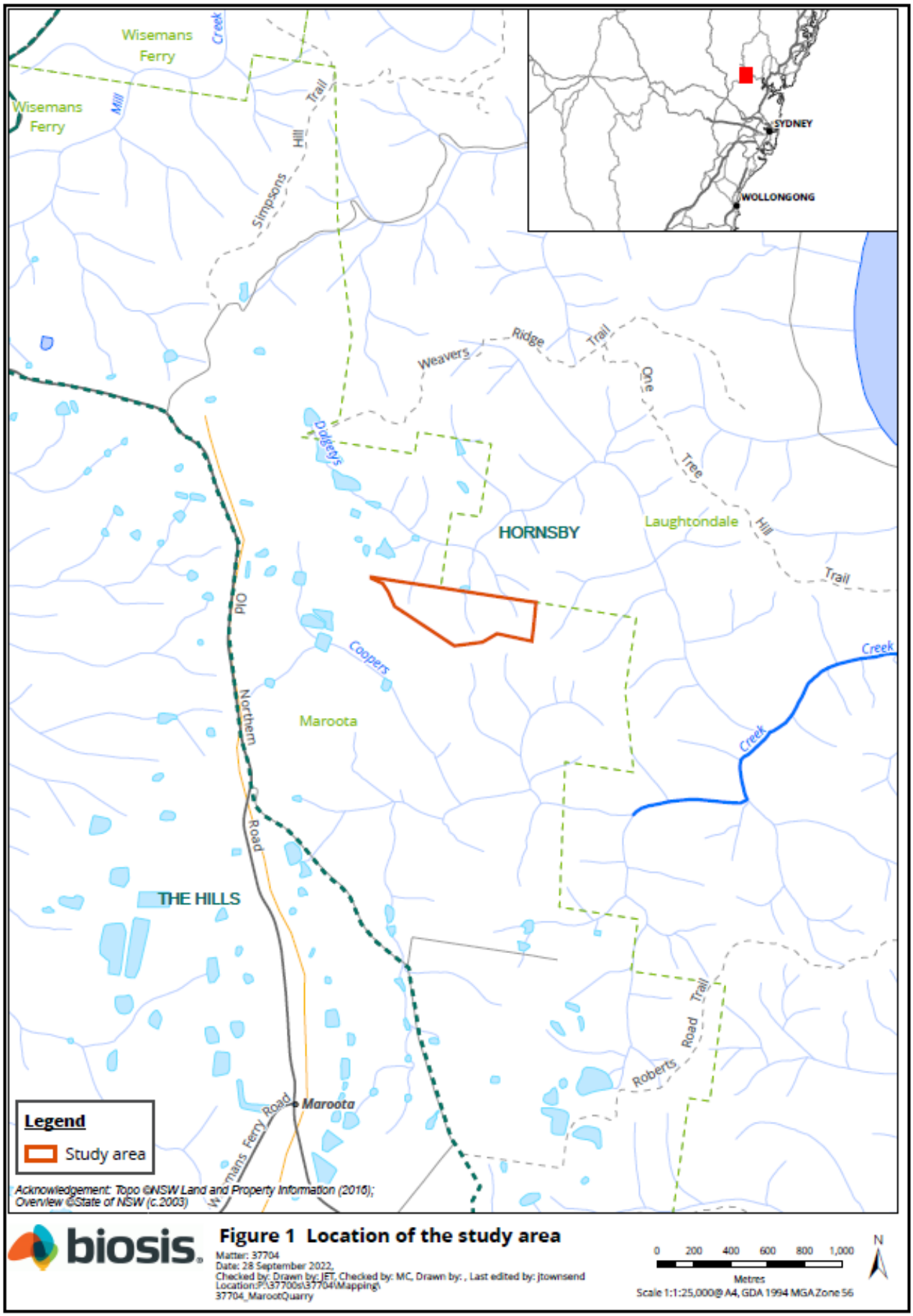
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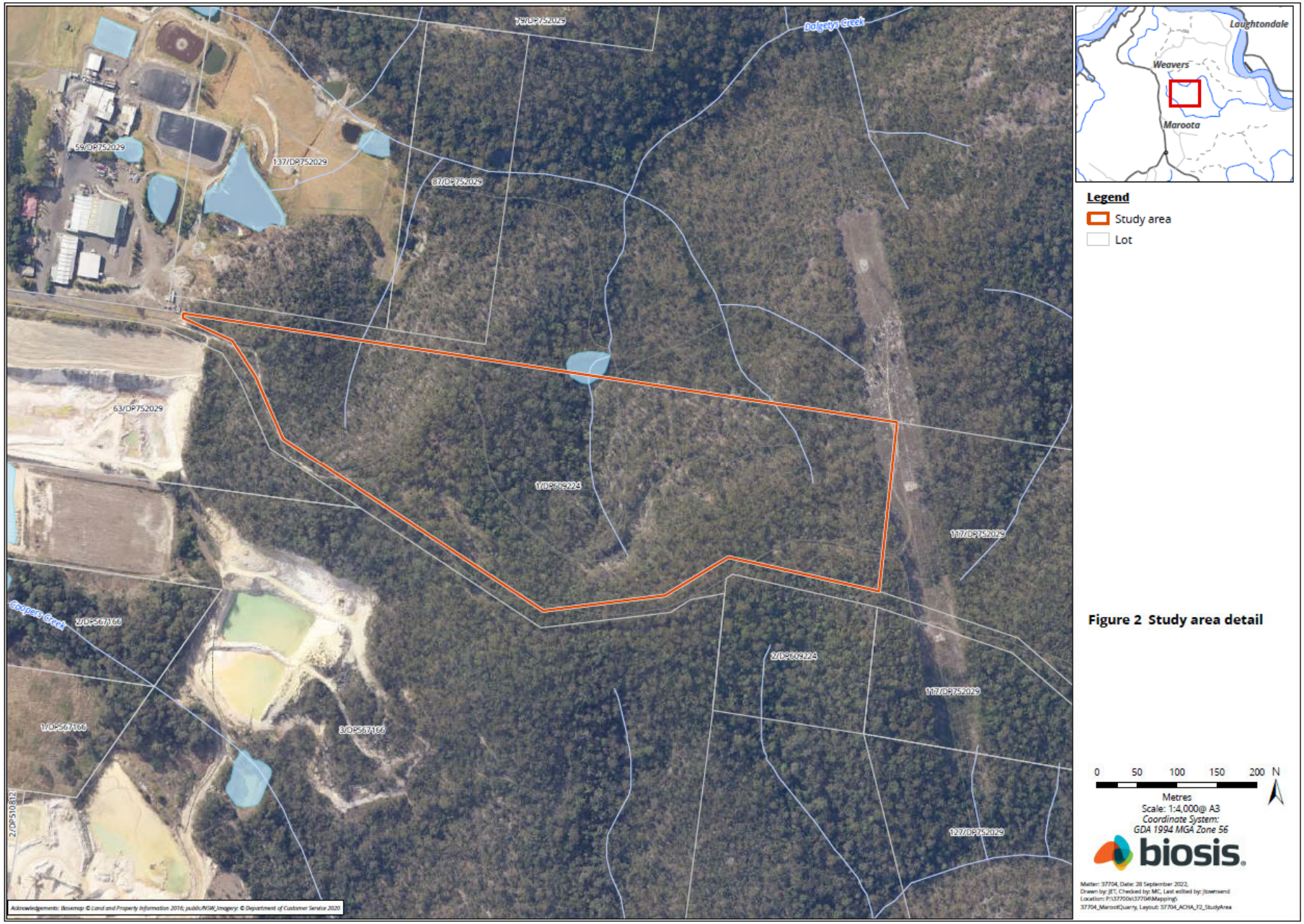
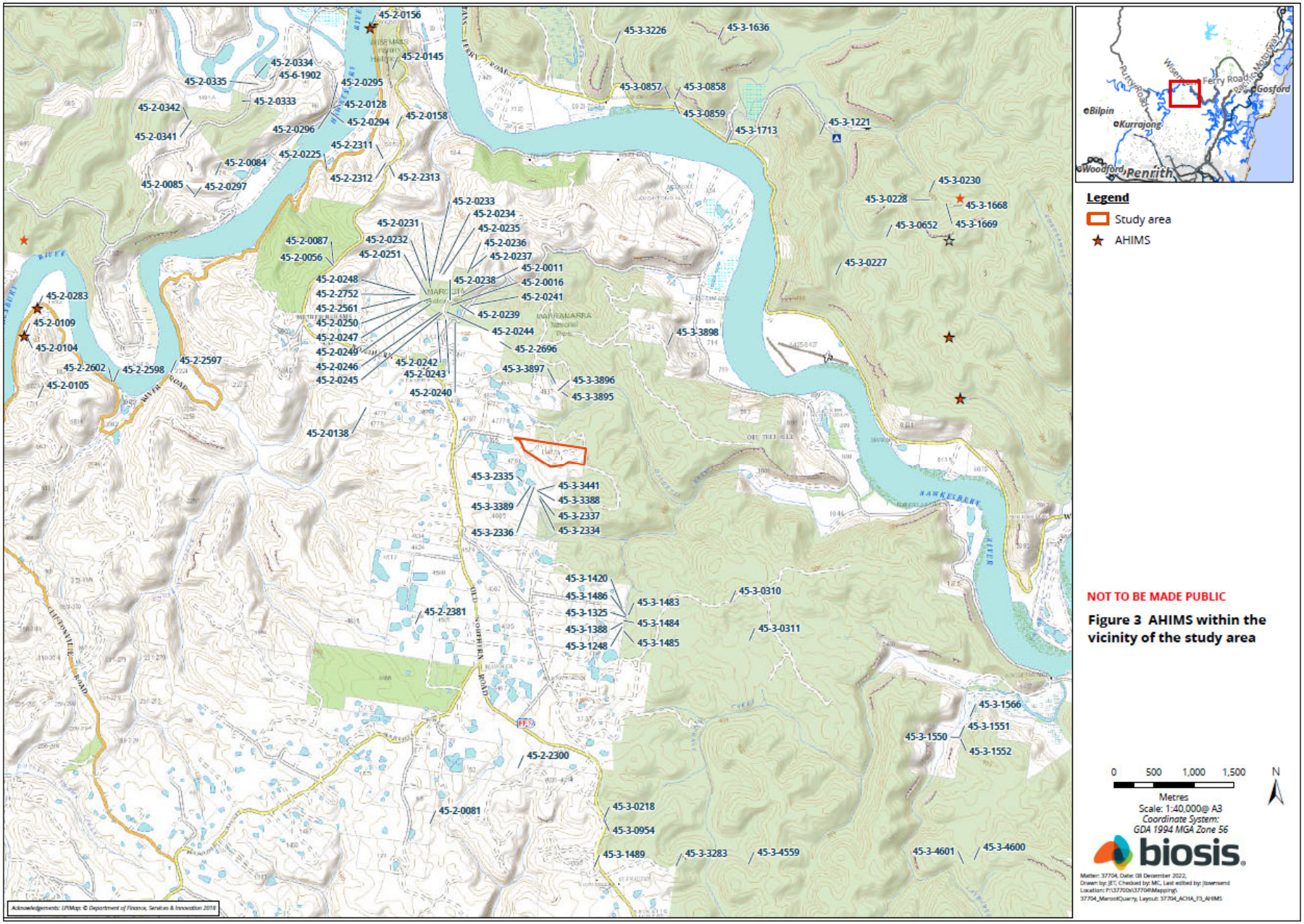


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Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
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- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

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This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

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Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

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- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

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Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Yurwang Gundana Consultancy Cultural Heritage Services.
Merekai Bell
PO Box 5628
SOUTH WINDSOR NSW 2756

Dear Merekai,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

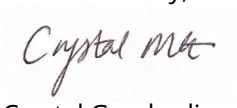
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
Archaeological test excavations (if required)	TBC	TBC
Information gathering	Continuous	N/A
Review of draft report	TBC	28 days review time allowed under the consultation guidelines.
Final report	TBC	TBC

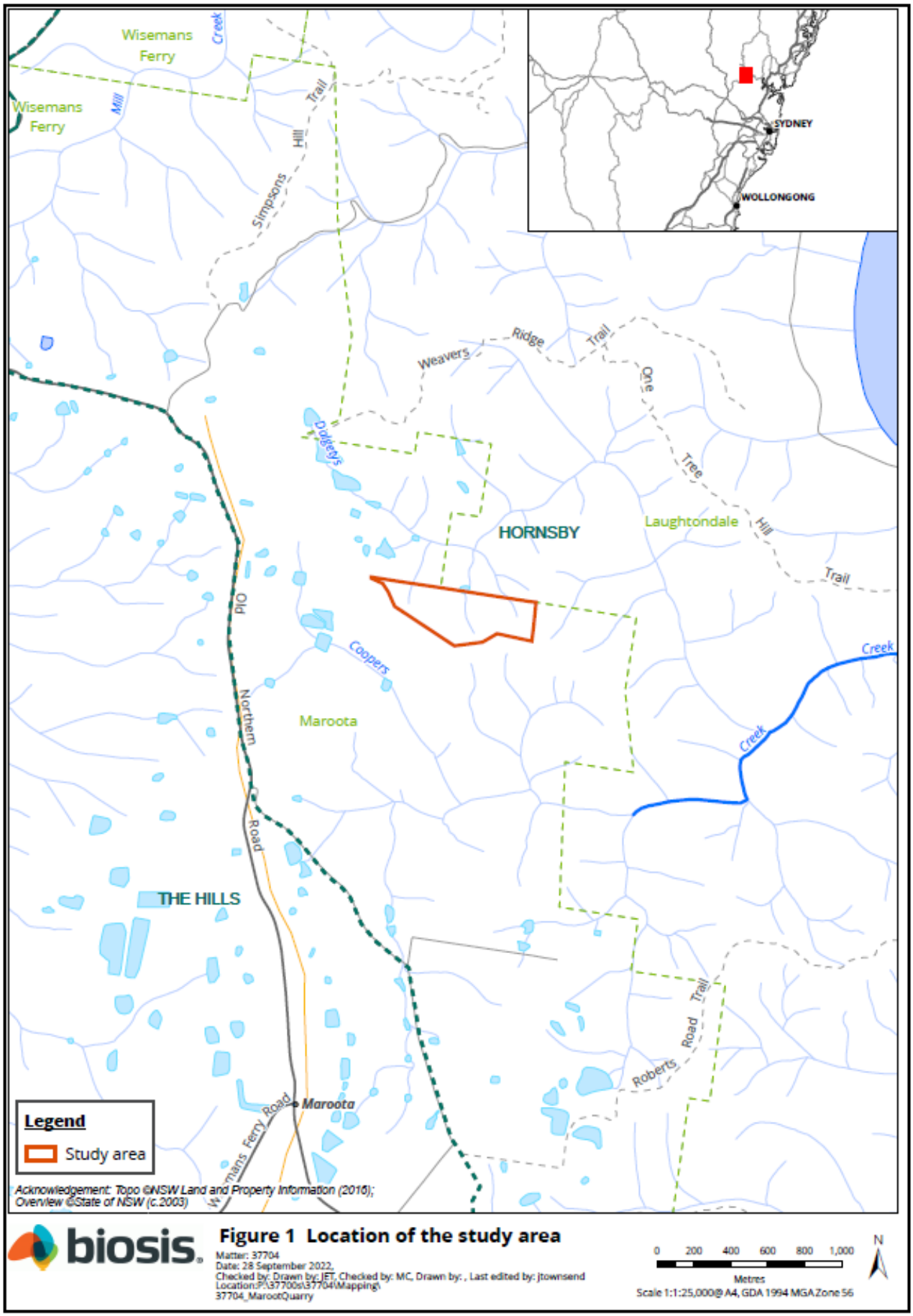
Responsibilities and roles

As part of the consultation process, RAPs will be provided the opportunity to offer input into regulatory processes, contribute to decision making by proponents and government authorities, respond to requests for cultural information and comment on draft reporting, as appropriate. This will be undertaken in accordance with their role specified in section 5 of the consultation requirements.

Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

- Displaying a meaningful appreciation, understanding and respect for the belief system, spiritual connection, and sense of belonging that Aboriginal people have to their land, people, and environment, which includes plants, animals, waterways, sacred sites and other places of cultural significance and importance.
- Upholding and respecting the traditional rights, obligations and responsibilities of Aboriginal people who hold cultural knowledge in accordance with traditional lore and custom, particularly as these relate to the cultural business of men and women.
- Encouraging active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process.
- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


Wisemans Ferry
Creek
Wisemans Ferry
Mill
Trail
Hill
Simpsons
SYDNEY
WOLLONGONG
Weavers
Ridge
Trail
One
Tree
Hill
Trail
Dodeys
HORNSBY
Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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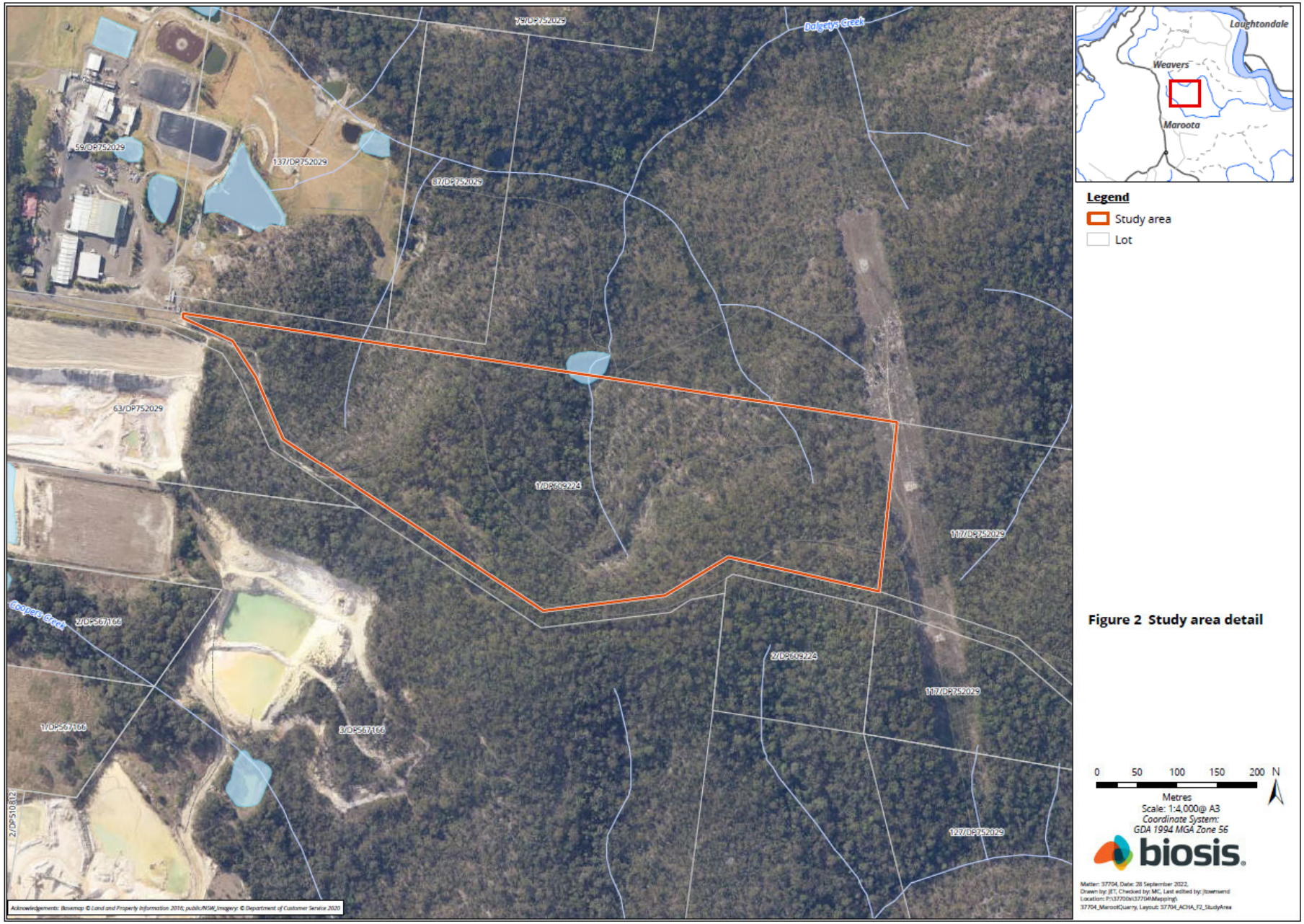
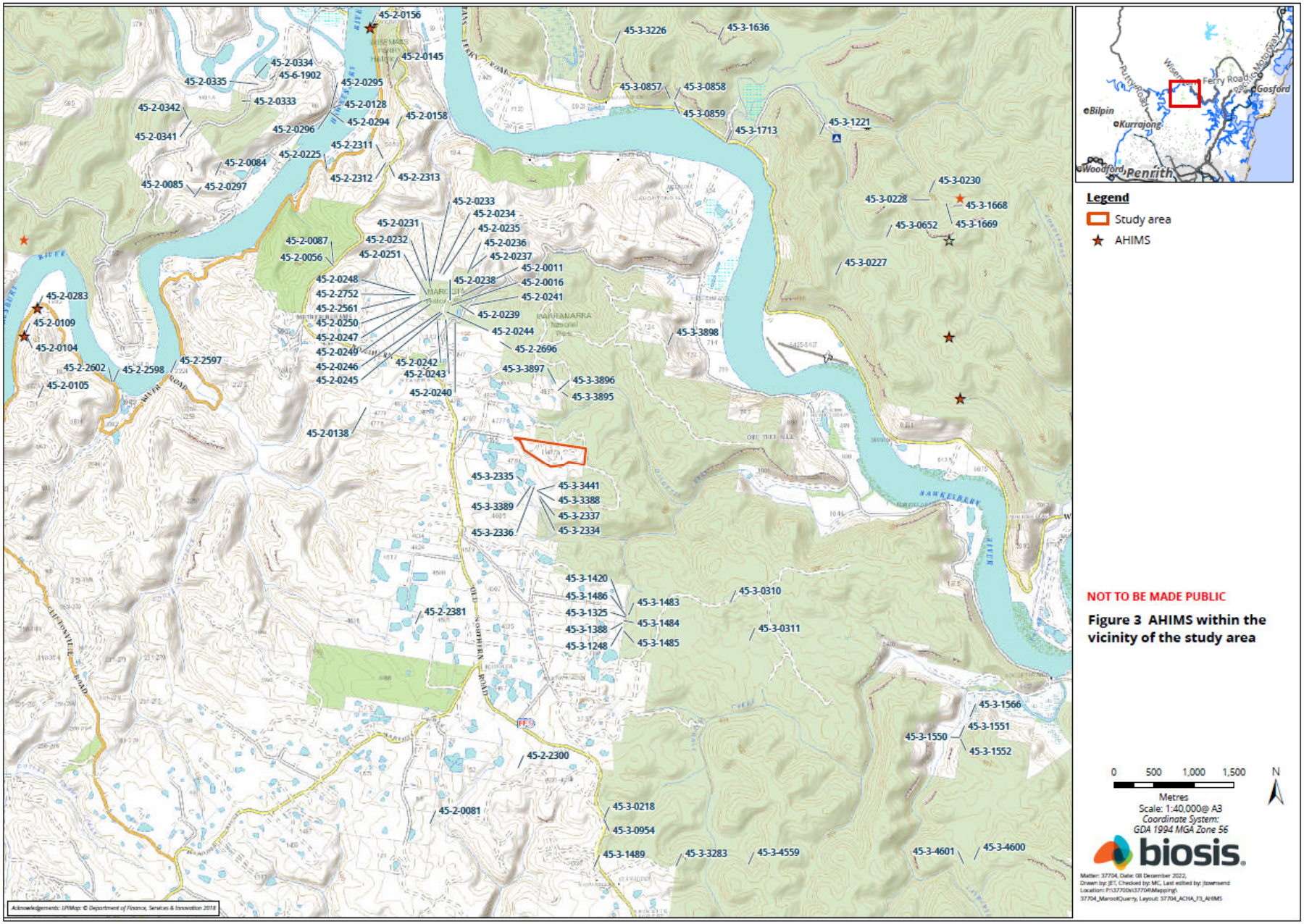


Figure 2 Study area detail


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20 January 2023

Ginninderra Aboriginal Corporation
Krystle Carroll
PO BOX 3143
Grose Vale NSW 2754

Dear Krystle ,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

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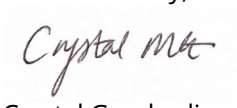
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Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

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Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
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Final report	TBC	TBC

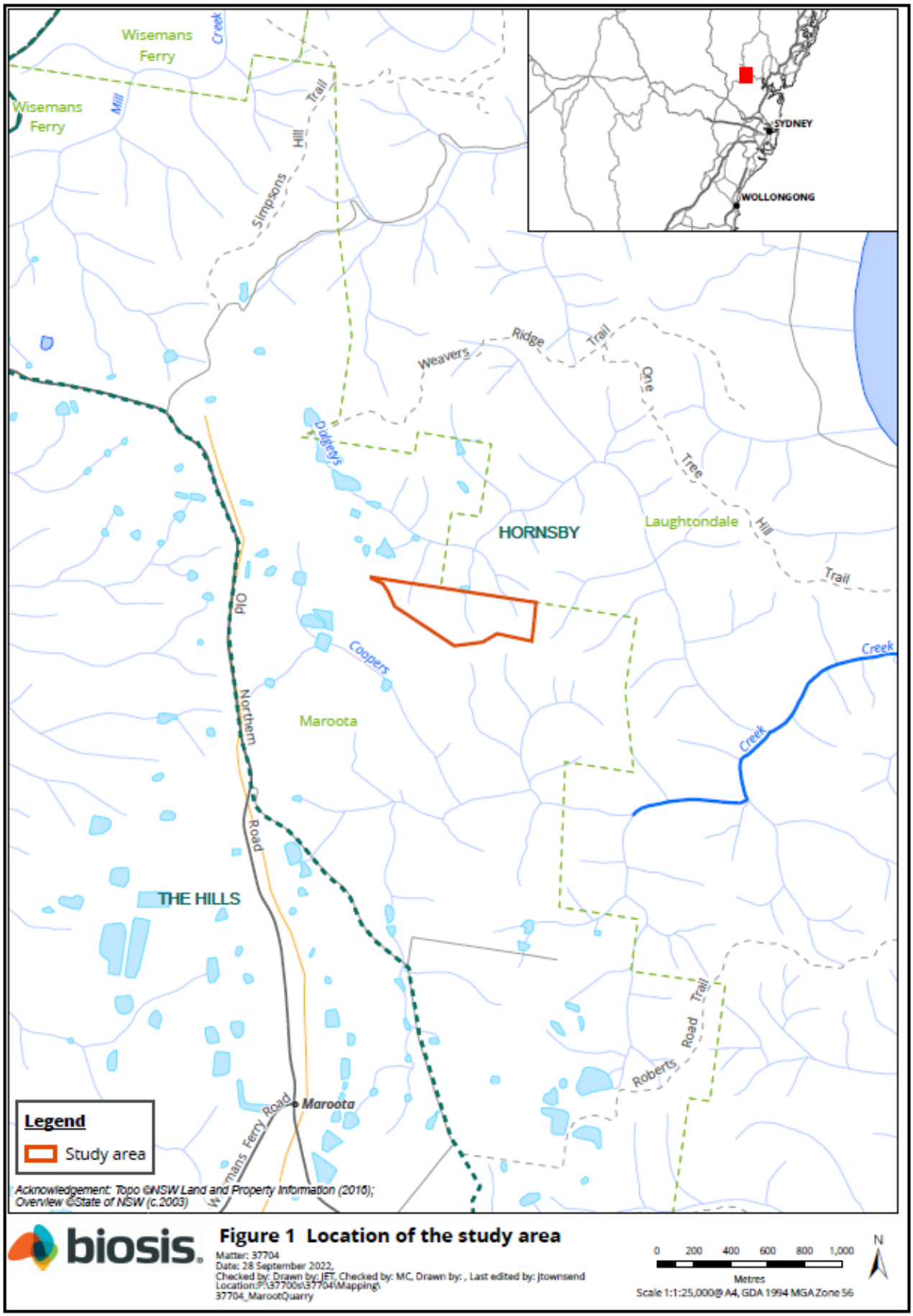
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- Encouraging active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process.
- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

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Old
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Northern
Road
Maroota
Creek
THE HILLS
Trail
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Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
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Date: 28 September 2022,
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Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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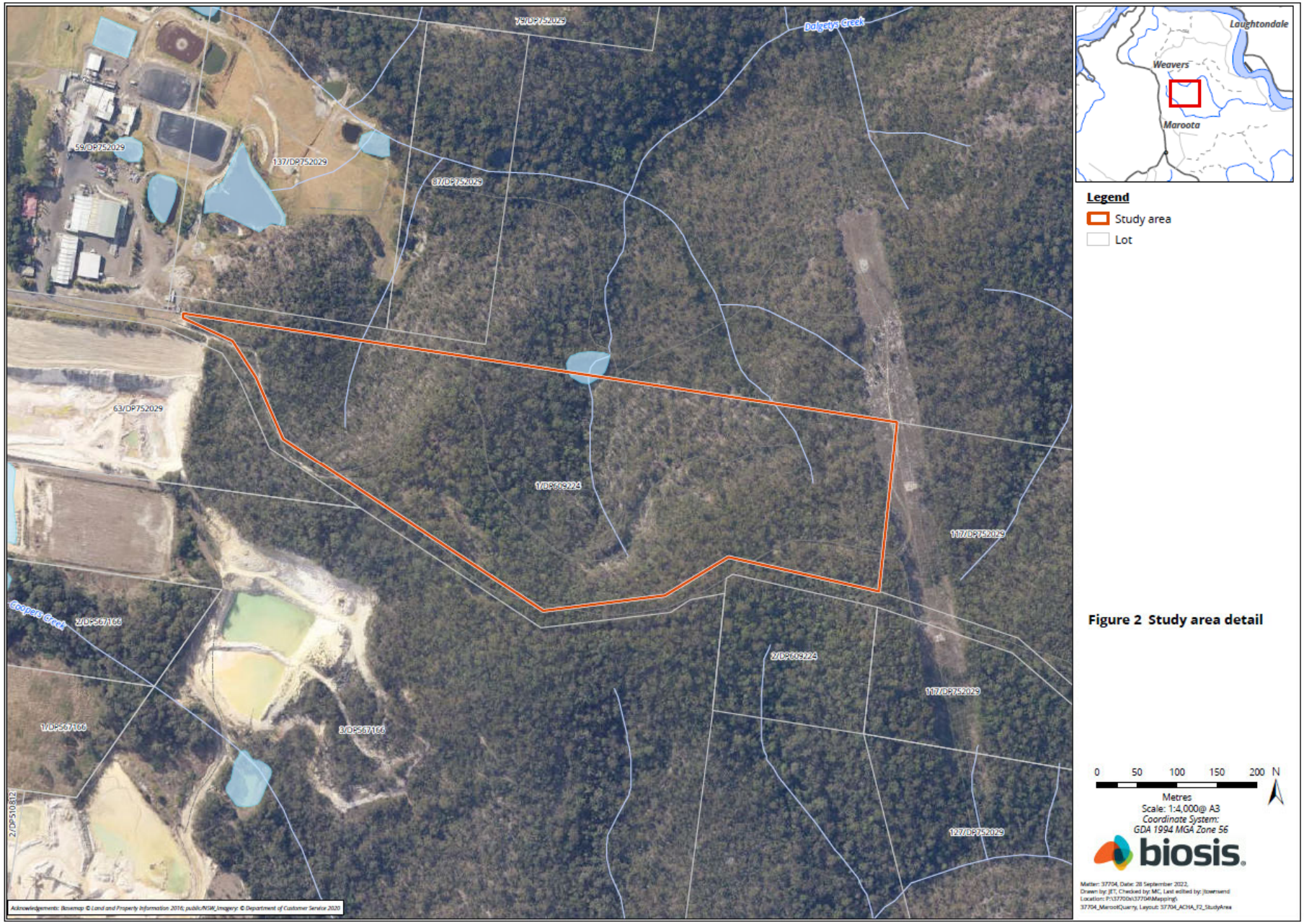
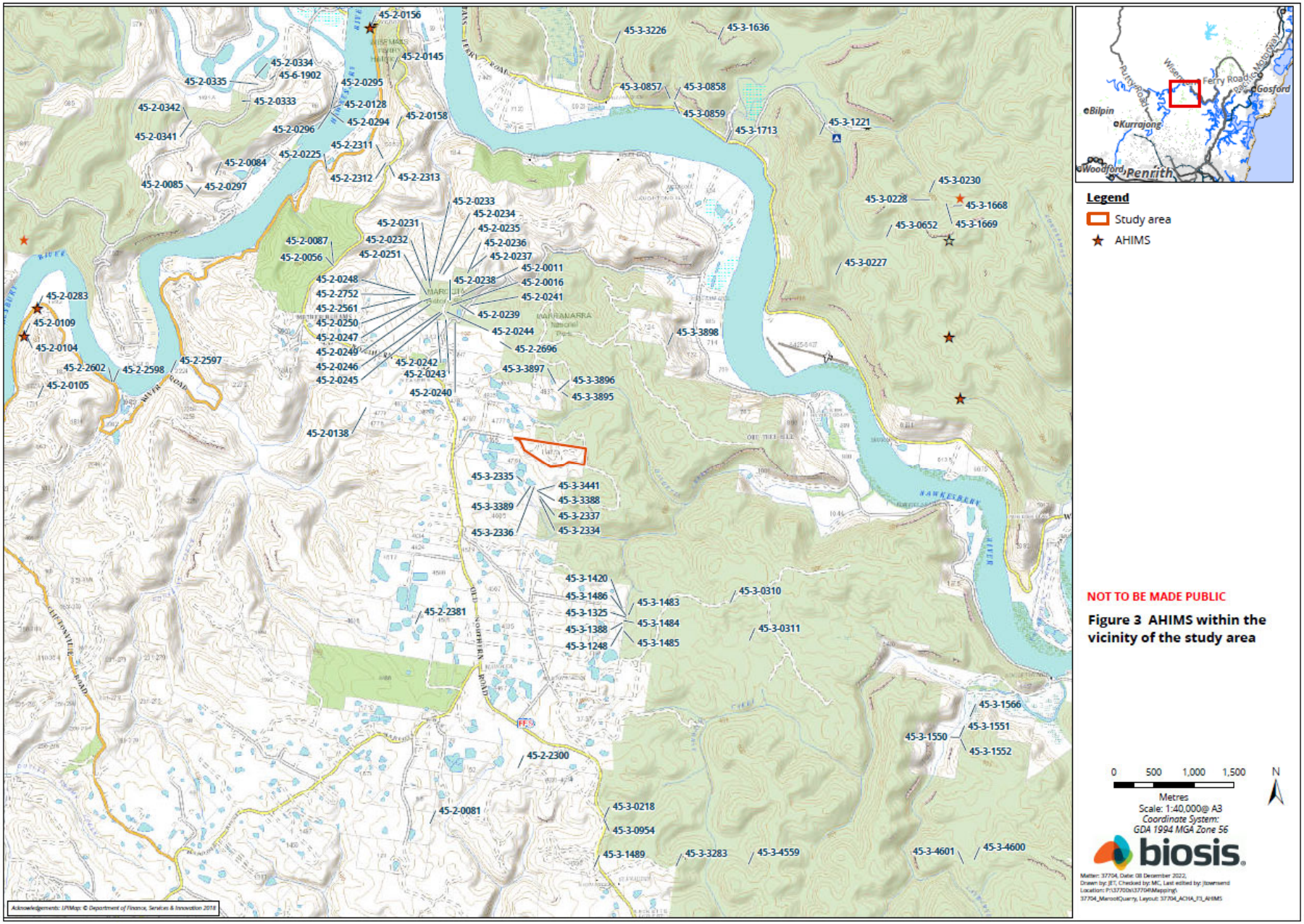


Figure 2 Study area detail


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biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

Consultation with the Aboriginal community

This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

Artefact Heritage 2018. *Rezoning and subdivision of 109 Darkes Road, Kembla Grange*, Report to NewQuest Property Pty Ltd.

Biosis Pty Ltd 2015. *Lot 1, DP 825516, Farmborough Heights NSW. Aboriginal Cultural Heritage Assessment for Proposed Rezoning*, Report to Plannex Environmental Planning.

DECCW 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, New South Wales Government Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Didge Ngunawal Clan
Lilly Carroll
33 Carlyle Crescent
Cambridge Gardens NSW 2747

Dear Lilly,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

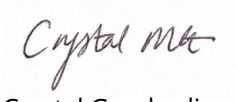
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

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Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
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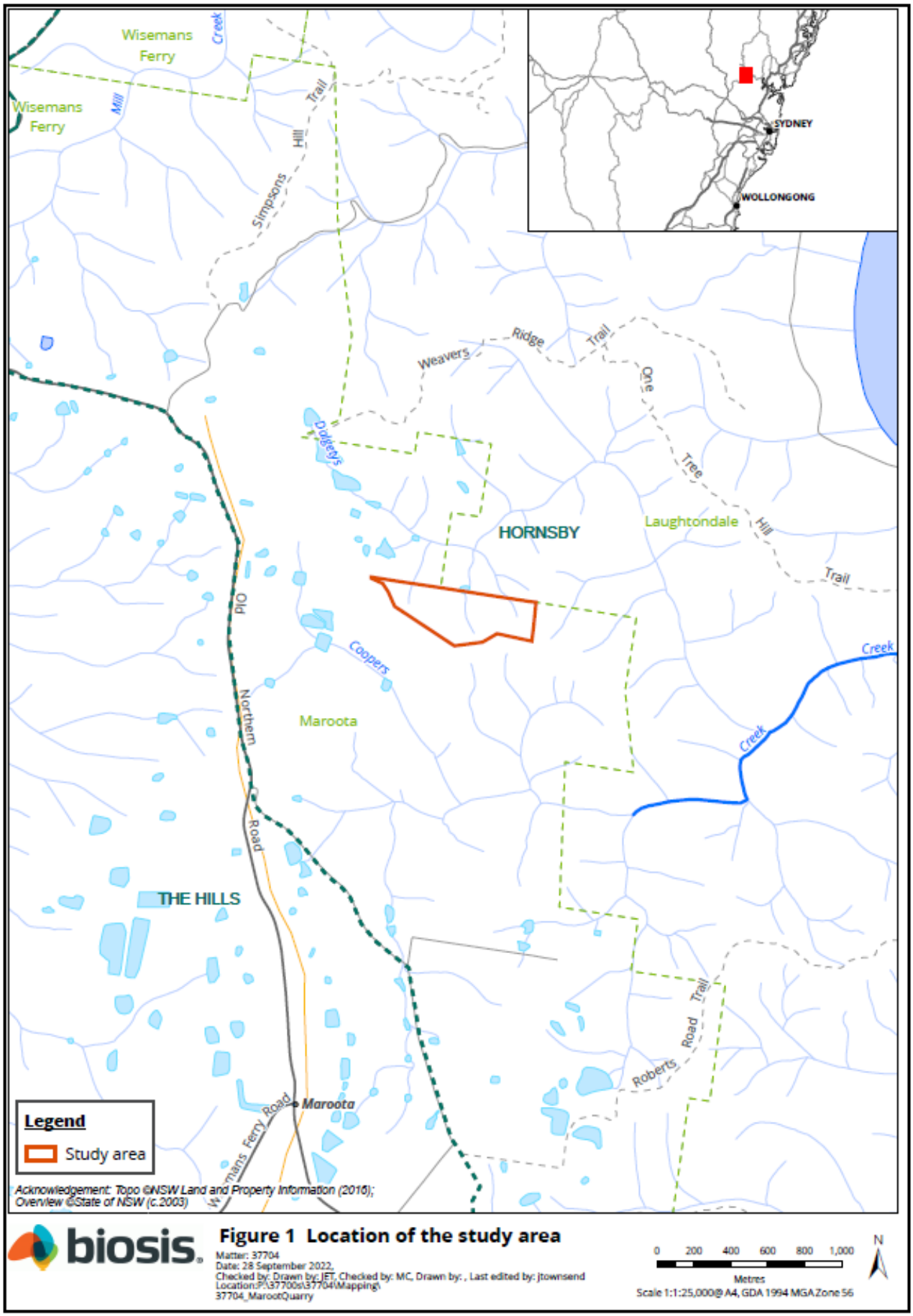
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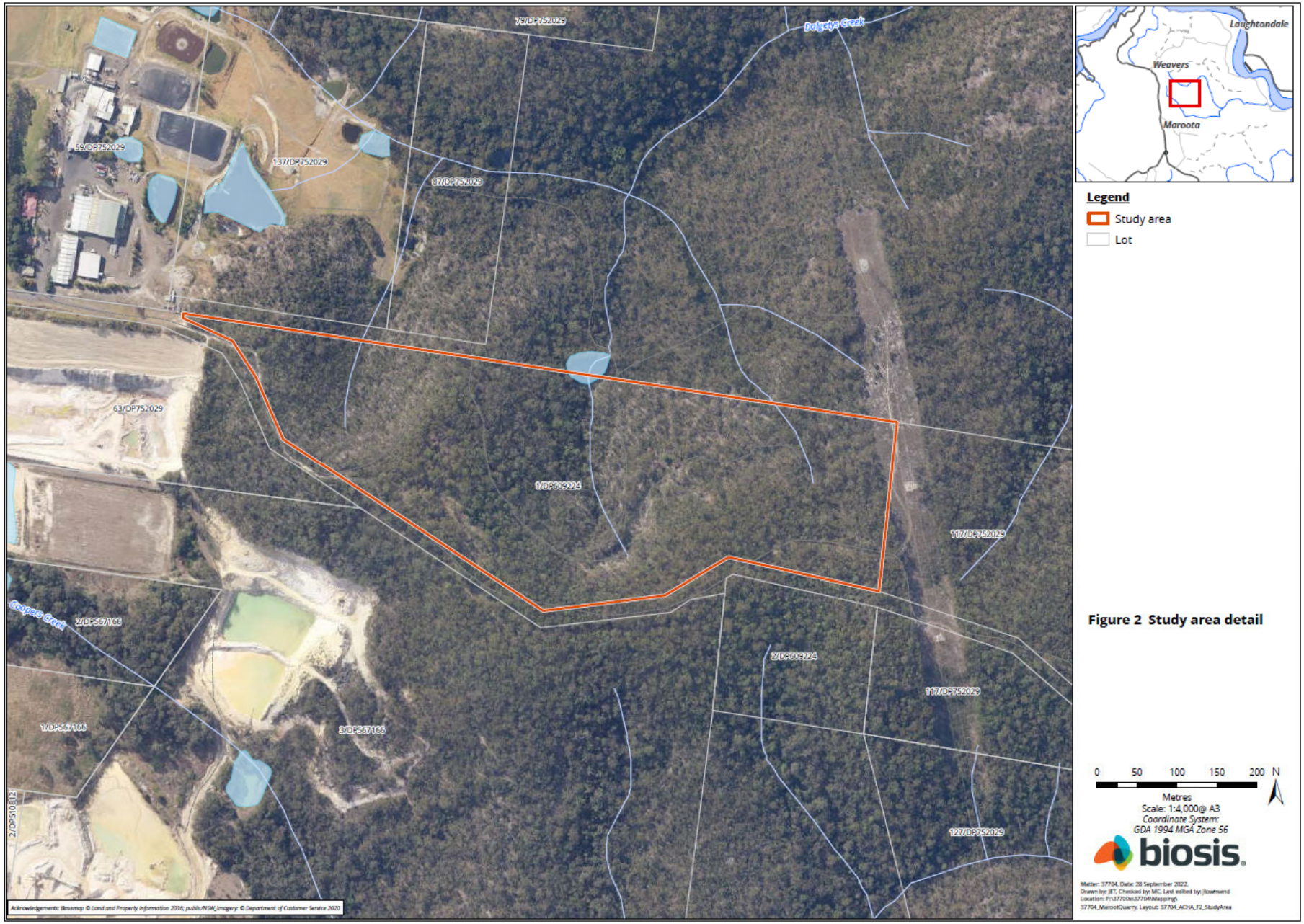
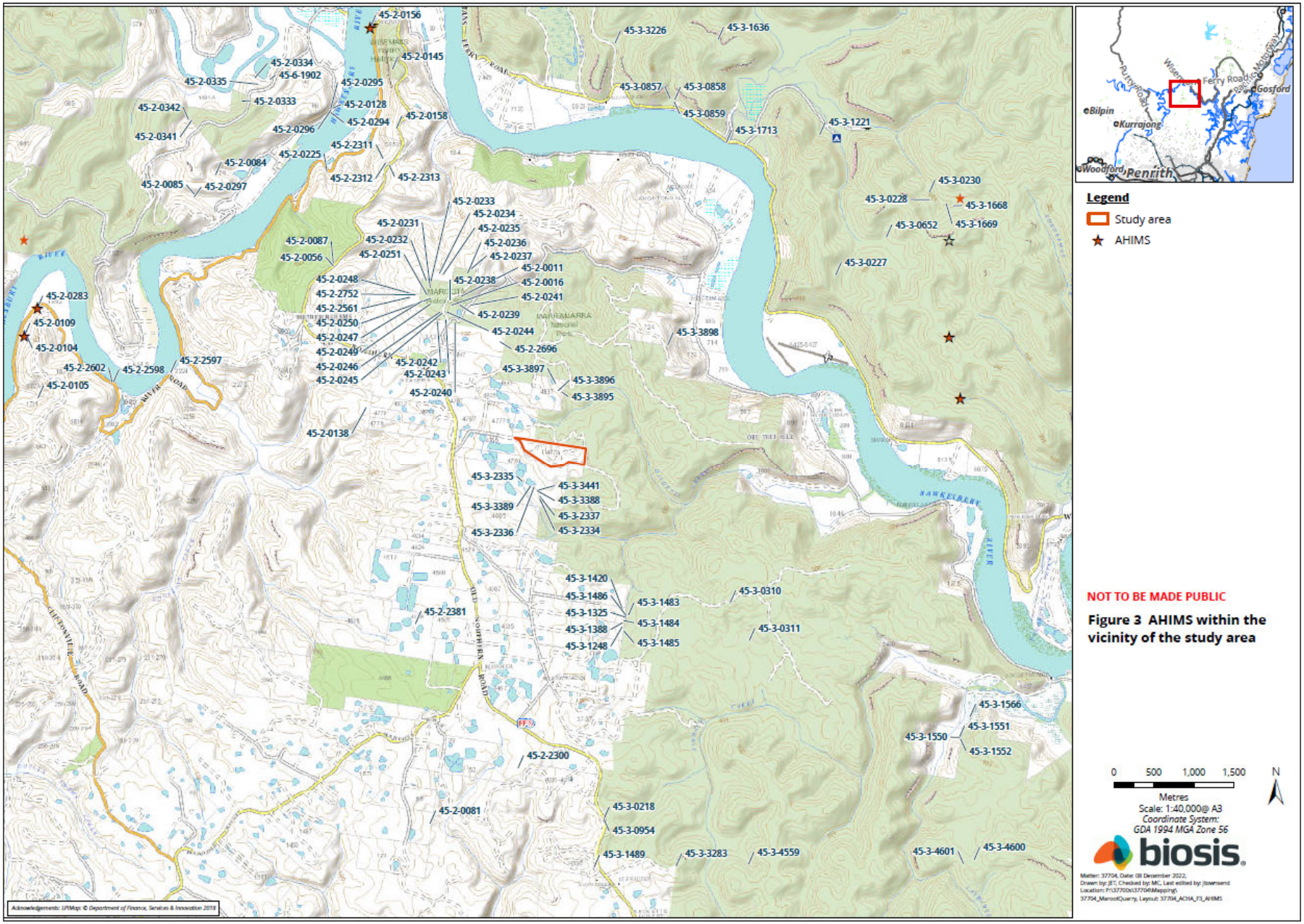


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Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

Consultation with the Aboriginal community

This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

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Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Corroboree Aboriginal Corporation
Marilyn Carroll-Johnson Carroll-Johnson

Dear Marilyn Carroll-Johnson,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

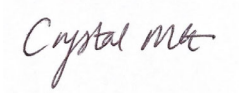
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
Archaeological test excavations (if required)	TBC	TBC
Information gathering	Continuous	N/A
Review of draft report	TBC	28 days review time allowed under the consultation guidelines.
Final report	TBC	TBC

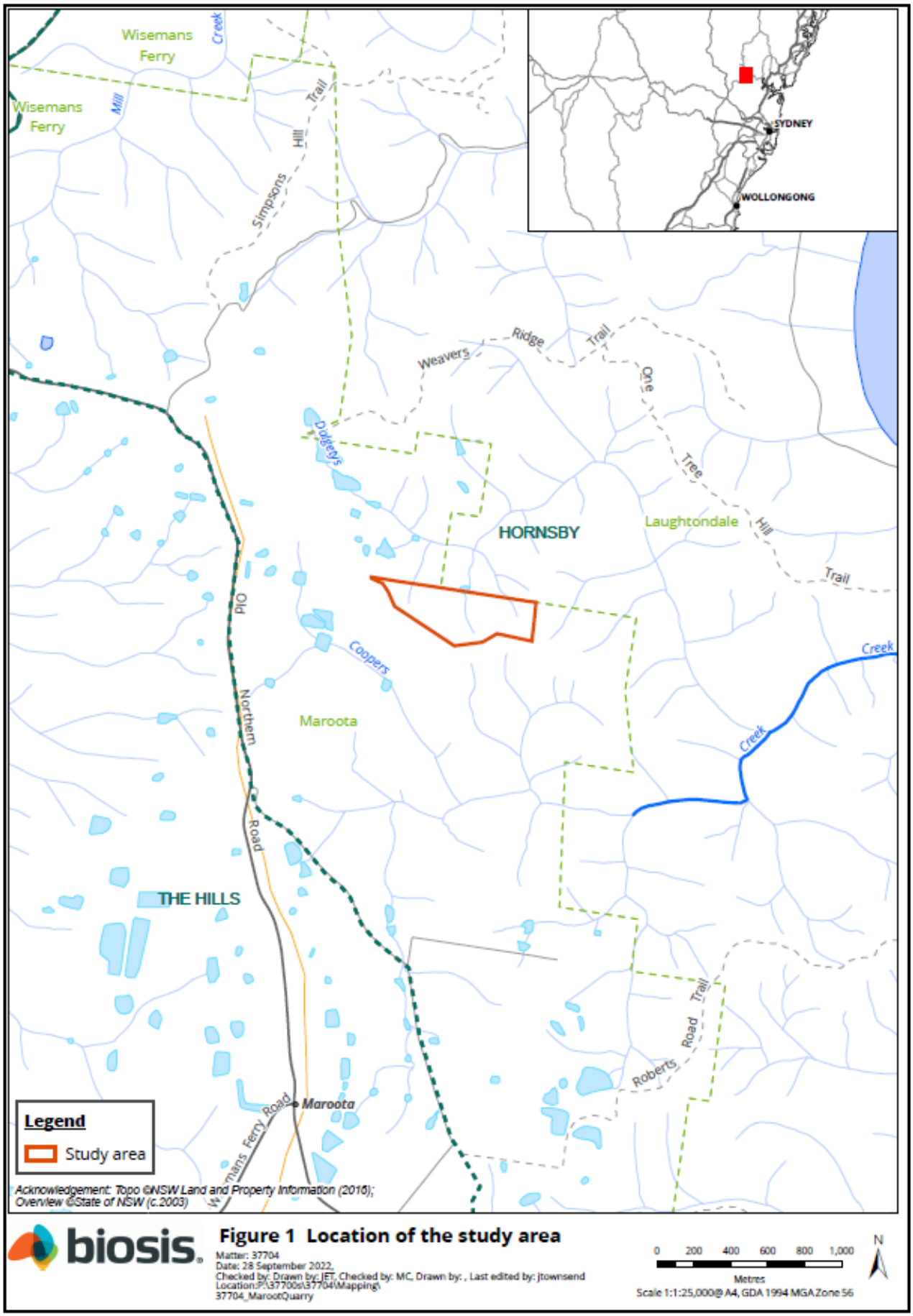
Responsibilities and roles

As part of the consultation process, RAPs will be provided the opportunity to offer input into regulatory processes, contribute to decision making by proponents and government authorities, respond to requests for cultural information and comment on draft reporting, as appropriate. This will be undertaken in accordance with their role specified in section 5 of the consultation requirements.

Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

- Displaying a meaningful appreciation, understanding and respect for the belief system, spiritual connection, and sense of belonging that Aboriginal people have to their land, people, and environment, which includes plants, animals, waterways, sacred sites and other places of cultural significance and importance.
- Upholding and respecting the traditional rights, obligations and responsibilities of Aboriginal people who hold cultural knowledge in accordance with traditional lore and custom, particularly as these relate to the cultural business of men and women.
- Encouraging active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process.
- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


Wisemans Ferry
Creek
Wisemans Ferry
Mill
Trail
Hill
Simpsons
SYDNEY
WOLLONGONG
Weavers
Ridge
Trail
One
Tree
Hill
Trail
Dodeys
HORNSBY
Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56
N

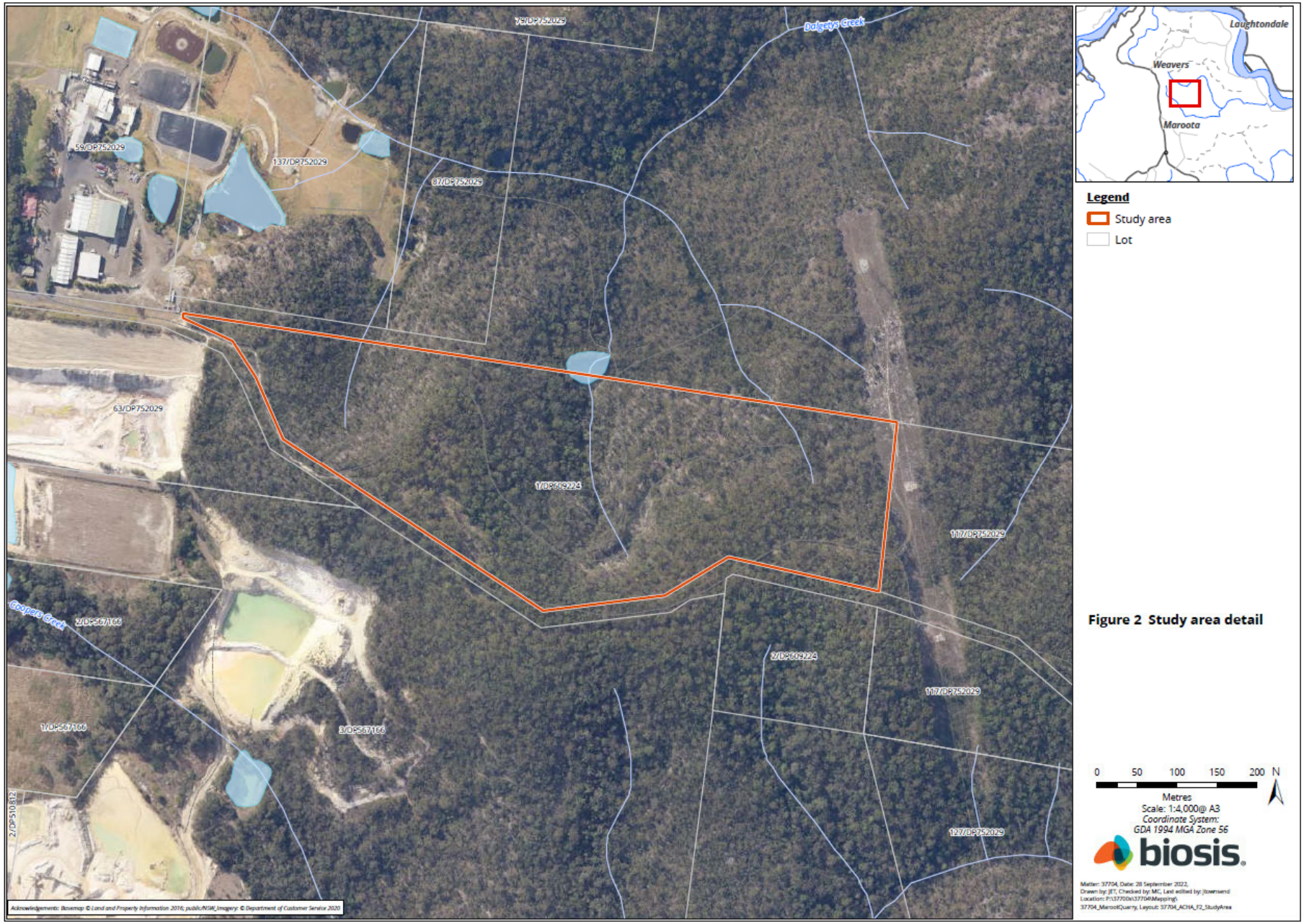
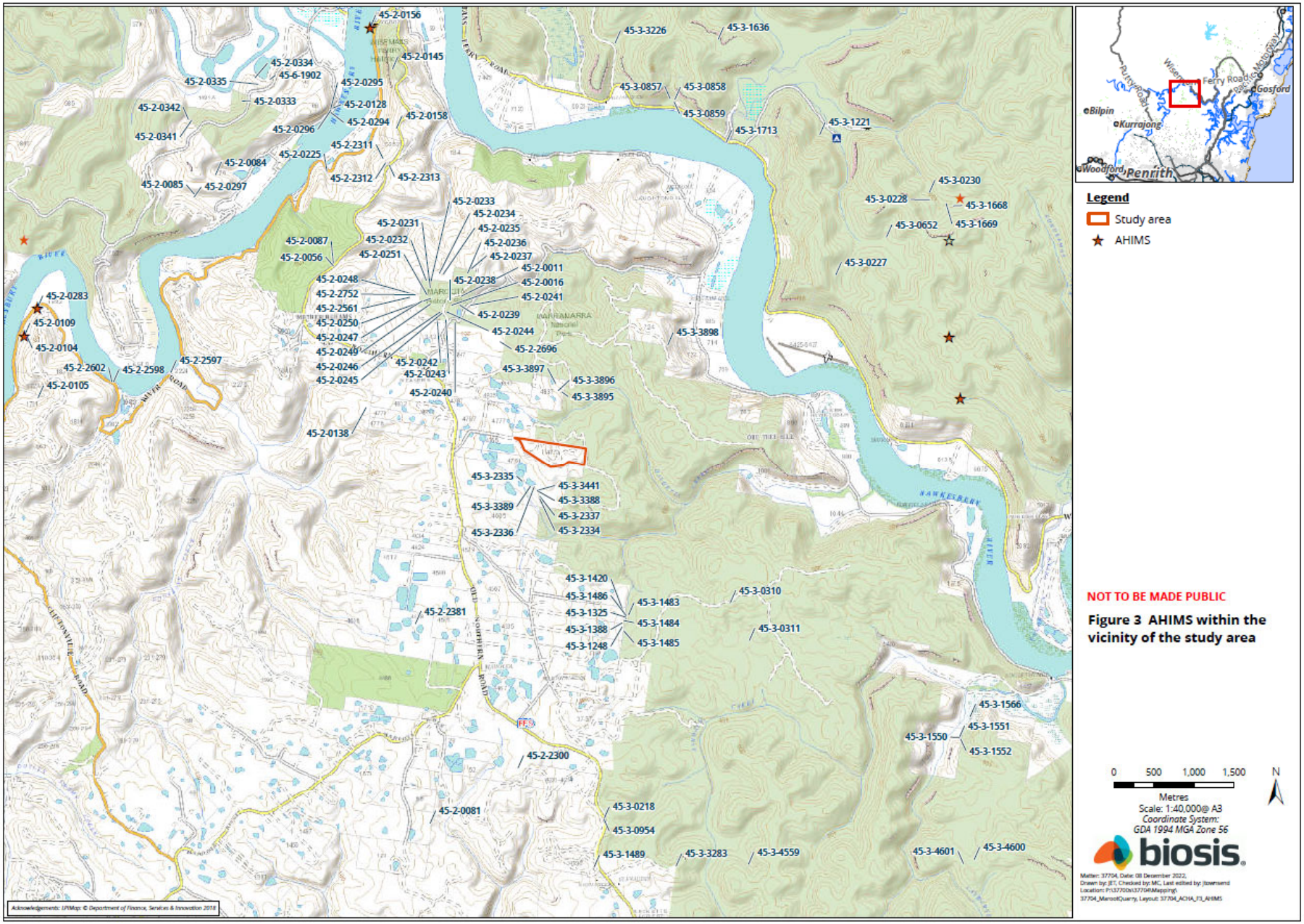


Figure 2 Study area detail


45-2-0156
45-3-3226
45-3-1636
45-2-0145
45-2-0334
45-6-1902
45-2-0335
45-2-0295
45-2-0333
45-2-0128
45-2-0342
45-2-0158
45-2-0294
45-2-0341
45-2-0296
45-2-2311
45-2-0225
45-2-0084
45-2-2312
45-2-2313
45-2-0085
45-2-0297
45-3-0857
45-3-0858
45-3-0859
45-3-1713
45-3-1221
45-3-0230
45-3-0228
45-3-1668
45-3-0652
45-3-1669
45-3-0227
45-2-0233
45-2-0234
45-2-0235
45-2-0231
45-2-0232
45-2-0236
45-2-0087
45-2-0056
45-2-0251
45-2-0237
45-2-0011
45-2-0248
45-2-0238
45-2-0016
45-2-2752
45-2-0241
45-2-2561
45-2-0239
45-2-0250
45-2-0244
45-3-3898
45-2-0247
45-2-0249
45-2-2696
45-2-0242
45-2-0246
45-2-0243
45-3-3897
45-3-3896
45-2-0245
45-3-3895
45-2-0240
45-2-0283
45-2-0109
45-2-0104
45-2-2602
45-2-2598
45-2-2597
45-2-0105
45-2-0138
45-3-2335
45-3-3441
45-3-3388
45-3-3389
45-2-2337
45-3-2336
45-3-2334
45-3-1420
45-3-1486
45-3-1483
45-3-0310
45-3-1325
45-2-2381
45-3-1484
45-3-1388
45-3-0311
45-3-1485
45-3-1248
45-3-1566
45-3-1551
45-3-1550
45-3-1552
45-2-2300
45-2-0081
45-3-0218
45-3-0954
45-3-1489
45-3-3283
45-3-4559
45-3-4601
45-3-4600
Ferry Road
Gosford
Bilpin
Kurrajong
Woodford
Penrith
Legend
Study area
AHIMS
NOT TO BE MADE PUBLIC
Figure 3 AHIMS within the vicinity of the study area
0
500
1,000
1,500
N
Metres
Scale: 1:40,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56
biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
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Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
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Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

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Field investigation

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- Photographs of the site indicating landform.
- Evidence of disturbance.
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Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

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The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
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As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

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20 January 2023

Darug Custodian Aboriginal Corporation
Justine Coplin
PO Box 81
Windsor NSW 2756

Dear Justine,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

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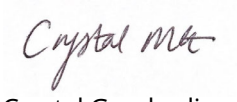
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Yours sincerely,



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Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

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- Upgrades to site access.

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Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

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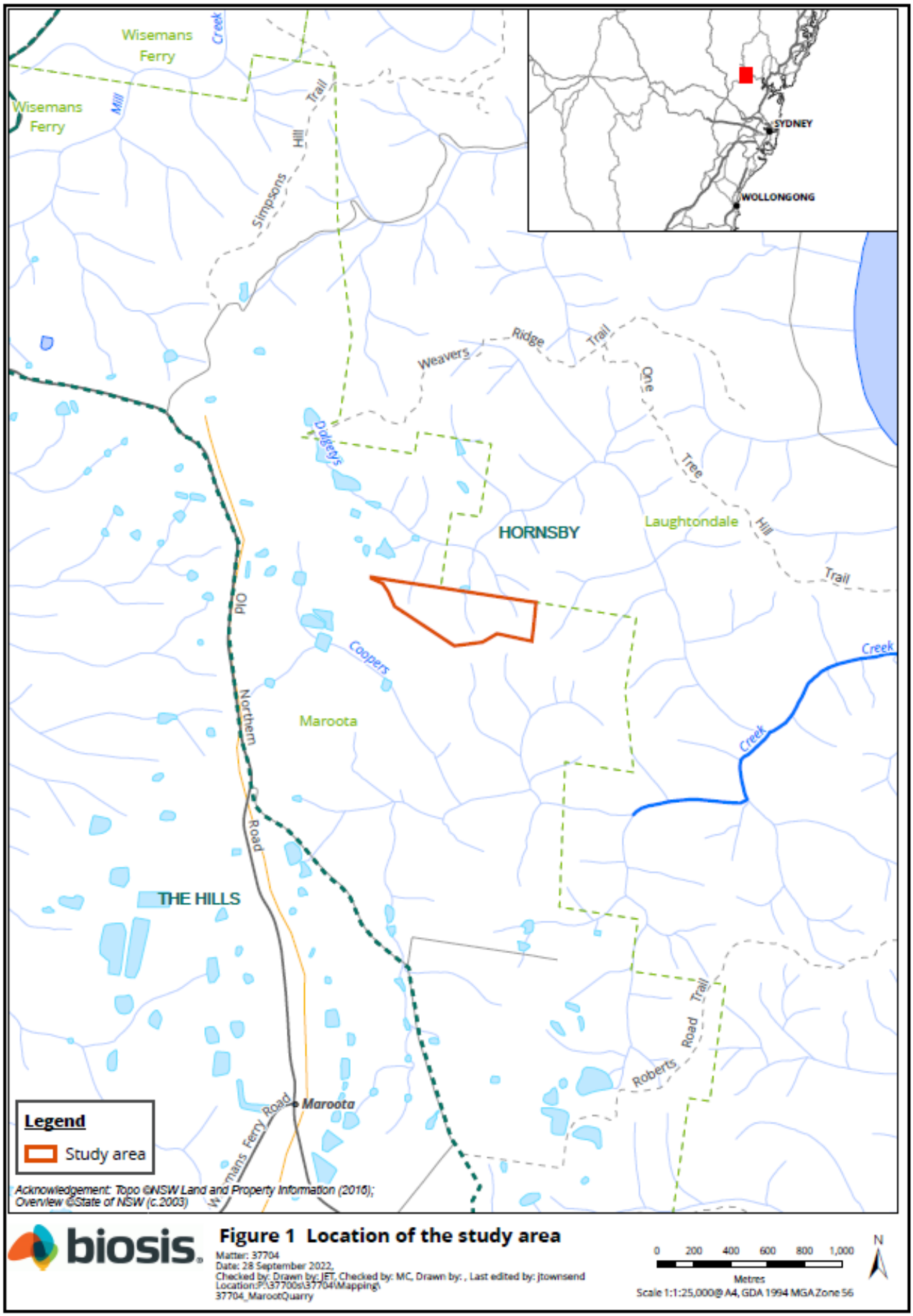
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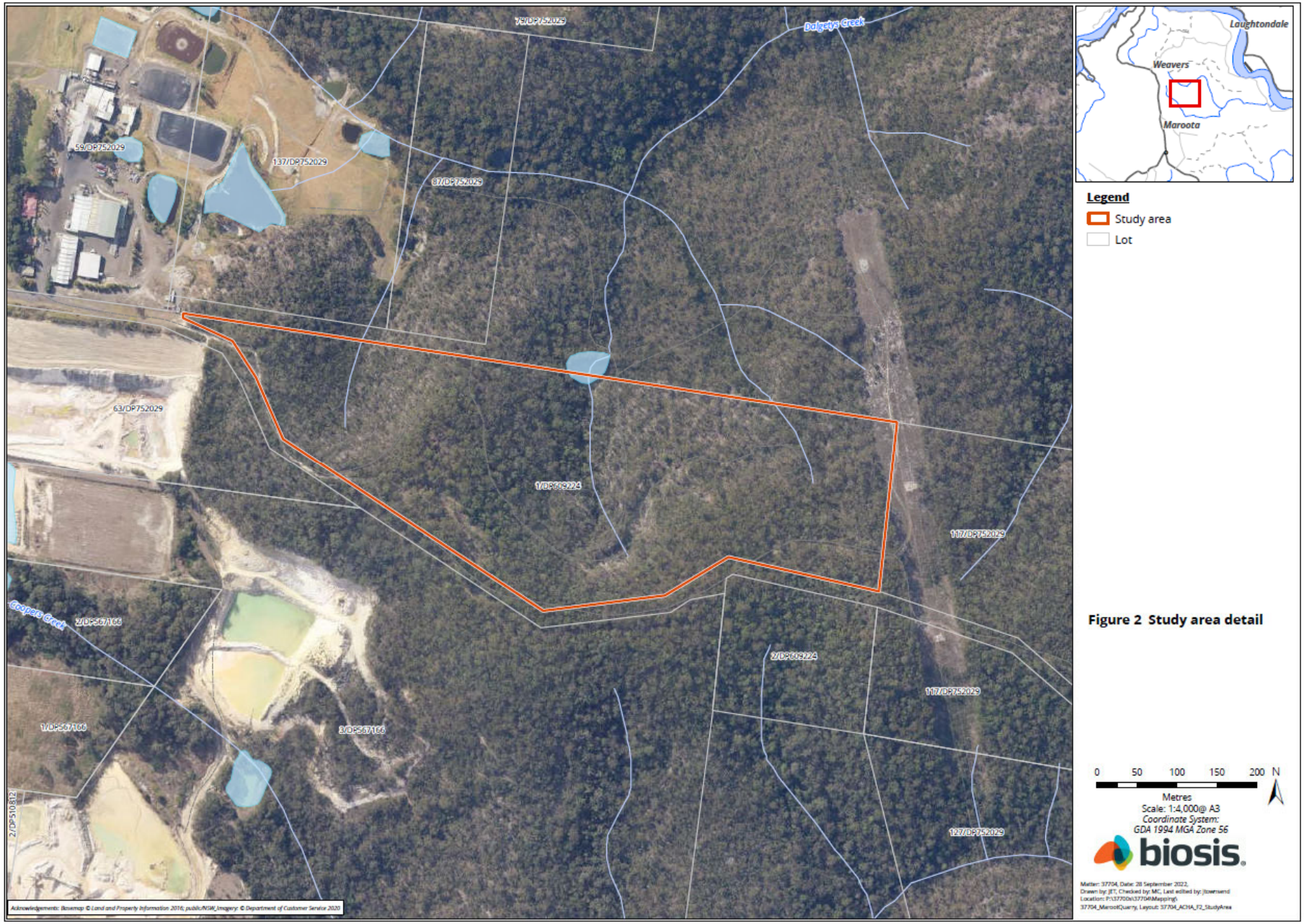
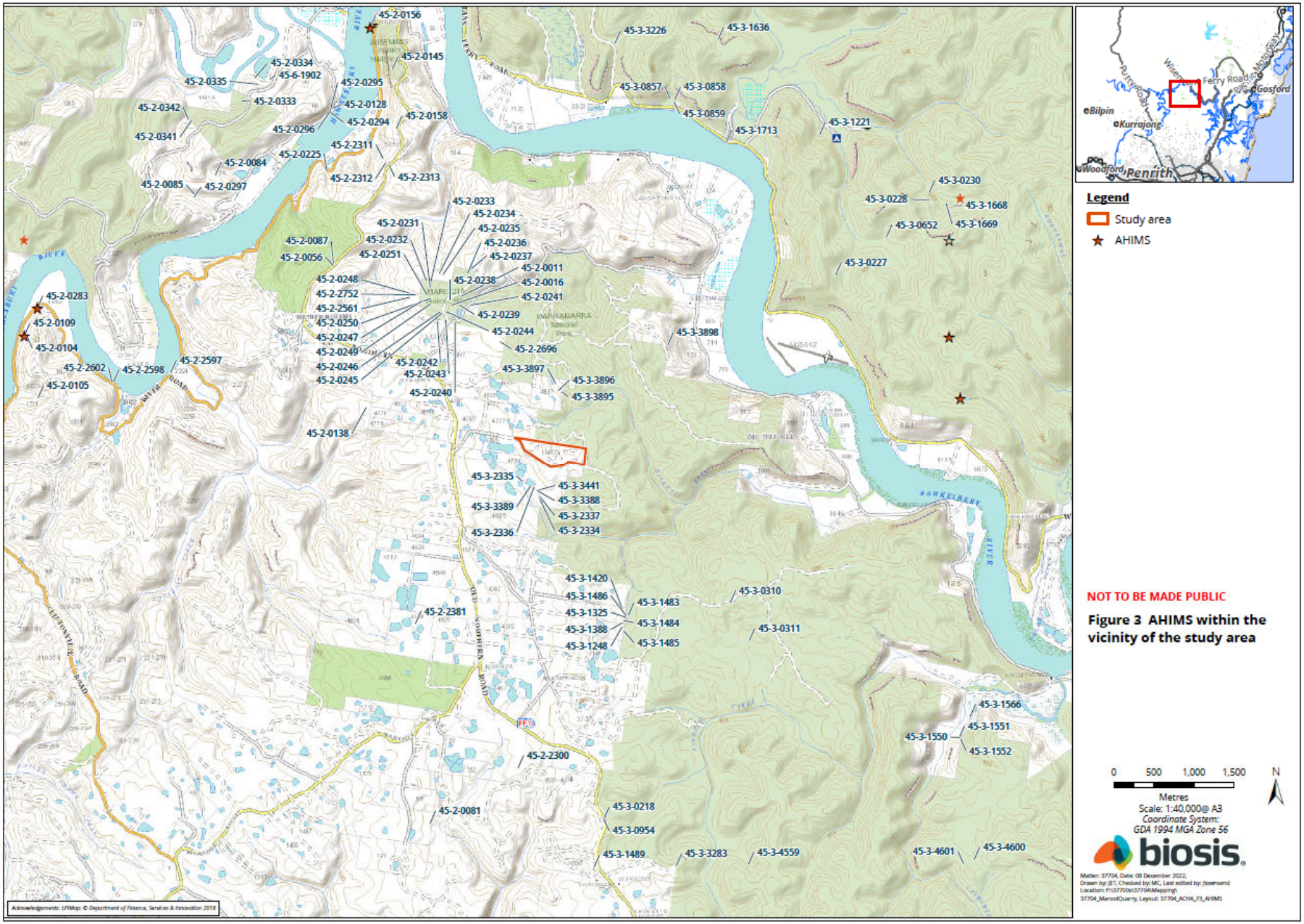


Figure 2 Study area detail


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- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

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This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

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- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

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Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

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Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

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- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
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Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

Artefact Heritage 2018. *Rezoning and subdivision of 109 Darkes Road, Kembla Grange*, Report to NewQuest Property Pty Ltd.

Biosis Pty Ltd 2015. *Lot 1, DP 825516, Farmborough Heights NSW. Aboriginal Cultural Heritage Assessment for Proposed Rezoning*, Report to Plannex Environmental Planning.

