CENTRAL CIVIL

ABN: 61 167 710 545

Submissions Report

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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.

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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. 1055/04 February 2025

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Executive Summary

This *Submissions Report* presents the response from Central Civil (NSW) Pty Ltd (the Applicant) to the submissions received and matters raised by Hornsby Shire Council (Council) regarding the application for development consent for the proposed Maroota Central Civil Quarry (the Quarry) during and following the public exhibition period for the *Environmental Impact Statement for the Maroota Central Civil Quarry* (the EIS).

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.

The Quarry is proposed to be 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 (the Quarry Site).

The EIS was placed on exhibition by Hornsby Shire Council (Council) from 6 September 2024. Since that date, submissions were received from four Government agencies and an undisclosed number of members of the public. Matters raised in the public submissions related to traffic management, air quality and noise-related impacts upon the community in the vicinity of the Quarry Site.

Minor refinements to the Proposal have been made in response to the submissions received including the following.

- An increase to the nominated planting density for revegetation as recommended by NSW National Parks and Wildlife Service.
- Updated road designs to meet Council's Civil Works Specifications AUS-SPEC, as well as a commitment to widen the one lane section of the Unnamed Local Road to 6.5m between the existing Give Way signs.

In addition, the following clarifications regarding the Proposal and its impacts have been provided.

- Updates to the *Air Quality Impact Assessment*, *Noise Assessment* and *Biodiversity Development Assessment Report* for clarification on a range of matters including management and mitigation measures, predicted impacts at surrounding residences and further details around how the principles of avoid and minimise were addressed during the design of the Proposal.
- Updates to the Compound Layout Plan for clarification and identification of a range of infrastructure within the Office, Amenities, and Parking Area.
- Preparation of a range of management plans for the Quarry, including the following.
  - *Erosion and Sediment Control Plan*
  - *Preliminary Construction Management Plan*
  - *Environmental Management Plan*
  - *Operational Plan of Management*
- Clarifications regarding the protocols proposed to be implemented during campaigns of Virgin Excavated Natural Materials (VENM), the volumes of VENM required for final landform construction as well as the anticipated rates of VENM importation.

The proposed Quarry as described in this *Submissions Report* would not result in any additional environmental impacts that are not consistent with the assessments provided as part of the EIS. The proposed Quarry has been designed to permit the efficient extraction of sandstone resources within the Quarry Site. A range of design and operational mitigation measures have been incorporated into the Quarry design to ensure all relevant statutory goals and criteria, environmental objectives, and reasonable community expectations are satisfied.

Environmental management at the Quarry would be undertaken in accordance with the prepared management plans and the Applicant's internal procedures. This *Submissions Report* demonstrates that potential impacts associated with biodiversity, erosion and sediment control, traffic and transportation, air quality, and noise would be acceptable and generally consistent with the assessments undertaken during the preparation of the EIS.

On balance, the proposed Quarry would be in the public interest as it would enable the beneficial use of the material generated by development elsewhere and would satisfy the demand for Quarry products within the Hornsby LGA and the Greater Sydney Region.

1. Introduction

1.1 Scope

This document has been compiled to provide a response to the key matters raised in public and government agency submissions lodged with the Hornsby Shire Council during and following the exhibition period for the *Environmental Impact Statement* (EIS) for the Maroota Central Civil Quarry (the Quarry). The applicant for the Quarry is Central Civil (NSW) Pty Ltd (the Applicant). The Quarry is proposed to be 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 (the Quarry Site) (**Figure 1**).

The Applicant is seeking approval for the development and operation of the Quarry (the Proposal) which would include the following (**Figure 2**).

- 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.

The EIS was placed on exhibition by Hornsby Shire Council (Council) from 6 September 2024. Since that date, submissions were received from four Government agencies and an undisclosed number of members of the public.

This document provides an analysis of the submissions received, a summary of actions taken since the exhibition of the EIS and a review of the matters raised. The document concludes with an updated evaluation of the Proposal's merits that reflect all additional matters addressed in this document.

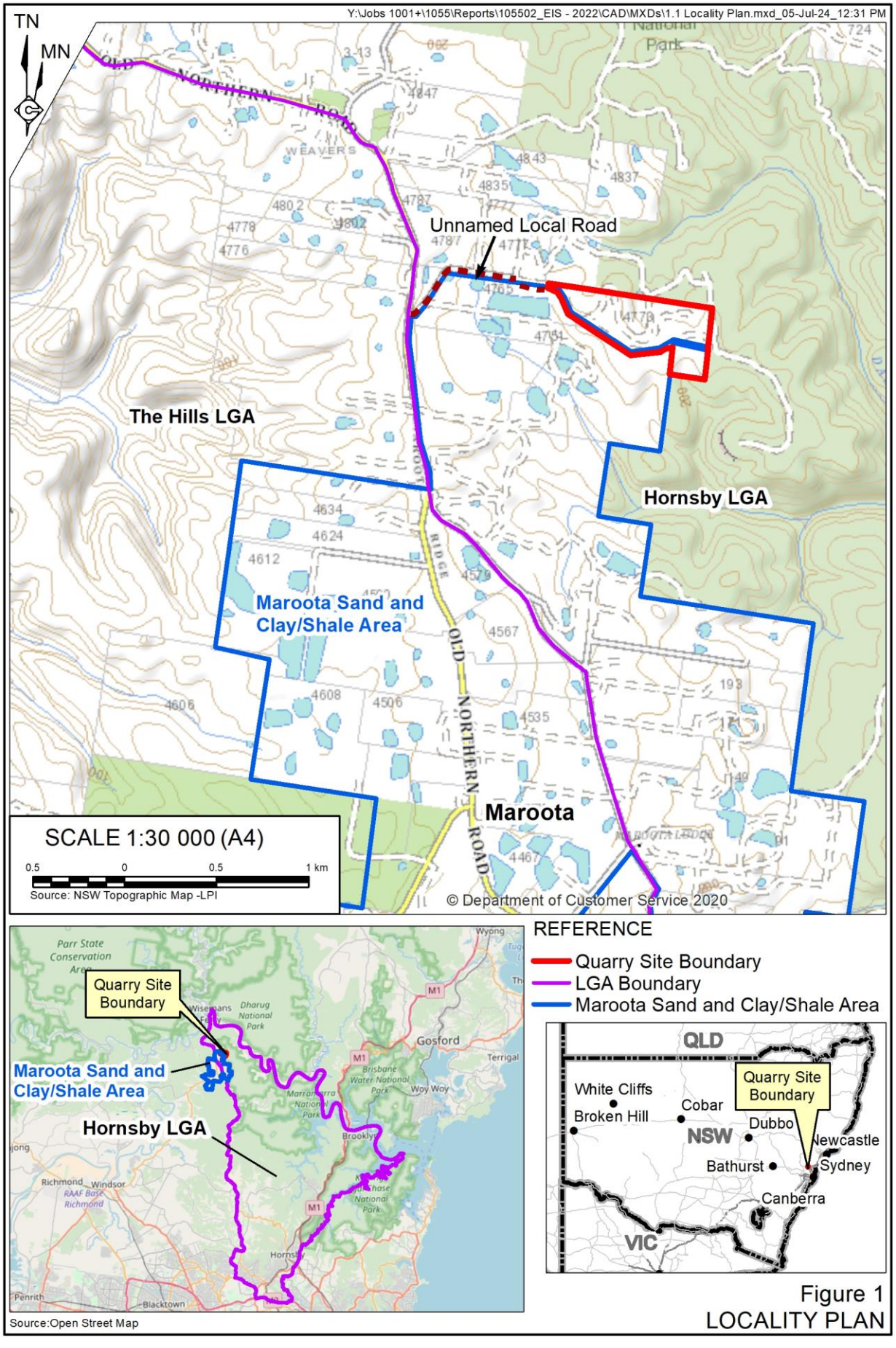


Figure 1
LOCALITY PLAN

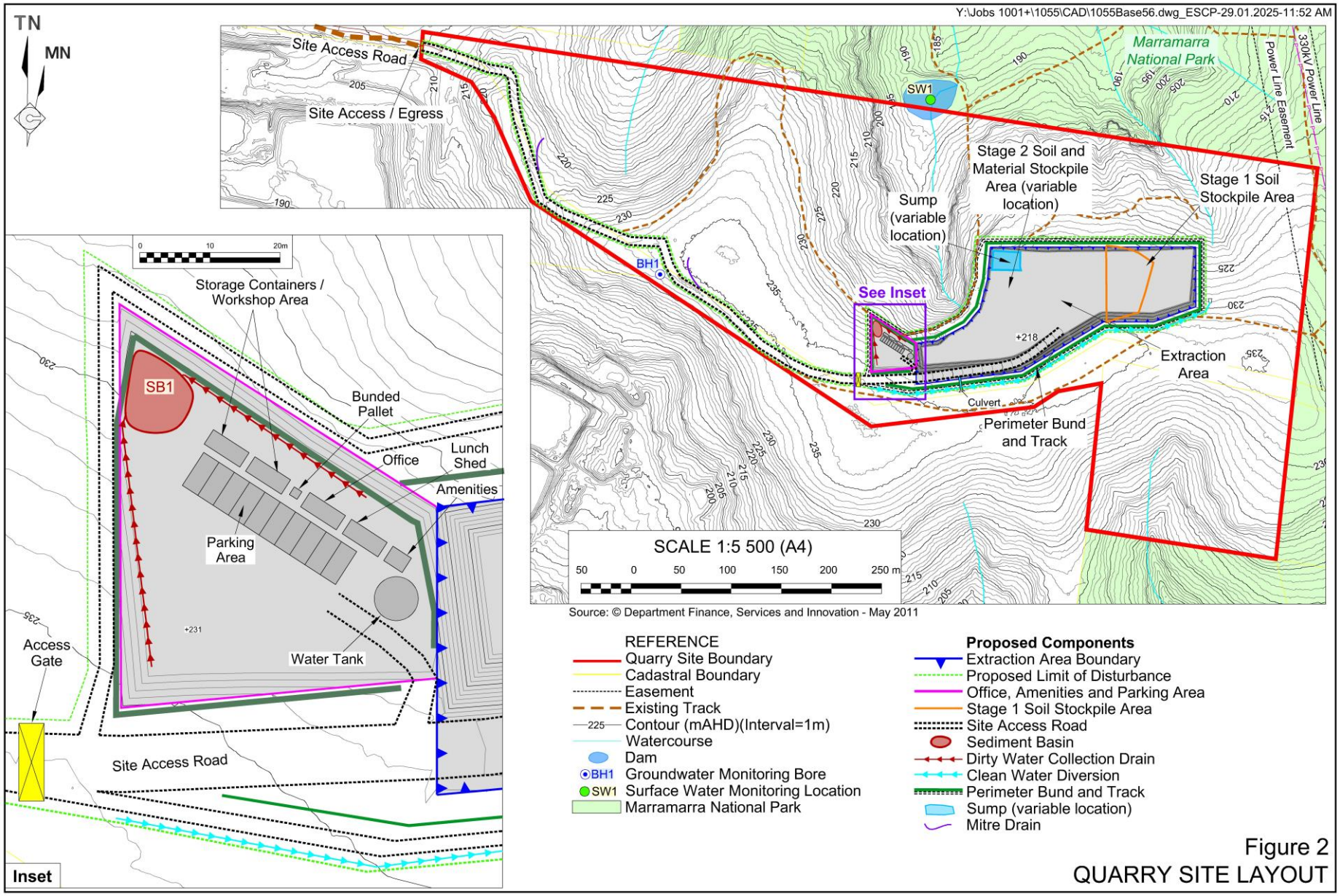


Figure 2
QUARRY SITE LAYOUT

1.2 Document Format

This report has been compiled in six sections with a set of 11 appendices as follows.

Section 1: introduces the report.

Section 2: provides an analysis of the submissions received from Government agencies and members of the public.

Section 3: provides a summary of the actions taken since exhibition, including consultation that has been undertaken as a result of the content of some of the submissions.

Section 4: provides a comprehensive set of responses to the matters raised by members of the public and Government agencies.

Section 5: provides an updated evaluation of the Proposal taking into consideration the matters raised in submissions.

Section 6: provides details of documents referenced in the Submissions Report.

A set of appendices is provided to support the report addressing the following.

1. *Noise Assessment – Updated* prepared by Muller Acoustic Consulting Pty Ltd
2. *Earthworks (Cut and Fill) Report* prepared by R.W. Corkery & Co. Pty Limited
3. *Sewage Tank Certification* prepared by Coerco
4. *Environmental Management Plan* prepared by R.W. Corkery & Co. Pty Limited
5. *Updated Biodiversity Development Assessment Report* prepared by Ecoplanning Pty Ltd
6. *Erosion and Sediment Control Plan* prepared by R.W. Corkery & Co. Pty Limited
7. *Updated Civil Designs* prepared by Duncan Priestley Civil Engineering Pty Ltd
8. *Letter Report in relation to the Air Quality Impact Assessment* prepared by Northstar Air Quality Pty Ltd
9. *Preliminary Construction Management Plan* prepared by R.W. Corkery & Co. Pty Limited
10. *Operational Plan of Management* prepared by R.W. Corkery & Co. Pty Limited
11. *Updated Sediment Basin Storage Requirement Calculations* prepared by R.W. Corkery & Co. Pty Limited

2. Analysis of Submissions

During exhibition, four Government agencies provided feedback generally regarding the matters relevant to the administrative functions of each agency. The majority of these submissions were compiled in a Request for Further Information (RFI) provided by Council on 14 October 2024, with Transport for NSW providing a submission separately on 18 October 2024. Council issued a further RFI on 6 January 2025. For the purposes of this document, Council's RFIs have been treated as Government agency submissions and are addressed in Section 4.

It is noted that the following Government agencies reviewed the EIS and were satisfied with, provided recommended conditions of consent and/or no comment on the Proposal. The Applicant has reviewed each of these submissions and would consent to imposition of conditions of consent consistent with the agency recommendations. As such, their submissions are not addressed in the following subsections.

- Transport for New South Wales.
- Water NSW
- NSW Rural Fire Service

An undisclosed number of public submissions were received by Council during public exhibition of the EIS. A summary of the matters raised by the public was provided by Council and related to traffic management, air quality and noise-related impacts upon the community in the vicinity of the Quarry Site. This reflects the local nature of potential impacts associated with the Proposal.

3. Actions Taken Since Exhibition

3.1 Consultation

Consultation was undertaken via a Preliminary Briefing meeting with Council and the Sydney North Planning Panel on 6 November 2024. Discussions during this meeting principally related to clarifications around Council's expectations for several matters raised in its initial RFI, including a request for a modified development proposal and submission of an updated EIS. These matters have been addressed in Section 4.5.3 and 5.2.

Further consultation with Council was undertaken in a virtual meeting on 11 November 2024. The discussion focused on further clarification on a range of matters raised in the initial RFI, including the qualifications required to prepare the requested *Earthworks (Cut and Fill) Report* and the need to more clearly identify the rates at which VENM would be imported to the Quarry Site. These matters have been addressed in Sections 4.2.3 and 4.5.3, respectively, as well as **Appendices 2** and **4**.

3.2 Clarifications to the Proposal

Amendments to the size of the proposed sediment basin and the definition of additional erosion and sediment controls proposed to be implemented at the Quarry were completed during preparation of the *Erosion and Sediment Control Plan* (ESCP) attached as **Appendix 6**. The updated *Sediment Basin Storage Requirement Calculations* are attached as **Appendix 11**. It is noted that the footprint of the sediment basin would be confined to the proposed limit of disturbance and would not require any additional clearing of native vegetation.

Clarifications around the proposed rate of importation of VENM for use in landform construction and progressive rehabilitation of the Quarry Site were also defined during the preparation of this *Submissions Report*. Further details on this matter are presented in Section 4.5.3.

The Applicant has also committed to increase to the proposed planting density for revegetation of the Quarry Site in accordance with a recommendation by the National Parks and Wildlife Service. Further details and justification for the nominated planting density is provided in Section 4.3.

Finally, in accordance with a request from Council, the Applicant has committed to update to the site access road civil plans to ensure the design is in accordance with the current Council's *Civil Works Specifications AUS- SPEC Specifications*. The Applicant has also committed to widen the one lane section of the Unnamed Local Road to 6.5m between the existing Give Way signs. Further detail is provided in Section 4.5.1 and the updated civil designs are attached as **Appendix 7**.

4. Response to Submissions

4.1 Introduction

This section provides a response to all submissions received during and following public notification of the EIS. In order to limit repetition and allow the matters raised in the submissions to be adequately and efficiently addressed, each submission was reviewed, and the matters raised were categorised.

The following subsections provide representative comments from a range of submissions for each issue raised and a consolidated response to that issue. The representative comment(s) have been chosen to highlight the matter identified and it is noted that these may not be the only feedback received in submissions that comment on a specific matter.

4.2 Project Description

4.2.1 Disturbance Area

Whilst it appears the 18.1ha figure provided in SEARs for the proposed disturbed area may represent the whole area of the premises occupied by the proposed extractive industry, there is still a significant discrepancy between the SEARS figure (18.1ha) and the 23.33ha figure provided for the overall 'Quarry Site' in the EIS.

Additionally, there are discrepancies between the area of proposed "operational disturbance" as specified in the EIS (41.13ha) compared with the project description provided in Section 2.1 of the Acoustic Report (4.37ha) which equates to a discrepancy of 0.24ha or 2400m2.

The proposed area for the overall quarry site and the proposed area of disturbance requires clarification.

Hornsby Shire Council

Response

It is noted that there was an error in calculating the total area of the Quarry Site within the Form A request for SEARs resulting in a lower area being reported in the request for SEARs than in the final EIS. The area in the EIS nominated for Quarry Site (23.33ha) is the correct figure, however it is noted that the actual operational disturbance area of 4.13ha is significantly smaller and has been assessed appropriately for all potential environmental impacts.

The Applicant engaged Muller Acoustic Consulting (MAC) to prepare an updated Noise Assessment. The updated Noise Assessment report is hereafter referred to as MAC (2025) and is attached as **Appendix 1**.

MAC (2025) has been updated to include the correct operational disturbance area of 4.13ha.

4.2.2 Layout Plans

The proposed Compound Layout Plan 1 does not provide dimensions / GPS coordinate details to clearly delineate the proposed development site and components of the development including dimensions and boundary setback distances of the proposed: quarry site; office, amenities and parking area; access road; perimeter bund and track; extraction area; sediment basin; sump, stockpile area/s and other site development, including setback distances to watercourses traversing the premises.

Whilst it is noted that section 2.4.1. of the EIS identifies: 'The marking out of all component areas to be disturbed with highly visible and permanent markers' (Page 2-8) to be carried out as part of the site establishment activities, it is not clear what "all component areas to be disturbed" means and therefore what aspects of the proposed development site will be identified with permanent markers and what the proposed permanent markers will comprise of.

Hornsby Shire Council

Response

The proposed Compound Layout Plan for the Quarry has been updated to include the dimensions and GPS coordinates of the various infrastructure located within the Office, Amenities, and Parking Area and the wider Quarry Site (**Figure 3**). The updated plan also includes setback distances for the various infrastructure and watercourses located within the Quarry Site.

Section 2.4.2 of the EIS and Section 3.1 of the *Preliminary Construction Management Plan* (PCMP) describe the activities relating to component mark out during the site establishment phase of the Quarry. The approved areas of disturbance and key component areas would be surveyed and marked out using highly visible, appropriately labelled permanent markers such as yellow painted concrete or steel posts. Survey markers would be placed at the corners of the disturbance areas, i.e. the proposed Limit of Disturbance and Extraction Area boundary, key component areas including the Office, Amenities, and Parking Area, and at various locations along the Site Access Road and Perimeter Track.

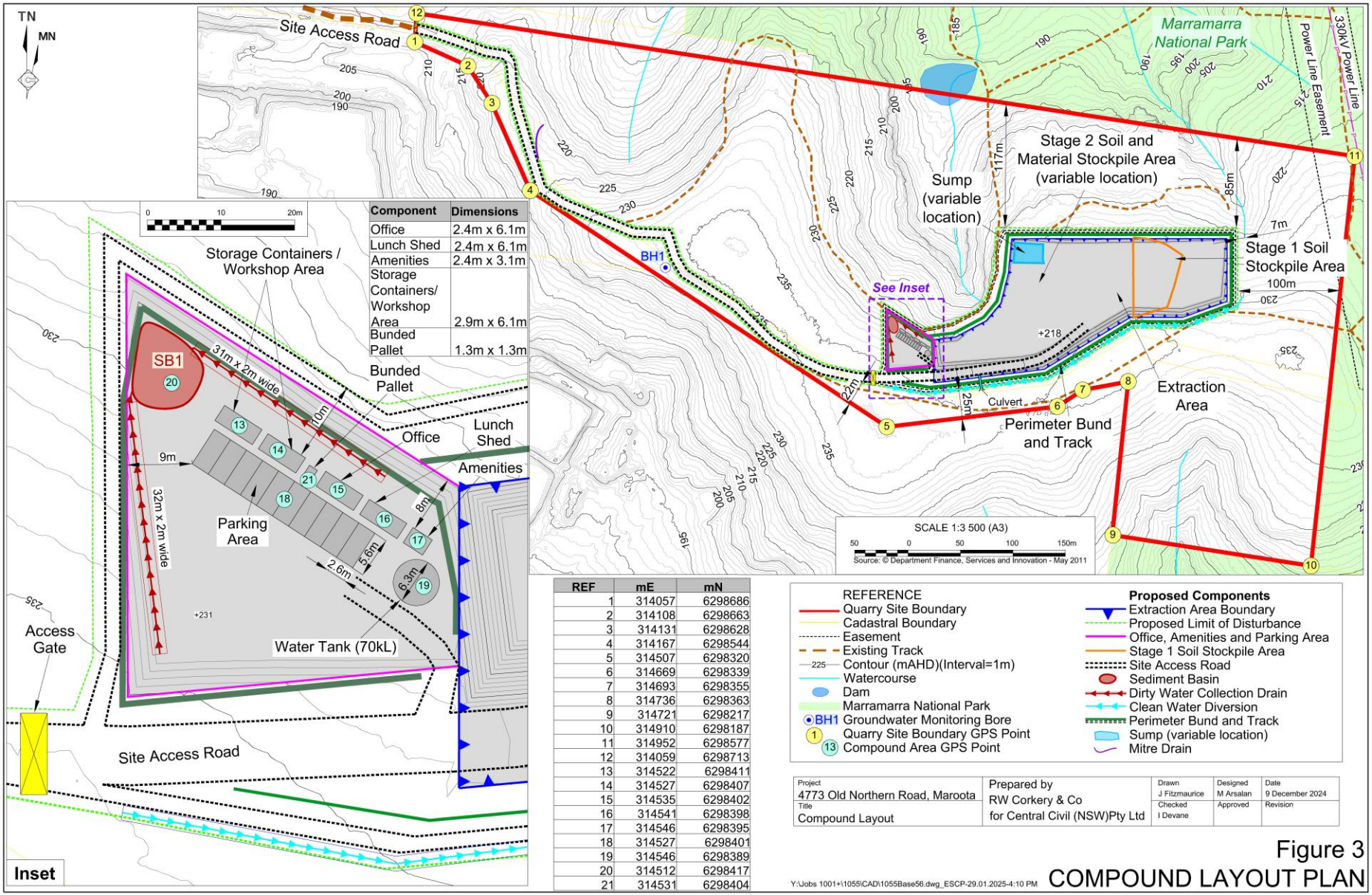
The proposed Compound Layout Plan 1 only relates to Stage 1 of the proposed extraction phase and there is no separate site plan showing proposed Stage 2 of the extraction phase.

Accordingly, while the proposed Compound Layout Plan 1 identifies the 'Stage 1 Soil Stockpile Area' location in the eastern part of the proposed extraction area, no soil stockpile location is identified for Stage 2.

Further, the proposed Compound Layout Plan 1 does not identify the proposed location of material stockpiles for Stages 1 and 2 of the development, including: sandstone logs, extracted friable sandstone and off-cuts and imported VENM (see next item re. 'VENM importation').

Whilst it is noted that Figures 2.4 and 2,5 of the EIS show the proposed Stage 1 Extraction Area and Stage 2 Extraction Area respectively, as well as not showing the proposed location of soil and stockpile areas for Stage 2 the plan represented by Figure 2.5 has not been included in the part of the architectural plan set.

Hornsby Shire Council



Component	Dimensions
Office	2.4m x 6.1m
Lunch Shed	2.4m x 6.1m
Amenities	2.4m x 3.1m
Storage Containers/ Workshop Area	2.9m x 6.1m
Bunded Pallet	1.3m x 1.3m

REF	mE	mN
1	314057	6298686
2	314108	6298663
3	314131	6298628
4	314167	6298544
5	314507	6298320
6	314669	6298339
7	314693	6298355
8	314736	6298363
9	314721	6298217
10	314910	6298187
11	314952	6298577
12	314059	6298713
13	314522	6298411
14	314527	6298407
15	314535	6298402
16	314541	6298398
17	314546	6298395
18	314527	6298401
19	314546	6298389
20	314512	6298417
21	314531	6298404

REFERENCE
- Quarry Site Boundary
- Cadastral Boundary
- Easement
- Existing Track
- Contour (mAHD)(Interval=1m)
- Watercourse
- Dam
- Marramarra National Park
- BH1 Groundwater Monitoring Bore
- Quarry Site Boundary GPS Point
- Compound Area GPS Point

Proposed Components
- Extraction Area Boundary
- Proposed Limit of Disturbance
- Office, Amenities and Parking Area
- Stage 1 Soil Stockpile Area
- Site Access Road
- Sediment Basin
- Dirty Water Collection Drain
- Clean Water Diversion
- Perimeter Bund and Track
- Sump (variable location)
- Mitre Drain

Project: 4773 Old Northern Road, Maroota	Prepared by: RW Corkery & Co for Central Civil (NSW)Pty Ltd	Drawn: J Fitzmaurice	Designed: M Arsalan	Date: 9 December 2024
Title: Compound Layout		Checked: I Devane	Approved:	Revision:

Y:\Jobs 1001+\1055\CAD\1055Base56.dwg_ESCP-29.01.2025-4:10 PM

Figure 3
COMPOUND LAYOUT PLAN

Response

The proposed Compound Layout Plan (**Figure 3**) shows the Quarry Site in its ultimate configuration. Notwithstanding, separate plans showing the proposed Stage 1 and Stage 2 of the extraction phase are presented as Figure 2.4 and Figure 2.5 of the EIS respectively.

As described in Section 2.4.5 of the EIS, during Stage 2 of extraction operations, soil would be stockpiled within completed sections of the Extraction Area for later use in rehabilitation. Similarly, as described in Section 2.5.4 of the EIS, extracted material from both stages of the development would be stockpiled within the Extraction Area for further processing or loading onto trucks for despatch.

For clarity, labels to these effects have been added to the updated Compound Layout Plan (see **Figure 3**). It is noted that the location of the soil and extracted material stockpiles would periodically change within the Extraction Area as extraction progress and spatial requirements shift for ease of management.

Stockpiling of imported VENM is addressed in Section 4.5.3 of this document.

The development proposal includes a workshop (EIS Section 2.2 and Acoustic Report Section 2.1) however, a workshop is not shown on either Compound Layout Plan 1 or Compound Layout Plan 2 and from the application documents, the location and configuration of the proposed workshop is unclear.

Hornsby Shire Council

Response

The Compound Layout Plan (**Figure 3**) has been updated to identify the location and dimensions of the proposed workshop. In essence, the workshop would be a shipping container located within the Office, Amenities, and Parking Area used mainly to serve as a storage area for small quantities of earthmoving equipment consumables, general tools and small equipment.

The proposed development includes fuel storage and waste storage, however, the location of these facilities is not shown on the Proposed Site Compound Layout Plans.

Hornsby Shire Council

Response

The storage of any minor quantities of fuels required at the Quarry Site would be located on bunded pallets within the Office, Amenities, and Parking Area (**Figure 3**). The bunded pallets have been identified on the Compound Layout Plan, however the location of the bunded pallets may change as required as the operations at the Quarry progress.

As identified in Section 2.10 of the EIS, no diesel would be permanently stored within the Quarry Site. A self-bunded trailer, vehicle-mounted diesel tank or similar would be used to transport diesel to the Quarry Site, as required. Any storage of hydrocarbons required on site would be undertaken in accordance with *AS1940 The Storage and Handling of Flammable and Combustible Liquids*. Further detail on this matter is provided in Section 4.2.6 of this document.

4.2.3 Earthworks

According to Section 2.2 of the EIS, the area immediately west of the Extraction Area would be profiled using cut and fill methods to an elevation of approximately 231m AHD', however, a cut and fill plan has not been provided showing the extent of cut and fill works.

Additionally, the extent of earthworks (cut and fill) required for other Site Establishment Activities, including roads works, perimeter safety bund and track and water management infrastructure are not shown on the submitted site and architectural plans.

Hornsby Shire Council

Response

An *Earthworks Cut and Fill Report* is attached to this *Submissions Report* as **Appendix 2**, which presents the locations and quantities of the cut and fill activities required at the Quarry Site during the site establishment phase.

Cut and fill details for the proposed roadworks are provided in the updated site access road civil plans (see Section 4.5.1).

4.2.4 Hours of Operation

The proposed hours of operation specified in the EIS are inconsistent with the hours of operation set out in Table 3 of the Noise Assessment. Clarification of the proposed hours of operation of the development is required.

Hornsby Shire Council

Response

The proposed hours of operation are presented in Table 2.4 of the EIS. It is acknowledged that MAC (2024) presented incorrect proposed hours of operation, however, Table 3 of MAC (2025) (**Appendix 1**) presents the correct proposed hours of operation. For clarity, the proposed hours of operation for the Quarry are reproduced in **Table 1**.

Table 1
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			
Product despatch			
Maintenance (non-audible)	24 hours / day	24 hours / day	Nil

4.2.5 Waste Management

The proposed development includes onsite sewerage management facilities comprising either chemical OR pump-out toilet, however further details have not been provided. Accordingly, a Site Capability and System Design report is required outlining the most suitable on-site wastewater management system for the site.

Hornsby Shire Council

Response

The proposed onsite sewerage management facilities would consist of a pump out toilet.

A Site Capability and System Design report is not considered relevant to the Proposal as both *AS 1547 – Onsite domestic wastewater management (2000)* and *Environment & Health Protection Guidelines – Onsite Sewage Management for Single Households (1998)* apply to residential developments. Notwithstanding, the attached sewage tank certification identifies the dimensions and specification of the proposed system (see **Appendix 3**).

4.2.6 Hazardous Materials

The application does not provide sufficient information on the proposed mobile refuelling operation, including tank storage capacity for the proposed trailer mounted diesel fuel tank, refuelling procedures and general hazardous storage material storage and management, including hazardous waste storage and management. The Compound Layout Pan 1 and Compound Layout Plan 2 do not show the location of proposed hazardous material storage including location of proposed hazardous waste storage for all stages of the proposed development.

Hornsby Shire Council

Response

Mobile refuelling operations would occur at the Quarry Site during both the site establishment and operational phases of the Quarry. Mobile refuelling would be serviced by a commercially available trailer or vehicle-mounted, self-bunded diesel fuel tank. The capacity of the mobile fuel tank would vary throughout the Quarry life dependent on Quarry requirements and contractor equipment availability. However, the capacity of the mobile fuel tank would not exceed 10,000L. Refuelling of equipment would be undertaken in accordance with the Applicant's Refuelling Vehicles Plant and Equipment procedure, attached as Appendix 5 of the *Environmental Management Plan* (EMP) (**Appendix 4**).

Storage and management of hazardous waste and materials would be undertaken in accordance with Section 9.1 of the EMP. In summary, the following hazardous chemical management controls and safeguards would be implemented throughout the life of the Quarry.

- All Quarry personnel, contractors, and their employees would undergo a site-specific induction, incorporating hazardous chemical management prior to commencing work at the Quarry.
- Hydrocarbons and hazardous materials (i.e. diesel) 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*.

- Adhere to the general principles of AS1940:2017 – The storage and handling of flammable combustible liquids.

Proposed hazardous material storage, namely hydrocarbons, would be undertaken within the bunded pallet area located within the Office, Amenities, and Parking Area as identified on the Compound Layout Plan (**Figure 3**). No diesel would be permanently stored on site as diesel refuelling would be undertaken off-site or serviced by a mobile trailer mounted, self-bunded diesel tank as required at the Quarry.

4.3 Biodiversity

NPWS notes the presence of multiple individuals of the highly restricted Darwinia fascicularis ssp oligantha endangered population adjacent to the access road. NPWS recommends the implementation of measures to ensure that these plants and their habitat are retained and protected.

NSW National Parks and Wildlife Service

Response

Management and mitigation measures to protect the individuals of *Darwinia fascicularis* subsp. *oligantha* adjacent to the Site Access Road are laid out in Sections 3 and 4.1 of the *Vegetation Management and Restoration Plan* (VMRP – refer to EMP Appendix 3) and Section 4.1 of the EMP for the Quarry (**Appendix 4**).

In summary, the following management and mitigation measures will be implemented to protect individuals of *Darwinia fascicularis* subsp. *oligantha* adjacent to the Site Access Road.

- Pre-clearance surveys would be undertaken under the supervision of a suitably qualified ecologist prior to disturbance of areas where individuals of *Darwinia fascicularis* subsp. *oligantha* may be present.
- A permanent barrier would be constructed around individuals of *Darwinia fascicularis* subsp. *oligantha* adjacent to the Site Access Road and maintained to ensure species are not inadvertently impacted by construction, use and maintenance of the Site Access Road.
- All personnel and contractors would be inducted and made aware that unauthorised clearing of native vegetation is not permitted and may have legislative consequences.

Where revegetation of the site is to occur, species used should be native and consistent with the vegetation community that was cleared, to minimise the potential for non-native or non-local native species to spread in to Marramarra National Park. It is recommended that a greater planting density than that proposed in the Vegetation Management and Restoration Plan be implemented.

NSW National Parks and Wildlife Service

Response

As noted in Section 2.13 of the EIS and further detailed in Section 4.4 of the VMRP and Table 3 of the EMP, revegetation areas would be seeded with native species consistent with those listed as occurring within the PCTs mapped across the Quarry Site.

The Applicant would implement NPWS' recommendation to increase the proposed planting density assist in the success of revegetation activities. As such, the standard planting densities for the quarrying/mining industry identified in the *NSW Rehabilitation Cost Estimate Tool version 2024-1* (NSW Resources Regulator, July 2024) have been adopted as follows.

- One tree per $16m^2$ (4m centres)
- One shrub per $16m^2$ (4m centres)
- Up to 4 groundcovers per $1m^2$

It is also noted that hydromulching, broadcast seeding and planting of tubestock would be supplemented by passively revegetation through natural seed distribution from the surrounding areas of remnant vegetation within the Quarry Site and the adjoining Marramarra National Park.

Twelve hollow-bearing trees (HBTs) were recorded within the subject land, and 28 HBTs were recorded within the study area. The BDAR provides insufficient information demonstrating whether or not these fauna habitat resources are used by native animals including threatened species.

Hornsby Shire Council

Response

The Applicant engaged Ecoplanning Pty Ltd (Ecoplanning) to prepare an updated BDAR. The updated BDAR is hereafter referred to as Ecoplanning (2025) and is attached as **Appendix 5**.

It is acknowledged that HBTs were identified within the Quarry Site, however, a majority of these features have been avoided under the Proposal (see Figure 3.9 within Ecoplanning (2025)). During preparation of the initial BDAR included as Appendix 7 to the EIS, Ecoplanning undertook targeted surveys for threatened species that could potentially utilise these features within the Quarry Site in accordance with the BAM. The methodologies and outcomes of these surveys are detailed in Section 4.3 of Ecoplanning (2025). In summary, surveys including stag watching and spotlighting of large HBTs (>20cm diameter at breast height) did not detect any species of forest owls. Furthermore, Glossy Black-Cockatoos were not detected at suitable stags during the breeding season.

Threatened Eastern Pygmy Possum (Cercartetus nanus) was recorded with a camera in the far eastern portion of the study area. This species is likely to use a large portion of the Subject Land for foraging and as connective habitat that is likely to be within the typical home ranges of this species. The BDAR provides insufficient information on how impacts to this species have been avoided and mitigated within the Subject Land.

Hornsby Shire Council

Response

The Eastern Pygmy Possum was detected within the eastern area of the Quarry Site during spotlighting surveys and on remote cameras. Based on these results, Ecoplanning conservatively identified the entirety of the Quarry Site as habitat for this species.

As noted in Sections 5.1 and 5.2 of Ecoplanning (2025), impacts to this species have been avoided and minimised by locating the areas of proposed disturbance within the most degraded portions of the Quarry Site (i.e. those associated with historical extraction activities), with the portions of the Quarry Site which are not proposed to be disturbed considered to represent better quality habitat for the species.

Although the Proposal would impact connective and foraging habitat for the species, Ecoplanning (2025) considers that retained vegetation would still provide connectivity throughout the Quarry Site.

Unavoidable impacts to the conservatively estimated habitat extents of Eastern Pygmy Possum will be offset in accordance with the BAM to ensure no net loss for these species.

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. The subject land is within the species polygon for Red-crowned Toadlet (Figure 4.11 of the BDAR). Red-crowned Toadlet disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter, therefore, non-riparian areas within the Subject Land provides potential habitat for this species. The BDAR provides insufficient information on how impacts to this species have been avoided and mitigated.

Hornsby Shire Council

Response

While the proposed limit of disturbance is located within the species polygon for Red-crowned Toadlet which represents breeding and non-breeding habitat for this species, it is not feasible or practical to totally avoid impacts to the species polygon due to site-specific constraints.

From an engineering and environmental perspective, placing the Extraction Area and associated areas of disturbance close to the top of the ridge within the Quarry Site would minimise the risks of groundwater intersection during extraction operations. The proposed location of the Extraction Area also has the benefit of former extraction areas providing existing sumps, thereby minimising the risks of sediment-laden runoff during site establishment.

Ecoplanning (2025) considers that relocating the Extraction Area away from the Red-crowned Toadlet species polygon would have greater impacts on native vegetation and habitat for other threatened species including the Eastern Pygmy Possum. Although impacts to the species polygon for the Red-crowned Toadlet cannot be totally avoided by the Proposal, the Proposed Limit of Disturbance (**Figure 2**) is generally located within the most degraded habitat within this species polygon, and all records of the species are outside the Proposed Limit of Disturbance which would minimise impacts to the Red-crowned Toadlet. Additionally, the watercourse which provides breeding habitat for the species will not be directly impacted by the Proposal.

There is a significant failure to consider the impacts of the proposed development on threatened species habitat and aquatic habitat present downstream from the Subject Land. The cumulative impacts of the proposed quarry on the waterways of Marramarra National Park requires more information in the BDAR, as there are other quarries adjacent to the National Park that are affecting riparian areas. This prescribed impact must be considered and appropriately mitigated.

Hornsby Shire Council

Response

As noted in Section 5.1 of Ecoplanning (2025), the Extraction Area and associated areas of disturbance would be located near the top of the ridge within the Quarry Site, thereby maximising the area of native vegetation between the proposed areas of disturbance and watercourses. By extension, as the Quarry would be located at the top of catchment locally, this location would also mitigate potential impacts to threatened species habitat and aquatic habitat present downstream from the Quarry Site, as well as cumulative impacts on the watercourses within Marramarra National Park.

Furthermore, Ecoplanning (2025) considers that implementation of the proposed closed water management system (see Section 4.4 of this document) would minimise potential downstream impacts.

The BDAR lacks the appropriate information to give Council officers the confidence that the principles of 'avoid and minimise' before offsetting have been appropriately addressed through the development design process.

Hornsby Shire Council

Response

The responses to the matters raised in this subsection have been incorporated into Ecoplanning (2025) to further demonstrate to Council that the principles of avoid and minimise were addressed during the design of the Proposal.

4.4 Erosion and Sediment Control

NPWS recommends Council gain further clarity and assurances about the proposed reporting, monitoring and remediation triggers in the event of uncontrolled discharges of sediment laden water into Marramarra National Park.

NSW National Parks and Wildlife Service

Response

Monitoring and maintenance protocols for erosion and sediment control structures are described in the ESCP (**Appendix 6**). It is considered that with proper installation, maintenance and monitoring of the erosion and sediment control structures at the Quarry, no sediment laden water would be discharged from the Quarry Site.

However, in the unlikely event of an uncontrolled discharge of sediment laden water from the Quarry Site, the monitoring program and triggers for investigation and/or remediation presented in Sections 5.3.1 and 5.4 of the EMP has been developed.

NPWS recommends Council gain further clarity and assurances about the erosion and sediment controls to be used to stabilise the material in the Stage 1 Stockpile Area (containing topsoil, vegetation, and overburden from quarry operations). The proposed stockpile is located on land sloping northwards towards the most easterly first order stream within the subject site.

NSW National Parks and Wildlife Service

Response

Figure E2 of the ESCP (**Appendix 6**) presents the location and types of erosion and sediment controls to be utilised during Stage 1 of the Quarry.

In summary, a clean water diversion would be constructed to the south of the Stage 1 Soil Stockpile Area to ensure no clean water flows onto the stockpile area and becomes contaminated, and an energy dissipator would be constructed at the eastern extent of the clean water diversion to ensure no erosion occurs as a result of the diversion of flow. The perimeter safety bund would also extend across the perimeter of the Stage 1 Soil Stockpile Area, thereby ensuring all runoff generated within this area is ultimately diverted to the Extraction Area sump. As an additional precaution, sediment fencing would also be installed along the northern and eastern sides of this area.

All erosion and sediment controls would be constructed in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volume 2E – Mines and Quarries* (DECC, 2008).

NPWS recommends Council gain further clarity and assurances about the erosion and sediment controls to be used along the proposed northwest and northern perimeter site access roads. Stormwater from these access roads will flow northwards into two of the first order streams within the subject site.

NSW National Parks and Wildlife Service

Response

The Site Access Road would have two mitre drains constructed approximately at the northwest and mid-points of the road as presented on Figure E1 of the ESCP. Erosion and sediment controls constructed on the Perimeter Track would include cross banks/whoa-boys at regular intervals along the western, northern, and eastern areas of the track. As described above, a clean water diversion would also be constructed to the south of Stage 1 Stockpile Area and the southern section of the Perimeter Track.

As described in Section 5.4.3.2.2 of the EIS, 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 to reflect the progressive enlargement of the Extraction Area.

NPWS recommends Council gain further clarity and assurances about The Erosion and Sediment Control Plan – Stage 1 and 2 which indicates the perimeter containment bund is not continuous, specifically around northwestern sediment retention basin (SB1). NPWS recommends further information on the implications of this and what safeguards are in place to mitigate any detrimental environmental impact.

NSW National Parks and Wildlife Service

Response

Figures E1, E2 and E3 within the ESCP (**Appendix 6**) present the continuous perimeter bund around the Office, Amenities and Parking Area, with the exception of entry into to this area via the Site Access Road.

NPWS recommends Council gain further clarity and assurances about the clean water diversion system and energy dissipator. Specifically, NPWS recommends further information about the anticipated volume of water that will flow in this diversion system, and the specifications of the energy dissipator and how it will avoid causing erosion in the nearby gully of the first order stream to the north.

NSW National Parks and Wildlife Service

Response

The specifications of all energy dissipators would be in accordance with SD 5-8 of *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004). The energy dissipators would reduce the velocity of the water exiting the clean water diversions to ensure the erosion hazard to land immediately downslope of the discharge location is no greater than pre-development.

As noted in Table E4 of the ESCP (**Appendix 6**), the peak discharge velocity of water exiting the clean water diversion and energy dissipator would be approximately 0.044m^3/s during Stage 1 and 0.092m^3/s during Stage 2. Given these minor velocities, and that the Quarry Site is located at the top of catchment, it is considered that Quarry operations would not result in erosion in surrounding watercourses.

The EIS refers to the recommended approach of no detrimental change to hydrological regimes and use of water sensitive urban design (WSUD) principles. NPWS recommends Council gain further clarity on:

- *changes to hydrological regimes including stormwater flow regimes and natural level patterns, over all flow ranges, prior to reaching NPWS land. Information on how the proponent will ensure no detrimental change to hydrological regimes.*
- *what WSUD treatment train elements are to be implemented to treat the water quality including hydrocarbons, nutrients, pathogens and other contaminants.*
- *what mitigations and safeguards are in place for all flow events, including greater than 2-year ARI, and/or sustained rainfall periods.*

NSW National Parks and Wildlife Service

Response

Changes to the hydrological regime would be limited to a minor decrease in the regional catchment area. Surface water flow from the southern portion of the Quarry Site would be diverted around the Extraction Area by a series clean water diversion to a point where the water can flow to NPWS land or be captured by the Quarry Sump. The Quarry Site has been designed to minimise disturbance to areas containing steep slopes, where practicable, to ensure impacts to the catchment are minimised. The Quarry would also utilise a closed water management system to ensure nil discharge of sediment-laden water from the Quarry Site.

In accordance with *Volume 2E – Mines and Quarries* (DECC, 2008), SB1 has been designed with consideration of the 5-day 95th percentile rainfall event.

Stormwater runoff at the Quarry Site would generally be limited to the water from the eastern clean water diversion, which does not require treatment as it is considered "clean water". Water captured within the disturbance area of the Quarry would be directed to either SB1 or the Quarry Sump for settlement and use for misting sprays or internal application on haul roads and unformed tracks (i.e. open space irrigation). No hydrocarbons would be stored outside of the closed water management system at the Quarry and therefore would not contribute polluted water to the surrounding watercourses. Therefore, it is considered that the management and mitigation measures proposed for the Quarry are sufficient and therefore, do not require augmentation with WSUD elements.

Mitigations and safeguards for all surface water flow events are described in Section 5.4.3.2 of the EIS and Section 5 of the EMP. Erosion and sediment control measures identified in the ESCP would also assist in the management of water at the Quarry.

It is considered that these management and mitigation measures are sufficient for all flow events including greater than 2-year ARI and/or sustained rainfall periods.

As there are other quarries adjacent to the national park that are affecting the park's waterways, the EIS should consider the cumulative impacts of this quarry on the park's environment and waterways. NPWS requests further information about this.

NSW National Parks and Wildlife Service

Response

As described in Sections 3.5.1.3 and 3.5.3 of the EIS and detailed in the ESCP, the Quarry Site has been designed with a closed water management system to ensure there would be nil discharge of sediment-laden water from the site. Therefore, it is considered that there would be no impacts to the surrounding waterways resulting from "dirty water".

It is acknowledged that the Quarry would excise approximately 4.13ha from the regional Hawkesbury River catchment. However, given that the Quarry would be located at top of catchment locally, and that the total regional catchment size is approximately 2,140,000ha, it is considered that an overall reduction of 1.92^{-6}% would not result in any adverse environmental impacts.

4.5 Traffic and Transportation

4.5.1 Roadworks

The first section of the unsealed road, between the existing access to Cammileri Stock Feeds and the western boundary of the subject site (Ch 0.00 to CH 200) of the proposed access road, is currently under the management of Hornsby Council, therefore the proposed design and construction of this section of the road needs to be carried out in accordance with the current Hornsby Council's Civil Works Specifications AUS- SPEC Specifications.

Hornsby Shire Council

Response

The Applicant engaged Duncan Priestley Civil Engineering Pty Ltd to prepare an update to the site access road civil plans to ensure the design is in accordance with the current Hornsby Council's Civil Works Specifications AUS-SPEC Specifications. The updated designs are attached as **Appendix 7**.

There is a one one-lane, two-way road, with "give way" controls at each end on the [unnamed road]. This 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. Council recommends that this section of road be reconstructed to have a 6.5m pavement width between the existing Give Way signs.

Hornsby Shire Council

Response

The updated designs attached as **Appendix 7** include details for widening the one lane section of the Unnamed Local Road to 6.5m between the existing Give Way signs.

Submissions raised concerns regarding the upkeep and maintenance of the road due to the increase in trucks using the road and also if there are any additional roadworks which could potentially be required to the current road to fulfil the DA.

Public Submission

Response

Section 5.1 of the EIS and the *Road Transport Assessment* prepared by The Transport Planning Partnership included as Appendix 3 to the EIS present an assessment of the traffic and transportation related impacts relating to the development of the Quarry. These assessments conclude that the additional traffic movements generated as a result of the Quarry would be accommodated by the existing road network with acceptable impacts on the capacity, efficiency and safety of the road network.

Notwithstanding, the widening of the one lane section of the Unnamed Local Road between the existing Give Way signs to 6.5m is expected to alleviate some of the potential impacts anticipated to occur as a result of the development and operation of the Quarry.

Council is the roads authority for the Unnamed Local Road. Therefore, any contributions required to be provided by the Applicant to assist in the upkeep of local roads potentially impacted by the development and operation of the Quarry are at Council's discretion to determine.

4.5.2 Site Access

NPWS understands that the proponent intends to purchase and close the unnamed Crown Road that passes through the subject site, and becomes Dalgetys Creek Fire Trail. NPWS requests that a condition of consent is that this is referred to NPWS at such time that the application is received by Crown Land, as required under the Roads Act 1993, to ensure an appropriate easement is granted to allow for ongoing access into the park.

NPWS requires unrestricted access to the Dalgetys Creek Fire Trail at all times for management and emergency response purposes. Site layout, including locations of access gates and other security measures, should provide for ongoing access to the adjacent Trail by NPWS and their representatives.

NSW National Parks and Wildlife Service

Response

The imposition of a condition to refer the road closure and purchase application to NPWS is a matter for Crown Lands and Council.

Notwithstanding, the Applicant supports the continued use of the unnamed Crown Road by NPWS, NSW Rural Fire Service and any other relevant authorities as required. The Quarry Site design accommodates unrestricted access to Dalgetys Creek Fire Trail, including the location of access gates and security measures.

4.5.3 VENM Importation and Handling

VENM may constitute 'friable sandstone' imported from off-site and it is not clear that processing (crushing and screening) will be performed exclusively on material extracted from the subject premises or will include processing of imported VENM.

Clarification is required whether processing of imported VENM will be carried out as part of the development proposal.

Hornsby Shire Council

Response

Imported VENM would be used exclusively for landform construction and rehabilitation activities at the Quarry Site. Therefore, no processing of imported VENM is proposed or would occur.

The application has not sufficiently demonstrated why an additional 10 year period is required if approval is being sought for importation of VENM solely for 'use in landscaping and progressive rehabilitation in the latter stages of the Quarry life'.

The application also does not demonstrate why the importation of up to 30,000tpa of virgin excavated natural material (VENM), equating to up to 900,000 tonnes of imported VENM over the proposed 30year operational life of the development, is required to facilitate landscaping and progressive rehabilitation of the proposed Extraction Area from which approximately 575,000 tonnes of material is expected to be recovered over the life of the development.

If consent was granted to the development proposal in its current form, it would be approving importation of an approximately 325,000tonne of surplus VENM material to the development site over the proposed 30year operational life of the development.

The proposed annual importation of up to 30,000 tonnes of VENM should be reduced to a more appropriate figure commensurate with the required volume to achieve the proposed RL's of the rehabilitated final landform which shall not exceed the yearly extraction volume averaged over the 30year life of the development proposal (i.e. 525,000tonne / 30 years = average 17,500tpa).

Hornsby Shire Council

Response

Imported VENM would be used exclusively for landform construction and rehabilitation activities. As a result, importation of VENM cannot commence until the initial sections of the Extraction Area are complete and a period of time will be required following completion of extraction operations to allow backfilling of the final sections of the Extraction Area. Therefore, an additional 10 years is sought for the provision of further placement of VENM within the Extraction Area following the cessation of extraction operations.

A total of approximately 111,170m^3 of VENM would be required to construct the final landform. It is noted that VENM can consist of various material types with highly variable densities and as such, it is not possible to provide an accurate tonnage of VENM required for use in rehabilitation. Notwithstanding, a standard density of 2t/m^3 (assuming all VENM would be clay, silt or other unconsolidated material) has been adopted for conservatism. Therefore, it is estimated that up to approximately 222,340t of VENM would be required over the life of the Quarry.

In light of the above, importation operations would not commence until later in the life of the Quarry and would continue following completion of extraction operations until the final landform is fully constructed. As a result, it is anticipated that VENM importation would be undertaken at a stepped rate as follows.

- Years 1 to 15 = nil
- Years 15 to 20 = up to 10,000tpa
- Years 21+ = up to 30,000tpa (i.e. after cessation of extraction)

It is reiterated that no more than 111,170m^3 of VENM would be imported over the life of the Quarry.

Considering the above, no reduction in the importation rate of VENM to the Quarry is proposed. The proposed importation rate of VENM of 30,000tpa would not be reached most years, as this is the maximum importation rate sought. The average importation rate of VENM would vary depending on the availability of completed sections of the Extraction Area ready to be filled and the availability of VENM to be imported.

As requested by Council, an *Earthworks Cut and Fill Report* has been prepared detailing the requirements for cut and fill works during the site establishment phase of the Quarry (see **Appendix 2**).

The EIS identifies that 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. (EIS, Page ES-3). This is not appropriate as responsibility lies with the landowner and operator of the proposed extractive industry. Appropriate VENM receival and onsite handling/management protocols are required to be detailed in the requested Environmental Management Plan to ensure all VENM received to the development site meets the definition in Schedule 1 of the Protection of the Environment Operations Act 1997.

Hornsby Shire Council

Response

It is reiterated that responsibility for the transportation of VENM to the Quarry Site lies wholly with the generator of that material. Under the relevant VENM Guidelines published by the EPA, the Applicant's responsibility relating to imported VENM would be taken from the receipt and acceptance of the VENM at the Quarry Site, not prior. Notwithstanding, as noted in Section 2.8.3 of the EIS, the Applicant would limit the number of heavy vehicle movements to and from the Quarry Site during campaigns of VENM importation to ensure that the maximum number of daily movements is not exceeded.

Detailed VENM receipt and onsite handling and management protocols are described in Section 11 of the EMP (**Appendix 4**).

The EIS does not detail the expected volume of imported VENM to be stored on the premises at any given time as well as the proposed VENM stockpile locations for Extraction Stages 1 and 2. It is expected that the VENM importation rate will not significantly exceed the rate of extracted material removed from the premises, therefore, making excessive stockpiling unnecessary.

Hornsby Shire Council

Response

VENM would only be accepted when sections of the Extraction Area are complete and ready for backfilling. Therefore, temporary stockpiling and double handling of VENM within the Quarry would be minimal.

4.6 Air Quality

The submitted Air Quality Assessment Report models only 1 operational scenario without any justification why the singular model has been adopted.

Hornsby Shire Council

Response

The Applicant engaged Northstar Air Quality Pty Ltd (Northstar) to prepare a response to the submissions provided relating to air quality at the Quarry. Northstar's response to the various matters raised are included in the letter report hereafter referred to as Northstar (2025) and attached as **Appendix 8**.

Northstar selected the Stage 1 extraction operations scenario for quantitative assessment as it included additional emissions sources when compared to Stage 2. The Stage 1 scenario also has the emissions sources located within the western extent of the Extraction Area, i.e. closest to the receptors west of the Quarry.

Therefore, Northstar (2025) concludes that the use of the Stage 1 scenario as representative of worst case potential air quality impacts as a result of Quarry operations is appropriate.

The Air Quality Assessment Report does not sufficiently address the impacts to Receivers (R33, R34, R36, R37 and R39) of worst-case incremental outcome of modelled predictions for 24-hour PM_{10} and 24-hour $PM_{2.5}$.

Hornsby Shire Council

Response

This matter is addressed in **Appendix 8**. In summary, Section 6.3 of the Air Quality Impact Assessment (AQIA) included as Appendix 4 to the EIS presents the results for the maximum PM_{10} and $PM_{2.5}$ concentration at all modelled receptor locations. The modelled predictions at maximum impacted receptors are presented in Tables 19 and 20 of the AQIA.

Northstar (2025) includes additional analysis of the predicted additional exceedances of the 24-hour PM10 and PM2.5 criteria resulting from the Quarry operation, as well as the predicted incremental and cumulative 24-hour PM10 impacts at receptors R33 and R37.

Northstar (2025) concludes that no additional exceedances of the maximum 24-hour $PM_{2.5}$ concentrations are predicted at any receptor locations. This includes the incremental impact from the Quarry plus existing $PM_{2.5}$ concentrations. It is noted that this assumes that the Quarry would operate at peak capacity every day of the year, which is highly conservative and unlikely to be reflective of day-to-day operations. One additional exceedance of the maximum 24-hour PM_{10} concentration is predicted to occur at receptors R33 and R37. However, no additional 24-hour PM_{10} exceedances were predicted to occur at any other receptor.

Considering the conservatisms in the dispersion modelling, assumptions that peak emissions would occur every day of the year, and the high background concentrations, Northstar (2025) concludes that the actual cumulative impacts would be lower on a day-to-day basis than those presented in the AQIA and **Appendix 8**.

The Air Quality Assessment Report does not sufficiently address the Cumulative Impact to Receivers (R1 to R50 inclusive) of the predicted annual average particulate matter concentrations (PM2.5) resulting from the operations at the Quarry Site.

Hornsby Shire Council

Response

This matter is addressed in **Appendix 8**. In summary, exceedances of annual average $PM_{2.5}$ criterion are predicted at all receptor locations due to the existing background concentration already exceeding that criterion. Northstar (2025) also clarified that the predicted impacts to surrounding receptor locations are minimal and the predicted contributions to air quality from the Quarry cannot realistically be lowered.

The exceedance of the annual average $PM_{2.5}$ criteria is a result of a range of activities unrelated to the Quarry. Northstar (2025) considers that incremental $PM_{2.5}$ contributions associated with Quarry operations would not result in any additional exceedances of the relevant criterion.

The Air Quality Assessment Report does not incorporate detailed emission control measures that will be implemented throughout all stages of the proposed development proposed extractive industry operation, regardless of the outcome of modelling predictions.

Hornsby Shire Council

Response

Management and mitigation measures for air quality at the Quarry are described in Section 5.2.6 of the EIS and Section 7.2 of the EMP. In summary, the Applicant has committed to implementing the following mitigation measures during Quarry operations.

- 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 controlled by a speed limit of 40km/h.
- Adopt and implement a complaints management system (see Section 14 of the EMP) which would be maintained to ensure that all air quality related complaints are dealt with through investigation and implementation of corrective treatments.

4.7 Noise

Details of reasonable and feasible mitigation measures to minimise noise emissions and monitoring and management measures that would minimise impacts are marked as n/a and are not addressed in the submitted Acoustic Report without any explanation why these requirements are deemed not applicable.

Hornsby Shire Council

Response

Sections 8.1 and 8.2 of MAC (2025) present the modelled management and mitigation measures to reduce noise impacts at the Quarry during construction and operational scenarios. It is noted that these management and mitigation measures are consistent with those presented in Section 9.3 of the PCMP (**Appendix 9**) and Section 6.2 of the EMP.

In relation to construction noise, Section 7.2 of the Acoustic Report states that 'predicted noise level satisfy the NMLs at all identified receiver locations.' However, according to Table 27 (copied below) the predicted noise level for road construction exceeds the NMLs at receiver R37.

Hornsby Shire Council

Response

MAC (2025) includes clarifying information regarding the exceedance at R37. In summary, noise impacts to R37 may exceed the relevant criterion by up to 3dBA due to the proximity of the receiver to the activities relating to the widening of the access road. As the road widening would be a temporary activity, the exceedance would likewise be of a short duration and would only occur when the road widening works are at the nearest proximity during the construction hours identified in the EIS. MAC (2025) also notes that the exceedance of 3dBA is of negligible significance.

Notwithstanding, management and mitigation measures to minimise disruption due to Quarry construction activities have been presented within Section 8.1 of the updated *Noise Assessment* and Sections 9.3 of the PCMP and Section 6.2 of the EMP.

Construction noise sources appear to have been assessed independently of each other. Clarification of this is required and if the case, the Preliminary Construction Management Plan must incorporate isolation of construction activities or an updated acoustic assessment be submitted to Council for review and assessment.

Hornsby Shire Council

Response

Section 6.1.2 of MAC (2025) clarifies the reason that construction noise emissions sources have been assessed separately. In summary, the construction activities assessed (road widening, earthworks, dam construction, vegetation clearing, and bund construction) all require the same equipment (i.e. a bulldozer and excavator). As the Applicant would use only a single bulldozer and excavator, each activity could not be completed concurrently and must be completed independently and sequentially.

The development proposes a maximum 3 laden heavy vehicle movements per hour, which presumably equates to a maximum 3 unladen vehicle movements and 3 corresponding laden vehicle movements per hour. The noise modelling must reflect the actual 'proposed worst case transportation schedule', which according to the proposed truck movements detailed in the EIS, would include assessment of 3 laden heavy vehicle movements/ hour x2 = 6 heavy vehicle movements/hour in the modelling.

Hornsby Shire Council

Response

Table 28 of MAC (2025) presents the heavy vehicle movements associated with the Quarry. Section 7.4 of MAC (2025) clarifies that the road noise modelling completed reflects the proposed worst case transportation schedule as follows.

As the proposed hours of operations for the Quarry are typically between 7am and 5pm, road traffic noise was assessed over the 15-hour daytime and 9-hour nighttime periods. Therefore, the proposed worst-case transportation schedule would result in 20 heavy vehicle movements per daytime or nighttime period.

The main haul route for the transportation of product is via Old Northern Road and/or Wisemans Ferry Road. The nearest residential dwelling on the Unnamed Road, Old Northern Road or Wisemans Ferry Road is located approximately 15m from the road centre.

Calculations were completed to represent worst-case transportation traffic flows from the Quarry at an offset distance of 15m for receivers adjacent to the Unnamed Road, Old Northern Road or Wisemans Ferry Road. Predicted road traffic noise levels associated with the Quarry are presented in Table 29 of MAC (2025) for the proposed worst-case transportation schedule of 20 heavy vehicle movements per daytime period or 20 heavy vehicle movements per nighttime period at a speed of 80km/h when travelling on Old Northern Road or Wisemans Ferry Road and a speed of 50km/h when travelling on the Unnamed Road.

Whilst it is acknowledged that Section 2.2. of RNP does provide that, '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 for local roads identified as a principal haulage route to a mine site or extractive industry to be the noise criteria for the route should match those for arterial/sub-arterial roads'. However, the Acoustic Reports has overlooked that Section 2.2 of RNP also provides: 'Good planning practice acknowledges this type of road use and develops ways of managing any associated adverse noise impacts'.

The Acoustic Report has applied the noise criteria for Old Northern Road to the unnamed local road which links the proposed development site to Old Northern Road, however, does not address managing adverse impacts associated with use of a local road as a principal haulage route in accordance with Section 2.2. of RNP.

Hornsby Shire Council

Response

Section 5.4 of MAC (2025) clarifies that the comment in Section 2.2 of the RNP regarding "good planning practice" is interpreted to be the responsibility of the relevant planning authority relating to such roads and future land use developments. MAC (2025) further states that it is not possible for proponents to apply good planning practice across regions or in the context of roads as they are not the responsible roads authority.

MAC (2025) also clarifies the noise assessment used the 'sub arterial road' category for the Old Northern Road and Wisemans Ferry Road, and that the Unnamed Local Road linking the Quarry to the Old Northern Road is considered a principal haulage route, hence the noise criteria for the sub-arterial category is applicable.

The management and mitigation measures for road traffic noise associated with the Quarry in Sections 8.1 and 8.2 of MAC (2025), Section 9.3 of the PCMP and Section 6.2 of the EMP are considered appropriate for principal haulage routes.

The predicted Operational Road Traffic Noise Levels identified in Table 28 of the Acoustic Report has been derived based on modelling at a road speed of 80km/hour. Whilst this modelling is appropriate for Old Northern Road, the unnamed local road has a significantly lower speed limit and separate modelling for this scenario should be used to predict operational road traffic noise levels at the actual speed limit which applies to the unnamed local road connecting Old Northern Road to the proposed development site.

Hornsby Shire Council

Response

Section 7.4 of MAC (2025) clarifies that the Road Traffic Noise Assessment considered vehicle movements at a speed of 80km/h when travelling on Old Northern Road or Wiseman's Ferry Road and a speed of 50km/h when travelling on the Unnamed Local Road.

Predicted Operational Noise Levels specified in Section 5.3.6.2 of the Acoustic Report are based on only 2 modelled operational scenarios as detailed in Section 6.1.1 without sufficient information provided on the particulars of the 2 modelled scenarios or justification why these models were adopted.

Hornsby Shire Council

Response

Additional detail has been added to Section 6.1.1 of MAC (2025) to clarify the justification for adopting the two modelled operational scenarios. In summary, the scenarios chosen reflect the two stages of extraction, being Stage 1 (i.e. operations concentrated within the western extent of the Extraction Area) and Stage 2 (i.e. operations concentrated within the eastern extent of the Extraction Area).

As the operational activities at the Quarry would largely be confined to these two stages, it is considered that modelling of these two stages is sufficient to characterise the noise impacts because of operational activities.

A submission raised a concern regarding the impact on the amenity of neighbouring properties due to the increase in truck movements, in particular by the additional noise and dust generated. The concerns noted that the noise and dust monitoring systems were located at Maroota Public School and 4713 Old Northern Road which does not consider all the closest neighbours to the site.

Public Submission

Response

The noise monitoring locations that were utilised to quantify ambient background noise levels in the vicinity of the Quarry Site are presented in Figure 5.3 of the EIS and Figure 1 of MAC (2025). As described in Section 4.1 of MAC (2025), these monitoring locations are representative of surrounding residential receivers in accordance with Fact Sheet B1.1 of the *Noise Policy for Industry* (EPA, 2017).

Air quality monitoring data was sourced from the nearest publicly available data sets, namely Maroota Public School, Richmond AQMS, and the deposited dust monitoring location related to Environment Protection Licence 3829 at 4713 Old Northern Road.

The locations of the monitoring data collected for both assessments were the closest publicly available data sets in relation to the Quarry, or most representative locations for the surrounding area. Notwithstanding, the modelling for both the assessments considered all closest neighbours as identified in Figure 2 of the AQIA and Section 2.1.1, Figure 1, and Table 2 of the Noise Assessment.

Therefore, both the AQIA and MAC (2025) have considered the closest neighbours to the Quarry Site in both assessments.

4.8 Quarry Management Plans

An Operational Plan of Management as specified in Item 4 of Council's Pre-lodgement advice sent dated 7 July 2023 under Pre-lodgement Development Application No. PL/30/2023 (D08685139) is required to be submitted to Council for consideration and assessment.

Hornsby Shire Council

Response

An *Operational Plan of Management* (OPM) has been prepared for the Quarry and is included as **Appendix 10** of this *Submissions Report*.

A Preliminary Construction Management Plan (PCMP) must be prepared by a suitably qualified environmental consultant in consultation with a qualified traffic engineer and submitted to Council for review as specified in Item 9 of Council's Pre-lodgement advice dated 7 July 2023 under Pre- lodgement Development Application No. PL/30/2023 (D08685139).

Response

A PCMP is included as **Appendix 9** of this *Submissions Report*.

An Environmental Management Plan prepared by a suitably qualified environmental consultant must be submitted to Council for review.

Hornsby Shire Council

Response

An EMP is included as **Appendix 4** of this *Submissions Report*.

An operational traffic management plan will be required separate to a construction traffic management.

Hornsby Shire Council

Response

Operational traffic management has been included in Section 3.2.6 of the OPM (**Appendix 10**). Transport management has also been addressed in Section 3 of the EMP (**Appendix 4**).

In addition, construction traffic management has been considered in Section 4 of the PCMP (**Appendix 9**).

5. Evaluation

5.1 Introduction

This section provides an update to the evaluation of the merits of the Proposal presented in Section 7.2 of the EIS. It takes into account amendments made to the Proposal and refinements to management and mitigation that have been made in response to the submissions received from Government agencies and/or the public. As environmental assessment outcomes have not changed as a result of the review of submissions, this section presents the relevant updates to the merits of the Proposal. A final review of the public interest is provided in conclusion to the document.

5.2 Refinements and Clarifications to the Proposal

Minor refinements to the Proposal have been made in response to the submissions received from Government agencies, organisations and the public including the following.

- An increase to the nominated planting density for revegetation as recommended by NPWS.
- Updated road designs to meet Council's Civil Works Specifications AUS-SPEC, as well as a commitment to widen the one lane section of the Unnamed Local Road to 6.5m between the existing Give Way signs.

In addition, the following clarifications re the Proposal and its impacts have been provided.

- Updates to the AQIA and Noise Assessment for clarification on a range of matters.
- Updates to the Compound Layout Plan for clarification and identification of a range of infrastructure within the Office, Amenities, and Parking Area.
- Preparation of a range of management plans for the Quarry.
- Clarifications regarding the Proposal, particularly with respect to biodiversity, erosion and sediment control, traffic and transportation, air quality and noise, and various aspects of the description of the Proposal.

As none of the above refinements or clarifications are considered significant changes and would not alter the carrying out of Quarry operations as described in the EIS, an update to Section 2 of the EIS (Description of the Proposal) is not considered warranted.

5.3 Updated Context for the Proposal

A thorough analysis of the legislative and planning context for the Project was presented in Section 3 of the EIS. It is considered that the outcomes of the response to submission do not change the statutory or strategic context of the Project, and that no further consideration on these matters is required.

5.4 Updated Justification of The Proposal

5.4.1 Social and Economic Considerations

As described in Section 7.2.3 of the EIS, the Project is not likely to result in any negative changes to the social or economic environment of the Hornsby LGA. The construction and operation of the Quarry is considered likely to improve the economic and social environment surrounding he Quarry, particularly with the provision of ongoing employment and extraction of construction materials to exert downward pressure on costs of construction materials.

The construction and operation of the Quarry is generally considered to bring benefit to Hornsby Shire Council through the economic and social benefits provided.

5.4.2 Biophysical Considerations

A detailed summary of the biophysical outcomes of assessment for the Quarry was presented in Section 7.2.2 of the EIS. There have been no changes to the outcomes of technical assessments as a result of review of the Government agency and public submissions received following public exhibition of the EIS.

Additional clarification has been provided in relation to noise and air quality matter as requested by Council, however these matters do not change the outcomes of assessment of potential air quality or noise related impacts. Additional management and mitigation measures relating to air quality impacts at the Quarry have been proposed in Section 4.5 of this *Submissions Report* following the request from Council.

No other additional management or mitigation measures relating to biophysical considerations are proposed.

5.5 The Consequences Of Not Proceeding With The Proposal

A detailed summary of the consequences of not proceeding with the Proposal were presented in Section 7.2.4 of the EIS. The consequences of not proceeding with the Quarry remain largely unchanged since the exhibition of the EIS.

5.6 Conclusion

As clarified in Section 4, the proposed Quarry would not result in any additional environmental impacts that are not consistent with the assessments provided as part of the EIS. The proposed Quarry has been designed to permit the efficient extraction of sandstone resources within the Quarry Site. A range of design and operational mitigation measures have been incorporated into the Quarry design to ensure all relevant statutory goals and criteria, environmental objectives, and reasonable community expectations are satisfied.

Environmental management at the Quarry would be undertaken in accordance with the prepared management plans and the Applicant's internal procedures. This *Submissions Report* demonstrates that potential impacts associated with biodiversity, erosion and sediment control, traffic and transportation, air quality, and noise would be acceptable and generally consistent with the assessments undertaken during the preparation of the EIS. This *Submissions Report* also presents clarification on a range of matters relating to the project description as well as a range of management plans for the construction and operational management of the Quarry.

On balance, the proposed Quarry would be in the public interest as it would enable the beneficial use of the material generated by development elsewhere and would satisfy the demand for Quarry products within the Hornsby LGA and the Greater Sydney Region.

6. References

Department of Environment and Climate Change (DECC) (2008). *Volume 2E – Mines and Quarries*

Ecoplanning Pty Ltd (2025). *Biodiversity Development Assessment Report*, prepared on behalf of Maroota Central Civil Quarry

Environment Protection Authority (EPA) (2017). *Noise Policy for Industry*

Landcom (2004). *Managing Urban Stormwater: Soils and Construction Volume 1*

Muller Acoustic Consulting (MAC) (2024). *Noise Assessment* prepared on behalf of Maroota Central Civil Quarry

Muller Acoustic Consulting (MAC) (2025). *Updated Noise Assessment* prepared on behalf of Maroota Central Civil Quarry

Northstar Air Quality Pty Ltd (2025). *Letter Report in relation to the Air Quality Impact Assessment*

NSW Resources Regulator (2024). *NSW Rehabilitation Cost Estimate Tool version 2024-1*, July 2024

Appendices

Appendix 1 Updated Noise Assessment

Appendix 2 Earthworks Cut and Fill Report

Appendix 3 Sewage Tank Certification

Appendix 4 Environmental Management Plan

Appendix 5 Updated Biodiversity Development Assessment Report

Appendix 6 Erosion and Sediment Control Plan

Appendix 7 Updated Civil Designs

Appendix 8 Letter Report in relation to the Air Quality Impact Assessment

Appendix 9 Preliminary Construction Management Plan

Appendix 10 Operational Plan of Management

Appendix 11 Updated Sediment Basin Sizing

Appendix 1

Updated Noise Assessment

(Total No. of pages including blank pages = 88)

Noise Assessment

Maroota Central Civil Quarry
4773 Old Northern Road
Maroota, NSW

Prepared for: R.W. Corkery & Co. Pty Ltd
November 2024
MAC221612-01RP1V2

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
MAC221612-01RP1V2	28 November 2024	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.	Construction -Section 8.1 Operations - Section 8.2
Monitoring and management measures that would minimise impacts.	Construction – Section 8.1 Operations - Section 8.2
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 4.13ha 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
R33	Suburban	1225	313345	6298612

Table 2 Receiver Locations				
Receiver	Receiver Type	Distance to Extraction Area, m	Coordinates (GDA94/MGA56)	
			Easting	Northing
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/ operations, typical operating hours and the relevant NPI assessment period. It is noted that whilst typical operations normally occur up to 5pm. However, if operations were to continue to 6pm, there is no difference in terms of meeting the requirements of the NPI as the daytime period is from 7am to 6pm. Similarly, this would also apply to operations if they were to occur on a Saturday after 1pm (but no later than 6pm), being the same "NPI assessment period".

Table 3 Activities and Operating hours[1]		
Activity/Operation	Typical Operating Times	NPI Assessment Period
Site Development and Construction	7am to 5pm Monday to Friday 7am to 1pm Saturday	Daytime
Extraction Operations		Daytime
Product Despatch		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.

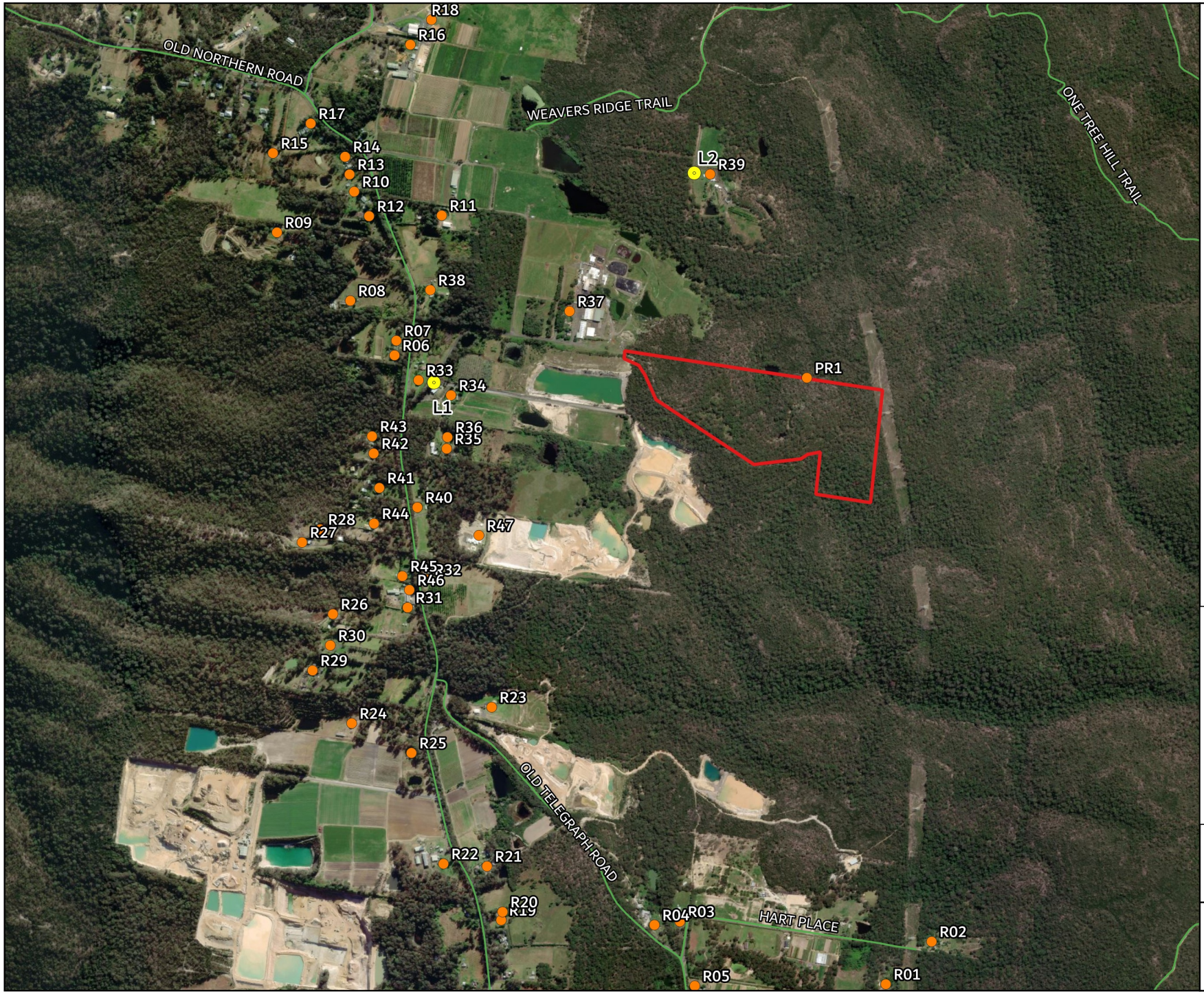


FIGURE 1

Project Layout

MAC221612

Maroota Central Quarry

KEY

- Receiver
- Project Boundary
- Monitoring Location

0 100 200 300 400 500 600 700 m

N

MAC
Muller Acoustic Consulting

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.

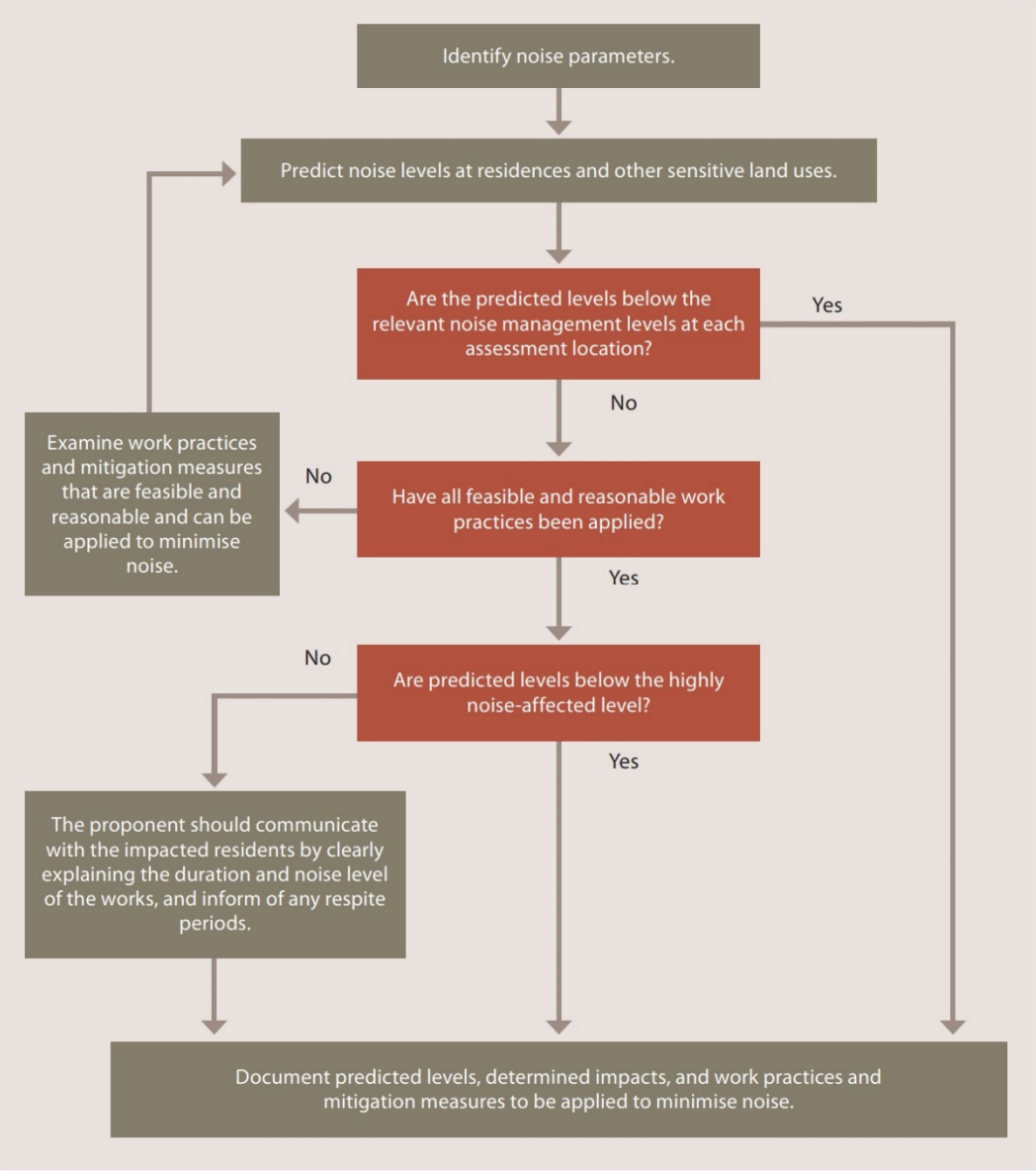
3.2 Interim Construction Noise Guideline

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
Active Recreation	All	When in use	55	50	53

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]
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.
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.

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:
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 RNP comment regarding "*good planning practice*" is interpreted to be the responsibility of the relevant planning authority relating to such roads and future land use developments. It is not possible for proponents to apply good planning practice across regions or in context of roads as they are the responsible authority.

The unnamed road linking the project to the Old Northern Road is considered a principal haulage route and hence the noise criteria for the sub-arterial category is applicable.

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.

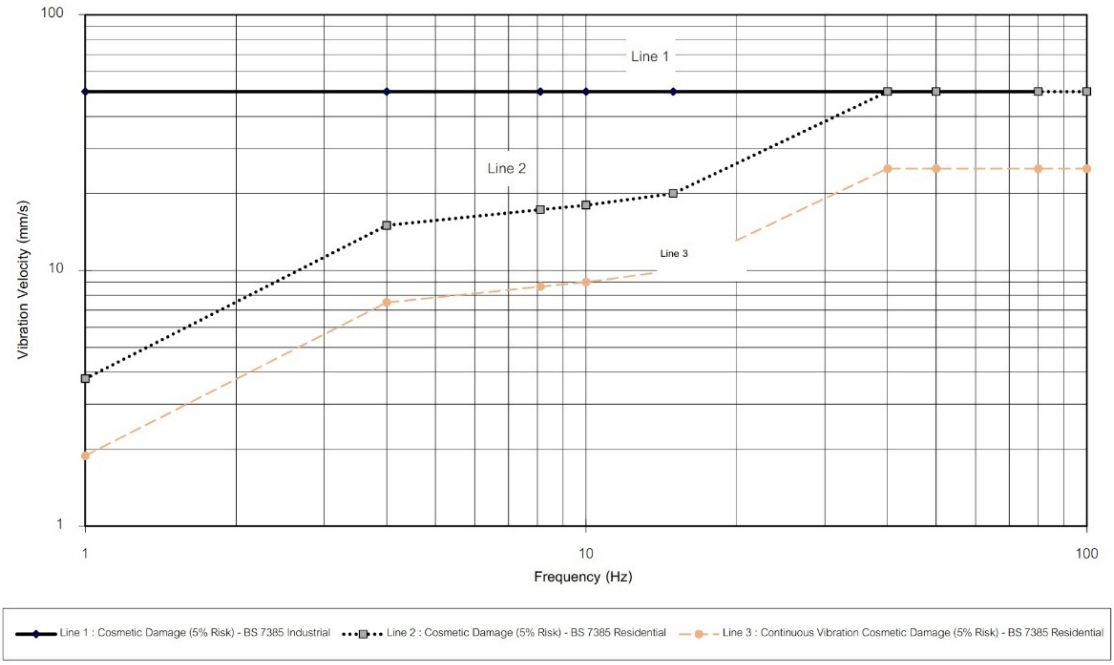
British Standard BS 7385:Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2", gives guidance on the levels of vibration which building structures could be damaged. BS7385 also takes into consideration the frequency of the vibration which is critical when assessing the likelihood 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.

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

The extraction area will be developed in two stages from west to east. Therefore, two typical operational scenarios have been assessed to understand the potential noise emissions over time as the project develops as follows:

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. Each construction activity (access road, dam, clearing, bunds) will be completed independently as the same equipment is required for each activity. Therefore, the construction noise assessment has assessed each activity separately.

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 Widening			
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 typical operations (extraction, processing and dispatch) for Stage 1 and Stage 2 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.**

Table 26 Noise Predictions – Noise Enhancing Conditions[1]

Location	Predicted Noise Level dB LAeq(15min)		PNTL dB LAeq(15min)			Compliant		
	Stage 1	Stage 2	Day	Eve	Night	Day	Eve	Night
R01	<35	<35	42	42	35	✓	✓	✓
R02	<35	<35	42	42	35	✓	✓	✓
R03	<35	<35	42	42	35	✓	✓	✓
R04	<35	<35	42	42	35	✓	✓	✓
R05	<35	<35	42	42	35	✓	✓	✓
R06	<35	<35	42	42	35	✓	✓	✓
R07	<35	<35	42	42	35	✓	✓	✓
R08	<35	<35	40	36	35	✓	✓	✓
R09	<35	<35	40	36	35	✓	✓	✓
R10	<35	<35	42	42	35	✓	✓	✓
R11	<35	35	40	36	35	✓	✓	✓
R12	<35	<35	42	42	35	✓	✓	✓
R13	<35	<35	42	42	35	✓	✓	✓
R14	<35	<35	42	42	35	✓	✓	✓
R15	<35	<35	40	36	35	✓	✓	✓
R16	<35	<35	40	36	35	✓	✓	✓
R17	<35	<35	42	42	35	✓	✓	✓
R18	<35	<35	40	36	35	✓	✓	✓
R19	<35	<35	42	42	35	✓	✓	✓
R20	<35	<35	42	42	35	✓	✓	✓
R21	<35	<35	42	42	35	✓	✓	✓
R22	<35	<35	42	42	35	✓	✓	✓
R23	<35	<35	42	42	35	✓	✓	✓
R24	<35	<35	42	42	35	✓	✓	✓
R25	<35	<35	42	42	35	✓	✓	✓
R26	<35	<35	40	36	35	✓	✓	✓
R27	<35	<35	42	42	35	✓	✓	✓

Table 26 Noise Predictions – Noise Enhancing Conditions[1]								
Location	Predicted Noise Level dB LAeq(15min)		PNTL dB LAeq(15min)			Compliant		
	Stage 1	Stage 2	Day	Eve	Night	Day	Eve	Night
R28	<35	<35	42	42	35	✓	✓	✓
R29	<35	<35	40	36	35	✓	✓	✓
R30	<35	<35	40	36	35	✓	✓	✓
R31	<35	<35	42	42	35	✓	✓	✓
R32	<35	35	42	42	35	✓	✓	✓
R33	35	36	42	42	35	✓	✓	✗
R34	36	37	42	42	35	✓	✓	✗
R35	36	36	42	42	35	✓	✓	✗
R36	36	36	42	42	35	✓	✓	✗
R37	37	38	40	36	35	✓	✗	✗
R38	<35	35	42	42	35	✓	✓	✓
R39	36	37	40	36	35	✓	✗	✗
R40	35	35	42	42	35	✓	✓	✓
R41	<35	<35	42	42	35	✓	✓	✓
R42	<35	<35	42	42	35	✓	✓	✓
R43	<35	<35	42	42	35	✓	✓	✓
R44	<35	<35	42	42	35	✓	✓	✓
R45	<35	<35	42	42	35	✓	✓	✓
R46	<35	<35	42	42	35	✓	✓	✓
R47	37	37	42	42	35	✓	✓	✗
PR1	42	44	48	48	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.

Predicted noise levels from typical operations satisfy the PNTLs at all identified receiver locations for both operational scenarios for the daytime period. However, noise levels for typical operations may exceed the PNTLs by up to 1dBA during the evening period and up to 2dBA during the night time period.

For operations to be compliant with the PNTLs during the evening and or night period, mitigation measures would be required to reduce noise levels. Such measures may involve reducing the amount of equipment operating or limiting operations to extraction or processing. Additional modelling of possible mitigation measures would be required to identify measures that would satisfy the PNLTs at all receivers during the evening and night time periods. Notwithstanding, noise control recommendations during construction are provided in **Section 8.2** for consideration.

Furthermore, emissions from the project satisfy the PNTL +5dB limit for very noise-enhancing meteorological conditions.

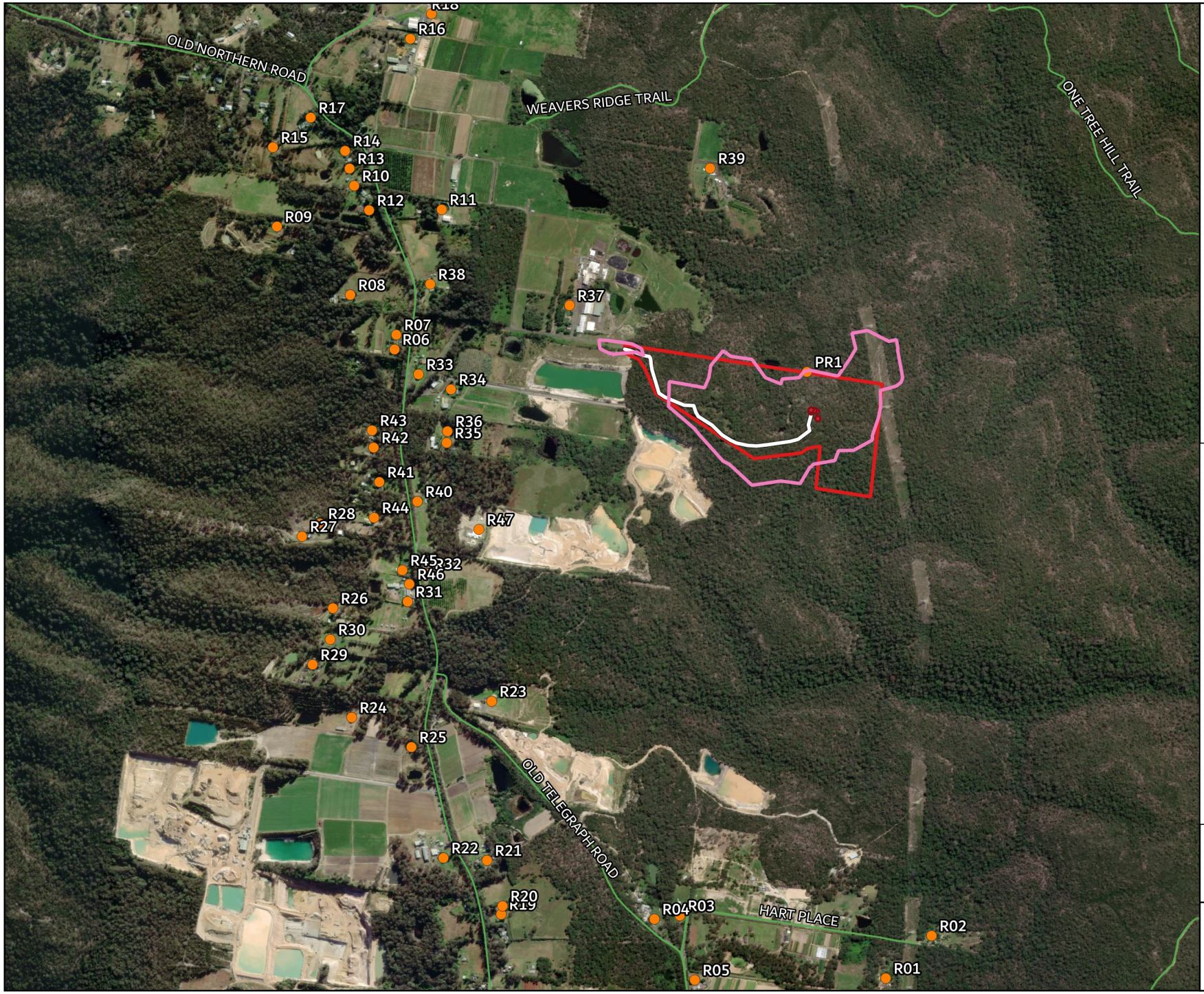


FIGURE 4

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

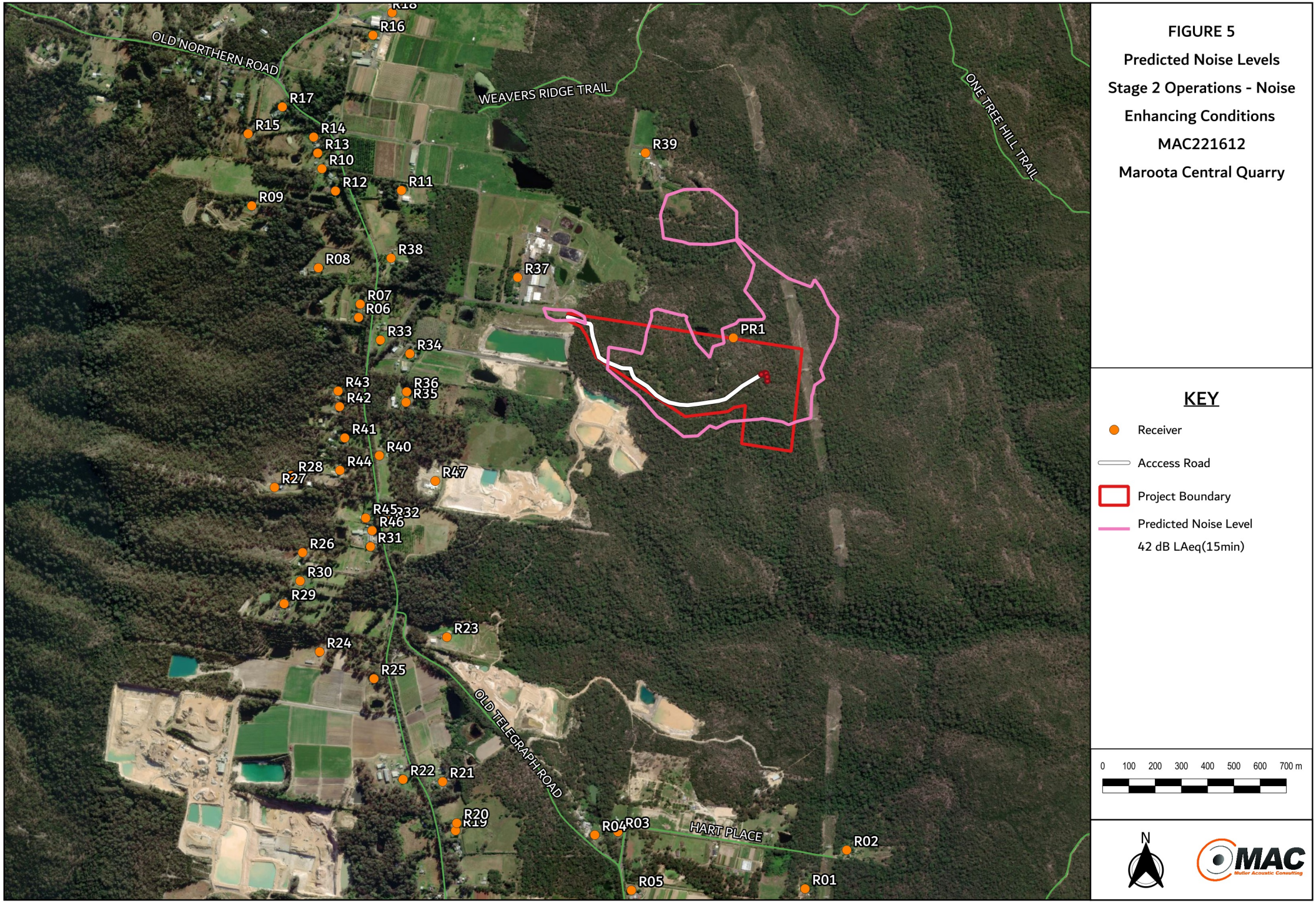


FIGURE 5

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**.

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	✓
R31	<35	<35	<35	<35	42	✓
R32	<35	<35	<35	<35	42	✓

Table 27 Noise Predictions – All Receivers						
Location	Predicted Noise Level dB LAeq(15min)				NML dB LAeq(15min)	Compliant
	Road	Dam	Clearing	Bund		
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	✓

Predicted noise level satisfy the NMLs at all identified receiver locations, except at R37, where noise levels may exceed the NML by up to 3dBA. The exceedance is attributable to the proximity (120m) of the receiver to the widening of the access road. The exceedance would be of a temporary nature and of short duration and would only occur when works are at their nearest proximity during standard construction hours. The magnitude of the exceedance of 3dB is of negligible significance. Notwithstanding, noise control recommendations during construction are provided in **Section 8.1** for consideration.

7.3 VLAMP Assessment

A review of noise contours (**Figure 4**) demonstrates that predicted project noise levels do not exceed the VLAMP criteria (40dB $L_{Aeq(15min)}$ 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

Road traffic noise assessment criteria are split into two periods – daytime (7am to 10pm) and night time (10pm to 7am). Whilst traffic levels associated with the project vary daily, the anticipated heavy vehicle movements are presented in **Table 28**.

Table 28 Heavy Vehicle Movements

Daily Laden Heavy Vehicle Movements		Daily Heavy Vehicle Movements		Maximum Hourly Laden Heavy Vehicle Movements	Maximum Hourly Heavy Vehicle Movements
Average	Maximum	Average	Maximum		
4	10	8	20	3	6

Source: EIS Table 2.3, for each laden heavy vehicle movement there is an associated unladen heavy vehicle movement.

Whilst the project typically operates between 7am and 5pm, road traffic noise has been assessed over the 15 hour daytime and 9 hour night time periods. Therefore, the proposed worst-case transportation schedule would result in 20 heavy vehicle movements per period – ie daytime or night time period.

The main offsite haul route for the transportation of sales product is via Old Northern Road and/or Wisemans Ferry Road. The nearest residential dwelling on the Unnamed Road, Old Northern Road or Wisemans Ferry Road is approximately 15m from the road centre.

Calculations were completed to represent worst-case transportation 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. Predicted road traffic noise levels from the project are presented in **Table 29** for the proposed worst-case transportation schedule of 20 heavy vehicle movements per daytime period or 20 heavy vehicle movements night time period at a speed of 80km/h when travelling on Old Northern Road or Wisemans Ferry Road and a speed of 50km/h when travelling on the Unnamed Road.

Table 29 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 Old Northern Road Wisemans Ferry Road	Day	80	60dB LAeq(15hr)	49.6 dB LAeq(15hr)	Yes
		Night	80	55dB LAeq(15hr)	51.9 dB LAeq(15hr)	Yes
15m	Arterial/ Sub Arterial Old Northern Road Wisemans Ferry Road	Day	60	60dB LAeq(15hr)	47.2 dB LAeq(15hr)	Yes
		Night	60	55dB LAeq(15hr)	49.5 dB LAeq(15hr)	Yes

The results of the road traffic assessment based on a proposed worst-case transportation schedule of 20 heavy vehicle movements in either the daytime period or the night period would satisfy the relevant RNP criteria. It is noted that if heavy vehicle movements occurred partly in the daytime period and partly in the night time period, noise levels ($LA_{eq,15hr}$ or $LA_{eq,9hr}$) would be lower than the corresponding levels presented in **Table 29.**

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 30). 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 Operations 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 30 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 30 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 Recommendations

8.1 Construction Noise Recommendations

It is noted that construction noise emissions are anticipated to exceed the relevant NMLs at R37 during the construction of the access road. The following noise mitigation measures should be considered during the construction phase to reduce emissions to the R37:

- a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community;
- where possible use localised mobile screens or construction hoarding around piling rig/plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (eg unloading and laydown areas);
- operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations;
- selection of the quietest suitable machinery available for each activity;
- minimise noisy plant/machinery working simultaneously where practicable;
- minimise impact noise wherever possible;
- utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm;
- provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities;
- signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site; and
- utilise project related community consultation forums to notify residences within proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure.

The reduction achieved from the mitigation measures will depend on the specific measures implemented. Monitoring with and without the measures in place will provide an indication of the reduction achieved.

8.2 Operational Noise Recommendations (Evening and Night Time Operations)

It is noted that operational noise emissions have potential to exceed the relevant PNTLs during the evening and night time periods. For the project to satisfy the PNTLs at all receivers for all assessment periods, the following operational noise mitigation and management measures should be considered to reduce noise levels below the PNTLs:

- reducing the amount of equipment operating or limiting operations to extraction, processing or dispatch or suitable combinations that do not exceed the PNTLs;
- alternative (quieter) equipment selection;
- additional bunds/ barriers;
- alternate stockpile and waste dump locations for daytime operations and night time operations; and;
- scheduling noise intensive works at times when there is less likelihood of noise enhancing conditions occurring.

If operations were to extend into the evening and night time periods, additional assessment would be required to identify mitigation measures and operational management that would result in compliance with the PNTLs. It is likely that this would also require a Noise Management Plan to be developed to address how the mitigation and management measures are implemented as well as outline whether noise monitoring requirements, reporting and dealing with complaints.

9 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 typical operations (extraction, process and dispatch) would satisfy the relevant required by the Noise Policy for Industry (NPI) PNTLs at all assessed receivers for the NPI daytime assessment period at all identified receivers. Noise emissions from typical operations during the evening and night time periods have potential to exceed the relevant PNTLs and would require mitigation and management measures to satisfy the PNTLs.

Modelled noise emissions from construction activities identify that predicted noise emissions are expected to satisfy the applicable construction management levels at all assessed receivers, except at one receiver (R37) during the road widening of the Unnamed Road connecting the quarry to the Old Northern Road. The exceedance of 3dB is of negligible significance and would be temporary for a short duration when works are at their nearest proximity to R37. Mitigation measures to reduce construction noise have been provided for consideration by the proponent to be implemented where practicable. .

Road traffic noise emissions associated with the transportation of sandstone products and the importation of VENM materials are expected to satisfy the relevant Road Noise Policy (RNP), 2011 road traffic noise criteria for daytime and night time periods.

