Department of Planning, Housing & Infrastructure

Our ref: DA85/2865-PA-46

Ewen McKenzie
Acting Environmental Compliance Manager
11 NARABANG WAY
BELROSE 2085

23/09/2024

Subject: Aboriginal Cultural Heritage Management Plan version 5

Dear Mr McKenzie

I refer to the updated Aboriginal Cultural Heritage Management Plan (version 5) submitted following updates made in response to the substage 8A–8C scar tree survey and in response to review comments made by the Department.

I note the scar tree survey identifies a tree (TN1) as having a wound determined to have been highly likely to be the result of Aboriginal cultural origin. I also note this tree is outside the excavation area and will not be disturbed by the project. However, you must ensure the tree is managed in consultation with relevant Aboriginal stakeholders.

Given the changes to the plan are minor and would continue to meet the conditions of approval, I therefore approve the updated plan.

If you wish to discuss the matter further, please contact me via email: carl.dumpleton@planning.nsw.gov.au.

Yours sincerely

Carl Dumpleton

Team Leader – Energy and Resources Assessments

As nominee of the Planning Secretary

Aboriginal Heritage Management Plan

Menangle Sand and Soil Quarry

Prepared for Menangle Sand and Soil Pty Ltd
August 2024

EMM
creating opportunities

Menangle Sand and Soil Quarry - Stage 8 Area

Aboriginal Heritage Management Plan

Prepared for Menangle Sand and Soil Pty Ltd
August 2024

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Menangle Sand and Soil Quarry - Stage 8 Area

Aboriginal Heritage Management Plan

Report Number

J190166 RP#25

Client

Menangle Sand and Soil Pty Ltd

Date

28 August 2024

Version history

Version	Date	Prepared by	Approved by	Comments
v2a	7 December 2020	R. Desic	P. Towler	Draft
v2b	20 January 2021	R. Desic	P. Towler	Updated based on RAP/Heritage NSW comments
v2	20 April 2021	R. Desic	P. Towler	Updated based DPE comments
v3	28 February 2022	K. Ward	R. Desic	Updated to incorporate MOD2
v4	28 June 2024	P. Towler	P. Towler	Minor updates in response to substage 8A–8C scar tree survey
V5	28 August 2024	P. Towler	P. Towler	Added HeritageNSW consultation email to Appendix C.

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Appendices

Tables

Figures

1 Introduction

1.1 Context

Menangle Sand and Soil Pty Ltd (Menangle Sand and Soil) operates the Menangle Sand and Soil Quarry at 15 Menangle Road, Menangle (Figure 1.1).

The quarry, located in the Wollondilly and Campbelltown local government areas, extracts sand and soil along the Nepean River as approved by Development Consent 85/2865, granted by the Minister for Planning on 15 November 1989.

To date, sand and soil has been extracted from Stages 1 to 2 and 4 to 7 (Figure 1.2). While previously approved, sand and soil will not be extracted from Stage 3.

On 10 September 2020, the NSW Land and Environment Court (LEC) approved the Menangle Quarry Extension – Modification 1 (MOD1) to Development Consent 85/2865. Consent Conditions are provided in the Notice of Orders for LEC 2018/342158. The Consolidated Consent ('the Consent') allows the extraction of sand and soil in the Stage 8 area and operations (but no extraction) in the Stage 6 and 7 areas. Extraction in the Stage 8 area commenced in September 2023.

On 5 November 2021, the Minister for Planning and Public Spaces approved the Menangle Quarry Extension – Modification 2 (MOD2). Changes to the Consent conditions are provided in the Notice of Modification for Development Consent DA 85/2865.

The extracted material will be transported to the processing area where it will be stockpiled, processed and blended with materials imported to the site, prior to being dispatched from the quarry. Operations (but not extraction) will continue in the Stage 6 and Stage 7 areas.

Modification 2 removed the requirement for an overland conveyor and replaced it with the operation of an off-road haul truck for the transfer of extracted materials from the Stage 8 area to the processing area using existing roads. There will be no additional ground disturbance as a result of MOD2.

This Aboriginal Heritage Management Plan (AHMP) has been prepared to address the requirements of the Consent.

The AHMP applies to the Stage 8 project area boundary as shown on Figure 1.3. This comprises the Stage 8 extraction area (Substages 8A–8M) and the Stage 8 restoration area which are referred to separately when relevant. The AHMP also provides management measures for:

- a rockshelter site that is outside but in proximity to the project area, being Bulli Site 40 (AHIMS 52-2-3720 – rockshelter with art)
- a culturally modified tree that is outside of the extraction area, approximately 50 m west of the substage 8B boundary (AHIMS Site ID #52-2-4888).

1.2 Project overview

The quarry has consent to extract the sand and soil resource in the Stage 8 area to 2035. The Stage 8 area extends approximately 2.8 km upstream of the currently active Stage 7 area.

As well as the extraction areas, key components of the quarry include:

- a wheel wash and weighbridge

- a site office and amenity building
- a workshop west of the site office
- fuel supply tanks north of the storage shed
- processing area, including stockpiles
- other minor infrastructure.

These components will be used to support activities in the Stage 8 area which include:

- extraction in the Stage 8 extraction area followed by rehabilitation
- restoration of areas adjacent to the extraction areas
- haul roads.

1.3 Operations

1.3.1 Activities

Operations at the quarry comprises the following activities:

- vegetation management and clearance
- sand and soil excavation
- material transport by off-road haul truck
- sorting and screening of excavated material
- processing of excavated material
- blending of excavated material with imported materials (permitted by the Consent and EPL 3991)
- stockpiling
- loading of product into trucks
- transport of product off-site by road trucks.

1.3.2 Plant and equipment

Condition A33 of the development consent states:

> All plant and equipment used on site, or to monitor the performance of the development must be:
>
> (a) maintained in a proper and efficient condition
>
> (b) operated in a proper and efficient manner.

Hence, regular maintenance of all plant and equipment will be logged and stored on site available for review at any time.

1.3.3 Quarry life

The Stage 8 Operations may be carried out on the site until 31 December 2035.

1.3.4 Operating hours

The quarry will operate during the approved hours in accordance with development consent Table 1.1, Condition A26, as reproduced in Table 2.1 below.

Table 1.1 Operating hours

Activity	Permissible hours
Construction work	• 7 am to 5 pm Monday to Friday • 7 am to 1 pm Saturday • At no time on Sundays or public holidays
Quarrying operations including loading and dispatch of laden trucks	• 6 am to 5 pm Monday to Friday • 6 am to 12 noon Saturday • At no time on Sundays or public holidays
Maintenance, security, office work, cleaning, etc	• May be conducted at any time, provided that these activities are not audible at any residence on privately-owned land

Condition A27 of the development consent states that where police or other public authorities request that deliveries or dispatching of materials are to be carried out outside operating hours and emergency work to avoid the loss of lives, property or to prevent environmental harm is required, then these activities are permitted outside the normal operating hours. In such circumstances, the Applicant must notify the Department of Planning, Housing and Industry (DPHI) and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

1.4 Purpose and objectives

The primary purpose of this plan is to define management of Aboriginal heritage values within project area and its vicinity. The term 'management' includes both Aboriginal heritage protection as well as mitigation of impacts on Aboriginal heritage. This AHMP includes:

- a list of all Aboriginal sites identified in the project area
- management procedures for Aboriginal cultural heritage values within and adjacent to the project boundary
- measures to ensure ongoing consultation with the project's registered Aboriginal parties (RAPs) and Heritage NSW
- protocols for RAP access arrangements for Aboriginal stakeholders outside of approved disturbance areas
- protocols for educating staff and contractors of their obligations relating to Aboriginal cultural heritage values through a site induction process
- protocols for newly identified sites
- protocols for suspected human skeletal materials
- protocols for the ongoing care of salvaged Aboriginal objects (if identified and salvage is required)

- protocols for monitoring and inspection of Aboriginal sites
- reporting requirements and site database update requirements
- provisions for continuous improvement to the plan through auditing and plan modification
- provisions for review and updates of the AHMP.

This AHMP has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Menangle Sand and Soil.

Menangle Sand and Soil will implement the AHMP as approved by the Planning Secretary.

1.5 Authorship

This plan was originally prepared by EMM Associate Archaeologist Ryan Desic (BA (hons) Historical and Prehistoric Archaeology) and reviewed by EMM Archaeologist Associate Director Dr Alan Williams FSA MAACAI. In accordance with Schedule 3, CoA B62(a), Ryan Desic was endorsed to prepare the AHMP by the Planning Secretary (refer Appendix C.1).

1.6 Regulatory consultation

1.6.1 AHMP preparation

In accordance with CoA B62(b), EMM on behalf of Menangle Sand and Soil consulted with Heritage NSW about the preparation of AHMP. Consultation with the Aboriginal community is addressed in Section 3.

EMM initially emailed a letter to Heritage NSW on 22 October 2020 during the preparation of the AHMP. The letter advised that the preferred consultation approach would be for Heritage NSW to review the AHMP after the RAP review period and its submission to the Department of Planning Industry and Environment (now Department of Planning and Environment, DPE) but were also offered to provide any upfront input or feedback during the AHMP preparation.

EMM discussed matters regarding the AHMP with Heritage NSW via teleconference on 1 and 7 December 2020. EMM provided a draft of the AHMP to Heritage NSW on 7 December 2020 welcoming initial feedback but acknowledging that Heritage NSW was likely to undertake a formal review after the results of Aboriginal consultation were provided and the document was issued to DPE for assessment and approval. The draft AHMP was subsequently reviewed by Heritage NSW and their comments addressed (Appendix C).

The AHMP (version 3, February 2022) was approved by the Planning Secretary on 25 March 2022 (Appendix D).

1.6.2 AHMP update

There will be no additional ground disturbance as a result of MOD2.

Heritage NSW was consulted during the MOD2 application process. Their comments were considered by Menangle Sand and Soil during the application process and by DPE on behalf of the Minister in approving the application and amending the Consent conditions.

This AHMP (version 4) has been updated to include the results of the scar tree survey in the Substage 8A–8C area that was conducted in consultation with Aboriginal community representatives Duncan Falk and Kirsty Chalker (see Section 3.4).

Source: EMM (2022); DFSI (2017); GA (2011); ASGC (2006)

0 5 10 km

GDA 1994 MGA Zone 56

N

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KEY

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- Local government area

INSET KEY

- Main road
- State forest

Regional context

Menangle Sand and Soil Quarry
Figure 1.1

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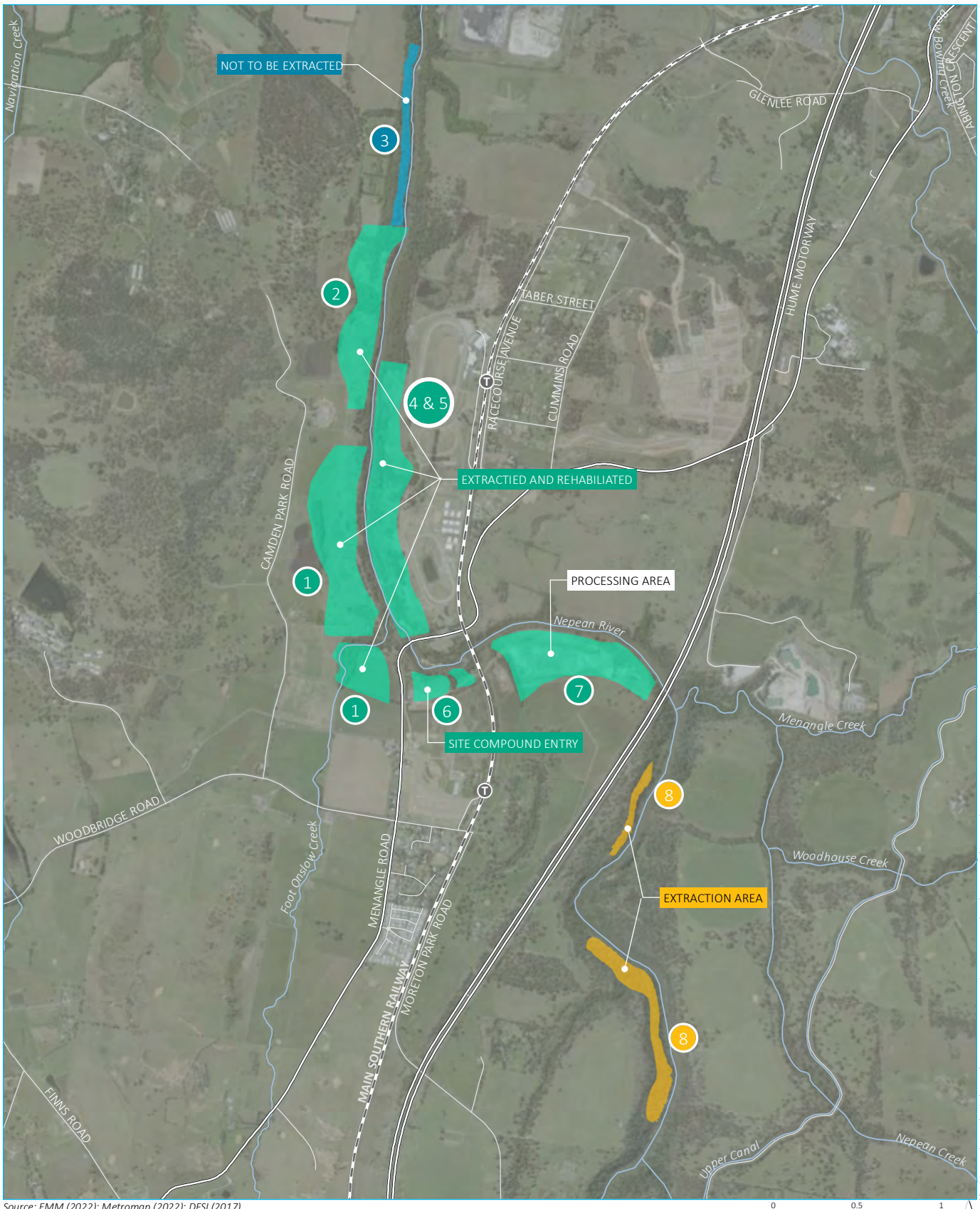

Source: EMM (2022); Metromap (2022); DFSI (2017)

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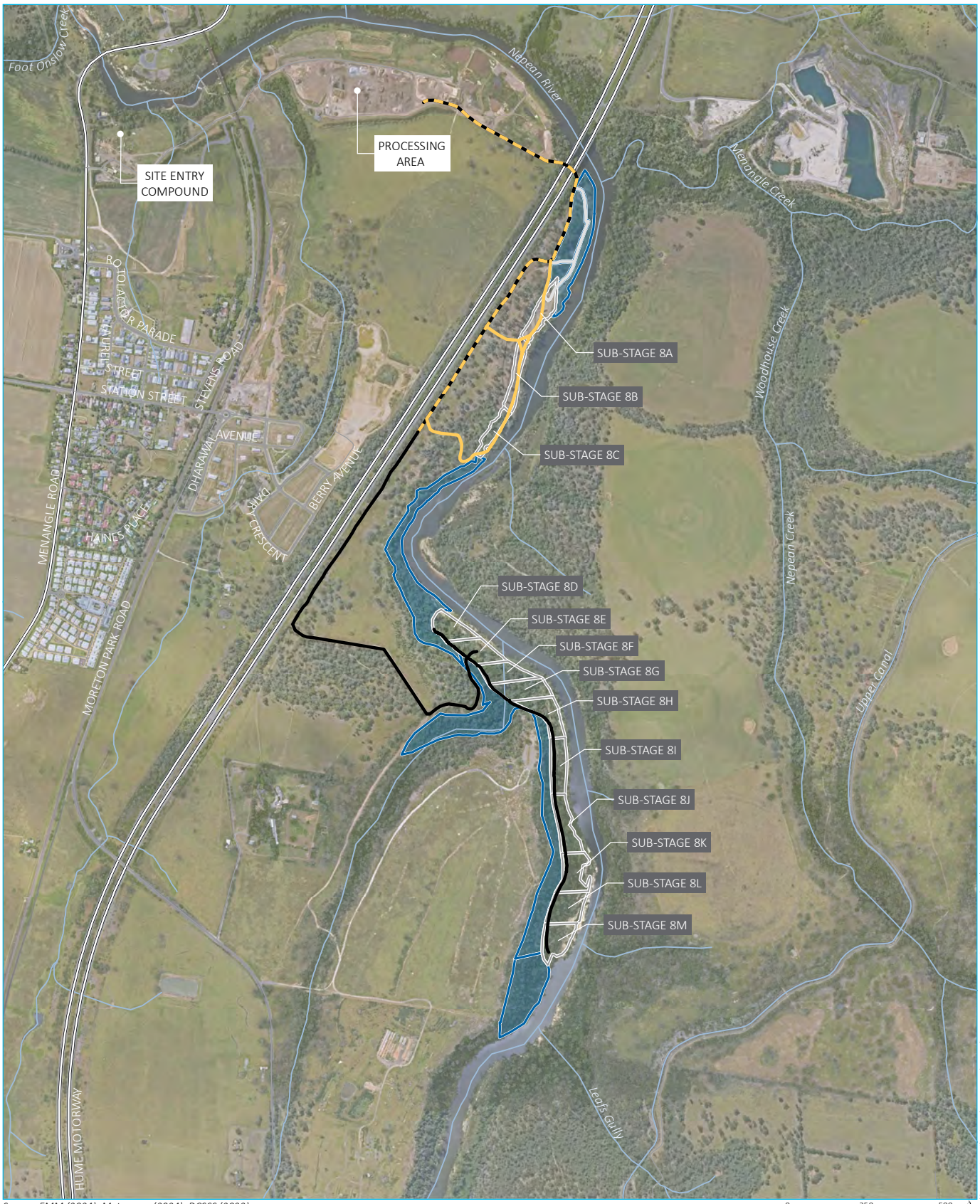
KEY

- Train station
- Rail line
- Main road
- Local road
- Named watercourse
- Extractive operations (approved)
- Extractive operations (approved but not extracted)
- Stage 8 - extraction/rehabilitation area

Menangle Quarry stages 1 to 8

Menangle Sand and Soil Quarry
Figure 1.2

EMM
creating opportunities



Source: EMM (2024); Metromap (2024); DCSSS (2023)

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KEY

- Stage 8 - restoration area (no extraction)

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Access track

Haul roads

- Substage 8A-8M
- Substage 8A-8C
- Substage 8D-8M
- Substage boundary

Phase 1 Sub-stages 8A - 8B
Phase 2 Sub-stage 8C
Phase 3 Sub-stages 8D - 8E
Phase 4 Sub-stages 8F - 8G
Phase 5 Sub-stages 8H - 8I
Phase 6 Sub-stages 8J - 8K
Phase 7 Sub-stages 8L - 8M

Stage 8 area

Menangle Sand and Soil Quarry
Figure 1.3

EMM creating opportunities

2 Environmental requirements

2.1 Legislative context

There are several Commonwealth and state Acts (and associated regulations) that manage and protect Aboriginal cultural heritage which are summarised in Table 2.1.