DECCW 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, New South Wales Government Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Tocomwall Pty Ltd
Scott Franks
Po box 145
Miranda NSW 1490

Dear Scott,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

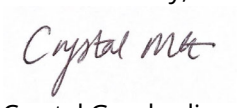
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
Archaeological test excavations (if required)	TBC	TBC
Information gathering	Continuous	N/A
Review of draft report	TBC	28 days review time allowed under the consultation guidelines.
Final report	TBC	TBC

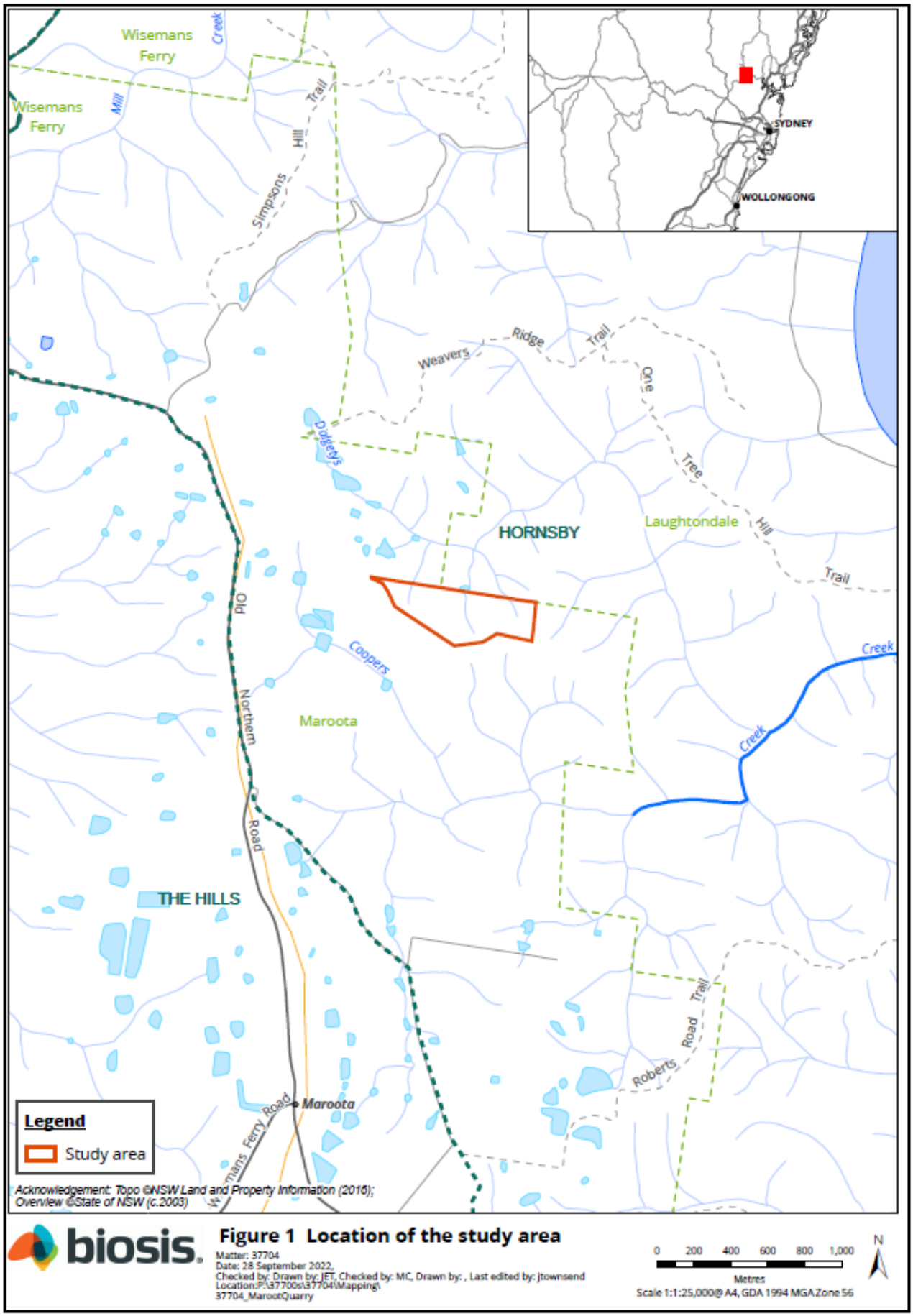
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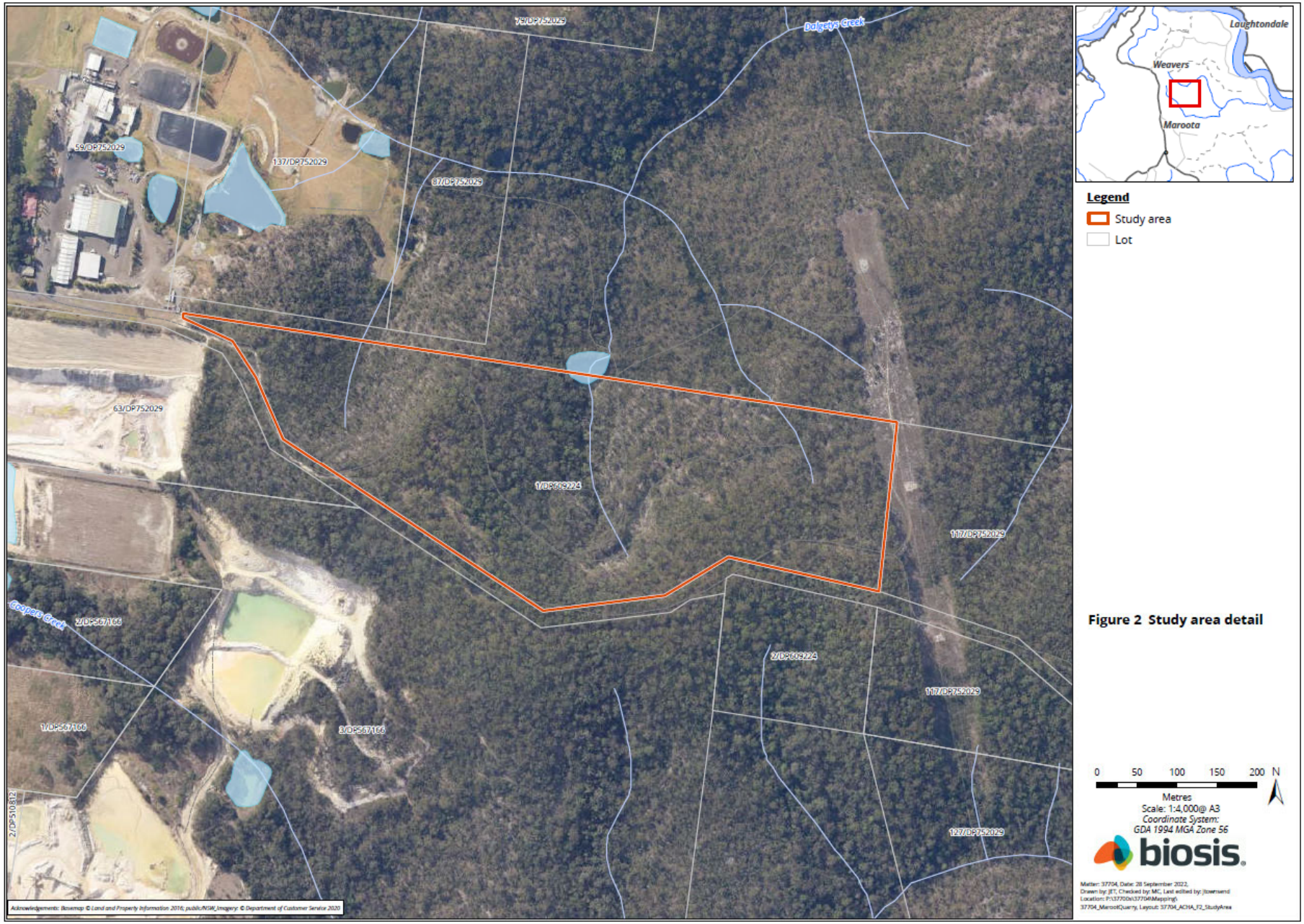
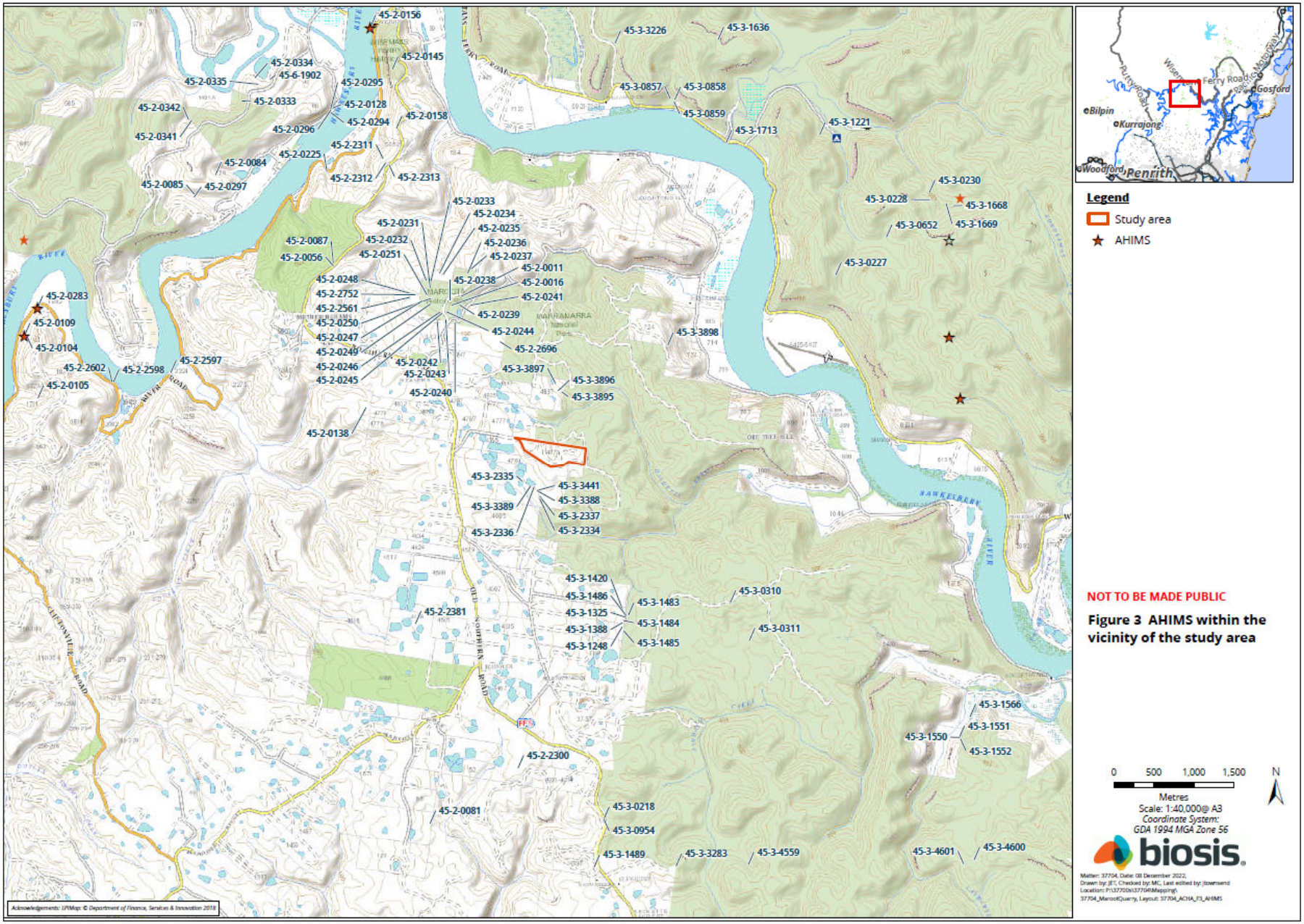


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The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

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Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

GUNYA ABORIGINAL CULTURAL HERITAGE SERVICES PTY LTD
Adam Gunther

Dear Adam ,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

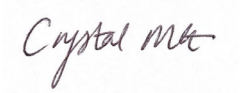
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
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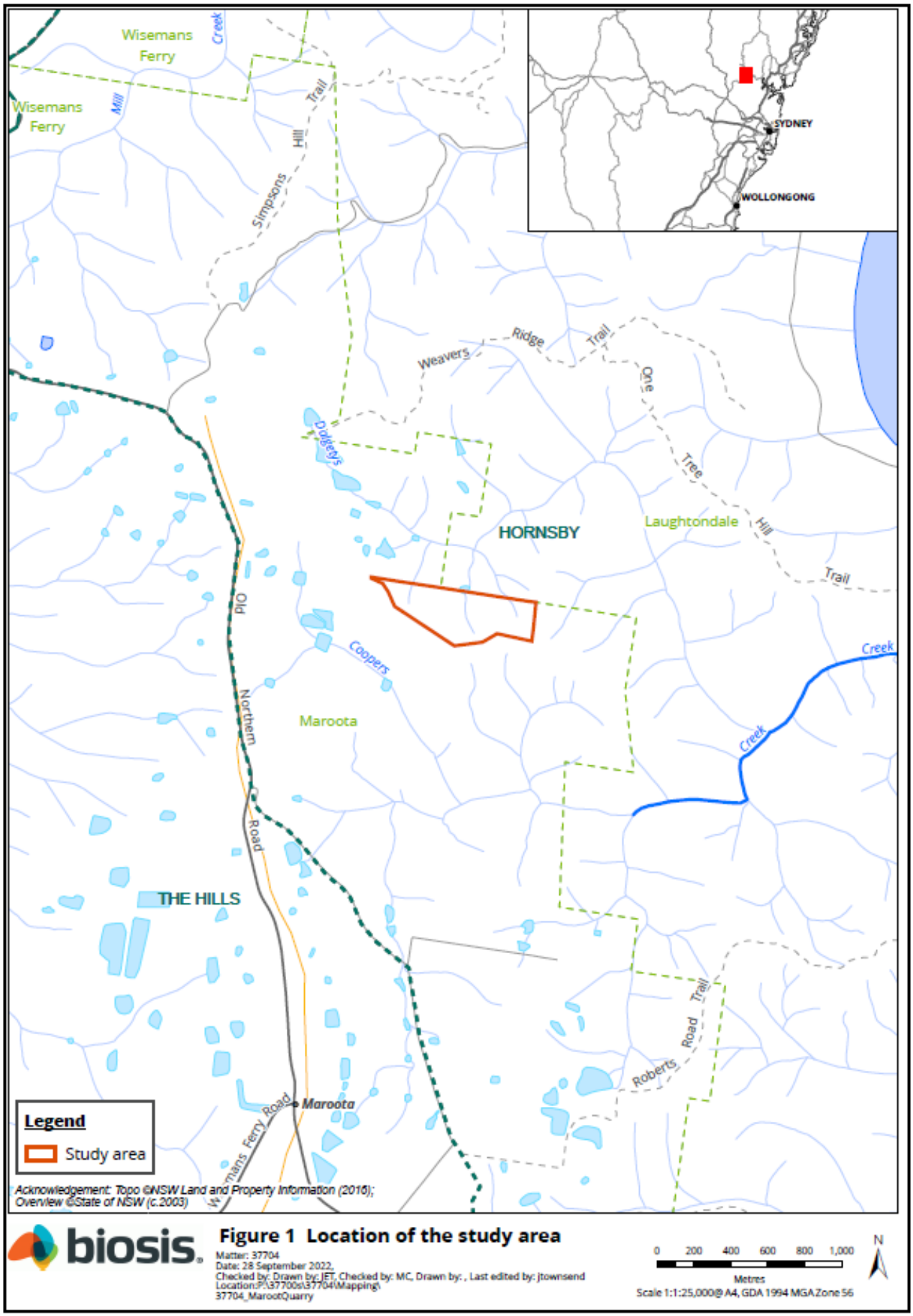
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Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

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- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


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Creek
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SYDNEY
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Weavers
Ridge
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Tree
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Trail
Dodeys
HORNSBY
Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56
N

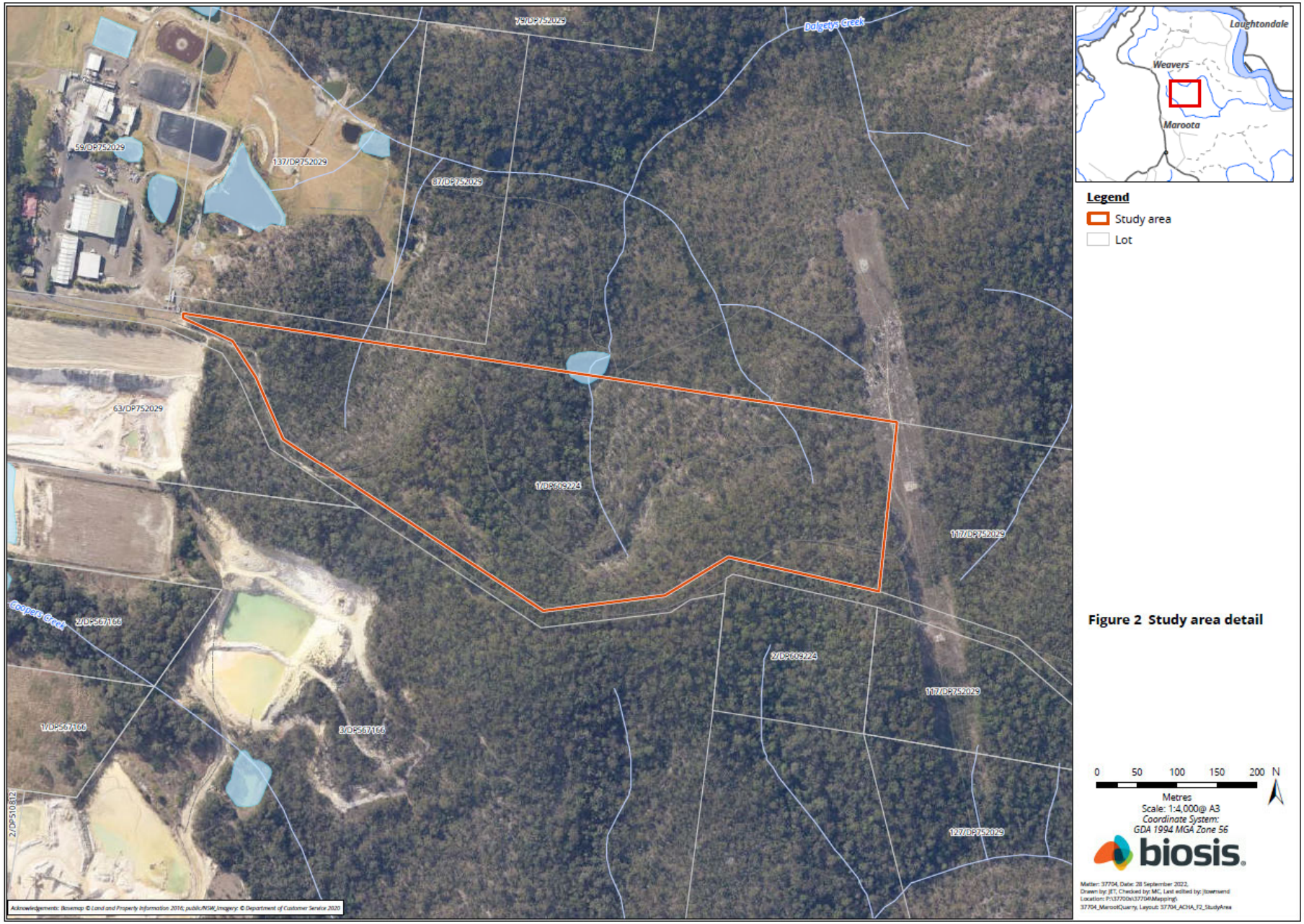
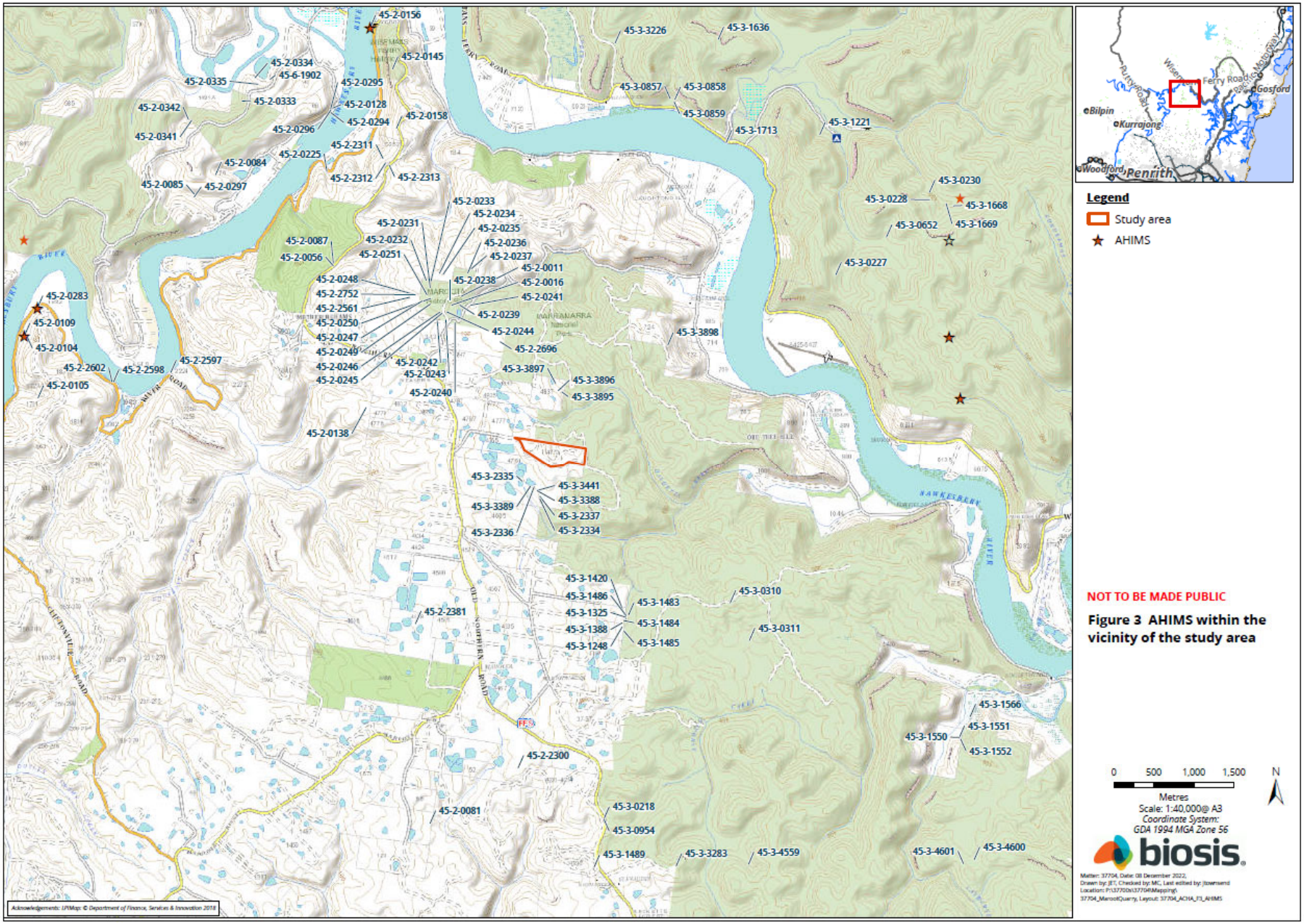


Figure 2 Study area detail


45-2-0156
45-3-3226
45-3-1636
45-2-0145
45-2-0334
45-6-1902
45-2-0335
45-2-0295
45-2-0333
45-2-0128
45-2-0342
45-2-0158
45-2-0294
45-2-0341
45-2-0296
45-2-2311
45-2-0225
45-2-0084
45-2-2312
45-2-2313
45-2-0085
45-2-0297
45-3-0857
45-3-0858
45-3-0859
45-3-1713
45-3-1221
45-3-0230
45-3-0228
45-3-1668
45-3-0652
45-3-1669
45-3-0227
45-2-0233
45-2-0234
45-2-0235
45-2-0231
45-2-0232
45-2-0236
45-2-0087
45-2-0056
45-2-0251
45-2-0237
45-2-0011
45-2-0248
45-2-0238
45-2-0016
45-2-2752
45-2-0241
45-2-2561
45-2-0239
45-2-0250
45-2-0244
45-3-3898
45-2-0247
45-2-0249
45-2-2696
45-2-0242
45-2-0246
45-2-0243
45-3-3897
45-3-3896
45-2-0245
45-3-3895
45-2-0240
45-2-0283
45-2-0109
45-2-0104
45-2-2602
45-2-2598
45-2-2597
45-2-0105
45-2-0138
45-3-2335
45-3-3441
45-3-3388
45-3-3389
45-2-2337
45-3-2336
45-3-2334
45-3-1420
45-3-1486
45-3-1483
45-3-0310
45-3-1325
45-2-2381
45-3-1484
45-3-1388
45-3-0311
45-3-1485
45-3-1248
45-3-1566
45-3-1551
45-3-1550
45-3-1552
45-2-2300
45-2-0081
45-3-0218
45-3-0954
45-3-1489
45-3-3283
45-3-4559
45-3-4601
45-3-4600
Ferry Road
Gosford
Bilpin
Kurrajong
Woodford
Penrith
Legend
Study area
AHIMS
NOT TO BE MADE PUBLIC
Figure 3 AHIMS within the vicinity of the study area
0
500
1,000
1,500
N
Metres
Scale: 1:40,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56
biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

Consultation with the Aboriginal community

This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

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As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

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20 January 2023

AHCS
Amanda Hickey

Dear Amanda ,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

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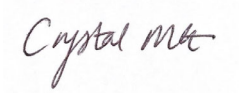
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Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

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RWC are in the process of preparing planning designs that include:

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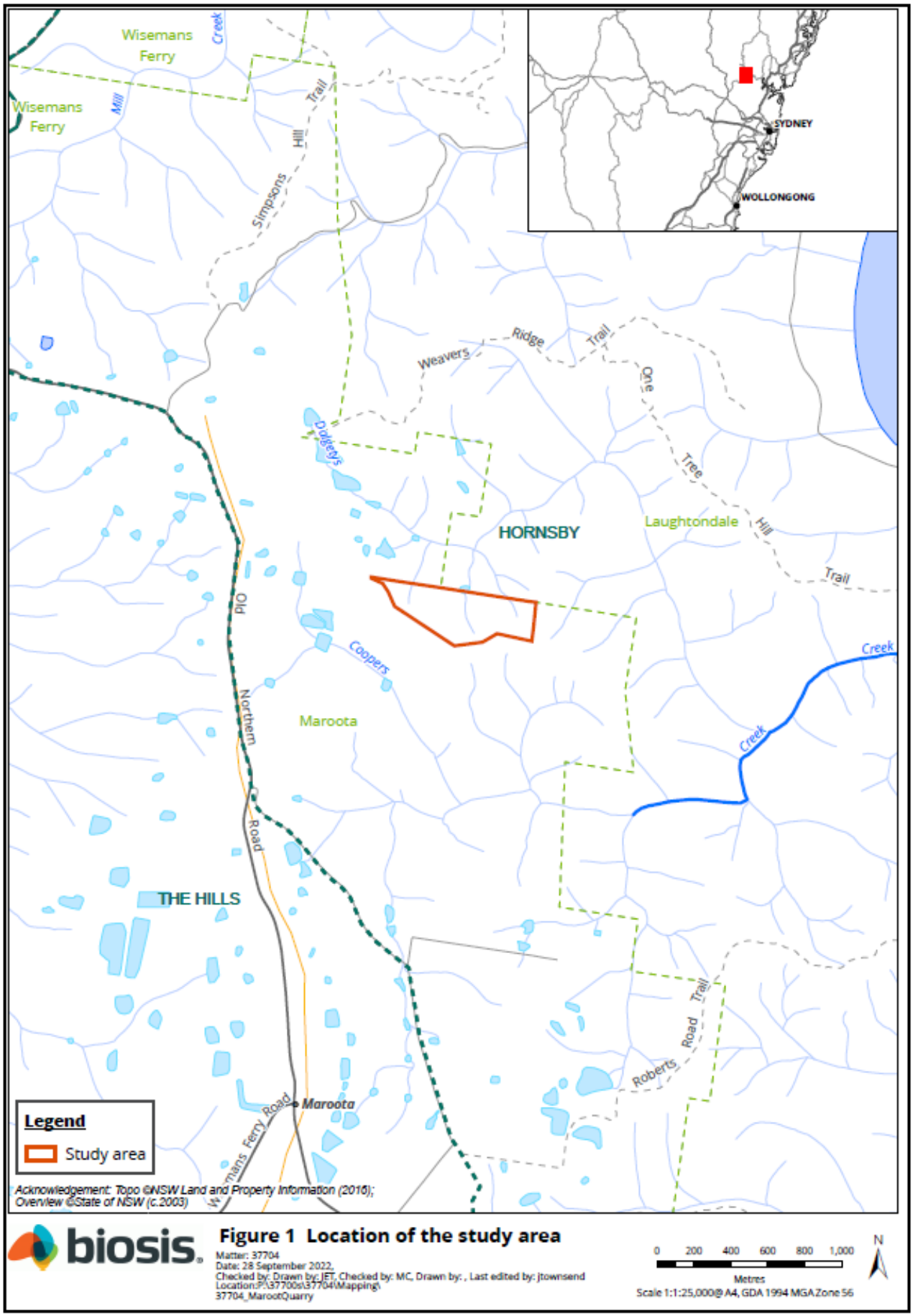
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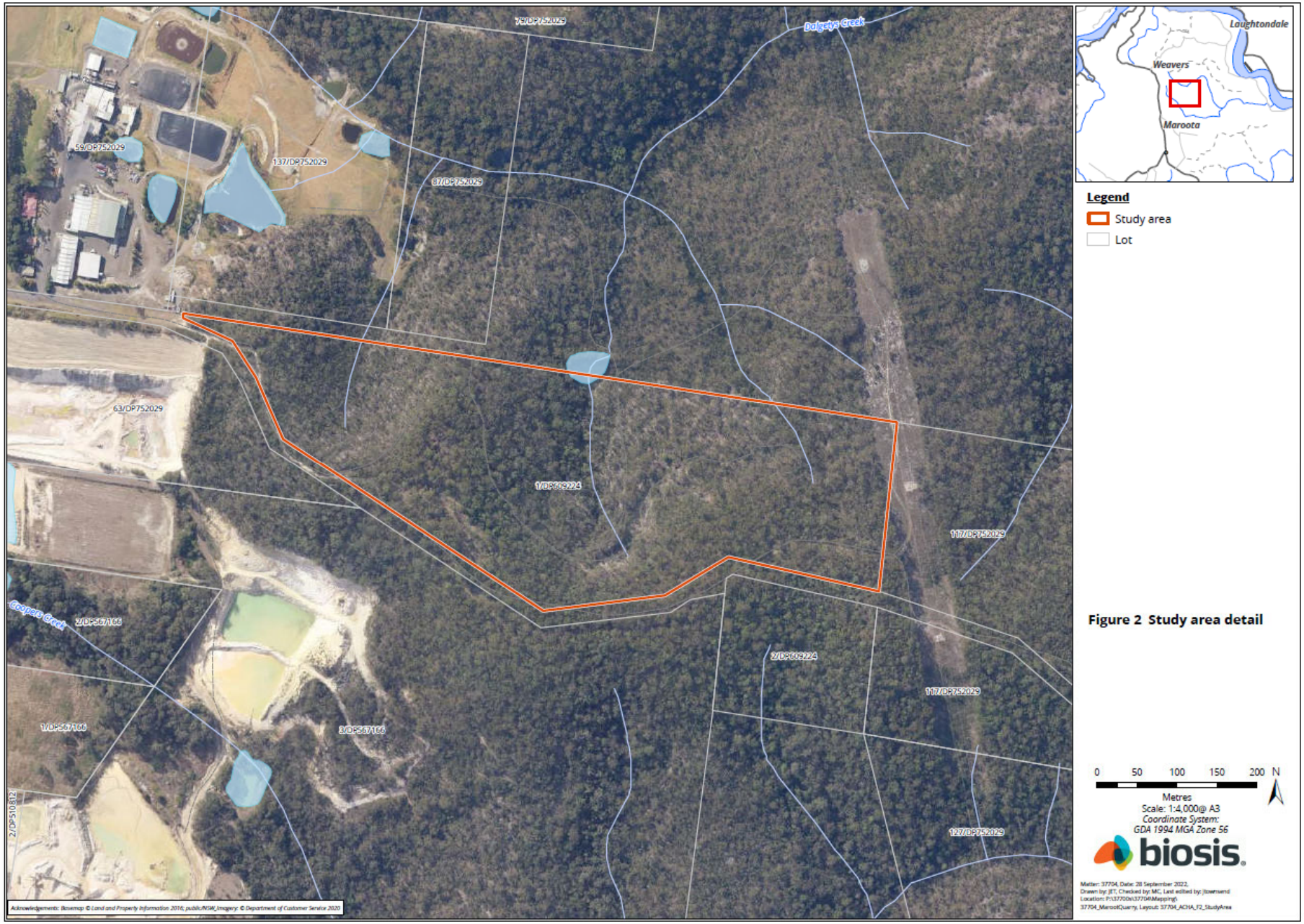
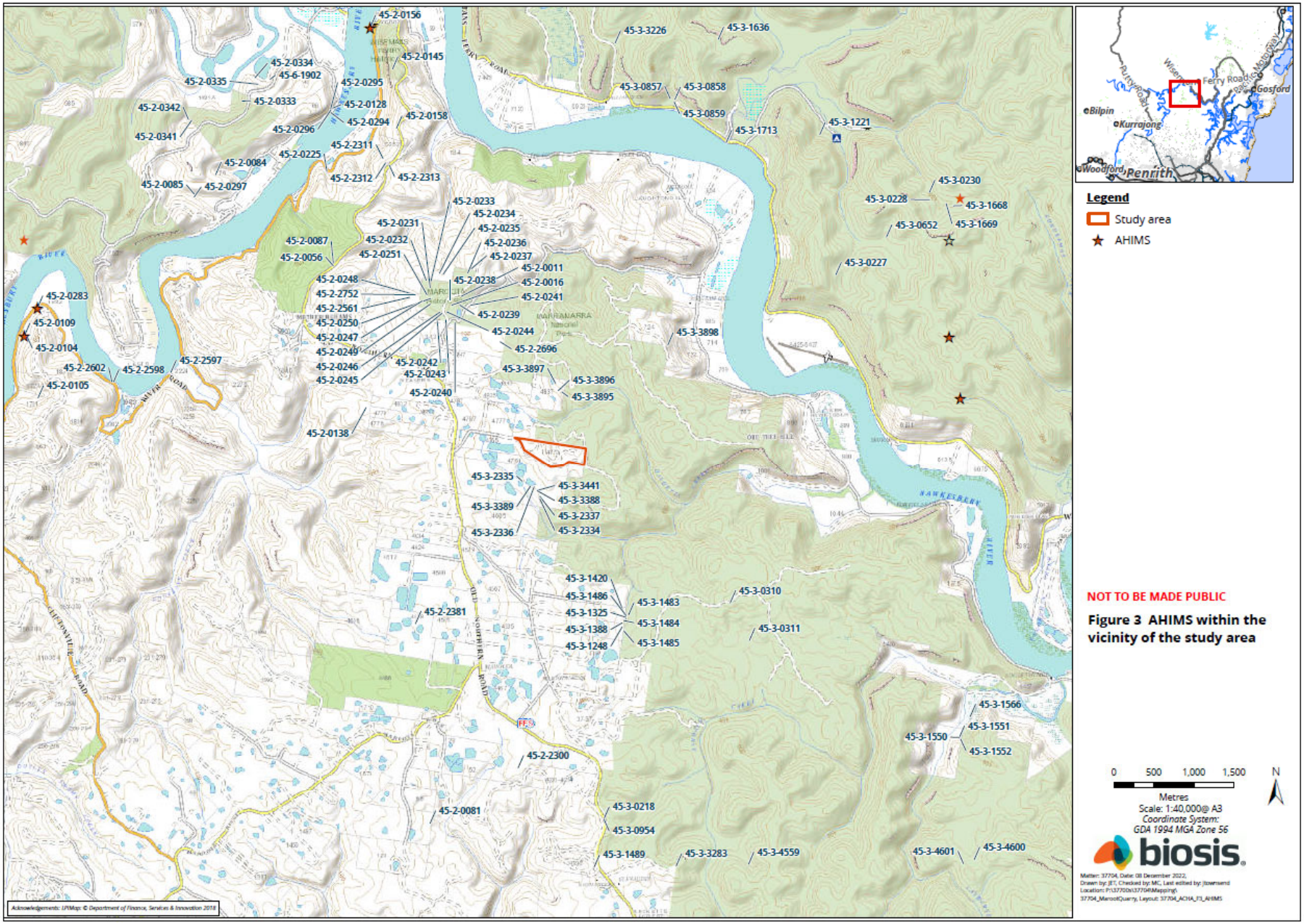


Figure 2 Study area detail


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biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
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- A summary of the historical uses of the study area will be developed.

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This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

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OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

A1 Indigenous Services
Carolyn Hickey
10 Marie Pitt Place
Glenmore Park NSW 2745

Dear Carolyn ,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

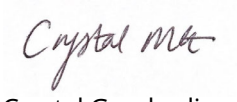
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
Archaeological test excavations (if required)	TBC	TBC
Information gathering	Continuous	N/A
Review of draft report	TBC	28 days review time allowed under the consultation guidelines.
Final report	TBC	TBC

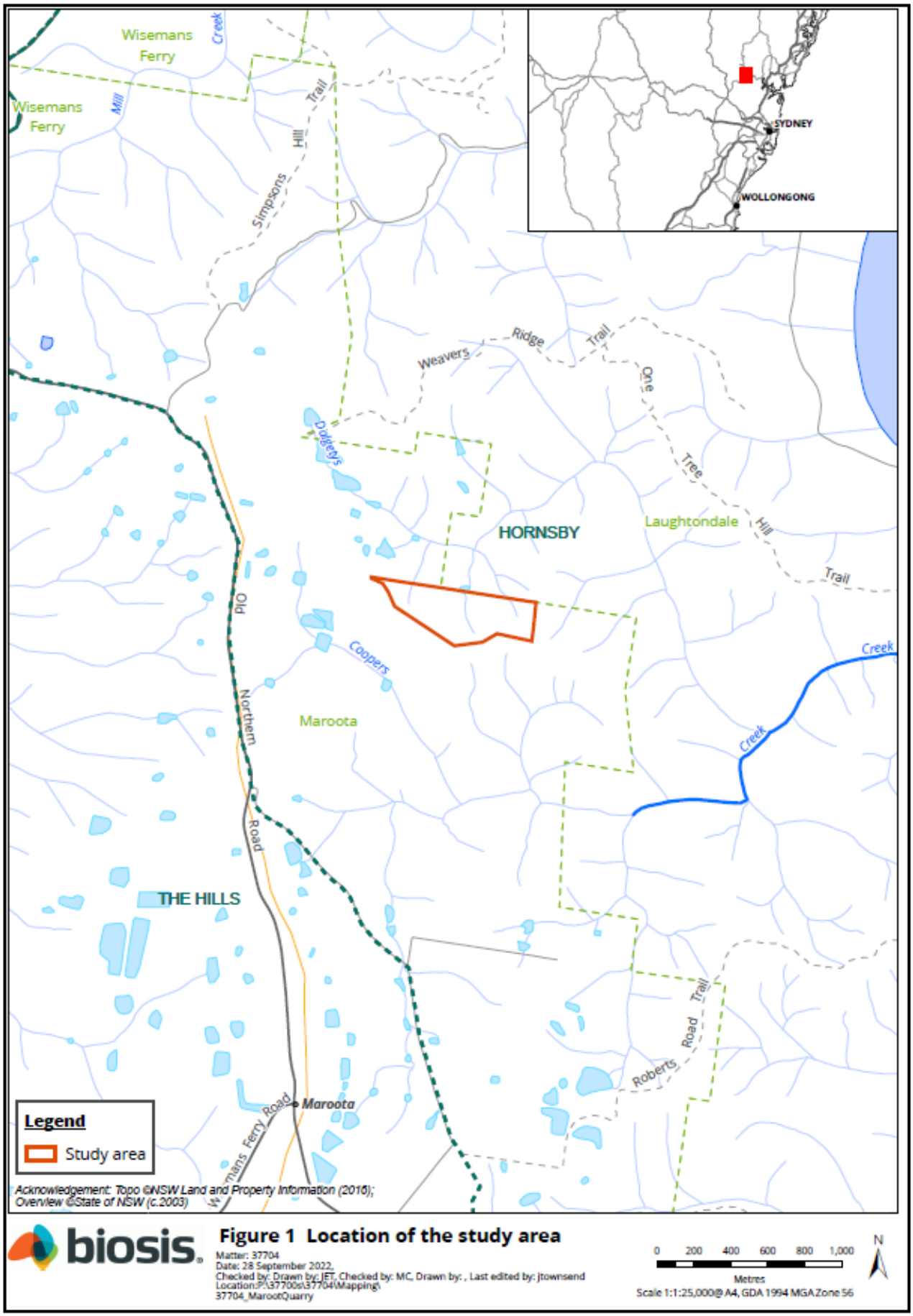
Responsibilities and roles

As part of the consultation process, RAPs will be provided the opportunity to offer input into regulatory processes, contribute to decision making by proponents and government authorities, respond to requests for cultural information and comment on draft reporting, as appropriate. This will be undertaken in accordance with their role specified in section 5 of the consultation requirements.

Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

- Displaying a meaningful appreciation, understanding and respect for the belief system, spiritual connection, and sense of belonging that Aboriginal people have to their land, people, and environment, which includes plants, animals, waterways, sacred sites and other places of cultural significance and importance.
- Upholding and respecting the traditional rights, obligations and responsibilities of Aboriginal people who hold cultural knowledge in accordance with traditional lore and custom, particularly as these relate to the cultural business of men and women.
- Encouraging active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process.
- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


Wisemans Ferry
Creek
Wisemans Ferry
Mill
Trail
Hill
Simpsons
SYDNEY
WOLLONGONG
Weavers
Ridge
Trail
One
Tree
Hill
Trail
Dodeys
HORNSBY
Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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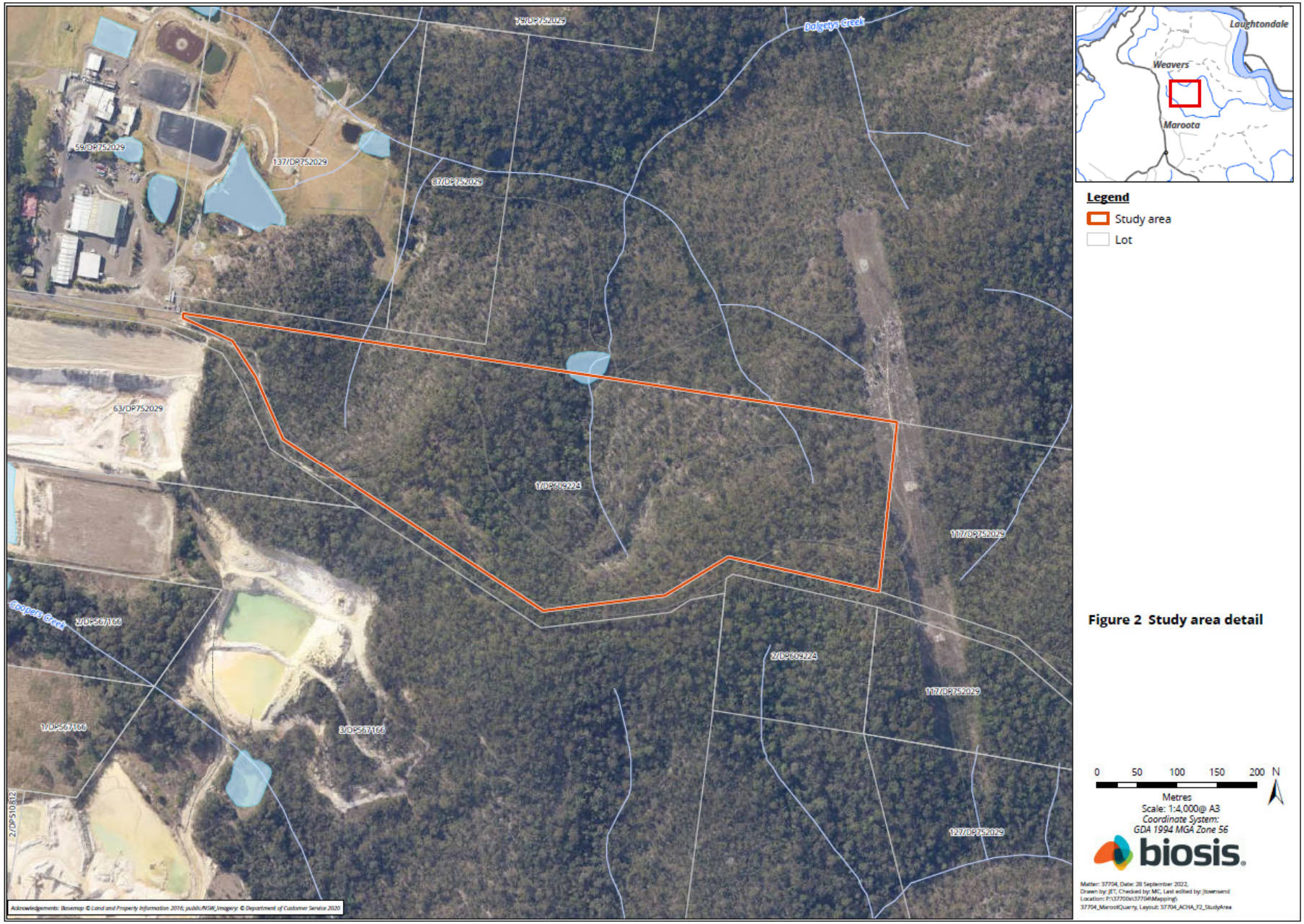
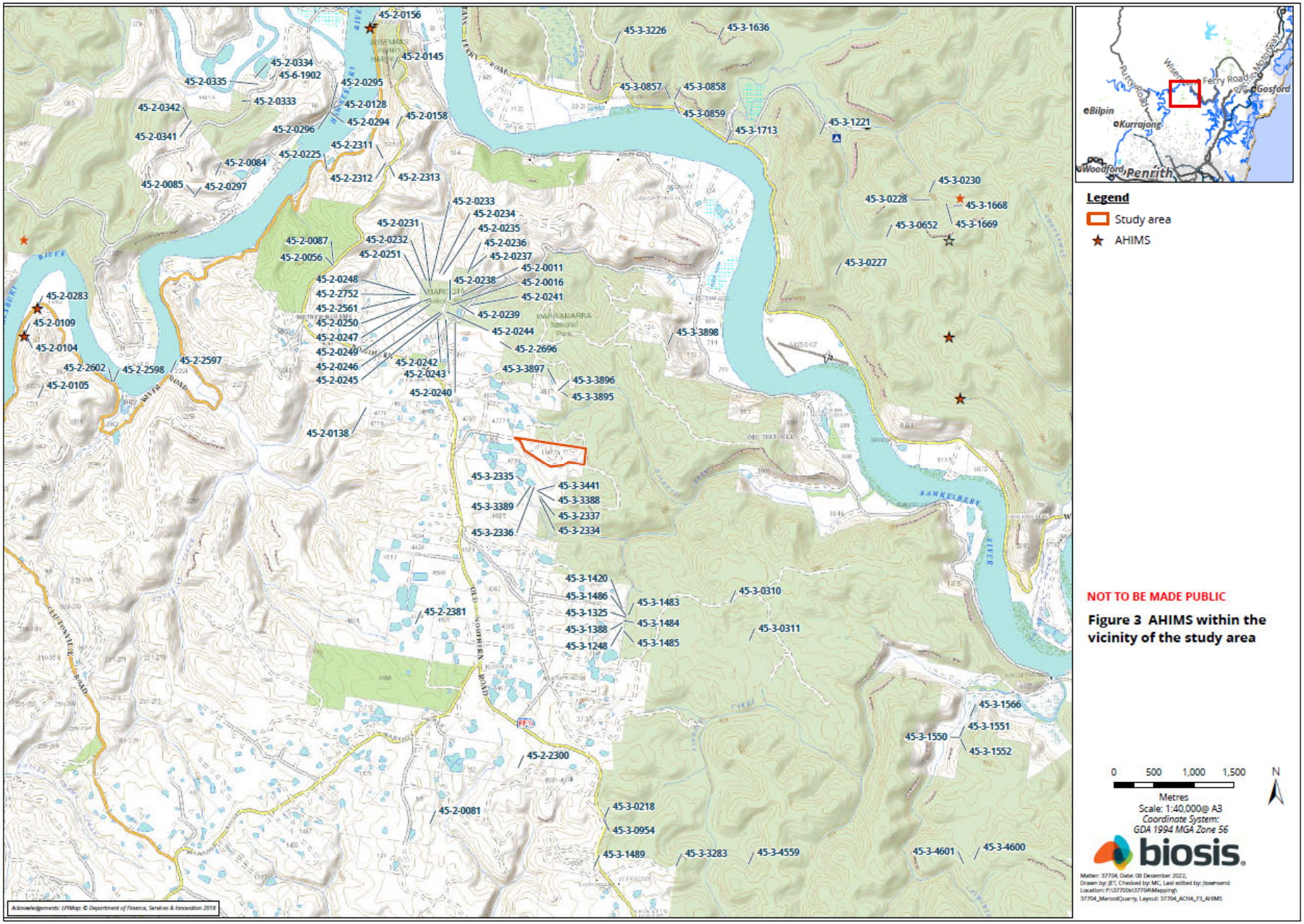


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20 January 2023

Woka Aboriginal Corporation
Steven Johnson
145 Carnarvon road
Schofields NSW 2762

Dear Steven,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

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The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

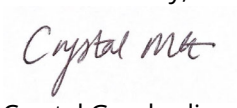
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
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Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

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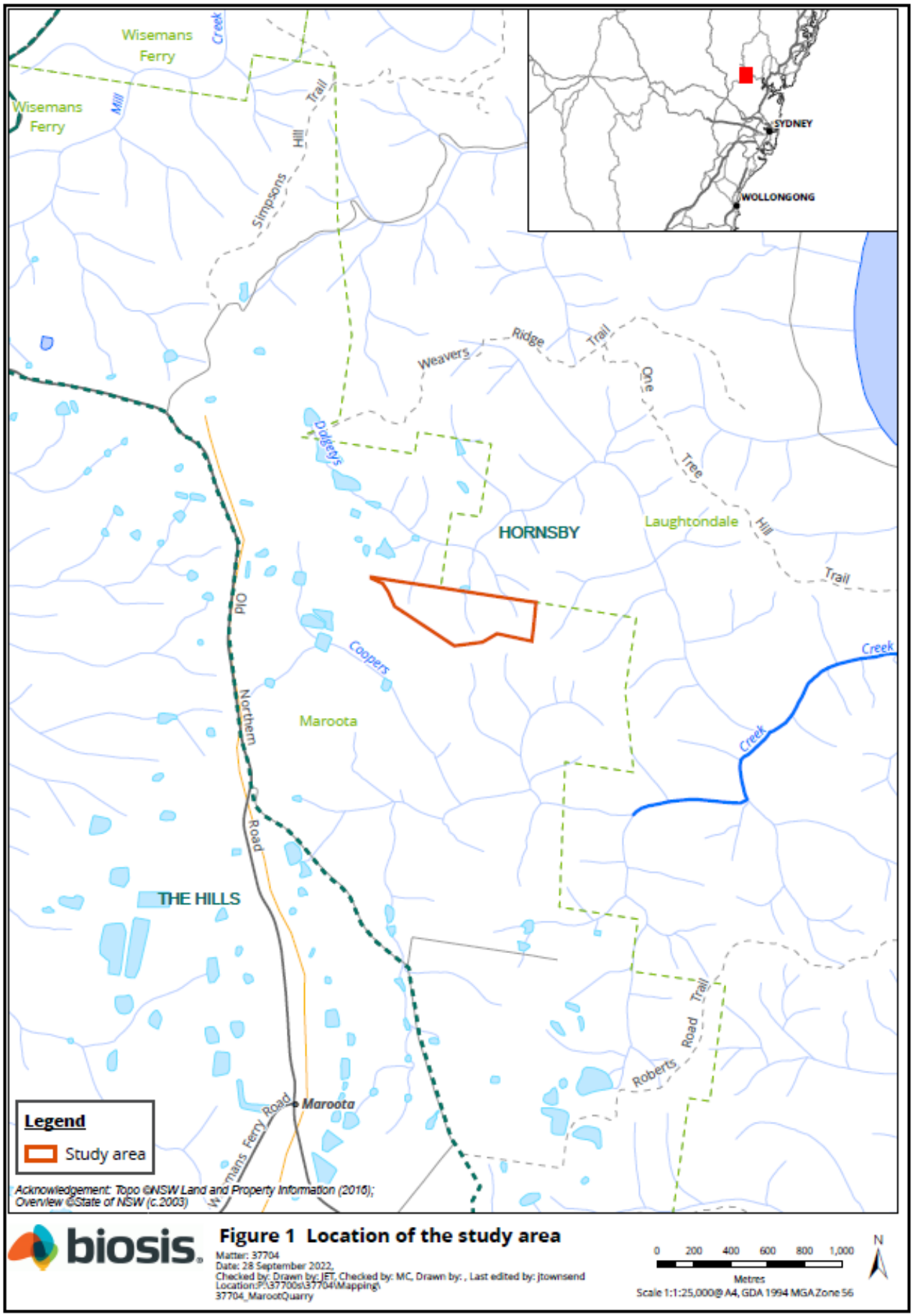
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Weavers
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Dodeys
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Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56
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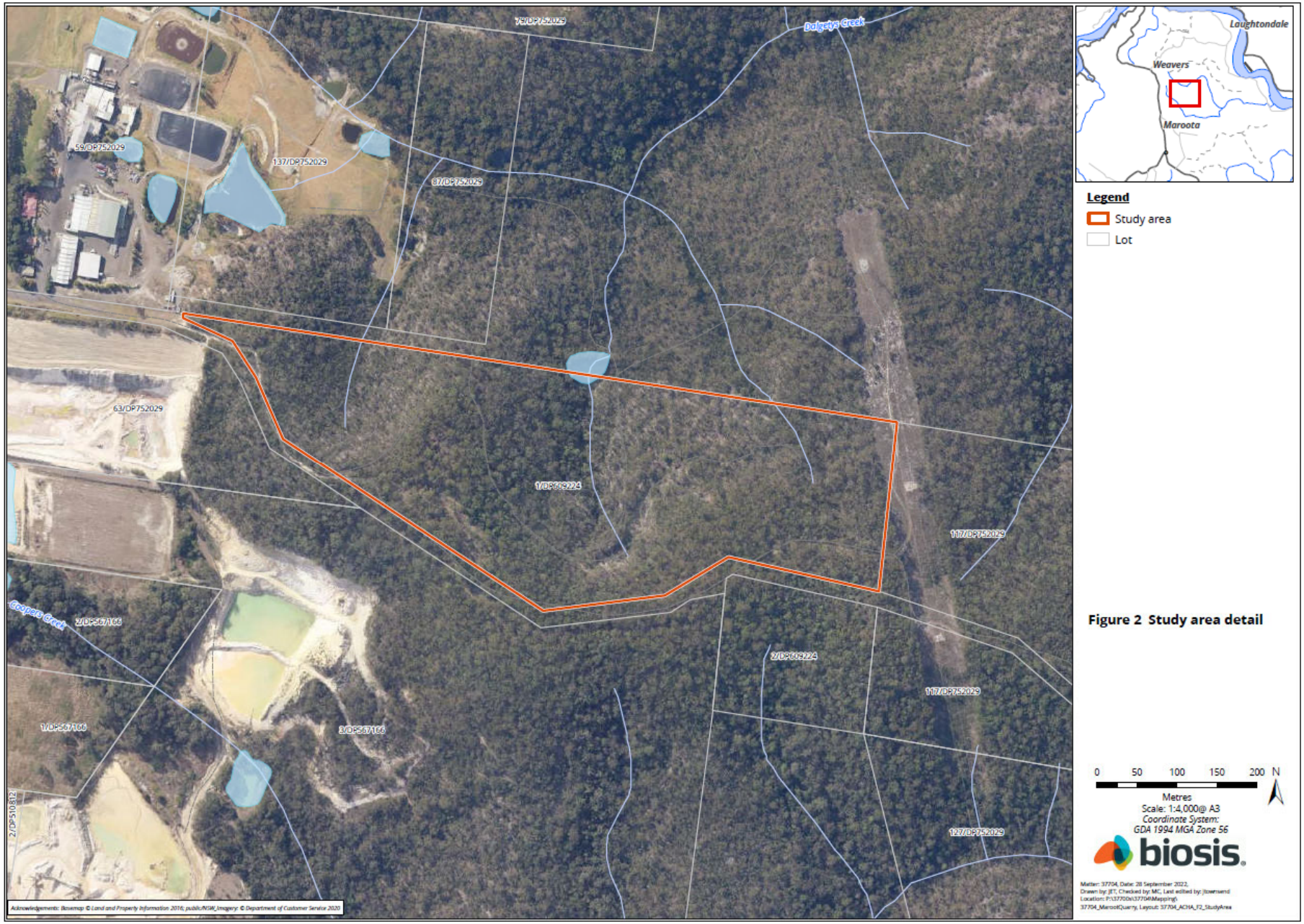
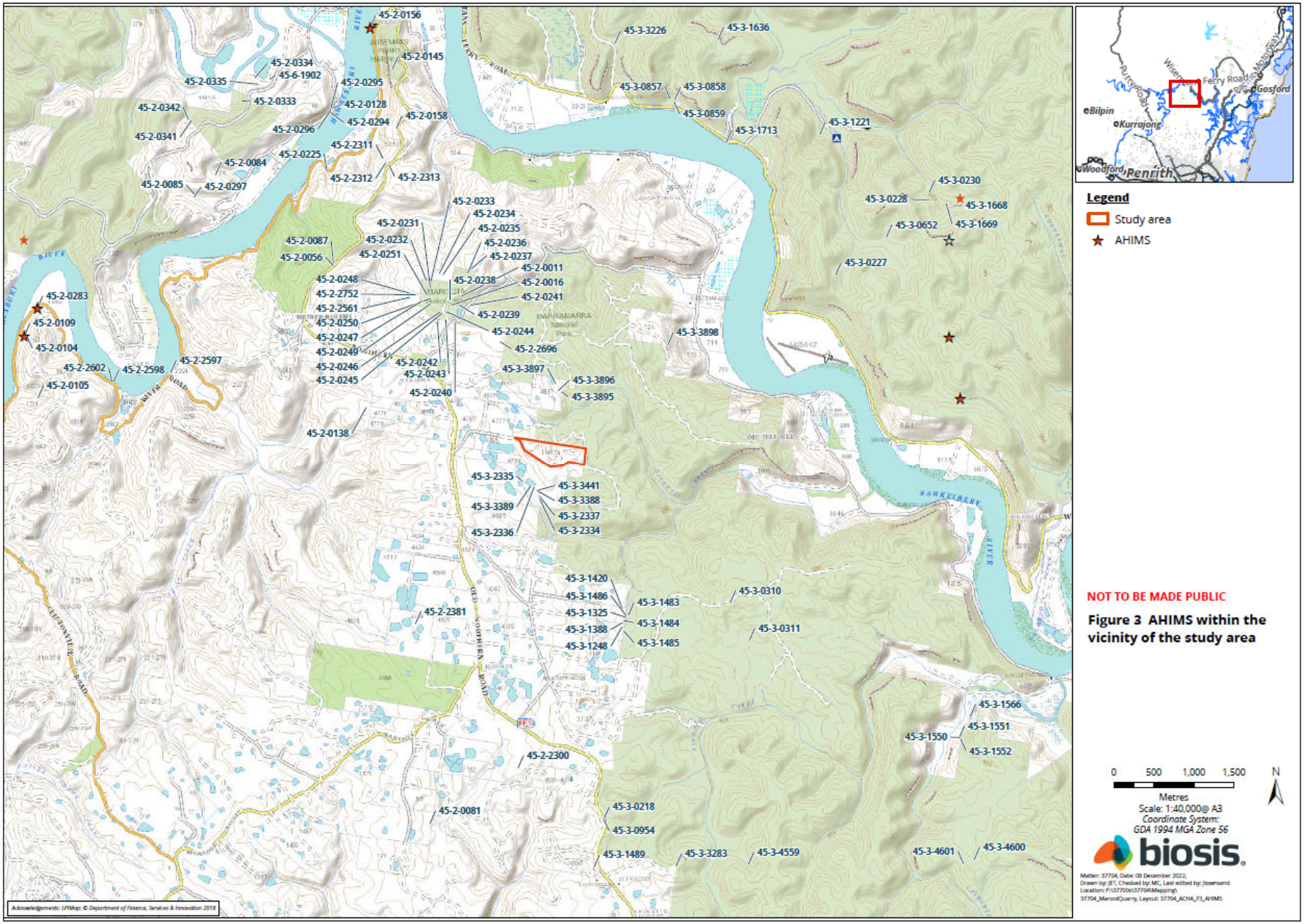


Figure 2 Study area detail


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45-3-3283
45-3-4559
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45-3-4600
Ferry Road
Gosford
Bilpin
Kurrajong
Woodford
Penrith
Legend
Study area
AHIMS
NOT TO BE MADE PUBLIC
Figure 3 AHIMS within the vicinity of the study area
0
500
1,000
1,500
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Metres
Scale: 1:40,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56
biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

Background research

This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

Consultation with the Aboriginal community

This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

Field investigation

Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

- Any resources that may potentially have been exploited by Aboriginal people.
- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

Artefact Heritage 2018. *Rezoning and subdivision of 109 Darkes Road, Kembla Grange*, Report to NewQuest Property Pty Ltd.

Biosis Pty Ltd 2015. *Lot 1, DP 825516, Farmborough Heights NSW. Aboriginal Cultural Heritage Assessment for Proposed Rezoning*, Report to Plannex Environmental Planning.

DECCW 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, New South Wales Government Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

Kamilaroi Yankuntjatjara Working Group
Phil Khan
78 Forbes Street
Emu Plains NSW 2750

Dear Phil,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

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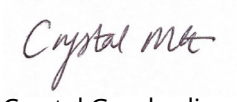
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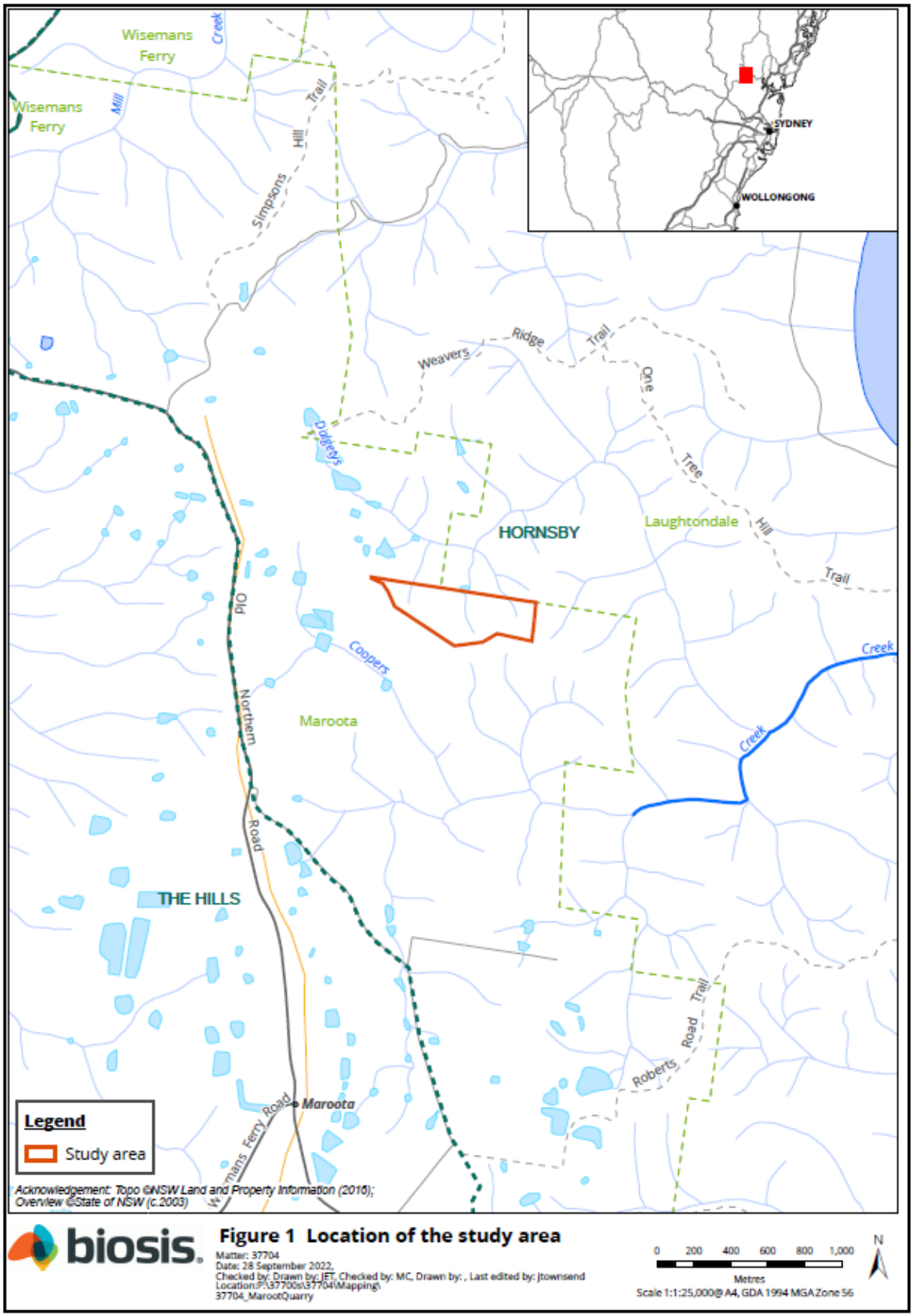
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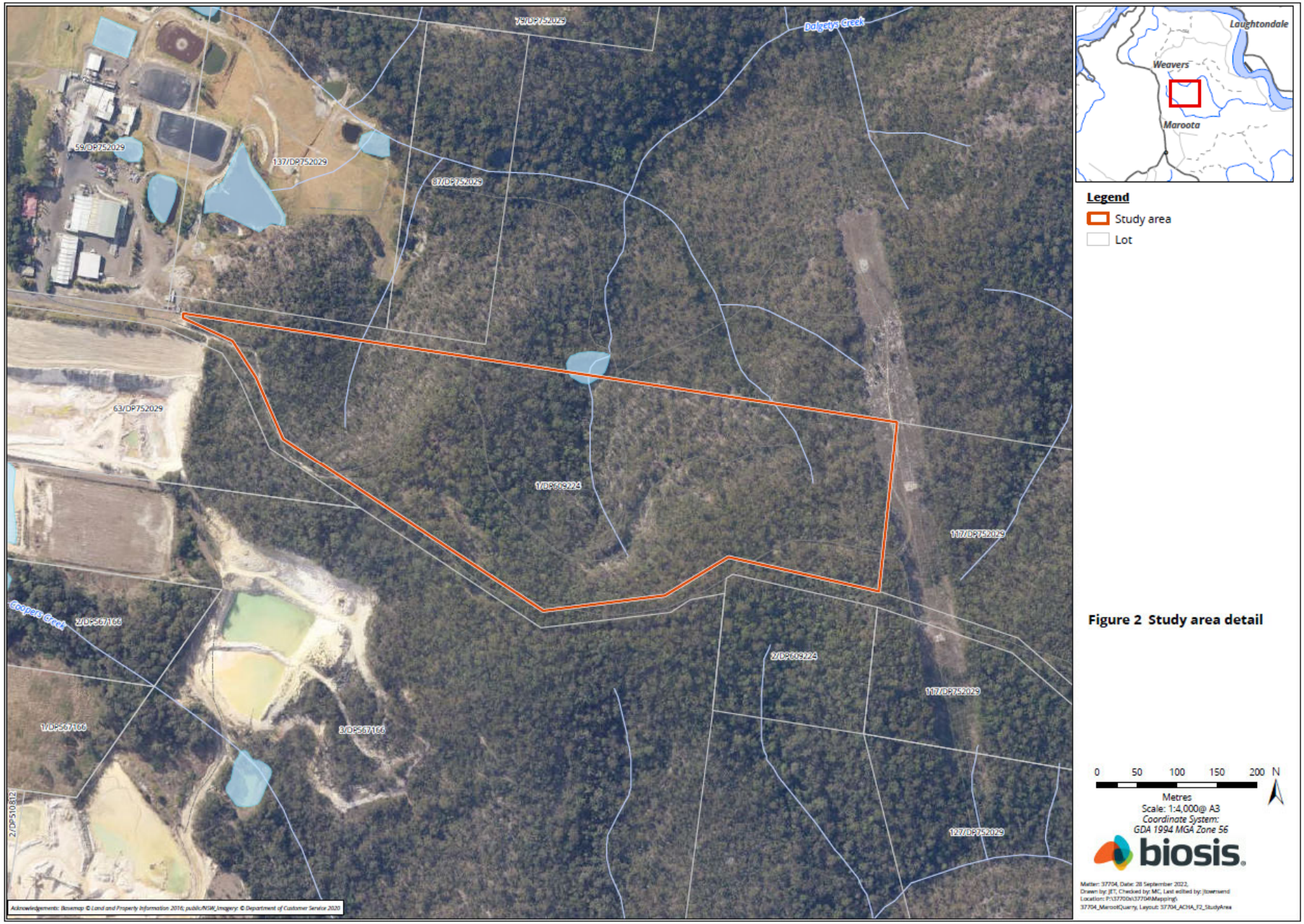
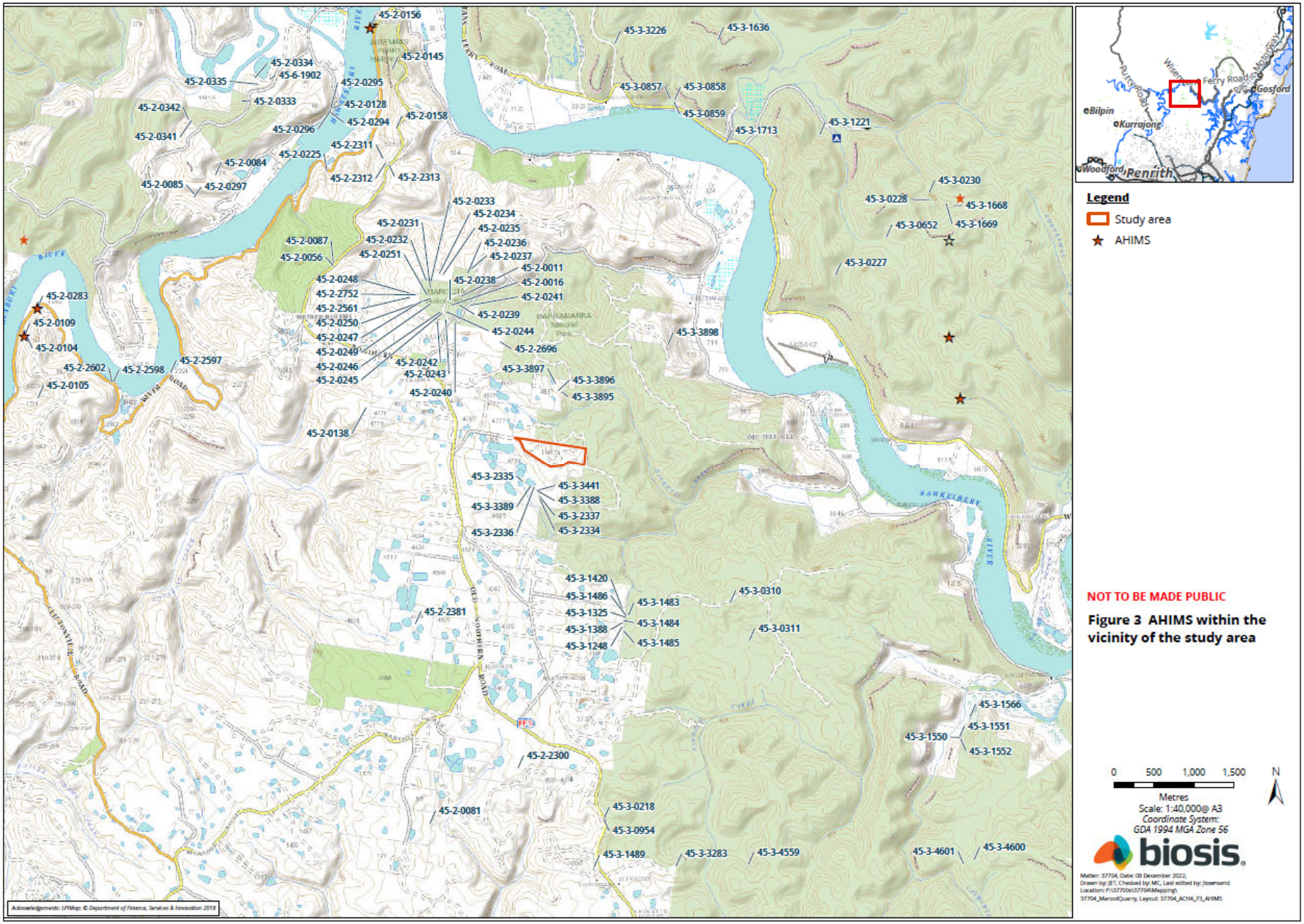


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45-3-0218
45-3-0954
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45-3-4559
45-3-4601
45-3-4600
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Study area
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NOT TO BE MADE PUBLIC
Figure 3 AHIMS within the vicinity of the study area
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1,000
1,500
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Metres
Scale: 1:40,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56
biosis

Stage 3 – Gathering information about cultural significance

The aim of Stage 3 of the consultation process is to facilitate a process where RAPs for the project can:

- Contribute to culturally appropriate information gathering and the research methodology.
- Provide information that will enable the cultural significance of Aboriginal objects and/or places in the proposed study area to be determined.
- Have input into the development of any cultural heritage management options (DECCW 2010a, p. 12).

The purpose of the stage 3 document below is to provide RAPs with information about the proposed ACHA methodology for the project, including the survey strategy and to seek feedback on the Aboriginal cultural values present within the study area.

The assessment methodology includes the following tasks:

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This task will identify known Aboriginal sites, areas of potential archaeological sensitivity and previous disturbance, and inform the predictive modelling for the assessment/study area. The following steps will be undertaken:

- A search of the AHIMS database will be completed to identify registered sites in the vicinity of the assessment/study area. The results of the AHIMS search will be used to obtain relevant site cards and relevant previously completed Aboriginal cultural heritage assessments.
- A review of relevant reports identified through the AHIMS search will be undertaken.
- A review of aerial photographs and other resources to gauge the existing landscape and previous history of land disturbance will be undertaken.
- A review of the historical heritage databases will be undertaken.
- A summary of the historical uses of the study area will be developed.

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This task will provide the Aboriginal community with the opportunity to participate in decisions regarding the management of their cultural heritage by providing proponents information regarding cultural significance and opportunities to input into management options.

Aboriginal community consultation will be undertaken in accordance with the consultation requirements, which includes:

- COMPLETED. Biosis ascertained the names of Aboriginal people or groups who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/ or places within the study area.

- COMPLETED. Aboriginal stakeholders were provided with notification by letter of the project on 20 December 2022 via Biosis on behalf of RWC and given the opportunity to be involved in consultation.
- This document outlines the details of the project and proposed archaeological testing methodology. If required. The RAPs must be given an opportunity to review and provide feedback to the proponent within a minimum of 28 days of Biosis providing the methodology document.
- The draft ACHA report and AR will be provided to all RAPs for comment – the proponent must allow 28 days for comment. All comments and correspondence sent and received regarding the project will be included in the final report in an appendix.

Culturally sensitive material

Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.

Cultural information provided will be recorded in the Aboriginal consultation log and discussed in the report. If the information is regarded as too sensitive to be made public, then RAPs should advise Biosis and identify the nature of the sensitivity. Biosis will then arrange for the recording of the information in accordance with its sensitivity. Documents which hold sensitive information will clearly list, on the front cover, who can have access to the document. These documents will be stored securely.

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Recording during the field investigation will follow requirements 5 to 10 of the Code and industry best practice. Information recorded will include:

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- Aboriginal objects or sites present in the study area during the investigation.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Survey coverage.
- Landforms.

Where possible, Identification of natural soil deposits within the study area will be undertaken. Representative photographs of survey units, landform, vegetation coverage, ground surface visibility will be undertaken.

Detailed results of the field investigation will be provided in the draft ACHA report and AR.

Reporting

Biosis will prepare an ACHA and AR for the project. The ACHA will document the findings of the assessment and detail the consultation process. The AR will be included as an appendix to the ACHA and will document the desktop assessment, field investigation, and test excavation results.

The main aim of the report is to document the assessment of potential development related impacts to Aboriginal cultural heritage and to formulate strategies to manage these impacts. Reporting will follow the guidelines of Heritage NSW, in particular the consultation requirements, the Code, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The ACHA report will contain:

- Details of the Aboriginal consultation process undertaken as part of the assessment.
- A review and summary of the Aboriginal archaeological context of the study area.
- Maps detailing any Aboriginal sites identified during the assessment process.
- A review and summary of the environmental context of the study area.
- Archaeological test excavation results.
- Aboriginal site significance assessment.
- Management strategies.
- Impact assessment.

The RAPs will be provided with the draft ACHA report and AR, and their comments on the report content sought. Comments on the report's content are to be provided to Biosis by the party's respective nominated spokesperson(s). All comments not provided in writing will be recorded in an informal logbook by Biosis. These comments and responses to these comments will be documented in the final ACHA.

As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

The final report will incorporate all comments and will be forwarded on to RAPs once completed.

References

AMBS 2006. *Volume 1: Aboriginal Heritage Management Plan: West Dapto Release Area*, An unpublished report to Wollongong City Council.

Artefact Heritage 2018. *Rezoning and subdivision of 109 Darkes Road, Kembla Grange*, Report to NewQuest Property Pty Ltd.

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DECCW 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011., Office of Environment and Heritage, Department of Premier and Cabinet, Sydney NSW.

Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

20 January 2023

RAW Cultural Healing
Raymond Weatherall

Dear Raymond,

RE: Stage 2 and 3 Aboriginal Community Consultation – Maroota Central Civil Quarry Project, Maroota

Our Ref: Matter 37704

Thank you for registering your interest in the Maroota Central Civil Quarry (MCCQ) Project. Biosis Pty Ltd (Biosis) is currently undertaking an Aboriginal Cultural Heritage Assessment (ACHA) for RW Corkery & Co Pty Ltd (RWC) to inform the development and future operation of MCCQ and to support Development Applications (DA's) to The Hills Shire Council to develop and operate the sandstone quarry at 4773 Old Northern Road (Lot 1 DP609224), Maroota, New South Wales (NSW) (the study area). The proposed development will comprise of a small-scale extraction operation to produce up to 50,000 tonnes per annum (tpa) of sandstone logs and related product. The project involves upgrades of site access and infrastructure.

The purpose of the ACHA is to determine the impacts the proposed development will have on any Aboriginal heritage values present within the study area. The ACHA will also assist RWC in modifying their design to minimise the impacts the works will have on Aboriginal heritage values. The following project information and assessment methodology has been provided in accordance with section 4.2 and section 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (consultation requirements). The aim of this letter is to provide you with information about the project, and the proposed ACHA process and to seek your feedback to inform the ACHA.

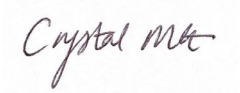
It would be appreciated if you would provide feedback on the project information and methodology presented in this letter to Biosis by **5:00pm 22 February 2023** either by email, phone or return mail.

Please address feedback to:

Crystal Garabedian
Biosis Pty Ltd, 14/17-27 Power Avenue, Alexandria
cgarabedian@biosis.com.au

Please do not hesitate to contact me if you require additional information or have any queries about the methodology or information provided.

Yours sincerely,



Crystal Garabedian
Archaeologist

Stage 2 – Project information

The aim of the Stage 2 document is to provide Registered Aboriginal Parties (RAPs) with information about the scope of the project, and the proposed cultural heritage assessment process, and to seek their feedback on the project.

The project

RWC are in the process of preparing planning designs that include:

- An estimated area of impact between 2.5 hectares and 4 hectares.
- Upgrades to existing infrastructure.
- Upgrades to site access.

Biosis has been engaged by RWC to undertake the ACHA to support the DA and to inform the proposed works for the study area. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS). The ACHA will be prepared in accordance with *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). It includes an Archaeological Report (AR) prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) (the Code) and consultation with Aboriginal community in accordance with the consultation requirements. The ACHA will inform RWC of the potential for the project to impact on or expose Aboriginal objects or sites. Biosis will provide recommendations based on the outcomes of the ACHA.

Study area

The study area encompasses 4773 Old Northern Road (Lot 1 DP609224), Maroota, NSW. The proposed disturbance area is yet to be defined; however, it is anticipated to be between 2.5 and 4 hectares. It is within the Hornsby Shire local government area (LGA) and is approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district (CBD) (Figure 1). The study area encompasses approximately 21.9 hectares of land (

Figure 2).

Background

The background research identified that the study area is situated within a complex hydrological system. Watercourses within the study area include three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 120 metres north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of the ninth-order perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area can be classed as an undulating slope, sloping towards a valley in the southern portion, with drainage depressions, crests and simple slopes located throughout. The presence of several floral and faunal resources along with the close proximity of the Hawkesbury River and the underlying Hawkesbury sandstone suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year-round. The geological formations present within the study area also indicate that rock shelters may be present within the study area. These rock shelters would have provided shelter from the elements. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in situ*.

Project schedule

The proposed schedule and time allocations for the consultation stages are summarised below.