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

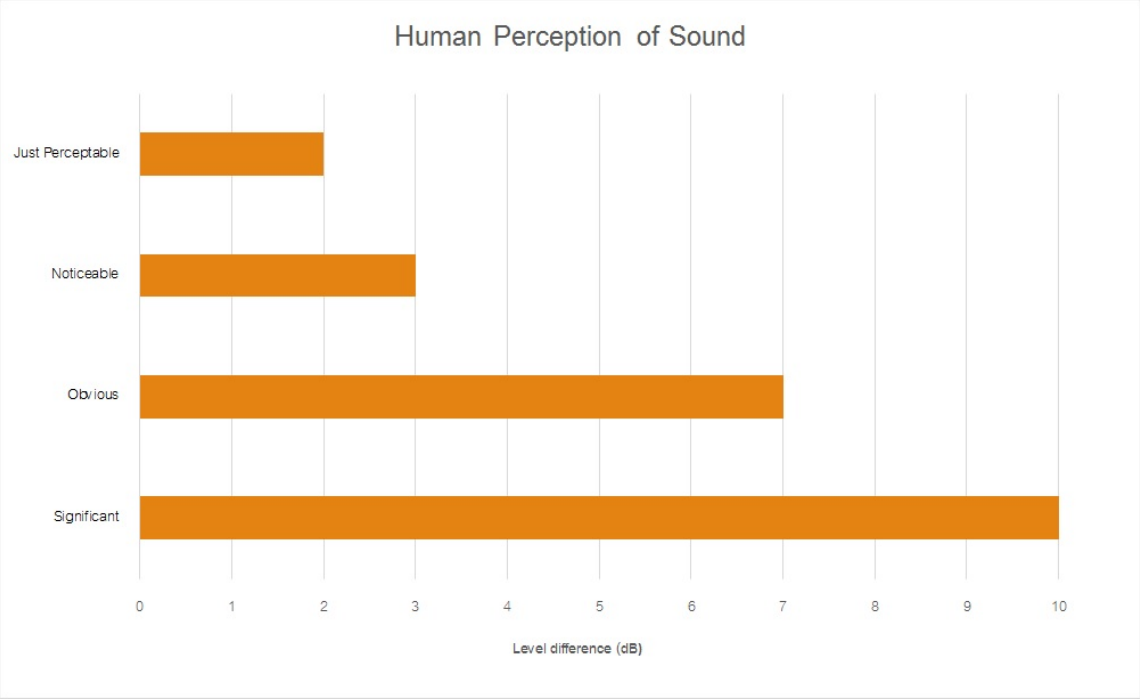
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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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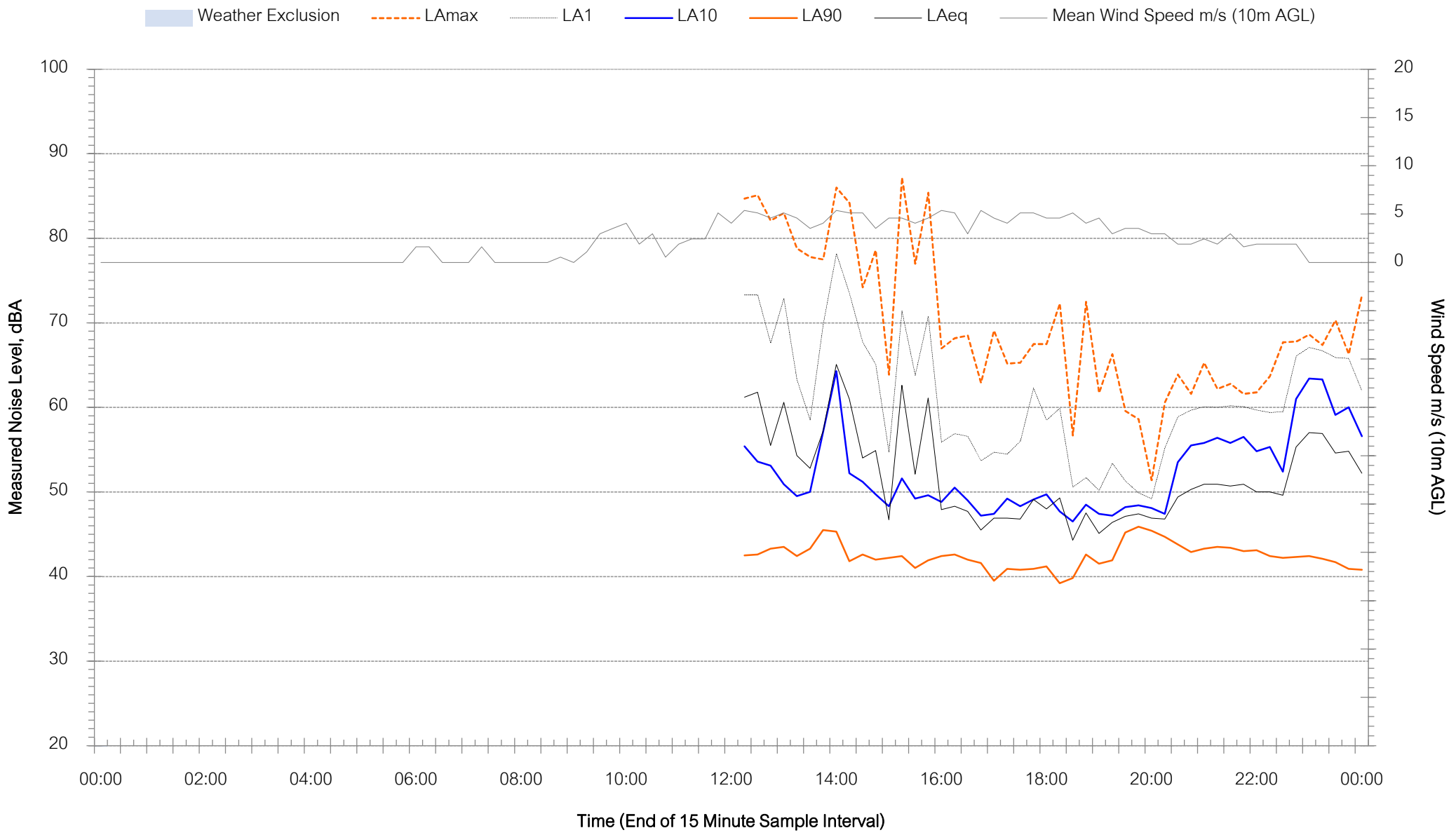
Appendix B – Noise Monitoring Charts

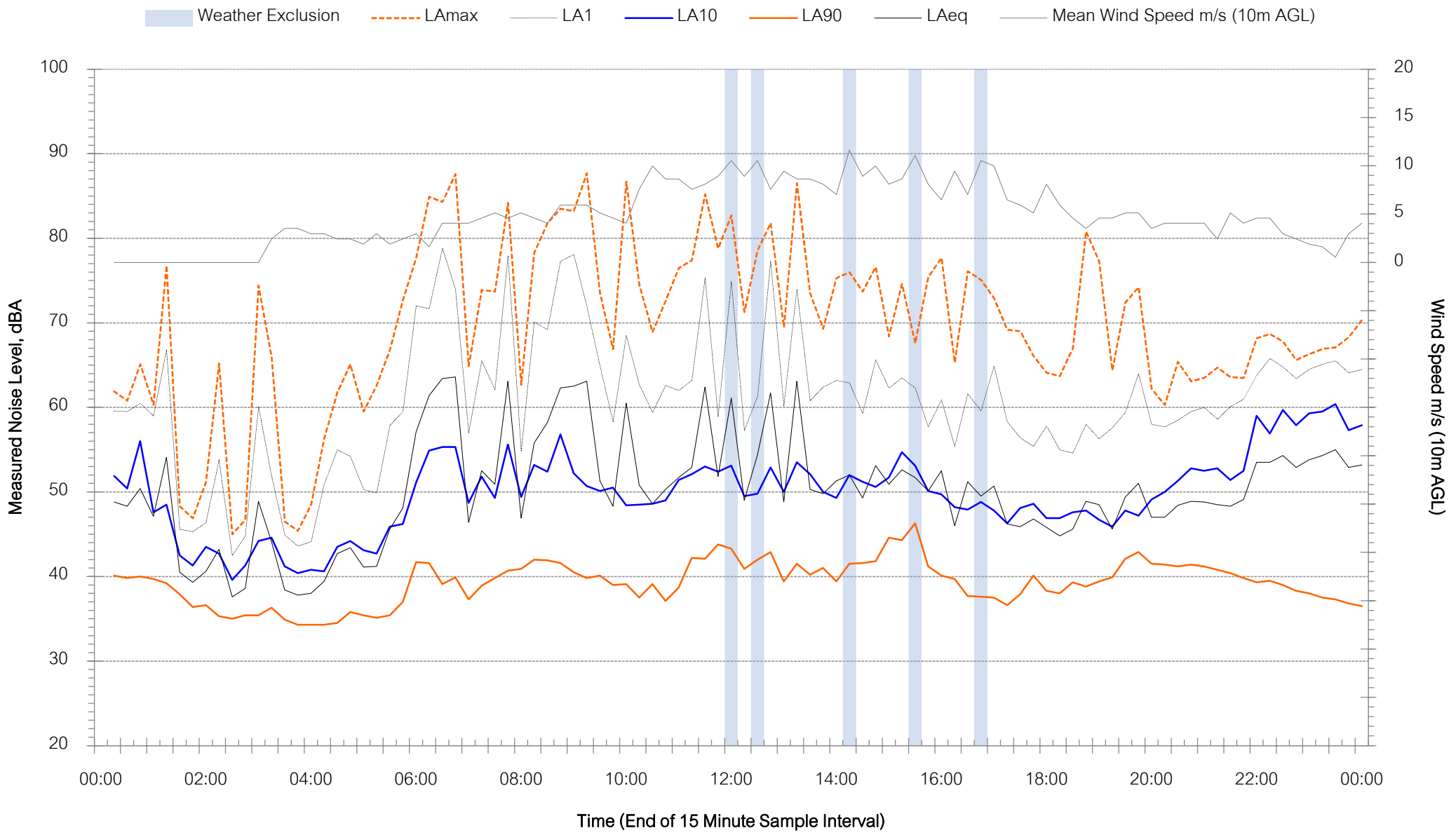
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Thursday 13 October 2022



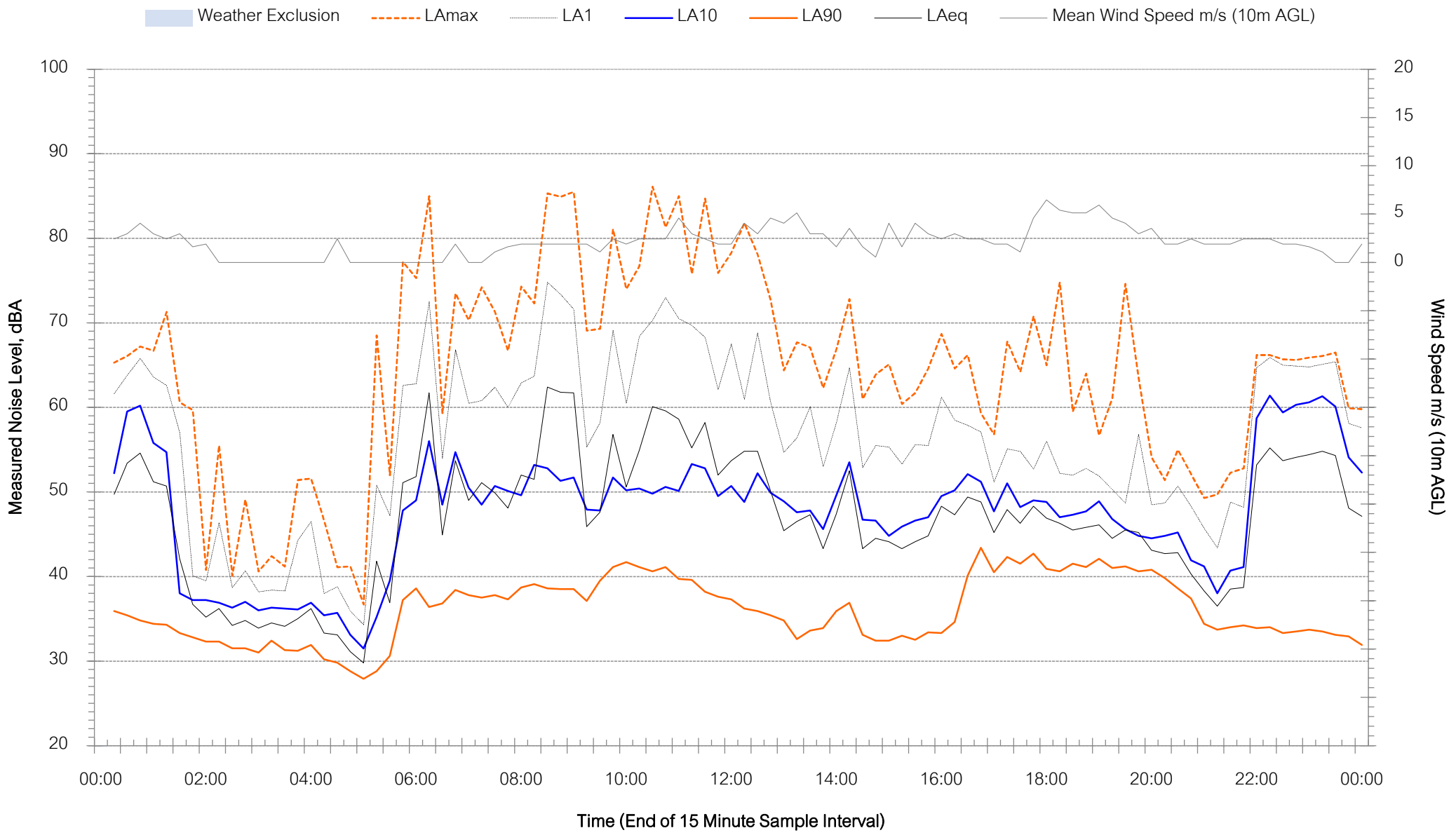
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Friday 14 October 2022



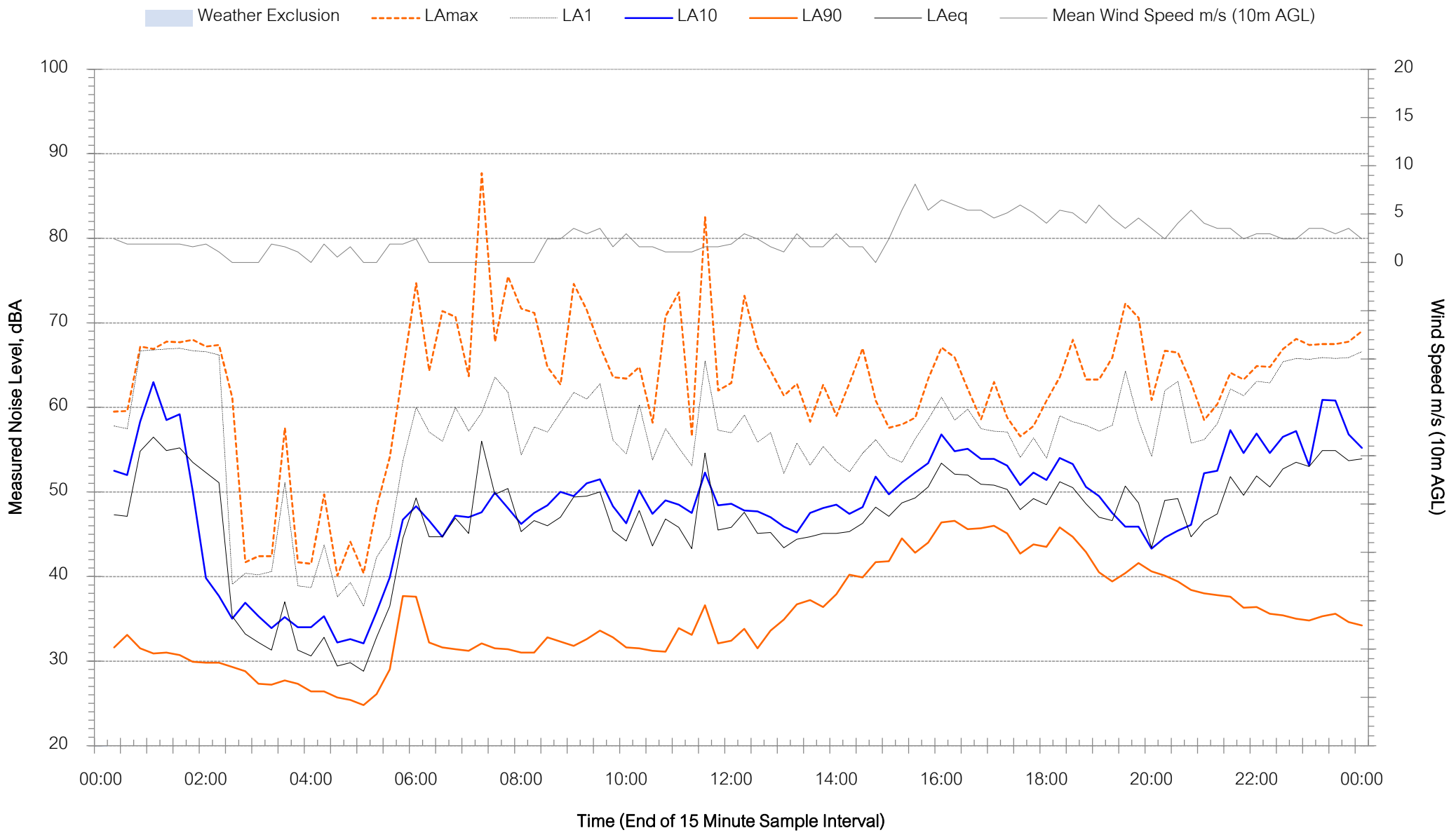
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Saturday 15 October 2022



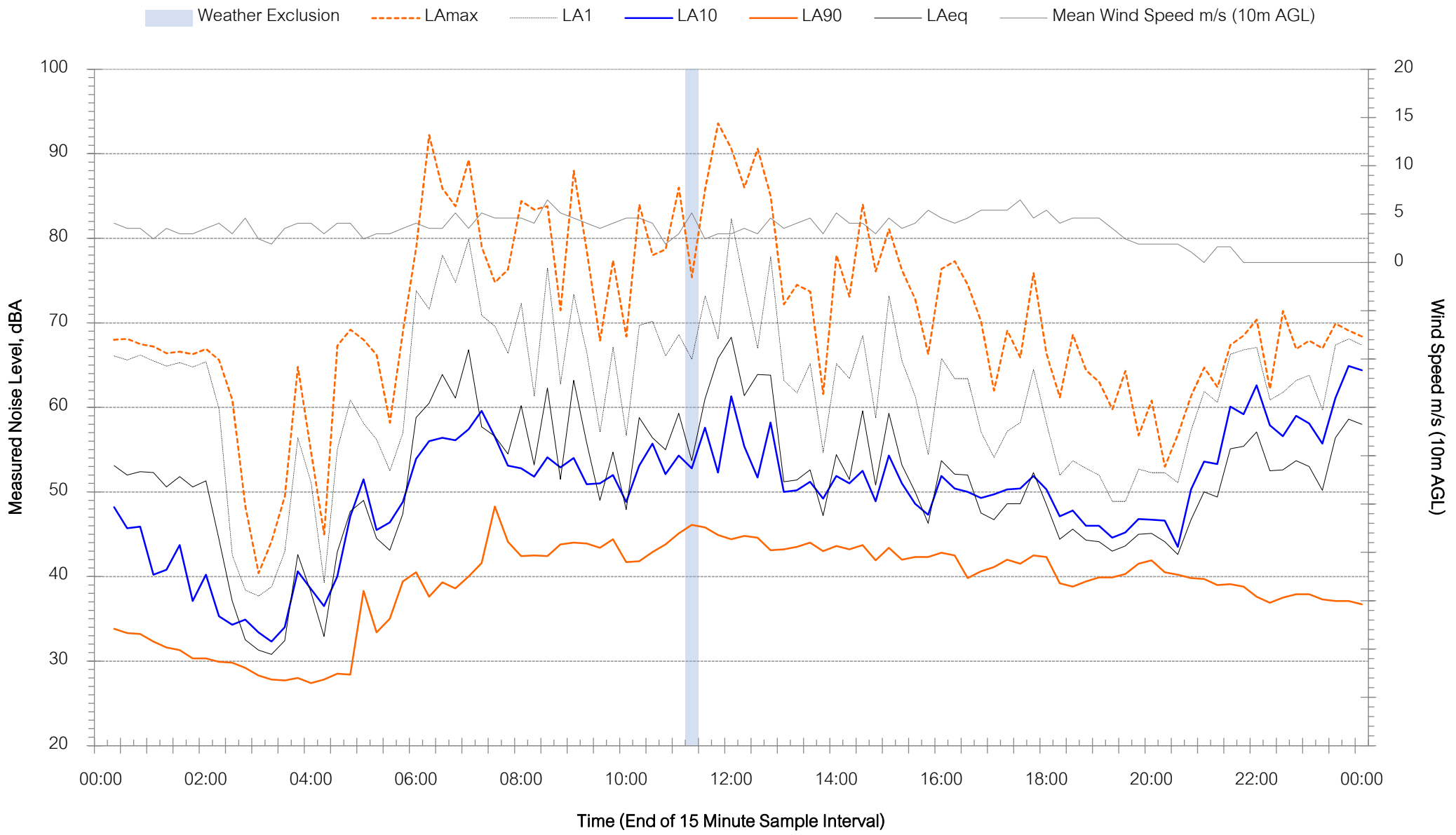
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Sunday 16 October 2022



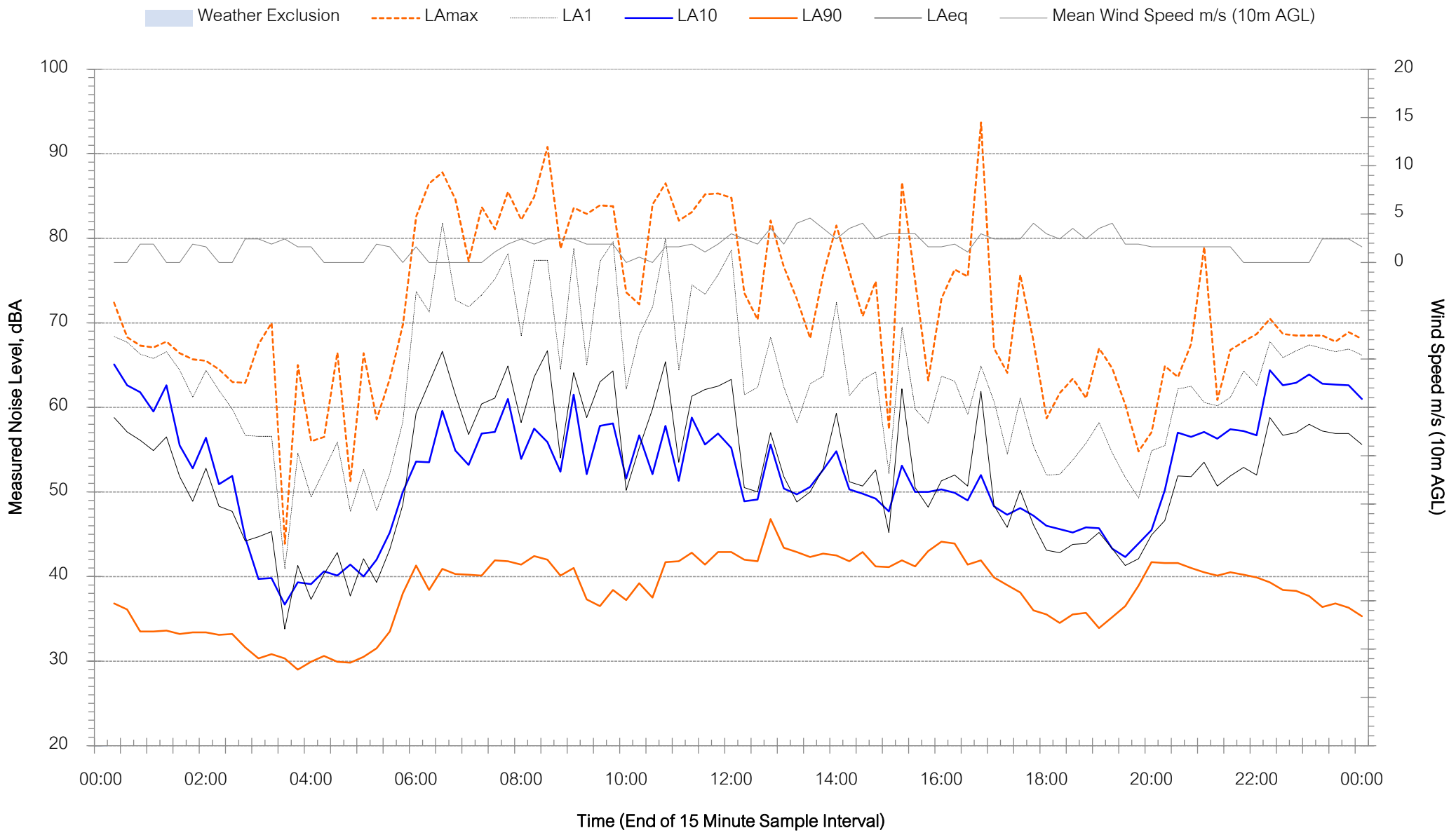
Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Monday 17 October 2022



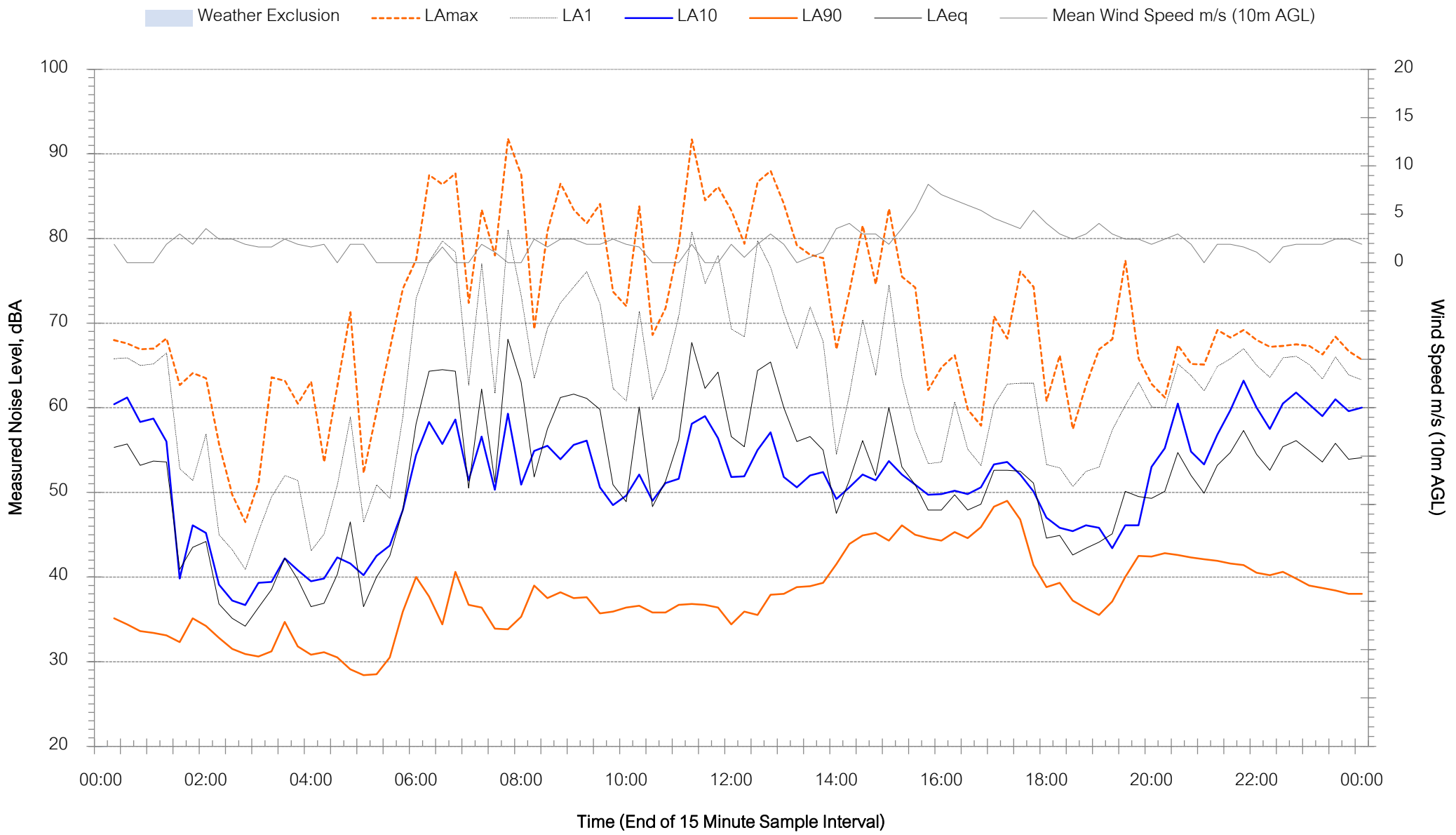
Background Noise Levels

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

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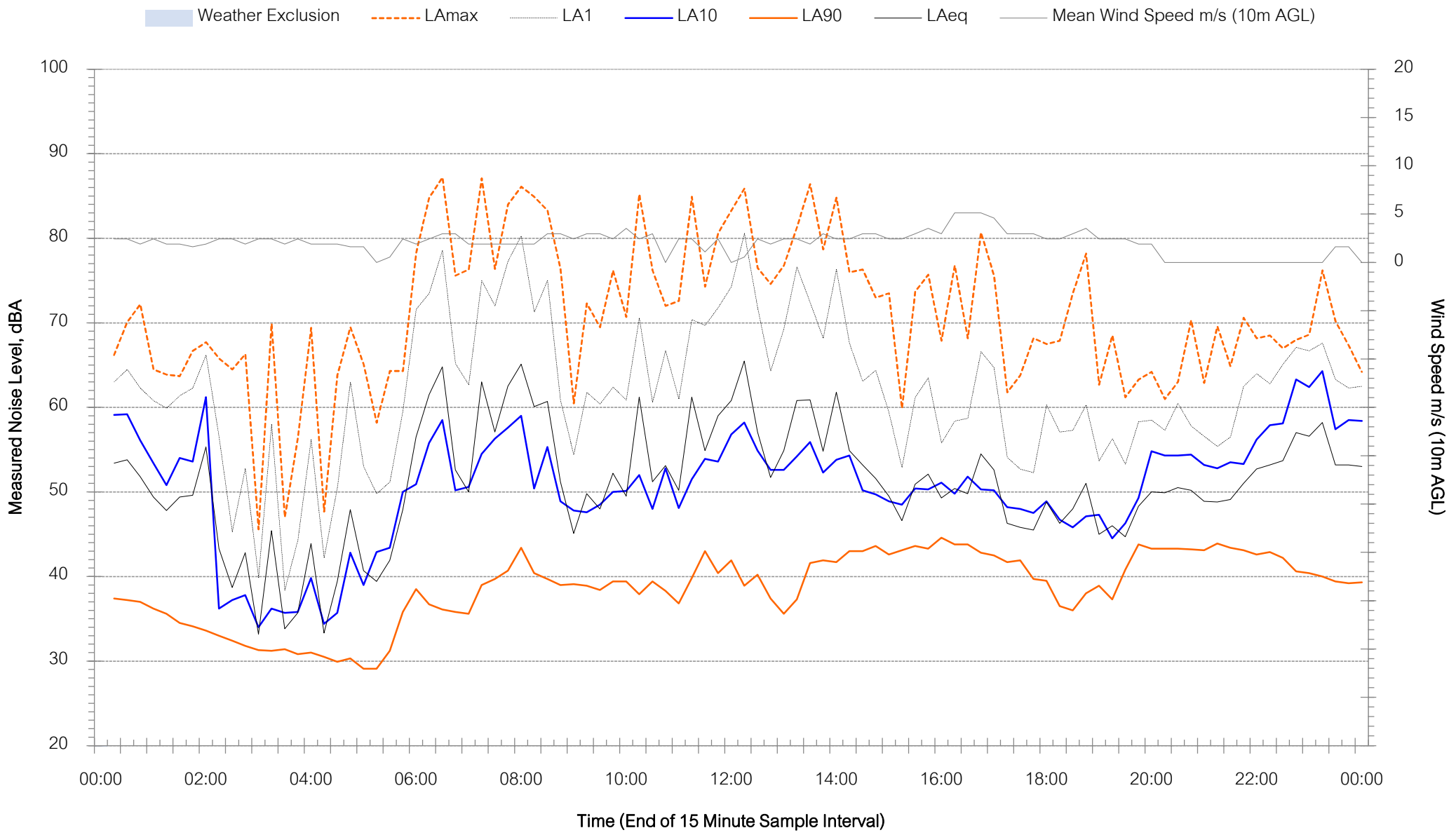
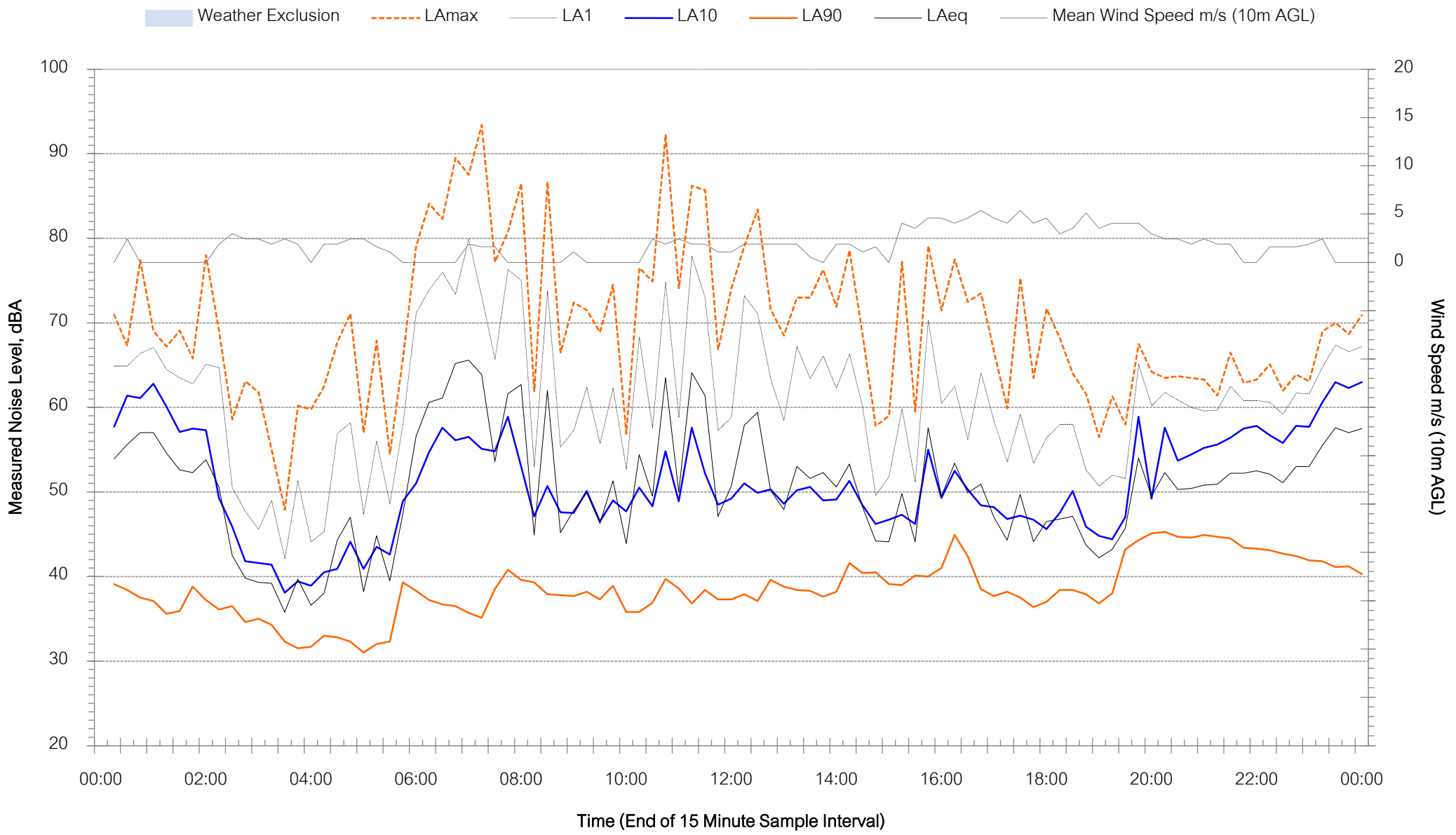


Background Noise Levels

L1 - Western Boundry, 4765 Old Northern Road, Maroota - Friday 21 October 2022



Background Noise Levels

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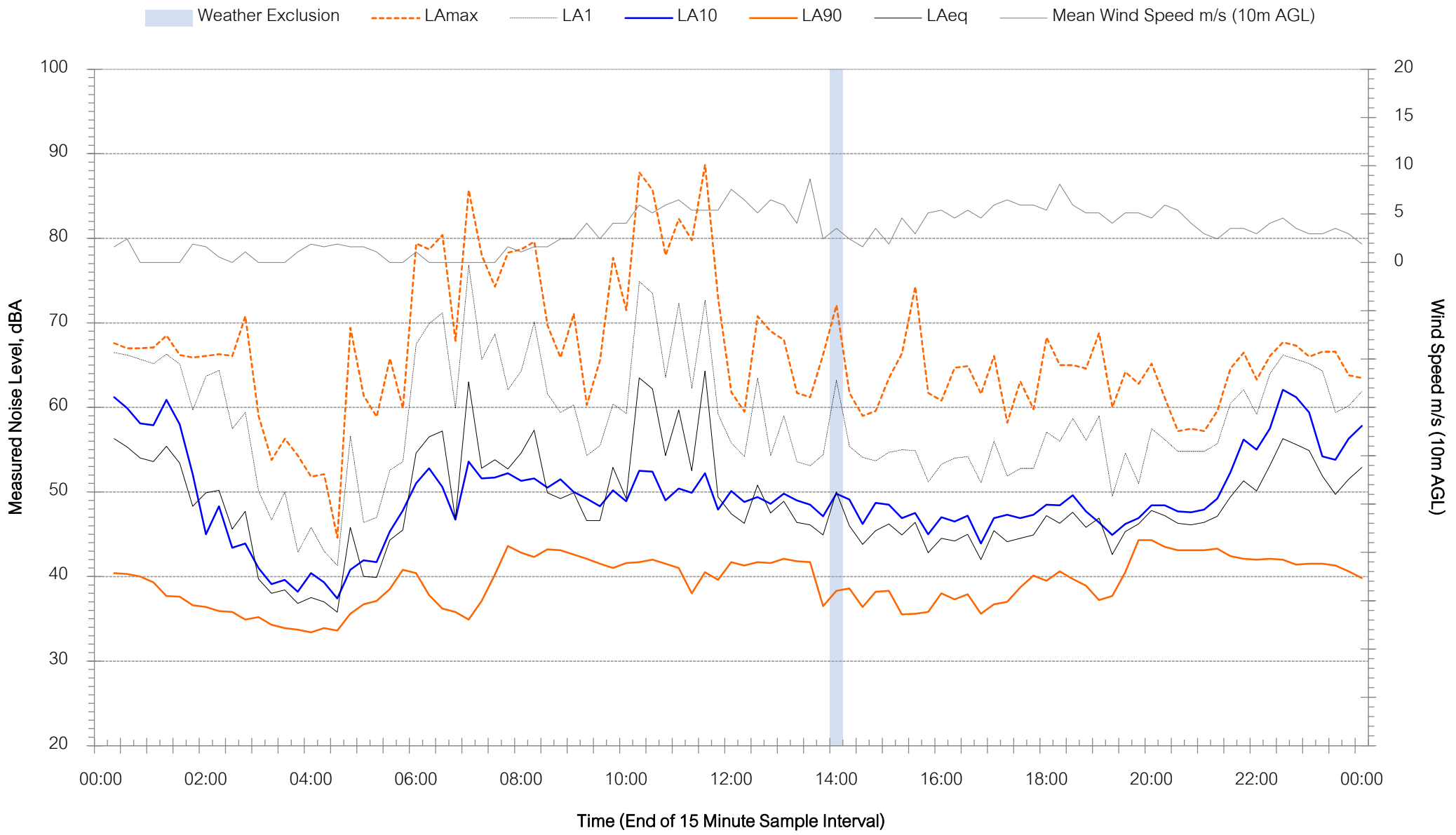

Background Noise Levels

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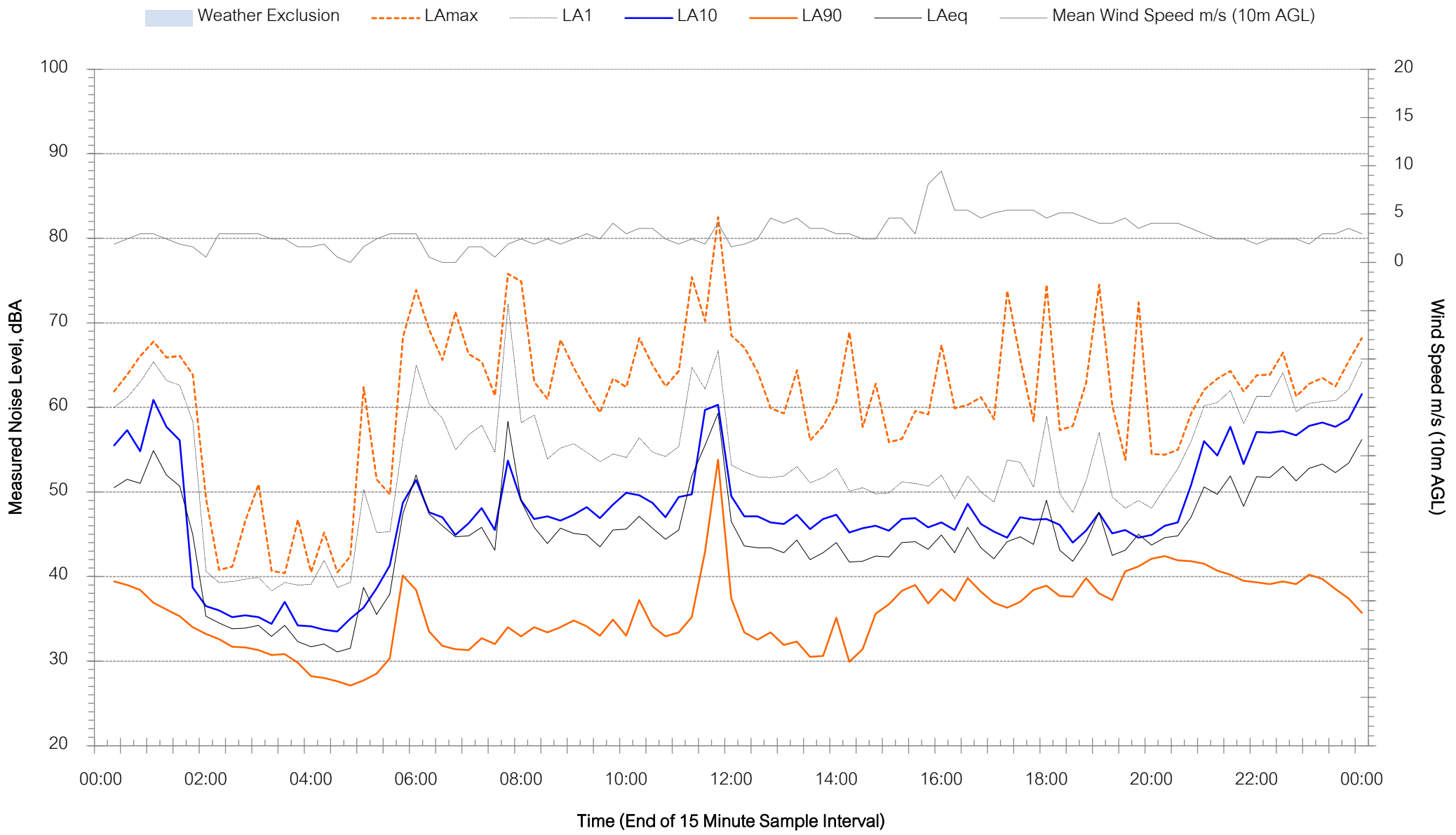
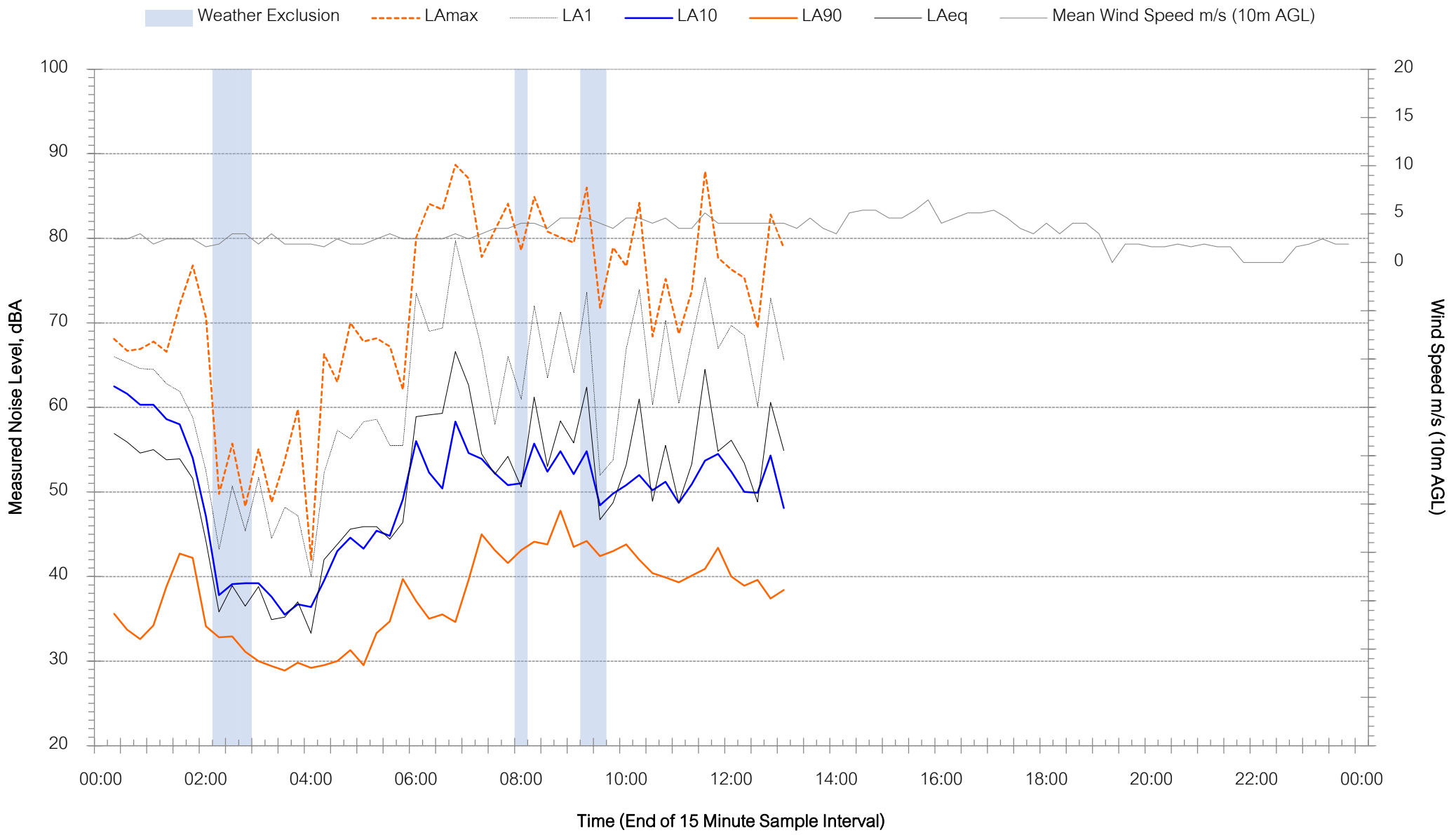


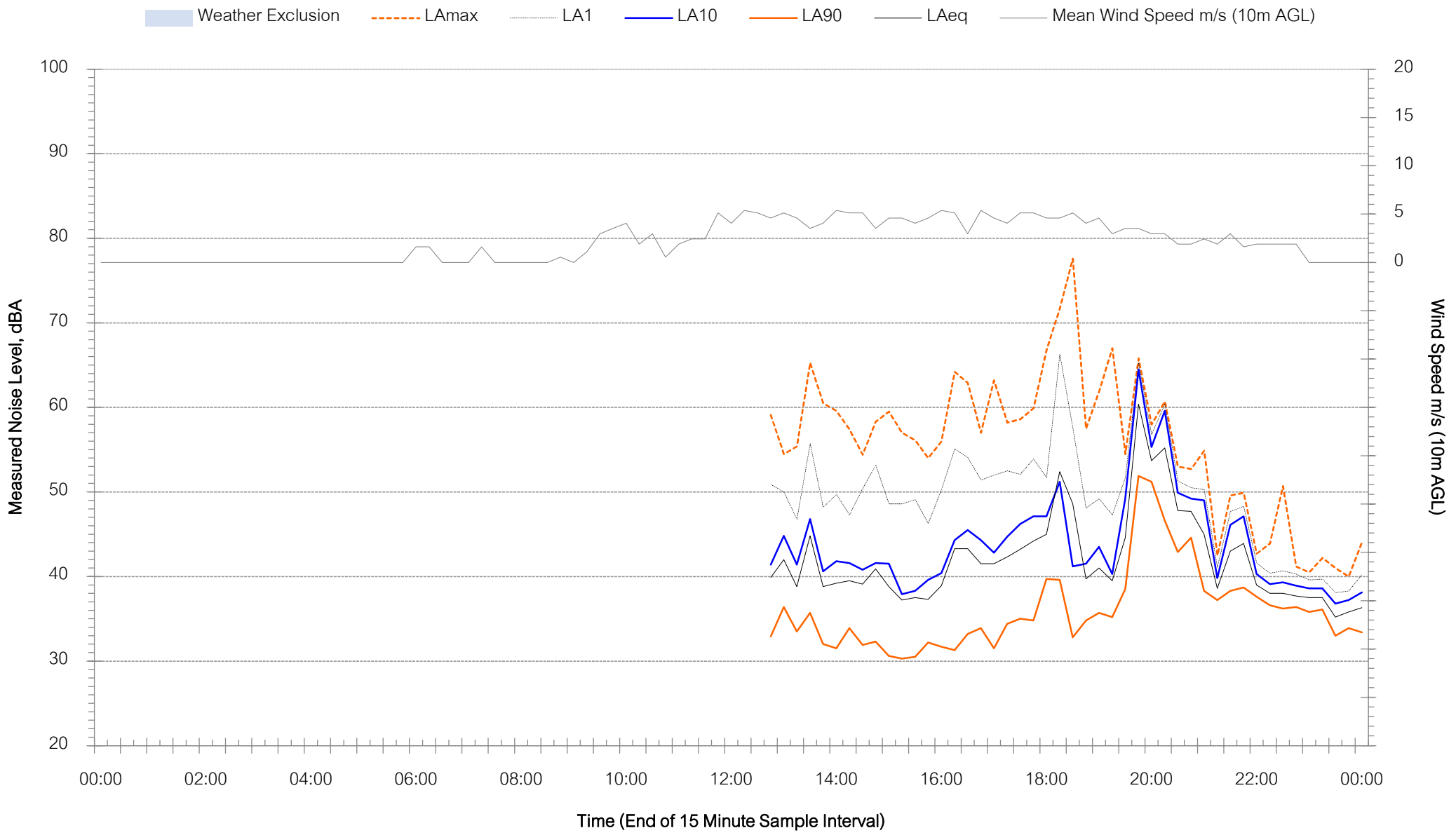
Background Noise Levels

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

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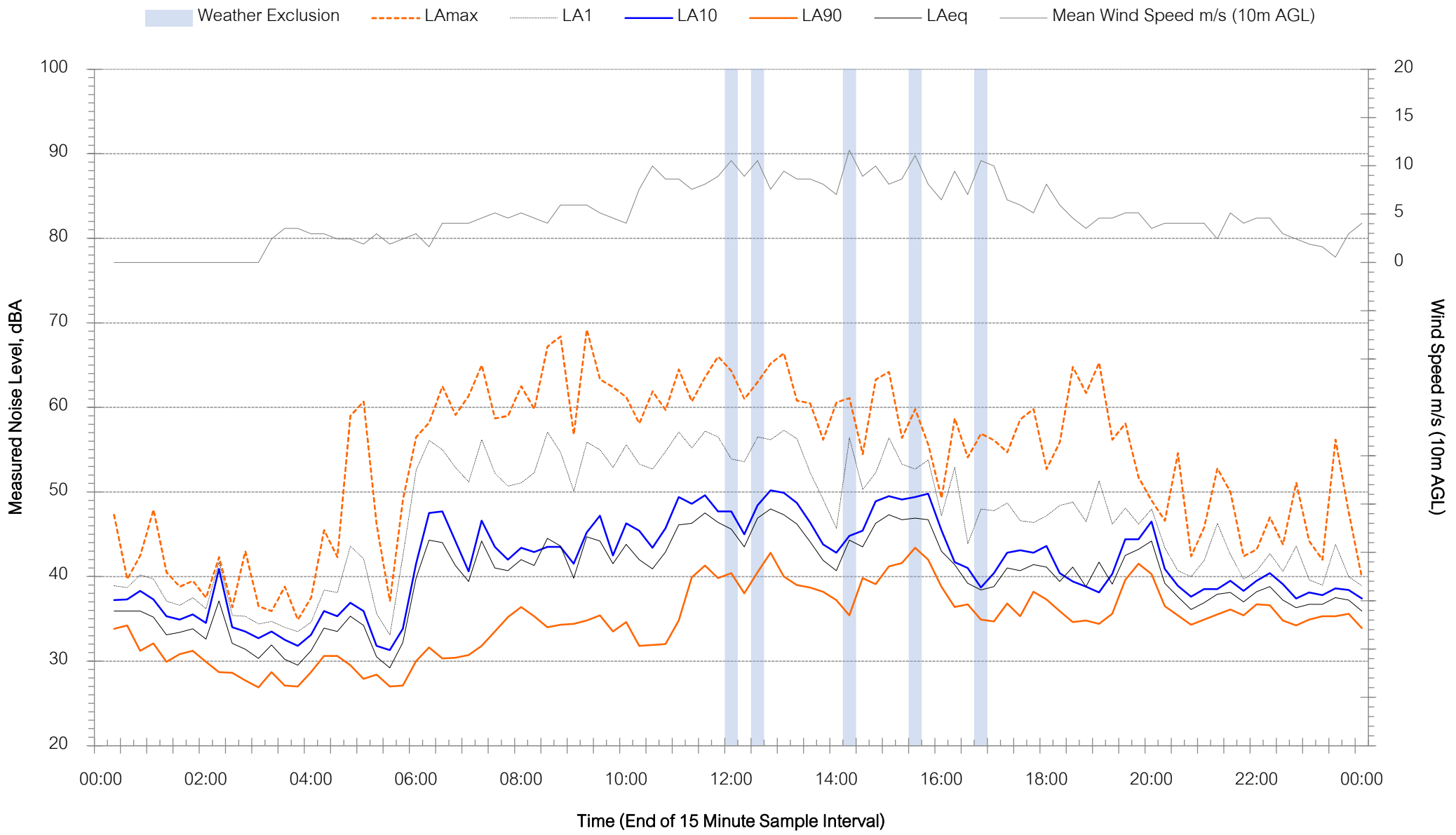
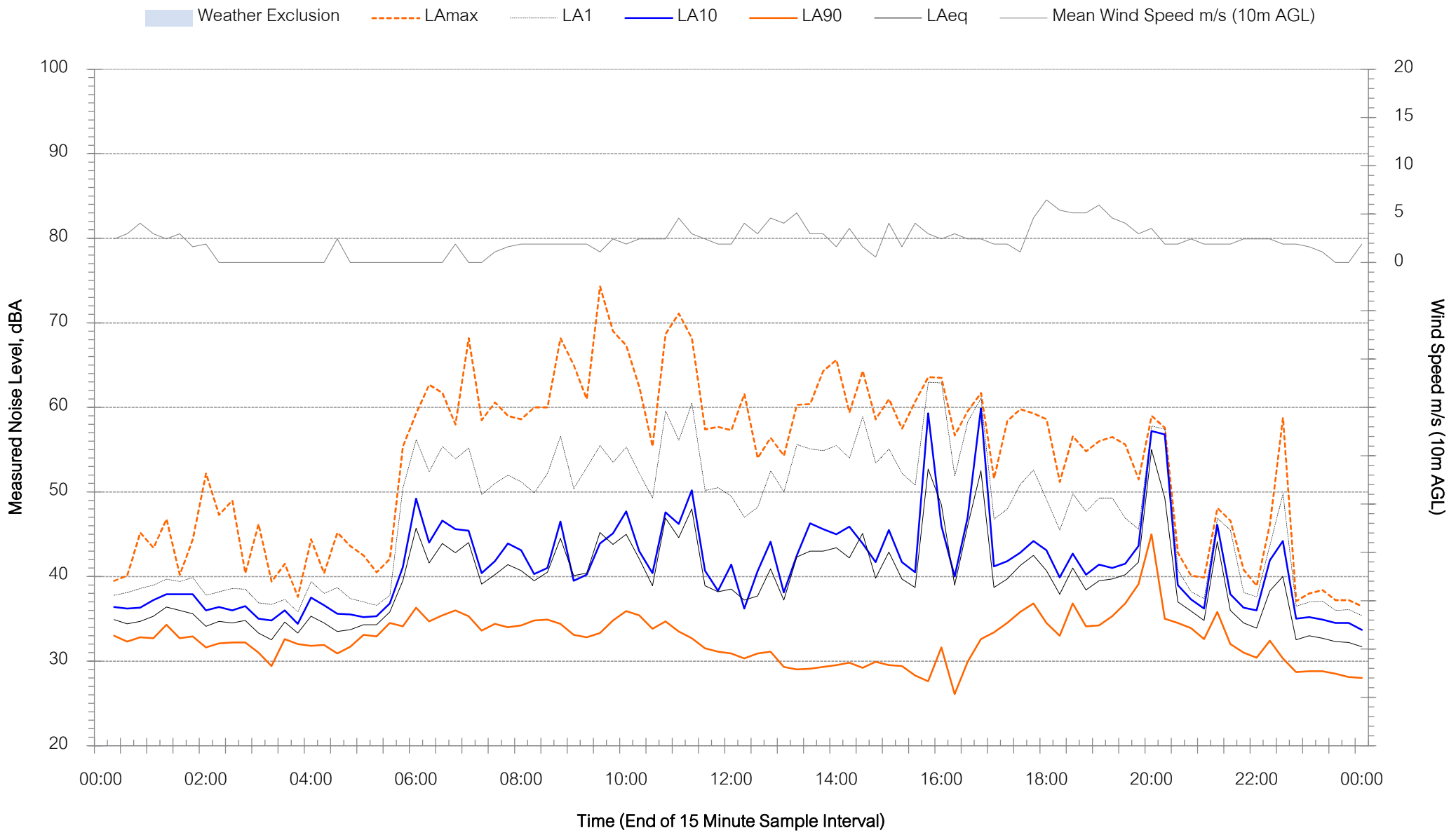


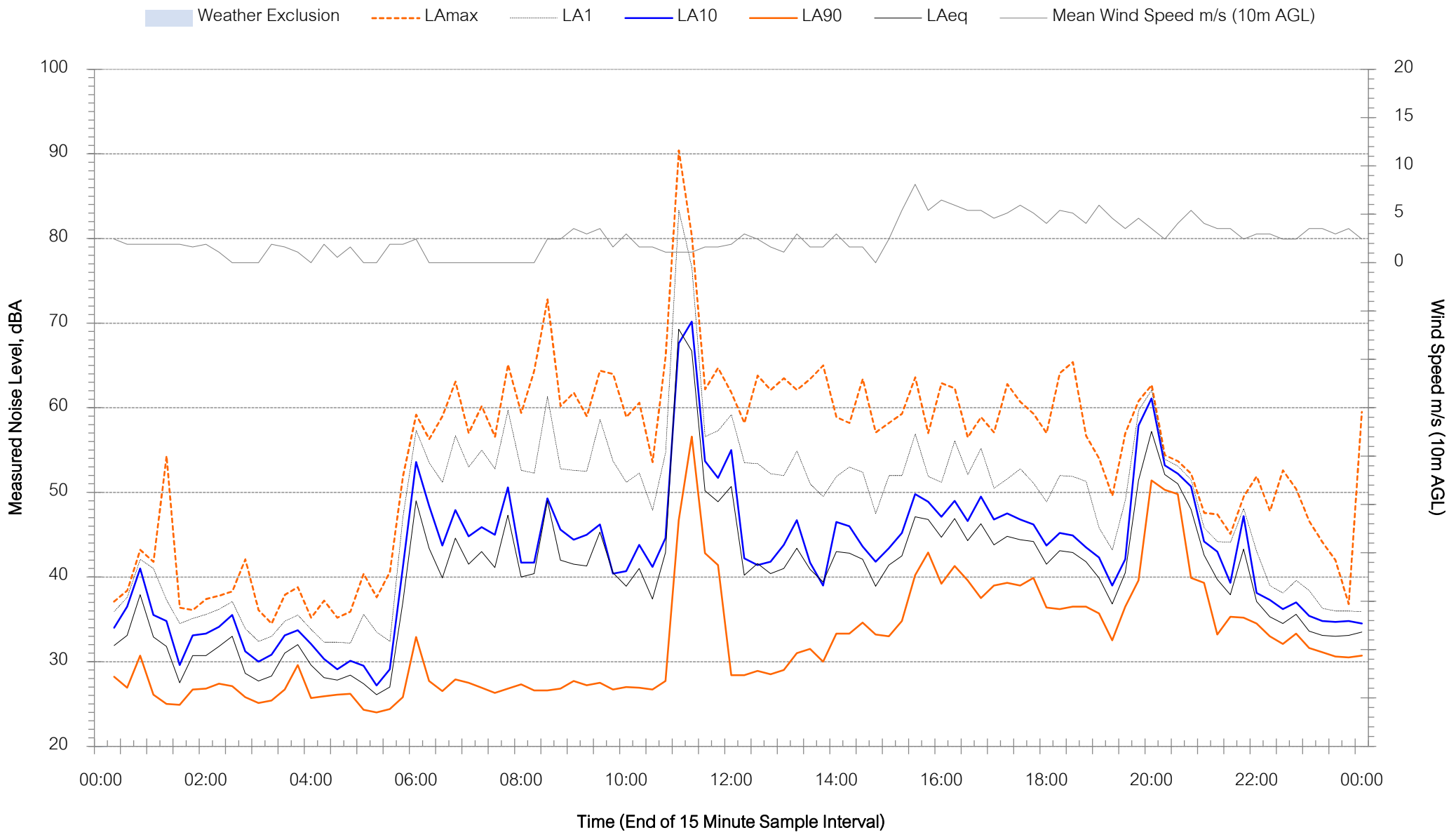
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Saturday 15 October 2022



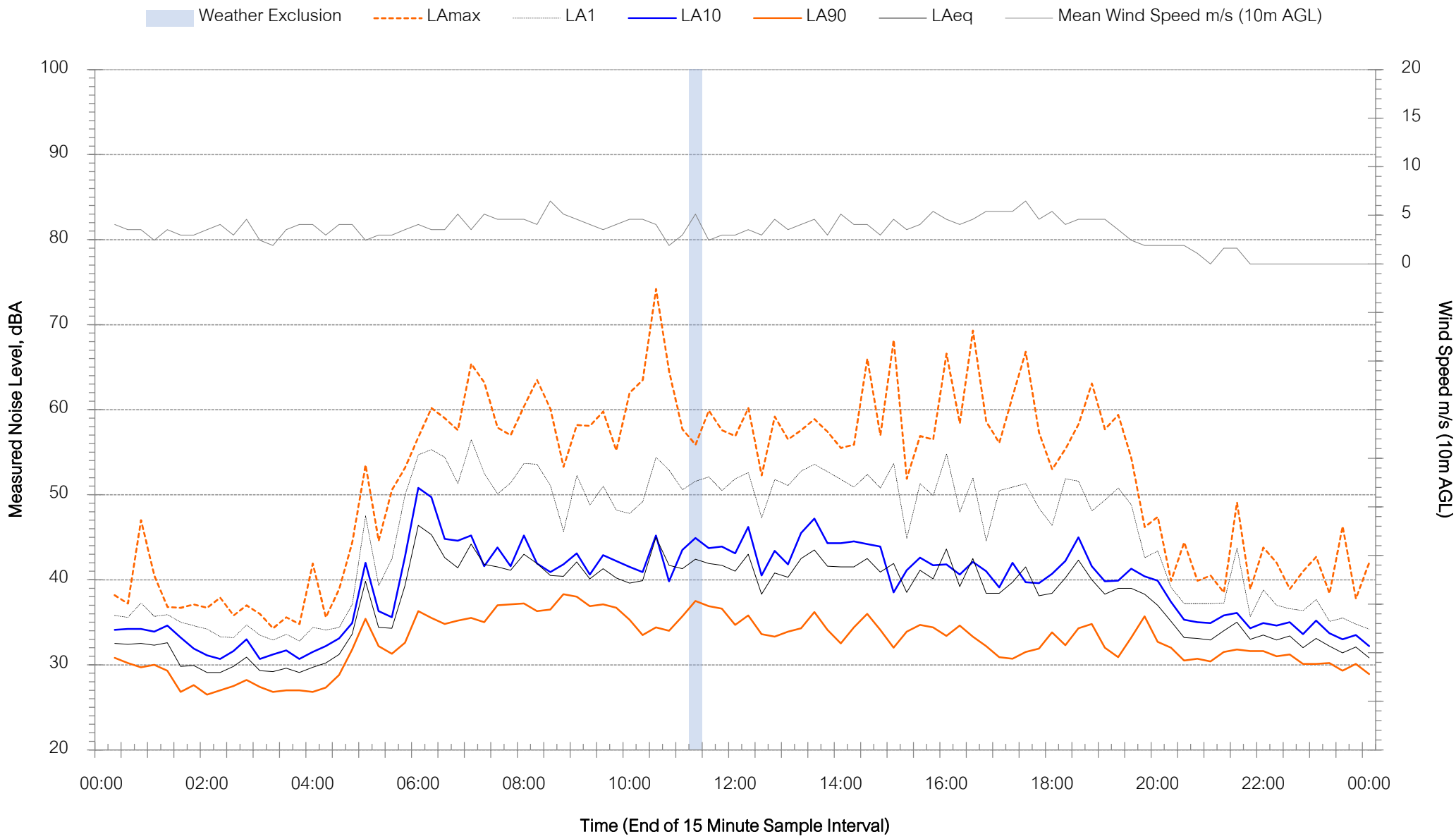
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Sunday 16 October 2022



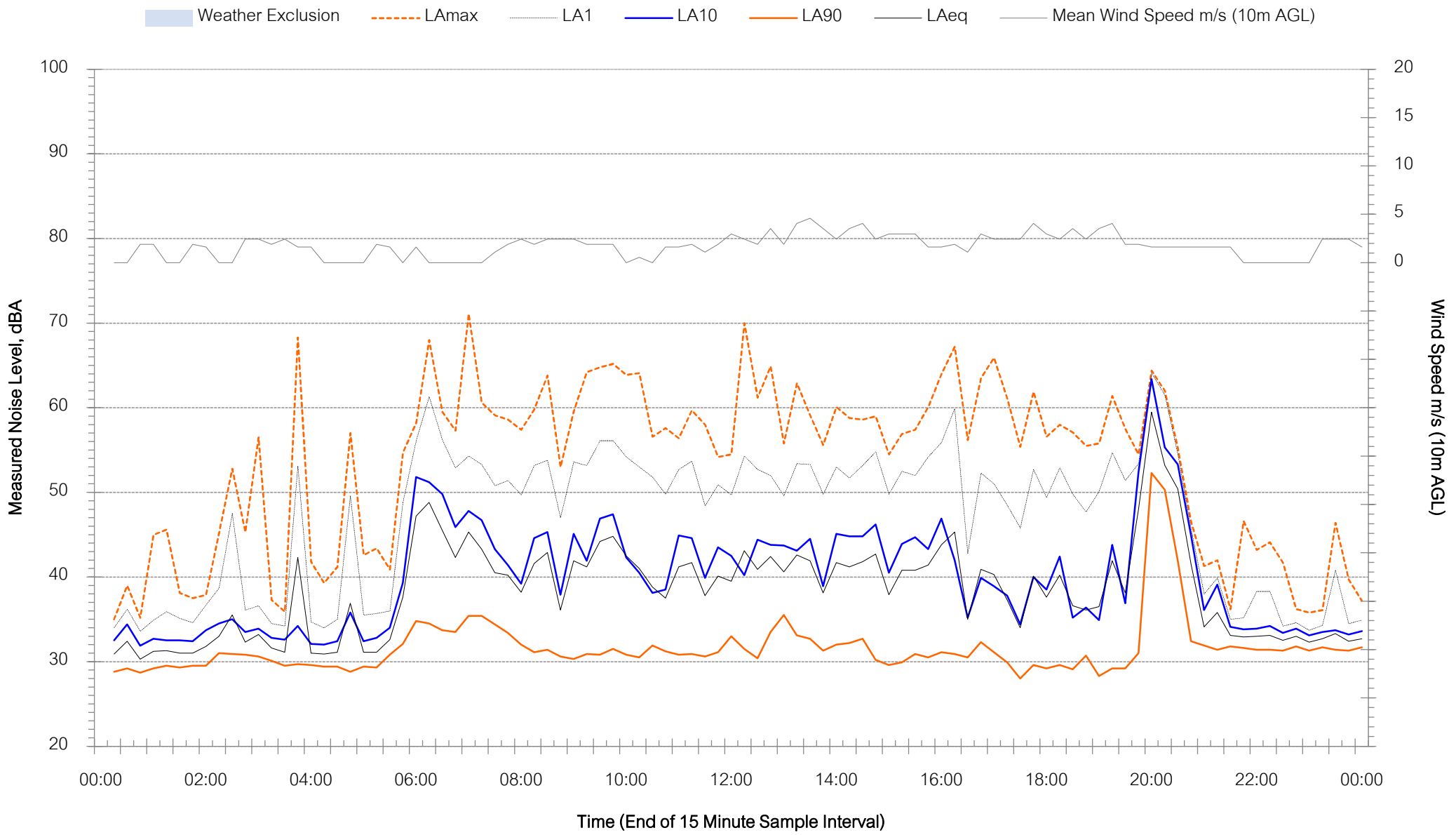
Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Monday 17 October 2022



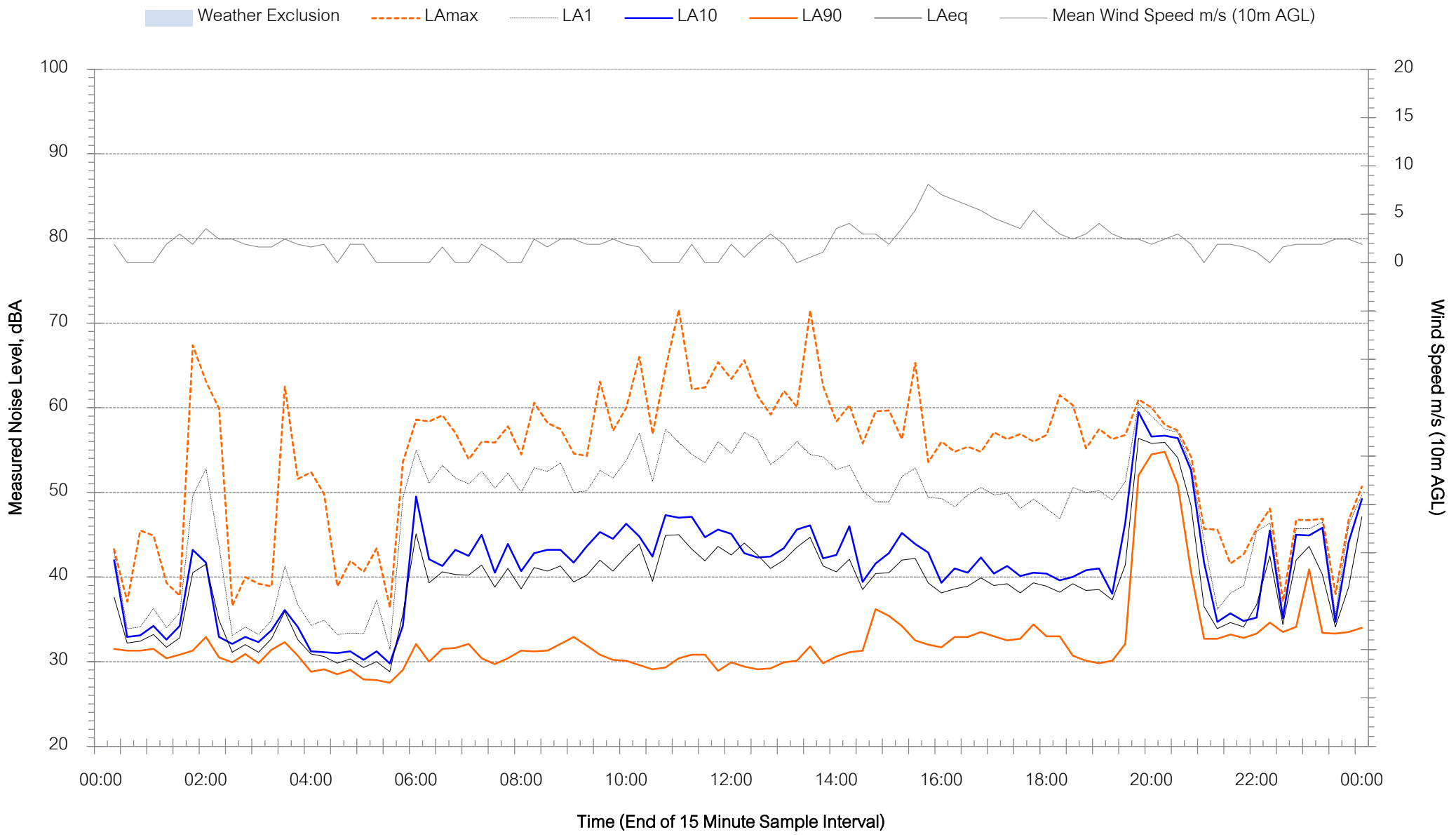
Background Noise Levels

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

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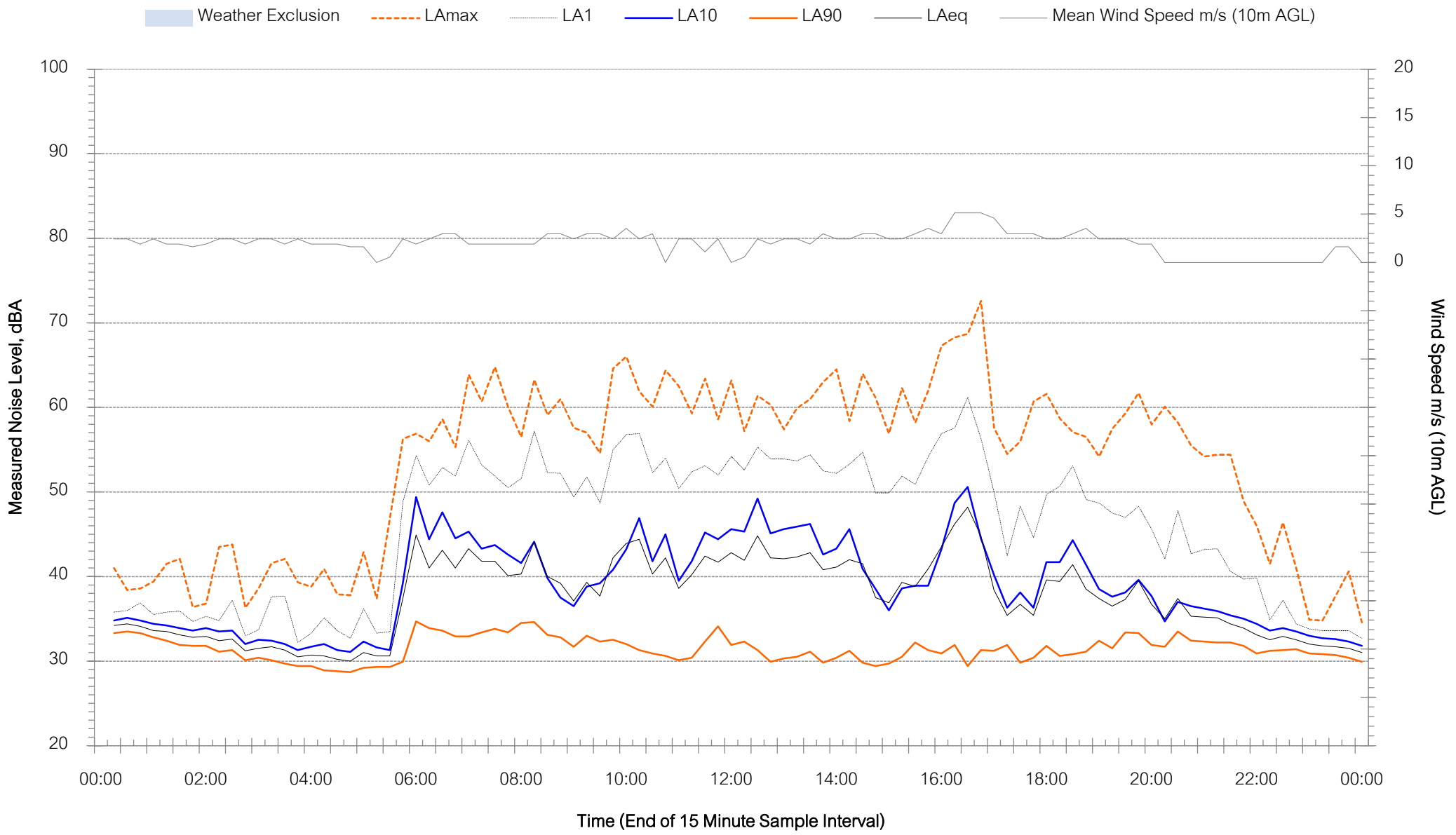
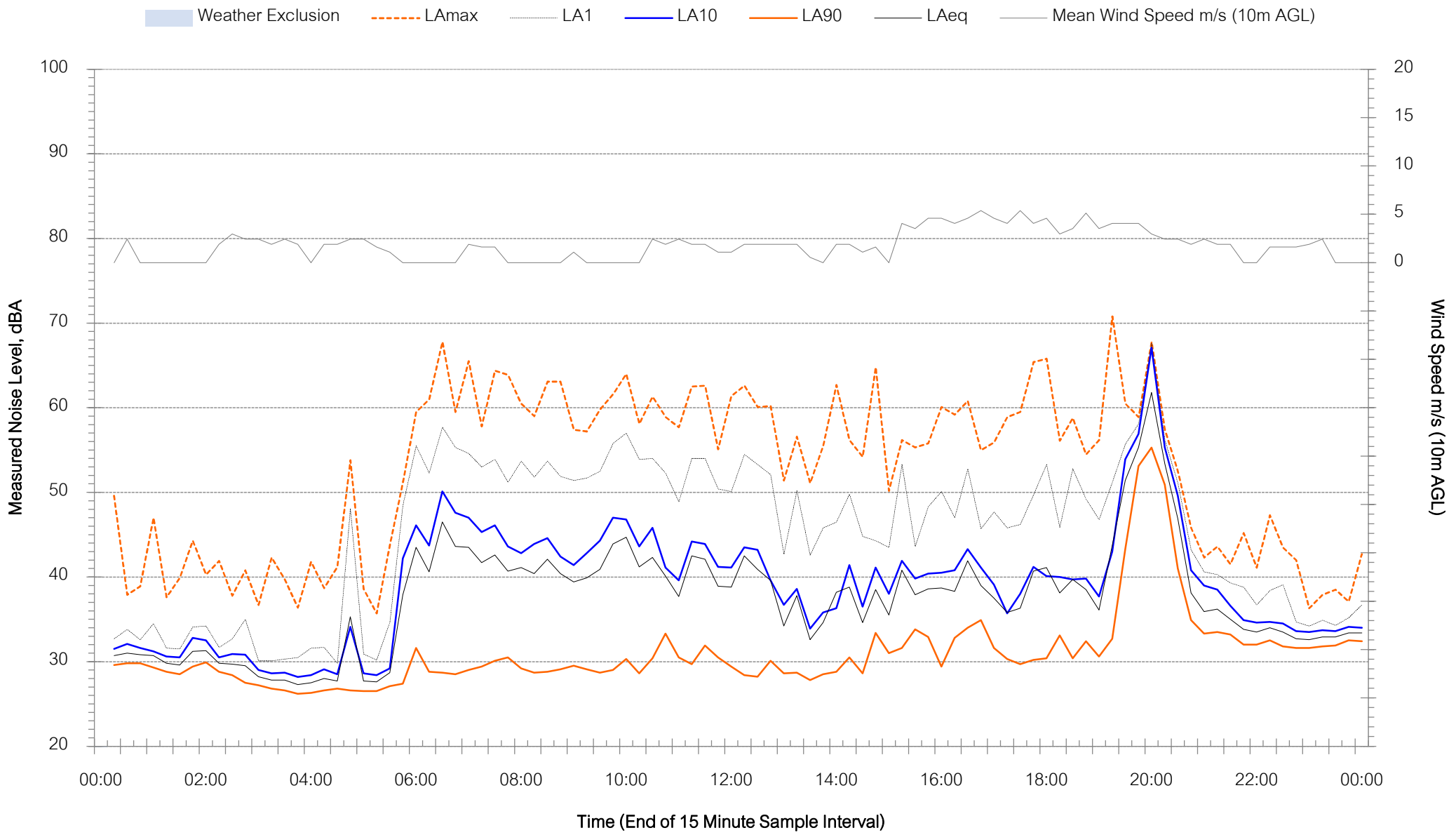


Background Noise Levels

L2 - 4837 Old Northern Road, Maroota - Friday 21 October 2022



Background Noise Levels

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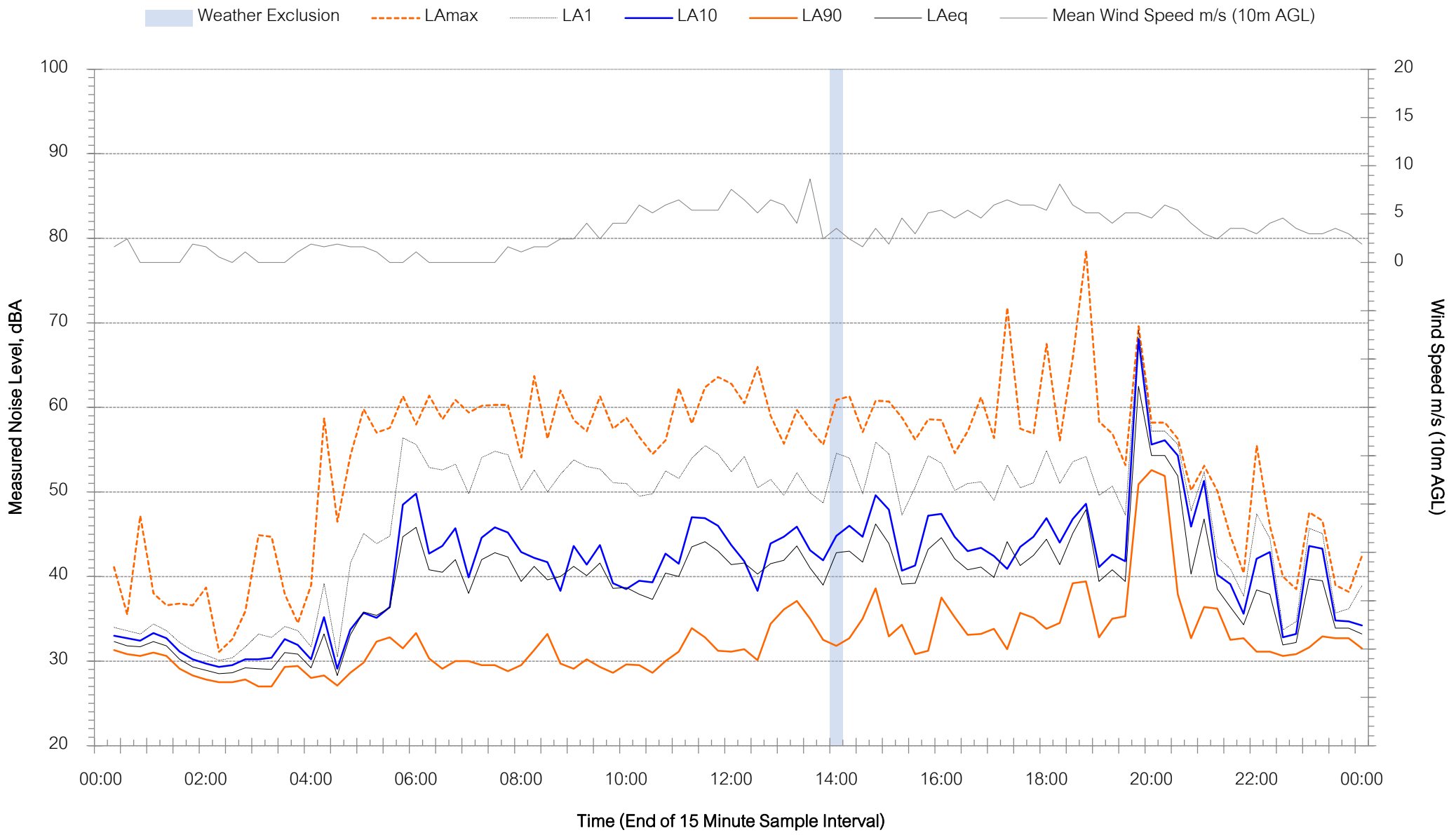

Background Noise Levels

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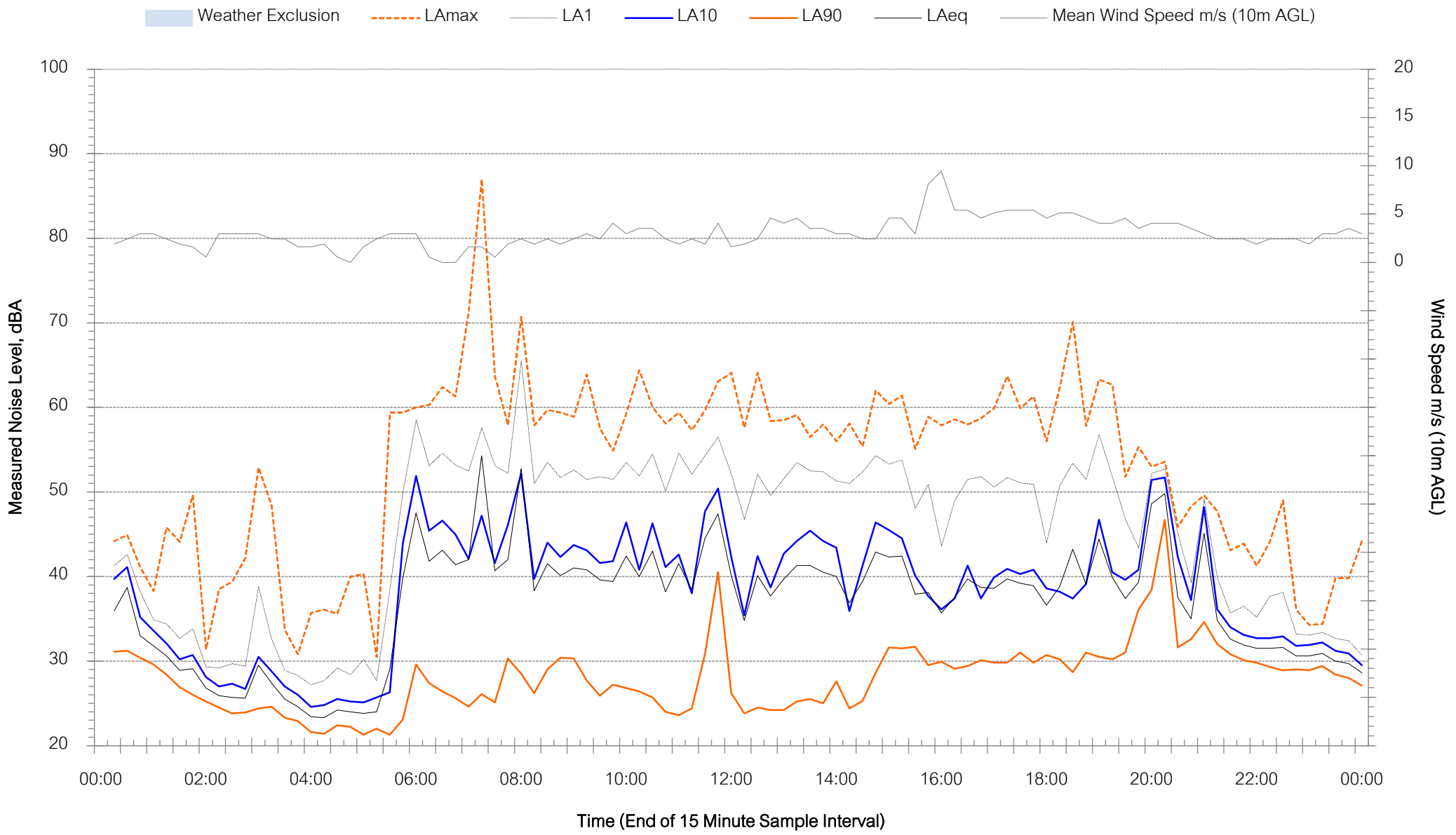

Background Noise Levels

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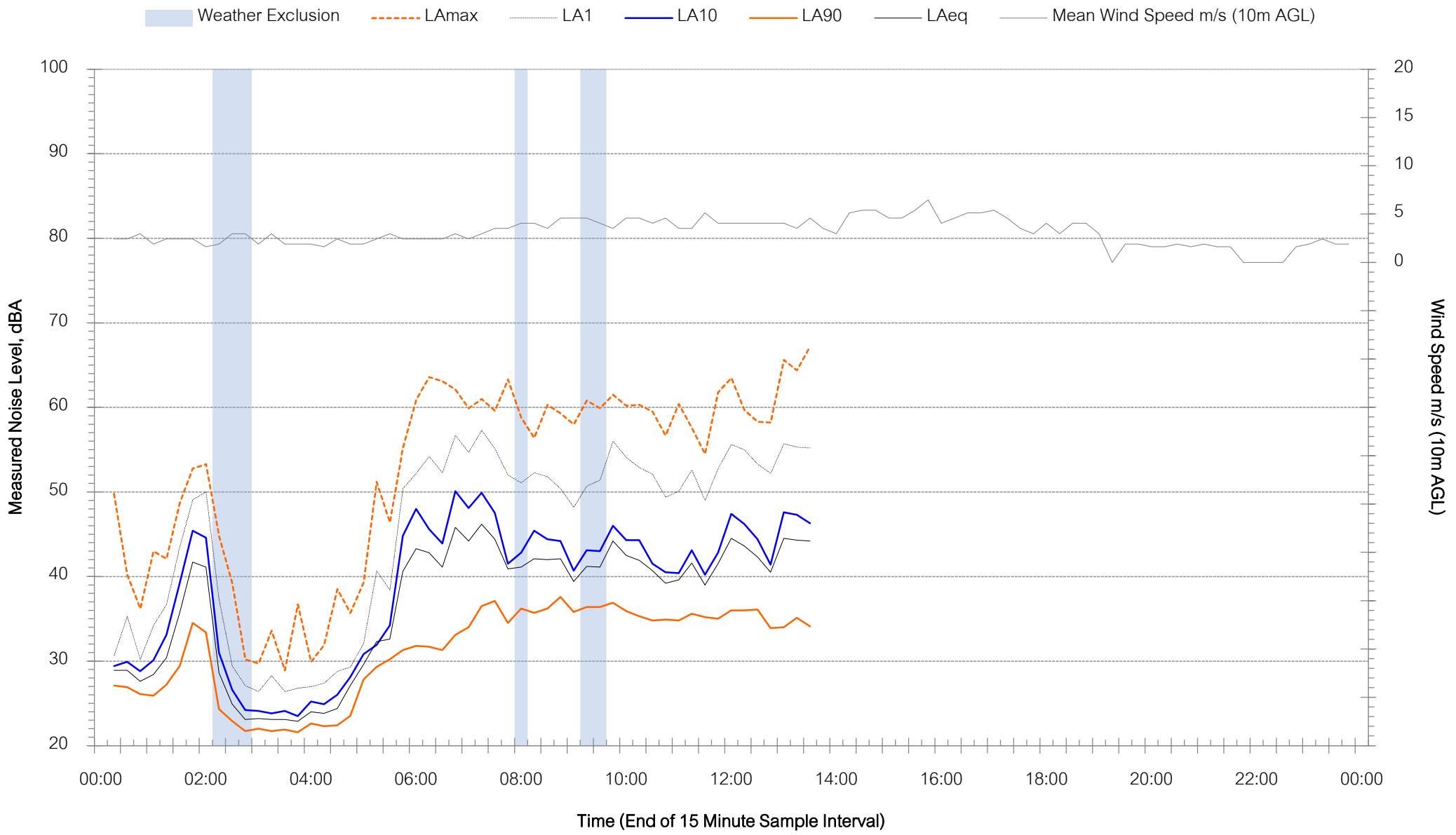

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Appendix C – Determination of NPI

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 2

Earthworks Cut and Fill Report

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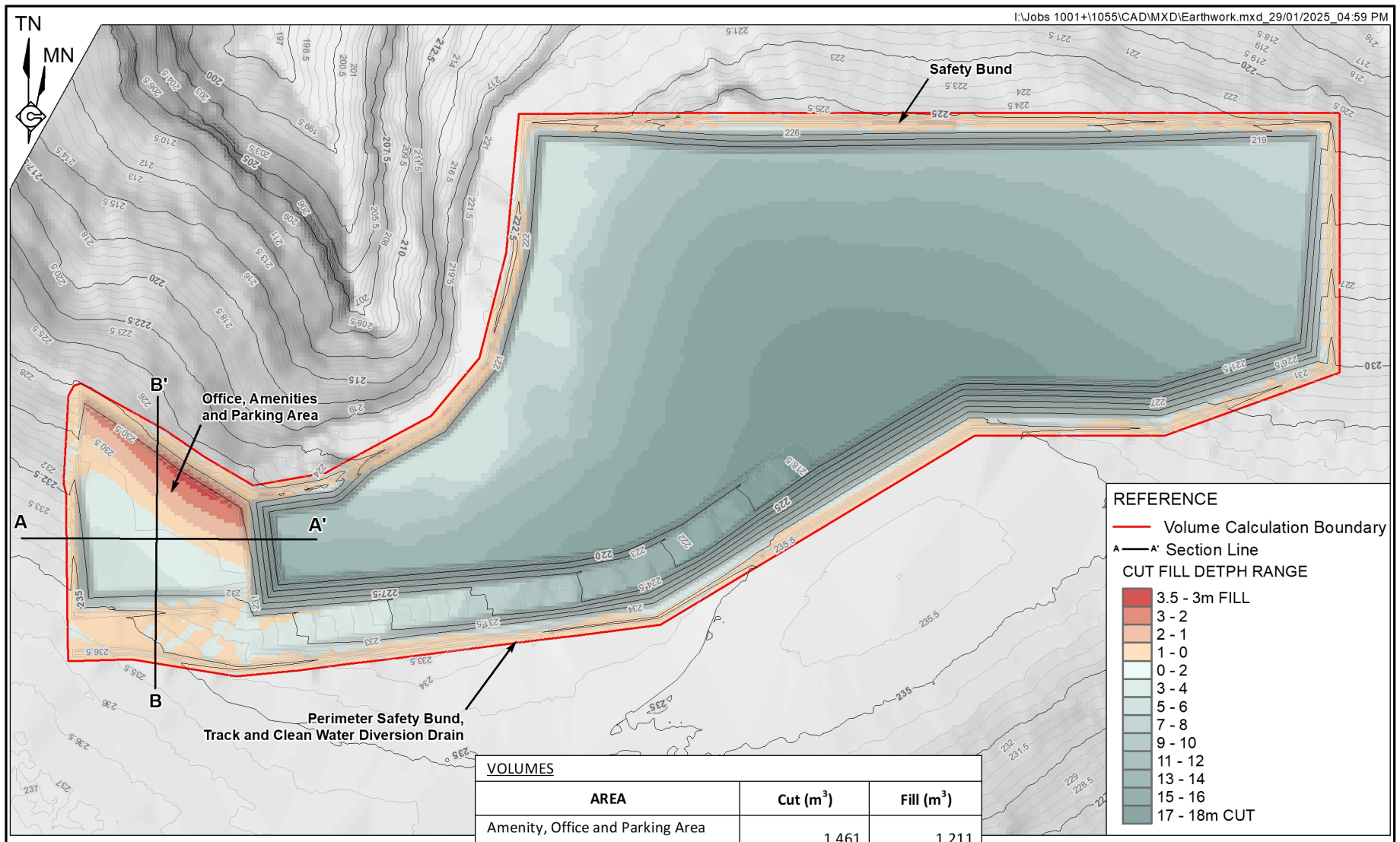


VOLUMES

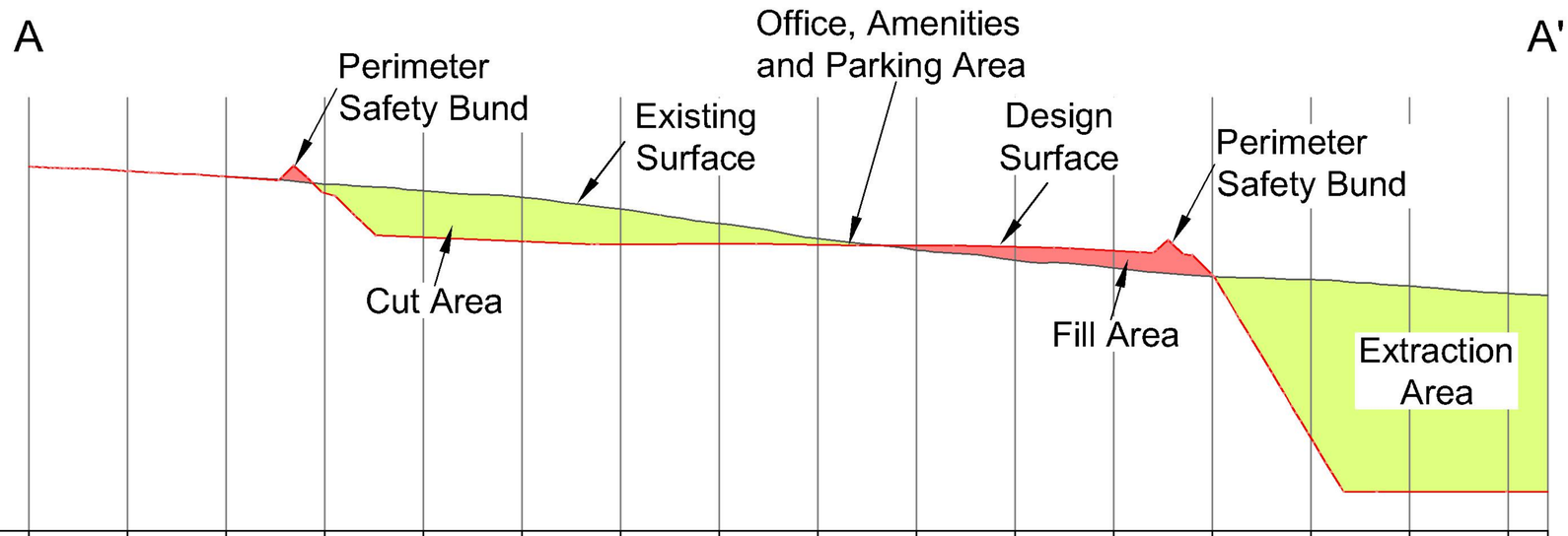
AREA	Cut (m^3)	Fill (m^3)
Amenity, Office and Parking Area Coverd Area = 2 200m^2	1 461	1 211
Perimeter Safety Bund H x W x L = 1m x 0.5 - 2.5 x 1155m	-	1 403

SCALE 1:1 500 (A4)

20 0 20 40 60 m

Source: ELVIS - Geoscience Australia

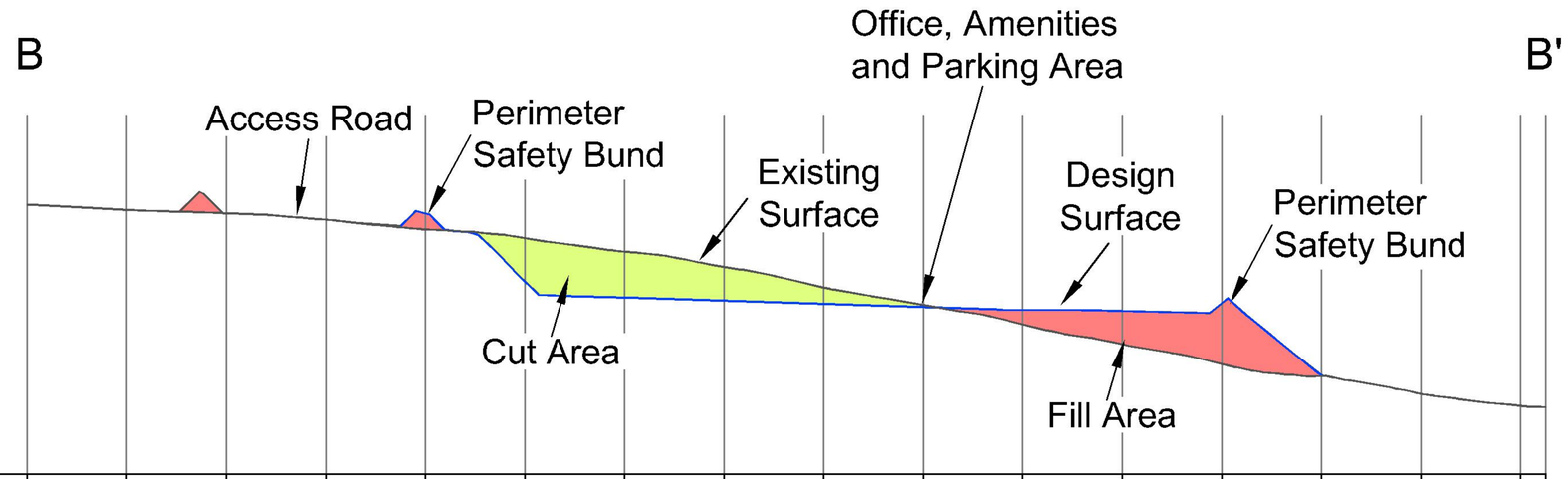
Figure A
CUT AND FILL DETAILS



EXISTING PROFILE (mAHD)	234.3	234.0	233.6	233.3	232.9	232.3	231.6	230.8	230.3	229.7	229.4	228.9	228.8	228.4	228.1				
DESIGN PROFILE (mAHD)	234.3	234.0	233.2	230.9	230.7	230.6	230.6	230.5	230.5	230.4	230.2	229.0	220.7	218.0	218.0				
CUT FILL DETAIL (m)	0.0	0.0	0.0	0.4	2.4	2.2	1.8	1.0	0.3	-0.2	-0.7	-0.9	-0.1	8.0	10.4	10.1			
CHAINAGE	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75			

Source:

Figure B
CROSS SECTION A - A'



EXISTING PROFILE (mAHD)		235.3	235.1	234.8	234.3	233.8	233.2	232.4	231.4	230.5	229.5	228.5	227.5	226.9	226.0	225.4		
DESIGN PROFILE (mAHD)		235.3	235.1	234.8	235.1	231.7	230.9	230.7	230.5	230.4	230.3	230.2	230.6	227.0	226.0	225.4		
CUT FILL DETAIL (m)	0.0	0.0	0.0	0.0	-0.8	2.2	2.3	1.7	0.8	0.1	-0.7	-1.7	-3.0	-0.1	0.0	0.0	0.0	
CHAINAGE	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	76	

Figure C
CROSS SECTION B - B'

Source:

Appendix 3

Sewage Tank Certification

(Total No. of pages including blank pages = 26)

2000 LITRE ABLUTION WASTE TANK

ITEM NO.	QTY.	DESCRIPTION
N1	1	100MM PVC INSPECTION OPENING
N2	1	80MM MALE BSP THREADED WASTE OUTLET
N3	1	50MM FEMALE BSP THREADED PLASTIC FITTING AND BUNG

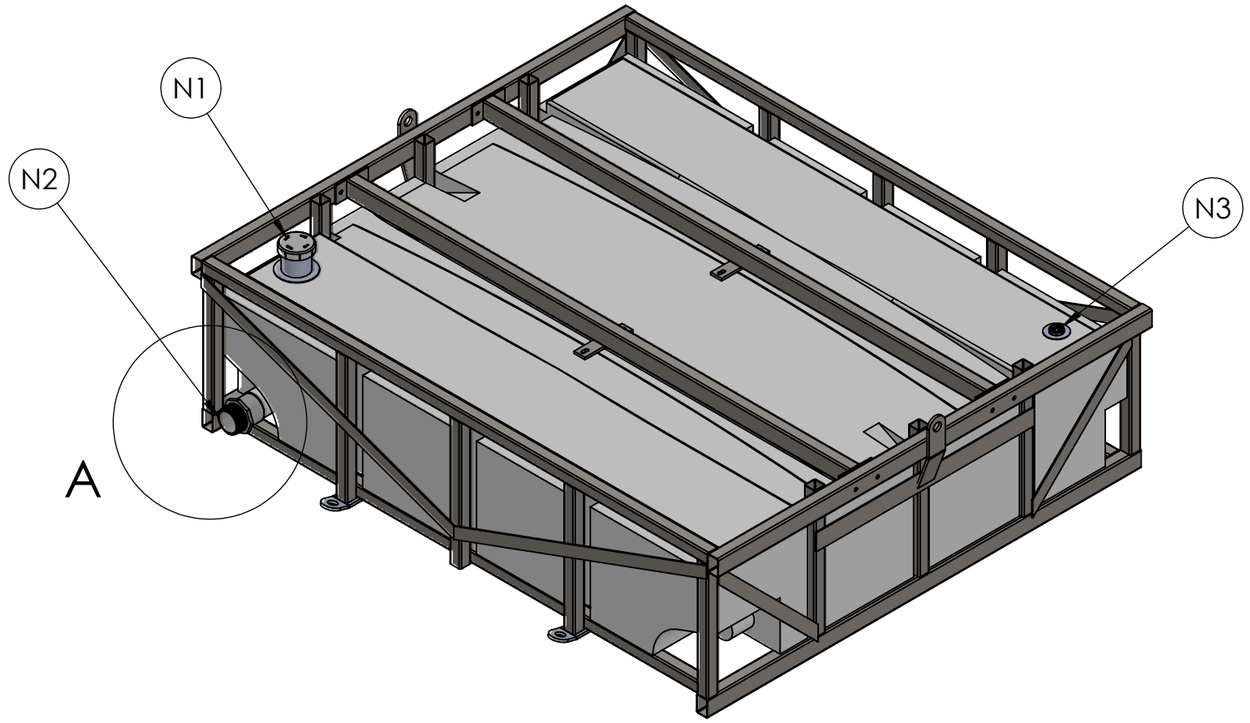
RSA

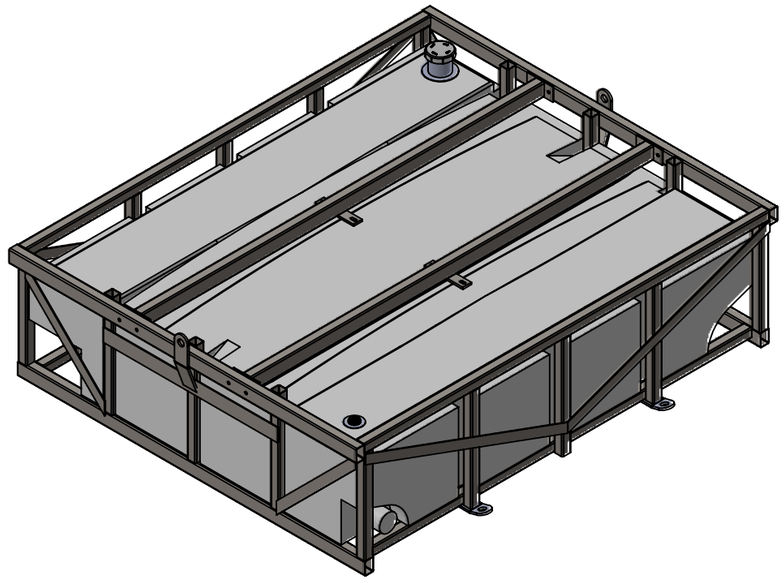
CERTIFICATION RSA REF: 23-0507

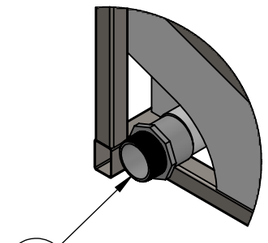
STRUCTURE DESIGN WIND LOADING TO AS/NZS 1170.2 - 2021
ANNUAL PROBABILITY OF EXCEEDANCE - 1:500 - IMPORTANCE LEVEL 2
WIND REGION: D (CYCLONIC) - TERRAIN CATEGORY 1
WIND SPEEDS: REGIONAL - 88m/s SERVICEABILITY - 55m/s

Signed: ..... Date: 29/08/2023

Robin Salter BEng(Hons) FIEAust CPEng NER RPEQ
RSA Pty Ltd | Unit 6, 9 Playle Street, Myaree WA 6154
T: +61 08 9317 3331 | E: info@rsaeng.com.au







DETAIL A

NOTE:
1. UNIT EMPTY WEIGHT = 310kg.

REV	DESCRIPTION	DWN	CHK	APP	DATE
00	ISSUED FOR CONSTRUCTION	KD	RB	MJ	14.08.23

coerco Engineered Project Solutions

MATERIAL	AS SPECIFIED
COLOUR/ FINISH	
S.G.	

DWN	KD
CHK	RB
APP	MJ
SCALE: NTS	

STOCK CODE ABWT2000SF
PRODUCT 2000 LTR WASTE TANK

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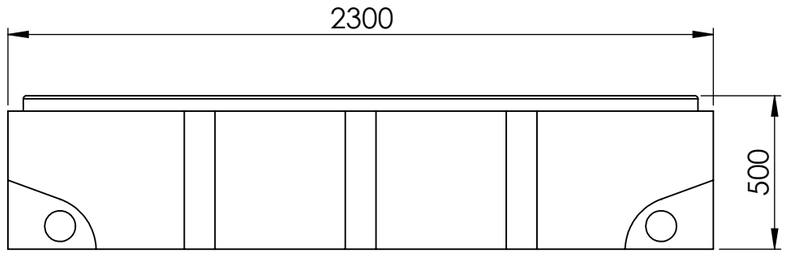
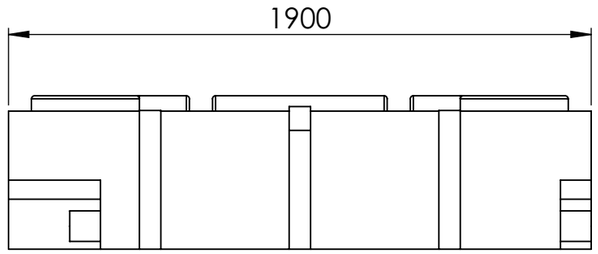
E-mail:info@coerco.com.au

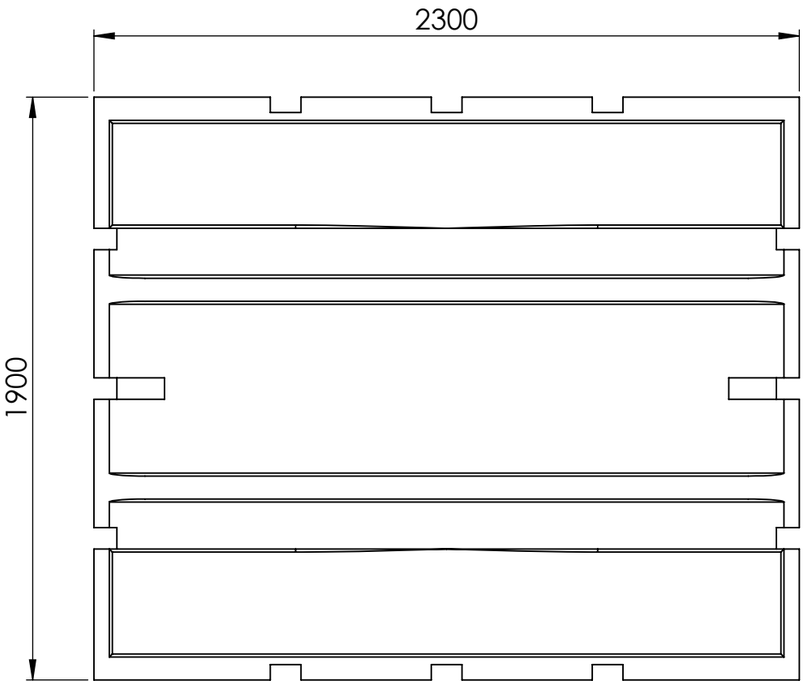
SHEET 1 OF 5 | DWG NO. ABWT2000SF_GA_001 | REV.



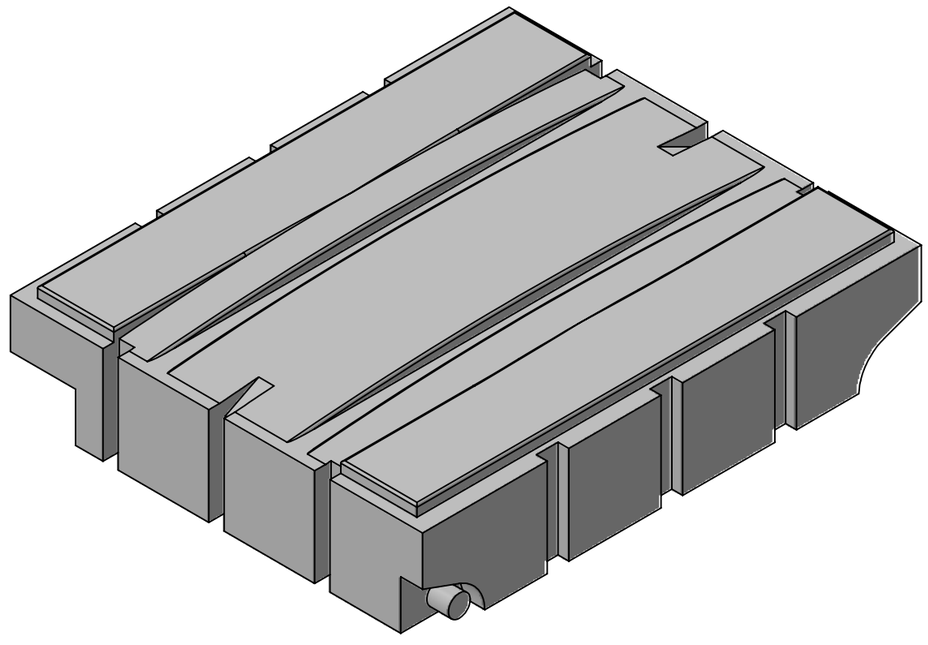
TANK FRONT VIEW



TANK SIDE VIEW



TANK TOP VIEW



NOTES:
1. EMPTY TANK MASS 100kg
2. TANK NOMINAL CAPACITY 2000 L

CERTIFICATION RSA REF: 23-0507
STRUCTURE DESIGN WIND LOADING TO AS/NZS 1170.2 - 2021
ANNUAL PROBABILITY OF EXCEEDANCE - 1:500 - IMPORTANCE LEVEL 2
WIND REGION: D (CYCLONIC) - TERRAIN CATEGORY 1
WIND SPEEDS: REGIONAL - 89m/s SERVICEABILITY - 55m/s
Signed: ..... Date: 29/08/2023
Robin Salter BEng(Hons) FIEAust CPEng NER RPEQ
RSA Pty Ltd | Unit 6, 9 Playle Street, Myaree WA 6154
T: +61 08 9317 3331 | E: info@rsaeng.com.au

REV	DESCRIPTION	DWN	CHK	APP	DATE
00	ISSUED FOR CONSTRUCTION	KD	RB	MJ	14.08.23

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Engineered Project Solutions

MATERIAL	**AS SPECIFIED**
COLOUR/ FINISH	
S.G.	

DWN	KD
CHK	RB
APP	MJ
SCALE: NTS	

STOCK CODE ABWT2000SF
PRODUCT 2000 LTR WASTE TANK

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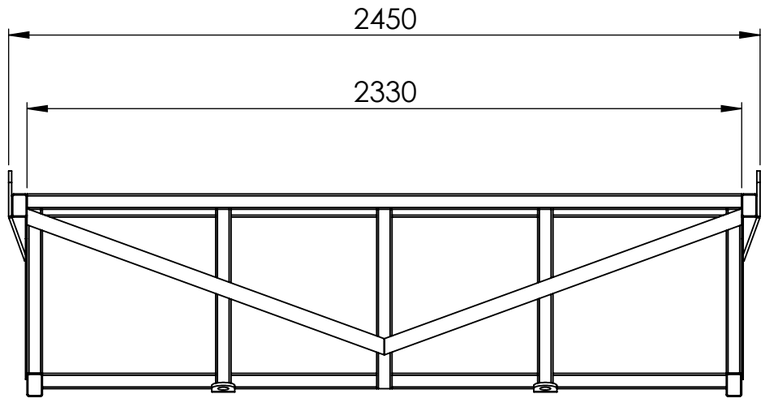
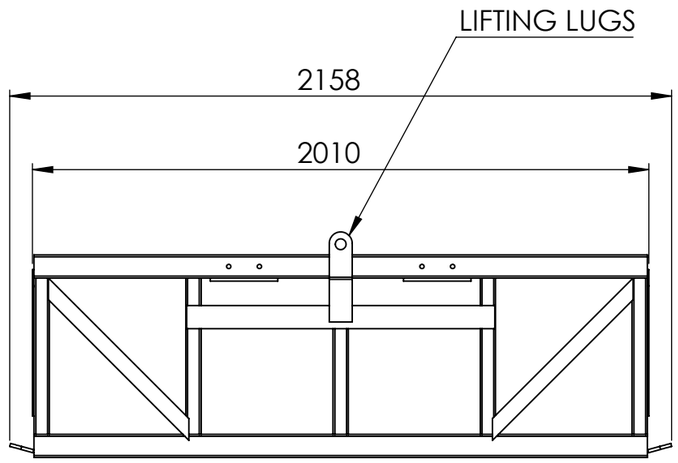
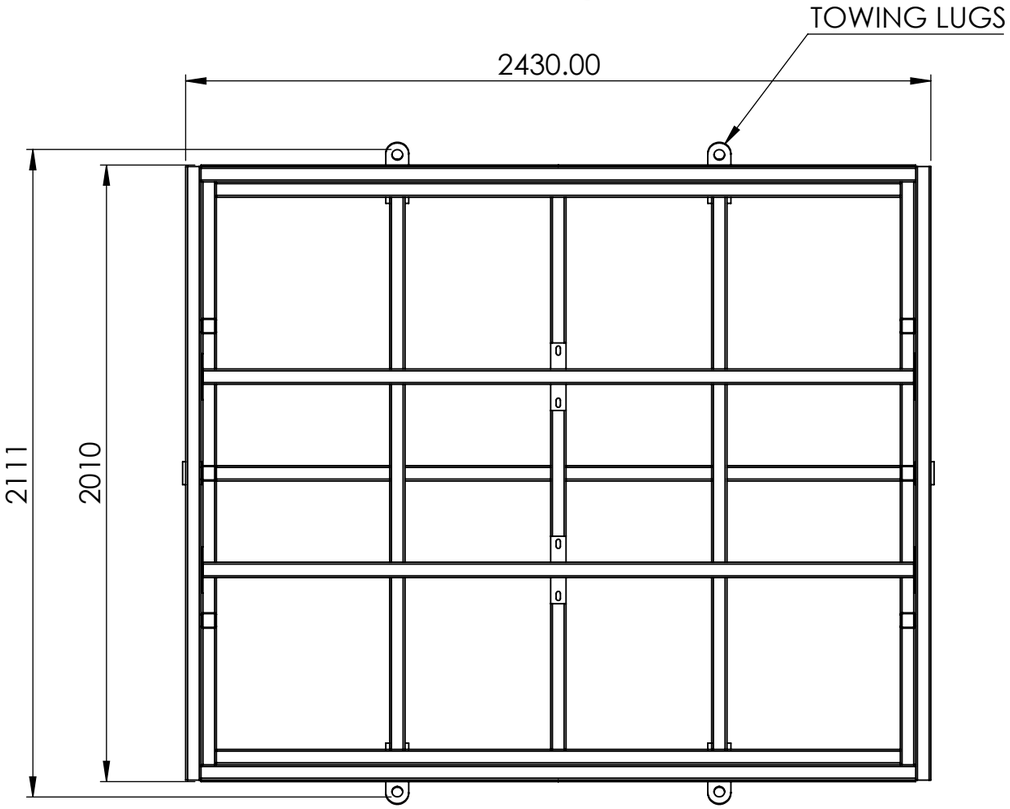


FRAME FRONT VIEW



FRAME SIDE VIEW



FRAME TOP VIEW

GENERAL NOTES:

1. FRAME MANUFACTURED FROM STEEL HOLLOW SECTIONS AS PER AS 1163
2. WELDING AS PER AS 1554.7
3. LIFTING LUGS WLL RATED CAPACITY IS 500 KG

CERTIFICATION RSA REF: 23-0507
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MATERIAL	AS SPECIFIED
COLOUR/ FINISH	
S.G.	

DWN	KD
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APP	MJ
SCALE: NTS	

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PRODUCT 2000 LTR WASTE TANK

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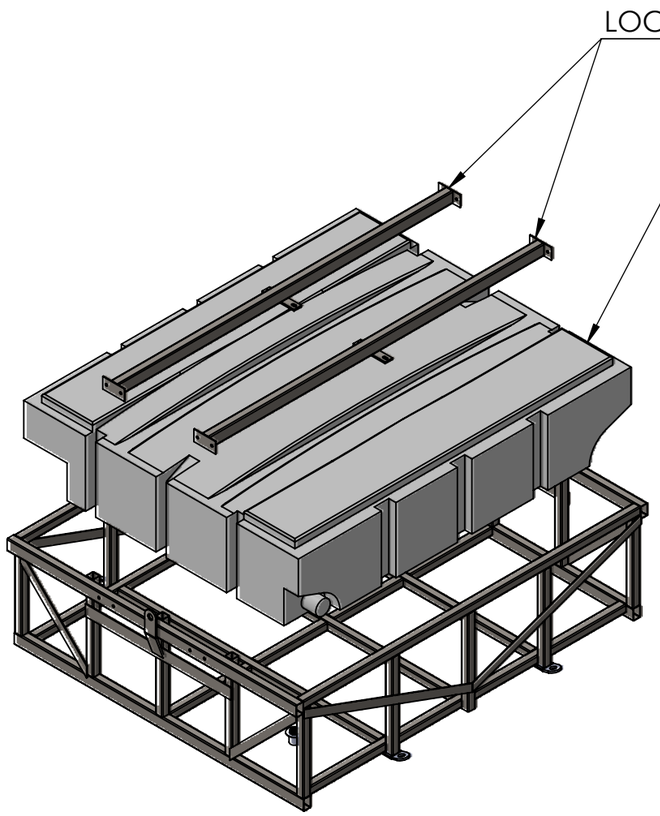
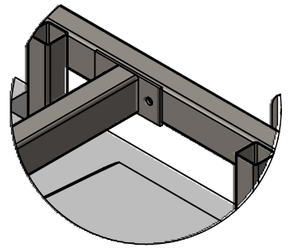
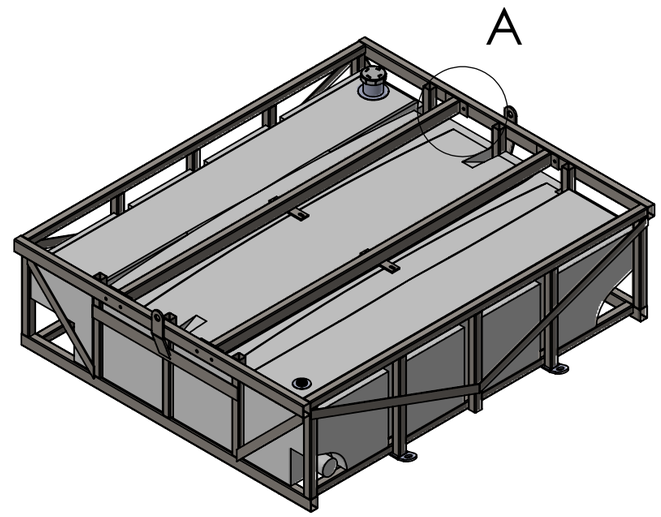




DETAIL A



GENERAL NOTES:

1.LUGS ARE DESIGNED TO LIFT THE FRAME WITH EMPTY TANKS ONLY.
2. LOCKING BAR TO BE BOLTED USING M12X70 BOLTS.
3. TANK TO BE INSTALLED AS SHOWN.

CERTIFICATION RSA REF: 23-0507
STRUCTURE DESIGN WIND LOADING TO AS/NZS 1170.2 - 2021
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WIND SPEEDS: REGIONAL - 88m/s SERVICEABILITY - 55m/s
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REV	DESCRIPTION	DWN	CHK	APP	DATE
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MATERIAL	**AS SPECIFIED**
COLOUR/ FINISH	
S.G.	

DWN	KD
CHK	RB
APP	MJ
SCALE: NTS	

STOCK CODE ABWT2000SF
PRODUCT 2000 LTR WASTE TANK

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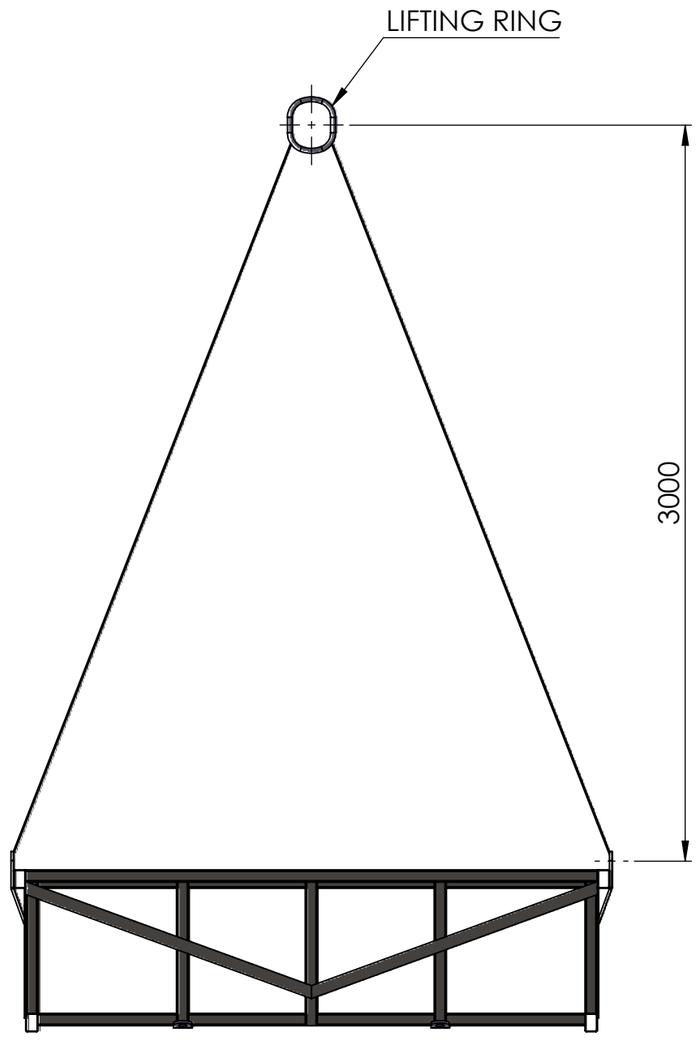

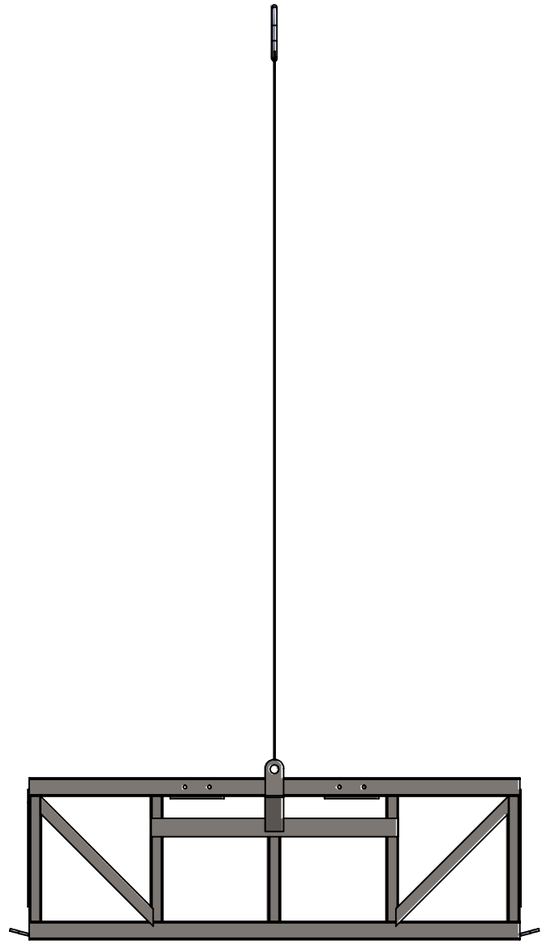

LIFTING PLAN

CERTIFICATION RSA REF: 23-0507
STRUCTURE DESIGN WIND LOADING TO AS/NZS 1170.2 - 2021
ANNUAL PROBABILITY OF EXCEEDANCE - 1:500 - IMPORTANCE LEVEL 2
WIND REGION: D (CYCLONIC) - TERRAIN CATEGORY 1
WIND SPEEDS: REGIONAL - 88m/s SERVICEABILITY - 55m/s

Signed: ..... Date: 29/08/2023

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GENERAL NOTES:
1.LUGS ARE DESIGNED TO LIFT THE FRAME WITH EMPTY TANKS ONLY.
2.TOTAL EMPTY WEIGHT OF ABWT2000SF = 310kg.
3.LIFTING DESIGN BASIS = 1.5

REV	DESCRIPTION	DWN	CHK	APP	DATE
00	ISSUED FOR CONSTRUCTION	KD	RB	MJ	14.08.23

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MATERIAL **AS SPECIFIED**
COLOUR/ FINISH
S.G.