Table 2.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	Recognises sites with universal value on the World Heritage List (WHL). Protects Indigenous heritage places with outstanding heritage value to the nation on the National Heritage List (NHL), and significant heritage value on the Commonwealth Heritage List (CHL).	No	There are no Indigenous heritage places within the project area that are listed on the WHL, NHL, or the CHL.
Native Title Act 1993	Administers rights and interests over lands and waters by Aboriginal people. Provides for negotiation and registration of Indigenous Land Use Agreements (ILUAs). Often used in NSW to identify relevant stakeholders for consultation.	No	No native title claim applications or determinations or Indigenous Land Use Agreements exist over the project area.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Preserves and protects areas and objects of particular significance to Aboriginal people that are under threat from injury or desecration.	No	There are no areas or objects within the project area subject to a Declaration under the Act.
State			
Environmental Planning and Assessment Act 1979	Requires environmental impacts, including to Aboriginal heritage, to be considered in land use planning. Provides for the development of environmental planning instruments, including State Environmental Planning Policies and Local Environmental Plans.	Yes	The project was originally approved by Development Consent 85/2865, granted by the Minister for Planning on 15 November 1989. The extension project was assessed as a modification under Section 75W of the EP&A Act as the extant development consent was issued under Section 101 of the Act (refer to Clause 12 of Schedule 6A for transitional arrangements).

Table 2.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
National Parks and Wildlife Act 1974 (NPW Act)	Provides blanket protection for all Aboriginal objects and declared Aboriginal places. Includes processes and mechanisms for development where Aboriginal objects are present, or where Aboriginal Places are proposed for harm.	Yes	The project was originally approved by Development Consent 85/2865, granted by the Minister for Planning on 15 November 1989. DPE has advised that the NPW Act requirement for an Aboriginal heritage impact permit (AHIP) to harm Aboriginal objects remains in force for this project development consent.
Aboriginal Land Rights Act 1983	Establishes Local Aboriginal Land Councils (LALCs). Allows transfer of ownership of vacant crown land to a Local Aboriginal Land Council. The Office of the Registrar, *Aboriginal Land Rights Act 1983 (ORALRA)*, registers Aboriginal land claims and maintains the Register of Aboriginal Owners. Often used in NSW to identify relevant stakeholders for consultation.	No	The project area does not appear to have Registered Aboriginal Owners pursuant to Division 3 of the Act.

2.2 Project consent conditions

Conditions B58–B64 of project approval set out Aboriginal heritage requirements. The conditions listed in Table 2.2 refer to the relevant sections of this plan which address them.

Table 2.2 Conditions of Consent relevant to this AHMP

Condition	Requirement	Where addressed in this document
	Heritage Operating Conditions	
B58	The Applicant must ensure that the development does not cause any direct or indirect impact on any identified heritage item located outside the approved disturbance area.	Sections 5.1.2 and 5.1.3
B59	If suspected human remains are discovered on site, then all work surrounding the area must cease, and the area must be secured. The Applicant must immediately notify NSW Police and Heritage NSW, and work must not recommence in the area until authorised by NSW Police and Heritage NSW.	Section 5.4.3
B60	If any previously unknown Aboriginal object or Aboriginal place is discovered in the Stage 8 Area:	
(a)	all work in the immediate vicinity of the object or place must cease immediately;	Section 5.4.1
(b)	a 10 metre buffer area around the object or place must be cordoned off; and	
(c)	Heritage NSW must be contacted immediately.	

Table 2.2 Conditions of Consent relevant to this AHMP

Condition	Requirement	Where addressed in this document
B61	Work in the immediate vicinity of an object or place subject to condition B60 may only recommence if:	
(a)	the potential Aboriginal object or Aboriginal place is confirmed by Heritage NSW upon consultation with the Registered Aboriginal Parties not to be an Aboriginal object or Aboriginal Place; or	Sections 5.4.1 and 5.4.2
(b)	an Aboriginal Heritage Impact Permit is obtained under section 90 of the *National Parks and Wildlife Act 1974*, and the Aboriginal Cultural Heritage Management Plan is revised to include appropriate measures in respect the Aboriginal object or Aboriginal place, to the satisfaction of the Planning Secretary.	
	Aboriginal Cultural Heritage Management Plan	
B62	The Applicant must prepare an Aboriginal Cultural Heritage Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:	This document
(a)	be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;	Section 1.5
(b)	be prepared in consultation with Heritage NSW and Registered Aboriginal Parties;	Section 1.6 (Heritage NSW) Section 3.3 (RAPs)
(c)	describe the measures to be implemented within the Stage 8 Area, Nepean River Buffer Zone and Restoration Area to:	
(i)	ensure all workers on the site receive suitable Aboriginal cultural heritage inductions prior to carrying out any activities which may cause impacts to Aboriginal objects or Aboriginal places, and that suitable records are kept of these inductions;	Section 6.1
(ii)	protect, monitor and manage Aboriginal objects and Aboriginal places;	Section 5
(iii)	protect Aboriginal objects and Aboriginal places located outside the approved disturbance area from impacts of the development;	Section 5.1 Section 5.4.2
(iv)	manage any new Aboriginal objects or Aboriginal places discovered during the life of the development;	Section 5.4
(v)	maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area); and	Section 3.5.2
(vi)	facilitate ongoing consultation and involvement of Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site.	Section 3.4
B63	The Applicant must not commence Quarrying Operations in the Stage 8 Area until the Aboriginal Cultural Heritage Management Plan is approved by the Planning Secretary.	Section 1.4
B64	The Applicant must implement the Aboriginal Cultural Heritage Management Plan approved by the Planning Secretary.	Section1.4

3 Aboriginal consultation protocols

3.1 Registered Aboriginal parties

There are seven Aboriginal groups registered for the project (Table 3.1). The RAPs were identified, registered and consulted as part of the ACHA (EMM 2016). Previous consultation included discussion of the management measures which were outlined in the ACHA and are detailed in this AHMP.

Table 3.1 List of RAPs

Organisation	Date of registration
Cubbitch Barta Native Title Claimants Aboriginal Corporation (Cubbitch Barta)	1 Jun 2016
Peter Falk Consultancy (now Duncan Falk Consultancy)	14 Jun 2016
Gulaga	15 Jun 2016
Biamanga	15 Jun 2016
Callendulla	15 Jun 2016
Murramarang	15 Jun 2016
Goobah	15 Jun 2016
Tharawal Local Aboriginal Land Council	Not formally registered but consulted throughout the modification application, since July 2016

3.2 Consultation process for the EA

The following summary of the Aboriginal consultation process followed for the EA is based on the more extensive account given in the ACHAR (EMM 2016).

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a) were used for the ACHA. RAPs were invited to provide cultural information about the project area, were provided with draft assessment and fieldwork methods for review and kept consulted about project updates and management via a consultation meeting, letters and emails and provided with assessment documentation for review and comment. A summary of the main consultation components during the EA phase is provided in Table 3.2.

Table 3.2 Summary of consultation for the project EA

Component	Key features
May–November (EMM 2016) Main ACHA consultation component	This phase included: • the identification, notification and registration of RAPs • presentation of project information and assessment methodologies (including on-site meeting on 23 September 2016) • gathering cultural information • archaeological survey (April 2016) • archaeological test excavation (October 2016) • provision of draft ACHA for RAP review (November–December 2016) • provision of final ACHA to RAPs as part of EA lodgement.

3.3 Consultation in developing this plan

In accordance with CoA B62(b), EMM consulted RAPs in developing this plan. Documentation of the consultation process is included in Appendix B.

Aboriginal consultation for this AHMP was approached in a manner consistent with the requirements set out in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a). Consultation was undertaken with existing RAPs who have been involved in the consultation process since the preparation of the ACHA (refer Section 3.1).

RAPs were notified via letter about the intention for EMM to prepare the AHMP on 22 October 2020. The notification letter outlined the consultation process for the AHMP and identified key matters to be discussed for the AHMP.

A draft of this AHMP was provided to all of the RAPs on 11 December 2020 allowing for a 28-day review period. The draft report included highlighted text indicating sections where RAP input was sought in reference to particular management decisions, such as the keeping place location. RAPs were also issued with a cover letter explaining the review process and highlighting where key input was sought.

Responses were received by Cubbitch Barta, Goobah, Murramarang, and Biamanga. A summary of RAP submissions and outcomes relating to the AHMP are presented in Table 3.3. Appendix B contains Cubbtich Barta's detailed letter and EMM's response along with copies of the other RAP submissions.

Table 3.3 Outcomes of consultation with RAPs (RAP submissions attached in Appendix B)

Stakeholder	Issue or recommendation (EMM paraphrase from submission)	Response and where issue is addressed in AHMP if applicable
Cubbitch Barta	Concern over environmental impact of the project, with specific reference to native old growth trees that will be destroyed.	This issue was previously raised during the ACHA phase of the project and addressed during that consultation period. This comment refers to the approval of the project in general and not the contents of the AHMP. Notwithstanding, EMM has provided a response attached in Appendix B. No changes to the AHMP have been made from this submission topic.
Cubbitch Barta	Cubbitch Barta raised an issue about the difference between vegetation removal and topsoil removal.	This was clarified in EMM's response letter and did not require changes to the AHMP.

Table 3.3 Outcomes of consultation with RAPs (RAP submissions attached in Appendix B)

Stakeholder	Issue or recommendation (EMM paraphrase from submission)	Response and where issue is addressed in AHMP if applicable
Cubbitch Barta	Statement that no work should take place in areas not previously surveyed until further assessment has taken place.	EMM's response letter (Appendix B) referred to Section 5.2 of the AHMP which states that additional survey prior to works in the Stage 8 extraction area will take place after the understorey is cleared and prior to the removal of mature trees to determine if any feature Aboriginal scarring or carving; and additional survey will take place for rock shelters in the Stage 8 restoration area.
Cubbitch Barta	Concern over impacting and removing Aboriginal scarred trees if identified.	This is addressed in Appendix B. No Aboriginal scarred or carved trees have been identified in the project area, but the trees will be subject to further survey once weeds are removed and they can be accessed. Note that any proposal to impact Aboriginal objects in the project area would require an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW. Section 5.4.2 of the AHMP sets out the level of assessment that will be required to accompany an AHIP application, including an impact assessment and demonstration why any site(s) in question cannot be reasonably avoided.
Murramarang	Supported the draft AHMP	None required
Biamanga	Supported the draft AHMP	None required
Goobah	Supported the draft AHMP	None required

3.4 Substage 8A–8C scar tree survey

Aboriginal community representatives Duncan Falk and Kirsty Chalker participated in the scar tree survey in substages 8A–8C in May 2023 (see Section 4.5).

3.5 Ongoing consultation

3.5.1 All RAPs to be kept informed

The RAPs will continue to be consulted on matters of Aboriginal heritage management for the project. Primary communication will be via letter which may be emailed or posted depending on RAP preferred means of communication. Issues raised in conversations, whether by telephone or in person, should be documented in a letter by the person raising the issue within a reasonable time of the conversation. Only suitably documented issues will be subject to further action by Menangle Sand and Soil with the RAPs.

Instances where consultation is required is set out throughout this report. In summary, consultation will be undertaken for (but may not be limited to) the following circumstances:

- when making changes to this plan, including the circumstances that trigger required changes to the plan (refer Section 6.3.6)
- when additional Aboriginal heritage assessment, investigation, protection or mitigation is required for the project
- when new Aboriginal sites and/or potential ancestral remains are discovered and input on their management is required (refer Section 5.4).

Menangle Sand and Soil will be responsible for consulting with the RAPs. Issues requiring the attention of RAPs will be communicated no later than one week of the issue arising. Feedback from RAPs is required no later than two weeks from the date correspondence is issued by Menangle Sand and Soil. Notwithstanding, review and feedback timeframes will be extended during periods such as Sorry Business or holidays. These extensions will be commensurate with period where RAPs are unable to conduct other activities.

3.5.2 Access to Aboriginal sites and objects

In accordance with CoA B62(c)(v), the AHMP must maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area). The primary aims of Aboriginal community access of these sites will be to achieve intergenerational equity through maintaining a cultural connection to Country and using the sites as cultural education tools.

Local Aboriginal community site visitation access Aboriginal sites and objects will be subject to the following provisions:

- given reasonable notice, visitation access to the Stage 8 area will be provided during quarry operating hours, in line with all safety and security requirements
- access must comply with the facility's operational work health and safety (WHS) requirements, including appropriate transport to the Aboriginal heritage sites and a Menangle Sand and Soil site escort, if applicable
- all visitors must log their attendance on a register made available by Menangle Sand and Soil to all RAPs (held on site)
- RAPs must give at least one week's notice to Menangle Sand and Soil or its delegate about their intent to access the project area and which sites wish to be visited
- a RAP member may escort other members of the local Aboriginal community or other persons for research or educational reasons, on the condition that all proposed attendees give at least one week's notice written notice
- local Aboriginal community members seeking access to a RAP escort must receive prior written endorsement from one of the RAPs which identifies the name of the person, briefly describes their basis of interest and nominates the timeframe for access to the Aboriginal sites in order to provide confidence to Menangle Sand and Soil or their delegate and RAPs that the access request is authentic. At least two weeks' notice will need to be provided to Menangle Sand and Soil or its delegate.

3.5.3 Aboriginal involvement in Aboriginal heritage management measures

RAPs will be invited to provide a fieldwork representative to participate in Aboriginal heritage fieldwork activities as under contractual arrangement with Menangle Sand and Soil as presented in Section 5. Depending on the scope of specific management tasks, RAP fieldwork representatives may be required to work to a roster in an equal manner consistent with that employed during the project ACHA. All fieldwork management tasks will include at least one project archaeologist and will work in accordance with this plan.

RAPs will also be invited to assist in relevant Aboriginal heritage related fieldwork related to additional assessments as outlined in Section 6.3.5 where required.

RAPs will be provided with at least 14 days' notice prior to any fieldwork associated with this plan.

4 Existing environment

4.1 Overview

The Aboriginal cultural heritage values of relevance to the project were identified during the preparation of the project ACHA through archaeological investigation and Aboriginal community consultation with RAPs (EMM 2016). This section provides an overview of the Aboriginal sites and Aboriginal socio-cultural values relevant to the project as detailed in the project ACHA to provide context for the management provisions set out in Section 5.

4.2 Aboriginal socio-cultural and historical values

During ACHA preparation, the RAPs were consulted to determine whether any socio-cultural or historic heritage value relates specifically to the project area more broadly regardless of archaeological evidence. As a result of the consultation process, RAP Cubbitch Barta identified three types of intangible Aboriginal cultural heritage values during the consultation process.

The first type of values relate to the Nepean River which Cubbitch Barta identified as being culturally significant to the wider Aboriginal community. The Nepean River would have influenced many aspects of prehistoric Aboriginal life (eg resources and spiritual and cultural practices) and has continued as an important landscape feature up until the present. However, it is problematic to make management measures (other than complete avoidance) that respond to the general significance of the total Nepean River because it extends over a considerable geographic extent. No specific management measures for managing the cultural significance were proposed in the ACHA and are also not extended into the AHMP. Notwithstanding, the ACHA noted that the removal of exotic weeds and restoration of the project area will result in the Nepean River and its surrounds to ecologically resemble its pre-historic form to a level greater than it currently is.