Action	Timeframe	Potential constraints and limitations
Commencement of Aboriginal community consultation – advertising of project and notification to stakeholders	Completed	Project advertised in the *Hawkesbury Gazette* on 11 January 2023. Notices sent to identified Aboriginal parties 12 December November 2022.
Notices sent to identified Aboriginal parties	20/12/2022	N/A
Aboriginal stakeholder registration period	20/12/2022 to 17/01/2023	Registration period expired on 17 January 2023.
Field investigation	TBC	TBC
Archaeological test excavations (if required)	TBC	TBC
Information gathering	Continuous	N/A
Review of draft report	TBC	28 days review time allowed under the consultation guidelines.
Final report	TBC	TBC

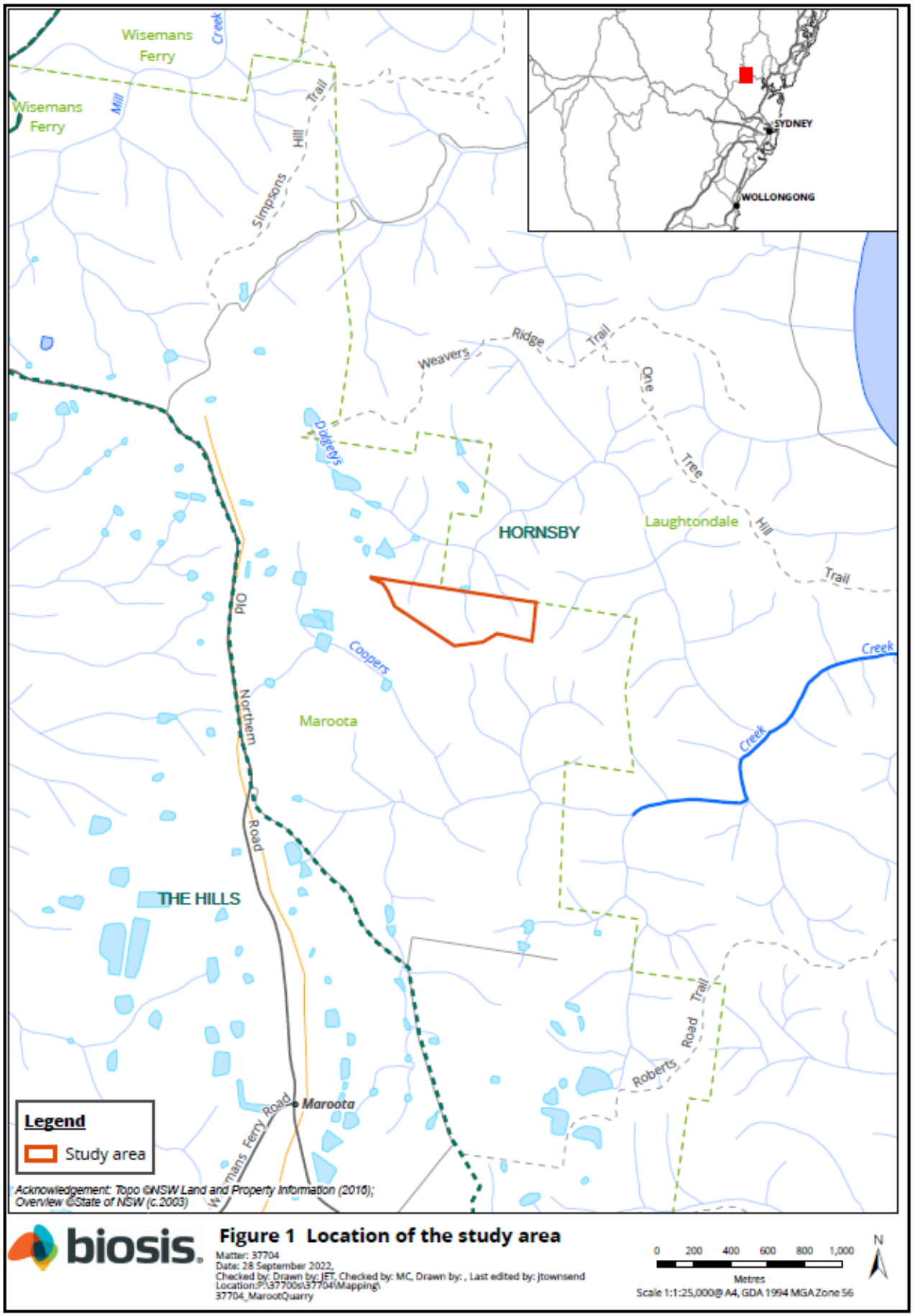
Responsibilities and roles

As part of the consultation process, RAPs will be provided the opportunity to offer input into regulatory processes, contribute to decision making by proponents and government authorities, respond to requests for cultural information and comment on draft reporting, as appropriate. This will be undertaken in accordance with their role specified in section 5 of the consultation requirements.

Biosis and the proponent, in accordance with their role under section 5 of the consultation requirements, will consult with the Aboriginal community by:

- Displaying a meaningful appreciation, understanding and respect for the belief system, spiritual connection, and sense of belonging that Aboriginal people have to their land, people, and environment, which includes plants, animals, waterways, sacred sites and other places of cultural significance and importance.
- Upholding and respecting the traditional rights, obligations and responsibilities of Aboriginal people who hold cultural knowledge in accordance with traditional lore and custom, particularly as these relate to the cultural business of men and women.
- Encouraging active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process.
- Encouraging opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process.
- Have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia.
- Supply suitable project information and provide the opportunity for Aboriginal stakeholders to provide input into the heritage management process (DECCW 2010a).

Each section of the ACHA methodology will be undertaken in consultation with the RAPs for the project. Biosis invites RAPs to provide culturally appropriate information via mail, email, or phone with regards to this project.


Wisemans Ferry
Creek
Wisemans Ferry
Mill
Trail
Hill
Simpsons
SYDNEY
WOLLONGONG
Weavers
Ridge
Trail
One
Tree
Hill
Trail
Dodeys
HORNSBY
Laughtondale
Old
Coopers
Creek
Northern
Road
Maroota
Creek
THE HILLS
Trail
Road
Roberts
Ferry Road
Maroota
Legend
Study area
Acknowledgement: Topo ©NSW Land and Property Information (2016); Overview ©State of NSW (c.2003)
biosis
Figure 1 Location of the study area
Matter: 37704
Date: 28 September 2022,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\37704_MarootQuarry
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Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56
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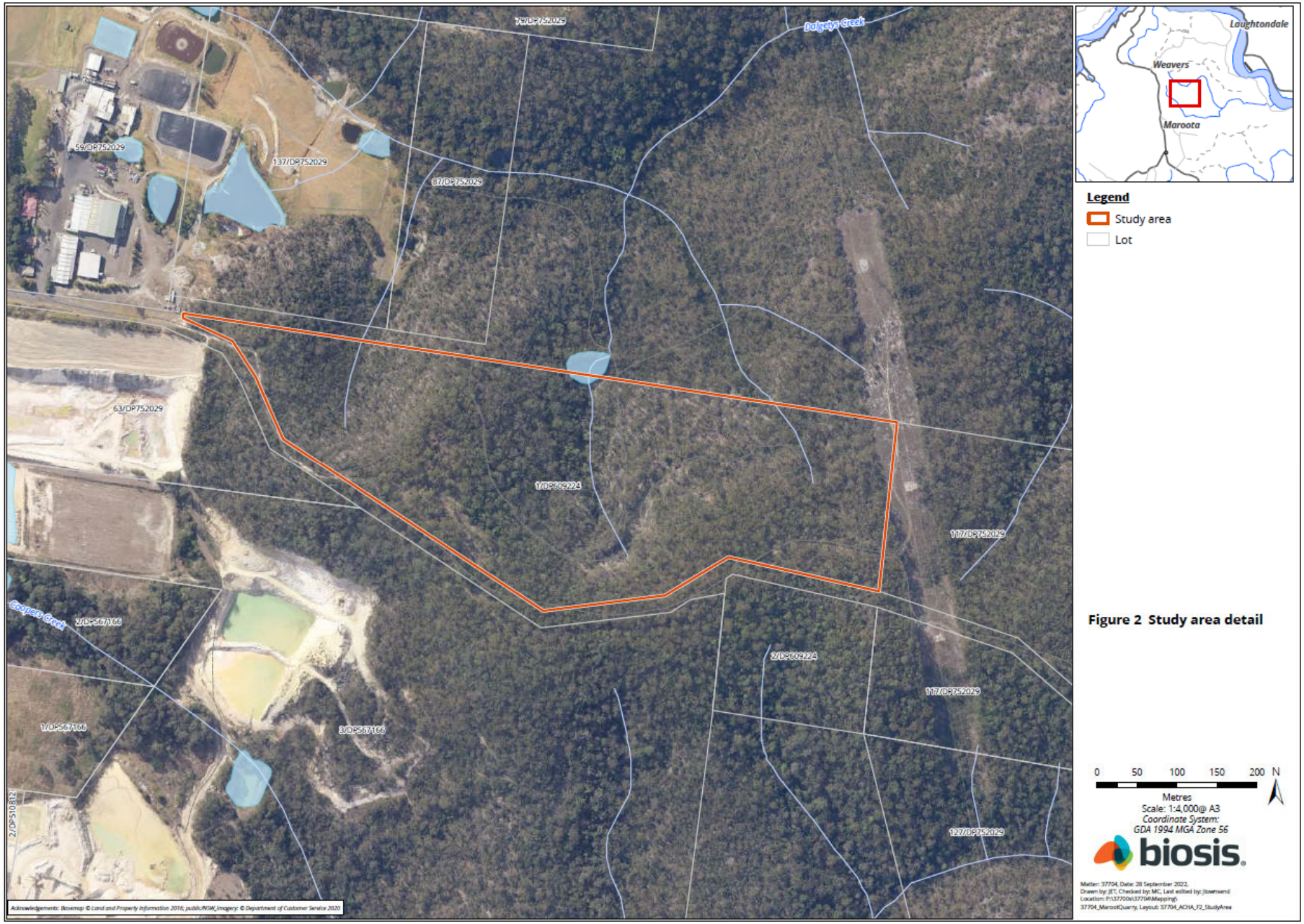
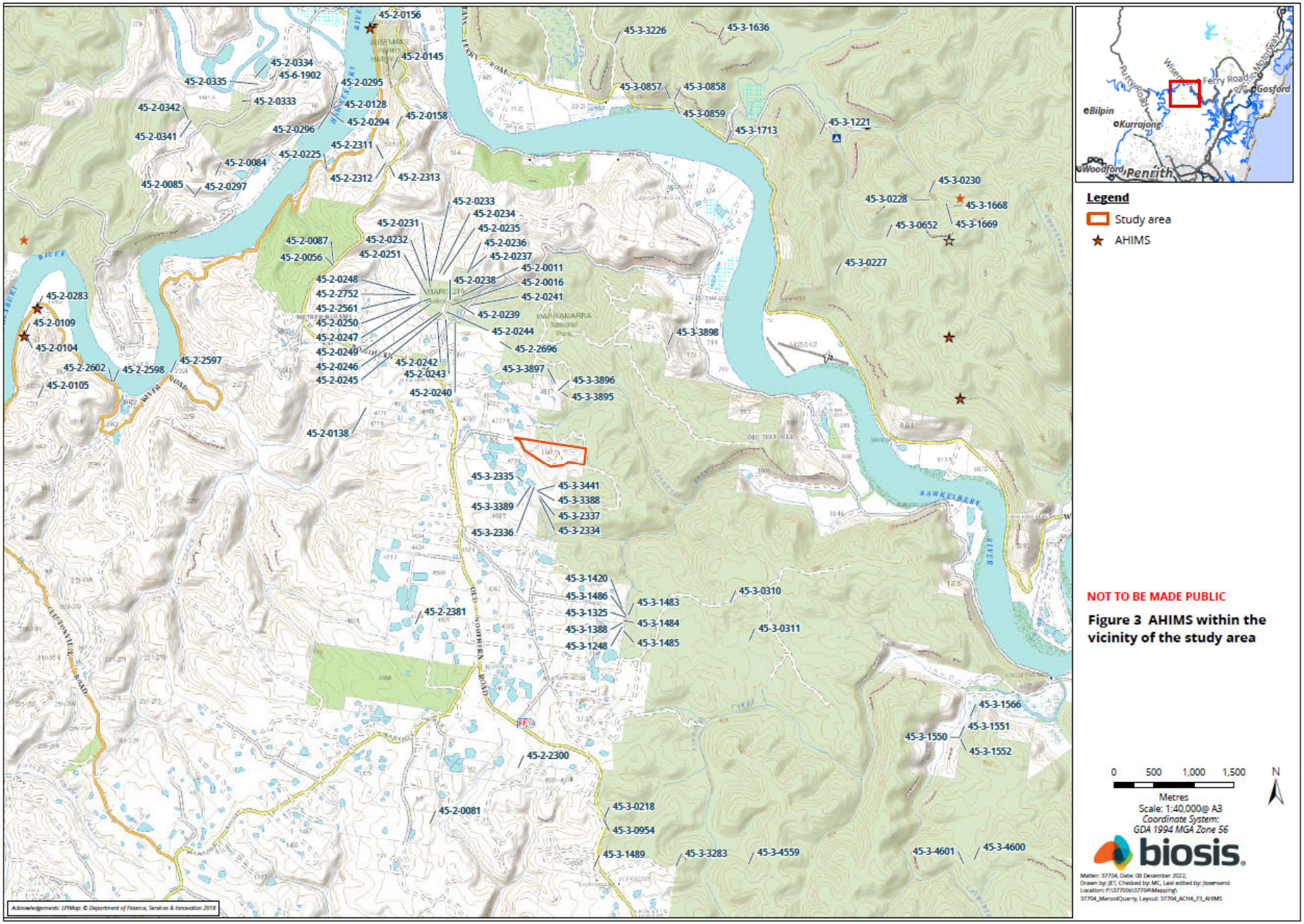


Figure 2 Study area detail


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45-3-3226
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As part of this methodology registered Aboriginal parties will be provided with the draft report for comment and allowed **28 days** for review.

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References

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Sefton C 1980. *Aboriginal Cultural Resources Study Illawarra Region. Illawarra Regional Planning Committee*,.

DARUG CUSTODIAN
ABORIGINAL
CORPORATION

PO BOX 81 WINDSOR 2756
PHONE: 0245775181 FAX: 0245775098
MOBILE: 0414962766 Justine Coplin
EMAIL: justinecoplin@optusnet.com.au

Attention Biosis **Date:** 10/03/23

Subject: Pit 5 and 15 Extension Project 4695 and 4751 Old Northern Road, Maroota, New South Wales

Dear Ashley

This Project is on Dharug land. This should be written in all correspondence.

Our group is a non- profit organisation that has been active for over forty years in Western Sydney, we are a Dharug community group with over three hundred members. The main aim in our constitution is the care of Dharug sites, places, wildlife and to promote our culture and provide education on the Dharug history.

The Maroota area is an area that our group has a vast knowledge of, we have worked and lived in for many years, this area is significant to the Dharug people due to the connection of sites and the continued occupation. Our group has been involved in all previous assessments and works in this area as a traditional owner Dharug group for the past 40 plus years.

People from other mobs should be respectful of our country and people if they are not respectful that the Dharug are the knowledge holders then they are not cultural, therefore should not be involved on cultural heritage on Dharug land.

Therefore, we would like to register our interest for full consultation and involvement in the above project area.

Our Country is the traditional land of the Dharug people, who speak the Dharug language. Our Country isn't defined or identified by government bodies and their agencies.

These agencies and bodies do not support the people of our Country and are not the traditional custodians and therefore should not be in a position to speak for the Dharug people, Dharug land or Dharug knowledge.
Maintaining cultural protocols is fundamental in obtaining knowledge and invoking discussion for Country. To speak directly to and consult with the people of traditional lands, in this case the Dharug people, is necessary to maintain correct protocol and acquire accurate knowledge.
It is culturally inappropriate for any Non-Dharug person or group/s to speak on Dharug cultural heritage.
Dharug people are the only people that have the authority to speak for Dharug Country, and hence should be the only peoples that can and must speak for Dharug Country

Please contact us with all further enquiries on the above contacts.

Regards



Justine Coplin

We acknowledge and pay respect to the Darug people,the traditional Aboriginal custodians of this land.

Appendix 4 Stage 4: Review of draft cultural heritage assessment report

From: Crystal Garabedian
Bcc: rosfogg@bigpond.net.au
Subject: Maroota Quarry Draft ACHA and AR (37704)
Date: Tuesday, 1 August 2023 5:46:07 PM
Attachments: image274246.png
image824539.png
image010646.png
image022826.png

Good afternoon,

Following on from your registration in the Maroota Quarry, Maroota, New South Wales Aboriginal Cultural Heritage Assessment (ACHA). You can follow the link below to access the draft ACHA and Archaeological Report (AR):

https://spaces.hightail.com/space/ilpN1FRM3B

Please provide any feedback on the ACHA, AR and testing methodology before 6:00 pm Tuesday 29 August 2023.

Please do not hesitate to contact me if you require additional information or have any issues accessing the draft reports.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au

Leaders in Ecology and Heritage Consulting

Biosis acknowledges the Aboriginal and Torres Strait Islander people as Traditional Custodians of the country on which we live and work.
We pay our respects to the Traditional Custodians and Elders past, present and future, and honour their connection to the land and ongoing contribution to society.

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From: Crystal Garabedian
Bcc: amandahickey@live.com.au
Subject: Maroota Quarry Draft ACHA and AR (37704)
Date: Tuesday, 1 August 2023 6:14:36 PM
Attachments: image274246.png
image824539.png
image010646.png
image022826.png
image122052.png
image998742.png
image321645.png
image730265.png

Good afternoon,

Following on from your registration in the Maroota Quarry, Maroota, New South Wales Aboriginal Cultural Heritage Assessment (ACHA). You can follow the link below to access the draft ACHA and Archaeological Report (AR):

https://spaces.hightail.com/space/ilpN1FRM3B

Please provide any feedback on the ACHA, AR and testing methodology before 6:00 pm Tuesday 29 August 2023.

Please do not hesitate to contact me if you require additional information or have any issues accessing the draft reports.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au

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From: Crystal Garabedian
Bcc: metrolalc@metrolalc.org.au; Yurwang.Gundana.C.H.S@outlook.com; didgengunawalclan@yahoo.com.au; scott@tocomwall.com.au; RAW.CulturalHealing@hotmail.com; Ginninderra.corp@gmail.com; justinecoplin@optusnet.com.au; philipkhan.acn@live.com.au; cazadirect@live.com; osfogg@bigpond.net.au; gunya.ach@gmail.com; mandahickey@live.com.au; murrabidgeemullangari@yahoo.com.au
Subject: Maroota Quarry Draft ACHA and AR (37704)
Date: Tuesday, 1 August 2023 5:45:32 PM
Attachments: image919654.png
image202064.png
image791863.png
image114161.png

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Please do not hesitate to contact me if you require additional information or have any issues accessing the draft reports.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au

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From: Crystal Garabedian
To: Phil Khan
Subject: RE: Maroota Quarry Draft ACHA and AR (37704)
Date: Tuesday, 29 August 2023 3:46:10 PM
Attachments: image001.jpg
image002.png
image003.png
image004.png
image005.png
image819913.png
image146794.png
image110146.png
image836648.png

Hi Phil,

Thank you for taking the time to read over the ACHA and I really appreciate your feedback.

The scope of works for the proposed development is an ongoing mining operation. With your recommendation for monitoring, did you have any ideas as to how that might look within the scope of works? Given the nature of the works, monitoring for the entire operation of the project may not be feasible, but if you can provide some more detail I can discuss this with you further.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au

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From: Phil Khan <philipkhan.acn@live.com.au>
Sent: Tuesday, 29 August 2023 11:57 AM
To: Crystal Garabedian <CGarabedian@biosis.com.au>
Subject: RE: Maroota Quarry Draft ACHA and AR (37704)

Hello Crystal,

Thank you for your Draft ACHAR & AR regarding Maroota Quarry, we would like to agree and support your recommendations, we also recommend that an Aboriginal RAP be present during earthworks. We look forward to working alongside you on this project.

Kind Regards
Phil Khan – Director
P 0434545982
Email: philipkhan.acn@live.com.au



From: Crystal Garabedian
Sent: Tuesday, 1 August 2023 5:45 PM
Subject: Maroota Quarry Draft ACHA and AR (37704)

Good afternoon,

Following on from your registration in the Maroota Quarry, Maroota, New South Wales Aboriginal Cultural Heritage Assessment (ACHA). You can follow the link below to access the draft ACHA and Archaeological Report (AR):

https://spaces.hightail.com/space/ilpN1FRM3B

Please provide any feedback on the ACHA, AR and testing methodology before 6:00 pm Tuesday 29 August 2023.

Please do not hesitate to contact me if you require additional information or have any issues accessing the draft reports.

Kind regards,
Crystal Garabedian

Crystal Garabedian She/Her
Heritage Consultant

0456 625 253
(02) 9101 8727
CGarabedian@biosis.com.au



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Appendix 5 Archaeological report



Maroota Central Civil Quarry Project: Archaeological Report

FINAL REPORT

Prepared for RW Corkery & Co Pty Ltd

6 September 2023

Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to:	RW Corkery & Co Pty Ltd
Prepared by:	Molly Crissell Crystal Garabedian
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LGA:	Hornsby

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Version	Internal reviewer	Date issued
Draft 01	Samantha Keats	26/04/2023
Final 01	Mathew Smith	30/08/2023

Acknowledgements

Biosis gratefully acknowledges the contributions of the following people and organisations in preparing this report:

- Amy Weihart (RW Corkery & Co Pty Ltd).
- Samuel Rosek (RW Corkery & Co Pty Ltd).

Biosis staff involved in this project were:

- Jen Townsend (mapping).

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AREIC	Aboriginal Rock Engraving Interpretation Centre
AHIMS	Aboriginal Heritage Information Management System
AR	Archaeological Report
Consultation requirements	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*
DA	Development Application
DECCW	Department of Environment, Climate Change and Water (now Heritage NSW)
DP	Deposited Plan
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
GPS	Global Positioning System
GSV	Ground Surface Visibility
ICOMOS	International Council on Monuments and Sites
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MGA	Map Grid of Australia
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
RWC	RW Corkery & Co Pty Ltd
SEPP	State Environmental Planning Policy
Study area	4773 Old Northern Road, Maroota, New South Wales (Lot 1 and Lot 2 DP609224)
TEC	Total Earth Care
the Code	*Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*

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VENM	Virgin excavated natural material

Summary

Biosis Pty Ltd (Biosis) was commissioned by RW Corkery & Co Pty Ltd (RWC) on behalf of Central Civil to undertake an Aboriginal Cultural Heritage Assessment (ACHA) of the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota, New South Wales (NSW) (Lot 1 and Lot 2 DP609224) (the study area). This Archaeological Report (AR) documents the findings of the archaeological investigations conducted as part of the ACHA. As required under Section 2.3 of The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) (the Code), the AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA.

The proposed study area (Figure 3) is located on rural land within Lots 1 and 2 DP609224 and an unnamed Crown road reserve. The Quarry Site includes all proposed activities and covers a total area of approximately 23.33 hectares of which 4.37 hectare would be disturbed throughout the life of the Quarry. There are 99 Aboriginal cultural heritage sites and one Aboriginal place, within a 5 by 5 kilometre search area, centred on the study area, registered with the Aboriginal Heritage Information Management System (AHIMS) register. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS).

The Aboriginal community was consulted regarding the heritage management of the project throughout its lifespan. Consultation has been undertaken as per the process outlined in the Department of Environment Climate Change and Water document (DECCW) document, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b) (consultation requirements).

The survey was conducted on 3 April and 6 April 2023 by Crystal Garabedian (Biosis—Heritage Consultant), Bronte Baonza (Biosis—Graduate Heritage Consultant) and Raymond Weatherall (Metropolitan Local Aboriginal Land Council (LALC)—Cultural Sites Offer). The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low. This was attributed to vegetation cover restricting ground surface visibility (GSV) combined with a low number of exposures. No previously unrecorded Aboriginal cultural heritage sites were identified during the archaeological survey and no areas of archaeological potential were identified. While the study area does not contain any tangible Aboriginal cultural values, the consultation received indicates that the study area is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites. The landscaping and progressive rehabilitation for nature conservation to be completed as part of the proposed development will assist in reducing the impact of the works to the cultural landscape and help in supporting and maintaining natural resources within the area.

Comments made by the Registered Aboriginal Party (RAP), Metropolitan LALC, during the archaeological survey included the following:

- The study area has been disturbed to varying degrees throughout.
- The study area appeared to be historically cleared and contained minimal mature vegetation.
- The study area lacked characteristics that would suggest this area was intensely occupied by Aboriginal groups.

Management recommendations

Strategies have been developed based on the archaeological significance of cultural heritage relevant to the study area. The strategies also take into consideration:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practice, widely considered to include:
  - Ethos of *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013* (the Burra Charter).
  - the Code.

The recommendations that resulted from the consultation process are provided below.

Prior to any development impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area being assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal parties

As per the consultation requirements, it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

Recommendation 3: Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to any unexpected Aboriginal objects. The heritage induction should include the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Planning and Environment (Heritage NSW). Should any unanticipated Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the *Heritage Act 1977* (Heritage Act). Relics cannot be disturbed except with a permit or exception notification.

Should unanticipated relics be discovered during the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

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1 Introduction

1.1 Project background

Biosis has been commissioned by RWC on behalf of Central Civil to undertake an ACHA for the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota, NSW (Lot 1 and Lot 2 DP609224) (Figure 1 and Figure 2). This AR documents the findings of the archaeological investigations conducted as part of the ACHA. The AR provides evidence about the material traces of Aboriginal land use to support the conclusions and management recommendations in the ACHA. The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which will require an Environmental Impact Statement (EIS).

This investigation has been carried out under Part 6 of the NPW Act. It has been undertaken in accordance with the Code. The Code has been developed to support the process of investigating and assessing Aboriginal cultural heritage by specifying the minimum standards for archaeological investigation undertaken in NSW under the NPW Act. The archaeological investigation must be undertaken in accordance with the requirements of the Code.

It is stated in section 1.2 of the Code that where the ACHA report concludes that the proposed activity will result in harm to Aboriginal objects or declared Aboriginal Places, an application for an AHIP will be required. This application must be supported by an ACHA report.

The EP&A Act includes provisions for local government authorities to consider environmental impacts in land-use planning and decision making. Each Local Government Area (LGA) is required to create and maintain a Local Environmental Plan (LEP) that includes Aboriginal and historical heritage items. Local Councils identify items that are of significance within their LGA, and these items are listed on heritage schedules in the local LEP and are protected under the EP&A Act and Heritage Act.

1.2 Study area

The study area and proposed Quarry Site (Figure 3) are located within Lots 1 and 2 DP609224, as well as an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (Figure 1). The study area covers a total area of approximately 23.33 hectares of which 4.37 hectares would be disturbed throughout the life of the Quarry. The study area is adjacent to Marramarra National Park and is situated within a forested landscape. The study area and the surrounding landscape includes dense vegetation.

The study area is within the:

- Hornsby Shire LGA.
- Parish of Frederick.
- County of Cumberland (Figure 2).

1.3 Planning approvals

The project will be assessed under Schedule 3 of the EP&A Regulation as a Designated Development, which will require an EIS. Other relevant legislation and planning instruments that will inform this assessment include:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NPW Act.
- NSW *National Parks and Wildlife Amendment Act 2010.*
- *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP).
- *Hornsby Local Environmental Plan 2013* (LEP).
- *Hornsby Development Control Plan 2013* (DCP).

1.4 Objectives of the investigation

The objectives of the investigation can be summarised as follows:

- To identify and consult with any registered Aboriginal stakeholders and the Metropolitan LALC.
- To conduct additional background research to recognise any identifiable trends in site distribution and location.
- To search statutory and non-statutory registers and planning instruments to identify listed Aboriginal cultural heritage sites within the study area.
- To highlight environmental information considered relevant to past Aboriginal occupation of the locality and associated land use and the identification and integrity/preservation of Aboriginal sites.
- To summarise past Aboriginal occupation in the locality of the study area using ethnohistory and the archaeological record.
- To formulate a model to broadly predict the type and character of Aboriginal sites likely to exist throughout the study area, their location, frequency, and integrity.
- To conduct a field survey of the study area to locate unrecorded or previously recorded Aboriginal sites and to further assess the archaeological potential of the study area.
- To assess the significance of any known Aboriginal sites in consultation with the Aboriginal community.
- To identify the impacts of the proposed development on any known or potential Aboriginal sites within the study area.
- To recommend strategies for the management of Aboriginal cultural heritage within the context of the proposed development.

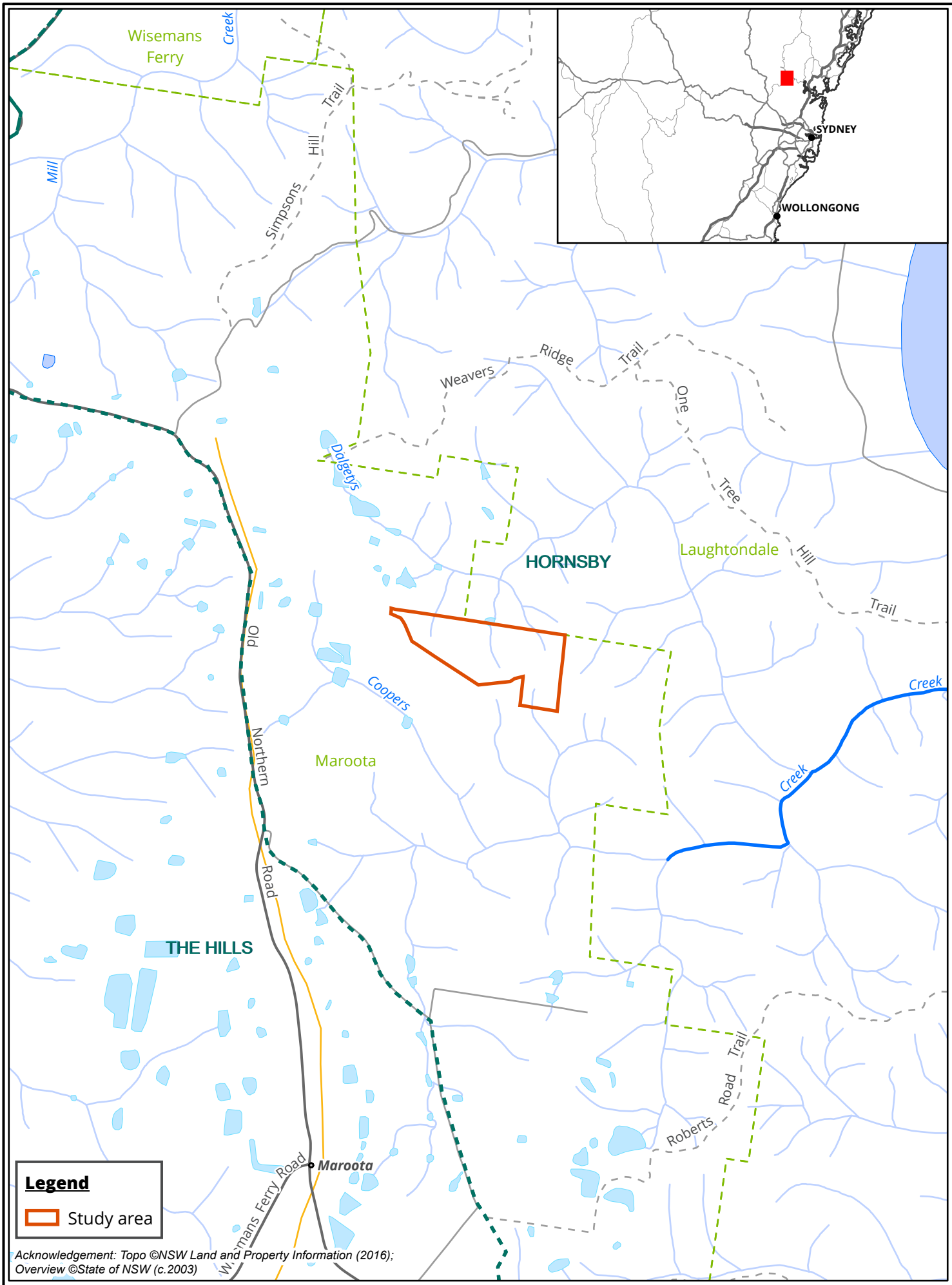
1.5 Investigators and contributors

The roles, previous experience and qualifications of the Biosis project team involved in the preparation of this archaeological report are described below in Table 1.

Table 1 Investigators and contributors

Name and qualifications	Experience summary	Project role
Samantha Keats Bachelor of Arts (Honours)—Archaeology and Palaeoanthropology	Samantha is currently the Heritage Manager and an archaeologist with Biosis Wollongong office who has over seven years of experience as an archaeologist. Samantha has had experience working as an	• Technical advice. • Quality assurance.

Name and qualifications	Experience summary	Project role
	archaeologist and project manager on a number of Aboriginal and European heritage projects across New South Wales, including water infrastructure and linear projects, residential development projects, renewable energy projects, and telecommunications projects.	
Crystal Garabedian Bachelor of Arts (Honours)—Archaeology Bachelor of Science—Geology and geophysics	Crystal joined Biosis in the Sydney office in 2021. She has experience in conducting archaeological surveys, test excavations, Aboriginal consultation, and desktop assessments for a variety of projects throughout NSW. Crystal possesses specialist skills in the identification of marine zooarchaeological material, whilst also having experience in artefact processing of historical artefacts, including ceramics, building materials and glass.	• Aboriginal community consultation. • Background research. • Field investigation. • Project management. • Report preparation.
Molly Crissell Bachelor of Arts—Archaeology	Molly joined Biosis in the Newcastle office in 2021 and has three years' experience. Molly has gained experience conducting archaeological surveys, archaeological test excavations, and desktop assessments for a variety of projects throughout NSW. Molly possesses skills in lithic identification, project management and report writing.	• Aboriginal community consultation. • Background research.
Bronte Baonza Bachelor of Arts—Archaeology and International Relations	Bronte joined Biosis in 2023 as a Graduate Archaeologist with the Sydney Heritage team. During her time with Biosis, she has supported project managers in conducting archaeological surveys, test excavations, Aboriginal consultation, and background research.	• Field investigation.
Jennifer Townsend Bachelor of Science—Physical Geography and Environmental Geosciences	Jennifer is a GIS Analyst and has been a member of the GIS team at Biosis since November 2021. In her time at Biosis, she has gained experience across a wide range of technical skills, including data collection and management, digitisation, and cartographic design. Since joining Biosis, Jennifer has been committed to producing high quality maps and spatial analyses for clients on a wide range of projects including historical and Aboriginal heritage reports, and complex ecological assessments throughout NSW and Victoria. Jennifer has a background in Environmental science, participating and conducting research projects, focusing on the classification of coastal vegetation and mangroves through GIS, providing experience in satellite imagery classification and LiDAR datasets.	• GIS mapping.



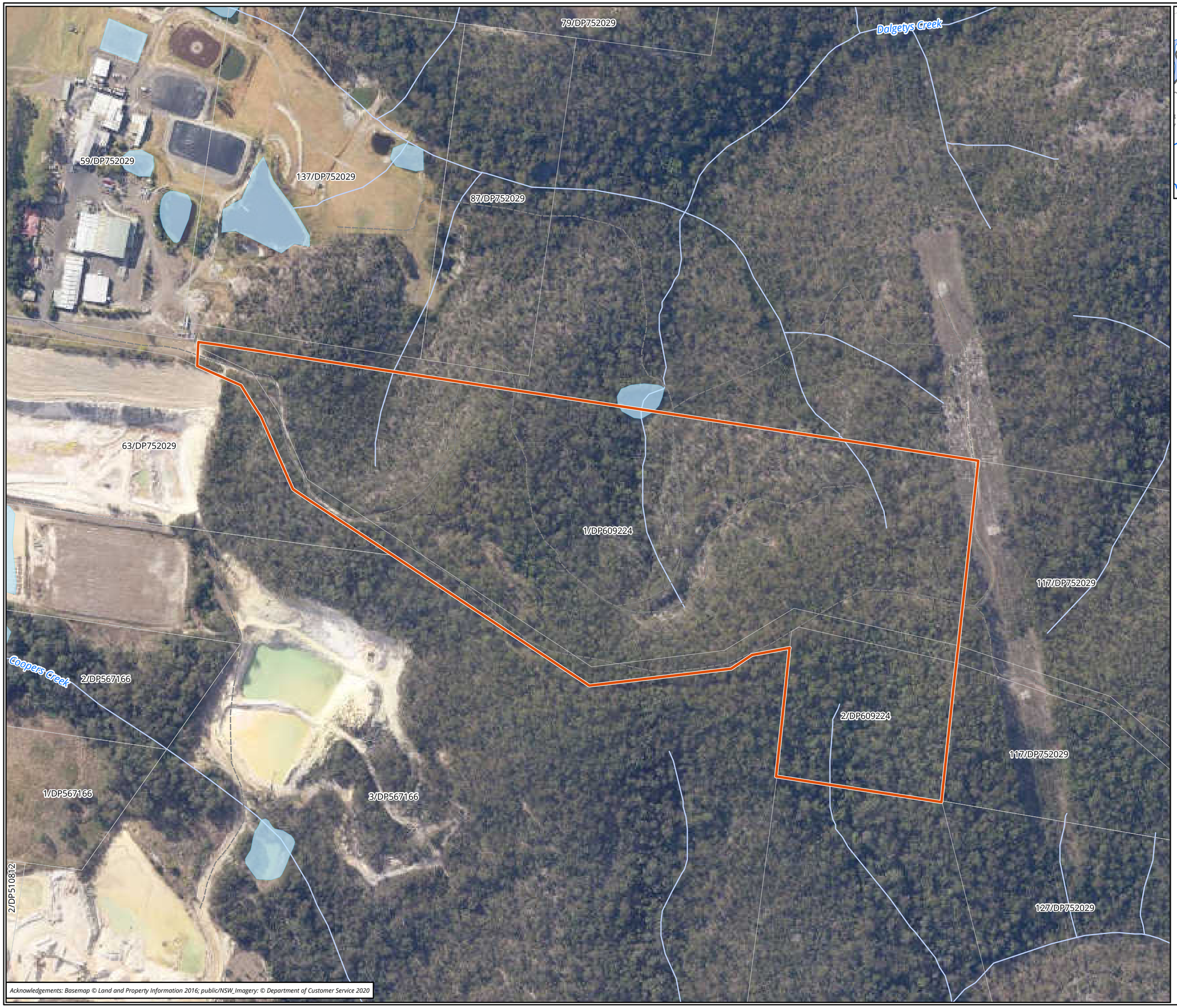
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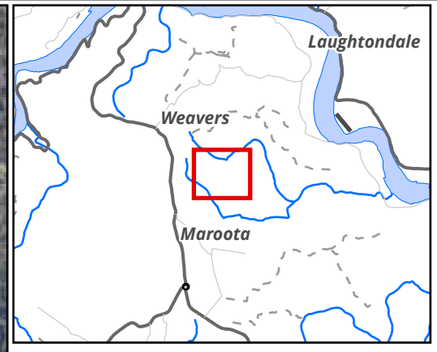
Figure 1 Location of the study area

Matter: 37704
Date: 30 May 2023,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\
37704_MarootQuarry

0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56

N





Legend

- Study area
- Lot

Figure 2 Study area detail

0 50 100 150 200 N

Metres
Scale: 1:4,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

biosis

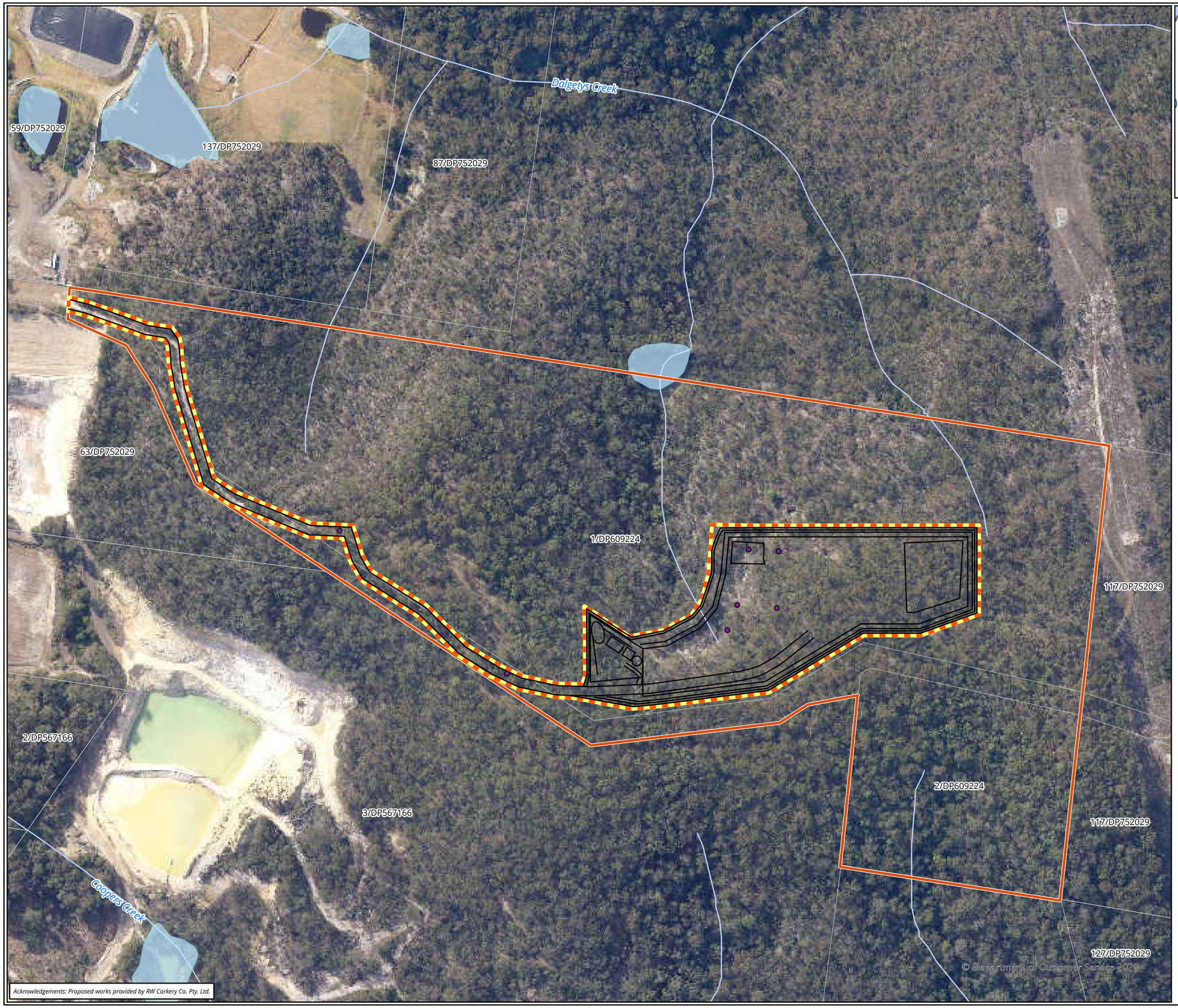
Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F2_StudyArea

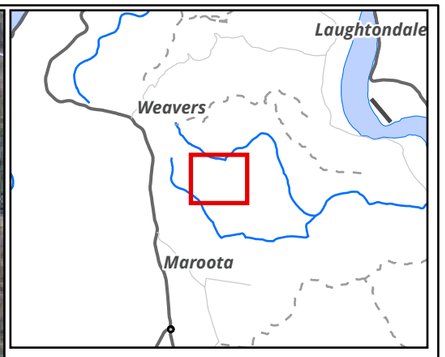
2 Proposed development

The proposed development refers to the establishment and operations of the Maroota Central Civil Quarry which would include the following.

- Extraction, processing and despatch of up to 30,000 tonnes per annum of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of four heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent (Figure 3).

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Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Figure 3 Proposed works

0 30 60 90 120

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F3_ProposedWorks

3 Desktop assessment

The desktop assessment involves researching and reviewing existing archaeological studies and reports relevant to the study area and surrounding region. This information is combined to develop an Aboriginal site prediction model for the study area, and to identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the Code.

3.1 Landscape context

It is important to consider the local environment of the study area for any heritage assessment. The local environmental characteristics can influence human occupation, associated land use and the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly landscape features can contribute to the cultural significance that places can have for people.

3.1.1 Topography and hydrology

The Hornsby Plateau undulates between the Macdonald ranges located to the north of the study area and extends east to the Watagan Mountains. The geological formation within the study area is Hawkesbury sandstone, which comprises medium- to coarse-grained quartz sandstone with minor shale and laminite lenses (Figure 4). This landscape is characterised by rugged and very steep hills, benched hill slopes with narrow flat topped ridges and broader plateau tops on horizontal Triassic quartz sandstone with occasional conglomerate and thin discontinuous shales (Mitchell 2002, pp. 112). Valleys within this area contain tributaries of the Hawkesbury River that dissect the rugged Hawkesbury Sandstone sediments (Murphy 1993, pp. 2). The study area can be classed as an undulating slope, with steep slopes, ridgelines, and flat crests in the south, and sloping towards valley in the northern portion (Figure 5).

Stream order and topography are recognised as factors which helps the development of predictive modelling in Aboriginal archaeology in the Cumberland Plain. Predictive models which have been developed for the region have a tendency to favour permanent water courses as the locations of complex sites that have been continuously occupied, as they would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups (JMCHM 2000, pp. 19). The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

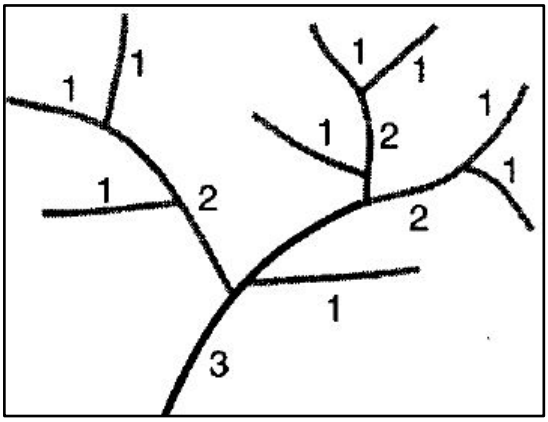


Photo 1 Diagram showing Strahler stream order (Ritter, Kochel, & Miller 1995, pp. 151)

The study area is situated within a complex hydrological system, with watercourses within the study area including three first-order, non-perennial creeklines (Figure 5). The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 245 metres north-east of the study area at its closest point. Several first-, second- and third-order watercourses exist in the vicinity of the study area, and these are all tributaries of ninth-order, perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

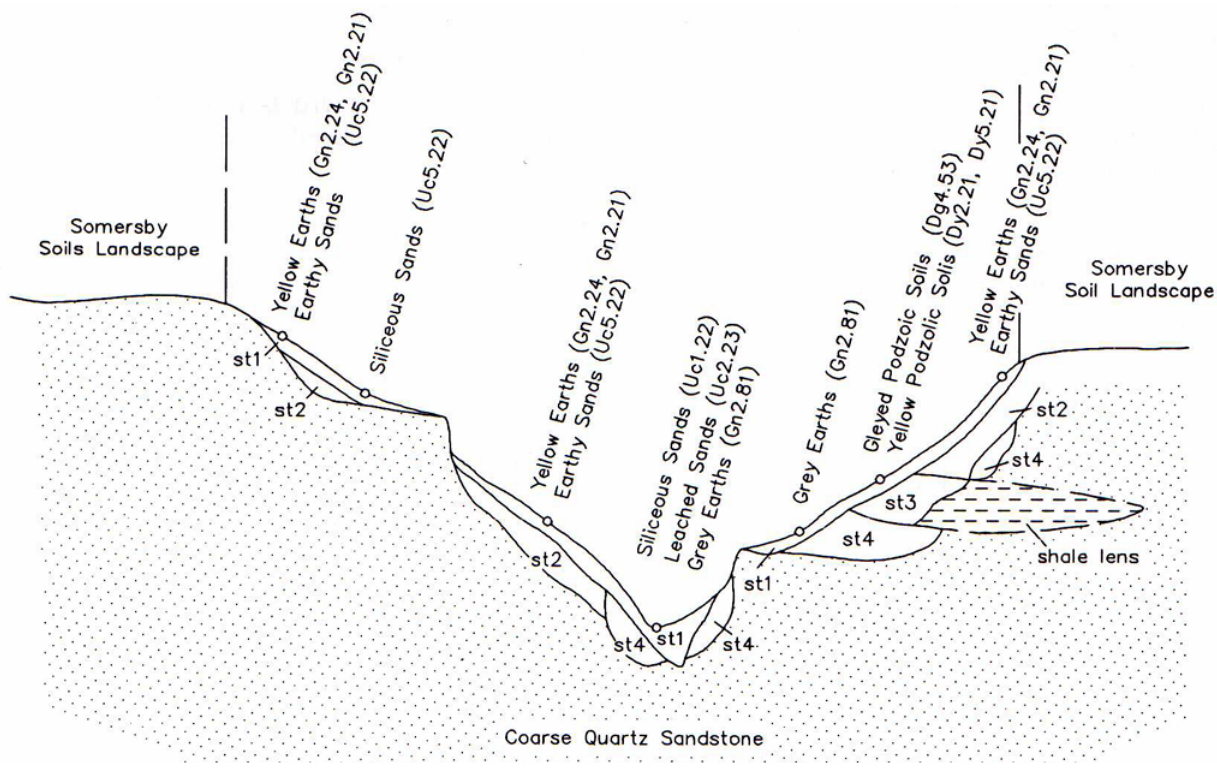
3.1.2 Soil landscapes

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation, and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The study area is predominantly located within the Sydney Town soil landscape, with disturbed terrain existing in the western most portion (Figure 6). It is topographically characterised by undulating to rolling hills and moderately inclined slopes on quartz sandstone along the edge of the Somersby Plateau. The slope gradient of this soil landscape ranges from 5–25%. Sandstone benches occasionally occur and are often exposed along narrow incised drainage lines. The soils within the landscape are highly permeable, and strongly acidic with very low fertility, and are subject to permanent waterlogging and present a very high erosion hazard (Table 2).

Table 2 Sydney Town soil landscape characteristics (Murphy 1993)

Soil Material	Description
Sydney Town 1 (*st1*)	20–100 cm of loose brown sand or sandy loam, with apedal single grained structure and porous sandy fabric that usually occurs as topsoil. Ranges from dark brown (10YR 3/2) when organic matter content is high to greyish yellow brown (10YR 6/2, 10YR 5/2, 10YR 4/2) when organic matter content is low. Soil colour often becomes lighter with depth. Sandstone fragments, charcoal and roots are common.
Sydney Town 2 (*st2*)	50–150 cm of earthy bright brown sandy clay loam, with apedal massive structure and porous earthy fabric that usually occurs as a subsoil. Soil colours are bright and are commonly yellowish brown (10YR 6/8, 2.5YR 6/6, 2.5YR 6/7, 2.5YR 6/8) and brown (7.5YR 5/8). Sandstone fragments are common, but charcoal and roots become less.
Sydney Town 3 (*st3*)	50–150 cm of strong pedal clay, with strong pedal structure when dry, and apedal when saturated. These soils possess a rough-faced ped fabric and commonly occurs as subsoil from shale lenses within the Hawksbury Sandstone. Soil colour ranges from bright reddish brown (5YR 5/6) in well drained areas to light grey (10YR 8/1) in poorly drained areas. Stratified ironstone gravels are common within this soil material.
Sydney Town 4 (*st4*)	50–150 cm of grey massive, mottled sand clay loam with apedal massive structure and porous earthy fabric. This soil material generally occurs as a subsoil in wet areas. The soil colour is characterised by pallid grey soil colours such as light grey (2.5Y 7/1) and greyish yellow (2.5Y 6/2). In wet situations there are often rusty piped mottles around root traces. Sandstone and charcoal fragments are rare or absent, and few roots are present.



■ *Schematic cross-section of the Sydney Town soil landscape illustrating the occurrence and relationship of the dominant soil materials.*

Photo 2 Schematic cross-section of the Sydney Town soil landscape (Murphy 1993)

Erosional soils are generally subject to movement of shallow soils, which can result is poor preservation of the archaeological record. Dispersed sandy soils of sandstone bedrock and loose quartz sandy loam, and earthy clayey sands, which occur as A1 and B horizons, have low erosional potential. However, when cleared of vegetation, the soils can be subject to high levels of erosion. As this soil landscape is characterised as highly erosional, the soil can be shallow and highly permeable, as well as producing low soil fertility. This would indicate that the presence of Aboriginal sites and objects is unlikely (Chapman et al. 1989, pp. 64–67, McInnes 1997, p.45, cited by Umwelt (Australia) Pty Limited 2016, pp. 13).

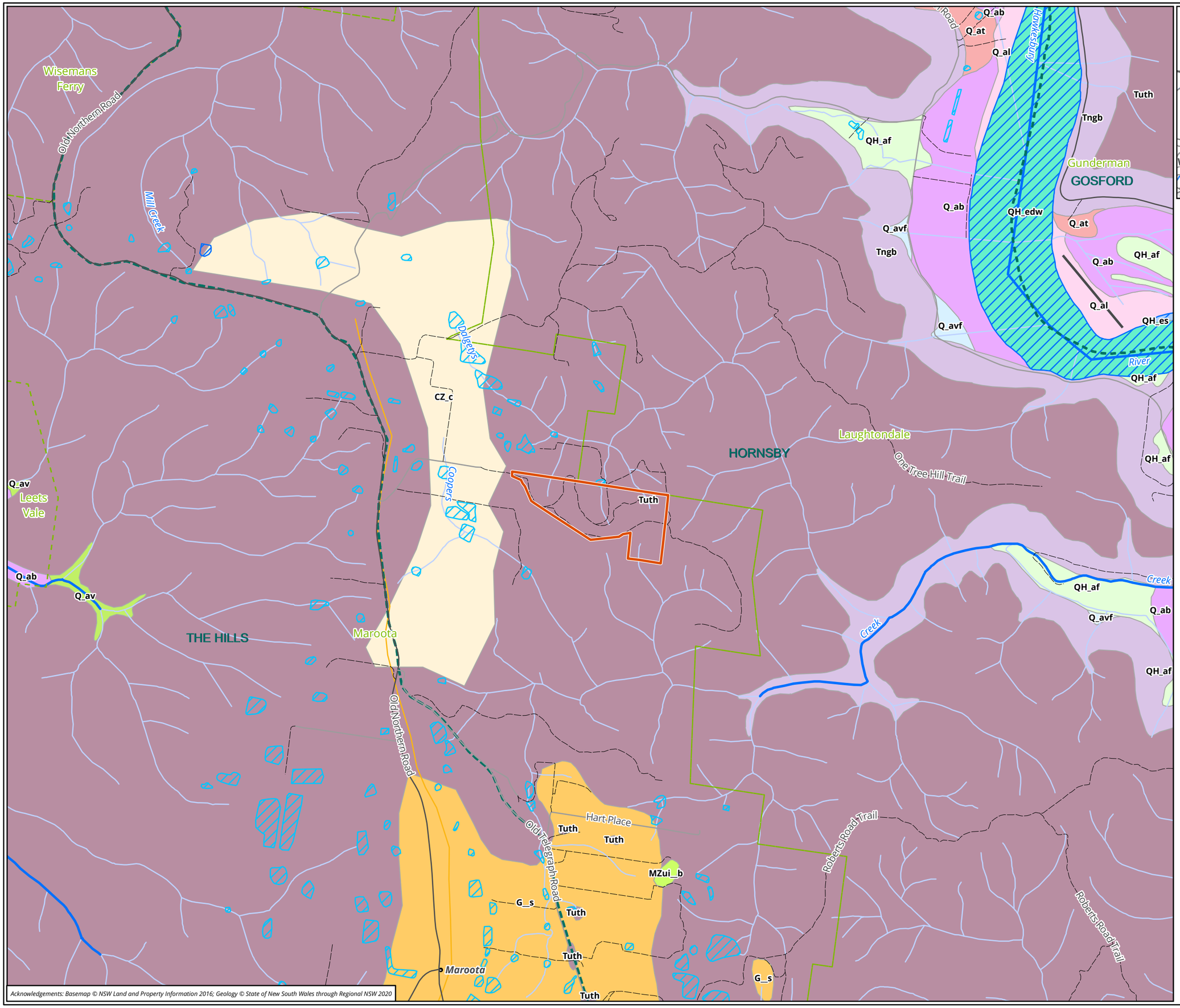
Disturbed terrain (soil landscape) is characterised by level plains to hummocky terrain disturbed by human activity, including complete disturbance, removal, or burial of soil. Landfill is often present, comprising rock, soil, building and other waste materials. The local relief is around 10 metres, with slopes comprising 20% (Bannerman & Hazelton 1990, pp. 149). The soil characteristics of this landscape are described in Table 3.

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Table 3 Disturbed Terrain soil landscape characteristics (Bannerman & Hazelton 1990, pp. 150–151)

Soil material	Description
Loose, black sandy loam (*xx1*)	This is black loamy sand to loam-fine-sandy with loose apedal single grained structure and sandy fabric. It is used for topsoiling turf and often corresponds to the lowland Nepean River alluvium or Elderslie soil series of Walker (1960). Local sands have also been used for topdressing. This material occurs as topsoil (A1 horizon). The material is brittle when dry and crumbly when moist. The colour ranges from a dark brown to black (10YR 3/3-10YR 2/1) or brown (10YR 4/6). It is often water repellent, and a surface crust may be present. The pH ranges from moderately acid (pH 5.0) to neutral (pH 7.5). Roots are common to abundant when turfed and ironstone nodules are occasionally present.
Compacted, mottled clay (*xx2*)	This is a mottled, compacted sandy clay loam to medium clay with an apedal massive to moderately pedal structure. It generally has been compacted to form an impermeable isolating cap over potentially hazardous buried material. Peds when present are often platy and smooth-faced. Colour is highly variable, and mottles are common. The pH is also variable, ranging from extremely acid (pH 3.5) to slightly alkaline (pH 8.0). Platy or concretionary ironstones are occasionally present, and roots are absent.
Variable transported fill (*xx3*)	This material is commonly referred to as fill and may consist of any type of soil or regolith material. It often includes demolition rubble and industrial and household wastes. Colour, texture, structure, fabric, degree of compaction, porosity and pH vary markedly.
Dark dredged muds and sands (*xx4*)	This material consists of dark dredged sands, sandy loams to silty clay loams and sandy clays with apedal single-grained to massive structure and sandy fabric. This material occurs as subsoil. Colour varies from black (10YR 2/1) to a yellowish-brown (2.5Y 5/2). Charcoal, shells, or shell fragments are commonly present. This material swells, is highly saline and neutral (pH 7.0) to moderately alkaline (pH 9.0) when first dredged, but with drainage and oxidation the salinity levels drop, and acidity may increase dramatically.

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Legend

Study area

Geological units

- CZ_c,Colluvium
- G__s,Saint Marys Formation
- MZui__b,Ungrouped Mesozoic igneous units - basalt
- QH_af,Alluvial floodplain deposits
- QH_edw,Estuarine fluvial delta front (subaqueous)
- QH_es,Estuarine swamp
- Q_ab,Alluvial backswamp deposits
- Q_al,Alluvial levee/overbank deposits
- Q_at,Alluvial terrace deposits
- Q_av,Alluvial valley deposits
- Q_avf,Alluvial fan deposits
- Tngb,Burralow Formation
- Tuth,Hawkesbury Sandstone

Figure 4 Geological units in the vicinity of the study area

0 200 400 600 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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Matter: 37704, Date: 07 August 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F4_Geology

Acknowledgements: Basemap © NSW Land and Property Information 2016; Geology © State of New South Wales through Regional NSW 2020



Legend

- Study area
- Contour (10m)

Strahler Order

- 1
- 2
- 3
- 4

0 100 200 300 400 N

Metres

Scale: 1:10,000@ A3

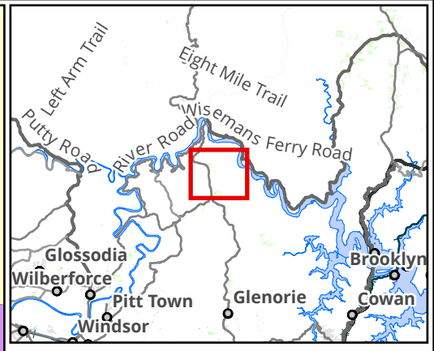
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37704_MarootQuarry_JET, Layout:37704_ACHA_F5_Hydrology

Figure 5 Hydrology and topography in the vicinity of the study area

Acknowledgements: Basemap © Land and Property Information 2016



Legend

Study area

Soil landscape units

- er - ERINA
- gy - GYMEA
- ha - HAWKESBURY
- hr - HAWKESBURY RIVER
- la - LAMBERT
- lh - LUCAS HEIGHTS
- ma - MAROOTA
- mc - MANGROVE CREEK
- so - SOMERSBY
- st - SYDNEY TOWN
- ts - TACOMA SWAMP
- WATER - WATER
- wf - WISEMANS FERRY
- wn - WATAGAN
- xx - DISTURBED TERRAIN

Figure 6 Soil landscapes in the vicinity of the study area

0 200 400 600 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704Date: 07 August 2023,
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37704_MarootQuarry_JET, Layout: 37704_ACHA_F6_Soils

Acknowledgements: Basemap © Land and Property Information 2016; Soils: Murphy C.L., 1993, Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet map and report, Department of Conservation and Land Management, Sydney; Soil Landscapes of the St Albans 1:100,000 Sheet;

3.1.3 Landscape resources

The Maroota region would have provided an abundance of natural resources able to be utilised in a variety of ways by Aboriginal people. Plant fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was also used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002, pp. 113–114).

The Sydney Town soil landscape contains mostly uncleared tall eucalypt open-forest and closed forest in sheltered gullies. On steep slopes with a southerly aspect, Watagan soils commonly foster species including scribbly gum *Eucalyptus haemastoma*, brown stringybark *E. capitellata*, red bloodwood *Corymbia gummifera*, smooth-barked apple *Angophora costata*, Sydney peppermint *E. piperita* and old man banksia *Banksia serrata*. Common understorey shrubs include grey spider flower *Grevillea* spp., flaky-barked tea-tree *Leptospermum attenuatum* and drumsticks *Isopogon* spp.. Poorly drained areas support scrubland of heath banksia *B. ericifolia* and dagger hakea *Hakea teretifolia* (Murphy 1993, pp. 41).

Animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are often a part of the archaeological record. Brush-tailed Possums were highly prized for their fur and could be fashioned into a cloak (Attenbrow 2002, pp. 117). Native Fauna likely to have been present in the area include but are not limited to: Australian Brush Tail Possum *Trichosurus vulpecula*, Short-beaked Echidna *Tachyglossus aculeatus*, Swamp Wallaby *Wallabia bicolor*, Rainbow Lorikeet *Trichoglossus moluccanus*, Kookaburra *Dacelo novaeguineae*, Australian Magpie *Cracticus tibicen*, Water Dragon *Intellagama lesueurii,* Eastern Blue-Tongue *Tiliqua scincoides*.

3.1.4 Land use history

European exploration of the land now designated at Marramarra National Park can be traced back to as early as 1789, when Governor Arthur Philip embarked on his second venture on the Hawkesbury River (NSW NPWS n.d.). The Hawksbury River was a significant communication and trade route between Port Jackson and the north-western settlements. It was determined that the long ridgeline extending north towards the Hawkesbury River was an ideal route for a road the colonists were proposing to link Port Jackson with the area that it now known as the Hunter Valley. Built between 1825 and 1836 by European convicts, its construction was overseen by Surveyor General, Sir Thomas Mitchell (Corkill 2007).

European settlement of Wisemans Ferry, located approximately 5 kilometres north of the study area, began in 1819, with the earliest known settler in the area, Solomon Wiseman arriving with his family to begin farming. Wiseman and his family arrived in Sydney on the 20 August 1806, aboard the *Alexander I* (*Shipping Indents* n.d.). In 1811, Wiseman had commissioned a sloop-rigged schooner at Cockle Bay named 'Hawkesbury Packet', and in 1812 a second vessel named 'Hope' was built ('Sydney' 1811). Wiseman also acquired a licence for the use of a building on Blight Street as a hotel, operating it as the innkeeper (Swancott 1970, p.7). Unfortunately for Wiseman, the loss of 'Hope' in July of 1817, followed by the loss of a second sloop, Hawkesbury Packet three months later resulted in the loss of his property ('Sydney Gazette' 1816). Luckily for Wiseman and his family, he had applied for and received a grant of 200 acres of land from Governor Macquarie which he had selected at the confluence of the Hawkesbury and McDonald Rivers (*Index to Registers of Grants 1792-1856 (Cumberland)* n.d.).

In 1819, Wiseman and his family moved out to their grant on the Hawkesbury and by 1821 had opened an inn called "The Sign of the Packet" to cater to the frequent overlanders making use of an unmade track north of the Lower Portland Head (Penglase 1978, p.3). By 1828, the Inn was

represented as being one of the best in the country according to *The Australian* issue on 2 Jan 1828 (*The Australian* 1828). Following the establishment of the ferry service across the Hawkesbury River in 1827, the town became known as Wisemans Ferry (*Origin of Suburb & Street Names* 2019).

Surveyor Felton Mathew's journal entry for January 1830 states that he "camped at the 'Finger post', nine miles south of Wisemans Ferry", which is located to the south of present-day Maroota (Corkill 2007). He recorded that there was no land suitable for agricultural purposes between the location at which he camped and Wiseman Ferry. In early 1832, several parcels of land were put up in an auction that was largely unsuccessful (Corkill 2007). Some of these were later reposted and on 1 October 1832 and nine lots were purchased by military personnel, as a means of buying themselves out of the armed forces (Corkill 2007). According to sources, some of the men and their families resided in Maroota for less than seven days and abandoning it due to the disappointing prospects of using the lands for agricultural purposes (Corkill 2007).

Eventually, in the late-19th century settlers came into the Maroota area. The historic sources indicate that the land within the study area remained the property of the Crown well into the 20th century. A conditional sale was made to an unknown entity, whose conditions of the sale lapsed without extension. In 1973 the property was sold to Ronald Leslie Weaver also as a conditional sale. The property was owned and possibly occupied by Weaver until 1974, where it was transferred to Manifold Estates Pty Ltd. In 1977, the property was again transferred to the Cambridge Credit Corporation Limited, until it was transferred to Lina Renee Zapletal in 1978. At this point of sale, the land was subdivided into two lots, Lot 1 and Lot 2 DP609224. These two lots were purchased by Central Civil in 2022.

Historical aerial imagery allows for modern developments and land use to be identified within the study area. Table 4 summarises the development of the study area with reference to the historical aerials.

Table 4 Summary of historical aerials

Aerial	Description
1960 (Photo 3)	Aerial imagery from 1960 shows that portions of the study area have been cleared of large vegetation. This vegetation clearance has been limited to the south-west and south-east of the study area, with a small section in the north-east. Within the southern portion there appears to be an orchard and in south-west portion, the land appears to have been cleared for agricultural purposes. Access tracks have been constructed on the north-west and south-east portions.
1965 (Photo 4)	Aerial imagery from 1965 shows that portions of the study area have been extensively cleared of large vegetation. This vegetation clearance has been limited to the south-west and south-east of the study area, with a small section in the north-east. Within the south-west portion, the land appears to have been cleared for agricultural purposes. Access tracks have been constructed on the north-west and south-east portions.
1974 (Photo 5)	Aerial imagery from 1974 shows that limited changes have occurred within the study area. The cleared land has been maintained and an artificial dam has been constructed along the northern border. There is now an access track that connects the dam with the cleared portion in the south-east.
1983 (Photo 6)	Aerial imagery from 1983 shows that limited changes have occurred within the study area . A small structure now exists within the cleared section within the south-west.

Aerial	Description
1993 (Photo 7)	Aerial imagery from 1993 shows that vegetation clearance has occurred within the central portion of the study area. The grass in this area appears to have been removed with exposed soils visible on the aerial.
Current (Figure 2)	Little change has occurred within the study area from 1994.

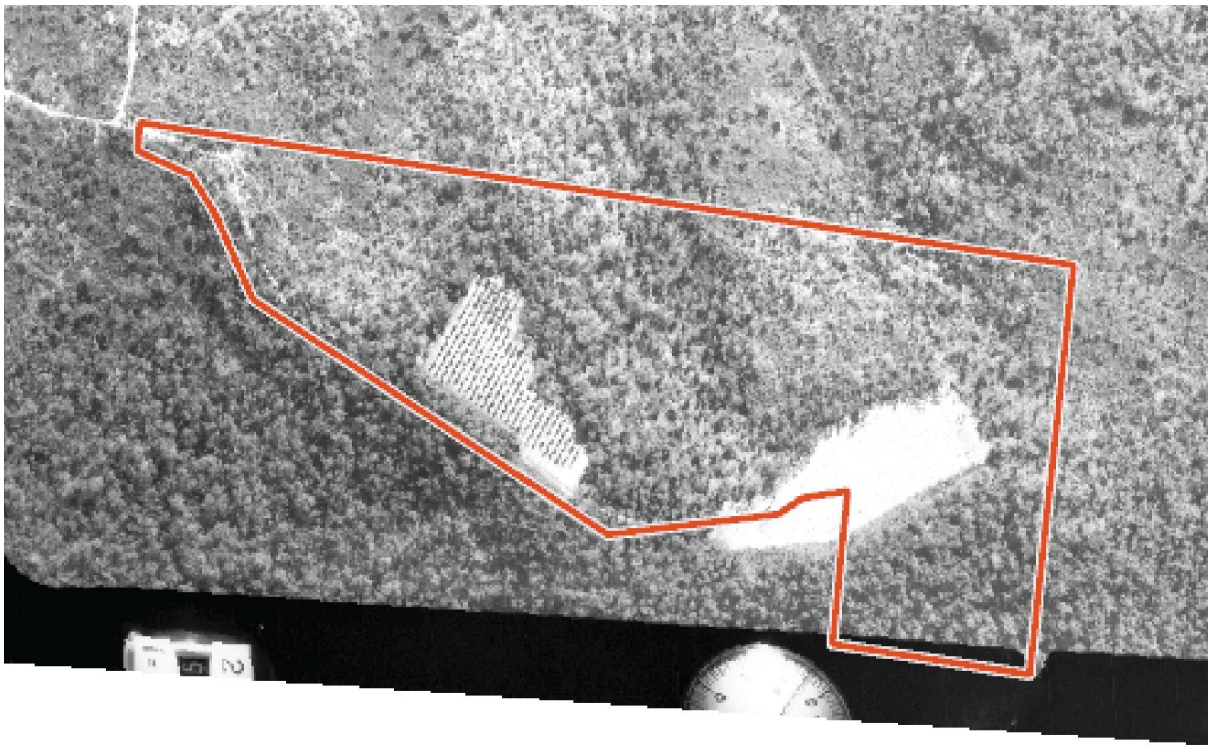


Photo 3 Aerial photograph dated to 1960, study area shown in red (Source: NSW Spatial Services)

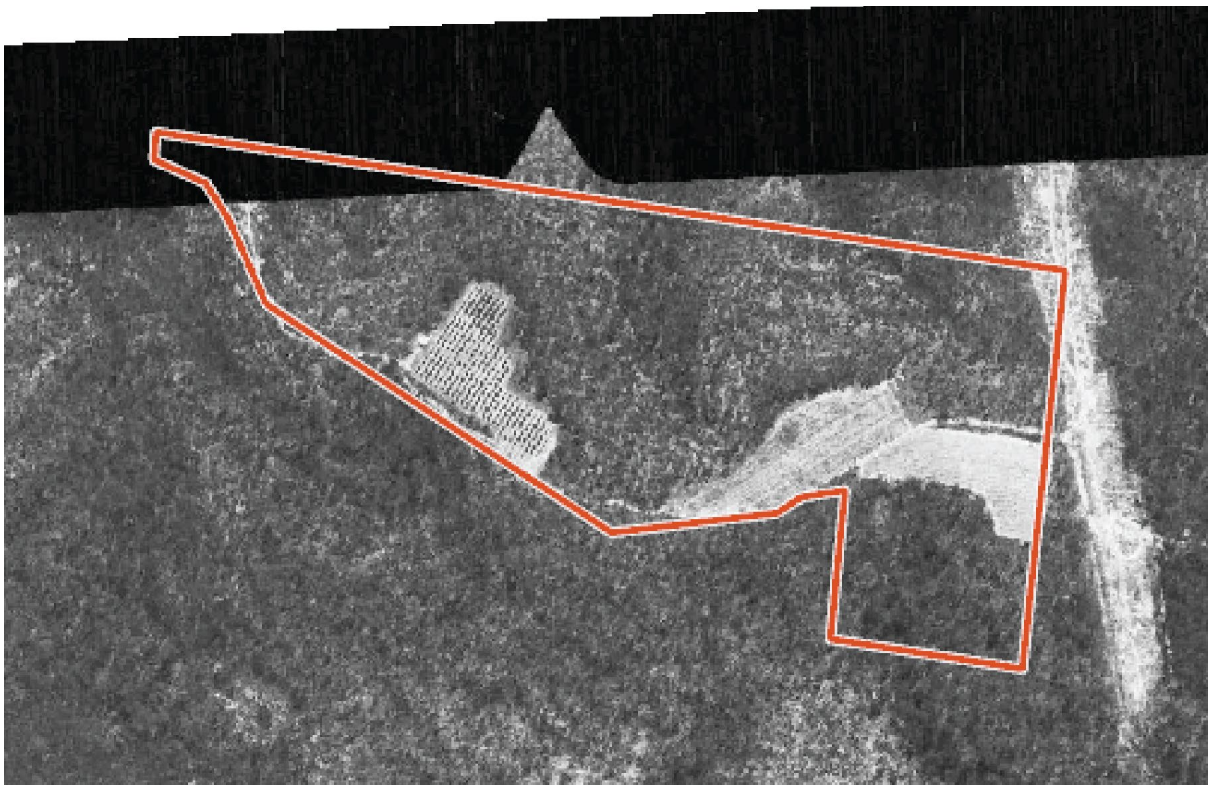


Photo 4 **Aerial photograph dated to 1965, with the study area indicated by the red boundary (Source: NSW Spatial Services)**



Photo 5 **Aerial photograph dated to 1974, with the study area indicated by the red boundary (Source: NSW Spatial Services)**



Photo 6 **Aerial photograph dated to 1983, with the study area indicated by the red boundary (Source: NSW Spatial Services)**

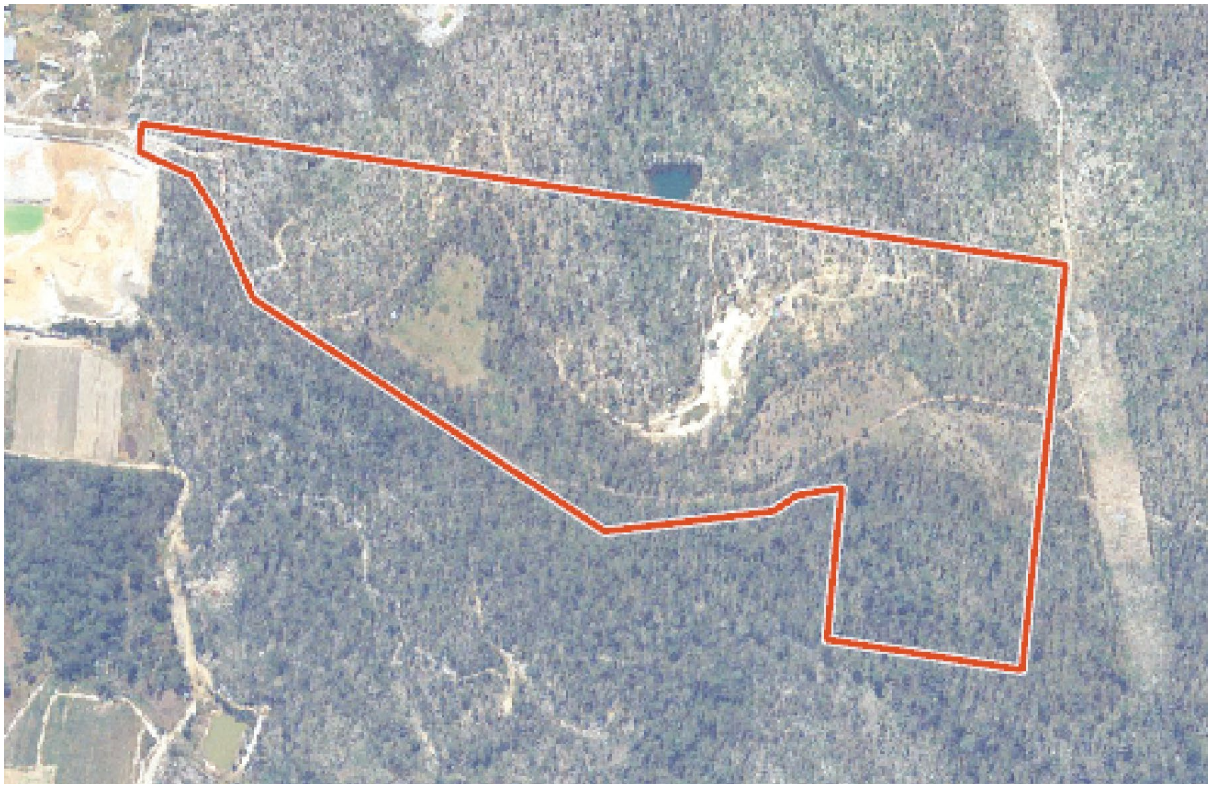


Photo 7 **Aerial photograph dated to 1993, with the study area indicated by the red boundary (Source: NSW Spatial Services)**

3.2 Previous archaeological work

3.2.1 Regional overview

Several Aboriginal cultural heritage investigations have been conducted for the region. Models for predicting the location and type of Aboriginal sites with a general applicability to the region and thus relevant to the study area have also been formulated as a part of these investigations. Studies over the past 30 years indicate that rock shelters with midden deposits or art, rock engravings, middens and axe grinding grooves are the most common site types, while open artefact scatters, scarred trees, burials, and stone arrangements are less common. The location of these Aboriginal site types depends on the environmental context, such as middens being near fresh and salt water bodies, and rock shelters in areas of exposed sandstone escarpments (Archaeological & Heritage Management Solutions 2011, pp. 37).