DWN	KD
CHK	RB
APP	MJ
SCALE: NTS	

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SHEET 5 OF 5 DWG NO. ABWT2000SF_GA_001 REV.

ABLUTION WASTE TANK
INSTALLATION GUIDE

coerco
mining & industrial

WARNING

Observe all OH&S and Confined Space Requirements Prior to Entering the Tank or Excavation.
Installation Procedures must be in accordance with the instruction and guidance manual supplied with the equipment. For detailed information, refer to the Engineers Department.

coerco
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Certified System
Quality
ISO 9001
SAI GLOBAL

Ablution Waste Tank
General Instalation Guide

COERCO STORAGE SYSTEMS must be installed according to these instructions.

INTRODUCTION

Introduction

Congratulations on your purchase of the Coerco Ablution Waste Tank System.
With proper care and following a few simple guidelines your system will give you many years of dependable service.

IMPORTANT

Important

The following information must be read in conjunction with all local council, governing authorities and relevant standards for the requirements of installing this system

Only qualifed personnel should install, operate and repair your Coerco Ablution Waste Tank System. Any wiring of pumps or similar electrical equipment should only be performed by a qualifed electrician.

All specifcations must be certifed by the engineers/consultants and relative governing authorities before commencement of construction and installation.

The customer or installer is responsible for ensuring that the installation of this Coerco Ablution Waste Tank System is in compliance with any regulatory requirements of the planning authorities, building control, Environmental Agency, Water Board and/or National AS/NZ Standards.

SAFETY PRECAUTIONS

Safety Precautions

- Ensure the installer is aware of all “Confined Spaces” and “OH&S” guidelines.
- Make sure that there is suficient oxygen and there are no poisonous gases present.
- Check the explosion risk before welding or using electrical tools.
- Do not ignore health hazards and observe strict cleanliness.
- Ensure all lifting equipment is in good condition and meets the relevant standards for the purpose.
- Incase of any contamination, please ensure all personnel who work on the system are vaccinated against diseases that can occur.
- Always keep a first aid kit within easy reach.

Off-loading and Handling

(Please refer to APPENDIX A - “Lift Study Details”)

The contractor is responsible for the off-loading of the tank. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects.

Oversize Loads

Where tanks are of such size that police or private escort is required, delivery times given are only estimates. In the event of a delay outside our control, if any extra charges arise, they will be forwarded to the contractor.

Ablution Waste Tank
General Instalation Guide

Site Access and Conditions

It is the responsibility of the client or installer to ensure suitable access to good hard ground conditions that are safe and suitable for off loading the Coerco Storage System.

Storage

Set the tank on smooth level ground, free from bricks and/or sharp objects. Chock/tie down to prevent the tank moving during high winds.

The tanks should be lifted using suitable slings, chains or wire ropes, attaching to designated lifting points. Do not drag the tank along the ground for any distance and avoid jarring or bumps.

DO NOT lift with water in the tank.

PRIOR TO INSTALLATION

Prior to Installation

Determine the best location for your Coerco Storage System and pump controls (if applicable).

These recommendations indicate the requirement for installation in the typical site conditions. The installer should ensure that the requirements for their particular site conditions and anticipated loadings are met, taking Engineers advice where necessary.

The installation of the Coerco Storage System may require he prior approval of the local council.

Questions relating to this should be directed to a responsible officer of the local council and/or relevant authorities. Coerco, regret they are not able to supply this information. Check tank for any damage that may have occurred during freight or handling. Be careful to avoid any “bruising”, as all damage must be repaired before installation. Refer to supplier.

Please tighten all fasteners and associated equipment before installation.

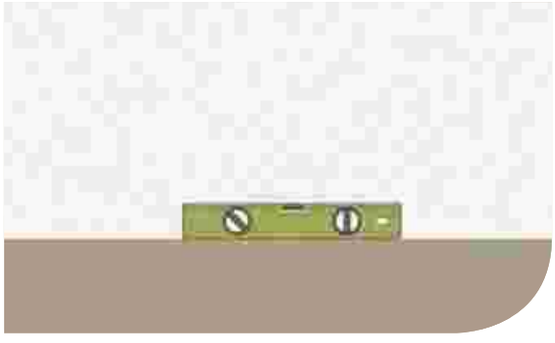
VENTING

Venting

Coerco Storage Systems should be vented in accordance with the current applicable plumbing and drainage standards. In multiple chamber tanks, venting must not be combined into a common stack below a point where pollutants contained could be transferred to other chambers.

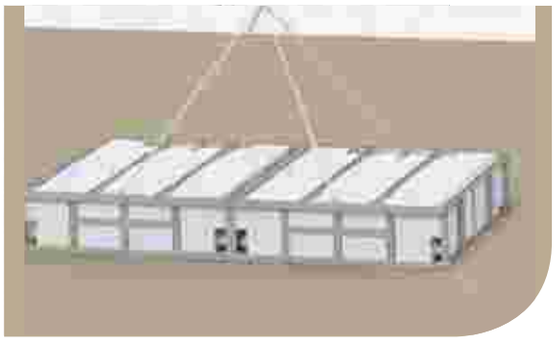
Ablution Waste Tank

General Instalation Guide



Step No. 1

Clear area of installation and ensure site is level, compacted and free from any objects such as stones, sticks etc. which may damage or hinder the level resting of the Coerco Ablution Waste Tank.

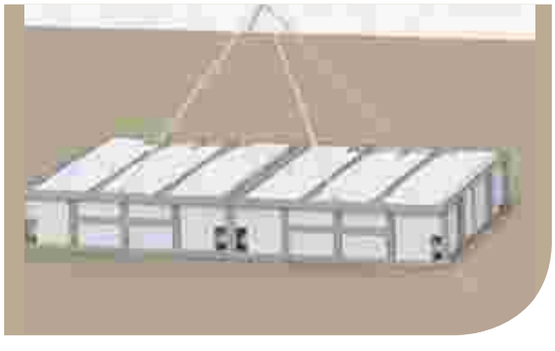


Step No. 2

Coerco Ablution Waste Tank
MUST ONLY BE LIFTED WHEN EMPTY.

Lift tank by designated certified lifting points (see APPENDIX A) into place ensuring it is correctly orientated with inlet/outlet points in the desired finished positions. Carefully lower Coerco Ablution Waste Tank into chosen position and set into place. Ensure tank is sitting level on all planes for optimum waste flow and operation.

Note all OH & S requirements and practises regarding the lifting of the Coerco Ablution Waste Tank.



Step No. 3

Once a Coerco Ablution Waste Tank is level and sitting stable, check all inlet/outlet points are ready for connection and free from damage. Carry out verification testing for tank water tightness as per procedures and test forms given in APPENDIX C & D of this installation manual.

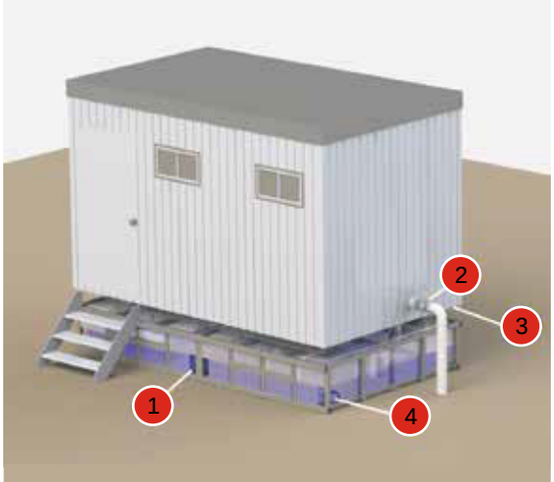
Ablution Waste Tank
General Instalation Guide

Step No. 4

Check that ablution building is within engineering design safe load weight for Rapid Coerco Ablution Waste Tank supporting frame.

Lift ablution building into place (refer to ablution building manufacturer's lift study & instructions before lifting building structure), gently lowering onto top of Coerco Ablution Waste Tank supporting frame ensuring location of ablution building sewage outlets match the orientation of the Coerco Ablution Waste Tank.

Note all OH & S requirements regarding the lifting of the Ablution building.



1 Tank joiners (if app)

2 Water supply

3 Joining connection between building and tank

4 Outlet connection

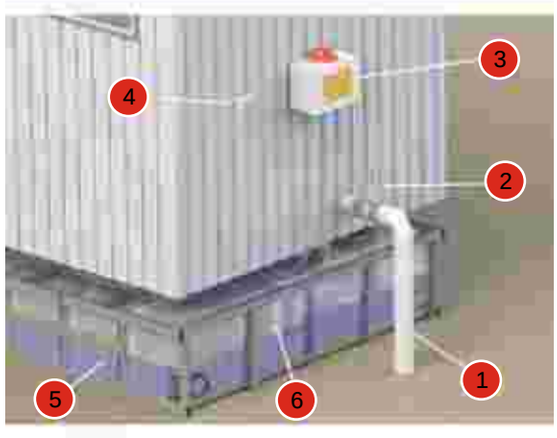
All INLETS and OUTLETS must be minimum size of DN100

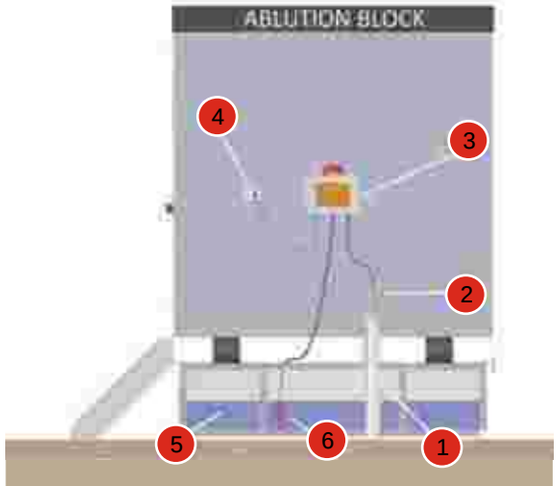
Flowpath distance between INLET and OUTLET must be a minimum of 1200mm.

Step No. 5

Connect water supply to ablution building and sewage outlets to inlet on Coerco Ablution Waste Tank, ensuring all couplings are securely fitted and functional. Carry out verification testing for joints around fittings as per procedures and test forms given in APPENDIX B & D of this installation manual.

Ablution Waste Tank
General Instalation Guide





1 Water supply
2 Solenoid valve
3 Liquid level alarm controller
4 Power source
5 Waste water
6 Pump

Step No. 6

Install water shut off & level alarm to the ablution block and Coerco Ablution Waste Tank as per manufacturer's instructions. The Water Shut-off & Level Alarm is a system controller developed to isolate the supply of Mains Water in the event of certain alarm conditions, such as when the Coerco Ablution Waste Tank is full and needs to be pumped out. Allowing water supply to continue in the event of power failure or pump fault, could result in an overflow spill of untreated sewage.

By monitoring the level in the Coerco Ablution Waste Tank and the presence of mains power, the controller appropriately switches the Water Supply Valve open or closed. The controller also incorporates 'Power On', 'Alarm' lamp indicators, as well as a mutable Audible Siren, which is activated in the event of a High Level. Refer to manufacturer's instructions for full details.

Ablution Waste Tank
General Instalation Guide

Step No. 7

Perform ☒nal visual inspection of Coerco Ablution Waste Tank around the perimeter and ablution facility is successfully operational.

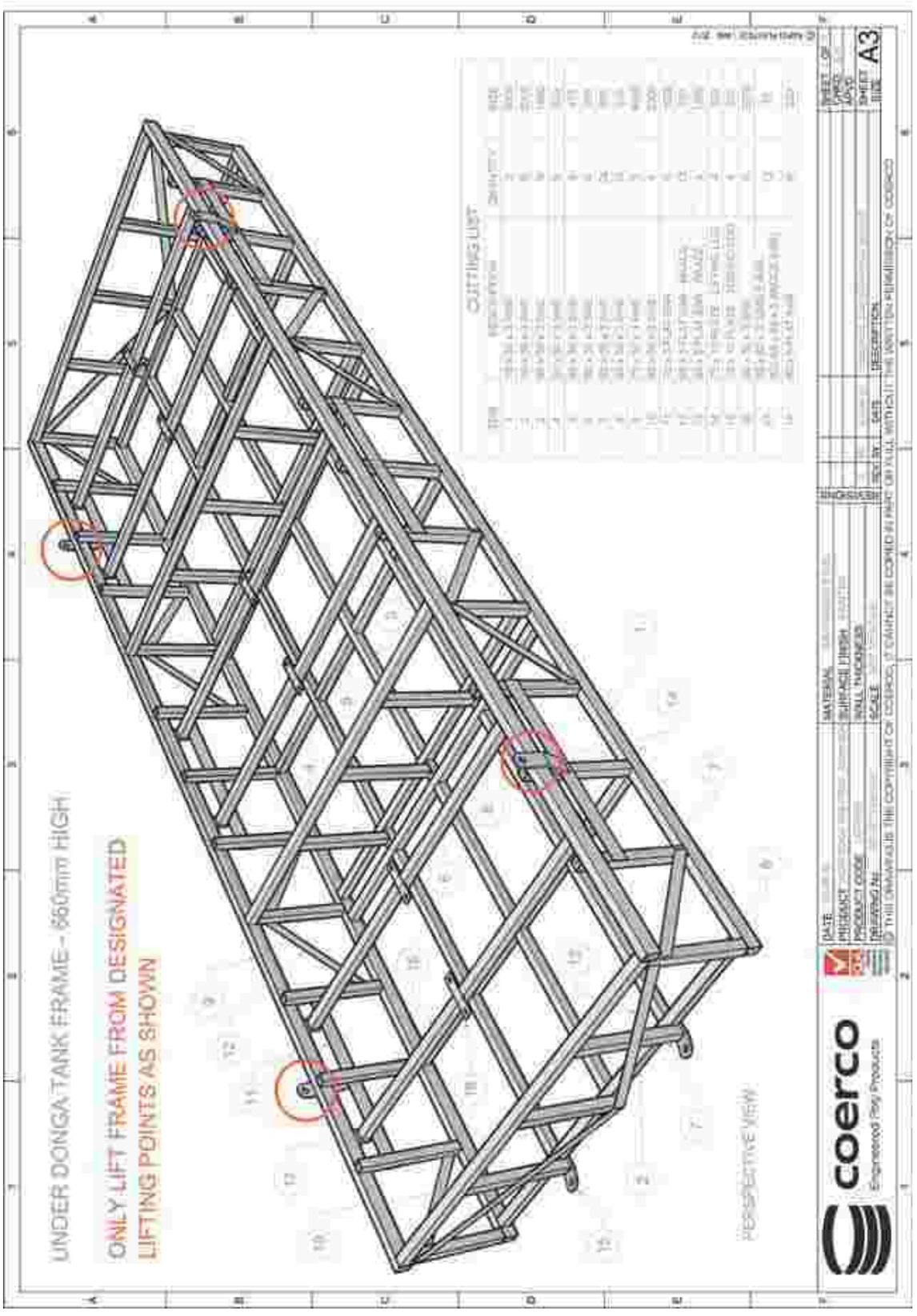
Note the contents of Coerco Ablution Waste Tank must be pumped, hauled and disposed of by a licensed sewage pumping contractor and in a manner approved by the local government. No sewage from the Coerco Ablution Waste Tank system must be applied onto the ground surface, into ground water or surface waters. Sewage from the Coerco Ablution Waste Tank must be disposed of into an approved site.

Please refer to local government body and Department of Health in your local area for full regulatory requirements concerning Sewage Holding Tanks and related services.

Ablution Waste Tank
General Instalation Guide

APPENDIX A - LIFT STUDY GUIDE DETAILS

APPENDIX A



APPENDIX E of AS/NZS 1546.1:2006
TEST OF MANUFACTURER'S INSTRUCTIONS FOR THE INSTALLATION OF FITTINGS IN A SOUND AND WATERTIGHT MANNER

(Normative)

E1 SCOPE

This Appendix sets out a method for the testing of the manufacturer's instructions for the installation of fittings in a sound and watertight manner, whether the fittings are installed in the factory or on-site.

E2 PRINCIPLE

This Appendix sets out a method for the testing of the manufacturer's instructions for the installation of fittings in a sound and watertight manner, whether the ⊠ttings are installed in the factory or on-site.

CE2

It is assumed that a fitting installation that is watertight in this situation will also be watertight against water ingress to the tank through the fittings.

E3 TESTING

E3.1 Procedure
The test procedure shall be as follows:
(a) Set up the tank as for the watertightness test as required by Appendix G;
(b) Install fittings in accordance with the manufacturer's instructions;
(c) Seal openings in the fittings to allow water to build up behind the fitting during the test;
(d) Fill the tank with water to the rim;
(e) Allow the tank to stand for at least ten minutes; and
(f) Observe the tank and fittings for any leakage.

E3.2 Test criteria
The criteria of G4.2 shall apply.

E4 TEST RECORDS

The report shall include the following information for each test specimen:
(a) Identification of person/organisation carrying out test;
(b) Identification of the fitting system(s) tested;
(c) Date of test;
(d) The results of the test; and
(e) Reference to this test method, AS/NZS 1546.1, Appendix E

Ablution Waste Tank
General Instalation Guide

APPENDIX G of AS/NZS 1546.1:2006
DETERMINATION OF WATERTIGHTNESS
(Normative)

G1 SCOPE

This Appendix sets out a method for the testing of the watertightness of septic tanks.

G2 PRINCIPLES

The tank is subjected to a hydrostatic pressure head and is then examined for signs of water leakage

G3 TESTING OF TANKS CAST-IN-SITU

G3.1 Testing Procedure

The procedure shall be as follows:
(a) Fill the tank with water to a depth of 900mm or to the invert of the outlet pipe, whichever is the greater depth;
(b) Allow to stand for a minimum of 24 hours;
(c) Top up with water and start test observation;
(d) Top up again after 8 hours to determine the 8-hour loss; and(
e) Continue for a further 24 hours if required by G3.2, and again top up to determine the loss.

G4 TESTING OF FACTORY-BUILT TANKS

G4.1 Set-up and test procedure
Tanks that can be stood in position without the need of support shall be placed on at least three bearing blocks:500mm (minimum) length x 100mm wide x 100mm deep (see Figure G1 (a)).

Tanks that need support in order to remain in position for example, horizontal cylinders shall be placed on timber bearers and held in place with chocks, (see Figure G1 (b)). Horizontal cylindrical tanks shall be supported sufficiently so as to counter any bending and induced tension.

For the test an elbow is plumbed into the outlet (temporarily). Start the test with the water level at a mark, about 50mm up vertical. Measure the water needed to “top tank up” to that same sight mark.

The procedure shall be as follows:
(a) Level the tank on the supports;
(b) Fill the tank with water to a depth of 900mm or to the invert of the outlet pipe, whichever is the greater depth;
(c) Allow to stand for a minimum of 4 hours;
(d) Top up with water and start test observation; and
(e) Observe for any leakage and count the drops per minute from any single point.

G4.2 Test criteria

Concrete septic tanks shall not show a leakage rate greater than 4 drops/min from any single point, and a total loss in accordance with G3.2; damp patches in concrete tanks are not considered leakage.

Glass ⊠bre-reinforced or plastic tanks shall have no leakage, and no damp patches.

G5 REPAIR

Isolated minor leakages in concrete tanks may be repaired so as to effectively and permanently seal the leak. After repair, the tank shall be retested

G6 TEST RECORDS

The report shall include the following information for each test specimen:

(a) Identification of person/organisation carrying out test;
(b) Identification of the tank tested
(c) Date of test;
(d) The leakage rate, in drops per minute; and
(e) Reference to this test method, AS/NZS 1546.1, Appendix G.

Ablution Waste Tank
General Instalation Guide

APPENDIX D - TEST FORM TEMPLATE

APPENDIX D

HYDROSTATIC TEST FORM DATA

PERSON TESTING	TANK MODEL	TANK SERIAL ID	DATE TESTED	RESULTS	TEST METHOD	JOB N°	CLIENT	SIGNED
					AS/NZS 1546.1, Appendix E & G			

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FORM N° 48 - Rev 2

- INDUSTRIAL CHEMICAL TANKS
- FREE STANDING CARTAGE TANKS
- BALL BAFFLE SYSTEMS/SKID MOUNT CARTAGE TANKS
- FIREFIGHTER UNITS
- DIESEL AND ADBLUE TANKS
- DIESEL PUMP KITS, FLOW METRES AND ACCESSORIES
- WATER PUMPS
- CONVEYOR HOOD SYSTEMS
- PIPE FLOATS
- MUD TUBS
- HANDLING EQUIPMENT
- SEPTI-TECH SEPTIC TANK RANGE/LEACH DRAINS
- ABLUTION BUILDING WASTE SYSTEM RANGE
- PORTABLE PRESSURE TANK SYSTEMS

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July 2023

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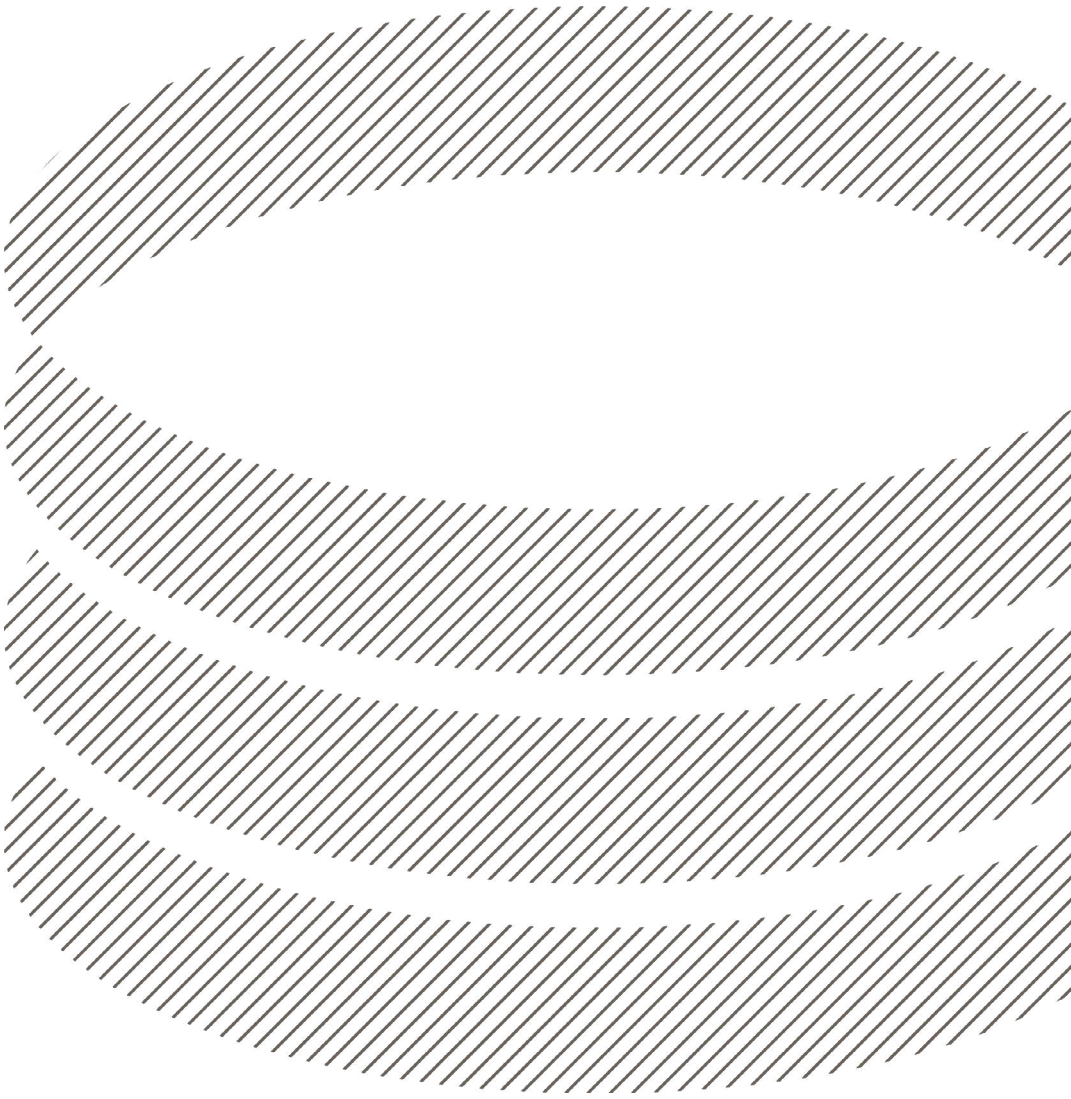
Warranty Guarantee



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Thank You

At Coerco, we know that success involves much more than a superior product. It requires a deep awareness and understanding of the needs and desires of the people within the target markets we work with.

We realize that durability and reliability are important and that forces of nature and passage of time must be factored in during development and manufacturing. Listening to what you want has enabled us to engineer and create products using industry-leading technology, uncompromising quality and unsurpassed performance.

At Coerco we stand behind our products. We believe that our reputation is built on the long-term satisfaction of our customers and know that a warranty is only as good as the company that stands behind it. Because of this we strive to give everyone the prompt and courteous service they deserve.

Coerco has set the standard of excellence in poly product performance. There is an inherent sense of commitment to quality in all that we do, thereby guaranteeing durability and reliability with every product we make.

Since 2008 Coerco has been certified to global standard ISO9001. We inspect our products throughout the manufacturing process including a final inspection before they leave our premises, and we conduct regular audits and reviews to identify and correct any issues.

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You will soon discover how your Coerco product is designed and built to perform and in the unlikely event that it doesn't, we will make it right. Be assured that Coerco has your back.

Thank you for choosing Coerco, we appreciate having you as a valued customer.

Your Warranty

Our Promise

Attention to detail and developing poly products that go the distance is a promise we make to every customer. To back this commitment, Coerco takes every measure possible to make sure you are getting the very best.

We conduct regular feedback surveys with our customers to help us further understand how we can serve you better. We also involve independent certification and regulation bodies to audit and assess our practices, processes and products which guarantees conformance to applicable certifications and standards of quality.

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The following list contains information outlining the length of warranty given for each product group. You may have purchased products from different groups which can have different lengths of cover so please check carefully.

Your warranty gives you guaranteed manufacturer support of your product purchase for the period stated. This means that the product is warranted against defect or fault caused by poor workmanship or inferior quality. Deliberate misuse, negligence, abuse or failure to install, use and maintain the product in accordance with manufacturer's recommendations will render this offer of guaranteed warranty null and void.

Coerco will repair or replace (at its discretion) the product affected as soon as possible within reasonable terms & conditions to facilitate the least possible inconvenience to you. Depending on the product concerned and the type of warranty claim this time may vary although we promise to keep regular and open communication throughout the process.

This warranty does not apply to products which have been manufactured by someone other than Coerco such as an engine or pump, or to any of Coerco's products which have been modified or altered by any party other than Coerco.

Overall 100% customer satisfaction is our highest goal and desired outcomes so we strive to eliminate the need for you to have to claim warranty support by creating and delivering great products to you. In the unlikely/unfortunate that you may have to make a warranty claim we will work overtime on effort and service to 'get it right' and ensure your complete satisfaction in our dealings.

Please contact us on 1800 646 277 or warranty@coerco.com.au if you have any questions or need help with any warranty claim.

Warranty Period

Product Group	Product Sub-Group	Warranty (Years)
Industrial Process Tanks	Corrugated Walled Process Tanks	5
	Flat Walled Process Tanks	5
	Conical Based Process Tank Systems	5
	Clarifiers	5
	Self Bunded Chemical Tanks	5
	Insulated Tanks	5
	Agitated Tanks	5
	Container Tank Systems	5
Underground Storage Tanks	Underground Storage Tanks	5
Tank Modifications, Fittings & Accessories	Tank Modifications, Fittings & Accessories	5
Liquid Transportation	Free Standing Liquid Transport Tanks	10
	Sump Based Liquid Transport Tanks	10
	Heavy Duty Skid Mounted Liquid Transport Units	5
	Skid Mounted Liquid Delivery Units	5
	Skid Mounted Dust Suppression Units	5
	Liquid Transport Accessories	5
Water Delivery Equipment	Skid Mount Water Delivery Units	5
	Trailed Water Delivery Units	5
	Water Delivery Accessories	5
Pressure Washer Equipment	Skid Mount Pressure Washer Units	5
	Compact Pressure Washer Units	5
	Trailed Pressure Washer Units	5
	Pressure Washer Accessories	5
Diesel Storage & Transport	Diesel Storage Tanks	5
	Trailed Diesel Transport Equipment	5
	Free Standing Diesel Transport Tanks	10
	Sump Base Diesel Transport Tanks	10
	Diesel Transfer Products	5
	Self Contained Diesel Transport Tanks	5

Product Group	Product Sub-Group	Warranty (Years)
Trailer Equipment Accessories	Trailer Equipment Accessories	5
Septic Systems	Septic Tanks	15
	Leach Drain Systems	5
Ablution Waste Tanks	Standard Profile	1
	Custom Skids/Tanks	1
	Fabricated Steps to Cabin	1
Portable Pressure Tank Systems	Portable Pressure Tank Systems	1
Hose & Cable Floats	Cable Floats	1
	Hose & Pipe Floats	1
	Hose & Pipe Float Accessories	1
Pontoons	Heavy Duty Pontoon	1
	Donut Pontoon - with Pump Cradle	1
	Donut Pontoon - suits suspended pump	1
	Poly Pontoons	1
	Modular Pontoons	1
Access Walkways	Floating Walkways	1
	Gangways	1
Pump Pits	Pump Pits	1
Lift Stations	Lift Stations	1
Industrial Pump Accessories	Poly Strainers	1

CERTIFICATE OF REGISTRATION

This is to certify that:

COERCO Pty Ltd

ABN 54 145 356 565

Lot 581 Huggett Drive Dalwallinu WA 6609 AUSTRALIA
(Refer to Attachment to Certificate of Registration dated 20 July 2023 for additional certified sites)

operates a

QUALITY MANAGEMENT SYSTEM

which complies with the requirements of

ISO 9001:2015

for the following scope

The compounding of polymers, manufacture, assembly and despatch of poly rainwater tanks, cartage tanks, firefighting units, stock troughs and chemical tanks as well as the manufacture and distribution of Septic Tanks and AdBlue diesel vehicle fuel additive storage tanks.

Certificate Number:
QEC24518

Originally Certified:
14 July 2008

Current Certification:
11 July 2023

Issue Date:
20 July 2023

Expiry Date:
14 July 2026

ISO 9001

WWW.JAS-ANZ.ORG/REGISTER

Calin Moldovean
President, Business Assurance

SAI Global Certification Services Pty. Ltd.
Level 7 Suite 7.01 45 Clarence Street
Sydney NSW 2000
Australia

Registered by:
SAI Global Certification Services Pty Ltd (ACN 108 716 669) Level 7 Suite 7.01 45 Clarence Street Sydney NSW 2000 Australia with ("SAI Global") and subject to the SAI Global Terms and Conditions for Certification. While all due care and skill was exercised in carrying out this assessment, SAI Global accepts responsibility only for proven negligence. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request. To verify that this certificate is current please refer to SAI Global On-Line Certification register at http://register.saiglobal.com/

APPENDIX TO CERTIFICATE OF REGISTRATION

These sites are registered under certificate No: QEC24518 issued on 20 July 2023.

COERCO Pty Ltd

SAI Site Cert no.	Certified Site Details	Effective Date
C-826657	Lot 581 Huggett Drive Dalwallinu WA 6609 AUSTRALIA	11 July 2023
	Site Scope: Rotomoulding, customized products and fitouts.	

These registrations are dependent on COERCO Pty Ltd maintaining their scope of registration to ISO 9001:2015.

Registered by:
SAI Global Certification Services Pty Ltd (ACN 108 716 669) Level 7 Suite 7.01 45 Clarence Street Sydney NSW 2000 Australia with ("SAI Global") and subject to the SAI Global Terms and Conditions for Certification. While all due care and skill was exercised in carrying out this assessment, SAI Global accepts responsibility only for proven negligence. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request.
To verify that this certificate is current please refer to SAI Global On-Line Certification register at http://register.saiglobal.com/

Appendix 4

Environmental Management Plan

(Total No. of pages including blank pages = 155)

CENTRAL CIVIL

ABN: 61 167 710 545

Environmental Management Plan

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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

Environmental Management 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. 1055/03b February 2025

RWCorkery&co

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1. Introduction

This *Environmental Management Plan* (EMP) has been prepared by RW Corkery & Co Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd (the Company) to provide a framework to assist in the environmental management and environmental monitoring programs for the operation of the Maroota Central Civil Quarry (the Quarry).

The Quarry is located within Lots 1 and 2 DP609224 and an unnamed Crown road reserve (the Quarry Site) (**Figure 1**). The Company is seeking approval for the development and operation of the Quarry which would include the following (**Figure 2**).

- 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.

The Site 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 (**Figure 3**). The proposed transportation routes from the Quarry are presented on **Figure 4**.

A Development Application (DA) for the Quarry was lodged via the NSW Planning Portal on 25 July 2024, and the accompanying Environmental Impact Statement (EIS) was placed on public notification by Hornsby Shire Council (Council) from 6 September 2024. Council subsequently issued a Request for Further Information (RFI) dated 14 October 2024 with requirements pertaining to the preparation of an EMP for the Quarry. The details of these requirements are presented in **Table 1**.

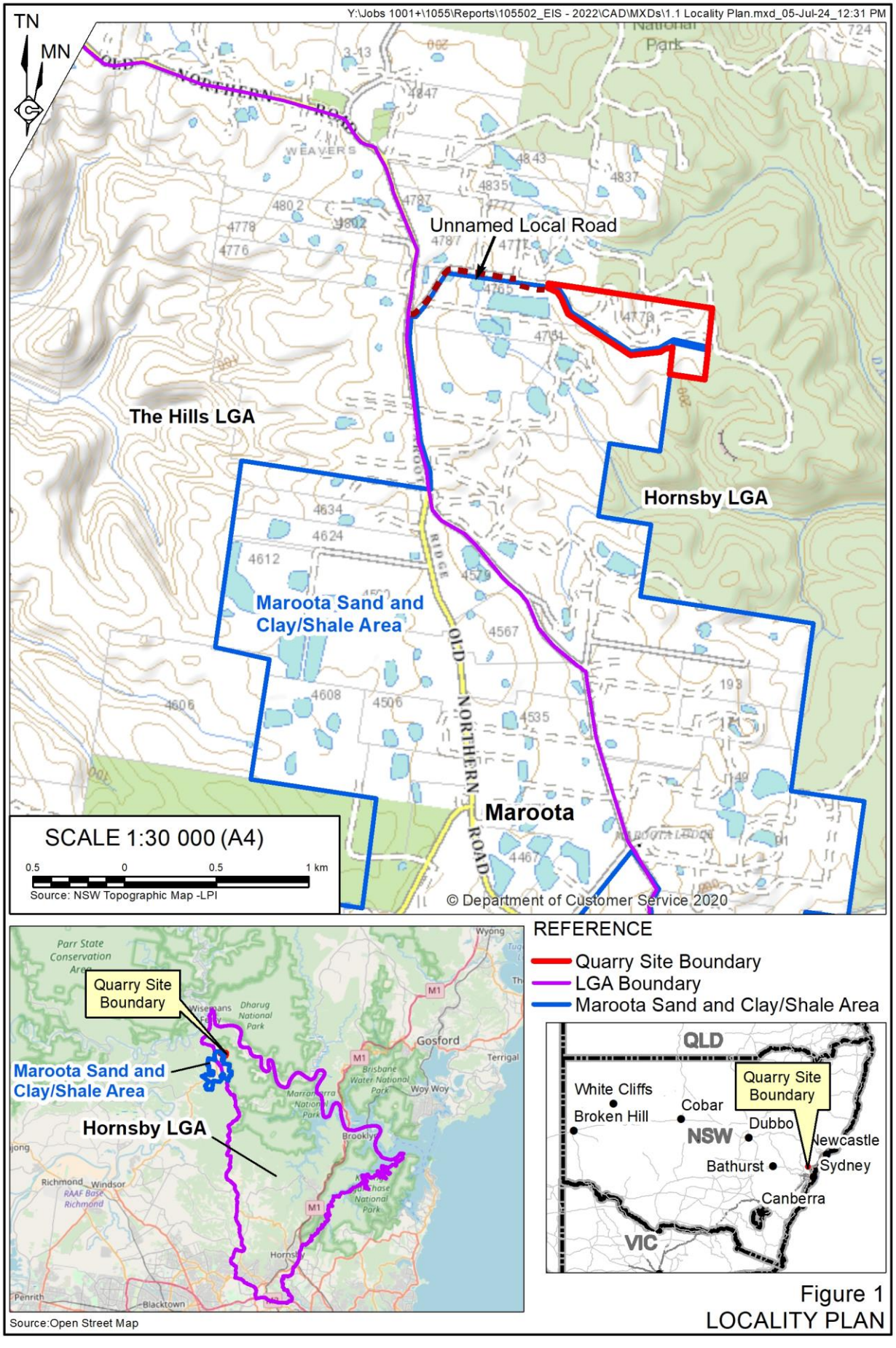


Figure 1
LOCALITY PLAN

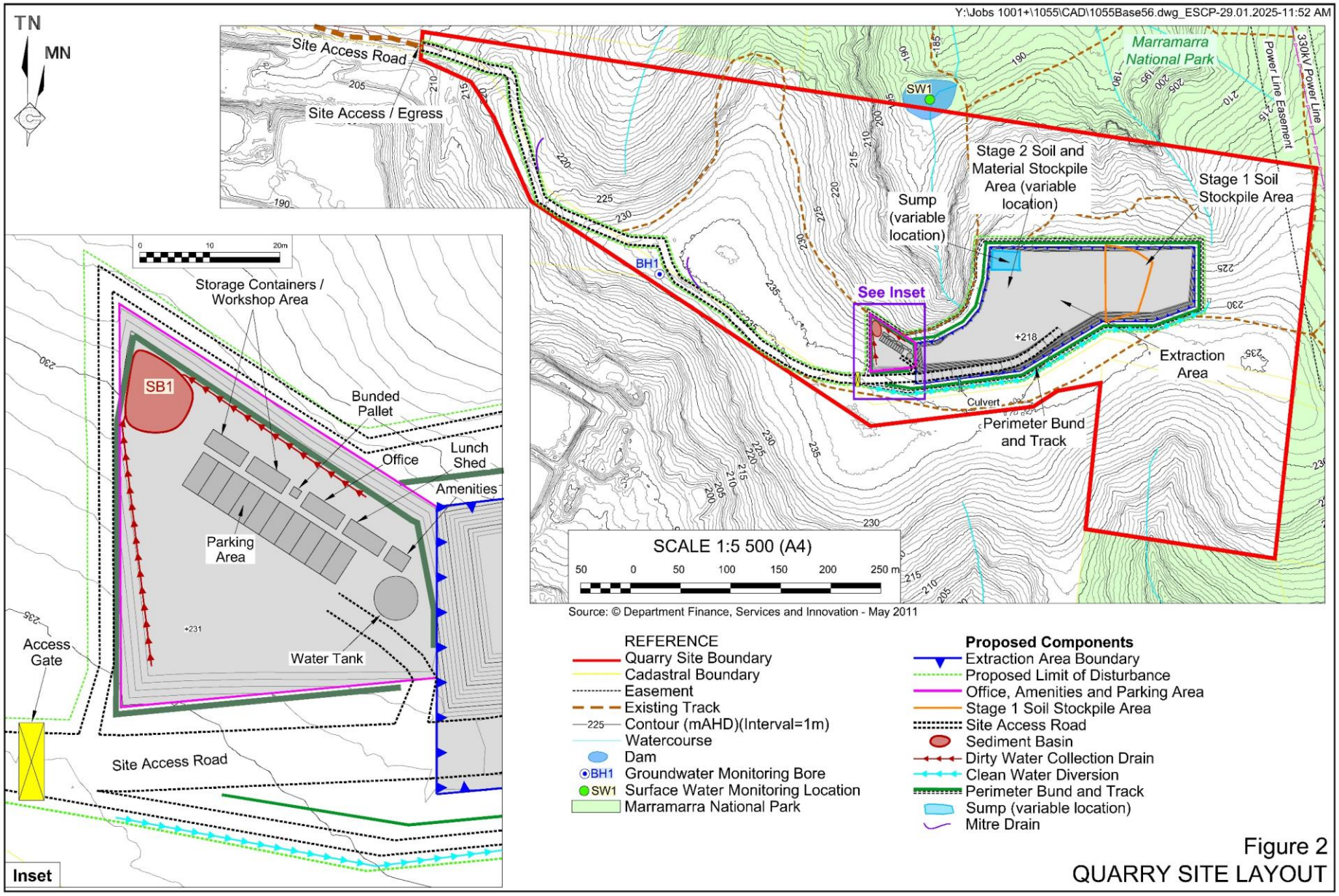


Figure 2
QUARRY SITE LAYOUT

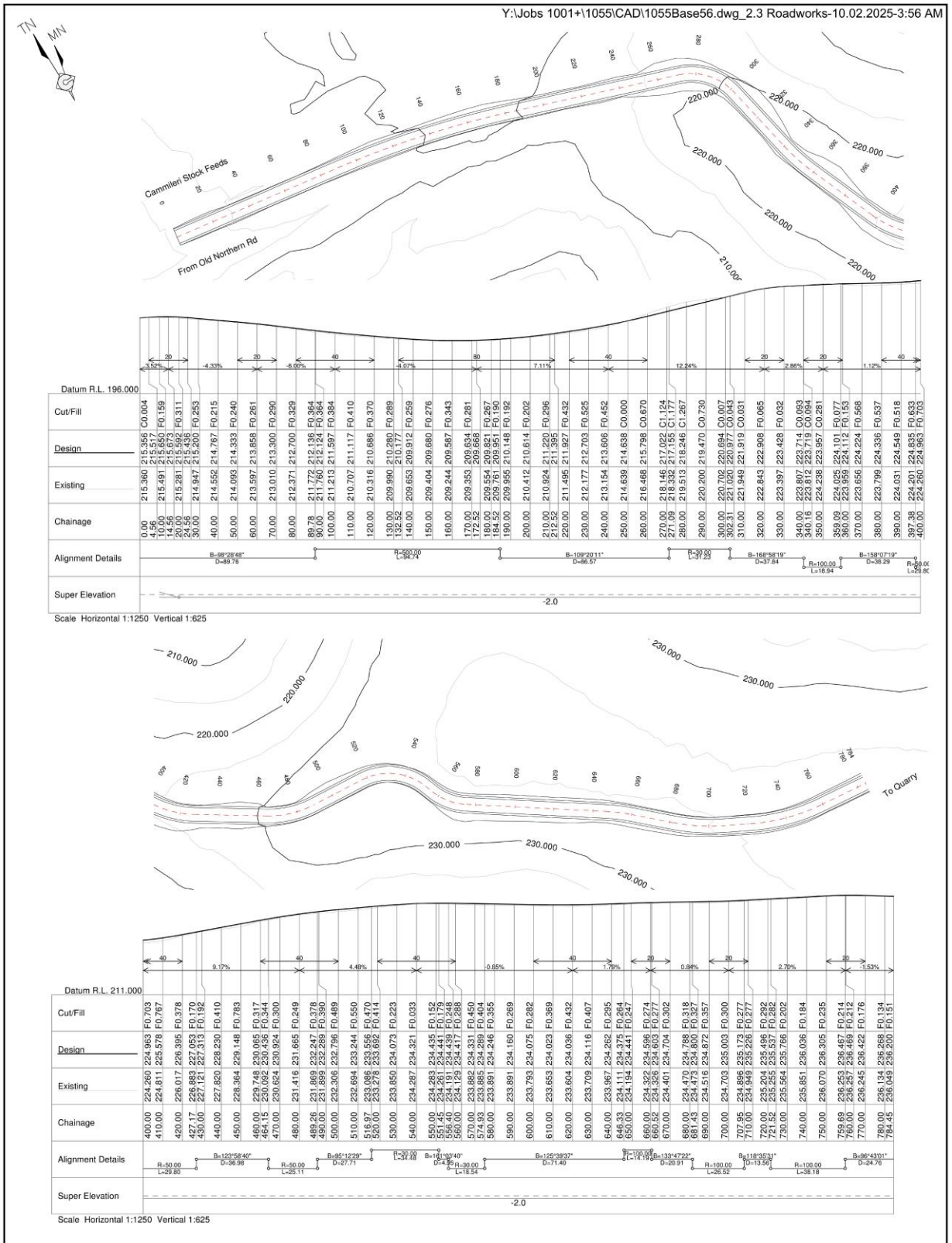
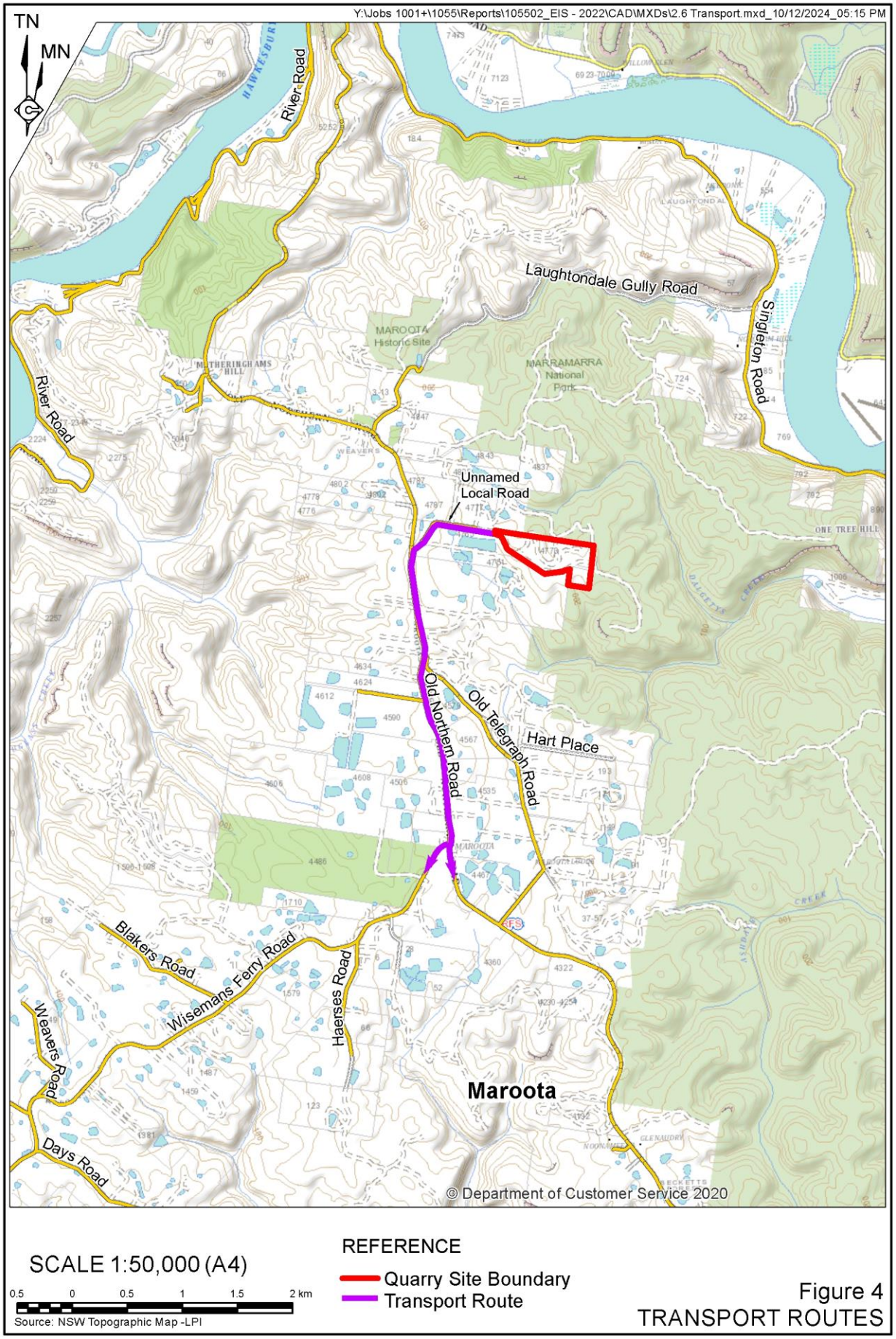


Figure 3
PRELIMINARY SITE ACCESS ROAD DESIGN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TN
MN
River Road
Laughtondale Gully Road
Singleton Road
MAROOTA Historic Site
NARRAMARRA National Park
MUTHERINGH AMS HILL
ONE TREE HILL
Unnamed Local Road
Old Northern Road
Old Telegraph Road
Hart Place
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 4
TRANSPORT ROUTES

2. Plan Requirements

Table 1
Environmental Management Plan Council Requirements

Requirement No.	Council Requirement	Addressed in the EMP
1	An Environmental Management Plan prepared by a suitably qualified environmental consultant must be submitted to Council for review specified in Item 11 of Council's Pre-lodgement advice sent dated 7 July 2023 under Pre lodgement Development Application No. PL/30/2023 (D08685139).	This report
	The Plan must detail the measures that will be taken to protect the environment for the duration of all works and activities, and all responsible parties ensuring compliance with the Plan. The Plan must include but not be limited to:	
2	a) Water quality and soil management, including but not limited to sediment and erosion control measures.	Section 5 **Appendix 4**
3	b) Air quality management.	Section 7
4	c) Noise and vibration management, including mitigation measures for rock sawing/rock breaking activities.	Section 6
5	d) Waste Management including hazardous waste management.	Section 8
6	e) Hazardous materials, oils, and chemical management.	Section 9
7	f) This must also include on-site fuel storage and diesel re-fuelling procedures, including re- fuelling from vehicle mounted diesel tank/s.	Section 9.1 **Appendix 5**
8	g) Unexpected finds protocol.	Section 10
9	h) Procedure for receiving and onsite handling/management of VENM to ensure all proposed imported material received to the development site is Virgin Excavated Natural Material (VENM) as defined in Schedule 1 of the *Protection of the Environment Operations Act 1997*, including: i) Maximum expected volume of imported VENM to be stored on the premises at any given time; ii) VENM stockpile locations for Extraction Stages 1 and 2; iii) Due diligence protocols, including chain-of-custody, reporting and auditing procedures.	Section 11 **Appendix 6** **Appendix 7**

3. Transport Management

3.1 Criteria and Performance Measures

No more than 30,000tpa of Quarry products would be transported from the Quarry, with heavy vehicle movements limited to a maximum of 6 truck movements per hour (3 in / 3 out) and 20 truck movements per day (10 in / 10 out). These limits would be implemented to ensure acceptable impacts on the capacity, efficiency and safety of the surrounding road network.

3.1.1 Management and Mitigation Measures

The following management and mitigation measures would be implemented to ensure that Quarry-related traffic and transport impacts are minimised.

Site Establishment and Construction

- Roadworks within the public network would be undertaken within 12 months of receipt of development consent. These roadworks would include:
  - Reconstruction/widening of the section of the Unnamed Local Road in between the existing "GIVE WAY" signs to a width of 6.5m.
  - Upgrades to the section of the Unnamed Local Road between the existing access to Camilleri Stockfeeds and the Site Access to a local street standard in accordance with Council's *AUS-SPEC Specifications – Section 0042 Pavement Design*.
  - Installation of "GIVE WAY" controls on all three legs of the Site Access intersection.
- Roadworks 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.
- 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.
- Any traffic control measures required during the road and intersection upgrades would be provided by appropriately licenced persons or contractors.

Ongoing

- Limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the number of movements identified in Section 3.1 are not exceeded. These limits would also be enforced during campaigns of VENM importation (see Section 11).

- 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.
- Implementation of the complaints management system detailed in Section 14 to ensure that all traffic and transportation related complaints are dealt with through investigation and implementation of corrective treatments.
- Enforcement of a Driver's Code of Conduct (see **Appendix 1**) to ensure drivers are aware of their responsibilities within the Quarry Site and during transportation of raw materials. This includes:
  - A requirement that all drivers employed or contracted by the Company sign the Code;
  - the Code is included in induction, re-induction and training processes; and
  - the Code is retained with drivers at all times during their travel to and from the Quarry.

3.2 Monitoring

The following parameters would be recorded throughout the life of the Quarry.

- An accurate record of daily truck movements to and from the Quarry Site would be maintained by monitoring heavy vehicles entering and exiting at the Quarry entrance. This would be achieved by the following.
  - The weights of trucks would be monitored using a wireless digital load indicator crane scales to weigh goods in a lifting/tension application, with capacities up to 5t (see **Appendix 2**).
  - Trucks used in the process are either semi-tippers or truck-dog combinations of $18m^3$ and $20m^3$ capacity. This is consistent with the commitment that with the average vehicle load would be approximately 32t, to a maximum of 38t.
- Monitoring and maintenance, of vegetation on the northern side of the intersection of the Unnamed Local Road and the Camilleri Stockfeeds access, as required, to ensure sightlines are maintained between eastbound and southbound drivers.

4. Biodiversity Management

4.1 Management and Mitigation Measures

4.1.1 Native Vegetation

Table 2 details the management and mitigation measures that would be implemented to ensure that biodiversity-related impacts are minimised. This includes 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 of native vegetation would be assigned to either Zone 1 or Zone 2 (**Figure 5**) in accordance with the *Vegetation Management and Restoration Plan* (VMRP) (attached as **Appendix 3**) as follows.

- Zone 1 – Moderate Resilience Bushland (to be retained).
- Zone 2 – Moderate Resilience Bushland (to be disturbed).

Table 2
Management and Mitigation of Native Vegetation

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 all surface water management infrastructure in accordance with the *Erosion and Sediment Control Plan* (ESCP) (attached as **Appendix 4**). Undertake visual inspections of structures to ensure stability and sediment storage capacity is maintained after any significant rainfall event.	Surface water management 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) (presented as Appendix 7 of the EIS) 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.

Table 2 (Cont'd)
Management and Mitigation of Native Vegetation

Management Issues	Objective	Actions	Performance Criteria
Zone 2 – Moderate Resilience Bushland (to be disturbed) (Cont'd)			
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.
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.

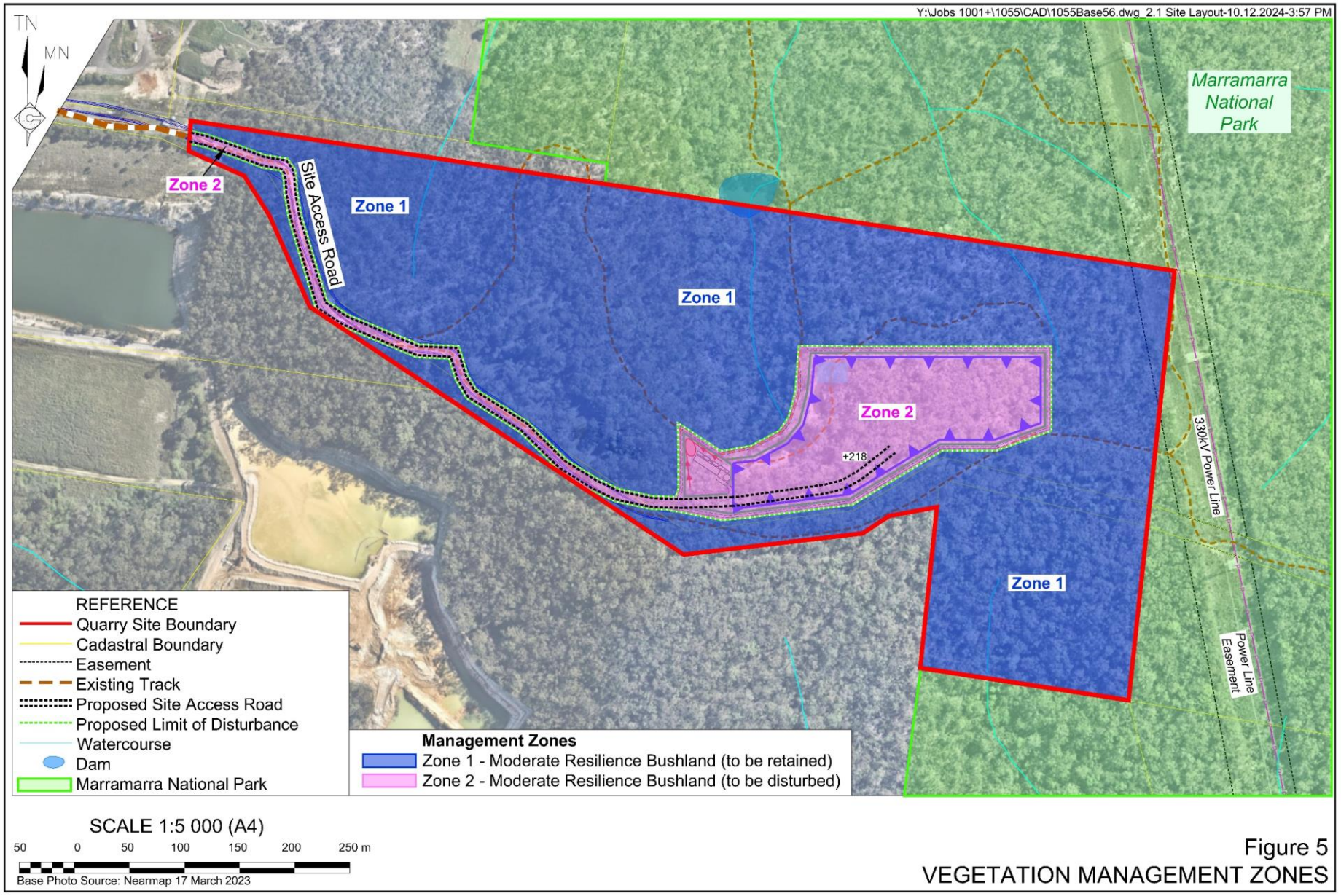


Figure 5
VEGETATION MANAGEMENT ZONES

4.1.2 Vegetation Clearing Protocol

In order to minimise or mitigate unavoidable impacts on native flora and fauna, the following management measures would be implemented to avoid or mitigate the risk of residual adverse impacts on threatened flora and fauna within the Quarry Site.

- 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 permanent 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.

4.1.3 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.

4.1.4 Invasive Species 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.
- Non-production waste would be managed to limit the presence of feral animals and rubbish inadvertently entering areas of remnant vegetation.

4.2 Rehabilitation

The Company would ensure that rehabilitation of the Quarry Site centres on creating a final landform that is safe, secure, non-polluting, stable and suitable for biodiversity conservation. In summary, disturbed areas of the Quarry Site would be progressively rehabilitation as extraction progresses and completed areas are no longer required for operations. All stages of the indicative schedule of rehabilitation works would comprise of management measures to minimise the impact on biodiversity, and effectively restore biodiversity conservation areas. These stages include:

1. Operations;
2. Decommissioning;
3. Landform Establishment;
4. Growth Medium Development;
5. Ecosystem and Land Use Establishment; and
6. Ecosystem and Land Use Development.

Table 3 summarises the primary rehabilitation activities implemented in each stage to restore native vegetation and establish biodiversity conservation areas for the intended final land use. The majority of the Quarry Site would be progressively rehabilitated to achieve the appearance of vegetated natural landforms in the surrounding area. Further detail is provided in Sections 4 and 5 of the VMRP.

Table 3
Rehabilitation Activities

Page 1 of 2

Rehabilitation Stage	Rehabilitation Activity
Operations	• Stripped soil would be placed directly onto rehabilitation areas or stockpiled within the Extraction Area footprint for use in progressive rehabilitation activities to maximise the opportunity for retention of the natural seed stock.
Decommissioning	• Site Access Road would be retained following the life of the Quarry to provide ongoing access for rehabilitation and maintenance activities

Table 3 (Cont'd)
Rehabilitation Activities

Rehabilitation Stage	Rehabilitation Activity
Landform Establishment	• Imported VENM and/or stockpiled overburden would be utilised to backfill the Extraction Area and shaped in accordance with the final landform • Vegetation recovered from clearing activities would be spread across the final landform. • Areas would be seeded with native species consistent with those listed as occurring within the PCTs mapped across the Quarry Site (see Section 5.4.6 of the VMRP).
Growth Medium Development	• Soil and/or fine-grained overburden material would be placed at the surface before being lightly scarified and spread to a minimum depth of 50mm. • In the event that adequate soil material is not available, soil conditioner / fertiliser and mulch would be spread to create a growth medium.
Ecosystem and Land Use Establishment and	• Rehabilitation earthworks would occur to control surface water runoff and 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 this. • Seeding of available areas would be completed using a combination of direct seeding, broadcast seeding and hydromulch application methods • 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 16m^2 (4m centres) – One shrub per 10m^2 (4m centres) – Up to 4 groundcovers per 1m^2
Ecosystem and Land Use Development	• Rehabilitation and revegetation activities would be monitored in accordance with the methods described in Section 4.11 of the VMRP. • 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. Water Quality and Soil Management

5.1 Criteria and Performance Measures

The principal performance measures for surface and groundwater management at the Quarry Site are as follows.

- Preventing any discharge of sediment-laden runoff from the Quarry Site.
- Ensuring extraction operations are confined to a minimum of 2m above the high wet weather groundwater level.
- Minimising the erosion and degradation of soil resources within and surrounding the Quarry Site.

The Quarry would be operated in a manner such that all sediment-laden runoff generated within the Quarry Site reports to SB1 and the sump within the Quarry Site boundary.

5.2 Management and Mitigation Measures

5.2.1 Surface Water

The proposed closed water management system for the Quarry has been developed in a manner that enables the following management objectives.

- Prevent and/or minimise soil erosion and sediment transport to downstream areas.
- Manage rainfall and surface water runoff by establishing effective water storage infrastructure in order to protect receiving environments.
- Support efficient recovery and use of natural water resources.

As per the ESCP (**Appendix 4**), Best Management Practices (BMPs) would be employed to minimise erosion and avoid discharge of sediment to lands and/or waters from activities undertaken at the Quarry. BMPs are detailed within the ESCP.

The proposed closed water management system would establish structures that would be constructed to separate “clean” and “dirty” surface water runoff. **Figures 6** and **7** display the representative catchments within the Quarry Site and the proposed surface water management infrastructure for Stages 1 and 2 of operations. A summary of the management measures for surface water within each Quarry catchment is provided in the following subsections.

Extraction Area – Sediment-laden Runoff

Construction of water management infrastructure would be undertaken in accordance with the ESCP, with initial controls comprising the following.

- Installation and maintenance of sediment fencing downslope of all areas to be disturbed, with straw bales utilised as additional controls for fine particle capture as required.

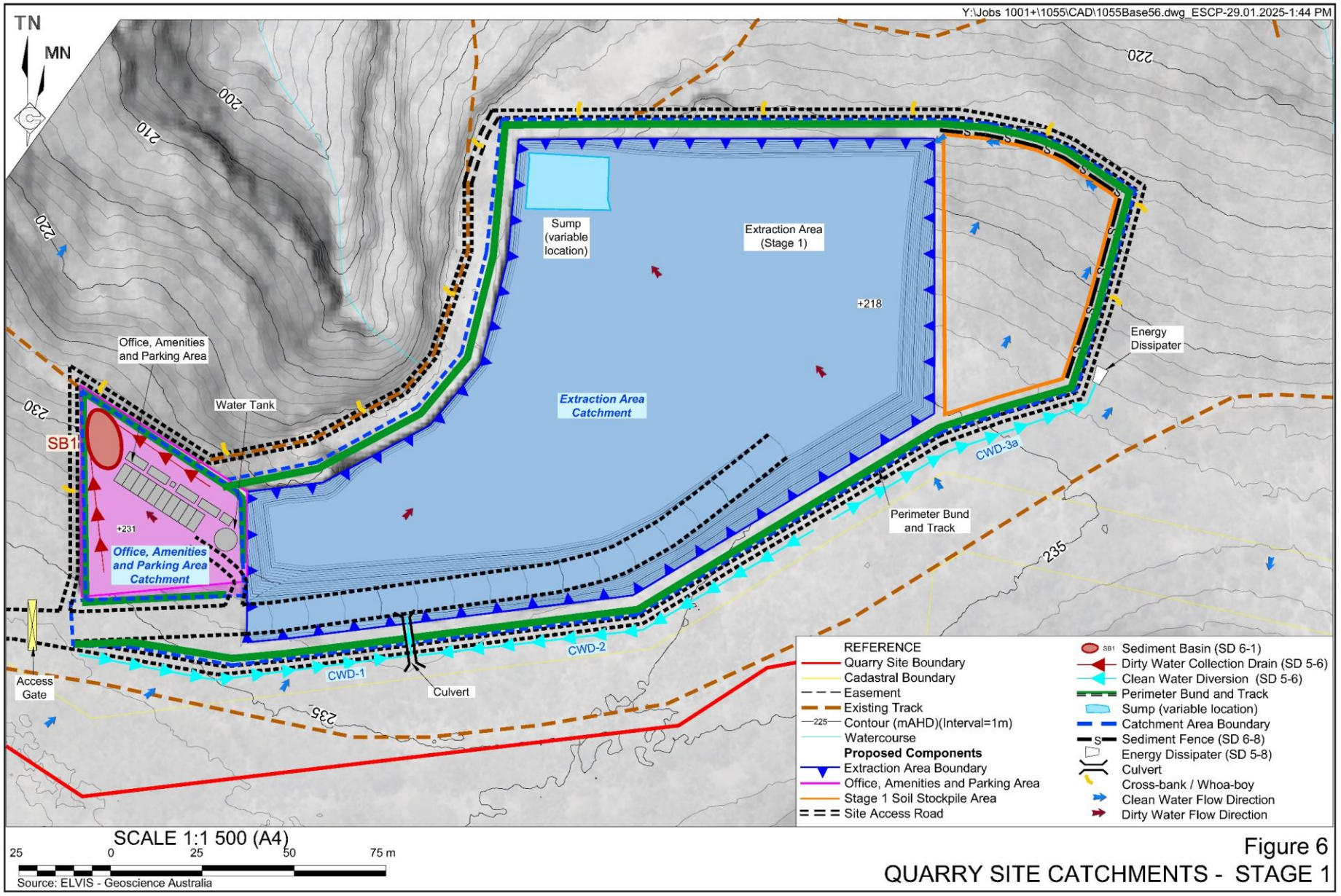


Figure 6
QUARRY SITE CATCHMENTS - STAGE 1

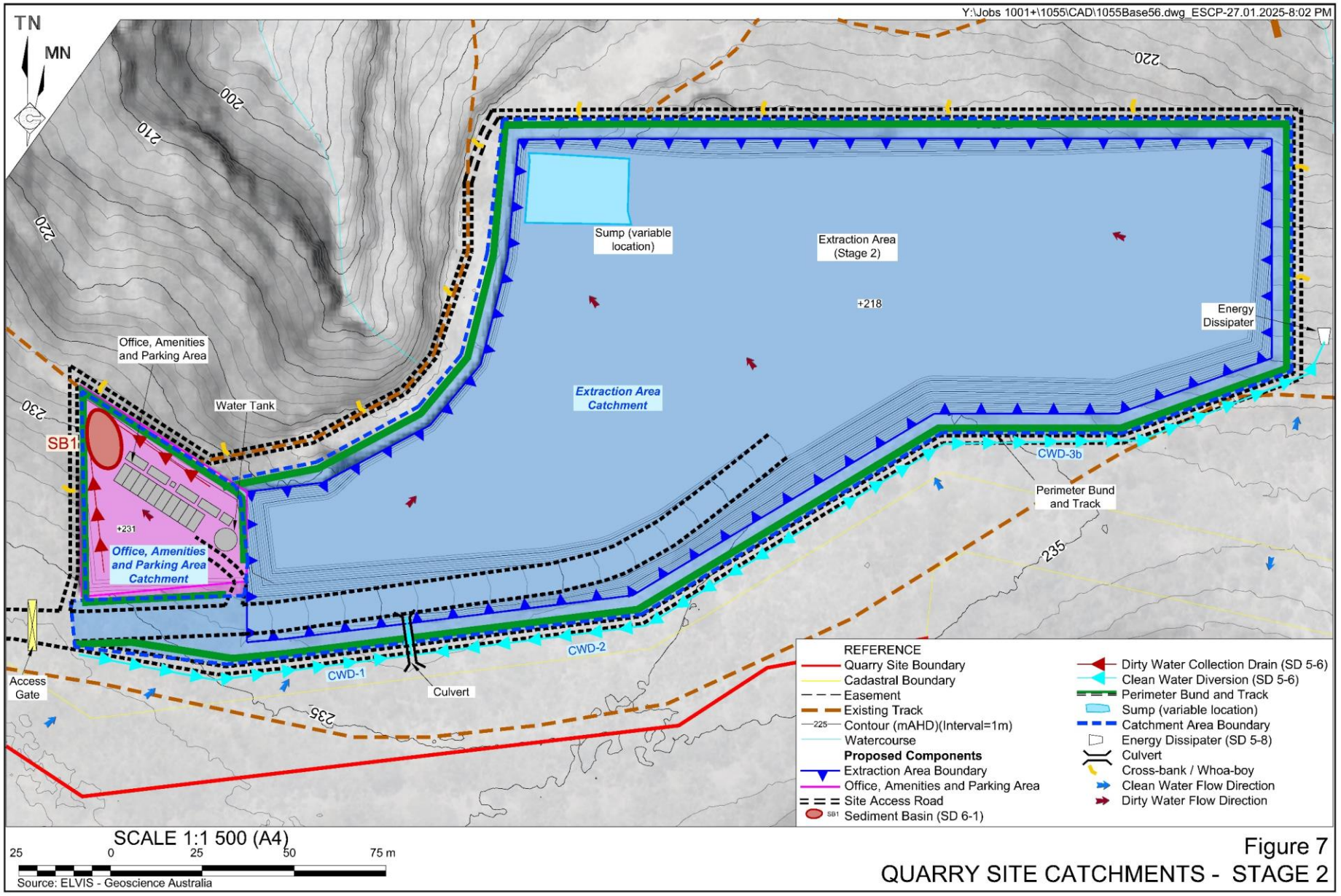


Figure 7
QUARRY SITE CATCHMENTS - STAGE 2

- Construction of clean water diversions (CWD-1, CWD-2 and CWD3a/3b) around the southern perimeter of the Extraction Area and associated energy dissipater. A culvert / pipe would also be constructed beneath the Perimeter Bund to divert runoff from CWD-1 and CWD-2 to the Extraction Area sump.

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.

Office, Amenities and Parking Area – Sediment-laden Runoff

A permanent sediment basin (SB1) would be constructed within the northwestern section of the Office, Amenities and Parking Area with a minimum capacity of 111m^3 to collect and manage sediment-laden runoff from within this area.

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.

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 CWD3a/3b 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.

General Management Measures

Based on the design of the closed water management system, it is not anticipated that sediment-laden water would be discharged to the surrounding environment. However, the Company would implement the following risk mitigation measures to ensure any impacts on surface or groundwater are adequately identified and addressed.

- Where extreme periods of high or prolonged rainfall events are anticipated to occur, ensure the following risk management strategies are in place as soon as practicable.
  - Undertake inspections of all structures to ensure stability and sediment storage capacity is maintained prior to and after any significant rainfall event.
  - Where it is required, implement measures to remove any excess sediment and/or debris from water storage structures and clean water diversion drains.
  - Inspect sediment fencing and sediment basins, and repair or maintain the control structures as necessary.

- Following 25mm or rain in 24 hours, and/or on a monthly basis, inspect erosion and sediment control structures to ensure these have not been damaged, are not eroding or causing erosion.
- If erosion observed within drains, install rock check dams.
- Ensure there is no buildup of sediment or vegetation against sediment fencing or straw bale protection. If present, remove as soon as practically possible.

5.2.2 Groundwater

As no groundwater was intersected during drilling investigations undertaken as part of the EIS, specific management and mitigation measures in relation to groundwater are not considered to be required for the Quarry.

Notwithstanding, appropriate management and mitigation measures would be implemented in relation to the handling and storage of hydrocarbons to manage the risk of groundwater contamination (see Section 9.1) visual monitoring for any signs of groundwater inflow during extraction operations would be undertaken.

5.3 Monitoring

5.3.1 Surface Water

In the unlikely event of an uncontrolled discharge, surface water sampling would be undertaken downstream of the Quarry disturbance area at the historic dam located at the northern extent of the Quarry Site (SW1 – refer **Figure 2**). Due to the topographic setting of the Quarry Site (i.e. top of catchment), there are no suitable locations for upstream sampling. Water samples would be analysed for the parameters identified in **Table 4** and assessed against the relevant criterion.

Table 4
Surface Water Quality Criteria

Parameter	Concentration Limit[1]
pH	6.5 to 8.5
Electrical Conductivity (EC)	125-2200µS/cm
Total Suspended Solids (TSS)	50mg/L
Oil and Grease	10mg/L
Note 1: per ANZECC Water Quality Limits	

All samples will be collected by a suitably trained person, placed in appropriately treated sample bottles, placed on ice in a cooler and delivered to a NATA registered laboratory on the same day as they are collected.

5.3.2 Groundwater

The following groundwater monitoring would be undertaken throughout the life of the Quarry.

- Monitor the standing water level within the groundwater monitoring bore along the southern extent of the Quarry Site boundary (BH1 – refer **Figure 2**) on a quarterly basis to ensure that extraction operations are confined to a minimum of 2m above the high wet weather groundwater level.
- While it is not expected, the Company would visually monitor extraction faces for groundwater inflows. Should it be determined that sustained inflow is occurring, the Company would arrange for a suitable water access licence and the relevant approvals under the *Water Management Act 2000*.

5.3.3 Summary of Water Monitoring Program

Table 5 provides a summary of the proposed water monitoring program for the Quarry.

Table 5
Water Monitoring Program

Location	Parameters	Frequency	Method
SW1	pH, EC, TSS, oil and grease	Event based (uncontrolled discharge)	Grab sample
BH1	SWL	Quarterly	Dip
Closed Water Management System	Stability, erosion, and sediment build up	Monthly and event based (after 25mm of rain over 24 hours)	Observation and photograph

5.4 Triggers for Investigation

Triggers for action or investigation of the surface water management system are presented in **Table 6**.

Table 6
Surface Water Investigation Triggers and Actions

Page 1 of 2

Trigger	How Identified	Action / Remedial Response
Failure of clean water diversion. This includes geotechnical failure, functional issue or failure of stabilising vegetation cover.	Monthly inspections and/or inspection after a rainfall event that exceeds 25mm.	Remediate failure and/or seek geotechnical advice. Notify Council and NPWS. Prepare report on investigation and response.
Excess sedimentation of clean water diversion.	Monthly inspections and/or inspection after a rainfall event that exceeds 25mm.	Investigate source of sediment and remove from drainage. If sediment has escaped drainage and entered environment notify Council and NPWS. Prepare report on investigation and response.

Table 6 (Cont'd)
Surface Water Investigation Triggers and Actions

Trigger	How Identified	Action / Remedial Response
Failure of erosion and sediment controls.	Monthly inspections and/or inspection after a rainfall event that exceeds 25mm.	Repair erosion and sediment controls as soon as practical. If inspection identifies sediment-laden water flowing to Marramarra National Park, notify Council and NPWS. Prepare report on investigation and response.
Surface water monitoring records outside the range specified in **Table 4**.	Review of monitoring records when received.	Investigate cause of anomalous result and remediate, where necessary. Notify Council and NPWS. Prepare report on investigation and response
Erosion, oil and grease or litter from the Quarry is observed in or adjacent to Marramarra National Park.	Monthly inspections and/or inspection after a rainfall event that exceeds 25mm.	Investigate source of pollution and remediate. Photograph and record outcomes for reporting to Council and NPWS.

5.5 Soil Management Measures

The following soil management procedures and safeguards which would be implemented to prevent excessive soil deterioration during stripping and transportation, and to maximise the viability of soil resources for use in rehabilitation.

- 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.

Soil management and procedures for rehabilitation and restoration of the Quarry Site are provided in Section 4.2 and detailed further in the VMRP.

6. Noise and Vibration Management

6.1 Criteria and Performance Measures

Noise and vibration emissions sources for the Quarry are detailed in Section 5.3.5.1 of the EIS and the updated Noise Assessment completed by Muller Acoustic Consulting (MAC) (2024). MAC (2024) presents the applicable criteria and performance measures for the Quarry which are detailed in the following subsections.

6.1.1 Construction Noise Criteria

The Noise Management Levels (NMLs) for each receiver type in the vicinity of the Quarry Site over standard construction hours[1] are presented in **Table 7**.

Table 7
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 (2024) – Modified after Table 14		

MAC (2024) notes that predicted noise levels would be within the relevant criteria during construction works, except for an exceedance of 3dB at R37 (located approximately 120m from the widened Site Access Road). The exceedance would be temporary, of a short duration and would only occur when works are at their nearest proximity during standard construction hours. MAC (2024) considers that the magnitude of this exceedance is negligible and would be effectively mitigated and managed through the controls identified in Section 6.2.

6.1.2 Operational Noise Criteria

The Project Noise Trigger Levels (PNTL) criteria are the project-specific criteria against which the Quarry is required to be assessed. The PNTL criteria for the Quarry are identified in **Table 8**.

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

Table 8
PNTL Criteria

Receiver	Period[1]	PNTL (dB $L_{Aeq(15min)}$)
Suburban Residential	Day	42
	Evening	42
	Night	35
Rural Residential	Day	40
	Evening	36
	Night	35
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 (2024) – Modified after Tables 11 and 12		

6.1.3 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".

The criteria adopted for the Quarry are identified in **Table 9** based upon the noise over a 15-hour period, i.e. from 7:00am to 10:00pm. The Company would ensure that noise associated with all construction and operational road traffic activities would be compliant with these criteria.

Table 9
Road Traffic Noise Assessment Criteria

Road Category	Road(s)	Assessment Criteria	Increase Criteria
Freeway/arterial/ sub-arterial[1]	Unnamed Local Road, Old Northern Road, Wisemans Ferry Road	60dB $L_{Aeq(15hr)}$	Existing traffic $L_{Aeq(15hr)}$ + 12dB
Note 1: MAC (2024) notes that the 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.			
Source: MAC (2024) – Modified after Tables 16 and 17			

6.1.4 Hours of Operation

The Company would ensure the hours of operation during the Quarry life would be consistent with the hours identified in **Table 10**.

Table 10
Hours of Operation

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

6.2 Management and Mitigation Measures

The Company 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 **Table 10** would be strictly adhered to.
- The maximum number of truck movements would be limited to 6 per hour (3 in / 3 out) and 20 per day (10 in / 10 out).
- 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).
- Where practicable, equipment with lower noise emissions or sound dampening technology would be utilised.
- Where possible, use localised mobile screens or construction hoarding around piling rig/plant to act as barriers between construction works and receivers, particularly when undertaking works near the Quarry Site boundary and/or a residential receiver.
- Ongoing consultation with residents in proximity to the Quarry Site regarding project progress, upcoming noise generating works and their durations.
- Implementation of the complaints management system detailed in Section 14.

6.3 Monitoring

Given that the Quarry is not predicted to result in any exceedances of the relevant assessment criteria during extraction operations, monitoring of noise is not proposed. However, should any substantiated complaint(s) relating to noise be received, the Company would commission an independent noise assessment to establish the actual levels and compliance with the criteria set out in Section 6.1.

7. Air Quality Management

7.1 Criteria and Performance Measures

Table 11 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 to minimise any potential impacts to human health and amenity. The Company would ensure that construction and operational activities would be compliant with the below criteria.

Table 11
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			

7.2 Management and Mitigation Measures

The Company would employ the following best practice mitigation measures throughout the life of the Quarry 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 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 the complaints management system detailed in Section 14 to ensure that all air quality related complaints are dealt with through investigation and implementation of corrective treatments.

7.3 Monitoring

Given that the Quarry is not predicted to result in any exceedances of the relevant assessment criteria, monitoring of air quality is not proposed. However, should any substantiated complaint(s) relating to air quality be received, the Company would commission an independent air quality assessment to establish the actual levels and compliance with the criteria set out in **Table 9**.

8. Waste Management

Table 12 presents a summary of the types and estimated volumes of wastes that are likely to be generated during the life of the Quarry and how these would be managed. Waste storage facilities would be provided in the Office, Amenities, and Parking Area, either within the office, lunch shed, toilet facilities, storage containers / workshop or bunded pallet area depending on the waste material types (**Figure 2**).

Table 12
Non-Production Waste Management

Waste Type	Storage	Estimated Volume[1]	Management and Disposal
General waste (including food scraps and packaging, paper, cardboard, etc.)	Small bins would be located on-site, generally within the office and toilet facilities. External bins would be lidded.	1 x 120L bin general waste and 1 x 120L bin recyclables per fortnight during extraction / processing campaigns.	Bins would be taken off site for disposal / recycling at an appropriately licenced facility.
Maintenance Waste[2] (including oils and greases, tyres, batteries, etc.)	Hydrocarbons would be stored in 20L or 205L drums and stored in accordance with *AS1940 The storage and handling of flammable and combustible liquids*. Any batteries would be placed in a suitable location not subject to potential damage from vehicles / earthmoving equipment. Any tyres or scrap steel would be stored within a suitable location not subject to vehicles / earthmoving equipment.	Generally, <20L per month assuming no unplanned on-site maintenance required.	Any wastes generated from on-site equipment repair or maintenance would be removed from the Quarry Site on the day of generation and disposed of / recycled at an appropriately licenced facility.
Waste Water	Waste water from the toilet facilities would be stored within a pump out tank.	Estimated average of 20L per day.	The toilet facilities would be serviced by a licenced contractor with waste water pumped out for off-site treatment / disposal.

Notes:

1: The volumes of non-production wastes generated through the proposed operational activities would be minimal. Volumes provided are estimates only.

2: To minimise on-site waste generation, equipment maintenance would generally be undertaken off site.

9. Hazard Management

9.1 Hazardous Materials and Chemicals

The following hazardous chemical management controls and safeguards would be implemented throughout the life of the Quarry.

- All Quarry personnel, contractors, and their employees would undergo a site-specific induction, incorporating hazardous chemical management prior to commencing work at the Quarry.
- Hydrocarbons and hazardous materials (i.e. diesel) 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*.
- Adhere to the general principles of AS1940:2017 – The storage and handling of flammable combustible liquids.

Diesel Management

- 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.
- Ensure all Quarry-related activities are undertaken in cleared areas, where practicable, and in accordance with the Company's Refuelling Vehicles Plant and Equipment procedure (attached as **Appendix 5**).
- Ensure mobile equipment would not be left unattended with the engine running.

Hydrocarbon Management

- 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 Company 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.
- Quarterly inspections to confirm storage containers and bunded pallets are in an acceptable condition.

9.2 Bush Fire

It is recognised that some areas of the Quarry Site will remain vegetated and, therefore, there is the potential for bush fire to spread both within the Quarry Site and adjacent to the Quarry Site As a result, the following management controls and measures would be implemented throughout the life of the Quarry to ensure potential bush fire hazards would be mitigated

Table 13 presents the controls proposed to limit the risk of bush fire posed by Quarry activities.

Table 13
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 Company. • Water cart available. • All site vehicles and mobile earthmoving equipment to carry a fire extinguisher.

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.
- Works would be restricted within 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 (see Section 13).

In terms of potential impacts, the assets considered at risk include employees and the local community. In order to protect these assets, should approval be granted, a proposed a *Bush Fire Emergency Management and Operations Plan* would be prepared in consultation with the local RFS. The *Bush Fire Emergency Management and Operations Plan* would provide additional detail on the following measures.

- 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.
- Implementation and maintenance of Asset Protection Zones (APZ).

9.2.1 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.

10. Heritage Management

No items or places of Aboriginal heritage significance have been identified within or in the vicinity of the Quarry Site, however, should any Aboriginal object or human remains be uncovered during extraction-related activities, work in the area immediately surrounding the object or remains would cease and a 10m buffer area would be cordoned off to prevent personnel or machinery access. The protocol described in **Table 14** must be implemented immediately.

Table 14
Unexpected Find Protocol

Action / Observation	Notification / Reporting	Timing	Responsibility
Identification			
Material observed, and work ceased in the vicinity of the object.	Quarry Manager notified.	Immediately upon identification.	Personnel who observes the item.
A 10m buffer area around the artefact is cordoned off to prevent access.	None	Immediately upon identification.	Quarry Manager or their delegate.
Skeletal Remains			
Material is human remains	Notification given via phone to: • NSW Police • Heritage NSW • Council	Immediately upon identification.	Quarry Manager or their delegate.
Commission an archaeologist to assess remains in consultation with Registered Aboriginal Stakeholders	Notification given via phone / letter / email to Registered Aboriginal Parties.	Once remains are identified as of Aboriginal origin.	Quarry Manager or their delegate.
	Management strategy and reporting prepared in consultation with Heritage NSW and Registered Aboriginal Stakeholders if remains are of Aboriginal origin.	As agreed with relevant parties.	Quarry Manager or their delegate.
Artefactual Material			
Material is artefactual	Notification given via phone to Heritage NSW and Council.	Immediately upon identification.	Quarry Manager or their delegate.
Commission an archaeologist to undertake an assessment of the material in consultation with the Registered Aboriginal Stakeholders.	Notification given via phone/letter/email to Registered Aboriginal Parties	Once material is confirmed to be of Aboriginal origin.	Quarry Manager or their delegate.
	Outcomes to be notified to the Heritage NSW and Council	To be confirmed with Heritage NSW.	Quarry Manager or their delegate.
Implement recommendations of assessment in consultation with the Registered Aboriginal Stakeholders	Documentation to be prepared by archaeologist describing the outcomes of assessment. Outcomes to be notified to Heritage NSW and Council	To be confirmed with authorities and Registered Aboriginal Stakeholders.	Quarry Manager or their delegate.
Re-Commence Extraction Works			
Approval in writing is given by the NSW Police or BCS to recommences works in the affected area.	Notification given to the following groups. • Registered Aboriginal Parties. • Heritage NSW • Council	Once outcomes of management strategies or assessment are resolved or material is formally identified to not be artefactual.	Quarry Manager or their delegate.

Under Section 86 of the *National Parks and Wildlife Act 1974*, it is an offence to harm or desecrate an Aboriginal object or Aboriginal places and under Section 89A of the *National Parks and Wildlife Act 1974*, it is an offence to be aware of the location of an Aboriginal object and not notify the authorities of its location.

The following subsections provide a more detailed summary of the actions and procedures for managing unexpected finds of skeletal remains or artefactual material.

10.1 Skeletal Remains

With the exception of a human skull which is easily recognised, most of the remaining skeletal parts may not be easily identified and so until an appropriately qualified archaeologist has identified whether or not bones are from animals or humans, all skeletal material would be treated as if it were human remains. On no account are the skeletal remains to be handled or disturbed further than they have been when first observed.

- No skeletal remains would be removed from where they are found. To do so is likely to lead to prosecution, fines and/or possible imprisonment. It is illegal to remove skeletal remains until they have been identified as being of human or animal origin, and without written authority of Heritage NSW. It is also illegal to excavate a site without a permit and so no further soil removal, either mechanically or by hand, would be undertaken. Similar penalties may be incurred as for the unauthorised removal of artefactual material.
- In the event that skeletal remains are found, the Quarry Manager must immediately inform the local police (as the remains may be as a consequence of homicide) and inform Heritage NSW of the discovery and the measures being undertaken to protect the site.
- The location of the skeletal remains would be cordoned off immediately, and the Quarry Manager would inform all workers who might otherwise work in the area of the remains that under no condition is anyone to step inside or disturb the deposits within the cordoned-off area.
- Once clearance has been provided by police, and if the remains are considered to be artefacts, the Quarry Manager or their delegate would organise for an appropriately qualified archaeologist to visit the site and assess the skeletal remains. Until the examination of the skeletal remains has been analysed and identified as not being of human remains, no work is to take place at that location.
- If, however, the remains are identified as being human, the Quarry Manager is to inform all Registered Aboriginal Stakeholders and the Sydney Metropolitan Local Aboriginal Land Council (LALC) of the discovery.
- Until such time as the police have completed their investigations; and the Aboriginal stakeholders have determined the appropriate Cultural Management procedure to deal with the skeletal remains no-one, other than the police or the archaeologist is to enter the cordoned-off area.

- The archaeologists (if the archaeologist identifying the remains is other than the archaeological consultant engaged by the Quarry Manager in the first instance) are to report on the procedures undertaken, the methodology of protecting the remains, the consultation undertaken with NSW Police, Heritage NSW and the stakeholders, and the subsequent recommendations of the Aboriginal stakeholders.
- The reports are to be provided to each of the Aboriginal stakeholders, the police and to Company management.

10.2 Artefactual Material

The most obvious feature or characteristic of an artefact is that it is of a material and/or a shape not naturally found in the area. For example, a water-worn rounded stone of basalt is unlikely to occur naturally where the predominant soils are sedimentary or derived from sands and gravels. Similarly, a piece of clear crystal quartz is unlikely to be found in greywacke soils. The person observing the artefact may have no idea what the artefact is but would realise that the object "was out of place".

- No artefactual material would be removed from where it was found. Doing so may lead to prosecution, fines or possible imprisonment. It is illegal to remove artefactual material without written authority of Heritage NSW. It is also illegal to excavate a site without a permit and so no further soil removal, either mechanically or by hand, would be undertaken. Similar penalties may be incurred as for the unauthorised removal of artefactual material.
- The Quarry Manager or their representative would cordon off the location where the artefactual material was observed with fluorescent fencing.
- The Quarry Manager or their delegate is to contact a qualified professional archaeological consultant to request that they visit the site to identify the material.
- The archaeologist is to write a brief report of the results of the examination of the subject items and forward a copy to the Company to provide a record of the site visit.

In the event that the item(s) is identified as an artefact:

- If the archaeologist identifies the subject item as being artefactual (having been deliberately humanly modified) then work cannot continue at that location until the site has been visited by the Aboriginal community. An Aboriginal Heritage Impact Permit (AHIP) would be required for salvage of the site and an application must be made immediately. Under Section 86 of the *National Parks and Wildlife Act 1974* it is an offence to harm or desecrate Aboriginal object or Aboriginal places and under Section 89A of the *National Parks and Wildlife Act 1974* it is an offence to be aware of the location of an Aboriginal object and not notify the authorities of the location.
- The archaeologist would be required to produce a report of the analysis and interpretation of the archaeological context.

- The archaeologist would also be required to complete a Site Recording Form to be submitted to list the site on the Aboriginal Heritage Information Management System (AHIMS) Site Register.
- Once the salvage has been undertaken the archaeologist would be required to submit an "Aboriginal Site Impact Recording Form", to record the change of status of the site on the AHIMS Site Register.
- If there are too many artefacts to be fully recorded on site, the archaeologist would take custody of the artefacts for the purposes of analysis, after which they would be handed to the agreed custodians or other suitable arrangements made in agreement with the Registered Aboriginal Stakeholders in accordance with the salvage report.
- Any artefactual material that is salvaged and retained for educational purposes would be provided to an Aboriginal organisation that can provide both security of the material and viewing access to members of the Aboriginal community. Traditionally the organisation is the relevant LALC; but in the event that an Aboriginal Land Claim is approved the appropriate organisation might be the successful land title claimants.
- A copy of the final report would be forwarded to each Aboriginal stakeholder, Heritage NSW and to Quarry Management.

11. VENM Importation and Handling

11.1 Volume Requirements and Importation Rates

Importation of VENM to the Quarry Site would occur on a campaign basis and as a result, the timing or scale of VENM importation on a monthly or annual basis would depend on the generation of materials at construction sites in the Sydney metropolitan area. VENM would primarily be sourced from the Company's civil projects and network of industry contacts, as well as from local developments and transfer stations.

A total of approximately 111,170m^3 of VENM would be required to construct the final landform. It is noted that VENM can consist of various material types with highly variable densities and as such, it is not possible to provide an accurate tonnage of VENM required for use in rehabilitation. Notwithstanding, a standard density of 2t/m^3 (assuming all VENM would be clay, silt or other unconsolidated material) has been adopted for conservatism. Therefore, it is estimated that up to approximately 222,340t of VENM would be required over the life of the Quarry.

Importation operations would not commence until later in the life of the Quarry and would continue following completion of extraction operations until the final landform is fully constructed. It is anticipated that VENM importation would be undertaken at a stepped rate as follows.

- Years 1 to 15 = nil
- Years 15 to 20 = up to 10,000tpa
- Years 21+ = up to 30,000tpa

As a result, the maximum proposed importation rate of 30,000tpa would only be reached following cessation of extraction operations. No more than 111,170m^3 of VENM would be imported over the life of the Quarry.

11.2 Management and Mitigation Measures

The following management procedures and safeguards would be implemented to safely manage potential risks associated with VENM importation.

- The Company would be responsible for ensuring that suitable records are maintained including the following.
  - An Import Fill Tracking Sheet would be used to monitor and maintain records of (attached as **Appendix 6**).
  - Certification of classification for any material supplied as VENM which would be consistent with information contained in NSW EPA's *Certification Virgin Excavated Natural Material* (EPA 2013/0693; September 2013).
  - Validation and record by Quarry personnel on the source location for VENM that is to be used before the material is accepted onto the site
  - All records would be maintained for a minimum of six years.

  - The Company would also ensure that any records maintained for this activity are available for review on request by the community, Council or relevant government authorities.
  - The Company would ensure that all Quarry personnel responsible for the management of VENM importation and handling would be trained on the requirements of the process listed above.

- VENM would ideally be placed directly into rehabilitation areas following importation. In the event that temporary stockpiling is required, this would be undertaken within the Extraction Area footprint. No more that 5,000t of VENM would be stockpiled at any one time.
- During campaigns of VENM importation, the Company would limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the number of movements identified in Section 3.1 are not exceeded.
- Should unexpected contamination, asbestos or suspected contamination be discovered as a result of VENM importation, the Unexpected Contaminated Land and Asbestos Finds Procedure (attached as **Appendix 7**) would be followed.

Should the current regulatory framework change or be updated before the importation of VENM for rehabilitation works is proposed to commence, this report would be updated to reflect changes to regulatory requirements. The proposed amendments will be submitted for assessment and approval by Council via the appropriate application pathway to be advised by Council.

12. Pollution Incident Management

12.1 Pollution Incident Identification

An incident which causes or threatens to cause material harm to the environment is referred to as a **Pollution Incident**.

For the purpose of this EMP, material harm is harm that:

- pollution that involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or
- results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment).

12.2 Pollution Incident Notification

In the event of an incident which is deemed a Pollution Incident, the Quarry Manager will be notified, and the event will be reported to the Council and the EPA within 24 hours of the incident. An investigation into the cause of the non-compliance shall be commenced in accordance with the Company's internal *Pollution Incident Management Plan* (attached as **Appendix 8**).

12.3 Pollution Incident Reporting

Following implementation and review of corrective measures, the Company would provide any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

13. Emergency Procedures

Should approval be granted, an *Emergency Response Plan* would be developed for the Quarry in consultation with the Rural Fire Service.

The Plan would include detailed response plans for the following.

- Fire emergency.
- Medical emergency.
- Major chemical spill emergency.
- Evacuation Procedure (attached as **Appendix 9**).

The Quarry Manager would be responsible for the implementation and updating of the emergency response procedure.

14. Complaints Handling

14.1 Introduction

Complaints may be made via the following channels.

- Directly contacting an Environmental Management Representative for the Quarry on 0476 910 130 or 0499 010 000.
- Via a Government agency such as Hornsby Shire Council or the EPA.

The Company would maintain a Complaints Register to record the following details of the complaint.

a) The date and time of the complaint.

b) The method by which the complaint was made.

c) Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.

d) The nature of the complaint.

e) The action taken in relation to the complaint, including any follow-up contact with the complainant.

f) If no action was taken, the reasons why no action was taken.

14.2 Handling of Complaints

The Company has developed a complaints procedure for the operation of the Quarry with all complaints to be investigated and a response provided to the complainant.

The investigation would consider the following.

- What activities (and/or equipment) were being carried out or operated at the time of the complaint.
- Whether at the time of the complaint, normal day-to-day activities were being conducted.
- Whether equipment or activities on-site were the potential source of complaint (or whether other activities in the locality may have contributed to the complaint).
- What actions may be carried out to resolve the complaint and/or minimise the likelihood of further complaints.

If monitoring is undertaken to investigate a complaint, the Quarry Manager would make the results of the monitoring available for viewing by the complainant, on request.

14.3 Dispute Resolution

In the event of a disagreement between the Company and a member of the community regarding environmental management issues, the Quarry Manager or other relevant personnel would work with the community member to resolve the issue.

If an agreement cannot be reached through direct consultation, the Company would seek external assistance from a third party in the resolution of the dispute. This may include mediation facilitators, technical matter experts or relevant government agencies.

Appendices

Appendix 1	Driver Code of Conduct
Appendix 2	Compuload Load Indicator Crane Scale Brochure 3: 50 ton – October 2018
Appendix 3	Vegetation Management and Restoration Plan – February 2025
Appendix 4	Erosion and Sediment Control Plan – February 2025
Appendix 5	Refuelling Vehicles, Plant and Equipment – Safe Operating Procedure
Appendix 6	Imported Fill Tracking Sheet
Appendix 7	Unexpected Contaminated Land and Asbestos Finds Protocol
Appendix 8	Pollution Incident Response Management Plan
Appendix 9	Emergency Evacuation Plan

Appendix 1

Driver Code of Conduct

(Total No. of pages including blank pages = 2)

Driver Code of Conduct

Unit 3B, Building 4, 256B New Line Road, Dural NSW 2158
ABN: 61 167 710 545 **| W:** www.centralcivilnsw.com.au

Vehicle drivers attending the site must comply with the following:

a) hold a current appropriate licence for the vehicle they are operating
b) strictly comply with all traffic regulations
c) comply with all maximum gazetted speed limits on all roads, or a lesser speed as dictated by the site specific signage
d) drive in a manner at all times that is in accordance with road conditions
e) yield "right of way" whenever appropriate to ensure safe passage of other road users
f) at all times leave adequate distance between vehicles to allow safe passing by other road users, as required
g) decrease vehicle speeds to minimise dust and noise around private dwellings, road works and stationary vehicles
h) not use engine braking where noise is likely to adversely impact on residents
i) remain calm and courteous when in contact with other road users, members of the public, landowners
j) not use obscene language on radio or intercom communication
k) if required, accurately complete required paperwork prior to departure and follow specified routes.
l) maintain vehicles in a clean and tidy condition
m) ensure that there is no littering
n) avoid any other noise emitting activities for example loud music or raised voices.
    i. Raised voices should be avoided
    ii. No shouting or yelling permitted;
    iii. radio volume to be turned down;
o) reverse movements to be minimised;
p) truck engines to be turned off during deliveries;
q) minimise the impacts of earthworks and construction on the local and regional road network.

I, …… (Print name) of Central Civil (NSW)) hereby agree to abide by the above conditions (a)-(q)

…… ……
Signature Date

Appendix 2

Compuload Load Indicator Crane Scale Brochure 3: 50 ton – October 2018

(Total No. of pages including blank pages = 3)

Compuload

CLY Load Indicator Crane Scale

Non wireless model

Wireless model

The Compuload CLY series of digital Load Indicator Crane Scales, offers the user a simple and easy method to weigh goods in a lifting / tension application, with capacities up to 50 ton.

A standard 6 digit x 18mm LCD backlight display makes for easy reading of the displayed weight. With 24 hours of continuous operation with-out backlighting turned on and standard Zero, Tare, and Stable functions makes this a very simple to use scale. The Compuload Load Indicator Crane Scale is able to read weights in Kg, KN & Klb and displays the gross and net weight.

Other handy features include an overload alarm to warn you if you have gone over the rated capacity of the Compuload Load Indicator Crane Scale, plus a battery indication function to warn you of your current battery power level.

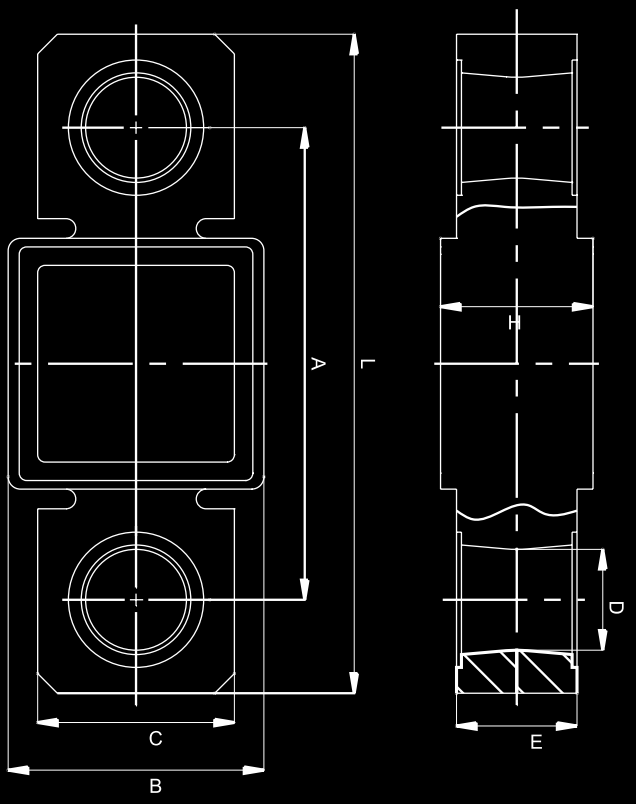
The applications are limitless from the food industry, fishing, marine, construction, general industry when weighing and measuring tension weights and forces are required in non-trade applications!

Options available
Nata calibration and test reports, Carry cases model specific.

Compuload
On Board Weighing Systems

Key Features

- 6 capacities from
  3 ton x 1kg
  5 ton x 2kg
  10 ton x 5kg
  20 ton x 10kg
  30 ton x 10kg
  50 ton x 20kg
- Robust strong tool steel construction
- 18mm x 6-digit LCD Backlight display
- Portable tension weighing
- Simple operation
- Wireless model
- Non wireless model available



kN
lb kg
Lb/kg/kN selectable

Applicable in day and night

Built-in beeper

CE

AA battery

PEAK

Accuracy	0.1% F.S
Zeroing Range	100% F.S
Maximum Safe Load	100% F.S
Time to stable reading	8s
Display	6 digit x 18mm LCD Display with backlighting
Operating temperature	-10°C to + 45°C
Low Voltage Indicator	Low voltage indicator icon turns on when the scale power supply voltage is low
Power Supply	
Load Indicator Crane Scale	3 x AA/1.5V, Alkaline batteries
Remote Hand Held	4 x AA/1.5V, Alkaline batteries
Auto Power Off	30 minutes after the scale is inactive or at extreme low power supply
Casing	Tool Steel

Caution: Overloading of Compuload Load Indicator Crane scale will void all warranty claims and can result in serious injury or death.

Max Capacity	Division	Unit Net Weight (kg)	L	B	C	H	E	A	D
3t	1kg	2.3	204	99	46	54	30	158	Φ 26
5t	2kg	3.6	222	99	60	58	35	162	Φ 31
10t	5kg	6.2	268	104	80	62	49	192	Φ 41
20t	10kg	15.0	344	120	120	66	66	232	Φ 56.5
30t	10kg	21.9	394	132	132	73	73	264	Φ 66
50t	20kg	45.5	500	150	150	100	100	340	Φ 80

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Appendix 3

Vegetation Management and Restoration Plan – February 2025

(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

February 2025

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 February 2025

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

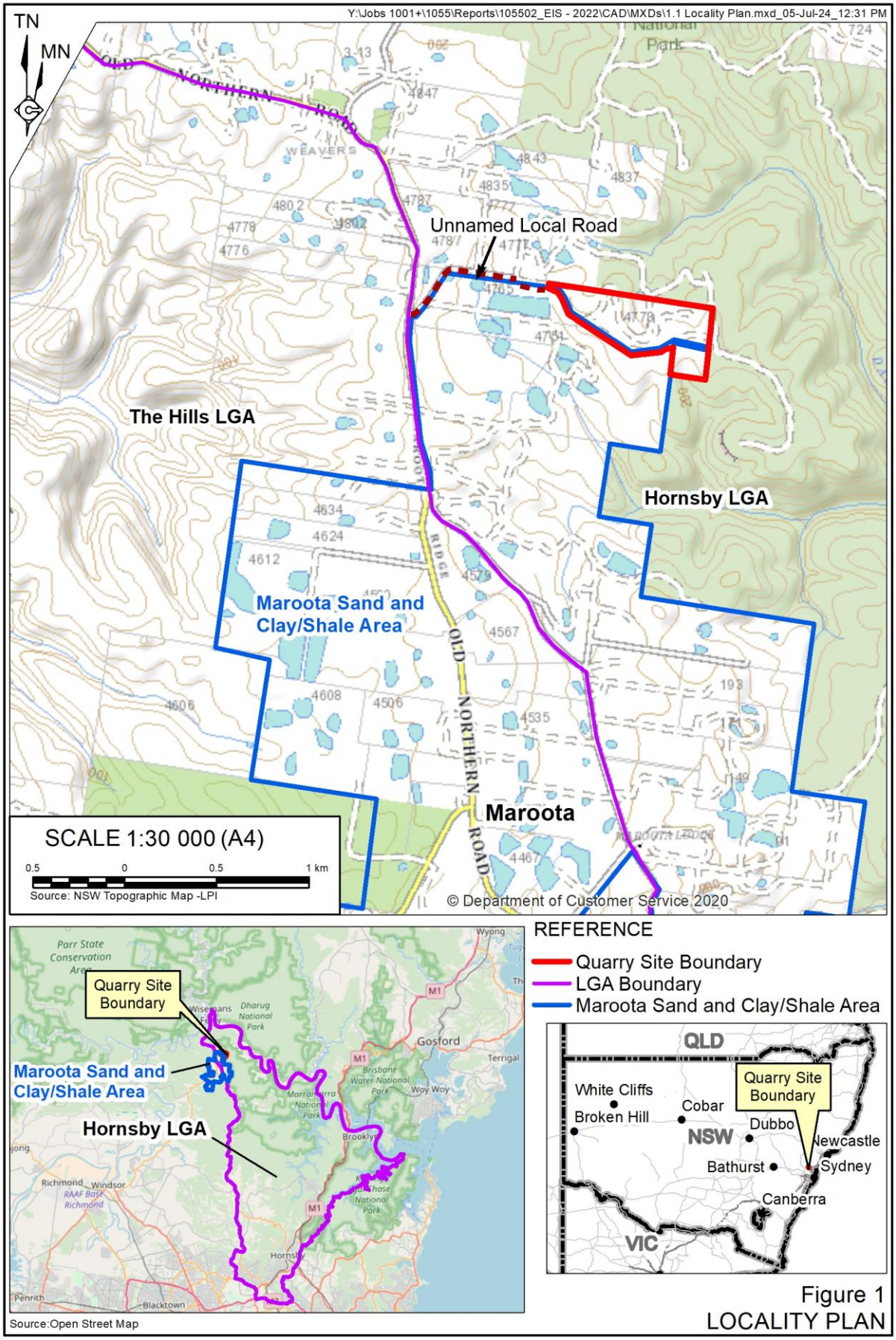

Figure 1
LOCALITY PLAN

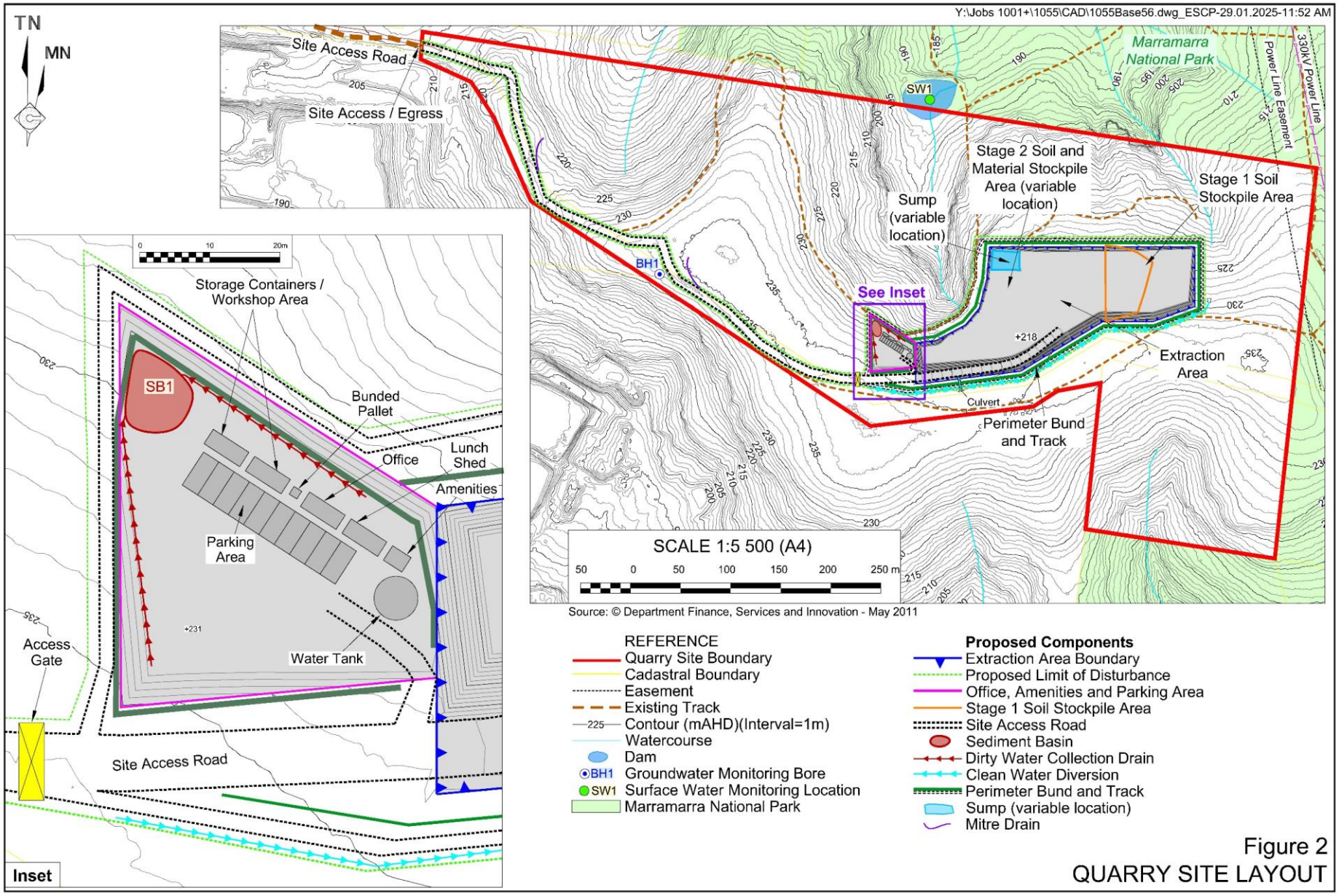

Figure 2
QUARRY SITE LAYOUT

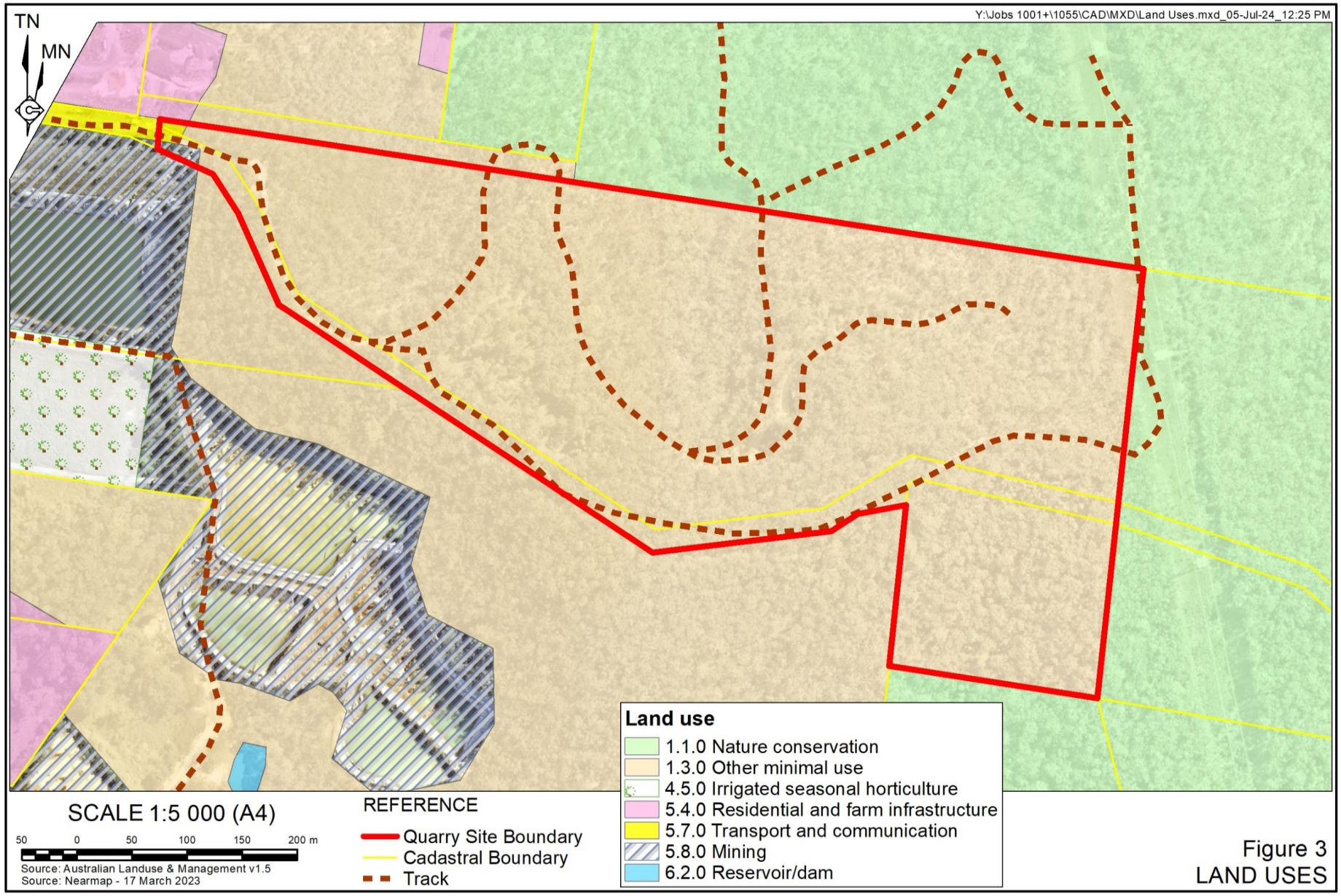

Figure 3
LAND USES

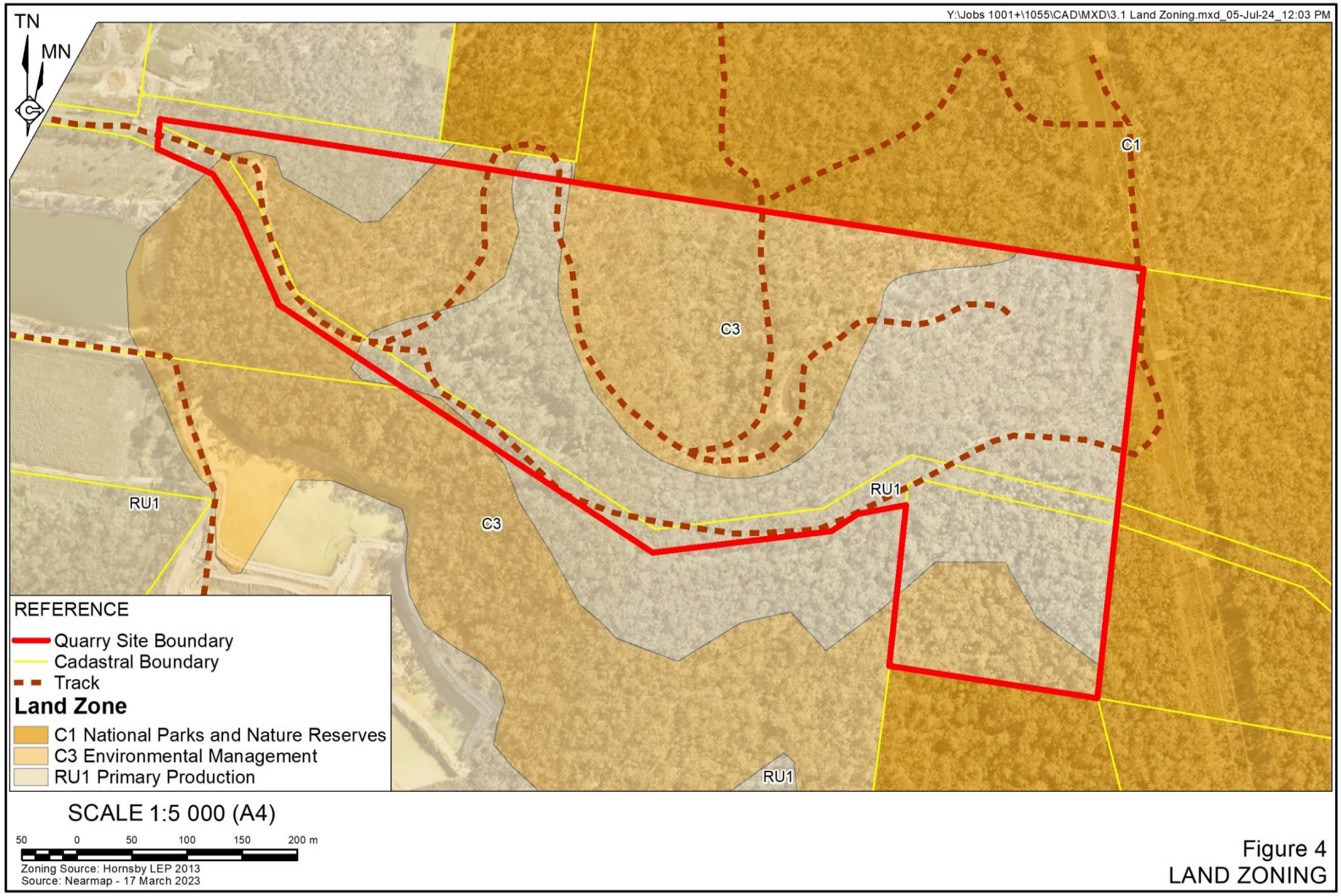

Figure 4
LAND ZONING

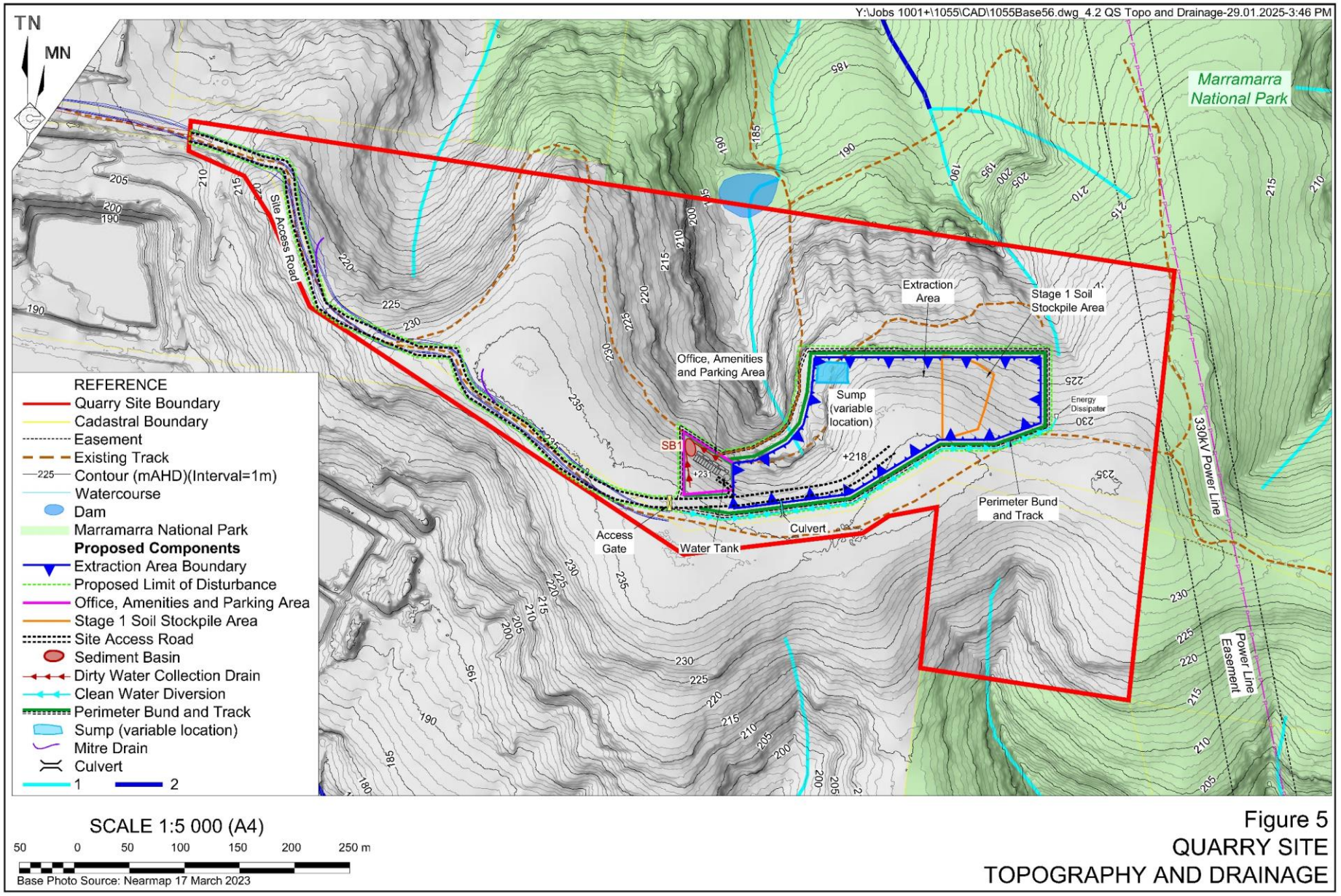

Figure 5
QUARRY SITE
TOPOGRAPHY AND DRAINAGE

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.