The second type of values relate to a specific place (non-statutory) associated spiritual and traditional knowledge by Cubbitch Barta. This place was identified as associated with culturally sensitive information that was requested not to be shared publicly. EMM confirmed that the place is outside the Stage 8 impact areas and, because it relates to culturally sensitive knowledge, further information about the place was not provided to EMM. The project will avoid this area and no specific management measures for this area are set out in the AHMP.

The third type of values relates to the more recent and historic value Cubbitch Barta has associated with the Nepean River surrounding the Stage 8 area. This level of significance specifically relates to Glenda Chalker's family, including the continuation of cultural practices including fishing and collecting freshwater mussels. No management measures to address this were presented in the ACHA nor are proposed for this set of values in the AHMP. Note that the Nepean River will still be accessible generally from other land surrounding the Stage 8 area.

4.3 Summary of project ACHA and Aboriginal sites

The preparation of the Aboriginal cultural heritage assessment (ACHA) for the modification application included:

- background research of the Stage 8 area's environmental, archaeological and ethno-historical context
- Aboriginal consultation in accordance with the *Aboriginal Consultation Requirements for Proponents 21010* (DECCW 2010c)
- an archaeological survey, geoarchaeological survey and test excavation program

- an assessment of archaeological, socio-cultural and historical values (significance to the Aboriginal community); impacts of the project and management for the identified Aboriginal cultural heritage values using the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2010b).

The archaeological survey and test excavation results, Aboriginal sites and proposed project impacts are summarised in Table 4.1 and shown on Figure 4.1. No other Aboriginal sites or areas of PAD relevant to the project area were identified during the project ACHA (EMM 2016).

In summary, the assessment found:

- The project area includes three distinct landform types adjacent to the Nepean River, comprising a lower terrace, upper terrace and sandstone escarpment (scarp). Each landform was assessed of its archaeological potential.

- Six known (recorded) Aboriginal sites relevant to the project. This comprises one confirmed Aboriginal site (Bulli Site 40, AHIMS #52-2-3720 – rockshelter with art) that was recorded prior to the project ACHA, and five rockshelters with PAD (sites MQ1–MQ5) that were recorded during the project ACHA but have not been confirmed to feature Aboriginal objects (eg art, engravings or stone artefacts). The Aboriginal sites were identified and assessed through review of AHIMS data and targeted archaeological survey and all occur on the scarp landform outside of the Stage 8 extraction area.

- No Aboriginal objects were identified through targeted test excavation in the Stage 8 extraction area and the upper and lower terrace landforms are considered to have low archaeological potential for subsurface archaeological deposits, primarily because of their geomorphological depositional sequence (EMM 2016 p.63). No other Aboriginal sites or areas of PAD relevant to the project area were identified during the project ACHA.

- The scarp landform is suitable to feature Aboriginal rock shelters sites. There is potential for further rockshelters to occur in the Stage 8 restoration area, but many areas were inaccessible due to thick vegetation cover.

- The project will not impact the known Aboriginal rockshelter sites relevant to the project.

- There is some residual potential for Aboriginal scar trees to occur within the Stage 8 extraction area as there are mature native trees that couldn't be accessed due to thick vegetation cover.

- The escarpment at the western boundary of the Stage 8 extraction area has been buried by sediment accumulation of the Nepean River. As such, there is a theoretical potential for buried rockshelter or other sandstone-type sites (eg engravings or grinding grooves) to be buried and potentially exposed by project works in the Stage 8 extraction area. This has been based on the geoarchaeological assessment completed for the ACHA.

The Aboriginal sites and predicted project impacts are summarised in Table 4.1 and shown on Figure 4.1. No other Aboriginal sites or areas of PAD relevant to the project area were identified during the project ACHA (EMM 2016).

Table 4.1 Known Aboriginal sites

Site Name	AHIMS	Site type	Archaeological significance	Relationship to the project area	Predicted project impacts
Bulli Site 40	**52-2-3720**	Aboriginal rockshelter with art and PAD	Not specified on AHIMS site card. However, presence of 7 art motifs and PAD indicates moderate to high archaeological significance.	350 m west of Stage 8 extraction area 30 m south-west of Stage 8 restoration area	None: avoidance
MQ1	**TBC**	Rockshelter with PAD	Low: Problematic shelter with limited floor space, difficult to access on a steep slope.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	None: avoidance
MQ2	**52-2-4636**	Rockshelter with PAD	Moderate: Moderate PAD area with minor disturbance.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	None: avoidance
MQ3	**52-2-4637**	Rockshelter with PAD	Low: Problematic shelter with limited floor space, very exposed due to narrow shelter with high roof height and difficult to access.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	None: avoidance
MQ4	**52-2-4638**	Rockshelter with PAD	Low: Limited floor area and low ceiling height, moderately accessible on moderately inclined slope.	Within 50 m of Stage 8 extraction area Inside Stage 8 restoration area	None: avoidance
MQ5	**52-2-4639**	Rockshelter with PAD	Low: Limited floor area and low ceiling height, moderately accessible on moderately inclined slope.	Within 50 m of Stage 8 extraction area Inside Stage 8 restoration area	None: avoidance
TN1[1]	**52-2-4888**	Scar tree	A mature 250 to 300-year-old Bangalay or Southern Mahogany (*Eucalyptus botryoides*), that is upright but died between 5 and 15 years ago. Wound 1 is approximately 1,850 mm x 650 mm and is highly likely to be the result of Aboriginal cultural origin. The two other wounds are likely formed by insect borers and/or natural formation processes, and deemed not to be of cultural origin.	Approximately 50 m west of the substage 8B boundary	None: avoidance

1. See Section 4.5.

4.4 Limitations of project ACHA

Certain limitations of the ACHA have influenced some of the provisions of this management plan. They are summarised here to provide context for the necessity of their inclusion in this AHMP.

The archaeological survey component of the project ACHA was limited by dense vegetation throughout the Stage 8 area combined with the generally low ground surface visibility conditions. There were parts of the upper and lower terrace that could not be accessed across the project area. This meant that the survey was not effective for inspecting mature trees within the riparian community of Bangalay crossed with Sydney Blue Gum for Aboriginal scarring or carving within the project area. Even some of the trees within the surveyed areas had almost 3 m of their trunks obscured by a vegetated understory (the parts most likely to feature scarring or carving). Conservatively, these trees may be of suitable age to feature Aboriginal scarring or carving that cannot be discounted until inspected. As such, despite being a relatively uncommon site in the local area, there is some potential for unknown modified trees to be impacted by the project. Pre-clearance surveys will enable identification of culturally modified trees (if any) in the Stage 8 extraction area (refer Section 0).

The pre-clearance surveys of substages 8A–8C were undertaken in May 2023 (see Section 4.5).

Note that no mature trees will be impacted in the Stage 8 restoration area, nor the Stage 8 access corridor, as only exotic plants will be removed, and native trees will be conserved.

The focus of the project ACHA was on the Stage 8 extraction area which theoretically had the most potential to impact Aboriginal objects through significant earthworks. The Stage 8 restoration area was not targeted for archaeological investigations as the impacts proposed at the time were limited to exotic weed removal without the method of removal specified. Since the project EA in 2016, the method of exotic weed removal had been defined and will involve machine removal of between approximately 200 mm and 300 mm of topsoil in some areas on upper terrace and scarp landforms that were not previously subject to archaeological survey. Clearing and topsoil removal is described in Sections 5.2 of the *Menangle Sand and Soil Quarry Biodiversity and Rehabilitation Management Plan* (BRMP). Furthermore, land within portions of the Stage 8 restoration area will be used for hauling material on existing tracks.

There is some potential for previously unrecorded Aboriginal rockshelters to occur in the restoration area. As such, additional survey to identify and protect (if applicable) further rockshelters will be undertaken in the Stage 8 restoration area (refer Section 5.3).

4.5 Substages 8A–8C scar tree survey

The substage 8A–8C scar tree survey was undertaken by EMM, Urban Tree Management Australia and Aboriginal community representatives Duncan Falk and Kirsty Chalker in May 2023.

The survey team examined the trunk of each standing or felled where the tree had a trunk diameter greater than 600 mm, as these trees were considered to have been of sufficient age to contain wounds of Aboriginal cultural origin. The results are presented in Appendix E.

One culturally modified tree was identified (TN1). It is outside of the extraction area, approximately 50 m west of the substage 8B boundary. The tree has been recorded on the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) database as MQ MT1 (AHIMS Site ID #52-2-4888). It will not be impacted by extraction activities.

The scar tree survey results are provided in Appendix E.

Source: EMM (2024); DCSSS (2023); GA (2009); MetroMap (2024)

0 0.5 1 km

GDA 1994 MGA Zone 56

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KEY

- Stage 8 - restoration area (no extraction)
- Stage 8 - extraction/rehabilitation area

Aboriginal site
- Rock shelter with PAD
- Rock shelter with art & PAD
- AHIMS site

Previous Archaeological investigation
- Survey transect
- Geoarchaeology borehole
- Aboriginal scar tree
- Proposed artefact reburial location

Test pit location
- Hand
- Hand/Machine
- Machine

Existing environment
- Rail line
- Major road
- Minor road
- Named watercourse

Existing environment

Menangle Sand and Soil
Aboriginal Heritage Management Plan
Figure 4.1

EMM creating opportunities

5 Aboriginal heritage management

5.1 Management of known sites

Aboriginal heritage management over the life of the project for currently known (ie the six rockshelter) sites will take the form of protective measures for sites that will be avoided by project impacts. These measures apply to the six rockshelter sites as presented on Figure 4.1,Table 4.1 and Appendix A.

5.1.1 Active or passive protection

Aboriginal sites that are not identified as being impacted by the ACHA will be protected. Either active or passive protection measures will be implemented. Active management means construction of temporary or permanent barriers, installation of signage and controls on access by those undertaking activities within the project boundary. Passive management means no fencing or signage will be applied if sites are at limited risk of inadvertent impacts because they are a suitable distance from the disturbance footprints.

5.1.2 Active protection

Rockshelters MQ1 to MQ5 are outside of the Stage 8 extraction area but within the Stage 8 restoration area which will undergo exotic weed removal. This will also involve a component of topsoil stripping in some areas. The rockshelters and surrounding scarp are generally devoid of vegetation requiring removal, but nevertheless will have protective measures established to avoid any inadvertent impacts to shelter PAD areas or the structural integrity of the sandstone shelter features. This method will also apply to any newly identified Aboriginal rockshelters within the project area.

Site Bulli Seam 40 (AHIMS #52-2-3720) is outside the project area but within 50 m, and therefore will receive active protection too.

Protection buffer zones will be established for a 10 m radius around the observed extent of each rockshelter (including any PAD that extends beyond the shelter). The buffer zones will be demarcated using stake and wire fencing prior to extraction or restoration activities. The placement of fencing will be guided by markers set out by a suitably qualified archaeologist.

A durable sign will be attached to the fencing including words to the effect of:

> Environmentally sensitive area
>
> Do not disturb
>
> Contact the Property Manager on [phone number].

Weed management associated with Stage 8 restoration activities in the Nepean River Buffer Zone will be limited to non-invasive measures such as cutting vegetation at its base and treating with weed control products. No ground disturbance activities such as uprooting vegetation or topsoil removal is permitted in this zone. Weed management will be implemented according to industry best management practice for the weed species present in accordance with relevant sections of Sections 6 and 7 of the *Biodiversity and Rehabilitation Management Plan*, but tailored to an approach which will not involve ground disturbance.

5.1.3 Passive protection away from project activities

Passive management is not proposed for the currently known sites. However, if new sites are identified on Menangle Sand and Soil property over 50 m from the project area (Stage 8 extraction and restoration areas), passive management will apply. While no fencing, signage or active land management measures are proposed for these sites, their locations will be kept by Menangle Sand and Soil for persons working on or visiting the project boundary. Their presence in the landscape will be demarcated by at least one high visibility peg, stake or other marker to alert persons to their location. These locations will be marked by a suitably qualified archaeologist.

5.2 Additional survey and management

5.2.1 Purpose

Additional archaeological survey is required to account for any unidentified Aboriginal scar trees and rockshelters in the project area due to the limitations of the project ACHA described in Section 1 of this AHMP. The following section provides details of survey requirements, staging and timing.

5.2.2 Stage 8 extraction area

The project ACHA identified that the Stage 8 extraction area contains mature native trees that are potentially over 100 years old. Currently much of the Stage 8 area is too overgrown with weeds to allow adequate access to inspect all mature trees. Therefore, an additional survey will be undertaken in the Stage 8 extraction area after the understorey is cleared and prior to the removal of mature trees to determine if any feature Aboriginal scarring or carving. The survey will use the methods:

- The tree survey will be completed across the entirety of the Stage 8 extraction footprint by the project archaeologist and RAP representatives.
- The survey may be completed in a staged approach in keeping with the extraction Sub-stages 8A to 8M or any variation or grouping of such stages. Menangle Sand and Soil should stage approaches with consideration to potential AHIP timeframes as set out in Section 5.4.2 of the AHMP, given that any required AHIP may require an approximate 4-month timeframe and must precede project-related impacts.
- The survey must be completed after removal of the vegetation understory to a level that exposes the entirety of each mature tree trunk suitable for access and visual inspection.
- GPS coordinates and photographs will be taken for each inspected mature tree.
- A short report will be prepared by the project archaeologist documenting the outcomes of each fieldwork stint, inclusive of a figure showing the locations of the trees inspected. These reports will be issued to RAPs and Heritage NSW and kept by Menangle Sand and Soil for their internal records. If the Aboriginal sites are identified, the reports will be submitted as part of AHIMS site cards and lodged on the AHIMS register.
- If no Aboriginal scarred or carved trees or other Aboriginal objects are identified in the relevant portion of the Stage 8 extraction surveyed area during each stint, the report will provide clearance for project works to proceed (subject to other relevant environmental approvals or requirements).

If Aboriginal scarred or carved trees, or other Aboriginal objects are identified and cannot be avoided, the new finds management procedures set out in Section 5.4.2 will be followed. This includes the requirement for all work in the immediate vicinity to cease and a 10 m buffer area around the object must be cordoned off. A report detailing the

fulfilment of relevant provisions of this AHMP will be required by the project archaeologist prior to project works proceeding in cordoned off area of the identified site.

5.2.3 Stage 8 restoration area

i Survey for rock shelters

The project ACHA identified areas of scarp in the vicinity of the project area using GIS slope analysis teamed with visual observations during the archaeological survey. All scarp landform in the project area occurs outside of the Stage 8 extraction area and all to the south of the Sub-stage 8C area within the Stage 8 restoration area (Figure 1.3).

Only small sections of the scarp were targeted during the archaeological investigation because they were previously outside of proposed ground disturbance and also inaccessible due to dense vegetation. Furthermore, the targeted sections of scarp were heavily vegetated which may have obscured any rockshelters in the restoration area additional to MQ1–MQ5.

Archaeological survey will be undertaken by the project Archaeologist and RAP representatives in scarp landforms within the restoration area. The survey will be undertaken prior to invasive vegetation clearance (ie vegetation clearance that involves ground disturbance) of the scarp landforms. Depending on the density of vegetation, and resulting access constraints, it is likely that some level of mechanical and/or hand tool vegetation clearance on upper terrace landforms will be required, along with some preliminary non-ground-invasive vegetation on the scarp landforms to allow the scarp to be adequately inspected. The type of mechanical vegetation removal will be consistent with the methods described in the BRMP.

If additional rockshelter sites are identified during survey, they will receive the same active protection measures as presented in Section 5.1.2.

ii Survey of haul road

Existing tracks will be used as haul roads so no vegetation removal, other than pruning branches adjacent to the tracks, will be required. If any additional ground disturbance is required, archaeological survey for the identification of Aboriginal modified trees will be completed. The survey strategy in Section 5.2.2 will be employed.

5.3 Avoidance of buried sandstone features

Geotechnical borehole investigations completed by geoarchaeologist Sam Player as part of the project ACHA indicate that the sandstone escarpment continues below the ground surface in the Stage 8 extraction area on an angle that slopes toward the Nepean River. As such, there is a buried sandstone escarpment that continues beneath the upper terrace landform in the Stage 8 extraction area that will be subject to extraction. As the nature of this buried landscape is currently undefined, there is some residual risk that there are buried rockshelters or other sandstone-type sites (eg engravings or grinding grooves) to occur along the western boundary of the Stage 8 extraction area.

The sand and soil resource in the Stage 8 area will be extracted using an excavator and off-road haul truck. No vibrational impacts to nearby sandstone features are anticipated from this extraction method, given that machinery will only extract the sand and soil resource and will not interact with bedrock.