Vinnecombe (1980) completed an archaeological survey of the Gosford/Wyong region to collect sufficient site records and site type information to determine patterns of site distribution in the area. The survey area was divided into three environmental zones, including coastal estuarine areas of the Brisbane Water/Bouddi Peninsula, marginal estuarine areas of lower Mangrove Creek located, and inland freshwater areas of Mangrove Creek approximately 17 kilometres north-east of the current study area within a very similar landscape. The initial large scale assessment involved systematic survey of 10 square kilometre locations; however, this initial work did not consider several environments and landforms, thus further areas of the open coast, Tuggerah Lake/Central Coast Lagoons were surveyed. This survey work resulted in the recording of several middens, engravings, and rock shelters. The assessment identified regional patterns for site types within the various environmental zones. Predictive models developed for the survey indicated that the most frequently occurring site types were rock shelters with art and/or deposit, followed by axe grinding grooves, and engravings. Vinnicombe's analysis of the survey findings, ethnohistorical information and environmental context, indicated that resources were exploited seasonally along the coast during the summer months and throughout the hinterland during the winter months.

Attenbrow (1981) studied the Mangrove Creek Dam catchment located approximately 25 kilometres north-east of the current study area, which included an inundation area of 1215 hectares. The aim of the investigation was to assess the relationship between chronological and spatial site patterns within the Upper Mangrove Creek catchment with demographic and human behavioural patterns within the area. This work involved the excavation of several Aboriginal shelter sites, resulting in basal occupation dates at Mussel Shelter of 8460±120 BP (SUA-1560) and Loggers Shelter of 11,050±136 BP (SUA-931). These results indicated continuous and extensive occupation of the Mangrove Creek catchment and that the 'coastal hinterland' was inhabited and exploited for longer and more intensively than first thought. Attenbrow compared the results from the excavated material at Mangrove Creek with sites in the MacDonald River Valley and Brisbane Waters region. This analysis identified variations within artefact types and available stone and faunal resources suggesting that site usage patterns varied within and between similar landscape units.

McDonald & Rich (1993) conducted a relatively large sub-surface investigation at Rouse Hill, located approximately 27 kilometres south-west of the study area. Criteria for assessing regional site representativeness and an accompanying interpretive guide were developed for this investigation (JMCHM 1999, pp. 14–17). The criteria included 'Location,' 'Geomorphic Location', 'Site Integrity', 'Artefact Density', 'Assemblage Characteristics' and 'What Type of Site' (JMCHM 1999, pp. 14–17). Based on McDonald & Rich's (1993) theory that geology and water permanency influenced cultural material variation, spatial areas were defined upon consideration of these elements and used as analytical units (JMCHM 1999, pp. 9). McDonald & Rich (1993) concluded the following:

- Sub-surface deposits are present in most areas.

- Ploughing generally only disturbs soil to a depth of approximately 30 centimetres deep.
- There is potential for open sites located in aggraded and stable landscapes to have structural integrity.
- Site artefact density is dependent on the dimensions of site and extent of the associated human activity, and in many cases can be "extremely high".
- Aboriginal sites are significantly more complex than indicated by previous surveys and sub-surface investigations, which have been limited.

Broad patterns can be identified between Aboriginal sites and environmental features. For example, increased site complexity near permanent water.

Navin & Officer (1994) were contracted by Sinclair Knight and Partners to provide a preliminary cultural heritage assessment on behalf of Optus, for the proposed cable route to be installed from Sydney to Newcastle, and onwards to Orange. The purpose of the assessment was to provide a predicative model for site locations that would influence the cable route. Within the report, the archaeological sensitivity of five landforms (Sandstone Ranges of the Sydney Basin, Central Lowlands of the Hunter Valley, Cumberland Plain, the Coastal Margin and Plain, and Western Rangelands) were assessed, and a predicted site location criteria was provided for each landform. The study area falls within the Sandstone Ranges of the Sydney Basin and can be subcategorised as part of the Dissected Rangelands, defined as "a high relief series of ridgelines and narrow valleys, defined by a high density network of drainage lines". The following site location criteria is presented as part of the assessment (Navin & Officer 1994, pp. 13–14):

- "*Rock shelter sites with occupation deposit and/or Aboriginal rock art may occur wherever suitable rock outcrops and overhangs occur. These may be weathered areas in vertical rock exposures in sandstone (such as major and minor escarpments - especially at the break of slope along a ridge crest) or may occur in isolated blocks of material which have moved from their original source. Most of the rock shelters which provide sufficient space (head room), a level dry sediment floor and protection from the weather will have evidence of Aboriginal occupation. There is a preference for northerly or northwest aspects.*
- *Rock engravings commonly occur on flat rock faces in either exposed locations on ridgecrest and plateau contexts or less commonly, within rock shelters.*
- *The location of grinding grooves, which are the by-product of the manufacture of ground edge tools, was dependent on the presence of a suitable rock type, usually fine-grained homogeneous sandstone, and an accessible, but not necessarily permanent, water source*
- *Open sites are likely to occur on level, well drained ground adjacent to water sources such as fluvial corridors and plateau wetlands and upland swamps. Open sites may also occur in sand bodies, especially source bordering dunes along fluvial corridors and sand mantels on plateaus*
- *High site densities are likely to occur along valley floors adjacent to main creeks (especially shelters with occupation deposit), and ridgeside subsidiary creek zones (especially shelters with art).*
- *Site densities on plateau topographies appear to be similar, if not higher than basal slope contexts. Elevation and seasonally cold temperatures cannot be interpreted as a deterrent to occupation (Brayshaw and Dallas 1992).*
- *Larger sites are most likely to be associated with permanent water sources.*
- *Sites are likely to be associated with topographically defined access corridors such as major ridgelines, spurlines and major fluvial corridors associated with open valley floors. Peninsula like ridgeline complexes may also exhibit high site densities depending on local area variability.*

- *Within the enclosed valleys of the peripheral margin, and particularly the Lithgow western escarpment, major site complexes may occur at the head of the valleys where resources were concentrated and there was ready access to the plateau (McIntyre 1989, Haglund 1990).*
- *Large sites may be located on streamlines on the edges of the sandstone ranges, (especially the western escarpment) at their boundary with adjacent valley floor and upland plateau topographies. Smaller sites may occur at the valley floor end of long ridgelines."*

McDonald (2008) undertook a large scale study of engravings and rock shelter with art sites within the Sydney Basin. The survey area included the Hawkesbury catchment between MacDonald River and Broken Bay. The study focused solely on defining the nature and extent of art sites in the Sydney Basin. At the time of the study, over 5,000 previously recorded Aboriginal archaeological sites had been recorded. A total of 1,370 of these were rock shelter sites with associated art, and 1,450 were engraving sites. Based on information on the registered site records of engraving sites, 55.9% of engraving sites were located upon ridgelines, 41% on hillsides, and few sites were in valley bottoms. Almost 70% of rock shelters with art sites were located on hillsides, 31.7% occurred on the tops of ridgelines and 16.7% occurred at the bottom of valleys. As part of this study, test excavations were conducted in rock shelters with art (pigment and engravings) and grinding grooves near Mount Yengo on the McDonald River, approximately 60 kilometres to the north-west of the study area: AHIMS 37-5-1/Yengo 1; and AHIMS 37-5-2/Yengo 2. At AHIMS 37-5-1/Yengo 1, a total of 10,060 stone artefacts were recovered from the 10 excavated pits. Most of the lithic material (98.4%) was catalogued as unmodified debitage, with 70% of the whole assemblage being classified as microdebitage (<1 centimetre in size), while only 1.6% featured macroscopic evidence of usewear and/or retouch, most of which (47.2%) were modified amorphous flakes and flake fragments. 0.8% of the assemblage were cores, while there were also 58 backed artefacts, most of which were asymmetrical (Bondi) points with the remaining being symmetrical (geometric) backed artefacts. The dominant raw material was quartz, followed by silicified tuff and quartzite; silcrete was also present. Faunal remains were also recovered, with more than 20 mammal species identified from bones. While excavations occurred at AHIMS 37-5-2/Yengo 2, the small amount of material that was recovered was lost, but it is noted that there was sparse evidence of occupation with the deposit accumulating through natural processes.

3.2.2 Local overview

Few Aboriginal archaeological assessments have been undertaken in the vicinity of the study area (within 5 kilometres). A review of those Aboriginal archaeological assessments conducted within the vicinity of the study area accessible on the AHIMS database is detailed below.

Harris (1979) undertook an archaeological survey of unreserved crown land, located approximately 1.9 kilometres south-west of the study area. The parcel of crown land was to be leased to a member of the public, Mr. Max Harris. Harris intended to remove large, loose rocks and vegetations from some of the area that he was leasing to create a small track. No Aboriginal sites or objects were identified during the survey and further archaeological investigation was not recommended within the development area.

McDonald (1986) conducted an intensive assessment of the proposed development of the Maroota Historic Site into an Aboriginal Rock Engraving Interpretation Centre (AREIC), located approximately 1.6 kilometres north-west of the study area. The assessment included consultation with the Aboriginal community, extensive background research and an archaeological survey. It was noted that all Aboriginal sites within the Maroota Historic Site boundary were grouped under one site, AHIMS 45-2-0016/DRM; Maroota Historic Site; Devil's Rock, Maroota; Laughtondale, with only one site card. This site contained multiple forms of Aboriginal site types, including shelter with art, engraving and stone arrangement. This has since been updated and AHIMS sites now exist for each. The results

of the archaeological surey identified 22 sites and nine rock shelters with Potential Archaeological Deposits (PADs), three of which were previously recorded sites, and some that were associated with multiple sites. These included:

- 12 engraving sites, two of which were associated with other sites.
- Four grinding grove sites.
- Three shelters with pigment/engraved art, two with occupation deposits.
- Two scarred trees.
- One stone arrangement.
- One open site.

Six of these sites were outside of the then boundaries of the Maroota Historic Site. McDonald (1986) recommended that three of the sites (AHIMS 45-2-0248/DR6; Maroota Historic Site, AHIMS 45-2-0234/DR12 Maroota Historic Site; Laughtondale Gulley Rd and AHIMS 45-2-0235/DR13; Maroota Historic Site) be acquired for inclusion in the AREIC. The remaining three sites (AHIMS 45-2-0242/DR19; Maroota Historic Site, AHIMS 45-2-0240/DR17; Maroota Historic Site and AHIMS 45-2-0241/DR17; Maroota Historic Site) were not recommended for acquisition as their locations on private land and near public roads would have made managing them as part of the AREIC challenging.

Corkill (1989) conducted a survey of 40 hectares of ridgetop land at Maroota, approximately 2.6 kilometres south-west of the study area, the topography of this study area was very similar to the current Biosis study area. High levels of disturbance were noted throughout the survey. Several sandstone outcrops were inspected for rock art or engravings; however, none were found. Corkill (1989) noted that engravings are rare on the west side of the Maroota ridge (where the surveyed area was located), and much more common on the east side. This may be due to the artists preferring to select locations to the east, or due to weathering patterns eroding such sites on the western side. No Aboriginal sites or artefacts were detected, suggested to be due to the poor ground visibility also noted.

Corkill (1991) conducted an archaeological investigation of Aboriginal sites on Portions 29 and part of Portion 196 in Maroota NSW, approximately 2.1 kilometres south-west of the study area. The proposed development involved the mining of sandstone for building materials. Background research identified that the geology within the study area was dominated by the Hawkesbury Sandstone formation. It was identified that other raw materials including silcrete and basal would have been transported into the area. An archaeological survey was carried out by Corkill and a member of the Daruk LALC; however, no Aboriginal sites or objects were identified within the study area during the survey. It was recommended that the proposed development be able to proceed without any further archaeological investigation.

Corkill (1994a) undertook a survey of Lot 3 DP567166, Maroota, NSW, located adjacent to the south of the current study area. Corkill identified five Aboriginal sites within the study area. The first site, CC1, consisted of two groupings of grinding grooves along a tributary of Coopers Creek. The first grouping contained nine grooves and was in the sandstone bed above a small rock pool. The second grouping contained 13 grooves located around a keyhole shaped rockpool. The second site identified was CC2, which contained engravings and grinding grooves. The engravings displayed two figures, a flightless bird and an animal with thin legs and tail. Eleven grinding grooves were located 11 metres from the engravings in a shallow rock-lined watercourse. The third site, CC3, consisted of a rock shelter with deposit. The rock shelter consisted of a south-west facing overhang and contained a stone artefact found within the dripline. The fourth site found by Corkill consisted of another shelter

with deposit, named CC4. This shelter was located under an overhang and was west facing. Two basalt flakes from ground edge implements were also identified at the back of the shelter. The final site was named PAD 1 and consisted of a rock shelter with subsurface potential located under a sheltered overhang. In addition to the sites identified by Corkill, the Maroota Sand pebbles and cobbles were also noted as being of archaeological interest due to their suitability for artefact manufacture.

Corkill (1994b) undertook a survey of Lot 2 DP595538, Maroota, NSW, located approximately 1.4 kilometres south-west of the current study area. The proposed works included the mining of sand and sandstone within the study area. An archaeological survey was carried out by Corkill and a member of the Daruk LALC; however, no Aboriginal sites or objects were identified within the study area during the background research or the survey. During the survey, extensive sandstone outcropping largely in the form of horizontal or sloped platforms was noted. Corkill (1994b) identified that these surfaces were ideal for rock art, including engravings. Several small rockshelters were also inspected for evidence of Aboriginal occupation; however, these and the sandstone outcrops however were absent of any human modification. It was also noted that art in the form of engravings was rare on the western side of the ridge in Maroota when compared with the eastern side (Corkill 1994b, pp. 7). Within the Maroota State Forest, there are several Aboriginal art sites and few engraving sites. Corkill (1994b, pp. 7) suggested that this could indicate a lack in preference for engraving as the primary mode of art in this region.

Corkill & Edgar (1999) conducted an Aboriginal archaeological investigation within Lot 2 DP312327 and Lots 1 and 2, DP228308 in Maroota, NSW, located approximately 2.7 kilometres south of the study area. The aims of the investigation were to identify previously registered sites within the study area, undertake a survey with members of the Aboriginal community and make recommendations for the management of any identified sites. GSV throughout the study area was considerably low during the survey, being calculated as an average of 6%. No Aboriginal sites or objects were identified during the survey, and it was suggested that any objects found would not have been *in situ*. This was concluded to be the result of extensive disturbances from agricultural activities within the study area, rather than an absence of Aboriginal occupation of the area.

Total Earth Care (TEC) (2008) undertook an Aboriginal cultural heritage and Archaeological assessment at Old Northern Road, Maroota, located adjacent to the south of the current study area. This report built on the 1994 assessment undertaken by Corkill. It included a field survey of the study area to relocate sites identified by Corkill and whether any further sites will be impacted. The survey of the study area relocated four of the previously recorded sites and two new sites. The relocated sites consisted of:

- CC1—Grinding groove occurring in two groups along a small unnamed watercourse running into Coopers Creek.
- CC2—Rock art engravings and grindings grooves. Engravings of an emu and quadruped mammal were identified as well as a group of grinding grooves within 10 metres of the engravings.
- CC3—Shelter with deposit. This site was originally recorded by Corkill and consisted of a silcrete flake on the surface of a rock shelter floor. The TEC survey could not relocate the silcrete flake and determined that it was likely the unstable soils had resulted in reburial of the artefact.
- CC4—This site was originally recorded as a rock shelter with deposit. Two basalt flakes from a ground edge implement were also present within the rock shelter. These artefacts could not be relocated, however, one silcrete flake and some burnt bone was identified on the

surface. The bone was interpreted as possibly being a piece of surface cultural faunal deposit.

- CC5—This site was original described as an area of PAD by Corkill and was located 50 metres south-east of CC3. TEC revisited this site and identified two further artefacts consisting of a quartz flake and a silcrete cobble used as both a core and hammerstone.
- CC6—This site consisted of two shallow grinding grooves that were located within an ephemeral drainage line.

Biosis (2019) conducted an Aboriginal Due Diligence Assessment at Lot 2 DP605644, Wisemans Ferry, NSW, approximately 3.9 kilometres north-west of the current study area. the assessment included a field investigation. The field investigation was limited by poor ground surface visibility as well as inaccessibility to some parts of the study area due to steep terrain and topography. The results of the field investigation identified ten rockshelters, six of which contained PAD. In addition to the rock shelters recorded within the study area, numerous other rock shelters were noted across the study area outside of the sample survey transects. One circular engraving was also identified on the north facing side of a boulder near the eastern border of the study area. Further archaeological assessment in the form of an ACHA including a full coverage archaeological survey and Aboriginal community consultation was recommended.

3.2.3 AHIMS site analysis

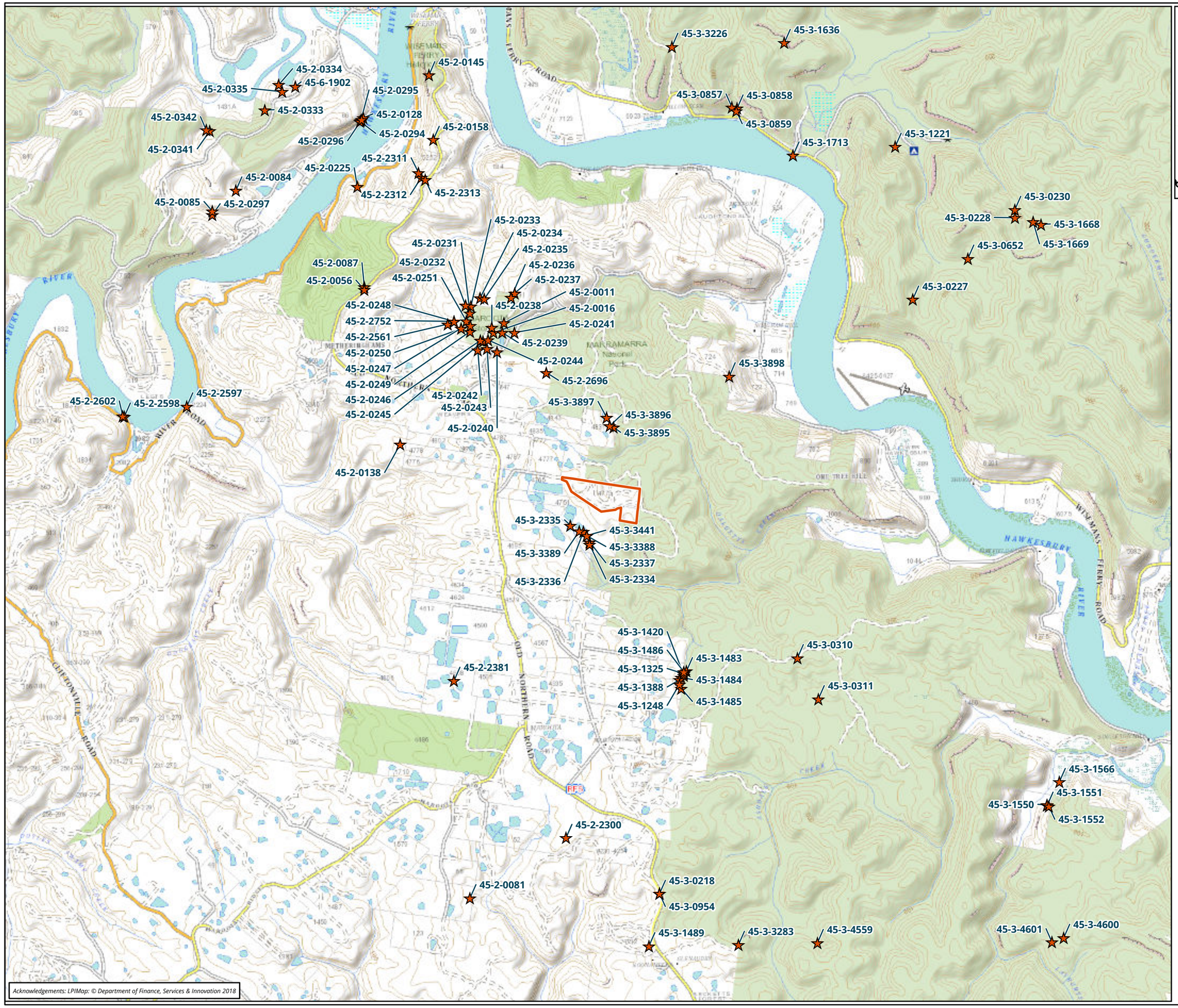
A search of the AHIMS database (Client Service ID: 720245) identified 99 Aboriginal archaeological sites and one Aboriginal place within a 5 by 5 kilometre search area, centred on the study area (Table 5). None of these registered sites are located within the study area (Figure 7). AHIMS search results are provided in Appendix 1. Table 5 provides the frequencies of Aboriginal site types in the vicinity of the study area. The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied on where notable discrepancies occurred.

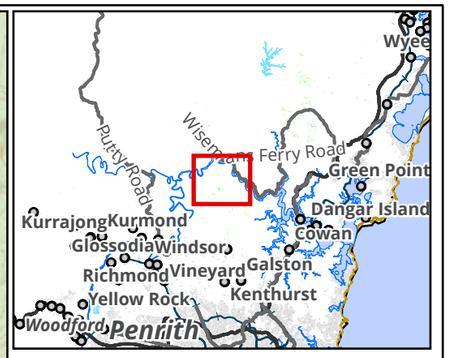
It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area. Some recorded sites consist of more than one element, for example artefacts and a modified tree, however for the purposes of this breakdown and the predictive modelling, all individual site types will be studied and compared. This explains why there are 112 results presented here, compared to the 99 sites identified in AHIMS.

Table 5 AHIMS site type frequency

Site type	Number of occurrences	Frequency (%)
Art (Pigment or Engraved)	58	51.79
Grinding Groove	29	25.89
Artefact	15	13.39
PAD	5	4.46
Modified Tree (Carved or Scarred)	2	1.79
Shell	1	0.89
Water Hole	1	0.89
Stone Arrangement	1	0.89
Grand Total	**112**	**100.00**

A simple analysis of the Aboriginal cultural heritage sites registered within the 5 by 5 kilometre search area, centred on the study area indicates that art (pigment or engraved) sites are the most frequently recorded site with 21.79% (n=58). This is followed by grinding groove sites with 25.89% (n=29), and artefact with 13.39% (n=15). PAD sites are represented by 4.46% (n=5) and modified tree (carved or scarred) by 1.79% (n=2). Lastly, shell, water hole and stone arrangement site types were each represented by 0.89% (n=1).





Legend

- Study area
- AHIMS

Acknowledgements: LPIMap: © Department of Finance, Services & Innovation 2018

NOT TO BE MADE PUBLIC

Figure 7 AHIMS within the vicinity of the study area

0 500 1,000 1,500

Metres

Scale: 1:40,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 30 May 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry, Layout: 37704_ACHA_F7_AHIMS

3.3 Discussion

The presence of several floral and faunal resources, along with the proximity of the Hawkesbury River and several of its tributaries, suggests that the study area would have provided Aboriginal people with reliable food, water, and raw material resources year round. The soil landscapes within the study area include Sydney Town and disturbed terrain. Within the Sydney Town landscape, there is the potential for subsurface artefact deposits in areas that have not been subject to disturbance such as vegetation clearance. Within disturbed terrain, Aboriginal objects may exist however, any potential deposits would not be *in* situ. The geological formations present within the study area also indicate that rock shelters, rock art, grinding grooves and stone arrangements could be present within the study area. Rock shelters would have provided Aboriginal people with shelter from the elements. It is therefore likely the study area was extensively utilised by Aboriginal people in the past and evidence of their occupation in the form of artefact scatters, isolated artefacts, open camp sites, grinding grooves, rock engravings, and PADs may be present within the study area as a result.

3.3.1 Predictive statements

A series of predictive statements have been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

These statements are based on:

- Site distribution in relation to landscape descriptions within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Table 6 indicates the site types most likely to be encountered across the present study area. The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 6 Aboriginal site prediction statements

Site type	Site description	Potential
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	High: Suitable horizontal sandstone rock outcrops could occur along drainage lines. The underlying geology includes Hawksbury Sandstone, which suggests that there is potential for sandstone outcrops to exist within the study area to facilitate this site type. This site type has also been recorded in the vicinity of the study area.
Modified trees	Trees with cultural modifications	Moderate: Aerial imagery indicates that some mature native trees appear to have survived within the study area and this site type has been previously recorded in the vicinity.

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Moderate: Stone artefact sites have been previously recorded in the region across a wide range of landforms including alluvial flats, and also within the study area; they have the high potential to be present in undisturbed areas within the study area.
Rock shelters with art and/or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Moderate: The sites will occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which may be present in the study area.
PADs	Potential sub surface deposits of cultural material.	Moderate–low: PADs have been previously recorded in the region in a limited capacity. They have the potential to be present in undisturbed landforms.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area.
Aboriginal ceremony and Dreaming Sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have not been recorded within the study area. There is some potential for shell middens to be in vicinity of permanent water sources. Due to the distance from permanent water, any shell remains are likely to be incidental occurrences rather than from a midden.
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual, or historic significance. Often, they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There is one recorded Aboriginal historical association within the Marramarra National Park, however it is not located near the study area.

Site type	Site description	Potential
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	Low: There are no post-contact sites previously recorded in the study area and historical sources do not identify one.
Burials	Aboriginal burial sites.	Low: Aboriginal burial sites are generally situated within deep, soft sediments, caves, or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials.

4 Archaeological survey

A field survey of the study area was undertaken on 3 April and 6 April 2023. The field survey sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological survey objectives

The objectives of the survey were to:

- Provide RAPs an opportunity to view the study area and to discuss previously identified Aboriginal object(s) and/or place(s) in or within proximity to the study area.
- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of PADs.

4.2 Archaeological survey methodology

The survey methods were intended to assess and understand the landforms and to determine whether any archaeological material from Aboriginal occupation or land use exists within the study area.

4.2.1 Sampling strategy

The survey effort targeted all landforms that will potentially be impacted by the development. It focused on areas with disturbances to assess the extent and impact of these on the ground surface, as well as on areas with increased GSV and exposure, as this enables Aboriginal objects to be identified on the ground surface.

4.2.2 Survey methods

The archaeological survey on 3 April and 6 April 202 was conducted on foot by Crystal Garabedian (Biosis—Heritage Consultant), Bronte Baonza (Biosis—Graduate Heritage Consultant) and Raymond Weatherall (Metropolitan Local Aboriginal Land Council (LALC)—Cultural Sites Offer). Recording during the survey followed the archaeological survey requirements of the Code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may potentially have been exploited by Aboriginal people.
- Landform.
- Photographs of the site indicating landform.
- Evidence of disturbance.
- Aboriginal artefacts, culturally modified trees, or any other Aboriginal sites.

Where possible, identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative

photographs of survey units, landform, vegetation coverage, ground surface visibility (GSV) and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System (GPS) and the Map Grid of Australia (MGA) (94) coordinate system.

4.3 Archaeological survey results

A total of one meandering transect was walked across the entire study area, with the three surveyors walking two metres apart (Figure 8). This follows the methodology set out in Burke and Smith (2004, pp. 65) which states that a single person can only effectively visually survey an area of two linear metres. Results from the field survey have been summarised in Figure 8 and Figure 9 below.

4.3.1 Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The survey was limited by poor GSV due to dense vegetation and leaf litter obscuring the ground surface.

4.3.2 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010a).

GSV across the study area was generally low (0–25%), with the average being approximately 20%. It was seen to increase within some parts of the study area, most notably along fire trails (Photo 8). The low levels of visibility were the result of extensive grass coverage and leaf litter, and sandstone boulders throughout the entire study area (Photo 9 and Photo 10).



Photo 8 **Increased GSV near previous fire trail within the eastern portion of the study area, facing south-west**



Photo 9 **Low GSV within the central portion of the study area, facing south-east**



Photo 10 **Low GSV within the western portion of the study area, facing south**

4.3.3 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, pp. 79, DECCW 2010a).

Overall, the study area displayed low levels of exposure, ranging between 0–15% and averaging 5%. Higher levels of exposure were seen predominantly in areas near the fire trails and around dams (Photo 11 and Photo 12). Areas with low exposure were primarily the result of leaf litter obscuring the view of the ground (Photo 13).



Photo 11 **Increased exposure near fire trails in the western portion of the study area, facing north-east**



Photo 12 **Increased exposure near fire trails in the central portion of the study area, facing north-east**



Photo 13 **Area with no exposure in the southern portion of the study area, facing north-east**

4.3.4 Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits, and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with human agents include farming and agricultural practices and constructing fence lines and small structures. Disturbance levels within the study area were assessed during the visual inspection. Levels of disturbance were categorised through an inspection of the ground surface, landforms, and aerial imagery.

As evidenced by the historic aerials (Photo 3 to Photo 7) and the archaeological survey, the study area has been subjected to varying levels of disturbance. Previous clearing of large vegetation in the southern region for use as an orchard can be observed in the historical aerial imagery. During the survey, several features were noted that would have disturbed the ground surface, including; a small shed structure in the central portion of the study area, gates and fencing, fire trails, artificial dam, tree clearance, water tanks and stockpiling of sediment and waste throughout the study area (Photo 14 to Photo 19).



Photo 14 **Shed in the central portion of the study area, facing north-west**



Photo 15 **Fire trail and metal gate in the central portion of the study area, facing south-west**



Photo 16 **Water tanks in the central portion of the study area, facing north-west**



Photo 17 **Artificial dam in the central portion of the study area, facing north-east**



Photo 18 **Tree clearance and waste piles in the central portion of the study area, facing south-east**



Photo 19 **Stock piling and tree clearance in the central portion of the study area, facing south-east**

Table 7 Survey coverage

Survey unit	Landform	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
1	Crest	13,988.41	20	15	419.65	3.0
2	Ridge	13,231.10	25	10	330.78	2.5
3	Slope	14,586.96	10	5	72.93	0.5
4	Valley	2,883.37	10	5	14.42	0.5

Table 8 Landform summary

Landform	Landform area (m²)	Area effectively surveyed (m²)	Landform effectively surveyed (%)	No. of Aboriginal sites	No. of artefacts or features
Crest	13,988.41	419.65	3.0	0	0
Ridge	13,231.10	330.78	2.5	0	0
Slope	14,586.96	72.93	0.5	0	0
Valley	2,883.37	14.42	0.5	0	0

4.4 Discussion of archaeological survey results

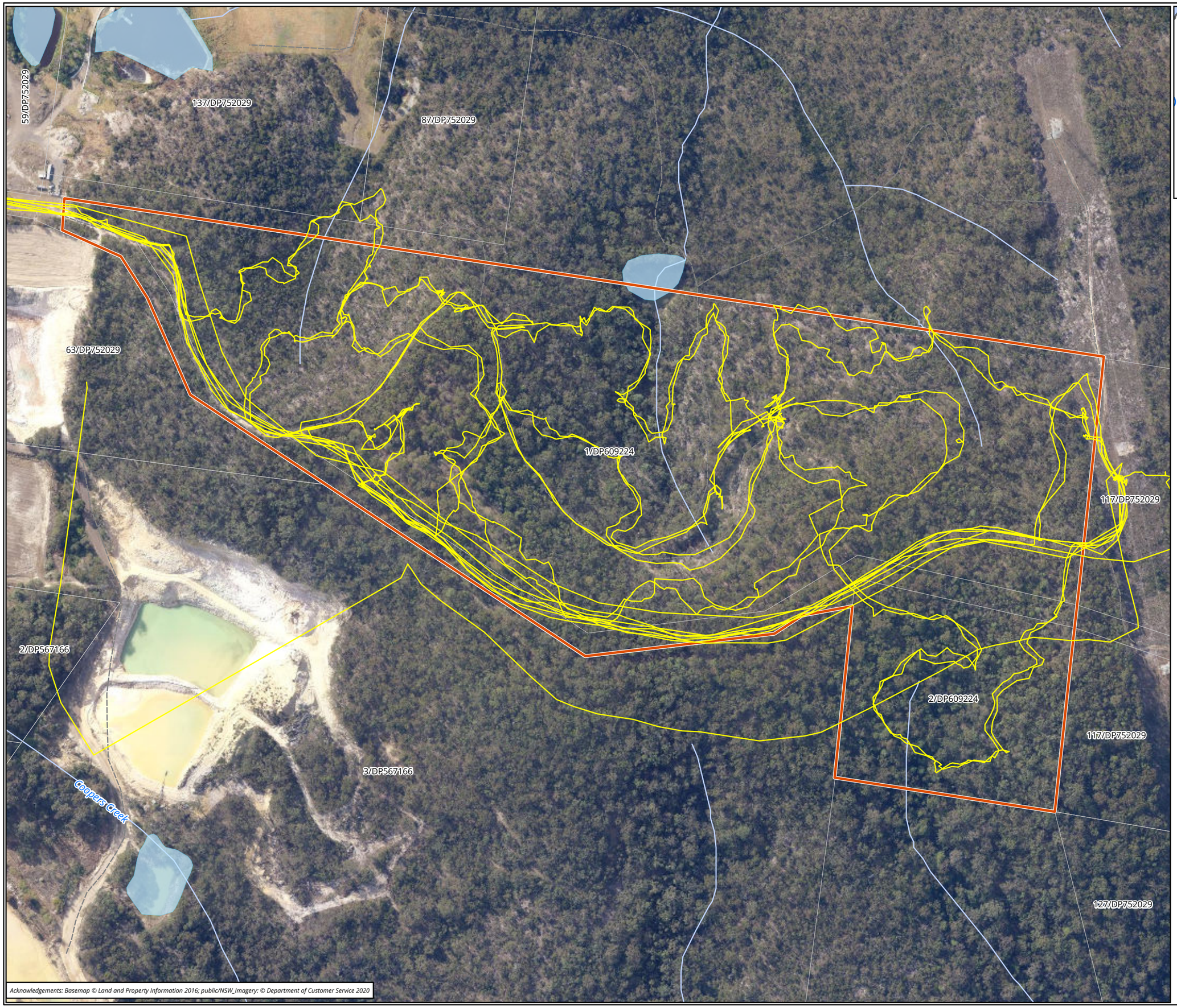
The archaeological investigation consisted of one meandering pedestrian transect walked across the entire study area. The results of the archaeological survey have been summarised below in Figure 8, Figure 9 and Figure 10. During the archaeological survey, no Aboriginal sites or objects, or areas of archaeological potential were identified. However, the lack of surface material does not indicate that there is an absence of archaeological deposits. This is instead likely attributable to the limited exposure and areas of disturbance seen during the archaeological survey, rather than an absence of Aboriginal occupation of the area.

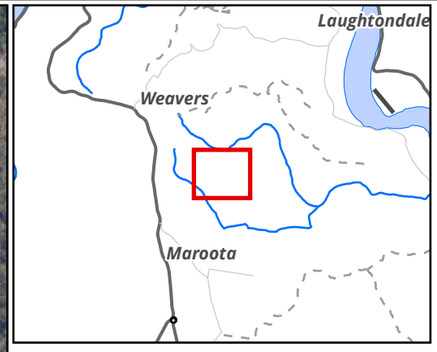
Background research identified that the study area is underlain by the Hawkesbury Sandstone geological unit. The study area lies in an undulating landscape, with steep slopes, ridgelines, and flat crests in the south, and sloping towards valley in the northern portion. This landscape coupled with the underlying sandstone geology suggests the presence of rockshelters or significant overhangs along the ridgelines or near water courses are likely. Throughout the study area there were sandstone outcrops; however, none were significant in size enough to act as a shelter or habitation structure. These outcrops were also inspected for grinding grooves and rock art; however, the surface of the sandstone did not contain any Aboriginal features of this nature. Corkill (1994b, pp. 7) suggested that the presence of several Aboriginal art sites and few engraving sites within the Maroota State Forest could indicate a lack in preference for engraving as the primary mode of art in this region. In a study area with similar topography to the current Biosis study area, located approximately 2.6 kilometres south-west, Corkill (1989) noted that engravings are rare on the west side of the Maroota ridge, where the current study area is.

The study area is also underlain by the erosional Sydney Town soil landscape. The Sydney Town soil landscape contains shallow–moderately deep soils that are highly permeable and have high erosion hazard. Erosional landscapes comprise of soils that are generally subject to movement of shallow soils, which can result in poor preservation of the archaeological record. Additionally, when the land is cleared of vegetation, the soils within this landscape typically experience higher degrees of erosion. The study area contains three first-order, non-perennial creeklines. These are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately 245 metres north-east of the study area at its closest point. The Hawkesbury River, a ninth-order, perennial watercourse, is located approximately 2.33 kilometres north-east of the study area at its closest point. While there are several watercourses in the vicinity and some within the study area itself, the absence of permanent high-order watercourses nearby suggests that most of the study area was unlikely to have been used for extensive occupation by Aboriginal groups.

The flat crest on top of the steep ridgeline presents as the most favourable landform within the study area, occurring in the southern portion (Figure 9). As is evident in the historic aerials (Photo 3 to Photo 7) within this region, previous clearing of all large vegetation has occurred for use of the area as an orchard. During the archaeological survey, the vegetation in this area was dominated by low lying grassy vegetation and shrubs, with some larger, but juvenile, trees scattered throughout. The cultural sites officer, Raymond Weatherall, who attended the survey also commented on the unexpected presence of plant species in this area, including reed plants that usually exist near water ways, and suggested that this was likely the result of lots of movement around the site. This area is also located within the erosional Sydney Town soil landscape. Other flat areas within the study area had been graded for use as fire trails or disturbed to create areas for vehicles to turn around and for rubbish dumping and storage (Photo 18 and Photo 19). The levels of disturbance from those activities within these areas would have removed or displaced sub-surface archaeological deposits due to the nature of the shallow soils present. This assessment is consistent with other studies that have conducted investigations in disturbed landscapes within the Maroota region (Harris 1979, Corkill & Edgar 1999).

The previous ground disturbances, nature of the soil landscapes and typical soil depths found within the landforms in the study area, combined with distance from permanent, higher-order water sources and lack of other markers of human occupation in the sandstone outcrops, suggests there is low potential for intact, subsurface deposits to be located within the study area (Figure 10). This assessment was supported by the cultural sites officer, Raymond Weatherall, who attended the archaeological survey.





Legend

- Study area
- Lot
- Survey tracks

Figure 8 Survey coverage

0 30 60 90 120

Metres

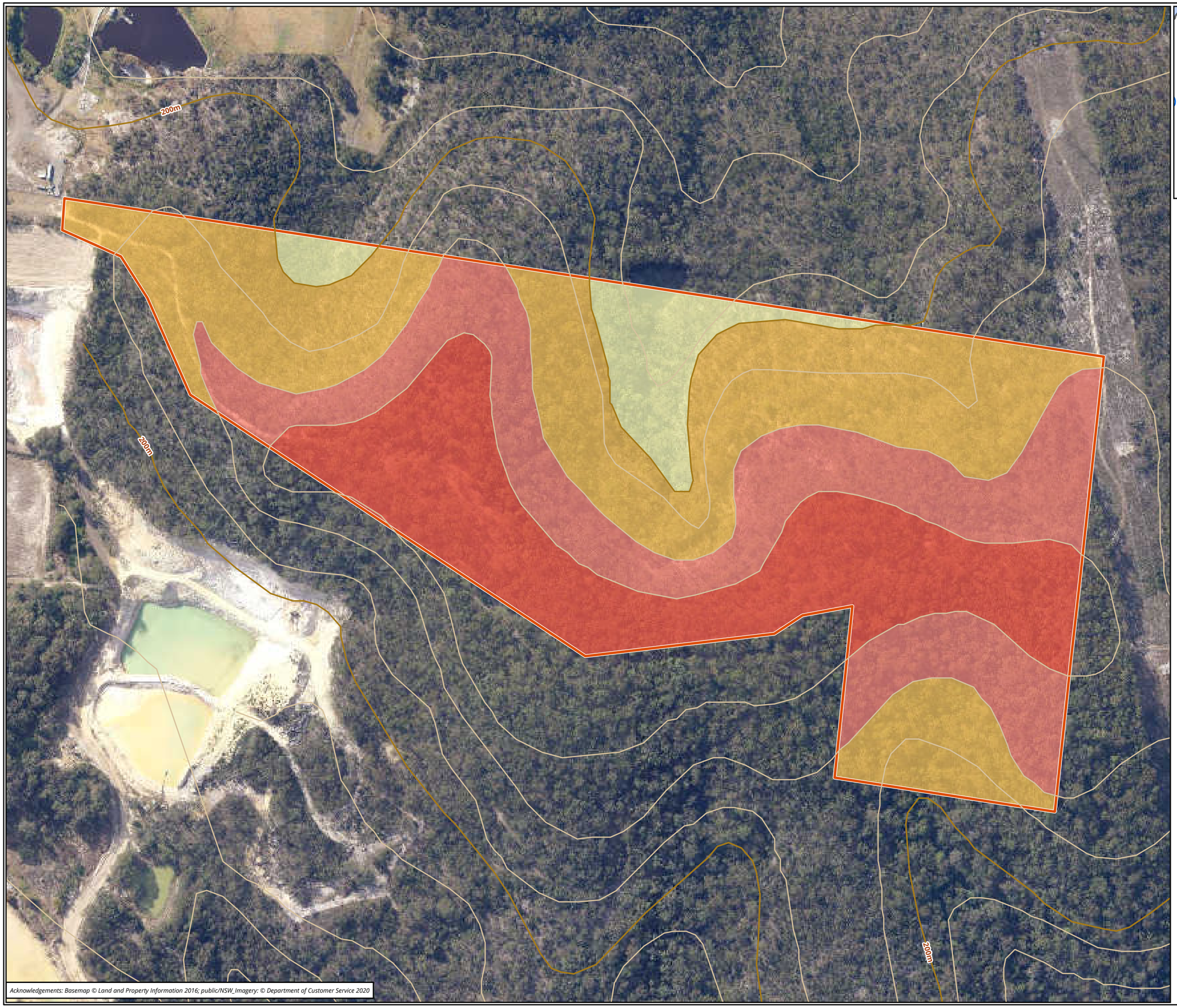
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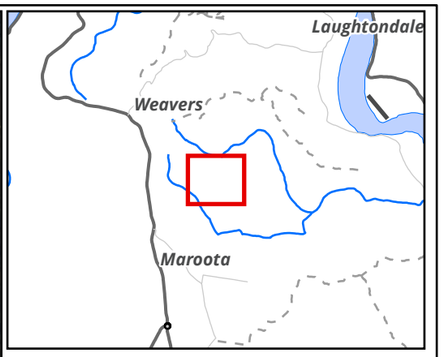
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 30 May 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry, Layout: 37704_AR_F8_Survey





Legend

- Study area
- Index contour
- Contour (10m)

Landform

- Valley flat
- Slope (unspecified)
- Ridge
- Crest

Figure 9 Landforms

0 30 60 90 120

Metres

Scale: 1:3,000@ A3

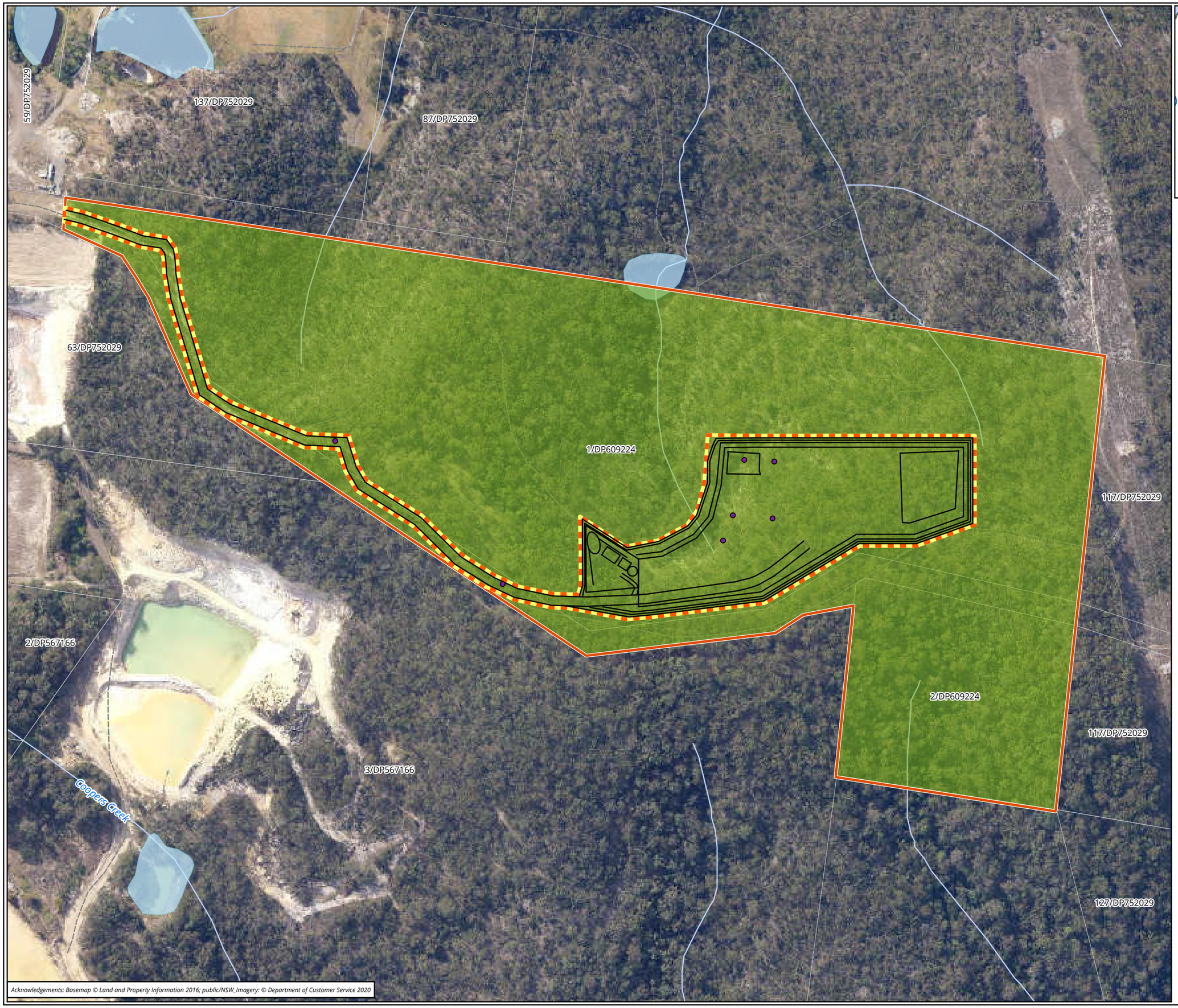
Coordinate System:
GDA 1994 MGA Zone 56

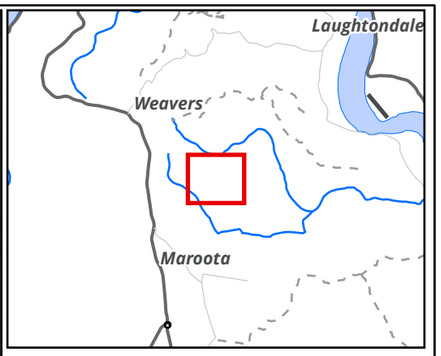
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Matter: 37704, Date: 31 May 2023,
Drawn by: JET, Checked by: CG, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_AR_F9_Landforms

Acknowledgements: Basemap © Land and Property Information 2016; public/NSW_Imagery: © Department of Customer Service 2020





Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Archaeological potential

- Low

Figure 10 Assessment of archaeological potential

0 30 60 90 120

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: CG, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_AR_F10_ArchPot

5 Scientific values and significance assessment

The two main values addressed when assessing the significance of Aboriginal sites are cultural values to the Aboriginal community and archaeological (scientific) values. This report will assess scientific values while the ACHA report will detail the cultural values of Aboriginal sites in the study area.

5.1 Introduction to the assessment process

Heritage assessment criteria in NSW fall broadly within the significance values outlined in the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS 2013). This approach to heritage has been adopted by cultural heritage managers and government agencies as the set of guidelines for best practice heritage management in Australia. These values are provided as background and include:

- **Historical significance** (evolution and association) refers to historic values and encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.
- **Aesthetic significance** (Scenic/architectural qualities, creative accomplishment) refers to the sensory, scenic, architectural and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.
- **Social significance** (contemporary community esteem) refers to the spiritual, traditional, historical or contemporary associations and attachment that the place or area has for the present-day community. Places of social significance have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be determined through consultative processes with local communities.
- **Scientific significance** (Archaeological, industrial, educational, research potential and scientific significance values) refers to the importance of a landscape, area, place or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

The cultural and archaeological significance of Aboriginal and historic sites and places is assessed on the basis of the significance values outlined above. As well as the ICOMOS Burra Charter significance values guidelines, various government agencies have developed formal criteria and guidelines that have application when assessing the significance of heritage places within NSW. Of primary interest are guidelines prepared by the Commonwealth Department of the Environment and Energy, Heritage NSW, NSW Department of Planning, Industry and Environment. The relevant sections of these guidelines are presented below.

These guidelines state that an area may contain evidence and associations which demonstrate one or any combination of the ICOMOS Burra Charter significance values outlined above in reference to Aboriginal heritage. Reference to each of the values should be made when evaluating archaeological and cultural significance for Aboriginal sites and places.

In addition to the previously outlined heritage values, the Heritage NSW Guidelines (OEH 2011) also specify the importance of considering cultural landscapes when determining and assessing Aboriginal heritage values. The principle behind a cultural landscape is that 'the significance of individual features is derived from their inter-relatedness within the cultural landscape'. This means that sites or places cannot be 'assessed in isolation' but must be considered as parts of the wider cultural landscape. Hence the site or place will possibly have values derived from its association with other sites and places. By investigating the associations between sites, places, and (for example) natural resources in the cultural landscape the stories behind the features can be told. The context of the cultural landscape can unlock 'better understanding of the cultural meaning and importance' of sites and places.

Although other values may be considered – such as educational or tourism values – the two principal values that are likely to be addressed in a consideration of Aboriginal sites and places are the cultural/social significance to Aboriginal people and their archaeological or scientific significance to archaeologists. The determinations of archaeological and cultural significance for sites and places should then be expressed as statements of significance that preface a concise discussion of the contributing factors to Aboriginal cultural heritage significance.

5.2 Archaeological (scientific significance) values

Archaeological significance (also called scientific significance, as per the ICOMOS Burra Charter) refers to the value of archaeological objects or sites as they relate to research questions that are of importance to the archaeological community, including indigenous communities, heritage managers and academic archaeologists. Generally the value of this type of significance is determined on the basis of the potential for sites and objects to provide information regarding the past life-ways of people (Burke & Smith 2004, pp. 249, NPWS 1997), For this reason, the NPWS summarises the situation as 'while various criteria for archaeological significance assessment have been advanced over the years, most of them fall under the heading of archaeological research potential' (NPWS 1997, pp. 26). The NPWS criteria for archaeological significance assessment are based largely on the ICOMOS Burra Charter.

Research potential

Research potential is assessed by examining site content and site condition. Site content refers to all cultural materials and organic remains associated with human activity at a site. Site content also refers to the site structure – the size of the site, the patterning of cultural materials within the site, the presence of any stratified deposits and the rarity of particular artefact types. As the site contents criterion is not applicable to scarred trees, the assessment of scarred trees is outlined separately below. Site condition refers to the degree of disturbance to the contents of a site at the time it was recorded.

Table 9 and Table 10 outline the site content and site condition rating used for archaeological sites.

Table 9 Site contents ratings used for archaeological sites

Rating	Description
0	No cultural material remaining.
1	Site contains a small number (e.g. 0–10 artefacts) or limited range of cultural materials with no evident

Rating	Description
	stratification.
2	Site contains a larger number, but limited range of cultural materials; and/or some intact stratified deposit remains; and/or are or unusual example(s) of a particular artefact type.
3	Site contains a large number and diverse range of cultural materials; and/or largely intact stratified deposit; and/or surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were deposited.

Table 10 Site condition ratings used for archaeological sites

Rating	Description
0	Site destroyed.
1	Site in a deteriorated condition with a high degree of disturbance; lack of stratified deposits; some cultural materials remaining.
2	Site in a fair to good condition, but with some disturbance.
3	Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down.

Pearson and Sullivan (1995, pp. 149) note that Aboriginal archaeological sites are generally of high research potential because 'they are the major source of information about Aboriginal prehistory'. Indeed, the often great time depth of Aboriginal archaeological sites gives them research value from a global perspective, as they are an important record of humanity's history. Research potential can also refer to specific local circumstances in space and time—a site may have particular characteristics (well preserved samples for absolute dating, or a series of refitting artefacts, for example) that mean it can provide information about certain aspects of Aboriginal life in the past that other less or alternatively valuable sites may not (Burke & Smith 2004, pp. 247–8). When determining research potential value particular emphasis has been placed on the potential for absolute dating of sites.

The following sections provide statements of significance for the Aboriginal archaeological sites recorded during the sub-surface testing for the assessment. The significance of each site follows the assessment process outlined above. This includes a statement of significance based on the categories defined in the Burra Charter. These categories include social, historic, scientific, aesthetic and cultural (in this case archaeological) landscape values. Nomination of the level of value—high, moderate, low or not applicable—for each relevant category is also proposed. Where suitable the determination of cultural (archaeological) landscape value is applied to both individual sites and places (to explore their associations) and also, to the Study Area as a whole. The nomination levels for the archaeological significance of each site are summarised below.

Representativeness

Representativeness refers to the regional distribution of a particular site type. Representativeness is assessed by whether the site is common, occasional, or rare in a given region. Assessments of representativeness are subjectively biased by current knowledge of the distribution and number of archaeological sites in a region. This varies from place to place depending on the extent of archaeological research. Consequently, a site that is assigned low significance values for contents and condition, but a high significance value for representativeness, can only be regarded as significant in terms of knowledge of the regional archaeology. Any such site should be subject to re-assessment as more archaeological research is undertaken.

Assessment of representativeness also takes into account the contents and condition of a site. For example, in any region there may only be a limited number of sites of any type that have suffered minimal disturbance. Such sites would therefore be given a high significance rating for representativeness, although they may occur commonly within the region.

Table 11 outlines the site representativeness ratings used for archaeological sites.

Table 11 Site representativeness ratings used for archaeological sites

Rating	Description
1	Common occurrence.
2	Occasional occurrence.
3	Rare occurrence.

Overall scientific significance ratings for sites, based on a cumulative score for site contents, site integrity and representativeness are provided in Table 12.

Table 12 Scientific significance ratings used for archaeological sites

Rating	Description
1–3	Low scientific significance.
4–6	Moderate scientific significance.
7–9	High scientific significance.

Each site is given a score based on these criteria—the overall scientific significance is determined by the cumulative score. This scoring procedure has been applied to the Aboriginal archaeological sites identified during the surface evaluation.

5.2.1 Statement of archaeological significance

No Aboriginal sites, objects or areas of archaeological potential were identified as part of this assessment. Within the areas containing landforms that may have been favourable for Aboriginal occupation and artefact preservation, disturbance from previous land use has occurred. This disturbance was from agricultural practices, and previous land modifications and extraction operations that would have removed or displaced any archaeological deposits. The study area also appeared to be absent of mature vegetation and had been cleared entirely of large vegetation in some areas. The cultural sites officer, Raymond Weatherall, who attended the survey also commented on the presence of plant species in unexpected areas, i.e., reed plants that usually exist near water ways on top of ridge lines and suggested that this was likely the result of lots of movement around the site. No rockshelters or significant overhangs were identified along the ridgelines or near watercourses. The surface of the sandstone did not contain any Aboriginal features including grinding grooves or rock art. The background research coupled with the archaeological survey has resulted in the entire study area being assessed as having low archaeological potential. This assessment was also confirmed by the cultural sites officer, Raymond Weatherall, who attended the archaeological survey. The study area therefore has low research potential, scientific significance or representativeness associated with it. This assessment has therefore determined that study area has low archaeological significance.

6 Impact assessment

The proposed future development will consist of a sandstone quarry, with an estimated area of impact between 2.5 hectares and 4 hectares. The potential impact of these works on Aboriginal heritage is presented below.

6.1 Proposal details

The Proposal refers to the establishment and operations of the Maroota Central Civil Quarry which would include the following.

- Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.

6.2 Ecologically Sustainable Development

One of the primary aims of the NPW Act is the 'conservation of objects places and features … of cultural value within the landscape, including … places, objects and features of significance to Aboriginal people …' ((s.2A(1)(b)(i)). The *Operational Policy: Protecting Aboriginal Cultural Heritage (Version 2)* (State of NSW and Office of Environment and Heritage NSW 2011) provides guidance to proponents in term of Ecologically Sustainable Development (ESD).

ESD has been defined in Part 3, 6. (2) Objective of the Authority of the *Protection of the Environment Administration* Act 1991 (NSW). This outlines that the ESD requires the integration of economic and environmental considerations (including cultural heritage) in the decision-making process. In regard to Aboriginal cultural heritage, ESD can be achieved by applying the principle of intergenerational equity and the precautionary principle.

> ***Intergenerational equity***
>
> *The principle of intergenerational equity states that the present generation should make every effort to ensure the health, diversity and productivity of the environment – which includes cultural heritage – for the benefit of future generations.*
>
> *In terms of Aboriginal cultural heritage, intergenerational equity can be considered in terms of the 'cumulative impacts' of any proposal to Aboriginal objects and places. For example, if few Aboriginal objects and places remain in a region (because of harm authorised under previous AHIPs), fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places.*

Information about the significance of Aboriginal cultural heritage values associated with the Aboriginal objects and places proposed to be harmed will be relevant to the consideration of intergenerational equity and an understanding of the cumulative impacts of a proposal.

Where there is uncertainty, the precautionary principle should also be followed (see below).

The precautionary principle

The precautionary principle states that the lack of full scientific certainty about the threat of harm should not be used as a reason for not taking measures to prevent harm from occurring.

In applying the precautionary principle, decisions should be guided by:

- *a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment (which includes cultural heritage)*
- *an assessment of the risk-weighted consequences of various options.*

The precautionary principle is relevant to Heritage NSW consideration of potential harm to Aboriginal cultural heritage where:

- *the proposal involves a risk of serious or irreversible harm to Aboriginal objects or places or to the value of those objects or places, and*
- *there is a lot of uncertainty about the significance of Aboriginal cultural heritage values of the Aboriginal objects or places proposed to be harmed.*

Where this is the case, a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce harm to the Aboriginal objects/place (State of NSW and Office of Environment and Heritage NSW 2011, pp. 26).

The results of this assessment did not identify tangible Aboriginal cultural heritage values within the study area. However, as identified in the background research and through Aboriginal community consultation, the region surrounding the study area, particularly to the east, contains several sites, landforms and landscapes that are significant to local Aboriginal groups. These sites and landscapes will not be directly impacts by the proposed works. Therefore, this assessment has been able to further our knowledge of Aboriginal archaeology in the area, by highlighting the environmental and cultural significance of the surrounding landscape and how this may have been intertwined with the current study area.

6.3 Assessment of impacts to the study area

The study area does not contain any recorded Aboriginal sites and has been assessed as having low archaeological potential due to existing disturbances within the study area. The proposed works will therefore not impact on any Aboriginal archaeological values.

A summary of the impacts of the proposed works to the study area is presented in Table 13 and Table 14 below.

Table 13 Summary of sub-surface impacts of proposed works

Proposed works	Impacts to potential archaeological deposits (Yes/No)
Establishment of a sandstone quarry	No—there will be no impacts to potential archaeological deposits by the works as these are unlikely to exist within the study area. Should the proposed development be approved, the works will result in physical disturbances across

Proposed works	Impacts to potential archaeological deposits (Yes/No)
	the study area. However, as no Aboriginal cultural values are present across the site, the works will not impact on Aboriginal archaeological values. While the study area does not contain any tangible Aboriginal cultural values, the consultation received indicated that the study area is situated within a culturally significant landscape due to its proximity to natural resources such as water and food resources, as well as other significant Aboriginal sites. Despite this, the study area contains extensive disturbance from previous land use, with low potential to hold archaeological significance and portions cleared of native vegetation. Therefore the proposed works are unlikely to impact on the cultural landscape. Additionally, the landscaping and progressive rehabilitation for nature conservation to completed as part of the proposed works will reduce any potential visual impacts the works may have on the cultural landscape and assist in maintaining native vegetation within the area.

Table 14 Summary of potential archaeological impacts to the study area

Study area potential	Significance	Type of harm	Degree of harm	Consequence of harm
Low	Nil	None	None	No consequence: the study area is unlikely to contain any Aboriginal sites, objects, or areas of archaeological potential. A heritage induction for all site workers and contractors should be undertaken to prevent any unintentional harm to Aboriginal sites located within the study area and its surrounds. An unexpected finds protocol should be put in place if unanticipated Aboriginal objects or remains are uncovered during the proposed works.

6.4 Management and mitigation measures

Ideally, heritage management involves conservation of sites through the preservation and conservation of fabric and context within a framework of 'doing as much as necessary, as little as possible' (Marquis-Kyle & Walker 1994, pp. 13). In cases where conservation is not practical, several options for management are available. For sites, management often involves the salvage of features or artefacts, retrieval of information through excavation or collection (especially where impact cannot be avoided) and interpretation.

Consideration has been given to the principles of ESD to minimise impacts. Avoidance of impact to archaeological and cultural heritage sites through design of the development is the primary mitigation and management strategy and should be implemented where practicable. As part of the management and mitigation measures for the proposed works, an ACHA including archaeological survey and consultation with the Aboriginal community was undertaken. This was done to determine the presence and nature of any potential Aboriginal sites so that appropriate management could be undertaken. The assessment did not identify any Aboriginal sites or objects; therefore, the study area has been assessed as having low archaeological potential. However, this assessment has contributed to our knowledge of Aboriginal land use in the area and will be available for future generations to build on in line with inter-generational equity principles. The proposed works will avoid impacts to any known Aboriginal sites. Consultation undertaken has resulted in the following management strategies.

6.4.1 No further archaeological work required

No further archaeological work is recommended for the study area. The study area has been assessed as having low archaeological potential and no further investigations are required in this area. This recommendation is conditional upon the recommendations outlined in this report.

6.4.2 Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to Aboriginal sites located within the study area and its surrounds. This includes the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

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7 Recommendations

Strategies have been developed based on the archaeological (significance) of cultural heritage relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
  - Ethos of the Australia ICOMOS Burra Charter.
  - The Code.

Prior to any development impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area being assessed as having low archaeological potential. This recommendation is conditional upon Recommendation 2 to 6.

Recommendation 2: Continued consultation with the registered Aboriginal parties

As per the consultation requirements, it is recommended that the proponent provides a copy of this report to the RAPs and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

Recommendation 3: Heritage induction

Heritage inductions for all site workers and contractors should be undertaken to prevent any unintentional harm to any unexpected Aboriginal objects. The heritage induction should include the following items:

- Relevant legislation.
- Location of identified Aboriginal heritage sites, areas of archaeological potential, and areas of archaeological sensitivity within proximity to the study area.
- Basic identification skills for Aboriginal and non-Aboriginal artefacts, and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance.

Recommendation 4: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any unanticipated Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 5: Discovery of unanticipated historical relics

Relics are historical archaeological resources of local or State significance and are protected in NSW under the Heritage Act. Relics cannot be disturbed except with a permit or exception notification. Should unanticipated relics be discovered during the project, work in the vicinity must cease and an archaeologist contacted to make a preliminary assessment of the find. The Heritage Council will require notification if the find is assessed as a relic.

Recommendation 6: Discovery of human remains

If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

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Appendices

Appendix 1 AHIMS results

THE FOLLOWING APPENDIX IS NOT TO BE MADE PUBLIC

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-3-0230	Mill Creek;	AGD	56	319141	6301588	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Fred McCarthy					**Permits**		
45-3-1551	Layburys Creek;Singletons Mill Area;	AGD	56	319510	6294760	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	David Bell,A Anderson,J.A Hatfield					**Permits**		
45-2-0249	DR7;Maroota Historic Site STA	GDA	56	313006	6300382	Open site	Valid	Stone Arrangement : -	Stone Arrangement	916
	Contact	**Recorders**	Doctor.Jo McDonald,Mr.Mike Job					**Permits**		
45-2-0242	DR19;Maroota Historic Site;	AGD	56	312990	6299980	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0234	DR12 Maroota Historic Site;Laughtondale Gulley Rd;	GDA	56	313121	6300766	Open site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	916
	Contact	**Recorders**	Doctor.Jo McDonald,NSW Rural Fire Service - Hornsby/Ku-ring-gai,Mr.Rolf Poole					**Permits**		
45-2-0016	DRM; Maroota Historic Site; Devil's Rock,Maroota; Laughtondale	AGD	56	313170	6300180	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald,Fred McCarthy					**Permits**		
45-2-0239	DR16;Maroota Historic Site;	AGD	56	313270	6300180	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0011	Laughtondale;	AGD	56	313290	6300290	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Mr.R Taplin					**Permits**		
45-3-0218	Maroota; Little Devils Rock	GDA	56	315175	6293940	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	3873
	Contact	**Recorders**	Mr.Kelvin Officer,Fred McCarthy,Tegan Burton					**Permits**		
45-2-2381	MQIF1 (Maroota Quarry Find 1)	AGD	56	312717	6296191	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**		
45-2-0297	Del Rio III;	AGD	56	309950	6301530	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-3895	Dalgetys Creek Axe Grinding Grooves 2	GDA	56	314650	6299285	Open site	Valid	Grinding Groove : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-3-2337	Coopers Creek 3	AGD	56	314270	6297780	Closed site	Valid	Artefact : -	Shelter with Deposit	2991
	Contact	**Recorders**	John Edgar,Ms.Tessa Corkill					**Permits**		
45-2-0087	Metheringhams Hill;	GDA	56	311795	6300895	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Mr.R Taplin,Mr.Tim Stewart					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-3-0858	Hazel Dell;	AGD	56	315960	6302750	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0241	DR18;Maroota Historic Site;	AGD	56	313410	6300180	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-1550	Layburys Creek;Singleton Mill Area;	AGD	56	319510	6294770	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	David Bell,A Anderson,J.A Hatfield					**Permits**		
45-3-0857	Hazel Dell;	AGD	56	315900	6302760	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0251	DR8A;Maroota Historic Site;	AGD	56	312860	6300310	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0233	DR11;Maroota Historic Site;	AGD	56	312910	6300480	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0245	DR3;Maroota Historic Site;	AGD	56	313050	6300080	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-1636	Dharug;	AGD	56	316500	6303500	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0238	DR15;Maroota Historic Site;	AGD	56	313150	6300240	Open site	Valid	Artefact : -	Open Camp Site	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-2598	LEETS CREEK TWOFISHROO SWA	GDA	56	309047	6299409	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Ms.Collette Douchkov					**Permits**		
45-3-2335	Coopers Creek 1	AGD	56	314050	6297970	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	2991
	Contact	**Recorders**	John Edgar,Ms.Tessa Corkill					**Permits**		
45-3-2334	Coopers Creek CC4	AGD	56	314270	6297750	Closed site	Valid	Artefact : -	Shelter with Deposit	2991
	Contact	**Recorders**	John Edgar,Ms.Tessa Corkill					**Permits**		
45-3-0954	The Vale; Little Devils Rock	GDA	56	315175	6293940	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	3873
	Contact	**Recorders**	Fred McCarthy,Tegan Burton					**Permits**		
45-2-0085	Leets Vale;MacNamarras Property;	AGD	56	309950	6301570	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-3-0227	Laughtondale;	AGD	56	317971	6300559	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Fred McCarthy					**Permits**		
45-2-0225	Horse;Lower Portland;	AGD	56	311610	6301850	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Warren Bluff,Doctor.Jo McDonald					**Permits**		
45-3-1489	Wisemans Ferry; Becketts Forest	AGD	56	314950	6293150	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	589
	Contact	**Recorders**	Mr.S McCarthy					**Permits**		
45-2-0334	Webbs creek;	AGD	56	310710	6303020	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0232	DR10;Maroota Historic Site;	AGD	56	312850	6300490	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0246	DR4;Maroota Historic Site;	AGD	56	313020	6300090	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0243	DR1;Maroota Historic Site	GDA	56	313201	6300185	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald,Mr.Mike Job					**Permits**		
45-2-2602	LEETS CK PORTMARK SWA	GDA	56	309028	6299412	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Ms.Collette Douchkov					**Permits**		
45-2-2300	MR1;	AGD	56	314000	6294390	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	John Edgar					**Permits**		
45-3-2336	Coopers Creek 2	AGD	56	314200	6297900	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	2991
	Contact	**Recorders**	John Edgar,Ms.Tessa Corkill					**Permits**		
45-2-2597	DOUGLASS CK PORTMIN SWA	GDA	56	309762	6299526	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Ms.Collette Douchkov					**Permits**		
45-2-2561	CSD1	GDA	56	312750	6300467	Open site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Mr.Balazs Hansel					**Permits**		
45-2-0248	DR6;Maroota Historic Site;	GDA	56	312822	6300498	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald,NSW Rural Fire Service - Hornsby/Ku-ring-gai,Mr.Rolf Poole					**Permits**		
45-2-0081	Maroota Trig;	AGD	56	312900	6293700	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	
	Contact	**Recorders**	Andrew Ross					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-3-3896	Dalgetys Creek Axe Grinding Grooves 1	GDA	56	314605	6299300	Open site	Valid	Grinding Groove : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-3-1483	Cooper's Creek 3;Hart Place, Maroota.;	AGD	56	315380	6296300	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-2-0056	Weaver's Ship SIte Engraving	GDA	56	311795	6300860	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	R Clegg,Mr.Tim Stewart					**Permits**		
45-3-0859	Hazel Dell;	AGD	56	315950	6302720	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0138	Maroota;Weavers;	AGD	56	312100	6298900	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-4559	ASHDALE CK OCHRE MORPHS SWA	GDA	56	316984	6293376	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Ms.Collette Douchkov					**Permits**		
45-3-1669	Dharug;	AGD	56	319350	6301450	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-3-4600	Layburys Creek Axe Grinding Grooves 6	GDA	56	319805	6293435	Open site	Valid	Grinding Groove : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-2-0231	DR9;Maroota Historic Site;	AGD	56	312900	6300400	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0235	DR13;Maroota Historic Site;	GDA	56	313168	6300754	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	916
	Contact	**Recorders**	Doctor.Jo McDonald,NSW Rural Fire Service - Hornsby/Ku-ring-gai,Mr.Rolf Poole					**Permits**		
45-2-2696	DixBQuarry IF 1	GDA	56	313880	6299911	Open site	Destroyed	Artefact : -		
	Contact	**Recorders**	Umwelt (Australia) Pty Limited - Individual users,Apex Archaeology,Ms.Jenni Bate,					**Permits**	4455	
45-3-3897	Dalgetys Creek Rock Shelter 1	GDA	56	314570	6299395	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-2-2752	Maroota Guragalung Gayanayung (Maroota Historic Site) Duplicate 45-2-0248	GDA	56	312822	6300498	Closed site	Deleted	Art (Pigment or Engraved) : -, Water Hole : -		
	Contact	**Recorders**	NSW Rural Fire Service - Hornsby/Ku-ring-gai,Mr.Rolf Poole					**Permits**		
45-2-0084	MacNamarras Property;Leet's Vale;	AGD	56	310220	6301810	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Andrew Ross					**Permits**		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-2-2312	HL2	AGD	56	312343	6301957	Closed site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact T Russell	**Recorders**	Ms.Fiona Leslie					**Permits**		
45-2-0335	Webbs creek;	AGD	56	310750	6302940	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-3-1552	Laybury Creek;Singletons Mill Area;	AGD	56	319530	6294750	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	David Bell,A Anderson,J.A Hatfield					**Permits**		
45-3-1485	Cooper's Creek 4;Old Telegraph Road, Maroota.;	AGD	56	315320	6296100	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-1484	Cooper's Creek 8;Hart Place, Maroota.;	AGD	56	315320	6296230	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-1420	Cooper's Creek 2;Hart Place, Maroota;	AGD	56	315350	6296250	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-3283	MK 1, Maroota	AGD	56	315975	6293165	Open site	Valid	Artefact : 2		
	Contact Searle	**Recorders**	Ms.Tessa Corkill					**Permits**		
45-2-0145	Longreach Lookout; Wisemans Ferry	AGD	56	312430	6303130	Open site	Valid	Grinding Groove : -, Art (Pigment or Engraved) : -	Axe Grinding Groove,Rock Engraving	
	Contact	**Recorders**	Warren Bluff,Mr.S McCarthy,Tegan Burton					**Permits**		
45-2-0158	Wisemans Ferry;	AGD	56	312480	6302390	Open site	Valid	Grinding Groove : -, Art (Pigment or Engraved) : -	Axe Grinding Groove,Rock Engraving	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-2-0250	DR8;Maroota Historic Site;	GDA	56	313009	6300451	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald,Mr.Mike Job					**Permits**		
45-3-0310	Callemondah;Marramarra NP;	AGD	56	316650	6296450	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	A Anderson,J.A Hatfield,R Saunders					**Permits**		
45-3-3441	CC5 (Rockshelter)	GDA	56	314343	6298044	Closed site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Oliver Brown Consulting Archaeology,Mr.Oliver Brown					**Permits**		
45-2-0247	DR5;Maroota Historic Site;	AGD	56	312800	6300230	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-2-0341	Clay pipe gully 1;	AGD	56	309920	6302490	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0333	Webbs Creek;	AGD	56	310550	6302730	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0128	Wisemans Ferry;Bathurst Reach 1;	AGD	56	311680	6302640	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	
	Contact	**Recorders**	Doctor.Jo McDonald,Charles.D Power					**Permits**		
45-3-1388	Coopers Creek 7;Maroota;	AGD	56	315300	6296200	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-2-0237	DR14A;Maroota Historic Site;	GDA	56	313517	6300822	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	916
	Contact	**Recorders**	Doctor.Jo McDonald,NSW Rural Fire Service - Hornsby/Ku-ring-gai,Mr.Rolf Poole					**Permits**		
45-3-0228	Laughtondale;Flat Rocks Ridge;	AGD	56	319142	6301496	Open site	Valid	Grinding Groove : -, Art (Pigment or Engraved) : -	Axe Grinding Groove,Rock Engraving	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-3-1221	Mill Creek;	AGD	56	317770	6302310	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-3-0652	Laughtondale;	AGD	56	318603	6301029	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Fred McCarthy					**Permits**		
45-3-1325	Cooper's Creek 1;Hart Place Maroota.;	AGD	56	315350	6296270	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-3898	Laughtondale Rock Shelter 1	GDA	56	315975	6299870	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-2-0240	DR17;Maroota Historic Site;	AGD	56	313210	6299960	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0236	DR14;Maroota Historic Site;	AGD	56	313370	6300580	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	916
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-3389	CC6 (Grinding Groove)	GDA	56	314257	6298095	Open site	Valid	Grinding Groove : 2		101370
	Contact	**Recorders**	Mr.Oliver Brown					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-2-0342	Clay pipe gully 2;	AGD	56	309880	6302500	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-2-0295	Bathurst Reach No 3;	AGD	56	311650	6302610	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-4601	Layburys Creek Rockshelter 4	GDA	56	319670	6293385	Open site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Mr.Tim Stewart					**Permits**		
45-3-1486	Cooper's Creek 5;Hart Place. Maroota.;	AGD	56	315350	6296290	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	589
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-3-3226	Rivergum Creek Grinding grooves	AGD	56	315214	6303456	Open site	Valid	Grinding Groove : 16		
	Contact	**Recorders**	Ms.Sarah Brookes					**Permits**		
45-3-0311	Marramarra;Marramarra NP;	AGD	56	316890	6295980	Open site	Valid	Grinding Groove : -, Art (Pigment or Engraved) : -	Axe Grinding Groove,Rock Engraving	
	Contact	**Recorders**	A Anderson,J.A Hatfield,R Saunders					**Permits**		
45-2-0244	DR2;Maroota Historic Site ENG	GDA	56	313213	6300285	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	916
	Contact	**Recorders**	Doctor.Jo McDonald,Mr.Mike Job					**Permits**		
45-2-2311	HL3	AGD	56	312311	6302013	Closed site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact T Russell	**Recorders**	Ms.Fiona Leslie					**Permits**		
45-2-2313	HL1	AGD	56	312388	6301930	Closed site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact T Russell	**Recorders**	Ms.Fiona Leslie					**Permits**		
45-3-1248	Cooper's Creek 6;Old Telegraph Road / Moroota.;	AGD	56	315300	6296150	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	J.A Hatfield					**Permits**		
45-6-1902	Long Nose Point 2.;	AGD	56	310900	6303000	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-3-3388	CC6 (Rockshelter)	GDA	56	314343	6298041	Closed site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : -		101370
	Contact	**Recorders**	Mr.Oliver Brown					**Permits**		
45-3-1668	Dharug;	AGD	56	319440	6301420	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		

Report generated by AHIMS Web Service on 26/09/2022 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 309014.35 - 319953.74, Northings : 6293316.291 - 6303712.848 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 99

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 37704-moc

Client Service ID : 720245

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-3-1566	Layburys; Singletons Mill;	AGD	56	319650	6295030	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	J Cressbrook					**Permits**		
45-2-0294	Bathurst Reach No 4;	AGD	56	311640	6302600	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-2-0296	Bathurst Reach No 2;	AGD	56	311660	6302620	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**		
45-3-1713	Hawkesbury Rv;	AGD	56	316600	6302210	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

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Appendix 9

Historic Heritage Assessment

prepared by
Biosis Pty Ltd

(Total No. of pages including blank pages = 54)



Maroota Central Civil Quarry Project: Historical Heritage Assessment

FINAL REPORT

Prepared for RW Corkery & Co Pty Ltd

22 September 2023

Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to:	RW Corkery & Co Pty Ltd
Prepared by:	Crystal Garabedian Charlotte Allen
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- Bronte Baonza (assistance in the field).
- Jen Townsend (mapping).
- Mathew Smith (assistance in the field).

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Summary

Biosis Pty Ltd (Biosis) was commissioned by RW Corkery & Co Pty Ltd (RWC), on behalf of on behalf of Central Civil (NSW) Pty Ltd (Central Civil), to undertake a Historical Heritage Assessment (HHA) of the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota, (Lot 1 and Lot 2 DP609224) New South Wales (NSW) (the study area). The study area is located in a forested landscape approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district.

The project will involve a small-scale extraction operation to produce up to 30,000 tonnes per annum of sandstone logs, flagging stone and friable sandstone, along with upgrades to site access and infrastructure (Figure 4). The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* as a Designated Development, which requires an Environmental Impact Statement (EIS).

Heritage assessment

The limited information regarding the study area's use that is known relates to agricultural activities such as orcharding and possibly animal grazing. The archaeological remains of the shed [1], while likely to be in a state of high sub-surface integrity, are likely limited to post holes, a compacted floor surface and artefact scatters; these resources are unlikely to contribute to our understanding and knowledge of agriculture and horticulture in the Hornsby Shire Local Government Area (LGA). The study area has been assessed as holding low research potential and low archaeological potential.

The study area was subject to an assessment of heritage significance, which determined that there were no items in the study area that were assessed to have heritage significance.