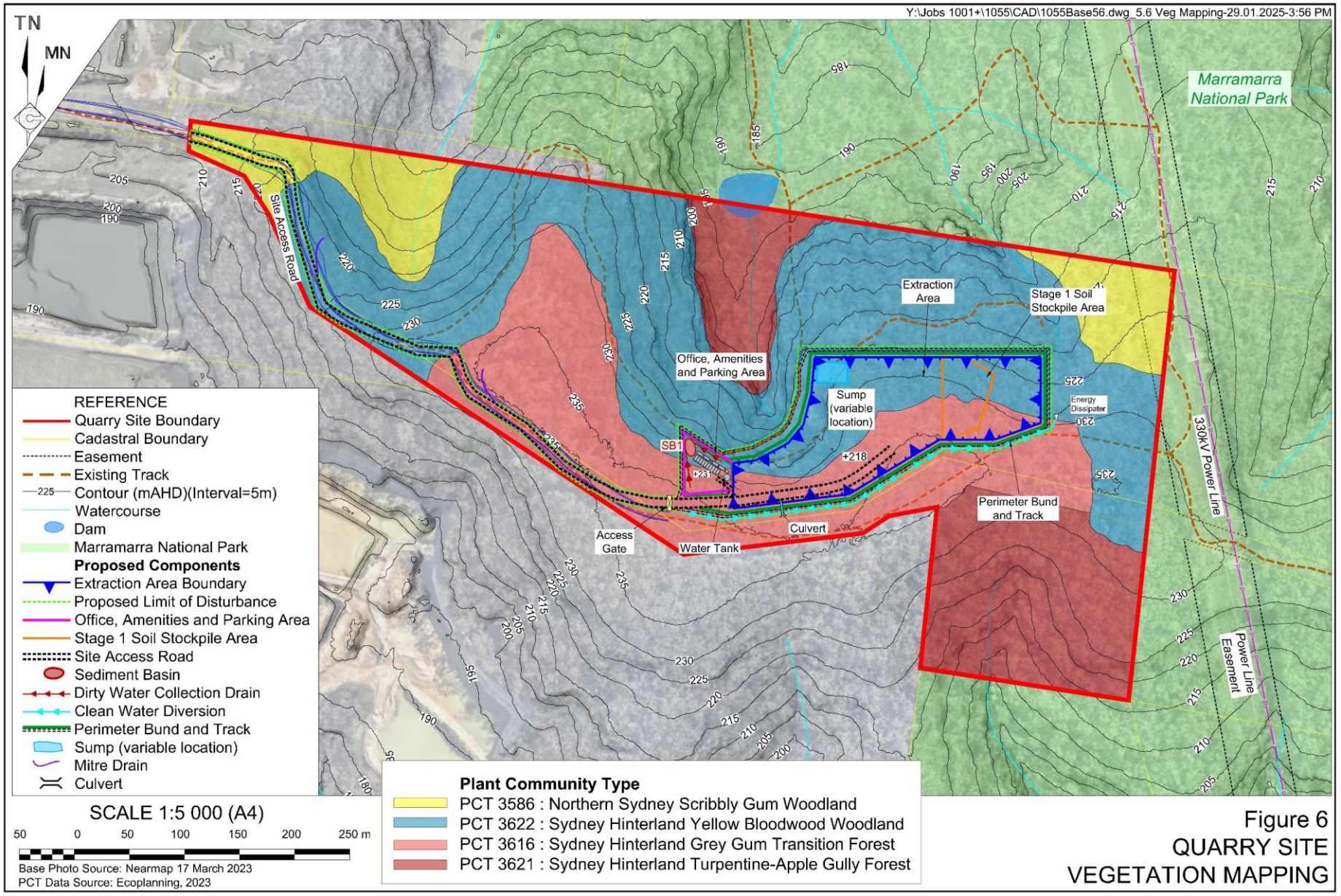

Figure 6
QUARRY SITE
VEGETATION MAPPING

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**.

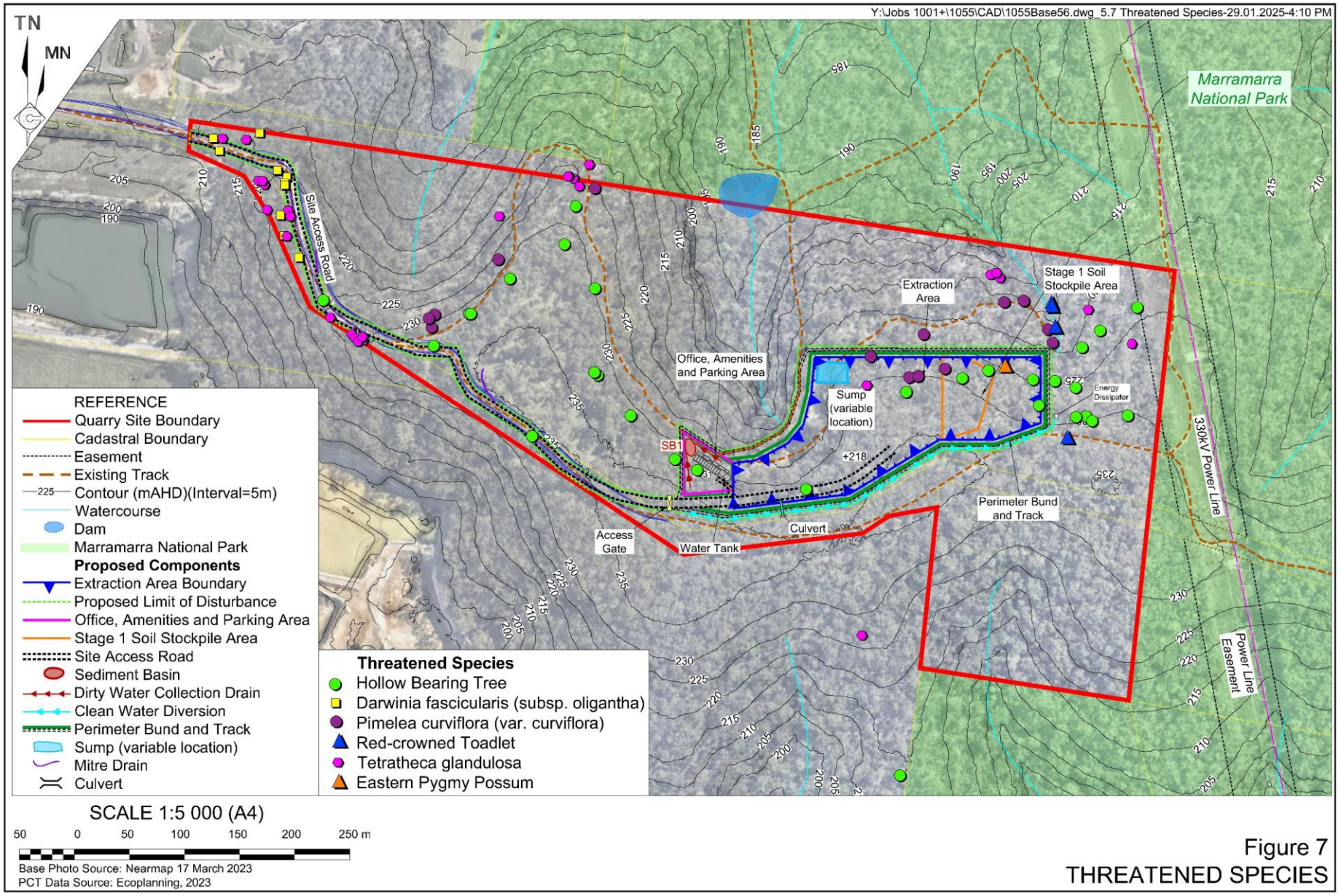

Figure 7
THREATENED SPECIES

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.

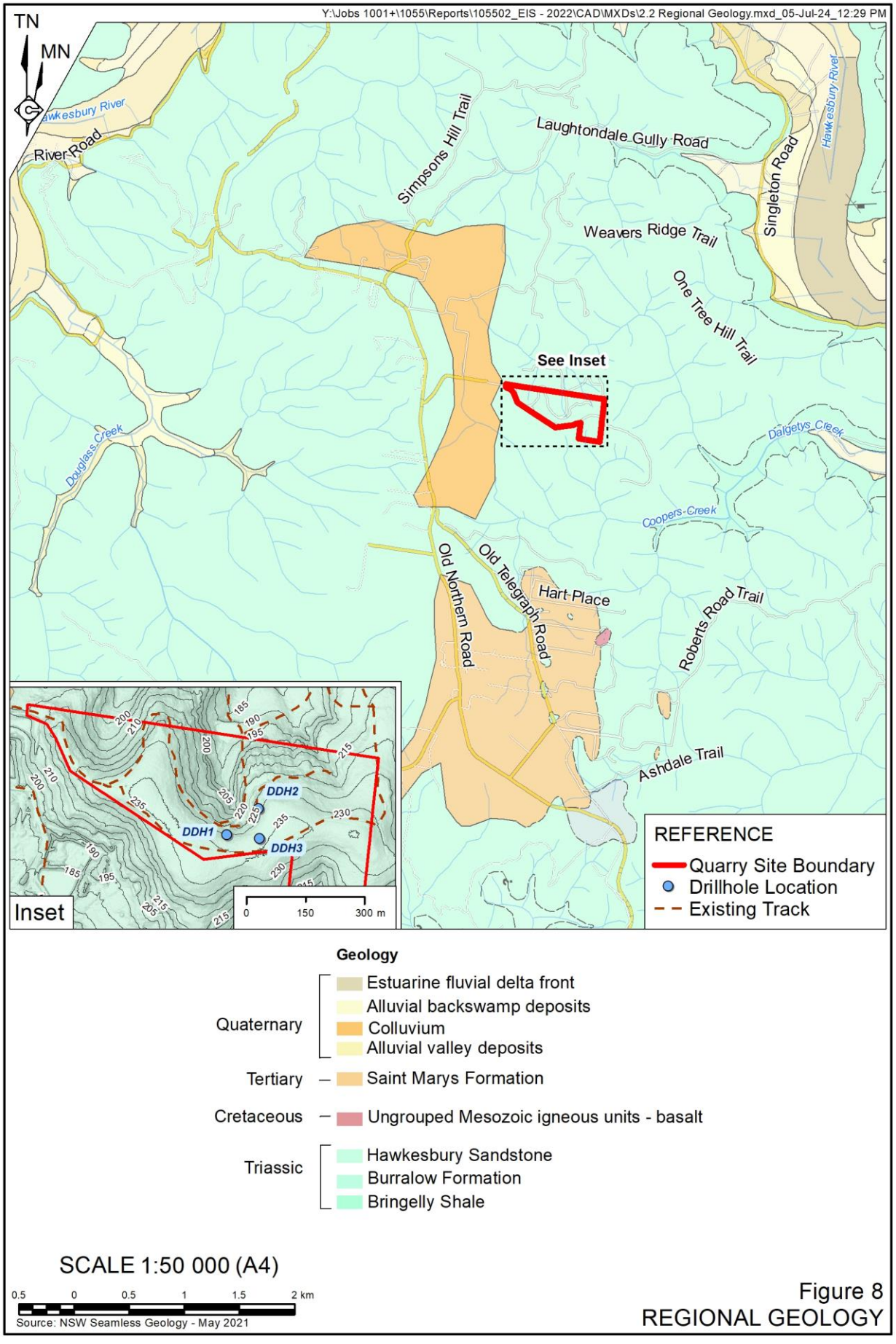

Figure 8
REGIONAL GEOLOGY

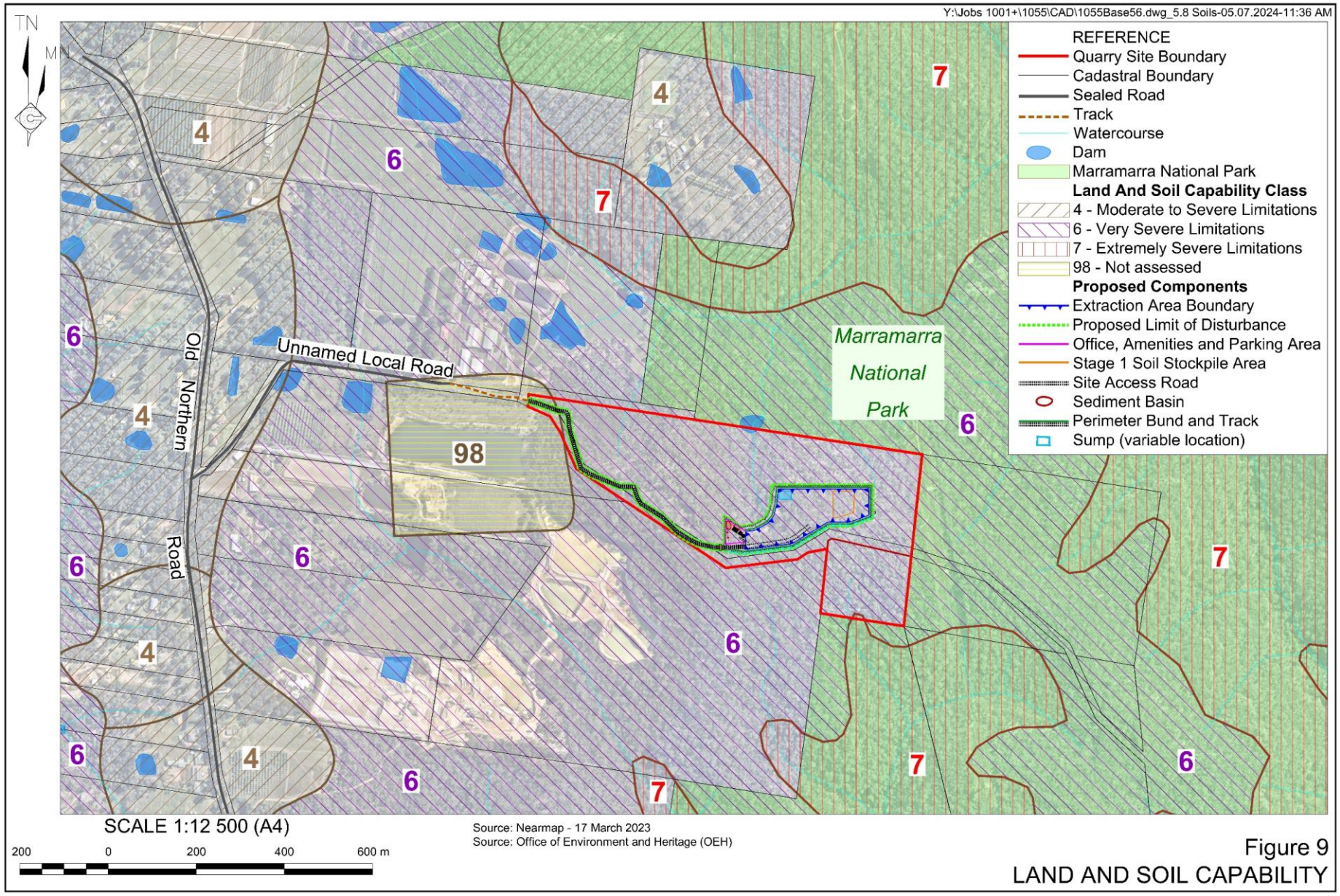

Figure 9
LAND AND SOIL CAPABILITY

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)

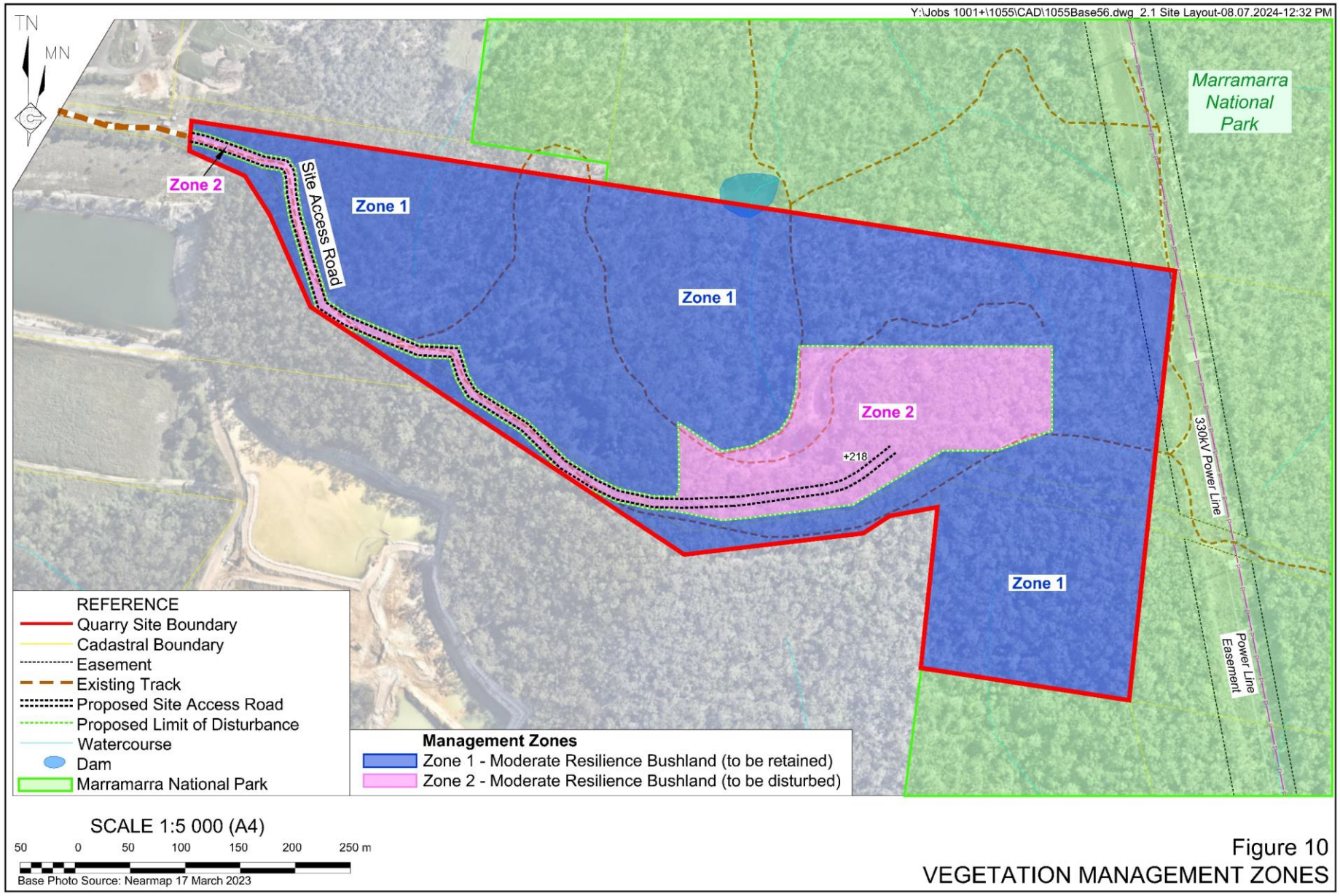

Figure 10
VEGETATION MANAGEMENT ZONES

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 all surface water management infrastructure in accordance with the *Erosion and Sediment Control Plan.* Undertake visual inspections of structures to ensure stability and sediment storage capacity is maintained after any significant rainfall event.	Surface water management 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 $16m^2$ (4m centres)
- One shrub per $16m^2$ (4m centres)
- 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.

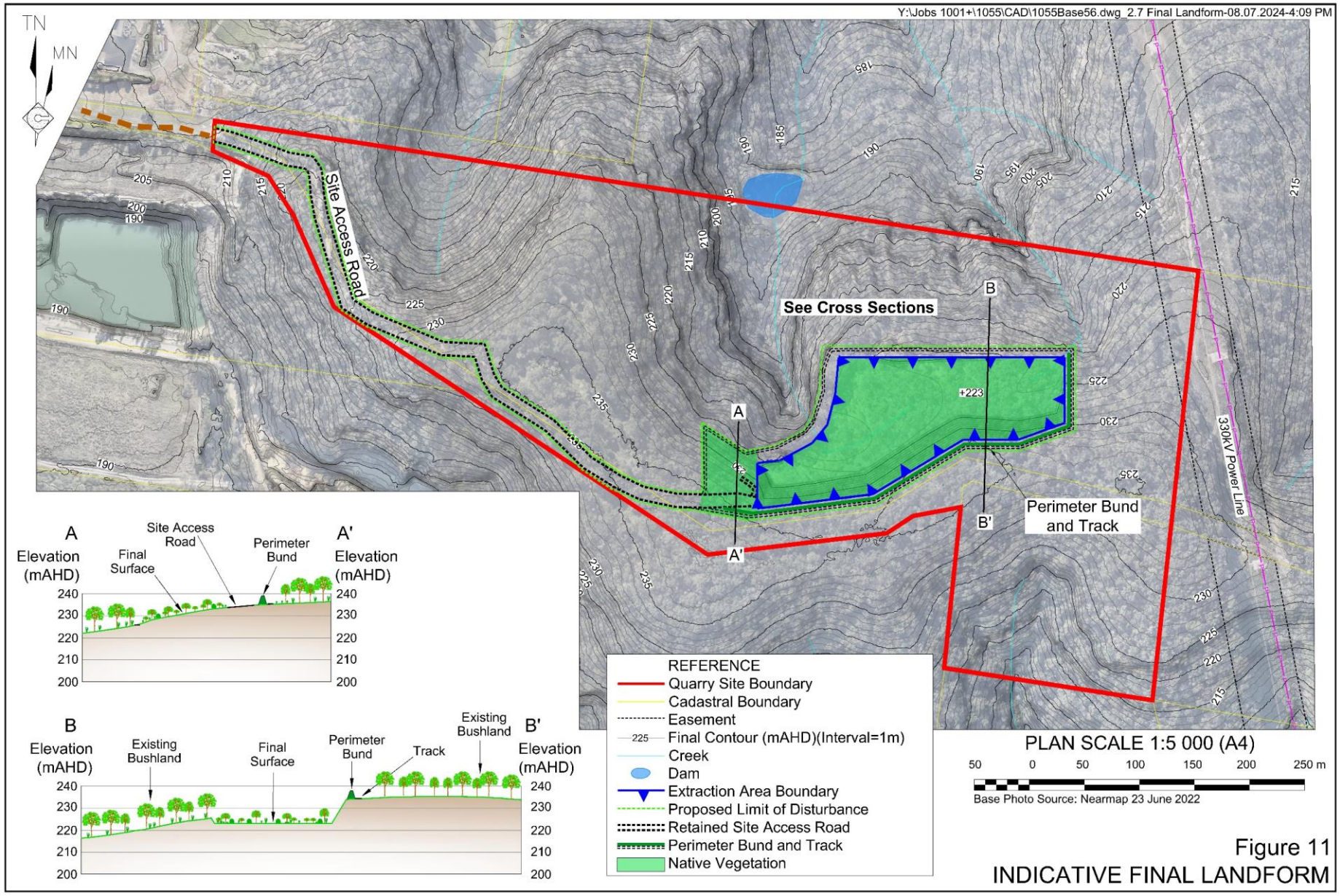

Figure 11
INDICATIVE FINAL LANDFORM

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 $16m^2$ (4m centres)
- One shrub per $16m^2$ (4m centres)
- 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, the standard planting densities identified in the *NSW Rehabilitation Cost Estimate Tool version 2024-1* (NSW Resources Regulator, July 2024) 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 4

Erosion and Sediment Control Plan – February 2025

(Total No. of pages including blank pages = 19)

CENTRAL CIVIL

ABN: 61 167 710 545

Erosion and Sediment Control Plan

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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

Erosion and Sediment Control 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. 1055/03e February 2025

RWCorkery&co

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

GENERAL NOTES

SCOPE

- This *Erosion and Sediment Control Plan* (ESCP) has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd.
- The ESCP describes the Best Management Practices (BMPs) that will be employed to minimise erosion and avoid discharge of sediment to lands and/or waters from activities undertaken at the Maroota Central Civil Quarry (the Quarry) within Lots 1 and 2 DP609224 as well an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (the Quarry Site).

SCOPE (Cont'd)

- The ESCP includes the installation, operation, and maintenance of BMPs, including clean water diversion drains, sediment fencing, and a sediment basin, for activities completed during Quarry operations (refer to Figures E1, E2 and E3).
- BMPs are designed according to the relevant guidelines and Standard Drawings (SDs) in *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volume 2E – Mines and Quarries* (DECC, 2008).
- BMPs will remain operational and maintained throughout the life of the Quarry unless otherwise specified.
- This ESCP will continue to apply until any significant changes to site operations necessitate a revised ESCP to address updated erosion and sediment control requirements.

MANAGEMENT OBJECTIVES

The ESCP's primary objectives are to:

- Prevent and/or minimise soil erosion and sediment transport to downstream areas.
- Manage rainfall and surface water runoff sustainably to protect natural ecosystems.
- Support adaptive management and ecological sustainability throughout Quarry operations.

PRINCIPLES OF EROSION AND SEDIMENT CONTROL MANAGEMENT

- The ESCP is based on the three broad stormwater management principles identified by *Table 4.1* of *Managing Urban Stormwater: Council Handbook* (EPA, 1997).
- These management principles are applied hierarchically, where valuable features of the natural environment are identified and retained or restored.
- Preventative measures are then implemented with 'end of pipe' measures only applied for residual impacts that cannot be effectively mitigated at source.

MANAGEMENT TECHNIQUES

- Five broad management practices are applied as part of the ESCP.
- **Table E1** identifies the stormwater management techniques to be applied for each of the five management practices and with reference to the principles of stormwater management hierarchy.

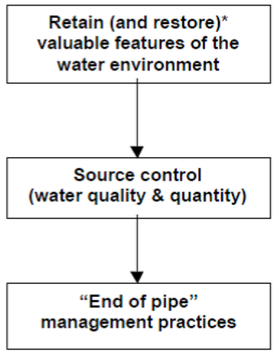

Table 4.1 – Stormwater Management Hierarchy

Source: EPA (1997)

TABLE E1 STORMWATER MANAGEMENT TECHNIQUES

Management Practice	Management Principles			Monitoring and Maintenance
	Retention and Restoration	Source Control	End-of-Pipe Mitigation	
Flow	Reduce the disturbed catchment by diverting clean water runoff away from disturbed areas into designated clean water diversion channels (SD 5-6). Divert runoff from the Stockpile Area into the Extraction Area where feasible to reduce risks of offsite impacts (BMP Notes - Diversion Drains).	Clear land incrementally, in immediate advance of extraction activities, to minimize exposed disturbed areas (BMP Notes - Progressive Stabilisation, Table E5). Construct perimeter drains and bunds to control and safely discharge accumulated flow within the site (SD 5-6).	Install rock lining and energy dissipaters at drainage discharge points to prevent scouring (SD 5-4). Design sediment basins to retain all inflows, adhering to nil-discharge principles (BMP Notes - Sediment Basins, Table E4).	Implement a self-auditing program that maintains flow control structures and ensures non-erosive discharges within the site (Notes on Monitoring and Maintenance).
Channel Morphology	Establish and maintain vegetation cover along diversion channels and bunds to reduce flow velocities and prevent erosion (Table E3, BMP Notes - Diversion Drains). Use compacted material or geotextiles where vegetation is not sustainable (BMP Notes - Progressive Stabilization, Table E5).	Install rock check dams or straw bale barriers in drainage paths to slow flows and reduce erosion risks (SD 5-4, SD 6-7, BMP Notes - Diversion Drains).	Maintain clean water diversion drains and rock-lined outfalls to stabilise discharge points (SD 5-6, SD 5-4). Ensure all discharge flows from channels are managed to prevent scouring (BMP Notes - Diversion Drains).	
Water Quality	Ensure that all sediment-laden water is directed to sediment basins or the Extraction Area Sump for retention and treatment, following the closed water management system (SD 5-5, BMP Notes - Sediment Basins). Divert clean water away from disturbed areas using upslope diversion channels (SD 5-6).	Design drains and bunds to contain and control flow in a non-erosive manner (Table E3, SD 5-6). Progressively rehabilitate areas post-extraction to reduce runoff volumes and improve water quality (BMP Notes - Progressive Stabilization, Table E5).	Maintain sediment fencing downslope of disturbed areas, including stockpile zones and road construction areas (SD 6-8, BMP Notes - Sediment Fencing, Table E2). Use straw bales as additional controls for fine particle capture (SD 6-7, BMP Notes - Sediment Fencing).	Conduct regular inspections and maintenance of sediment basins and other water management structures to ensure functionality (Notes on Monitoring and Maintenance).
Riparian Vegetation	Not applicable because of Nil Water Discharge Site			
Aquatic Habitat	Implement measures to reduce the regional catchment by redirecting clean water away from disturbed areas through diversion drains (SD 5-6, BMP Notes - Diversion Drains).	Construct clean water drains and diversion structures to manage the accumulated flow and prevent erosion (SD 5-6, BMP Notes - Diversion Drains).	Maintain sediment basins with designed capacity to ensure efficient sediment retention (BMP Notes - Sediment Basins, Table E4). Install energy dissipaters at channel outlets where applicable (SD 5-4).	

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

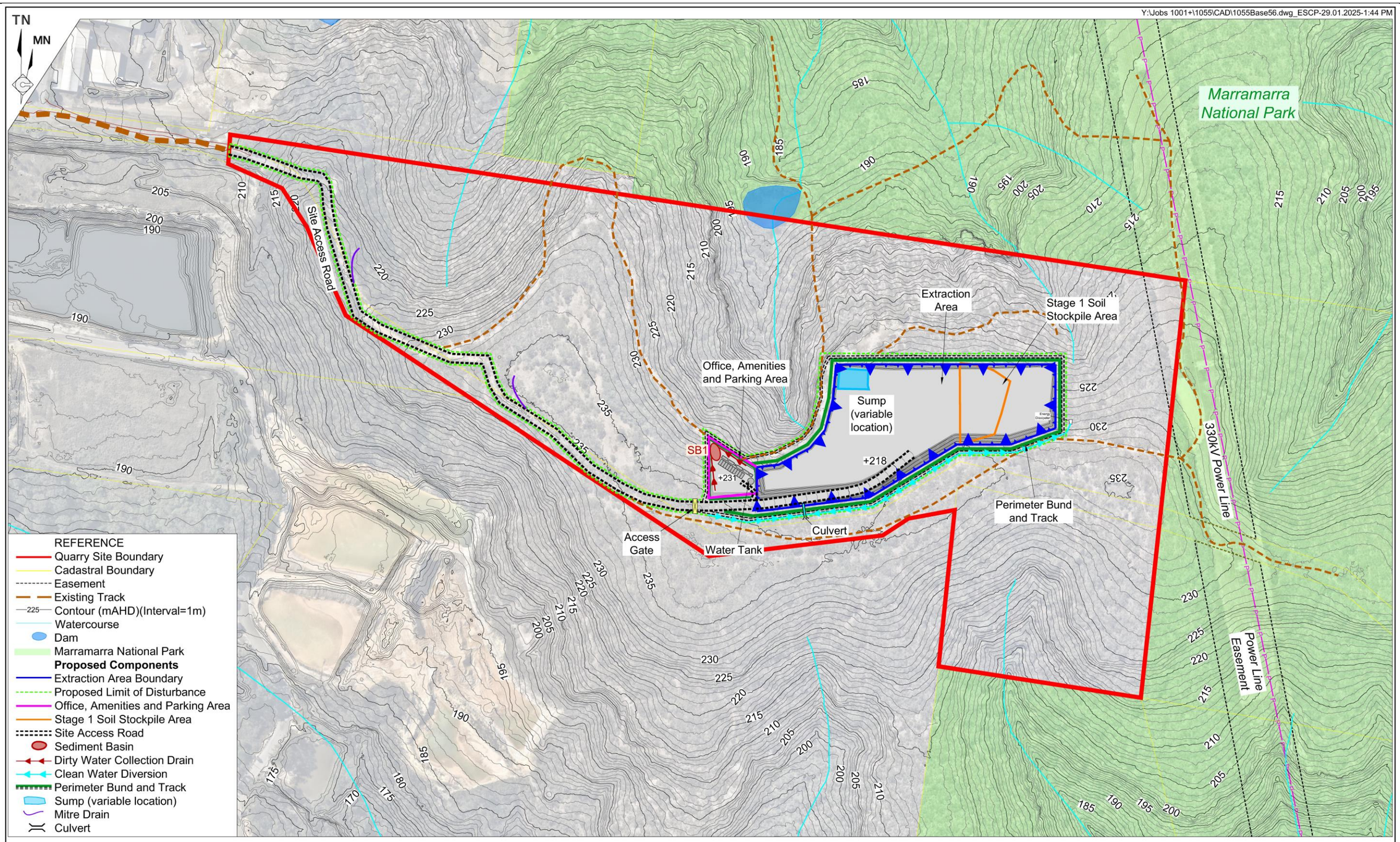

Figure E1
PROJECT SITE LAYOUT

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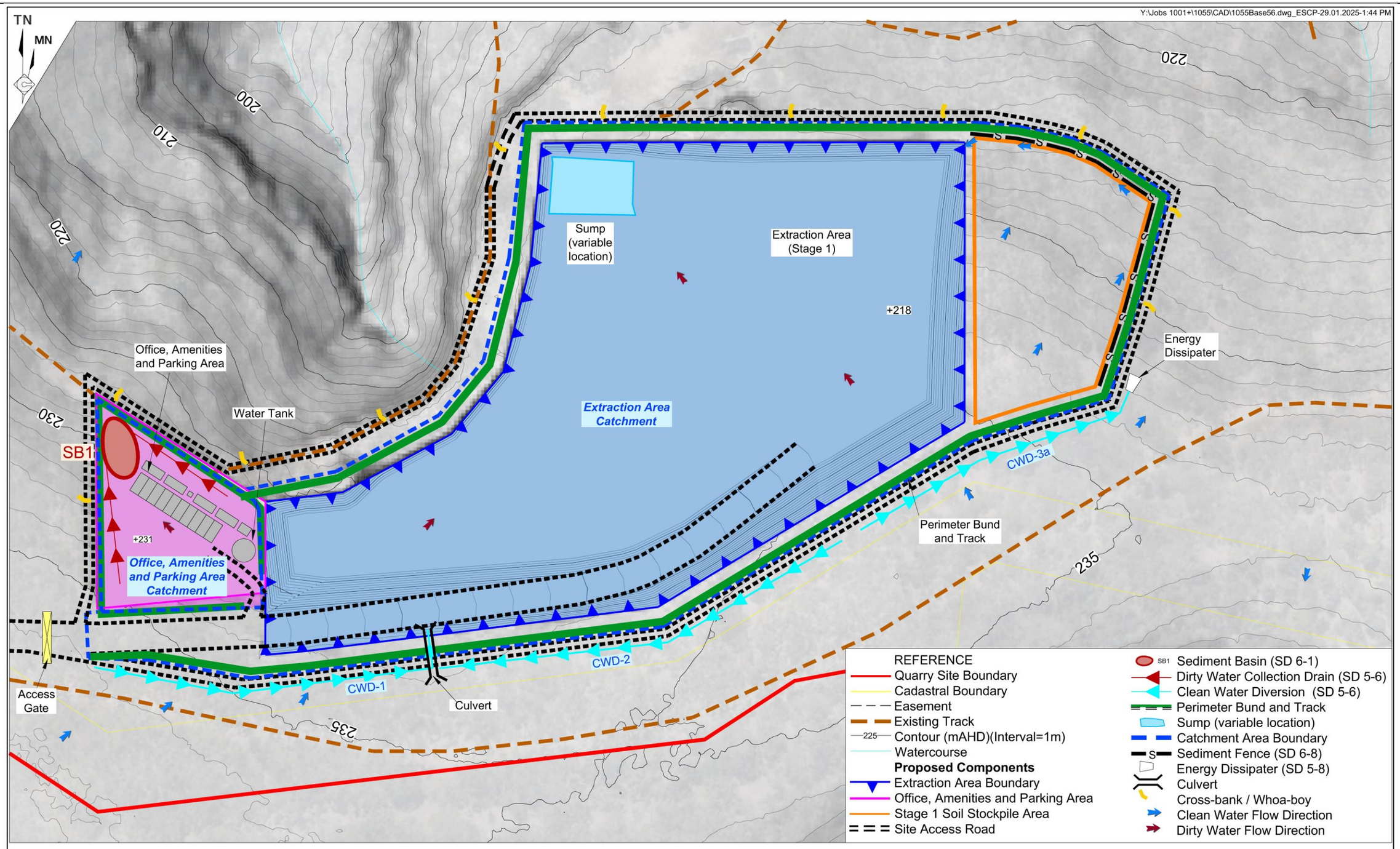

SCALE 1:1 000 (A3)

10 0 10 20 30 40 50 m

Source: ELVIS - Geoscience Australia

Figure E2
EROSION AND SEDIMENT CONTROL PLAN - STAGE 1

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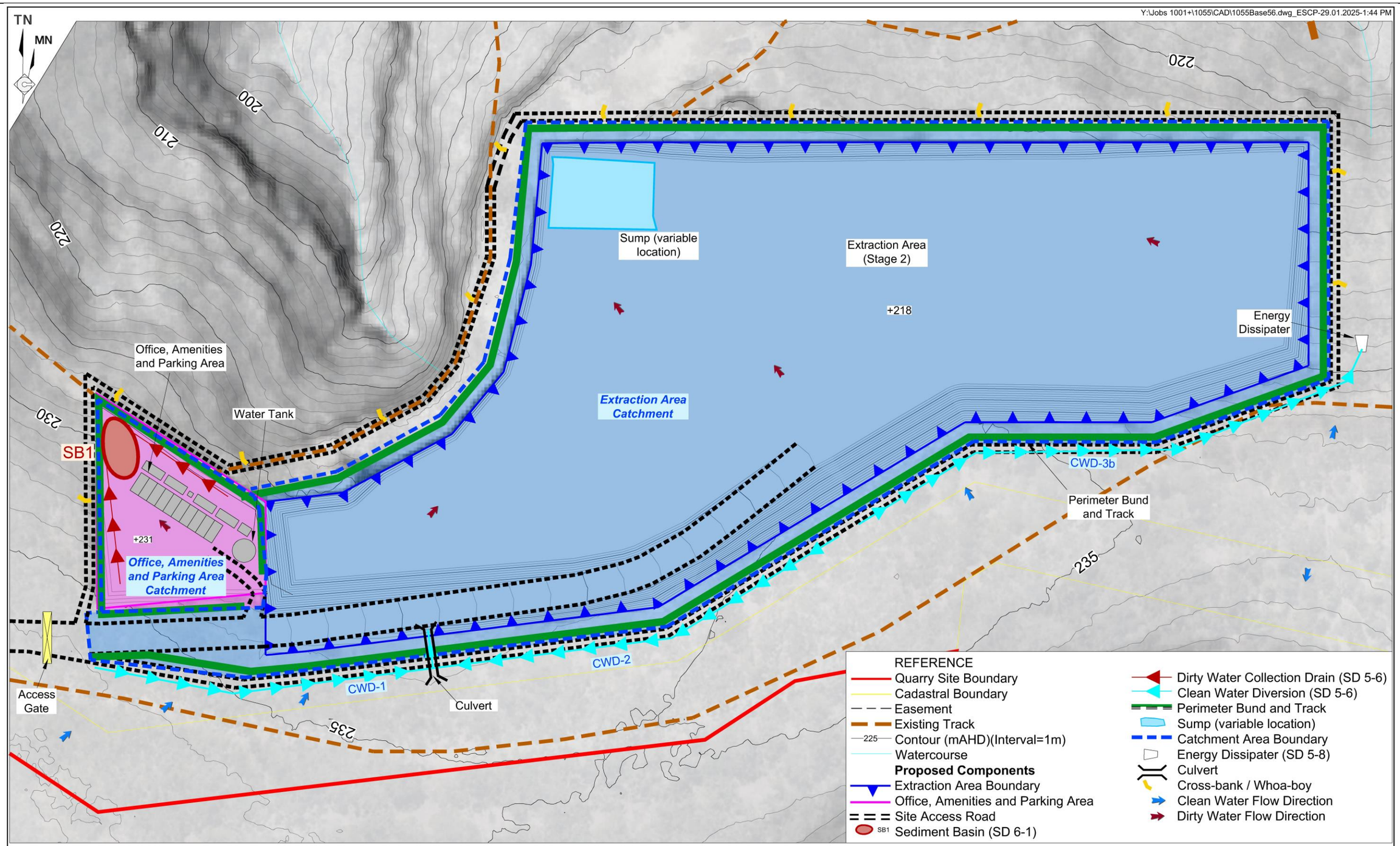
Maroota Central Civil Quarry – Erosion and Sediment Control Plan



SCALE 1:1 000 (A3)

10 0 10 20 30 40 50 m

Source: ELVIS - Geoscience Australia

Figure E3
EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - NOTES 4		
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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

ESCP IMPLEMENTATION

STAGE 1

Works (as identified in **Figures E1, E2 and E3 – Sheets 02 to 04**) are to be undertaken concurrently within three areas of the Quarry Site, namely:

- Extraction Area
- Stage 1 Soil Stockpiling Area
- Office, Amenities and Parking Area

Within these three areas, the following general measures will be implemented.

1. Access Restrictions:

   Delineate and restrict access to No Go Areas with bunds, diversion banks, or other suitable means in the areas nominated on **Figure E2** (refer to BMP Notes – Facility Access and Barrier Fencing).

   Restrict access within the land defined by the ESCP, as nominated in **Table E2**.

2. Safety and Diversion Bunds:

   Construct Safety/Diversion Bunds as nominated in **Figure E2** (refer to BMP Notes – Safety/Diversion Bunds and **Table E4**).

3. Clean Water Diversion Drains:

   Construct Clean Water Diversion Drains to divert clean runoff away from disturbed areas, as illustrated in **Figure E2** (refer to **SD 5-6**, BMP Notes – Diversion Drains and **Table E4**).

4. Sediment Basin:

   Construct Sediment Basin 1 (SB1) for the capture of runoff from disturbed zones, ensuring design capacities meet or exceed requirements for a 5-day 95th percentile rainfall event (refer to BMP Notes – Sediment Basins and **Table E5**).

   Place vertical markers within SB1 to define the Water Settlement Zone and Sediment Storage Zone requirements.

5. Earth Banks for Runoff Diversion:

   Construct Perimeter bund as low-flow earth banks to divert runoff from the Stage 1 Soil Stockpiling Area to Quarry Sump (refer to BMP Notes – Diversion Drains and **Table E4**).

   Stabilise all drains and batters (refer to BMP Notes – Diversion Drains & Discharge Points).

6. Outlet Protection:

   Install energy dissipaters at the discharge point of the Clean Water Diversion Drains to prevent scouring (refer to **SD 5-8** and BMP Notes – Outlet Protection).

7. Stockpiling and Soil Management:

   Establish the Stage 1 Soil Stockpiling Area, ensuring compliance with **SD 4-1** for slope stability and height restrictions (refer to **Sheet 10**).

   Stabilise soil stockpiles within 10 days to achieve a C-Factor of 0.1 (refer to **Table E3**).

8. Sediment Fencing:

   Install sediment fencing downslope of the Stage 1 Soil Stockpile Area and Extraction Area in accordance with **SD 6-8** (refer to **Sheet 14**).

9. Progressive Stabilization:

   Initiate progressive stabilisation measures to control erosion in completed sections of the site (refer to BMP Notes – Progressive Stabilization).

10. Monitoring and Maintenance:

    Implement self-auditing programs and regular inspections to maintain flow control structures (refer to BMP Notes – Monitoring and Maintenance).

STAGE 2

11. Safety and Diversion Bunds:

    Extend or modify Safety/Diversion Bunds around the expanded Stage 2 Extraction Area, as shown on **Figure E3** (refer to BMP Notes – Safety/Diversion Bunds and **Table E4**).

12. Clean Water Diversion Drains:

    Construct and maintain extended Clean Water Diversion Drains for the expanded Stage 2 Extraction Area, following specifications outlined in **SD 5-6** (refer to **Sheet 11**).

13. Outlet Protection:

    Ensure energy dissipaters are in place at the new discharge point at the end of extended clean water diversion drain, as outlined in **SD 5-6** (refer to **Sheet 11**).

SOIL STRIPPING

1. Where soil is present, this will be stripped to the maximum depth available.
2. Soil stripping will not be undertaken during or following rainfall when soil likely to be excessively damp.
3. Soil stripping will not be undertaken during hot, windy conditions.

Stripped topsoil will either be temporarily stockpiled (refer to Notes on Soil Stockpiling) or immediately transferred to completed and profiled sections of the Extraction Area (refer to Notes on Soil Respreading).

SOIL STOCKPILING

1. All stockpiles will be constructed in accordance with **SD 4-1** (refer to **Sheet 10**).
2. Soil stockpiles will remain less than 2m in height.
3. Slopes of the stockpiles will be battered to provide a 1:3 (V:H) slope or less.
4. Stockpiles will be at least 5m from a watercourse.
5. Stockpiles will be stabilized to achieve a C-Factor of 0.1 within 10 days of formation (refer to **Table E2**).
6. Stockpiles retained in excess of 10 days, which are not stabilized as noted above, will be protected through installation of silt fencing (refer to BMP - Notes - Sediment Fencing).

TABLE E2 LIMITATIONS TO ACCESS DURING CONSTRUCTION

LAND USE	LIMITATION	REMARKS
Construction Areas	Limited to 5m from the edge of any essential construction activity as shown on the relevant plans.	All workers should clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope) or similar materials.
Access Areas	Limited to a maximum width of 5m.	The Quarry Manager will determine and mark the location of these zones on the site. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All workers will clearly recognise these boundaries.
Remaining lands including revegetation areas	Entry prohibited except for essential management works	Thinning of growth might be necessary as part of bush fire management plans or weed reduction strategies.

TABLE E3 MAXIMUM ACCEPTABLE C-FACTORS AT NOMINATED TIMES DURING WORKS

LANDS	MAXIMUM C-FACTOR	EQUIVALENT GROUND COVER	REMARKS
Waterways and other areas subjected to concentrated flows (e.g. table drains), post construction and during operation.	0.05	70%	Applies after ten working days from completion of formation and before they are allowed to carry any concentrated flows. Foot and vehicular traffic will be prohibited in these areas.
Stockpiles and batters, post construction and during operation.	0.10	60%	Applies after ten working days from completion of formation.
All lands, including waterways and stockpiles during construction and operation.	0.15	50%	Applies after 20 working days of inactivity, even though works might continue later.
All lands, including waterways and stockpiles during construction and operation.	0.05	70%	Applies after 60 working days of inactivity.

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EROSION AND SEDIMENT CONTROL PLAN - NOTES 5

PROJECT NO. 1055/04 | SHEET No 05 | REV 0

Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES

SOIL RESPREADING

1. Paddock-dump soil at the top of the nominated slope and push down to provide an even coverage to a minimum of approximately 50mm (or an adequate amount to achieve the outcome).
2. Lightly rip parallel to the contour to assist in keying the soil into the landform below.
3. Sow with native species seed mix and water as seasonal conditions dictate. Seedbed preparation will be carried out, i.e. in accordance with **SD 7-1** (see **Sheet 14**).

MITRE DRAINS

The construction and compaction of the Site Access Road will create drainage paths for runoff. To prevent concentrated flows, construct mitre drains in accordance with the following.

1. The 'tail' of the mitre drain should extend at least 5m from the Site Access Road.
2. Construct with V-shaped cross section and grade of 1% or less.
3. Install outlet protection in the form of rubble at the toe (discharge) end of the drain.
4. If erosion within the mitre drain is observed, install a rock check dam in accordance with **SD 5-4** (see **Sheet 10**) approximately midway between the road and the discharge point of the drain.

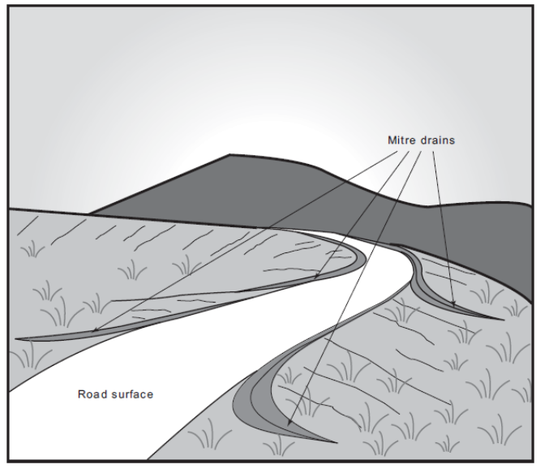

Figure 5.9 **Runoff dispersal using mitre drains** *(redrawn from Garden 1988)*

Figure E2

SCHEMATIC ILLUSTRATION OF MITRE DRAIN

Source: *Figure 5.9 of DECC (2008)*

SAFETY/DIVERSION BUNDS

1. Construct Safety/Diversion Bunds upslope and downslope of all areas of disturbance as shown on **Figures E1, E2 and E3**.
2. **Table E4** provides the estimated flow depths for the diversion drains. Ensure that the height of all Safety/Diversion Bunds is a minimum of the flow depth for the respective drain, plus 1m.
3. Ensure that the outer face of each bund is constructed from non-eroding rock and that the toe of the bund is constructed for the Clean Water Diversion and Dirty Water Containment structures.

DIVERSION DRAINS

Clean Water Diversion

1. High flow earth banks will be constructed and maintained in accordance with **SD 5-6** (refer to **Sheet 11**) to divert 'clean' runoff away from disturbed areas.
2. Table E4 provides the critical parameter requirements (a to f) of **SD 5-6** for the Clean Water Diversion Drains (CWD).
3. The channels and banks will be grassed where practical to achieve the average retardance height nominated in **Table E4**.
4. If grassing of channels and banks is not possible, rock check dams (constructed in accordance with **SD 5-4** – **Sheet 10**) or straw bales (installed in accordance with **SD 6-7** – **Sheet 13**) will be constructed at regular intervals.
5. Where the channel slope of the diversion drains exceeds 10% (~6º), rock check dams will be installed in accordance with **SD 5-4** (see **Sheet 10**).
6. The discharge point of the Clean Water Diversion Drains will be constructed and maintained as a Level Spreader with dimensions meeting the design standards of **SD 5-6** and **SD 5-8** (see **Sheets 11** and **12**), namely:
   - drain slope of <1% for >6m on approach to discharge;
   - sill width of >6m;
   - sill grade of 0%; and
   - sill to be maintained with grass cover.

Dirty Water Containment

1. Low flow earth banks will be constructed and maintained in accordance with **SD 5-5** (see **Sheet 11**) downslope of extraction area earthworks.

DIVERSION DRAINS (Cont'd)

Dirty Water Containment (Cont'd)

2. The channels and banks will be grassed where practical to achieve a C–Factor of 0.05 (70% coverage) within 60 days (refer to **Table E3** – **Sheet 05**).
3. If grassing of channels and banks is not possible, rock check dams (constructed in accordance with **SD 5-4** – **Sheet 10**) or straw bales (installed in accordance with **SD 6-7** – **Sheet 13**) will be constructed at regular intervals.

SEDIMENT BASINS

1. Sediment Basins will be constructed and maintained to accept, store and settle (prior to reuse) runoff from the disturbed catchment area, i.e. runoff collected by the Dirty Water Diversion Drains.
2. Table 6.1 of Volume 2E of Landcom (2004) suggests that the Quarry Site is located within a 'Sensitive' receiving environment. The design rainfall event considered for the purpose of sediment basin design (5-day, 95th percentile of 77.4mm)[2] assumes the receiving waters to be 'sensitive'.
3. The volumetric runoff coefficient (C_v) for catchment has assumed Soil Hydrologic Group C (moderate to high runoff potential) for the design rainfall even in accordance with Appendix F and Table F2 of Landcom (2004).
4. **Table E5** provides the minimum storage and settlement capacities for the sediment basin.

Note 2: 69.4mm is the 5-day, 95th percentile rainfall for Wilberforce, being closest long-term meteorological station of the Sydney/Blue Mountains region.

TABLE E4 DESIGN SPECIFICATIONS FOR CLEAN WATER DIVERSION DRAIN (PEAK DISCHARGE)

Drain Identification	Channel Lining	Retardance (average height of vegetation)	Soil Erodibility (K Factor)	Inundation Period	Side Slope (H:V)	Channel Slope	Standard Drawing 5-6 Parameters (m)						Depth of Flow (m)	Flow Velocity (m/s)	Peak Discharge (m^3/s)
							a	b	c	d	e	f			
STAGE 1															
CWD-1	Grass	50-150mm	0.02 to 0.05	6hr	1:3	2.3%	2.48	0.33	0.5	0.63	0.2	3.98	0.13	0.97	0.117
CWD-2	Grass	50-150mm	0.02 to 0.05	6hr	1:3	2.0%	2.48	0.33	0.5	0.63	0.2	3.98	0.13	0.82	0.094
CWD-3a	Grass	50-150mm	0.02 to 0.05	6hr	1:3	3.0%	2.18	0.28	0.5	0.58	0.2	3.68	0.08	0.78	0.044
STAGE 2															
CWD-3b	Grass	50-150mm	0.02 to 0.05	6hr	1:3	3.5%	3.74	0.54	0.5	0.84	0.2	4.4	0.34	1.81	0.092

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES (Cont'd)

SEDIMENT BASINS (Cont'd)

5. A marker will be maintained within the sediment basin, identifying the minimum freeboard requirement.
6. Except during and for a maximum of five days after a rainfall event, the water level within the sediment basin will not exceed this mark.
7. Accumulated water within the sediment basin will be removed within 5 days and either used for dust suppression or transferred to the Extraction Area Sump.
8. Accumulated sediment will be removed from the sediment basin periodically and placed within the Extraction Area.
9. Once dried, the accumulated sediment will be used in progressive rehabilitation of the site or incorporated into products to be sold as general or select fill.

SITE STABILISATION

- Undertake progressive stabilisation of disturbed ground surfaces as completed (refer to **Table E2 – Sheet 05**).
- Stabilisation measures and products will comply with Table A3 of Landcom (2004) (refer to **Sheet 09**).
- Appropriate seedbed preparation will be carried out, i.e. in accordance with **SD 7-1** (refer to **Sheet 14**).
- Diversion drains will retain a C-Factor of 0.05 (refer to **Table E3** – refer to **Sheet 05**).
- As surfaces are stabilised, temporary water management structures can be removed, e.g. diversion drains (or portions of).

BMP DECOMMISSIONING AND REHABILITATION

Sediment Fencing

1. Confirm C-factor ≤0.1 (refer to **Table E2** – see **Sheet 05**) established upslope of fencing.
2. Remove fencing, taking care not to damage the material (such that it can be reused if in suitable condition).
3. Lightly scarify along the contour where required to level off the surface and spread any vegetative debris.

Diversion Drains

1. Consider the stability of each drain and discharge point. Where stable and not inhibiting surface flows of the final landform, retain.
2. Gently push bank component of the drain into the channel and grade using dozer blade, excavator bucket or other means until level. Lightly scarify and allow to re-seed naturally.

Sediment Basins

1. Consider use for water storage in the final landform and retain where not inhibiting surface flows of the final landform.
2. Backfill with available overburden or Virgin Excavated Natural Material and allow to consolidate.
3. Cover with a minimum of 50mm of previously stockpiled soil and either sow with pasture species or allow to be revegetated naturally.

MONITORING AND MAINTENANCE

Erosion and Sediment Control

1. Erosion and sediment control structures constructed or installed to manage surface water flows will be inspected quarterly or following 25mm or rain in 24 hours to ensure these have not been damaged, are not eroding or causing erosion.
2. If erosion observed within drains, install rock check dams (see **SD 5-4** - **Sheet 10**).
3. Ensure there is no buildup of sediment or vegetation against sediment fencing or straw bale protection. If present, remove as soon as practically possible.
4. Confirm germination of seed sown over completed sections of the landform. If poor success, areas will be re-sown with additional water or fertiliser added.

TABLE E5 DESIGN CAPACITIES FOR SEDIMENT BASINS

Dam Identification	Maximum Catchment Area (ha)	Surface Area (m^2)	Average Depth (m)	Basin Volume (m^3)	Minimum Water Settlement Volume (m^3)	Minimum Sediment Storage Volume (m^3)	Total Minimum Storage Requirement (m^3)	Comments
Sediment Basin 1	0.2	115	1	115	108	3	111	The sediment basin will be regularly emptied as nominated in the Notes on Sediment Basins.

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES (Cont'd)

SELF-AUDITING PROGRAM

A self-auditing program will be initiated. The Quarry Manager is to inspect the site at least quarterly or following rainfall in excess of 25mm in 24 hours and maintain a written log of inspections, paying particular attention to the following.

1. Ensure the stability of the storage.
2. Ensure barrier fencing is maintained and No Go Areas are being observed.
3. Identify areas of localised soil erosion and taking appropriate preventative measures. These might include:
   - planting additional stabilising vegetation or wind breaks;
   - stabilising soils with mulches or alternative soil binders;
   - taking steps to minimise any unnecessary concentrated stormwater flow; or
   - installing formalised drainage channels or pipes. Remove spilled soils or other materials and dispose to safe areas, e.g. stabilised stockpile.

SELF-AUDITING PROGRAM (Cont'd)

4. Maintain erosion and sediment control measures in their functioning condition for the duration of the Quarry life.
5. Remove spilled soils or other materials and dispose to safe areas, e.g. stabilised stockpile.
6. Construct additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved.
7. Ensure all chemicals and hydrocarbons are stored appropriately and that any spill kits are maintained.
8. Ensure any obstructive materials (such as large rocks and debris) are to be removed from any publicly trafficked road surface as soon as possible.
9. Ensure waste receptacles are emptied as necessary. Disposal of waste must be in a manner approved by the Quarry Manager.
10. Ensure records of water usage, rainfall, water quality and auditing are being kept.

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EROSION AND SEDIMENT CONTROL PLAN - NOTES 8

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Table A3 Soil Stabilisation Control Matrix (adapted from various sources, including Meyer and Ports (1976), Israelson et al. (1980), Goldman et al. (1986), URS Greiner Woodward Clyde (1999) and the North American Green website).

Class	Type	Suitable for Vegetation Type [1]	Design Life (months)	Use in Concentrated Flow [2]	Availability (days) [3]	Relative Cost Bracket [4]	Residual Impact [5]	C -factor [6] <33%, <6m	C -factor <33%, 6-15m	C -factor <33%, >15m	C -factor 33-50%, <6m	C -factor 33-50%, 6-15m	C -factor 33-50%, >15m
BIODEGRADABLE MULCHES [7]													
Straw (anchored)	4.5 tonnes per hectare	Grass	1 to 6	No	< 5days	Low	Moderate	0.17	0.17	0.20	0.20	0.20	0.20
Wood Chip	16 tonnes per hectare	Grass/Shrubs	1 to 6	No	< 5days	Low	Moderate	0.08	0.08	0.08	No data		
Wood Chip	27 tonnes per hectare	Shrubs	1 to 6	No	< 5days	Low	Moderate	0.05	0.05	0.05	No data		
Wood Chip	56 tonnes per hectare	Shrubs	1 to 6	No	< 5days	Low	Moderate	0.02	0.02	0.02	0.02	0.02	0.02
Hydromulching	1.5 tonnes mulch + 300 litres binder per hectare	Grass	1 to 3	No	< 5days	Low	Low	0.00	0.03	0.07	0.03	0.06	0.10
Bonded Fibre	5 tonnes fibre per hectare	Grass	1 to 6	No	< 5days	Low	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
ROLLED EROSION CONTROL PRODUCTS (RECPs) [7]													
Biodegradable	Jute mesh	Grass	6 to 12	Yes	< 5days	Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
	Coconut fibre mesh	Grass	6 to 12	Yes	< 5days	Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
	Curled wood fibre	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
	Jute matting (~350 gsm)	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Jute matting (~600 gsm)	Shrubs	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Coconut fibre matting (~450 gsm)	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Coconut fibre matting (~900 gsm)	Shrubs	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Photodegradable	Mesh (< 5 mm openings)	Grass	1 to 6	Yes	< 5days	Low	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
Non Biodegradable	Plastic fibres with netting	Grass	> 12	Yes	< 5days	High	High	0.00	0.05	0.10	0.03	0.05	0.10
	Composite with biodegradable	Grass/Shrubs	> 12	Yes	< 5days	High	High	0.00	0.03	0.07	0.03	0.06	0.10
HYDRAULIC SOIL STABILISERS [7]													
	Polymers/Polyacrylamide (rate depends on type)	Grass	1 to 6	No	< 5days	Low	Low	0.01	0.05	0.10	0.10	No data	
	Bitumen emulsion (12,000 l/ha)	Grass	1 to 6	No	< 5days	Low	Low	0.01	0.05	0.10	0.10	No data	
TEMPORARY SEEDING													
	Annual	NA	6 to 12	No	< 5days	Low	Low	0.05	0.05	0.10	0.10	No data	
	Perennial	NA	> 12	No	< 5days	Low	Low to moderate	0.05	0.05	0.10	0.10	No data	
INSTANT TURF [7]													
	Kikuyu	Grass	> 12	Yes	< 5days	Medium	Low	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Reinforced turf (pregrown)	Grass	> 12	Yes	5 - 15 days	High	High	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes

1 Whether vegetation is required and its type if so, will affect the technique used. Biodegradable mulches, RECPs and hydraulic soil stabilisers can all be used on their own to provide short term protection. However, their effectiveness is less when used in isolation than when used with vegetative growth. Most techniques are used to help establish vegetative growth using sown grasses. Should the client specify shrubs (primarily planted as tubestocks), then thicker mulches, RECPs or biodegradable mulches should be used. Non biodegradable RECP's are used to reinforce grasses (turf) permanently. They are not suitable for use with individual shrubs. They can work synergistically with the established grass to increase its resistance to shear stress and, therefore, increase its resistance to erosion by concentrated flow.

2 Products might or might not be suitable for use in areas of concentrated flow. All products are suitable for sheet flow conditions, although some would be over designed in such cases.

3 Whether or not a product is readily available is critical to the selection process. Many RECP and hydraulic soil stabiliser techniques use products that might be "off the shelf" and available from several suppliers. Biodegradable mulches can be affected by seasonal variation, although they might also be available on site after initial clearing and grubbing. Temporary seeding might also be seasonal.

4 For any given technique, cost can vary greatly depending on geographic location, size of project and installation requirements. In addition, costs can vary over time. Because of these factors, giving accurate installed costs is not possible. However, if a product is relatively inexpensive to purchase and install close to its point of manufacture, it will still be relatively inexpensive to purchase and install remote from it.

5 This criterion relates to the impact that a particular practice might have on construction activities once they are resumed on an area that was temporarily stabilised.

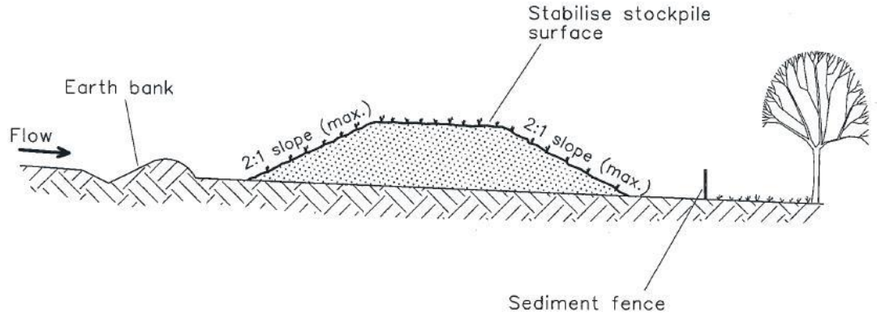
6 The performance of an erosion control technique is quantified by assigning it with a C-factor (Appendix A). The C-factor will vary from close to zero for full cover, to 1.0 for no cover on highly disturbed soils. The C-factor strongly affects the soil loss calculation (RUSLE) and users need to be careful in specifying its value, particularly when values <0.01 are quoted. Note that the C-factor does not apply to conentrated flow.

Values for the C-factor are given for various slopes gradients and lengths and show that it can change dramatically with them. The values given are compiled from existing data and from inference between products of a similar nature. They are given as a guide only and do not profess to be accurate in all respects. Overall, accurate C-factors are only available for manufactured products, primarily from the USA (RECP's in particular) where extensive independent testing has been undertaken. Unfortunately, very little data is available for the "lower cost" options such as biodegradable mulches, jute mesh and hydraulic soil stabilisers. Wherever possible, the manufactures should be contacted for their latest data on acceptable C-factors.

For the RECP's in particular, the C-factors given here are for the product as installed with no vegetation. Note however that lower C-factors can be expected if vegetation is promoted with many RECP's. Indeed, non biodegradable RECP's are designed to work synergistically with turf and must be used with it.

7 For information on trade names and suppliers of these products, please phone the office of Australasian Chapter of the International Erosion Control Association on 1800 354 322 or (+61 2) 4677 0901.

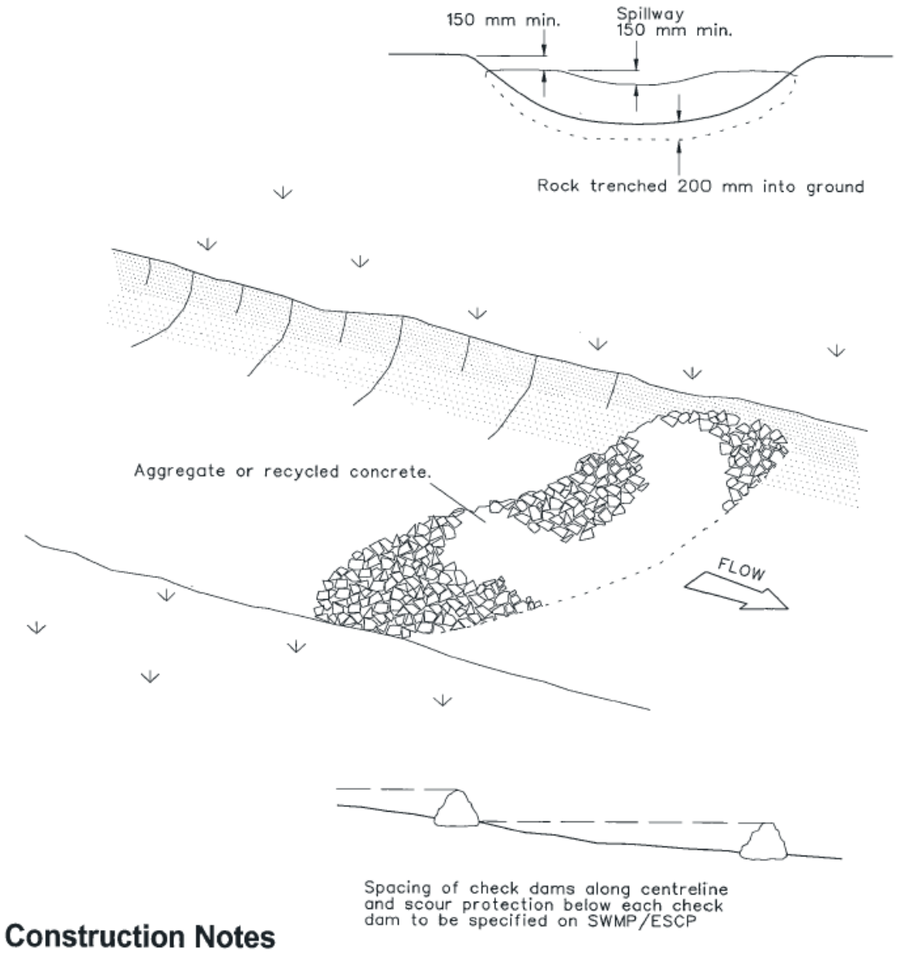
REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - NOTES 9		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 09	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						



Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

STOCKPILES — SD 4-1



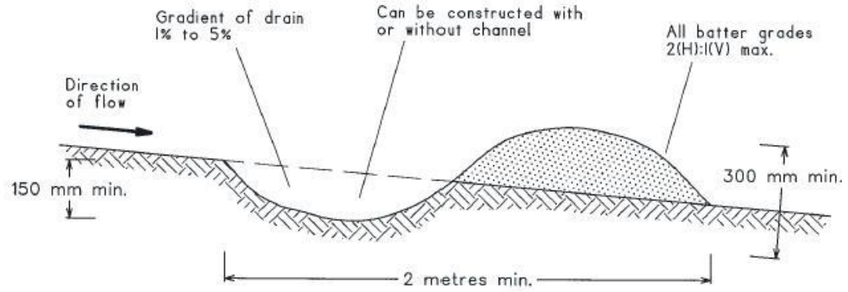
Spacing of check dams along centreline and scour protection below each check dam to be specified on SWMP/ESCP

Construction Notes

1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM — SD 5-4

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 1		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 10	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

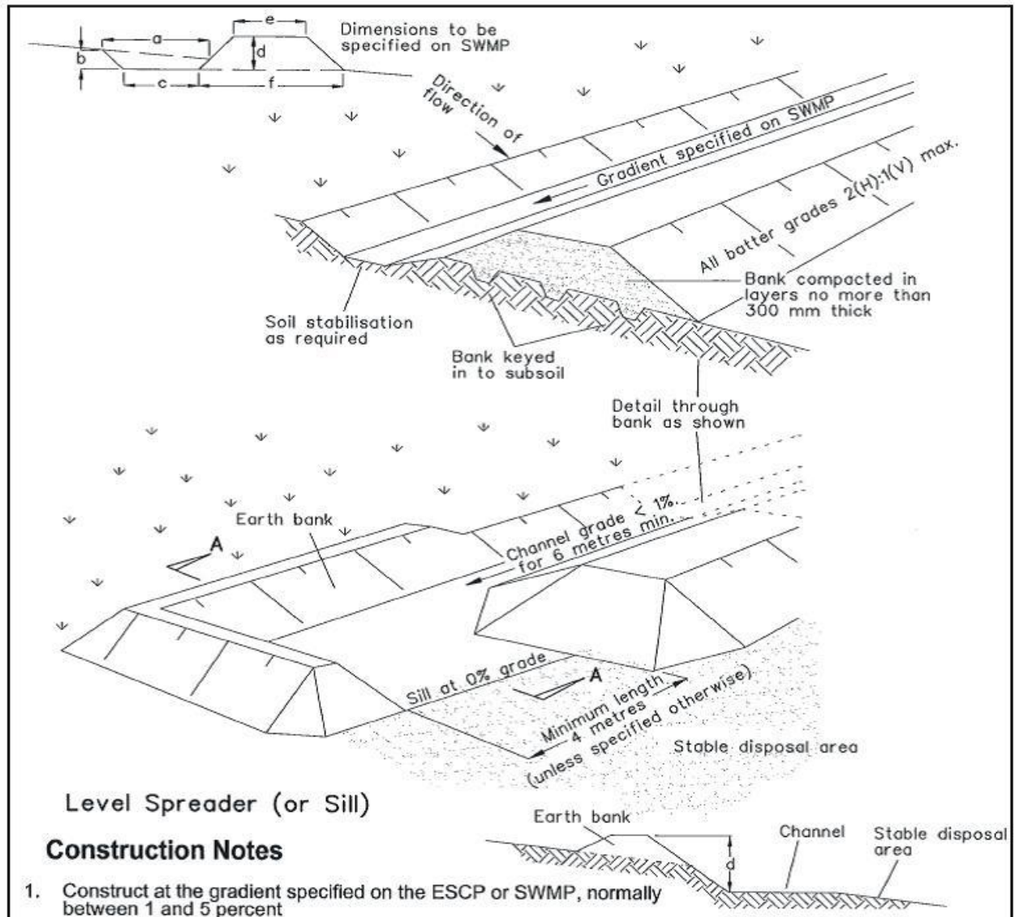


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) SD 5-5



Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, normally between 1 and 5 percent
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

EARTH BANK (HIGH FLOWS) SD 5-6

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL
					DRAWN BY:		MA	
					APPROVAL		SR	

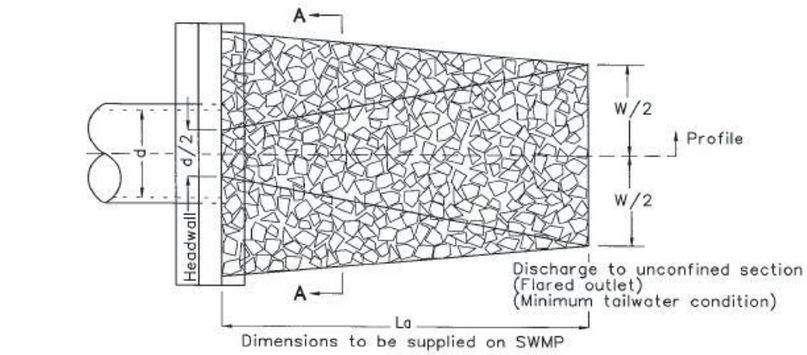
RWCorkery&co

PROJECT TITLE

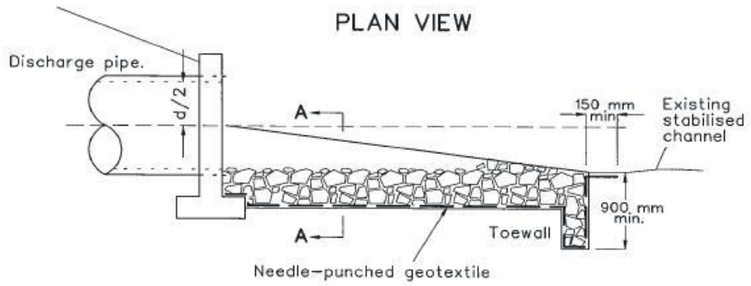
MAROOTA CENTRAL CIVIL QUARRY

EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 2

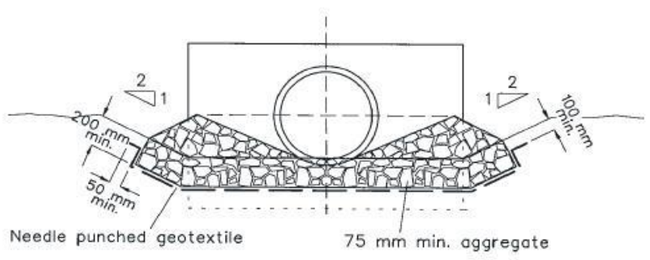
PROJECT NO. 1055/04 | SHEET No 11 | REV 0



PLAN VIEW



PLAN VIEW



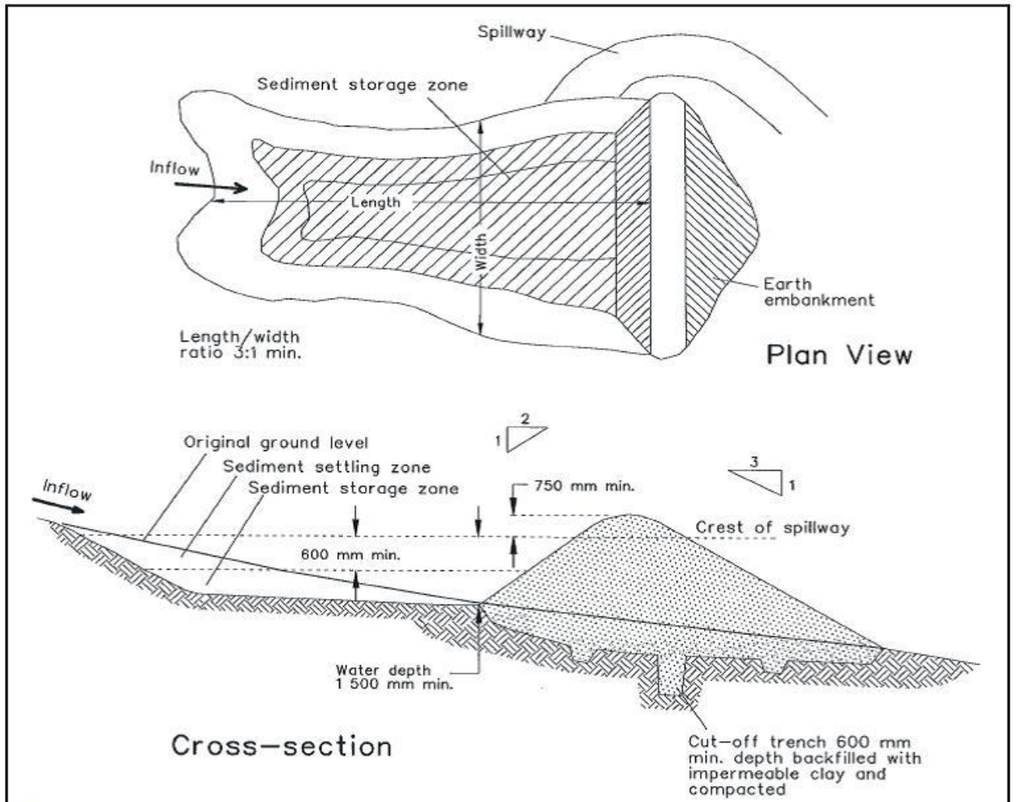
CROSS SECTION AA

Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

ENERGY DISSIPATER SD 5-8

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 3		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 12	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

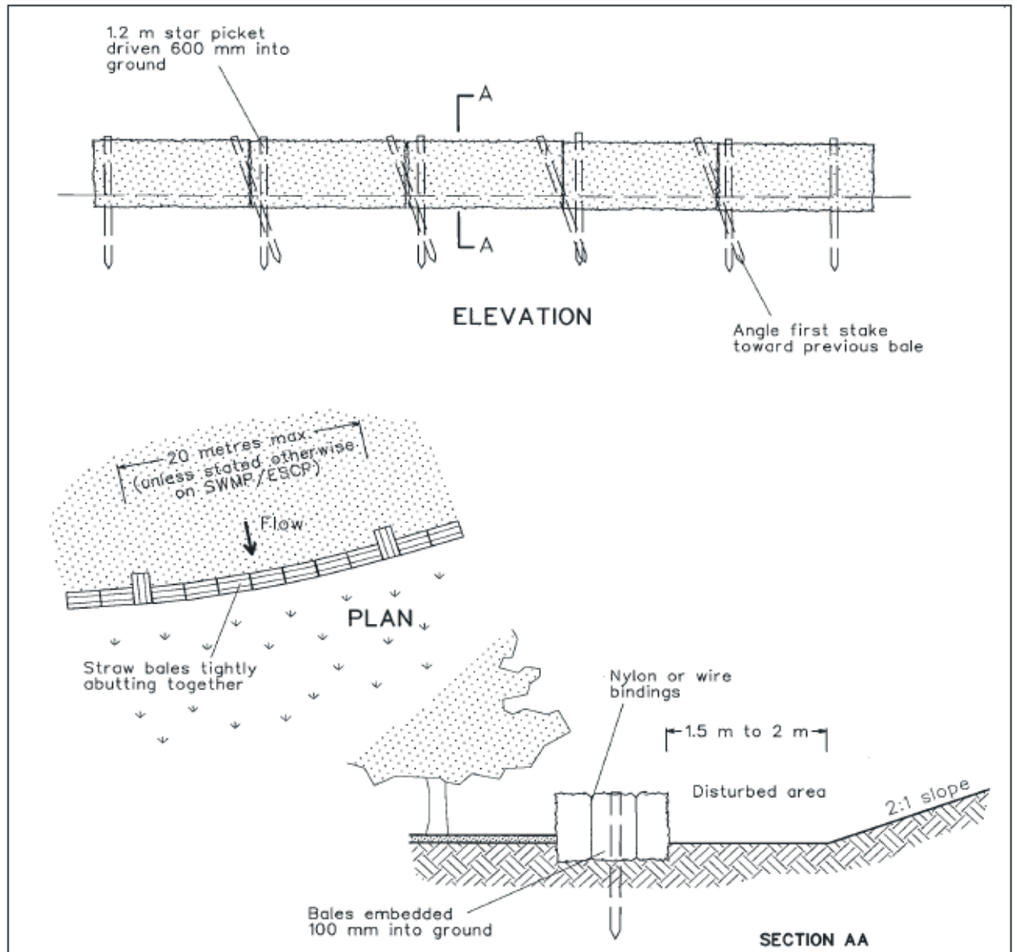


Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

EARTH BASIN - WET
(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

SD 6-4



Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

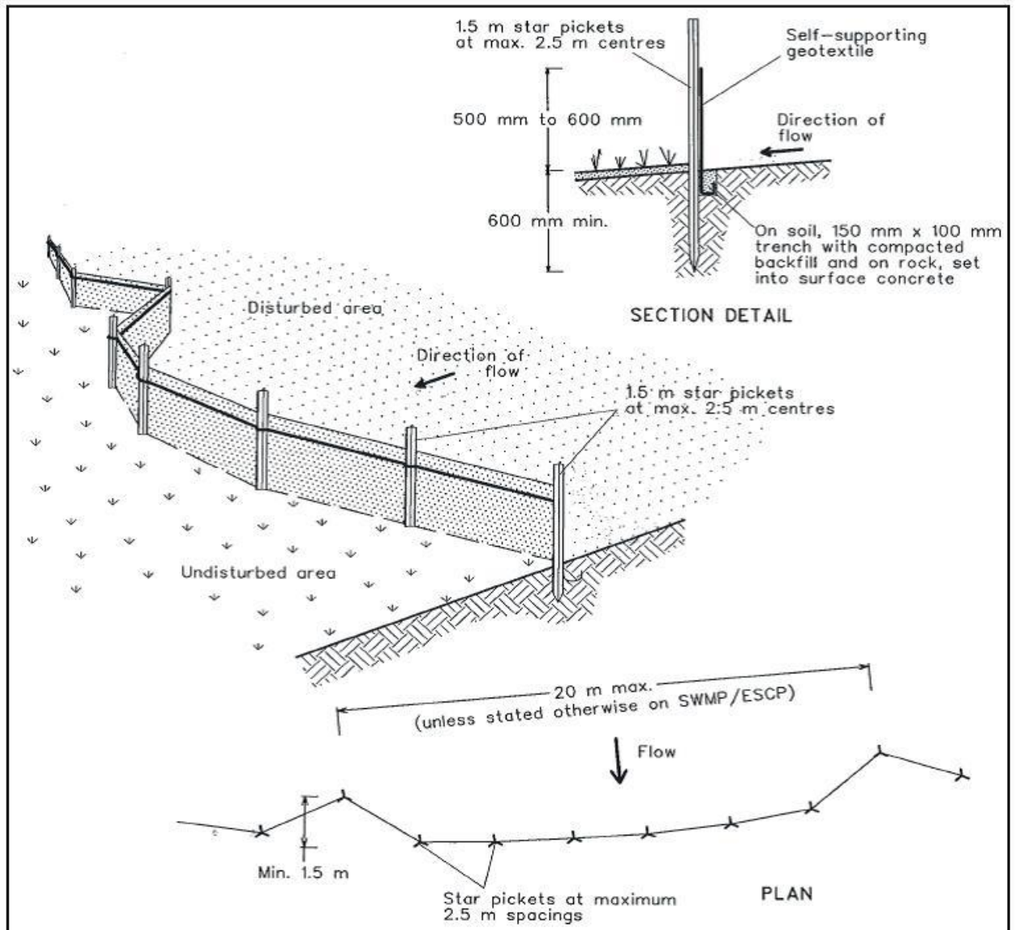
STRAW BALE FILTER

SD 6-7

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL
					DRAWN BY:		MA	
					APPROVAL		SR	

RWCorkery&co

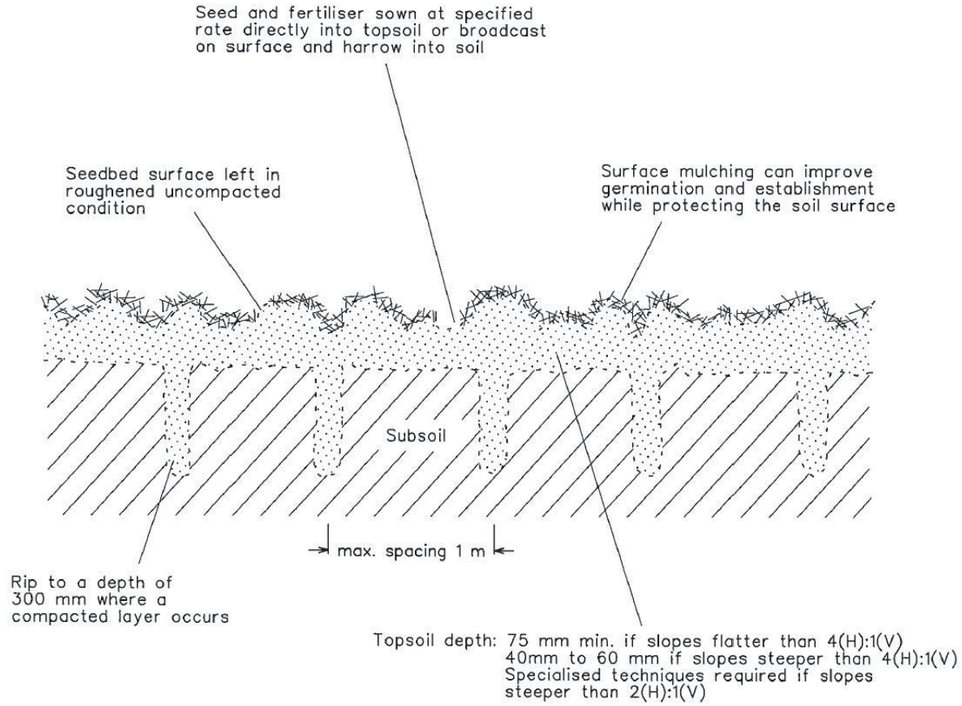
PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 3		
MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 13	REV 0



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**



Construction Notes

1. Loosen compacted soil before sowing any seed. If necessary, rip the soil to a depth of 300 mm. Avoid rotary hoe cultivation.
2. Work the ground only as much as necessary to achieve the desired tilth and prepare a good seedbed.
3. Avoid cultivation in very wet or very dry conditions.
4. Cultivate on or close to the contour where possible, not up and down the slope.

SEEDBED PREPARATION **SD 7-1**

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 4		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 14	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

Appendix 5

Refuelling Vehicles, Plant and Equipment – Safe Operating Procedure

(Total No. of pages including blank pages = 3)

CENTRAL CIVIL	**Refuelling Vehicles, Plant and Equipment – Safe Operating Procedure**	**Unit 3B, Building 4, 256B New Line Road, Dural NSW 2158** **ABN:** 61 167 710 545 **W:** www.centralcivilnsw.com.au

Refuelling Vehicles, Plant and Equipment

- This safe work procedure must be reviewed annually or any time the task, equipment or materials change.
- **DO NOT** perform this procedure until you have been appropriately trained and authorized to do so by your supervisor.
- Workers must be familiar with procedures specific to the equipment or machine being used. Consult owners / operator's manual for your equipment.

PPE Requirements

☒ ☐ ☒ ☐ ☐ ☐ ☒ ☐

Pre-Operational Safety Checks

1. Ensure all guards are fitted, secure and functional.
2. Ensure there is a suitable fire extinguisher within 5 m of the fuelling area.
3. Identify and ensure you know how to operate emergency fuel cut-off switches and valves
4. Ensure the equipment engine is turned off before refuelling.
5. Check there are no lit cigarettes, open flames, mobile phones or electronic handheld devices or other sources of spark or static in the vicinity while fuelling.
6. Check the fuel tank placard to ensure you are filling with the correct fuel.
7. Examine all fuel hoses, connections and couplings and make sure there are no leaks.
8. Locate and be familiar with ON/OFF switches, taps and controls.
9. Ensure fuel nozzle is operational before starting the motor and pump.
10. Faulty equipment must not be used. Report suspect machinery immediately.

Operational Safety Checks

1. Remove the filler cap. Avoid dust getting into the fuel tank.
2. Ensure the area is well ventilated when fuelling vehicles or equipment.
3. Once started, note the pressure uptake in the fuel hose.
4. Immediately report any leaks that are observed. Turn off pump if required.
5. Keep the metal fill nozzle in contact with the lip of the tank to eliminate any static accumulation.
6. Adjust the nozzle trigger to suit the particular fuel flow requirements.
7. Always check the fuel flow at regular intervals during normal operation.
8. Never kink the fuel hose to restrict or cut off the flow of fuel.
9. Report any fuel spills immediately and begin use of spill response/ recovery kit.
10. If fuel splashes onto clothing, remove and allow for fuel to evaporate completely outdoors before washing. Thoroughly wash clothing before re-use.

Refuelling

1. Ignition/starter to be switched to 'off' position.
2. Maintain direct contact between hose/nozzle and the vehicle/equipment fuel port during refuelling to prevent static discharge.
3. Fill the tank slowly. If you cannot see the fuel level as it fills, listen to the air coming out of the tank as the fuel pours in. The pitch will get higher as the tank fills. Stop before the tank is entirely full to allow for expansion of the tank.
4. Before removing the fuelling nozzle/hose from the fuel port, allow it to drain for a few seconds to prevent dripping.

5. Replace both the tank and filler cap/pump nozzle.
6. Wash your hands and face thoroughly after refuelling.

CLEANING UP

1. Avoid spillage on equipment or ground. If you have a spill, you MUST report to your supervisor or the person in charge.
2. Spills are to be contained immediately. Use peat, oil dry or similar product on small spills.
3. Fuel spilled on hands or exposed skin shall be washed with soap and water as soon as possible,
4. Wipe up any spills or drips and allow any damp spots around the motor to evaporate before attempting to start the equipment.
5. Lock up any unattended pump to store portable fuel cans in a well-ventilated area away from open flame or sparks.

MAITENANCE

1. Remove any rubbish or foreign material from filling area.
2. Clean the entire area at completion of task.
3. Service pump and equipment as required as per manufacturer's recommendation.
4. Keep the work area clean and tidy.

POTENTIAL HAZARDS

- Fire and explosion - No smoking, naked flame or ignition sources
- Absorption - Apron, gloves and safety glasses
- Inhalation of fumes - Ventilate area
- Splash injuries - Cut off nozzles, PPE

OTHERS

- Code of Practice - Managing Risks of Hazardous Chemicals in the Workplace Code of Practice
- Australian Standard - AS 1940 Storage and Handling of Flammable and Combustible Chemicals
- SDS – Diesel and ULP available via Chemwatch

REPORT ANY HAZARDOUS SITUATION TO YOUR SUPERVISOR/MANAGER OR EMPLOYER IMMEDIATELY

Appendix 6

Imported Fill Tracking Sheet

(Total No. of pages including blank pages = 2)

CENTRAL CIVIL	**Imported Fill Tracking Sheet**	**Unit 3B, Building 4, 256B New Line Road, Dural NSW 2158** **ABN:** 61 167 710 545 **W:** www.centralcivilnsw.com.au

DATE:	**Site:**
DAY:	

Truck Details ☐ Truck & Dog ☐ Bogie ☐ Semi-Trailer					**Time**						
No	**Rego**	**Supplier Transport Details**	**Site Placement Area**	**Material Category**							
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Inspecting Person (Print Name):	Signature:	Date:
Site Manager (Print Name) :	Signature:	Date:

Appendix 7

Unexpected Contaminated Land and Asbestos Finds Protocol

(Total No. of pages including blank pages = 2)

Unexpected Finds Procedure

INTERNAL HOLD POINT – Evidence of Contamination Observed
If observations indicate presence of potential contamination, then STOP all work in the immediate area and prevent further activity in the area.

↓

- Do not touch or disturb the item/materials.
- If material is suspected to be asbestos, cover with geofabric and secure.
- Set up appropriate barricades to prevent access to the area.
- Notify the Site Supervisor, Environmental Advisor, Safety Advisor and Project Manager.

← **WORKFORCE**

↓

Record the following details of the unexpected contamination find:

- Location of the [potential contamination
- Visual appearance
- Odour (if any)
- Depth
- Surrounding material and works being undertaken at the time of discovering the material

← **SUPERVISOR**

↓

As soon as reasonably practicable, Project Manager is to notify the client of unexpected find. Incident Report (WF0014) to be submitted to General Manager.

← **PROJECT MANAGER**

↓

- If required, Project Manager is to obtain assistance from a qualified and experienced contaminated land consultant in identifying the potential hazard to human health or environment.
- Sampling and laboratory analysis of materials may be undertaken in accordance with relevant guidelines.
- Where remediation is required a Remediation Action Plan (RAP) will be prepared and an associated working documentation.

← **PROJECT MANAGER**

↓

- RAP and associated working documents to be implemented.
- If contaminated material requires offsite disposal, waste classification is required along with disposal and tracking requirements.
- Disposal must be in accordance with the RAP.
- Unexpected find to be recorded in the waste disposal register.

← **SUPERVISOR/PROJECT MANAGER**

↓

- Construction activities to recommence once validation of contaminated area has been confirmed in accordance with the RAP.

← **GENERAL MANAGER**

PROTOCOL

This Unexpected Contaminated Land and Asbestos Finds Procedure must be followed should unexpected contamination or asbestos (or suspected contamination) be excavated or otherwise discovered.

Likelihood of Contamination

The presence of potentially contaminated material can be detected where material is uncovered which displays some or all of these characteristics:

- Unusual odour from soils that are not detected in other similar areas.
- Discolourisation or staining of soil or rock.
- Seepage of unusual liquids from soil or rock.
- Unusual odours, sheen or colour on groundwater and / or surface water.
- Unusual metal objects.
- Unexpected underground storage tanks, buried drums or machinery etc.
- Presence of waste or rubbish above or below ground.
- Potential asbestos containing materials.

Where these factors are identified, the material is considered to be possibly contaminated and the flowchart is to be followed.

Asbestos

An unexpected asbestos find occurs when Asbestos Containing Materials (ACM), not identified in the Asbestos Register, are found on site. In the event of an unexpected asbestos find, the below steps are to be followed along with the flowchart:

1. The area is to be delineated, works in the immediate vicinity to cease.
2. Notify the Environmental Advisor, Safety Advisor and Site Supervisor. Site Supervisor to notify workers in the vicinity of find.
3. Ensure the soil and potential asbestos remain damp with dust suppression or securely covered where water cannot be accessed. If material is to be left over night, exposed area is to be securely covered.
4. Project Manager must arrange for testing of the suspected ACM and arrange for an occupational hygienist to undertake monitoring of the area (if required).
5. A licenced asbestos removalist is to be engaged to provide recommendations to treat the area, as required.
6. A clearance certificate is required from the asbestos removalist to confirm that the area has been made safe.

Acid Sulphate Soil

It is likely Acid Sulphate Soils (ASS) will be encountered within the Project footprint. If detailed investigations determine high-risk ASS, then it will be identified on relevant area plans.
If ASS is encountered management strategies include:

- Modifying the work to avoid the area of ASS.
- Undertaking in situ testing including SPOCAS testing to determine liming rate required to neautralise the material.
- Onsite treatment to neutralise the ASS in designated stockpile area in accordance with SPOCAS testing results.
- Delineation, treatment and removal of material to a suitable licenced facility.
- Any material to be removed off site will be classified in accordance with the NSW EPA Waste Classification requirements.

Appendix 8

Pollution Incident Response Management Plan

(Total No. of pages including blank pages = 26)

Pollution Incident Management Plan

Maroota Quarry

Table of Contents

1 **Introduction**

2 **Protocol for Industry Notification of Pollution Incidents**

3 **Definition of Environmental Incident, Pollution Incident Notification Criteria and Response.**

4 **Emergency Contact Details**

5 **Environmental Incident Preventative Action and Responses**

6 **Emergency equipment requirements and storage locations**

7 **Incident Reporting and Notification**

8 **Complaints**

9 **Review**

10 **Testing of PIRMP**

11 **Pollution Incident Notification Protocol**

Issue of Pollution Incident Response Management Plan (PIRMP)

This Pollution Incident Response Management Plan (PIRMP) is available for all personnel onsite at 4773 Old Northern Road, Maroota to peruse in our document control ''Directory''. All personnel are bound under a confidentiality requirement not to provide the PIRMP to any third party, except with the written permission of the Director of Central Civil (NSW) Pty Limited.

It is the responsibility of the General Manager and QSE Advisor to those persons to whom this PIRMP is issued to safeguard and have available the PIRMP as and when required, and to maintain the currency of the PIRMP by inclusion of inserts and amendments, as and when issued. Copies of the manual may be issued to additional persons/ organisations, on the basis of need and relevance.

The initiation of any of the procedures set out in the PRIMP is the responsibility of the Environmental Management Representative (EMR) this will be either the Site Supervisor, Site Manager or Director.

PIRMP Document Register

Document Number	Issued to	Company	Address	Date Issued	Issue #
1	Sarkis Elias	Central Civil (NSW) P/L	Unit 3B, Building 4, 256B New Line Road, Dural NSW	30/06/2024	1
2	Central Civil (NSW) P/L Yard (all personnel)	Central Civil (NSW) P/L	4773 Old Northern Road, Maroota NSW	tbc	1

POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN (PIRMP)

1. Introduction – Pollution incident notification requirements

As of 6 February 2012, licensees under the POEO Act and anyone carrying on an activity or occupying a premises who becomes aware of a pollution incident are required to report pollution incidents **immediately** instead of 'as soon as practicable' under section 148 of the POEO Act.

The protocols for contact in the event of a pollution incident are outlined in **Section 2** of this PIRMP, relevant contact details are presented in **Section 4** and the adopted criteria for a pollution incident is outlined in **Section 3.** **Sections 5** to **7** outline the preventative actions and general operational response protocols to a pollution incident.

This pollution Incident Response Management Plan also forms part of Central Civil (NSW) P/L's overall Operational Environmental Management Plan (OEMP))

2. Protocol for industry notification of pollution incidents

The NSW EPA describe the protocol for notification of pollution incidents on the webpage *Report pollution (nsw.gov.au)*

Notification for a pollution incident is required if;

a pollution incident causes or threatens to cause 'material harm to the environment'. Material harm is defined in section 147 of the POEO Act as:

a) harm to the environment is material if:

i. it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

ii. it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and

b) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

Notification is required even where 'harm to the environment is caused only in the premises where the pollution incident occurs', as specified in section 147(2).

Section 148 of the POEO Act sets out additional pollution incident notification requirements.

The occupier of premises, the employer or any person carrying on the activity which causes a pollution incident is to immediately notify each relevant authority (identified below) when material harm to the environment is caused or threatened. The following information and procedures may assist those responsible for reporting a pollution incident.

2.1 Call 000 if the incident presents an immediate threat to human health or property. Fire and Rescue NSW, the NSW Police and the NSW Ambulance Service are the first responders, as they are responsible for controlling and containing incidents.

2.2 If the incident does not require an initial combat agency, or once the 000 call has been made, notify the relevant authorities in the following order. The 24-hour hotline for each authority is given when available:

- *the EPA phone Environment Line on 131 555*
- *the Ministry of Health (02) 9391 9000*
- *Fire and Rescue (000)*
- Disease notification - Infectious diseases (nsw.gov.au)
- *SafeWork NSW – phone 13 10 50*
- *Hornsby Council – phone (02) 9847 6666*

3. Environmental incident definition, pollution incident notification criteria and response

A pollution incident is defined as:

An incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.' (POEO Act)

Pollution incidents on or around the site are considered to have occurred in the course of the Contractor's activities in the following circumstances:

- *'If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial; and*
- *If actual or potential loss or property damage (including clean-up costs) associated with a pollution incident exceeds $10,000.'*

Above criteria is based on **s147** of the *Protection of the Environment Operations Act 1997* (NSW) and has been adopted in this PIRMP as the threshold for notification purposes.

The above definition has been adopted for the purposes of an environmental incident in this PIRMP. The proposed response to an environmental incident is as outlined below and in Table 1:

- EMR to ensure site safety, move people from immediate areas where safety is a concern.
- EMR to take any practical steps to contain the hazard and prevent it from spreading.
- EMR to notify the Director of Central Civil (NSW) and if necessary, the relevant authority, if the Director cannot be contacted Central Civil (NSW) must notify each relevant authority.
- The Director is to decide if the adopted pollution incident criteria threshold has been reached. If the adopted pollution incident threshold has been reached, the EMR is to immediately contact the relevant authorities listed in 2.2 (EPA and Hornsby Council); and the relevant information about a pollution incident required consisting of the following:
    - The time, date, nature, duration and location of the incident,
    - The location of the place where pollution is occurring or is likely to occur,
    - The nature, the estimated quantity or volume and the concentration of any pollutants involved, if known,
    - The circumstances in which the incident occurred (including the cause of the incident, if known),
    - The action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known,
    - Other information prescribed by the regulations.
- The EMR is to complete the notification of environmental incident report form (**FORM-WF0056**). Once completed, a copy of the incident report form must be forwarded to Hornsby Council and the EPA and other legislative governing authorities if triggers reportable criteria.

TABLE 1
Flow Chart for PIRMP

1.
Pollution Incident as Described in Section 3 Occurs – staff report

↓

2.
EMR ensure safety on site and or near the premises, and or call 000 if immediate threat to human health or property

↓

3.
EMR to notify Director of Central Civil (NSW) immediately and if contact cannot be made with Director, then EMR contacts relevant authority

↓

4.
Director will advise the EMR if the adopted pollution incident criteria have been reached and instruct the EMR to immediately contact:

- ***EPA (131 555)***
- ***Hornsby Council (02) 9847 6666***
- ***Safe Work NSW (13 10 50)***
- ***NSW Ministry of Health (02) 9391 9000***
- ***Local Premises (if and where applicable)***

↓

5.
EMR to complete environmental incident response and forward to:

- ***EPA***

4. Emergency contact details

Table 2 outlines emergency contact details and is to be maintained by the EMR.

Table 2 - Emergency contact details

Service required	Company	Contact name	Phone number
EMR	Central Civil (NSW)	tbc	
EMR (alternate 1)	Central Civil (NSW)	Sarkis Elias	0499 010 000
EMR (alternate 2)	Central Civil (NSW)	Greg Banks	0476 910 130
Police			000
Fire & Rescue			000
Ambulance			000
Report Environmental Incident	EPA Pollution Line		131 555
	Hornsby Council		(02) 9847 6666
	Department of Industry	Incident hotline	1300 814 609
	SafeWork NSW		13 10 50
	Ministry of Health		02 9391 9000
Injured wildlife	WIRES		1800 641 188
Infrastructure Services			
Water	Sydney Water Service Centre		132 090
Power	Ausgrid		131 388
Gas	AGL		131 003
Electricity	Integral Energy		131 909
Telecommunications	Telstra		132 203

5. Environmental incident preventative actions and responses

Table 3 outlines the potential environmental incidents identified during the environmental review process and the proposed preventative actions, the response actions to be undertaken and the person/s responsible for implementation of appropriate actions. Other potential environmental incidents may be identified after the operation commences, and these should be documented by the EMR and **Table 3** should be updated as they are identified.

In the Event of an incident on site methods of communicating with staff, subcontractors and visitors will be as follows:

- All staff and subcontractors can be contacted on site by two-way radio or mobile phone.
- All Visitors can be contacted via mobile phone or by site staff.

Pre-emptive actions also include:

- Accreditation to ISO14001, IS9001 and ISO45001 to ensure effective management systems and procedures are in place and implementation of systems and preventative maintenance
- Audits.
- Regular Site Inspections and implementation of controls as identified.
- Bunded and containment areas for fuel storage and stored liquids.
- Restricted and limited access areas as per site signage and induction procedures.
- Installation of equipment for combatting an incident.
- Monitoring on site for air (dust), silica exposure levels and stormwater runoff.

Table 3 - Summary of potential environmental incidents, preventative actions, and proposed response actions.

Potential environmental incident	Potential Risk	Preventative actions	Responses actions to incident	Responsible persons
Excessive dust	2 – Frequent / Minor	• Operate water trucks/irrigators • Sprinklers • Cease or limit operations based on risk assessment • Daily environmental inspection report • Implementation of traffic management plan • Grading/upkeep of unsealed haul roads • Monthly environmental reviews • Sediment control devices	• Contact EMR • Water down areas identified as the source of dust immediately; and • Cease works if weather conditions are adverse.	All personnel and EMR
Silica	3 – Occasional / Critical	• 6 monthly respirable dust report • Pre-employment medical • Employee health monitoring (annual for production staff including labourers, spotters and maintenance coordinator and every two years for operators) • Health and safety training in relation to respirable dust and silica • P2 Fit testing (annual) • Supply PPE • Control dust on site • Implement environmental management procedure and daily environmental inspections • Monitor use of mandatory PPE on site • Enclosed plant operation • Implementing sign posted speed limits on site	• EMR, Human Resources and medical facility to work toward a return-to-work program. This may include additional health monitoring, adjustment to workers role/responsibilities, PPE etc • Investigate cause of incident and respond accordingly. • Record incidents of this kind and monitor for trends or deficiencies in Safety Management System. • Ensure worker compliance to control measure. • Dust control on site	All personnel EMR HR

Spills Fuel / Chemical spill / Fire	3 – Remote / Critical	▪ All chemicals to be stored in accordance with the Code of Practice for safe use and storage in Agricultural / COP Managing Risks of Hazardous Chemicals in the Workplace / AS 1940: The storage and handling of flammable and combustible liquids • All diesel/fuel storage tanks to be bunded to contain spills and disposed of by qualified contractors. • HS&DG Audits and Register with quantities and SDS for each. • Refueling contractor to undergo SWMS review prior to site access	• Contact EMR • All refueling vehicles are to contain a spill kit • Refueling subcontractors to undergo SWMS review post incident • Use spill kit to contain the spill at the mixing and storage sites. • Dispose of contaminated materials appropriately; and clean and decontaminate the site. • If discharge enters waterway and criteria outlined in **Section 3** of this PIRMP is met ring EPA Pollution line 131 555. • Emergency Evacuation plan implemented, contain fire if safe to do so, follow first aid plan and account for all on site at EEA.	All personnel and EMR
Stored Pollutants spill, escape, unknown quantities	3 – Remote / Critical	• All bunded as per COP • Know inventory of Maximum Storage Quantities: Diesel Engine oil 410l (2x205l drums), Hydraulic oil and Transmission oil 410l (1x 205l drum of each), Grease 80kg, Coolant 1x 205L drum. • All chemical liquids stored within bunded/spill kit designated areas with spill bund capacity more than stored drums. • Conduct Audits and update SDS register and SDS's.	• All re-fueling vehicles are to contain a spill kit • Spill kit at oil storage locations. • Use spill kit to contain and absorb the spill at the mixing and storage sites. • Dispose of contaminated materials appropriately; and clean and decontaminate this site. • If discharge enters waterway and criteria outlined in **Section 3**	All personnel and EMR
Stormwater and Sediment losses to waterways	2 – Remote / Minor	• Maintain Erosion & Sediment Controls on site • Follow EPM & SECMP	• Contact EMR • Where relevant, repair sediment controls; and • Cease works if weather conditions are adverse. • If discharge enters waterway and criteria outlined in Section 3 of this PIRMP ring EPA Pollution Line 131 555.	All personnel and EMR
Raw Stockpiles of recovered sandstone feed stock	2 – Remote / Minor	• Maintain Erosion & Sediment Controls on site • Follow EPM & SECMP	• Contact EMR • Where relevant, repair sediment controls; and • Cease works if weather conditions are adverse. • If discharge enters waterway and criteria outlined in Section 3 of this PIRMP ring EPA Pollution Line 131 555.	All personnel and EMR

Finished product Stockpiles (Sandstone Aggregates, Sand).	2 – Remote/Major	• All tipped materials wet down • 2 stage Inspection of all loads; weighbridge, before loading and during loading operations • Worker PPE, and enclosed Plant operation • Finished product is checked daily and complies with site requirements • Stockpile testing in accordance to AS 1141.3.1:2021 • Complaints register • ISO 14001 Accreditation achieved • Greenstar Accreditation achieved	• If there has been a breach of the licence or EPA guidelines after notifying senior management, ring EPA Pollution Line • 131 555 or nominated EPA officer by phone or Email. • Environmental Complaints Register • QSE Performance Summary	All Personnel and EMR

An environmental risk assessment rating system, which is outlined in **Table 4**, has been adopted for the assessment of risks associated with potential environmental risks listed in **Table 3**.

The results of this assessment will be included in the operational EMP for this facility.

Table 3A - Raw Stockpiles of recovered feed stock. Sandstone Maximum Quantity

Product	Approx Maximum Quantity (Tonnes)
Sandstone	**4,000**

Table 3B - Finished Product Stockpiles

Product	Approx Maximum Quantity (Tonnes)
20mm Sandstone Aggregate	**1,000**
30-40mm Sandstone Aggregate	**1,000**
40-70mm Sandstone Aggregate	**1,000**
Bedding Sand	**1,000**

Table 4 - Environmental risk significance rating table*.

Risk of Occurrence						
May be as a result of a continuously operated process, activity or occurrence	**Continuous**	1	4	4	4	4
May be a result of a frequently used process, activity or occurrence.	**Frequent**	1	2	3	4	4
May be a result of a little used process, activity or occurrence.	**Occasional**	1	2	3	4	4
May be as a result of a chain of unusual events leading to an environmental incident	**Remote**	1	2	3	3	4
May be a result of a chain of extraordinary events leading to an environmental accident/disaster.	**Improbable**	1	2	3	3	4
		Positive	**Minor**	**Critical**	**Major**	**Catastrophic**
	Significance (Degree of Impact)	Positive impact on environment thus positive impact on business	Limited and/or localised impact on the environment and/or business	Medium scale impacts, wider implications to environment and/or business	Serious long-term implications for environment and/or business	Serious permanent damage to business and/or environment (e.g. loss of licence, restriction of activity)

*From: Environment Australia, 2007. Model Environmental Management System for Commonwealth Agencies.

Key to Risk Significance Rating	**1**	**Positive**
	2	**Low Risk**
	3	**Medium Risk**
	4	**High Risk**

Incident Response Procedure to Water Pollution

Fuel, Oil or Chemical Spills

The works carried out on this premises include the use of fuel, oil and chemicals, particularly in the workshop. The following is a sequential procedure implemented for any incidents involving these chemicals which could potentially pollute the stormwater system.

1. **Control the Spill**

If a spill occurs, identify the source and assess whether it can be controlled (stopped) in a safe manner. Protect storm water runoff drains by placing earth, sand or absorbent material around storm water entrance points and sediment basin to prevent further contamination.