To reduce the risk of impacting unknown Aboriginal objects that are part of the buried escarpment, Menangle Sand and Soil will employ the following extraction controls:

- Machinery will exercise caution when excavating near existing exposed sandstone escarpment, and during contouring of the landward batter near sandstone escarpment features. Areas of existing visible sandstone

escarpment indicates where the escarpment is likely to continue into the Stage 8 extraction area and should be used as a guide to advise contractors where to employ caution. Currently this comprises the substages 8D to 8M areas but would also apply if other areas of escarpment are exposed during the extraction process.

- Works will stop if machinery encounters sandstone features (sandstone bedrock expanses, cliff or overhang features) during extraction. Machinery is not permitted to excavate, scrape, or demolish identified sandstone features. Before recommencing works, Menangle Sand and Soil will reassess their work plan within the area and attempt to leave a 50 cm layer of soil over sandstone features to avoid inadvertent impacts – this may require probing or other geophysical survey to establish the location of the sandstone escarpment (subject to the predictability of where the sandstone escarpment occurs).

- If suspected rockshelters, grinding grooves and engravings are exposed during extraction, works in that area will cease. Menangle Sand and Soil will contact a qualified archaeologist to inspect the find. The archaeologist will aim to verify the find and to establish suitable buffers to avoid any archaeological features. In general, the active avoidance measures as set out in 5.1.2 will be employed. Additionally, any buffers applied to sandstone features must consider:

    - measures to avoid impacting the structural features of rockshelters – ie the overhang, ceiling, inside and base

    - measures to avoid any areas of potential archaeological deposit at the base of the rock shelter or any prior land surface that extends beyond the limits of the rockshelter feature

    - measures to avoid scraping, excavating or damaging exposed sandstone of grinding grooves or engravings, and the surrounding bedrock/rockbar that hosts the features.

  Archaeological monitoring by an archaeologist may be required to establish suitable buffers to archaeological features during mechanical extraction in the area. Works will not proceed until the feature is appropriately protected and demarcated and a letter is prepared by the archaeologist confirming works may proceed. Heritage NSW and RAPs will be notified about the identification of any newly identified sites and the site will be registered on AHIMS.

5.4 New finds procedures

5.4.1 Discovery of new Aboriginal sites

In the event of discovery of suspected new Aboriginal sites within the project area during the life of the project, the following will apply:

- All work within the vicinity (minimum of 10 m) of the object or place will cease immediately.

- A minimum of 10 m around the site will be secured to protect the find with temporary fencing and the find will be immediately reported to the work supervisor who will immediately advise the Menangle Sand and Soil environmental manager or other nominated senior staff member.

- Heritage NSW will be contacted immediately and informed that a potential Aboriginal object or place has been identified and that an archaeologist will undertake further investigation to verify the nature of the unexpected find.

- An archaeologist must be contacted within five days of the find to validate the find and determine the archaeological significance of the objects(s).

- If the object is determined not to be an Aboriginal object or place by the archaeologist, Heritage NSW and RAPs will be notified of this assessment in writing. RAPs will be given 5 days to review the assessment of the potential object or place and provide comments or feedback. If no feedback is provided, then the assumption is that there are no issues with the assessment. Heritage NSW will be advised on the outcome of the assessment and consultation. Works will only recommence within the vicinity of the find after Heritage NSW confirms that the find is not an Aboriginal object or place.

- If considered cultural, the site will be recorded in accordance with current best practice archaeological methods and guidelines and Heritage NSW and RAPs will be notified of this assessment and determination.

- Assessments of archaeological significance will be documented in a letter report in a manner consistent with the significance assessment for the project ACHA

- if the find is determined to be an Aboriginal object, RAPs will be contacted to determine the cultural significance of the find and have input into desired management measures.

- Any new sites will be registered on the AHIMs database (refer Section 6.3.2).

- Any new sites will be added to the AHMP site inventory during its next review and update cycle.

5.4.2 Management of new Aboriginal sites

Newly identified sites that are not at risk of impact (ie over 50 m from the project area) will be avoided through passive protection (Section 5.1.3). Avoidable sites that are within 50 m of the project area will be managed through active protection measures identified in this plan (refer Section 5.1.2). Note that avoidance of newly identified Aboriginal objects is always the preferred heritage outcome. Mitigation measures should only be employed when it can be reasonably demonstrated that avoidance is not feasible.

Table 5.1 sets out the measures that will be employed for newly identified Aboriginal sites, subject to the approval of an Aboriginal heritage impact permit (AHIP) issued by Heritage NSW that endorses these methods in accordance with CoA B61 (b). The following procedure will be undertaken if an AHIP is required:

- The existing project ACHA (EMM 2016) will be used as the base supporting documentation for AHIP application(s). If new Aboriginal site(s) are identified and cannot be avoided by project activities, then an ACHA addendum assessment must be prepared to support an AHIP application. The addendum assessment must:

    - be completed by a suitably qualified archaeologist.

    - clearly describe the site, its location and boundaries.

    - assess the site's archaeological and cultural significance – if applicable, this may require further investigative measures in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). If archaeological test excavation is required, it may be completed in accordance with the Code. However, if test excavation is needed in a scenario that does not comply with the Code, an AHIP may be required to carry out test excavations.

    - include an impact assessment and demonstrate why the site cannot be reasonably avoided if impacts are proposed.

    - provide appropriate protective or mitigative management measures for the site(s). The measures listed in Table 5.1 provide general terms of reference for management measures.

- include evidence of the outcomes of consultation with the project RAPs listed in Table 3.1 of this document.

- AHIP applications should be lodged to heritagemailbox@environment.nsw.gov.au and include an AHIP application form, the EMM 2016 ACHA and the addendum assessment. Note that AHIPs applications have a 60-day determination period by Heritage NSW, but additional time should be allowed for contingency. Overall, given that an ACHA is already prepared for the project and RAPs have been established, the timeframe for the entire AHIP process should be approximately 3–4 months.

- Any AHIP application will be subject to consideration of the section 90k factors set out in the *National Parks and Wildlife Act 1974*, and therefore must be receive approval by Heritage NSW.

- If after the AHIP application is lodged and approved, additional sites are identified that would be impacted by the project, additional ACHA addendum assessment(s) would be required. An AHIP variation application would be lodged to include any additional sites, impacts and impact areas to the existing AHIP.

- The AHMP will be revised to refer to any AHIP issued in relation to the project. The AHMP will be updated to be consistent with the conditions of any AHIP issued. All AHIPs will be attached to the AHMP as an appendix.

Any AHIP issued in conjunction with this AHMP should be consulted prior to enacting any management measures for identified Aboriginal objects. All proposed salvage measures must be completed by a qualified archaeologist(s) with participation of at least one RAP representative. All salvaged objects will be managed in accordance with Section 5.5.

Table 5.1 Proposed management of newly identified sites within the project area

Site type	Site within Stage 8 restoration area	Site within Stage 8 extraction area
Open stone artefact site	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	For sites of low to moderate archaeological significance, surface collection will be employed prior to project impact as follows: The collection will be undertaken by qualified archaeologists and RAP representatives. The collection method will be as follows: 1. The general vicinity of each site location will be inspected by the field team. Stone artefacts will be flagged on the ground and a photo taken of the flagged site. Each flagged artefact will be marked as a waypoint in the GPS. 2. All artefacts will be collected into snap lock plastic bags or similar, marked with the project name, site name, collection date and waypoint number. 3. All artefacts will be sorted and recorded post-fieldwork with respect to technological type, implement type, raw material, maximum block length and weight. 4. The collected artefacts will be incorporated into a salvage report detailing the results of the fieldwork, the artefacts recovered at each site and GIS figures showing the artefact locations. 5. The Aboriginal Heritage Information Management System (AHIMS) records will be updated with a site impact recording form for each collected site. For sites of high archaeological significance, or with potential to be of high archaeological significance through the identification of significant PAD, as determined by the project archaeologist, test excavation may be employed to a methodology prepared in consultation with Menangle Sand and Soil and RAPs.

Table 5.1 Proposed management of newly identified sites within the project area

Site type	Site within Stage 8 restoration area	Site within Stage 8 extraction area
		Any salvage excavation program would require a report on the methods and outcomes of the excavation.
Modified trees	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	Note that Aboriginal tree scars may require verification by a qualified scar tree expert such as an aborist or Aboriculturalist if the scars are ambiguous to a degree that they cannot be determined by the project archaeologist. If a tree is assessed by an expert not to be an Aboriginal object, then RAPs and Heritage NSW will be notified and confirm that the tree is not an Aboriginal object in accordance with CoA B62 (a) to confirm that works may proceed in the area of the tree. • If find is determined to be an Aboriginal scar tree that cannot be avoided, the following Aboriginal scar tree removal procedure will be followed:A suitably qualified person in scar tree management (eg archaeologist with scar tree specialisation, Arborculturalist or arborist) will be engaged to determine a suitable removal method in consultation with RAPs. This may involve the requirement to saw the tree above the scar location allowing a suitable buffer from the scar feature. The process of removal will be photographed. • The removed tree and scar may be treated to preserve the scar to prevent its further deterioration. Any treatment option would be completed in consultation with RAPs, Menangle Sand and Soil and a suitably qualified curator. • The tree will be relocated to a nominated Aboriginal keeping place or other location as guided by RAPs (yet to be determined) appropriately displayed using suitable materials in consultation with Menangle Sand and Soil and RAPs. The outcomes of the tree management activity will be documented in a short letter report including records of the original and new tree location. Note that long term management of any salvaged trees may require a Care Agreement as set out in Section 6.3.3. The AHIMS records will be updated with a site impact recording form for the site.
Hearths	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	Archaeological excavation of the hearth will be employed and will involve taking suitable dating and soil samples if feasible as determined by the archaeologist.
Rockshelters	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.
Grinding grooves or engravings	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.
Other rarer site types not known to occur in the project boundary (eg stone arrangements, middens etc).	Apply active or passive protection measures as per Sections 5.1.2 and 5.1.3.	As other site types have a very limited chance of being identified in the project boundary, no specific management methodology has been devised. If other site types not previously identified in the project boundary are identified, a salvage method must be prepared by the project archaeologist in consultation with RAPs and Heritage NSW. This may be established through an extraordinary meeting with RAPs or through letter correspondence with a reasonable timeframe for review. Any salvage activity to such sites may require additional assessment and approvals as dictated by Heritage NSW would require a report on the methods and results of the exercise.

5.4.3 Discovery of Aboriginal ancestral remains

In the event that known or suspected human skeletal remains are encountered during the activity, the following procedure presented in Table 5.2.

Table 5.2 Procedure for the discovery of potential Aboriginal ancestral remains

Stage	Actions
1.Stop work and secure site	• The immediate vicinity will be secured to protect the find and the find will be immediately reported to the work supervisor who will immediately advise the site supervisor or other nominated senior staff member. • A no-go zone will be established around the immediate area of the site. • Complete review of activities to enable compliance and continued operations.
2.Notification to authorities and stakeholders	• The environmental manager or other nominated senior staff member will notify: – Police and State Coroner on the same day as the find – Heritage NSW (1300 361 967) or Environment Line (131 555) – Engage suitably qualified archaeologist or forensic anthropologist to assist Police in monitoring of skeletal material.
3.Determination of the find and further notification	• If it is determined that the skeletal material is of ancestral Aboriginal remains, RAPs contacted and consultative arrangements will be made to discuss ongoing care of the remains. • Engage project archaeologist to assist and/or facilitate management of the Aboriginal ancestral remains with RAPs and Menangle Sand and Soil.
	• If the skeletal material is not human, resume work. Ensure determination of non-human material is provided by relevant experts (eg Coroner or Police) before resuming work.
	• If the remains are historic but non-Aboriginal human remains, the NSW Heritage Council (or delegate of the Heritage Council) will be consulted to determine requirements in accordance with the NSW *Heritage Act 1977* and relevant guidelines. Further actions are likely to require adherence with the following NSW Heritage Council guidelines: – *Conservation Management Documents: Guidelines on Conservation Management Plans and other Management Documents.* – *Skeletal Remains; Guidelines for Management of Human Skeletal Remains*.
	• If the remains are non-Aboriginal and non-historic human remains, coordinate Menangle Sand and Soil involvement with police. Works will not proceed until written approval is granted from relevant authorities.
4.Initial planning and reporting if it is determined that the remains are Aboriginal ancestral remains.	• Aboriginal ancestral remains certificate to be submitted to the Police/Coroner to address the Coroners Act. • In consultation with RAPs, Heritage NSW and archaeologist, establish investigation area and any additional protocols to be adhered to during further investigation. The investigation will aim to establish whether any other burials are within or likely to occur nearby. Suitable methods could include controlled and monitored hand or machine excavation and/or non-invasive techniques such as geophysical techniques. • Engage an archaeologist to record the site and undertake significance and impact assessment of the burial site with RAPs and archaeologist. Site recordings must involve drawings and photography. Additional technical studies and samples may be taken with the consent of RAPs such as those for dating and biological information (eg age, sex and health of deceased). • Record burial site on AHIMs register, noting any restricted access requirements requested by RAPs.

Table 5.2 Procedure for the discovery of potential Aboriginal ancestral remains

Stage	Actions
5.Engagement with construction and operation manager to determine whether disturbance of the burial site(s) can be avoided.	• If the Aboriginal ancestral remains cannot be avoided: – Consult with RAPs, Heritage NSW and project archaeologist to facilitate recovery and reburial protocols and actions. Approval for recovery methods must be obtained by relevant authorities prior to any further movement of the remains: – Recovery methods must include: ▪ Exhumation in a controlled archaeological method and in consultation with RAPs and placed into a secure, temperate controlled storage location until a final reburial site can it identified. ▪ Access to the secure storage location containing any human remains will be managed and facilitated by Menangle Sand and Soil in consultation with RAPs. ▪ RAPs will determine if further studies, media releases or other investigations are appropriate for the finds. ▪ Where required, Menangle Sand and Soil will help facilitate any culturally appropriate reburial or ceremonial methods. – Prepare report for Heritage NSW and RAPs on the outcome of relevant investigation, recovery and reburial outcomes. – Update AHMP. – Works will not recommence until written approval is received from relevant authorities.
	• If the Aboriginal ancestral remains can be avoided: – develop appropriate management and mitigation measures in consultation with RAPs, Heritage NSW and archaeologists – prepare report for DPE, Heritage NSW and RAPs – update AHMP – works will not recommence until written advice is provided from the project archaeologist that the remains are suitably protected and away from project impacts.

5.5 Management of salvaged objects

There are currently no Aboriginal objects that require salvage as part of the project. If stone artefacts are identified and require salvage in accordance with this plan and any other relevant permits, they will be reburied on Menangle Sand and Soil property in an area suitable for long term conservation and not be at risk of any foreseeable impacts. The proposed reburial location is shown on Figure 4.1.

The reburial activity would be guided by the stone artefact disposition procedures as set out in Section 3.7 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). Any reburial fieldwork would be undertaken by a qualified archaeologist so that it is recorded appropriately. RAPs who wish to be involved in the activity will also be requested to participate.

As no Aboriginal objects are currently proposed for salvage, a Care Agreement under the NSW *National Parks and Wildlife Act 1974* (NPW Act) for the transfer of Aboriginal objects to Aboriginal owners is not currently proposed. If Aboriginal objects in the project are identified and subsequently permitted for salvage, a Care Agreement may be pursued, subject to the nature of the find. The AHMP will be updated in the event of a Care Agreement application.

5.6 Monitoring and inspection

The project will develop in a staged process and therefore monitoring and inspection protocols will only be triggered when relevant project activities begin in the proximity of individual Aboriginal sites. The aims of monitoring and inspection will be to verify that the Aboriginal sites designated for avoidance and protection are managed appropriately and that no inadvertent impacts have occurred.

All sites that occur within the project area, with the addition of Bulli Site 40 (AHIMS #52-2-3720 – rockshelter with art), that are designated for avoidance and active protection will be subject to monitoring inspections. Monitoring inspections and baseline recording will be completed prior to ground disturbance occurring within 100 m of each respective site. Table 5.3 presents the monitoring requirements.

Table 5.3 Monitoring program for Aboriginal heritage

Aboriginal sites	Monitoring		
	Prior to extraction	**During extraction**	**Post extraction**
Rockshelters	Baseline monitoring to record the sites before mining and note any existing cracks and areas of vulnerability. Baseline recording – photographs, plan drawings.	N/A	Visual inspection and photography conducted by an archaeologist after extraction activities have continued past the site that allows safe access to sites for inspection.

In the event that impacts are observed for sites designated for avoidance and protection, Menangle Sand and Soil at the earliest opportunity will:

- investigate to determine if the impact is related to non-project factors or is a consequence of project activities
- take all reasonable steps to ensure that the impact ceases and does not reoccur
- consider all reasonable and feasible options for remediation (where relevant) in consultation with RAPs and Heritage NSW
- submit a report to DPE and Heritage NSW describing those options and any preferred remediation measures or other course of action
- implement remediation measures subject to the conditions of this AHMP and any other relevant permits.