Impact to heritage values

There are no heritage items in the study area that would be impacted by the proposed works.

Recommendation—Unexpected finds protocol

An unexpected finds protocol should be implemented as part of the construction management plan for the proposed works. This will ensure that any unexpected archaeological deposits are identified and managed appropriately in accordance with requirements of the *Heritage Act 1977* (Heritage Act).

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Glossary

Biosis	Biosis Pty Ltd
c.	Circa
Central Civil	Central Civil (NSW) Pty Ltd
CHL	Commonwealth Heritage List
DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DP	Deposited Plan
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Heritage NSW	Heritage NSW, Department of Planning and Environment
Heritage Act	*Heritage Act 1977*
HHA	Historical Heritage Assessment
HLEP	*Hornsby Local Environmental Plan 2013*
HDCP	Hornsby Development Control Plan
LGA	Local Government Area
NHL	National Heritage List
NSW	New South Wales
RWC	RW Corkery & Co Pty Ltd
SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
SHI	State Heritage Inventory
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
study area	4773 Old Northern Road, Maroota (Lot 1 and Lot 2 DP609224)

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1 Introduction

1.1 Project background

Biosis was commissioned by RWC on behalf of on behalf of Central Civil to undertake a HHA of the proposed Maroota Central Civil Sandstone Quarry located at 4773 Old Northern Road, Maroota (Lot 1 and Lot 2 DP609224), NSW (the study area) (Figure 1 and Figure 2). The project will involve a small-scale extraction operation to produce up to 30,000 tonnes per annum of sandstone logs, flagging stone and friable sandstone, along with upgrades to site access and infrastructure (Figure 3). The project will be assessed under Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) as a Designated Development, which requires an Environmental Impact Statement (EIS).

1.2 Location of the study area

The study area is located within the suburb of Maroota, Hornsby Shire LGA (Figure 1). The study area is located approximately 2.59 kilometres north of Maroota and approximately 55 kilometres north-west of the Sydney central business district.

The study area covers a total area of approximately 23.33 hectares, of which 4.37 hectares would be disturbed throughout the life of the Quarry. The study area is adjacent to Marramarra National Park and is situated within a forested landscape. It and the surrounding landscape includes dense vegetation. It is currently zoned RU1: Primary Production and C3: Environmental Management.

1.3 Scope of assessment

This report was prepared in accordance with current heritage guidelines including *Assessing Heritage Significance*, *Assessing Significance for Historical Archaeological Sites and 'Relics'*[1] and *The Burra Charter: the Australian ICOMOS Charter for Places of Cultural Significance*[2]. This report provides a heritage assessment to identify if any heritage items or relics exist within or in the vicinity of the study area. The heritage significance of these heritage items has been investigated and assessed to determine the most appropriate management strategy.

The following is a summary of the major objectives of the assessment:

- Prepare a historical summary of the study area to understand previous development of the site.
- Identify sites and features within the study area which are already recognised for their heritage value through statutory and non-statutory heritage listings.
- Identify heritage items that could be impacted by the proposed works and how they may be impacted.
- Recommend measures to avoid or mitigate any adverse impacts on the heritage significance of the study area.

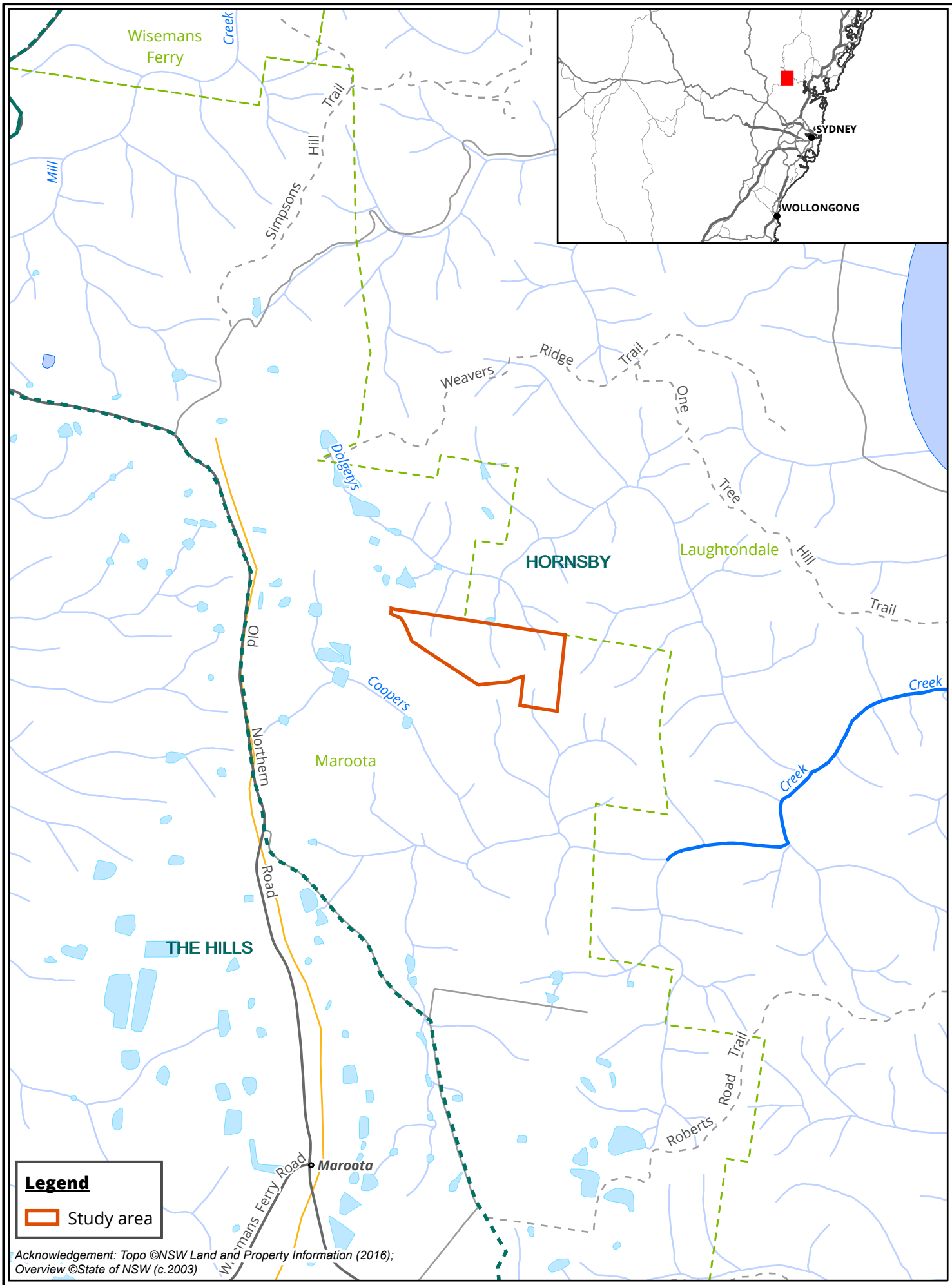
[1] Department of Planning and Environment 2023, NSW Heritage Branch, Department of Planning 2009, Australia ICOMOS 2013b

[2] Australia ICOMOS 2023. *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.*

1.4 Limitations

This report is based on historical research and field inspections. It is possible that further historical research or the emergence of new historical sources may support different interpretations of the evidence in this report. The background research was limited in its ability to discern transfer of ownership of the study area prior to its grant in the 1920s and after its sale in the 1970s.

Although this report was undertaken to best archaeological practice and its conclusions are based on professional opinion, it does not warrant that there is no possibility that additional archaeological material will be in subsequent works on the site. This is because limitations in historical documentation and archaeological methods make it difficult to accurately predict what is under the ground.



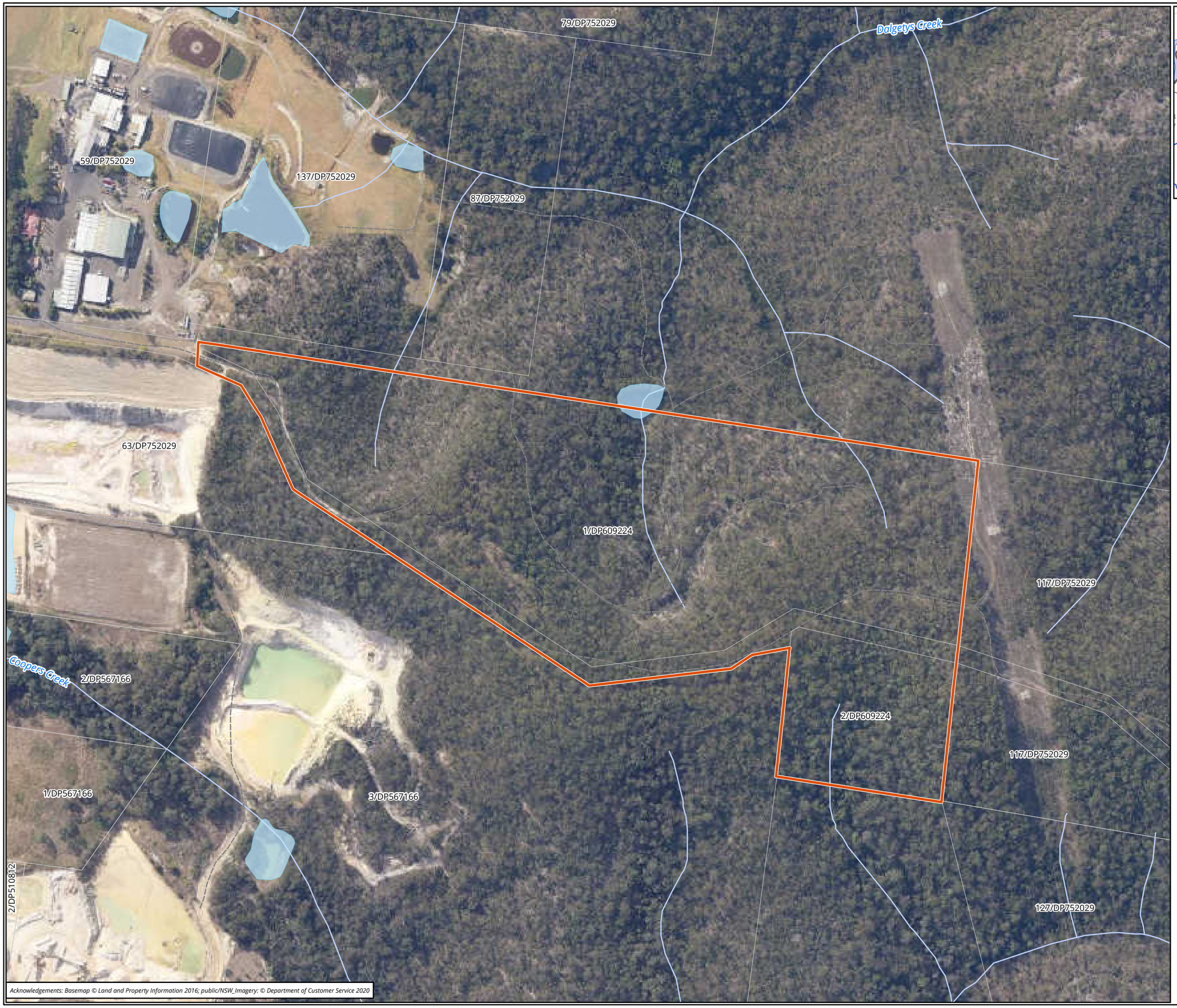
biosis

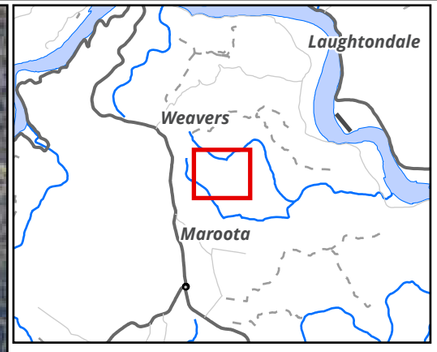
Figure 1 Location of the study area

Matter: 37704
Date: 30 May 2023,
Checked by: Drawn by: JET, Checked by: MC, Drawn by: , Last edited by: jtownsend
Location:P:\37700s\37704\Mapping\
37704_MarootQuarry

0 200 400 600 800 1,000
Metres
Scale 1:1:25,000@ A4, GDA 1994 MGA Zone 56

N





Legend

- Study area
- Lot

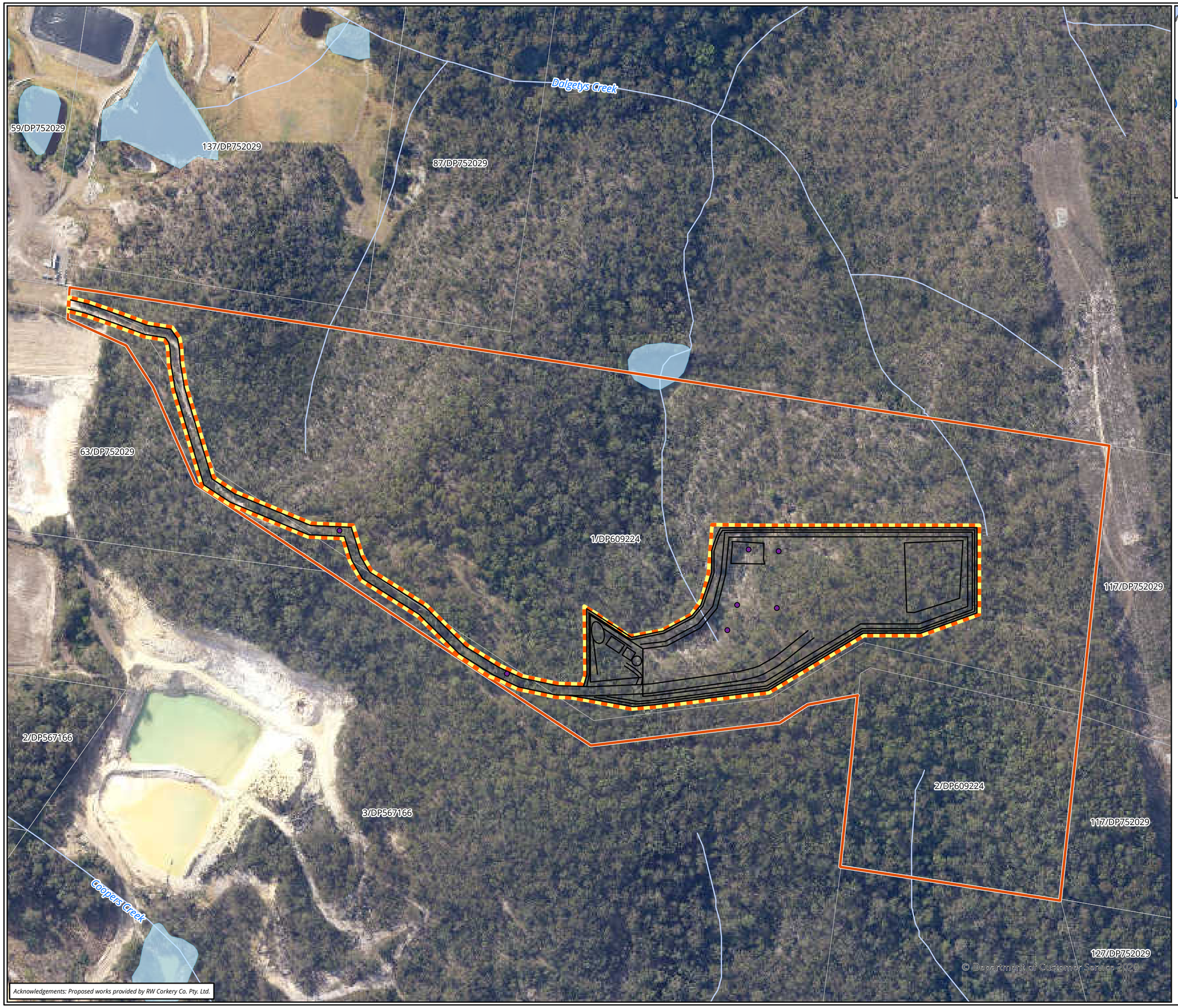
Figure 2 Study area detail

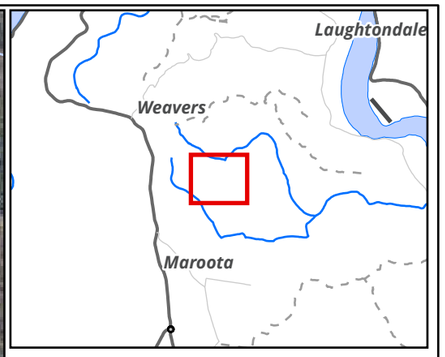
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Metres
Scale: 1:4,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F2_StudyArea





Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Figure 3 Proposed works

0 30 60 90 120

Metres

Scale: 1:3,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F3_ProposedWorks

2 Statutory framework

In NSW cultural heritage is managed in a three-tiered system: National, state, and local. Certain sites and items may require management under all three systems or only under one or two.

2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Act 1999* (EPBC Act) is the national Act protecting the natural and cultural environment. The EPBC Act is administered by the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act establishes two heritage lists for the management of the natural and cultural environment:

- The National Heritage List (NHL) contains items which have been assessed to be of outstanding significance and define 'critical moments in our development as a nation'.[3]
- The Commonwealth Heritage List (CHL) contains items which are natural and cultural heritage places that are on Commonwealth land, in Commonwealth waters or are owned or managed by the Commonwealth. A place or item on the CHL has been assessed as possessing 'significant' heritage value.[4]

A search of the NHL obtained two results. It should be noted that the items listed below are in the greater vicinity of the study area. While they are important to the context of Maroota, they bear no inherent significance to the study area. These items include:

- Old Great North Road, Wisemans Ferry (place ID 105961), Located approximately 4.5 kilometres north of the study area.
- The Greater Blue Mountains Area, Katoomba (place ID 105999), Located approximately 7.5 kilometres north of the study area.

A search of the CHL did not yield any results associated within or in the vicinity of the study area.

2.2 NSW Heritage Act 1977

Heritage in NSW is principally protected by the Heritage Act (as amended) which was passed for the purpose of conserving items of environmental heritage of NSW. Environmental heritage is broadly defined under Section 4 of the Heritage Act as consisting of the following items: 'those places, buildings, works, relics, moveable objects, and precincts, of State or Local heritage significance'. The Heritage Act is administered by the Heritage Council, under delegation by Heritage NSW, Department of Planning and Environment (Heritage NSW). The Heritage Act is designed to protect both known heritage items (such as standing structures) and items that may not be immediately obvious (such as potential archaeological remains or 'relics'). Different parts of the Heritage Act deal with different situations and types of heritage and the Heritage Act provides several mechanisms by which items and places of heritage significance may be protected.

[3] 'About National Heritage' http://www.environment.gov.au/heritage/about/national/index.html
[4] 'Commonwealth Heritage List Criteria'
http://www.environment.gov.au/heritage/about/commonwealth/criteria.html

2.2.1 State Heritage Register

Protection of items of State significance is by nomination and listing on the State Heritage Register (SHR) created under Part 3A of the Heritage Act. The Register came into effect on 2 April 1999.

There are no items or conservation areas listed on the SHR within or in the vicinity of the study area.

2.2.2 Section 170 Heritage and Conservation Registers

Section 170 of the Heritage Act requires that culturally significant items or places managed or owned by Government agencies are listed on departmental Heritage and Conservation Register.

There are no items within or adjacent to the study area that are entered on a State government instrumentality Section 170 Register.

2.2.3 Archaeological relics

The Heritage Act includes provisions for archaeological relics. Section 4(1) of the Heritage Act (as amended 2009) defines a relic as:

> *...any deposit, artefact, object or material evidence that*
>
> *(a) related to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
>
> *(b) is of State or local significance.*

Section 139 of the Heritage Act prevents the excavation or disturbance of land known or with the potential to contain archaeological relics, except in accordance with a permit issued by the NSW Heritage Council (in accordance with Section 141 of the Heritage Act) or in accordance with the Notice of Order Under Section 139 (4) of the Heritage Act, Gazetted 1 March 2022. The 'relics' provision and Section 139 Exceptions apply to all archaeological relics not included on the SHR or subject to an Interim Heritage Order.

2.3 Environmental Planning and Assessment Act 1979

2.3.1 *State Environmental Planning Policy (Transport and Infrastructure) 2021*

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP) contains schedules of heritage items by the controls in the instrument. These items contain state or regional environmental planning significance.

There are no heritage items listed in Part 5.5 of the SEPP located within or immediately adjacent to the study area.

2.3.2 *Hornsby Local Environmental Plan 2013*

The *Hornsby Local Environmental Plan 2013* (HLEP) contains schedules of heritage items that are managed by the controls in the instrument. Heritage items in the vicinity of the study area are identified in Figure 4.

Within the study area, there are no items of local significance listed on the HLEP Schedule 5 One item is located within the vicinity of the study area (see **Error! Reference source not found.**).

2.3.3 *Hornsby Development Control Plan 2013*

The *Hornsby Development Control Plan 2013* (HDCP) outlines built form controls to guide development and provides specific prescriptive measures for the development of heritage items identified in Part 1 of Schedule 5 the HLEP. The HDCP supplements the provisions of the HLEP. Controls for the development of heritage items include:

General

a. Features or elements that contribute to the heritage significance of the item should be retained.

b. Council does not generally support demolition of heritage items. Poor structural condition or costs associated with renovating are not sufficient justifications.

c. New work and changes should be located away from main areas that are intact or highly significant.

d. New buildings, structures, landscaping or other works should be located to minimise adverse impacts on the setting of the heritage item.

e. Introducing decorative elements that could reduce the integrity and confuse the period of the building should be avoided, unless documentary or physical evidence exists to show it has been removed.

f. For large projects a staging plan may be required to indicate when secondary or non-heritage works are to be undertaken.

g. Servicing, fire safety or BCA compliance upgrades for a new use should not impact on the heritage significance of the item.

Removing unsympathetic changes

h. Unsympathetic elements should be removed, especially where substantial changes are proposed to a heritage item and the reversal will assist an improved heritage outcome.

Form, massing and scale

i. New work should be designed to complement the heritage item in terms of scale, proportion, bulk, massing and detail.

j. Additions and extensions at the front of heritage items should be avoided. Additions should be located away from the principal elevation and significant features of the heritage item, and behind and below the main roof ridge.

k. Alterations and additions should be smaller in scale and length than the existing building.

l. Large second storey additions should be avoided. Additions should be located to the rear or side. Depending on the form and style of the building it may be possible to design new levels within the existing roof space or below the gutter line of the main building.

m. Extensive blank or unarticulated walls are discouraged. Articulation should be achieved through the use of materials or design elements such as soldier/string courses, windows, fibro/timber inserts or the like. Internal changes

n. Changes to the original layout of the building should be minimal so that the evolution of the building remains recognisable. Development should retain significant interior elements. For example, wall nibs, decorative ceilings, picture rails, architraves, feature tiling or features such as fire places should be retained. Materials, colours, finishes

o. Rendering or painting original face brick is not supported.

p. Materials should be selected to complement the period and style of the building. Compatible, but not necessarily matching materials i.e. modern materials, may be used where appropriate.

Controls for the development regarding development consent of heritage items and archaeological sites include:

a. Pursuant to Clause 5.10(3) of the HLEP, Development consent may not be required for work to a Heritage Item or Heritage Conservation Area if Council is satisfied that the proposed development:

- *is of a minor nature, or is for the maintenance of the heritage item, archaeological site, or a building, work, relic, tree or place within a heritage conservation area; and*
- *would not adversely affect the significance of the heritage item, archaeological site or heritage conservation area.*

b. Contact Council's Planning Division to determine whether development consent is required. Written advice from Council should be obtained prior to commencement of works.

2.4 Non-statutory listings

2.4.1 Register of the National Estate

It should be noted that all the items listed below are in the greater vicinity of the study area. While they are important to the context of Maroota, they bear no inherent significance to the study area. These items include:

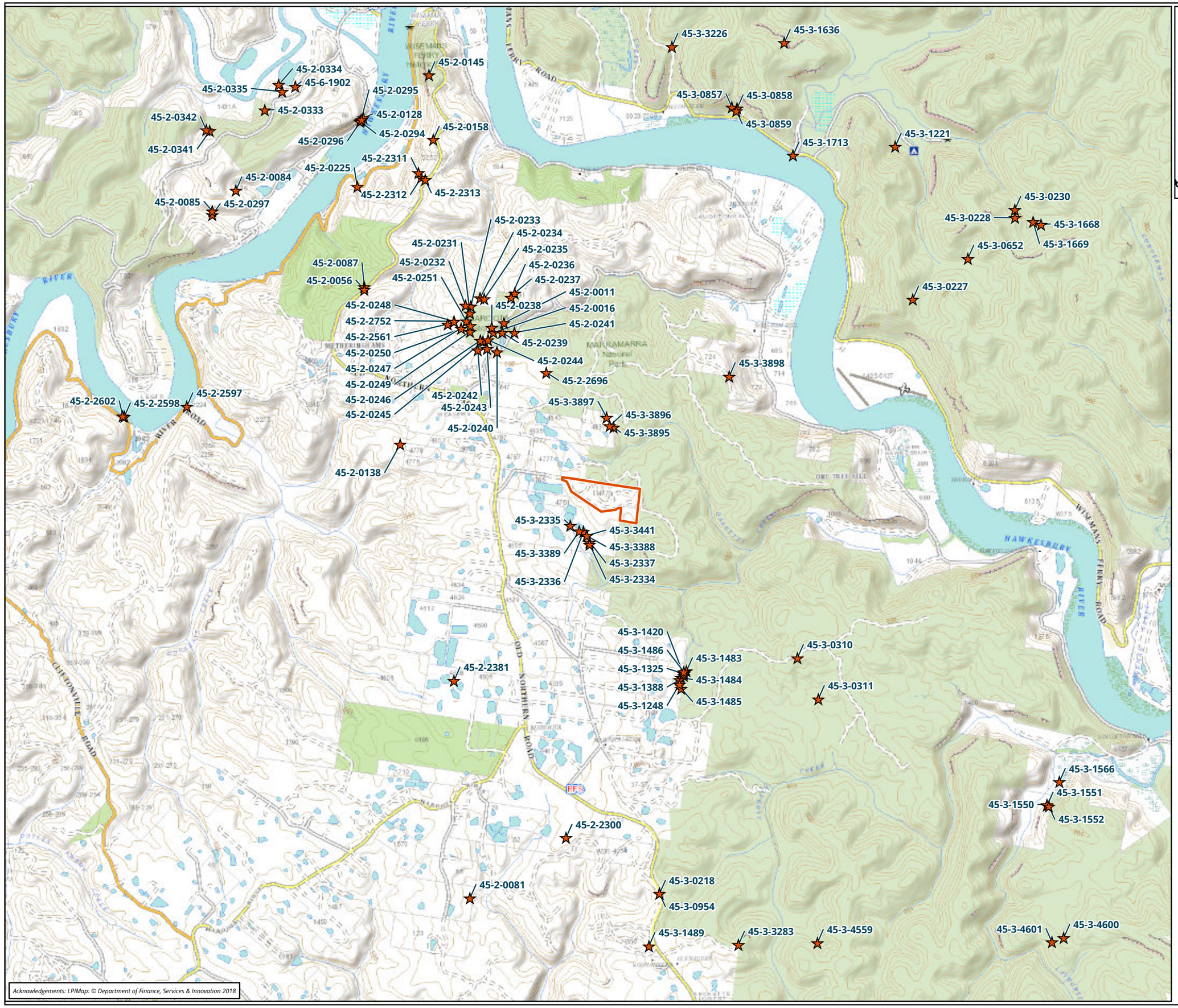
- Indigenous Place, Wisemans Ferry, NSW (place ID 2612). Location was not available.
- Indigenous Place, Canoelands, NSW (place ID 15878). Location was not available.
- Felton Mathew Marked Tree, Floyd Road, South Maroota, NSW (place ID 15055). Located approximately 11 kilometres south-west and therefore not within the extent of the study area.
- Marramarra National Park, Old Northern Road, Wisemans Ferry, NSW (place ID 1493). Marramarra National Park covers approximately 11,600 hectares, south of the Hawkesbury River between Berowra Creek and the Great Northern Road. Located adjacent to the study area at its closest point. Listed as an *Indicative Place*.

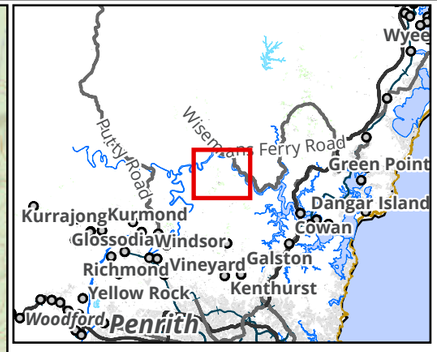
2.5 Summary of heritage listings

A summary of heritage listings within and in the vicinity of the study area is presented in **Error! Reference source not found.** and Figure 4. The Hills LEP area is located approximately 750 metres west of study area. One heritage item is listed below and is located within The Hills LEP.

Table 1 Summary of heritage listings within and adjacent to the study area

Site number	Site name	Address/Property description	Listing	Significance
A12	Old Northern Road	Old Northern Road between Dural and Wisemans Ferry. Located approximately 750 metres west of the study area.	The Hills LEP	Local





Legend

- Study area
- AHIMS

NOT TO BE MADE PUBLIC

Figure 4 Aboriginal sites located in the study area and vicinity

0 500 1,000 1,500

Metres

Scale: 1:40,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 30 May 2023,
Drawn by: JET, Checked by: MC, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry, Layout: 37704_ACHA_F4_AHIMS

3 Historical context

Historical research has been undertaken to identify the land use history of the study area, to isolate key phases in its history and to identify the location of any built heritage or archaeological resources which may be associated with the study area. The historical research places the history of the study area into the broader context of Maroota.

3.1 Topography and resources

The study area is located in an area of rugged terrain characterised by a densely vegetated undulating landscape, with a ridgeline crest in the southern portion and open depression drainage channels creating a series of valleys leading to Dalgety's Creek.

The Hornsby Plateau undulates between the Macdonald ranges located to the north of the study area and extends east to the Watagan Mountains. The geological formation within the study area is Hawkesbury sandstone, which comprises medium- to coarse-grained quartz sandstone with minor shale and laminite lenses. This landscape is characterised by rugged and very steep hills, benched hill slopes with narrow flat topped ridges and broader plateau tops on horizontal Triassic quartz sandstone with occasional conglomerate and thin discontinuous shales. [5] Valleys within this area contain tributaries of the Hawkesbury River that dissect the rugged Hawkesbury Sandstone sediments.[6] The study area can be classed as an undulating slope, sloping towards a valley in the southern portion.

The study area is situated within a complex hydrological system, with watercourses within the study area including three first-order, non-perennial creeklines. The creeklines are tributaries of Dalgety's Creek, a third/fourth-order, non-perennial watercourse located approximately the north of the study area. Several first-, second- and third-order watercourses exist in the vicinity of the study area; these are all tributaries of ninth-order, perennial watercourse, the Hawkesbury River, which is located approximately 2.33 kilometres north-east of the study area at its closest point.

The study area is predominantly located within the Sydney Town soil landscape, with disturbed terrain existing in the western most portion. It is topographically characterised by undulating to rolling hills and moderately inclined slopes on quartz sandstone along the edge of the Somersby Plateau. The slope gradient of this soil landscape ranges from 5–25%. Sandstone benches occasionally occur and are often exposed along narrow incised drainage lines. The soils within the landscape are highly permeable, and strongly acidic with very low fertility, and are subject to permanent waterlogging and present a very high erosion hazard.

3.2 Aboriginal country

It is generally accepted that Aboriginal people have inhabited the Australian landmass for the last 65,000 years.[7] Dates of the earliest occupation of the continent by Aboriginal people are subject to continued revision as more research is undertaken. The timing for the human occupation of the Sydney Basin is still uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the

[5] (Mitchell 2002, pp. 112)
[6] (Murphy 1993, pp. 2)
[7] (Clarkson et al. 2017)

earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with a cultural/archaeological deposit at Parramatta, which was dated to 30,735 ± 407 Before Present (BP).[8]

Archaeological evidence of Aboriginal occupation of the Cumberland Plain indicates that the area was intensively occupied from approximately 4000 years BP.[9] Such 'young' dates are probably more a reflection of the conditions associated with the preservation of this evidence and the areas that have been subject to surface and sub-surface archaeological investigations, rather than actual evidence of Aboriginal occupation prior to this time. The majority of excavated shelter and open sites in the region however yield much younger dates of around 3000 years BP.[10]

At the time of initial European occupation of the Sydney region, systematic ethnographic studies of Aboriginal society were not carried out; however, observations from individuals at the time can be compiled to suggest something of Aboriginal lifeways before European occupation. Attenbrow (2010) and McDonald (2008) have compiled various observations.[11] It is known that people lived in family groups, consisting of one or two adult males, their wives, and their dependants (young and old). It is also known that people belonged to named groups, which were tied to places, and that people in different areas spoke different dialects.

While information about Aboriginal life within the study area is scarce, some generalisations can be made from available writings and research that discusses Aboriginal Australia more broadly. Aboriginal people moved across the land in small family groups likely subsisting on plant food and the aquatic resources of creeks and rivers. In the Hawkesbury area, this would include the resources of the Hawkesbury River. A variety of local terrestrial resources, including possum, kangaroo, snakes, and lizards, would also have been exploited.[12]

The study area is located at the border of three Aboriginal linguistic groups; the Darug, Darkinjung, and Guringai.[13] According to Tindale, the study area is the traditional home of the Darkinjung people.[14] Darkinjung lands roughly extended from the Hawkesbury River northwards to Wollombi and to the southern drainage of the Hunter River. It has been suggested that the Darug tribe inhabited land within the Darkinjung boundaries and were situated at the mouth of the Hawkesbury River; the study area falls within this area.[15] According to Tindale, the Darkinjung people were bordered to the north by the Awabakal and Guringai people.

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. It is for this reason the boundaries of Aboriginal groups in the region cannot be easily defined. It is also highly likely that Aboriginal group boundaries were highly mobile and overlapped within some areas. The inherent bias of the class and cultures of these authors necessarily affect such documents. They were also often describing a culture that they did not fully understand—a culture that was in a heightened state of disruption given the arrival of European settlers and disease. Early written records can, however, be used in conjunction with archaeological information and surviving oral histories from members of the Indigenous community to gain a picture of Indigenous life in the region.

After the arrival of European settlers, the movement of Aboriginal people became increasingly restricted. European expansion along the Cumberland Plain was swift and soon there had been considerable loss of land to agriculture. Death, starvation and disease as a result of European arrival were some of the disrupting

[8] (JMCHM 2005a, JMCHM 2005b)
[9] (Dallas 1982)
[10] (Attenbrow 1987, Keotigg 1985, McDonald 1985)
[11] (2008), (2010)
[12] (Atlas of Living Australia 2022)
[13] (Horton 1994)
[14] (Tindale 1940, Tindale 1974, pp. 193)
[15] (Tindale 1974, pp. 193, Mathews 1897, pp. 1)

factors that led to a reorganisation of the social practices of Aboriginal communities after European contact occurred. The formation of new social groups and alliances were made as Aboriginal people sought to retain some semblance of their previous lifestyle.

3.3 Maroota—historical development

3.3.1 European exploration and early settlement of the Hawkesbury River

In March of 1788, little over a month after the first fleet arrived on the shores of Australia, Governor Arthur Philip and a party embarked on journey along the Hawkesbury River up to Dangar Island.[16] This expedition was followed by another in June 1789, during which the party reached the area now known as Wisemans Ferry. Exploration of the land now designated at Marramarra National Park, to the east of the study area, can be traced back to when Governor Philip and the party embarked on this second venture.[17] It was also on this trip that he named the river after the then British Board of Trade President, Lord on the Hawkesbury.[18]

The Hawksbury River was a significant communication and trade route between the colonial settlement at Port Jackson and the north-western settlements. This mode of transport was superseded by the more economically viable road transportation. The long ridgeline extending north towards the Hawkesbury River was determined as an ideal route for a road the colonists were proposing to link Port Jackson with the area that it now known as the Hunter Valley. The Great Northern Road, now known as the Old Northern Road was built between 1825 and 1836 by European convict work gangs, and its construction was overseen by Surveyor General, Sir Thomas Mitchell.[19]

European settlement of the Wisemans Ferry region began with the earliest known settler in the area, ex-convict Solomon Wiseman, arriving with his family in 1819. Wiseman and his family arrived in Sydney on 20 August 1806, aboard the *Alexander I*.[20] Not much is known of Wiseman's exploits in the early years of his settlement in Sydney. During his time in the colony, Wiseman displayed a shrewd business acumen. In 1811, Wiseman had commissioned a sloop-rigged schooner at Cockle Bay named 'Hawkesbury Packet', and in 1812 a second vessel named *Hope* was built.[21] He commissioned the first regular river crossing service over the Hawkesbury River at the time of the construction of the Great Northern Road at Wisemans Ferry.[22] Wiseman also acquired a licence for the use of a building on Blight Street, Sydney as a hotel, operating it as the innkeeper.[23] Wiseman mortgaged his hotel and two ships to finance his fleet of ships for the transport of coal, cedar, and other profitable cargoes.

Unfortunately for Wiseman, the loss of *Hope* in July of 1817, followed by the loss of a second sloop, *Hawkesbury Packet* three months later resulted in the loss of his property to mortgage holder Samuel Terry.[24] Luckily for Wiseman and his family, he had applied for and received a grant of 200 acres (80.94 hectares) of land from Governor Lachlan Macquarie which he had selected at the confluence of the Hawkesbury and McDonald Rivers.[25] In 1819, Wiseman and his family moved out to their grant on the Hawkesbury and by 1821 had opened an inn called "The Sign of the Packet" to cater to the frequent overlanders making use of an

[16] Hornsby Shire Recollects n.d.
[17] NSW NPWS n.d.
[18] Hornsby Shire Recollects n.d.
[19] Corkill 2007
[20] *Shipping Indents* n.d.
[21] 'Sydney' 1811
[22] Hornsby Shire Recollects n.d.
[23] Swancott 1970, p.7
[24] 'Sydney Gazette' 1816
[25] *Index to Registers of Grants 1792-1856 (Cumberland)* n.d.

unmade track north of the Lower Portland Head.[26] By 1828 the inn was represented as being one of the best in the country according to *The Australian* issue on 2 January 1828.[27] Following the establishment of the ferry service across the Hawkesbury River in 1827, the town became known as Wisemans Ferry.[28]

3.3.2 Settlement within Maroota

Surveyor Felton Mathew's journal entry for January 1830 states that he "camped at the 'Finger post', 9 miles south of Wisemans Ferry", which is located to the south of present-day Maroota.[29] He recorded that there was no land suitable for agricultural purposes between the location at which he camped and Wiseman Ferry. A map of the parish of Frederick shows that some portions along the eastern side of the Great North Road were purchased in 1831 (Photo 1).

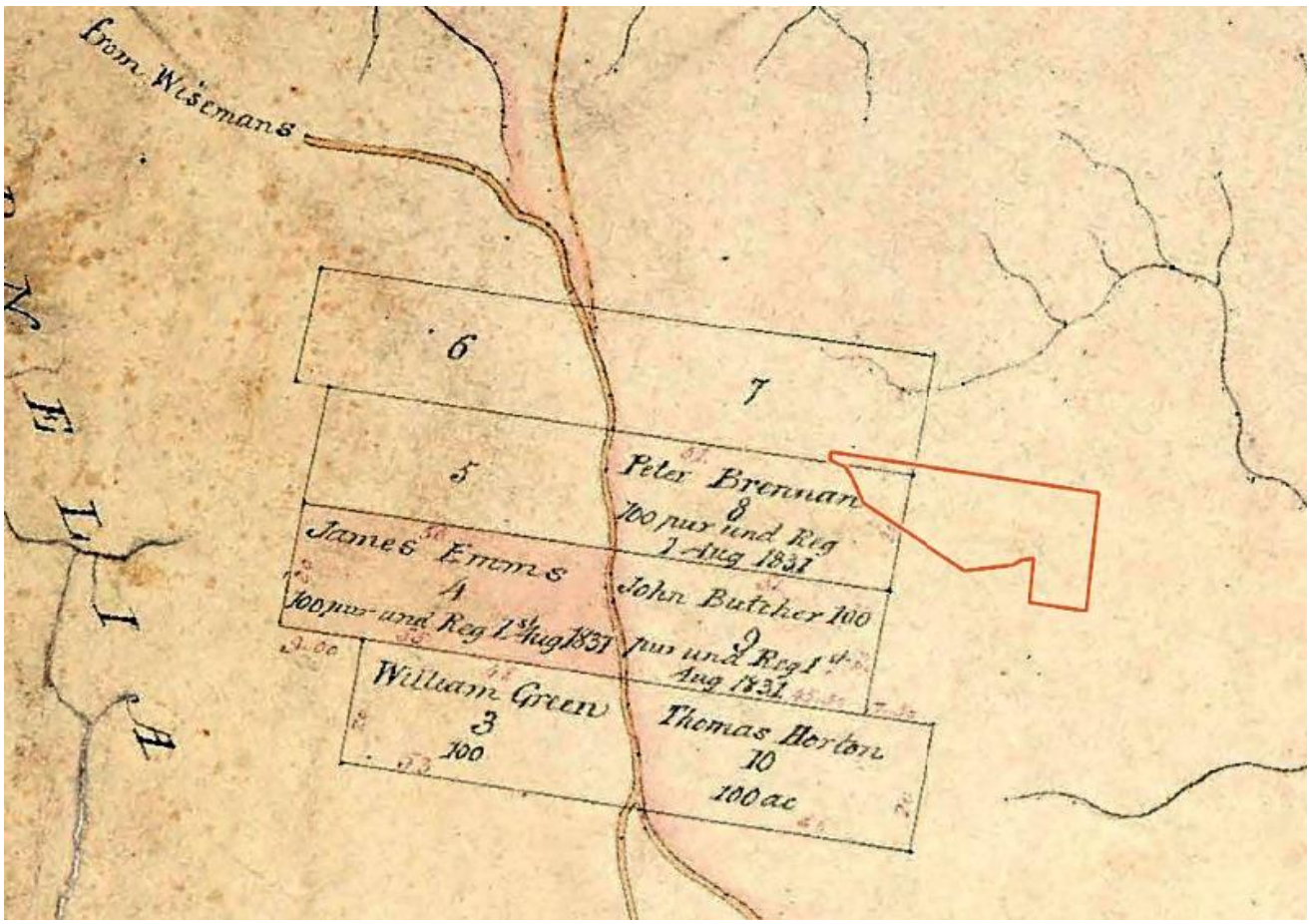


Photo 1 1830s map of Frederick parish, with the study area outlined in red (Source: NSW Land Registry Services, 1830s Parish map of Frederick)

[26] Penglase 1978, p.3
[27] The Australian 1928
[28] *Origin of Suburb & Street Names* 2019
[29] Corkill 2007

The study area partially located within parish portion 7 and 8; portion 8 was acquired by Peter Brennan on 1 August 1831. In early 1832, several parcels of land were put up in an auction that was largely unsuccessful.[30] Some of these were later reposted and on 1 October 1832 and nine lots were purchased by military personnel, as a means of buying themselves out of the armed forces.[31] According to sources, some of the men and their families resided in Maroota for less than seven days and abandoning it due to the disappointing prospects of using the lands for agricultural purposes.[32] An undated map of Frederick parish shows an additional portion has been established to the east of portions 8 and 9; unfortunately the annotation in this portion is illegible. The additional portion is partially located within the study area (Photo 2).

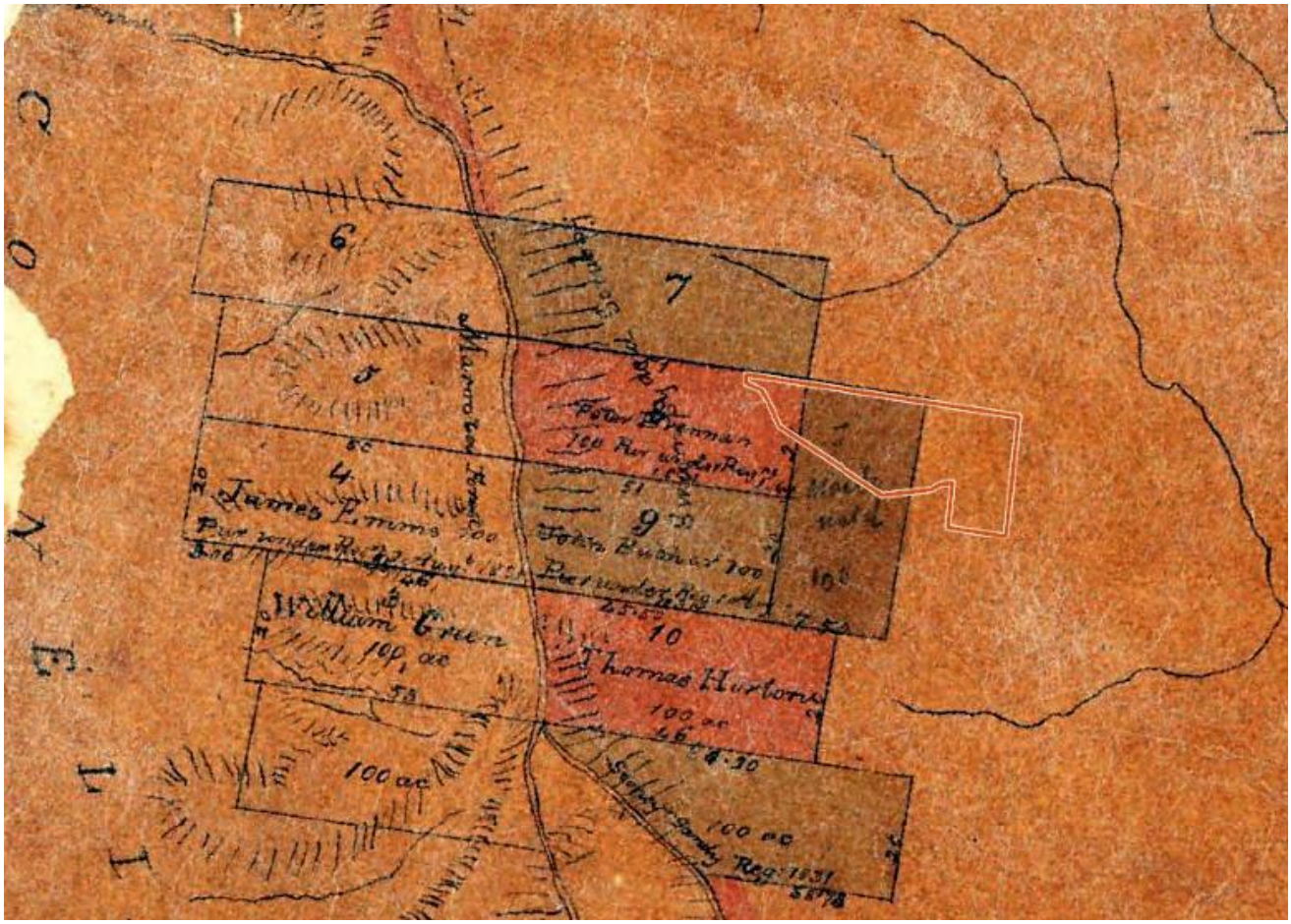


Photo 2 Undated map of Frederick parish, with the study area outlined in red (Source: NSW Land Registry Services, Frederick parish map)

An 1885 map of Frederick parish shows some reconfiguration of parish portions in the vicinity of the study area (Photo 3). Portion 7 from the earlier maps has been altered and is no longer numbered, with portion 7 now allocated to an alternative property to the north-east near the Hawkesbury River. Portion 8 no longer records an owner/occupant, and while there is a reference to a Crown plan for this portion, it is noted that this is missing as of 19 August 1885.

[30] Corkill 2007
[31] Corkill 2007
[32] Corkill 2007

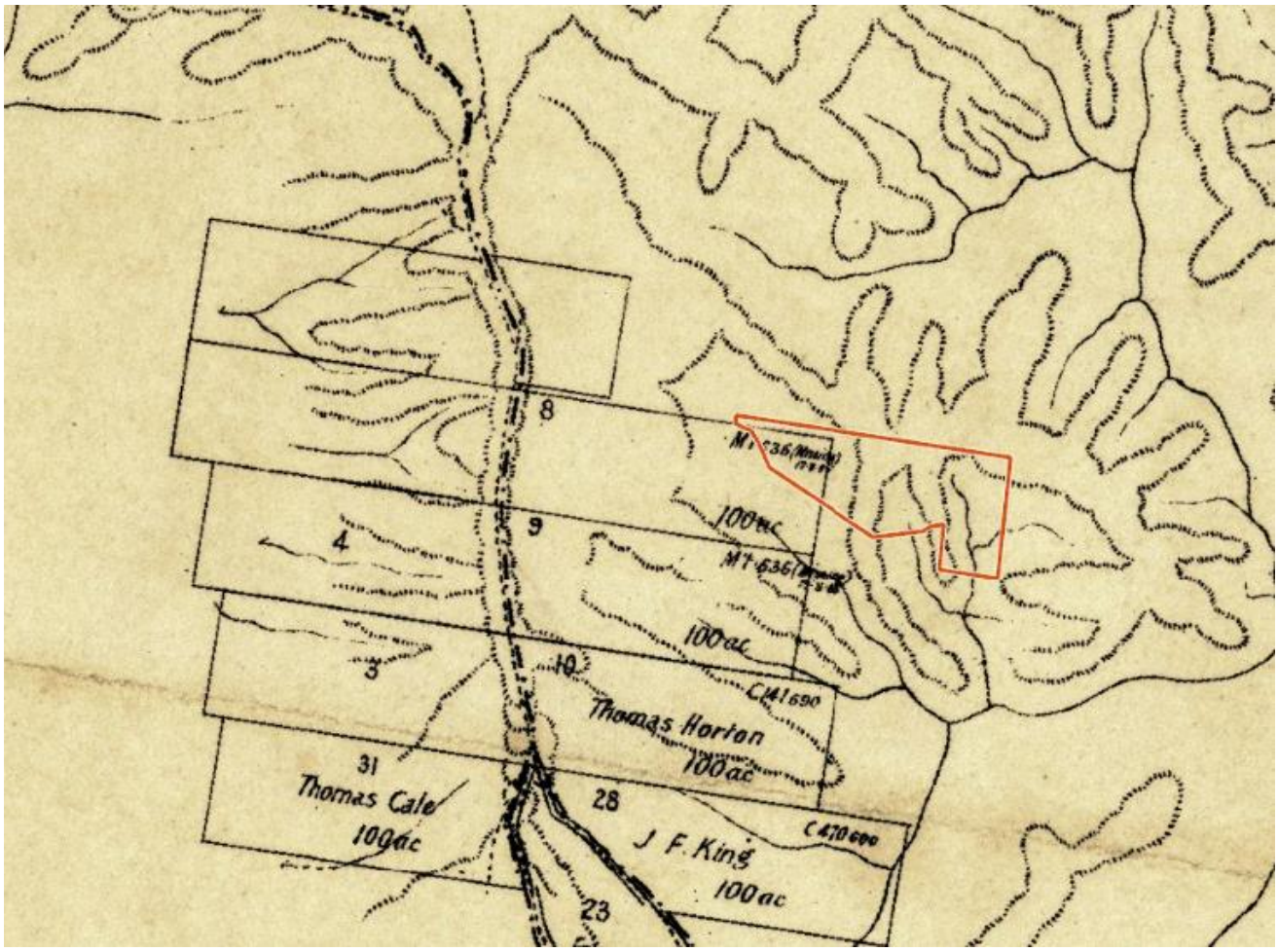


Photo 3 1885 map of Frederick parish, with the study area outlined in red (Source: (Department of Lands, Sydney 1885)

A 1904 map of Frederick parish demonstrates further reconfiguration of the parish portions in the vicinity of the study area (Photo 4). Portion 8 and the former portion 7 have now been rearranged into portion 63 and 66 and exclude the study area. The Crown plan for portion 63 states **that** the grant was applied for by Josua Everingham, with the document dating to 1888 and featuring further later annotations (Photo 5).[33] Nothing is recorded within the study area in this plan. The Crown plan for portion 66 states that the grant was applied for by Thomas M. Dalveen, with the document also dating to 1888, and with later annotations (Photo 6). In this plan, an annotation is made in pencil within the land containing the study area, denoting it as Crown land. The 1904 Frederick parish map indicates that the study area is part of land is reserved from sale or lease for residential or business purposes in 1893 (Photo 4).

[33] NSW Land Registry Services, Crown plan 1202.2030



Photo 4 **1904 map of Frederick parish, with the study area outlined in red (Source: Department of Lands, Sydney 1904)**

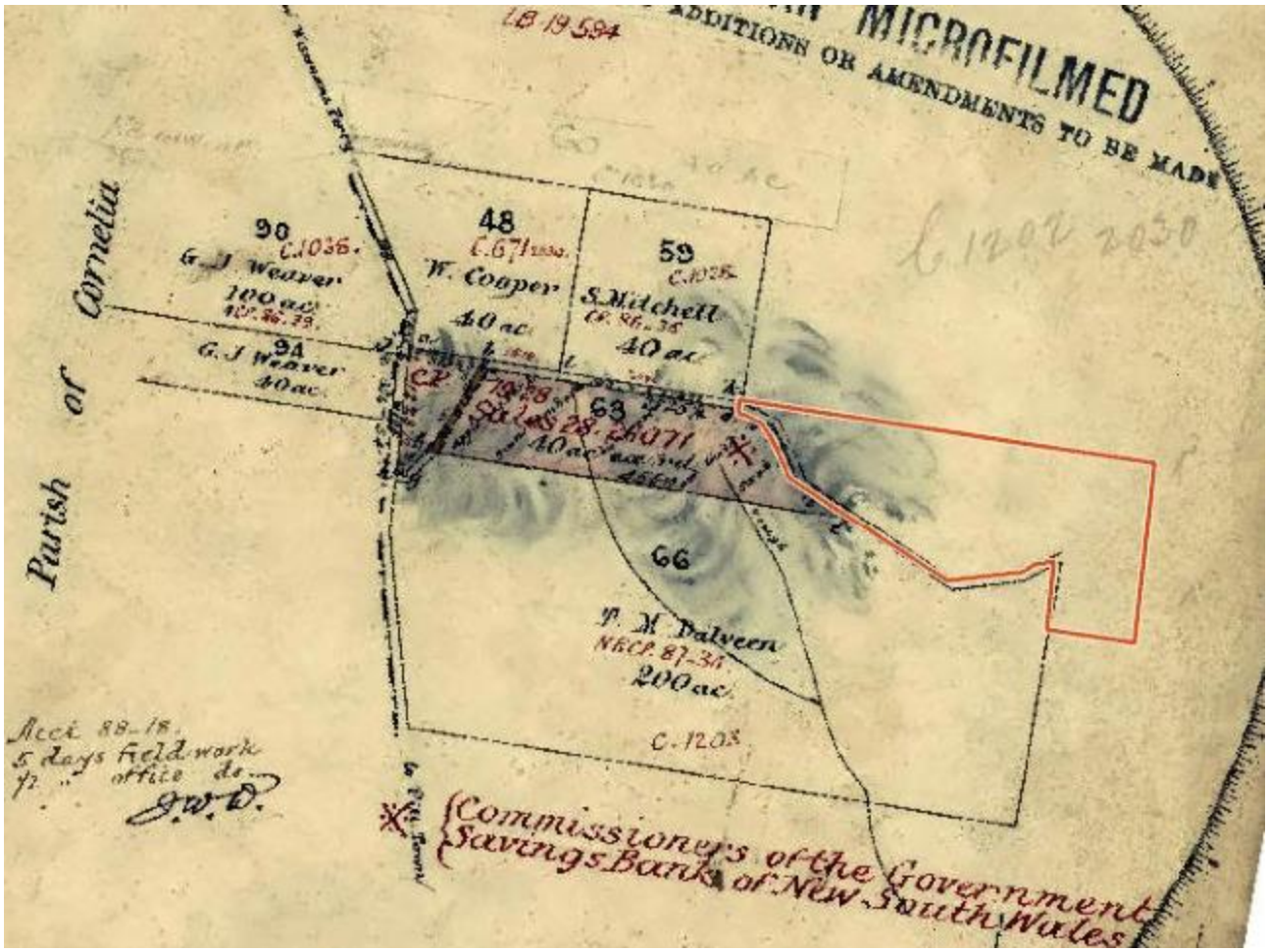


Photo 5 **1888 Crown plan of portion 63, located immediately west of the study area (outlined in red) (Source: NSW Land Registry Services, Crown plan 1202.2030)**

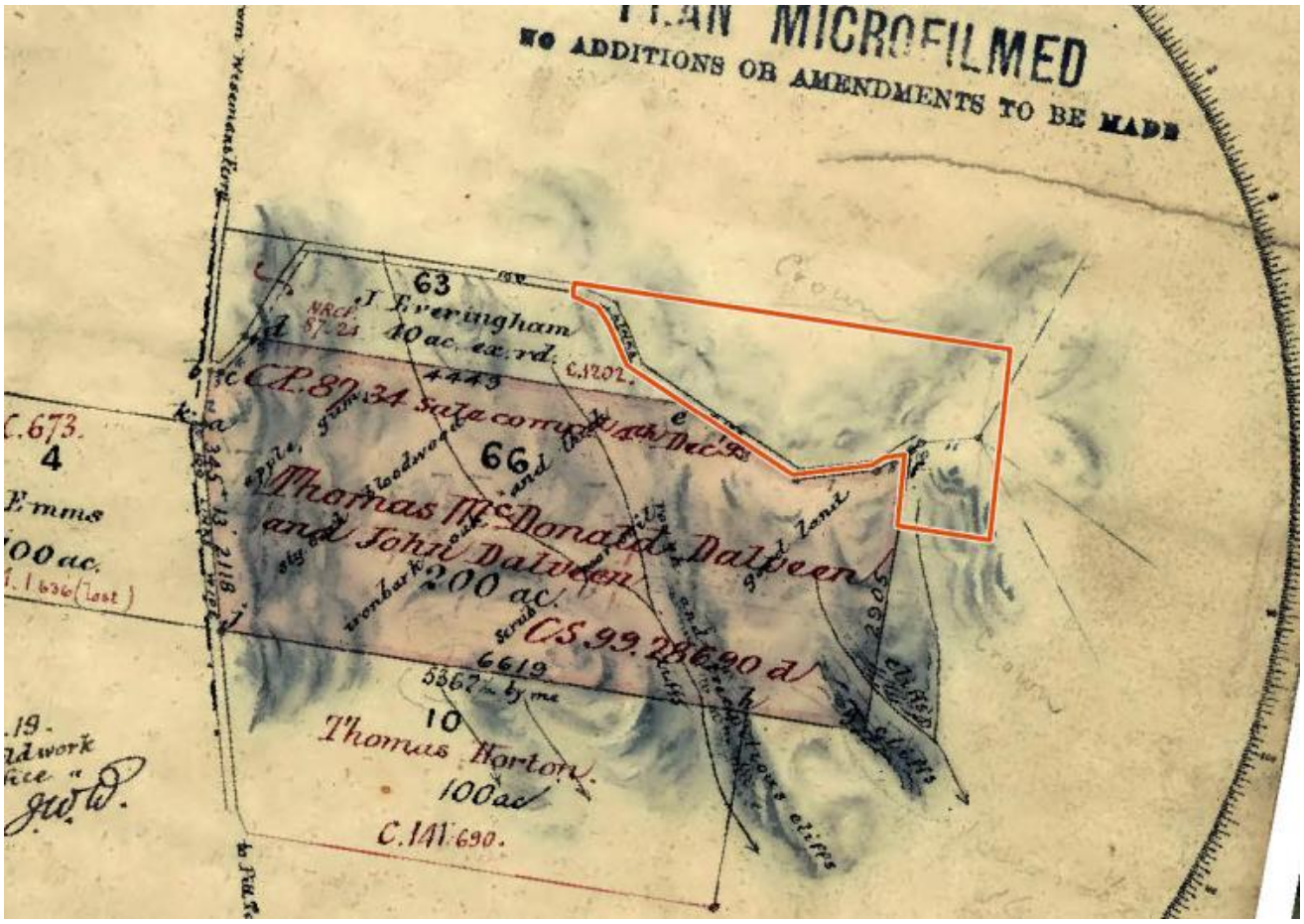


Photo 6 1888 Crown plan of portion 66, located immediately west and south of the study area (outlined in red) (Source: NSW Land Registry Services, Crown plan 1203.2030)

The historic sources indicate that the land within the study area remained the property of the Crown well into the 20th century. A 1922 Crown plan for the study area states that grant was applied for by James Curtis (Photo 7). The ownership and leasing of the study area is unclear, with several crown leases and conditional purchases recorded in the 1920s, 1930s and 1940s, but later revoked, disallowed, or withdrawn.

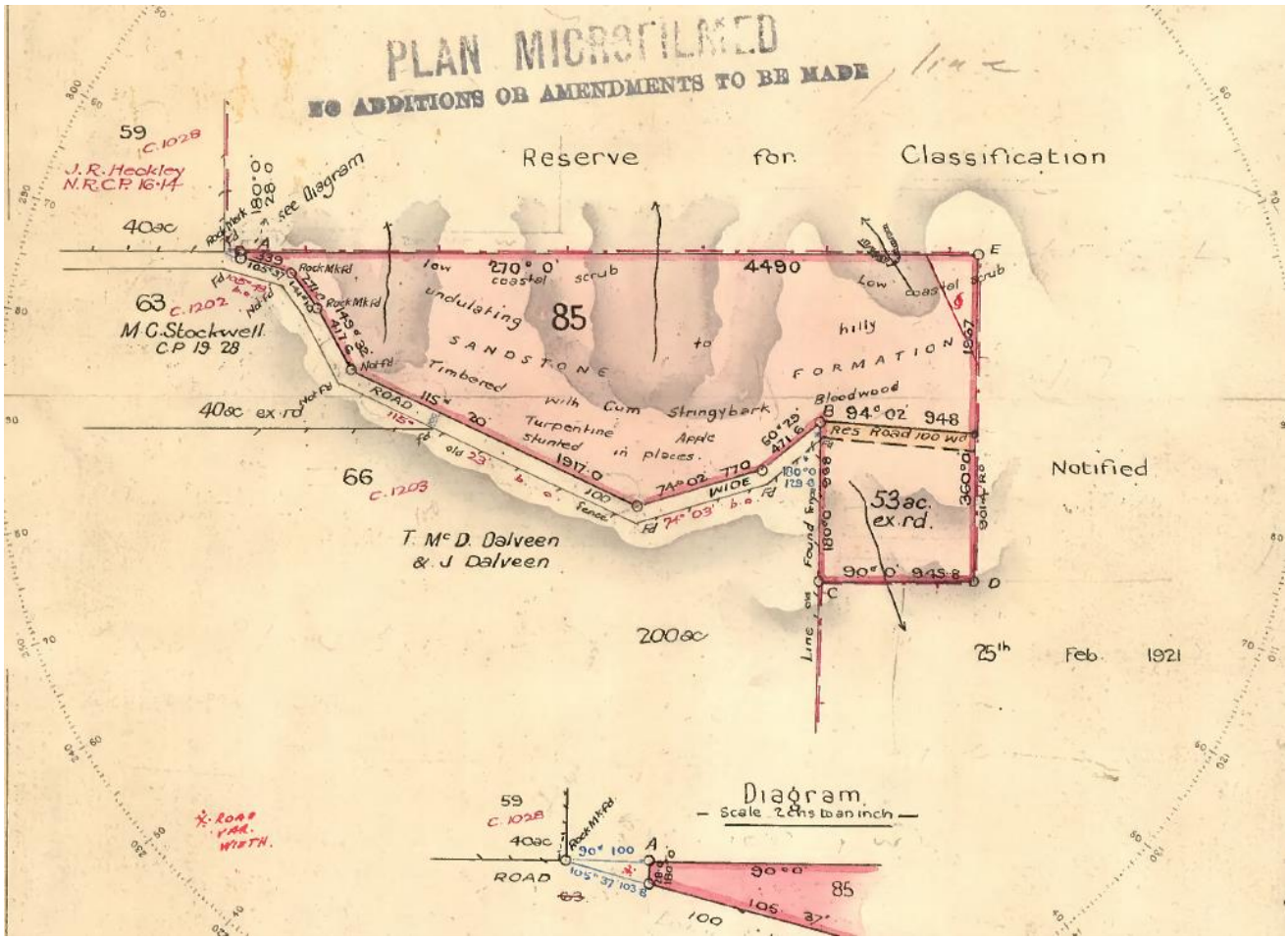


Photo 7 1922 Crown plan of portion 85, with the study area outlined in red (Source: NSW Land Registry Services, Crown plan 3512.2030)

A conditional sale was made prior to 1973 to an unknown entity, whose conditions of the sale lapsed without extension. In 1973 the property as shown in Photo 7, was sold to Ronald Leslie Weaver also as a conditional sale. The property was owned and possibly occupied by Weaver until 1974, where it was transferred to Manifold Estates Pty Ltd.[34] In 1977, the property was again transferred to the Cambridge Credit Corporation Limited, until it was transferred to Lina Renee Zapletal in 1978.[35] At this point of sale, the land was subdivided into two lots, Lot 1 and Lot 2 DP609224.

3.3.3 20th-century use of the study area

Aerial imagery allows for modern developments and land use to be identified within the study area. Aerial imagery from 1960 shows that portions of the study area have been cleared of large vegetation (Photo 8). This vegetation clearance has been limited to the south-western and south-eastern portions of the study area, with a small section in the north-east. Within the southern portion there appears to be an orchard, while in the south-west portion the land looks to have been cleared for agricultural purposes. Access tracks have been constructed in the north-western and south-eastern portions, with road bordering the southern boundary of the study area clearly established as per the Crown plans cited above.

[34] NSW Land Registry Services, Grant of Land Volume 12234 Folio 119
[35] NSW Land Registry Services, Certificate of Title Volume 14144 Folio 142

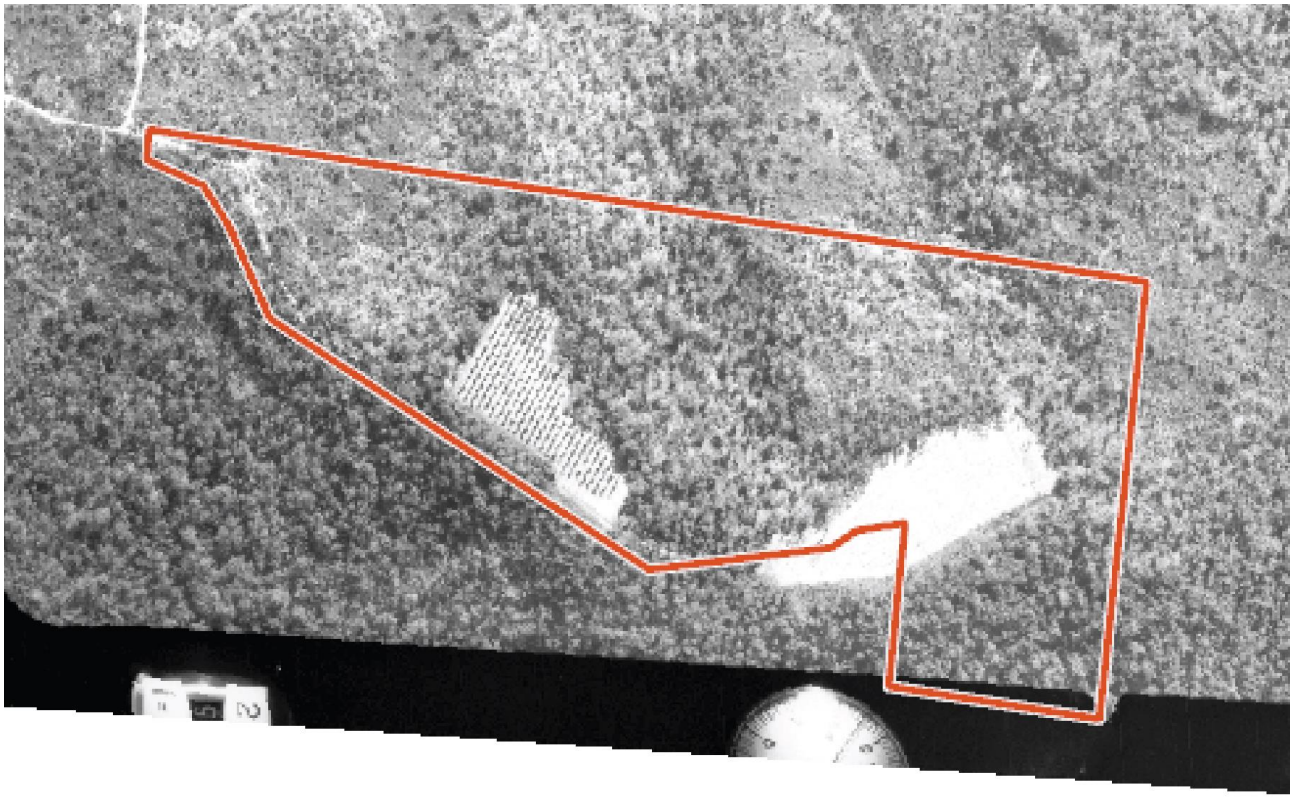


Photo 8 Aerial photograph dated to 1960, study area shown in red (Source: NSW Spatial Services)

Aerial imagery from 1965 shows that limited changes have occurred within the study area (Photo 9). A small, shed structure [1] has been constructed near the orchard in the south and a transmission line cuts through the north-eastern corner of the lot. Aerial imagery from 1974 shows that limited changes have occurred within the study area (Photo 10). The cleared land has been maintained and an artificial dam [2] has been constructed along the northern border. There is now an access track that connects the dam with the cleared portion in the south-east. The orchard in the south appears to have been decommissioned, with no trees now visible in this location. Aerial imagery from 1974 shows that limited changes have occurred within the study area (Photo 10). A small structure now exists within the cleared section within the south-western portion of the study area.

Aerial imagery from 1983 shows that limited changes have occurred within the study area. A small structure now exists within the cleared section within the south-west (Photo 11). Aerial imagery from 1993 shows that vegetation clearance has occurred within the central portion of the study area. The grass in this area appears to have been removed with exposed soils visible on the aerial (Photo 12).

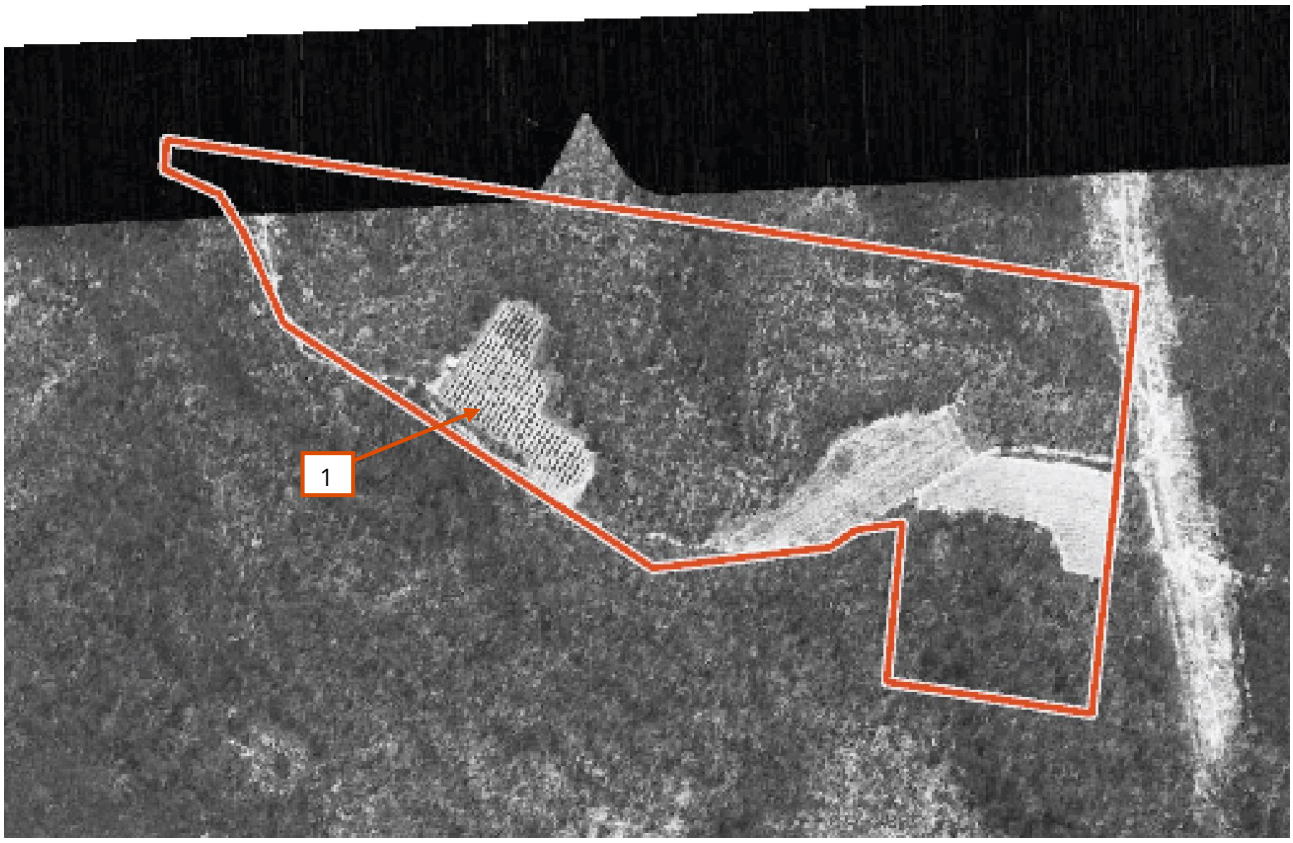


Photo 9 **Aerial photograph dated to 1965, with the study area outlined in red and showing the shed structure [1] (Source: NSW Spatial Services 2023)**

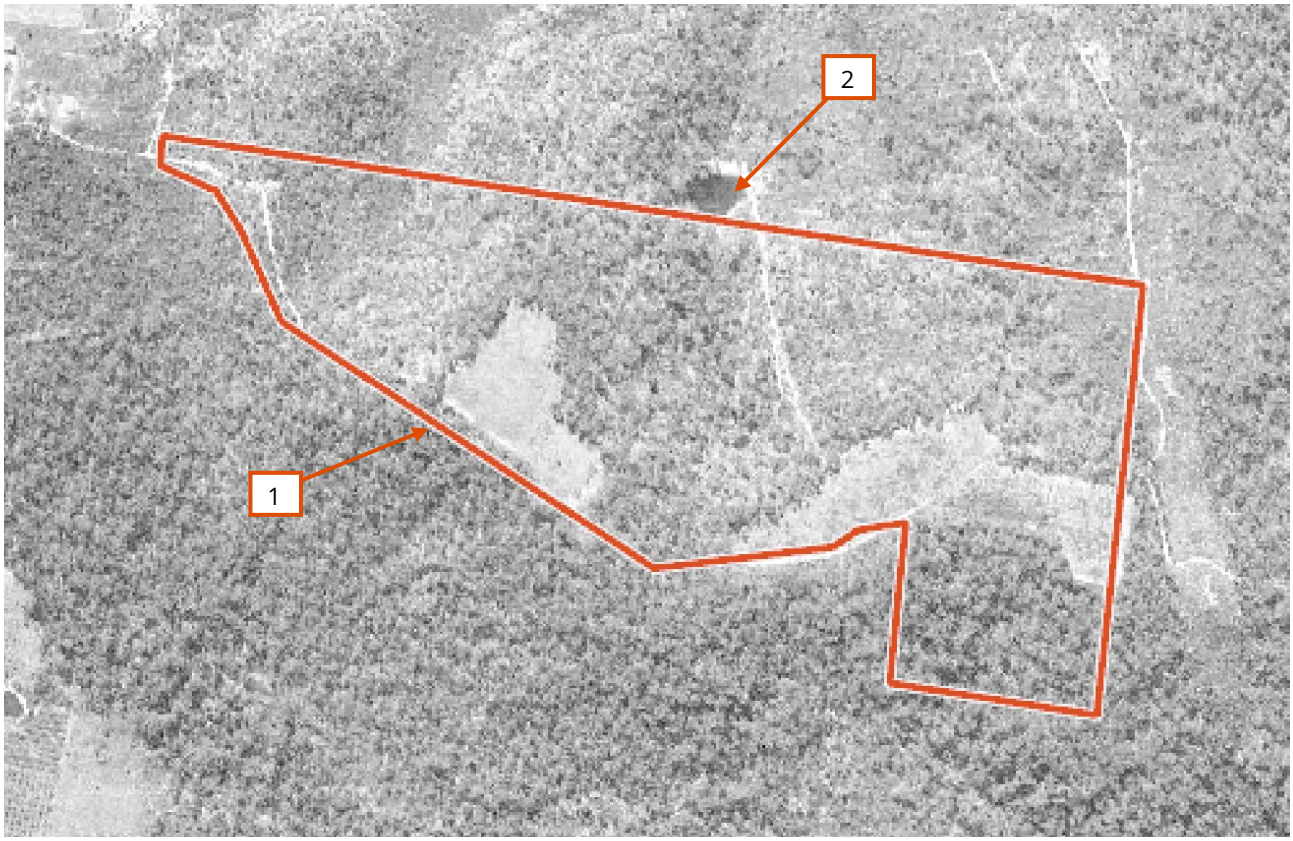


Photo 10 **Aerial photograph dated to 1974, with the study area outlined in red and showing the artificial dam [2] (Source: NSW Spatial Services 2023)**

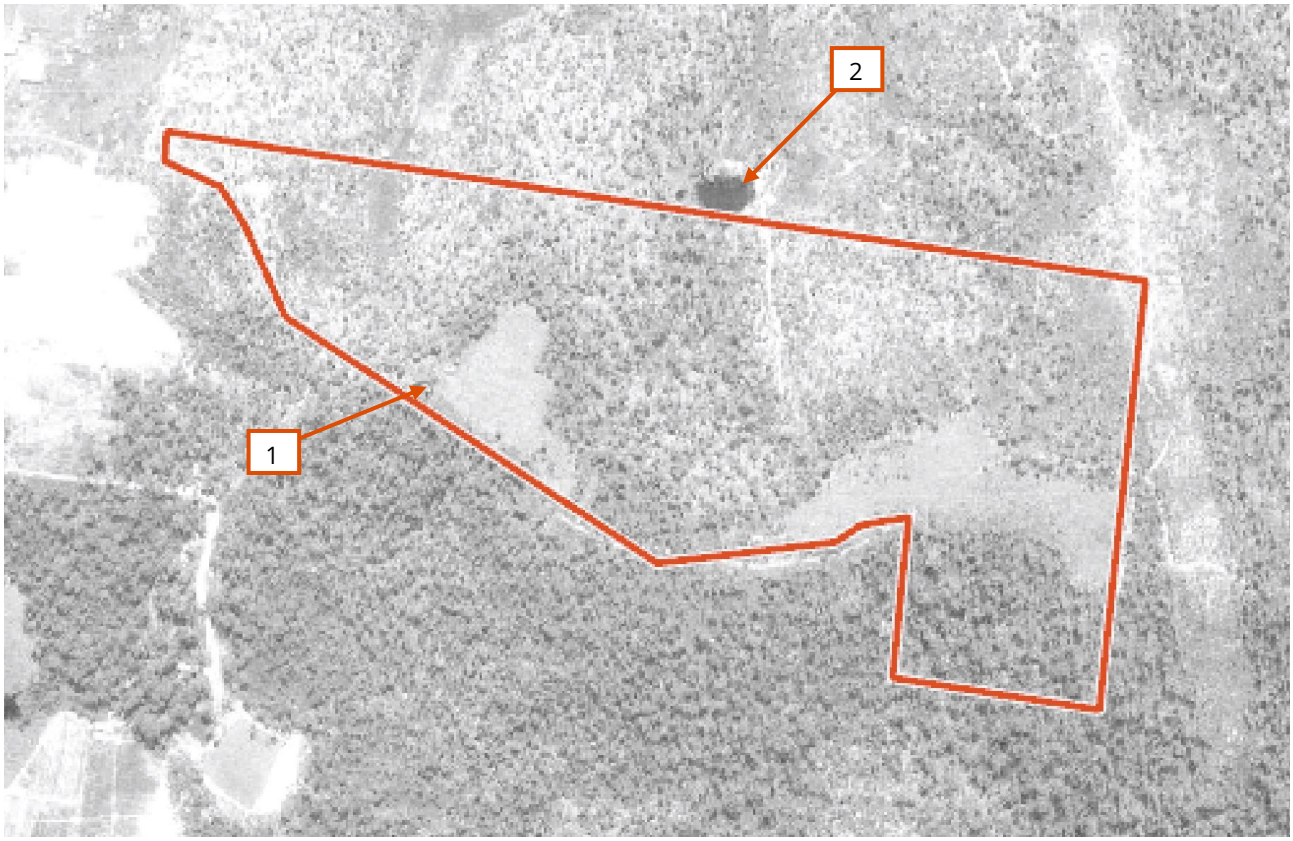


Photo 11 Aerial photograph dated to 1983, with the study area outlined in red (Source: NSW Spatial Services 2023)

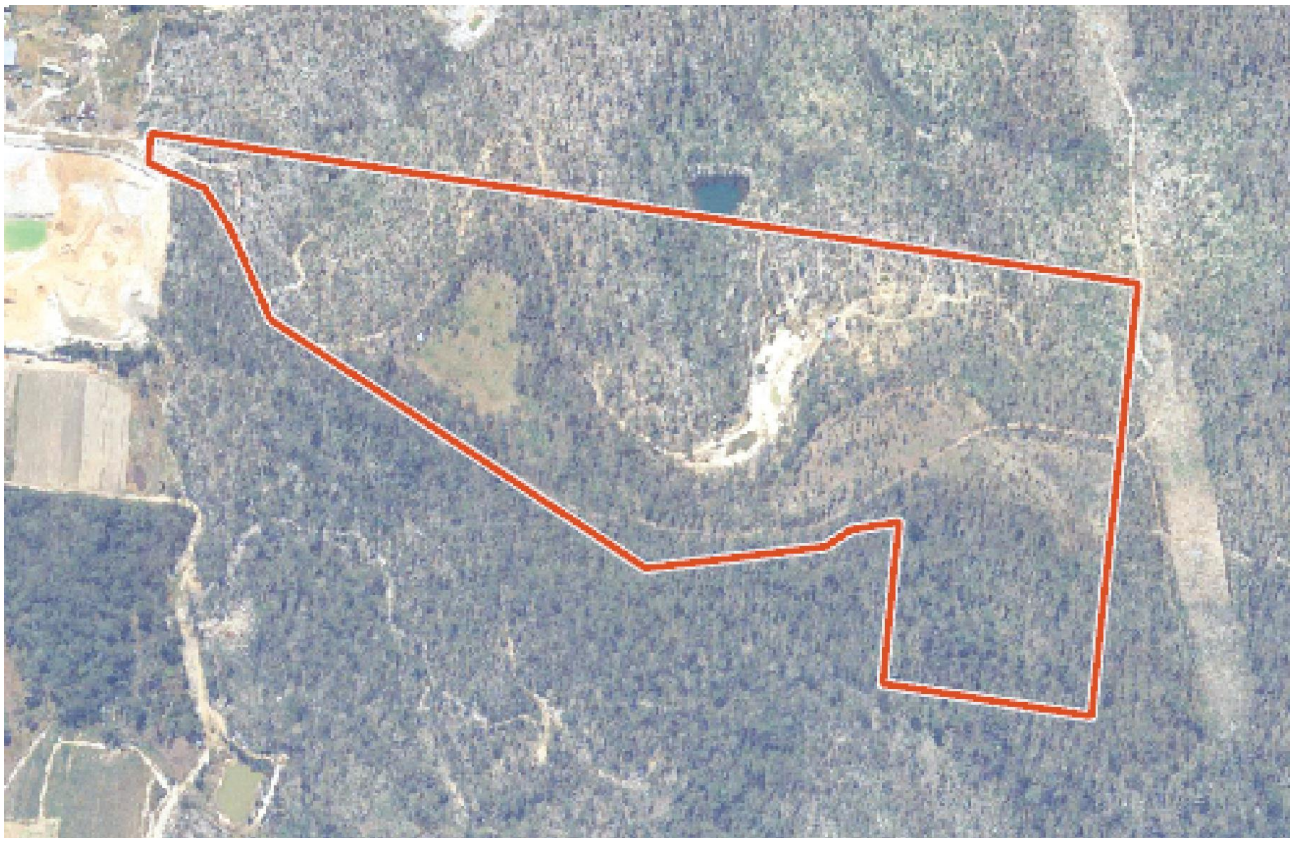


Photo 12 Aerial photograph dated to 1993, with the study area outlined in red (Source: NSW Spatial Services 2023)

3.4 Chronology of the study area

Based upon the historical research presented it is possible to summarise the chronology of the study area, this is presented in Table 2.