2. **Contain the Spill**

Construct bunds using on-site Spill Kits to prevent fuel, oil or chemical spreading out. Specific attention is to be given to prevent discharge into stormwater drainage channels, sediment basin or onto private property.

→ **For small spills**
Spread absorbent material from Spill Kit to absorb fuel, oil or chemical.

→ **For large spills**
Use a dozer or excavator to construct earth bunds around spill or use sandbags. Spread sand on ground to soak up fuel, oil or chemicals. If discharge enters sediment basin and mixes with water, isolate it with booms.

3. **Clean up the Spill**

Soak up the spill with absorbent material and ensure the surface is left clean. Material used to clean up the spill should be placed in a watertight container labelled “Spill Kit Waste”. When this drum is full it should be removed from site as prescribed waste. In some instances, an EPA (DECC) licensed tanker (vacuum truck) may be required to vacuum up the liquid.

→ **For small spills**
Load used pads, pillows and absorbent material into watertight container for disposal at an appropriate EPA approved waste facility.

→ **For large spills**
Load sand/earth/sandbags into watertight container on utility (small quantities) or truck lined with plastic (large quantities) for disposal at an appropriate EPA approved waste facility. Sweep site with broom to collect all sand or earth for disposal, as appropriate.

Sediment / Silt Contamination to Storm Water

For uncontrolled release of dirty water into waterway from sediment basin or bunded area. If discharge enters waterway and mixes with water, isolate it by booms and call the EPA (DECC) Pollution Line 131 555 IMMEDIATELY.

Air / Noise Pollution

Central Civil (NSW) has an Operation Environmental Management Plan (OEMP) which clearly stipulates the allowable tolerances for Noise and Air pollution. It also includes details on what to do in the case of any infringements to Noise and Air pollution.

Dust Monitoring is carried out on a scheduled basis to ensure applied limits are adhered to.

Noise Monitoring is carried out on a yearly basis to ensure tolerances are not exceeded.
If either Air or Noise Pollution occurs which exceeds those stipulated in the OEMP the following response should be carried out:

A. Control the Source
Immediately stop the action / source that is causing the air / noise pollution.

B. Assess the Parameters
Assess what actions can be taken to prevent / stop / reduce air / noise pollution. Implement them before continuing with further operations.

C. Monitor the Source
Carry on with site operations while closely monitoring air / noise to ensure limits are not exceeded.

6. Emergency equipment requirements and storage locations

Table 6 outlines the locations of emergency response equipment.

Table 4 - Emergency equipment requirements

Equipment	Storage location	Comment
Spill kit	On each re-fueling unit. Within hazardous substance storage area	Instructions are provided with the spill kit. Training conducted in the use of spill kits. Notify of use and replace items used. Locations on site map through induction process.
Fire extinguisher/s	On each piece of onsite equipment, office, fuel storage area, chemical storage area, offices and maintenance shed as per signage.	To be maintained in satisfactory working order and checked by appropriately qualified person every 6 months or after use. Only use when two people involved and safe to do so. Never take on large or uncontrolled fires. Ensure staff are trained in different types of extinguishers and safe use of extinguishers. Locations on site map through induction process.
Eyewash	At the maintenance area and site office. Within the First Aid Kits on site	Maintain in a satisfactory working order and test to ensure working correctly. Locations on site map through induction process.

7. Incident Reporting and Notification

Within 7 days of detecting an exceedance of goals/limits/performance criteria of this PIRMP or an environmental incident (as defined in **Section 3)**, Central Civil (NSW) shall report the exceedance to the EPA and Hornsby Council. All Incidents are to be reported on an Incident Report Form.

The report shall:

- describe the date, time and nature of the exceedance/incident.
- identify the cause (or likely cause) of the exceedance/incident.
- describe what action has been taken to date, and
- describe the proposed measures to address the exceedance/incident.

7.1 Community Notification

Strategy Who Will Be Notified?
All community stakeholders that may be affected by an incident will be notified. Appropriate to the incident circumstance, these include:

- Neighbouring residential property owners (see attached map 5)
- Neighbouring commercial properties (see attached map 5)
- General public within the vicinity of the site:
  - Pedestrians
  - Motorists
  - Users of nearby recreational facilities (sporting facilities, parks etc)
- Schools

When Will the Community be Notified?
If an incident presents a significant risk of causing material harm to persons, property, and/or the environment to an area that is not trivial, any community stakeholders within these areas will be notified at the earliest convenience.

What will be Communicated?
Communication will be relevant to the incident and risk and consider:

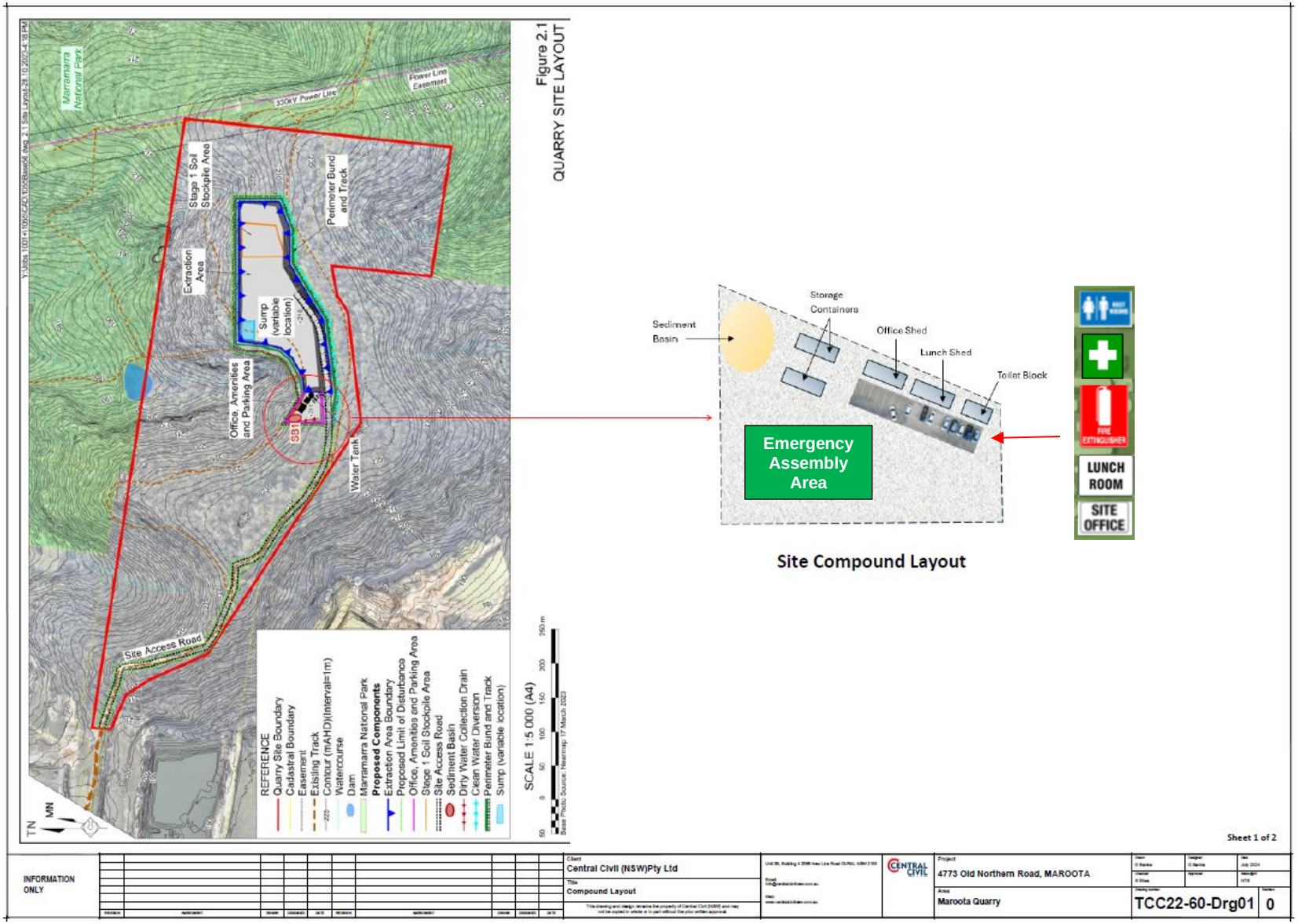
- The nature of the incident
- Phase of response (how it will be communicated)
- Type of pollutant
- Weather conditions and contribution to the incident
- Significance of emission
- Location and offsite impact or potential impacts
- Likelihood of exposure
- Possible impacts upon any sensitive receptors

How Will the Community be Notified?
When it has been established that a community stakeholder is at risk from an incident that has the potential to cause material harm the following process will be implemented:

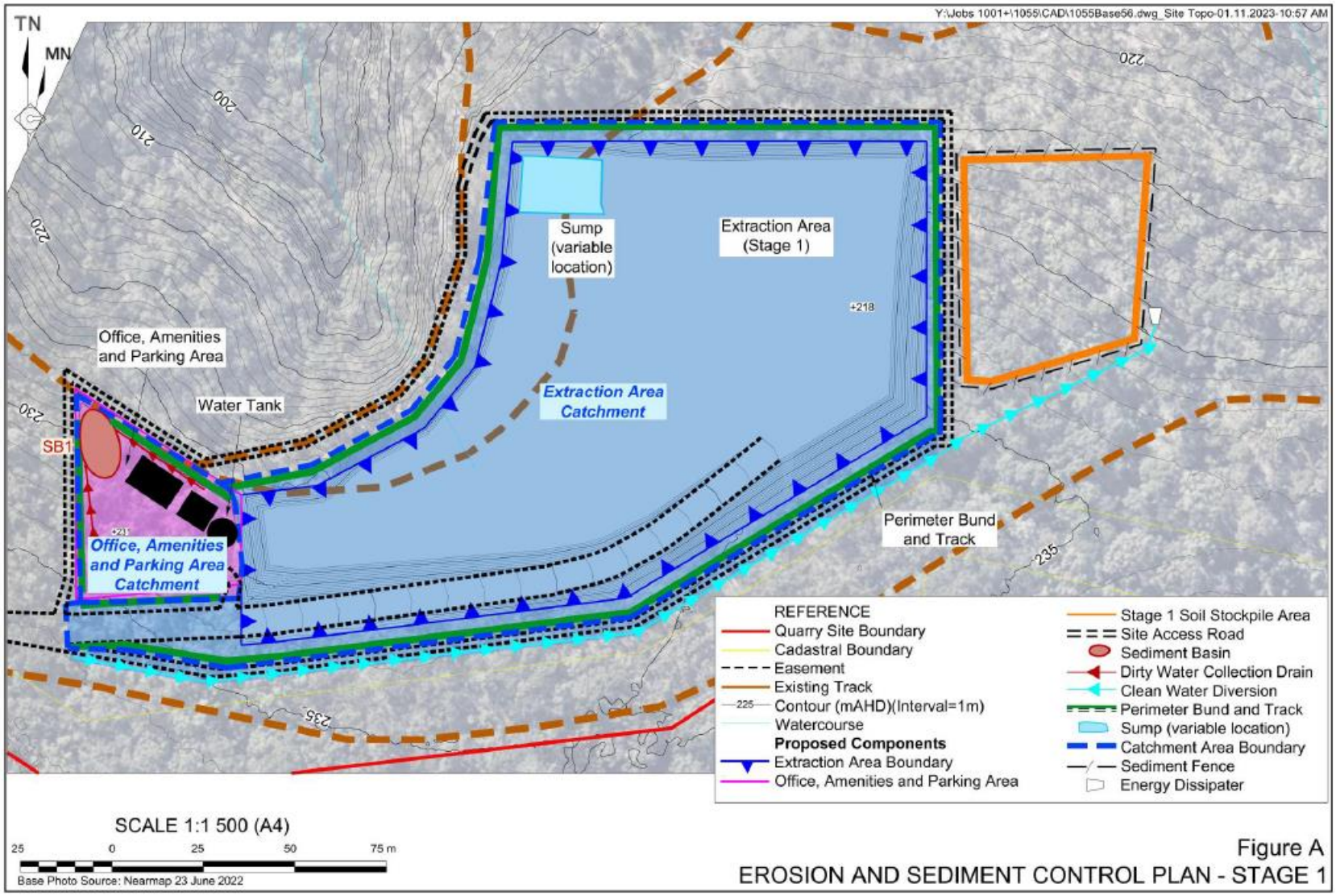
1. Community stakeholders will be contacted immediately after the relevant authorities have been contacted by telephone (or face to face if this is not possible).
2. Stakeholders will be advised of recommended actions that can be taken to prevent or minimise material harm e.g. evacuate area, shut all doors and windows, cease drawing water for irrigation purposes.
3. After the incident has been contained and managed by key personnel and authorities, subsequent communication will be undertaken by the EPA / SafeWork Coordinators. Appropriate to the circumstance, these may include:

    - Follow up telephone calls and/or face to face contact (door knocking)
    - Meetings with stakeholders
    - Written correspondence containing updates in regard to safety and environmental concerns associated with the pollution incident
    - Letterbox drops
    - Website notification
    - Social media notification

Map 1 – Site, Infrastructure, Equipment, Storage Areas and Emergency Assembly Area



Map 2 – Erosion and Sediment Control Map Stage 1



Map 3 – Erosion and Sediment Control Map Stage 2

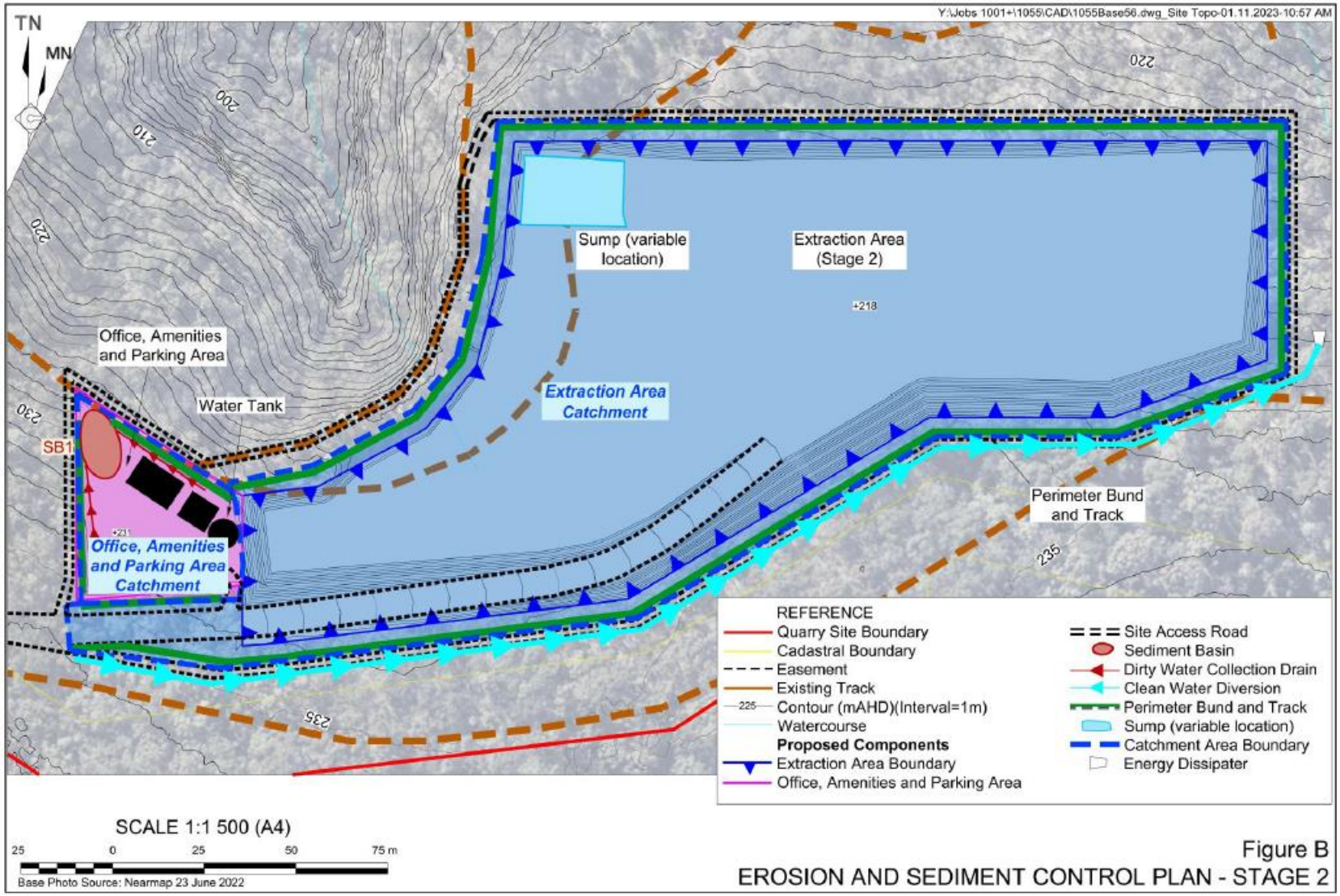
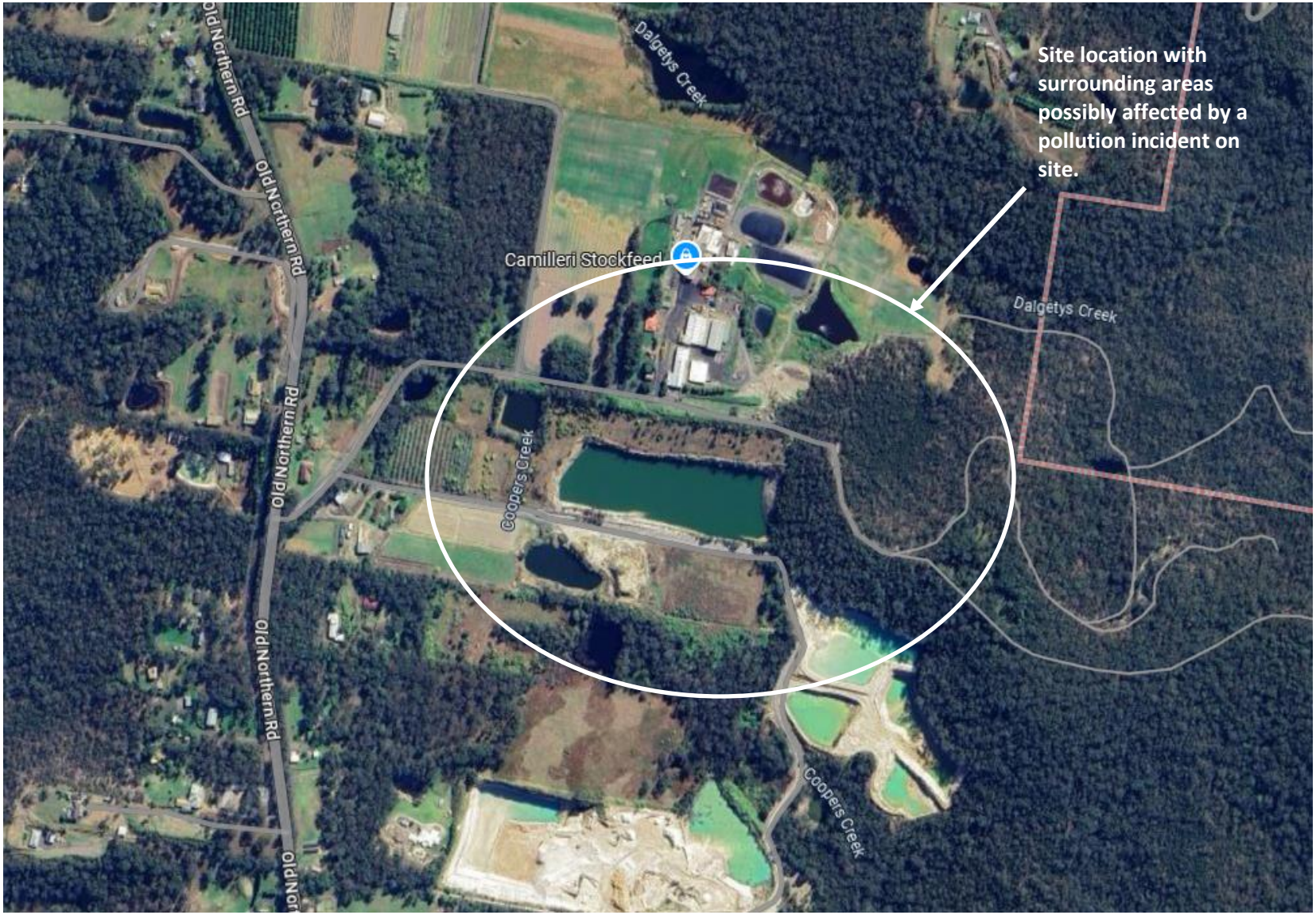
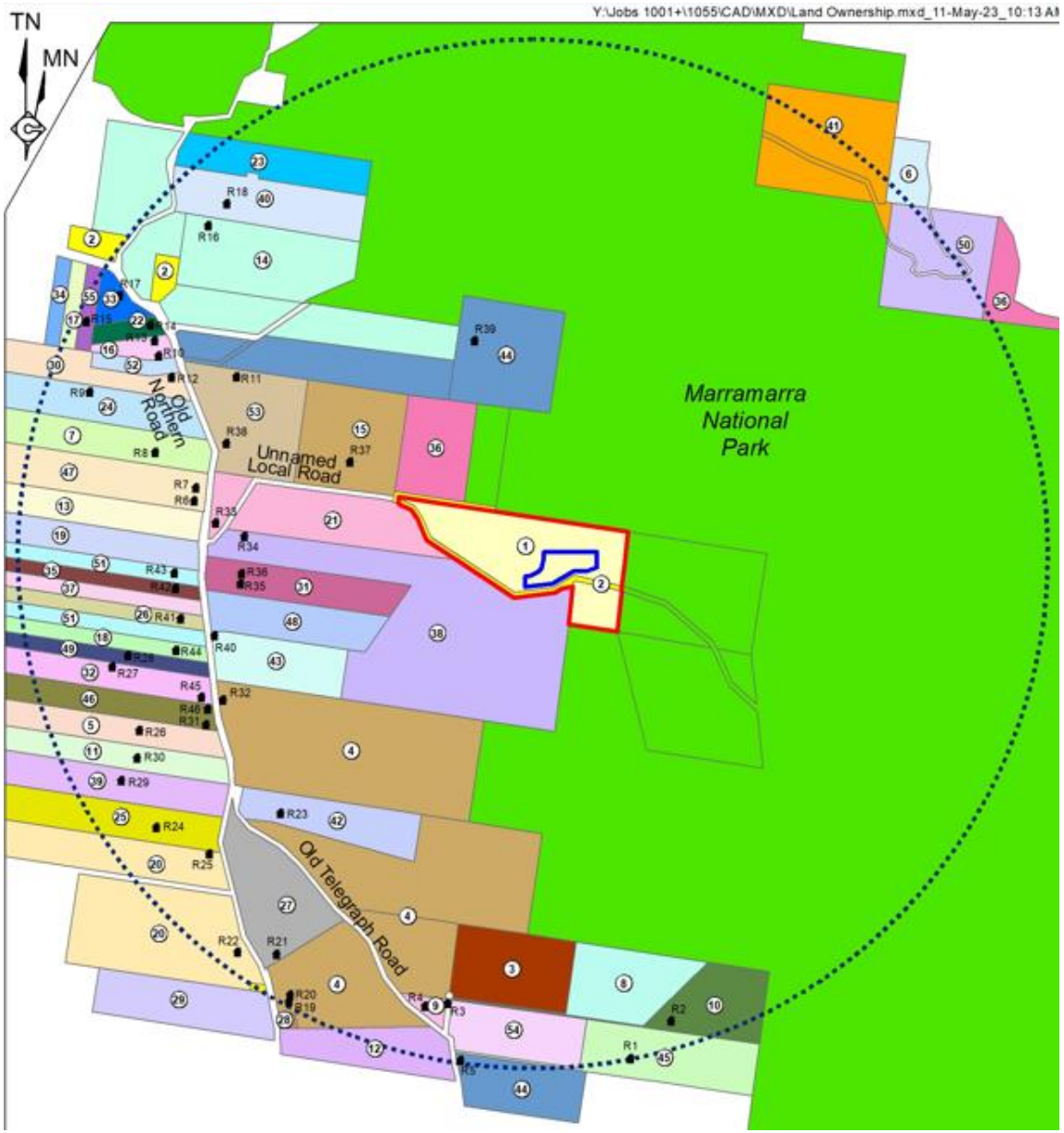


Figure B
EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

Map 4 – Site Location and Surrounding areas possibly affected by a pollution incident – direct neighbor's



Map 5 – Direct Neighbors surrounding Maroota site



REFERENCE

- Project Site Boundary
- Proposed Extraction Area
- Cadastral Boundary
- Crown Land
- Marramarra National Park
- Residence
- ① Landowner Identifier
- 2km Buffer

ID	Landowner
1	Company Owned Land
2	Crown Land
3	Dixon Sand
4	J & L Landholdings Pty Ltd
5	Pivotal Group
6	Dukerm Pty Ltd
15	Camilleri's Stockfeeds Pty Ltd
◯	All other land is privately owned

Name	Lot/DP	Address	Contact Name & No.
Ridley (Camilleri's Stockfeeds Pty Ltd)	Lot 137, DP752029	4777 Old Northern Road, Maroota, NSW 2756	Brian Ridley 0459 851 162
PF Formation Sand & Concrete	Lot 63, DP752029	4751 Old Northern Road, Maroota, NSW 2756	Josh 0245 668 365
G Trovato	Residence 33	4765 Old Northern Road, Maroota, NSW 2756	
PF Formation Sand & Concrete	Lot 3, DP567166	4713 Old Northern Road, Maroota, NSW 2756	

8. COMPLAINTS

8.1 Complaints register

A telephone complaints line has been established to receive any complaints from members of the public in relation to this site. Details of the complaints line are below:

COMPLAINTS TELEPHONE LINE:

Environmental Management Representative

Greg Banks 0476 910 130

Sarkis Elias 0499 010 000 Director

Site Office tbc

8.2 Complaints response protocol

If a complaint is received the following procedures are to be followed:

- Details of the complaint are to be recorded by the EMR in the complaints register and the complainant is to be advised verbally that the matter will be investigated by Central Civil (NSW) in accordance with the Operational Environmental Management Plan.
- The EMR is to investigate the complaint and to liaise with the complainant to attempt to resolve the complaint. Where necessary, the EMR will make appropriate changes to onsite management practices / procedures to resolve the complaint.
- If, through a subsequent investigation, the EMR becomes aware of an environmental incident (as defined in **Section 3** of this PIRMP), then Hornsby Council is to be notified in writing at the first available opportunity.
- If the criterion outlined in **Section 5** of this PIRMP is met, then the EPA is to be notified and at the first available opportunity.
- If the dispute is resolved, the agreed outcome is to be documented (in writing) and forwarded to the complainant, Hornsby Council and the EPA.
- If the dispute is not resolved, the EPA and Hornsby Council are to be advised in writing.
- If directed by the EPA or Hornsby Council, Central Civil (NSW) will contract the services of an independent consultant to review the specific details of the complaint and make appropriate recommendations to resolve the matter.
- At closure of the complaint the following information will have been recorded:
  a. Date of complaint
  b. Name of complainant
  c. Contact details of complaint (if supplied)
  d. A record of notification of Fairfield Council, EPA, DPE, WC
  e. A summary actions taken to address the subject matter of the complaint
  f. Investigation outcomes, and
  g. A record of notification of the complainant of the investigation outcomes Records will be kept for at least 4 years after the complaint was registered.

9. REVIEW

This PIRMP is to be reviewed annually or on as needed basis. Updates of this PIRMP will be supplied to all persons listed in the document register at the beginning of this PIRMP and reviewed with relevant site personnel through informal and formal training and toolbox meetings. Training and procedure review will include the objective of staff training, staff trained, dates and comments. All changes to PIRMP and training records will be updated and kept as per site document control procedures. Reporting on compliance with PIRMP obligations will be reported to the EPA annually in the annual return submission.

10. Testing of PIRMP

This PIRMP will be tested at least once a year by means of a mock drill and within one calendar month of any pollution incident occurring where the plan has been activated. All records of drills conducted will be recorded on FORM-WF0027A which includes the following details as a minimum:

- Type of drill tested
- Objective of the drill/training
- Date of drill
- Person(s) carrying (in charge) out testing
- Names of personnel involved in the drill
- Location
- Effectiveness of drill and training
- Debrief

Testing of the PIRMP as a result of a pollution incident occurring does not qualify as an annual PIRMP drill/test. This test may take the form of a post-incident debrief to assess whether:

- The PIRMP was implemented efficiently during the activation
- There were areas of the PIRMP that did not work or could be improved
- All contact details were correct and up to date
- Maps were accurate and sufficiently detailed
- Any other details in the PIRMP need to be updated.

Reporting on compliance with PIRMP obligations will be reported to the EPA annually in the annual return submission.

A record of the testing of PIRMP will be maintained in this plan. Refer to below table.

Pollution Incident Management Response Plan Testing

Date of Test	Name of Person who coordinated testing	Recommended Actions/Outcomes from Testing or PIRMP Review

11. POLLUTION INCIDENT NOTIFICATION PROTOCOL

Step one: What is a Pollution Incident?
A Pollution Incident occurs when material harm to the Environment is caused or threatened.

Step Two: What is material harm to the Environment?

(i) It involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

(ii) It results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 and loss includes the reasonable costs or losses to prevent mitigate or make good harm to the environment.

Step Three: Who must notify?

a) the person carrying on the activity
b) an employee or agent carrying on the activity
c) an employee carrying on the activity
d) the occupier of the premises where the incident occurs.

Step Four: Who do I notify?
A person engaged as an employee in carrying on an activity must immediately after becoming aware of the incident, notify the employer of the incident and all relevant information about it.

Step Five: Who must be notified about a Pollution Incident?
Call 000 if the incident presents an immediate threat to human health or property.

Ask for:

- Fire and Rescue NSW
- NSW Police
- NSW Ambulance Service, and/or
- EPA 131 555
- Hornsby Council Phone: (02) 9847 6666
- Ministry of Health Phone: (02) 9391 9000 www.health.nsw.gov.au/publichealth/infectious/phos.asp
- Safe Work NSW Phone: 131 050

Examples of Potential Environmental Incidents Excessive Dust

- Cease work, and
- Contact Environmental Management Representative
- Water Areas identified as source of dust

Fuel / Oil / Chemical Spills

- Always refuel in a bunded area
- Use spill kits in the field
- If discharge enters a waterway and may cause $10,000 damage and/or cleanup costs notify employer immediately.

Sediment Loss to a Waterway

- Cease work and contact Environmental Management Representative
- Repair Sediment controls
- If discharge enters a waterway and may cause $10,000 damage and/or cleanup costs notify employer immediately.

Appendix 9

Emergency Evacuation Plan

(Total No. of pages including blank pages = 2)

Emergency Evacuation Plan – 4773 Old Northern Road, Maroota

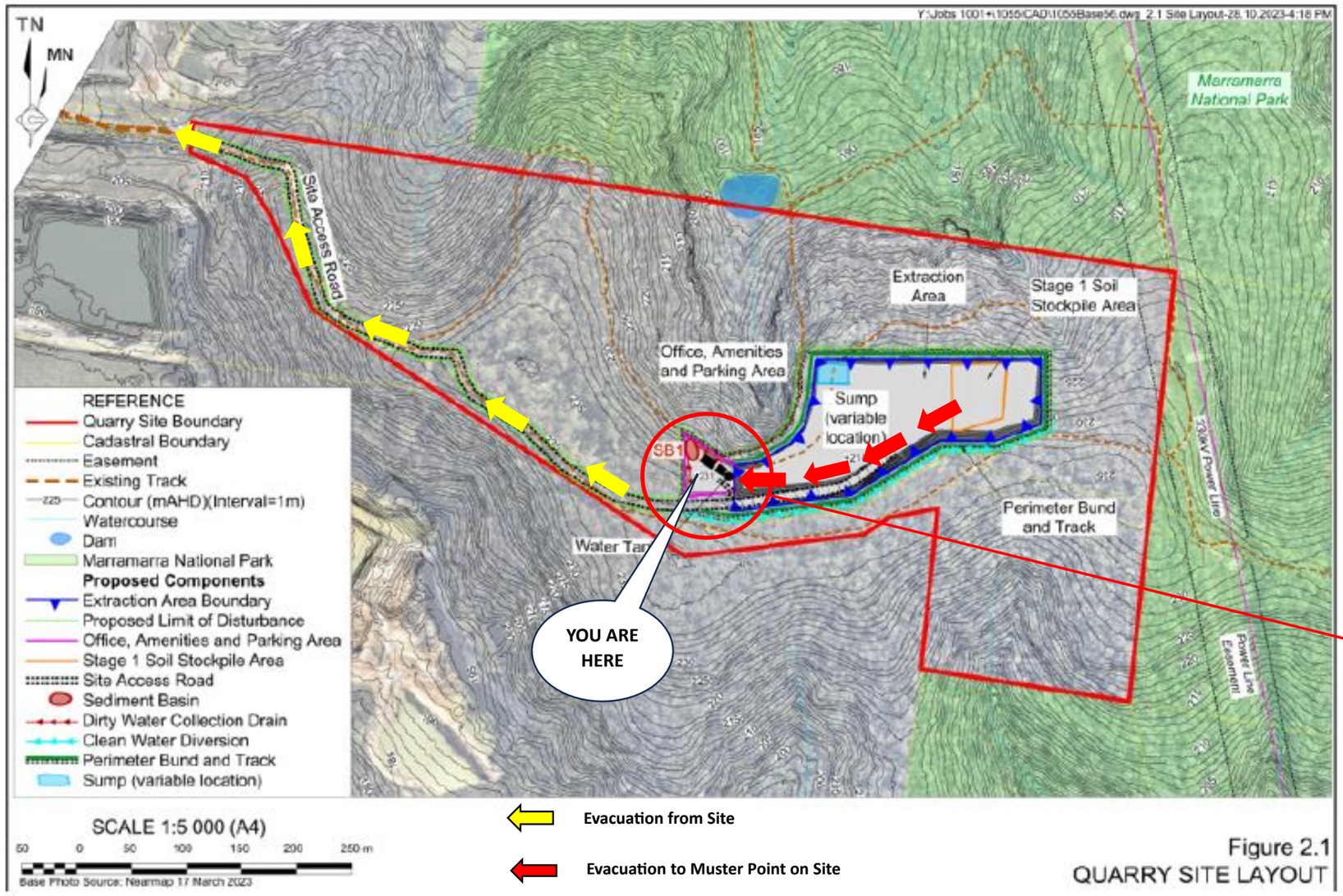
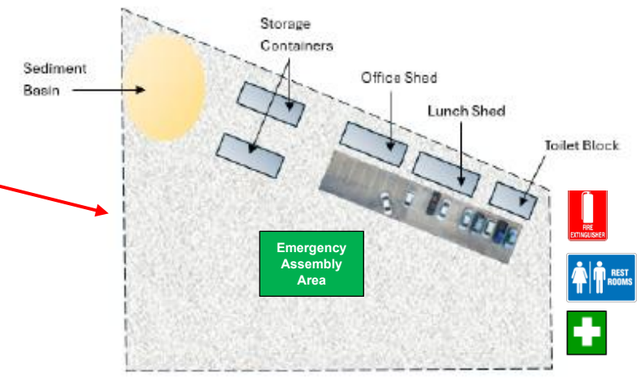


Figure 2.1
QUARRY SITE LAYOUT

R – remove people from danger
A – alert others, call 000, raise alarm (alarm = horn blast)
C – contain the danger if possible
E – evacuate immediately to emergency assembly area



Site Compound Layout

Evacuation of Site. Assemble at emergency assembly area, (Site Carpark) & Names Checked against Sign-in Log

Hawkesbury Hospital	**0245 605 555**
Police, Ambulance, Fire and Rescue	**000**
Medical Centre	**02 9726 9300**
Sydney Water	**13 20 90**

SafeWork	**13 10 50**
Environmental Protection Agency	**131 555**
Transport Management Service	**131 700**
Electricity – AGL	**131 245**

Appendix 5

Updated Biodiversity Development Assessment Report

(Total No. of pages including blank pages = 162)

ecoplanning
ecology | planning | offsets

Biodiversity Development Assessment Report

4773 Old Northern Road, Maroota

Maroota Central Civil Quarry

Prepared for: Central Civil (NSW) Pty Ltd

6 February 2025 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, Angus Cochrane			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Brian Towle		1.0	1 November 2023
			1.1	6 February 2025
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.'

Disclaimer: This report has been prepared by Ecoplanning Pty Ltd for Central Civil (NSW) Pty Ltd and may only be used for the purpose agreed between these parties, as described in this report. The opinions, conclusions and recommendations set out in this report are limited to those set out in the scope of works and agreed between these parties. Ecoplanning P/L accepts no responsibility or obligation for any third party that may use this information or for conclusions drawn from this report not provided in the scope of works or following changes occurring subsequent to the date that the report was prepared.

ECOPLANNING PTY LTD | 428 PRINCES HIGHWAY WOONONA NSW 2517 | P: (02) 4244 2736

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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.

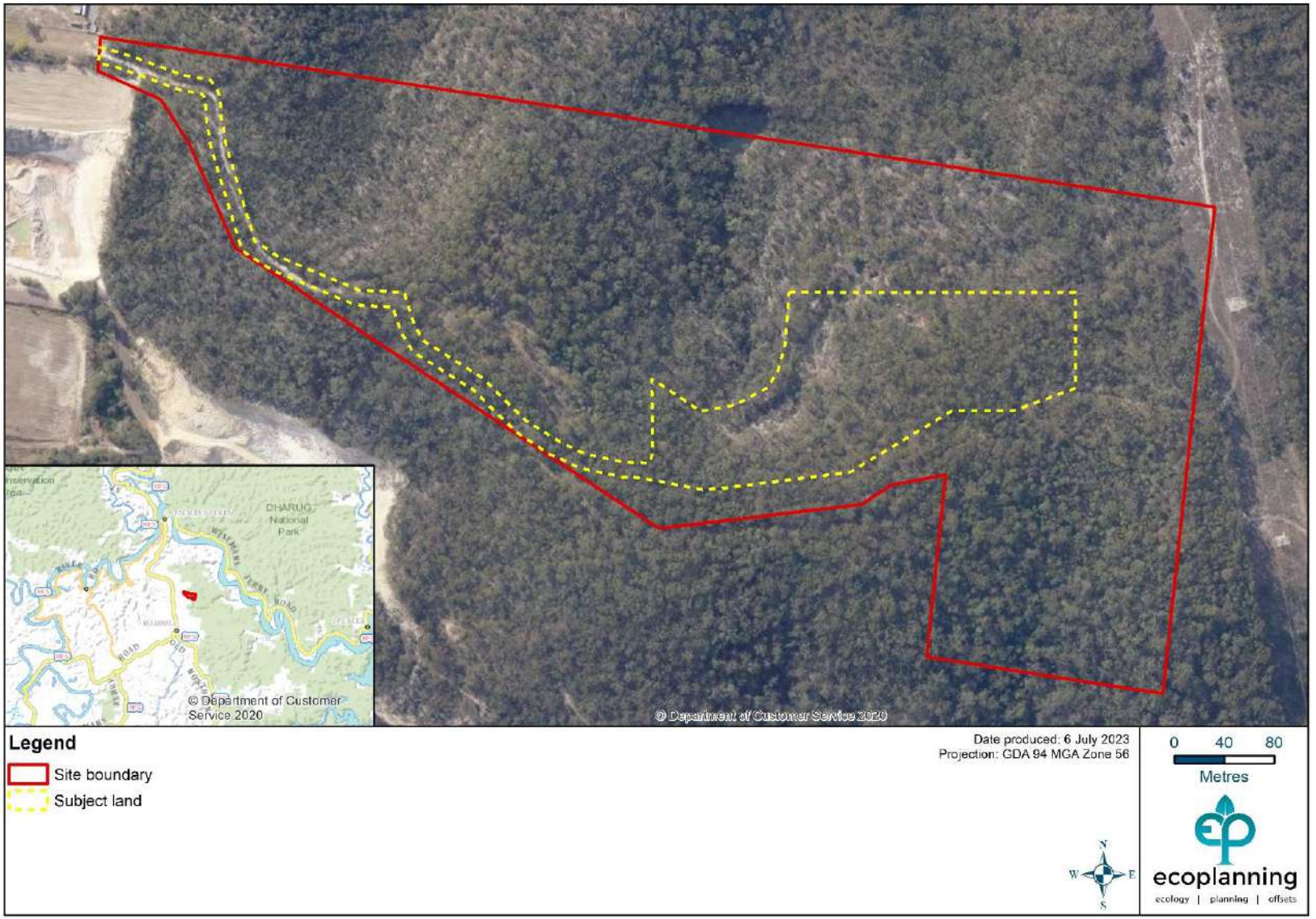

Figure 1.1: Location of the subject land

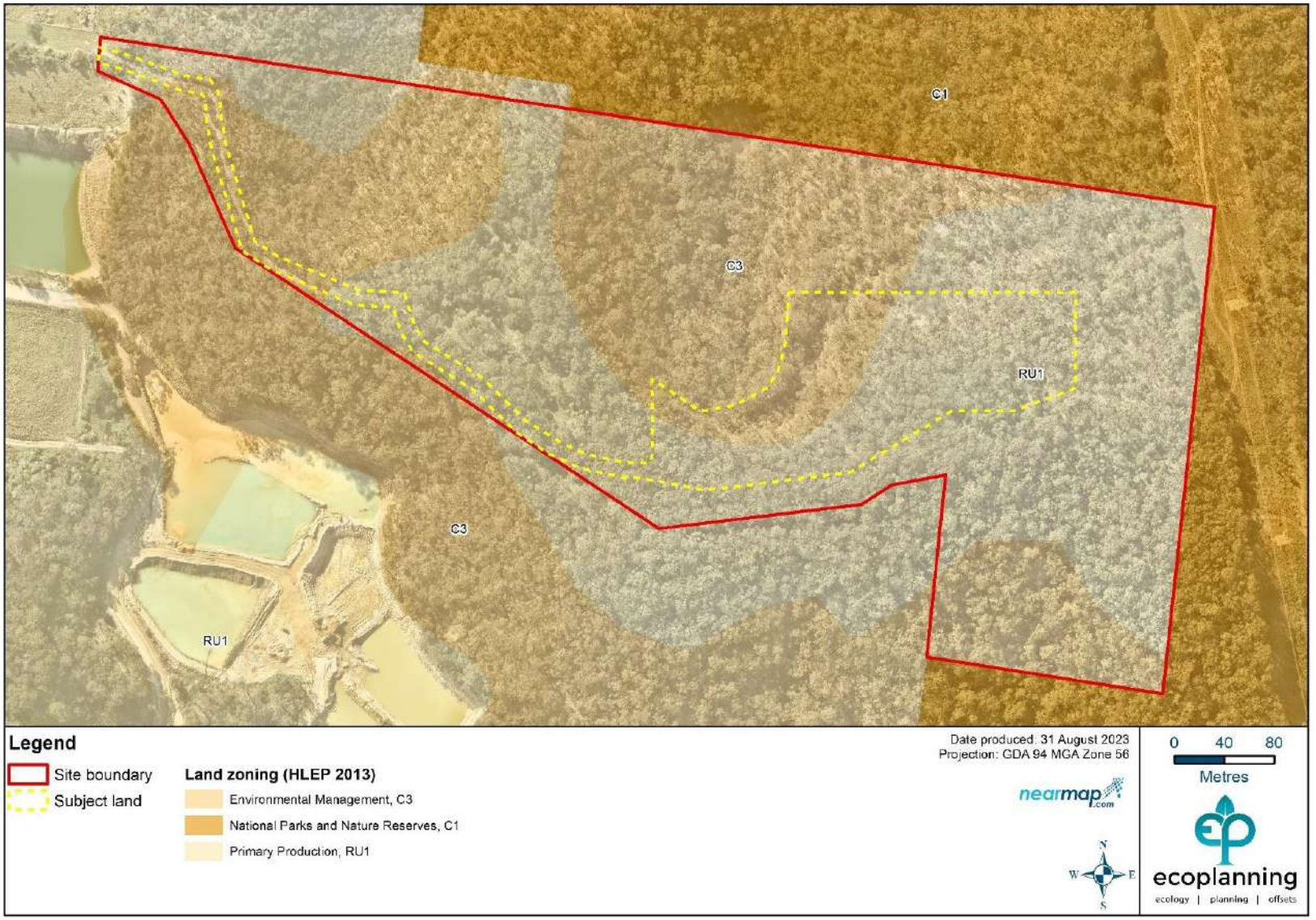

Figure 1.2: Zoning of the subject land

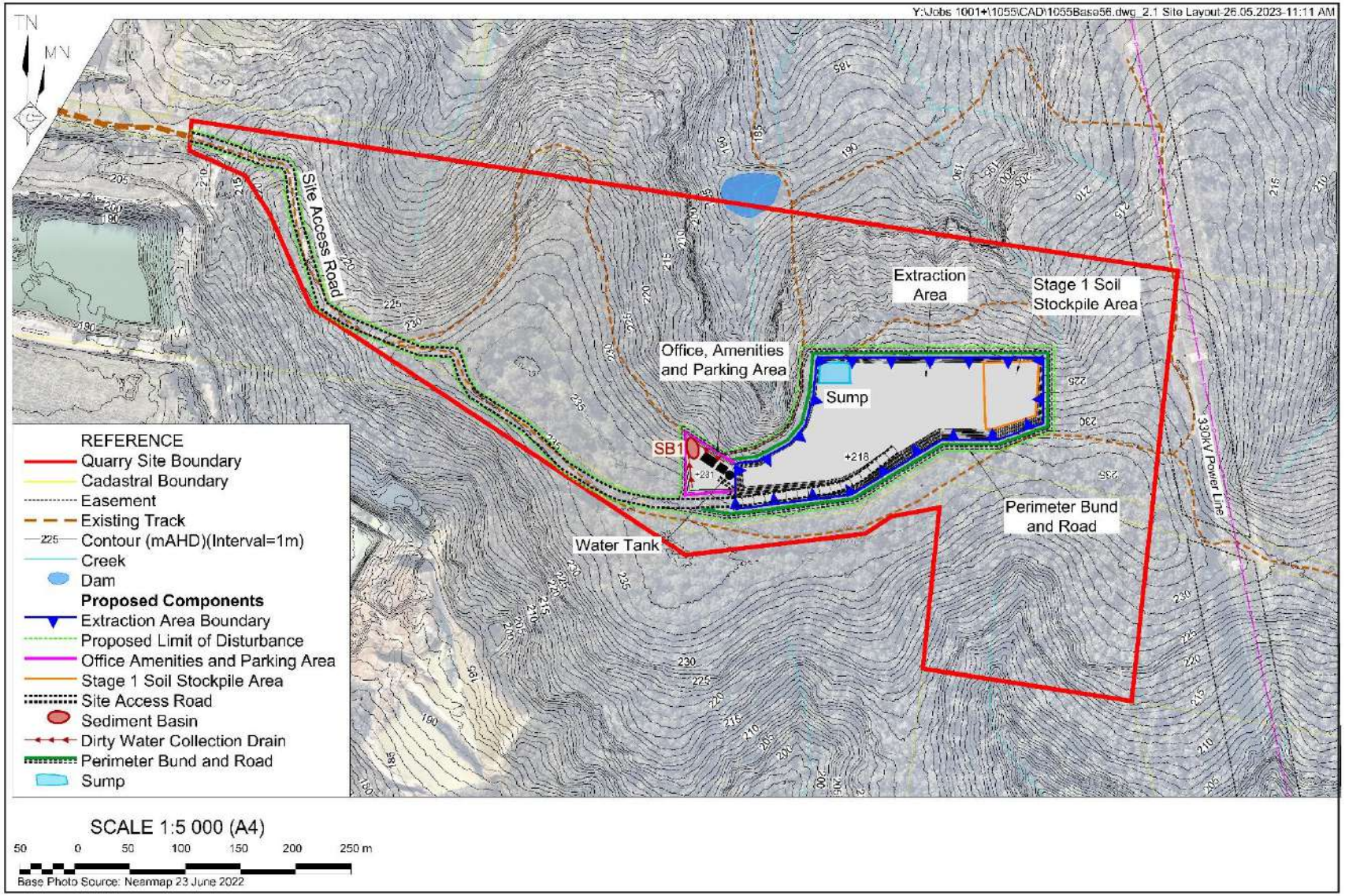

Figure 1.3: The Proposal

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.

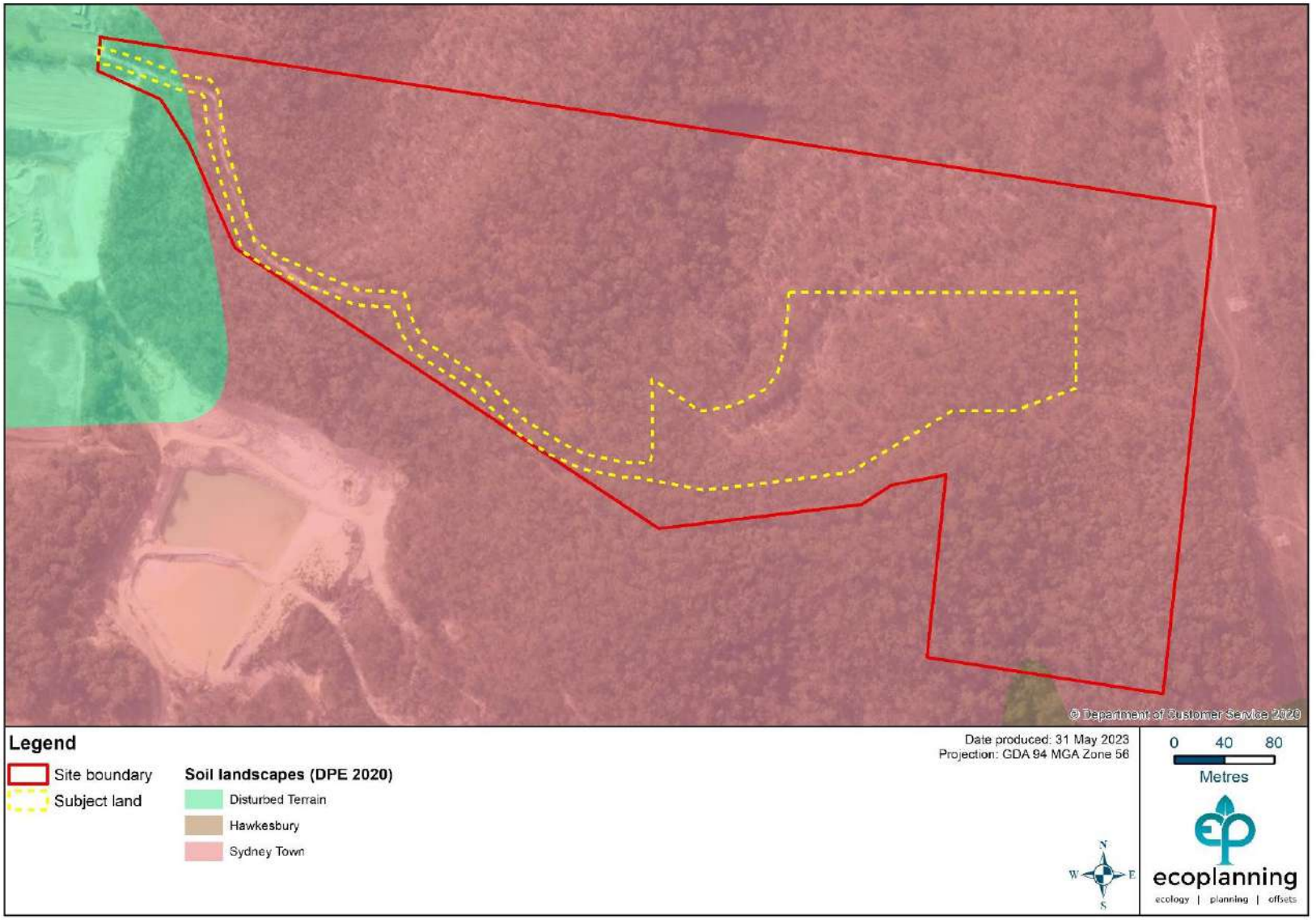

Figure 2.2: Soil landscapes

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.

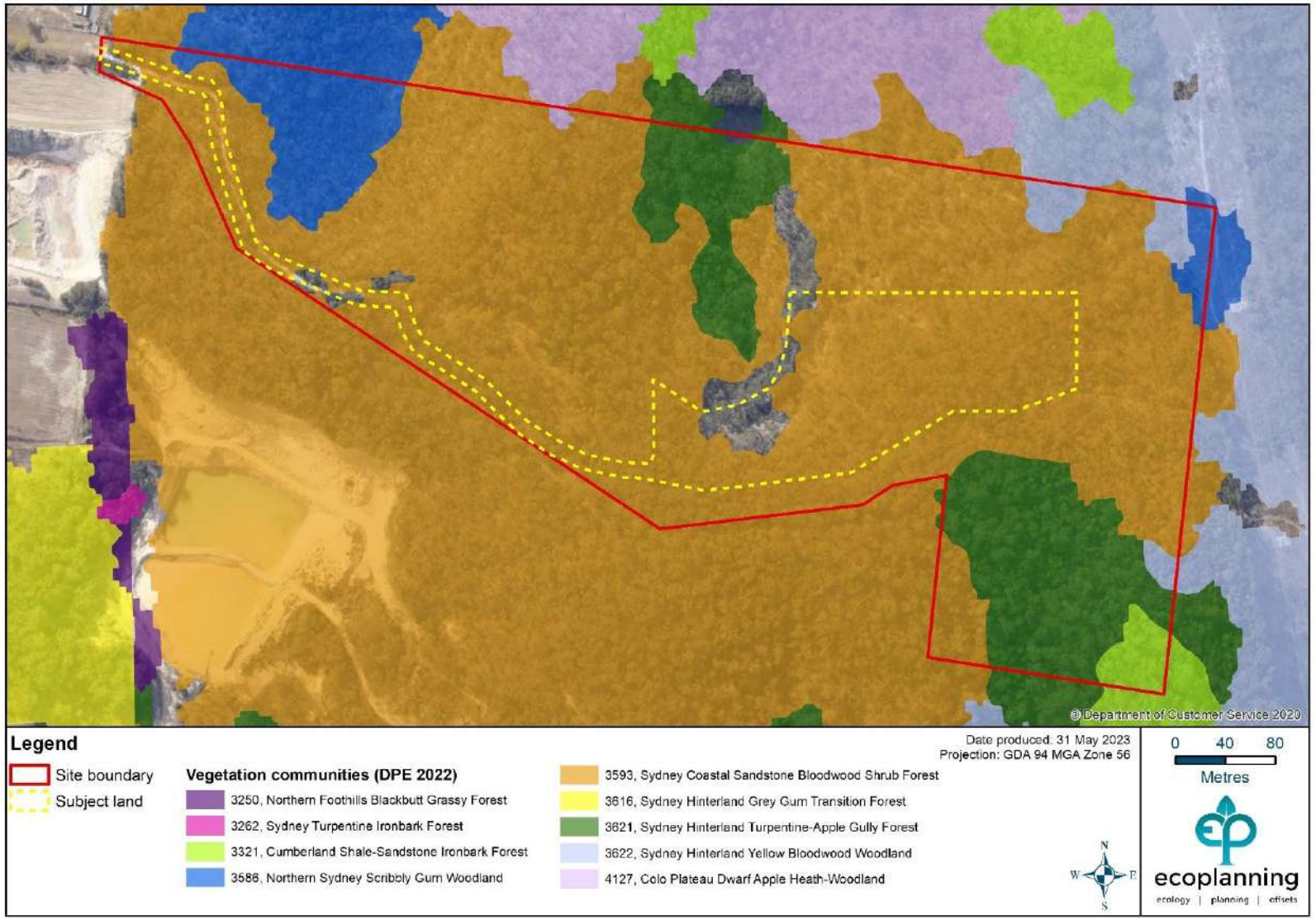

Figure 3.1: NSW State Vegetation Type Mapping (DPE 2022a)

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**.

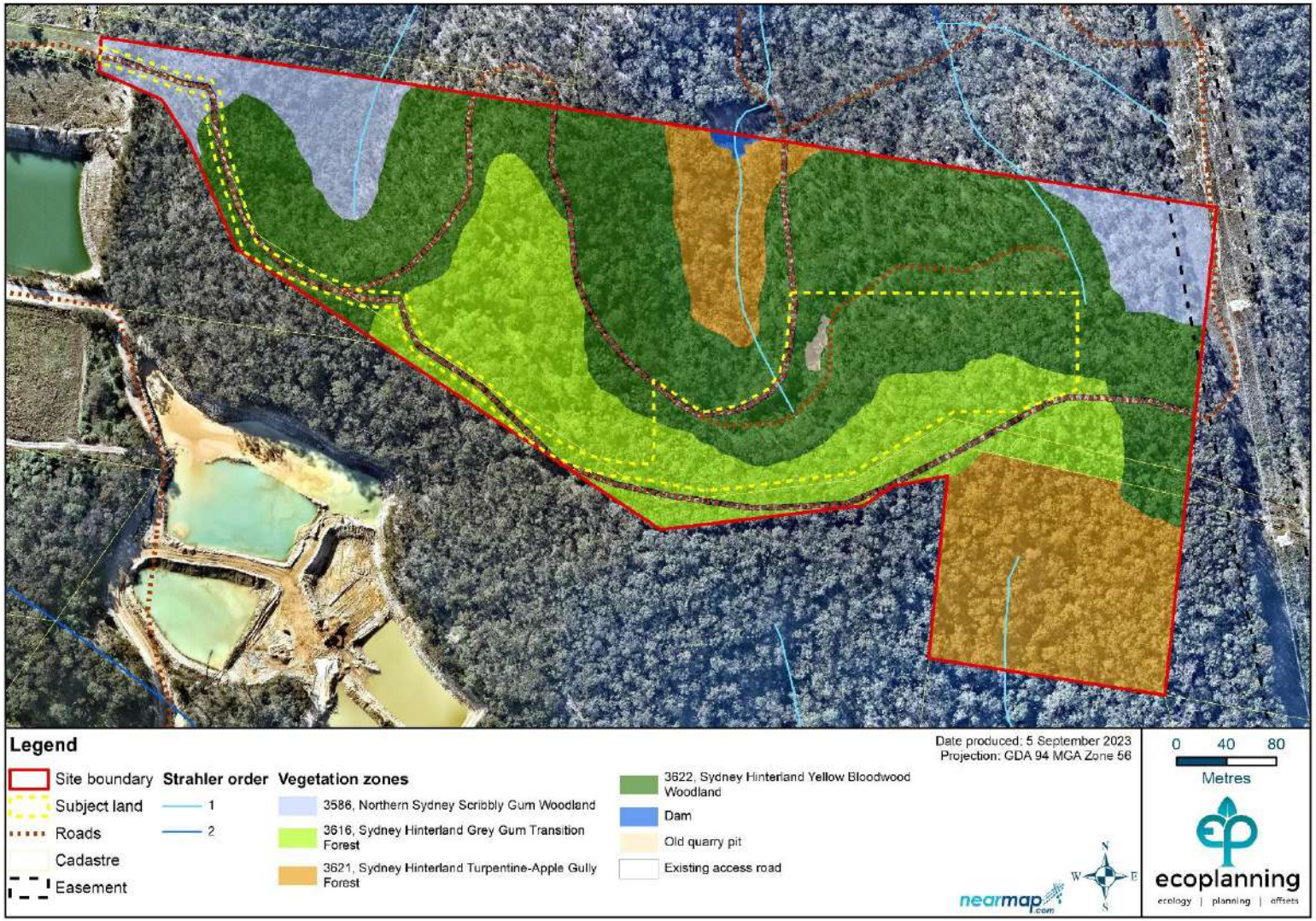

Figure 3.2: Field-validated vegetation

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

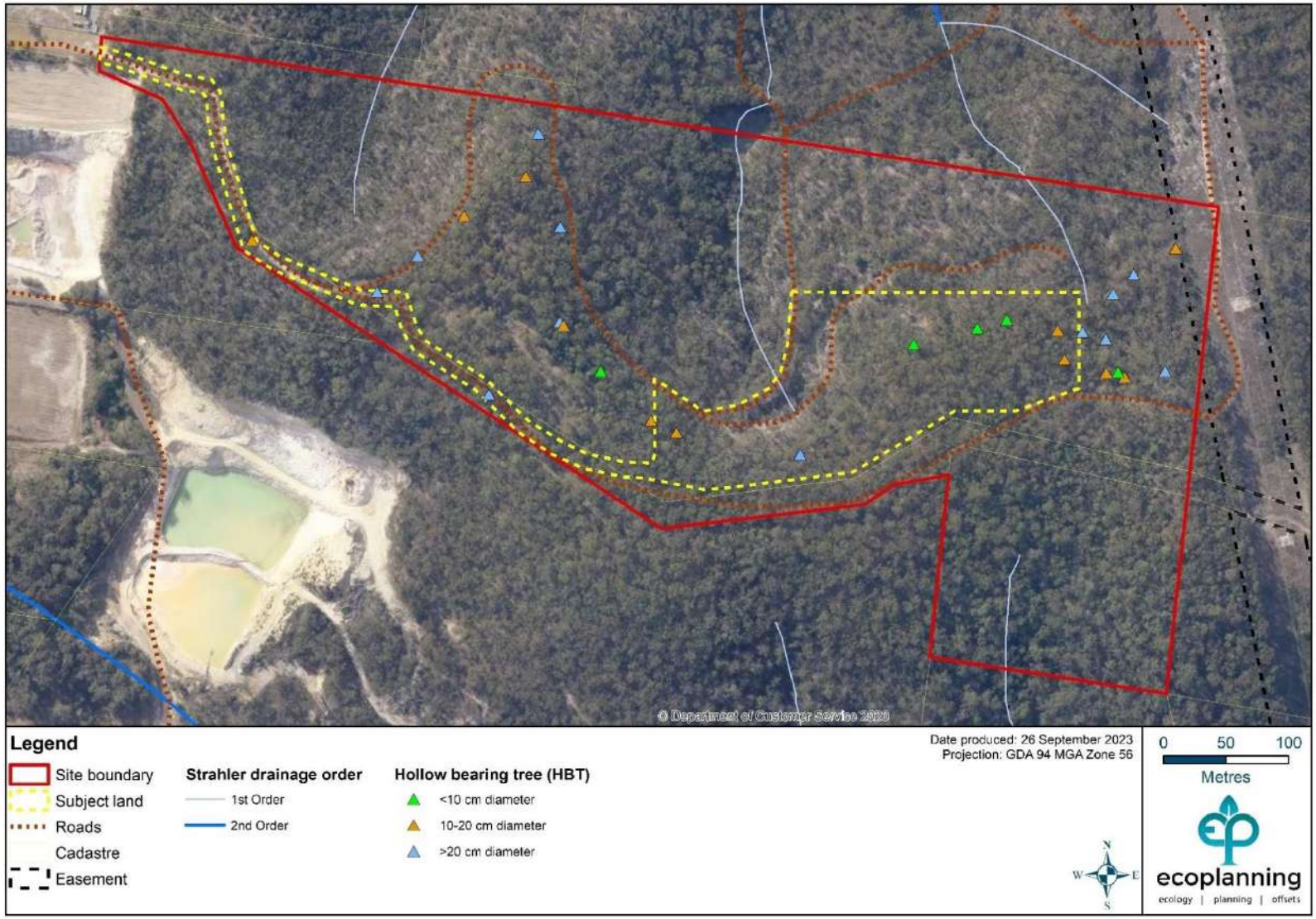

Figure 3.9: HBTs within the subject land and study area

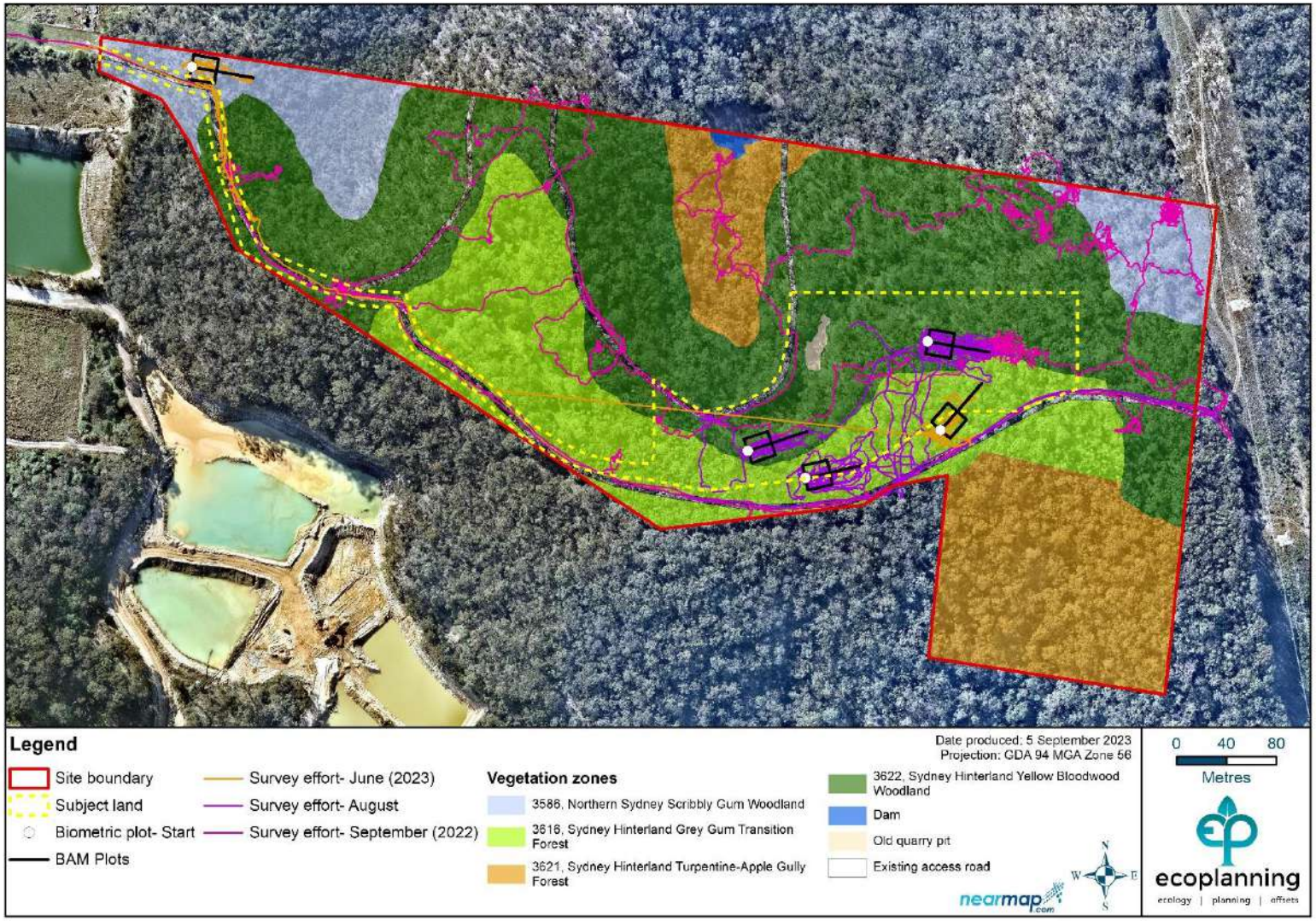

Figure 3.10: BAM plots and survey effort

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.

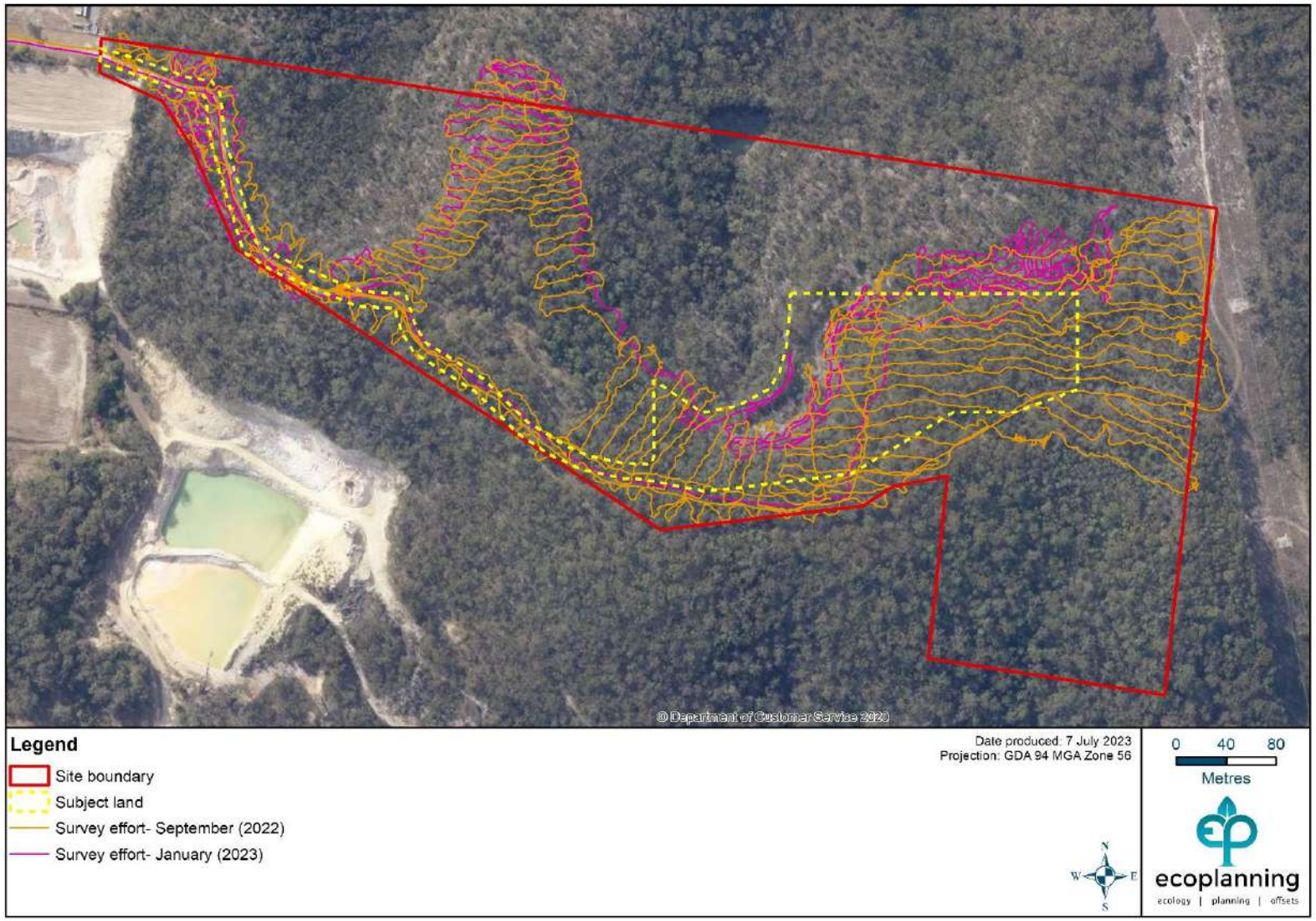

Figure 4.1: Survey effort – threatened flora

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**.

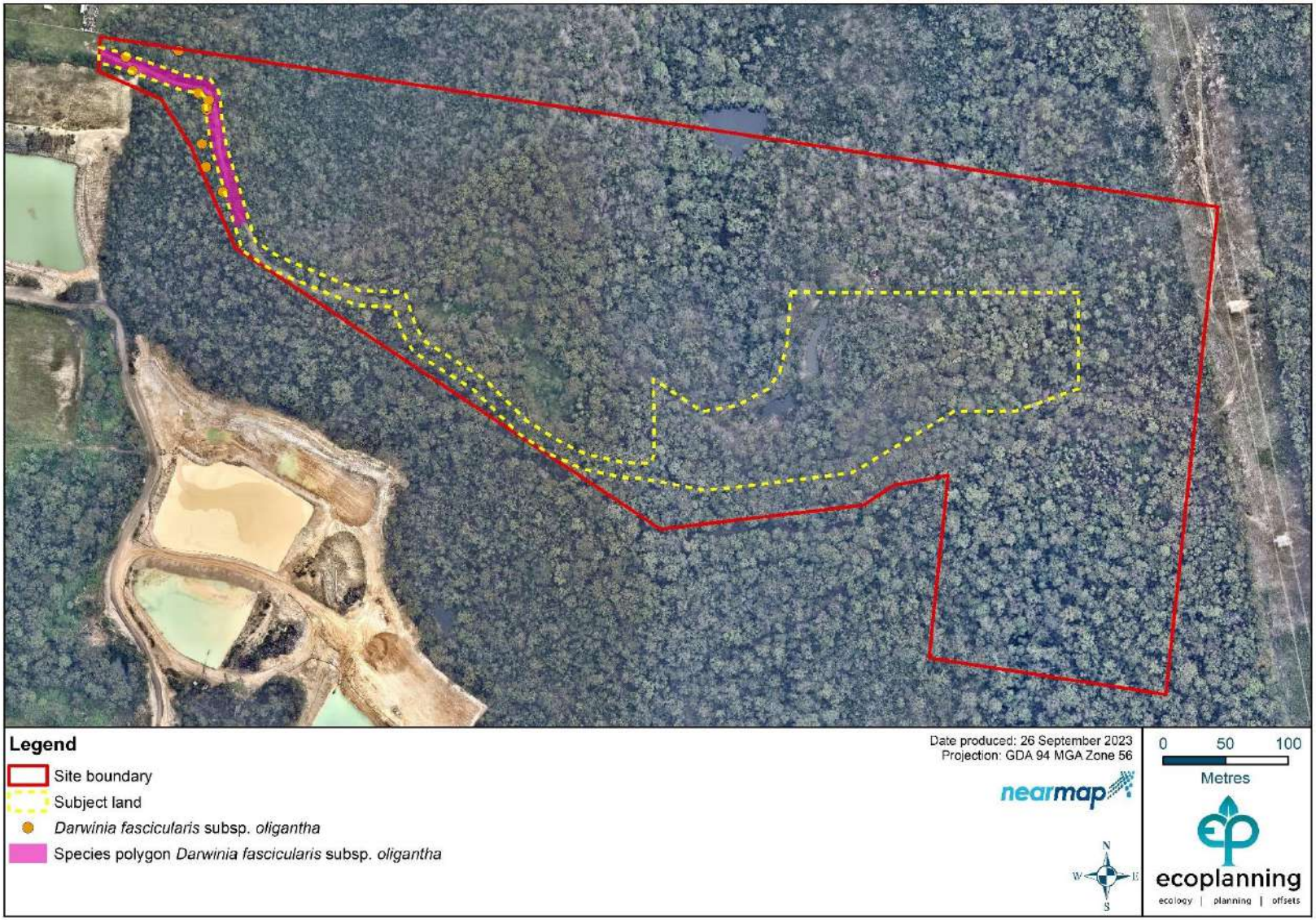

Figure 4.2: Species polygon for *Darwinia fascicularis* subsp. *oligantha* endangered population

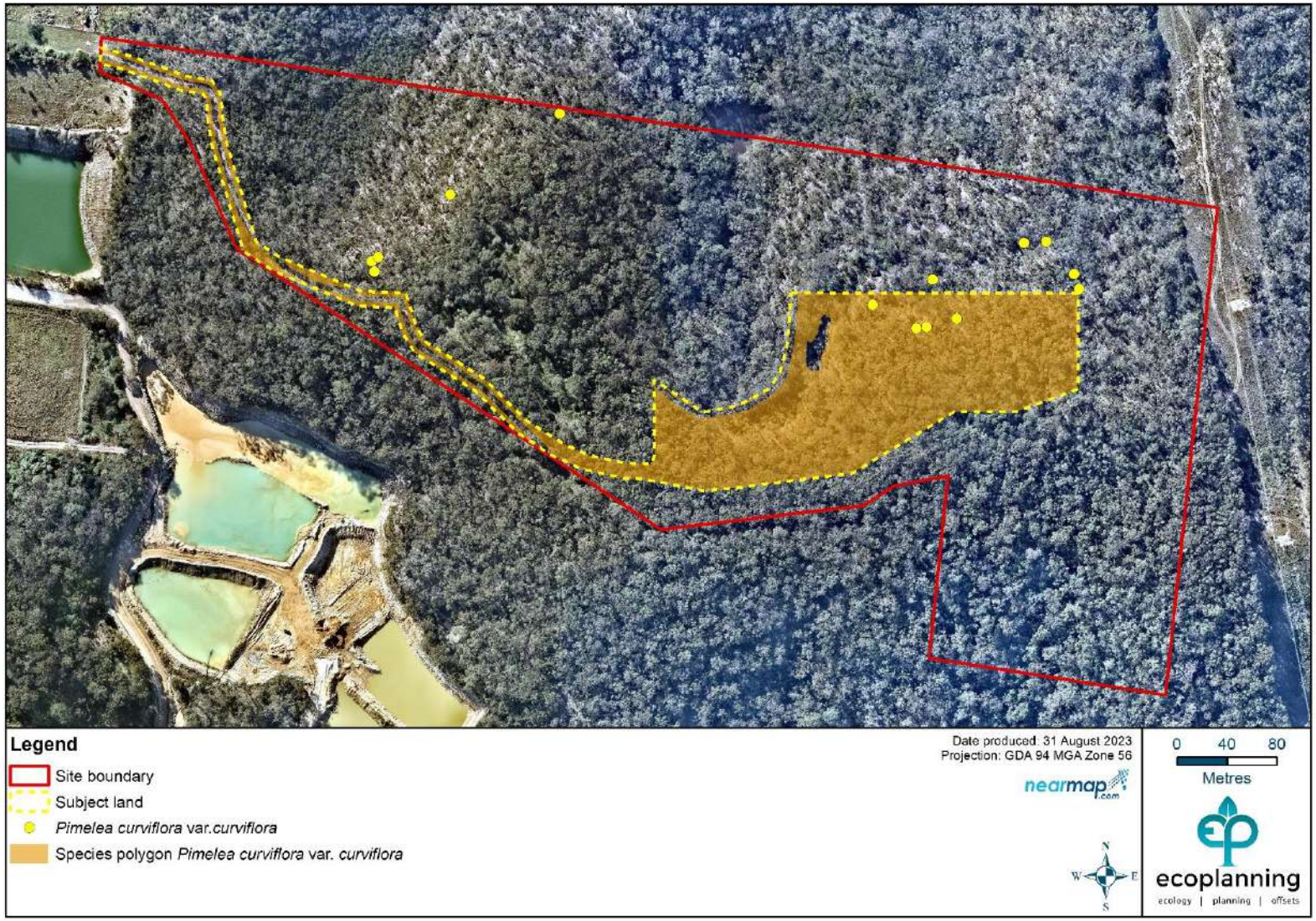

Figure 4.3: Species polygon for *Pimelea curviflora* var. *curviflora*

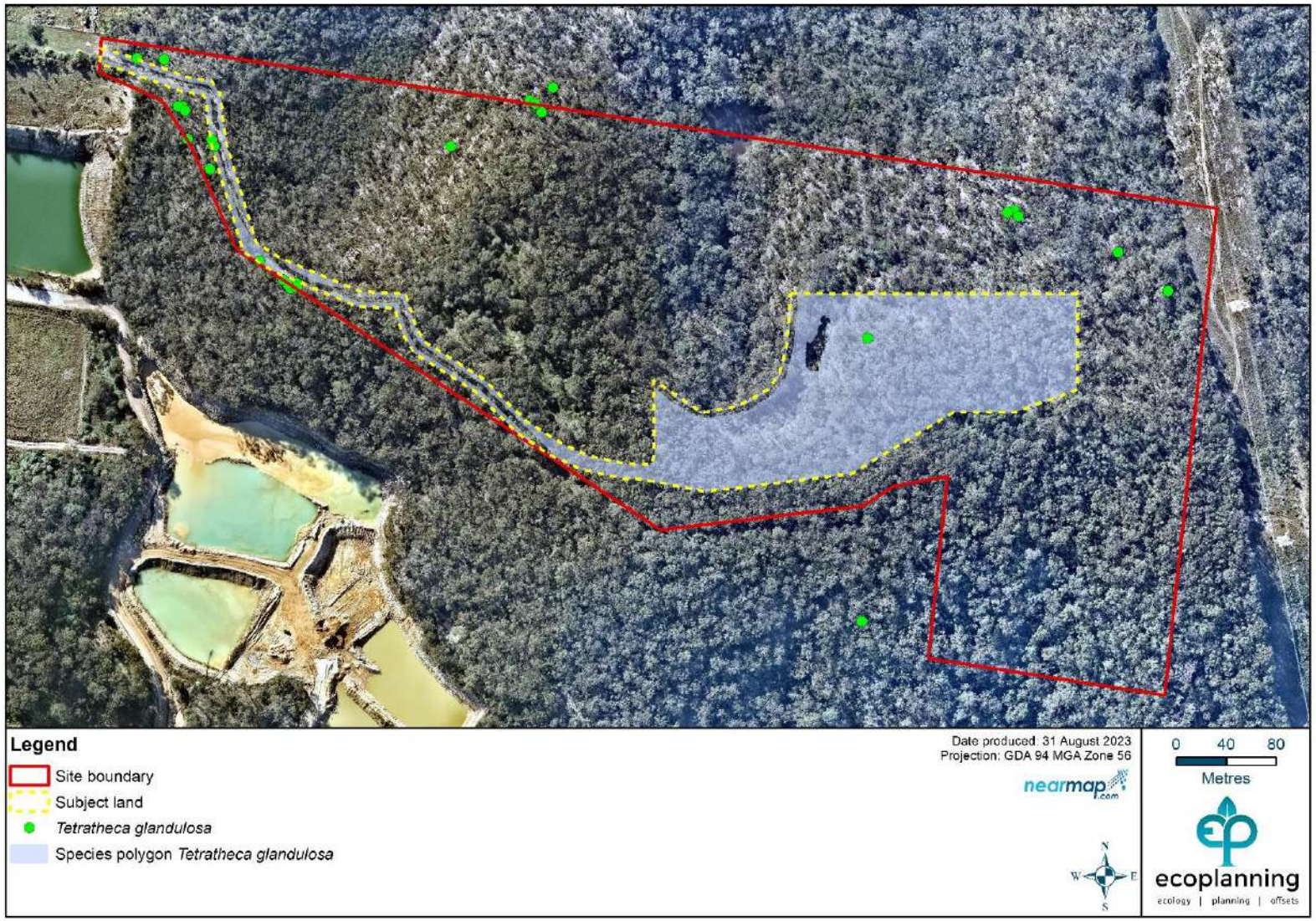

Figure 4.4: Species polygon for *Tetratheca glandulosa*

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.

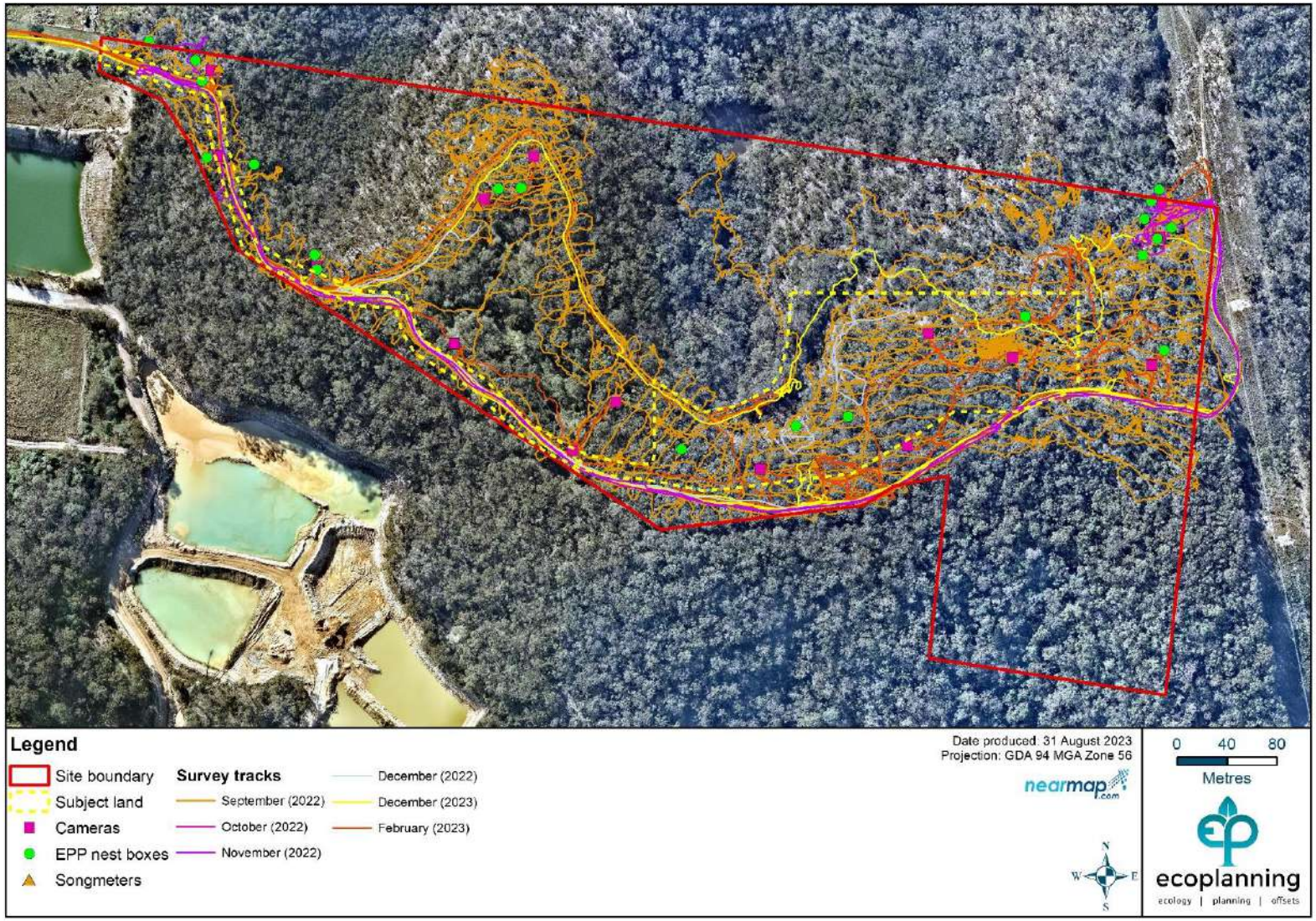

Figure 4.5: Survey effort – threatened fauna, spring 2022 – summery 2023

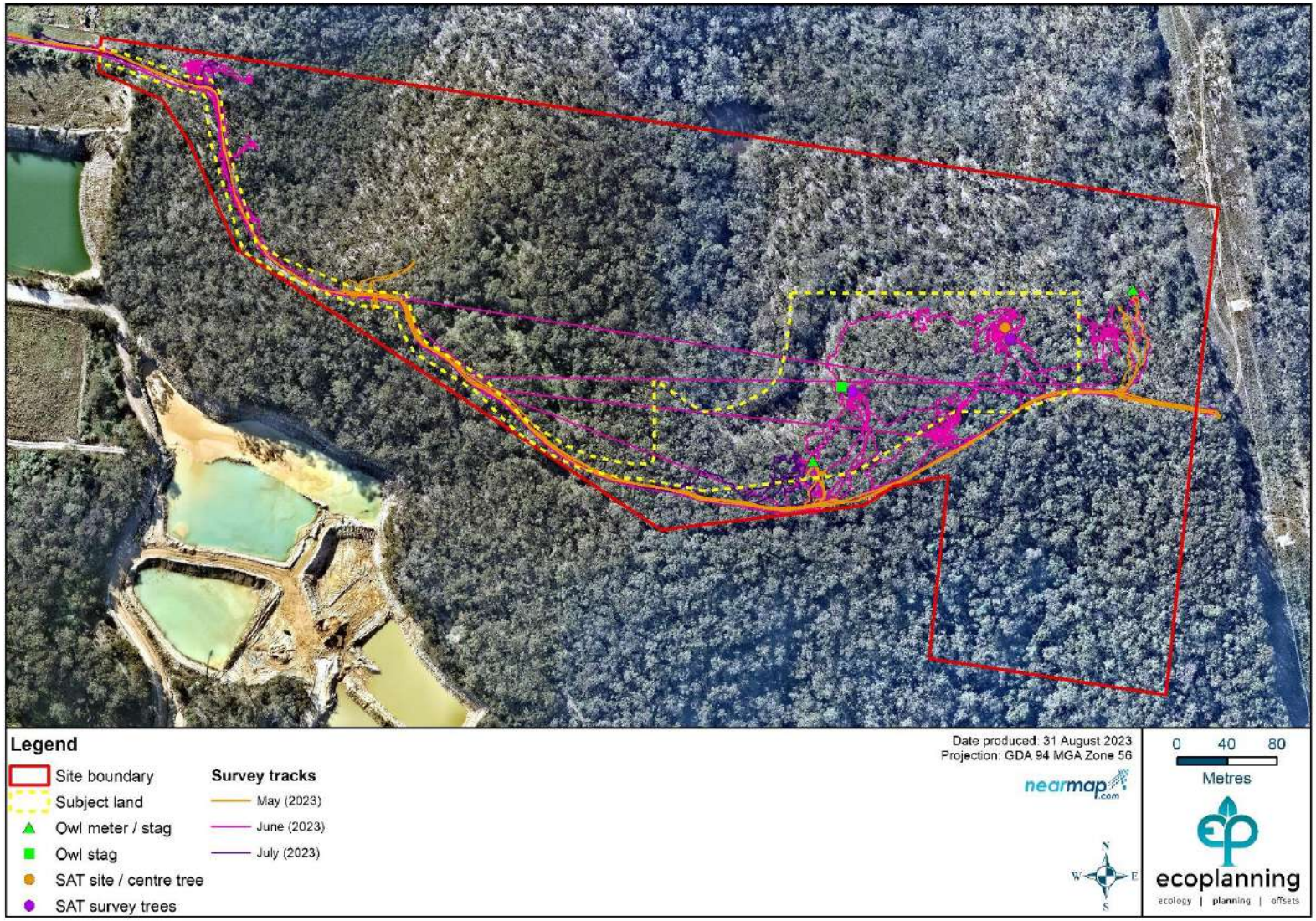

Figure 4.6: Survey effort – threatened fauna, winter 2023

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**.

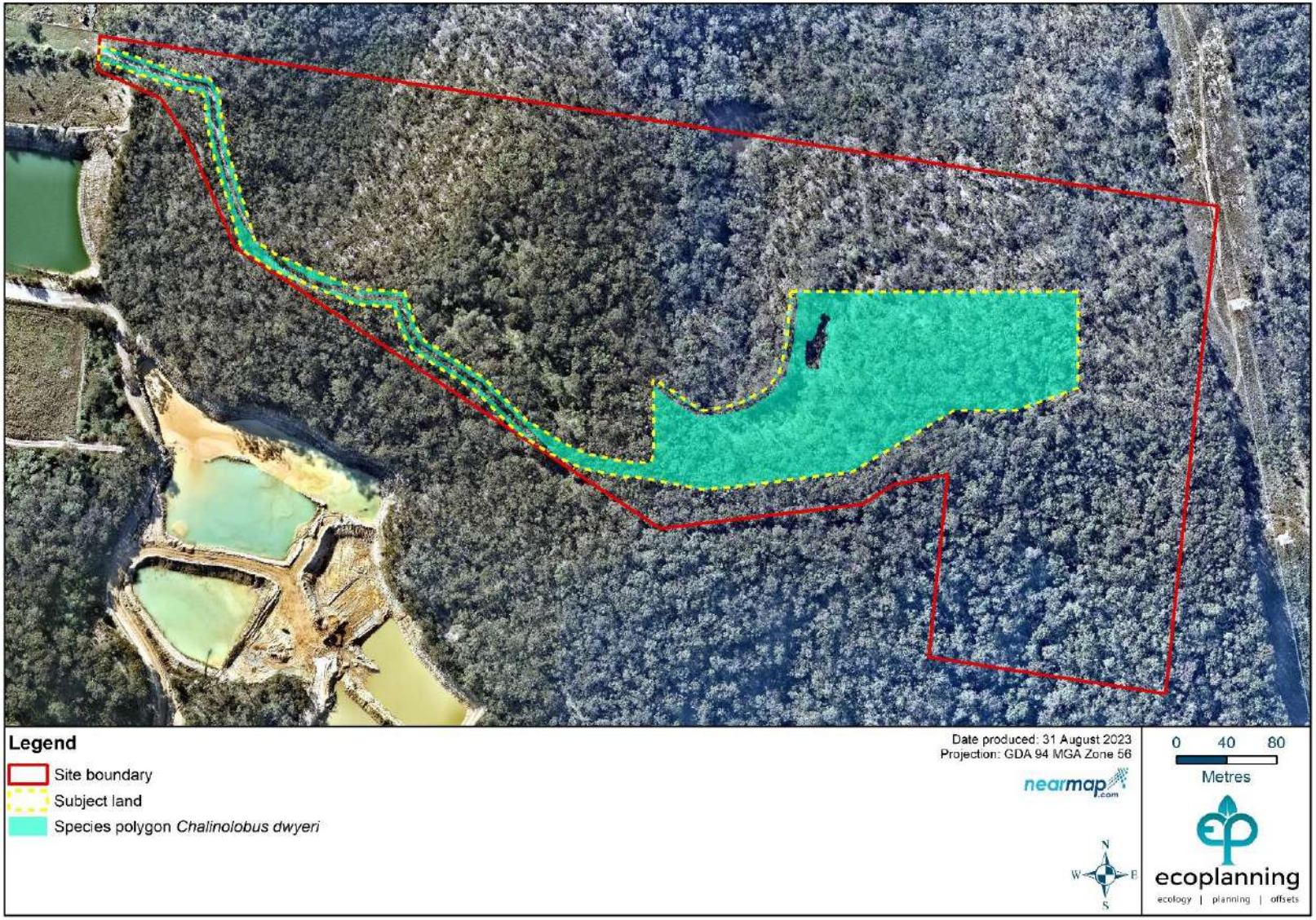

Figure 4.7: Species polygon for Large-eared Pied Bat

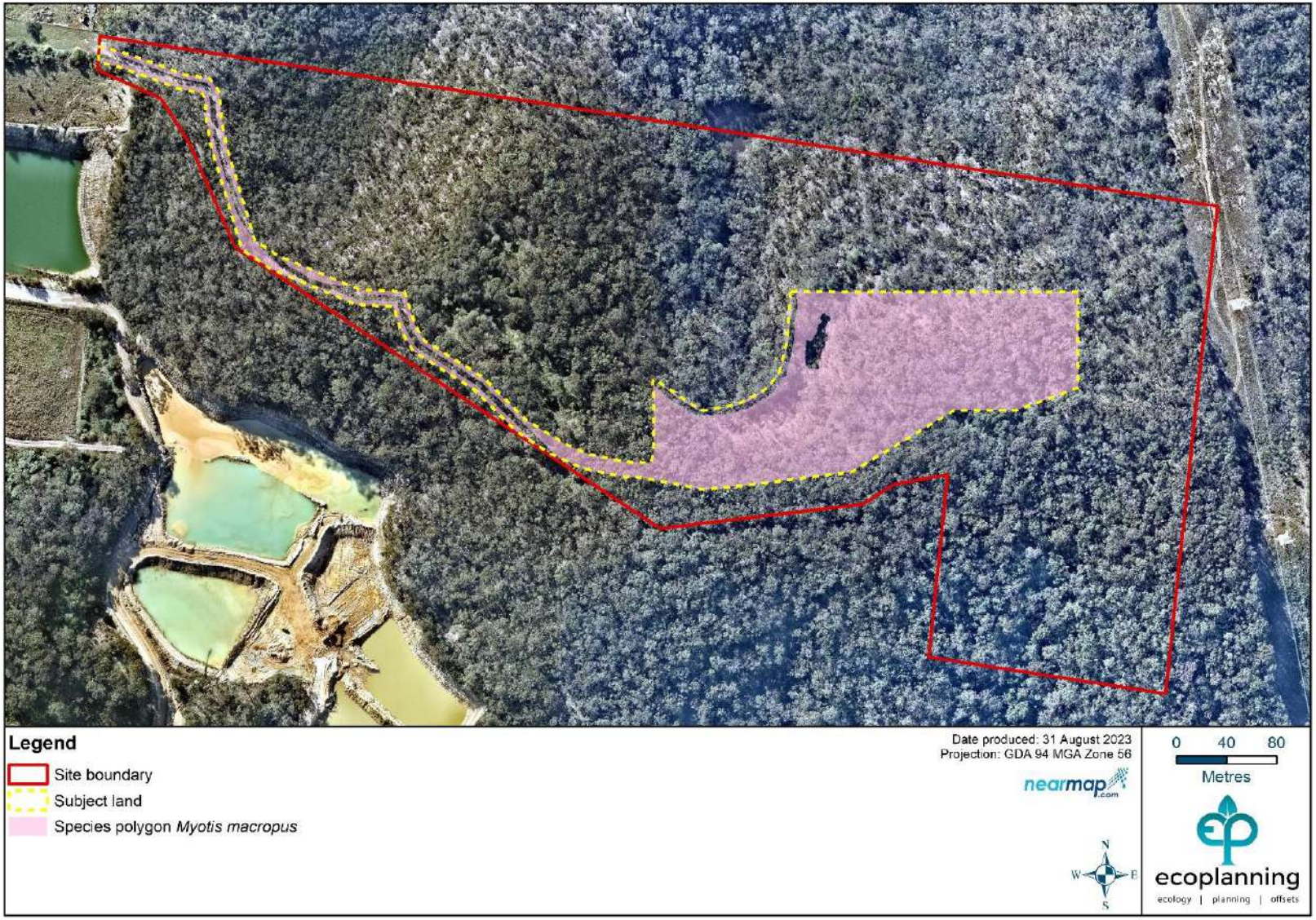

Figure 4.8: Species polygon for Southern Myotis

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**.

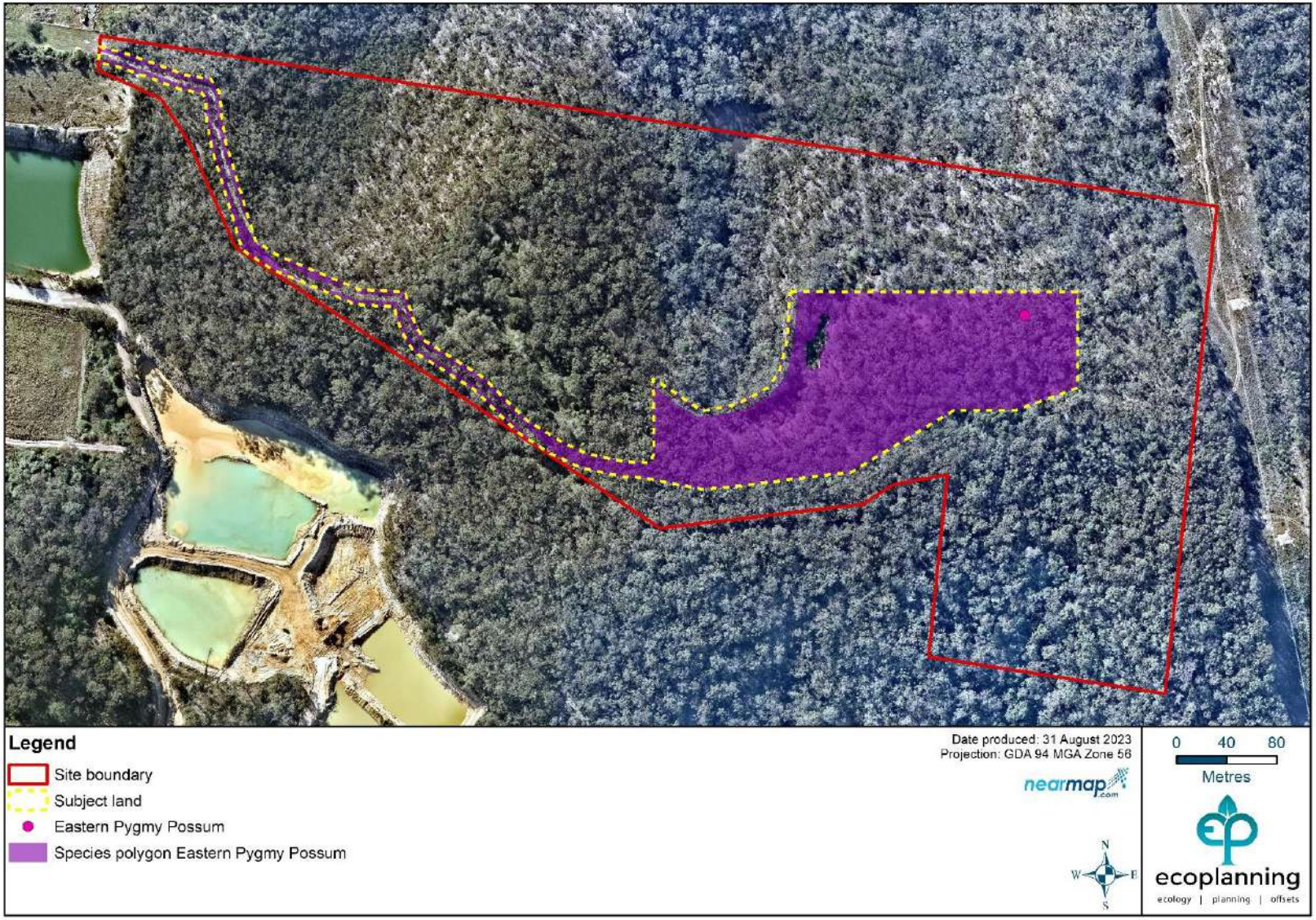

Figure 4.10: Species polygon for the Eastern Pygmy Possum

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.

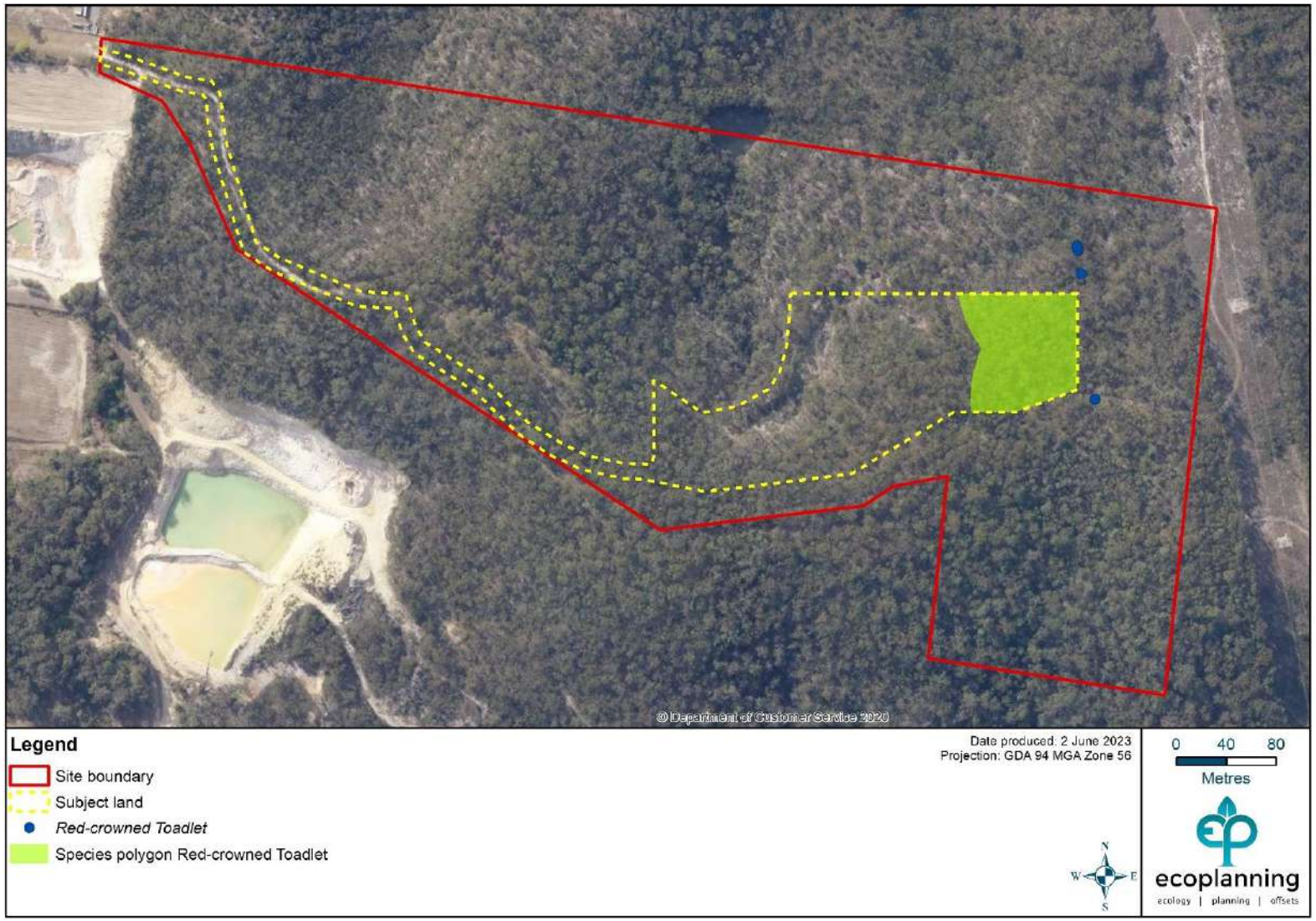

Figure 4.11: Species polygon for Red-crowned Toadlet

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.

The originally proposed extraction area was designed to encompass an area to the north of the former extraction areas at an elevation of approximately 210m AHD (**Figure 5.1**). Following field inspections undertaken by RWC and the Applicant, it was determined that the originally proposed location was unsuitable for a variety of reasons, including the impacts to native vegetation. A design of the alternate extraction area was never prepared as this was ruled out almost immediately after investigating the area during a site visit. After the site visit the 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.

In order to avoid impacts to native vegetation, the new proposed extraction area (subject land) 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 5.2**, 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 (**Figure 5.2)** 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 5.3**).

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 BAM plots were not completed in the location of the originally planned extraction area, or parts of the study area not impacted by the Proposal (which would allow for 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**).

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. The proposed location of the access road is favourable because it minimises works within this corridor as far as practicable and ensures that access would be maintained to Dalgety's Creek Fire Trail and the adjoining Marramarra National Park throughout all stages of operations. Utilising the existing access also means that impacting native vegetation to establish new tracks has been avoided as far as practicable. 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).

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), potential breeding habitat for threatened species such as hollow bearing trees were identified within the subject land, however a majority of these features within the study area have been avoided under the proposal (**Figure 3.9**). For threatened species that could utilise these features within the subject land, targeted surveys in accordance with the BAM have been conducted. Stag watching and spotlighting of large hollow bearing trees (>20 cm DBH) did not detect forest owls, Glossy Black-Cockatoos were not detected at suitable stags during the breeding season and stick nests of threatened raptors were not identified during the respective breeding seasons. To mitigate impacts to native hollow dependant species during development works, pre-clearance surveys of native vegetation and buildings are to be conducted to determine the presence of habitat trees and fauna. Clearing of native vegetation and buildings is to be supervised by a suitably qualified ecologist and soft felling techniques are to be utilised by arborists. These measures are discussed further in Section **7.1.2**.

To mitigate impacts of the proposed development on threatened species habitat and aquatic habitat present downstream from the Subject Land as well as cumulative impacts of the proposal on the waterways of Marramarra National, the Quarry Site has been designed with a closed water management system to ensure there would be nil discharge of sediment-laden water from the site. In summary, surface water flows from the southern portion of the Quarry

Site would be diverted around the Extraction Area by a series clean water diversion to a point where the water can flow to NPWS land or be captured by the Quarry Sump. The Quarry Site has been designed to minimise disturbance to areas containing steep slopes, where practicable, to ensure impacts to the catchment are minimised. Stormwater runoff at the Quarry Site would generally be limited to the water from the eastern clean water diversion, which does not require treatment as it is considered "clean water". Water captured within the disturbance area of the Quarry would be directed to either a sediment basin within the Office, Amenities and Parking Area or the Quarry Sump for settlement and use for misting sprays or internal application on haul roads and unformed tracks (i.e. open space irrigation). Therefore, it is considered that there would be no impacts to the surrounding waterways resulting from "dirty water".

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.

While the subject land is located within the species polygon for Red-crowned Toadlet which represents breeding and non-breeding habitat for the species (**Figure 4.11**), it is not feasible to totally avoid impacts to the species polygon due to the constraints of the site. From an engineering and environmental perspective, placing the extraction area close to the top of the ridge within the study area minimises the risks of groundwater intersection. As detailed in the EIS, monthly monitoring of the groundwater bore within the property has established that the average standing water level within this bore is approximately 47.1mbgl (i.e. >30m below the proposed extraction floor). Additionally, the proposed location of the extraction area within the subject land also has the benefit of the former extraction areas providing existing sumps, thereby minimising the risks of sediment-laden runoff during site establishment. From an economic and operation perspective, reducing the footprint of the extraction area is not practicable for the ongoing efficient recovery of resource and from an ecological perspective, lateral movement of the extraction area as a potential alternative location is considered to have greater impacts on native vegetation than the current location. Although impacts to the species polygon for the Red-crowned Toadlet cannot be totally avoided by the proposal, the development footprint is generally situated in the most degraded habitat within the species polygon and all records of the species are outside the subject land which minimises impacts to the Red-crowned Toadlet. Additionally, the watercourse which provides breeding habitat for the species will not be directly impacted by the proposal. Indirect impact to the species have been discussed in the previous section and will also be mitigated through a site-specific

EMP (**Section 7**). Unavoidable impacts to the lowest quality habitat for Red-crowned Toadlet will be offset in accordance with the BAM to ensure no net loss for the species.

The development footprint impacts the species polygons for additional threatened species such as Eastern Pygmy Possum, Eastern Cave Bat, Southern Myotis and Large-eared Pied Bat. Polygons for these species occur either entirely or across a majority of the study area, so total avoidance of the polygon is not possible. Therefore, the footprint of the development has been positioned in the most degraded areas for habitat to minimise impact to the species. Although the proposed works impact connective and foraging habitat for these species, retained vegetation does still provide connectivity throughout the study area. Unavoidable impacts to the conservatively estimated habitat extents of Eastern Pygmy Possum, Eastern Cave Bat, Southern Myotis and Large-eared Pied Bat will be offset in accordance with the BAM to ensure no net loss for these species.

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.

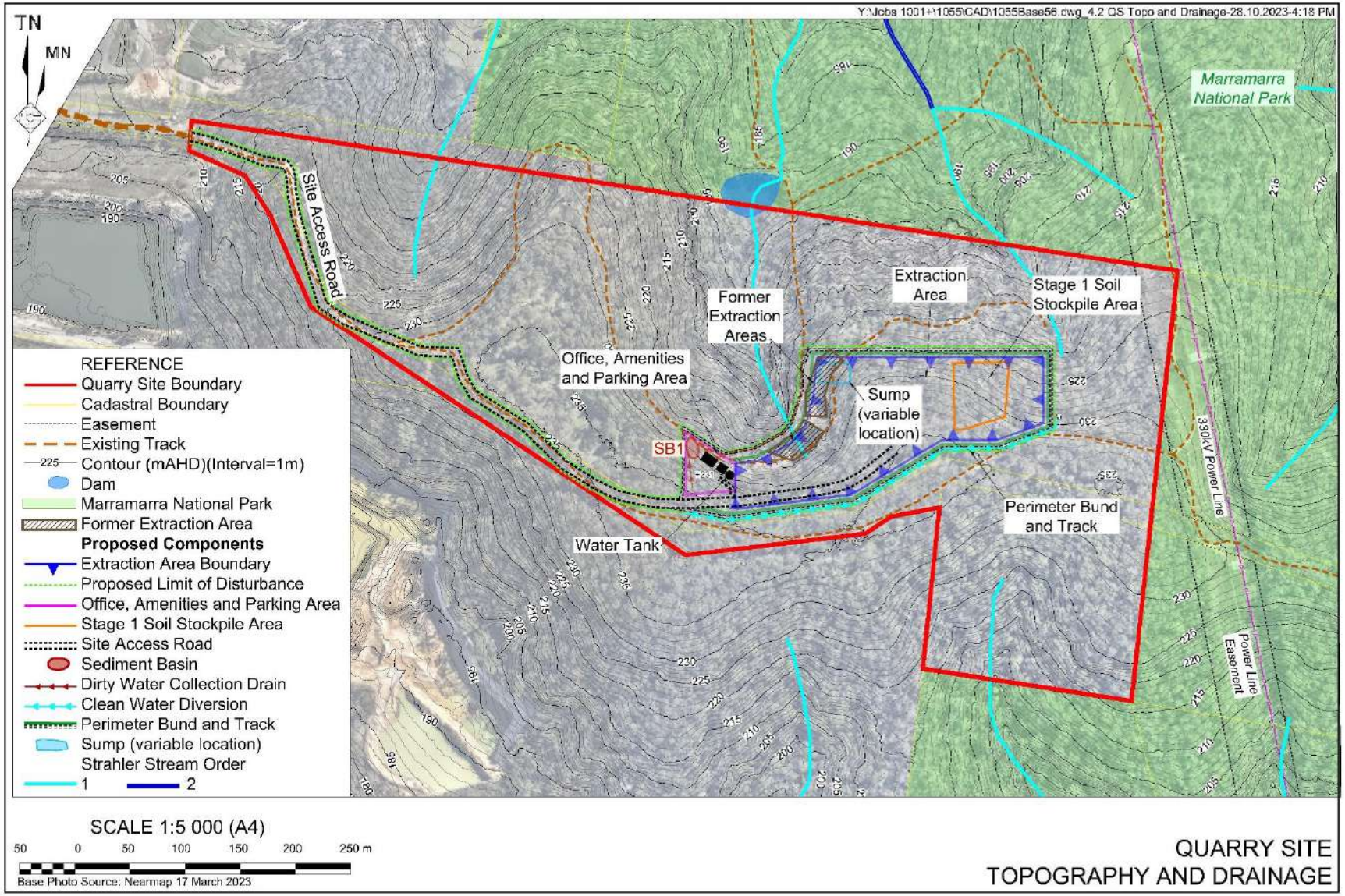

Figure 5.1: Former extraction areas, topography and drainage of the proposed quarry site

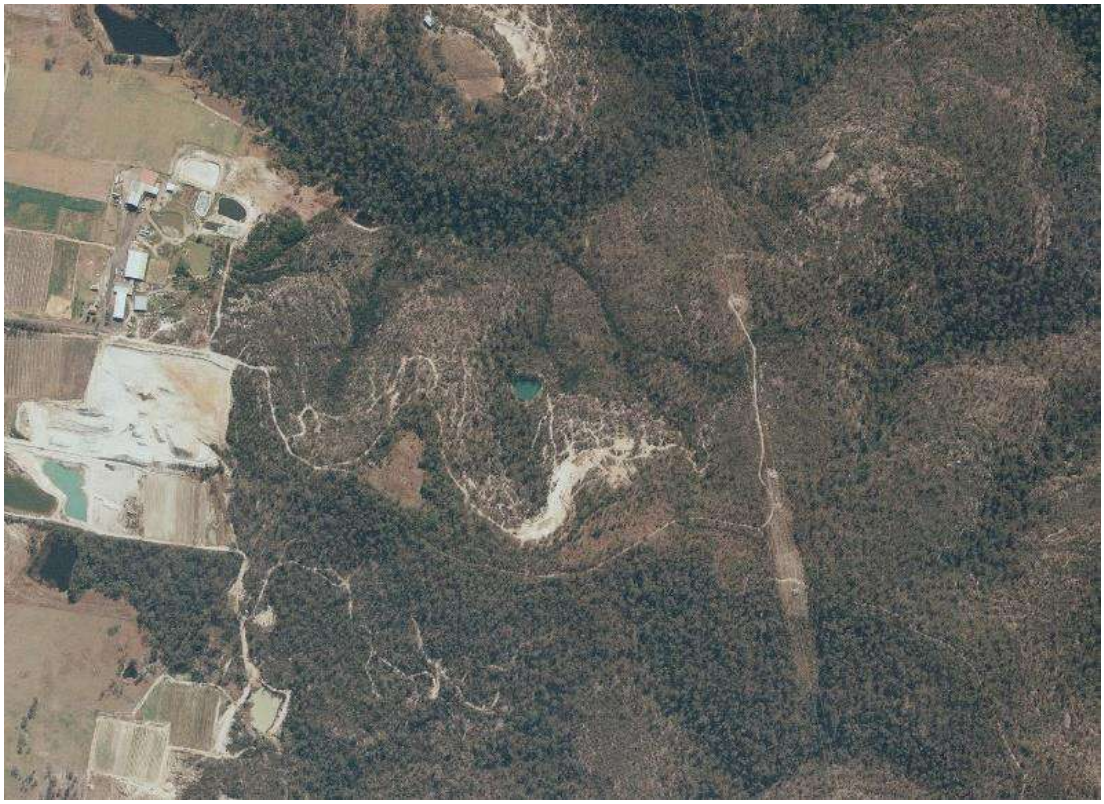

Figure 5.2: The subject land as of 1990 (NSW Spatial Services 2023)

Figure 5.3: 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**

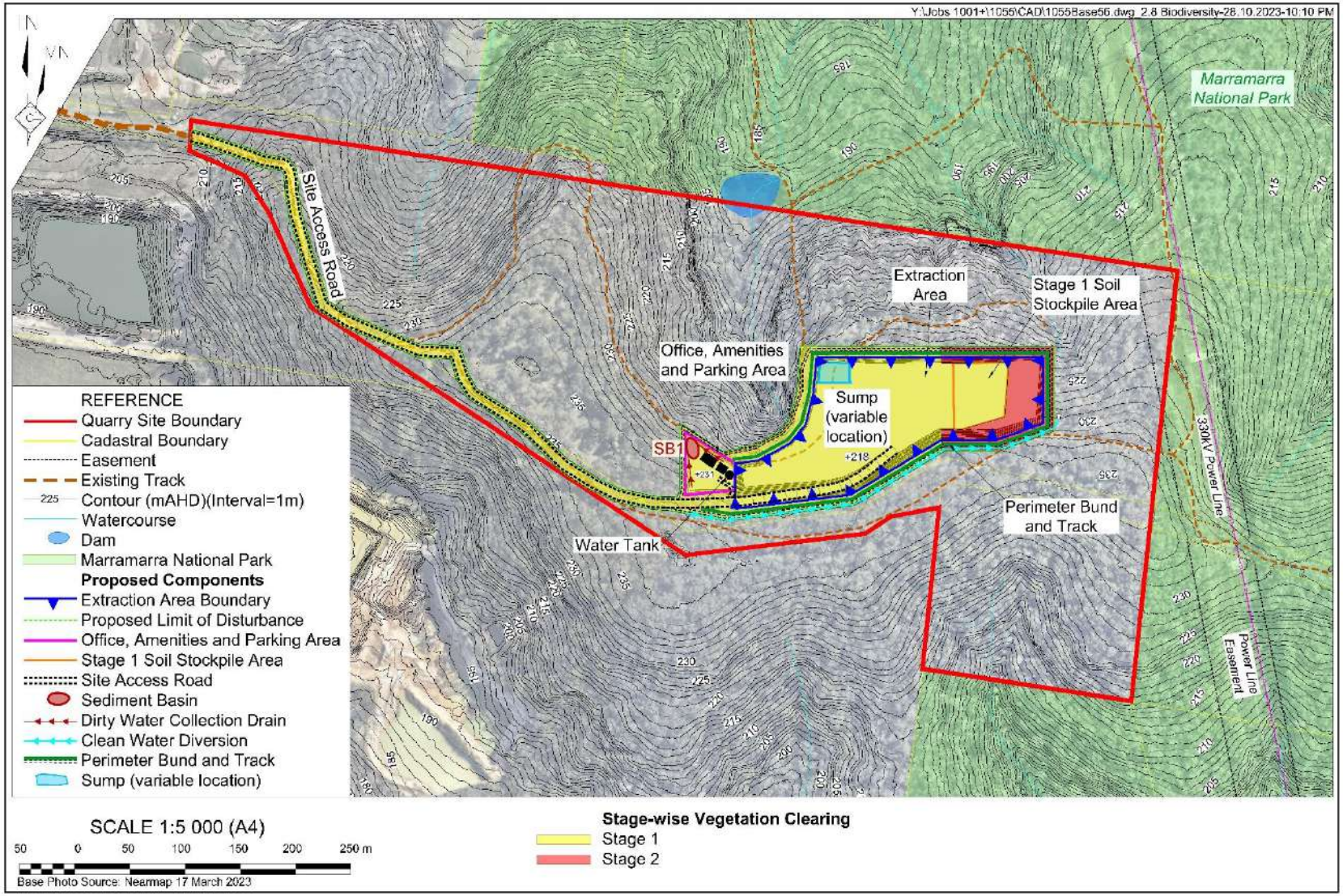

Figure 8.2: The stages of biodiversity impacts associated with the Proposal

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.