6 Compliance management

6.1 Training

6.1.1 Obligation to avoid harm

All employees, contractors, sub-contractors and visitors to the project have an obligation to avoid harming Aboriginal heritage unless engaged in an Aboriginal heritage management activity described in this plan.

The NPW Act defines “harm” to an object or place as any act or omission that:

(a) destroys, defaces or damages the object or place, or

(b) in relation to an object-moves the object from the land on which it had been situated, or

(c) is specified by the regulations, or

(d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that:

(e) desecrates the object or place, or

(f) is trivial or negligible, or

(g) is excluded from this definition by the regulations.

6.1.2 Obligation to protect and implement management measures

Site personnel, contractors and subcontractors responsible for land management or construction have an obligation to protect Aboriginal heritage within their area or work responsibility. Protection means active recognition of known Aboriginal heritage and active measure to avoid Aboriginal heritage. This may include fencing, erosion control and modification of work plans to avoid impacts to Aboriginal heritage, as well as facilitating a process where work personnel are aware of the nearby heritage.

Site personnel, contractors and subcontractors also have the responsibility to ensure that appropriate management measures have been employed prior to, or in association with, their activities which impact Aboriginal sites.

6.1.3 Aboriginal heritage induction and permitting process

All employees, contractors, sub-contractors involved in ground-disturbing activities will undergo an Aboriginal cultural heritage induction. In addition, visitors to the project and general contractors not involved in ground-disturbing activities will be made aware of their obligation to avoid harm to Aboriginal heritage through an Aboriginal heritage component of the general site induction. Records of these inductions will be kept by Menangle Sand and Soil.

The following points will be conveyed through site induction material:

- Aboriginal sites have been identified in the Stage 8 restoration area
- Aboriginal sites are of high significance to the Aboriginal community, are important to the wider community and must be treated with respect

- Aboriginal sites are protected by law and that project approval includes conditions allowing impacts to certain specified Aboriginal sites in accordance with this plan
- Aboriginal sites can be hard to recognise, therefore reference must be made to the Aboriginal heritage maps in this AHMP in order to clearly identify demarcated site boundaries
- certain areas of the project area must be managed by an archaeologist and RAPs prior to ground disturbance activities
- that there are new finds procedures which involve stopping work if suspected new Aboriginal sites or skeletal material is identified on-site
- sites such as rock shelters, engravings and grinding grooves have some potential to be uncovered during extraction activities – all personnel undertaking activities related to excavation in the extraction area will be provided with photographic examples of these site types and be reminded to stop work if these finds are uncovered.

6.2 Auditing

6.2.1 Implementation of this plan

Menangle Sand and Soil will implement this AHMP as approved by the Secretary. The individuals responsible for the implementation of the plan are provided in Table 6.1. The plan will be stored in Menangle Sand and Soil's document control system; the latest version will be available electronically at all times. As the document owner, Menangle Sand and Soil is the contact point for this plan and its requirements and will provide guidance and training to any person that requires additional training regarding this plan.

Table 6.1 Roles and responsibilities for Aboriginal heritage management

Role	Responsibilities
Quarry Manager	• Ensure that the AHMP is implemented as approved by the Secretary. • Ensure the implementation of this plan is carried out appropriately during construction/operations. • Ensure adequate financial and personnel resources are made available for the implementation of this plan. • Manage the implementation of this plan during extraction and restoration.
Environmental Manager	• Primary contact with RAPs. • Oversee signage and fencing of areas containing artefacts in accordance with this plan. • Ensure the Aboriginal heritage management measures required to be undertaken prior to ground disturbance activities are conducted in accordance with the measures outlined in this plan. • Ensure signage and fencing of Aboriginal sites is maintained. • Ensure inclusion of Aboriginal heritage in work inductions through delivery or input to induction documents. • Distribute copies of this plan as required. • Engage and coordinate relevant specialist personnel to undertake management measures or additional assessment as specified in this plan. • Maintain records of Aboriginal consultation. • Ensure relevant reporting, data management and registration is conducted, maintained and updated.

Table 6.1 Roles and responsibilities for Aboriginal heritage management

Role	Responsibilities
	• Arrange for a review of this plan in accordance with review cycles and conditions specified in this plan.

6.2.2 Measuring performance

Actions undertaken under the plan will be reported as part of required Independent Environmental Audits to DPE. Compliance with the plan will be measured by standard environmental auditing procedures undertaken at regular intervals. The audit will include an assessment of compliance with development consent conditions and will include auditing the following measures:

- protection of all nominated sites
- inductions are taking place and include appropriate material
- reporting and managing any newly identified Aboriginal objects in accordance with this plan.

Menangle Sand and Soil may engage a heritage consultant to assist with reporting compliance as part of an Independent Environmental Audit. Any incidents and non-compliance notifications will follow requirements set out in Part D of the project Conditions of Consent as per the Environmental Management Strategy (EMS).

6.3 Reporting

6.3.1 Statutory reporting requirements

Notifications to Heritage NSW are required in relation to discovery, impact and care of Aboriginal objects under the NPW Act. This will be the responsibility of the Environmental Manager.

6.3.2 Discovery of Aboriginal objects

Under Section 89A of the NPW Act, it is a requirement that Heritage NSW is notified of the existence of Aboriginal objects as soon as practicable after they are first identified. This is done through the completion of the Heritage NSW Aboriginal Site Card which is submitted to the Registrar of AHIMS for inclusion on the Aboriginal site database. Information regarding AHIMS and site recording forms can be downloaded from Heritage NSW's website:

https://www2.environment.nsw.gov.au/topics/heritage/search-heritage-databases/aboriginal-heritage-information-management-system.

6.3.3 Care agreements

Under s85A of the NPW Act, Aboriginal objects remain the property, and under the protection of, the Crown until formal transfer to a person or persons of a class prescribed by the regulations occurs. A Care Agreement is not currently proposed under this plan; however, may be pursued in the future if Aboriginal objects are identified to a level of significance that the RAPs wish to retain such objects.

Care Agreement application forms can be downloaded at:

https://www2.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/aboriginal-objects-and-places/apply-care-agreement-transfer-objects

6.3.4 Reporting impact to Aboriginal sites

An Aboriginal Site Impact Recording Form must be completed following impacts to AHIMS sites that are:

a) a result of test excavation carried out in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW*

b) authorised by an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW

c) undertaken for the purpose of complying with Secretary's environmental assessment requirements issued by DPE for:

   i) state significant development (SSD),

   ii) state significant infrastructure (SSI), or

   iii) a major project, or

d) authorised by a SSD/SSI/former Part 3A consent/approval under the EP&A Act.

Completed forms must be submitted to the AHIMS Registrar at:

http://ahims.fexcon.com.au

Aboriginal Site Impact Recording Forms can be downloaded at:

https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Aboriginal-cultural-heritage/aboriginal-site-recording-form-220501.pdf

6.3.5 Requirements for further assessment

Ground disturbance proposed outside of the approved project area, will not occur without prior Aboriginal heritage assessment and other relevant legislative and internal approvals. Depending on the scope, nature and approval pathway of the proposed ground disturbance, the following may apply:

- If the proposed activity requires additional environmental assessment, such as a modification to the existing development consent, an Aboriginal heritage assessment will be completed in accordance with relevant assessment requirements as specified by DPE.

- If the proposed activity is permissible under existing development consent and relevant heritage approvals, an Aboriginal heritage assessment must be completed to a level generally consistent with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2010c). Any potential impacts to known or newly identified Aboriginal objects will be managed in accordance with the new finds procedures set out in Section 5.4.

- If the proposed activity requires a separate approval pathway not permissible as part of the existing development consent under the EP&A Act and relevant heritage approvals, then an Aboriginal heritage assessment must initially be completed to a level generally consistent with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2010c) and relevant subdocuments. If Aboriginal objects are likely to be impacted, an AHIP would need to be pursued under the NPW Act to allow harm to Aboriginal objects.

6.3.6 AHMP review

i Review cycle for this plan

This AHMP will be reviewed within three months of an approved modification for the project, and following any incident or independent audit where issues are found.

ii Making changes to this plan

Changes to the plan will be made in the following circumstances:

- where new Aboriginal sites are discovered, they must be added to the inventory in this AHMP within one month of the find
- where approved modifications to the project introduce new impacts on Aboriginal heritage which are not generally covered by the AHMP
- where approved changes to the project change or remove previously planned impacts on Aboriginal heritage where mitigation was proposed in the plan but is no longer required; and/or
- where other conditions or situations arise that require the updating of this plan.

iii Aboriginal consultation for AHMP review

Where material changes are made to the AHMP, a draft of the modified plan will be provided to RAPs for their review and comment (14 calendar day review period).

Matters raised during consultation which are specific to any proposed changes in the plan will be acknowledged and addressed in the modified plan. Further requirements for Aboriginal consultation are set out in Chapter 3.

6.3.7 Complaints

The community complaints protocol as set out in the EMS for the project will apply in regard to complaints from the Aboriginal community.

The environmental manager will keep a complaints register for all complaints.

References

EMM Consulting Pty Limited (EMM) 2016, *Menangle Quarry Extension, Aboriginal Cultural Heritage Assessment,* prepared for Benedict Industries.

Department of Climate Change and Water (DECCW) 2010a, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.*

- 2010b, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.*
- 2010c, *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales*
- 2010d, *Code of Practice Archaeological Investigation of Aboriginal Objects in NSW.*

Abbreviations

Table 6.2 Abbreviations

Abbreviation	Full term
ACHA	Aboriginal cultural heritage assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AHMP	Aboriginal heritage management plan
EA	Environmental Assessment
EMM	EMM Consulting Pty Limited
DPE	NSW Department of Planning, Industry and Environment
IPC	Independent Planning Commission
LALC	Local Aboriginal Land Council
LGA	Local government area
RAP	Registered Aboriginal Party (for the project)
RTS	Response to submissions

Appendix A

Aboriginal site inventory

A.1 Site inventory

Table A.1 Site inventory

Site name	AHIMS	Site type	Height (m)	Depth (m)	Length (m)	Habitable area (PAD)	Disturbance to deposit, visibility	Aspect	Position	Depth of PAD (m)	Overall significance	Relationship to project area	Management measure
MQ1	52-2-4636	Rockshelter with PAD	2	2	4	1 x 2	Moderate, rock fall, leaf litter	East	Upper scarp	0.3	Low: Problematic shelter with limited floor space, difficult to access on a steep slope.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	Active protection
MQ2	52-2-4637	Rockshelter with PAD	2.5	4.5	4	3 x 2	Low, animal activity, sandy floor	East	Mid scarp	0.5	Moderate: Moderate PAD area with minor disturbance.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	Active protection
MQ3	52-2-4638	Rockshelter with PAD	8	4	10	0.5 x 5	Shallow yellow sand atop sandstone, sloping floor	East	Upper scarp	0.1	Low: Problematic shelter with limited floor space, very exposed due to narrow shelter with high roof height and difficult to access.	Within 20 m of Stage 8 extraction area Inside Stage 8 restoration area	Active protection
MQ4	52-2-4639	Rockshelter with PAD	2	4	3	2 x 1	Silty sand with low visibility, leaf cover	East	Mid scarp	0.3	Low: Limited floor area and low ceiling height, moderately accessible on moderately inclined slope.	Within 50 m of Stage 8 extraction area Inside Stage 8 restoration area	Active protection
MQ5	52-2-4636	Rockshelter with PAD	1.4	1.3	1.5	1 x 1	Low visibility, leaf litter	East	Upper scarp	0.2	Low: Limited floor area and low ceiling height, moderately accessible on moderately inclined slope.	Within 50 m of Stage 8 extraction area Inside Stage 8 restoration area	Active protection
Bulli Site 40	#52-2-3720	Rockshelter with art and PAD	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	However, presence of 7 art motifs and PAD indicates moderate to high archaeological significance.	30 m south-west of Stage 8 restoration area	

Table A.1 Site inventory

Site name	AHIMS	Site type	Height (m)	Depth (m)	Length (m)	Habitable area (PAD)	Disturbance to deposit, visibility	Aspect	Position	Depth of PAD (m)	Overall significance	Relationship to project area	Management measure
TN1	**52-2-4888**	Scar tree	1.85	0.150–0.175	0.65	-	-	-	-	-	Wound 1 is approximately 1,850 mm x 650 mm and is highly likely to be the result of Aboriginal cultural origin. The two other wounds are likely formed by insect borers and/or natural formation processes, and deemed not to be of cultural origin.	Approximately 50 m west of the substage 8B boundary	Avoidance

Appendix B

Aboriginal consultation

B.1 Consultation log (entire project)

Aboriginal Consultation Log - Menangle Quarry Extension

Stage 1 - Advisory Requests Sent

Organisation	Contact type	Date Sent	Comment
Office of Environment and Heritage, Metropolitan division	Letter	16-May-16	response received 24/5/16. Extensive list provided.
The Registrar, Aboriginal Land Rights Act 1983	Letter	16-May-16	response received 19/6/16. No registered Aboriginal owners. Suggested contacting Tharawal LALC
National Native Title Tribunal	Letter	16-May-16	response received 27/5/16. ILUA overlap with Gundangurra
Native Title Services Corporation (NTSCORP)	Letter	16-May-16	response received 24/5/16. Will not provide names but will forward information to groups they know of.
Tharawal LALC	Letter	16-May-16	
Wollondilly Shire Council	Letter	16-May-16	response recieved 19/8/2016 via email identifying Cubbitch Barter Native Title Claimants Corp (Glenda Chalker) and Tharawal LALC (Denise Ezzy).
Greater Sydney Local Land Service	Letter	16-May-16	response received 19/5/16. recommends contacting OEH
Water NSW	Letter	16-May-16	response received 26/5/16. No additional information

Advertisement in local newspaper

Wollondilly Advertiser	Email		Published 25/5/16

Aboriginal Group Invitations to register sent

Organisation	Contact type	Date	Comments
Tharawal LALC	letter	31/05/2016	
Cubbitch Barta	letter	31/05/2016	
Peter Falk Consultancy	letter	31/05/2016	
Kawul Cultural Services	letter	31/05/2016	
D'harawal Mens Aboriginal Corporation	letter	31/05/2016	
Walgalu	email	31/05/2016	
Thauaira	email	31/05/2016	
Dharug	email	31/05/2016	
Bilinga Cultural Heritage Technical Services	email	31/05/2016	
Gunyuu Cultural Heritage Technical Services	email	31/05/2016	
Munyunga Cultural Heritage Technical Services	email	31/05/2016	
Murrumbul Cultural Heritage Technical Services	email	31/05/2016	
Wingikara Cultural Heritage Technical Services	email	31/05/2016	
Gulaga	email	31/05/2016	
Biamanga	email	31/05/2016	
Callendulla	email	31/05/2016	
Murramarang	email	31/05/2016	

Aboriginal Group Registration

Organisation	Contact type	Date	Comments
Cubbitch Barta	email	01-Jun-16	Glenda Chalker
Peter Falk Consultancy	email	14-Jun-16	Peter Falk
Peter Falk	email	14-Jun-16	Duncan Falk
Gulaga	email	15-Jun-16	Wendy Smith
Biamanga	email	15-Jun-16	Seli Storer
Callendulla	email	15-Jun-16	Corey Smith
Murramarang	email	15-Jun-16	Roxanne Smith
Goobah	email	15-Jun-16	Basil Smith

OEH & LALC notified of Registered Stakeholders

Organisation	Contact type	Date	Comments
OEH (Metro division)	email	4/07/2016	
Tharawal LALC	letter	4/07/2016	
Tharawal LALC	email	5/07/2016	PO box address provided by OEH different to website. Email sent to website email address

Stage1 - Presentation of methodology and project

Organisation	Contact type	Date Sent	Comments
Tharawal LALC	Email	20-Aug-16	(not formally registered but sent method)
Cubbitch Barta	Email	20-Aug-16	
Peter Falk Consultancy	Email	20-Aug-16	Response to method recieved on 1.09.2016. Also previous response about the project area on 14.06.2016
D'harawal Mens Aboriginal Corporation	Email	20-Aug-16	(had only expressed interest on phone)
Gulaga	Email	20-Aug-16	
Biamanga	Email	20-Aug-16	
Callendulla	Email	20-Aug-16	
Murramarang	Email	20-Aug-16	
Goobah	Email	20-Aug-16	

Stage 2 - Fieldwork details

Organisation	Contact type	Date Sent	Comments
Tharawal LALC	Email	14-Sep-16	
Cubbitch Barta	Email	14-Sep-16	