Table 2 Chronological development of the study area

No.	Building	Date
1	Shed structure	Post-1960–pre-1965
2	Artificial dam	Pre-1975

3.5 Research themes

Contextual analysis is undertaken to place the history of a particular site within relevant historical contexts to gauge how typical or unique the history of a particular site actually is. This is usually ascertained by gaining an understanding of the history of a site in relation to the broad historical themes characterising Australia at the time. Such themes have been established by the AHC and Heritage NSW and are outlined in synoptic form.[36]

[36] (NSW Heritage Council 2001, Australian Heritage Council 2022)

There are 38 State historical themes, which have been developed for NSW, as well as a series of National heritage themes. These broader themes are usually referred to when developing sub-themes for a local area to ensure they complement the overall thematic framework for the broader region.

A review of the contextual history in conjunction with the local historical thematic history has identified one historical theme which relates to the occupational history of the study area.[37] This is summarised in Table 3.

Table 3 Identified historical themes for the study area

Australian theme	NSW theme	Local theme
Land, water, and resource use - Agriculture	Agriculture	Agriculture and Horticulture

[37] (GML Heritage 2021)

4 Physical inspection

A physical inspection of the study area was undertaken on 3 April and 6 April 2023, attended by Crystal Garabedian (Biosis—Heritage Consultant), Bronte Baonza (Biosis—Graduate Heritage Consultant) and Raymond Weatherall (Metropolitan Local Aboriginal Land Council (LALC)—Cultural Sites Offer). The principal aims of the survey were to identify heritage values associated with the study area; this included any heritage items. Heritage items can be buildings, structures, places, relics or other works of historical, aesthetic, social, technical/research or natural heritage significance. 'Places' include conservation areas, sites, precincts, gardens, landscapes and areas of archaeological potential.

4.1 Site setting

The study area comprises Lots 1 and 2 of DP 609224 and is bounded by Marramarra National Park to the north, east and south, a Crown road to the north, west and south, and Lot 3, DP 567166 to the west. The study area is situated within a rural and forested landscape characterised by incised drainage lines undulating slopes and ridgelines (Photo 13, Photo 14, Photo 15). To the west along the Old North Road there are a series of rural residential properties and industrial extraction sites, while the east is dominated by Marramarra National Park. Topographically, the study area can be classed as an undulating slope, with steep slopes, ridgelines, and flat crests in the south, and sloping towards valley in the northern portion.

The study area contains several fire trails (Photo 16), which follow the contours of the landscape, and there are several areas that retain evidence of past use in the southern, south-eastern and central portions of the study area as identified in Section 3.3. In the former cleared area in the south-east two large metal tanks were identified, along with some piles of broken sandstone (Photo 17). Dilapidated shed structures [1] were identified in the former orchard area along with several artefactual items (Photo 18, Photo 19, Photo 20). Rubbish was located in the former cleared area in the central portion of the study area, along with a dam (Photo 21, Photo 22). Further rubbish was located in various locations across the study area.



Photo 13 Example of vegetation and terrain within the study area



Photo 14 **Example of vegetation and terrain within the study area**



Photo 15 **Example of vegetation and terrain within the central northern portion of the study area**



Photo 16 **Example of fire trail, vegetation and terrain within the study area**



Photo 17 **Metal tanks located in the former cleared area in the south-eastern portion of the study area**



Photo 18 **View of the former orchard space in the southern portion of the study area**



Photo 19 **Dilapidated sheds in the former orchard in the southern portion of the study area**



Photo 20 **Bottle base near the dilapidated sheds in the former orchard area, southern portion of the study area**



Photo 21 **Rubbish in the former cleared area in the central portion of the study area**



Photo 22 **Dam in the central portion of the study area**



Photo 23 Example of items disposed of within the central-northern portion of the study area

4.2 Built fabric

The study area contains very few examples of built fabric. The dilapidated shed [1] structures in the former orchard area are constructed of timber framing and corrugated iron. The two tanks in the former cleared area in the south-eastern portion of the study area are of iron and/or steel construction. Other fabric within the study area comprises industrial waste which has been disposed of or left by previous occupants in various locations. All elements are in various states of dilapidation and decay.

4.3 Archaeology deposits

The potential archaeological resource relates to the predicted level of preservation of archaeological resources within the study area. Archaeological potential is influenced by the geographical and topographical location, the level of development, subsequent impacts, levels of onsite fill and the factors influencing preservation such as soil type. An assessment of archaeological potential has been derived from the historical analysis undertaken during the preparation of this report.

4.3.1 Archaeological resource

This section discusses the archaeological resource within the study area. The purpose of the analysis is to outline what archaeological deposits or structures are likely to be present within the study area and how these relate to the history of land use associated with the study area.

The historical context presented in this report indicates that the study area has had limited development and use since the first grant was issued in 1831 to Peter Brennan. Evidence from the historical research and physical inspection indicates that the terrain and dense vegetation contained within the study area may not have appealed to land owners or lessees, and as such has been subjected to little activity. The historical research identified two structures: a shed [1] in the orchard area; and a dam [2] at the northern border of the study area. Evidence of the shed [1] was identified in a dilapidated state. The dam [2] could not be accessed.

The shed [1] is likely to be represented archaeologically by structural post holes, a compacted floor surface and scattered artefacts discarded as refuse. The dam [2] may feature a cut for a larger depression to gather water, or a deposit of earth, rubble, stone or brick to create a dam wall.

4.3.2 Integrity of sub-surface deposits

Due to the lack of activity within the study area, the archaeological resources above are likely to have a high level of sub-surface integrity.

4.3.3 Research potential

Archaeological research potential refers to the ability of archaeological evidence to provide information about a site that could not be derived from any other source and which contributes to the archaeological significance of that site. Archaeological research potential differs from archaeological potential in that the presence of an archaeological resource (i.e. archaeological potential) does not mean that it can provide any additional information that increases our understanding of a site or the past (i.e. archaeological research potential).

The research potential of a site is also affected by the integrity of the archaeological resource within a study area. If a site is disturbed, then vital contextual information that links material evidence to a stratigraphic sequence may be missing and it may be impossible to relate material evidence to activities on a site. This is generally held to reduce the ability of an archaeological site to answer research questions.

Assessment of the research potential of a site also relates to the level of existing documentation of a site and of the nature of the research done so far (the research framework), to produce a 'knowledge' pool to which research into archaeological remains can add.

Land, water and resource use - Agriculture

The limited information regarding the study area's use that is known relates to agricultural activities such as orcharding and possibly animal grazing. The archaeological remains of the shed [1], while likely to be in a state of high sub-surface integrity, are likely limited to post holes, a compacted floor surface and artefact scatters; these resources are unlikely to contribute to our understanding and knowledge of agriculture and horticulture in the Hornsby Shire LGA.

4.3.4 Summary of archaeological potential

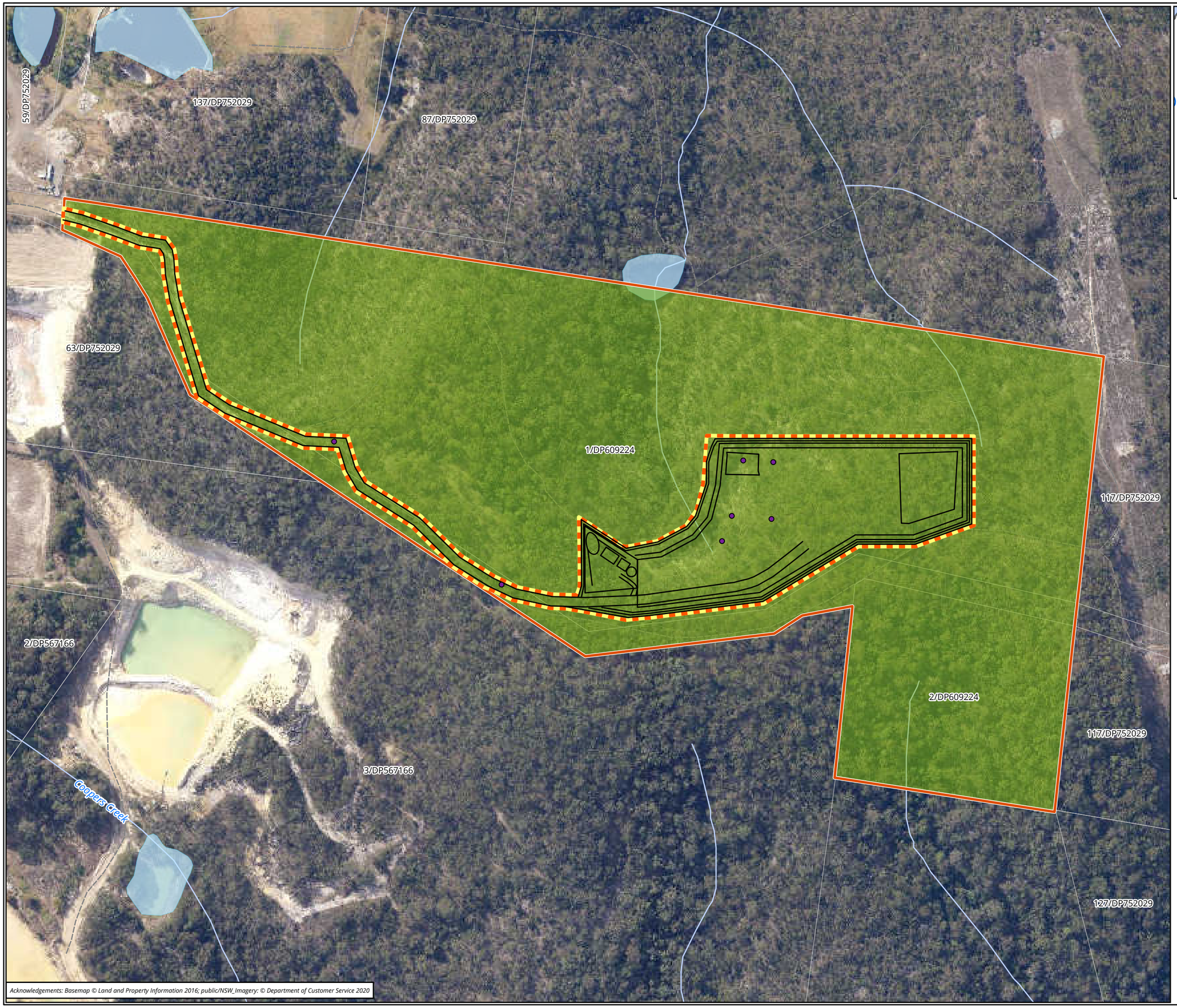
Through an analysis of the above factors a number of assumptions have been made relating to the archaeological potential of the study area, these are presented in Table 4 and Figure 5.

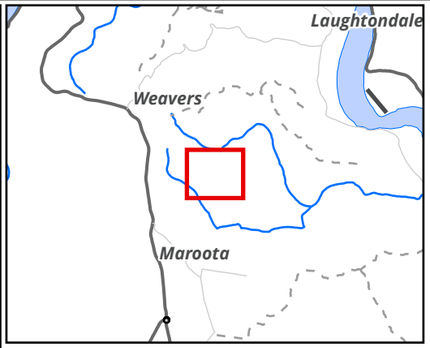
The assessment of archaeological potential has been divided into three categories:

- **High archaeological potential** – based upon the historical context and documentary evidence presented within this report there is a high degree of certainty that archaeologically significant remains relating to this period, theme or event will occur within the study area.
- **Moderate archaeological potential** – based upon the historical context and documentary evidence presented within this assessment it is probable that archaeological significant remains relating to this period, theme or event could be present within the study area.
- **Low archaeological potential** – based upon the historical context and documentary evidence presented within this assessment it is unlikely that archaeological significant remains relating to this period, theme or event will occur within the study area.

Table 4 Assessment of archaeological potential

Designation	Description	Probable feature(s)	Possible construction date	Archaeological potential
1	**Shed**	Post holes, a compacted floor surface, artefact scatters	1960-1965	Low
2	**Dam**	Cut for a larger depression, a deposit of earth, rubble, stone or brick for a dam wall	1965-1970	Low





Legend

- Study area
- Lot
- Operational scenario points
- Site Layout
- Limit of Disturbance

Archaeological potential

- Low

Figure 5 Assessment of archaeological potential

0 30 60 90 120

Metres
Scale: 1:3,000@ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 37704, Date: 27 July 2023,
Drawn by: JET, Checked by: CG, Last edited by: jtownsend
Location: P:\37700s\37704\Mapping\
37704_MarootQuarry_JET, Layout: 37704_ACHA_F5_ArchPot

5 Significance assessment

An assessment of heritage significance encompasses a range of heritage criteria and values. The heritage values of a site or place are broadly defined as the 'aesthetic, historic, scientific or social values for past, present or future generations'.[38] This means a place can have different levels of heritage value and significance to different groups of people.

The archaeological significance of a site is commonly assessed in terms of historical and scientific values, particularly by what a site can tell us about past lifestyles and people. There is an accepted procedure for determining the level of significance of an archaeological site.

Local heritage items

Local heritage items are those of significance to the local government area. In other words, they contribute to the individuality and streetscape, townscape, landscape or natural character of an area and are irreplaceable parts of its environmental heritage. They may have greater value to members of the local community, who regularly engage with these places and/or consider them to be an important part of their day-to-day life and their identity. Collectively, such items reflect the socio-economic and natural history of a local area. Items of local heritage significance form an integral part of the State's environmental heritage.

State heritage items

State heritage items, places, buildings, works, relics, movable objects or precincts of state heritage significance include those items of special interest in the state context. They form an irreplaceable part of the environmental heritage of NSW and must have some connection or association with the state in its widest sense.

The following evaluation assesses the cultural significance of the study area. This significance is based on the assumption that the site contains intact or partially intact archaeological deposits.

5.1 Evaluation of significance for the study area

The study area is part of the parish of Frederick, which over time, was subject to several reconfigurations of parish portions in the 19th and early-20th century. Early parish maps indicate the study area was contained within Portions 7 and 8, and reserved Crown land. Portion 8 was granted to Peter Brennan in 1831. Land within Maroota were sold off in 1832, but settlement of these did not last, with landowners abandoning their properties due to the unsuitability of the land for agriculture. A grant was issued for the study area, portion 85 of Frederick parish, in 1922; however, ownership and occupancy details remained unclear until 1978, when Ronald Leslie Weaver purchased the land as part of a conditional sale. Aerial photographs indicate the limited use of the study area, with an orchard with a shed [1], dam and several other cleared areas identified from 1960 onwards. Little further evidence of occupation and use were observed during the physical inspection of the study area, with instances of rubbish dumping or abandonment of industrial items recorded.

The study area is not considered important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the Hornsby Shire LGA or NSW, nor does it hold special or strong

[38] Australian Heritage Council 2022

associations with community or cultural group in the Hornsby Shire LGA or NSW for social, cultural or spiritual reasons.

The study area has been assessed as holding low archaeological potential due to low research value. The study area is not considered to possess uncommon, rare or endangered aspects of the Hornsby Shire LGA's or NSW's cultural or natural history, nor is it considered important in demonstrating the principal characteristics of a class of Hornsby Shire LGA's or NSW's cultural or natural places.

The study area does not hold heritage significance at a local or State level.

6 Conclusions and recommendations

6.1 Conclusions

The study area is part of the parish of Frederick, which over time, was subject to several reconfigurations of parish portions in the 19th and early-20th century. Early parish maps indicate the study area was contained within Portions 7 and 8, and reserved Crown land. Portion 8 was granted to Peter Brennan in 1831. A grant was issued for the study area, portion 85 of Frederick parish, in 1922; however, ownership and occupancy details remained unclear until 1978, when Ronald Leslie Weaver purchased the land as part of a conditional sale. Aerial photographs indicate the limited use of the study area, with an orchard with a shed [1], dam and several other cleared areas identified from 1960 onwards.

The limited information regarding the study area's use that is known relates to agricultural activities such as orcharding and possibly animal grazing. The archaeological remains of the shed [1], while likely to be in a state of high sub-surface integrity, are likely limited to post holes, a compacted floor surface and artefact scatters; these resources are unlikely to contribute to our understanding and knowledge of agriculture and horticulture in the Hornsby Shire LGA. The study area has been assessed as holding low research potential and low archaeological potential.

The study area was subject to an assessment of heritage significance, which determined that there were no items in the study that were assessed to have heritage significance.

6.2 Recommendation

Recommendation—Unexpected finds protocol

An unexpected finds protocol should be implemented as part of the construction management plan for the proposed works. This will ensure that any unexpected archaeological deposits are identified and managed appropriately in accordance with requirements of the Heritage Act.

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Appendices

Appendix 1 Heritage inventory sheets

Item Details

Name

Old Northern Road

SHR/LEP/S170

LEP #A12

Address

Old Northern Road between Dural and Wisemans Ferry DURAL NSW 2158

Local Govt Area

The Hills

Local Aboriginal Land Council

Unknown

Item Type	Group/Collection	Category
Unknown	Unknown	Unknown

All Addresses

Addresses

Records Retrieved: 5

Street No	Street Name	Suburb/Town/Postcode	Local Govt. Area	LALC	Parish	County	Electorate	Address Type
	Old Northern Road between Dural and Wisemans Ferry	GLENORIE/NSW/2157	The Hills	Unknown			Unknown	Alternate Address
	Old Northern Road between Dural and Wisemans Ferry	MAROOTA/NSW/2756	The Hills	Unknown			Unknown	Alternate Address
	Old Northern Road between Dural and Wisemans Ferry	MIDDLE DURAL/NSW/2158	The Hills	Unknown			Unknown	Alternate Address
	Old Northern Road between Dural and Wisemans Ferry	WISEMANS FERRY/NSW/2775	The Hills	Unknown			Unknown	Alternate Address
	Old Northern Road between Dural and Wisemans Ferry	DURAL/NSW/2158	The Hills	Unknown			Unknown	Primary Address

Owners

Records Retrieved: 0

Organisation	Stakeholder Category	Date Ownership Updated
No Results Found		

Description

Designer **Builder/Maker**

Physical Description **Updated**

Physical Condition **Updated**

Modifications And Dates

Further Comments

Current Use

Former Use

Listings

Listings

			Records Retrieved: 1		
Heritage Listing	**Listing Title**	**Listing Number**	**Gazette Date**	**Gazzette Number**	**Gazzette Page**
Local Environmental Plan	The Hills Local Environmental Plan 2019	A12	10/5/2012 12:00:00 AM		

Procedures/Exemptions

Records Retrieved: 0

Section of Act	Description	Title	Comments	Action Date	Outcome
No Results Found					

History

Historical Notes or Provenance **Updated**

Historic Themes

Records Retrieved: 0

National Theme	State Theme	Local Theme
No Results Found		

Recommended Management

Management Summary

Management

Records Retrieved: 0

Management Category	Management Name	Date Updated
No Results Found		

Report/Study

Heritage Studies

Records Retrieved: 0

Report/Study Name	Report/Study Code	Report/Study Type	Report/Study Year	Organisation	Author
No Results Found					

Reference & Internet Links

References

Records Retrieved: 0

Type	Author	Year	Title	Link
No Results Found				

Data Source

The information for this entry comes from the following source:

Data Source	Record Owner	Heritage Item ID
Local Government	The Hills Shire Council	1090243

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Appendix 10

Vegetation Management and Restoration Plan

prepared by
R.W. Corkery & Co. Pty Ltd

(Total No. of pages including blank pages = 46)

CENTRAL CIVIL

ABN: 61 167 710 545

Vegetation Management and Restoration Plan

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

July 2024

ACKNOWLEDGEMENT

R.W. Corkery & Co. acknowledge and pay our respects to the Traditional Custodians of the lands in NSW and Australia on which our projects are located. We value the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

ABN: 61 167 710 545

Vegetation Management and Restoration Plan

for the

Maroota Central Civil Quarry

Prepared for:

Central Civil (NSW) Pty Ltd
ABN: 61 167 710 545

Telephone: 0499 010 000
Email: sarkis@centralcivilnsw.com.au

Suite 3b, Building 4
256b New Line Road
DURAL NSW 2158

Prepared by:

R.W. Corkery & Co. Pty Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Telephone: (02) 9985 8511
Email: admin@rwcorkery.com
Postal: PO Box 1796
CHATSWOOD NSW 2057

Sydney | Orange | Townsville

Sydney
Suite 12.01, 1-5 Railway Street
CHATSWOOD NSW 2067

Orange
62 Hill Street
ORANGE NSW 2800

Ref No. 1055/03a July 2024

RWCorkery&co

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1. Introduction

1.1 Background

This Vegetation Management and Restoration Plan ("the Plan") has been prepared by R. W. Corkery & Co Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd ("the Applicant"), to accompany a development application submitted to Hornsby Shire Council ("Council") for the proposed development and operation of the Maroota Central Civil Quarry ("the Quarry"). The "Quarry Site" is located within Lots 1 and 2 DP609224 (owned by the Applicant), as well as an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (see **Figure 1**).

The Plan has been developed in accordance with the *Guidelines for the preparation of Vegetation Management and Restoration Plans 2008* ("the Guideline") and Section 2.5.9 of the *Hornsby Development Control Plan*.

The Applicant is seeking approval for the development and operation of the Quarry ("the Proposal") which would include the following.

- Extraction, processing and despatch of up to 30,000 tonnes per annum (tpa) of sandstone logs, flagging stone and friable sandstone.
- Crushing and screening of friable sandstone using a mobile processing plant for use in on-site road and track maintenance.
- Importation of up to 30,000tpa of virgin excavated natural material (VENM) for use in landscaping and progressive rehabilitation at the Quarry.
- Product transportation and material importation involving a maximum of 10 laden heavy vehicle movements per day, with an average of 4 laden heavy vehicle movements per day.
- Progressive and final rehabilitation of the Quarry to develop a final landform suitable for nature conservation.
- Ongoing operations for a period of 30 years from the commencement of operations under the development consent.

1.2 Site Plans

The following figures provide context for the Quarry Site of which this Plan applies to.

- **Figure 2** – Site Layout
- **Figure 3** – Land Use
- **Figure 4** – Land Zoning
- **Figure 5** – Topography and Drainage

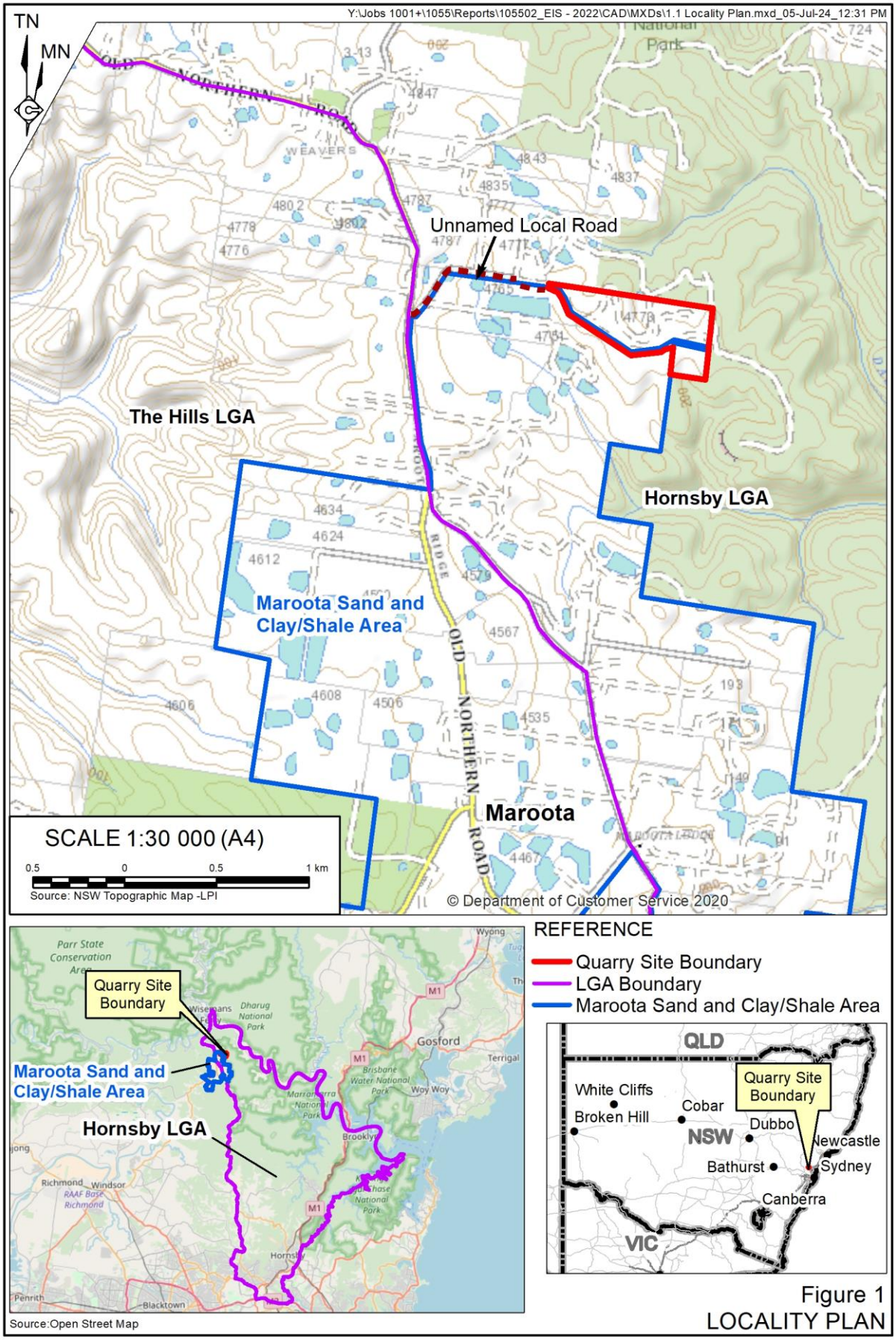


Figure 1
LOCALITY PLAN

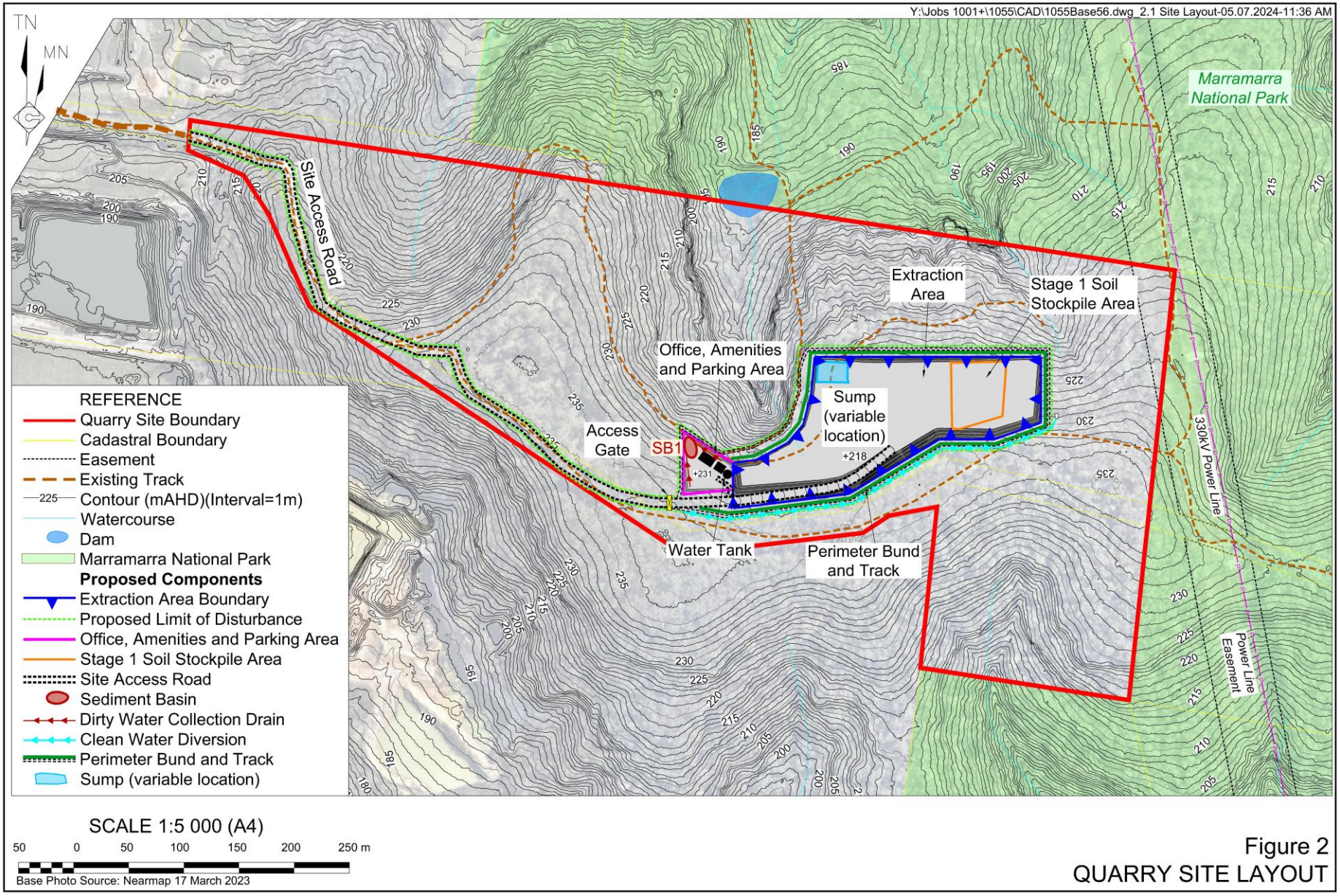


Figure 2
QUARRY SITE LAYOUT

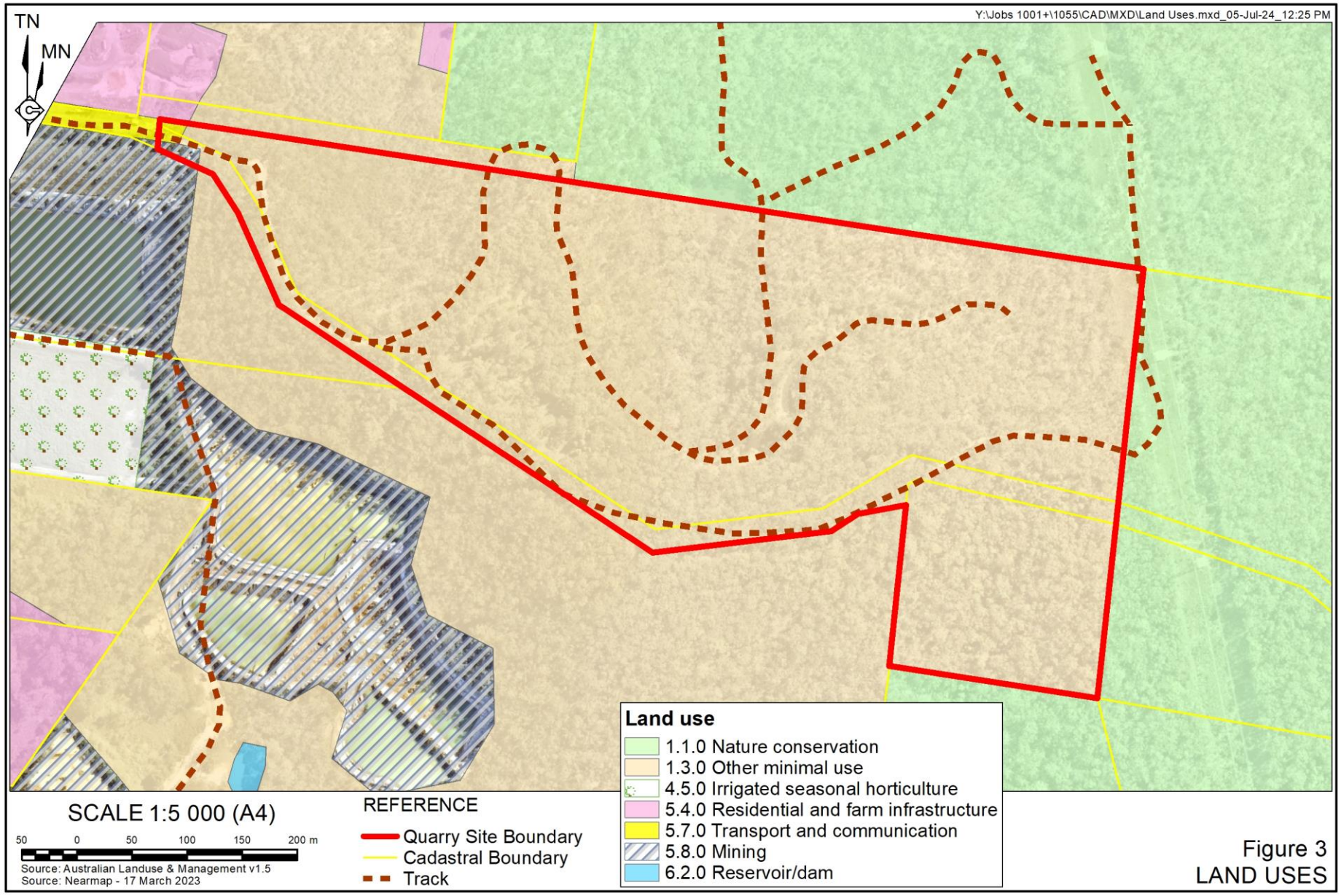


Figure 3
LAND USES

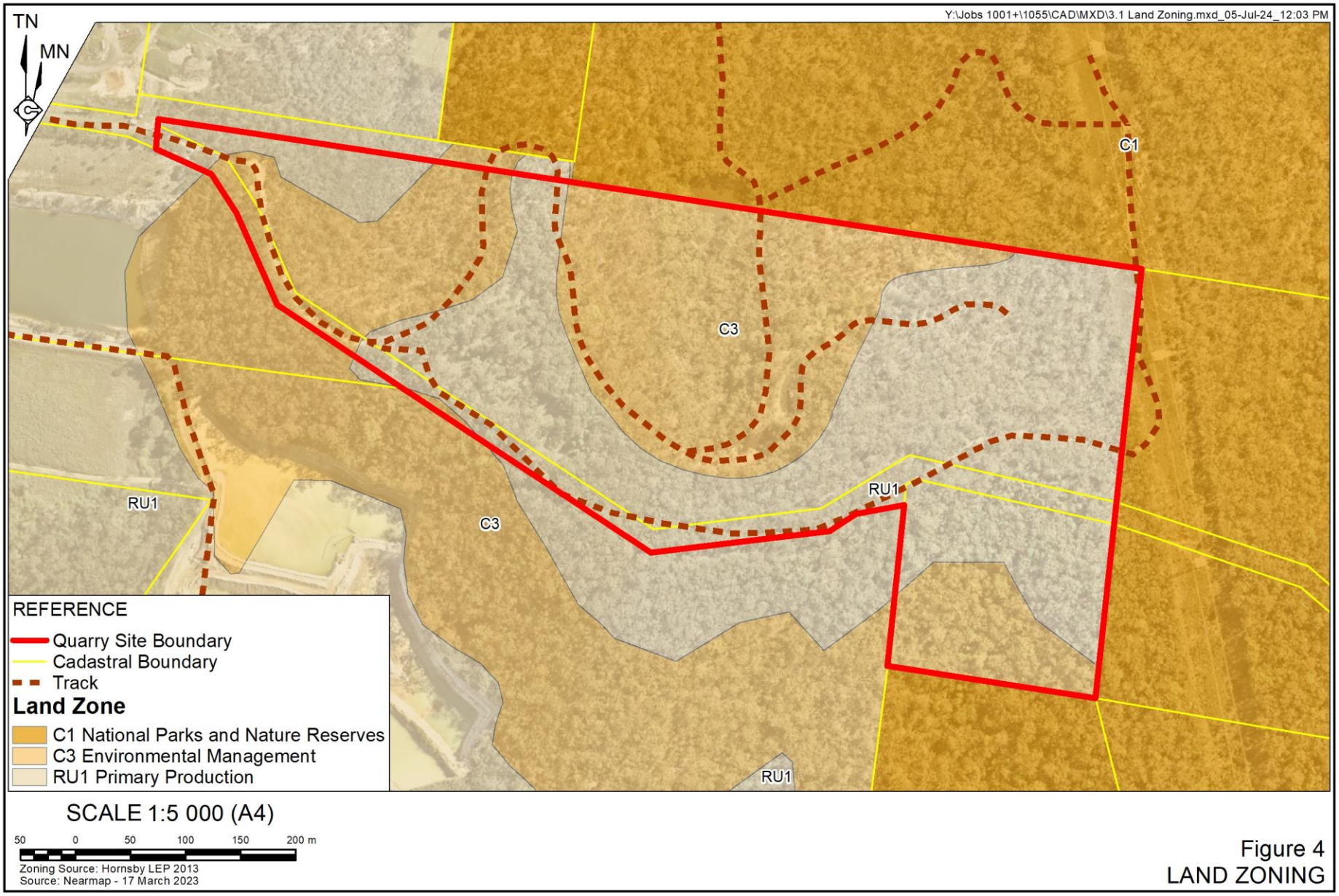


Figure 4
LAND ZONING

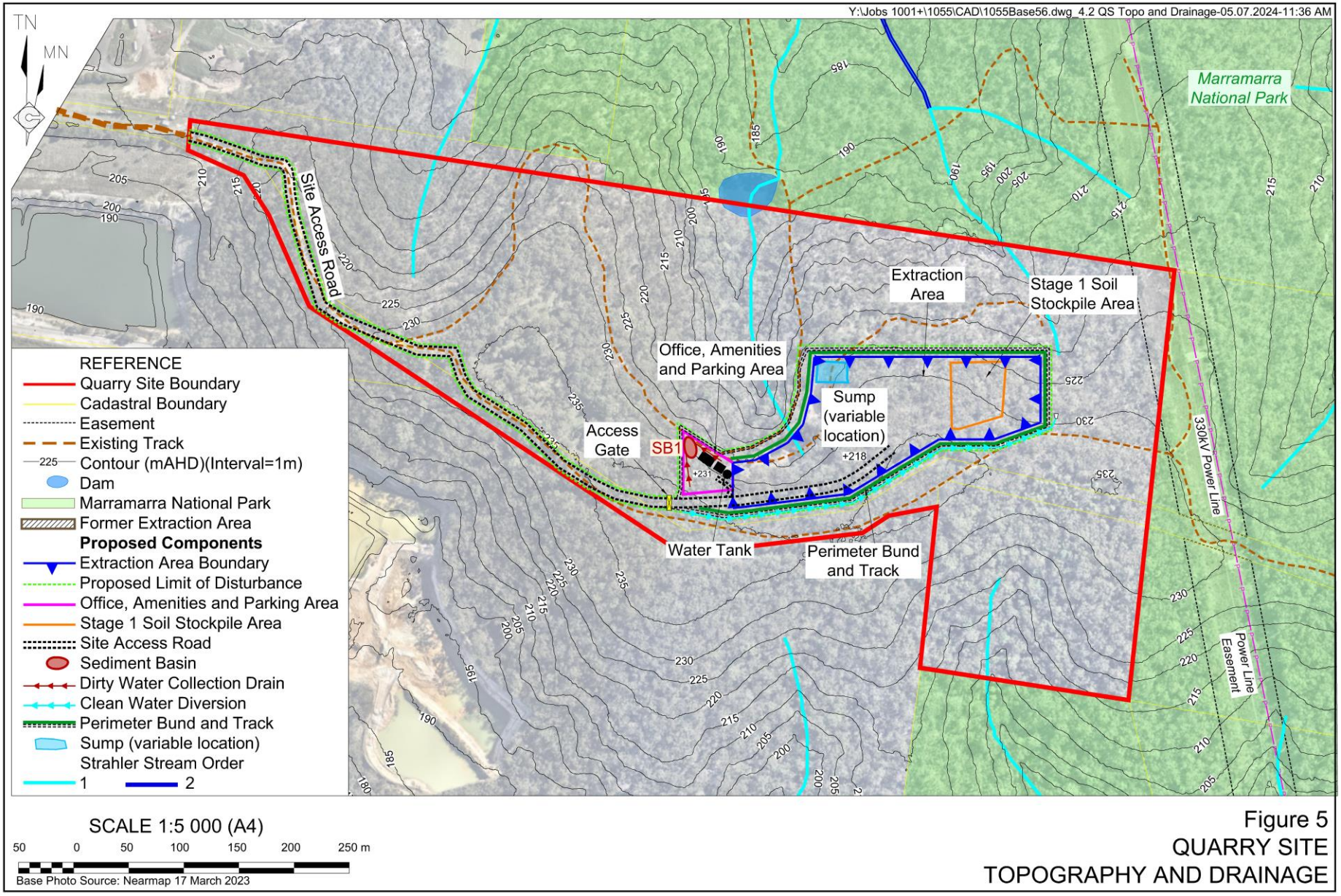


Figure 5
QUARRY SITE
TOPOGRAPHY AND DRAINAGE

2. Site Assessment

2.1 Methodology

A Biodiversity Development Assessment Report (BDAR) for the Proposal has been prepared by Ecoplanning Pty Ltd (Ecoplanning) which is referred to as Ecoplanning (2023). The following subsections detail the methodology utilised by Ecoplanning to assess the ecological and habitat values of the Quarry Site.

2.1.1 Desktop Assessment

The following information sources were considered in preparation for field surveys of the Quarry Site. This information provided suitable background to inform the type and timing of surveys that would be required and to identify species likely to be present and potentially affected by the Proposal.

- BioNet Atlas
- BioNet Vegetation Classification
- Protected Matters Search Tool
- NSW Hydrography
- State Vegetation Type Map
- NSW threatened species profiles
- ePlanning Spatial Viewer
- Hornsby LEP

2.1.2 Field Surveys

Ecoplanning completed field surveys within the Quarry Site from 22 August 2022 to 12 July 2023 to validate predictions made based on the desktop assessment and to map potential habitats and identified species within the Quarry Site.

The survey methods are described in full in Sections 3.2.1, 4.3.3 and 4.3.6 of Ecoplanning (2023). In summary, the survey effort comprised:

- total of five survey plots consistent with the Biodiversity Assessment Methodology (BAM);
- general habitat searches to identify significant habitat features such as hollow-bearing trees;
- targeted threatened fauna transects;
- incidental threatened flora and fauna searches;

- search for scats / signs of habitat use;
- diurnal bird surveys;
- nocturnal bat and mammal spotlighting surveys;
- two x song meter acoustic recorders (42 days);
- two x Titley Anabat Express bat detectors (28 nights);
- 15 x motion-detecting cameras (42 days); and
- 20 x nest boxes (115 days).

2.2 Natural Resource Information

2.2.1 Description of Vegetation Communities and Habitats

2.2.1.1 Plant Community Types

Field surveys within the Quarry Site identified the following Plant Community Types (PCTs).

- PCT 3586 – Northern Sydney Scribbly Gum Woodland
- PCT 3616 – Sydney Hinterland Grey Gum Transition Forest
- PCT 3622 – Sydney Hinterland Yellow Bloodwood Woodland
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest

A total of 3.77ha of native vegetation would be removed throughout the life of the Quarry, all of which is currently in moderate condition. Ecoplanning (2023) notes that areas classified as PCT 3621 are located beyond the proposed limit of disturbance and would not be impacted by the Proposal. **Figure 6** shows the spatial extent of each identified PCT within the Quarry Site.

2.2.1.2 Threatened Ecological Communities

No threatened ecological communities (TEC) listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified within the Quarry Site.

2.2.1.3 Threatened Species

A total of 41 ecosystem credit species and 57 species credits species were either confirmed or assumed to frequent the Quarry Site. Complete listings of ecosystem and species credit species are provided in Tables 4.2 and 4.3 of Ecoplanning (2023). Threatened flora species are discussed in the subsection below, and details on the threatened fauna species and their habitats are discussed in Section 2.2.5.

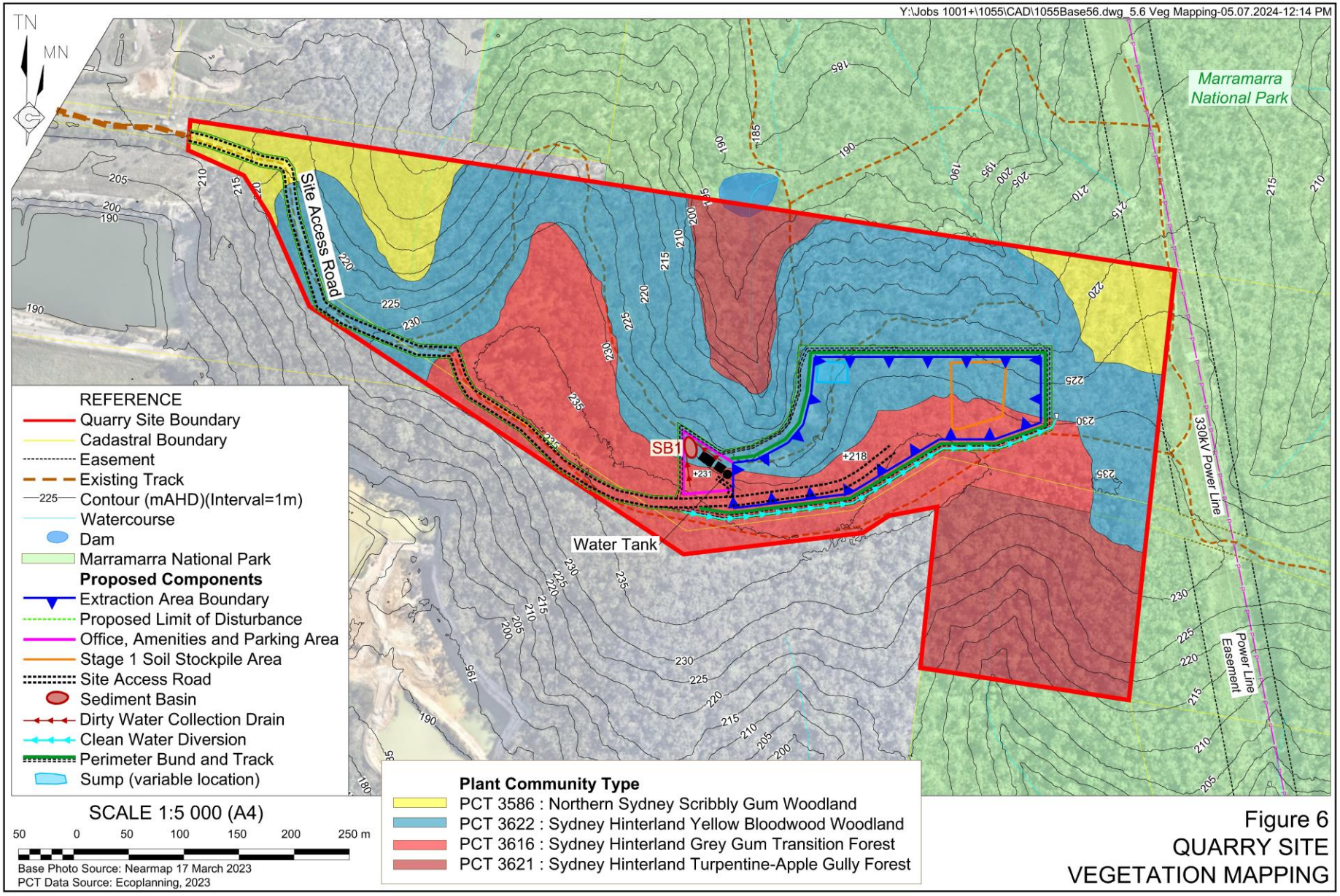


Figure 6
QUARRY SITE
VEGETATION MAPPING

Flora Species

The field surveys identified a total of 117 flora species, of which 114 are native flora species and three are exotic flora. A complete listing of flora species identified during field surveys is presented in Appendix A of Ecoplanning (2023).

Of the individual flora species recorded, three are threatened species listed under the BC Act and/or EPBC Act as follows.

1. *Darwinia fascicularis* subsp. *oligantha* – listed as an endangered population under the BC Act.
2. *Pimela curviflora* var. *curviflora* – listed as vulnerable under the BC Act and the EPBC Act.
3. *Tetratheca glandulosa* – listed as vulnerable under the BC Act.

The locations of these species are presented on **Figure 7**.

Fauna Species

The field surveys conducted by Ecoplanning (2023) identified a total of 64 fauna species including:

- 28 species of bird;
- 22 species of mammal;
- 6 species of reptile; and
- 8 species of frog.

Eight of the individual fauna species are threatened species listed under the BC Act and/or EPBC Act. **Table 1** provides a summary of these species, their legal status and an overview of the survey results.

Table 1
Listed Fauna Recorded or Likely to be Present

Page 1 of 2

Species	Legal Status	Overview of Survey Results / Comments
Bats		
Large Bent-winged Bat*	Vulnerable under the BC Act.	Large Bent-winged Bats are dual credit species, being ecosystem credit species for foraging purposes and species credit species for breeding habitat only. These species, although identified within the Quarry Site, are not required to be assessed as a species credit species as no breeding habitat (i.e. caves, derelict mines and other man-made structures) is present within the Quarry Site. In addition, although not preferred breeding habitat for this species, small crevices within sandstone outcrops were inspected and no evidence of breeding bats was identified.
Eastern Cave Bat	Vulnerable under the BC Act.	Possibly recorded during surveys. The species polygon for the Eastern Cave Bat includes all habitat within the Quarry Site within 2km of caves, scarps, cliffs, rock overhangs and disused mines. Therefore, the species polygon for the Eastern Cave Bat encompasses all areas of native vegetation within the Quarry Site.
Large-eared Pied Bat	Vulnerable under the BC Act and EPBC Act.	Recorded during surveys. The species polygon for the Large-eared Pied Bat includes all habitat within the Quarry Site within 2km of caves, scarps, cliffs, rock overhangs and disused mines. Therefore, the species polygon for the Large-eared Pied Bat encompasses all areas of native vegetation within the Quarry Site.

Table 1 (Cont'd)
Listed Fauna Recorded or Likely to be Present

Species	Legal Status	Overview of Survey Results / Comments
Bats (Cont'd)		
Little Bent-winged Bat*	Vulnerable under the BC Act.	Little Bent-winged Bats are dual credit species, being ecosystem credit species for foraging purposes and species credit species for breeding habitat only. These species, although identified within the Quarry Site, are not required to be assessed as a species credit species as no breeding habitat (i.e. caves, derelict mines and other man-made structures) is present within the Quarry Site. In addition, although not preferred breeding habitat for this species, small crevices within sandstone outcrops were inspected and no evidence of breeding bats was identified.
Southern Myotis	Vulnerable under the BC Act.	Recorded during surveys. The species polygon for the Southern Myotis includes all habitat within the Quarry Site that is within 200m of a waterbody with pools and/or stretches 3m or wider including rivers, creeks, billabongs, lagoons and dams. Therefore, the species polygon for the Southern Myotis encompasses all areas of native vegetation within the Quarry Site.
Birds		
Glossy Black-Cockatoo*	Vulnerable under the BC Act.	Recorded during surveys. However, Glossy Black-cockatoo is a species credit species for breeding only. The song meter recording was taken out of breeding season and no Glossy-Black-cockatoos were observed using hollows within the Quarry Site or otherwise engaging in breeding behaviour. Two stags capable of hosting breeding Glossy Black-cockatoos were observed during seasonal owl surveys, however, no Glossy Black-cockatoos were observed in these stags. Accordingly, no species polygon has been produced for this species.
Mammals		
Eastern Pygmy Possum	Vulnerable under the BC Act.	One Eastern Pygmy Possum was recorded with a camera and during spotlighting surveys within the eastern area of the Quarry Site. In addition, 20 nest boxes were installed for the period 4 November 2022 to 27 February 2023. However, no evidence of Eastern Pygmy Possum or other mammals was found in the nest boxes.
Frogs		
Red-crowned Toadlet	Vulnerable under the BC Act.	Recorded during every night of survey within the minor first-order watercourse located beyond the eastern boundary of the proposed Extraction Area.
* Not assessed as species credit species.		
Source: Ecoplanning (2023) – Compiled from Section 4		

2.2.1.4 Fauna Habitats

Details of the various fauna habitats identified within the Quarry Site are provided in **Table 1**. In summary, potential fauna habitats within the Quarry Site include small crevices within sandstone outcrops, areas of native vegetation within 200m of a waterbody and/or watercourse, and Hollow Bearing Trees (HBTs).

A total of 28 HBTs were recorded within the Quarry Site, with twelve located within the proposed limit of disturbance. HBTs ranged from small hollows <10cm in diameter to large hollows >20cm in diameter. The locations of HBTs within the Quarry Site are presented on **Figure 7**.

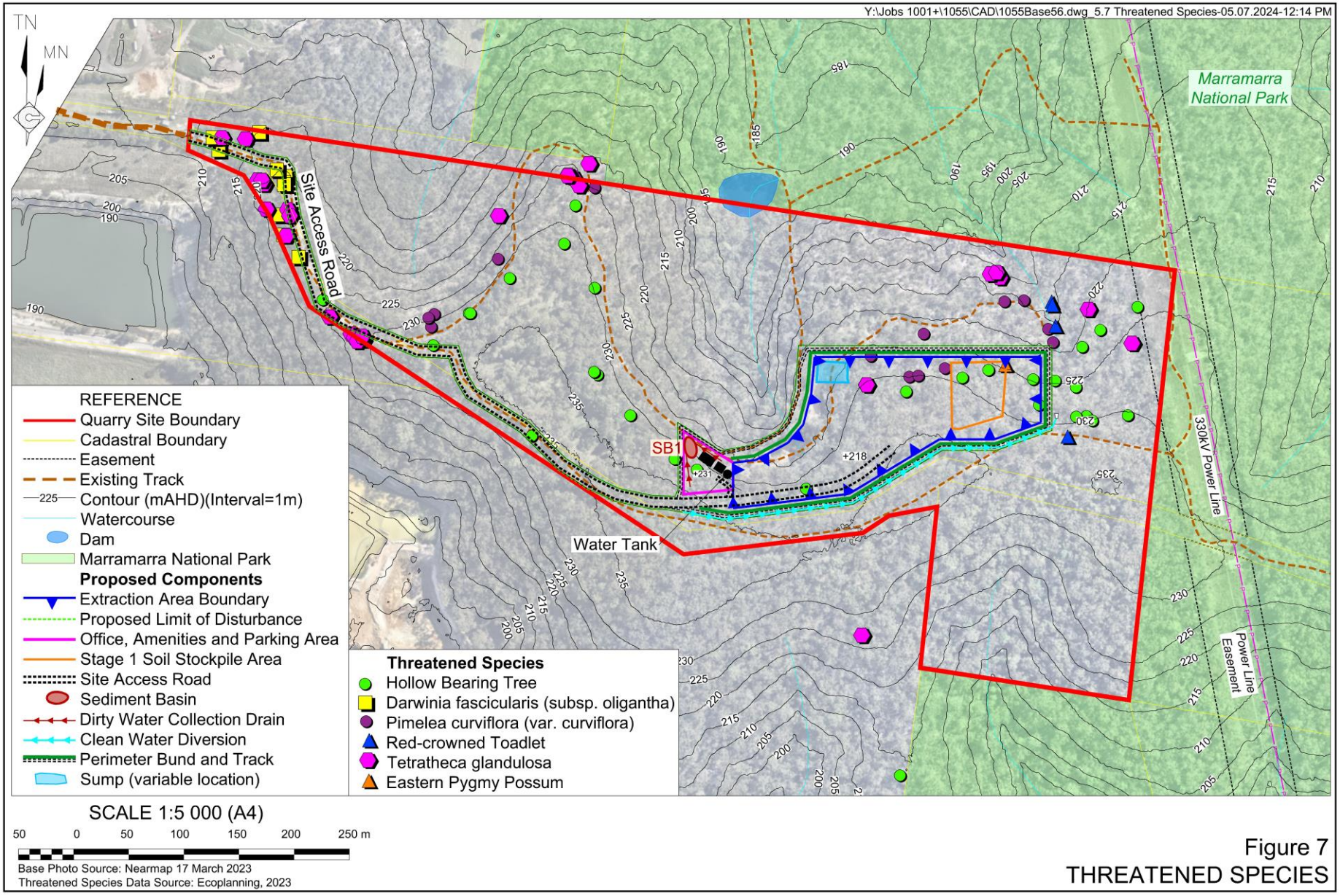


Figure 7
THREATENED SPECIES

2.2.2 Vegetation Conditions

Five vegetation integrity survey plots were completed in the Quarry Site. **Table 2** presents the vegetation types that would be removed during Quarry operations, their Vegetation Integrity Score, and their respective areas. If an area has a Vegetation Integrity Score of more than 17, offsetting of any disturbance is required.

Table 2
Vegetation Integrity Assessment

PCT	Condition	Area to be Cleared (ha)[1]	Number BAM Plots Completed	Vegetation Integrity Score
3586	Moderate	0.08	1	35.9
3616	Moderate	1.42	2	47.8
3622	Moderate	2.26	2	53.5
Note 1: Subject to rounding errors.				
Source: Ecoplanning (2023) – Modified after Table 3.8				

Few weeds were identified within the Quarry Site during field surveys, with a generally sparse distribution across each identified PCT. An infestation of *Andropogon virginicus* (Whiskey Grass) was identified within an area of historic disturbance, however, this was the only high-threat weed recorded within the Quarry Site. It is noted that the entirety of the infested area is within the proposed limit of disturbance and would be cleared during progressive development of the Extraction Area.

2.2.3 Watercourses and Riparian Zones

The Quarry Site is located within the Hawkesbury River Catchment with the Hawkesbury River located approximately 2.4km east-northeast of the Quarry Site at its closest point. Three first order watercourses drain northwards from within the Quarry Site towards Dalgetys Creek. One historic dam is located at the northern extent of the Quarry Site, with the embankment located within the adjoining Marramarra National Park (**Figure 5**).

Two small former extraction areas are present within the Extraction Area, both of which are internally draining with no surface water discharged to the surrounding environment (**Figure 2**). Similarly, the Proposal would be internally draining and would not discharge water into the surrounding environment.

2.2.4 Soils and Geology

2.2.4.1 Geology

The geology of the Maroota area is described by Etheridge (1980), Hopkins and Ross (1996), Russell (2001) and Lawson and Webb (2018). In summary, the principal units of economic interest in the Maroota area include the Triassic-aged Hawkesbury Sandstone which is unconformably overlain by the Tertiary-aged Maroota Tertiary Sand.

The Hawkesbury Sandstone is a generally massive, cross-bedded, relatively homogeneous quartz arenite with a tightly cemented fine to coarse-grained matrix. In the vicinity of Maroota, the unit is 150m to 200m thick. The upper sections of the Hawkesbury Sandstone in places are friable and capable of being extracted using free-dig techniques and being broken down into the constituent sand grains. Within the Maroota area, sandstone outcrop exhibiting well developed, steeply dipping jointing are commonly extracted to produce flagging stone.

The Tertiary Sand is an unconsolidated to partly consolidated, poorly sorted, fine to coarse grained fluvial sand with local clay and gravel lenses. The Tertiary Sand may be up to 50m thick in places with clay lenses up to 13m thick (**Figure 8**).

2.2.4.2 Soils

The Quarry Site comprises the following Mitchell Landscapes.

- Maroota Sands
- Hornsby Plateau

The soils of the Maroota Sands are represented by fluvial quartz sands with minor gravel and white clay along ridgelines associated with the Hawkesbury Sandstone, possessing well developed podsol profiles with limited yellow to grey texture-contrast profiles (Department of Environment and Climate Change, 2002). Within the Quarry Site, the Maroota Sands landscape is coincident with a minor area on the western boundary, adjacent to the Site Access Road.

Australian Soil Classification

The Quarry Site contains Rudosols and Tenosols as defined by the Australian Soil Classification. These soil types are generally shallow, typically formed from materials that are quartz rich and low in clay. Rudosols and Tenosols have very low agricultural potential due to their low chemical fertility, poor structure and low water-holding capacity.

Land and Soil Capability

The Quarry Site comprises approximately 23.33ha of land with approximately 0.28ha of land classified as having a Land and Soil Capability (LSC) of Class 98 (not assessed) and the remainder of the Quarry Site land classified as having a LSC of Class 6. Class 98 (not assessed) land is generally associated with historical excavations or extraction areas. Class 6 is land is considered to have very high limitations, with land uses restricted to low impact activities such as low intensity grazing, forestry and nature conservation. Careful management of limitations is required for cropping and grazing to avoid land and environmental degradation. **Figure 9** shows the land and soil capability within and immediately surrounding the Quarry Site.

2.2.5 Management Zones

Each PCT identified within the Quarry Site was assessed against the criteria for high, moderate and poor resilience presented in Table 1 of the Guideline. **Table 3** presents an assessment of each PCT identified within the Quarry Site against these criteria.

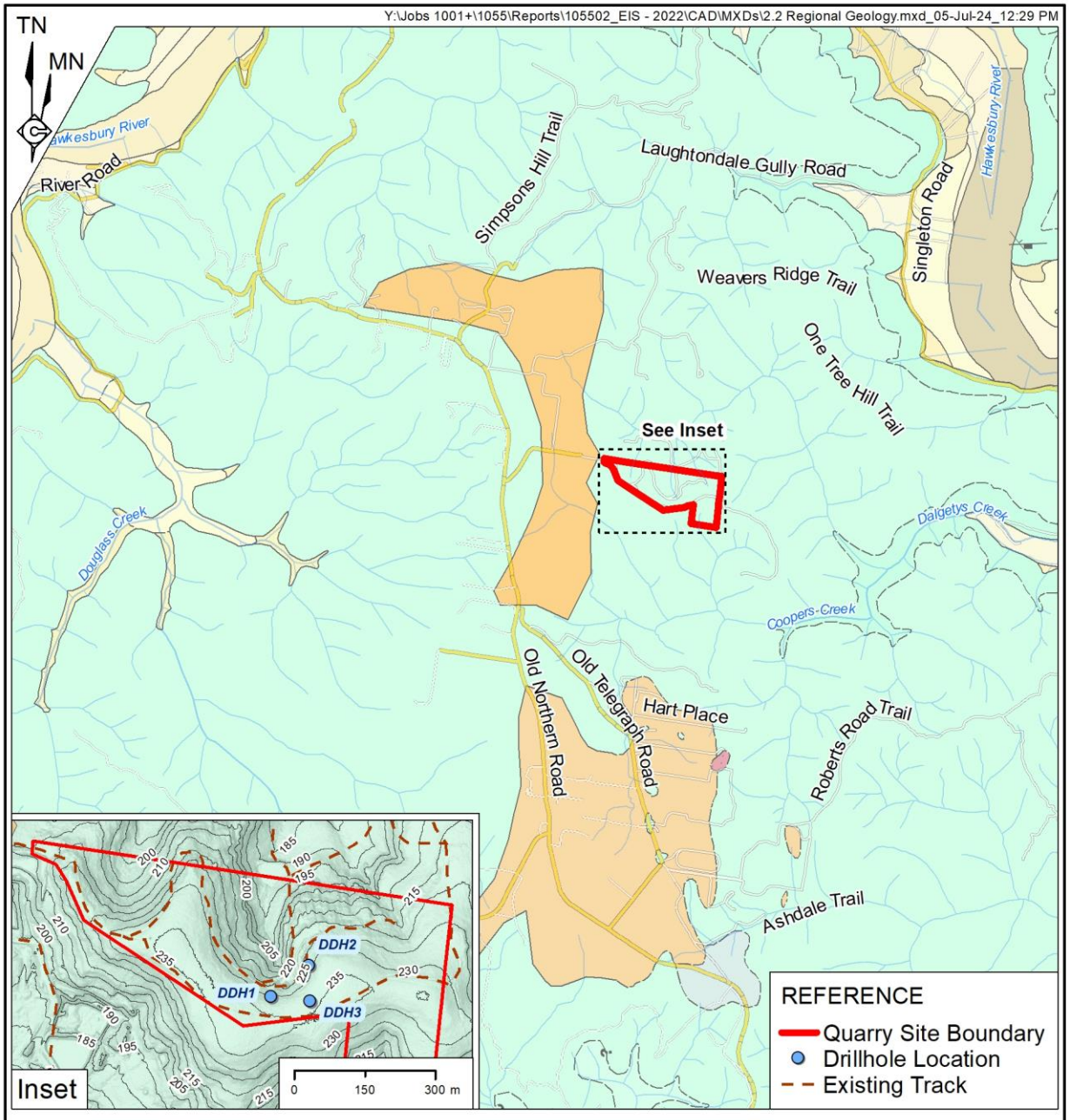


Figure 8
REGIONAL GEOLOGY

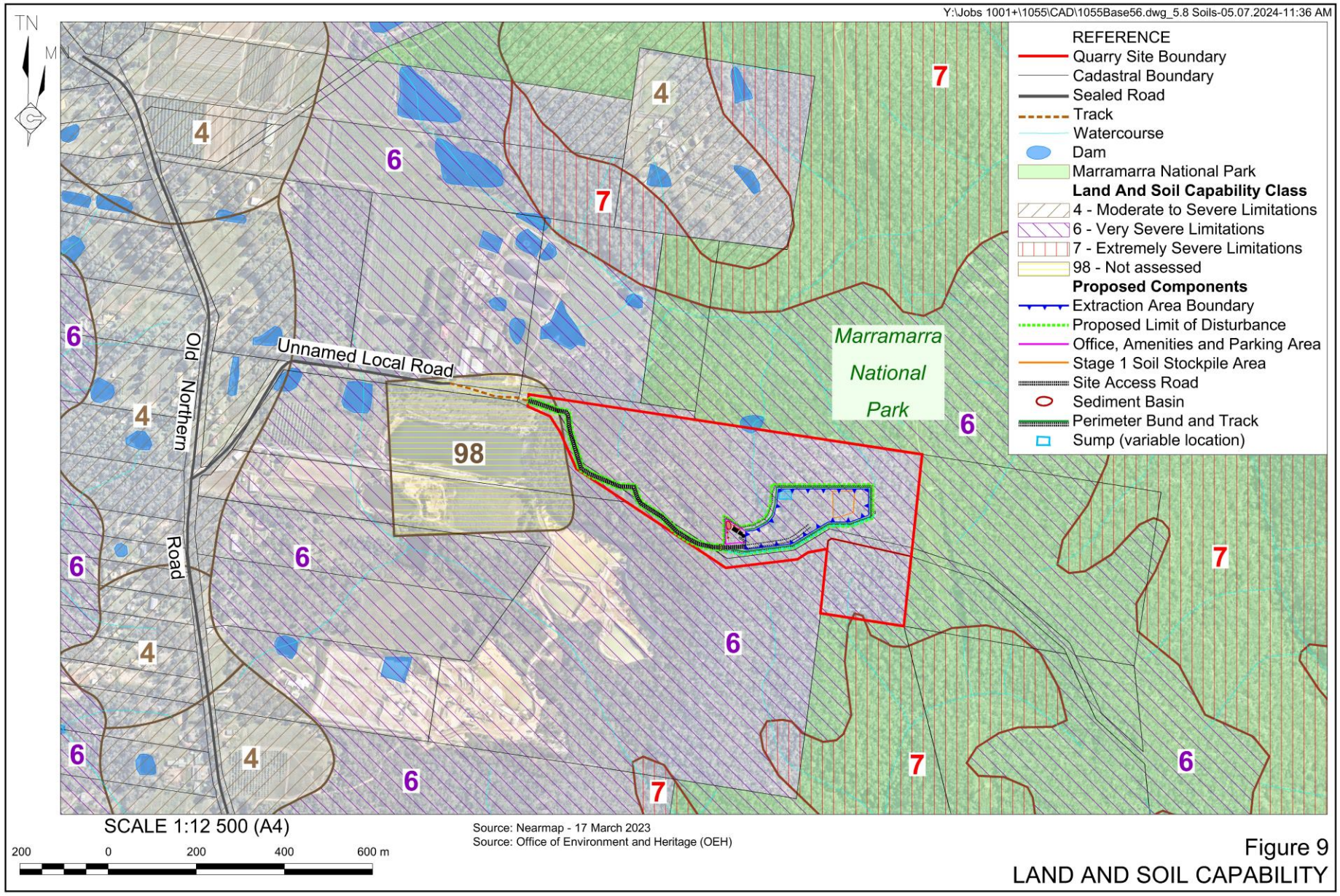


Figure 9
LAND AND SOIL CAPABILITY

Table 3
Resilience Assessment

PCT	Resilience Level Characteristics					
	Weeds	**Canopy Vegetation**	**Mid-Stratum Vegetation**	**Groundcover Vegetation**	**Diverse Native Flora**	**Undisturbed / Unmodified Soils**
3586	Few weeds were identified within the Quarry Site, with a generally sparse distribution across each identified PCT. An infestation of Whiskey Grass is present within an area of historic disturbance, however, the entirety of this area is located within the proposed limit of disturbance and would be cleared during progressive development of the Extraction Area.	Canopy coverage is sparse, but *Eucalyptus haemastoma* (Scribbly Gum) is the dominant tree with a subcanopy of *Angophora hispida* (Dwarf Apple), which are both typical of PCT 3586. The scarceness of canopy coverage is consistent with the attributes of PCT 3586.	The mid-stratum is dense, with thickets of Banksia species and *Petrophile pulchella* (Conesticks), as well as other shrubs species such as *Grevillea buxifolia* (Grey Spider Flower), *Lambertia formosa* (Mountain Devil), *Epacris pulchella* (Wallum Heath) and *Hakea sericea* (Needlebush). All identified shrubs are typical of PCT 3586.	Groundcover layer species present within the Quarry Site include *Lepyrodia scariosa*, *Cyathochaeta diandra* and *Lomandra filiformis* (Wattle Mat-rush), all of which are typical of PCT 3586.	Various species of native flora are present within areas of PCT 3686 over the Quarry Site, however the composition is not classified as diverse.	The soils across a small section of PCT 3586 within the western edge of the Quarry Site are classified as Disturbed Terrain soil landscape according to the DPIE Soil Landscapes of Central and Eastern NSW Mapping. The remainder of soils underlying PCT 3586 are understood to be undisturbed and/or unmodified.
3616		*Eucalyptus punctata* (Grey Gum) is the dominant tree species, with *Syncarpia glomulifera* (Turpentine), and *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) also present. All identified species are typical of PCT 3616.	The mid-stratum coverage is sparse and includes *Persoonia linearis* (Narrow-leaved Geebung), *Exocarpos strictus* (Dwarf Cherry), and *Dodonaea triquetra* (Large-leaf Hop-bush). The species and their sparseness are typical of PCT 3616.	The groundcover layer has good coverage, with species present including *Entolasia stricta* (Wiry Panic), *Themeda triandra* (Kangaroo Grass), *Imperata cylindrica* (Blady Grass) and *Microlaena stipoides* (Weeping Grass). The species are all typical of PCT 3616, with the exception of native grass *Imperata cylindrica*.	The vegetation composition of the groundcover layer is considered to be diverse.	The soils in PCT 3616 are understood to be undisturbed and/or unmodified according to the DPIE Soil Landscapes of Central and Eastern NSW Mapping.
3622		The canopy layer is co-dominated by *Corymbia eximia* (Yellow Bloodwood) and *Corymbia gummifera* (Red Bloodwood) and includes *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus haemastoma* (Scribbly Gum). The species are all typical of PCT 3622.	The mid-stratum layer comprises *Phyllanthus hirtellus* (Thyme Spurge), *Persoonia linearis* (Narrow-leaved Geebung), *Persoonia levis* (Broad-leaved Geebung), *Platysace linearifolia*, *Monotoca scoparia*, *Acacia linifolia* (White Wattle), *Grevillea buxifolia* (Grey Spider Flower), *Lambertia formosa* (Mountain Devil) and others.	The ground layer, where not interrupted by sandstone outcrops, is dominated by *Entolasia stricta* (Wiry Panic), with good coverage of *Austrostipa pubescens* and *Themeda triandra*.	The vegetation composition of the mid-stratum layer is considered to be very diverse.	The soils in PCT 3622 are understood to undisturbed and/or unmodified according to the DPIE Soil Landscapes of Central and Eastern NSW Mapping.