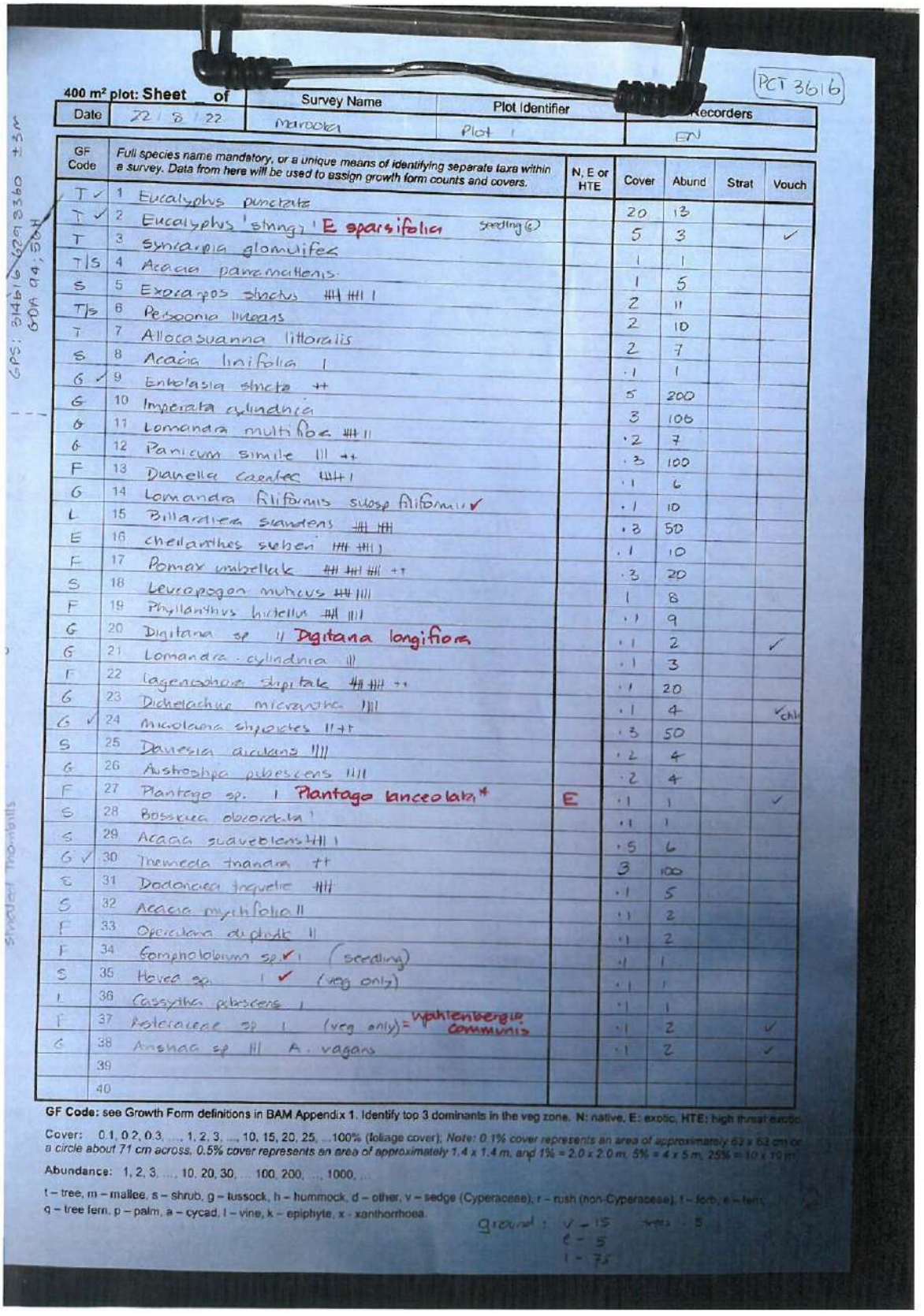
Appendix B Plot data

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



PCT 3616

400 m² plot: Sheet __ of

Date	Survey Name	Plot Identifier	Recorders
22/8/22	Maroota	Plot 1	EN

GPS: 56H 294166 6229336 ±3m

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	Eucalyptus punctata		20	13		
T ✓	2	Eucalyptus 'stringy' E sparsifolia seedling (E)		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	Allocasuarina littoralis		2	7		
S	8	Acacia linifolia		.1	1		
G ✓	9	Entolasia stricta ++		5	200		
G	10	Imperata cylindrica		3	105		
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	Chelanthes 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. 1 Digitaria longiflora		.1	2		✓
G	21	Lomandra cylindrica |||		.1	3		
F	22	Lagenophora stipitata |||||			.1	20		
G	23	Dichelachne micrantha ||||		.1	4		✓chl
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	Tremeda tranda ++		3	100		
S	31	Dodonaea boroniifolia |||		.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) = Hypochaeris communis		.1	2		✓
G	38	Aristida 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

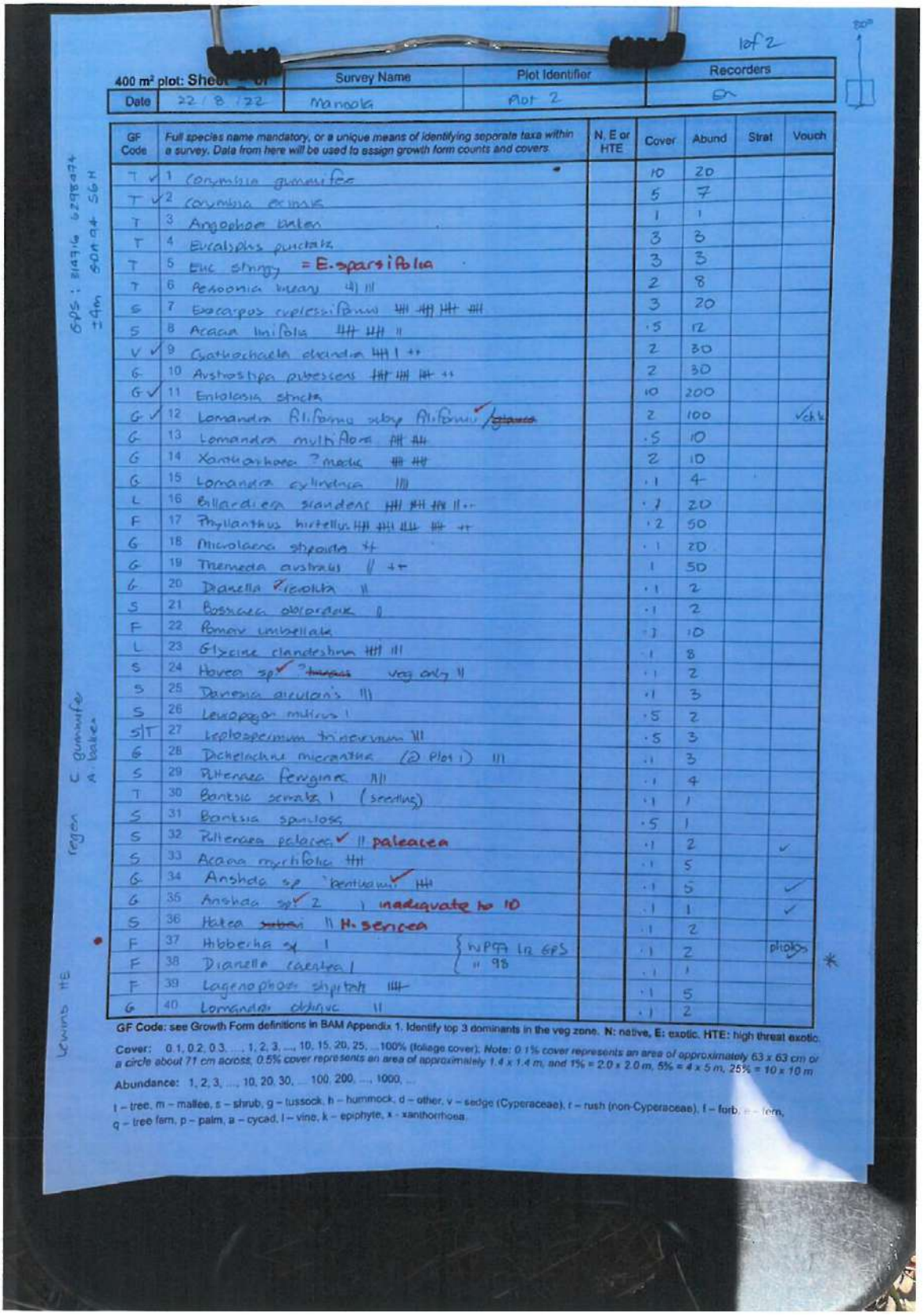
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

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 litter - 5
f - 5
l - 75

Shrubel Trail



400 m² plot: Sheet 1 of 2

Survey Name	Plot Identifier	Recorders
Maroota	Plot 2	EK

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
T ✓	1 Corymbia gummifera		10	20		
T ✓	2 Corymbia eximia		5	7		
T	3 Angophora hispida		1	1		
T	4 Eucalyptus punctata		3	8		
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 Gahnia clarkei 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		✓ckk
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 // 4+		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 ✓ ~~linearis~~ 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 Plots) III		.1	3		
S	29 Pultenaea ferruginea III		.1	4		
T	30 Banksia serrata I (seedling)		.1	1		
S	31 Banksia spinulosa		.5	1		
S	32 Pultenaea pelecies ✓ II paleacea		.1	2		✓
S	33 Acacia myrtifolia IIII		.1	5		
G	34 Anshdo sp 'pentiwan' ✓ IIII		.1	5		✓
G	35 Anshaa sp ✓ 2 I inadequate to ID		.1	1		✓
S	36 Hakea ~~subsal~~ II H. sericea		.1	2		
F	37 Hibbertia sp I { WP77 in GPS II 98		.1	2		photos
F	38 Dianella caerulea I		.1	1		
F	39 Lagenophora stipitata IIII+		.1	5		
G	40 Lomandra obliqua II		.1	2		

GPS: 814916 6298474 ±4m 56H

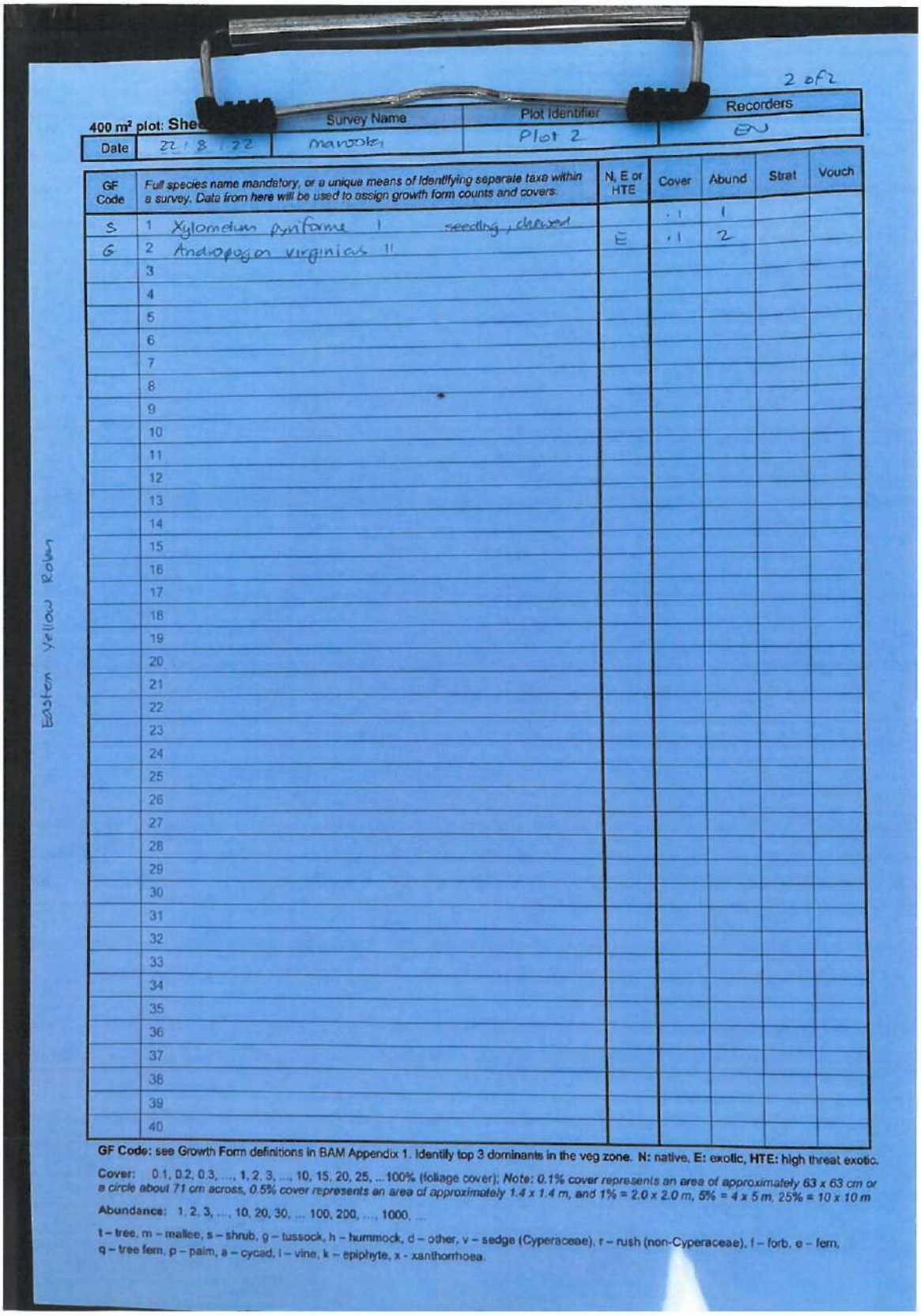
Lewins HE region C. gummifera A. baileyana

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



2 of 2

400 m² plot: Shee

Date	Survey Name	Plot Identifier	Recorders
22/8/22	Maroota	Plot 2	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
S	1 Xylomelum pyriforme		.1	1		
G	2 Andropogon virginicus	E	.1	2		
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
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	36					
	37					
	38					
	39					
	40					

seedling, chewed

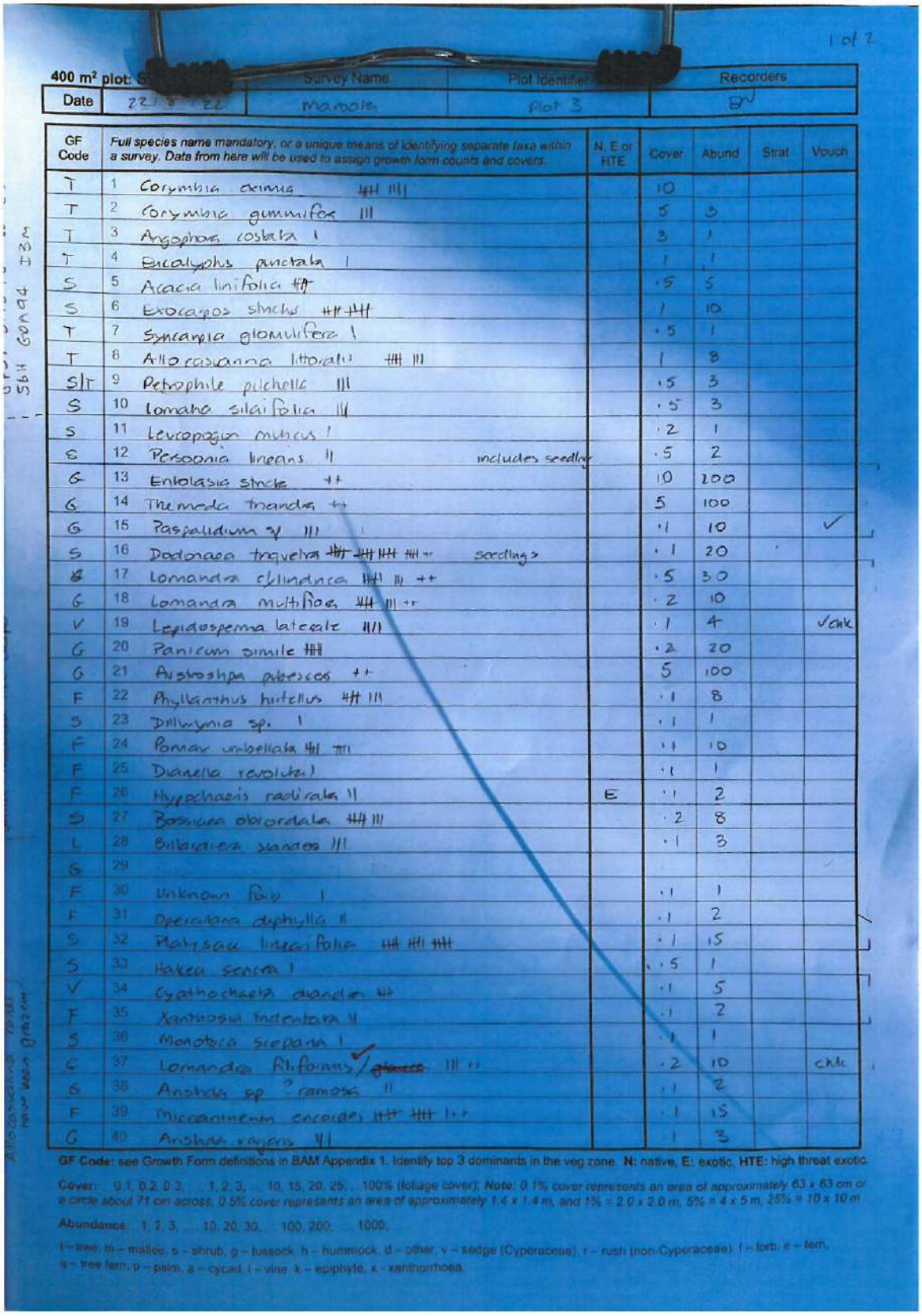
Eastern Yellow Robin

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	EV

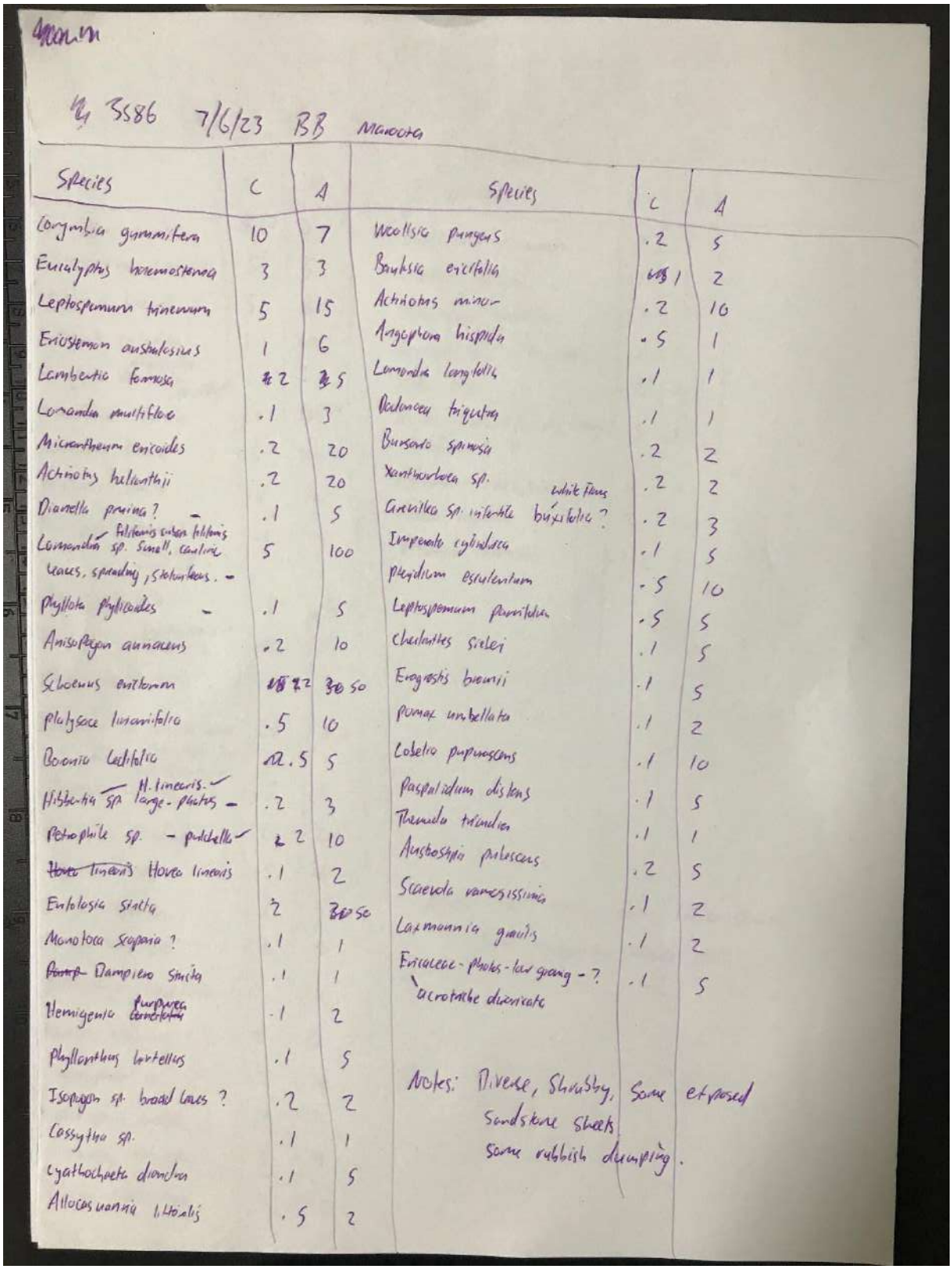
GF Code		Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
T	1	Corymbia eximia		10			
T	2	Corymbia gummifera		5	3		
T	3	Angophora costata		3	1		
T	4	Eucalyptus 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	100		
G	14	Themeda triandra		5	100		
G	15	Paspalidium sp.		.1	10		✓
S	16	Dodonaea triquetra	seedlings	.1	20		
G	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	Microtis unifolia		.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.

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.



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~~	~~5~~
Lomandra multiflora	.1	3
Micrantheum ericoides	.2	20
Actinotus helianthii	.2	20
Dianella prunina ?	.1	5
Lomandra sp. Small, caulive leaves, spreading, stoloniferous. - filiformis subsp filiformis	5	100
Phyllota phylicoides	.1	5
Anisopogon avenaceus	.2	10
Sclerus entheron	~~1~~ ~~2~~	~~30~~ 50
Platysace linearifolia	.5	10
Boronia ledifolia	~~2~~ .5	5
Hibbertia sp large-plates - H. linearis.	.2	3
Petrophile sp. - pulchella	~~2~~ 2	10
~~Hovea linearis~~ Hovea linearis	.1	2
Entolasia stricta	2	~~30~~ 50
Monotoca scoparia ?	.1	1
~~Dampiera~~ Dampiera stricta	.1	1
Hemigenia ~~purpurea~~ combustula	.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	~~.5~~ 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. infertile 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
Cobetia purpurascens	.1	10
Pasphalidium distans	.1	5
Thysanella triandra	.1	1
Aristobasis pulescens	.2	5
Scaevola ramosissima	.1	2
Laxmannia gracilis	.1	2
Ericaceae - plants - too young - ? 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

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

Appendix 6

Erosion and Sediment Control Plan

(Total No. of pages including blank pages = 19)

CENTRAL CIVIL

ABN: 61 167 710 545

Erosion and Sediment Control Plan

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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

Erosion and Sediment Control 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. 1055/03e February 2025

RWCorkery&co

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

GENERAL NOTES

SCOPE

- This *Erosion and Sediment Control Plan* (ESCP) has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd.
- The ESCP describes the Best Management Practices (BMPs) that will be employed to minimise erosion and avoid discharge of sediment to lands and/or waters from activities undertaken at the Maroota Central Civil Quarry (the Quarry) within Lots 1 and 2 DP609224 as well an unnamed Crown road reserve, at 4773 Old Northern Road, Maroota (the Quarry Site).

SCOPE (Cont'd)

- The ESCP includes the installation, operation, and maintenance of BMPs, including clean water diversion drains, sediment fencing, and a sediment basin, for activities completed during Quarry operations (refer to Figures E1, E2 and E3).
- BMPs are designed according to the relevant guidelines and Standard Drawings (SDs) in *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volume 2E – Mines and Quarries* (DECC, 2008).
- BMPs will remain operational and maintained throughout the life of the Quarry unless otherwise specified.
- This ESCP will continue to apply until any significant changes to site operations necessitate a revised ESCP to address updated erosion and sediment control requirements.

MANAGEMENT OBJECTIVES

The ESCP's primary objectives are to:

- Prevent and/or minimise soil erosion and sediment transport to downstream areas.
- Manage rainfall and surface water runoff sustainably to protect natural ecosystems.
- Support adaptive management and ecological sustainability throughout Quarry operations.

PRINCIPLES OF EROSION AND SEDIMENT CONTROL MANAGEMENT

- The ESCP is based on the three broad stormwater management principles identified by *Table 4.1* of *Managing Urban Stormwater: Council Handbook* (EPA, 1997).
- These management principles are applied hierarchically, where valuable features of the natural environment are identified and retained or restored.
- Preventative measures are then implemented with 'end of pipe' measures only applied for residual impacts that cannot be effectively mitigated at source.

MANAGEMENT TECHNIQUES

- Five broad management practices are applied as part of the ESCP.
- **Table E1** identifies the stormwater management techniques to be applied for each of the five management practices and with reference to the principles of stormwater management hierarchy.

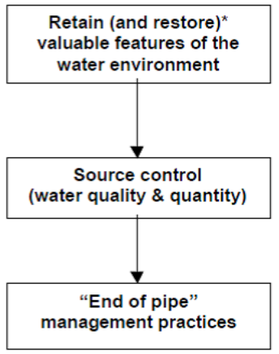

Table 4.1 – Stormwater Management Hierarchy

Source: EPA (1997)

TABLE E1 STORMWATER MANAGEMENT TECHNIQUES

Management Practice	Management Principles			Monitoring and Maintenance
	Retention and Restoration	Source Control	End-of-Pipe Mitigation	
Flow	Reduce the disturbed catchment by diverting clean water runoff away from disturbed areas into designated clean water diversion channels (SD 5-6). Divert runoff from the Stockpile Area into the Extraction Area where feasible to reduce risks of offsite impacts (BMP Notes - Diversion Drains).	Clear land incrementally, in immediate advance of extraction activities, to minimize exposed disturbed areas (BMP Notes - Progressive Stabilisation, Table E5). Construct perimeter drains and bunds to control and safely discharge accumulated flow within the site (SD 5-6).	Install rock lining and energy dissipaters at drainage discharge points to prevent scouring (SD 5-4). Design sediment basins to retain all inflows, adhering to nil-discharge principles (BMP Notes - Sediment Basins, Table E4).	Implement a self-auditing program that maintains flow control structures and ensures non-erosive discharges within the site (Notes on Monitoring and Maintenance).
Channel Morphology	Establish and maintain vegetation cover along diversion channels and bunds to reduce flow velocities and prevent erosion (Table E3, BMP Notes - Diversion Drains). Use compacted material or geotextiles where vegetation is not sustainable (BMP Notes - Progressive Stabilization, Table E5).	Install rock check dams or straw bale barriers in drainage paths to slow flows and reduce erosion risks (SD 5-4, SD 6-7, BMP Notes - Diversion Drains).	Maintain clean water diversion drains and rock-lined outfalls to stabilise discharge points (SD 5-6, SD 5-4). Ensure all discharge flows from channels are managed to prevent scouring (BMP Notes - Diversion Drains).	
Water Quality	Ensure that all sediment-laden water is directed to sediment basins or the Extraction Area Sump for retention and treatment, following the closed water management system (SD 5-5, BMP Notes - Sediment Basins). Divert clean water away from disturbed areas using upslope diversion channels (SD 5-6).	Design drains and bunds to contain and control flow in a non-erosive manner (Table E3, SD 5-6). Progressively rehabilitate areas post-extraction to reduce runoff volumes and improve water quality (BMP Notes - Progressive Stabilization, Table E5).	Maintain sediment fencing downslope of disturbed areas, including stockpile zones and road construction areas (SD 6-8, BMP Notes - Sediment Fencing, Table E2). Use straw bales as additional controls for fine particle capture (SD 6-7, BMP Notes - Sediment Fencing).	Conduct regular inspections and maintenance of sediment basins and other water management structures to ensure functionality (Notes on Monitoring and Maintenance).
Riparian Vegetation	Not applicable because of Nil Water Discharge Site			
Aquatic Habitat	Implement measures to reduce the regional catchment by redirecting clean water away from disturbed areas through diversion drains (SD 5-6, BMP Notes - Diversion Drains).	Construct clean water drains and diversion structures to manage the accumulated flow and prevent erosion (SD 5-6, BMP Notes - Diversion Drains).	Maintain sediment basins with designed capacity to ensure efficient sediment retention (BMP Notes - Sediment Basins, Table E4). Install energy dissipaters at channel outlets where applicable (SD 5-4).	

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

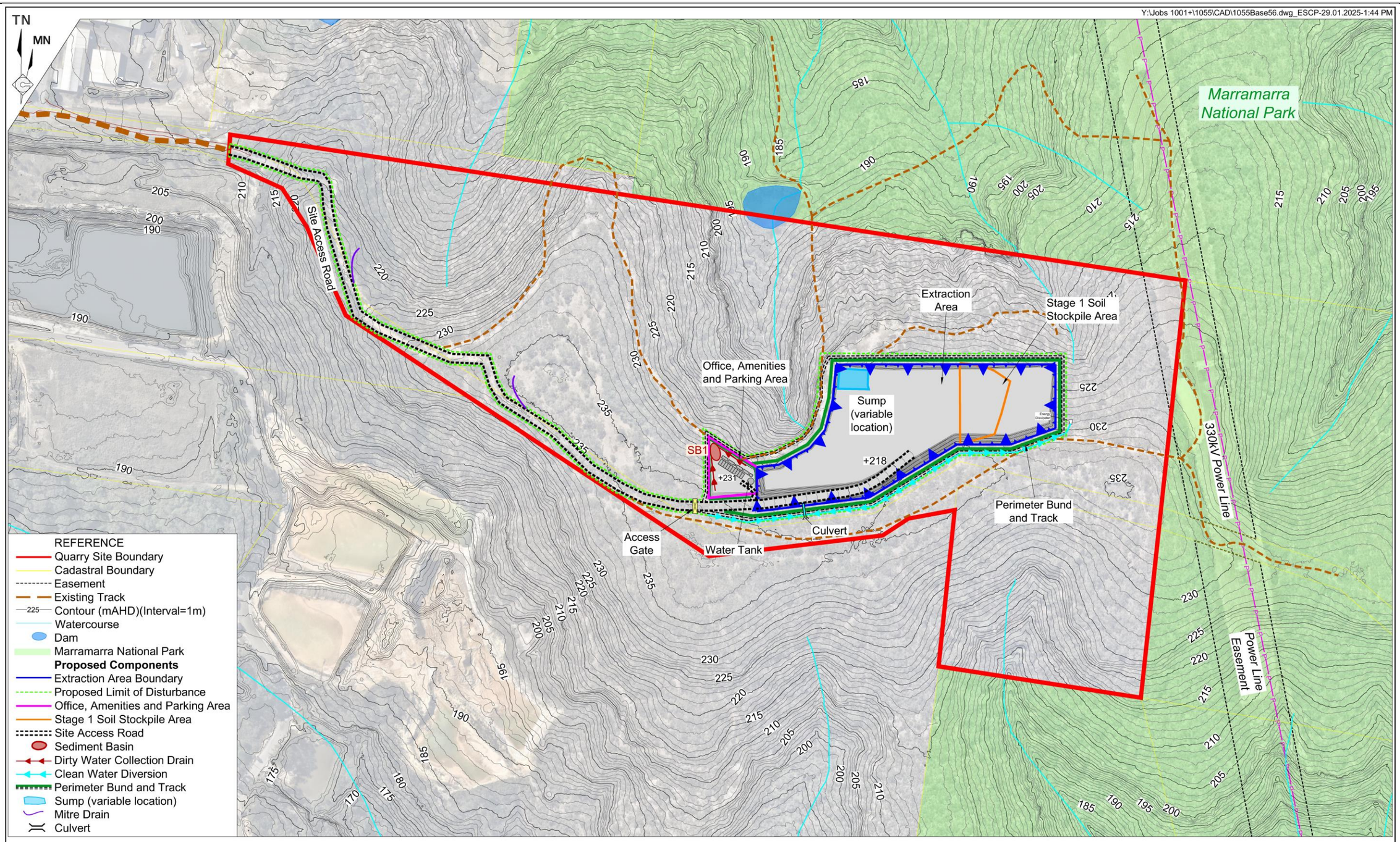

Figure E1
PROJECT SITE LAYOUT

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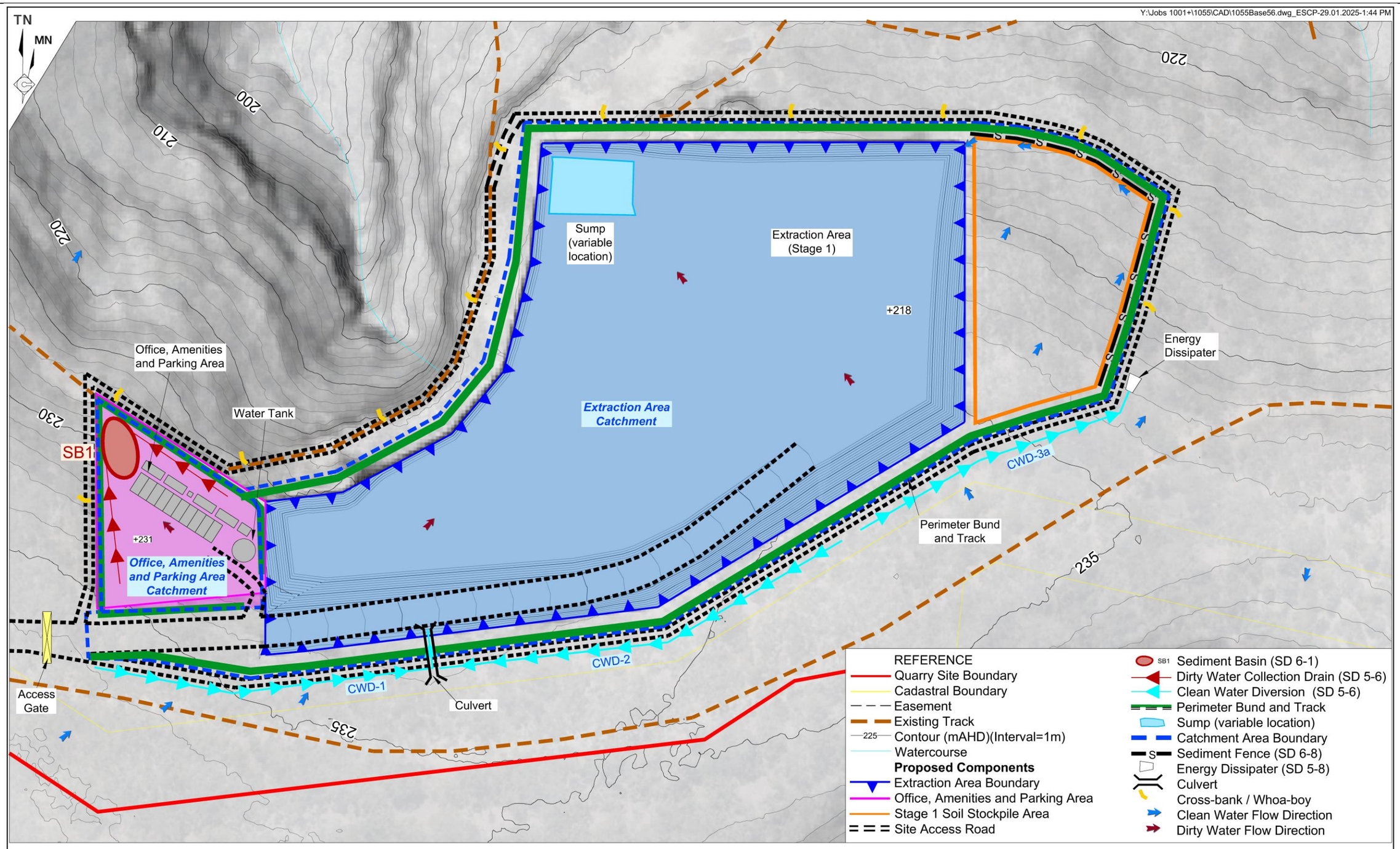

SCALE 1:1 000 (A3)

10 0 10 20 30 40 50 m

Source: ELVIS - Geoscience Australia

Figure E2
EROSION AND SEDIMENT CONTROL PLAN - STAGE 1

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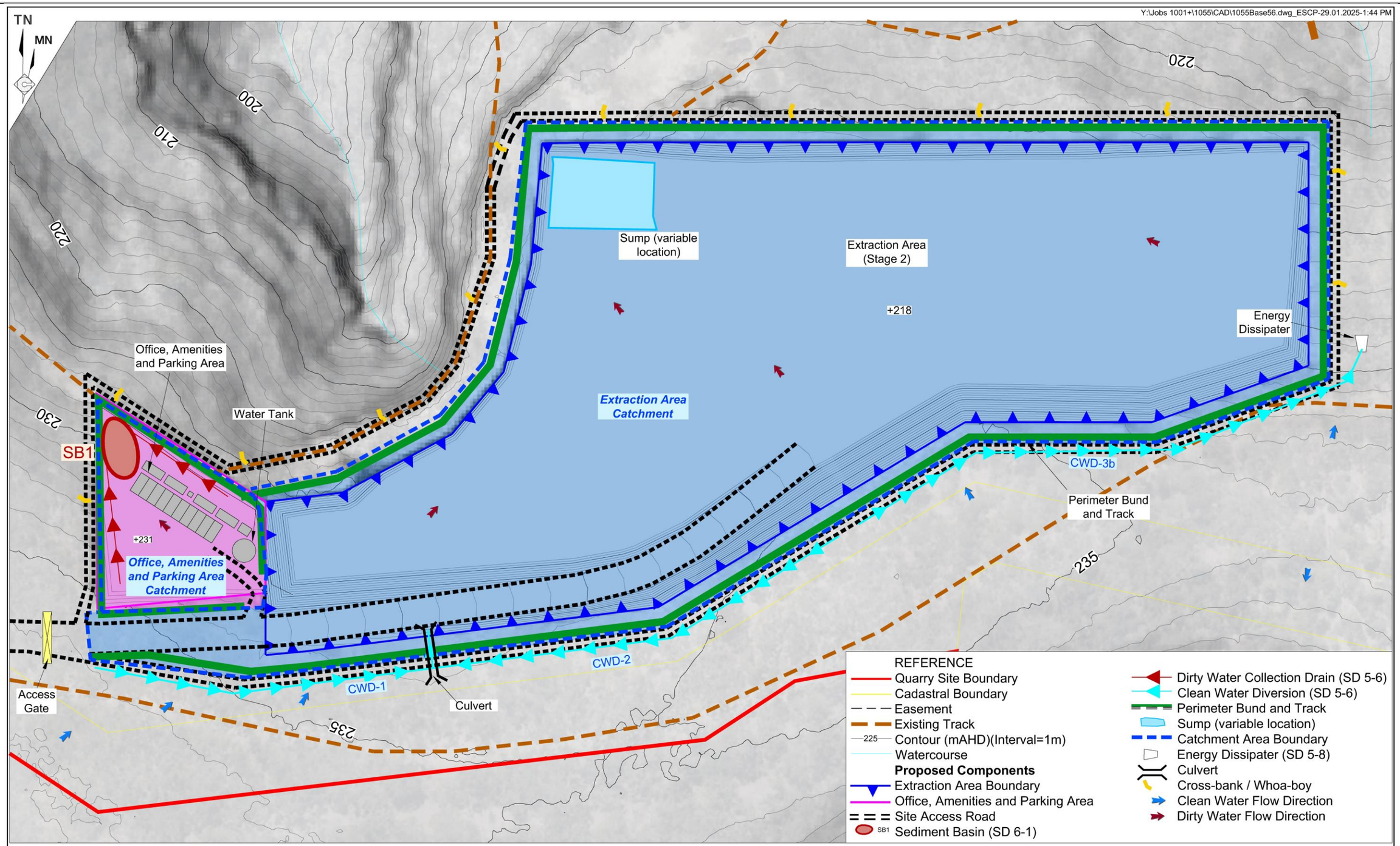
Maroota Central Civil Quarry – Erosion and Sediment Control Plan



SCALE 1:1 000 (A3)

10 0 10 20 30 40 50 m

Source: ELVIS - Geoscience Australia

Figure E3
EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - NOTES 4		
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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

ESCP IMPLEMENTATION

STAGE 1

Works (as identified in **Figures E1, E2 and E3 – Sheets 02 to 04**) are to be undertaken concurrently within three areas of the Quarry Site, namely:

- Extraction Area
- Stage 1 Soil Stockpiling Area
- Office, Amenities and Parking Area

Within these three areas, the following general measures will be implemented.

1. Access Restrictions:

   Delineate and restrict access to No Go Areas with bunds, diversion banks, or other suitable means in the areas nominated on **Figure E2** (refer to BMP Notes – Facility Access and Barrier Fencing).

   Restrict access within the land defined by the ESCP, as nominated in **Table E2**.

2. Safety and Diversion Bunds:

   Construct Safety/Diversion Bunds as nominated in **Figure E2** (refer to BMP Notes – Safety/Diversion Bunds and **Table E4**).

3. Clean Water Diversion Drains:

   Construct Clean Water Diversion Drains to divert clean runoff away from disturbed areas, as illustrated in **Figure E2** (refer to **SD 5-6**, BMP Notes – Diversion Drains and **Table E4**).

4. Sediment Basin:

   Construct Sediment Basin 1 (SB1) for the capture of runoff from disturbed zones, ensuring design capacities meet or exceed requirements for a 5-day 95th percentile rainfall event (refer to BMP Notes – Sediment Basins and **Table E5**).

   Place vertical markers within SB1 to define the Water Settlement Zone and Sediment Storage Zone requirements.

5. Earth Banks for Runoff Diversion:

   Construct Perimeter bund as low-flow earth banks to divert runoff from the Stage 1 Soil Stockpiling Area to Quarry Sump (refer to BMP Notes – Diversion Drains and **Table E4**).

   Stabilise all drains and batters (refer to BMP Notes – Diversion Drains & Discharge Points).

6. Outlet Protection:

   Install energy dissipaters at the discharge point of the Clean Water Diversion Drains to prevent scouring (refer to **SD 5-8** and BMP Notes – Outlet Protection).

7. Stockpiling and Soil Management:

   Establish the Stage 1 Soil Stockpiling Area, ensuring compliance with **SD 4-1** for slope stability and height restrictions (refer to **Sheet 10**).

   Stabilise soil stockpiles within 10 days to achieve a C-Factor of 0.1 (refer to **Table E3**).

8. Sediment Fencing:

   Install sediment fencing downslope of the Stage 1 Soil Stockpile Area and Extraction Area in accordance with **SD 6-8** (refer to **Sheet 14**).

9. Progressive Stabilization:

   Initiate progressive stabilisation measures to control erosion in completed sections of the site (refer to BMP Notes – Progressive Stabilization).

10. Monitoring and Maintenance:

    Implement self-auditing programs and regular inspections to maintain flow control structures (refer to BMP Notes – Monitoring and Maintenance).

STAGE 2

11. Safety and Diversion Bunds:

    Extend or modify Safety/Diversion Bunds around the expanded Stage 2 Extraction Area, as shown on **Figure E3** (refer to BMP Notes – Safety/Diversion Bunds and **Table E4**).

12. Clean Water Diversion Drains:

    Construct and maintain extended Clean Water Diversion Drains for the expanded Stage 2 Extraction Area, following specifications outlined in **SD 5-6** (refer to **Sheet 11**).

13. Outlet Protection:

    Ensure energy dissipaters are in place at the new discharge point at the end of extended clean water diversion drain, as outlined in **SD 5-6** (refer to **Sheet 11**).

SOIL STRIPPING

1. Where soil is present, this will be stripped to the maximum depth available.
2. Soil stripping will not be undertaken during or following rainfall when soil likely to be excessively damp.
3. Soil stripping will not be undertaken during hot, windy conditions.

Stripped topsoil will either be temporarily stockpiled (refer to Notes on Soil Stockpiling) or immediately transferred to completed and profiled sections of the Extraction Area (refer to Notes on Soil Respreading).

SOIL STOCKPILING

1. All stockpiles will be constructed in accordance with **SD 4-1** (refer to **Sheet 10**).
2. Soil stockpiles will remain less than 2m in height.
3. Slopes of the stockpiles will be battered to provide a 1:3 (V:H) slope or less.
4. Stockpiles will be at least 5m from a watercourse.
5. Stockpiles will be stabilized to achieve a C-Factor of 0.1 within 10 days of formation (refer to **Table E2**).
6. Stockpiles retained in excess of 10 days, which are not stabilized as noted above, will be protected through installation of silt fencing (refer to BMP - Notes - Sediment Fencing).

TABLE E2 LIMITATIONS TO ACCESS DURING CONSTRUCTION

LAND USE	LIMITATION	REMARKS
Construction Areas	Limited to 5m from the edge of any essential construction activity as shown on the relevant plans.	All workers should clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope) or similar materials.
Access Areas	Limited to a maximum width of 5m.	The Quarry Manager will determine and mark the location of these zones on the site. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All workers will clearly recognise these boundaries.
Remaining lands including revegetation areas	Entry prohibited except for essential management works	Thinning of growth might be necessary as part of bush fire management plans or weed reduction strategies.

TABLE E3 MAXIMUM ACCEPTABLE C-FACTORS AT NOMINATED TIMES DURING WORKS

LANDS	MAXIMUM C-FACTOR	EQUIVALENT GROUND COVER	REMARKS
Waterways and other areas subjected to concentrated flows (e.g. table drains), post construction and during operation.	0.05	70%	Applies after ten working days from completion of formation and before they are allowed to carry any concentrated flows. Foot and vehicular traffic will be prohibited in these areas.
Stockpiles and batters, post construction and during operation.	0.10	60%	Applies after ten working days from completion of formation.
All lands, including waterways and stockpiles during construction and operation.	0.15	50%	Applies after 20 working days of inactivity, even though works might continue later.
All lands, including waterways and stockpiles during construction and operation.	0.05	70%	Applies after 60 working days of inactivity.

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EROSION AND SEDIMENT CONTROL PLAN - NOTES 5

PROJECT NO. 1055/04 | SHEET No 05 | REV 0

Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES

SOIL RESPREADING

1. Paddock-dump soil at the top of the nominated slope and push down to provide an even coverage to a minimum of approximately 50mm (or an adequate amount to achieve the outcome).
2. Lightly rip parallel to the contour to assist in keying the soil into the landform below.
3. Sow with native species seed mix and water as seasonal conditions dictate. Seedbed preparation will be carried out, i.e. in accordance with **SD 7-1** (see **Sheet 14**).

MITRE DRAINS

The construction and compaction of the Site Access Road will create drainage paths for runoff. To prevent concentrated flows, construct mitre drains in accordance with the following.

1. The 'tail' of the mitre drain should extend at least 5m from the Site Access Road.
2. Construct with V-shaped cross section and grade of 1% or less.
3. Install outlet protection in the form of rubble at the toe (discharge) end of the drain.
4. If erosion within the mitre drain is observed, install a rock check dam in accordance with **SD 5-4** (see **Sheet 10**) approximately midway between the road and the discharge point of the drain.

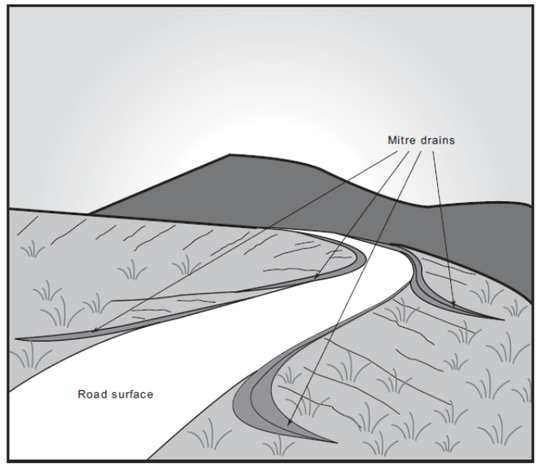

Figure 5.9 **Runoff dispersal using mitre drains** *(redrawn from Garden 1988)*

Figure E2

SCHEMATIC ILLUSTRATION OF MITRE DRAIN

Source: *Figure 5.9 of DECC (2008)*

SAFETY/DIVERSION BUNDS

1. Construct Safety/Diversion Bunds upslope and downslope of all areas of disturbance as shown on **Figures E1, E2 and E3**.
2. **Table E4** provides the estimated flow depths for the diversion drains. Ensure that the height of all Safety/Diversion Bunds is a minimum of the flow depth for the respective drain, plus 1m.
3. Ensure that the outer face of each bund is constructed from non-eroding rock and that the toe of the bund is constructed for the Clean Water Diversion and Dirty Water Containment structures.

DIVERSION DRAINS

Clean Water Diversion

1. High flow earth banks will be constructed and maintained in accordance with **SD 5-6** (refer to **Sheet 11**) to divert 'clean' runoff away from disturbed areas.
2. Table E4 provides the critical parameter requirements (a to f) of **SD 5-6** for the Clean Water Diversion Drains (CWD).
3. The channels and banks will be grassed where practical to achieve the average retardance height nominated in **Table E4**.
4. If grassing of channels and banks is not possible, rock check dams (constructed in accordance with **SD 5-4** – **Sheet 10**) or straw bales (installed in accordance with **SD 6-7** – **Sheet 13**) will be constructed at regular intervals.
5. Where the channel slope of the diversion drains exceeds 10% (~6º), rock check dams will be installed in accordance with **SD 5-4** (see **Sheet 10**).
6. The discharge point of the Clean Water Diversion Drains will be constructed and maintained as a Level Spreader with dimensions meeting the design standards of **SD 5-6** and **SD 5-8** (see **Sheets 11** and **12**), namely:
   - drain slope of <1% for >6m on approach to discharge;
   - sill width of >6m;
   - sill grade of 0%; and
   - sill to be maintained with grass cover.

Dirty Water Containment

1. Low flow earth banks will be constructed and maintained in accordance with **SD 5-5** (see **Sheet 11**) downslope of extraction area earthworks.

DIVERSION DRAINS (Cont'd)

Dirty Water Containment (Cont'd)

2. The channels and banks will be grassed where practical to achieve a C–Factor of 0.05 (70% coverage) within 60 days (refer to **Table E3** – **Sheet 05**).
3. If grassing of channels and banks is not possible, rock check dams (constructed in accordance with **SD 5-4** – **Sheet 10**) or straw bales (installed in accordance with **SD 6-7** – **Sheet 13**) will be constructed at regular intervals.

SEDIMENT BASINS

1. Sediment Basins will be constructed and maintained to accept, store and settle (prior to reuse) runoff from the disturbed catchment area, i.e. runoff collected by the Dirty Water Diversion Drains.
2. Table 6.1 of Volume 2E of Landcom (2004) suggests that the Quarry Site is located within a 'Sensitive' receiving environment. The design rainfall event considered for the purpose of sediment basin design (5-day, 95th percentile of 77.4mm)[2] assumes the receiving waters to be 'sensitive'.
3. The volumetric runoff coefficient (C_v) for catchment has assumed Soil Hydrologic Group C (moderate to high runoff potential) for the design rainfall even in accordance with Appendix F and Table F2 of Landcom (2004).
4. **Table E5** provides the minimum storage and settlement capacities for the sediment basin.

Note 2: 69.4mm is the 5-day, 95th percentile rainfall for Wilberforce, being closest long-term meteorological station of the Sydney/Blue Mountains region.

TABLE E4 DESIGN SPECIFICATIONS FOR CLEAN WATER DIVERSION DRAIN (PEAK DISCHARGE)

Drain Identification	Channel Lining	Retardance (average height of vegetation)	Soil Erodibility (K Factor)	Inundation Period	Side Slope (H:V)	Channel Slope	Standard Drawing 5-6 Parameters (m)						Depth of Flow (m)	Flow Velocity (m/s)	Peak Discharge (m^3/s)
							a	b	c	d	e	f			
STAGE 1															
CWD-1	Grass	50-150mm	0.02 to 0.05	6hr	1:3	2.3%	2.48	0.33	0.5	0.63	0.2	3.98	0.13	0.97	0.117
CWD-2	Grass	50-150mm	0.02 to 0.05	6hr	1:3	2.0%	2.48	0.33	0.5	0.63	0.2	3.98	0.13	0.82	0.094
CWD-3a	Grass	50-150mm	0.02 to 0.05	6hr	1:3	3.0%	2.18	0.28	0.5	0.58	0.2	3.68	0.08	0.78	0.044
STAGE 2															
CWD-3b	Grass	50-150mm	0.02 to 0.05	6hr	1:3	3.5%	3.74	0.54	0.5	0.84	0.2	4.4	0.34	1.81	0.092

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Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES (Cont'd)

SEDIMENT BASINS (Cont'd)

5. A marker will be maintained within the sediment basin, identifying the minimum freeboard requirement.
6. Except during and for a maximum of five days after a rainfall event, the water level within the sediment basin will not exceed this mark.
7. Accumulated water within the sediment basin will be removed within 5 days and either used for dust suppression or transferred to the Extraction Area Sump.
8. Accumulated sediment will be removed from the sediment basin periodically and placed within the Extraction Area.
9. Once dried, the accumulated sediment will be used in progressive rehabilitation of the site or incorporated into products to be sold as general or select fill.

SITE STABILISATION

- Undertake progressive stabilisation of disturbed ground surfaces as completed (refer to **Table E2 – Sheet 05**).
- Stabilisation measures and products will comply with Table A3 of Landcom (2004) (refer to **Sheet 09**).
- Appropriate seedbed preparation will be carried out, i.e. in accordance with **SD 7-1** (refer to **Sheet 14**).
- Diversion drains will retain a C-Factor of 0.05 (refer to **Table E3** – refer to **Sheet 05**).
- As surfaces are stabilised, temporary water management structures can be removed, e.g. diversion drains (or portions of).

BMP DECOMMISSIONING AND REHABILITATION

Sediment Fencing

1. Confirm C-factor ≤0.1 (refer to **Table E2** – see **Sheet 05**) established upslope of fencing.
2. Remove fencing, taking care not to damage the material (such that it can be reused if in suitable condition).
3. Lightly scarify along the contour where required to level off the surface and spread any vegetative debris.

Diversion Drains

1. Consider the stability of each drain and discharge point. Where stable and not inhibiting surface flows of the final landform, retain.
2. Gently push bank component of the drain into the channel and grade using dozer blade, excavator bucket or other means until level. Lightly scarify and allow to re-seed naturally.

Sediment Basins

1. Consider use for water storage in the final landform and retain where not inhibiting surface flows of the final landform.
2. Backfill with available overburden or Virgin Excavated Natural Material and allow to consolidate.
3. Cover with a minimum of 50mm of previously stockpiled soil and either sow with pasture species or allow to be revegetated naturally.

MONITORING AND MAINTENANCE

Erosion and Sediment Control

1. Erosion and sediment control structures constructed or installed to manage surface water flows will be inspected quarterly or following 25mm or rain in 24 hours to ensure these have not been damaged, are not eroding or causing erosion.
2. If erosion observed within drains, install rock check dams (see **SD 5-4** - **Sheet 10**).
3. Ensure there is no buildup of sediment or vegetation against sediment fencing or straw bale protection. If present, remove as soon as practically possible.
4. Confirm germination of seed sown over completed sections of the landform. If poor success, areas will be re-sown with additional water or fertiliser added.

TABLE E5 DESIGN CAPACITIES FOR SEDIMENT BASINS

Dam Identification	Maximum Catchment Area (ha)	Surface Area (m^2)	Average Depth (m)	Basin Volume (m^3)	Minimum Water Settlement Volume (m^3)	Minimum Sediment Storage Volume (m^3)	Total Minimum Storage Requirement (m^3)	Comments
Sediment Basin 1	0.2	115	1	115	108	3	111	The sediment basin will be regularly emptied as nominated in the Notes on Sediment Basins.

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - NOTES 7		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 07	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

Maroota Central Civil Quarry – Erosion and Sediment Control Plan

BEST MANAGEMENT PRACTICES (Cont'd)

SELF-AUDITING PROGRAM

A self-auditing program will be initiated. The Quarry Manager is to inspect the site at least quarterly or following rainfall in excess of 25mm in 24 hours and maintain a written log of inspections, paying particular attention to the following.

1. Ensure the stability of the storage.
2. Ensure barrier fencing is maintained and No Go Areas are being observed.
3. Identify areas of localised soil erosion and taking appropriate preventative measures. These might include:
   - planting additional stabilising vegetation or wind breaks;
   - stabilising soils with mulches or alternative soil binders;
   - taking steps to minimise any unnecessary concentrated stormwater flow; or
   - installing formalised drainage channels or pipes. Remove spilled soils or other materials and dispose to safe areas, e.g. stabilised stockpile.

SELF-AUDITING PROGRAM (Cont'd)

4. Maintain erosion and sediment control measures in their functioning condition for the duration of the Quarry life.
5. Remove spilled soils or other materials and dispose to safe areas, e.g. stabilised stockpile.
6. Construct additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved.
7. Ensure all chemicals and hydrocarbons are stored appropriately and that any spill kits are maintained.
8. Ensure any obstructive materials (such as large rocks and debris) are to be removed from any publicly trafficked road surface as soon as possible.
9. Ensure waste receptacles are emptied as necessary. Disposal of waste must be in a manner approved by the Quarry Manager.
10. Ensure records of water usage, rainfall, water quality and auditing are being kept.

REV	DATE	BY	APP.	REVISION DETAILS
0	29/01/2025	SR	GB	Submitted for Approval

DRAWING STATUS		
DESIGN BY:		MA
DRAWN BY:		MA
APPROVAL		SR

CLIENT: CENTRAL CIVIL

RWCorkery&co

PROJECT TITLE: MAROOTA CENTRAL CIVIL QUARRY

EROSION AND SEDIMENT CONTROL PLAN - NOTES 8

PROJECT NO. 1055/04 | SHEET No 08 | REV 0

Table A3 Soil Stabilisation Control Matrix (adapted from various sources, including Meyer and Ports (1976), Israelson et al. (1980), Goldman et al. (1986), URS Greiner Woodward Clyde (1999) and the North American Green website).

Class	Type	Suitable for Vegetation Type [1]	Design Life (months)	Use in Concentrated Flow [2]	Availability (days) [3]	Relative Cost Bracket [4]	Residual Impact [5]	C -factor [6] <33%, <6m	C -factor <33%, 6-15m	C -factor <33%, >15m	C -factor 33-50%, <6m	C -factor 33-50%, 6-15m	C -factor 33-50%, >15m
BIODEGRADABLE MULCHES [7]													
Straw (anchored)	4.5 tonnes per hectare	Grass	1 to 6	No	< 5days	Low	Moderate	0.17	0.17	0.20	0.20	0.20	0.20
Wood Chip	16 tonnes per hectare	Grass/Shrubs	1 to 6	No	< 5days	Low	Moderate	0.08	0.08	0.08	No data		
Wood Chip	27 tonnes per hectare	Shrubs	1 to 6	No	< 5days	Low	Moderate	0.05	0.05	0.05	No data		
Wood Chip	56 tonnes per hectare	Shrubs	1 to 6	No	< 5days	Low	Moderate	0.02	0.02	0.02	0.02	0.02	0.02
Hydromulching	1.5 tonnes mulch + 300 litres binder per hectare	Grass	1 to 3	No	< 5days	Low	Low	0.00	0.03	0.07	0.03	0.06	0.10
Bonded Fibre	5 tonnes fibre per hectare	Grass	1 to 6	No	< 5days	Low	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
ROLLED EROSION CONTROL PRODUCTS (RECPs) [7]													
Biodegradable	Jute mesh	Grass	6 to 12	Yes	< 5days	Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
	Coconut fibre mesh	Grass	6 to 12	Yes	< 5days	Low	Moderate	0.10	0.20	0.40	0.20	0.40	0.60
	Curled wood fibre	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
	Jute matting (~350 gsm)	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Jute matting (~600 gsm)	Shrubs	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Coconut fibre matting (~450 gsm)	Grass	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
	Coconut fibre matting (~900 gsm)	Shrubs	6 to 12	Yes	< 5days	Medium	Moderate	0.00	0.03	0.07	0.03	0.06	0.10
Photodegradable	Mesh (< 5 mm openings)	Grass	1 to 6	Yes	< 5days	Low	Moderate	0.01	0.05	0.10	0.10	0.15	0.20
Non Biodegradable	Plastic fibres with netting	Grass	> 12	Yes	< 5days	High	High	0.00	0.05	0.10	0.03	0.05	0.10
	Composite with biodegradable	Grass/Shrubs	> 12	Yes	< 5days	High	High	0.00	0.03	0.07	0.03	0.06	0.10
HYDRAULIC SOIL STABILISERS [7]													
	Polymers/Polyacrylamide (rate depends on type)	Grass	1 to 6	No	< 5days	Low	Low	0.01	0.05	0.10	0.10	No data	
	Bitumen emulsion (12,000 l/ha)	Grass	1 to 6	No	< 5days	Low	Low	0.01	0.05	0.10	0.10	No data	
TEMPORARY SEEDING													
	Annual	NA	6 to 12	No	< 5days	Low	Low	0.05	0.05	0.10	0.10	No data	
	Perennial	NA	> 12	No	< 5days	Low	Low to moderate	0.05	0.05	0.10	0.10	No data	
INSTANT TURF [7]													
	Kikuyu	Grass	> 12	Yes	< 5days	Medium	Low	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Reinforced turf (pregrown)	Grass	> 12	Yes	5 - 15 days	High	High	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes

1 Whether vegetation is required and its type if so, will affect the technique used. Biodegradable mulches, RECPs and hydraulic soil stabilisers can all be used on their own to provide short term protection. However, their effectiveness is less when used in isolation than when used with vegetative growth. Most techniques are used to help establish vegetative growth using sown grasses. Should the client specify shrubs (primarily planted as tubestocks), then thicker mulches, RECPs or biodegradable mulches should be used. Non biodegradable RECP's are used to reinforce grasses (turf) permanently. They are not suitable for use with individual shrubs. They can work synergistically with the established grass to increase its resistance to shear stress and, therefore, increase its resistance to erosion by concentrated flow.

2 Products might or might not be suitable for use in areas of concentrated flow. All products are suitable for sheet flow conditions, although some would be over designed in such cases.

3 Whether or not a product is readily available is critical to the selection process. Many RECP and hydraulic soil stabiliser techniques use products that might be "off the shelf" and available from several suppliers. Biodegradable mulches can be affected by seasonal variation, although they might also be available on site after initial clearing and grubbing. Temporary seeding might also be seasonal.

4 For any given technique, cost can vary greatly depending on geographic location, size of project and installation requirements. In addition, costs can vary over time. Because of these factors, giving accurate installed costs is not possible. However, if a product is relatively inexpensive to purchase and install close to its point of manufacture, it will still be relatively inexpensive to purchase and install remote from it.

5 This criterion relates to the impact that a particular practice might have on construction activities once they are resumed on an area that was temporarily stabilised.

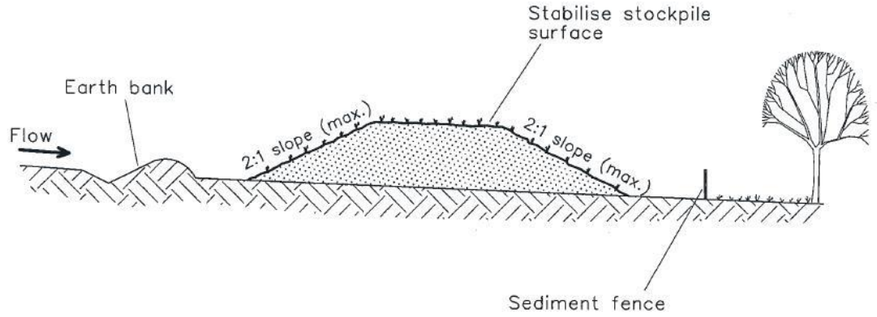
6 The performance of an erosion control technique is quantified by assigning it with a C-factor (Appendix A). The C-factor will vary from close to zero for full cover, to 1.0 for no cover on highly disturbed soils. The C-factor strongly affects the soil loss calculation (RUSLE) and users need to be careful in specifying its value, particularly when values <0.01 are quoted. Note that the C-factor does not apply to conentrated flow.

Values for the C-factor are given for various slopes gradients and lengths and show that it can change dramatically with them. The values given are compiled from existing data and from inference between products of a similar nature. They are given as a guide only and do not profess to be accurate in all respects. Overall, accurate C-factors are only available for manufactured products, primarily from the USA (RECP's in particular) where extensive independent testing has been undertaken. Unfortunately, very little data is available for the "lower cost" options such as biodegradable mulches, jute mesh and hydraulic soil stabilisers. Wherever possible, the manufactures should be contacted for their latest data on acceptable C-factors.

For the RECP's in particular, the C-factors given here are for the product as installed with no vegetation. Note however that lower C-factors can be expected if vegetation is promoted with many RECP's. Indeed, non biodegradable RECP's are designed to work synergistically with turf and must be used with it.

7 For information on trade names and suppliers of these products, please phone the office of Australasian Chapter of the International Erosion Control Association on 1800 354 322 or (+61 2) 4677 0901.

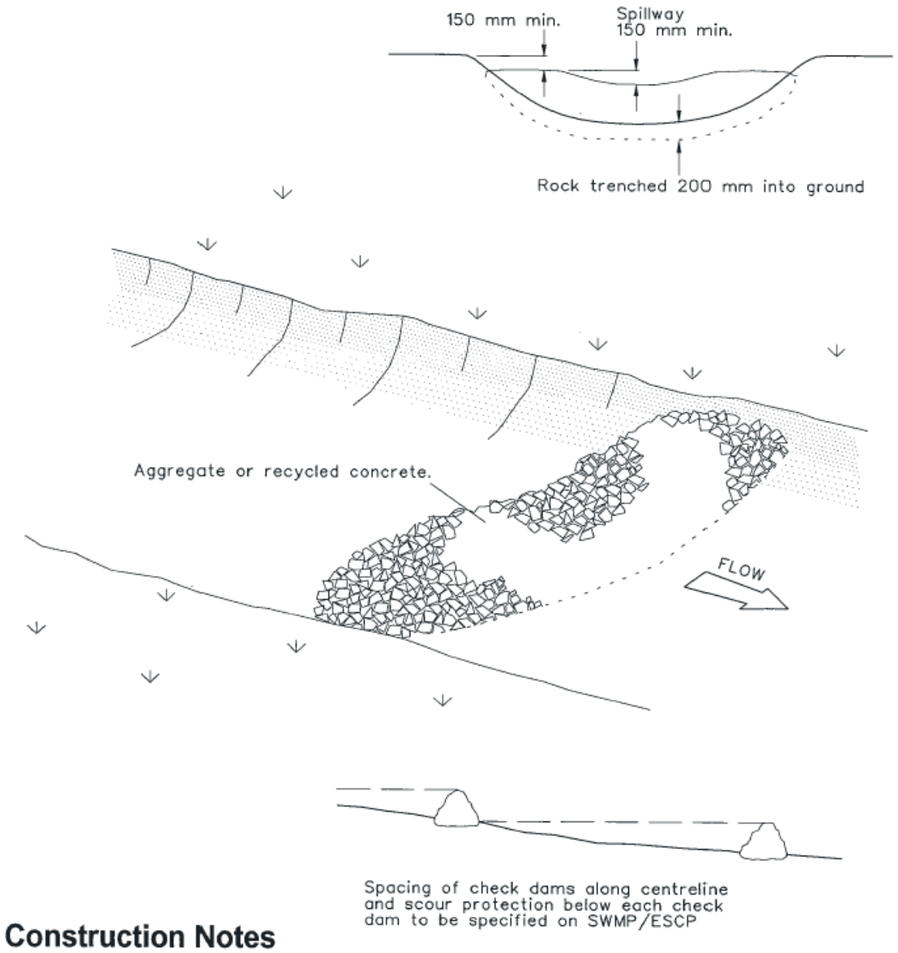
REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - NOTES 9		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 09	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						



Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

STOCKPILES — SD 4-1



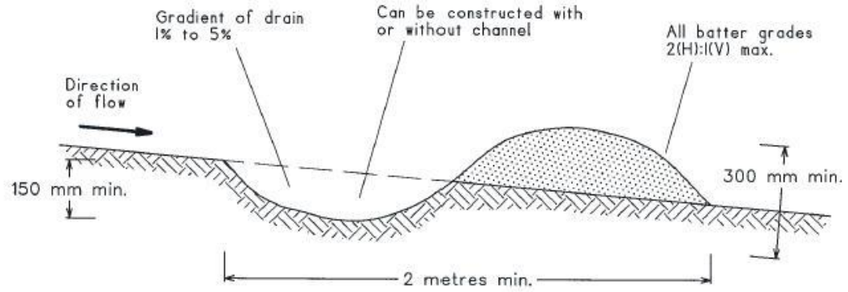
Spacing of check dams along centreline and scour protection below each check dam to be specified on SWMP/ESCP

Construction Notes

1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM — SD 5-4

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 1		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 10	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

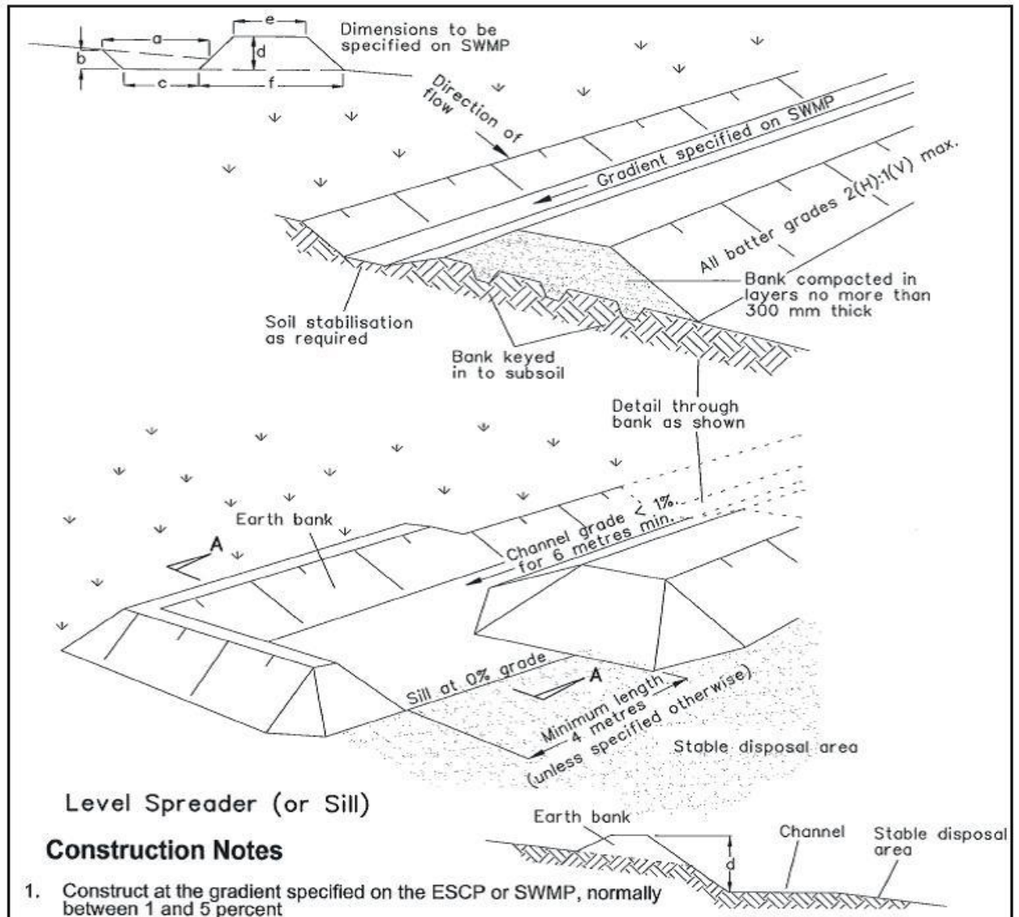


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) SD 5-5



Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, normally between 1 and 5 percent
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

EARTH BANK (HIGH FLOWS) SD 5-6

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL
					DRAWN BY:		MA	
					APPROVAL		SR	

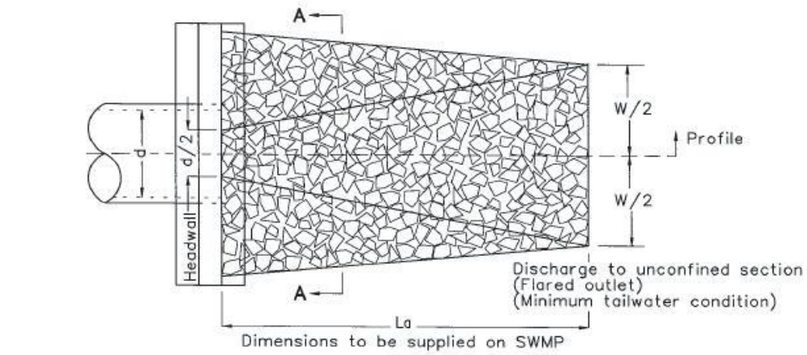
RWCorkery&co

PROJECT TITLE

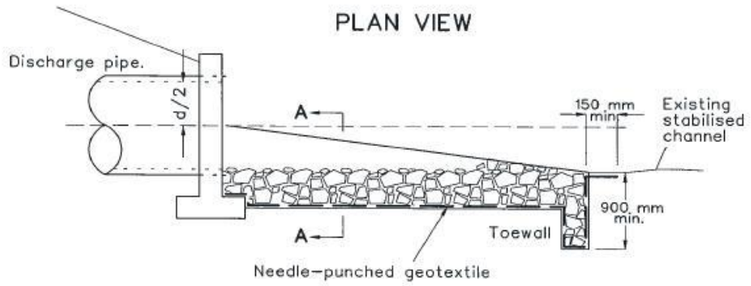
MAROOTA CENTRAL CIVIL QUARRY

EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 2

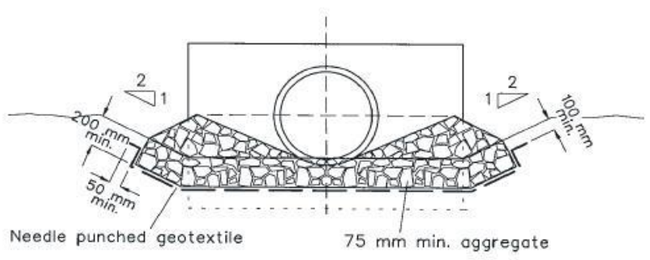
PROJECT NO. 1055/04 | SHEET No 11 | REV 0



PLAN VIEW



PLAN VIEW



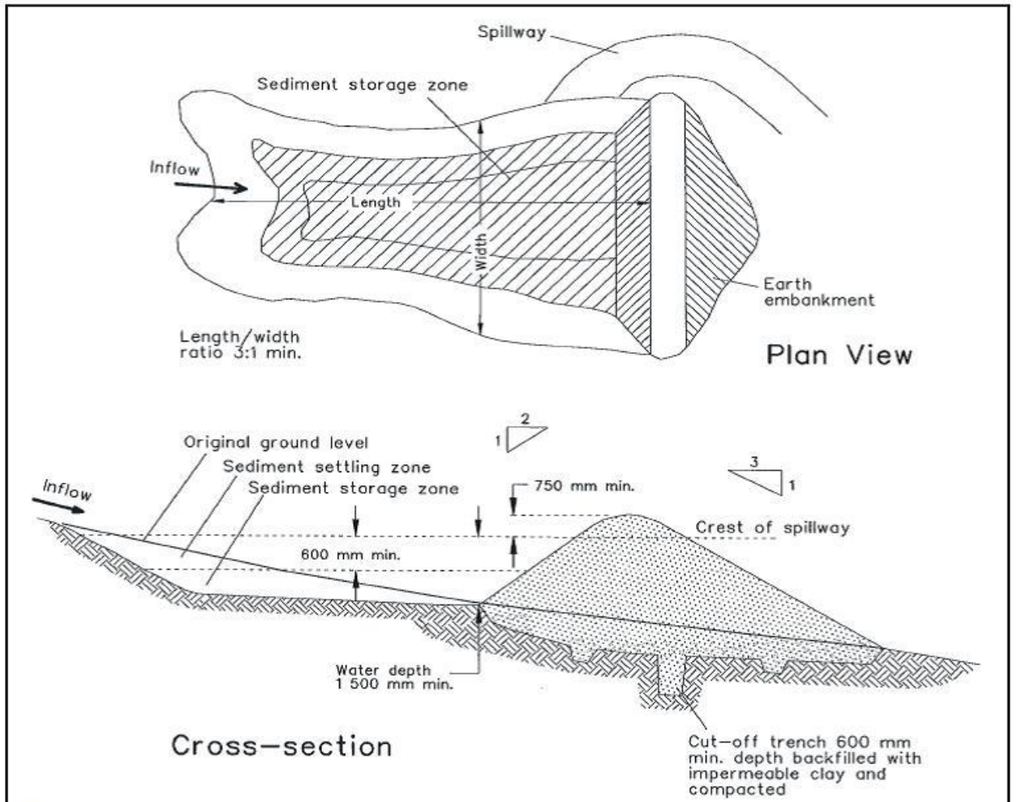
CROSS SECTION AA

Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

ENERGY DISSIPATER SD 5-8

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 3		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 12	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

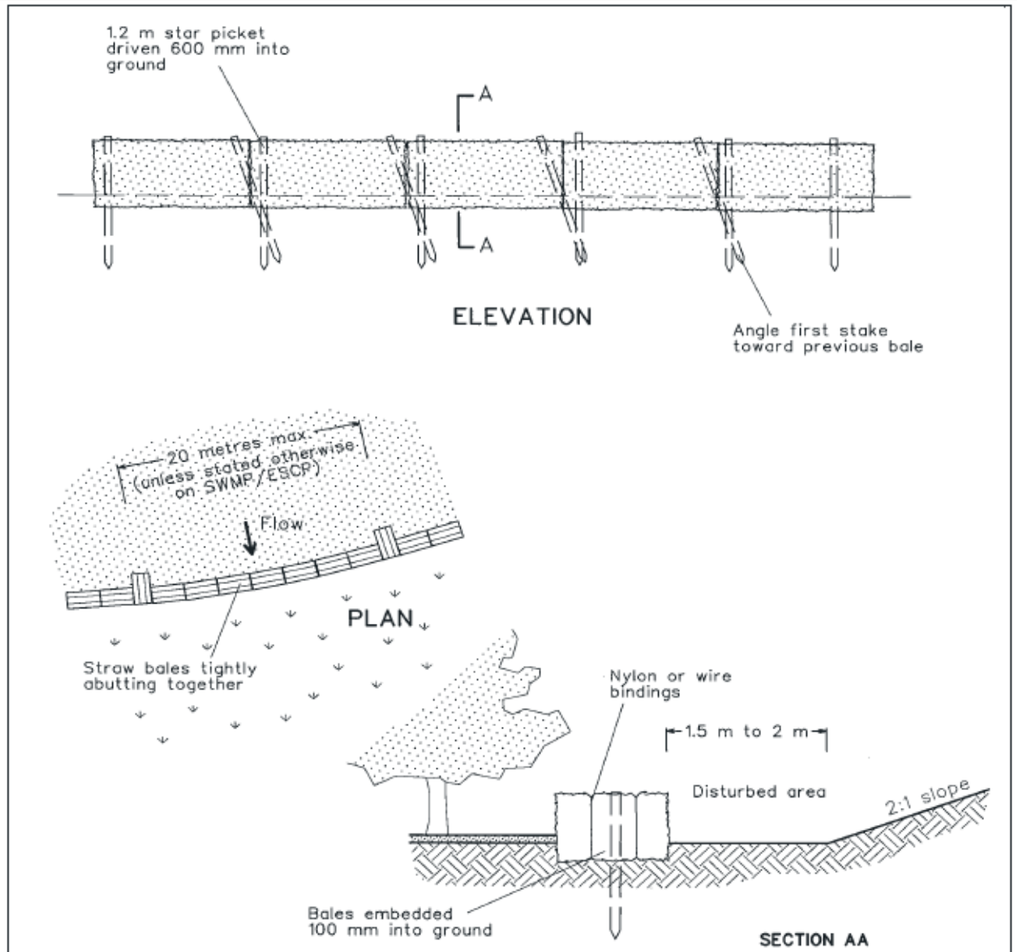


Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

EARTH BASIN - WET
(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

SD 6-4



Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

STRAW BALE FILTER

SD 6-7

REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL
					DRAWN BY:		MA	
					APPROVAL		SR	

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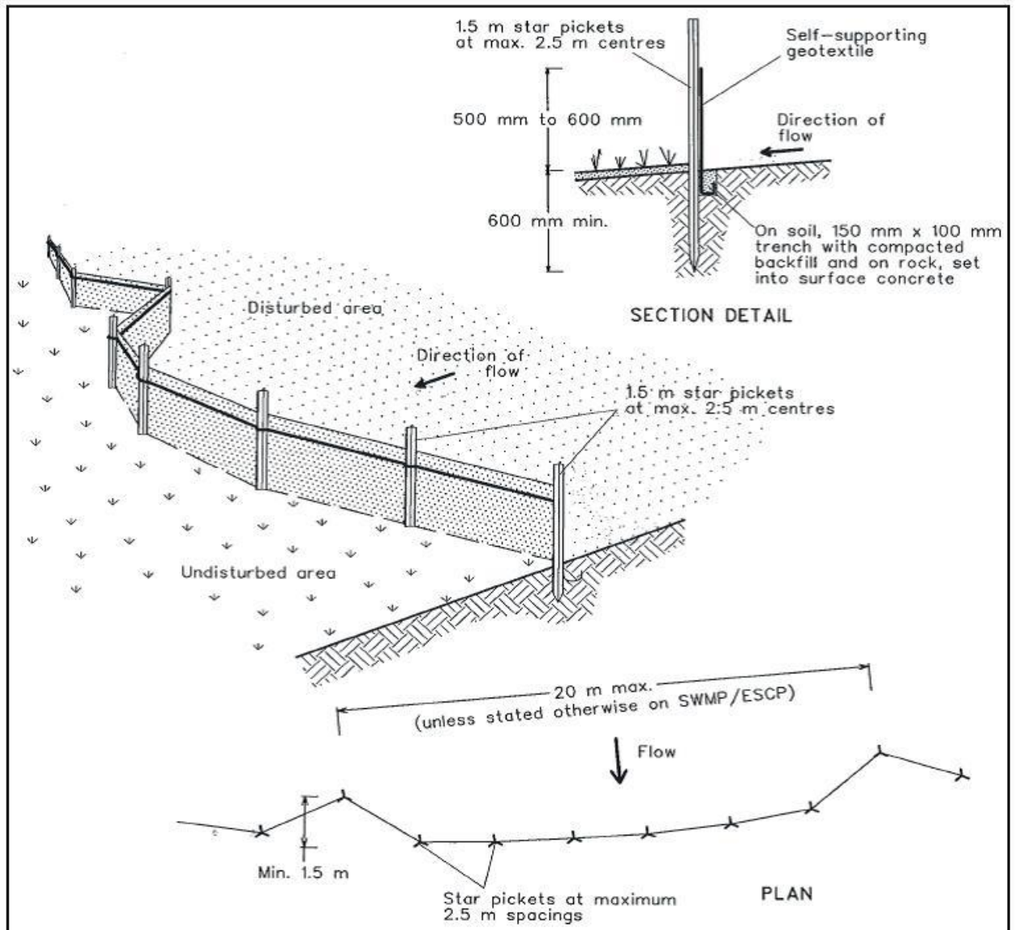
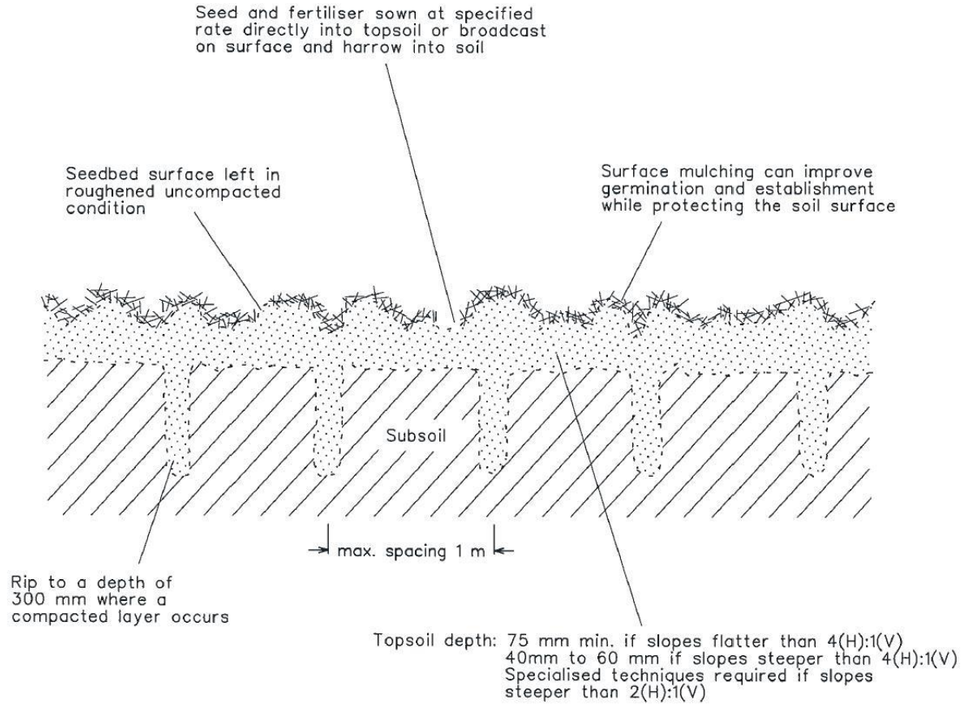
PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 3		
MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 13	REV 0



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**



Construction Notes

1. Loosen compacted soil before sowing any seed. If necessary, rip the soil to a depth of 300 mm. Avoid rotary hoe cultivation.
2. Work the ground only as much as necessary to achieve the desired tilth and prepare a good seedbed.
3. Avoid cultivation in very wet or very dry conditions.
4. Cultivate on or close to the contour where possible, not up and down the slope.

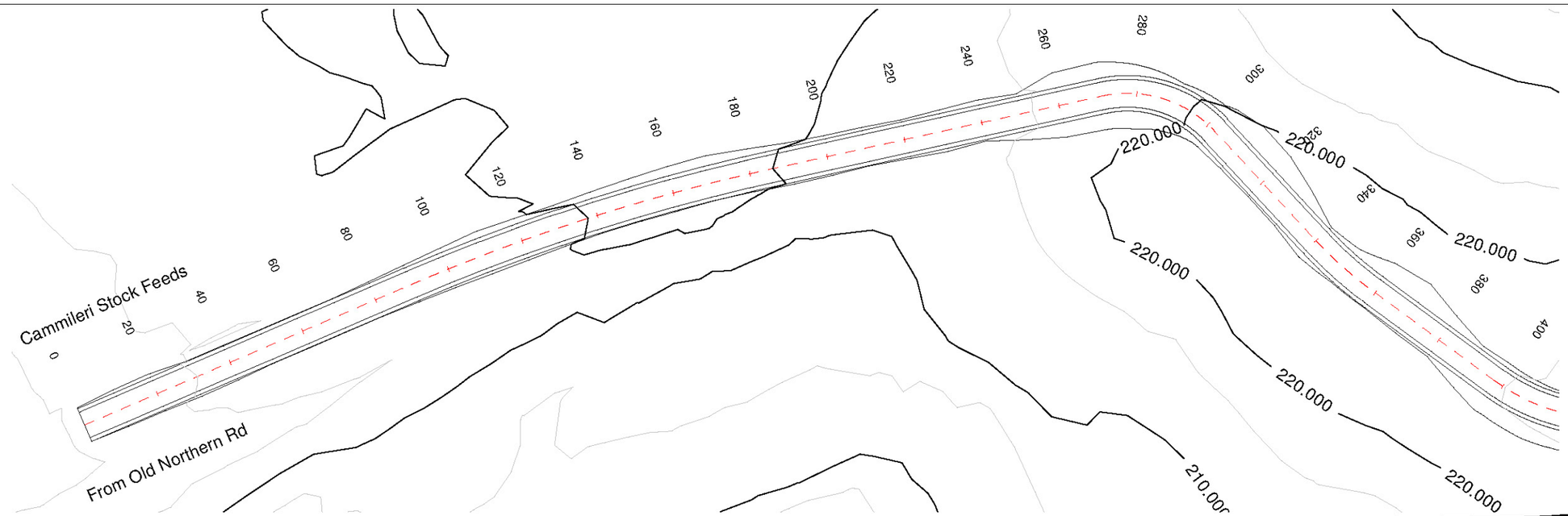
SEEDBED PREPARATION **SD 7-1**

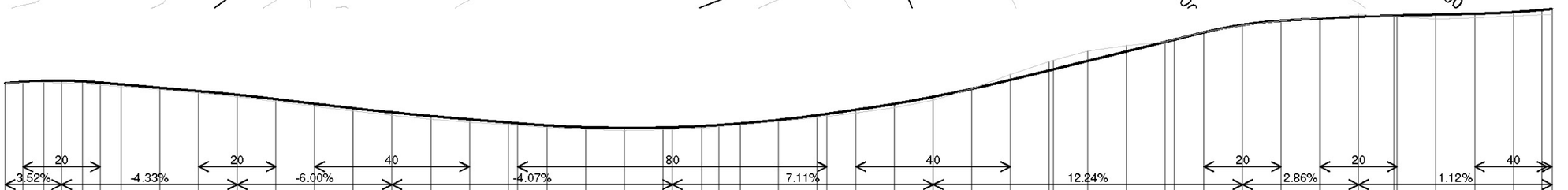
REV	DATE	BY	APP.	REVISION DETAILS	DRAWING STATUS			CLIENT		PROJECT TITLE	EROSION AND SEDIMENT CONTROL PLAN - DRAWINGS 4		
0	29/01/2025	SR	GB	Submitted for Approval	DESIGN BY:		MA	CENTRAL CIVIL	RWCorkery&co	MAROOTA CENTRAL CIVIL QUARRY	PROJECT NO. 1055/04	SHEET No 14	REV 0
					DRAWN BY:		MA						
					APPROVAL		SR						

Appendix 7

Updated Civil Designs

(Total No. of pages including blank pages = 3)





Datum R.L. 196.000

Chainage	Cut/Fill	Design	Existing
0.00	C0.004	215.356	215.360
4.56		215.517	
10.00	F0.159	215.650	215.491
14.56		215.673	
20.00	F0.311	215.592	215.281
24.56		215.436	
30.00	F0.253	215.200	214.947
40.00	F0.215	214.767	214.552
50.00	F0.240	214.333	214.093
60.00	F0.261	213.858	213.597
70.00	F0.290	213.300	213.010
80.00	F0.329	212.700	212.371
89.78	F0.364	212.136	211.772
90.00	F0.364	212.124	211.760
100.00	F0.384	211.597	211.213
110.00	F0.410	211.117	210.707
120.00	F0.370	210.686	210.316
130.00	F0.289	210.280	209.990
132.52		210.177	
140.00	F0.259	209.912	209.653
150.00	F0.276	209.680	209.404
160.00	F0.343	209.587	209.244
170.00	F0.281	209.634	209.353
172.52		209.668	
180.00	F0.267	209.821	209.554
184.52	F0.190	209.951	209.761
190.00	F0.192	210.148	209.955
200.00	F0.202	210.614	210.412
210.00	F0.296	211.220	210.924
212.52		211.395	
220.00	F0.432	211.927	211.495
230.00	F0.525	212.703	212.177
240.00	F0.452	213.606	213.154
250.00	C0.000	214.638	214.639
260.00	C0.670	215.798	216.468
270.00	C1.124	217.022	218.146
271.09	C1.177	217.155	218.332
280.00	C1.267	218.246	219.513
290.00	C0.730	219.470	220.200
300.00	C0.007	220.694	220.702
302.31	C0.043	220.977	221.020
310.00	C0.031	221.919	221.949
320.00	F0.065	222.908	222.843
330.00	F0.032	223.428	223.397
340.00	C0.093	223.714	223.807
340.16	C0.094	223.719	223.812
350.00	C0.281	223.957	224.238
359.09	F0.077	224.101	224.025
360.00	F0.153	224.112	223.959
370.00	F0.568	224.224	223.656
380.00	F0.537	224.336	223.799
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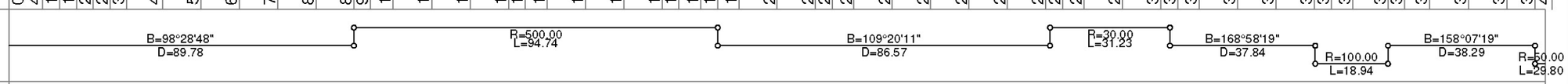
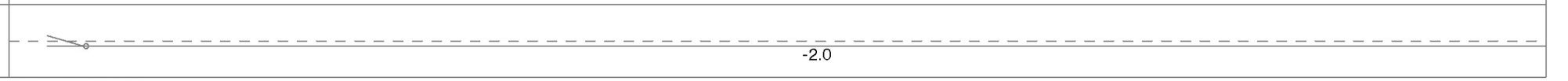
Alignment Details



Super Elevation



Scale Horizontal 1:1250 Vertical 1:625

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
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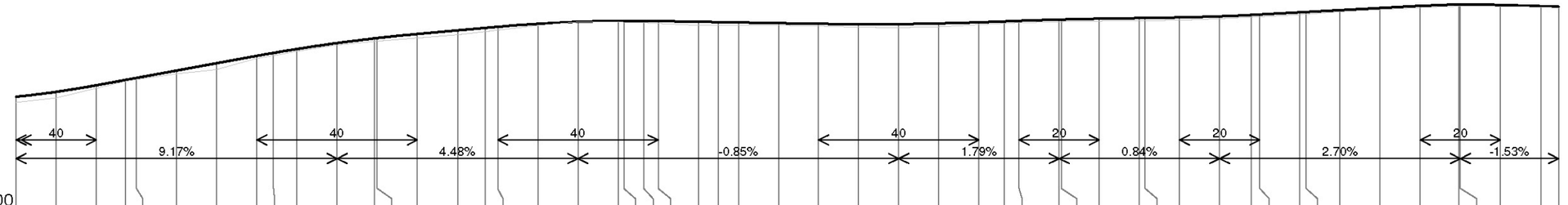
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	Sheet Number: 2
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



Datum R.L. 211.000

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450.00	F0.783	229.148	228.364
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510.00	F0.550	233.244	232.694
516.97	F0.470	233.556	233.086
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551.45	F0.179	234.441	234.261
556.40	F0.248	234.439	234.191
560.00	F0.288	234.417	234.129
570.00	F0.450	234.331	233.882
574.93	F0.404	234.289	233.885
580.00	F0.355	234.246	233.891
590.00	F0.269	234.160	233.891
600.00	F0.282	234.075	233.793
610.00	F0.369	234.023	233.653
620.00	F0.432	234.036	233.604
630.00	F0.407	234.116	233.709
640.00	F0.295	234.262	233.967
646.33	F0.264	234.375	234.111
650.00	F0.247	234.441	234.194
660.00	F0.274	234.596	234.322
660.52	F0.277	234.603	234.326
670.00	F0.302	234.704	234.401
680.00	F0.318	234.788	234.470
681.43	F0.327	234.800	234.473
690.00	F0.357	234.872	234.516
700.00	F0.300	235.003	234.703
707.95	F0.277	235.173	234.896
710.00	F0.277	235.226	234.949
720.00	F0.292	235.496	235.204
721.52	F0.282	235.537	235.255
730.00	F0.202	235.766	235.564
740.00	F0.184	236.036	235.851
750.00	F0.235	236.305	236.070
759.69	F0.214	236.467	236.253
760.00	F0.212	236.469	236.257
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Alignment Details

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Super Elevation

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Scale Horizontal 1:1250 Vertical 1:625

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	**DUNCAN PRIESTLEY CIVIL ENGINEERING**	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	**CENTRAL CIVIL (NSW) PTY LTD**	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			**QUARRY ACCESS ROAD**	PLAN NUMBER	**Sheet Number: 3**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	**MAROOTA NSW**		

Appendix 8

Letter Report in relation to the Air Quality Impact Assessment

(Total No. of pages including blank pages = 12)

Letter

Head Office: Suite 1504, 275 Alfred Street, North Sydney, NSW 2060
Riverina Office: PO Box 483, Albury, NSW 2640
Web: northstar-env.com | Tel: 1300 708 590

air quality | environment | sustainability

Date: Tuesday, 28 January 2025

Central Civil (NSW) Pty Ltd C/- R. W. Corkery & Co. Pty Limited
North Tower, Suite 12.01, 1/5 Railway St, CHATSWOOD NSW 2067

FAO: Sam Rosek

Project Name:	**Maroota Central Civil Quarry – Response to Submissions**
Reference:	**23.1001.FR2V1**
Status	**FINAL**

The following letter has been prepared by Northstar Air Quality Pty Ltd on behalf of Central Civil (NSW) Pty Ltd C/- R. W. Corkery & Co. Pty Limited and provides a response to comments provided by Hornsby Shire Council in relation to the Air Quality Impact Assessment performed for the Maroota Central Civil Quarry.

If you require any further information or clarification, please do not hesitate to contact the undersigned at your convenience.

For and on behalf of

Northstar Air Quality Pty Ltd

Dr Martin Doyle

Director & Air Quality Scientist

Reviewed by: GCG

This report has been prepared with the due care and attention of a suitably qualified consultant. Information is obtained from sources believed to be reliable, but is in no way guaranteed. No guarantee of any kind is implied or possible where predictions of future conditions are attempted. This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the addressee(s) and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report.

1. INTRODUCTION

Hornsby Shire Council (Council) has provided a number of comments relating to the Air Quality Impact Assessment (AQIA, ref 23.1001.FR1V1, dated 9 August 2023) performed for the proposed operation of the Maroota Central Civil Quarry (the Quarry), located at 4773 Old Northern Road, Maroota NSW (the Quarry Site).

Council comments relating to the AQIA are reproduced below:

> *"An updated Air Quality Assessment Report prepared by a suitably qualified environmental consultant is to be submitted to Council, given the Proposal 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.*
>
> *The updated Air Quality Impact Assessment Report must address the following errors/inconsistencies/concerns with the submitted Air Quality Assessment Report:*
>
> *a) The submitted Air Quality Assessment Report models only 1 operational scenario without any justification why the singular model has been adopted.*
>
> *b) The Air Quality Assessment Report does not sufficiently address the impacts to Receivers (R33, R34, R36, R37 and R39) of worst-case incremental outcome of modelled predictions for 24-hour PM_{10} and 24-hour $PM_{2.5}$.*
>
> *c) The Air Quality Assessment Report does not sufficiently address the Cumulative Impact to Receivers (R1 to R50 inclusive) of the predicted annual average particulate matter concentrations ($PM_{2.5}$) resulting from the operations at the Quarry Site (Section 6.1, Table 17).*
>
> *d) The Air Quality Assessment Report does not incorporate detailed emission control measures that will be implemented throughout all stages of the proposed development proposed extractive industry operation, regardless of the outcome of modelling predictions."*

A response to each comment is provided in the following sections.

2. GENERAL COMMENTS

Council provided the following comment:

> *"An updated Air Quality Assessment Report prepared by a suitably qualified environmental consultant is to be submitted to Council, given the Proposal 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."*

The AQIA was prepared to address Planning Secretary's Environmental Assessment Requirements (SEARs) which were provided for the Quarry by the (then) NSW Department of Planning and Environment (now, the NSW Department of Planning, Housing and Infrastructure [DPHI]). Council also provided requirements for the assessment of air quality, which were addressed in the AQIA. Table 1 of the AQIA outlines the specific sections of the report where those requirements were addressed.

The report was performed in accordance with the NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, and was authored by Dr Martin Doyle, a Director with Northstar and a Certified Air Quality Professional (CAQP), a scheme administered by the Clean Air Society of Australia and New Zealand (CASANZ).

3. DETAILED COMMENTS

3.1. Modelled Scenarios

Council provided the following comment:

> *"The submitted Air Quality Assessment Report models only 1 operational scenario without any justification why the singular model has been adopted."*

The scenario selected for quantitative assessment was extractive operations under Stage 1 operations. This scenario was selected as it included additional emissions sources when compared to Stage 2 such as the movement of topsoil to the Stage 1 Soil Stockpile Area at the far east of the Extraction Area (not present in Stage 2 operations), and the location of equipment towards the west of the Extraction Area, closest to receptors to the west of the Quarry.

The activity rates (e.g. tonnes per day) associated with extractive operations are not anticipated to vary significantly over the life of the Quarry, and given the size and location of the extraction area within the broader Quarry Site boundary, any minor changes to these source locations would not be anticipated to result in material impacts on modelled particulate matter concentrations.

The use of one scenario to approximate the potential air quality impacts associated with the Quarry operation is considered to be appropriate.

3.2. 24-hour PM_{10} and $PM_{2.5}$ Concentrations

Council commented:

> *"The Air Quality Assessment Report does not sufficiently address the impacts to Receivers (R33, R34, R36, R37 and R39) of worst-case incremental outcome of modelled predictions for 24-hour PM_{10} and 24-hour $PM_{2.5}$."*

Section 6.3 of the AQIA presents results for maximum 24-hour PM_{10} and $PM_{2.5}$ concentrations at all modelled receptor locations. A range of tables showing the model predictions at maximum impacted receptors are also shown in table 19 and table 20 of the AQIA.

Additional analysis is provided in the following tables within this letter report:

- Predicted additional exceedances of the 24-hour PM_{10} and $PM_{2.5}$ criteria, resulting from the Quarry operation (Table 1).
- Predicted incremental and cumulative 24-hour PM_{10} impacts at receptors R33 and R37 (Table 2 and Table 3, respectively).

Table 1 indicates that no additional exceedances of the maximum 24-hour $PM_{2.5}$ concentrations are predicted at any receptor location. This includes the incremental impact from the Quarry plus existing $PM_{2.5}$ concentrations. Note that this also assumes that the Quarry operates at peak capacity every day of the year, which is highly conservative.

Table 1 indicates that one additional exceedance of the maximum 24-hour PM_{10} concentration is predicted to occur at each of Receptor R33 and R37. Further analysis is presented in Table 2 and Table 3 which indicates additional exceedances were predicted to occur at both receptors on Saturday 25 January 2020. For clarity, no additional 24-hour PM_{10} exceedances were predicted to occur at any other receptor.

These additional exceedances were predicted to be associated with an existing background PM_{10} concentration on 25 January 2020 of 49.5 $\mu g \cdot m^{-3}$ (99 % of the criterion), with the incremental impact (Quarry) associated with a contribution of 0.9 $\mu g \cdot m^{-3}$ at R33 (1.8 % of the criterion), and 0.5 $\mu g \cdot m^{-3}$ at R37 (1 % of the criterion). Again, these increments are associated with peak activities at the Quarry, which have been assumed to occur on each and every day of the year.

Further review of the air quality environment on and around the 25 January 2020 highlights that elevated particulate matter concentrations were experienced statewide due to the 2019-2020 Black Summer bushfire crisis that began in 2019 and continued through January to mid-February 2020. Against the backdrop of regular smoke days during the bushfires, multiple dust storm events were also observed in this period, as much of the State was experiencing persistent and severe drought conditions. These conditions resulted in significant particle pollution across the State during January to mid-February 2020 (DPIE, 2021).

The conservatisms adopted in the dispersion modelling exercise provide confidence that the predicted incremental impacts would be lower on a day-to-day basis than those presented in the AQIA. However, the AQIA is required to present the potential maximum impacts of all meteorological conditions coincident with maximum emissions from the Quarry during operational hours (modelled as 7:00 am to 5:00 pm, 7 days per week).

Given that the potential additional exceedance occurs on a Saturday, it would be expected that impacts associated with the Quarry operation would only occur from 7:00 am to 1:00 pm (rather than 7:00 am to 5:00 pm), and therefore the impacts over a 24-hour period are overpredicted on Saturdays by a factor of 1.6 (i.e. 10 hours / 6 hours). Applying this correction to predicted incremental impacts would result in impacts being 0.5 $\mu g \cdot m^{-3}$ at R33 (1 % of the criterion), and 0.3 $\mu g \cdot m^{-3}$ at R37 (0.6 % of the criterion).

Importantly, addition of these increments to the high background concentration of 49.5 $\mu g \cdot m^{-3}$ would result in compliance with the criterion at R37 (cumulative impact of 49.8 $\mu g \cdot m^{-3}$), and compliance at R33 (cumulative impact of 50 $\mu g \cdot m^{-3}$).

Taken together, the conservatisms in the dispersion modelling, assumptions that peak emissions would occur every day of the year, and the high background concentrations resulting from significant bushfire activity, the actual cumulative impacts would be likely to be achieved at all receptor locations.

Table 1 Assessment of 24-hour PM_{10} and $PM_{2.5}$ exceedances

Receptor	PM_{10} exceedances (no Quarry)	PM_{10} exceedances (with Quarry)	Additional PM_{10} exceedances	$PM_{2.5}$ exceedances (no Quarry)	$PM_{2.5}$ exceedances (with Quarry)	Additional $PM_{2.5}$ exceedances
R1	6.0	6.0	0.0	9.0	9.0	0.0
R2	6.0	6.0	0.0	9.0	9.0	0.0
R3	6.0	6.0	0.0	9.0	9.0	0.0
R4	6.0	6.0	0.0	9.0	9.0	0.0
R5	6.0	6.0	0.0	9.0	9.0	0.0
R6	6.0	6.0	0.0	9.0	9.0	0.0
R7	6.0	6.0	0.0	9.0	9.0	0.0
R8	6.0	6.0	0.0	9.0	9.0	0.0
R9	6.0	6.0	0.0	9.0	9.0	0.0
R10	6.0	6.0	0.0	9.0	9.0	0.0
R11	6.0	6.0	0.0	9.0	9.0	0.0
R12	6.0	6.0	0.0	9.0	9.0	0.0
R13	6.0	6.0	0.0	9.0	9.0	0.0
R14	6.0	6.0	0.0	9.0	9.0	0.0
R15	6.0	6.0	0.0	9.0	9.0	0.0
R16	6.0	6.0	0.0	9.0	9.0	0.0
R17	6.0	6.0	0.0	9.0	9.0	0.0
R18	6.0	6.0	0.0	9.0	9.0	0.0
R19	6.0	6.0	0.0	9.0	9.0	0.0
R20	6.0	6.0	0.0	9.0	9.0	0.0
R21	6.0	6.0	0.0	9.0	9.0	0.0
R22	6.0	6.0	0.0	9.0	9.0	0.0
R23	6.0	6.0	0.0	9.0	9.0	0.0
R24	6.0	6.0	0.0	9.0	9.0	0.0
R25	6.0	6.0	0.0	9.0	9.0	0.0
R26	6.0	6.0	0.0	9.0	9.0	0.0
R27	6.0	6.0	0.0	9.0	9.0	0.0
R28	6.0	6.0	0.0	9.0	9.0	0.0
R29	6.0	6.0	0.0	9.0	9.0	0.0
R30	6.0	6.0	0.0	9.0	9.0	0.0
R31	6.0	6.0	0.0	9.0	9.0	0.0
R32	6.0	6.0	0.0	9.0	9.0	0.0

Receptor	PM_{10} exceedances (no Quarry)	PM_{10} exceedances (with Quarry)	Additional PM_{10} exceedances	$PM_{2.5}$ exceedances (no Quarry)	$PM_{2.5}$ exceedances (with Quarry)	Additional $PM_{2.5}$ exceedances
R33	6.0	7.0	1.0	9.0	9.0	0.0
R34	6.0	6.0	0.0	9.0	9.0	0.0
R35	6.0	6.0	0.0	9.0	9.0	0.0
R36	6.0	6.0	0.0	9.0	9.0	0.0
R37	6.0	7.0	1.0	9.0	9.0	0.0
R38	6.0	6.0	0.0	9.0	9.0	0.0
R39	6.0	6.0	0.0	9.0	9.0	0.0
R40	6.0	6.0	0.0	9.0	9.0	0.0
R41	6.0	6.0	0.0	9.0	9.0	0.0
R42	6.0	6.0	0.0	9.0	9.0	0.0
R43	6.0	6.0	0.0	9.0	9.0	0.0
R44	6.0	6.0	0.0	9.0	9.0	0.0
R45	6.0	6.0	0.0	9.0	9.0	0.0
R46	6.0	6.0	0.0	9.0	9.0	0.0
R47	6.0	6.0	0.0	9.0	9.0	0.0
R48	6.0	6.0	0.0	9.0	9.0	0.0
R49	6.0	6.0	0.0	9.0	9.0	0.0
R50	6.0	6.0	0.0	9.0	9.0	0.0

Table 2 Maximum 24-hour PM_{10} predictions at R33

Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$)			Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$)		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
23/01/2020	<0.1	151.8	151.9	8/07/2020	1.7	12.4	14.1
24/01/2020	0.4	80.5	80.9	18/06/2020	1.7	9.3	11.0
5/01/2020	0.3	71.9	72.2	18/05/2020	1.7	13.2	14.9
8/01/2020	0.3	62.2	62.5	28/03/2020	1.2	14.8	16.0
12/01/2020	0.4	52.1	52.5	6/06/2020	1.1	15.0	16.1
11/01/2020	0.4	50.6	51.0	10/06/2020	1.1	10.5	11.6
25/01/2020	0.9	49.5	50.4	12/07/2020	1.0	5.2	6.2
4/01/2020	<0.1	49.4	49.5	11/03/2020	1.0	8.7	9.7
4/02/2020	0.8	45.4	46.2	22/02/2020	1.0	10.7	11.7
29/01/2020	0.7	45.4	46.1	6/02/2020	1.0	7.7	8.7

Table 3 Maximum 24-hour PM_{10} predictions at R37

Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$)			Date	24-hour average PM_{10} concentration ($\mu g \cdot m^{-3}$)		
	Incremental Impact	Background	Cumulative Impact		Incremental Impact	Background	Cumulative Impact
23/01/2020	<0.1	151.8	151.9	12/07/2020	1.3	5.2	6.5
24/01/2020	0.3	80.5	80.8	27/05/2020	1.1	10.3	11.4
5/01/2020	0.2	71.9	72.1	18/05/2020	1.1	13.2	14.3
8/01/2020	0.3	62.2	62.5	8/07/2020	0.9	12.4	13.3
12/01/2020	0.3	52.1	52.4	6/07/2020	0.9	11.7	12.6
11/01/2020	0.2	50.6	50.8	17/05/2020	0.9	12.1	13.0
25/01/2020	0.5	49.5	50.0	12/02/2020	0.9	10.9	11.8
4/01/2020	<0.1	49.4	49.5	15/12/2020	0.9	6.2	7.1
29/01/2020	0.6	45.4	46.0	14/12/2020	0.8	11.5	12.3
4/02/2020	0.5	45.4	45.9	8/11/2020	0.8	12.6	13.4

3.3. Annual Average $PM_{2.5}$ Concentrations

Council have provided the comment:

> *"The Air Quality Assessment Report does not sufficiently address the Cumulative Impact to Receivers (R1 to R50 inclusive) of the predicted annual average particulate matter concentrations ($PM_{2.5}$) resulting from the operations at the Quarry Site (Section 6.1, Table 17)."*

Section 9 of the AQIA states that:

> *"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."*

For clarity, the predicted incremental concentrations of annual average $PM_{2.5}$ resulting from the Quarry operation are minimal at all surrounding receptor locations and cannot be realistically controlled any further to be lower than the concentrations predicted. The exceedance of the annual average $PM_{2.5}$ criteria is a result of a range of other activities, specifically not including the Quarry.