Peter Falk Consultancy	Email	14-Sep-16	
D'harawal Mens Aboriginal Corporation	Email	14-Sep-16	
Gulaga	Email	14-Sep-16	
Biamanga	Email	14-Sep-16	
Callendulla	Email	14-Sep-16	
Murramarang	Email	14-Sep-16	
Goobah	Email	14-Sep-16	
Consultation meeting 1 - 23 September 2016			
Organisation	Person present	Date Sent	Comments
Tharawal LALC	attend	23-Sep-16	
Cubbitch Barta	Glenda Chalker	23-Sep-16	
Peter Falk Consultancy	Duncan Falk	23-Sep-16	
D'harawal Mens Aboriginal Corporation	attend	23-Sep-16	
Gulaga	Wendy Smith	23-Sep-16	
Biamanga	attend	23-Sep-16	
Callendulla	Keeden Bell	23-Sep-16	
Murramarang	Jake Bell	23-Sep-16	
Goobah	Richard Detton	23-Sep-16	
Draft ACHA sent to RAPs _ 10 Nov 2016			
Organisation	email/letter	Date sent	
Tharawal LALC	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Cubbitch Barta	email and letter	10-Nov-16	Response recieved 18 November 2016, reply letter sent 7/12/2016
Peter Falk Consultancy	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Gulaga	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Biamanga	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Callendulla	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Murramarang	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Goobah	email	10-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
D'harawal Mens Aboriginal Corporation	email	11-Nov-16	Hightail link sent in email, follow up email/reminder sent 28/11/2016
Menangle AHMP - issue of notice of AHMP preparation			
Organisation	email/letter	Date sent	
Tharawal LALC	email	22-Oct-20	
Cubbitch Barta	email	22-Oct-20	
Peter Falk Consultancy	email	22-Oct-20	
Gulaga	email	22-Oct-20	
Biamanga	email	22-Oct-20	
Callendulla	email	22-Oct-20	
Murramarang	email	22-Oct-20	
Goobah	email	22-Oct-20	
D'harawal Mens Aboriginal Corporation	email	22-Oct-20	
Menangle AHMP - Draft AHMP			
Organisation	email/letter	Date sent	
Cubbitch Barta	email	11-Dec-20	Comment received 6 Jan 2021 requiring response. Response issued 20/02/2021
Peter Falk Consultancy	email	11-Dec-20	
Gulaga	email	11-Dec-20	
Biamanga	email	11-Dec-20	Comment received - supported AHMP
Callendulla	email	11-Dec-20	
Murramarang	email	11-Dec-20	Comment received - supported AHMP
Goobah	email	11-Dec-20	Comment received - supported AHMP
D'harawal Mens Aboriginal Corporation	email	11-Dec-20	

B.2 AHMP consultation correspondence

Ryan Desic

From: Ryan Desic
Sent: Thursday, 22 October 2020 1:19 PM
To: informationofficer@tharawal.com.au; reception@tharawal.com.au; kgchalker@bigpond.com; kanga26@live.com.au; eugoogleiser@hotmail.com; elwyn.brown@yahoo.com.au; gulagachts@gmail.com; biamangachts@gmail.com; cullendullachts@gmail.com; murramarangchts@gmail.com; goobahchts@gmail.com
Subject: Menangle Quarry Sand and Soil Quarry Extension Project: Notice of preparation of Aboriginal Heritage Management Plan

Dear Registered Party,

Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. The letter at the link below is to advise that EMM Consulting Pty Limited (EMM) has been engaged on behalf of Menangle Sand and Soil Pty Ltd (Menangle Sand and Soil) to prepare an Aboriginal heritage management plan (AHMP) for the project.

The letter seeks your input into the contents and preparation of the AHMP. We will also provide the draft AHMP to you for your review and comment. EMM will proceed to draft the AHMP which is estimated be issued to RAPs within the next month. RAPs will be provided with 28 days to review the AHMP and provide written feedback.

Please do not hesitate to contact me with any questions about the project and AHMP.

Please download a copy of the letter from this link: https://spaces.hightail.com/receive/D7PJc8NkOQ

Regards,

Ryan Desic
Associate Archaeologist – Heritage Team Leader
Bushfire, Ecology, Heritage and Spatial Solutions (BEHSS)

EMM creating opportunities

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D 02 9493 9541
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www.emmconsulting.com.au

22 October 2020

Re: Menangle Sand and Soil Quarry Extension Project: notice of preparation of Aboriginal heritage management plan

Dear Registered Aboriginal Party,

1 Introduction

Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. This letter is to advise that EMM Consulting Pty Limited (EMM) has been engaged on behalf of Menangle Sand and Soil Pty Ltd (Menangle Sand and Soil) to prepare an Aboriginal heritage management plan (AHMP) for the project.

2 Quarry overview

Menangle Sand and Soil Pty Ltd operates the Menangle Sand and Soil Quarry at 15 Menangle Road Menangle. Quarrying has been undertaken in the location for over 40 years by a number of operators and at varying rates of production. Extraction, processing and rehabilitation activities have been undertaken by Menangle Sand and Soil since 1978.

Current extractive activities were approved in 1989 (DA 85/2865) and have involved the construction and operation of the quarry in seven stages. Sand and soil has been extracted from Stages 1 to 2 and 4 to 6 and is currently being extracted from Stage 7. While previously approved, sand and soil will not be extracted from Stage 3.

In September 2020, the NSW Land and Environment Court approved 'Menangle Quarry Extension – Modification 1' (MOD1). This allows the extraction of sand and soil in a new area, the Stage 8 area, that is about 13 ha, and extends about 2 kilometres along the Nepean River south of the Stage 7 area. The extension will increase the life of the quarry by 15 years. The extracted material will be transported to the existing processing area where it will be stockpiled, processed and blended with materials imported to the site, prior to being dispatched from the quarry.

A description of the quarry, including MOD1, is provided in Appendix A. The Notice of Orders Made by the Land and Environment Court (the 'consent') is provided in Appendix B.

3 Assessment and approvals background

As part of the Environmental Assessment for the project, EMM prepared an Aboriginal cultural heritage assessment report (ACHA) for the project in December 2016. The ACHA included the outcomes of an Aboriginal consultation process, an archaeological investigation (survey and test excavation) and Aboriginal heritage impact assessment. The ACHA outlined management measures that are required to be detailed in an AHMP.

There has been some delay in developing the AHMP because the application was initially rejected by DPIE. However, Menangle Sand and Soil appealed the decision to the Land and Environment Court under Case number 2018/00342158, Case title Menangle Sand and Soil Pty Limited v Minister for Planning. On 10 September 2020 the Court made orders that the appeal was upheld and that the modification was approved. The Notice of Orders Made (the 'consent') is provided in Appendix B.

In accordance with Part B, Condition B62 (b) of the Determination, EMM on behalf of Menangle Sand and Soil, is preparing an AHMP in consultation with Heritage NSW and project Registered Aboriginal Parties (RAPs) The aims of this letter is to notify your organisation that the AHMP is being prepared and to gather upfront input and feedback about the management commitments outlined in the project ACHA. Further comments and feedback will be sought once the draft AHMP is prepared and issued to all RAPs.

4 Heritage assessment background

The preparation of the Aboriginal cultural heritage assessment (ACHA) for the modification application included:

- background research of the Stage 8 area's environmental, archaeological and ethno-historical context;
- Aboriginal consultation in accordance with the *Aboriginal Consultation Requirements for Proponents 21010* (DECCW 2010c);
- an archaeological survey, geoarchaeological survey and test excavation program; and
- an assessment of archaeological, socio-cultural and historical values (significance to the Aboriginal community); impacts of the project and management for the identified Aboriginal cultural heritage values using the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2010b).

The preparation of the ACHA included consulting seven Registered Aboriginal Parties (RAPs), including a consultation meeting at the quarry, RAP participation in the cultural heritage fieldwork and review of the draft ACHA report.

The ACHA identified that the project area includes three distinct landform types adjacent to the Nepean river, comprising a lower terrace, upper terrace and sandstone escarpment (scarp).

In summary, the assessment found:

- Six known (recorded) Aboriginal sites relevant to the project. This comprises one confirmed Aboriginal site (Bulli Site 40, AHIMS #52-2-3720 – rockshelter with art) that was recorded prior to the project ACHA, and five rockshelters with PAD (sites MQ1–MQ5) that were recorded during the project ACHA but have not been confirmed to feature Aboriginal objects (eg art, engravings or stone artefacts). The Aboriginal sites were identified and assessed through review of AHIMS data and targeted archaeological survey and all occur on the scarp landform outside of the Stage 8 extraction area.
- No Aboriginal objects were identified through targeted test excavation in the Stage 8 extraction area and the upper and lower terrace landforms are considered to have low archaeological potential for subsurface archaeological deposits, primarily because of their geomorphological depositional sequence (EMM 2016 p.63). No other Aboriginal sites or areas of PAD relevant to the project area were identified during the project ACHA.
- There is potential for further rockshelters to occur in the Stage 8 restoration area, but many areas were inaccessible due to thick vegetation cover.

- There is some residual potential for Aboriginal scar trees to occur within the Stage 8 extraction area as there are mature native trees that couldn't be accessed due to thick vegetation cover.

- The project will not impact the known Aboriginal rockshelter sites relevant to the project.

- The escarpment at the western boundary of the Stage 8 extraction area has been buried by sediment accumulation of the Nepean River. As such, there is a theoretical potential for buried rockshelter or other sandstone-type sites (eg engravings or grinding grooves) to be buried and potentially exposed by project works in the Stage 8 extraction area. This has been based on the geoarchaeological assessment completed for the ACHA.

These reports are available on the Major Projects website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8531.

5 Scope of AHMP

An AHMP will be prepared based on the management recommendations set out in the ACHA (2016) and will be updated to include any additional requirements as a result of the recently approved project design. The AHMP will involve the following main tasks:

- consultation with the Heritage NSW and RAPs about the details of the AHMP;
- preparation of a draft AHMP for RAP review, which will provide details of;
    - all Aboriginal sites identified during the archaeological investigation for the project;
    - measures to protect, monitor and manage Aboriginal objects;
    - measures to ensure ongoing consultation and involvement of project RAPs;
    - protocols for newly identified sites;
    - protocols for educating staff and contractors of their obligations relating to Aboriginal cultural heritage values through a site induction process;
    - protocols for suspected human skeletal materials;
    - protocols for the ongoing care of salvaged Aboriginal objects (if found and salvage is required); and
    - provisions for review and updates of the AHMP;
- preparation of a revised AHMP incorporating the outcomes of RAP consultation;
- preparation of a final draft for Heritage NSW review and comment; and
- preparation of the final AHMP, based on RAP, Heritage NSW, for issue to, and to be endorsed by, the Secretary of DPIE.

6 Next steps

This letter seeks your input into the contents and preparation of the AHMP. We will also provide the draft AHMP to you for your review and comment.

EMM will proceed to draft the AHMP which is estimated be issued to RAPs within the next month. RAPs will be provided with 28 days to review the AHMP and provide written feedback.

Yours sincerely,

Ryan Desic
Associate Archaeologist - Heritage Team Leader
rdesic@emmconsulting.com.au

Appendix A

Project description

Report appended to letter:

Land and Environment Court Proceedings 342158 of 2018

Applicant's Description of Amended Project

Menangle Sand & Soil Pty Limited v Minister for Planning

24 August 2020

Available from:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=DA85/2865-MOD-1%2120201026T085721.270%20GMT

Ryan Desic

From: Ryan Desic
Sent: Friday, 11 December 2020 3:25 PM
To: informationofficer@tharawal.com.au; reception@tharawal.com.au; kgchalker@bigpond.com; kanga26@live.com.au; eugoogleiser@hotmail.com; elwyn.brown@yahoo.com.au; gulagachts@gmail.com; biamangachts@gmail.com; cullendullachts@gmail.com; murramarangchts@gmail.com; goobahchts@gmail.com
Cc: Jeremy Slattery; Phil Towler
Subject: Menangle Quarry Sand and Soil Quarry Extension Project: draft review of Aboriginal Heritage Management Plan
Attachments: J190116_MQE_AHMP_v2_Draft.pdf

Dear Registered Party,

Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. Attached is the draft Aboriginal heritage management plan (AHMP) for the project. We are now up to the next stage of consultation for the project which is providing the draft AHMP to RAPs for their review and comments.

Notes for your review and comment on the draft ACHA

If you have specific comments for the draft AHMP document, please identify the section heading and page number so that we know specifically which part of the document to address. Our preference is for you to provide your comments in writing via email or letter. You will note that there are highlighted sections of the document that will be updated based on further consultation and amended for the final report.

Please note that appendices are in preparation and are not all are attached. But additional information about sites can be provided upon request.

When to respond by

If you wish to comment on the draft AHMP, please provide your consolidated comments within 28 days (ie by **8 January 2021**). This timeframe is in accordance with the NSW *Aboriginal consultation requirements for proponents* (DECCW 2010). If you are having trouble responding within this timeframe please let us know early so that we can consider alternative options.

Closing

Please do not hesitate to contact me on my details below for any matters regarding the project or if you have any difficulties in downloading or reading the document.

Regards,

Ryan Desic
Associate Archaeologist – Heritage Team Leader
Bushfire, Ecology, Heritage and Spatial Solutions (BEHSS)
EMM creating opportunities
T 02 9493 9500
M 0411 329 712
D 02 9493 9541
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards 2065

Ryan Desic

From: Goobah <goobahchts@gmail.com>
Sent: Saturday, 12 December 2020 11:27 AM
To: Ryan Desic
Subject: Re: Menangle Quarry Sand and Soil Quarry Extension Project: draft review of Aboriginal Heritage Management Plan

Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW

This is confirm that we support the Draft Heritage Management Plan and wish to be kept informed of any further developments

On Fri, Dec 11, 2020 at 3:25 PM Ryan Desic <rdesic@emmconsulting.com.au> wrote:

> Dear Registered Party,
>
> Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. Attached is the draft Aboriginal heritage management plan (AHMP) for the project. We are now up to the next stage of consultation for the project which is providing the draft AHMP to RAPs for their review and comments.
>
> **Notes for your review and comment on the draft ACHA**
>
> If you have specific comments for the draft AHMP document, please identify the section heading and page number so that we know specifically which part of the document to address. Our preference is for you to provide your comments in writing via email or letter. You will note that there are highlighted sections of the document that will be updated based on further consultation and amended for the final report.
>
> Please note that appendices are in preparation and are not all are attached. But additional information about sites can be provided upon request.
>
> **When to respond by**
>
> If you wish to comment on the draft AHMP, please provide your consolidated comments within 28 days (ie by **8 January 2021**). This timeframe is in accordance with the NSW *Aboriginal consultation requirements for proponents* (DECCW 2010). If you are having trouble responding within this timeframe please let us know early so that we can consider alternative options.
>
> **Closing**

Please do not hesitate to contact me on my details below for any matters regarding the project or if you have any difficulties in downloading or reading the document.

Regards,

Ryan Desic
Associate Archaeologist – Heritage Team Leader

Bushfire, Ecology, Heritage and Spatial Solutions (BEHSS)

T 02 9493 9500

M 0411 329 712

D 02 9493 9541

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards 2065

--

Regards

Basil Smith
Chairperson/CEO
GOOBAH

Contact Details:

Address:
Unit 25 26-28
Native Way,
MORUYA HEADS
NSW 2537

Mobile: 0405 995 725
Email: goobahchts@gmail.com

ABN: 67 517 874 760

Ryan Desic

From: Murramarang <murramarangchts@gmail.com>
Sent: Saturday, 12 December 2020 12:15 PM
To: Ryan Desic
Subject: Re: Menangle Quarry Sand and Soil Quarry Extension Project: draft review of Aboriginal Heritage Management Plan

Menangle Sand and Soil Quarry Extension Project draft Aboriginal heritage management plan (AHMP)

This is to confirm that we support the Draft and wish to be kept informed of any further developments for the above project.

On Fri, Dec 11, 2020 at 3:25 PM Ryan Desic <rdesic@emmconsulting.com.au> wrote:

> Dear Registered Party,
>
> Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. Attached is the draft Aboriginal heritage management plan (AHMP) for the project. We are now up to the next stage of consultation for the project which is providing the draft AHMP to RAPs for their review and comments.
>
> **Notes for your review and comment on the draft ACHA**
>
> If you have specific comments for the draft AHMP document, please identify the section heading and page number so that we know specifically which part of the document to address. Our preference is for you to provide your comments in writing via email or letter. You will note that there are highlighted sections of the document that will be updated based on further consultation and amended for the final report.
>
> Please note that appendices are in preparation and are not all are attached. But additional information about sites can be provided upon request.
>
> **When to respond by**
>
> If you wish to comment on the draft AHMP, please provide your consolidated comments within 28 days (ie by **8 January 2021**). This timeframe is in accordance with the NSW *Aboriginal consultation requirements for proponents* (DECCW 2010). If you are having trouble responding within this timeframe please let us know early so that we can consider alternative options.
>
> **Closing**

Please do not hesitate to contact me on my details below for any matters regarding the project or if you have any difficulties in downloading or reading the document.