Table 3 (Cont'd)
Resilience Assessment

PCT	Resilience Level Characteristics					
	Weeds	**Canopy Vegetation**	**Mid-Stratum Vegetation**	**Groundcover Vegetation**	**Diverse Native Flora**	**Undisturbed / Unmodified Soils**
3621		The canopy layer is dominated by *Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine).	The mid-stratum was not assessed in the BDAR as it would not be impacted under the Proposal.	The ground layer was not assessed in the BDAR as it would not be impacted under the Proposal.	The diversity of plants in PCT 3621 was not assessed in the BDAR as it would not be impacted under the Proposal.	The soils in PCT 3621 are understood to be undisturbed and/or unmodified according to the DPIE Soil Landscapes of Central and Eastern NSW Mapping.

Source: Ecoplanning (2023) – Compiled from Section 3

Based on **Table 3** and the outcomes of Ecoplanning (2023), the entire Quarry Site has been categorised as **moderate resilience bushland**. In accordance with the Guideline, remnant vegetation across the Quarry Site aligns with the following criteria:

- moderate weed densities, mainly in the mid stratum and ground layer;
- the canopy, mid stratum and groundcover layer are present or typical for the PCT but may have minor levels of modification due to weeds, clearing, grazing etc;
- a diverse assemblage of native flora species though in some areas weeds may dominate; and
- original natural soils persist but may be slightly disturbed or modified.

Based on the outcomes of the resilience assessment presented in **Table 3**, the Quarry Site has been divided into two Management Zones as follows. **Figure 10** presents spatial distribution of both Management Zones.

- Zone 1 – Moderate Resilience Bushland (to be retained)
- Zone 2 – Moderate Resilience Bushland (to be disturbed)

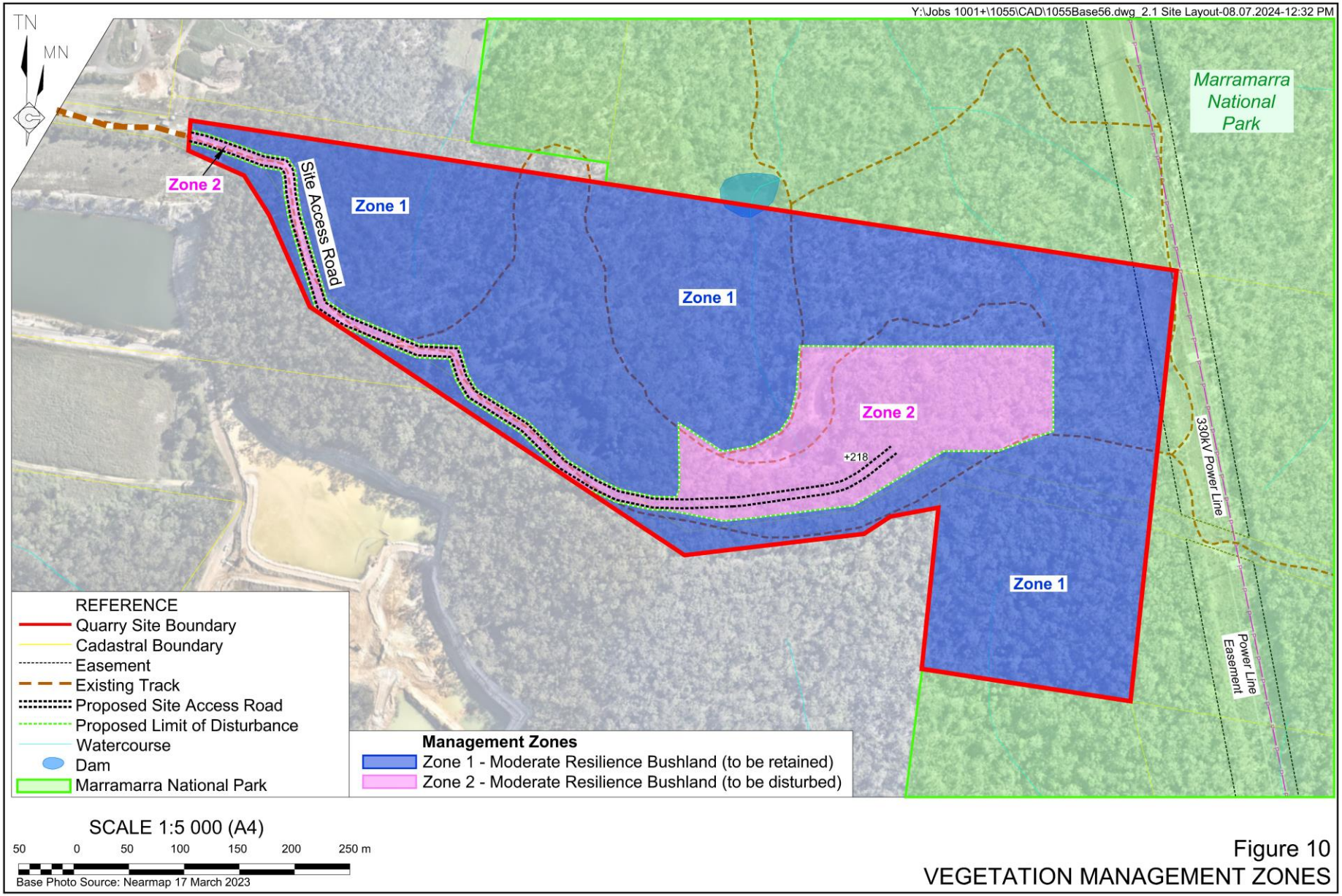


Figure 10
VEGETATION MANAGEMENT ZONES

3. Management Issues

Table 4 presents the management issues that would likely affect the Quarry Site, as well as the objectives, actions and performance criteria that would be implemented to rectify the issues. The management issues are assigned to either Zone 1 or Zone 2 as relevant (refer Section 2.2.6 and **Figure 10**).

Table 4
Management Issues and Actions

Management Issues	Objective	Actions	Performance Criteria
Zone 1 – Moderate Resilience Bushland (to be retained)			
Bushland degradation due to weed infestation.	To implement a weed management program.	Undertake regular visual inspections to identify any infestations. Engage a suitably qualified person to prepare and implement the weed removal program on an as-needed basis.	No further active weed control required.
Decreased water quality due to runoff into watercourses.	To ensure that the Quarry is internally draining.	Construct sump, sediment basin, dirty water diversion drains and clean water diversion bund. Undertake visual inspections of structures to ensure stability and sediment storage capacity is maintained after any significant rainfall event.	Surface water infrastructure is operating as expected and Quarry is internally draining.
Loss of hollow-bearing trees.	To ensure hollow-bearing trees are not disturbed.	Identify and retain all hollow-bearing trees beyond the proposed limit of disturbance.	Hollow-bearing trees recorded in Ecoplanning (2023) beyond the proposed limit of disturbance are still present at decommissioning.
Zone 2 – Moderate Resilience Bushland (to be disturbed)			
Clearing of 3.77ha of native vegetation.	To offset the impacts of vegetation clearing.	Determine preferred pathway for offsetting species and ecosystem credits in accordance with the Biodiversity Offset Scheme (e.g. a Biodiversity Stewardship Agreement, purchasing through the Biodiversity Conservation Fund or purchasing on the open market). Make the required contributions.	All impacts have been offset through the Biodiversity Offset Scheme.
Presence of endangered flora in proximity to areas of proposed disturbance.	To protect individuals of Darwinia fascicularis adjacent to the Site Access Road.	Suitably qualified ecologist involved during clearing processes, with follow-up reporting as required. Construct and maintain a barrier around individuals of Darwinia fascicularis adjacent to the Site Access Road to ensure species are not impacted by use and maintenance of the Site Access Road.	Individuals of Darwinia fascicularis adjacent to the Site Access Road are not impacted by Quarry operations.
Bushland degradation due to weed infestation.	To ensure the infestation of Andropogon virginicus within the proposed Extraction Area is managed prior to disturbance of this area.	Engage a suitably qualified person to remove all Andropogon virginicus from the proposed Extraction Area prior to commencement. Opportunistically monitor for Andropogon virginicus and implement further management if the infestation persists.	There is no presence of Andropogon virginicus within Zone 2.

Table 4 (Cont'd)
Management Issues and Actions

Management Issues	Objective	Actions	Performance Criteria
Zone 2 – Moderate Resilience Bushland (to be disturbed) (Cont'd)			
Disturbed bushland needs to be revegetated.	To ensure that cleared bushland is progressively rehabilitated throughout the life of the Proposal.	Remove plant and all associated infrastructure from areas to be rehabilitated. Progressively backfill batters where necessary to achieve a 1:4 slope (V:H) or less and backfill the Extraction Area floor to an elevation of 223m AHD. Areas of disturbance ripped and then covered with soil and mulch where available. Engage a suitably qualified bush regeneration contractor to undertake seeding and/or planting. Report on revegetation in Annual Progress Report to Council.	Annual Progress Reports. Zone 2 is successfully revegetated.
Loss of hollow-bearing trees.	To ensure suitable precautions are taken prior to removal of hollow-bearing trees.	Engage a suitably qualified ecologist to develop a clearing procedure prior to any vegetation clearing. Ensure the procedure aligns with the recommendations presented in Ecoplanning (2023). Where appropriate, hollow-bearing segments would be selected and relocated sensitively under guidance of the ecologist.	Suitably qualified ecologist involved during clearing processes, with follow-up reporting as required. Appropriate hollow-bearing segments have been successfully relocated.
Final landform must be free draining.	To ensure the Quarry Site is free draining after rehabilitation.	Following cessation of operations, removal of the perimeter safety bund from the northern and western edges of the Extraction Area.	Quarry Site is free draining post rehabilitation.
Topsoil quality reduced due to inappropriate management.	To implement topsoil management for a future growth medium source.	Clearly mark areas for soil stripping and stockpiling. Strip soil from areas of disturbance and store in stockpiles no more than 2m high oriented parallel to the contours, with side slopes of 1:3 (V:H) or less. Ensure that stockpile surfaces are rough in a micro-scale to assist in seed retention and germination, and then spread seed over stockpiles. Signpost soil stockpiles and limit operation of machinery on stockpiles.	Testing of topsoil quality finds it is suitable for seeding and revegetation prior to commencement of rehabilitation.

4. Restoration Methods

The following subsections present the proposed restoration, management and rehabilitation methods that would be implemented throughout the Proposal.

4.1 Preliminary Activities

The following management measures would be implemented during the Site Establishment phase of the Proposal.

- Prepare a comprehensive *Environmental Management Plan* for the ongoing management of the relevant environmental issues at the Quarry, including separate sections relating to vegetation clearing, biodiversity and rehabilitation management.
- Ensure areas of proposed disturbance would be clearly marked prior to the commencement of clearing campaigns to minimise the potential for over-clearing of vegetation.
- The following procedures would be adopted to guide the clearing of all mature trees and any hollow-bearing trees.
  - Where necessary, a qualified or suitably experienced spotter-catcher would be engaged to undertake an initial assessment of the area to be cleared for threatened species.
  - All trees would be checked for the presence of nesting or roosting fauna before felling or pushing.
  - Clearing activities would cease if threatened fauna species are detected until after individuals have dispersed.
  - Felled mature trees would be relocated to defined storage areas within the Quarry Site or mulched to enhance habitat.
- Undertake pre-clearance surveys under the supervision of a suitably qualified ecologist prior to disturbance of areas where individuals of *Darwinia fascicularis* are present.
- Construct a barrier around individuals of *Darwinia fascicularis* adjacent to the Site Access Road to ensure species are not impacted by use and maintenance of the Site Access Road.
- Offset the species and ecosystem credits required for the Proposal in accordance with the Biodiversity Offset Scheme prior to commencement.

4.2 Weed Control

The following measures would be implemented to control existing and future potential weed infestations.

- Weed control programs would be prepared and implemented by a suitably qualified person periodically to manage invasive species.

- The infestation of *Andropogon virginicus* within the Quarry Site would be initially managed during extraction. If the weed persists, it would continue to be managed in the weed control programs.
- All mobile plant and vehicles would be cleaned of soil and weeds before entry to the Quarry Site.

4.3 Corridors

The area of operational disturbance under the Proposal would be approximately 4.13ha, resulting in the disturbance of approximately 3.77ha of remnant native vegetation. The Quarry Site has a total area of approximately 23.33ha, meaning the Proposal would disturb approximately 17% of the entire Quarry Site area. As such, 83% of the Quarry Site would remain undisturbed, the majority of which comprises remnant native vegetation.

Retaining native vegetation within the Project Site beyond the proposed limit of disturbance would allow vegetation corridors to continue linking the surrounding areas, in particular, the areas of Marramarra National Park adjoining the Quarry Site.

4.4 Revegetation Works

Detailed rehabilitation methodologies, including proposed methods for revegetation, are presented in Section 5.

Species selection for revegetation would include only native species listed as occurring within the PCTs which were mapped across the Quarry Site as part of Ecoplanning (2023). The proposed planting density is as follows:

- One tree per 40m^2
- One shrub per 10m^2
- Up to 4 groundcovers per 1m^2

4.5 Asset Protection Zones

In accordance with Sections 8.3.5 and 8.3.6 of *Planning for Bushfire Protection* (RFS, 2019), a minimum Asset Protection Zone (APZ) of 10m would be maintained between any structures within the Office, Amenities and Parking Area and surrounding vegetation. The APZ would not require additional disturbance of vegetation as it would be contained entirely within the Office, Amenities and Parking Area boundary.

The APZ would be maintained throughout the life of the Quarry to a standard such that the Office, Amenities and Parking Area is considered a safe working environment in which efforts can be undertaken to defend any structures before, during and after the passage of bush fire.

4.6 Buffer Zones

The area that would require clearing has been minimised as much as feasible through the design process. However, given the nature of the Proposal, a total of 3.77ha of native vegetation within the proposed limit of disturbance would be disturbed throughout the life of the Proposal. As such, establishment of buffer zones within this area is not feasible or practicable.

Notwithstanding, indirect impacts to remnant native vegetation within the remainder of the Quarry Site that would be retained under the Proposal would be as follows.

- A barrier would be constructed around individuals of *Darwinia fascicularis* adjacent to the Site Access Road to ensure species are not impacted by use and maintenance of the Site Access Road.
- Areas of proposed disturbance would be clearly marked prior to the commencement of clearing campaigns to minimise the potential for over clearing of vegetation.
- Vegetation would be removed in a manner that avoids damage to surrounding vegetation.
- All personnel and contractors would be inducted and made aware that unauthorised clearing of native vegetation may have legislative consequences.

4.7 Soil Stabilisation and Management

Up to approximately 0.3m of topsoil, where present, would be removed with a focus on the recovery of seed-bearing material. The soil recovered would be placed initially within the designated Stage 1 Soil Stockpile Area (refer **Figure 2**). The following management measures would be implemented with the objective of appropriately storing topsoil until later use in rehabilitation.

- Clearly mark areas designated for soil stripping and stockpiling.
- Refrain from stripping or placing soil during wet conditions.
- Strip soil from all areas of disturbance and place directly within designated rehabilitation areas or store in stockpiles no more than 2m high oriented parallel to the contours.
- Ensure that soil stockpiles are constructed with side slopes of 1:3 (V:H) or less.
- Ensure that the soil stockpile surfaces have a surface that is as ‘rough’ as possible, in a micro-scale, to assist in surface water runoff control and seed retention and germination.
- Spread seed of a suitable cover crop on all soil stockpiles to facilitate revegetation.
- Signpost soil stockpiles and limit operation of machinery on stockpiles to minimise compaction and further degradation of soil structure.

4.8 Stream and Watercourse Management

Watercourses within the Quarry Site are ephemeral and the Extraction Area would be internally draining, therefore minimal management would be required.

Notwithstanding, a clean water diversion drain would be installed along the southern boundary of the Extraction Area to prevent clean water from encroaching on the Quarry, diverting clean runoff to adjacent areas of undisturbed vegetation and watercourses.

4.9 Stormwater and Runoff Management

As discussed in Section 4.8, the Quarry would be internally draining, and no sediment laden discharge would leave the Quarry Site. The following surface water infrastructure would be installed and maintained to manage risks of sediment laden runoff.

- Extraction Area Sump – The Extraction Area would be internally draining with all runoff reporting to the sump. Sediment laden runoff during Site Establishment and initial extraction operations would be managed though the installation of silt-stop fencing during development, as required. The perimeter safety bund would convey sediment-laden runoff from within this area to the sump.
- Sediment Basin – A sediment basin (SB1) would be constructed within the northwestern section of the Office, Amenities and Parking Area to collect and manage sediment-laden runoff from within this area. The sediment basin would be maintained such that it would continue to meet capacity requirements. This would involve excavation of sediment when this exceeds the identified sediment storage zone and stabilisation of drainage and sediment basin walls.
- Dirty Water Collection Drains – Dirty water collection drains would be constructed to convey sediment-laden runoff from areas of operational disturbance within the Office, Amenities and Parking Area to SB1. These drains would be constructed along the northern and western boundaries of the Office, Amenities and Parking Area to prevent sediment-laden runoff entering undisturbed areas.
- Clean Water Diversion – A clean water diversion would be constructed around the southern perimeter of the Extraction Area.

4.10 Maintenance Activities

Maintenance of rehabilitation and revegetation would be continuous throughout the full 30-year project life. Maintenance activities would also be responsive to the monitoring and review process discussed in Section 4.11. Maintenance activities may include, but are not limited to, the following.

- Earthworks or stabilisation measures to repair erosion.
- Stabilisation and reseeding of the perimeter safety bund.
- Implementation of weed and pest control measures.

- Application of fertilisers and/or mulches.
- Application of gypsum or lime to control pH and improve soil structure.

4.11 Monitoring and Review Process

The process for monitoring of the revegetation and rehabilitation of the Quarry Site would include the following.

- Regular visual inspections of general landform, vegetation cover, and infrastructure components as part of ongoing site monitoring and maintenance. Results from regular site monitoring inspections would be used to identify and action key management and maintenance activities, including the potential for increased monitoring frequency and/or scope.
- Annual photographic monitoring of revegetation works to record progress over time and identify issues or areas for improvement.
- Regular monitoring for pest and weed species presence/abundance.
- Preparation of an Annual Progress Report to be provided to Council.

The monitoring program would be designed with flexibility to incorporate updates based on results.

4.12 Schedule of Works

Table 5 presents an indicative schedule of works for revegetation and rehabilitation activities. The schedule of works is divided into the rehabilitation phases of:

- Operations;
- Decommissioning;
- Landform Establishment;
- Growth Medium Development;
- Ecosystem and Land Use Establishment; and
- Ecosystem and Land Use Development.

Basing the schedule of works off these phases allows the schedule to reflect the non-linear nature of rehabilitation work and the 30-year life of the Quarry and subsequent rehabilitation. It is noted that the schedule of works is indicative and would be updated as required based on monitoring and the progression of extraction operations.

Table 5
Indicative Schedule of Works

Management Zone	Actions from Table 4	Sequencing and Timing of Actions							Responsibility
		Site Establishment	Operations	Decommissioning	Landform Establishment	Growth Medium Development	Ecosystem and Land Use Establishment	Ecosystem and Land Use Development	
Zone 1	**Weed Management Program**								
	Undertake a visual inspection to identify any infestations.								Applicant
	Engage a suitably qualified person to prepare and implement the weed removal program on an as-needed basis.								Applicant and Bush Regeneration Contractor
Zone 2	**Weed Management Program**								
	Engage a suitably qualified person to remove all *Andropogon virginicus* from the proposed Extraction Area prior to disturbance in this area.								Applicant and Bush Regeneration Contractor
	Opportunistically monitor for *Andropogon virginicus* and implement further management if the infestation persists.								Applicant
	Progressive Rehabilitation								
	Remove plant and all associated infrastructure from areas to be rehabilitated.								Applicant
	Progressively backfill batters where necessary to achieve a 1:4 (V:H) slope or less and backfill the extraction area floor to an elevation of 223m AHD.								Applicant
	Rip areas of disturbance and then cover with soil and mulch where available.								Applicant

Table 5 (Cont'd)
Indicative Schedule of Works

Management Zone	Actions from Table 4	Sequencing and Timing of Actions							Responsibility
		Site Establishment	Operations	Decommissioning	Landform Establishment	Growth Medium Development	Ecosystem and Land Use Establishment	Ecosystem and Land Use Development	
Zone 2 (Cont'd)	**Progressive Rehabilitation (Cont'd)**								
	Engage a suitably qualified bush regeneration contractor to undertake seeding and/or planting.								Bush Regeneration Contractor
	Report on revegetation in Annual Progress Report to Council.								Applicant
	Ensure suitable precautions are taken prior to removal of hollow-bearing trees								Applicant
	Growth Medium Management								
	Clearly mark areas for soil stripping and stockpiling								Applicant
	Strip soil from areas of disturbance and store in stockpiles no more than 2m high oriented parallel to the contours, with side slopes of 1:3 (V:H) or less.								Applicant
	Ensure that stockpile surfaces are rough in a micro-scale to assist in seed retention and germination, and then spread seed over stockpiles.								Applicant
	Signpost soil stockpiles and limit operation of machinery on stockpiles.								Applicant

5. Rehabilitation Plan

5.1 Introduction

The following subsections detail the intended methods for rehabilitation of the Quarry Site in accordance with Section 2.5.9 of the *Hornsby Development Control Plan*. Rehabilitation would be focused on areas classed as Zone 2 (i.e. moderate resilience bushland that would be disturbed as part of the Proposal).

5.2 Future Land Use

Following cessation of extraction operations, the Quarry Site would be rehabilitated to achieve a final land use of native ecosystem. It is intended that the Quarry Site would be retained principally for biodiversity conservation purposes.

It is noted that preferences for final land use can change over time, and it is therefore acknowledged that as the Quarry approaches closure the final land use would be re-visited in consultation with Council.

5.3 Final Landform

Figure 11 displays the indicative final landform for the Quarry.

In summary, the Extraction Area floor would be backfilled to an elevation of 223m AHD and the Perimeter Safety Bund would be removed along the northern and western boundaries of the Extraction Area to ensure that the area is free draining. The Office, Amenities and Parking Area would be backfilled and shaped to ensure slopes are generally consistent with the pre-disturbance landform within this area.

The methodologies described in Section 5.4 would be implemented to achieve the indicative final landform.

5.4 Rehabilitation Implementation

5.4.1 Introduction

Emphasis will be placed on progressive rehabilitation of completed areas within the Quarry Site, including those areas previously disturbed and no longer required.

It is anticipated that rehabilitation would be undertaken in accordance with the indicative schedule of works presented in Section 4.12. However, “out of sequence” rehabilitation activities would be undertaken in accordance with the methodologies detailed in the subsection for the relevant rehabilitation phase. For example, placement of topsoil and/or overburden on terminal extraction benches during the operations phase would be undertaken in accordance with the methodologies described in Section 5.4.4.

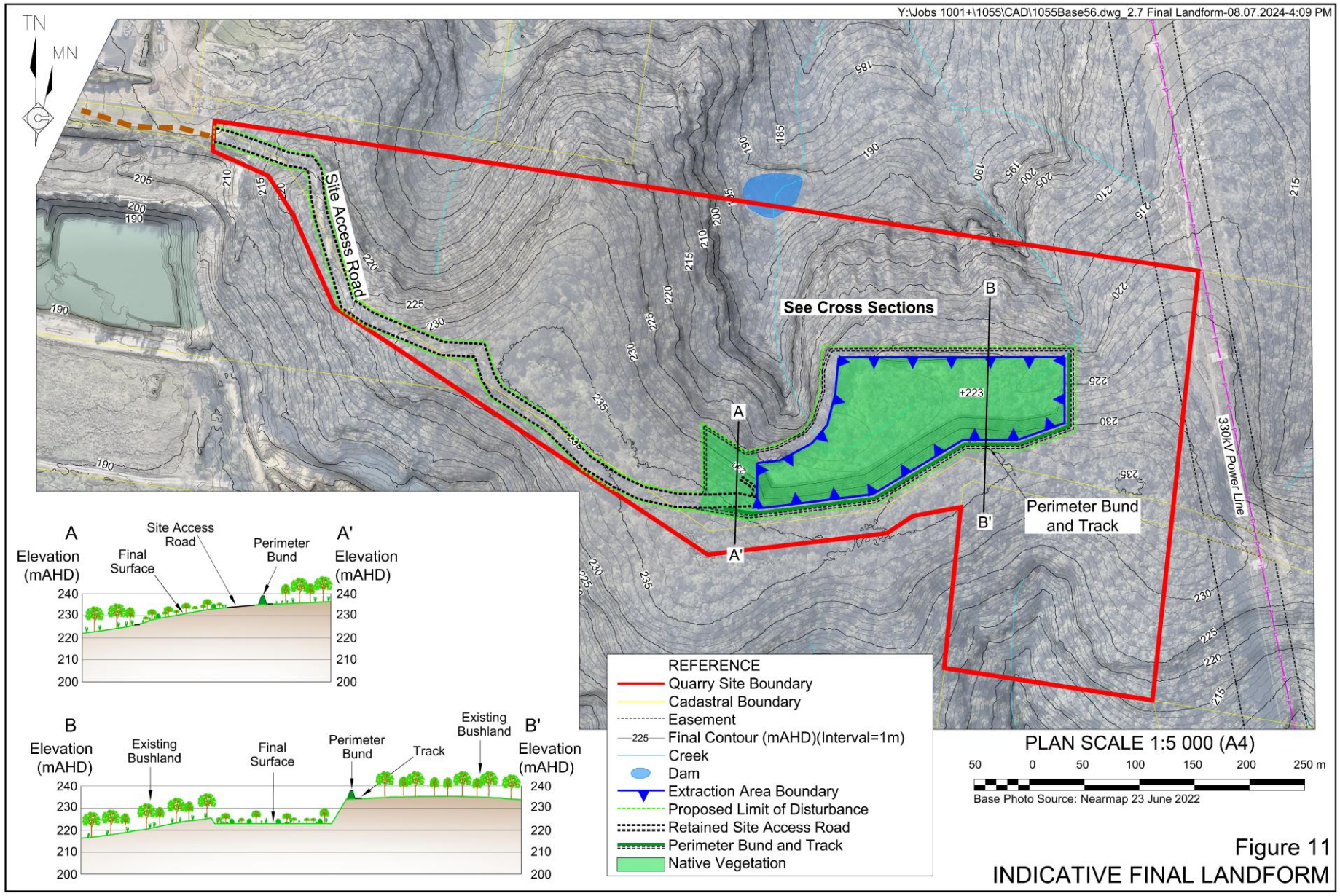


Figure 11
INDICATIVE FINAL LANDFORM

5.4.2 Operations

Areas of disturbance requiring soil stripping would be clearly defined following vegetation clearing (using marker pegs/posts if necessary). The soil recovered would be placed initially within the designated Stage 1 Soil Stockpile Area. Soil and select vegetation removed during subsequent clearing campaigns (i.e. Stage 2) would preferentially be placed directly on areas requiring rehabilitation to minimise double handling and maximise efficiencies, or alternatively, be stockpiled within completed sections of the Extraction Area for later use in rehabilitation. The topsoil stockpiles would be no higher than 2m, and with slopes no greater than 1:3 (V:H) with a slightly roughened surface to minimise erosion.

Wherever possible, no soil would be removed in wet conditions to avoid breakdown of the soil structure. Topsoil would be stripped to an average depth of approximately 30cm in all areas of disturbance, where present. Stripping would generally be undertaken using an excavator.

Appropriate sedimentation controls, including sediment fencing, would be placed immediately down slope of any soil stockpiles and maintained until such time as a stable vegetation cover over the stockpile is achieved. Any soil stockpile likely to be retained for more than 3 months and that has not naturally established vegetation cover would be stabilised using a non-persistent cover crop.

In the event that unacceptable weed generation is observed on the soil stockpiles, an appropriate weed eradication program would be implemented.

5.4.3 Decommissioning

Following the cessation of extraction, all infrastructure, including the demountable office, portable amenities and workshop, would be removed from the Quarry Site. It is proposed that the Site Access Road would be retained following the life of the Quarry to provide ongoing access for rehabilitation and maintenance activities and any subsequent land uses on the property. Unsealed internal tracks, ramps and safety bunds along the southern and eastern Extraction Area boundaries would be retained following the cessation of operations to provide for ongoing, safe access to the Extraction Area for rehabilitation and maintenance activities.

All demolition procedures and subsequent waste removal undertaken during the decommissioning phase of rehabilitation operations will comply with requirements as identified through consultation with Council and other relevant Government agencies, as required. As a minimum, the following controls will be implemented during demolition works at the Quarry Site.

- Areas will be continually damped down with water to suppress dust during decommissioning, with sediment laden water captured as appropriate.
- Works will be undertaken so as to minimise the generation of particulate matter.
- Works will not be undertaken during periods of high wind.
- Loads of waste material (i.e. scrap steel) removed from decommissioned site infrastructure will be covered prior to transportation.

All material and waste products generated from any demolition, decommissioning and/or removal operations will be collected and either disposed of within the Quarry Site where appropriate, removed immediately from the Quarry Site or stored in appropriate (i.e. disturbed) areas for removal by a licensed waste contractor as soon as practicable.

5.4.4 Landform Establishment

5.4.4.1 Final Landform Construction – General Requirements

As shown on **Figure 11**, the majority of the Quarry Site would be progressively rehabilitated to achieve the appearance of vegetated natural landforms in the surrounding area. Areas which would remain unvegetated, i.e. retained roads, would be consistent with the final land use for the Quarry Site. Furthermore, it is envisaged that the final landform would be safe, stable and internally draining to ensure there would be no impacts to downslope cultural or ecological values. Notwithstanding, should any changes to the final landform arise, any potential downslope impacts will be re-assessed.

5.4.4.2 Extraction Area

The Extraction Area will be progressively rehabilitated as extraction progresses and as such, rehabilitation of this area will invariably be linked to the sequence of extraction operations. Notwithstanding, rehabilitation activities undertaken within the Extraction Area to achieve the final landform consistent with that presented on **Figure 11** would be as follows.

- Imported VENM and/or stockpiled overburden would be utilised to backfill the Extraction Area floor to an elevation of 223m AHD.
- Imported VENM and stockpiled topsoil and/or overburden would be relocated into completed areas and shaped in accordance with the final landform. The shaped material would form an inward sloping final landform with final slopes of 1:2 (V:H) or less.
- 'Fine' grained VENM and/or overburden material will be preferentially placed at the surface so as to provide a layer of material that will better maintain moisture and facilitate establishment of vegetation.
- The Perimeter Safety Bund would be removed along the northern and western boundaries of the Extraction Area to ensure that the area is free draining.
- The surface of the final landform would be lightly scarified and soil material spread to a minimum of 50mm. In the event that adequate soil material is not available, soil conditioner / fertiliser and mulch (particles <16mm and thickness 20mm to max 40mm / 200m^3 to 400m^3 per ha) would be spread to create a growth medium (see Section 5.4.5).
- Vegetation material recovered from clearing activities would then be spread across the final landform (see Section 5.4.6).
- The area would then be seeded with native species consistent with those listed as occurring within the PCTs mapped across the Quarry Site (see Section 5.4.6).

5.4.4.3 Operational Disturbance Area

Rehabilitation activities undertaken within the remainder of the Quarry Site to achieve the final landform consistent with that presented on **Figure 11** would be as follows.

- Imported VENM and stockpiled topsoil and/or overburden would be emplaced within the Office, Amenities and Parking Area and shaped in accordance with the final landform. The shaped material would form slopes generally consistent with the pre-disturbance landform within this area and western adjoining undisturbed area.
- 'Fine' grained VENM and/or overburden material will be preferentially placed at the surface so as to provide a layer of material that will better maintain moisture and facilitate establishment of vegetation.
- The surface of the final landform would be lightly scarified and soil material spread to a minimum of 50mm. In the event that adequate soil material is not available, soil conditioner / fertiliser and mulch (particles <16mm and thickness 20mm to max 40mm / 200m^3 to 400m^3 per ha) would be spread to create a growth medium (see Section 5.4.5).
- Vegetation material recovered from clearing activities would then be spread across the final landform (see Section 5.4.6).
- The area would then be seeded with native species consistent with those listed as occurring within the PCTs mapped across the Quarry Site (see Section 5.4.6).

5.4.5 Growth Medium Development

Growth medium development activities would primarily involve placement of soil and/or fine-grained overburden material at the surface before being lightly scarified and spread to a minimum of 50mm. In the event that adequate soil material is not available, soil conditioner / fertiliser and mulch (particles <16mm and thickness 20mm to max 40mm / 200m^3 to 400m^3 per ha) would be spread to create a growth medium.

A water cart would be utilised to lightly wet growth medium material prior to spreading in order to minimise dust generation. In areas where there is an elevated risk of erosion, earthworks and revegetation via direct seeding or hydromulch would be applied to facilitate stabilisation and vegetation establishment. Areas which are not considered vulnerable to erosion would be sown using broadcast seeding methods or allowed to revegetate naturally from the stored seedbank and airborne seed. Growth medium spreading would not be undertaken during excessively wet or windy conditions.

Seasonal and local meteorological conditions would be monitored to identify conditions which may result in delaying vegetation establishment (e.g. extended drought conditions). Land preparation and growth medium spreading activities would only be undertaken where conditions are predicted to be favourable (i.e. average or above average annual rainfall) to the establishment of vegetation.

5.4.6 Ecosystem and Land Use Establishment

Vegetation establishment activities at the Quarry, including the application of hydromulch and broadcast seeding, would occur only where favourable climatic conditions are expected to occur. Consequently, prolonged drought periods may result in extended delays to rehabilitation activities including growth medium spreading and seeding.

Seeding of available areas would be completed using a combination of direct seeding, broadcast seeding and hydromulch application methods. The application of individual methods would depend partially upon the vulnerability of individual areas to erosion by wind and water.

Given suitable climatic conditions, rehabilitation earthworks would comprise the first stage of the process. The aim of these earthworks would be to control surface water runoff and also provide micro-scale niche environments where nutrients, water and seed can collect and increase the likelihood of germination and survival of emergent seedling. Contour ripping on flat and sloped ground would preferentially be employed to achieve these aims.

Revegetation would be undertaken following any earthworks and surface preparation works. Areas located adjacent to remnant vegetation which are generating seed on a routine basis (e.g. the western portion of the Office, Amenities and Parking Area) may not require the application of supplemental seed during rehabilitation operations. Larger disturbed areas would require direct seeding of local species following the completion of earthworks.

Seed material would be sourced where possible from local suppliers, nurseries and/or propagation specialists. Seed would also be sourced from commercial suppliers where the required volume of seed material or specific species are not available locally for rehabilitation works.

As outlined in Section 4.4, species selection for revegetation would include only native species listed as occurring within the PCTs mapped across the Quarry Site. The proposed planting density is as follows:

- One tree per 40m^2
- One shrub per 10m^2
- Up to 4 groundcovers per 1m^2

The proposed planting density has been determined by Ecoplanning with consideration of the PCTs mapped across the Quarry Site and site characteristics such as rainfall, elevation, topography and soil capability.

5.4.7 Ecosystem and Land Use Development

The management measures which would be implemented to monitor revegetation operations during the ecosystem and land use development phase of rehabilitation are described in Section 4.11.

Results from rehabilitation monitoring would be used to assess the progress of revegetated areas towards target values based on analogue sites for each of the established vegetation community types, i.e. areas of undisturbed native vegetation associated with the relevant PCT within the Quarry Site.

In the event rehabilitation monitoring identifies that revegetation has not been successful, additional management actions would be implemented as required. These additional management actions may include, but would not be limited to:

- growth medium amelioration (e.g. fertiliser or organic matter application);
- reseeding of areas with seed of target species where species assemblages are not consistent with those of analogue sites; and
- engaging a suitably qualified expert to provide recommendations to improve rehabilitation outcomes.

5.5 Erosion Control

Erosion and sedimentation risks during progressive rehabilitation activities undertaken throughout the operations phase would be managed and mitigated via the proposed closed water management system (see Section 4.9).

Erosion and off-site sedimentation risks during subsequent phases of rehabilitation would principally be managed via the installation and maintenance of silt-stop fencing downslope of rehabilitation areas, as required.

5.6 Weed Management

Weed management would primarily be handled by weed control programs that would be prepared and implemented by a suitably qualified person on an as-needed basis. Additionally, areas of progressive rehabilitation would be opportunistically monitored by site personnel for weed infestations which would be managed where present.

Several parameters associated with the presence of weeds and grazer impacts (if any) will be recorded as part of rehabilitation monitoring activities and included in the Annual Progress Report. At a minimum, this will include the following.

- An overview of any weed and pest management measures implemented at the Quarry Site during the 12-month reporting period.
- A list of weed species identified during rehabilitation monitoring and any other inspections completed at the Quarry Site.
- Details of any pests or evidence of grazer damage to revegetated areas identified during inspections, including a plan showing distribution within the Quarry Site, where appropriate.
- Recommendations for specific weed and pest management measures to be implemented during the subsequent 12-month period.

5.7 Final Drainage

Following completion of rehabilitation, the Quarry Site would be free draining. Removing the Perimeter Safety Bund along the northern and western boundaries of the Extraction Area and other surface water diversion structures would allow all clean water to drain passively and freely from the Quarry Site.

5.8 Responsibilities

The Applicant would be responsible for implementing rehabilitation activities throughout the life of the Proposal.

6. References

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Appendix 11

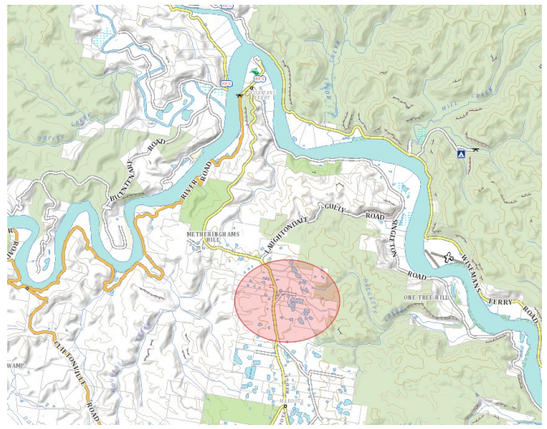
Preliminary Site Access Road Civil Plans

prepared by
Duncan Priestley Civil Engineering Pty Ltd

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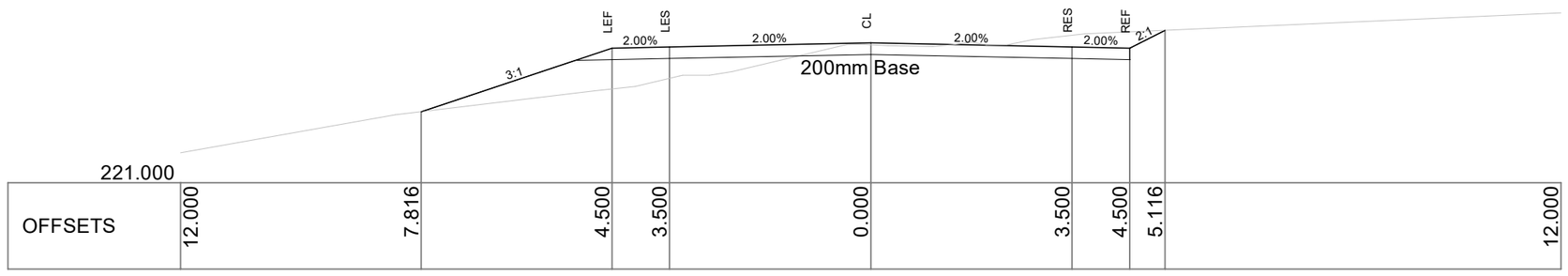
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Locality

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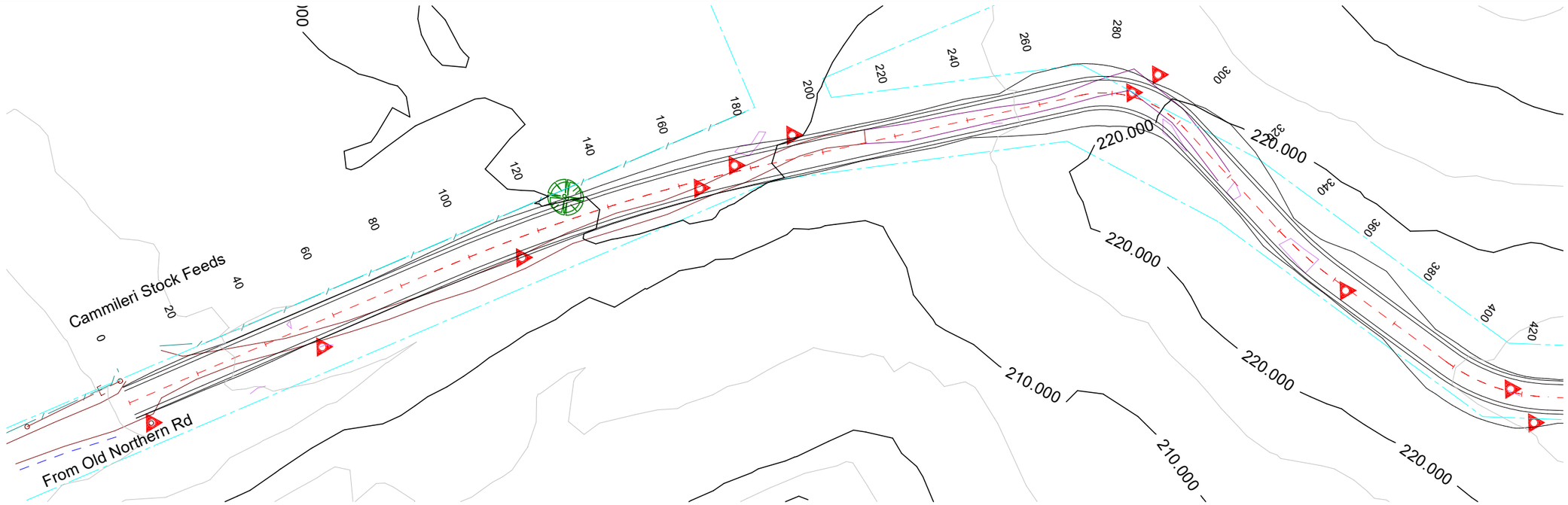
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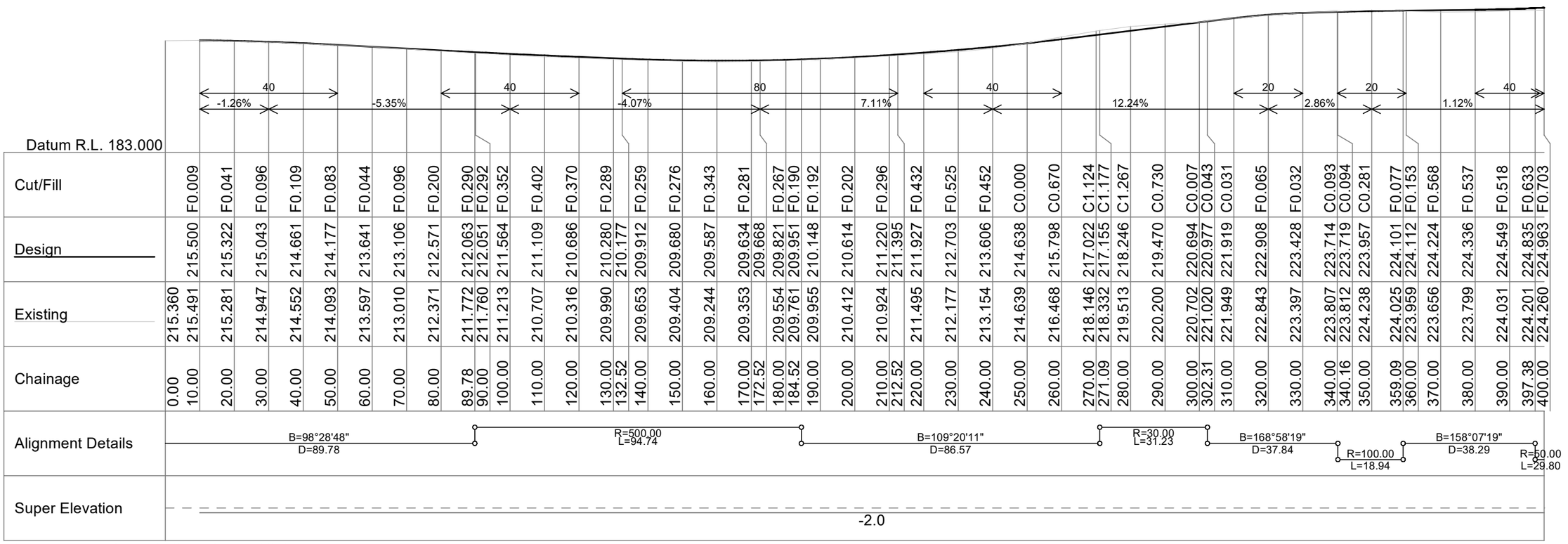


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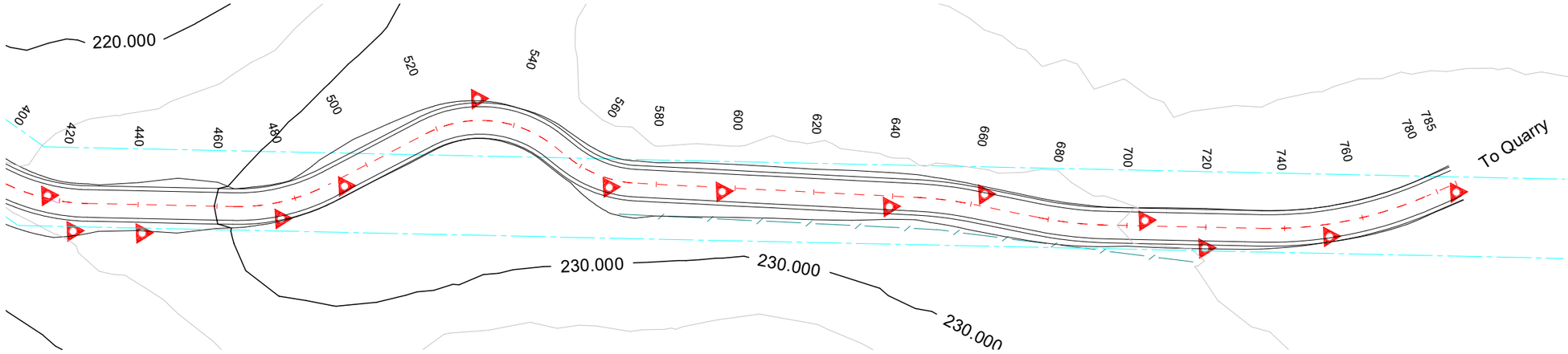
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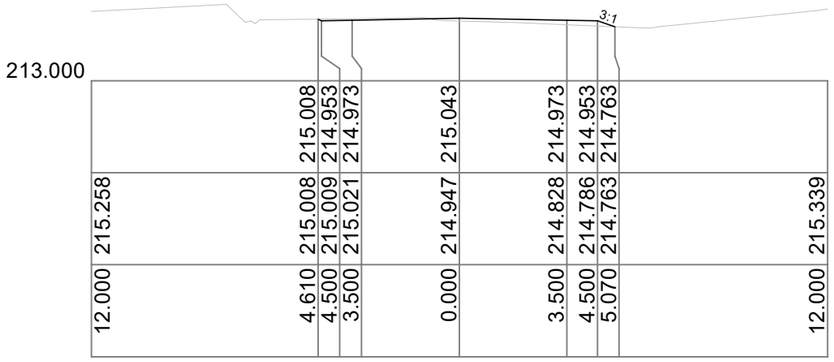
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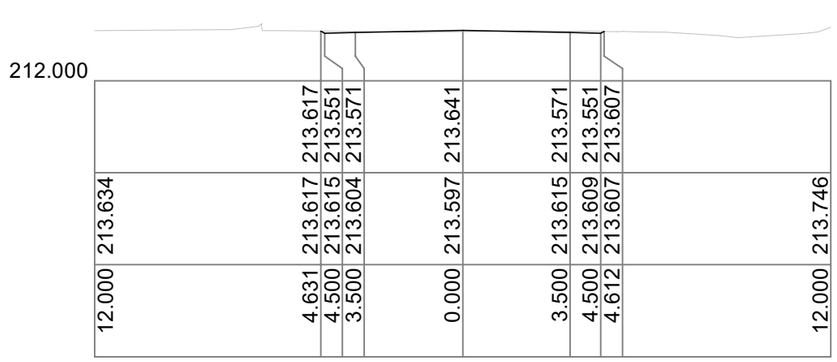
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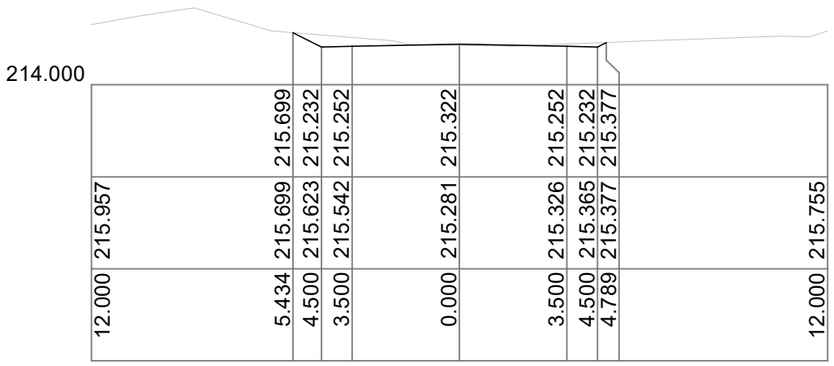
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		215.008	214.953	214.973	215.043	214.973	214.953	214.763	

30



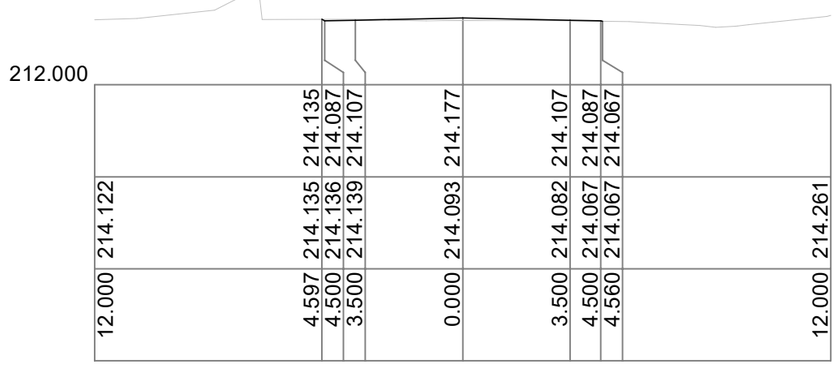
12.000	213.634	4.631	4.500	3.500	0.000	3.500	4.500	4.612	12.000
		213.617	213.615	213.604	213.597	213.615	213.609	213.607	213.746
		213.617	213.551	213.571	213.641	213.571	213.551	213.607	

60



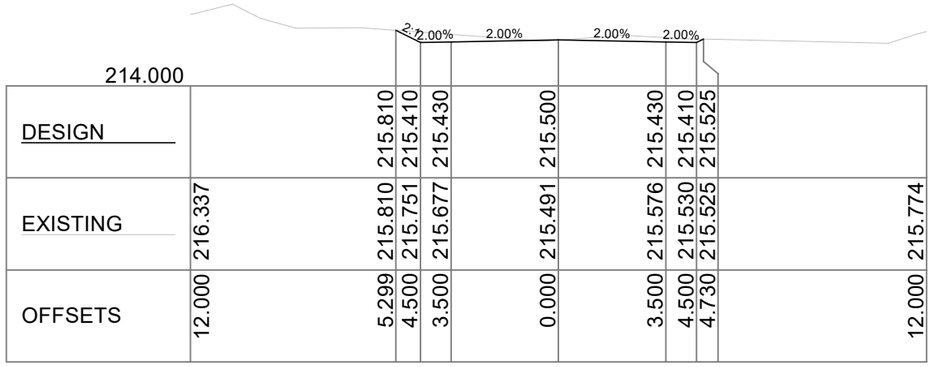
12.000	215.957	5.434	4.500	3.500	0.000	3.500	4.500	4.789	12.000
		215.699	215.623	215.542	215.281	215.326	215.365	215.377	215.755
		215.699	215.232	215.252	215.322	215.252	215.232	215.377	

20



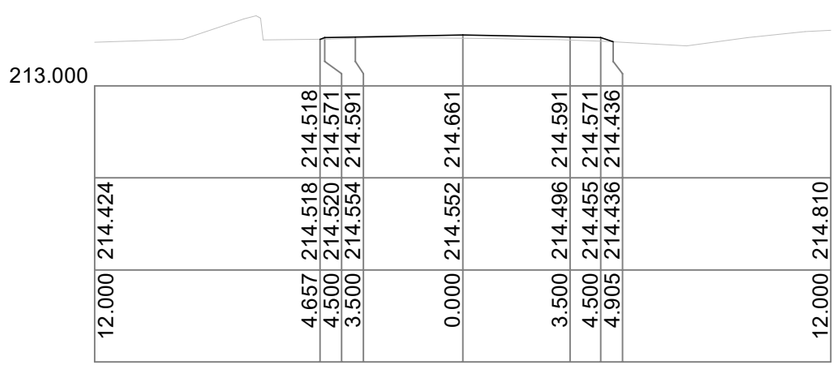
12.000	214.122	4.597	4.500	3.500	0.000	3.500	4.500	4.560	12.000
		214.135	214.136	214.139	214.093	214.082	214.067	214.067	214.261
		214.135	214.087	214.107	214.177	214.107	214.087	214.067	

50



DESIGN		5.299	4.500	3.500	0.000	3.500	4.500	4.730	12.000
		215.810	215.410	215.430	215.500	215.430	215.410	215.525	
EXISTING	216.337	215.810	215.751	215.677	215.491	215.576	215.530	215.525	215.774
OFFSETS	12.000								

10

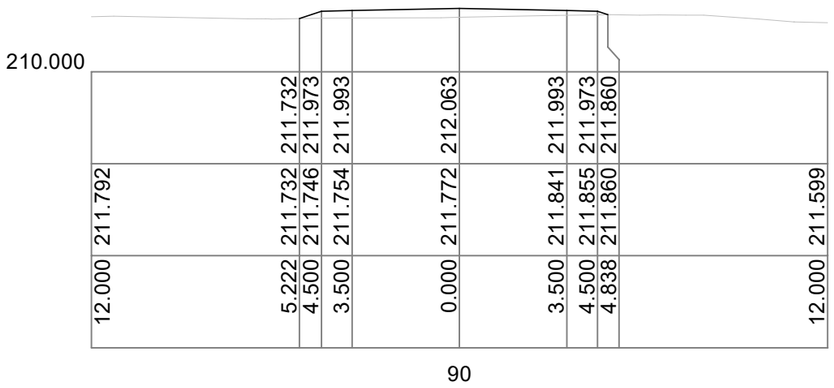


12.000	214.424	4.657	4.500	3.500	0.000	3.500	4.500	4.905	12.000
		214.518	214.520	214.554	214.552	214.496	214.455	214.436	214.810
		214.518	214.571	214.591	214.661	214.591	214.571	214.436	

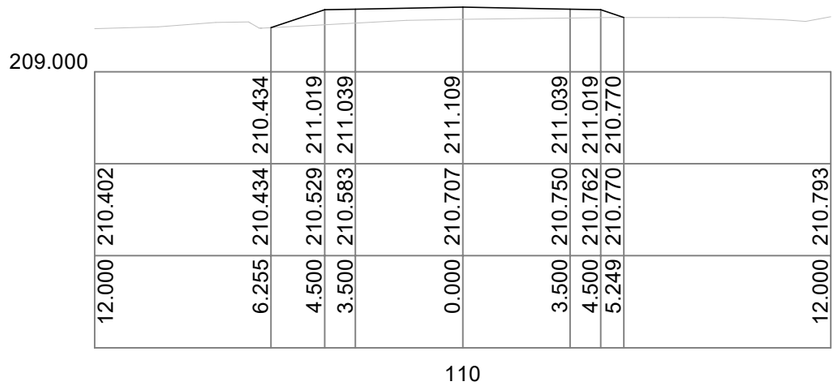
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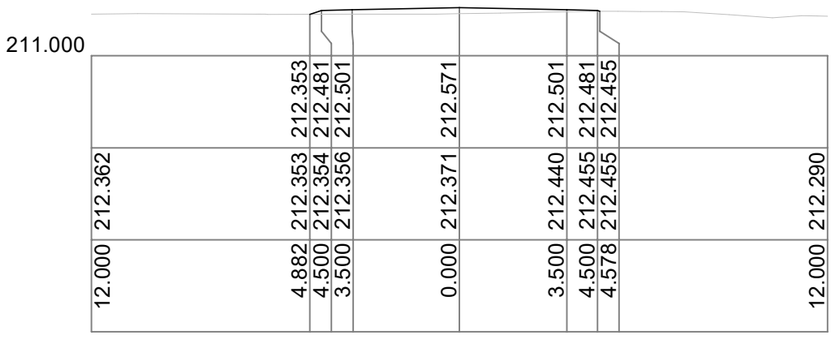
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 4**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



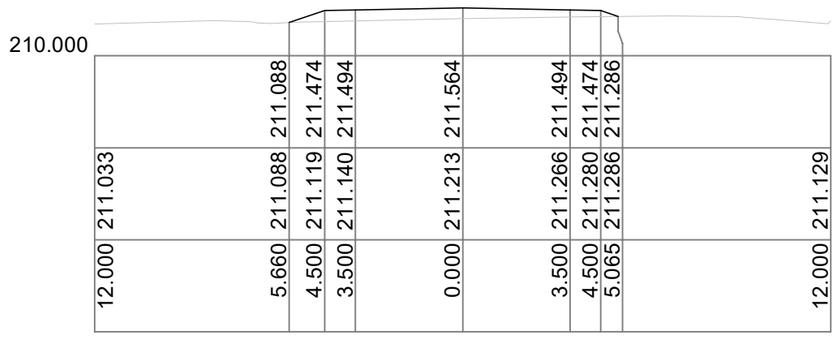
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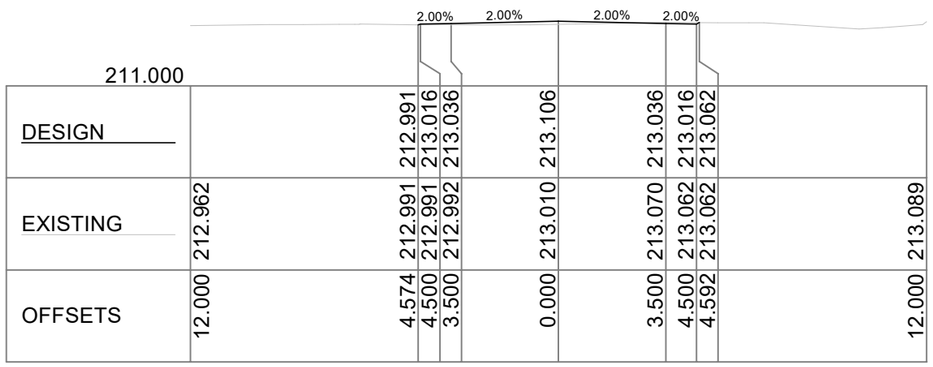
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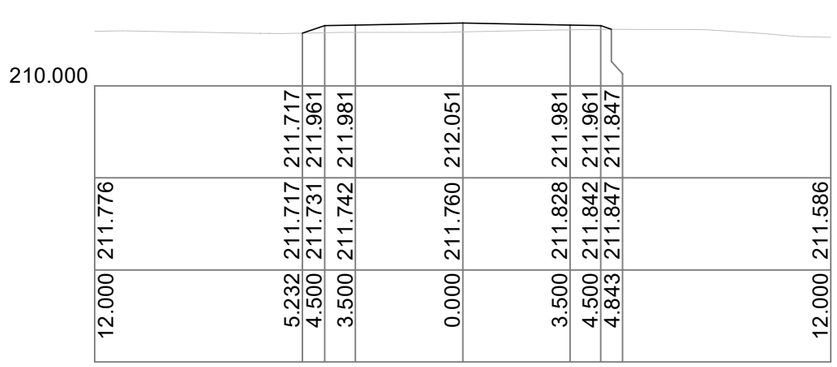
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100



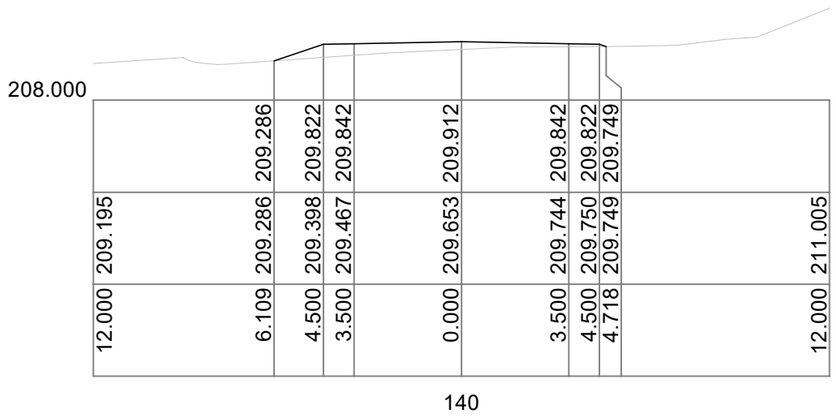
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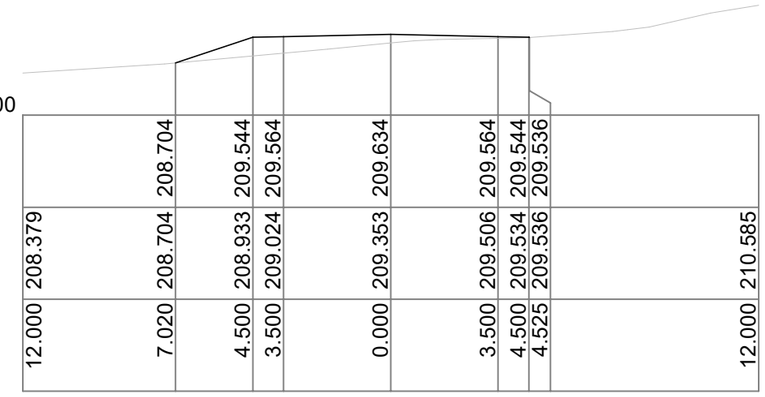
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ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 5**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



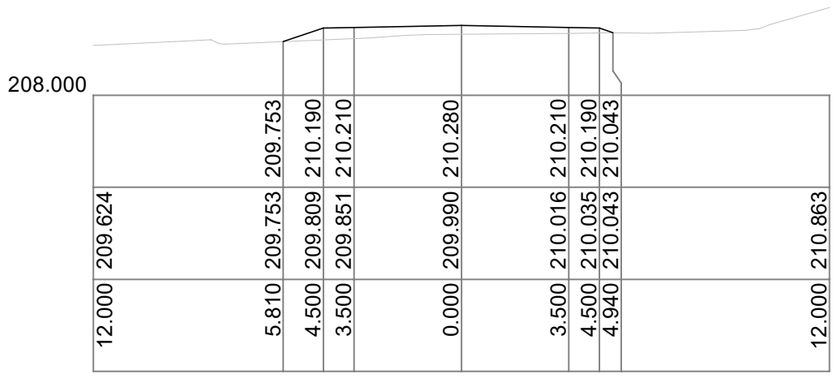
12.000	209.195	6.109	209.286	4.500	209.822	3.500	209.842	0.000	209.912	3.500	209.842	4.500	209.822	4.718	209.749	12.000	211.005

140



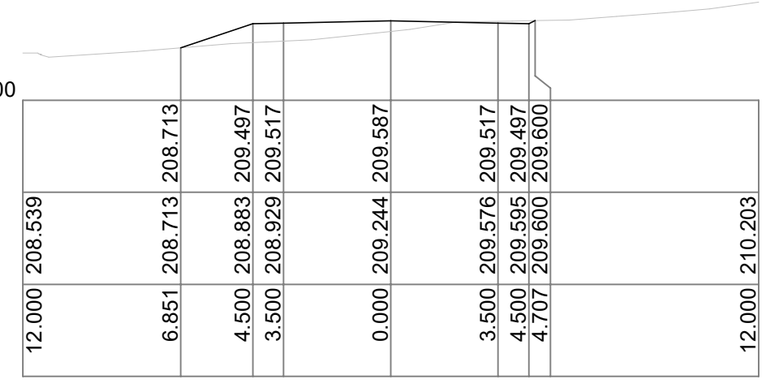
12.000	208.379	7.020	208.704	4.500	208.933	3.500	209.024	0.000	209.353	3.500	209.506	4.500	209.534	4.525	209.536	12.000	210.585

170



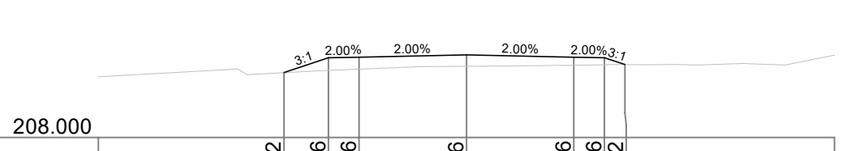
12.000	209.624	5.810	209.753	4.500	209.809	3.500	209.851	0.000	209.990	3.500	210.016	4.500	210.035	4.940	210.043	12.000	210.863

130



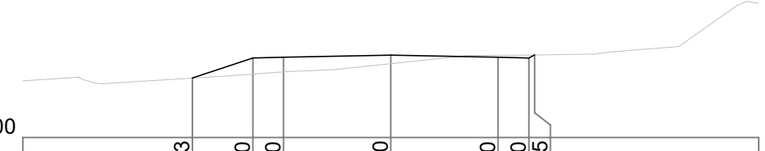
12.000	208.539	6.851	208.713	4.500	208.883	3.500	208.929	0.000	209.244	3.500	209.576	4.500	209.595	4.707	209.600	12.000	210.203

160



DESIGN		5.953	210.112	4.500	210.596	3.500	210.616	0.000	210.686	3.500	210.616	4.500	210.596	5.172	210.372	12.000	210.681
EXISTING	209.977	5.953	210.112	4.500	210.187	3.500	210.226	0.000	210.316	3.500	210.350	4.500	210.365	5.172	210.372	12.000	210.681
OFFSETS	12.000	5.953	210.112	4.500	210.596	3.500	210.616	0.000	210.686	3.500	210.616	4.500	210.596	5.172	210.372	12.000	210.681

120

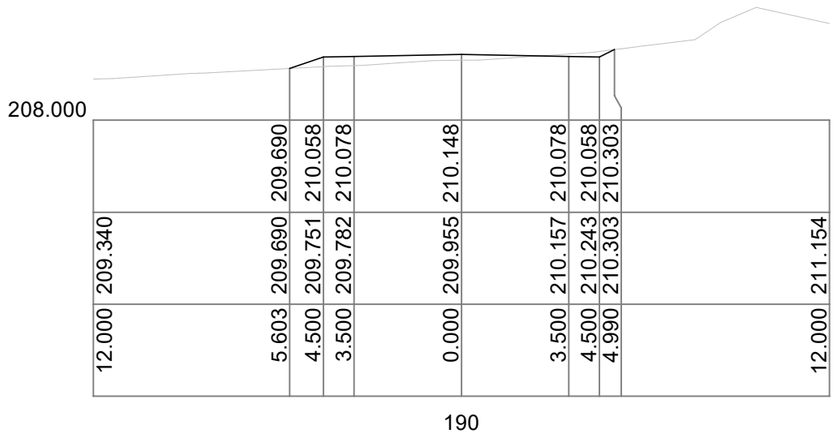


12.000	208.841	6.471	208.933	4.500	209.063	3.500	209.133	0.000	209.404	3.500	209.673	4.500	209.682	4.691	209.685	12.000	211.370

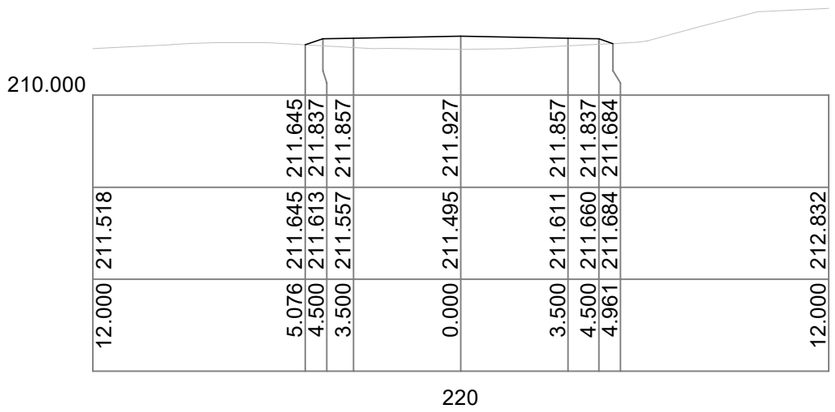
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Scale Horizontal 1:200 Vertical 1:200

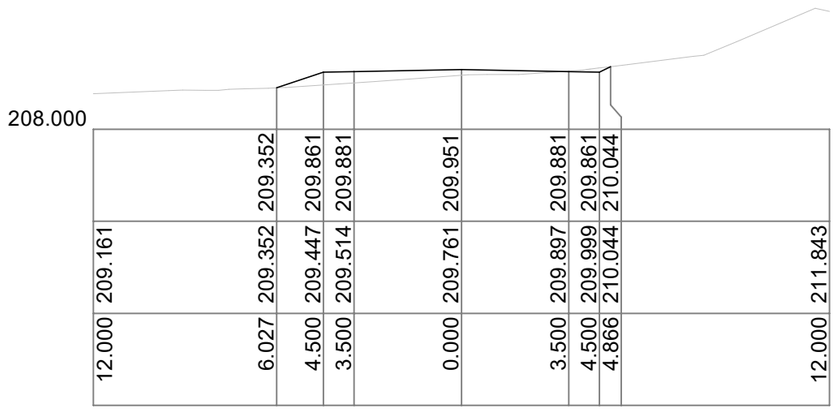
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 6**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



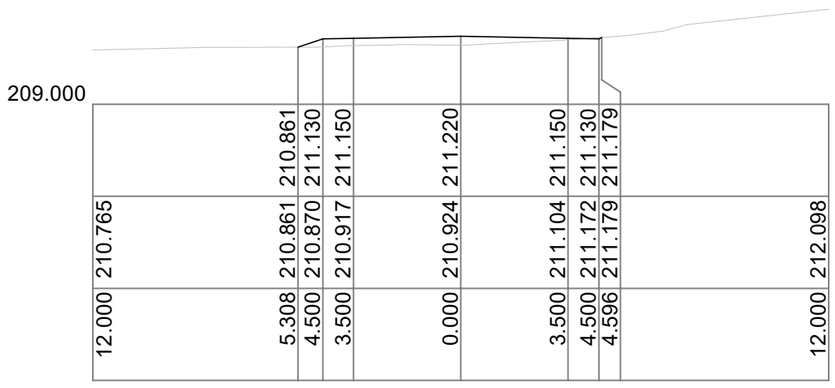
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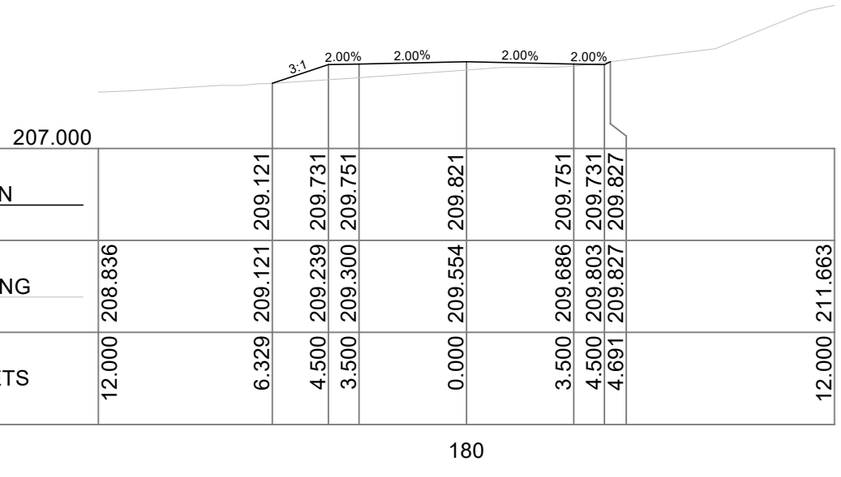
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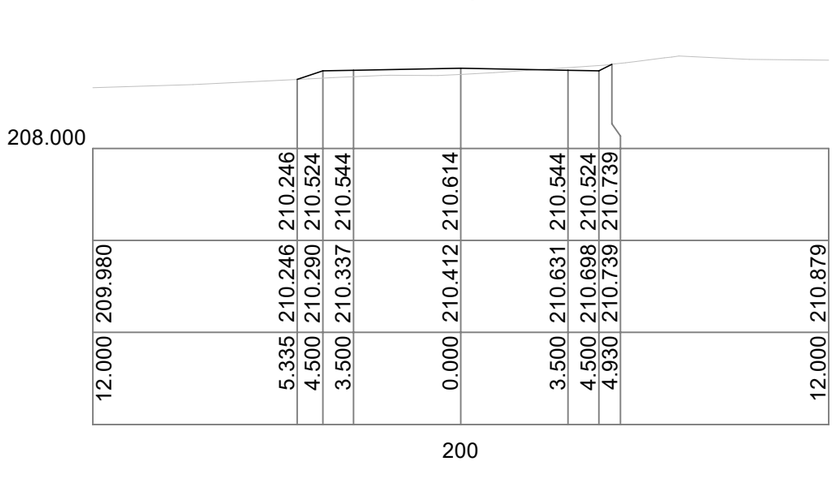
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210



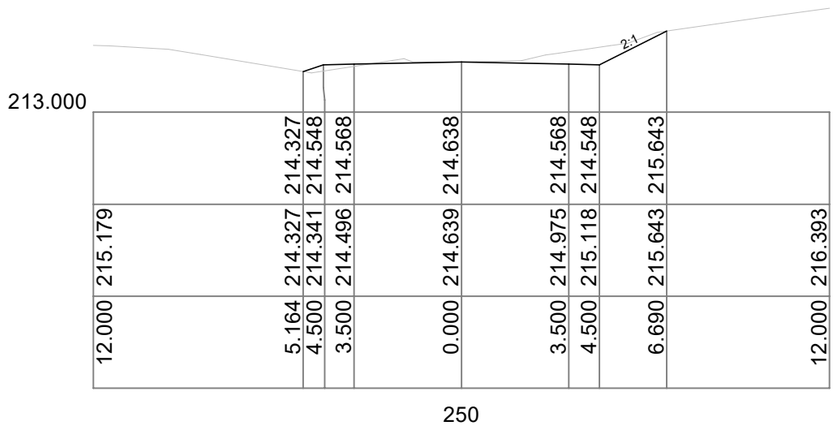
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200

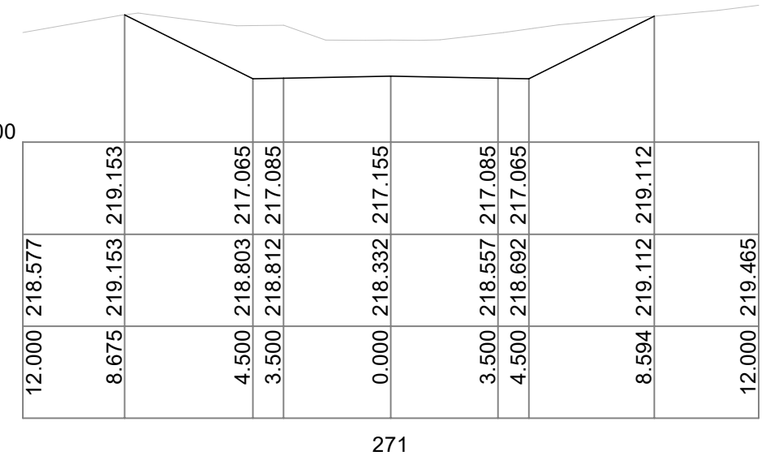
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ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 7**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



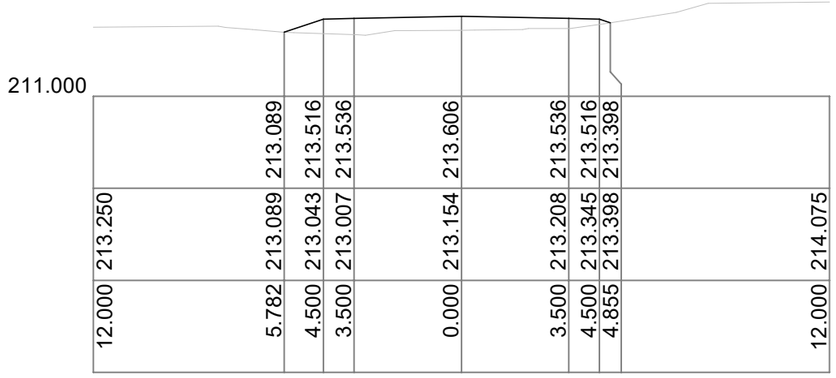
12.000	5.164	4.500	3.500	0.000	3.500	4.500	6.690	12.000
215.179	214.327	214.341	214.496	214.639	214.975	215.118	215.643	216.393
	214.327	214.548	214.568	214.638	214.568	214.548	215.643	

250



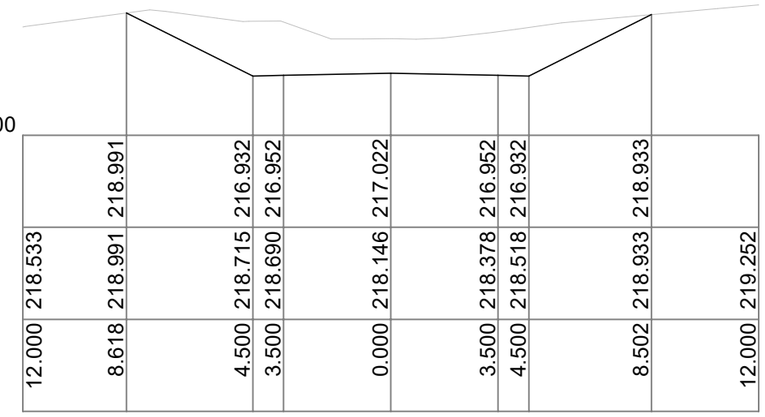
12.000	4.500	3.500	0.000	3.500	4.500	8.594	12.000
218.577	218.803	218.812	218.332	218.557	218.692	219.112	219.465
219.153	217.065	217.085	217.155	217.085	217.065	219.112	