An analysis of the last five years of available annual average $PM_{2.5}$ data from the Richmond air quality monitoring station (AQMS) (the AQMS adopted within the AQIA) is presented in Table 4. This demonstrates that exceedances of the annual average $PM_{2.5}$ criterion would occur either with or without the Quarry in

operation. Addition of the predicted negligible increments associated with Quarry operation would not result in any changes to the attainment of the annual average $PM_{2.5}$ criterion.

Table 4 Annual average $PM_{2.5}$ concentrations, Richmond

Year	Annual average $PM_{2.5}$ concentration ($\mu g \cdot m^{-3}$)				
	2017	2018	2019	2020	2021
Richmond AQMS	7.0	8.1	13.1	8.4	6.8
Quarry increment	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cumulative impact	7.1	8.2	13.2	8.5	6.9

3.4. Emission Control Measures

Council commented that:

> *"The Air Quality Assessment Report does not incorporate detailed emission control measures that will be implemented throughout all stages of the proposed development proposed extractive industry operation, regardless of the outcome of modelling predictions."*

In addition to the air quality management and mitigation measures outlined in section 5.3 of the AQIA (i.e. watering of unpaved roads, limiting of vehicle speeds on unpaved and paved roads), Central Civil (NSW) Pty Ltd further commits to implementing the following mitigation measures during Quarry operation:

- 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 controlled by a speed limit of 40 $km \cdot hr^{-1}$.
- 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.

These measures should act to minimise the generation of particulate matter during all stages of Quarry operation.

air quality | environment | sustainability

air quality	Northstar specialises in all aspects of air quality, dust, and odour management, covering monitoring, modelling and assessment, due diligence and process specification, licencing and regulatory advice, peer review and expert witness.
environment	Our team has extensive experience in environmental management, covering environmental policy and management plans, licencing, compliance reporting, auditing, data, and spatial analysis.
sustainability	We look beyond compliance to add value and identify opportunities. Our services range from sustainability strategies, ecologically sustainable development reporting and assessment, to bespoke greenhouse gas and energy estimation and reporting.

Head Office

Suite 1504, 275 Alfred Street,
North Sydney NSW 2060

Riverina Office

PO Box 483
Albury NSW 2640

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Appendix 9

Preliminary Construction Management Plan

(Total No. of pages including blank pages = 62)

CENTRAL CIVIL

ABN: 61 167 710 545

Preliminary Construction Management Plan

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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

Preliminary Construction Management 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. 1055/03d February 2025

RWCorkery&co

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1. Introduction

This *Preliminary Construction Management Plan* (PCMP) has been prepared by R. W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd (the Company) in consultation with The Transport Planning Partnership (TTPP) to describe the management and mitigation measures to be implemented for various impacts associated with the site establishment phase of the Maroota Central Civil Quarry (the Quarry).

The Company is an Australian owned and operated demolition and civil engineering company based in Dural, NSW. The Company has 10 years' experience and its 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 Company has an excellent record of environmental management, with no environmental related notices or orders since the Company's inception in 2014. As such, this PCMP is based on the Company's significant experience in responsible environmental, operational, and construction management activities.

The Quarry is located on rural land within Lots 1 and 2 DP609224 and an unnamed Crown road reserve (the Quarry Site) (**Figure 1**). The Site Access Road (**Figure 2**) 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.

A Development Application (DA) for the Quarry was lodged via the NSW Planning Portal on 25 July 2024, and the accompanying Environmental Impact Statement (EIS) was placed on public notification by Hornsby Shire Council (Council) from 6 September 2024. Council subsequently issued a Request for Further Information (RFI) dated 14 October 2024 with requirements pertaining to the preparation of a PCMP for the Quarry. The details of these requirements are presented in **Table 1**.

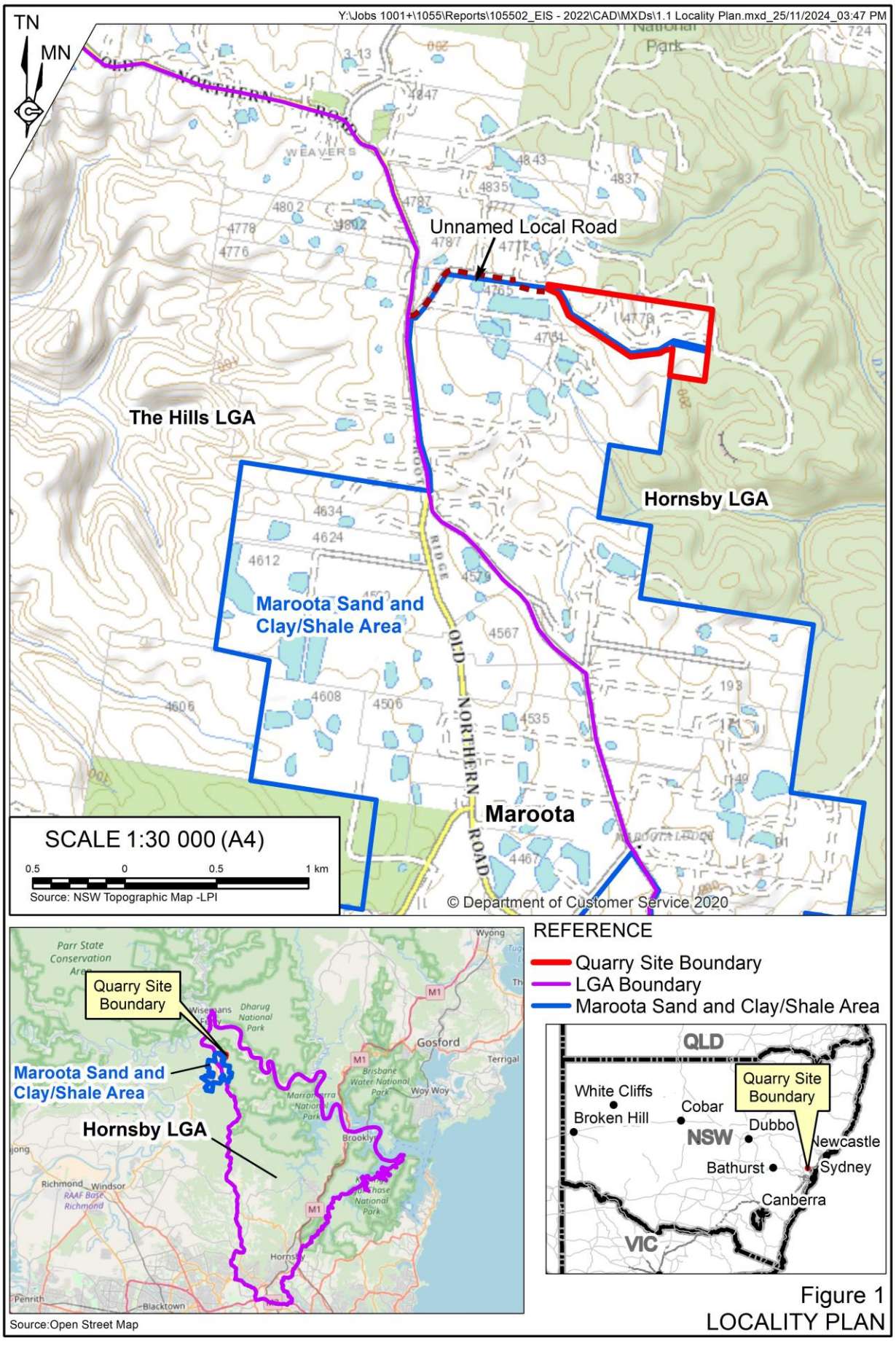


Figure 1
LOCALITY PLAN

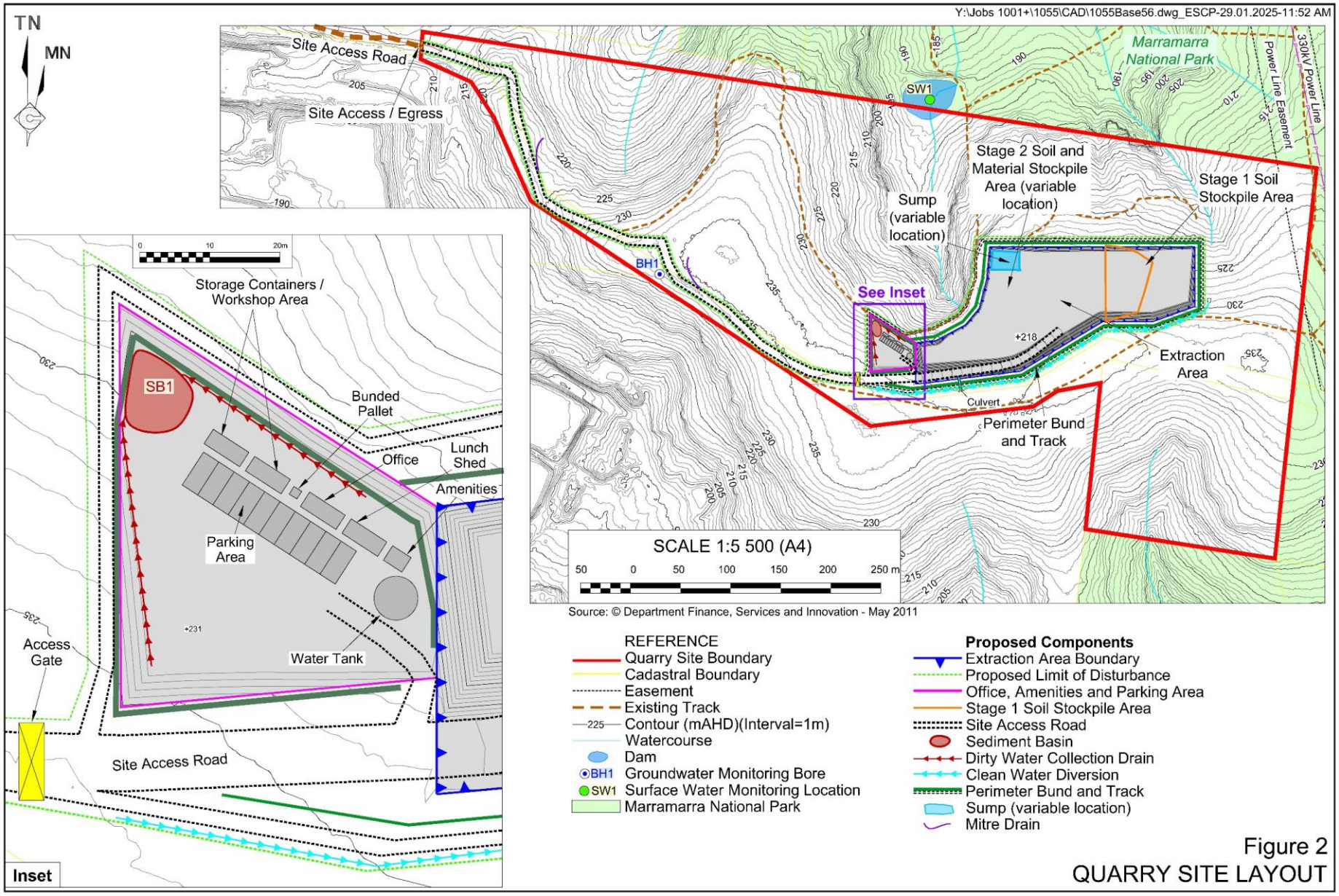


Figure 2
QUARRY SITE LAYOUT

2. Plan Requirements

Table 1 presents the Council's requirements for the preparation of this PCMP taken from the RFI.

Table 1
Hornsby Shire Council's Requirements

Ref	Requirements	Where Addressed
C13.1	The application is not supported by a Preliminary Construction Management Plan (PCMP) prepared by a suitably qualified environmental consultant in consultation with a qualified traffic engineer as specified in Item 9 of Council's Pre-lodgement advice sent dated 7 July 2023 under Pre-lodgement Development Application No. PL/30/2023 (D08685139).	This document
C13.2	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.	Section 3
C13.3	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.	Section 4
C13.4	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.	Section 5

Table 1 (Cont'd)
Hornsby Shire Council's Requirements

Ref	Requirements	Where Addressed
C13.5	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.	Section 6
C13.6	e) Tree management and protection i) Trees to be removed and retained on site consistent with other lodged Plans, including tree protection measures.	Section 7
C13.7	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.	Section 8
C13.8	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	Section 9
C13.9	h) Waste Management i) Detail the reuse, recycling and disposal methods for all demolition and construction waste on site.	Section 10
C13.10	i) Site plan i) A site plan which identifies the following information at each stage of the development: a. Existing and proposed buildings b. Site boundaries c. Extent of proposed earthworks (i.e. excavation and fill importation locations, and cut and fill locations) d. 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) e. Vehicle access and egress f. On-site vehicle parking areas g. Proposed hard-stand areas for loading and unloading materials, including the location of cranes and concrete pumps h. Location of material storage on-site, stockpiles, site sheds, hoardings, waste storage i. Location of sediment control measures (consistent with Erosion and Sediment Control plans submitted as part of the Development Application) j. Potential Work Zone locations	Section 12

3. Site Establishment Activities

3.1 Overview

In accordance with the commitments described in Section 2.4 of the EIS, a registered surveyor will 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.

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

- The marking out of all component areas to be disturbed (see Proposed Limit of Disturbance on **Figure 2**) with highly visible and permanent markers. 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.
- Construction and/or installation of water management infrastructure including dirty water collection drains, mitre drains, clean and dirty water diversions, an energy dissipator and a sediment basin (SB1) (see **Figure 2**).
- Progressive 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.
- Progressive construction of the perimeter safety bund using overburden pushed up from within the footprint of the proposed Extraction Area.
- Installation of the workshop, demountable office and portable amenities, including pump out toilets.
- Roadworks and track upgrades to ensure safe and ongoing access to the Quarry Site.

The principal items of mobile equipment required to undertake site establishment works are two excavators (35t) and a D8 bulldozer.

3.2 Earthworks and Staging

Earthworks would only commence following the completion of the survey and mark out of the approved areas of disturbance. If in-situ material cannot be used for cut and fill works, general fill material such as gravel would be imported in accordance with the maximum traffic movement limits identified in Section 4.1.

Site establishment activities are anticipated to occur over a period of between three and six months. Earthworks required to be completed during the site establishment phase of the Quarry include the following in the order of completion of works.

1. Roadworks within the public road network comprising the following. All proposed roadworks would be undertaken in accordance with the designs attached as **Appendix 1**.
    a) Reconstruction/widening of the section of the Unnamed Local Road in between the existing "GIVE WAY" signs to a width of 6.5m.
    b) Upgrades to the section of the Unnamed Local Road between the existing access to Camilleri Stockfeeds and the Site Access to a local street standard in accordance with Council's *AUS-SPEC Specifications – Section 0042 Pavement Design*.
    c) Installation of "GIVE WAY" controls on all three legs of the Site Access intersection, located such that adequate sightlines are provided for all approaching drivers and that the swept paths of the heavy vehicles turning to and from each leg can be accommodated when another vehicle is waiting.
2. Construction of initial surface water management infrastructure in accordance with the *Erosion and Sediment Control Plan* (ESCP) for the Quarry. In summary:
    a) Installation and maintenance of sediment fencing downslope of all areas to be disturbed, with straw bales utilised as additional controls for fine particle capture as required.
    b) Construction of clean water diversions around the southern perimeter of the Extraction Area and an associated energy dissipater.
3. Progressive stripping of soil within disturbance areas and placement of soil stockpiles within the Stage 1 Soil Stockpile Area.
4. Widening of the Site Access Road to achieve a width suitable for two heavy vehicles to pass, including roadside drainage and security gates. Mitre drains would be constructed progressively as road widening works proceed. Upgrades to the Site Access Road would be undertaken in accordance with **Appendix 1**.
5. Profiling of the Office, Amenities and Parking Area by cut and fill methods to achieve a flat, compacted earth floor with an elevation of approximately 231m AHD.
6. Construction of a perimeter safety bund around the profiled Office, Amenities and Parking Area.
7. Construction of remaining surface water management infrastructure in accordance with the ESCP for the Quarry. In summary:
    a) A sediment basin (SB1) would be constructed within the Office, Amenities, and Parking Area in accordance with the requirements of *Managing Urban Stormwater* Volumes 1 and 2E (Landcom, 2004 and DECC, 2008).

b) 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 to SB1.

8. Installation of the demountable office, portable amenities, workshop and water tank within the profiled Office, Amenities and Parking Area.

9. Progressive construction of the perimeter safety bund and track, including establishment of cross banks / whoa-boys and a culvert / pipe as extraction proceeds.

4. Construction Traffic and Management

4.1 Traffic and Transportation

Heavy equipment required for site establishment activities would be transported to the Quarry Site on low loaders or similar. Equipment would remain within the Quarry Site throughout the period required to complete site establishment works prior to transportation from the Quarry Site in the same manner.

All heavy vehicle movements along Old Northern Road which would pass through school zones would be restricted between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours (i.e. no heavy vehicle movements through these areas during school zone hours).

Traffic volumes during site establishment, including vehicles for employees and visitors/deliveries to the Quarry, will be a maximum of 24 daily total movements (12 inbound and 12 outbound). Any minor quantities of fill required to be imported for cut and fill works would be undertaken within this limit.

Importation of VENM will not be required during the site establishment phase.

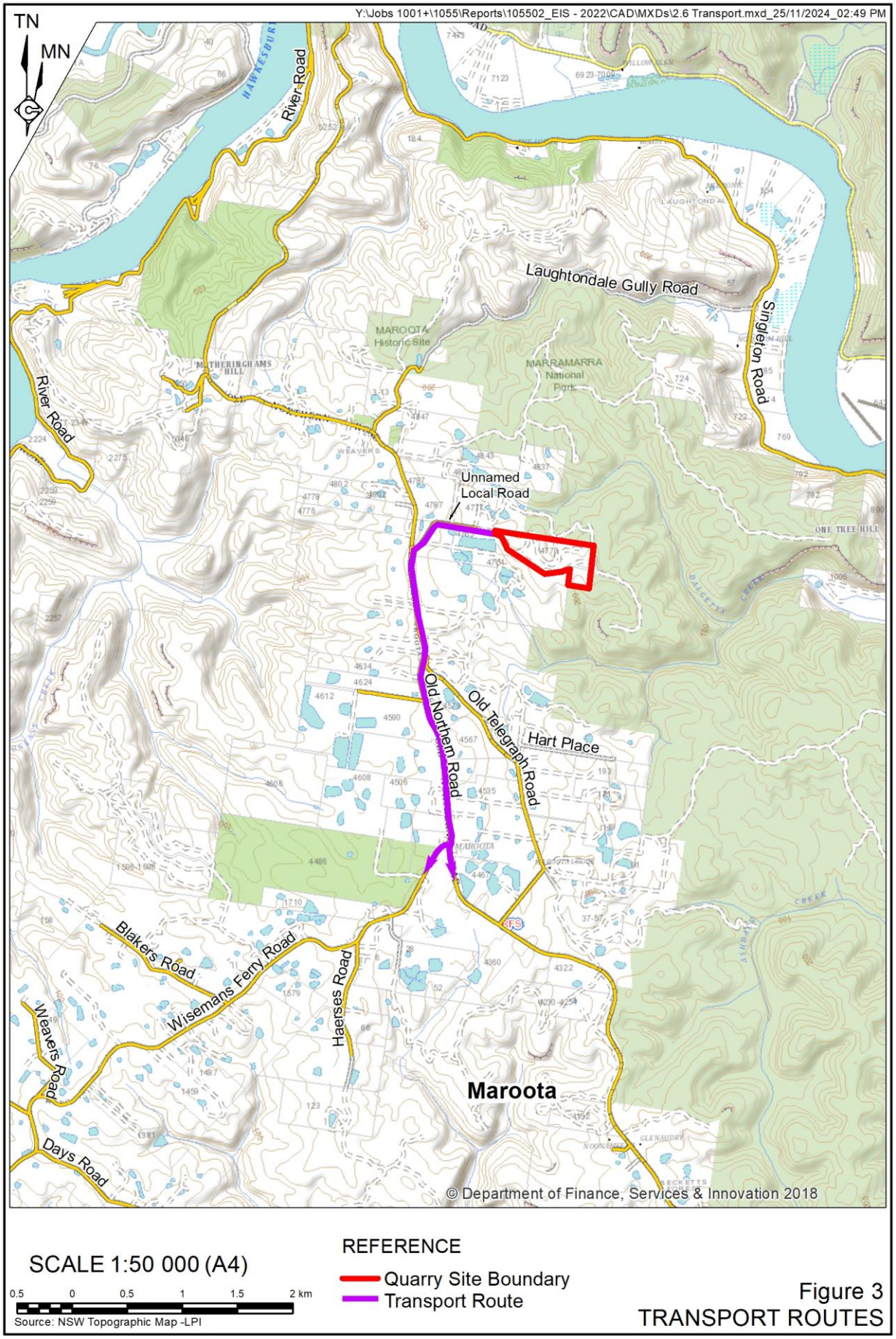
4.2 Transportation Route

Figure 3 presents the transportation route for the Quarry. In summary, vehicles accessing or exiting the Quarry will travel from the Site Access along the Unnamed Local Road until its intersection with Old Northern Road. Heavy vehicles will turn south from the Unnamed Local Road / Old Northern Road intersection and would utilise the State road network from the intersection of Old Northern Road and Wisemans Ferry Road.

No queuing along the transportation route is likely to occur following the implementation of the management and mitigation measures detailed in Section 4.6. In the unlikely event that vehicles are required to queue, they will do so on the shoulder of the Site Access Road between the Site Access and Camilleri Stock Feeds entrance.

4.3 Equipment

Table 2 presents the list of mobile equipment to be utilised at the Quarry Site during the site establishment phase.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TN
MN
River Road
Laughtondale Gully Road
Singleton Road
MAROOTA Historic Site
NARRAMARRA National Park
MUTHERINGHAMS HILL
WEAVERS
ONE TREE HILL
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 Finance, Services & Innovation 2018
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 3
TRANSPORT ROUTES

Table 2
Site Establishment Mobile Equipment

Equipment	Number	Use/Activity
D8 Bulldozer	1	Earthmoving, vegetation clearing, construction of safety perimeter bund (campaign basis)
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

Road trucks, low loaders and light vehicles will also be utilised during the site establishment phase for employee commutes, equipment and other deliveries. Numbers of these vehicles will vary depending on construction requirements and timing of construction and site establishment components.

4.4 Site Access and Egress

Site access and egress will be gained from the Site Access Road which will form an eastward extension of the Unnamed Local Road (**Figure 1**).

4.5 Permits and Licences

The primary traffic and transportation related approval required for the Quarry is a Section 138 permit under the *Roads Act 1993*. A permit under the *Roads Act 1993* would be required to undertake the following roadworks.

- Reconstruction/widening of the section of the Unnamed Local Road in between the existing "GIVE WAY" signs to a width of 6.5m.
- Upgrades to the section of the Unnamed Local Road between the existing access to Camilleri Stockfeeds and the Site Access to a local street standard in accordance with Council's *AUS-SPEC Specifications – Section 0042 Pavement Design*.
- Installation of "GIVE WAY" controls on all three legs of the Site Access intersection.

A road opening permit allows a person to dig into Council's assets, such as roads, footpaths and nature strips. A road opening permit may be required for the upgrades to the Unnamed Local Road at the bend where the road decreases in width to a single lane (**Figure 5**).

Works Zones will be provided to facilitate the efficient and safe operation of construction projects while minimizing disruption to traffic and pedestrians. Indicative Work Zone locations are identified on **Figure 6**. Work Zone permits relating to the road and intersection upgrades identified above would be sought from Council prior to the commencement of roadworks as required.

A Road Occupancy Licence may be required for the upgrades to the Unnamed Local Road at the bend where the road decreases in width to a single lane, as the roadworks are likely to temporarily impact on traffic flow on that road. Subsequently, a traffic control permit will also be required to ensure safe control and flow of any traffic past the work zone during roadwork times.

All permits and licences required to be received for any road or intersection upgrades would be sought following the receipt of development consent to ensure timely commencement of roadworks during site establishment.

4.6 Management and Mitigation Measures

In order to ensure that the traffic and transport impacts of the Quarry are minimised during site establishment activities, the following management and mitigation measures would be implemented.

- Roadworks 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.
- Any traffic control measures required during the road and intersection upgrades would be provided by appropriately licenced persons or contractors.
- 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.
- Enforcement of a Driver Code of Conduct (see **Appendix 2**) to ensure drivers are aware of their responsibilities within the Quarry Site and during transportation of raw materials. This includes:
  - A requirement that all drivers employed or contracted by the Company sign and implement the Code;
  - the Code is included in induction, re-induction and training processes; and
  - the Code is retained with drivers at all times during their travel to and from the Quarry.
- All heavy vehicle movements along Old Northern Road which would pass through school zones would be restricted between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.
- Undertake all operations in accordance with the *Environmental Management Plan* (EMP) for the Quarry.
- Implementation of the complaints management system detailed in Section 11 to ensure that all traffic and transportation related complaints are dealt with through investigation and implementation of corrective treatments.

5. Pedestrian Management

5.1 Potential Impacts on Pedestrian Movements

Due to the location of the Site Access Road and the intersection with the Unnamed Local Road it is not anticipated that there will be any impacts on pedestrian movements outside of the Quarry Site. There are no footpaths within the vicinity of the Site Access Road or intersection with the Unnamed Local Road. Therefore, no impacts to pedestrian movements are anticipated.

5.2 Management and Mitigation Measures

As no impacts to pedestrian movements are anticipated outside of the Quarry Site, no specific management and mitigation measures are required. Notwithstanding, the Driver's Code of Conduct includes details regarding safe driving and standard safety procedures which will prevent impacts to pedestrians inside and outside of the Quarry Site, however unlikely.

6. Parking

6.1 Potential Impacts on Street Parking

The Quarry is unlikely to result in any impacts on street parking on the Unnamed Local Road. Existing street parking on the Unnamed Local Road is limited, with vehicles sporadically parking in the cleared area between the Camilleri Stockfeeds access and the Site Access. Opportunities to park in this area would be maintained following the establishment of the Site Access Road, with this area effectively becoming the shoulder of the Unnamed Local Road between the Camilleri Stockfeeds access and the Site Access.

6.2 Worker Parking

Employee parking locations would generally depend on the progression of site establishment activities and areas available within the Quarry Site to park vehicles.

Employee parking would initially be provided on the shoulder of the Unnamed Local Road between the Site Access and Camilleri Stock Feeds during site establishment. Once sufficient space within the Office, Amenities, and Parking Area (**Figure 2**) has been established, employee parking would be provided within this area.

Alternative transportation arrangements, such as carpooling, may be implemented if insufficient vehicle parking space is available on the shoulder of the Unnamed Local Road prior to establishment of the Office, Amenities, and Parking Area. Following establishment of this area within the Quarry Site, there will be sufficient vehicle parking space available on site for all employees.

7. Tree Management and Protection

Tree and vegetation management at the Quarry will be undertaken in accordance with the commitments identified in the EIS, EMP and *Vegetation Management and Restoration Plan* (VMRP).

An assessment completed by Ecoplanning (2023) as part of the development application for the Quarry zoned the vegetation on site as Zone 1 – Moderate Resilience Bushland (to be retained) and Zone 2 - Moderate Resilience Bushland (to be disturbed) for management purposes. Objectives and actions for managing the two zones of management for vegetation are detailed in Table 4 of the VMRP.

Section 12 of this document presents the Site Plan for the Quarry which identifies the areas of the site which will have vegetation removed or retained.

Tree management and protection measures to be undertaken during the site establishment phase for the Quarry include the following.

- Undertake all operations in accordance with the EMP for the Quarry.
- Ensure areas of proposed disturbance are clearly marked prior to the commencement of clearing campaigns to minimise the potential for over-clearing of vegetation.
- Prior to 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 Quarry in accordance with the Biodiversity Offset Scheme prior to disturbance of native vegetation.

8. Stormwater Management

Construction of water management infrastructure would be undertaken in a staged manner (see Section 3.2), with initial controls comprising the following.

- Installation and maintenance of sediment fencing downslope of all areas to be disturbed, with straw bales utilised as additional controls for fine particle capture as required.
- Construction of clean water diversions around the southern perimeter of the Extraction Area and associated energy dissipater. A culvert / pipe would also be constructed beneath the Perimeter Bund to divert runoff to the Extraction Area sump.

Following profiling of the Office, Amenities and Parking Area and establishment of the perimeter safety bund around this area, the remaining water management infrastructure will be installed comprising the following.

- SB1 would be constructed within the Office, Amenities, and Parking Area in accordance with the requirements of *Managing Urban Stormwater* Volumes 1 and 2E (Landcom, 2004 and DECC, 2008).
- 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 to SB1.

Details and specifications of all water management structures, as well as management and mitigation measures, are described in the ESCP for the Quarry.

Runoff water from establishment and construction activities at the Quarry Site would initially be diverted to the existing sump within the former extraction area prior to the construction of the operational water management structures (**Figure 2**). Sediment fencing would also be utilised where required to minimise and prevent sediment leaving disturbance areas.

Water collected within the sump and SB1 would be used for dust suppression. In order to maintain a minimum capacity of 111m^3, excess water within SB1 would be pumped to the sump within the Extraction Area, as required.

9. Noise and Vibration

9.1 Emission Sources

Noise and vibration emissions sources for the Quarry are detailed in Section 5.3.5.1 of the EIS and the updated Noise Assessment completed by Muller Acoustic Consulting (MAC) (2024). The noise and vibration emissions sources for the site establishment phase of the Quarry are reproduced below in **Table 3**.

Table 3
Noise Source Sound Power Levels

Noise Source / Item	Number	Individual Sound Power Level	Sound Power Level dB $LA_{eq(15\ min)}$	Source Height[1]
Bulldozer (CAT D8)	1	108	108	1.5m
Excavator (35t)	1	104	104	1.5m
Front End Loader	1	109	109	1.5m
Note 1: Height above the relative ground or building below source.				
Source: MAC (2024) – Modified after Table 23				

Noise emission modelling for site establishment activities was undertaken in MAC (2024) and as part of the preparation of the EIS for the Quarry. Equipment to be utilised during the site establishment phase (**Table 3**) was assessed for noise emission quantification incorporating a three-dimensional terrain map, noise source data, ground type, attenuation from barriers and atmospheric information.

Noise emissions would be generated from roadworks, earthworks, sediment basin construction, vegetation clearing and removal and bund construction activities during the site establishment phase. MAC (2024) notes that predicted noise levels would be within the relevant criteria during construction works, except for an exceedance of 3dB at R37 (located approximately 120m from the widened Site Access Road). The exceedance would be temporary, of a short duration and would only occur when works are at their nearest proximity during standard construction hours. MAC (2024) considers that the magnitude of this exceedance is negligible and would be effectively mitigated and managed through the controls identified in Section 9.3.

9.2 Duration of Works

The duration of the site establishment phase for the Quarry is anticipated to be between 3 to 6 months. Hours of operation during the site establishment phase and the remainder of the Quarry life will be consistent with the hours identified in **Table 4**.

Table 4
Hours of Operation

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

9.3 Mitigation and Management Measures

The Company 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 **Table 4** would be strictly adhered to.
- The maximum number of heavy vehicle movements during site establishment would be limited to 24 daily total movements (12 inbound and 12 outbound).
- 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).
- Where practicable, equipment with lower noise emissions or sound dampening technology would be utilised.
- Where possible, use localised mobile screens or construction hoarding around piling rig/plant to act as barriers between construction works and receivers, particularly when undertaking works near the Quarry Site boundary and/or a residential receiver.
- Ongoing consultation with residents in proximity to the Quarry Site regarding project progress, upcoming noise generating works and their durations.
- Implementation of the complaints management system detailed in Section 11.

10. Waste Management

Table 5 presents a summary of the types and estimated volumes of wastes that are likely to be generated during site establishment works and how these would be managed.

Waste storage facilities would be provided in the Office, Amenities, and Parking Area (**Figure 2**).

Table 5
Non-Production Waste Management

Waste Type	Storage	Estimated Volume[1]	Management and Disposal
General waste (including food scraps and packaging, paper, cardboard, etc.)	Small bins would be located on-site, generally within the office and toilet facilities. External bins would be lidded.	1 x 120L bin general waste and 1 x 120L bin recyclables per fortnight during extraction / processing campaigns.	Bins would be taken off site for disposal / recycling at an appropriately licenced facility.
Maintenance Waste[2] (including oils and greases, tyres, batteries, etc.)	Hydrocarbons would be stored in 20L or 205L drums and stored in accordance with *AS1940 The storage and handling of flammable and combustible liquids*. Any batteries would be placed in a suitable location not subject to potential damage from vehicles / earthmoving equipment. Any tyres or scrap steel would be stored within a suitable location not subject to vehicles / earthmoving equipment.	Generally, <20L per month assuming no unplanned on-site maintenance required.	Any wastes generated from on-site equipment repair or maintenance would be removed from the Quarry Site on the day of generation and disposed of / recycled at an appropriately licenced facility.
Waste Water	Waste water from the toilet facilities would be stored within a pump out tank.	Estimated average of 20L per day.	The toilet facilities would be serviced by a licenced contractor with waste water pumped out for off-site treatment / disposal.

Notes:

1: The volumes of non-production wastes generated through the proposed operational activities would be minimal. Volumes provided are estimates only.

2: To minimise on-site waste generation, equipment maintenance would generally be undertaken off site.

11. Complaints Handling

11.1 Introduction

Complaints may be made via the following channels.

- Directly contacting an Environmental Management Representative for the Quarry on 0476 910 130 or 0499 010 000.
- Via a Government agency such as Hornsby Shire Council or the EPA.

The Company will maintain a Complaints Register to record the following details of the complaint:

a) The date and time of the complaint.

b) The method by which the complaint was made.

c) Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.

d) The nature of the complaint.

e) The action taken in relation to the complaint, including any follow-up contact with the complainant.

f) If no action was taken, the reasons why no action was taken.

11.2 Handling of Complaints

The Company has developed a complaints procedure for the operation of the Quarry with all complaints to be investigated and a response provided to the complainant.

The investigation will consider the following.

- What activities (and/or equipment) were being carried out or operated at the time of the complaint.
- Whether at the time of the complaint, normal day-to-day activities were being conducted.
- Whether equipment or activities on-site were the potential source of complaint (or whether other activities in the locality may have contributed to the complaint).
- What actions may be carried out to resolve the complaint and/or minimise the likelihood of further complaints.

If monitoring is undertaken to investigate a complaint, the Quarry Manager will make the results of the monitoring available for viewing by the complainant, on request.

11.3 Dispute Resolution

In the event of a disagreement between the Company and a member of the community regarding environmental management issues, the Quarry Manager or other relevant personnel will work with the community member to resolve the issue.

If an agreement cannot be reached through direct consultation, the Company will seek external assistance from a third party in the resolution of the dispute. This may include mediation facilitators, technical matter experts or relevant government agencies.

12. Site Plan

Figure 4 presents the Site Plan for the Quarry including the requirements identified in **Table 1**.

Figure 5 presents the extent of proposed cut and fill works within the Quarry Site. Cut and fill details for the proposed Site Access Road are detailed in **Appendix 1**.

Figure 6 presents the potential work zone locations required for the proposed roadworks.

Safe temporary fencing to protect the public from the hazards of adjacent construction, excavation or demolition works would utilised during roadworks as required.

There are no proposed hardstand areas associated with the Quarry. All operational facilities provided by a hardstand area would be provided via compacted earth within the Office, Amenities, and Parking Area.

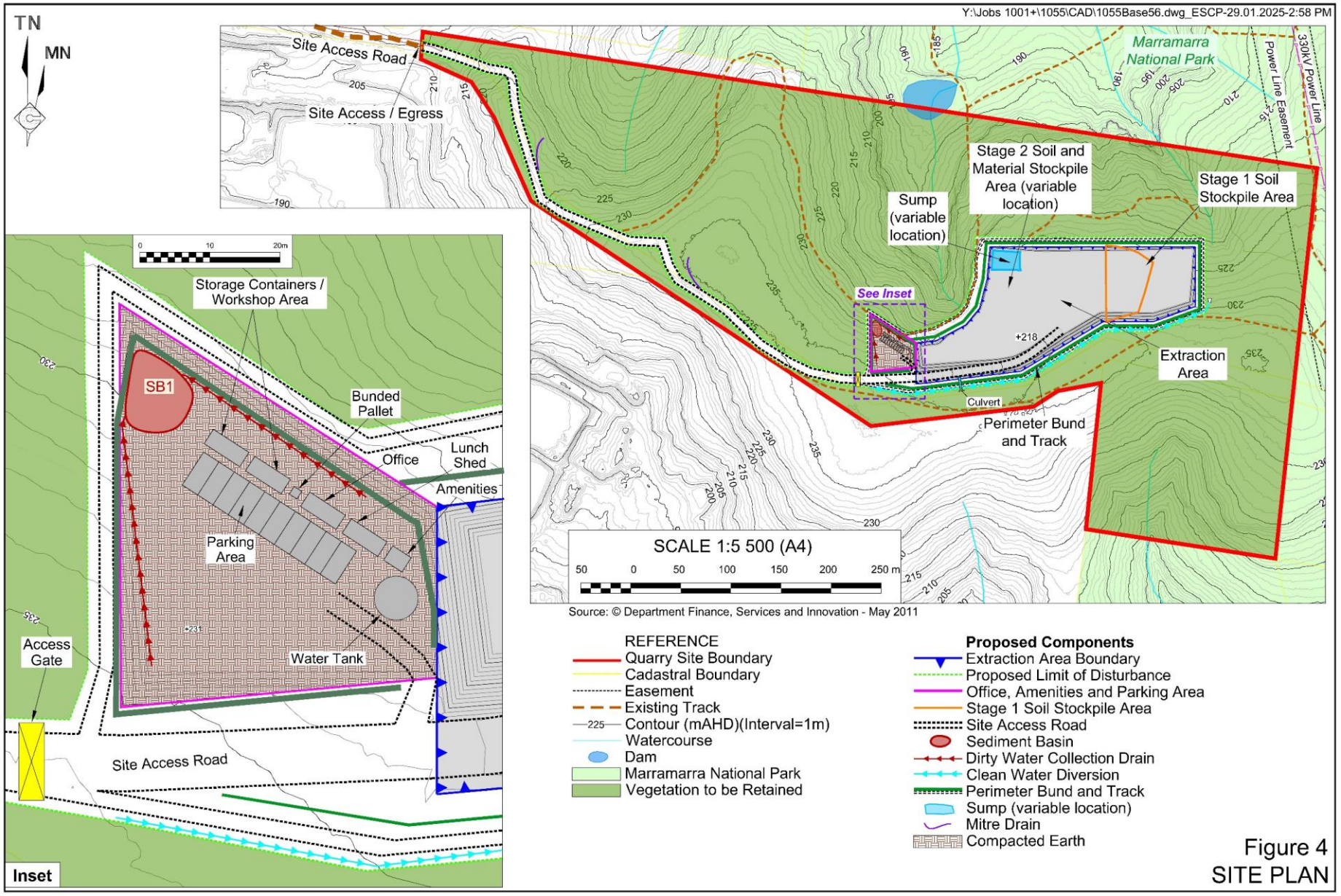
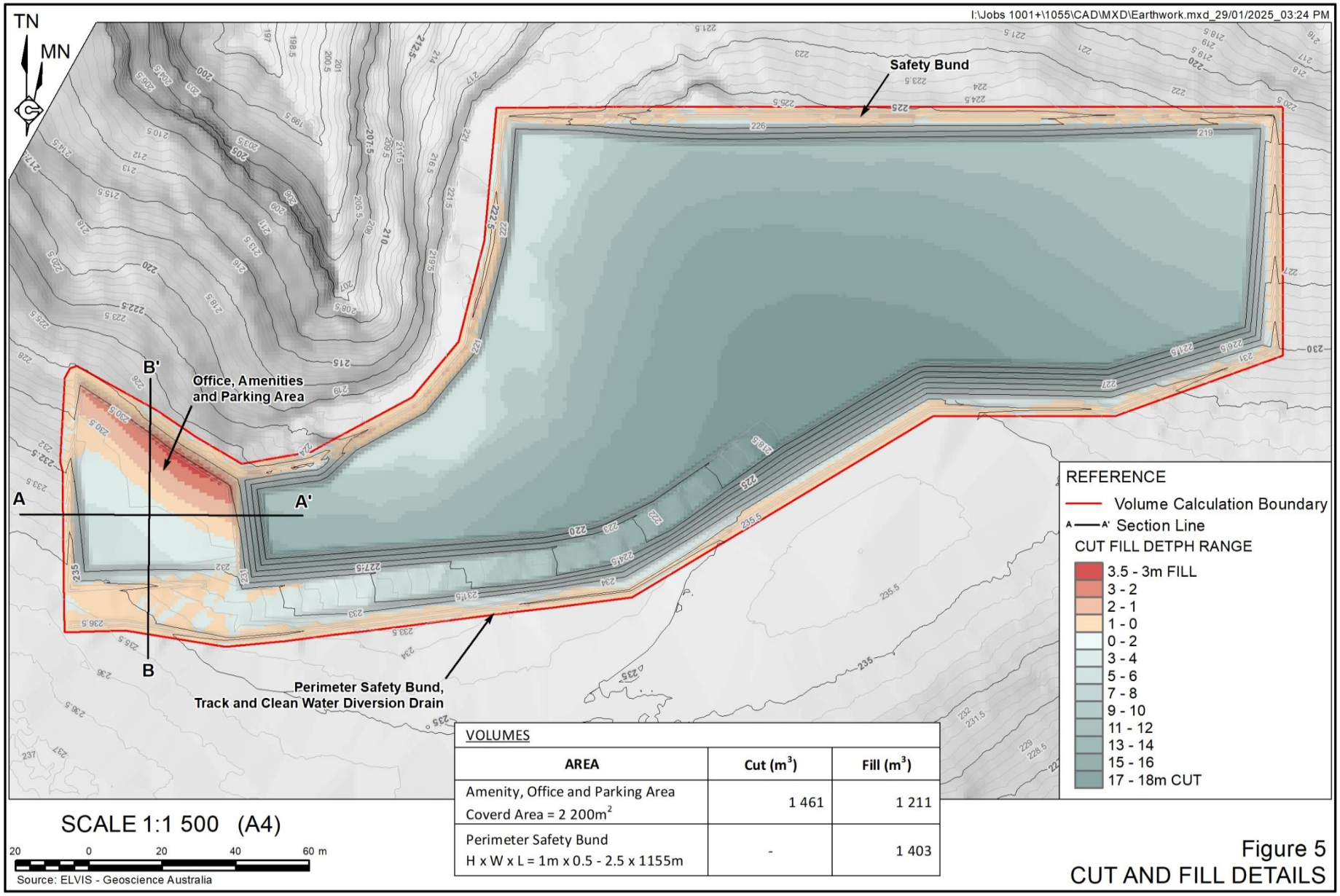


Figure 4
SITE PLAN



VOLUMES

AREA	Cut (m^3)	Fill (m^3)
Amenity, Office and Parking Area Coverd Area = 2 200m^2	1 461	1 211
Perimeter Safety Bund H x W x L = 1m x 0.5 - 2.5 x 1155m	-	1 403

Figure 5
CUT AND FILL DETAILS

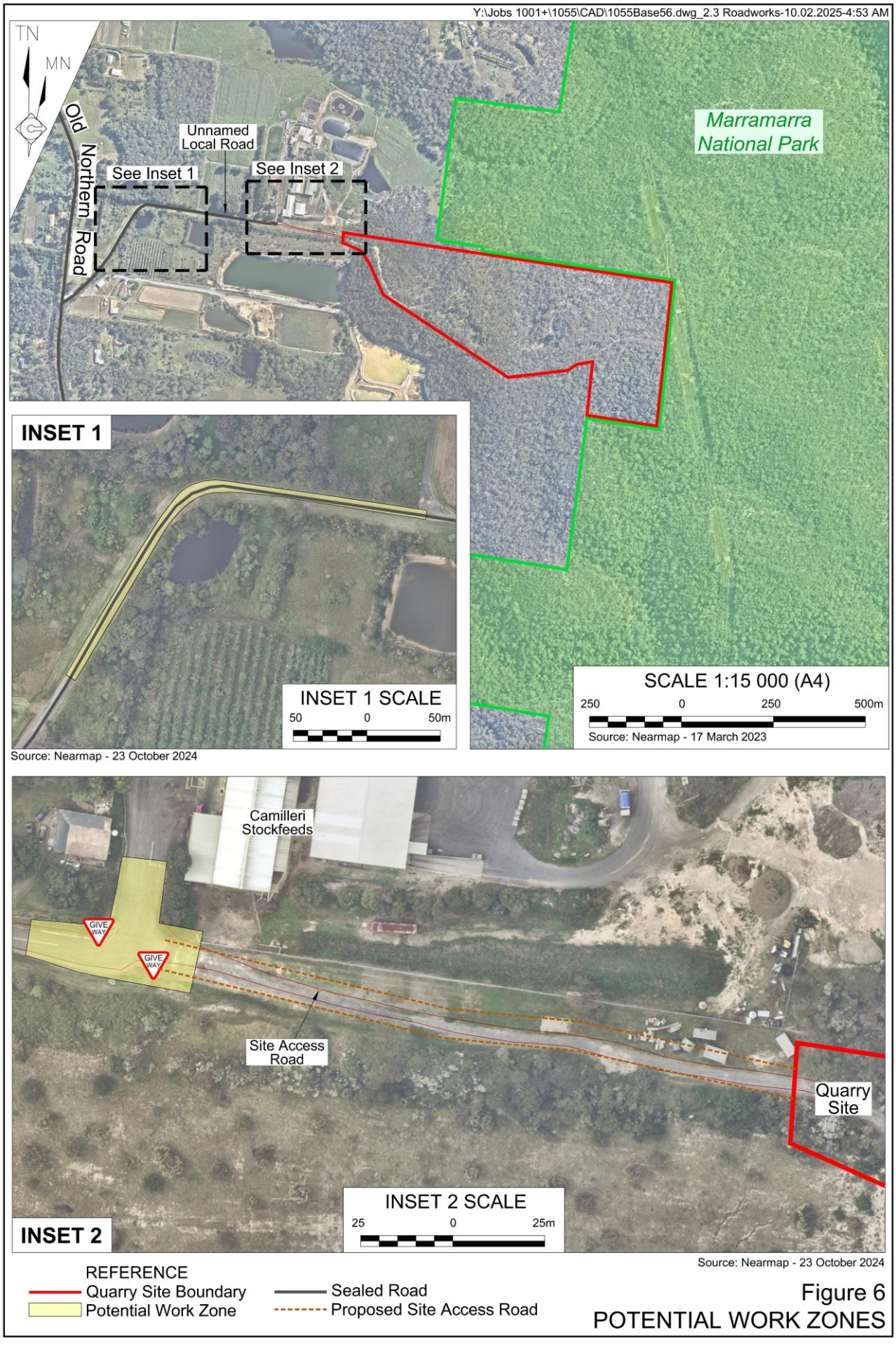


Figure 6
POTENTIAL WORK ZONES

Appendices

Appendix 1 Road Designs

Appendix 2 Driver Code of Conduct

Appendix 1

Road Designs

(Total No. of pages including blank pages = 27)

3d View

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Cover Sheet	1
Plan and Longsection	2 - 3
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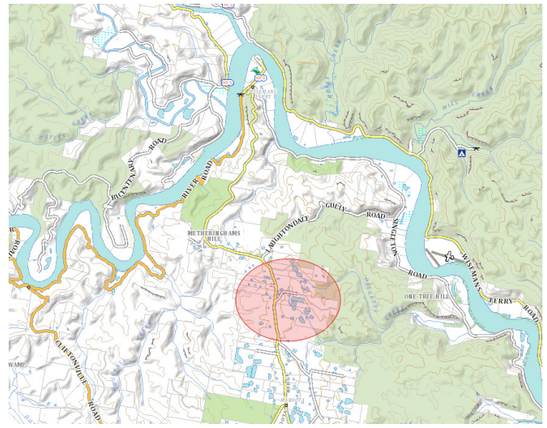
Volumes	20



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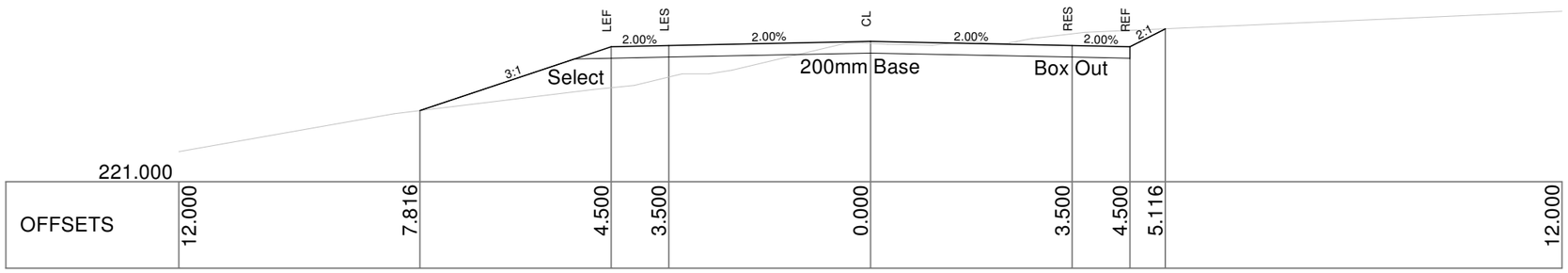

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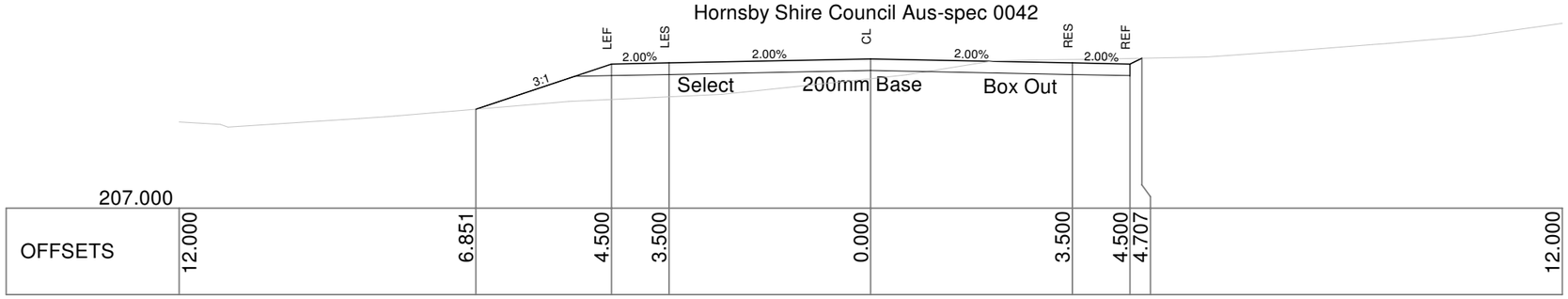
TYPICAL CROSS SECTION
CH 200 - END

Primer Seal And Asphalt
In Accordance With
Hornsby Shire Council Aus-spec 0042



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TYPICAL CROSS SECTION
CH 0 - 200

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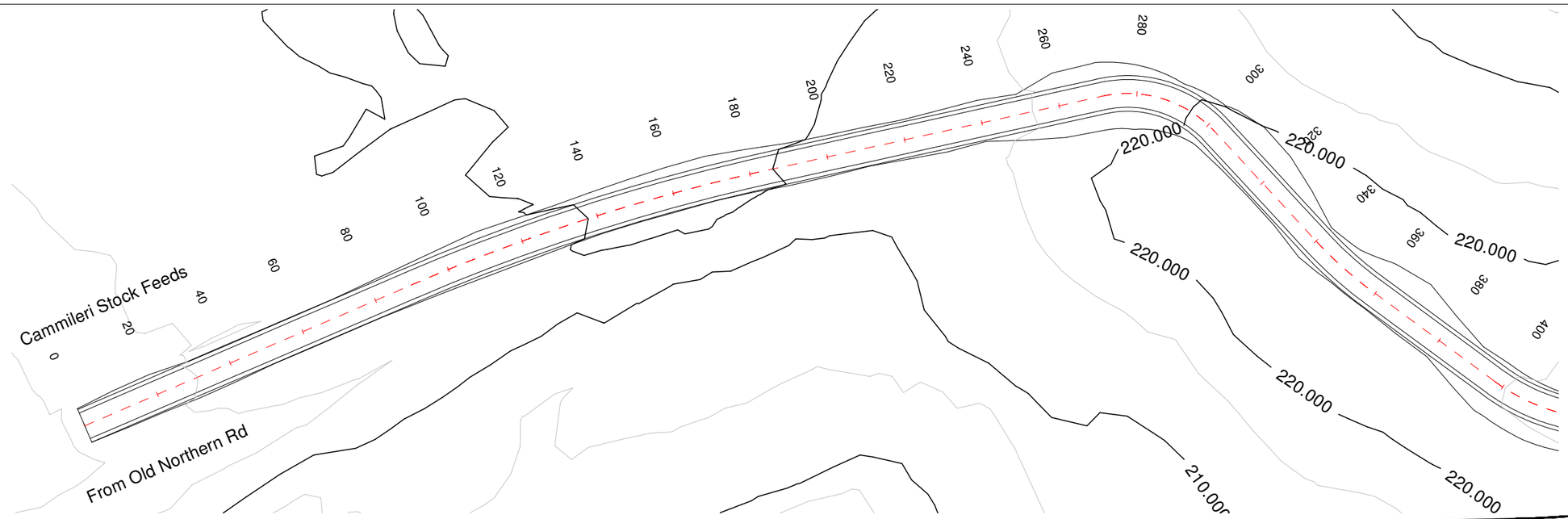

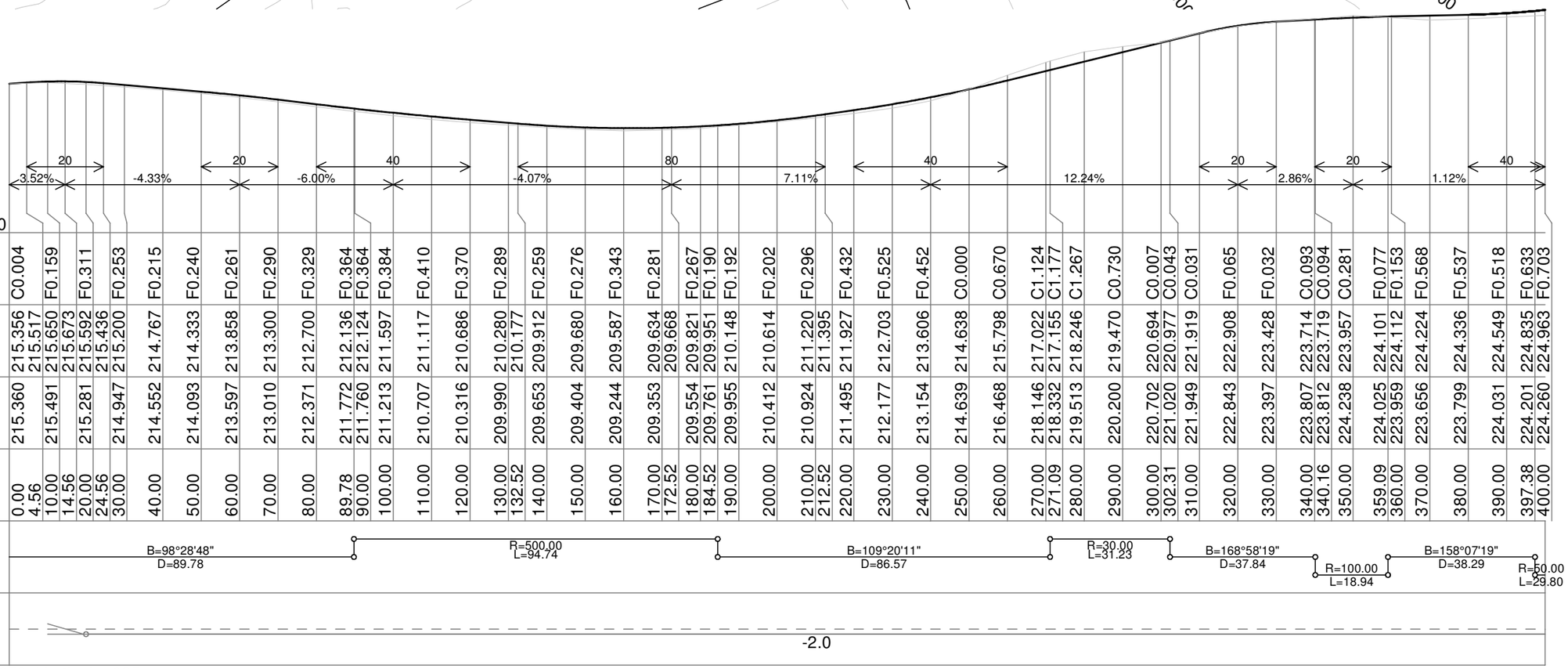

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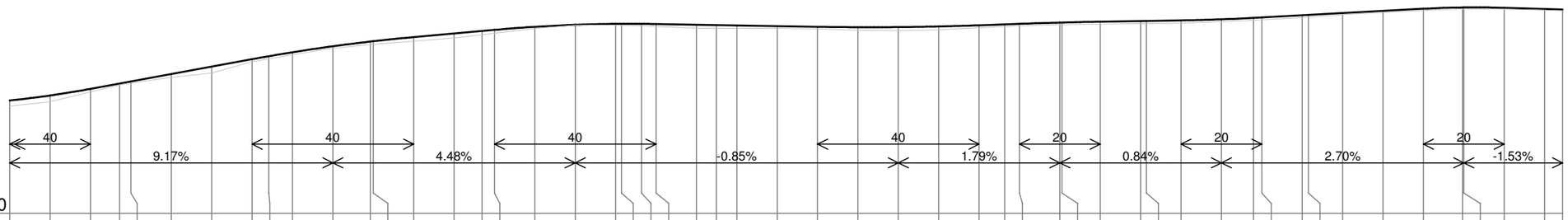

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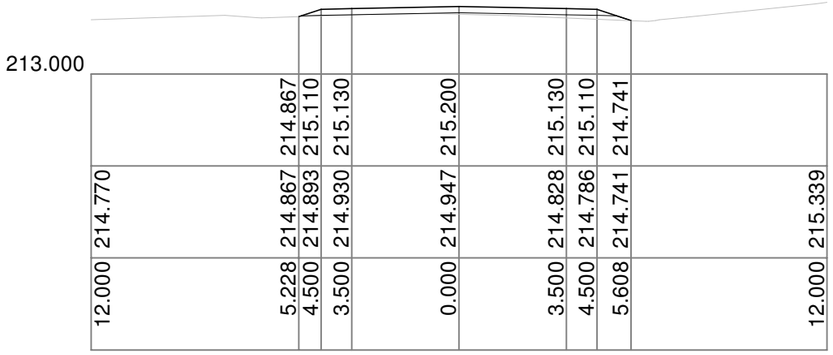

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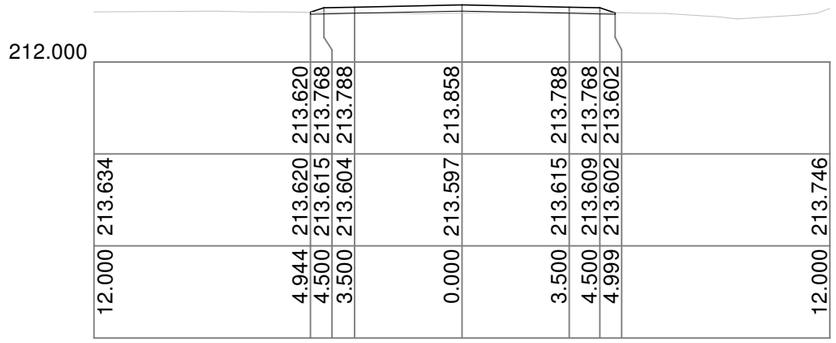

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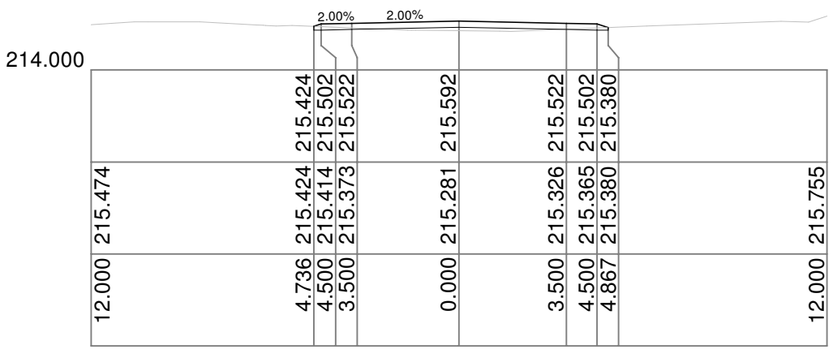

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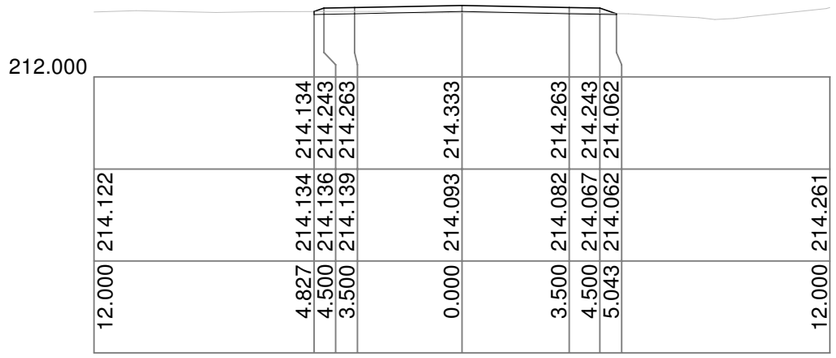

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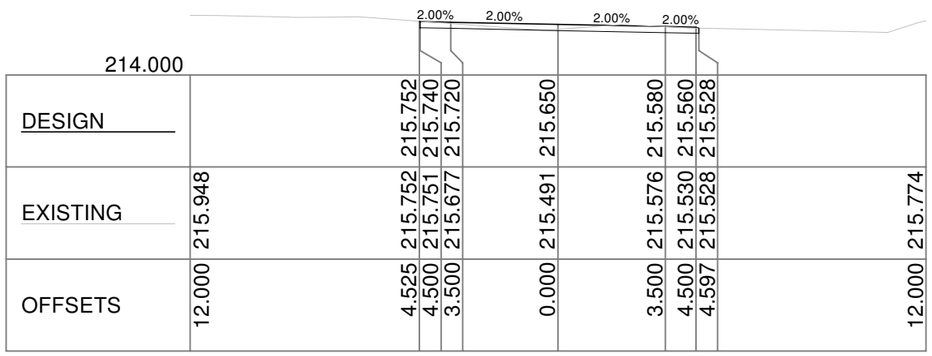

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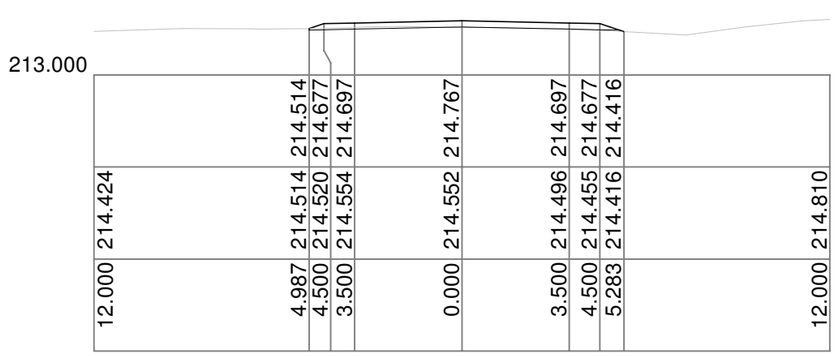

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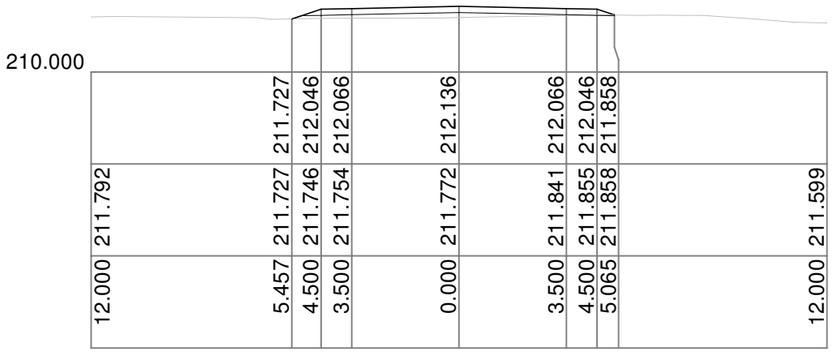

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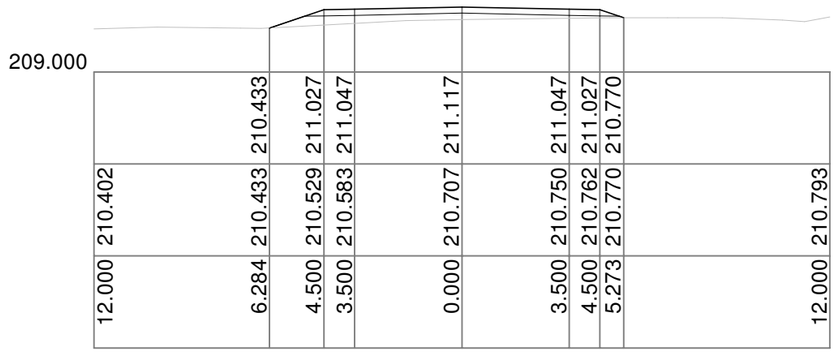

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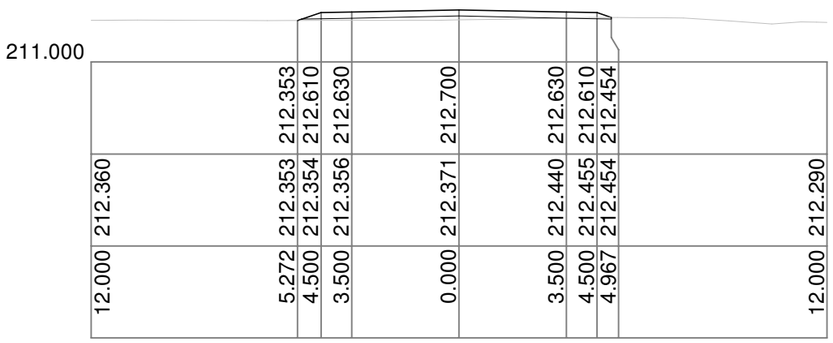

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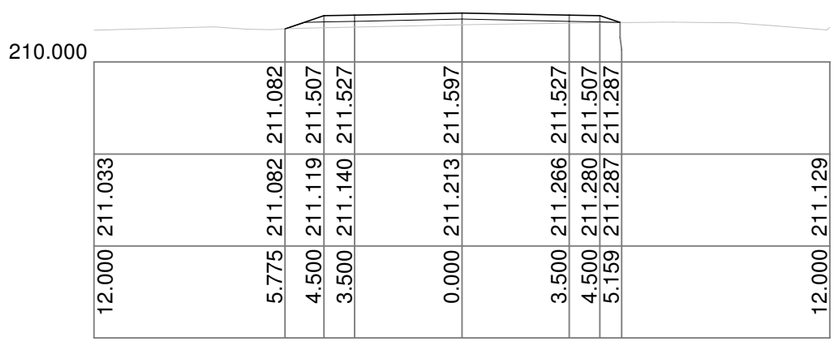

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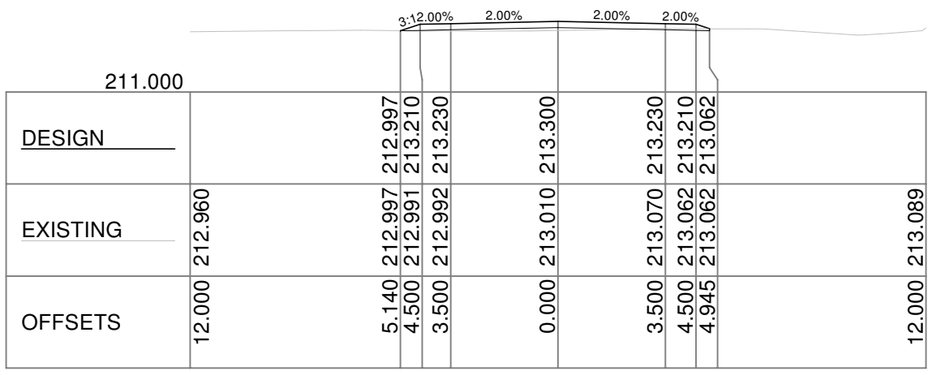

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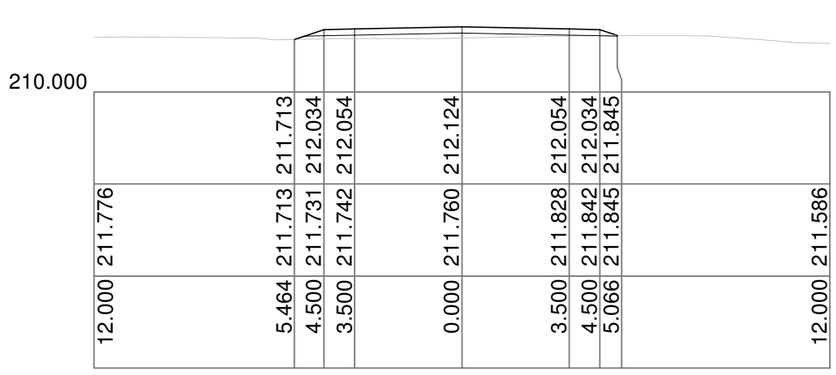

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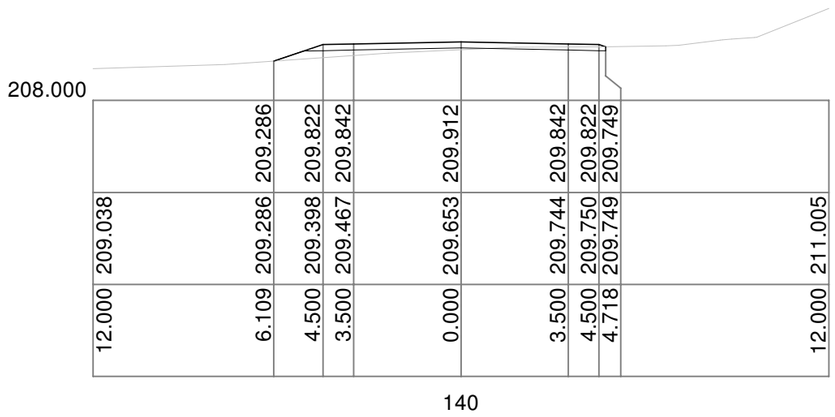

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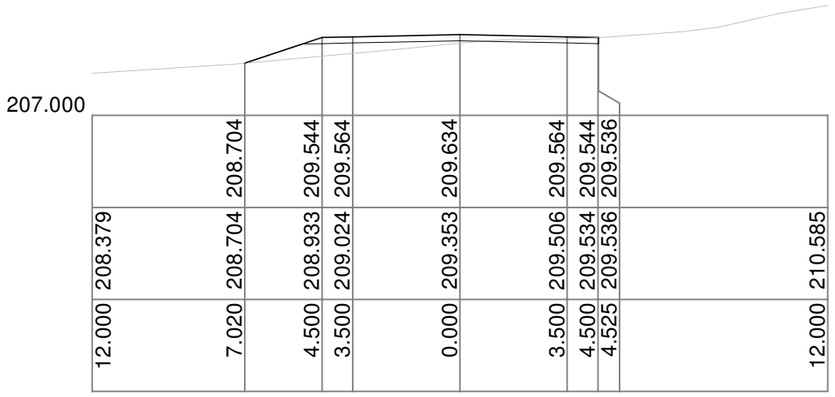

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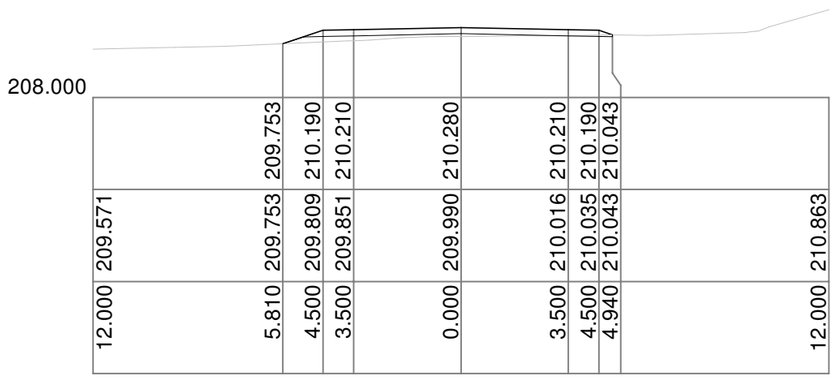

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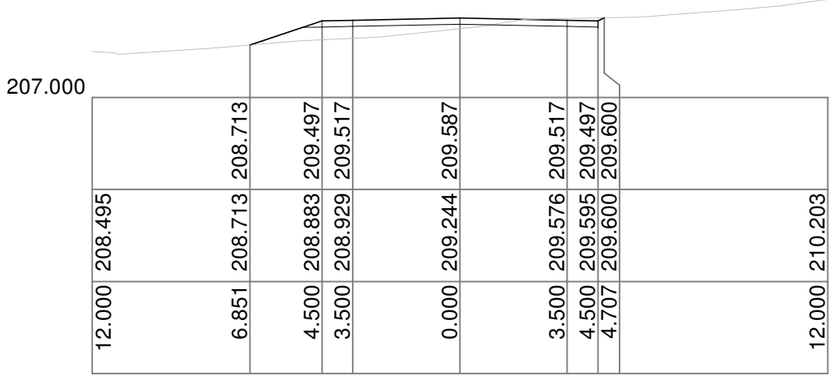

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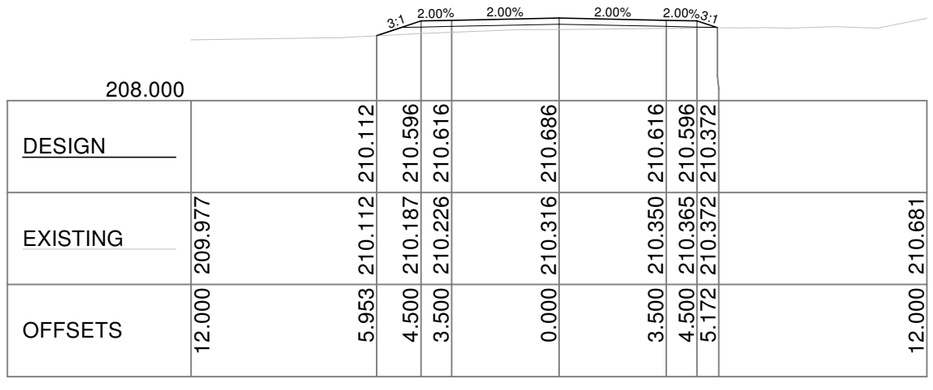

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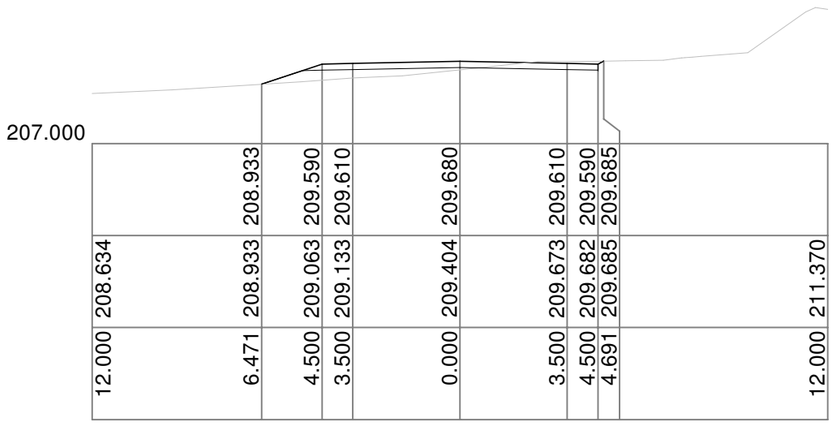

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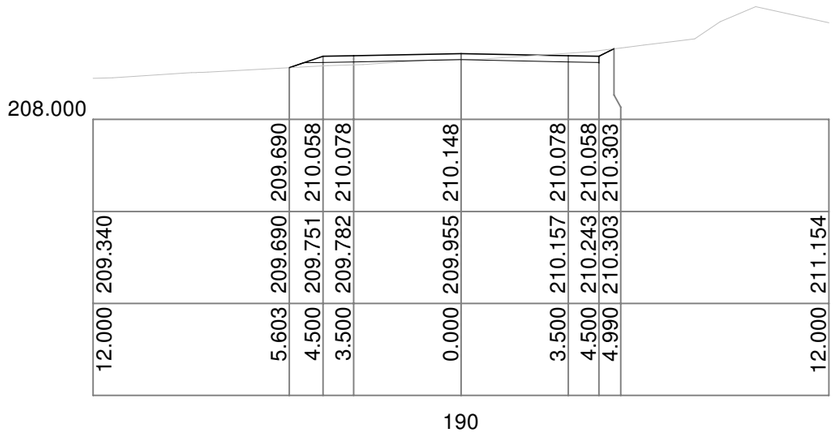

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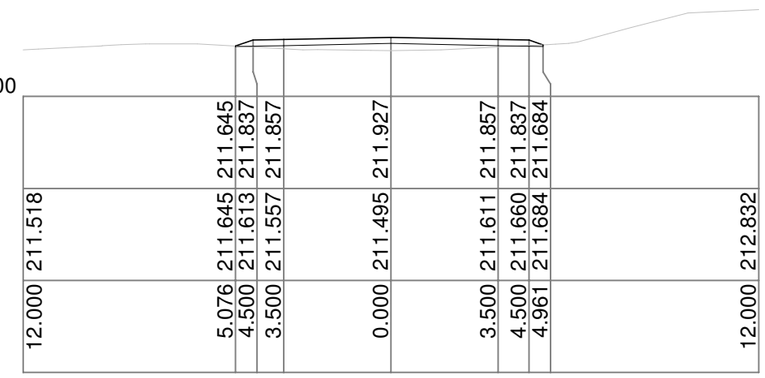

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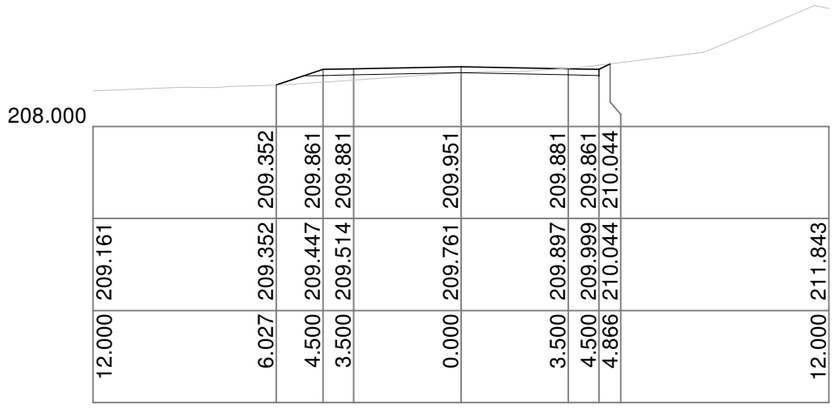

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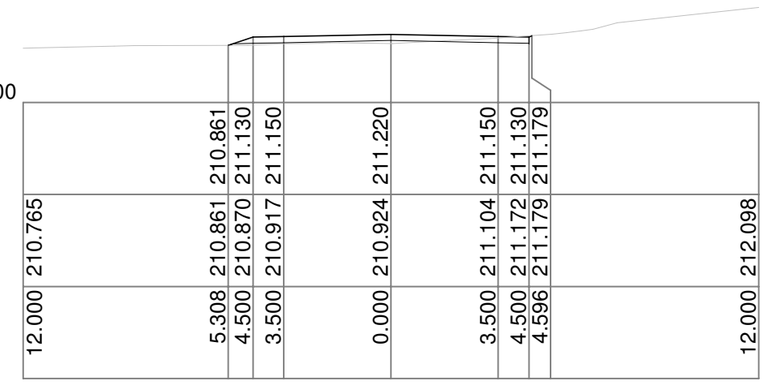

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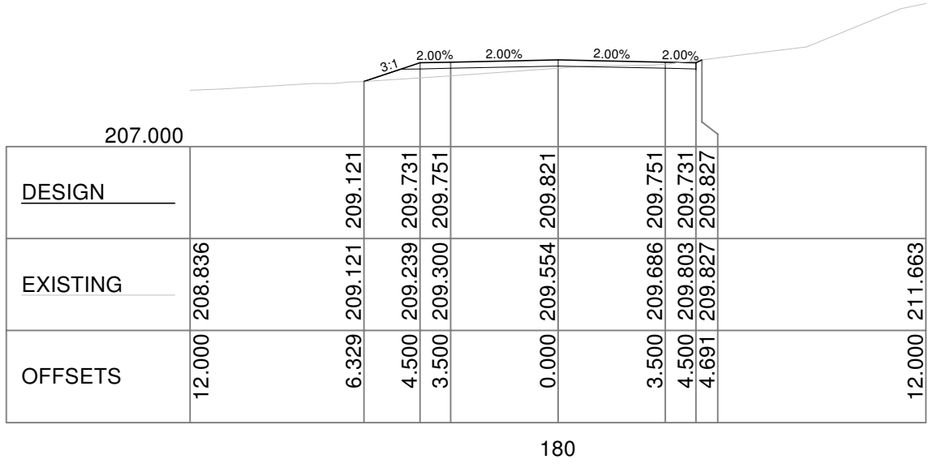

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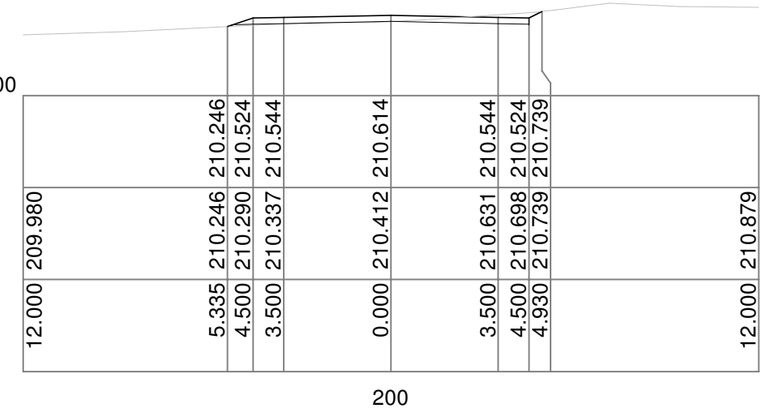

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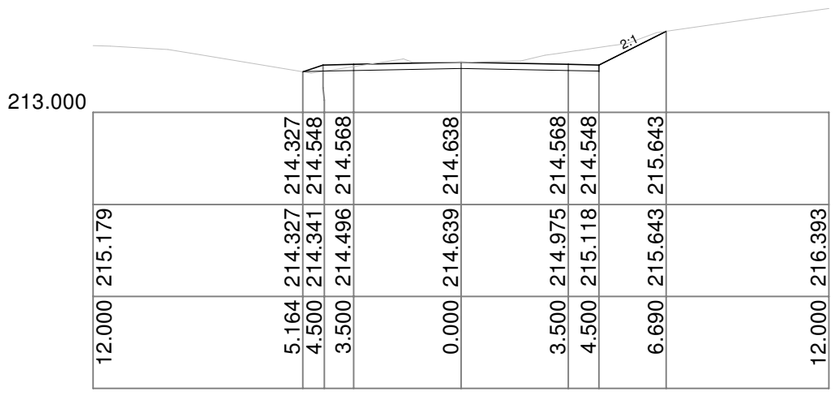

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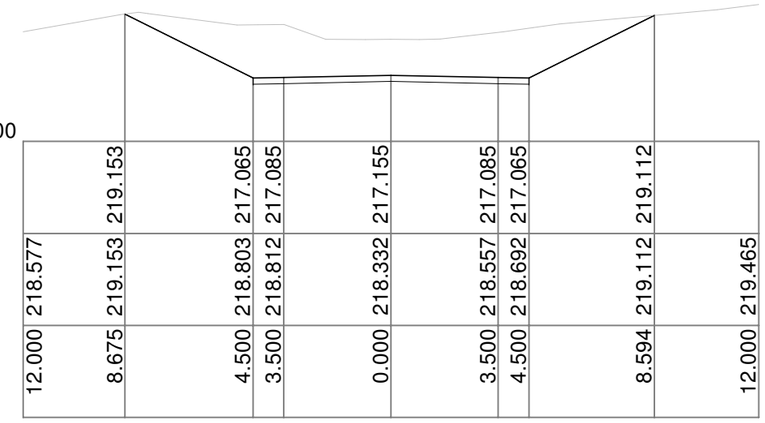
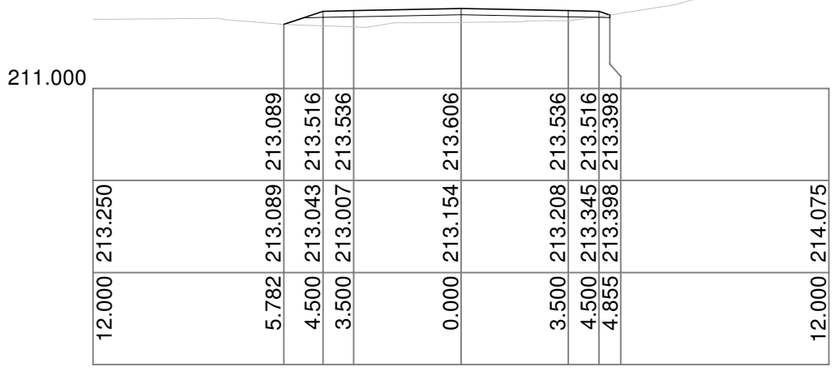


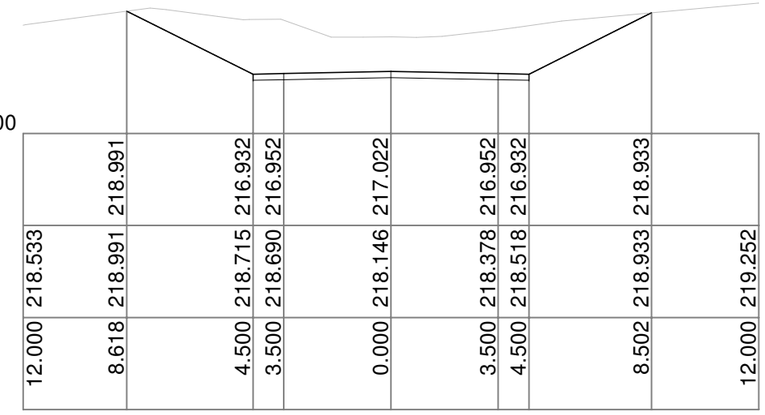
12.000	218.577	219.153	218.803	218.812	218.332	218.557	218.692	219.112	219.465
		8.675	4.500	3.500	0.000	3.500	4.500	8.594	12.000
		219.153	217.065	217.085	217.155	217.085	217.065	219.112	

271



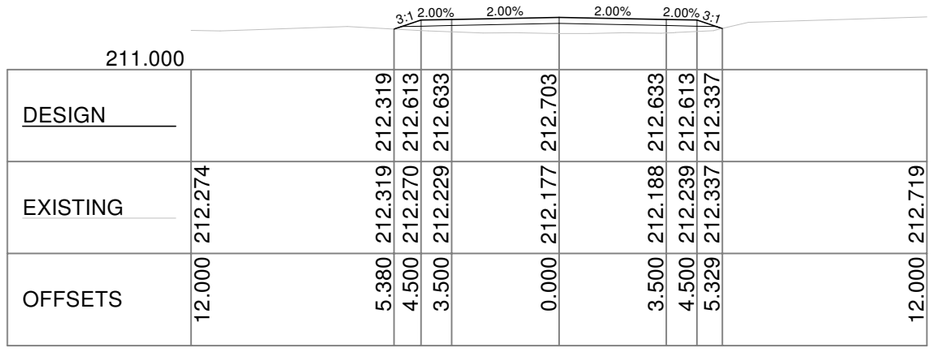
12.000	213.250	213.089	213.043	213.007	213.154	213.208	213.345	213.398	214.075
		5.782	4.500	3.500	0.000	3.500	4.500	4.855	12.000
		213.089	213.516	213.536	213.606	213.536	213.516	213.398	

240



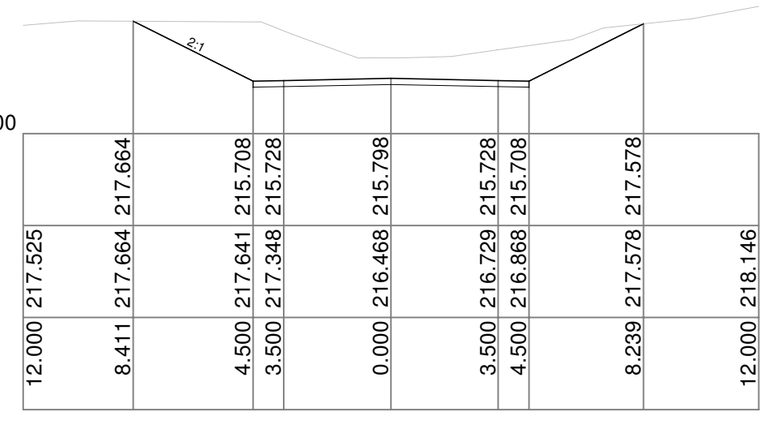
12.000	218.533	218.991	218.715	218.690	218.146	218.378	218.518	218.933	219.252
		8.618	4.500	3.500	0.000	3.500	4.500	8.502	12.000
		218.991	216.932	216.952	217.022	216.952	216.932	218.933	

270



DESIGN		212.319	212.613	212.633	212.703	212.633	212.613	212.337	
EXISTING	212.274	212.319	212.270	212.229	212.177	212.188	212.239	212.337	212.719
OFFSETS	12.000	5.380	4.500	3.500	0.000	3.500	4.500	5.329	12.000

230

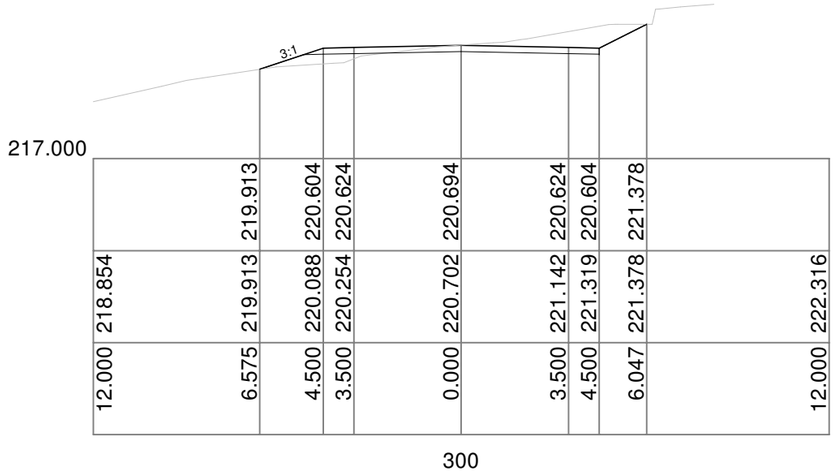


12.000	217.525	217.664	217.641	217.348	216.468	216.729	216.868	217.578	218.146
		8.411	4.500	3.500	0.000	3.500	4.500	8.239	12.000
		217.664	215.708	215.728	215.798	215.728	215.708	217.578	

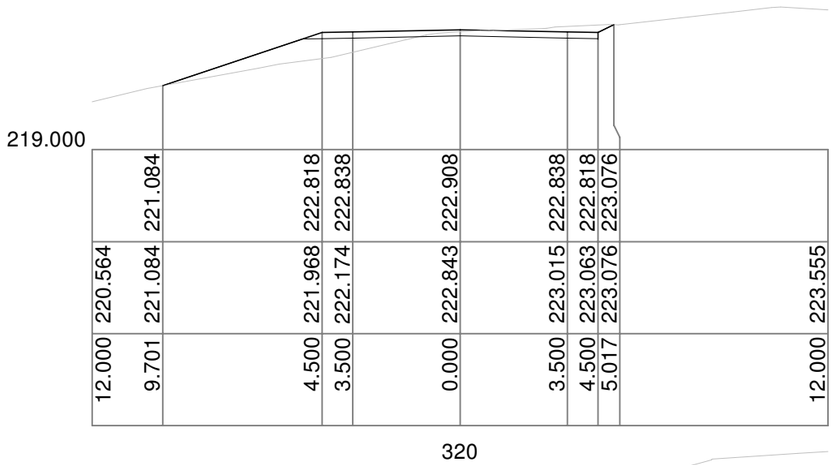
260

Scale Horizontal 1:200 Vertical 1:200

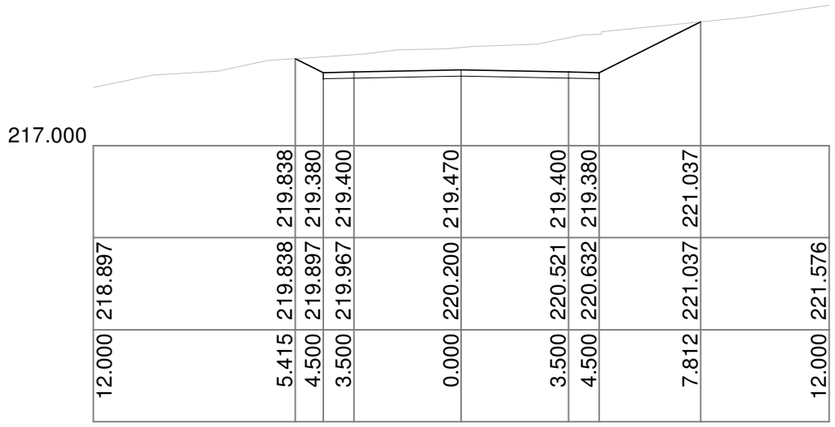
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 8**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



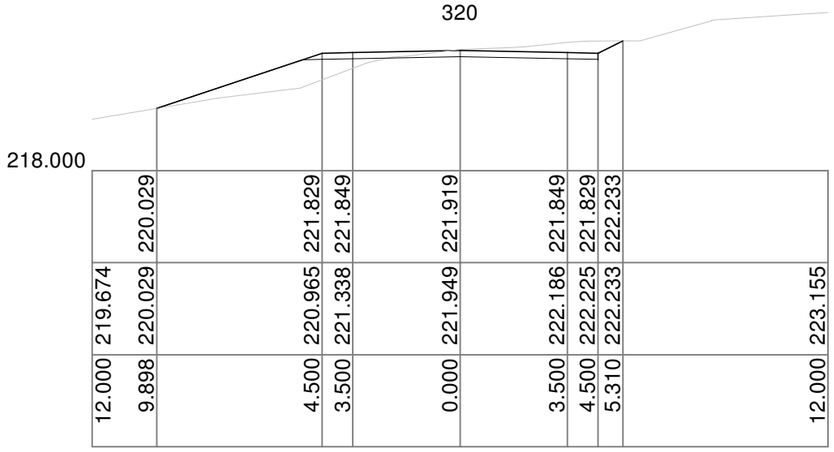
300



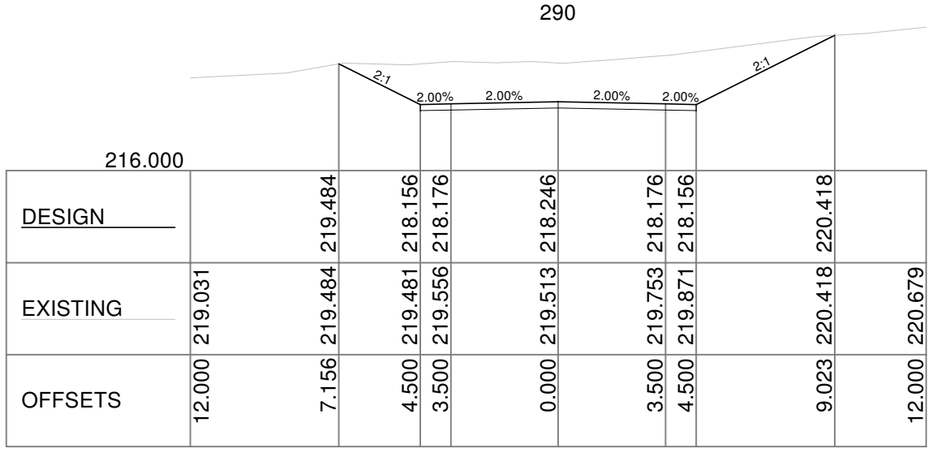
320



290



310



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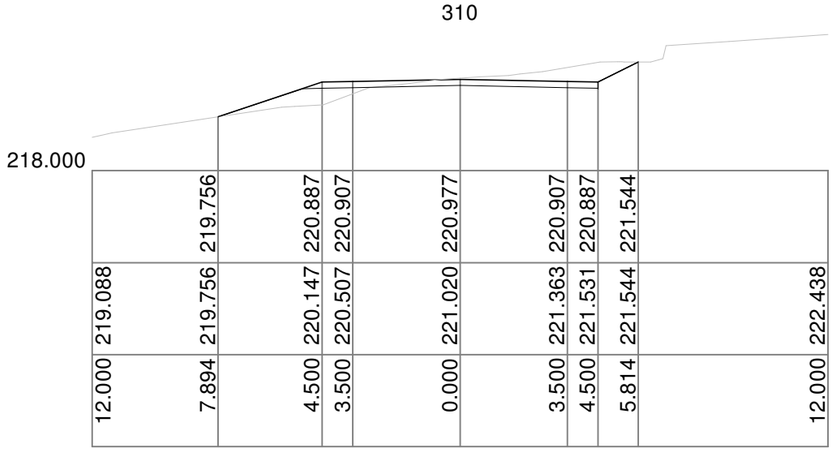
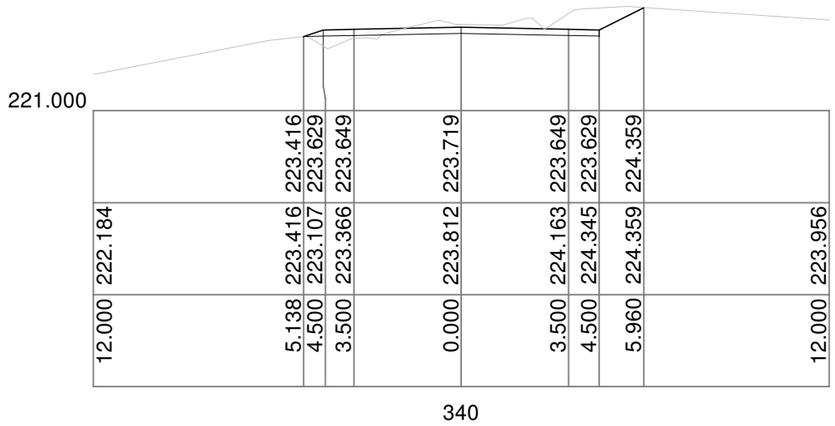


302

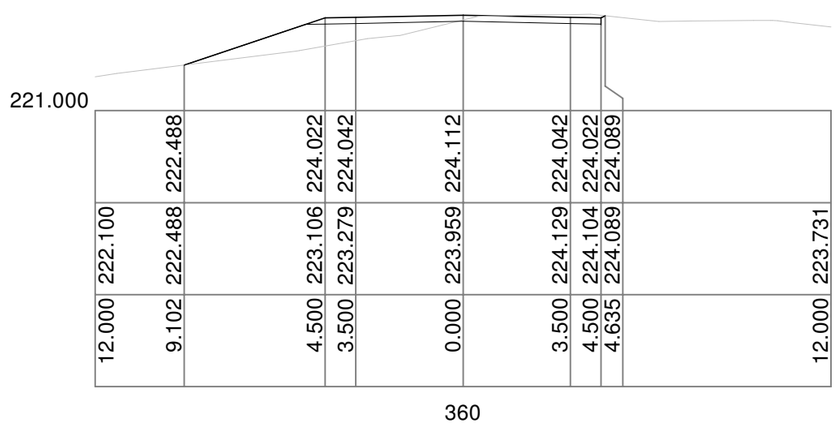
Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 9**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



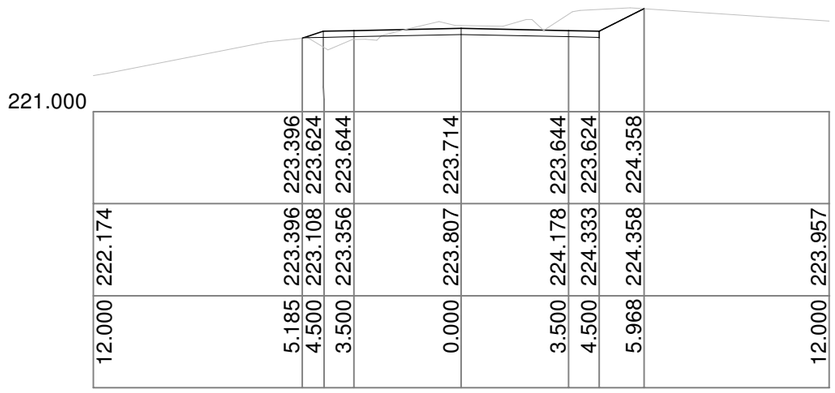
12.000	222.184	5.138	4.500	3.500	0.000	3.500	4.500	5.960	12.000
		223.416	223.629	223.649	223.719	223.649	223.629	224.359	
		223.416	223.107	223.366	223.812	224.163	224.345	224.359	223.956

340



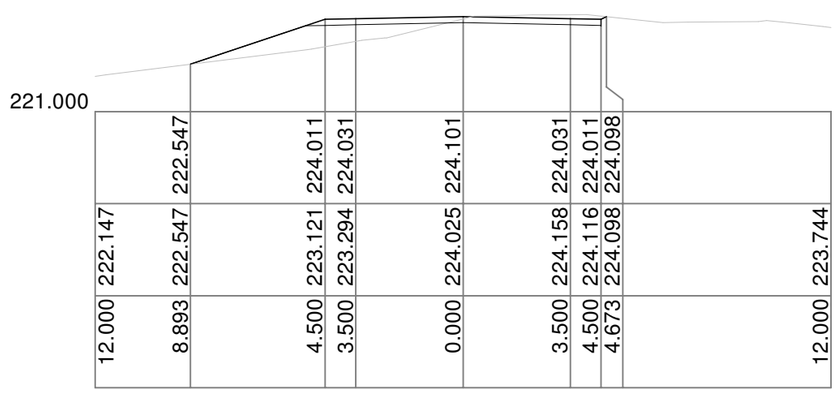
12.000	222.100	9.102	4.500	3.500	0.000	3.500	4.500	4.635	12.000
	222.488	222.488	224.022	224.042	224.112	224.042	224.022	224.089	
	222.488	222.488	223.106	223.279	223.959	224.129	224.104	224.089	223.731

360



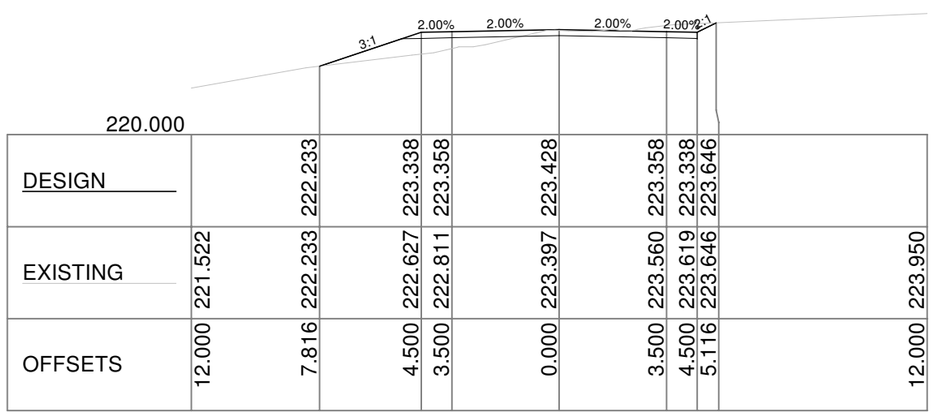
12.000	222.174	5.185	4.500	3.500	0.000	3.500	4.500	5.968	12.000
		223.396	223.624	223.644	223.714	223.644	223.624	224.358	
		223.396	223.108	223.356	223.807	224.178	224.333	224.358	223.957

340



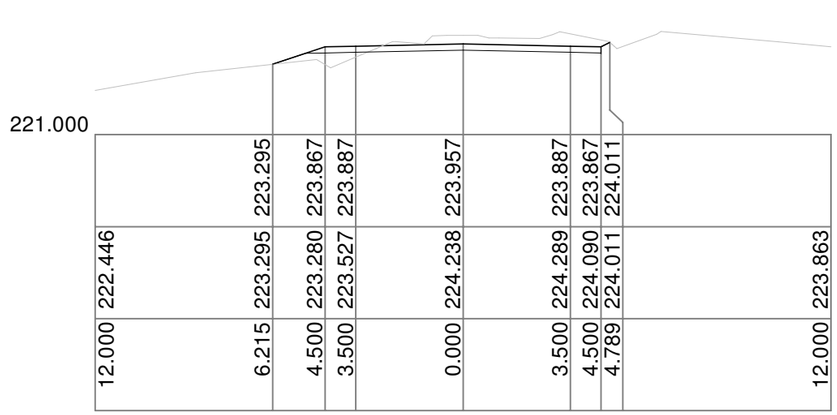
12.000	222.147	8.893	4.500	3.500	0.000	3.500	4.500	4.673	12.000
	222.547	222.547	224.011	224.031	224.101	224.031	224.011	224.098	
	222.547	222.547	223.121	223.294	224.025	224.158	224.116	224.098	223.744

359



12.000	7.816	4.500	3.500	0.000	3.500	4.500	5.116	12.000
	222.233	223.338	223.358	223.428	223.358	223.338	223.646	
221.522	222.233	222.627	222.811	223.397	223.560	223.619	223.646	223.950

330

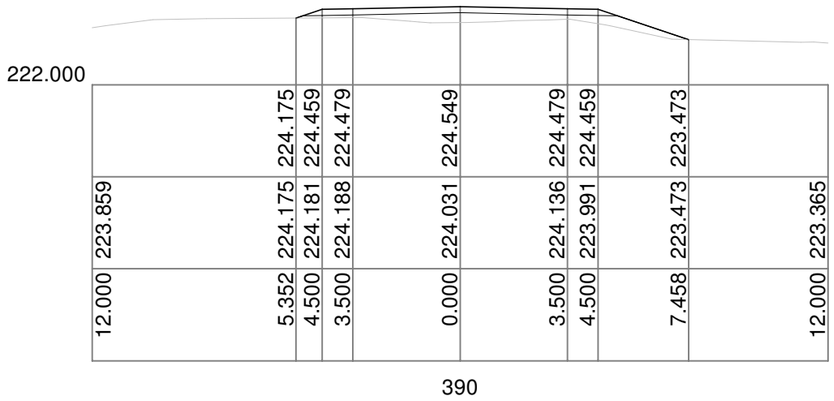


12.000	6.215	4.500	3.500	0.000	3.500	4.500	4.789	12.000
	223.295	223.867	223.887	223.957	223.887	223.867	224.011	
222.446	223.295	223.280	223.527	224.238	224.289	224.090	224.011	223.863

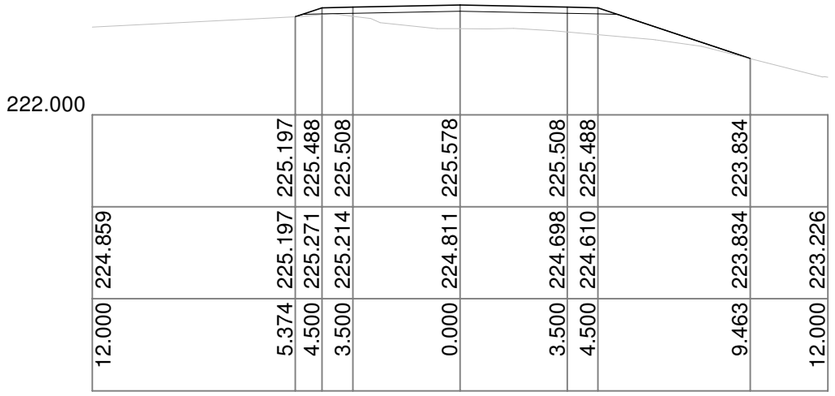
350

Scale Horizontal 1:200 Vertical 1:200

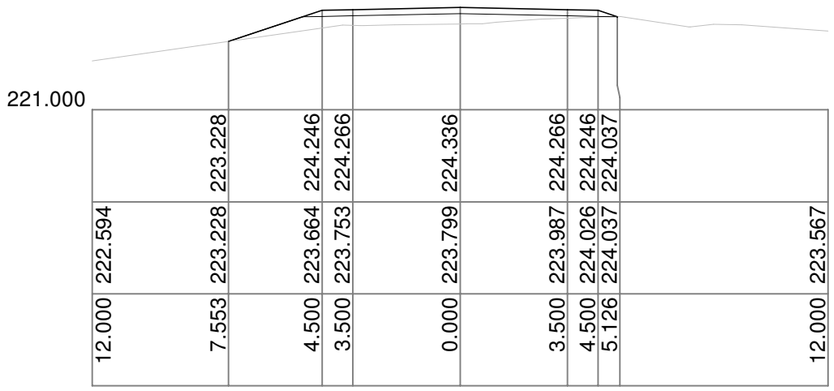
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 10**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



390



410



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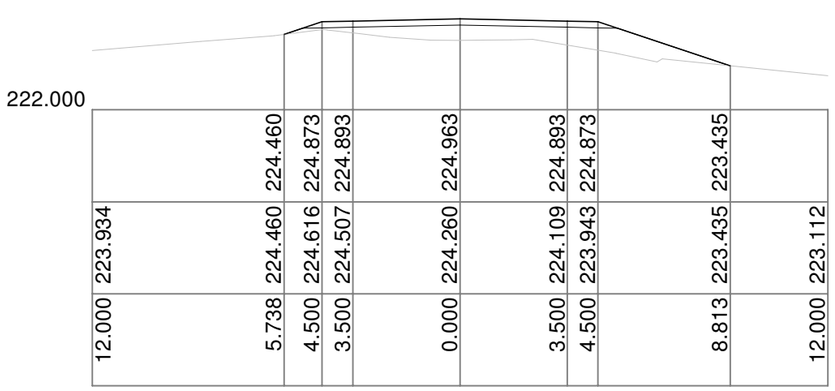
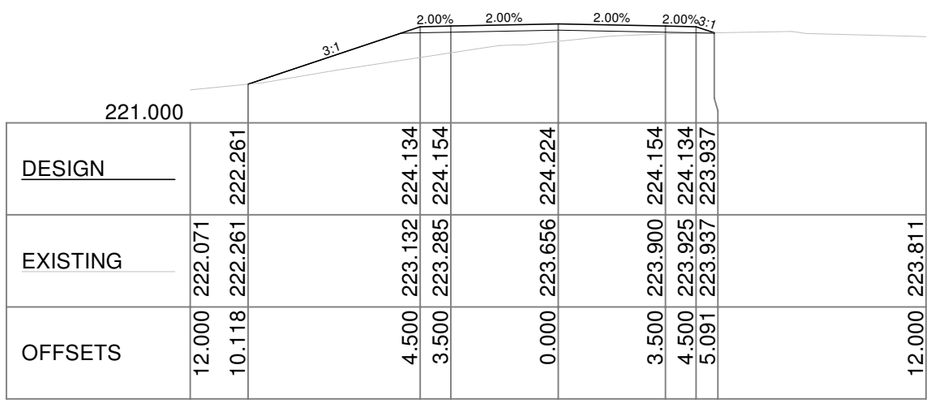
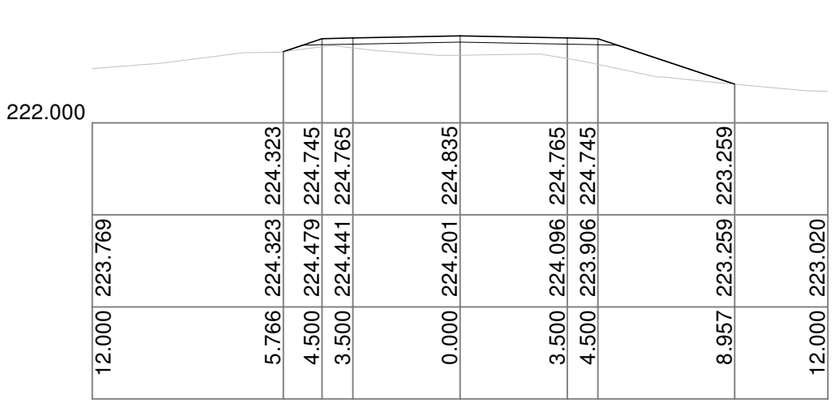


400



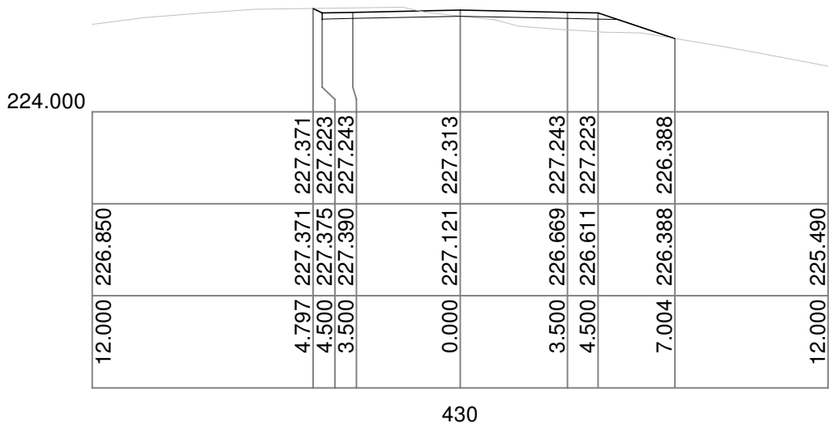
370



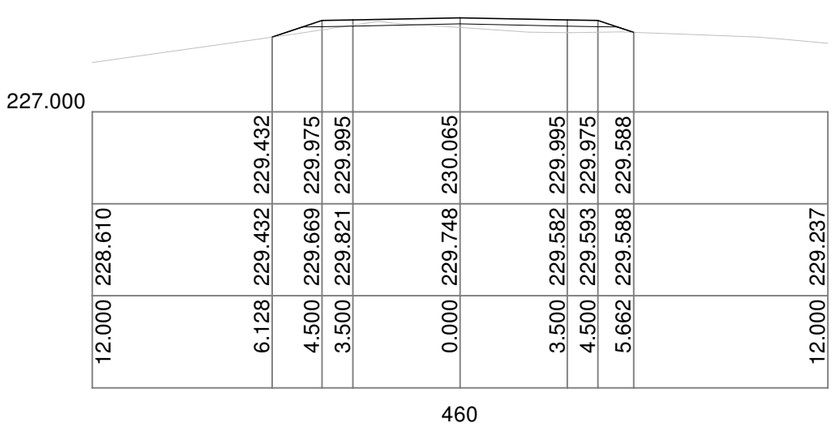
397

Scale Horizontal 1:200 Vertical 1:200

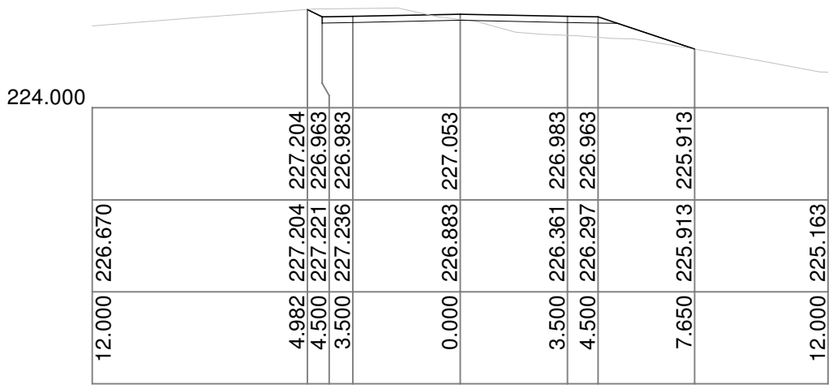
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 11**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