Regards,

Ryan Desic
Associate Archaeologist – Heritage Team Leader

Bushfire, Ecology, Heritage and Spatial Solutions (BEHSS)

T 02 9493 9500

M 0411 329 712

D 02 9493 9541

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards 2065

--
Kind Regards
Roxanne Smith
Cultural Heritage Officer
Murramarang

Ryan Desic

From: Biamanga <biamangachts@gmail.com>
Sent: Saturday, 12 December 2020 12:44 PM
To: Ryan Desic
Subject: Re: Menangle Quarry Sand and Soil Quarry Extension Project: draft review of Aboriginal Heritage Management Plan

We confirm the draft Aboriginal heritage management plan (AHMP) for this project and please keep me in the loop for any further developments

On Fri, Dec 11, 2020 at 3:25 PM Ryan Desic <rdesic@emmconsulting.com.au> wrote:

> Dear Registered Party,
>
> Thank you for your continued involvement in Aboriginal cultural heritage matters for the Menangle Sand and Soil Quarry Extension Project (the project) in Menangle NSW. Attached is the draft Aboriginal heritage management plan (AHMP) for the project. We are now up to the next stage of consultation for the project which is providing the draft AHMP to RAPs for their review and comments.
>
> **Notes for your review and comment on the draft ACHA**
>
> If you have specific comments for the draft AHMP document, please identify the section heading and page number so that we know specifically which part of the document to address. Our preference is for you to provide your comments in writing via email or letter. You will note that there are highlighted sections of the document that will be updated based on further consultation and amended for the final report.
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> Please note that appendices are in preparation and are not all are attached. But additional information about sites can be provided upon request.
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>
> If you wish to comment on the draft AHMP, please provide your consolidated comments within 28 days (ie by **8 January 2021**). This timeframe is in accordance with the NSW *Aboriginal consultation requirements for proponents* (DECCW 2010). If you are having trouble responding within this timeframe please let us know early so that we can consider alternative options.
>
> **Closing**

Please do not hesitate to contact me on my details below for any matters regarding the project or if you have any difficulties in downloading or reading the document.

Regards,

Ryan Desic
Associate Archaeologist – Heritage Team Leader

Bushfire, Ecology, Heritage and Spatial Solutions (BEHSS)

T 02 9493 9500

M 0411 329 712

D 02 9493 9541

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards 2065

--
Kind Regards
Janaya Smith
Chief Executive Officer
Biamanga

Cubbitch Barta Native Title Claimants
Aboriginal Corporation
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574.
6th January, 2021.

EMM
Ground Floor 20 Chandos Street,
ST. LEONARDS. N.S.W. 2065.

Dear Ryan,

MENANGLE QUARRY

Thank you for the opportunity of commenting on the AHMP for the Menangle Quarry. As you are aware I have a life long connection to this particular part of the river that will be fatally impacted by this project. I have very vivid childhood memories of this particular part of the river, and also to where mining is currently taking place. Those places will no longer exist for me to tell my great grandchildren about, because there simply will be nothing left. What is the good of access to a place after it is destroyed for intergenerational equity

In my opinion the destruction of this place in the name of a sand and soil quarry is a crime, not only to the Aboriginal Heritage, but also to the environment. There are trees that I believe could be over 500 years old, and also are part of an endangered ecological community. I remember those trees as giants even as a child, and even my father talks about the giants along the river bank when he was a child.

I cannot believe that this project was given government approval, especially in regards to the environment. The removal of all this soil, sand and trees has the potential to change the natural flow of the river completely , just as the current sand and soil removal area affected the flow of the river in the flood of 2016. Don't say I did not warn anybody in the future.

On one hand this document says that weed removal will be done by cutting and pasting, and then says that up to 500mm of topsoil will be removed in the restoration area. Kind of defeats the purpose of cutting and pasting and then removing 500mm of topsoil.

Just because there were no Aboriginal artefacts excavated, does not take away the cultural significance of the place. There should be no work take place within those unidentified areas until a further assessment has taken place in regards to the trees and possible shelters. How many scarred trees are Aboriginal people expected to put in keeping places now and into the future. They should be left insitu to live out their lives where they are not removed to a keeping place. Didn't anyone learn from the Victorian issue about culturally important trees to the Aboriginal Community. I do not agree that this project should go ahead at all.

Yours faithfully,

G. Chalker.

Glenda Chalker
Phone/Fax 0246841129 0427218425
kgchalker@bigpond.com

Level 1, 146 Hunter Street
Newcastle NSW 2300

T 02 4907 4800
E info@emmconsulting.com.au

www.emmconsulting.com.au

20 January 2021

Glenda Chalker
Cubbitch Barta Native Title Claimants

Re: Menangle Sand and Soil Extension Project

Dear Glenda,

Thank you for taking the time to prepare a submission in response to the draft Aboriginal Heritage Management Plan for the Menangle Sand and Soil Extension Project (the project). On behalf of EMM and Menangle Sand and Soil I would like to take the opportunity to respond to your issues and concerns.

I would firstly like to acknowledge that the main concern raised is a continuation of that provided during the project Aboriginal Cultural Heritage Assessment (ACHA) in 2016. Your previous submissions raised concerns about the environmental impact of the project and specifically mentioned old growth trees present in the project area. As these concerns were targeted at potential impacts to the ecosystem, EMM directed Cubbitch Barta to the ecology chapter of the project environmental assessment (EA) and the proposed management strategies in Section 9.4–10.5 of the EA (EMM 2016). EMM took this approach acknowledging that ecological sustainability and intergenerational equity are key concerns to the Aboriginal community, but that the trees in question were not attributed with specific Aboriginal cultural heritage values. As such, the ACHA had limited mechanisms to address impacts to these items within the provisions of Part 6 of the *National Parks and Wildlife Act 1974,* which only applies to Aboriginal objects and declared Aboriginal places. This statement does not aim to detract from the significance Cubbitch Barta places on the Nepean River and riparian corridor through historical family experiences, rather it highlights the ACHA limitations given that no declared places or known Aboriginal objects are currently proposed for project impacts.

Overall, trees will be removed as part of the project. However, management strategies will be employed across many disciplines to minimise environmental impacts. In particular, there will be no extraction within the river and the lower riverbank will be left in place. Rehabilitation of the Stage 8 area and adjacent restoration activities will remove exotic weeds, restore native vegetation and provide habitats for native fauna. Outcomes that we hope are aligned with Cubbitch Barta's desire to return the Nepean River in its natural state. It is acknowledged that Cubbitch Barta views that the quarry will result in vegetation losses before the rehabilitated areas become self-sustaining. We believe that the proposed rehabilitation and management measures will replace the existing weed-infested vegetation community with a high-quality sustainable vegetation community. While the largest the trees will take many years to reach maturity, when they do, they will be part of an improved vegetation community. To reduce the lag in equity, the extraction and rehabilitation process will be progressive along the Stage 8 area so that the rehabilitation can commence in certain areas while extraction continues in others.

I would like to address the specific issues raised about the draft AHMP. Below I have provided excerpts from your letter followed by our responses:

1. *On one hand this document days that weed removal will be done by cutting and pasting, and then says that up to 500 mm of topsoil will be removed in the restoration area. Kind of defeats the purpose of cutting and pasting and then removing 500 m of topsoil.*

We would like to clarify that weed management involving non-invasive measures such as cutting vegetation and using weed control products will apply within protection buffer zones for the Aboriginal sites that require active protection and to the lower riverbank where soil removal could cause bank instability. Soil will be removed from the restoration areas to remove the weed seedbank as part of restoring these areas. No ground disturbance activities such as uprooting vegetation or topsoil removal is permitted in the protection buffer zones. Please refer to section 5.1.2 of the AHMP for further details.

2. *Just because there were no Aboriginal artefacts excavated, does not take away the cultural significance of the place. There should be no work take place within those unidentified areas until a further assessment has taken place in regards to the trees and possible shelters.*

   Section 5.2 of the AHMP addresses this issue by stating that Additional archaeological survey is required to account for any unidentified Aboriginal scar trees and rockshelters in the project area due to the limitations of the project ACHA described in Section 4.4 of the AHMP. This will involve additional survey in the Stage 8 extraction area after the understorey is cleared and prior to the removal of mature trees to determine if any feature Aboriginal scarring or carving; and additional survey for rock shelters in the Stage 8 restoration area.

3. *How many scarred trees are Aboriginal people expected to put in keeping places now and into the future. They should be left in situ to live out their lives where they are not removed to a keeping place.*

   No Aboriginal scarred or carved trees have been identified to date and the proposed additional survey is a conservative measure to account for the limitations of the archaeological survey completed during the ACHA. We acknowledge that the preference is to avoid any identified Aboriginal scarred or carves trees if identified. However, Menangle Sand and Soil require contingencies if avoidance is not feasible and avenues for tree removal need to be explored. Any proposal to impact Aboriginal objects in the project area would require an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW. Section 5.4.2 of the AHMP sets out the level of assessment that will be required to accompany an AHIP application, including an impact assessment and demonstration why any site(s) in question cannot be reasonably avoided.

   In the event that an Aboriginal scar tree requires removal, further consultation would be undertaken during the AHIP application process to determine an appropriate keeping place or other arrangement that suits the local Aboriginal community.

I hope this letter clarifies and addresses the issues raised in your letter. We acknowledge that Cubbitch Barta opposes the project as per your letter; however, the measures proposed in the AHMP and other management plans aim to mitigate Aboriginal cultural heritage and ecological impacts to the best of our ability.

Please do not hesitate to contact me if you have any further questions about the AHMP.

Yours sincerely,

Ryan Desic
Associate Archaeologist - Heritage Team Leader
rdesic@emmconsulting.com.au

Appendix C

Regulatory consultation

C.1 Endorsement of author

Planning & Assessment
Energy, Industry & Compliance
Contact: Lauren Evans
Phone: 9274 6311
Email: lauren.evans@planning.nsw.gov.au

Jeremy Slattery
EMM Consulting
PO Box 21
St Leonards NSW 1590

Via email: jslattery@emmconsulting.com.au

13/10/2020

Dear Mr Slattery

Menangle Quarry (DA 85/2865)
Stage 8 Environmental Management Plans
Endorsement of Experts

I refer to your letter dated 6 October 2020 seeking the Planning Secretary's endorsement of suitably qualified persons to prepare various reports and environmental management plans required to carry out Stage 8 of the above development.

The Department has reviewed the information provided and is satisfied that each of the nominated persons possesses the necessary qualifications and experience to prepare the relevant documents. Consequently, the Planning Secretary has endorsed the appointment of these experts as outlined below.

Document	Relevant Condition	Appointed Person
Native Vegetation Identification Report(s)	A10(b)(i) of Schedule 2	Dr Steven Ward
Ephemeral Creek Management Plan	B40(a) of Schedule 2	Chris Kuczera
Traffic Management Plan	B55(a) of Schedule 2	Abdullah Uddin
Aboriginal Cultural Heritage Management Plan	B62(a) of Schedule 2	Ryan Desic

Please note that any further post approval requests, including endorsement requests and the lodgement of plans for approval should be made via the Department's Major Projects website.

If you wish to discuss this matter further, please contact Lauren Evans at the details above.

Yours sincerely,

Matthew Sprott
Director
Resource Assessments
as nominee of the Planning Secretary

C.2 Consultation with Heritage NSW

Our ref: DOC21/285176-2

Ryan Desic
Associate Archaeologist – Heritage Team Leader
EMM Consulting Pty Ltd
email: rdesic@emmconsulting.com.au

Dear Mr Desic,

Menangle Sand and Soil Quarry Extension – draft Aboriginal Heritage Management Plan (DA85/2865 & LEC 2018/342158)

Thank you for providing Heritage NSW the opportunity to comment on the draft Aboriginal Heritage Management Plan (AHMP) for Stage 8 of the Menangle Sand and Soil Quarry Extension as approved under LEC 2018/342158 on 10 September 2020. Condition B62 of the LEC approval require Heritage NSW to be consulted as part of the preparation of the AHMP.

Heritage NSW has reviewed the draft AHMP and the LEC Notice of Orders and provide comments in relation to Aboriginal cultural heritage matters only. Detailed comments on the AHMP are provided in Attachment A.

We note that condition B61(b) requires an Aboriginal Heritage Impact Permit (AHIP) to be obtained if any Aboriginal objects are located and cannot be avoided by the project. Heritage NSW advises that the issuing of any AHIP will be subject to consideration of the section 90k factors set out under the *National Parks and Wildlife Act 1974*. While the draft AHMP describes a process and measures to assess and manage Aboriginal objects as part of project operations, Heritage NSW cannot provide certainty that an AHIP will be issued until an assessment of any AHIP application has been made.

Heritage NSW is available to discuss the comments and AHMP process further if required.

If you have any questions regarding the above advice please contact me on (02) 6229 7089 or via email at jackie.taylor@environment.nsw.gov.au.

Yours sincerely

Jackie Taylor
Senior Team Leader, Aboriginal Cultural Heritage Regulation - South
Heritage NSW
13 April 2021

Attachment A: Detailed Heritage NSW comments on draft Aboriginal Heritage Management Plan for Menangle Sand and Soil Quarry Extension

AHMP section	Issue/ Comment	Action required
Title page and Introduction 1.1	It is not clear from this section that the AHMP relates to Stage 8 works only.	Move section 1.6 'Area to which this plan applies' up to the front of the AHMP.
Table 3.1	Confirm whether the Tharawal Local Aboriginal Land Council are a Registered Aboriginal Party for this project.	Update Table if required.
Table 3.3	Spelling error in this sentence: *This is addressed in Appendix B. No Aboriginal scarred or carved trees have been identified in the project area, but the trees will eb subject to further survey once weeds are removed and they can be accessed.*	Revise spelling.
3.4.1	The AHMP outlines the proponent is responsible for consulting with RAPs with feedback required no later than two weeks from the date of correspondence.	Recommend allowances be made and specified for sorry business or holiday periods where a longer timeframe may be required for RAPs to consider and provide comments.
3.4.2	This section states: *the AHMP must maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area).* However, the first dot point states: *visitation access will be provided at the completion of the project (after extraction and rehabilitation is fully completed), in line with all safety and security requirements.* It is not clear when access will occur or to which area(s).	• Clarify when access will be provided to RAPs. If the conditions of approval allow for access outside of the disturbance area - can visitation be provided before completion of the project. • Clarify whether "completion of project" refers to completion of Stage 8 works only.
4.2	Due to the types of values raised by Cubbitch Barta are there other avenues or opportunities for these values to be recorded and protected – either through Cultural Values Assessment and/ or nomination of an Aboriginal Place?	Consider other opportunities and avenues to record and protect cultural values identified.
4.3, page 15, 7th dot point.	Grammar error in this sentence: *The is some residual potential for Aboriginal scar trees to occur within the Stage 8 extraction area as there are mature native trees*	Revise grammar.

AHMP section	Issue/ Comment	Action required
	that couldn't be accessed due to thick vegetation cover.	
4.4, page 16, 2nd para	Repeated wording in the 2nd para, 2nd sentence: *There were parts of the upper and lower terrace that could not be accessed across the project area that could not be accessed.*	Revise sentence.
4.4, page 17, 2nd para	This para identifies the exotic weed removal has now been defined and includes removal of "up to 500 mm of topsoil in some areas". How will the 500mm of topsoil be removed?	Provide detail on how the topsoil will be removed.
5.1.2	What is the proposed buffer zone distance 10m based on and is this enough distance from works? Does there need to be a larger distance between proposed extraction and the rockshelters? Is the proposed weed management a one-off event or intended to be ongoing during the life of the works?	• Justify the 10 m buffer zone. • Clarify the timeframes for weed management.
5.2	This section deals with the survey for the Stage 8 extraction area. Does the AHMP also need to include a longer term 'unexpected finds' protocol if objects are also uncovered during extraction activities.	Consider including an additional section for 'unexpected finds' during the life of the project.
5.2.2, dot point 2	Is there a timeframe for the staged approach? If an AHIP is sought, longer timeframes may be needed to allow for the determination of an AHIP.	Consider including timeframes for the staged approach and the AHIP approval process.
5.2.2, dot point 5	What Do these reports need to be provided to AHIMS as a record of survey or consolidated in a larger report?	Clarify what will happen with the short survey reports prepared?
5.2.2, dot point 6	Spelling error in this sentence: *If no Aboriginal scarred or carved trees or other Aboriginal objects are identified in the relevant portion of the Stage 8 extraction surveyed are during each stint, the report will provide clearance for project works to proceed (subject to other relevant environmental approvals or requirements).*	Revise sentence.
5.2.3, i, 1st para	Spelling error in this sentence: *Only small sections of the scarp were targeted during the archaeological investigation because they were previously*	Revise sentence.