271



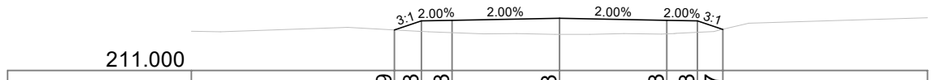
12.000	5.782	4.500	3.500	0.000	3.500	4.500	4.855	12.000
213.250	213.089	213.043	213.007	213.154	213.208	213.345	213.398	214.075
	213.089	213.516	213.536	213.606	213.536	213.516	213.398	

240



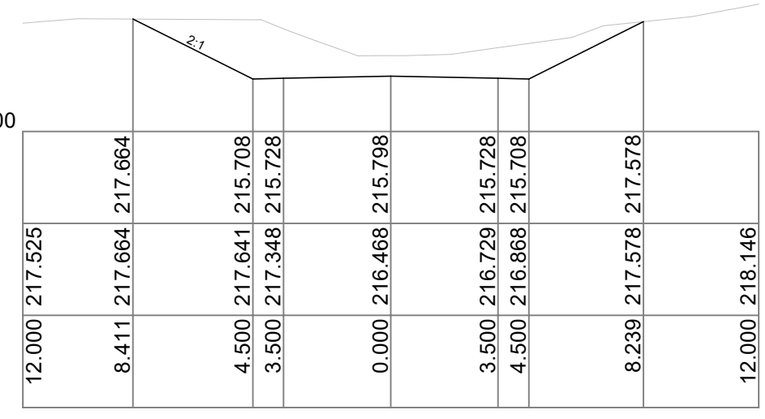
12.000	8.618	4.500	3.500	0.000	3.500	4.500	8.502	12.000
218.533	218.991	218.715	218.690	218.146	218.378	218.518	218.933	219.252
218.991	216.932	216.952	217.022	216.952	216.932	218.933		

270



OFFSETS	12.000	5.380	4.500	3.500	0.000	3.500	4.500	5.329	12.000
EXISTING	212.274	212.319	212.270	212.229	212.177	212.188	212.239	212.337	212.719
DESIGN		212.319	212.613	212.633	212.703	212.633	212.613	212.337	

230

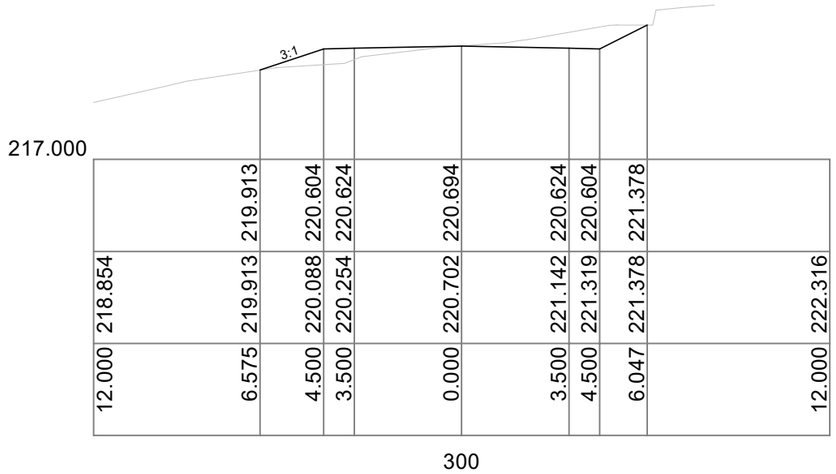


12.000	8.411	4.500	3.500	0.000	3.500	4.500	8.239	12.000
217.525	217.664	217.641	217.348	216.468	216.729	216.868	217.578	218.146
	217.664	215.708	215.728	215.798	215.728	215.708	217.578	

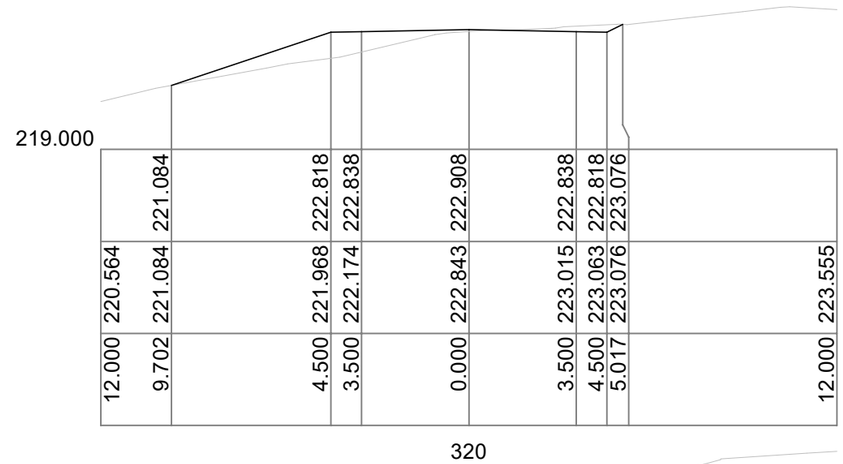
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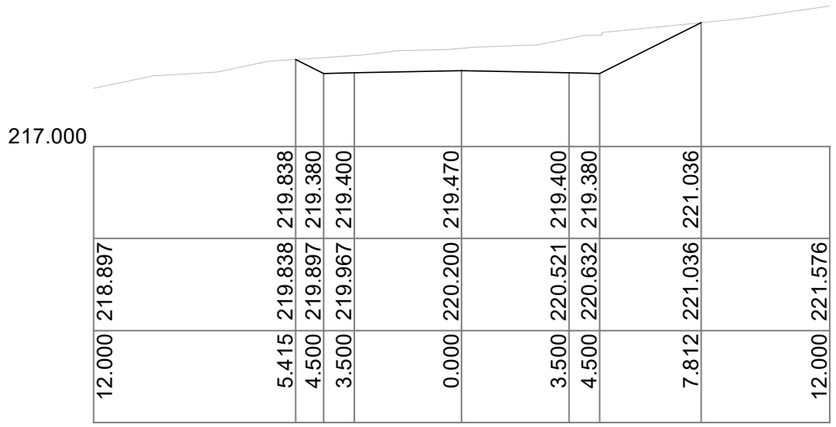
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 8**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



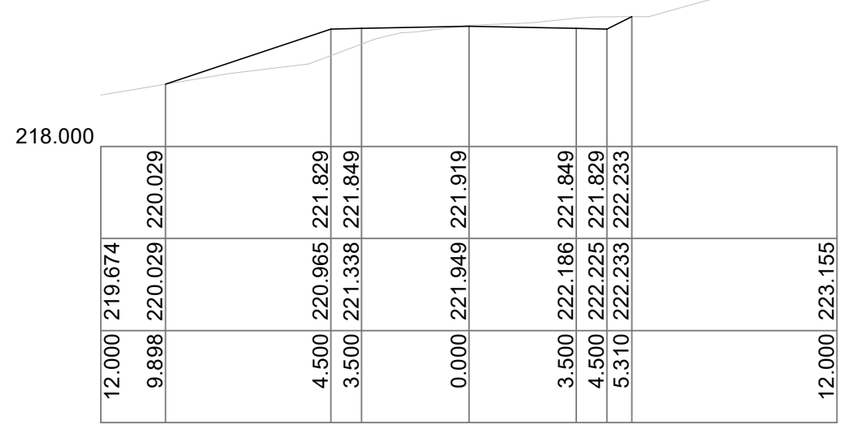
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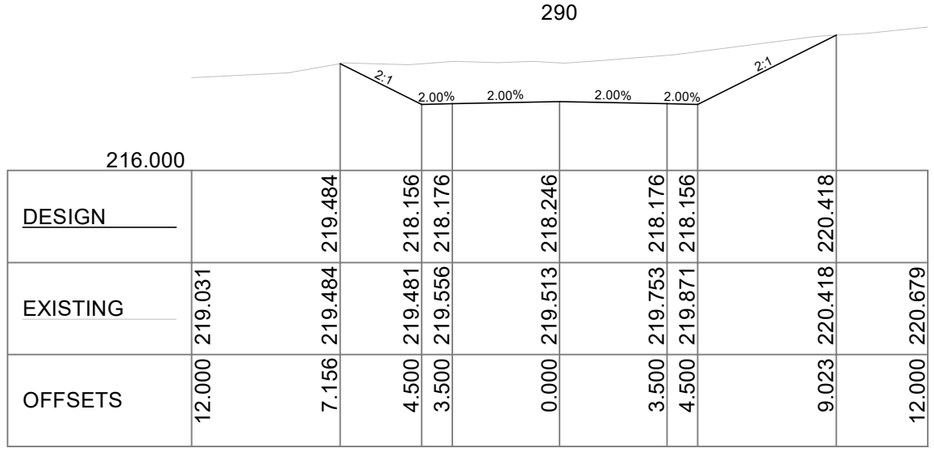
320



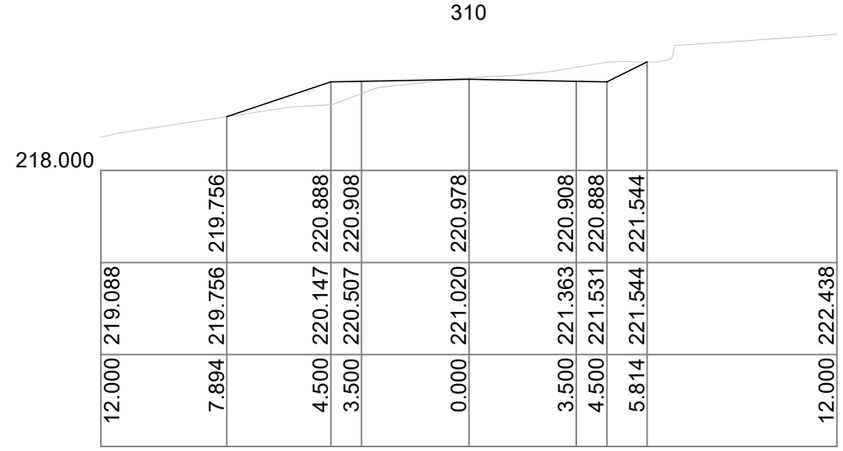
290



310



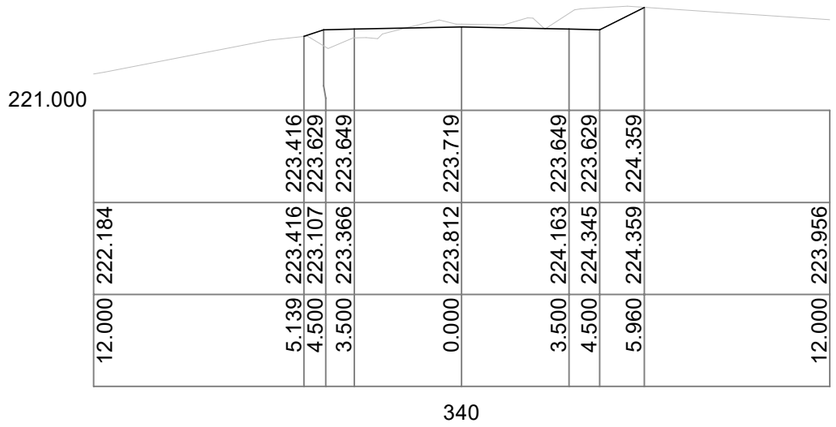
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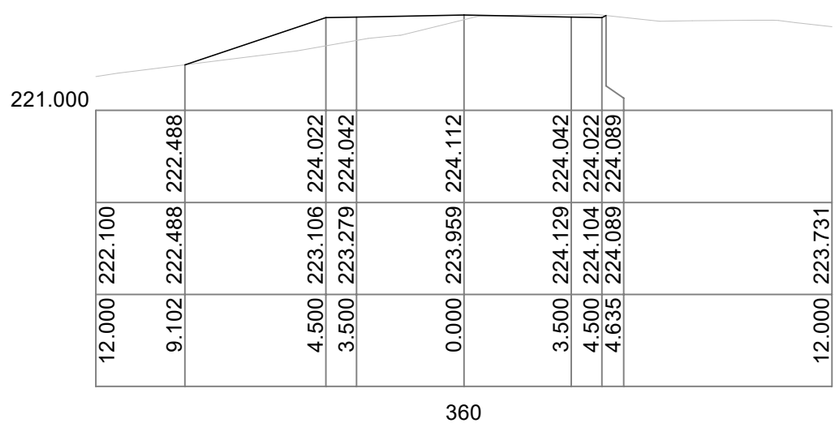
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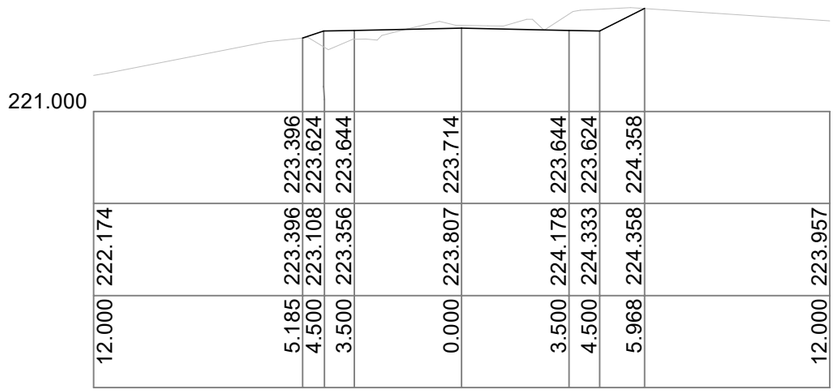
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 9**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



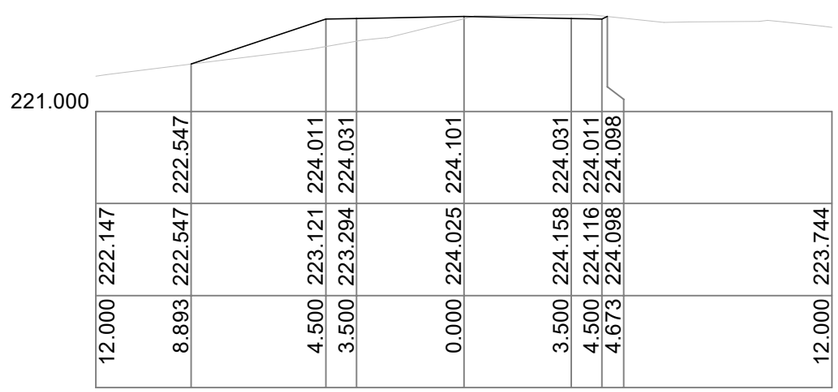
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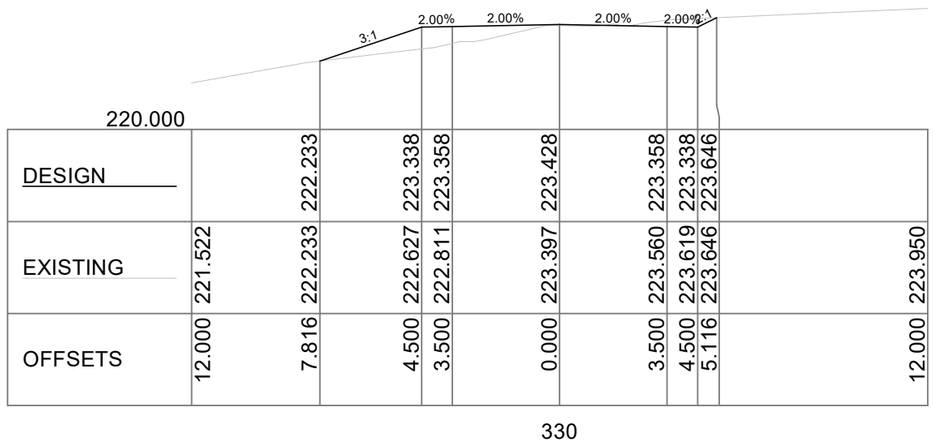
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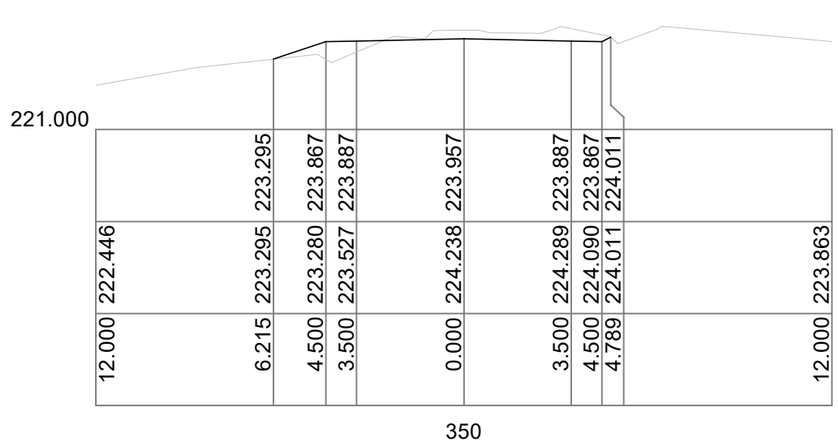
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359



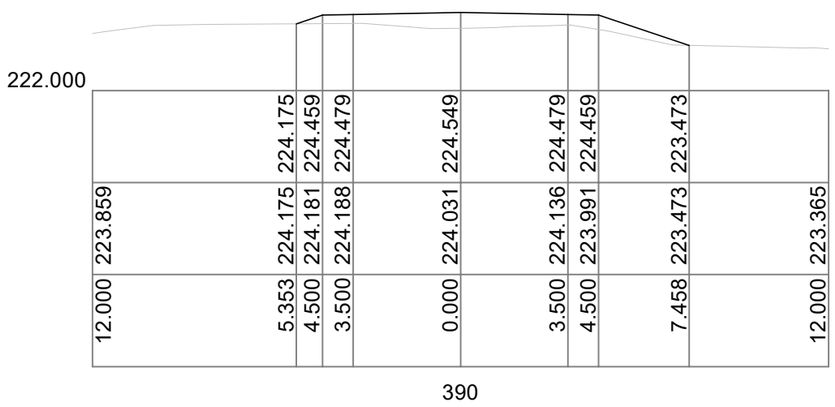
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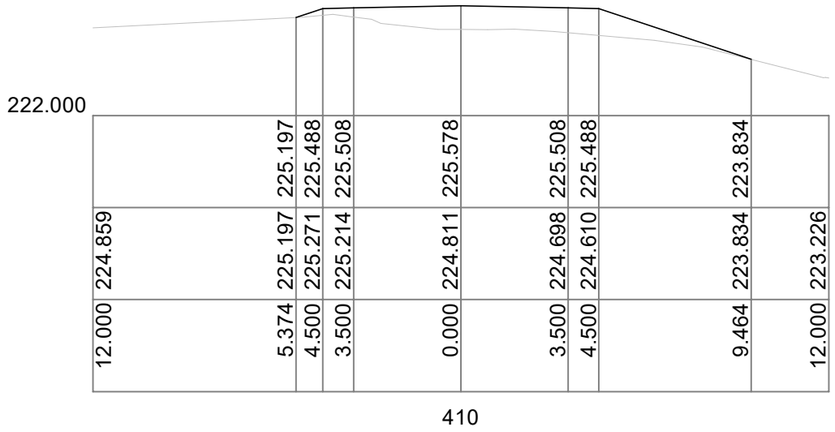


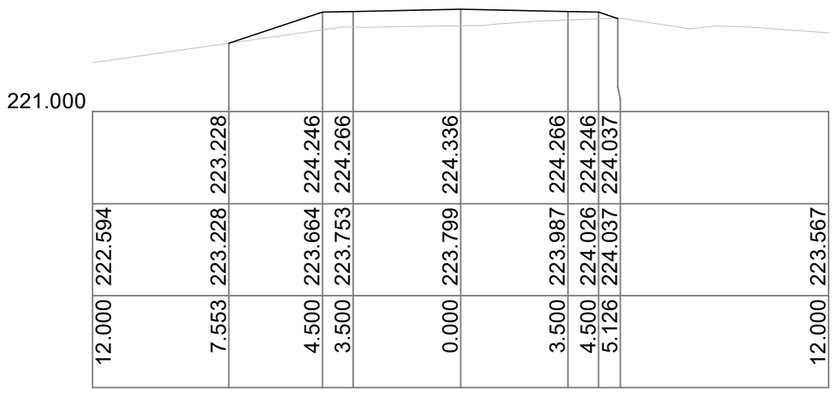
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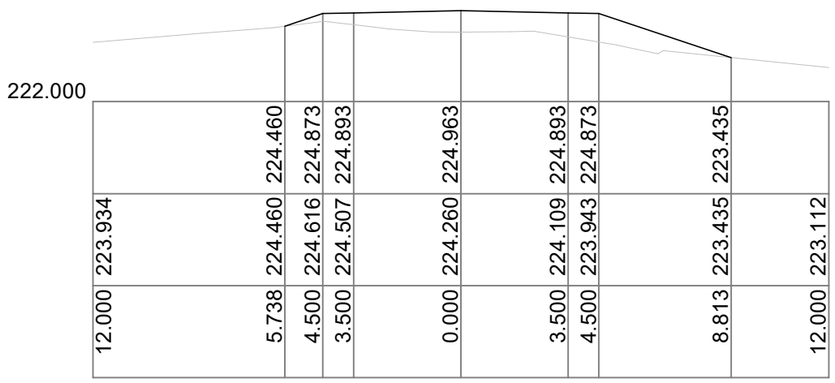
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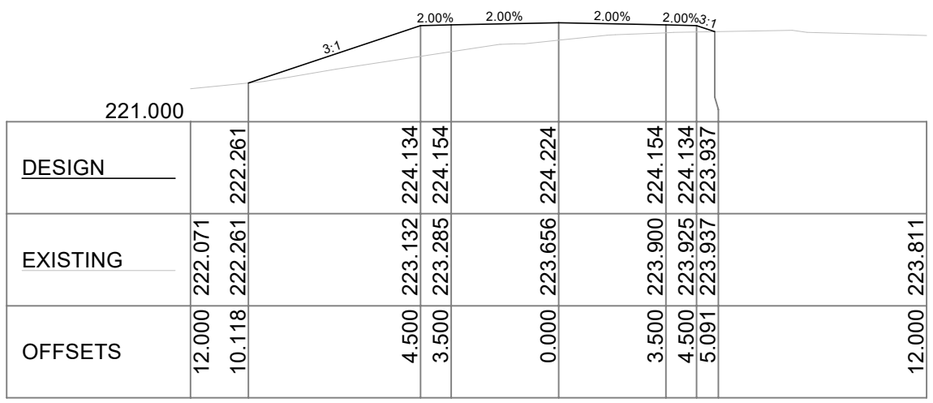
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 10**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		

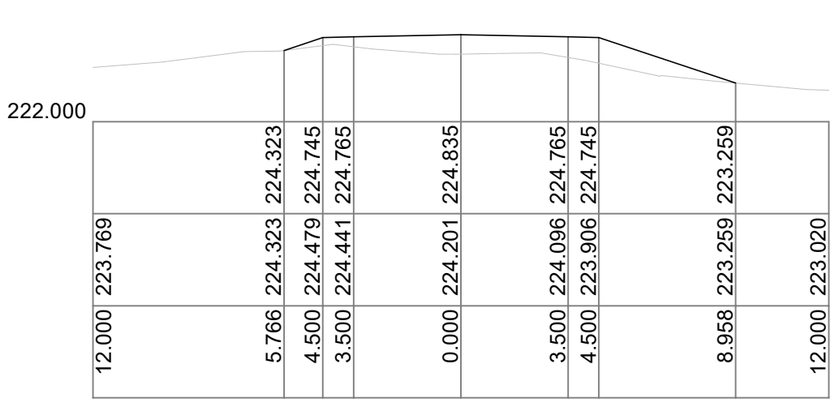






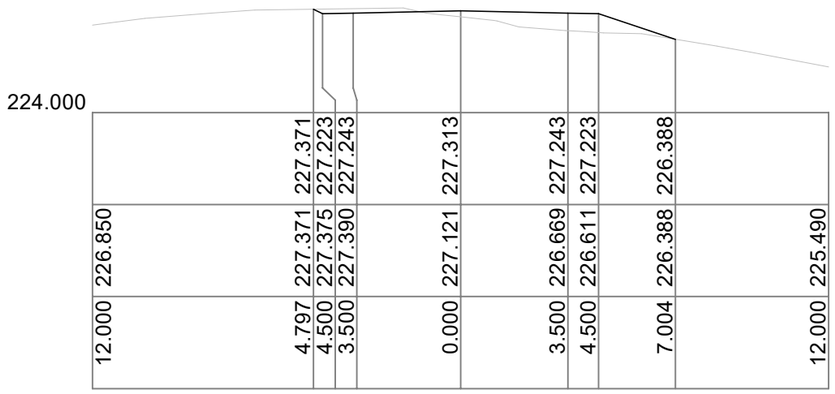




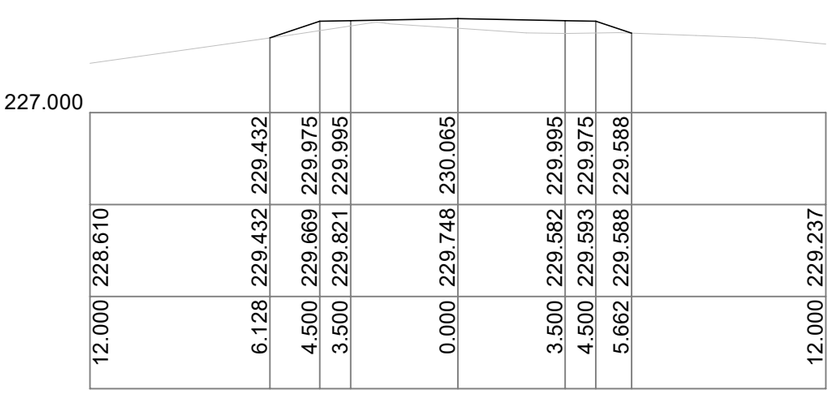


Scale Horizontal 1:200 Vertical 1:200

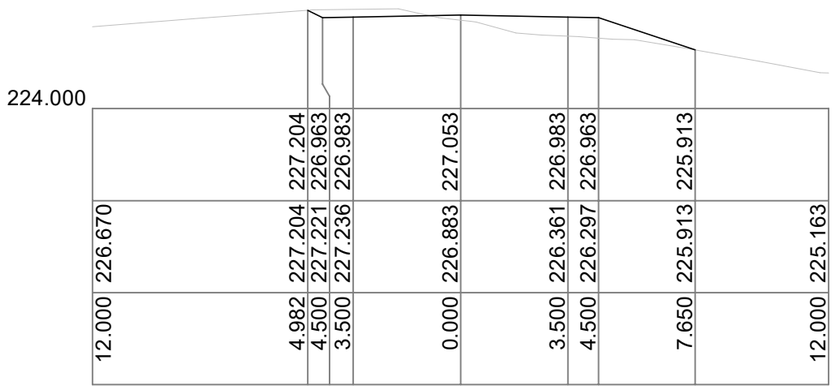
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 11**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



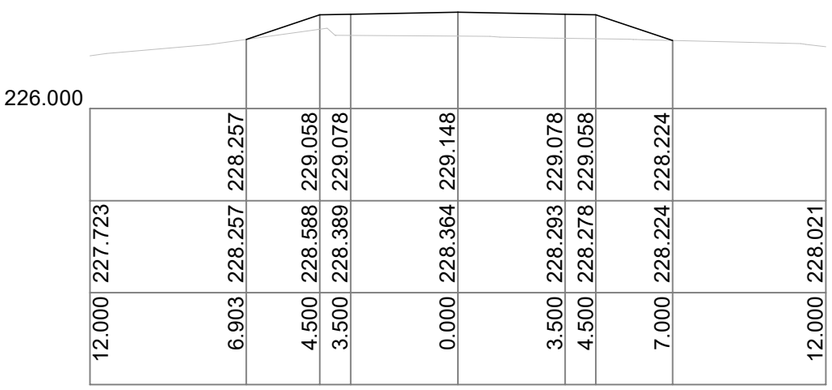
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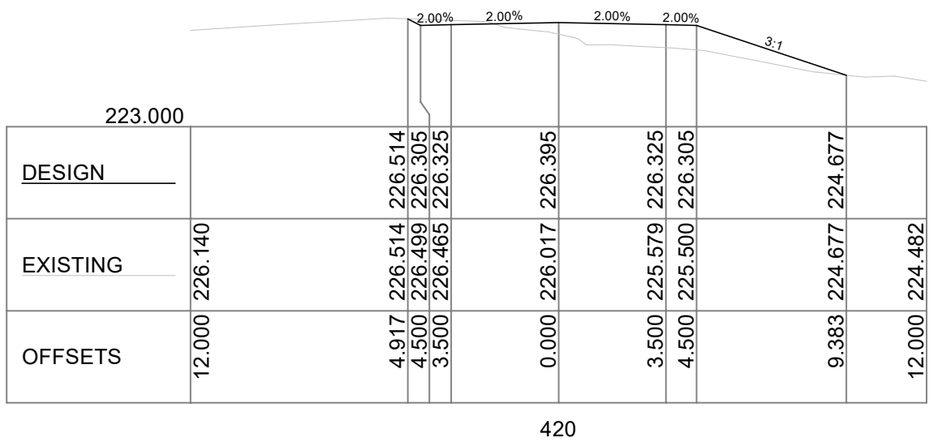
460



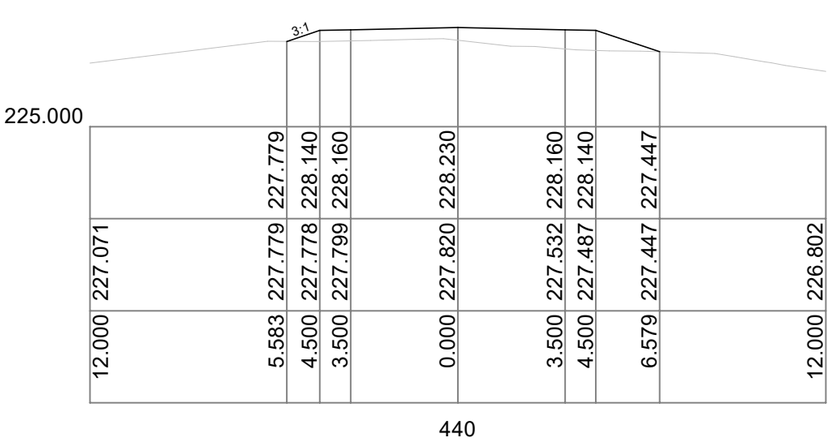
427



450



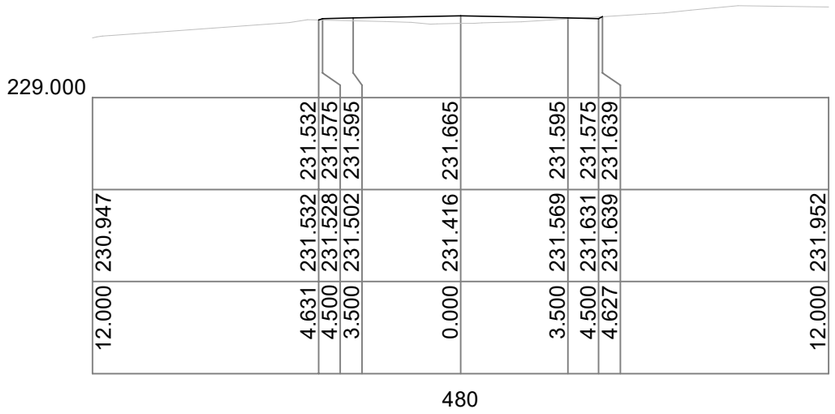
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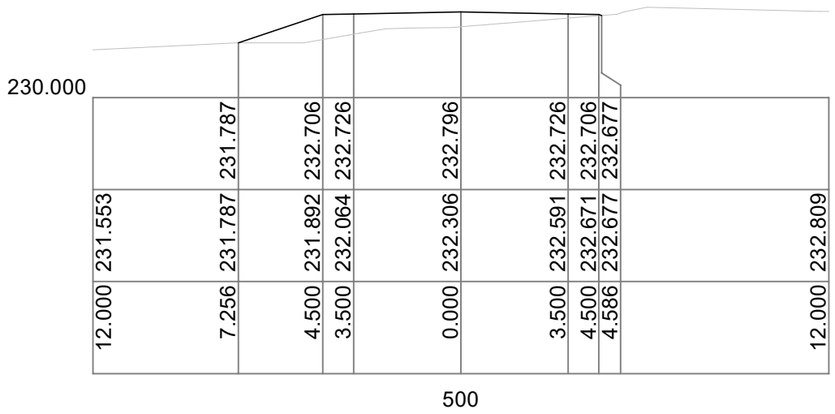
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Scale Horizontal 1:200 Vertical 1:200

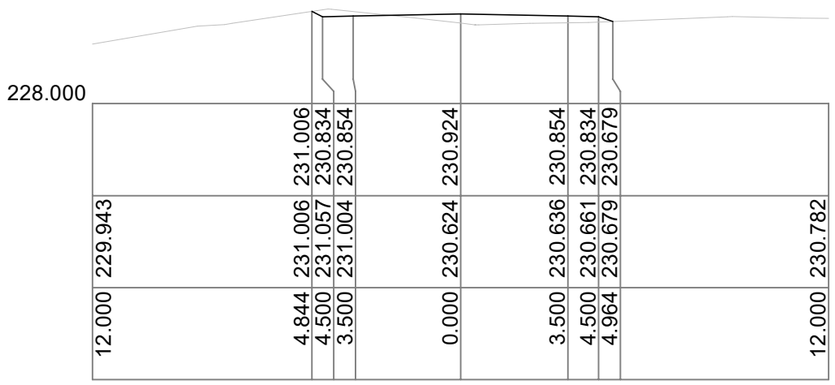
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 12**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



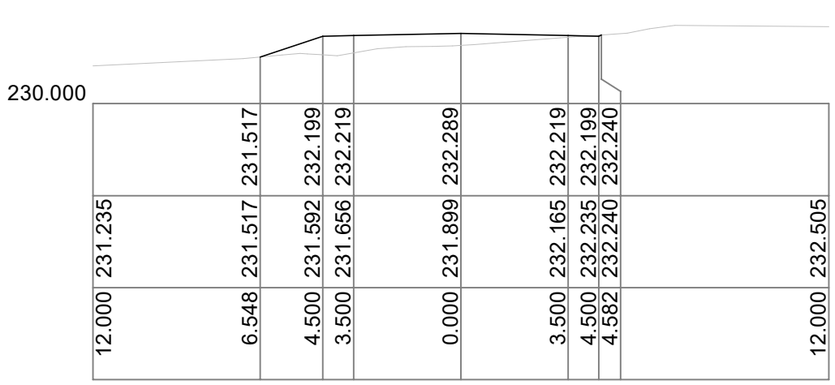
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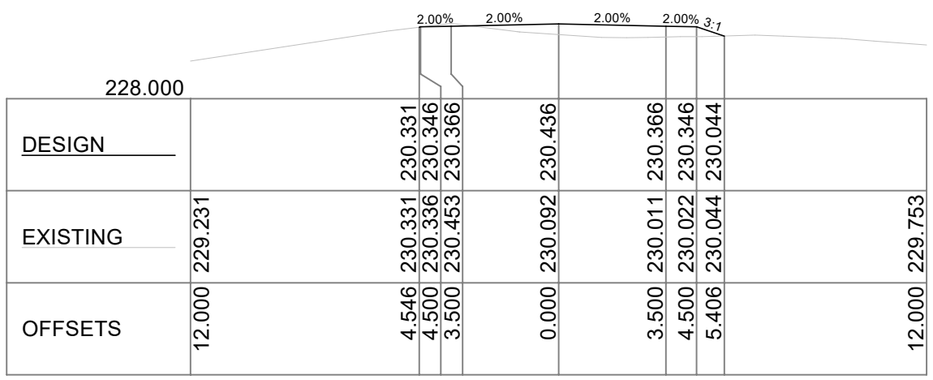
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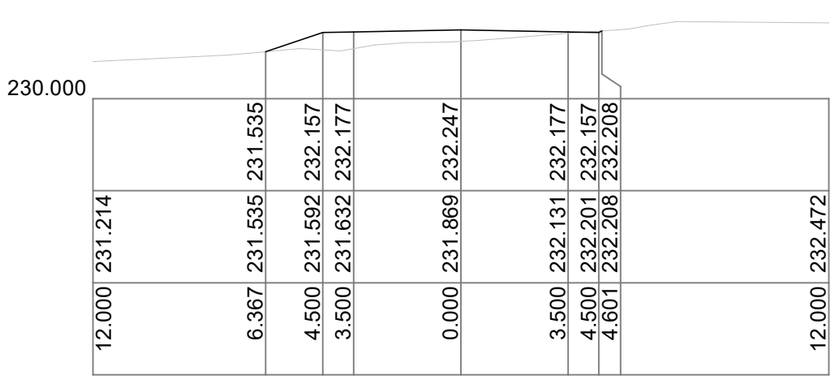
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490



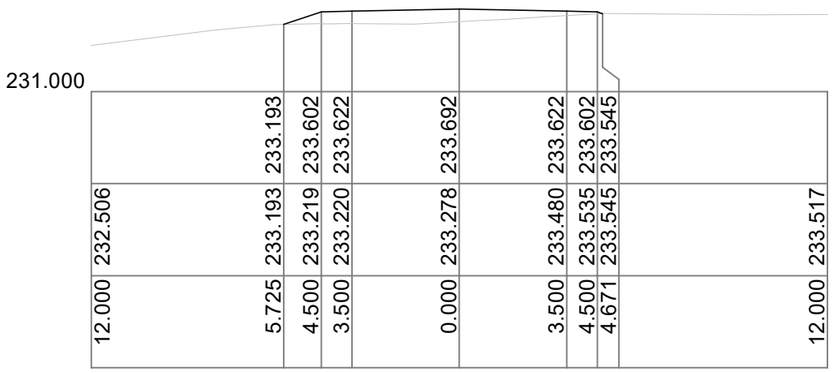
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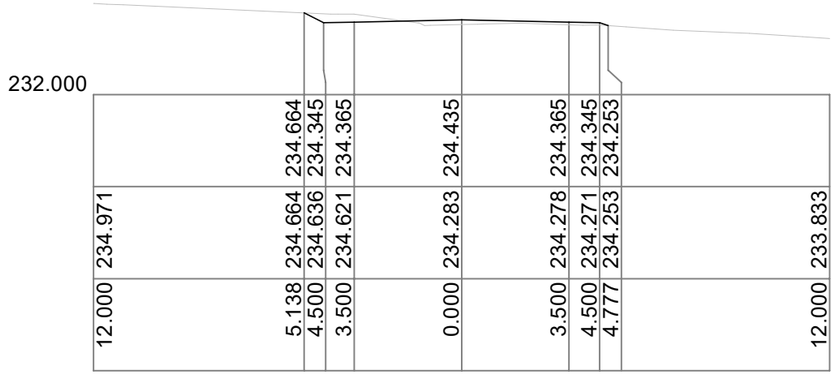
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Scale Horizontal 1:200 Vertical 1:200

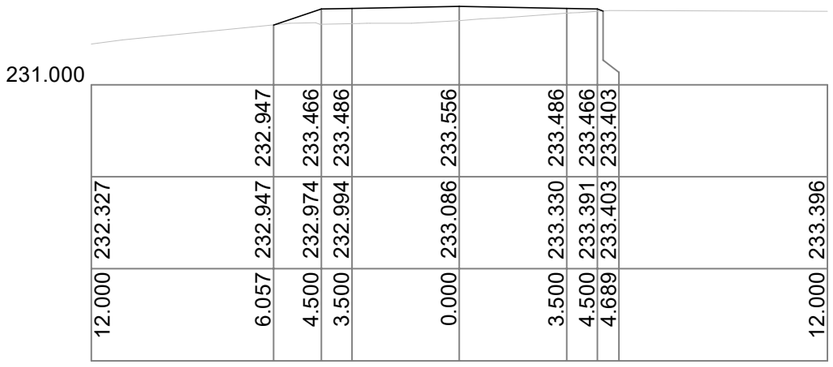
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
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14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 13**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



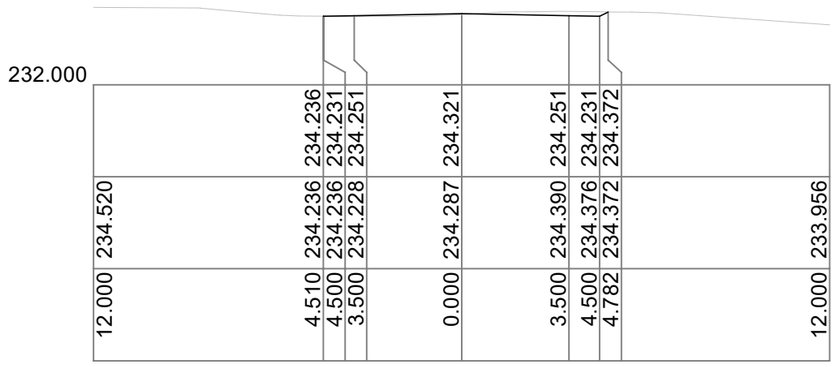
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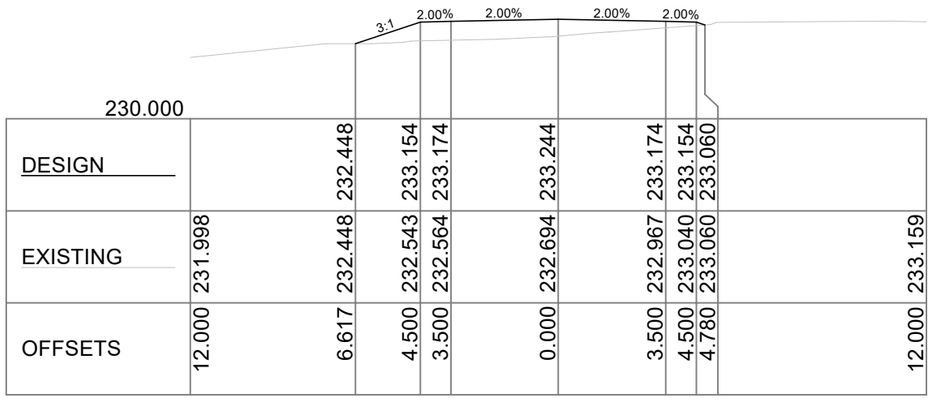
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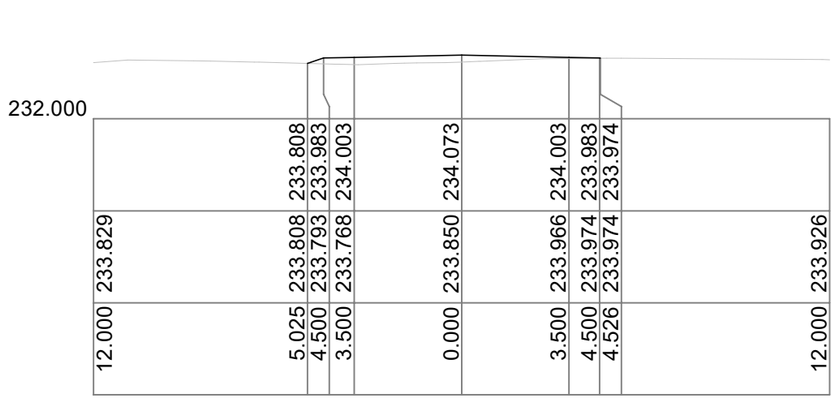
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540



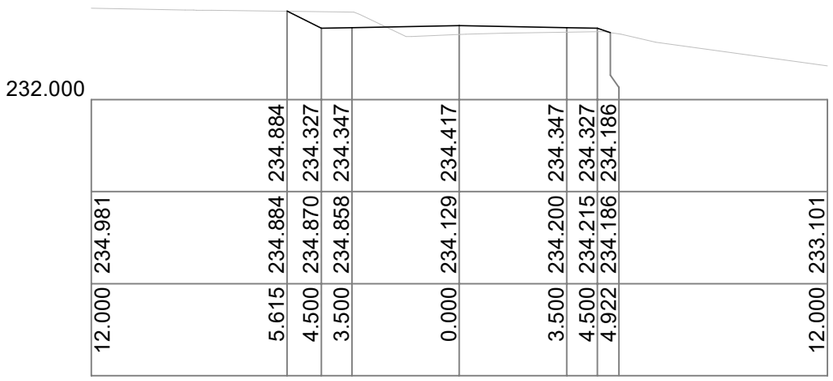
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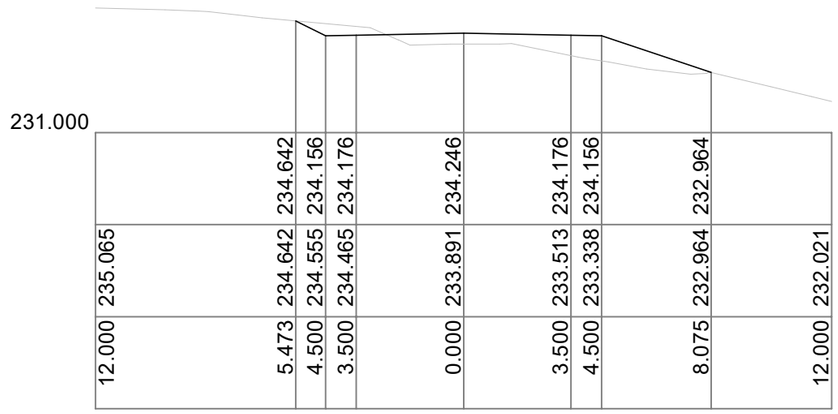
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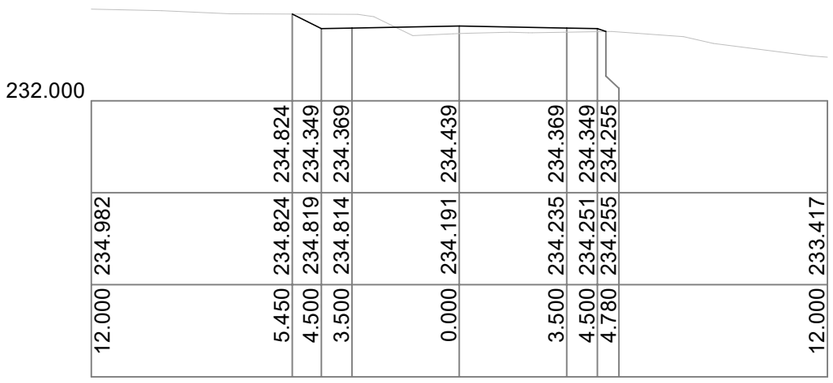
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 14**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



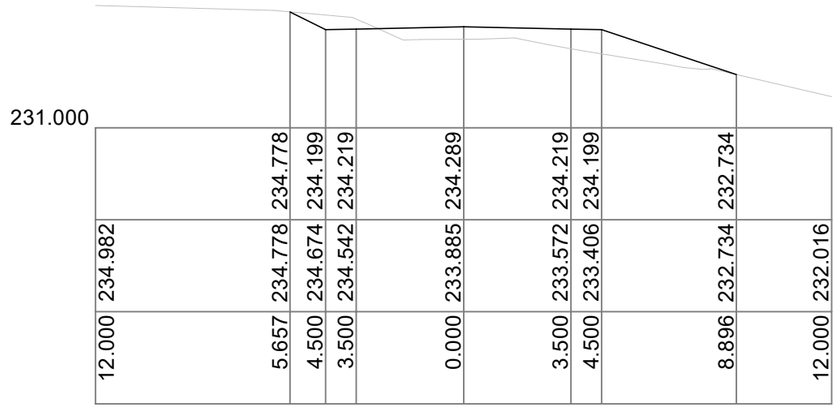
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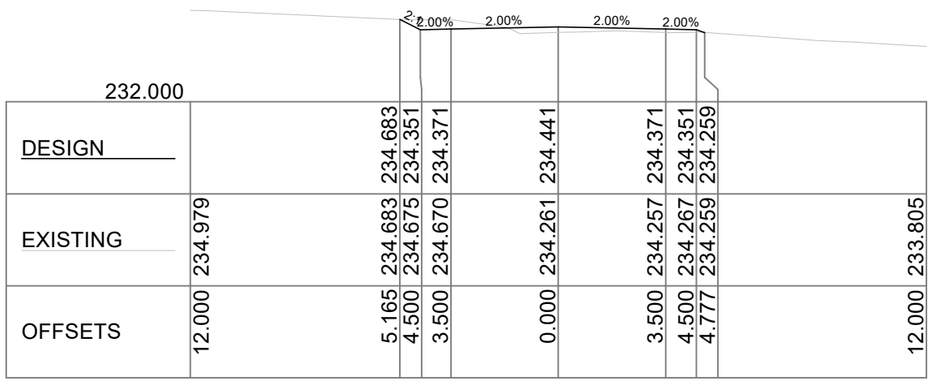
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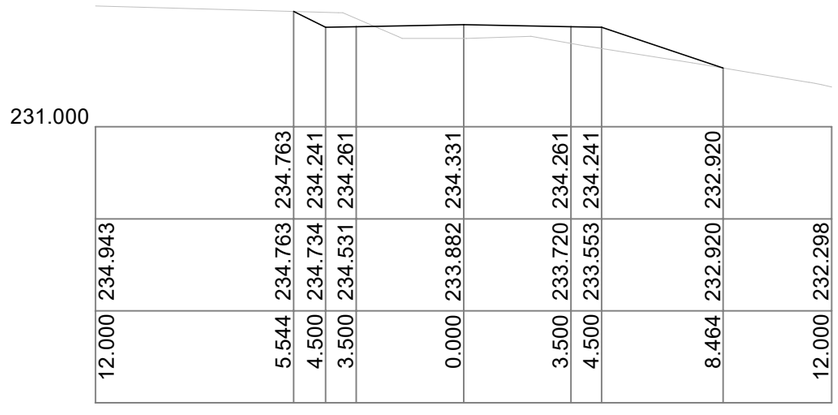
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575



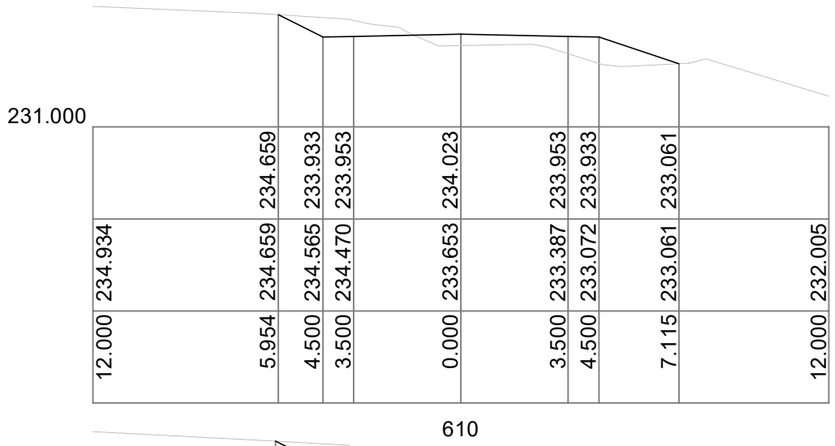
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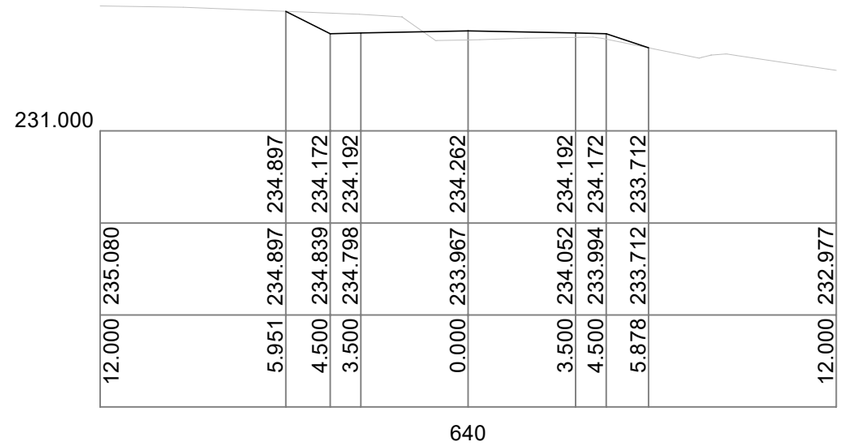
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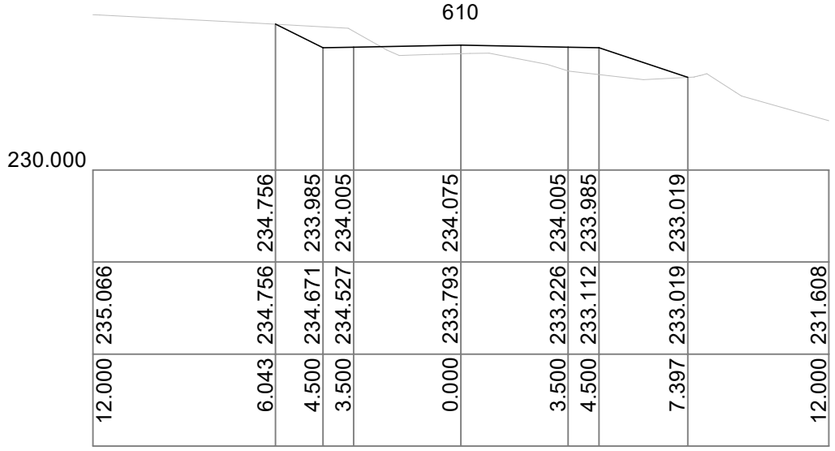
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 15**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



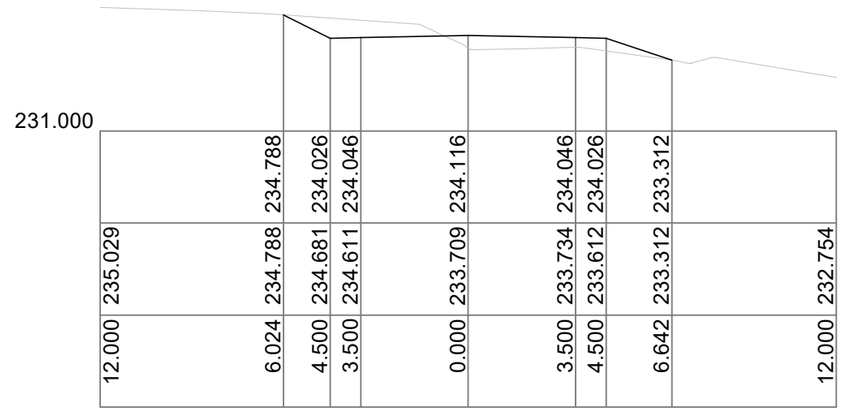
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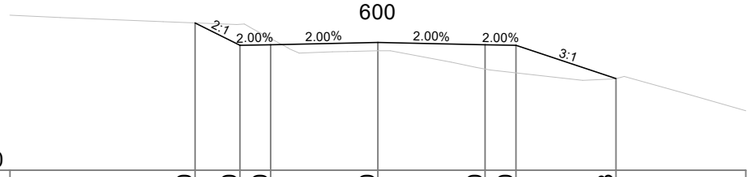
640



600

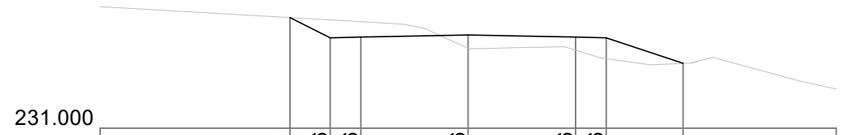


630



230.000						
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EXISTING	235.054	234.800	234.752	234.292	233.891	233.299	233.174	232.983	231.938
OFFSETS	12.000	5.960	4.500	3.500	0.000	3.500	4.500	7.762	12.000

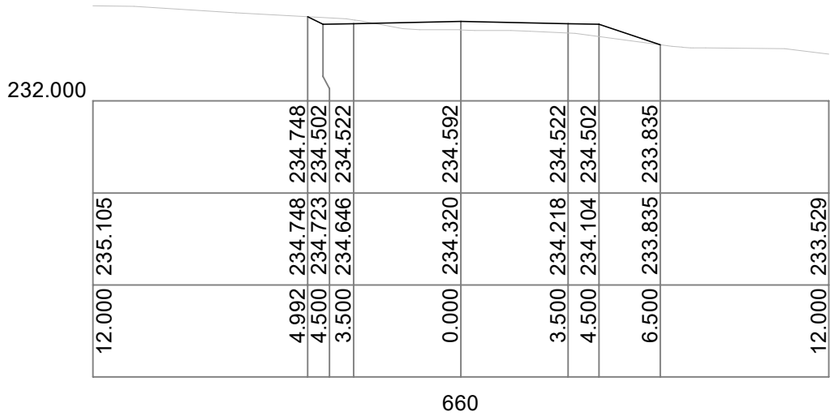
590



620

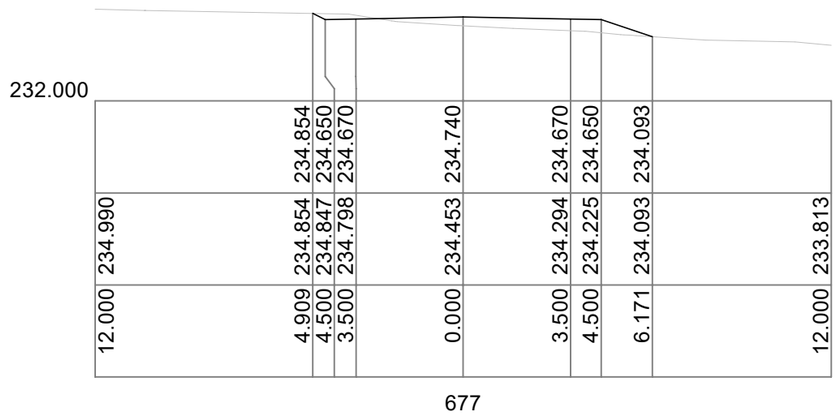
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ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 16**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



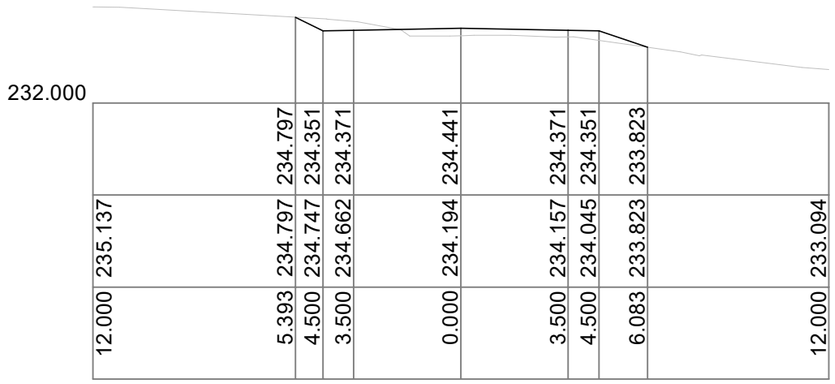
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12.000	235.105	234.748	234.723	234.646	234.320	234.218	234.104	233.835	233.529
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660



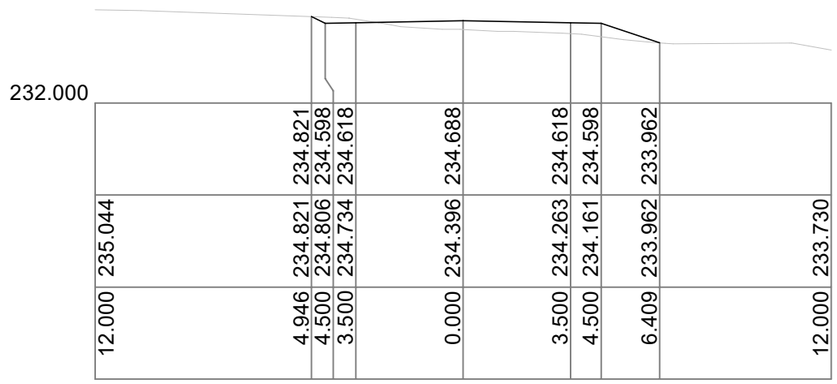
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12.000	234.990	234.854	234.847	234.798	234.453	234.294	234.225	234.093	233.813
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677



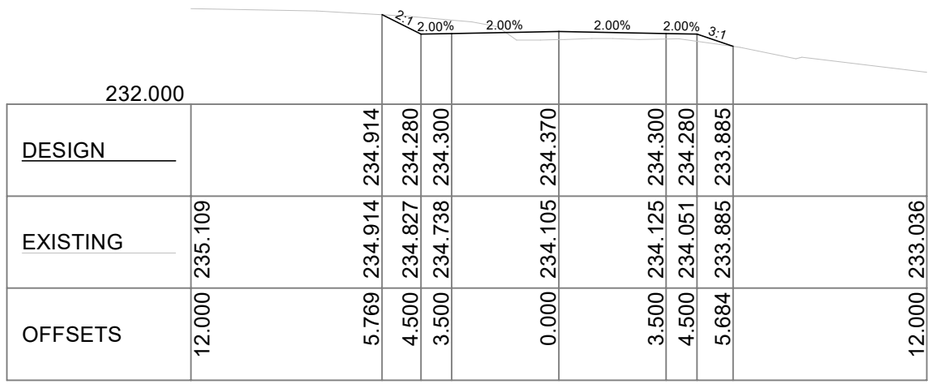
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12.000	235.137	234.797	234.747	234.662	234.194	234.157	234.045	233.823	233.094
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650



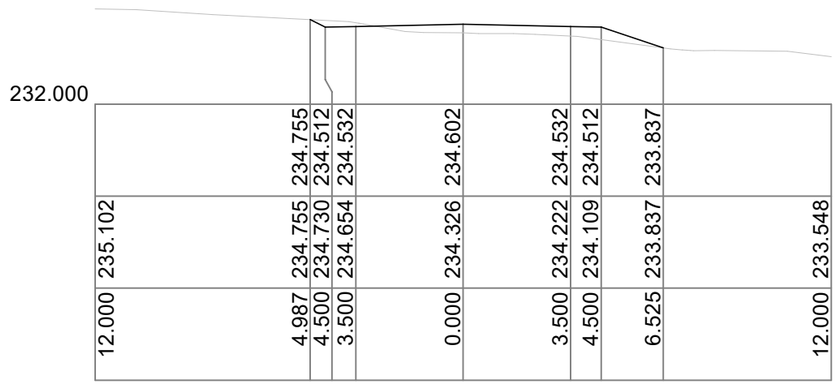
		234.821	234.598	234.618	234.688	234.618	234.598	233.962
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670



		234.914	234.280	234.300	234.370	234.300	234.280	233.885
12.000	235.109	234.914	234.827	234.738	234.105	234.125	234.051	233.885	233.036
12.000		5.769	4.500	3.500	0.000	3.500	4.500	5.684	12.000

646

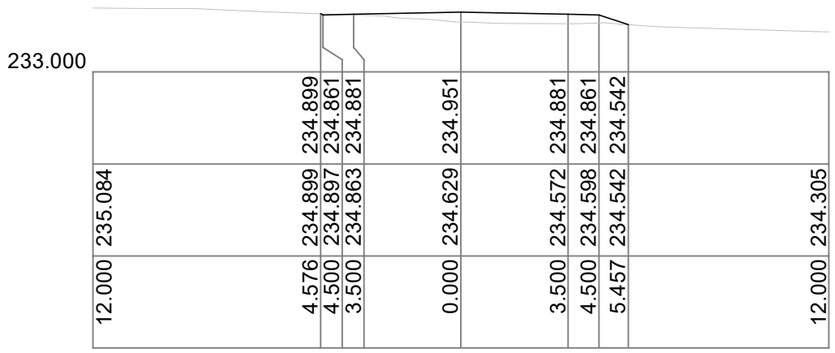


		234.755	234.512	234.532	234.602	234.532	234.512	233.837
12.000	235.102	234.755	234.730	234.654	234.326	234.222	234.109	233.837	233.548
12.000		4.987	4.500	3.500	0.000	3.500	4.500	6.525	12.000

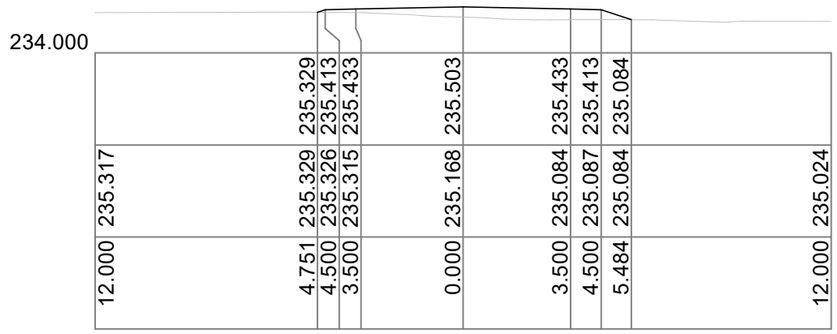
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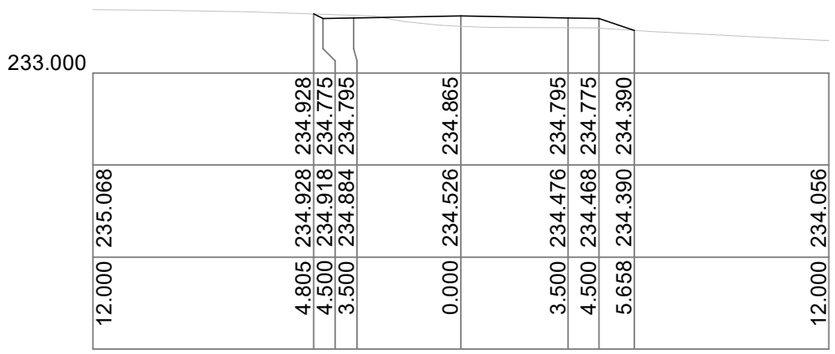
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 17**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



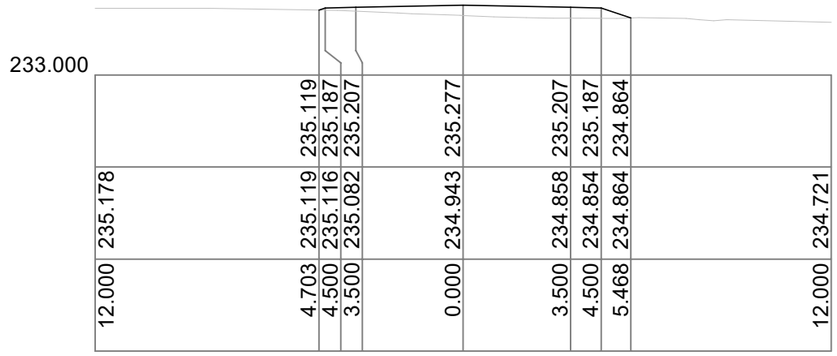
695



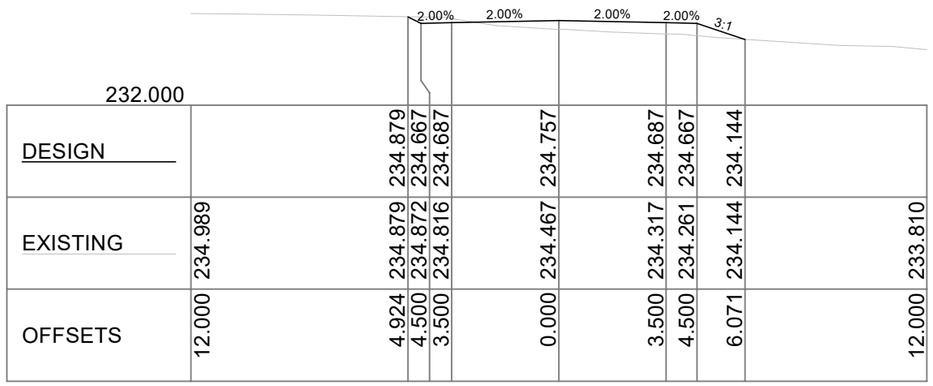
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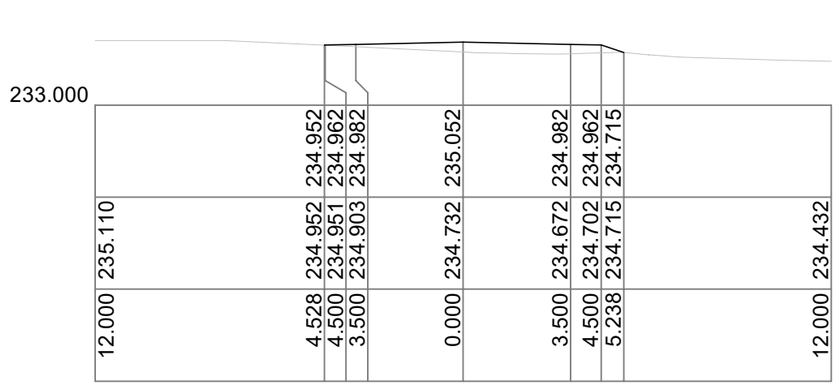
690



710



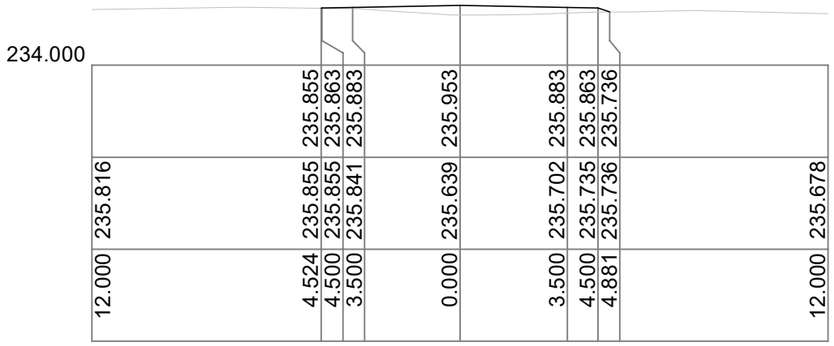
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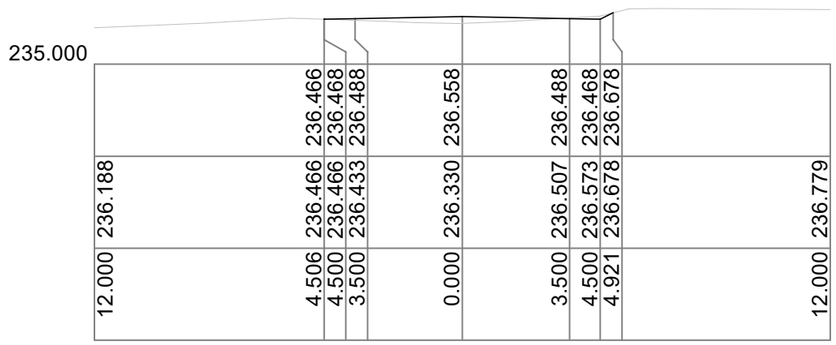
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Scale Horizontal 1:200 Vertical 1:200

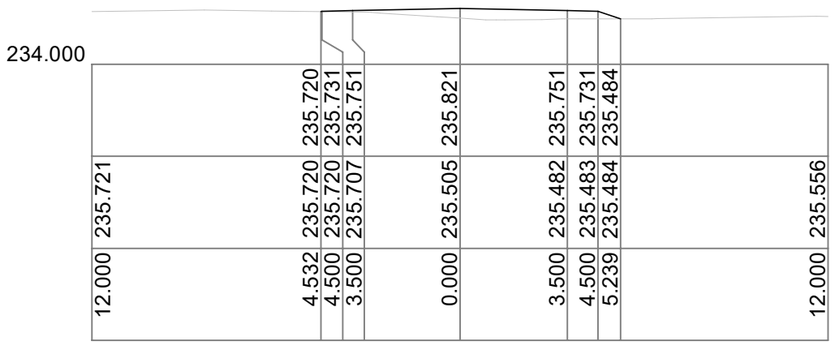
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
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14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 18**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



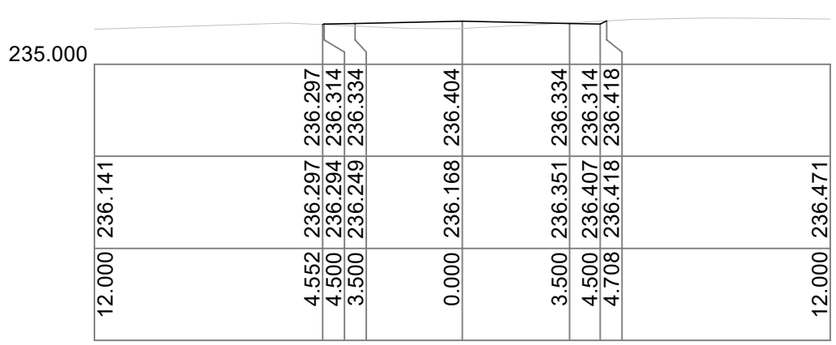
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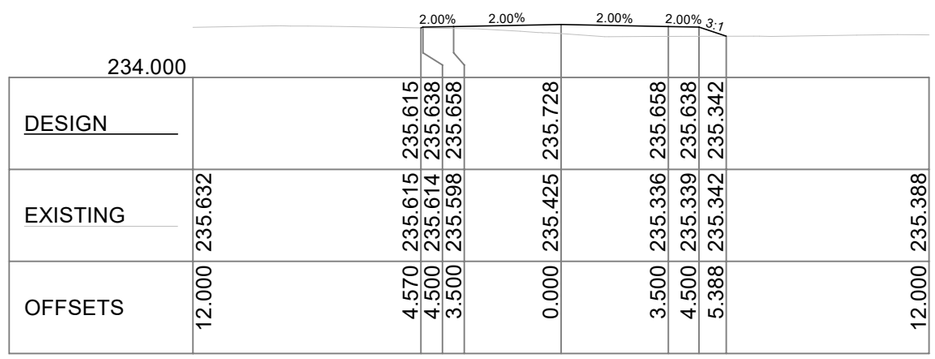
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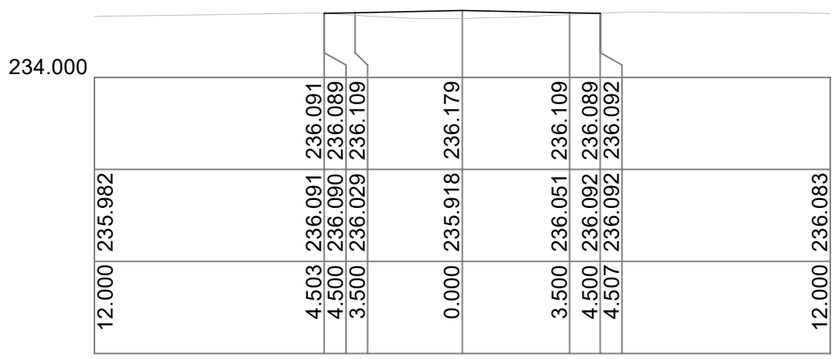
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760



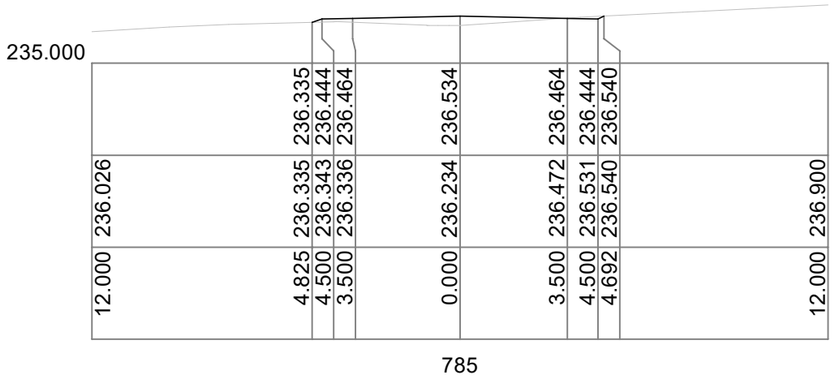
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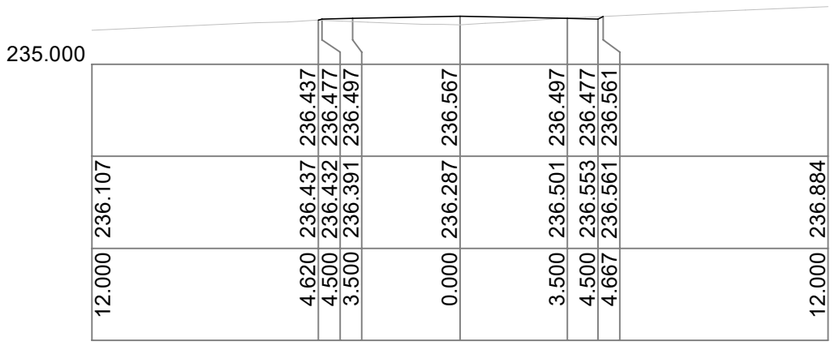
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Scale Horizontal 1:200 Vertical 1:200

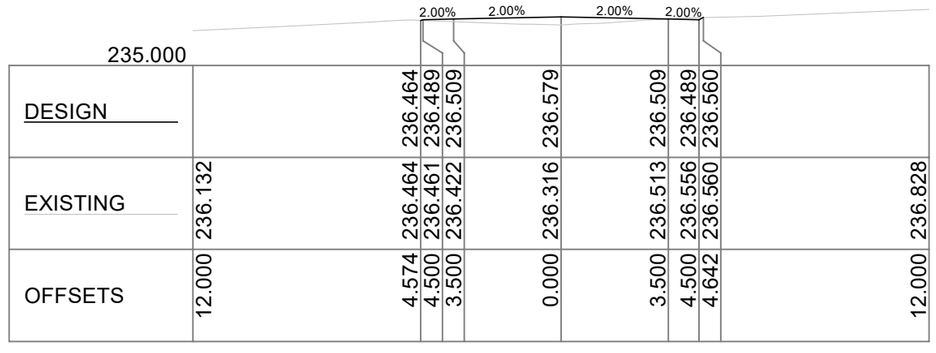
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 19**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



785



780



777

MAGNET Site - Volumes Report
Jul 14, 2024 12:21AM

Job: MAROOTA.mjo

ALIGNMENT: ALIGN1
DESIGN SURFACE: DESIGN
NATURAL SURFACE: NATURAL

Stripping Volume 0.000
Pavement Volume 1457.439

Total Cut 1435.124
Total Fill 1114.127

Net Volume 320.997 Cut

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 55	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA - MP	
14/07/2024	HEIGHT DATUM			**QUARRY ACCESS ROAD**	PLAN NUMBER	**Sheet Number: 20**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	**MAROOTA NSW**		