430



460



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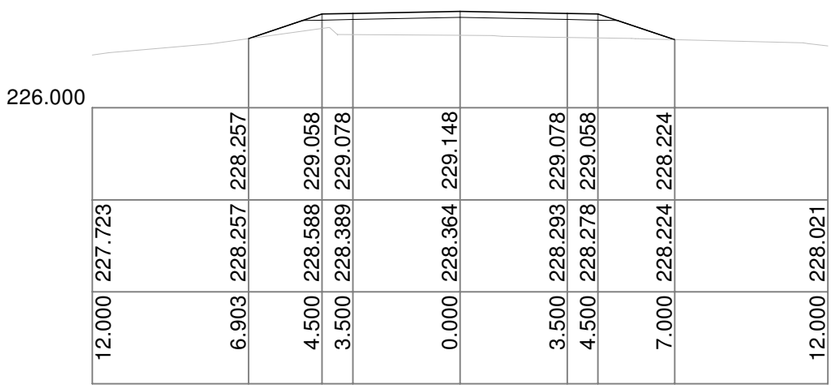

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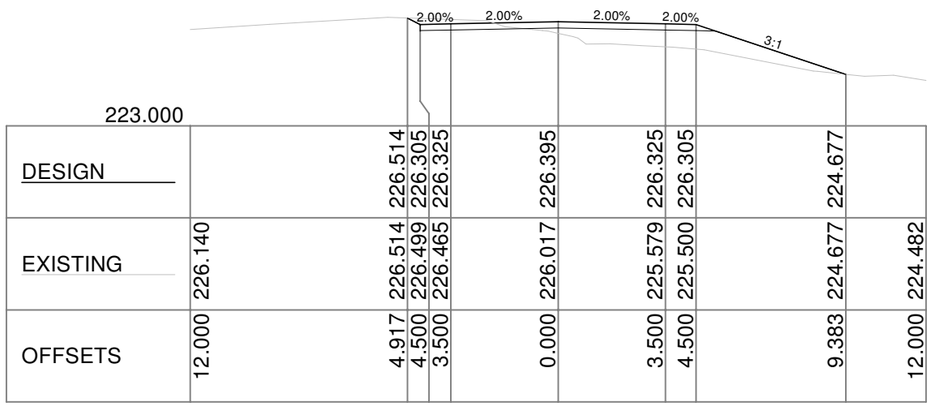

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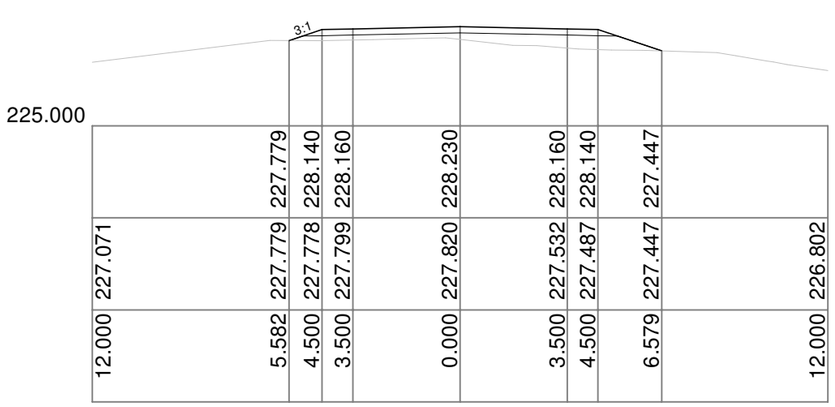
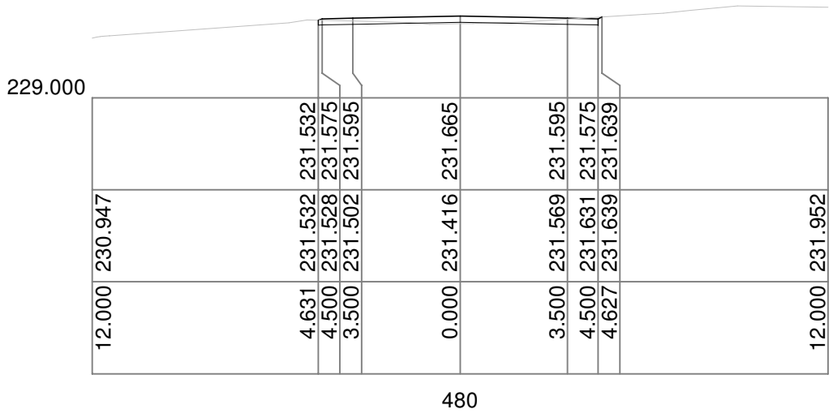


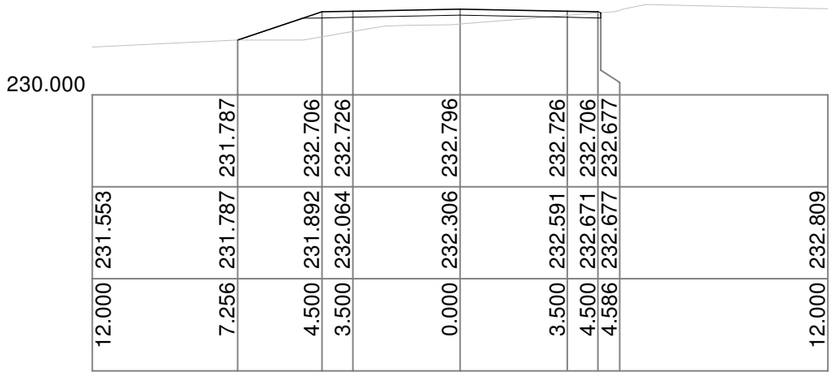
440

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 12**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



480



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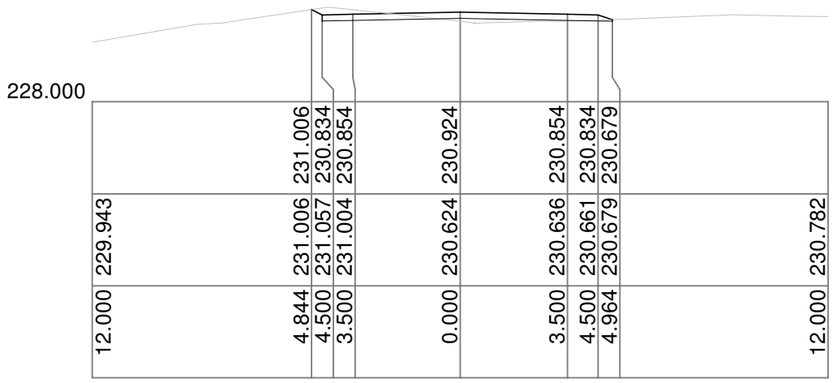
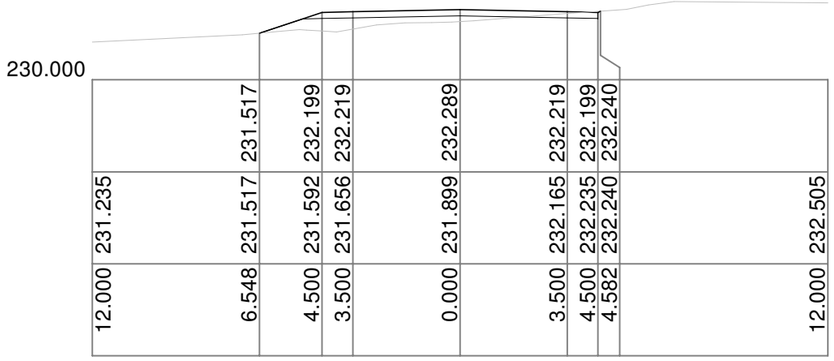


470



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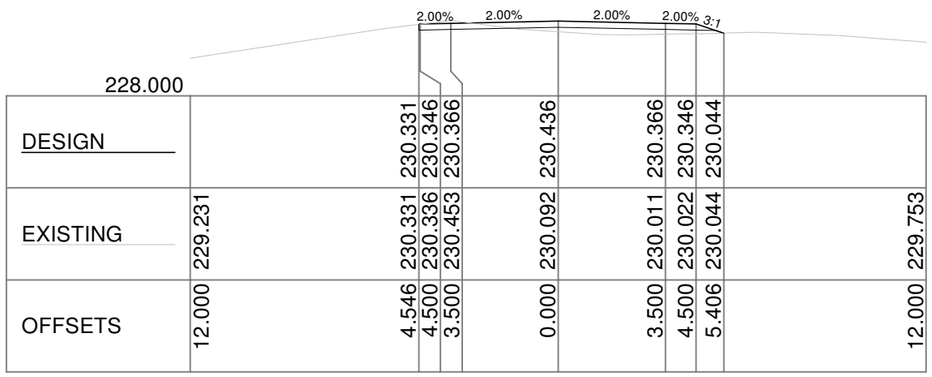
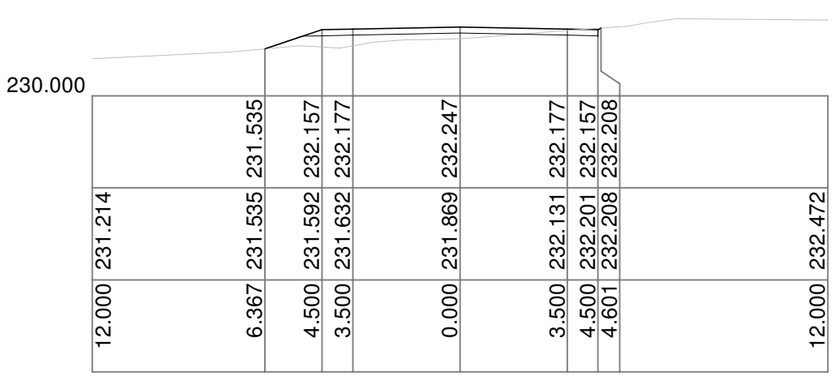


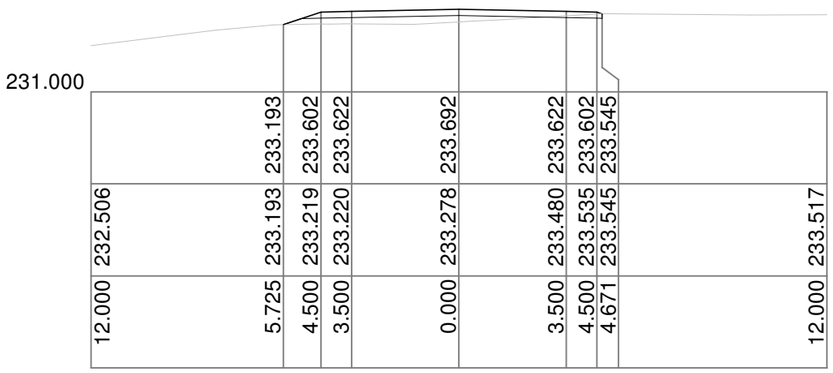
464



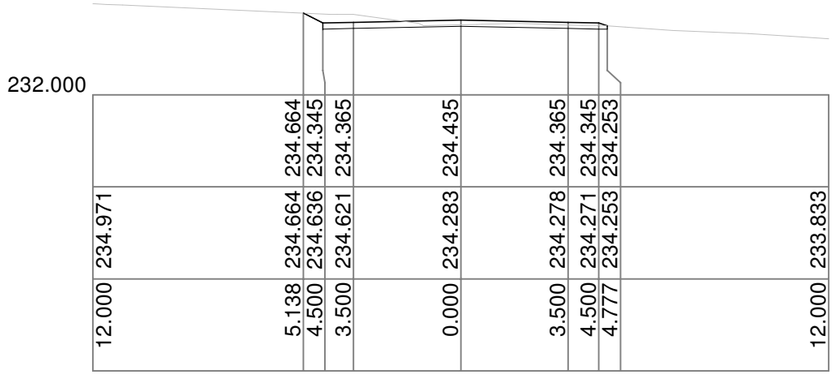
489

Scale Horizontal 1:200 Vertical 1:200

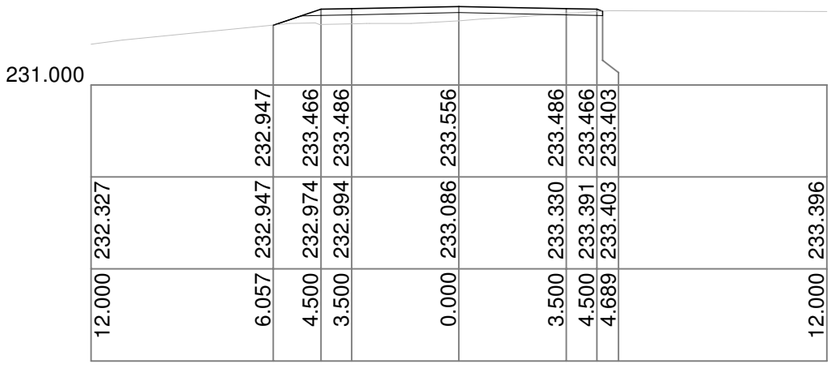
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 13**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



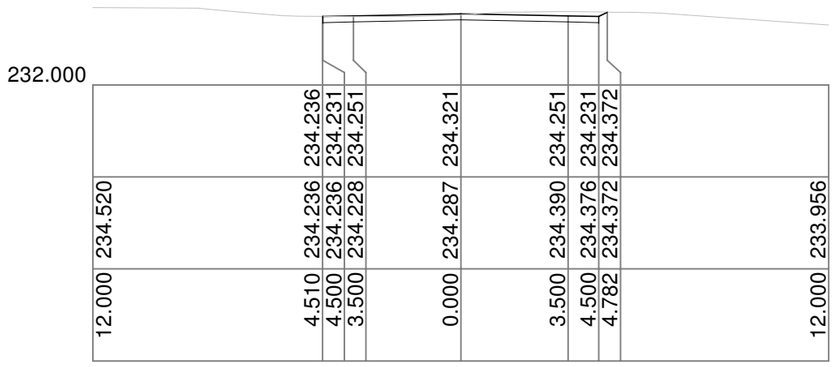
520



550



517



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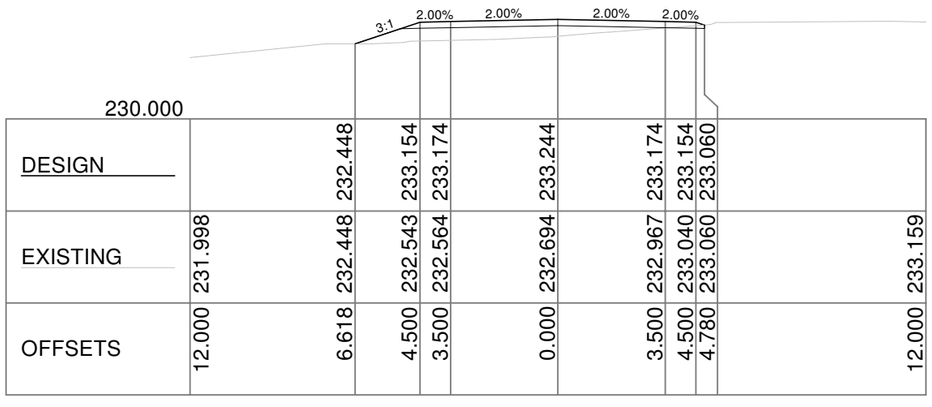
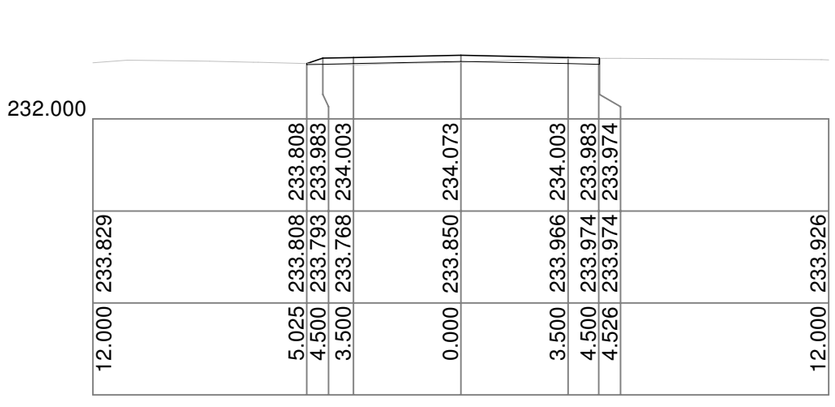


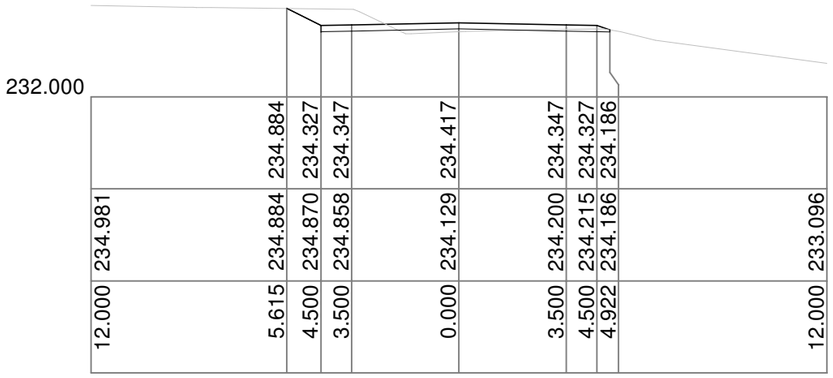
510



530

Scale Horizontal 1:200 Vertical 1:200

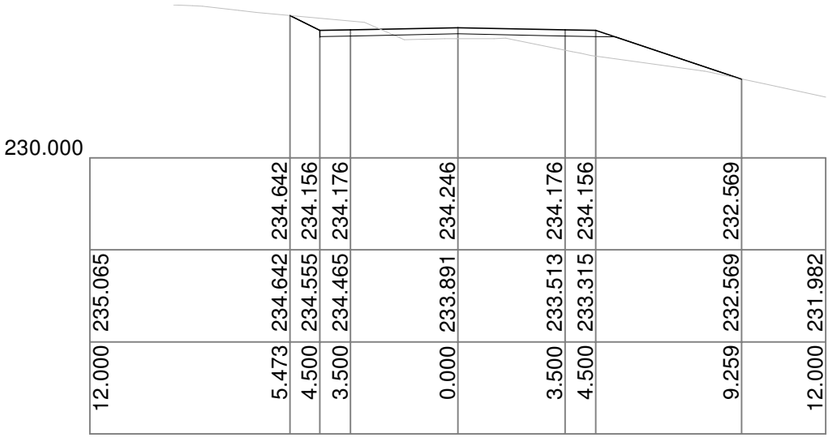
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 14**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



232.000

		234.884	234.327	234.347	234.417	234.347	234.327	234.186
	234.981	234.884	234.870	234.858	234.129	234.200	234.215	234.186	233.096
12.000		5.615	4.500	3.500	0.000	3.500	4.500	4.922	12.000

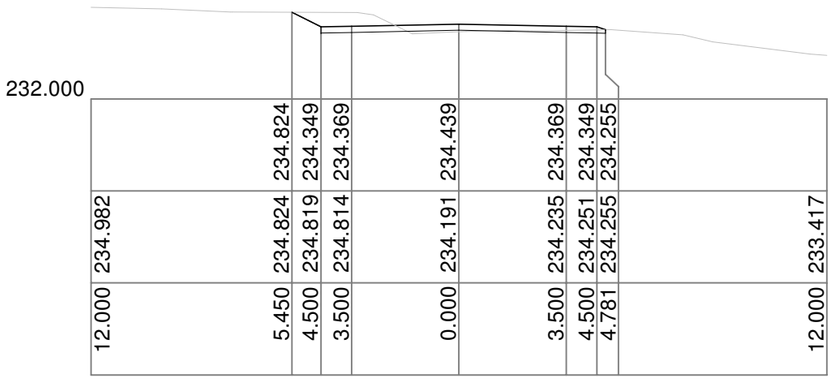
560



230.000

		234.642	234.156	234.176	234.246	234.176	234.156	232.569	
	235.065	234.642	234.555	234.465	233.891	233.513	233.315	232.569	231.982
12.000		5.473	4.500	3.500	0.000	3.500	4.500	9.259	12.000

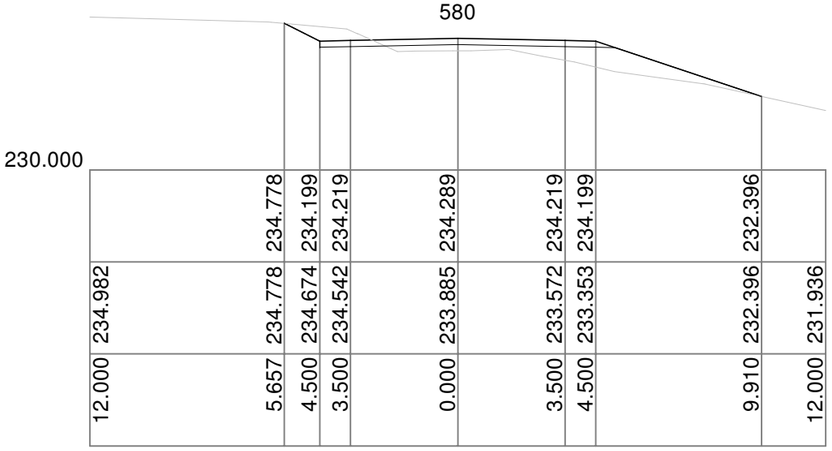
580



232.000

		234.824	234.349	234.369	234.439	234.369	234.349	234.255	
	234.982	234.824	234.819	234.814	234.191	234.235	234.251	234.255	233.417
12.000		5.450	4.500	3.500	0.000	3.500	4.500	4.781	12.000

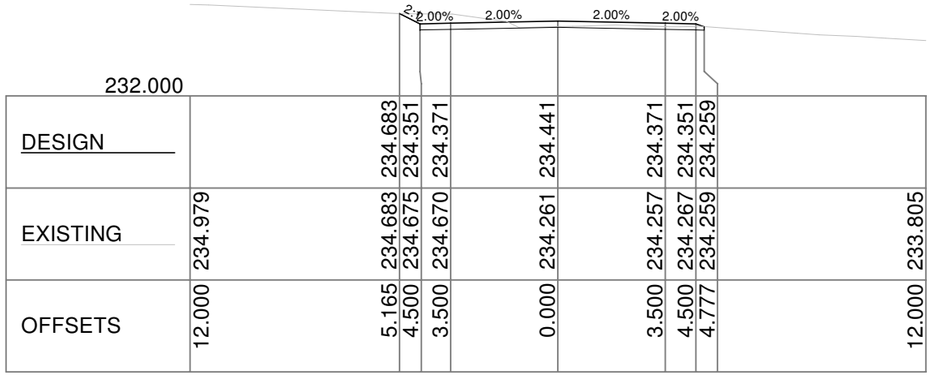
556



230.000

		234.778	234.199	234.219	234.289	234.219	234.199	232.396	
	234.982	234.778	234.674	234.542	233.885	233.572	233.353	232.396	231.936
12.000		5.657	4.500	3.500	0.000	3.500	4.500	9.910	12.000

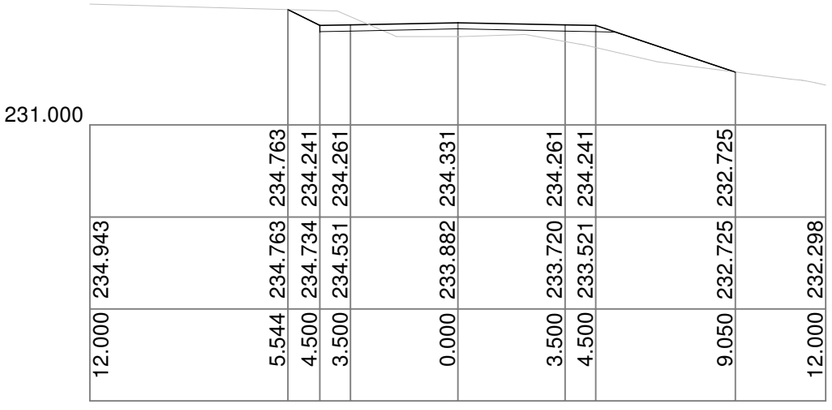
575



232.000

DESIGN		234.683	234.351	234.371	234.441	234.371	234.351	234.259	
EXISTING	234.979	234.683	234.675	234.670	234.261	234.257	234.267	234.259	233.805
OFFSETS	12.000	5.165	4.500	3.500	0.000	3.500	4.500	4.777	12.000

551



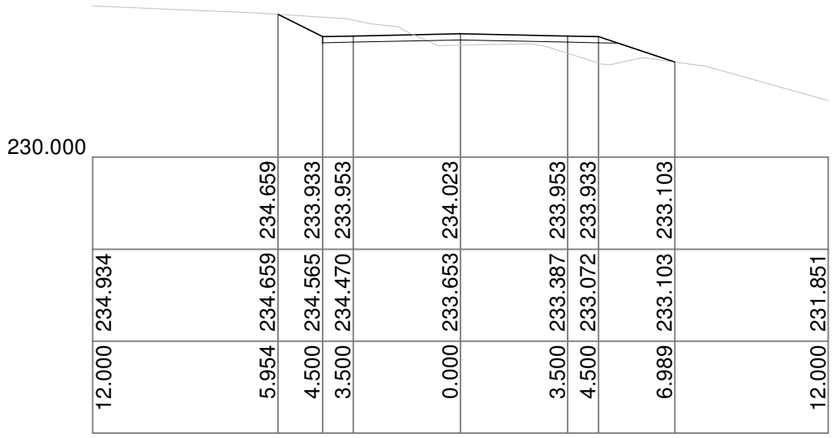
231.000

		234.763	234.241	234.261	234.331	234.261	234.241	232.725	
	234.943	234.763	234.734	234.531	233.882	233.720	233.521	232.725	232.298
12.000		5.544	4.500	3.500	0.000	3.500	4.500	9.050	12.000

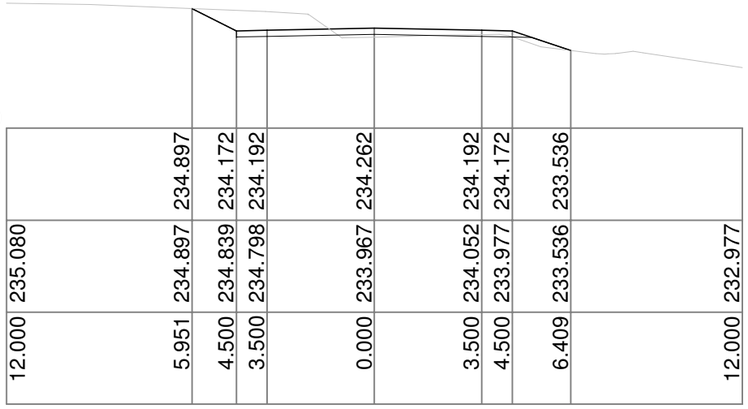
570

Scale Horizontal 1:200 Vertical 1:200

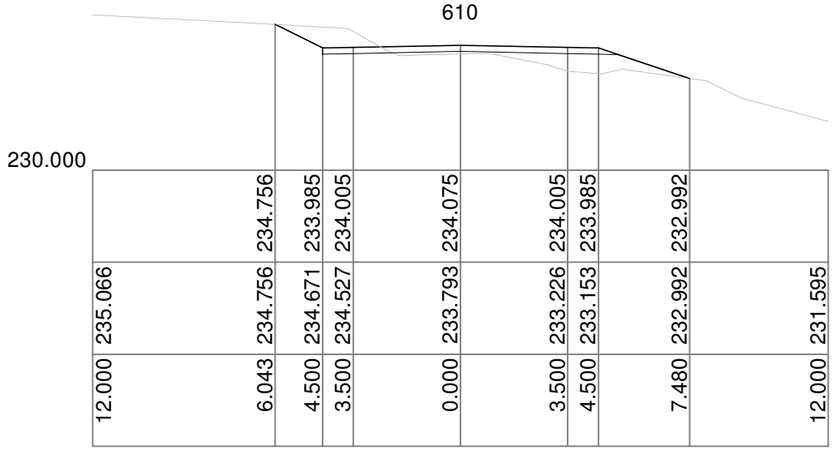
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 15**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



610



640



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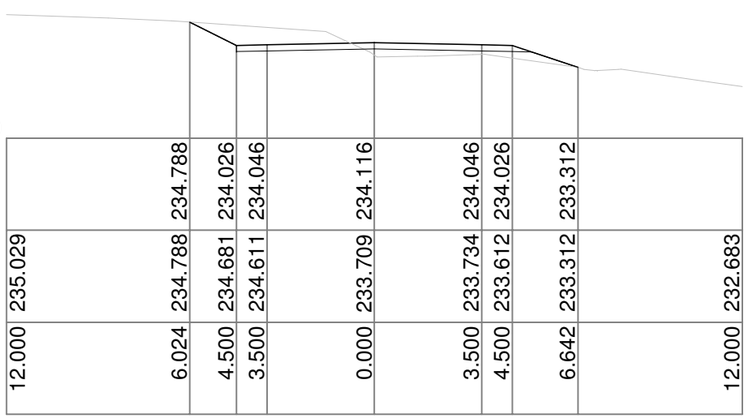
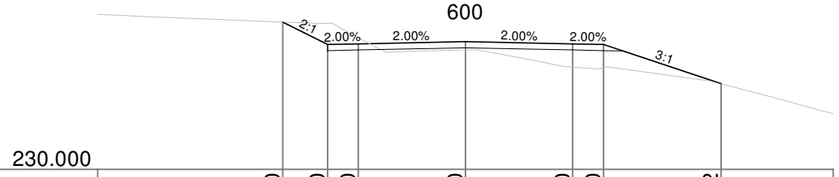
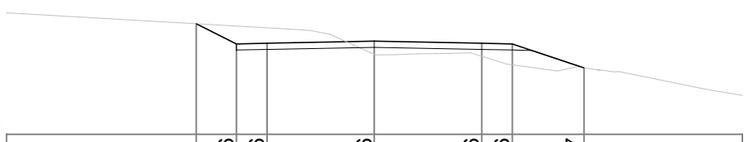


630



DESIGN		234.800	234.070	234.090	234.160	234.090	234.070	232.792	
EXISTING	235.054	234.800	234.752	234.292	233.891	233.333	233.316	232.792	231.812
OFFSETS	12.000	5.960	4.500	3.500	0.000	3.500	4.500	8.335	12.000

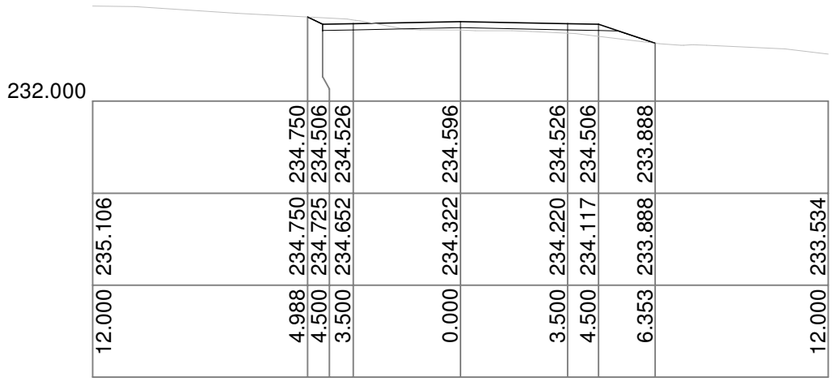
590



620

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN		DRAWING	
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	**DUNCAN PRIESTLEY CIVIL ENGINEERING**	MAROOTA 1 - MP	Total Sheets: 20
05/02/2025	HEIGHT DATUM			**CENTRAL CIVIL (NSW) PTY LTD**	PLAN NUMBER	**Sheet Number: 16**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	**QUARRY ACCESS ROAD** **MAROOTA NSW**		



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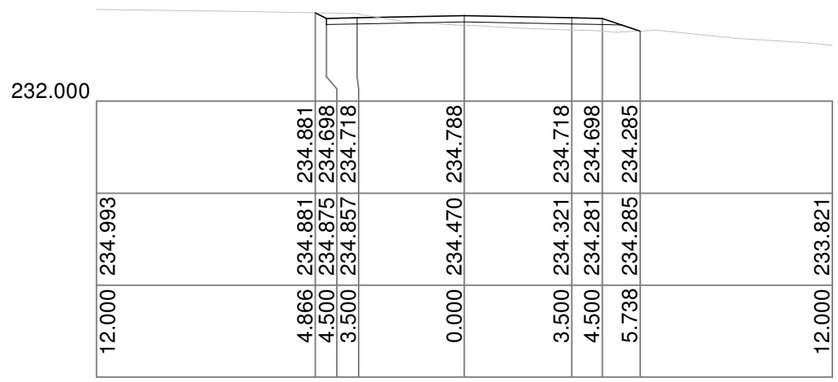

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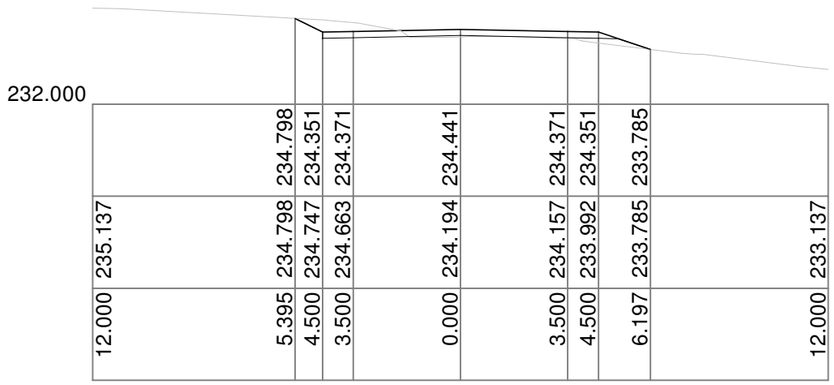

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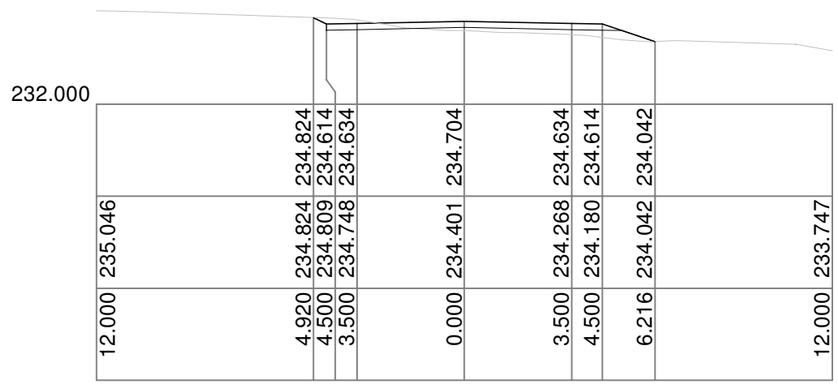

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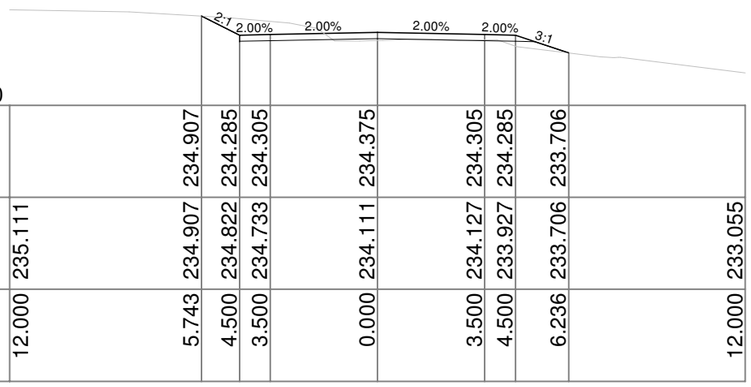

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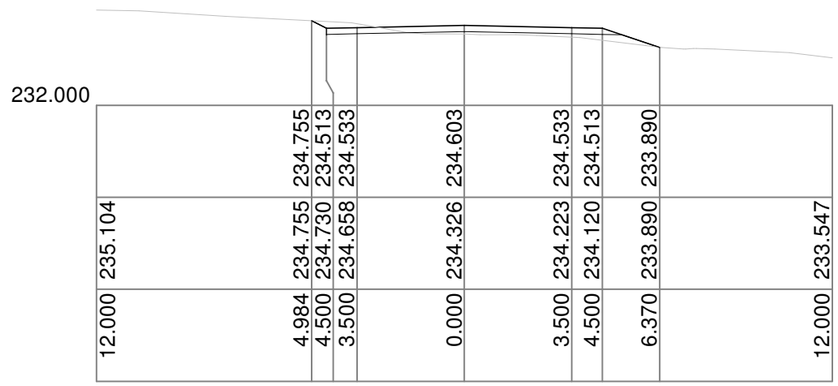
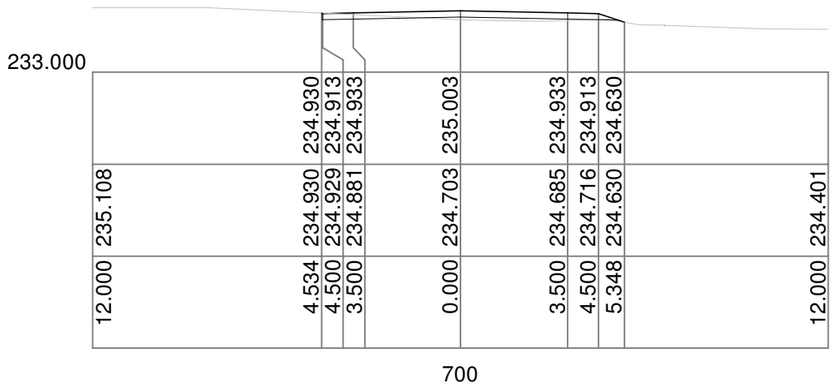


661

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 17**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



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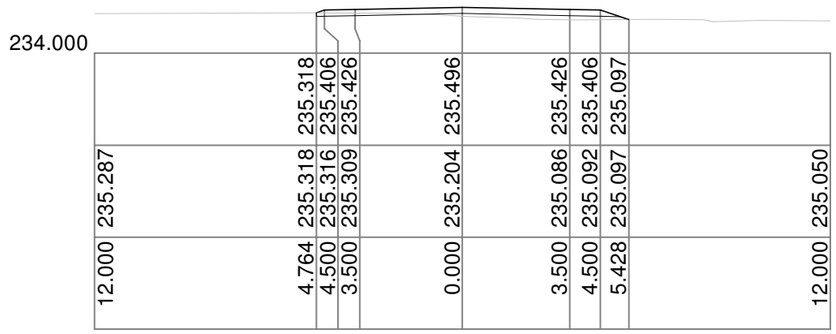

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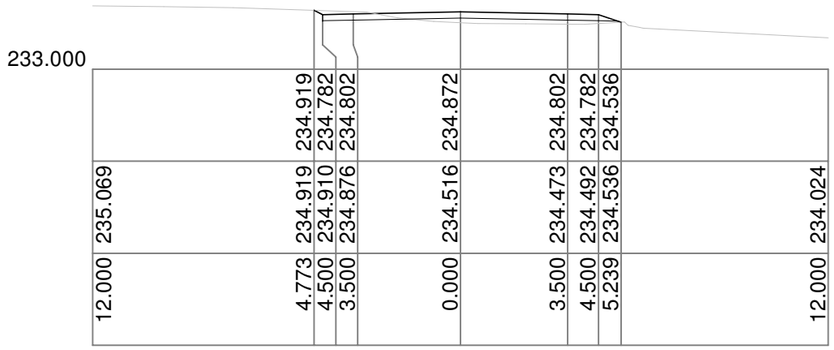

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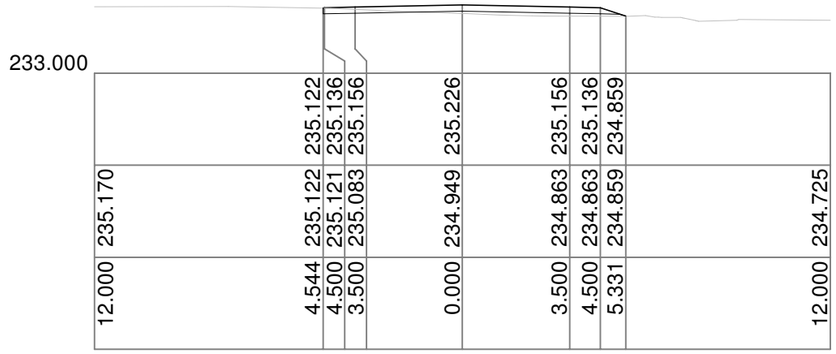
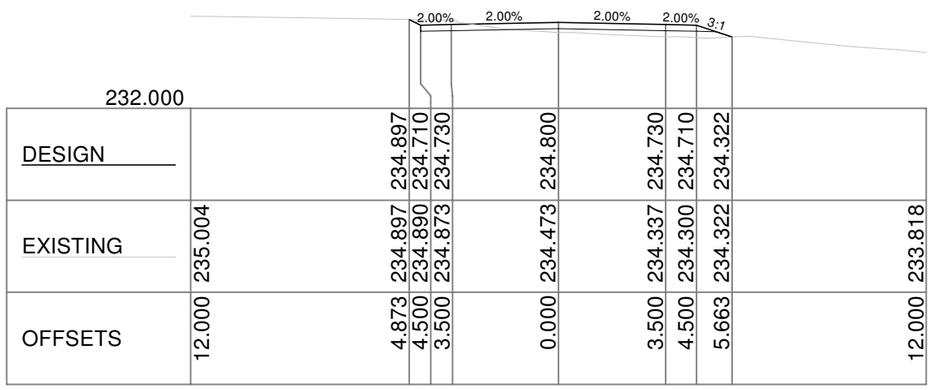


710



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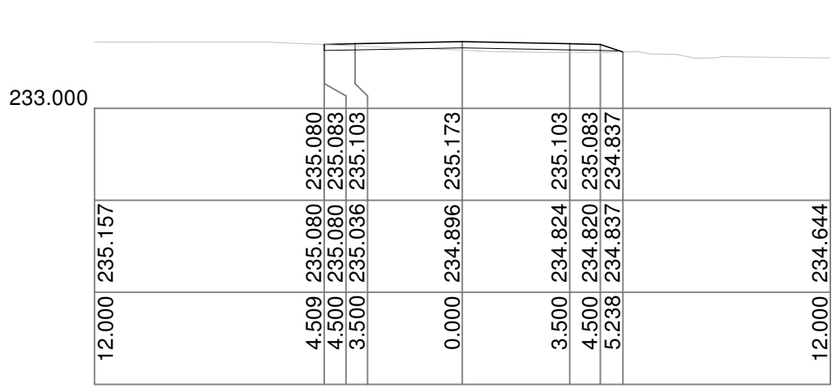
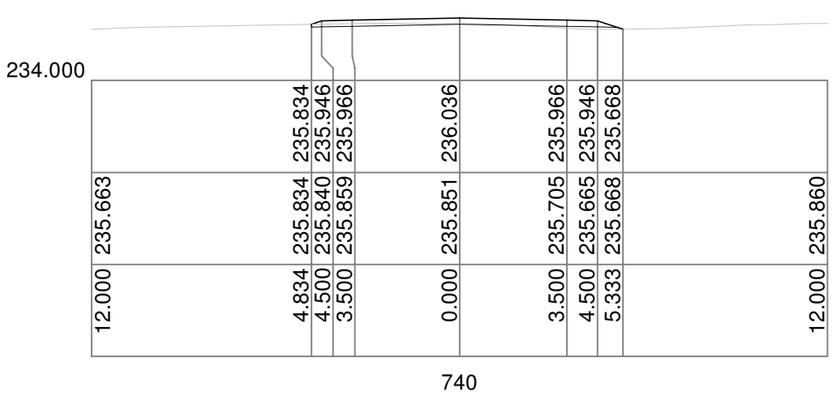


708

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	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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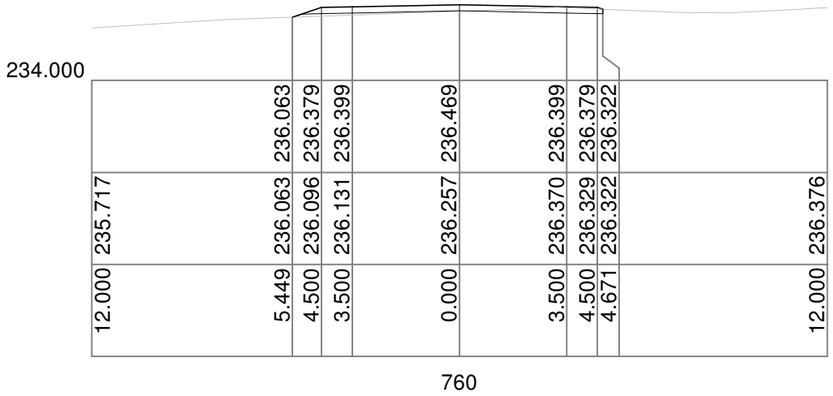

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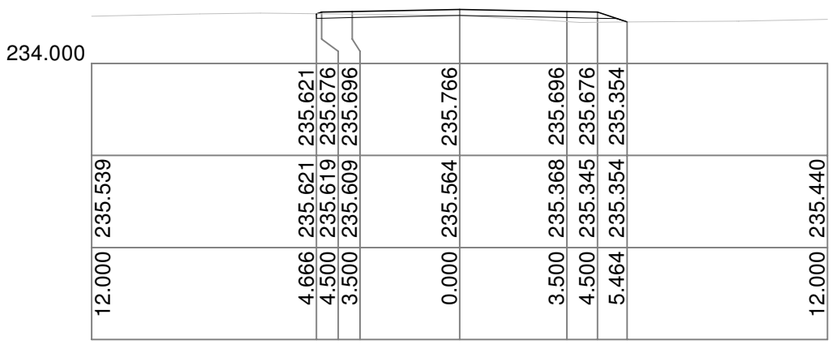

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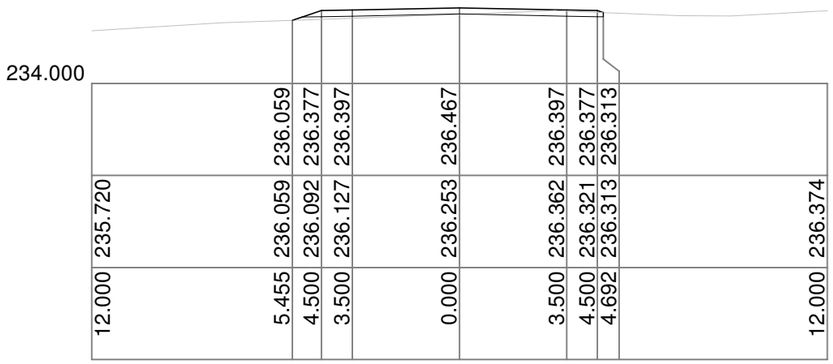

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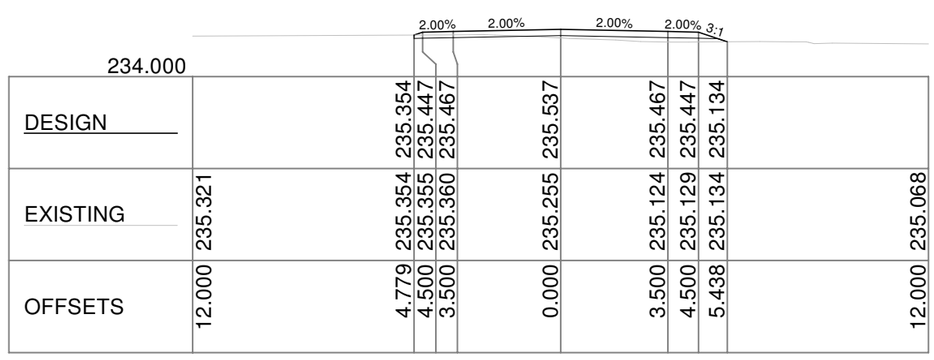

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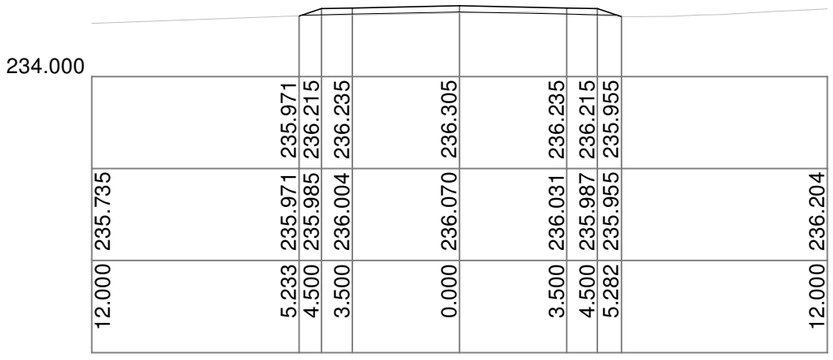
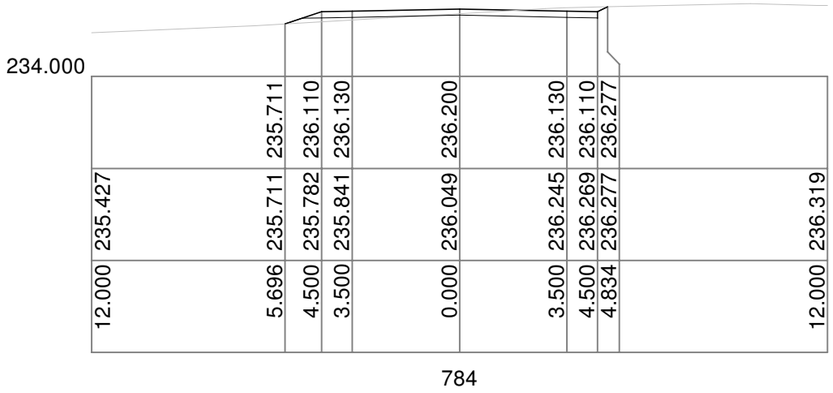


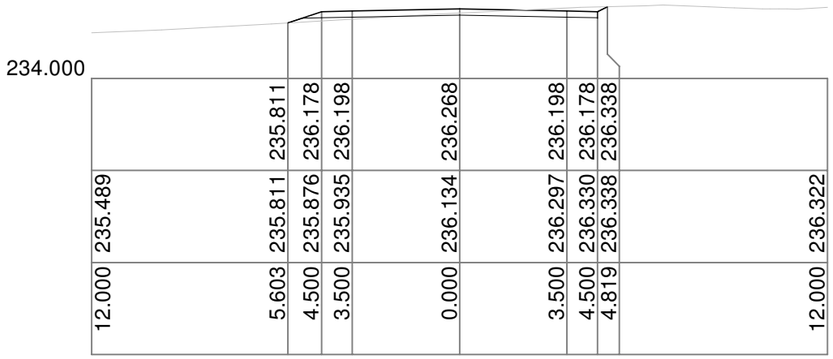
750

Scale Horizontal 1:200 Vertical 1:200

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 19**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



784



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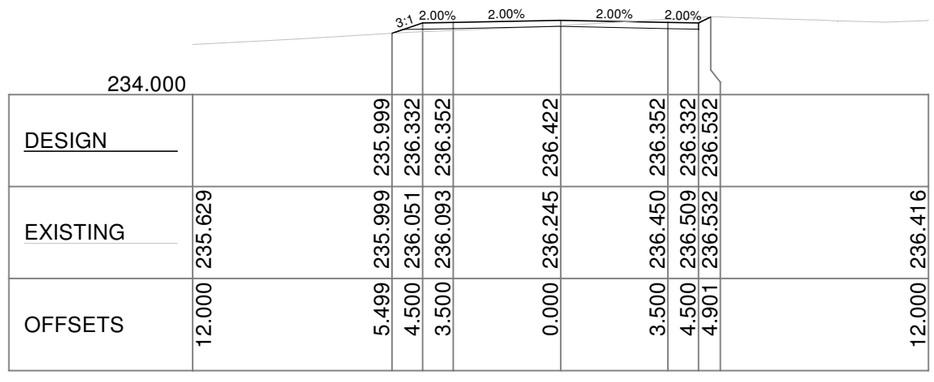


770

Volumes Report
Feb 05, 2025 06:53PM

Job:MAROOTA.mjo

ALIGNMENT: ALIGN1
DESIGN SURFACE: DESIGN
NATURAL SURFACE: NATURAL

Stripping Volume 0.000 m3
Pavement Volume 1474.435 m3

Total Cut 1321.395 m3
Total Fill 1139.831 m3

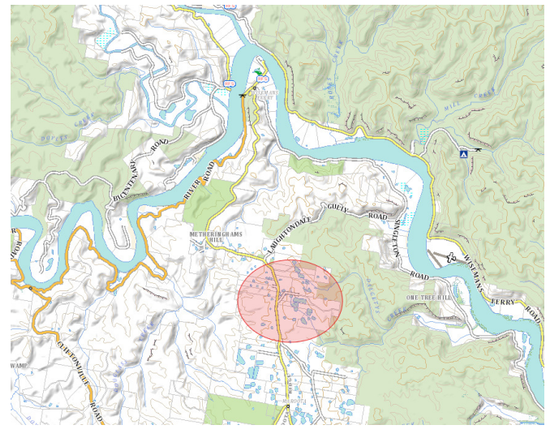
Net Volume 181.564 m3 Cut

Scale Horizontal 1:200 Vertical 1:200

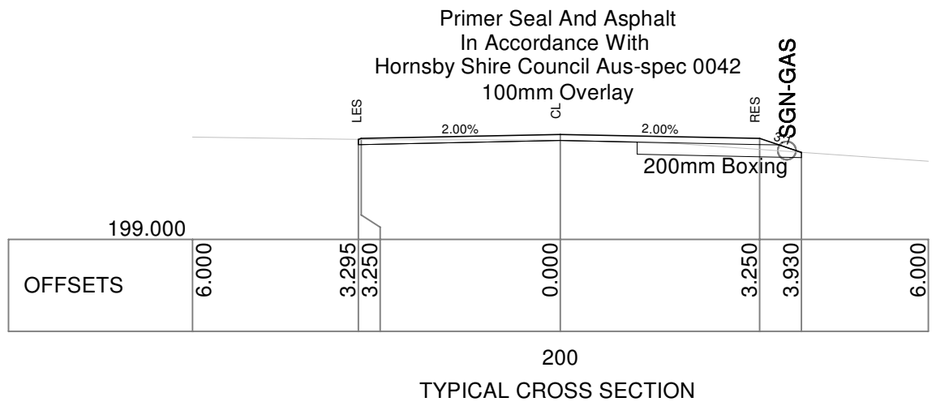
ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 20
	MGA Zone 56	DUNCAN PRIESTLEY CIVIL ENGINEERING	DUNCAN PRIESTLEY CIVIL ENGINEERING	CENTRAL CIVIL (NSW) PTY LTD	MAROOTA 1 - MP	
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD	PLAN NUMBER	**Sheet Number: 20**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		

INDEX

Cover Sheet	1
Plan and Longsection	2
Cross Sections	3 - 6
Volumes	6



Locality



200

TYPICAL CROSS SECTION

ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN		DRAWING	Total Sheets: 6
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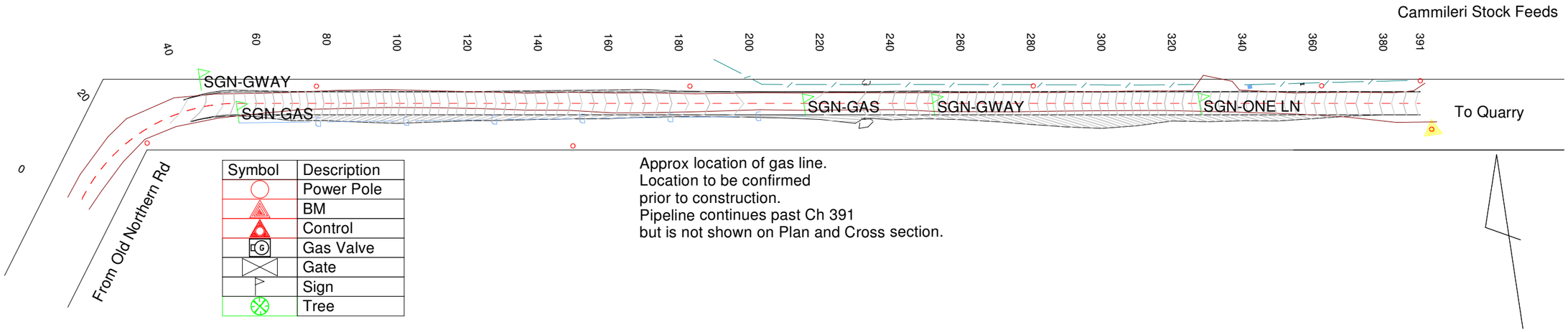
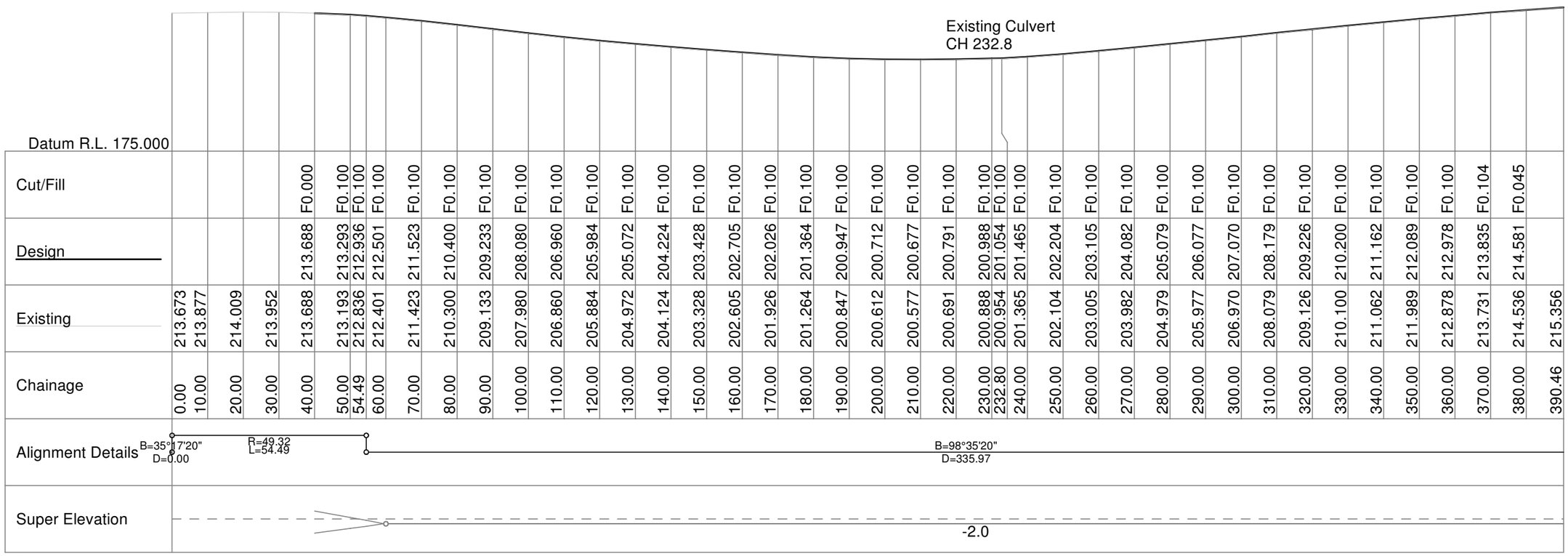
05/02/2025	HEIGHT DATUM			**CENTRAL CIVIL (NSW) PTY LTD**	PLAN NUMBER	
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	**QUARRY ACCESS ROAD APPROACH ROAD WIDENING**		**Sheet Number: 1**
				MAROOTA NSW		

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CH 232.8
Datum R.L. 175.000
Cut/Fill
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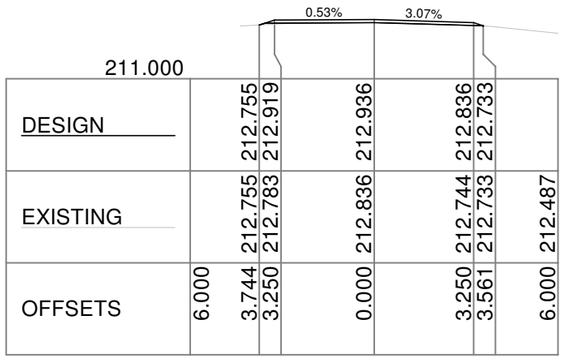
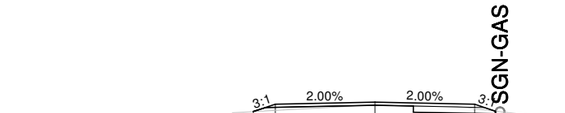

0.53%
3.07%
211.000

| | | |



200.000

DESIGN		201.720	201.961	202.026	201.961	201.737	
EXISTING		201.720	201.759	201.926	201.818	201.737	201.506
OFFSETS	6.000	3.974	3.250	0.000	3.250	3.923	6.000

170

199.000

	200.668	200.632	200.647	200.712	200.647	200.421	
	200.668	200.632	200.632	200.612	200.469	200.421	200.274
6.000		3.295	3.250	0.000	3.250	3.930	6.000

200

199.000

		200.912	200.923	200.988	200.923	200.115	
		200.912	200.914	200.888	200.528	200.115	200.150
6.000		3.284	3.250	0.000	3.250	5.673	6.000

230

200.000

		202.048	202.139	202.204	202.139	201.763	
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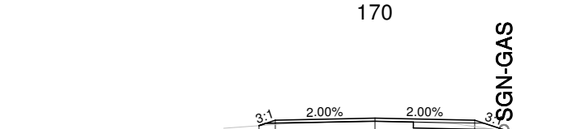
250



201.000

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EXISTING		202.461	202.501	202.605	202.429	202.268	202.032
OFFSETS	6.000	3.788	3.250	0.000	3.250	4.365	6.000

160

199.000

	200.841	200.850	200.882	200.947	200.882	200.710	
	200.841	200.850	200.850	200.847	200.741	200.710	200.577
6.000		3.347	3.250	0.000	3.250	3.767	6.000

190

199.000

		200.700	200.726	200.791	200.726	200.290	
		200.700	200.704	200.691	200.465	200.290	200.110
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220

199.000

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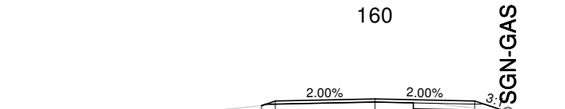
240



201.000

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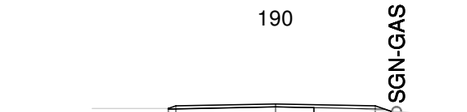
150



199.000

		201.216	201.299	201.364	201.299	201.125	
		201.216	201.216	201.264	201.162	201.125	200.976
6.000		3.498	3.250	0.000	3.250	3.771	6.000

180

199.000

		200.605	200.612	200.677	200.612	200.308	
		200.605	200.605	200.577	200.404	200.308	200.115
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210

199.000

		200.994	200.989	201.054	200.989	200.711	
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233

Scale Horizontal 1:200 Vertical 1:200

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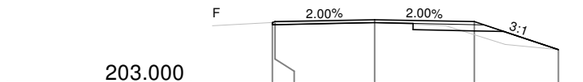
05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD APPROACH ROAD WIDENING	PLAN NUMBER	**Sheet Number: 4**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		



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280

206.000

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310

209.000

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340

212.000

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EXISTING	213.609	213.728	213.734	213.731	213.650	213.640	213.384
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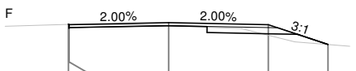
370



202.000

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270

204.000

DESIGN		206.997	207.005	207.070	207.005	206.088	
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OFFSETS	6.000	3.271	3.250	0.000	3.250	6.000	

300

208.000

DESIGN		210.162	210.135	210.200	210.135	209.483	
EXISTING	210.205	210.162	210.161	210.100	209.820	209.483	209.404
OFFSETS	6.000	3.304	3.250	0.000	3.250	5.206	6.000

330

211.000

DESIGN		212.881	212.913	212.978	212.913	212.543	
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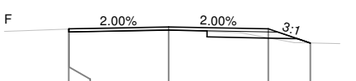
360



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260

203.000

DESIGN		205.955	206.012	206.077	206.012	205.095	
EXISTING		205.955	205.972	205.977	205.506	204.914	
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290

207.000

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320

210.000

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350

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ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	DUNCAN PRIESTLEY CIVIL ENGINEERING	DRAWING	Total Sheets: 6
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05/02/2025	HEIGHT DATUM			QUARRY ACCESS ROAD APPROACH ROAD WIDENING	PLAN NUMBER	**Sheet Number: 5**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	MAROOTA NSW		

MAGNET Site - Volumes Report
Jan 12, 2025 06:53PM

Job: MAROOTA 2.mjo

ALIGNMENT: ALIGN1
DESIGN SURFACE: DESIGN
NATURAL SURFACE: NATURAL

Stripping Volume	0.000 m3
Overay Volume	229.582 m3
Boxing Volume	152.157 m3
Total Cut	124.008 m3
Total Fill	98.615 m3
Net Volume	25.393 m3 Cut

214.000

2.00% 2.00%

DESIGN		215.363	215.291	215.356	215.291	215.298	
EXISTING		215.363	215.363	215.356	215.298	215.298	215.212
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390

213.000

2.00% 2.00%

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380

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ISSUE STATUS	COORD SYSTEM	SURVEY	DESIGN	**DUNCAN PRIESTLEY CIVIL ENGINEERING**	DRAWING	Total Sheets: 6
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05/02/2025	HEIGHT DATUM			**QUARRY ACCESS ROAD APPROACH ROAD WIDENING**	PLAN NUMBER	**Sheet Number: 6**
SCALE: $SCALE	AHD	SURVEYED: D Priestley	DESIGNED: D Priestley	**MAROOTA NSW**		

Appendix 2

Driver Code of Conduct

(Total No. of pages including blank pages = 2)

Driver Code of Conduct

Unit 3B, Building 4, 256B New Line Road, Dural NSW 2158
ABN: 61 167 710 545 **| W:** www.centralcivilnsw.com.au

Vehicle drivers attending the site must comply with the following:

a) hold a current appropriate licence for the vehicle they are operating
b) strictly comply with all traffic regulations
c) comply with all maximum gazetted speed limits on all roads, or a lesser speed as dictated by the site specific signage
d) drive in a manner at all times that is in accordance with road conditions
e) yield "right of way" whenever appropriate to ensure safe passage of other road users
f) at all times leave adequate distance between vehicles to allow safe passing by other road users, as required
g) decrease vehicle speeds to minimise dust and noise around private dwellings, road works and stationary vehicles
h) not use engine braking where noise is likely to adversely impact on residents
i) remain calm and courteous when in contact with other road users, members of the public, landowners
j) not use obscene language on radio or intercom communication
k) if required, accurately complete required paperwork prior to departure and follow specified routes.
l) maintain vehicles in a clean and tidy condition
m) ensure that there is no littering
n) avoid any other noise emitting activities for example loud music or raised voices.
    i. Raised voices should be avoided
    ii. No shouting or yelling permitted;
    iii. radio volume to be turned down;
o) reverse movements to be minimised;
p) truck engines to be turned off during deliveries;
q) minimise the impacts of earthworks and construction on the local and regional road network.

I, …… (Print name) of Central Civil (NSW)) hereby agree to abide by the above conditions (a)-(q)

…… ……
Signature Date

Appendix 10

Operational Plan of Management

(Total No. of pages including blank pages = 24)

CENTRAL CIVIL

ABN: 61 167 710 545

Operational Plan of Management

for the

Maroota Central Civil Quarry

Prepared by:

RWCorkery&co

February 2025

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

Operational Plan of Management

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. 1055/03c February 2025

RWCorkery&co

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and
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1. Introduction

This *Operational Plan of Management* (OPM) has been prepared by R. W. Corkery & Co. Pty Limited (RWC) on behalf of Central Civil (NSW) Pty Ltd (the Company) to describe the management and mitigation measures to be implemented for various impacts associated with the operational aspects of the Maroota Central Civil Quarry (the Quarry) (**Figure 1**).

The Company is an Australian owned and operated demolition and civil engineering company based in Dural, NSW. The Company has 10 years' experience, and its 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 Company has an excellent record of environmental management, with no environmental related notices or orders since the Company's inception in 2014. As such, this OPM is based on the Company's significant experience in responsible environmental, operational, and construction management activities.

The Quarry is located on rural land within Lots 1 and 2 DP609224 and an unnamed Crown Road reserve (the Quarry Site). The Site Access Road (**Figure 2**) 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. **Figure 3** displays the proposed transport route.

A Development Application (DA) for the Quarry was lodged via the NSW Planning Portal on 25 July 2024, and the accompanying Environmental Impact Statement (EIS) was placed on public notification by Hornsby Shire Council (Council) from 6 September 2024. Council subsequently issued a Request for Further Information (RFI) dated 14 October 2024 with requirements pertaining to the preparation of an OPM for the Quarry. The details of these requirements are presented in **Table 1**.

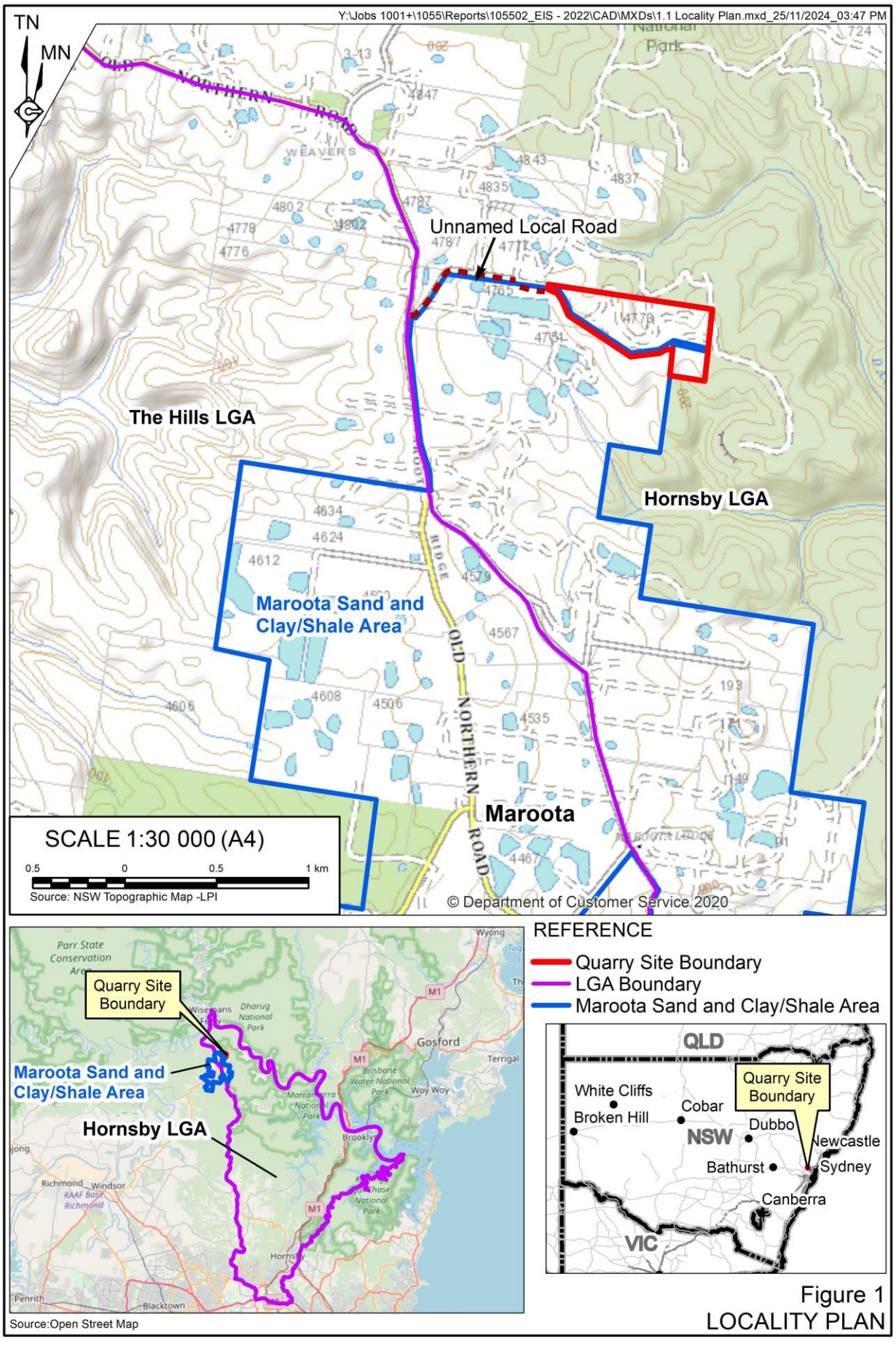


Figure 1
LOCALITY PLAN

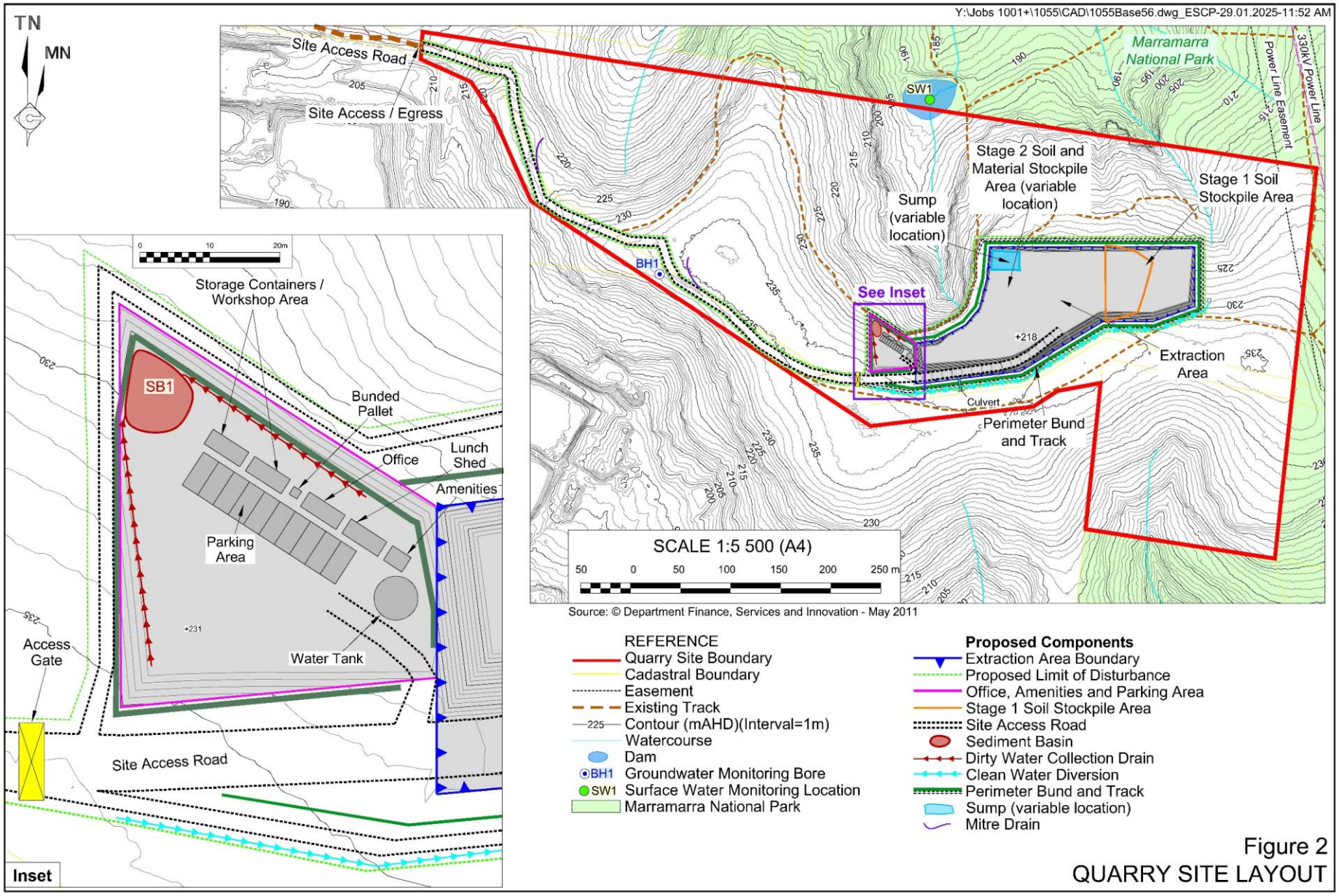
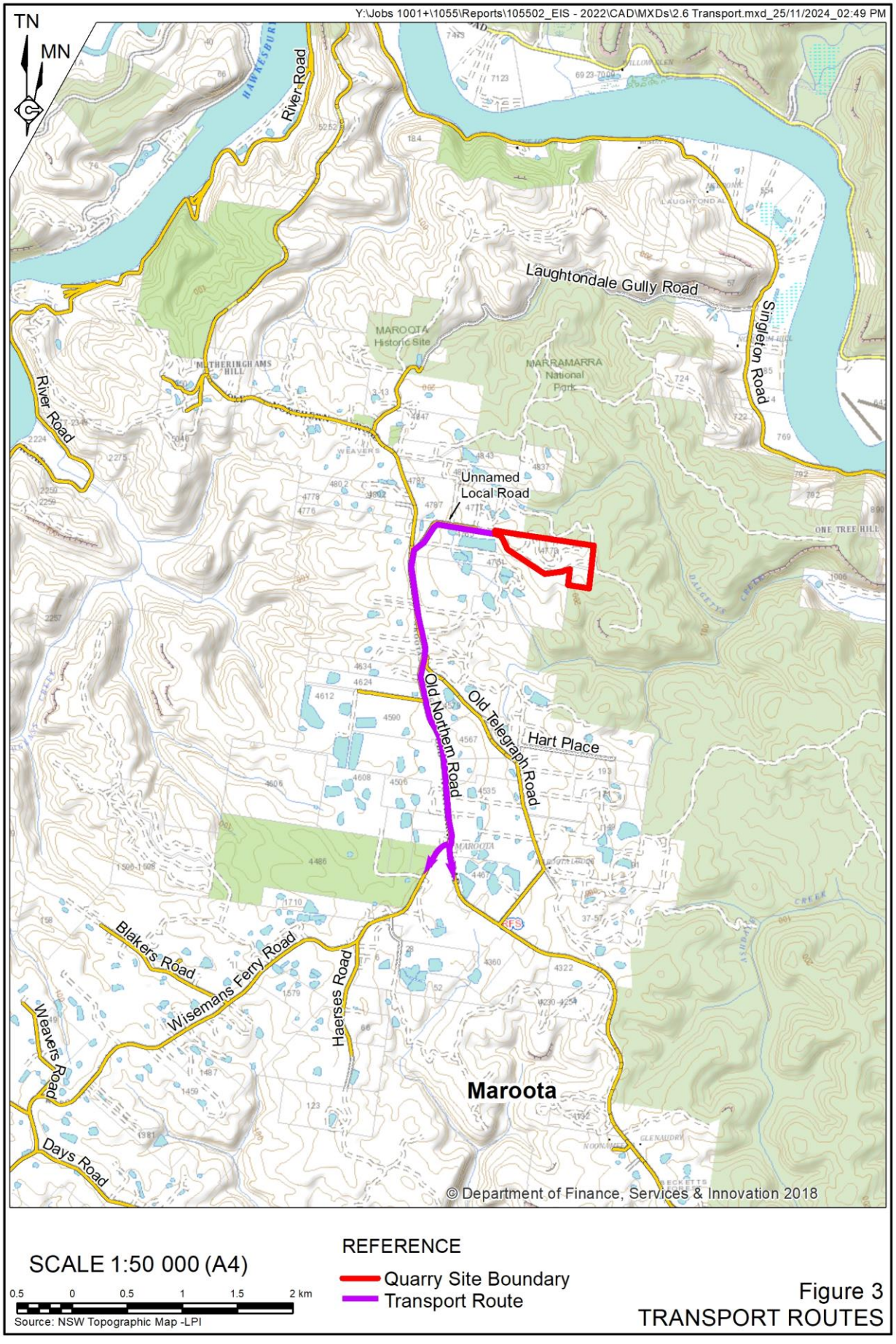


Figure 2
QUARRY SITE LAYOUT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TN
MN
River Road
Laughtondale Gully Road
Singleton Road
MAROOTA Historic Site
NARRAMARRA National Park
MUTHERINGH AMS HILL
Unnamed Local Road
Old Northern Road
Old Telegraph Road
Hart Place
Blakers Road
Wisemans Ferry Road
Haerses Road
Weavers Road
Days Road
Maroota
© Department of Finance, Services & Innovation 2018
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 3
TRANSPORT ROUTES

2. Plan Requirements

Table 1 presents the Council's requirements for the preparation of this OPM taken from the RFI.

Table 1
Hornsby Shire Council's Requirements

Ref	Requirements	Where Addressed
	An Operational Plan of Management as specified in Item 4 of Council's Pre-lodgement advice sent dated 7 July 2023 under Pre-lodgement Development Application No. PL/30/2023 (D08685139) is required to be submitted to Council for consideration and assessment.	This Plan
C14.2	The Operational Plan of Management shall include, at minimum: a) 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;	3.1.1, 3.2.3, 3.2.4
C14.3	b) Hours of operation, including proposed restrictions on 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, as detailed in Section 2.12 of the EIS and clarification of what constitutes a 'heavy vehicle movement'.	3.1.2 & 3.2.1
C14.4	c) Number of staff employed;	3.2.6.3
C14.5	d) The location, time, duration and frequency of daily activities to be undertaken on the site;	3.1.2 & 3.2.1
C14.6	e) The type, size and quantity of products made, stored or transported and associated storage area/facilities;	3.2.5
C14.7	f) Loading and unloading facilities on site;	3.2.6
C14.8	g) The method for determining and recording the following: i) Weight of extracted material; ii) Tonnages of extracted material removed from the premises; iii) All heavy vehicle movements to/from the premises ; iv) Material laden vehicle movements from the premises.	3.2.6.4
C14.9	h) Methodology for determining and recording the incoming volume of Virgin Excavated Natural Material received to the premises to ensure the proposed importation limit is not exceeded.	3.2.7
C14.9	i) Emergency procedures; and	4
C14.10	j) Complaints procedures.	5
C14.11	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 requested updated Acoustic Report.	This Plan

3. Site Activities

3.1 Site Establishment

3.1.1 Activities and Equipment

As detailed in the *Preliminary Construction Management Plan*, a range of activities would be undertaken to enable the progressive development of the Quarry. The principal activities would be as follows.

- The marking out of all component areas to be disturbed (see Proposed Limit of Disturbance on **Figure 2**) with highly visible and permanent markers. 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.
- Construction and/or installation of water management infrastructure including dirty water collection drains, mitre drains, clean and dirty water diversions, energy dissipators and a sediment basin (SB1) (see **Figure 2**).
- Progressive 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.
- Progressive construction of the perimeter safety bund using overburden pushed up from within the footprint of the proposed Extraction Area.
- Installation of the workshop, demountable office and portable amenities, including pump out toilets.
- Roadworks and track upgrades to ensure safe and ongoing access to the Quarry Site.

Road trucks, low loaders and light vehicles will be utilised during the site establishment phase for employee commutes, equipment and other deliveries. The number of these vehicles will vary depending on construction requirements and timing of construction and site establishment components.

Table 2 presents the list of mobile equipment to be utilised at the Quarry Site during the site establishment phase.

Table 2
Site Establishment Mobile Equipment

Equipment	Number	Use/Activity
D8 Bulldozer	1	Earthmoving, vegetation clearing, construction of safety perimeter bund (campaign basis)
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, and movement of shipping containers around the Office, Amenities, and Parking Area as required

3.1.2 Hours and Duration

The duration of the site establishment phase for the Quarry is anticipated to be between 3 to 6 months. Hours of operation during the site establishment phase and the remainder of the Quarry life will be consistent with the hours identified in **Table 3**.

Table 3
Hours of Operation

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

3.1.3 Site Establishment Traffic

Heavy equipment required for site establishment activities would be transported to the Quarry Site on low loaders or similar. Equipment would remain within the Quarry Site throughout the period required to complete site establishment works prior to transportation from the Quarry Site in the same manner. A Driver's Code of Conduct is appended to the *Environmental Management Plan* (EMP) which details specific site management activities relating to traffic.

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 (i.e. no heavy vehicle movements during school zone hours).

Traffic volumes during site establishment, including vehicles for employees and visitors / deliveries to the Quarry, will be a maximum of 24 daily total movements.

3.2 Operational Activities

3.2.1 Hours of Operation

Hours of operation at the Quarry will be consistent with those presented in **Table 3**. 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 (i.e. no heavy vehicle movements during school zone hours).

3.2.2 Equipment

Table 4 lists the range of equipment proposed to be used within the Quarry Site. The Company 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 4
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

3.2.3 Extraction Operations

Figures 4 and **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 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.

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 within the Extraction Area footprint 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.

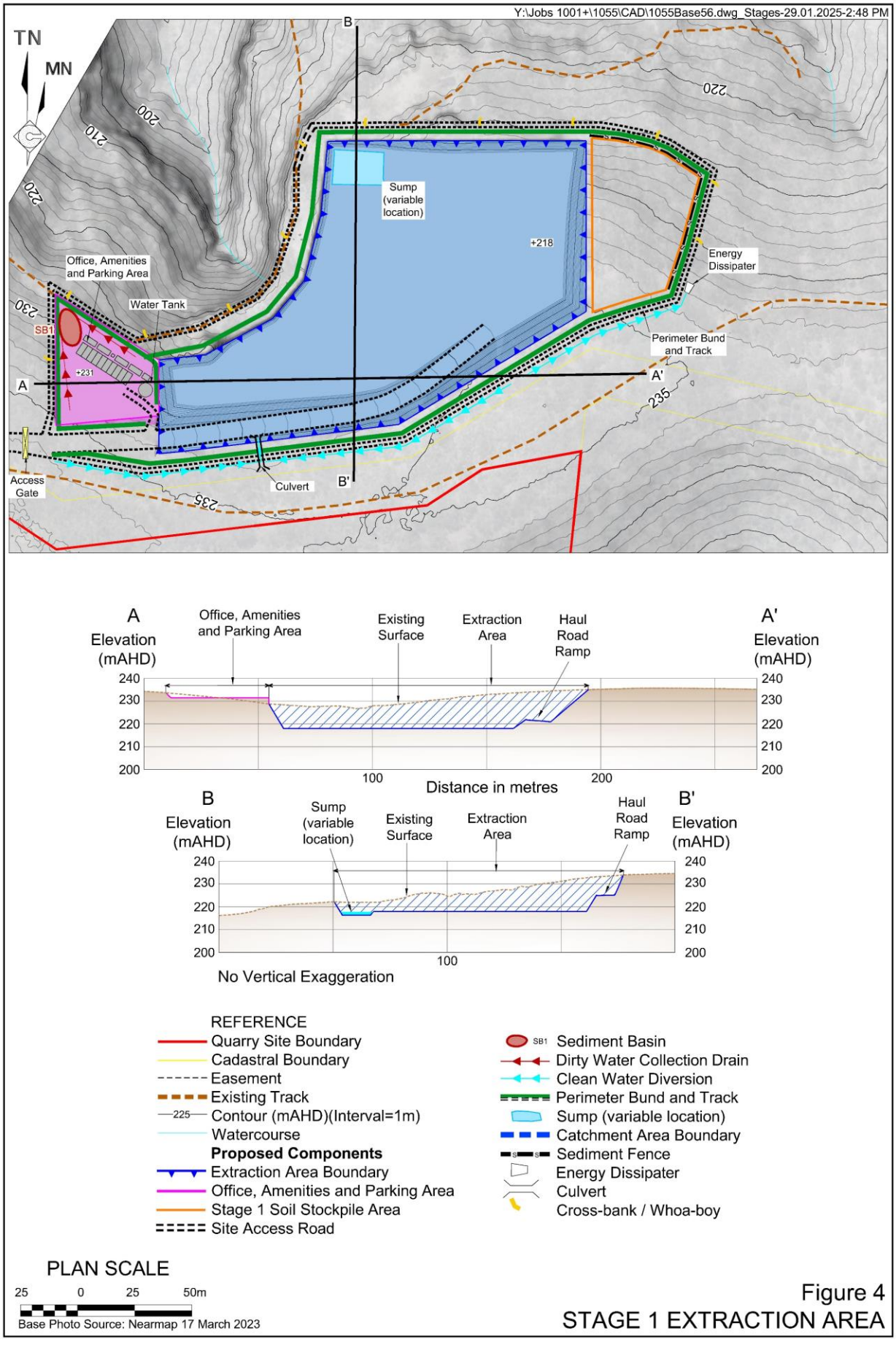

Figure 4
STAGE 1 EXTRACTION AREA

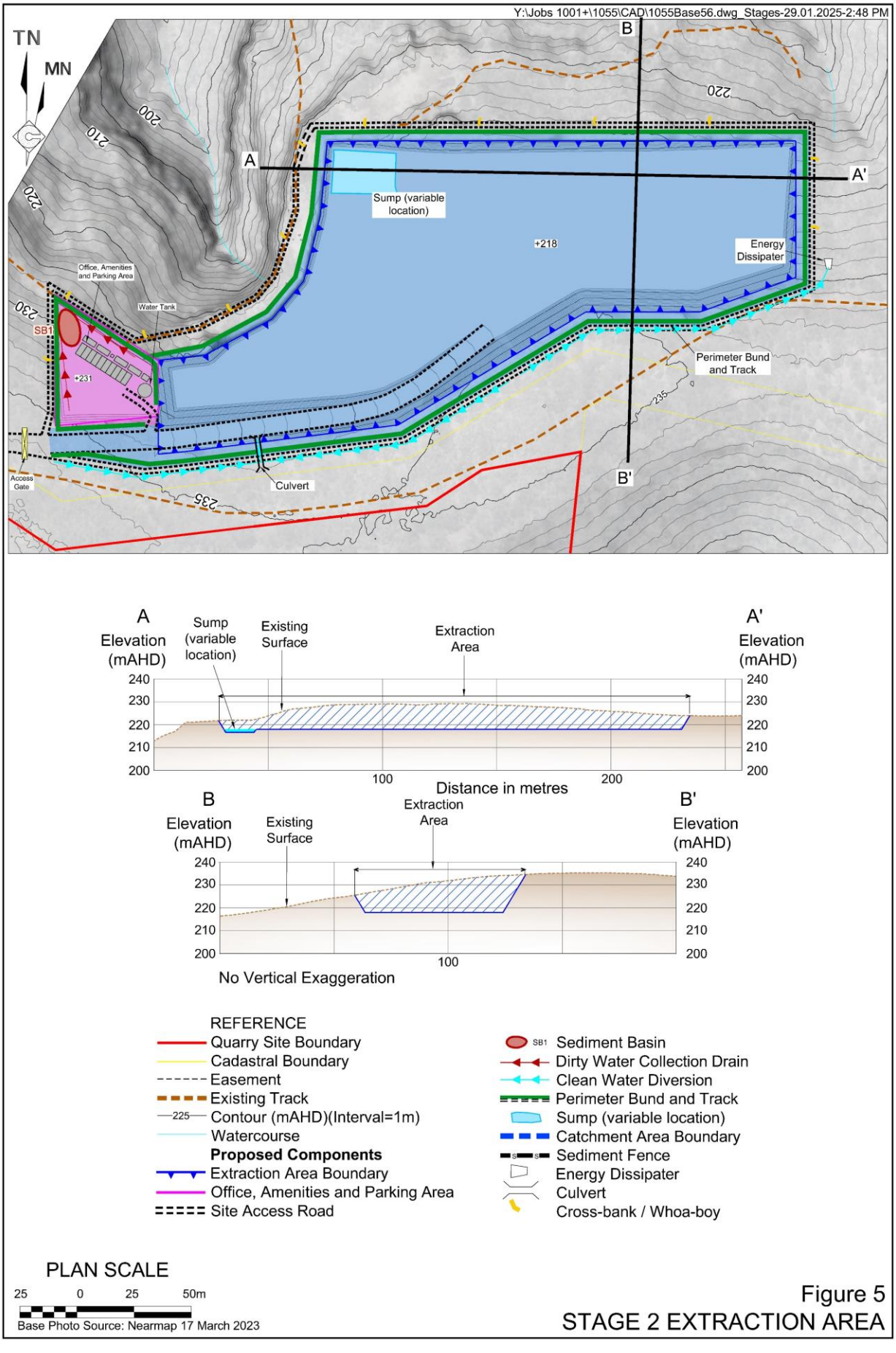

Figure 5
STAGE 2 EXTRACTION AREA

Stage 2

Stage 2 extraction operations would involve the continued progressive development of the Extraction Area to the east (**Figure 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.

3.2.4 Processing Operations

3.2.4.1 Mobile Crushing Operations

The Company 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 Company 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.

3.2.4.2 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.

3.2.4.3 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.

3.2.5 Quarry Products

The principal products produced at the Quarry would be sandstone logs (**Plate 1**), flagging stone (**Plate 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.

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

Plate 1 **Typical sandstone log used for landscaping purposes (Ref: E1055D_001)**

Plate 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.

Quantity of the various products sourced at the Quarry will vary on the geological conditions varying across the site as well as market demand. No more than 30,000tpa of products will be produced at the Quarry.

Quarry products will be stockpiled within the Extraction Area to allow for additional minor trimming, washing and grading or placed directly onto road trucks for despatch.

3.2.6 Transportation Operations

3.2.6.1 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.

3.2.6.2 Laden Transport Routes

Figure 3 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 laden heavy vehicles along Old Northern Road would be restricted to transportation operations between the hours of 8:00am to 9:30am and 2:30pm to 4:00pm, coincident with school zone hours.

3.2.6.3 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.

Traffic levels would vary substantially on a daily basis throughout the life of the Quarry based on market demands. **Table 5** presents the anticipated heavy vehicle movements generated by the Quarry.

Table 5
Laden Heavy Vehicle Movements

Annual Production Rate	Daily HV Movements		Maximum Hourly HV Movements
	Average[1]	Maximum	
30,000tpa	7	20	6

Note 1: Heavy vehicle movements have been rounded up for conservatism. Actual average daily averages based on 30,000tpa would be 7.4.

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.

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 Company would limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the number of movements identified in **Table 5** are not exceeded.

3.2.6.4 Monitoring

The following parameters would be recorded throughout the life of the Quarry.

- An accurate record of daily truck movements to and from the Quarry Site would be maintained by monitoring heavy vehicles entering and exiting at the Quarry entrance. This would be achieved by the following.
  - The weights of trucks would be monitored using a wireless digital load indicator crane scales to weigh goods in a lifting/tension application, with capacities up to 5t as described in the EMP.
  - Trucks used in the process are either semi-tippers or truck-dog combinations of 18m^3 and 20m^3 capacity.

- 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.

3.2.7 Importation of VENM

3.2.7.1 Volume Requirements and Importation Rates

Importation of VENM to the Quarry Site would occur on a campaign basis and as a result, the timing or scale of VENM importation on a monthly or annual basis would depend on the generation of materials at construction sites in the Sydney metropolitan area. VENM would primarily be sourced from the Company's civil projects and network of industry contacts, as well as from local developments and transfer stations.

A total of approximately 111,170m^3 of VENM would be required to construct the final landform. It is noted that VENM can consist of various material types with highly variable densities and as such, it is not possible to provide an accurate tonnage of VENM required for use in rehabilitation. Notwithstanding, a standard density of 2t/m^3 (assuming all VENM would be clay, silt or other unconsolidated material) has been adopted for conservatism. Therefore, it is estimated that up to approximately 222,340t of VENM would be required over the life of the Quarry.

Importation operations would not commence until later in the life of the Quarry and would continue following completion of extraction operations until the final landform is fully constructed. It is anticipated that VENM importation would be undertaken at a stepped rate as follows.

- Years 1 to 15 = nil
- Years 15 to 20 = up to 10,000tpa
- Years 21+ = up to 30,000tpa

As a result, the maximum proposed importation rate of 30,000tpa would only be reached following cessation of extraction operations. No more than 111,170m^3 of VENM would be imported over the life of the Quarry.

3.2.7.2 Management and Mitigation Measures

The following management procedures and safeguards would be implemented to safely manage potential risks associated with VENM importation.

- The Company would be responsible for ensuring that suitable records are maintained including the following.
  - An Import Fill Tracking Sheet would be used to monitor and maintain records of (attached to EMP).
  - Certification of classification for any material supplied as VENM which would be consistent with information contained in NSW EPA's *Certification Virgin Excavated Natural Material* (EPA 2013/0693; September 2013).

  - Validation and record by Quarry personnel on the source location for VENM that is to be used before the material is accepted onto the site
  - All records would be maintained for a minimum of six years.
  - The Company would also ensure that any records maintained for this activity are available for review on request by the community, Council or relevant government authorities.
  - The Company would ensure that all Quarry personnel responsible for the management of VENM importation and handling would be trained on the requirements of the process listed above.
- VENM would ideally be placed directly into rehabilitation areas following importation. In the event that temporary stockpiling is required, this would be undertaken within the Extraction Area footprint. No more that 5,000t of VENM would be stockpiled at any one time subject to stockpile area availability.
- During campaigns of VENM importation, the Company would limit the number of heavy vehicle movements to and from the Quarry Site to ensure that the number of movements identified in Section 3.1 are not exceeded.
- Should unexpected contamination, asbestos or suspected contamination be discovered as a result of VENM importation, the Unexpected Contaminated Land and Asbestos Finds Procedure (attached to EMP) would be followed.

Should the current regulatory framework change or be updated before the importation of VENM for rehabilitation works is proposed to commence, this report would be updated to reflect changes to regulatory requirements. The proposed amendments will be submitted for assessment and approval by Council via the appropriate application pathway to be advised by Council.

4. Emergency Procedures

Should approval be granted, an *Emergency Response Plan* would be developed for the Quarry in consultation with the Rural Fire Service.

The Plan would include detailed response plans for the following.

- Fire emergency.
- Medical emergency.
- Major chemical spill emergency.
- Evacuation Procedure (see EMP**).**

The Quarry Manager would be responsible for the implementation and updating of the emergency response procedure.

5. Complaints Handling

5.1 Introduction

Complaints may be made via the following channels.

- Directly contacting an Environmental Management Representative for the Quarry on 0476 910 130 or 0499 010 000.
- Via a Government agency such as Hornsby Shire Council or the EPA.

The Company will maintain a Complaints Register to record the following details of the complaint.

a) The date and time of the complaint.

b) The method by which the complaint was made.

c) Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.

d) The nature of the complaint.

e) The action taken in relation to the complaint, including any follow-up contact with the complainant.

f) If no action was taken, the reasons why no action was taken.

5.2 Handling of Complaints

The Company has developed a complaints procedure for the operation of the Quarry with all complaints to be investigated and a response provided to the complainant.

The investigation will consider the following.

- What activities (and/or equipment) were being carried out or operated at the time of the complaint.
- Whether at the time of the complaint, normal day-to-day activities were being conducted.
- Whether equipment or activities on-site were the potential source of complaint (or whether other activities in the locality may have contributed to the complaint).
- What actions may be carried out to resolve the complaint and/or minimise the likelihood of further complaints.

If monitoring is undertaken to investigate a complaint, the Quarry Manager will make the results of the monitoring available for viewing by the complainant, on request.

5.3 Dispute Resolution

In the event of a disagreement between the Company and a member of the community regarding environmental management issues, the Quarry Manager or other relevant personnel will work with the community member to resolve the issue.

If an agreement cannot be reached through direct consultation, the Company will seek external assistance from a third party in the resolution of the dispute. This may include mediation facilitators, technical matter experts or relevant government agencies.

Appendix 11

Updated Sediment Basin Storage Requirement Calculations

(Total No. of pages including blank pages = 10)

1. Sediment Basin Calculations

1.1 Basin Type

The sediment basin will be designed as a Type F (Water Retention) Basin, consistent with the requirements outlined in Volume 2E of the Blue Book. These basins are designed to accept, store, and settle runoff from the disturbed catchment area, ensuring sediment is removed. Water is either reused for dust suppression activities or transferred to the Extraction Area Sump for storage and further management. The design ensures compliance with nil discharge principles, retaining all inflows for settlement to minimise environmental impacts on sensitive receiving environments.

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 drained, with all sediment-laden runoff ultimately reporting to the Quarry Sump or infiltrating the underlying water table. The effective catchment area for the Quarry Sump is projected to be approximately 2ha during Stage 1 of operations, expanding to 2.7 ha during Stage 2.

- Office, Amenities and Parking Area Catchment (Dirty Water)

  A sediment basin will manage sediment-laden runoff within this catchment. 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 the design rainfall event for determining sediment storage and water settlement zones as either:

- 5-day 90th percentile event for standard receiving environments, or
- 5-day 95th percentile event for sensitive receiving environments.

A ‘sensitive’ receiving environment is defined in 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.” Based on Table 6.1 of Volume 2E of Landcom (2004), the Quarry Site has been classified as being within a sensitive receiving environment, requiring the use of the **5-day 95th** percentile rainfall event for sediment basin design (see Table A).

Rainfall data extracted from the SILO database for the site provides a 5-day 95th percentile rainfall depth of **77.4mm**. This calculated value is compared to the Blue Book Table 6.3a (Volume 1), which provides the following 5-day 95th percentile rainfall depths for nearby towns:

- Wilberforce (20 km west): 69.4 mm, and
- Gosford (33 km east): 99.3 mm.

The SILO-calculated rainfall depth of 77.4 mm falls between the rainfall depths of Wilberforce and Gosford, providing a reasonable and rationalised value that reflects both the site-specific conditions and the regional rainfall characteristics. This value has been adopted for sediment basin sizing at the Quarry Site.

Table A:
Recommended minimum design criteria for
temporary erosion and sediment control measures at mines and quarries

Duration of disturbance	< 6 months		6–12 months		1–3 years		> 3 years	
Sensitivity of receiving environment ('standard' or 'sensitive')[1]	standard	sensitive	standard	sensitive	standard	sensitive	standard	sensitive
Temporary drainage (erosion) controls[2]								
– designed to have a non-erosive hydraulic capacity to convey	2 yrs	5 yrs	5 yrs	10 yrs	10 yrs	20 yrs	20 yrs	20 yrs
Temporary sediment control measures[3]								
– should be constructed to remain structurally sound in:	2 yrs	5 yrs	5 yrs	10 yrs	10 yrs	20 yrs	20 yrs	20 yrs
Type C sediment retention basin								
– designed to achieve required water quality for flows up to:	0.5 x 1 yr	1 yr	1 yr	2 yrs	1 yr	2 yrs	1 yr	2 yrs
– embankment and spillway designed to be structurally sound in[4]:	10 yrs	20 yrs	20 yrs	50 yrs	50 yrs	100 yrs	50 yrs	100 yrs
Type F or D Sediment retention basin								
– designed to achieve required water quality for storms up to nominated five-day duration percentile event:[5]	75th	80th	80th	85th	80th	85th	90th	95th
– designed to achieve required water quality for storms up to nominated five-day duration percentile event with enhanced erosion controls[6]:	75th	75th	75th	80th	75th	80th	90th	95th
– embankment and spillway designed to be structurally sound in[4]:	10 yrs	20 yrs	20 yrs	50 yrs	50 yrs	100 yrs	50 yrs	100 yrs

[1] A 'sensitive' receiving environment is one that has a high conservation value, or supports human uses of water that are particularly sensitive to degraded water quality.
[2] e.g. diversion banks, perimeter banks, catch drains, level spreaders, check dams, batter drains and chutes.
[3] e.g. sediment fences, stacked rock sediment traps etc. on small catchments where used as a 'last line of defence' (i.e. without a down-slope sediment basin).
[4] This is indicative only – consider the risks of basin failure for each basin to determine appropriate spillway design flow.
[5] For a five-day management period. Adjustment factors to the five-day volumes for alternate management periods are 85% for two-days, 125% for 10 days and 170% for 20 days.
[6] Enhanced erosion controls are described on **vol.1** section 6.3.4(g).

Source: Blue Book - Table 6.1 of Volume 2E of Landcom (2004)

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 primarily influenced by the soil's or surface's permeability and saturation. 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 during 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. Typically, they consist of moderately deep (>0.5m), well-drained soils with medium, loamy textures or clay loams with moderate structure. They shed runoff infrequently.
- **Group C:** Moderate to high runoff potential. Water moves into and through these soil materials at slow to moderate rates when thoroughly wetted. Typically, they consist of soils with:
  - 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. These soils regularly shed runoff during moderate rainfall events.
- **Group D:** Very high runoff potential. Water moves into and through these soil materials very slowly when thoroughly wetted. These soils usually consist of:
  - Fine-textured (clay), poorly structured, surface-sealed soils with high shrink/swell properties,

– Soils with a permanent high water table and/or

– Soils with a layer near the surface that is nearly impervious. These soils shed runoff during most rainfall events.

Soil Types in Catchment Areas

1. **Natural Soil Conditions:**
   The soil profile is considered most representative of Soil Hydrologic Group A for undisturbed soils in their natural state. This classification is supported by the Soil Profile Report from the NSW Soil and Land Information System (Ref: Profile 316 (1000133) at 314505E, 6300990N, MGA Zone 56). The report indicates that the soil is well-drained and highly permeable, with limited surface water retention and low potential for runoff generation, which aligns with the characteristics of Group A.

2. **Extraction Area Catchment:**
   The Extraction Area Catchment consists of moderately compacted, disturbed soils. These conditions align with Soil Hydrologic Group B**,** which has low to moderate runoff potential. Water moves through these soils at a moderate rate, but the disturbed conditions generate runoff during more frequent rainfall events. For sediment basin design, the 5-day 95th percentile rainfall event of 77.4 mm is used, with a volumetric runoff coefficient (Cv) of 0.57 (~57% of rainfall accumulates as runoff), as per Table F2 of the Blue Book.

3. **Office, Amenities, and Parking Area Catchment:**
   The Processing Area Catchment features highly compacted surfaces due to infrastructure and frequent activities, significantly reducing infiltration and increasing runoff. These conditions are characteristic of Soil Hydrologic Group C, with moderate to high runoff potential. These soils regularly shed runoff during moderate rainfall events. For sediment basin design, the 5-day 95th percentile rainfall event of 77.4 mm is used, with a volumetric runoff coefficient (Cv) of 0.7 (~70% of rainfall accumulates as runoff), as per Table F2 of the Blue Book.

By considering the distinct soil characteristics and runoff coefficients for each catchment, sediment and erosion control measures, including sediment basins and the Quarry Sump, are designed to effectively manage runoff and sediment discharge, ensuring compliance with environmental guidelines.

1.6 Settlement and Storage Volume Requirements

Considering the likely runoff volume and sediment load under a 5-day 95th percentile rainfall event, Table B provides the minimum water settlement and sediment storage zone requirements for the sediment basin and Quarry Sump. The capacity of the Sediment Basin for the Office, Amenities, and Parking Area Catchment (SB1) will remain consistent throughout the Quarry's operational lifespan, given the stable catchment area of approximately 0.2 ha. In alignment with

the Blue Book's recommendations, the total volume provision for SB1 is set at **111 m³**, comprising a water settlement zone of **108 m³** and a sediment storage zone of **3 m³**.

The extent of the Extraction Area determines the capacity of the Quarry Sump. During Stage 1 extraction operations, the operational disturbance for the Extraction Area is projected to be approximately **2 ha**, as illustrated in Figure A. In line with the Blue Book's recommendations, the Quarry Sump's volume for Stage 1 is set at **993 m³**, comprising a water settlement zone of **882 m³** and a sediment storage zone of **111 m³**. As the Extraction Area reaches its full development during Stage 2, the operational disturbance is anticipated to expand to approximately **2.87 ha**, as shown in Figure B. Accordingly, the Quarry Sump's total volume requirement will increase to **1341 m³**, with a water settlement zone of **1191 m³** and a sediment storage zone of **150 m³**.

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	108	3	111
Quarry Sump – Stage 1	882	111	993
Quarry Sump – Stage 2	1191	150	1341

The worksheet used estimate these minimum capacities are provided as **Attachment 1**.

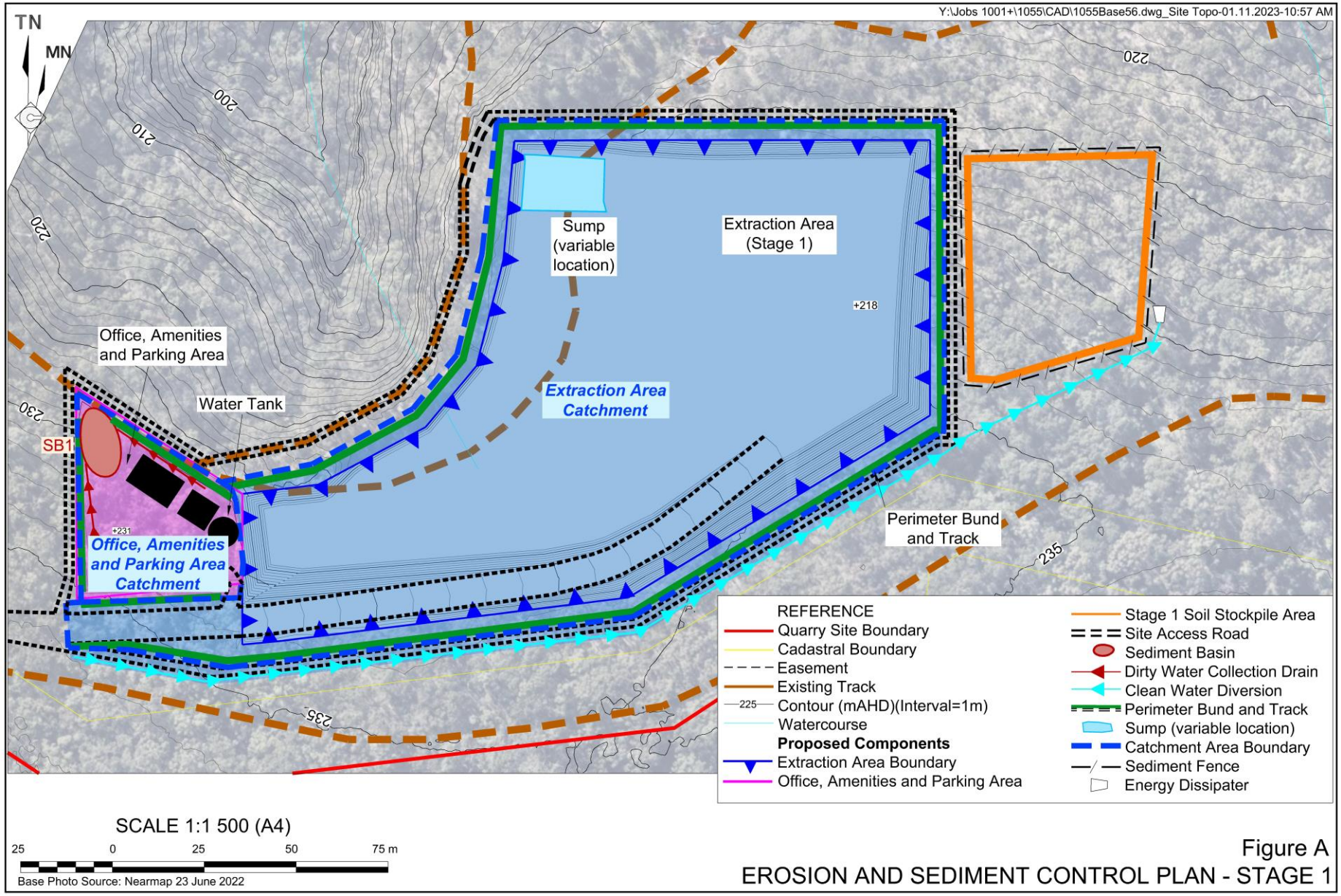

Figure A
EROSION AND SEDIMENT CONTROL PLAN - STAGE 1

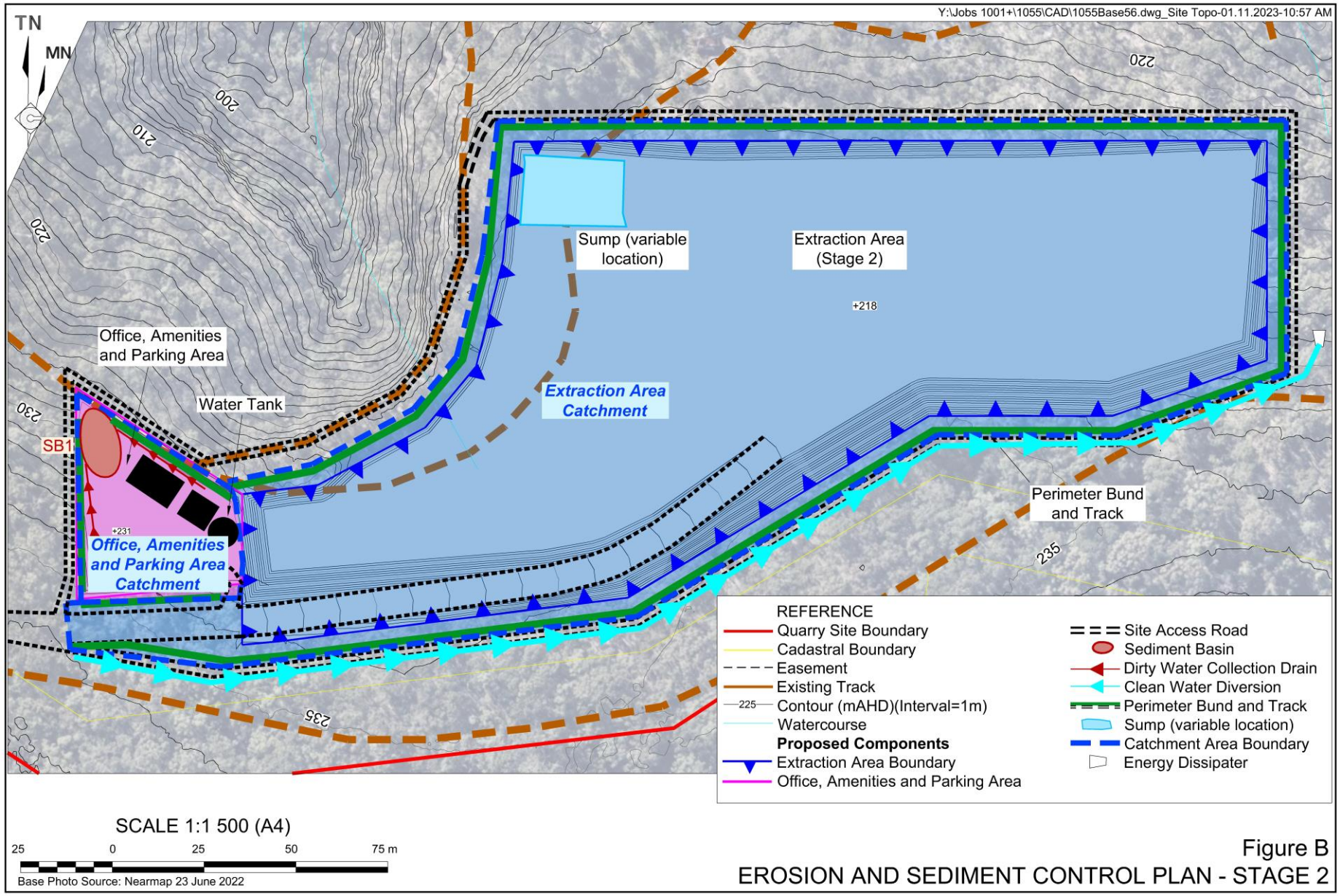

Figure B
EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

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 Stage 2

Other Details:

Site area	Sub-catchment or Name of Structure						Notes
	SB1	S-1	S-2				
Total catchment area (ha)	0.2	2	2.7				
Disturbed catchment area (ha)	0.2	2	2.7				

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)	77.4	77.4	77.4				
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				RUSLE LS factor calculated for a high rill/interrill ratio.
Slope length (m)	80	80	80				
Slope gradient (%)	3	10	10				
Length/gradient (*LS*-factor)	0.65	2.81	2.81				
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)	0.7	0.57	0.57				See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	100	432	432				
Soil Loss Class	1	4	4				See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	77	333	333				Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	3	111	150				See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	108	882	1191				See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	111	993	1341				

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).