AHMP section	Issue/ Comment	Action required
	outside of proposed ground disturbance and also inaccessible due to dense vegetation.	
5.2.3, i, 2nd para	This section refers to the use of mechanical vegetation clearance. Will mechanical techniques have a greater impact on the area?	Describe the type of mechanical vegetation clearance proposed.
5.2.3, ii	This section states surveys of the haul road and conveyor alignments will be undertaken "if applicable".	Clarify when surveys will be "applicable"
5.2.4	This section doesn't explicitly state whether survey will occur of the conveyor alignments outside of the Stage 8 area.	Clarify where survey will occur.
5.3, page 22, dot point 1	Have sandstone features been encountered in previous stages of the quarry? If so, has this process of stopping worked?	Consider providing further detail of the stop work process.
5.3, page 22, dot point 2	Is training required for contractors to know how to identify grinding grooves and engravings?	Consider providing further detail of training for contractors.
5.4.2	Any further investigative measures in line with the 2010 Code of Practice Archaeological Investigation of Aboriginal Objects in NSW, such as test excavations, may require an AHIP application. Would the AHMP benefit from raising this early? Any AHIP application will require consultation on the proposed management measures.	• Provide additional detail that an AHIP may be required for test excavations, if required. • Provide detail on the AHIP process and timeframes. • Include an additional point that an AHIP is not guaranteed to be issued.
5.4.3	As extraction of the sand and soil resource will be undertaken by machinery – are there any specific measures that could be put in place as a warning sign of possible burial locations such as change in soil colour etc? Is there information known regarding the historical depths of burials in the area that may assist?	Outline any additional measures that could be used to identify burial features, if known.
5.6	Spelling error in this sentence: *All sites that occur within the project area, with the additional of Bulli Site 40 (AHIMS #52-2-3720 – rockshelter with art), that are designated for avoidance and active protection will be subject to monitoring inspections.*	Revise sentence.
6.3.5, 2nd dot point	What allowances will be made to consult with RAPs as part of any further assessments?	Include the requirement for consultation with RAPs as part of any further assessment.

AHMP section	Issue/ Comment	Action required
6.3.5, 3rd dot point	If a separate approval pathway is required is following Due Diligence an appropriate level of assessment.	Consider whether due diligence is an appropriate level of assessment.
References, page 35		Include Code of Practice Archaeological Investigation of Aboriginal Objects in NSW.
Abbreviations, page 36		Include AHIP and Aboriginal Heritage Impact Permit.
B.1 Consultation log	It is noted that Tharawal LALC is not listed in the last section under the heading **Menangle AHMP – Draft AHMP**.	Clarify whether Tharawal LALC sent a copy of the draft AHMP for comment.
Appendix B	The LEC Notice of Orders includes the requirements for a number of other environmental plans to be prepared. How do these other plans interact with the AHMP? Is there a need to broaden the AHMP assessment and further surveys to incorporate any of the onsite works that may be required to be undertaken for these plans?	Outline if and how the AHMP interacts with other environmental plans.
Consultation letter from Cubbitch Barta and EMM response	We note the concerns raised by Cubbitch Barta and the response from EMM.	• Recommend other considerations be made to record oral history and cultural values of the area during future assessments. • Can RAPs be involved in the rehabilitation works for the site as part of caring for country?

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20 April 2021

Re: Menangle Sand and Soil Quarry Extension - draft Aboriginal Heritage Management Plan. Response to Heritage NSW submission.

The following table provides responses to Heritage NSW's comments on the draft Aboriginal Heritage Management Plan (AHMP) for Stage 8 of the Menangle Sand and Soil Quarry Extension as approved under LEC 2018/342158 on 10 September 2020. Heritage NSW's comments were provided on 13 April 2021.

Reponses provided in the table below are also reflected in the updated draft AHMP version for DPIE's consideration.

Yours sincerely,

Ryan Desic
Associate Archaeologist - Heritage Team Leader
rdesic@emmconsulting.com.au

AHMP section	Issue/ Comment	Action required	Response
Title page and Introduction1.1	It is not clear from this section that the AHMP relates to Stage 8 worksonly.	Move section 1.6 'Area to which this plan applies' up to the front ofthe AHMP.	• Title page updated to include Stage 8 area • Section 1.6 moved to Section 1.1 to clarify that the project area relates to Stage 8 only.
Table 3.1	Confirm whether the Tharawal Local Aboriginal Land Council area Registered Aboriginal Party for this project.	Update Table if required.	The Tharawal Local Aboriginal Land Council is not formally registered but consulted throughout process since July 2016. Table 3.1 has been updated to reflect this.
Table 3.3	Spelling error in this sentence: *This is addressed in Appendix B.No Aboriginal scarred or carved trees have been identified in the project area, but the trees will eb subject to further survey once weeds are removed and they canbe accessed.*	Revise spelling.	Error corrected.
3.4.1	The AHMP outlines the proponentis responsible for consulting with RAPs with feedback required no later than two weeks from the date of correspondence.	Recommend allowances be made and specified for sorry business or holiday periods where a longer timeframe may be required for RAPs to consider and providecomments.	Section 3.4.1 has been updated to state "Notwithstanding, review and feedback timeframes will be extended during periods such as Sorry Business or holidays. These extensions will be commensurate with period where RAPs are unable to conduct other activities .".

AHMP section	Issue/ Comment	Action required	Response
3.4.2	This section states: *the AHMP must maintain and manage reasonable access for relevant Aboriginal stakeholders toAboriginal objects and Aboriginal places (outside of the approved disturbance area).* However, the first dot point states: *visitation access will be provided atthe completion of the project (after extraction and rehabilitation is fully completed), in line with all safety and security requirements.* It is not clear when access willoccur or to which area(s).	Clarify when access will be provided to RAPs. If the conditions of approval allow for access outside of the disturbance area - can visitation be provided before completion of the project. Clarify whether "completion of project" refers to completion ofStage 8 works only.	First dot point in Section 3.4.2 has been amended to state: "given reasonable notice, visitation access to the Stage 8 area will be provided during quarry operating hours, in line with all safety and security requirements".
4.2	Due to the types of values raised by Cubbitch Barta are there other avenues or opportunities for these values to be recorded and protected – either through CulturalValues Assessment and/ or nomination of an Aboriginal Place?	Consider other opportunities and avenues to record and protect cultural values identified.	Refer to Section 4.2 that discusses the identified Aboriginal socio-cultural and historical values of the Stage 8 area. The section identifies three types of values, the first and third values are the Nepean River in general and the family values of the Chalker family respectively. Both these values were identified as unlikely to meet the criteria to be nominated to become a successfully declared Aboriginal place. The second intangible value related to an area of spiritual significance nearby the Stage 8 area, but which would not be impacted by the project. EMM were not provided with detail about the place due to culturally sensitive information. As this area is outside of the Stage 8 area and will not be impacted, no further assessment is proposed.

AHMP section	Issue/ Comment	Action required	Response
4.3, page 15,7th dot point.	Grammar error in this sentence: *The is some residual potential forAboriginal scar trees to occurwithin the Stage 8 extraction areaas there are mature native trees*	Revise grammar.	Error corrected.
4.4, page 16,2nd para	Repeated wording in the 2nd para,2nd sentence: *There were parts of the upper andlower terrace that could not be* *accessed across the project area that could not be accessed.*	Revise sentence.	Error corrected.
4.4, page 17,2nd para	This para identifies the exotic weed removal has now been defined andincludes removal of "up to 500 mm of topsoil in some areas". How will the 500mm of topsoil be removed?	Provide detail on how the topsoil will be removed.	Note: the level of topsoil removal has been amended from 500 mm to 200–300 mm. In general, topsoil will be removed by machine but it will seek to avoid native trees and shrubs where practical to do so. This includes leaving suitable buffers around established native vegetation. Clearing and topsoil removal is described in Sections 3.1, 5.3 and 5.3 of the Biodiversity and Rehabilitation Management Plan (BRMP) (EMM 2021). Section 4.4 has been updated to reflect the amended soil removal depth.
5.1.	What is the proposed buffer zone distance 10m based on and is this enough distance from works? Doesthere need to be a larger distance between proposed extraction and the rockshelters? Is the proposed weed management a one-off event or intended to be ongoing duringthe life of the works?	Justify the 10 m buffer zone. Clarify the timeframes for weed management.	The 10 m buffer applies to topsoil stripping activities within the Stage 8 restoration area and not extraction activities. All of the rockshelters are outside of potential risk of impact from extraction as they all occur on terraced rock scarp landforms above the recently deposited alluvial sands below in the extraction area. Weed management will be implemented according to industry best management practice for the weed species present in accordance with relevant sections of Sections 6 and 7 of the Biodiversity and Rehabilitation Management Plan (BRMP) but tailored to an approach which will not involve ground disturbance from hand tool use. This will be an ongoing process during the life of the project.

AHMP section	Issue/ Comment	Action required	Response
5.2	This section deals with the survey for the Stage 8 extraction area. Does the AHMP also need to include a longer term 'unexpected finds' protocol if objects are also uncovered during extraction activities.	Consider including an additional section for 'unexpected finds' during the life of the project.	Section 5.4 already addresses unexpected finds protocols, but Section 5.4.1 has been updated to specify that the protocol applies during the life of the project.
5.2.2, dot point 2	Is there a timeframe for the staged approach? If an AHIP is sought, longer timeframes may be neededto allow for the determination of an AHIP.	Consider including timeframes for the staged approach and the AHIP approval process.	The staging for survey requires flexibility and therefore no timing has been nominated. Section 5.2.2 has been updated to state: "Menangle Sand and Soil should stage approaches with consideration to potential AHIP timeframes as set out in Section 5.4.2 of the AHMP, given that any required AHIP may require an approximate 4-month timeframe and must precede project-related impacts".
5.2.2, dot point 5	What Do these reports need to be provided to AHIMS as a record of survey or consolidated in a larger report?	Clarify what will happen with the short survey reports prepared?	Section 5.2.2 has been updated to state the following "These reports will be issued to RAPs and Heritage NSW and kept by Menangle Sand and Soil for their internal records. If the Aboriginal sites are identified, the reports will be submitted as part of AHIMS site cards and lodged on the AHIMS register."
5.2.2, dot point 6	Spelling error in this sentence: *If no Aboriginal scarred or carved trees or other Aboriginal objects are identified in the relevant portionof the Stage 8 extraction surveyed are during each stint, the report willprovide clearance for project worksto proceed (subject to other relevant environmental approvalsor requirements).*	Revise sentence.	Error corrected.
5.2.3, i, 1st para	Spelling error in this sentence: *Only small sections of the scarp were targeted during the archaeological investigation because they were previously outside of proposed ground disturbance and also inaccessible due to dense vegetation.*	Revise sentence.	Error corrected.

AHMP section	Issue/ Comment	Action required	Response
5.2.3, i, 2nd para	This section refers to the use of mechanical vegetation clearance. Will mechanical techniques have a greater impact on the area?	Describe the type of mechanical vegetation clearance proposed.	This section has been updated to state “The type of mechanical vegetation will be consistent with the methods described in the Biodiversity and Rehabilitation Management Plan (BRMP) (including in Sections 5.2–5.3).”
5.2.3, ii	This section states surveys of the haul road and conveyor alignmentswill be undertaken “if applicable”.	Clarify when surveys will be“applicable"	Section 5.2.3, ii has been reworded to clarify that surveys in those areas will only be required if ground disturbance is proposed as part of the project scope. These surveys will be undertaken if additional ground disturbance or vegetation clearing is required for haul roads the conveyor. Noting, a) existing 4-m wide tracks will be used and that it is proposed the conveyor will not be used (instead, extending the distance the haul truck will travel on the existing tracks).
5.2.4	This section doesn’t explicitly state whether survey will occur of the conveyor alignments outside of the Stage 8 area.	Clarify where survey will occur.	This section has been updated to state that these areas will be surveyed if they are beyond previously surveyed areas. See comment above for further clarification.
5.3, page 22, dot point 1	Have sandstone features been encountered in previous stages ofthe quarry? If so, has this process of stopping worked?	Consider providing further detail of the stop work process.	No sandstone features have been encountered in the earlier quarry stages.
5.3, page 22, dot point 2	Is training required for contractors to know how to identify grinding grooves and engravings?	Consider providing further detail of training for contractors.	Section 6.1.3 (induction and permitting process) has had an additional bullet point added to assist contractors to identify potential sandstone-type sites.

AHMP section	Issue/ Comment	Action required	Response
5.4.2	Any further investigative measuresin line with the 2010 Code of Practice Archaeological Investigation of Aboriginal Objects in NSW, such as test excavations, may require an AHIP application. Would the AHMP benefit from raising this early? Any AHIP application will require consultation on the proposed management measures.	Provide additional detail that an AHIP may be required for test excavations, if required. Provide detail on the AHIP process and timeframes. Include an additional point that an AHIP is not guaranteed to be issued.	Section 5.4.2 has been updated to address these points.
5.4.3	As extraction of the sand and soil resource will be undertaken by machinery – are there any specific measures that could be put in place as a warning sign of possible burial locations such as change in soil colour etc? Is there information known regarding the historical depths of burials in the area that may assist?	Outline any additional measures that could be used to identify burial features, if known.	The project ACHA concluded that the soils subject to extraction are all within the recent historical period whereby European artefacts were identified at depth until the current water table was reached. As such, as the machine test excavation program for the project included mechanical excavation to the water table, and no older stratum was identified, EMM does not have any evidence to suggest a potential burial-bearing deposit exists. Overall, it is proposed that the project will be extracting modern alluvial deposits on lower terraces, and modern alluvial deposits overlying older swamp stratum, not suitable for past Aboriginal occupation. As such, no additional measures have been nominated.
5.6	Spelling error in this sentence: *All sites that occur within the project area, with the additional of Bulli Site 40 (AHIMS #52-2-3720 –* *rockshelter with art), that are designated for avoidance and active protection will be subject to monitoring inspections.*	Revise sentence.	Error corrected.
6.3.5, 2nd dotpoint	What allowances will be made to consult with RAPs as part of any further assessments?	Include the requirement for consultation with RAPs as part ofany further assessment.	Section 3.4.1 states that RAP consultation is required: • "when making changes to this plan, including the circumstances that trigger required changes to the plan; • when additional Aboriginal heritage assessment, investigation, protection or mitigation is required for the project; and

AHMP section	Issue/ Comment	Action required	Response
			• when new Aboriginal sites and/or potential ancestral remains are discovered and input on their management is required.
6.3.5, 3rd dotpoint	If a separate approval pathway is required is following Due Diligence an appropriate level of assessment.	Consider whether due diligence is an appropriate level of assessment.	This section has been updated to refer more generally to the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2010c) which provides the process and requirements for Aboriginal heritage assessments in NSW.
References,page 35		Include Code of Practice Archaeological Investigation of Aboriginal Objects in NSW.	Section updated with this reference.
Abbreviations,page 36		Include AHIP and Aboriginal Heritage Impact Permit.	Section updated with this reference
B.1 Consultationlog	It is noted that Tharawal LALC is not listed in the last section underthe heading Menangle AHMP – Draft AHMP.	Clarify whether Tharawal LALC sent a copy of the draft AHMP for comment.	The Tharawal LALC were sent a copy of the draft AHMP for comment on the same date as all other RAPs. This was a typographical error.
Appendix B	The LEC Notice of Orders includesthe requirements for a number of other environmental plans to be prepared. How do these other plans interact with the AHMP? Is there a need to broaden the AHMPassessment and further surveys toincorporate any of the onsite works	Outline if and how the AHMP interacts with other environmentalplans.	The AHMP primarily interacts with the Biodiversity and Rehabilitation Management Plan (BRMP) as it will involve vegetation removal and soil disturbance within the Stage 8 restoration area. The AHMP will also apply to any other ground disturbance proposed under other plans if such activities have the potential to harm Aboriginal objects. Note that management plans that detail ground disturbance in the Stage 8 extraction area require to adhere to unexpected finds protocols.

AHMP section	Issue/ Comment	Action required	Response
	that may be required to be undertaken for these plans?		Note that management plans that detail ground disturbance in the Stage 8 restoration area must consider whether the additional survey requirements and active management measures have been completed prior to that activity proceeding.
Consultation letter from Cubbitch Barta and EMM response	We note the concerns raised by Cubbitch Barta and the response from EMM.	Recommend other considerations be made to record oral history and cultural values of the area during future assessments. Can RAPs be involved in the rehabilitation works for the site as part of caring for country?	Refer to comment against 4.2 in this table regarding consulting with Cubbitch Barta about the identified place of significance that may be suitable for an Aboriginal place nomination. If Cubbitch Barta determine the identified place is appropriate to be nominated as a declared Aboriginal place, then Menangle Sand and Soil may seek to record oral histories as part of this application process. The quarry will employ a full-time rehabilitation specialist who will undertake most of the rehabilitation work. It is not possible to determine whether contractors (including RAPs) may be required for rehabilitation works at this stage.

Phil Towler

From: Laressa Barry
Sent: Thursday, 30 November 2023 12:52 PM
To: Phil Towler
Subject: FW: Menangle Quarry Expansion Project - Provision of Survey Report for Stages 8A, 8B and 8C
Attachments: J190166a_MQ_Stage8AtoC_Survey_Report_V1.0.pdf

Laressa Barry
Senior Archaeologist | Aboriginal Heritage Team Leader (A)

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M 0432 830 813
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Note: My work days are Monday, Tuesday, and Thursday

From: Laressa Barry
Sent: Tuesday, August 15, 2023 11:20 AM
To: OEH HD Heritage Mailbox <heritagemailbox@environment.nsw.gov.au>
Cc: CCHD Information Systems & Assessment Mailbox <ahims@environment.nsw.gov.au>
Subject: Menangle Quarry Expansion Project - Provision of Survey Report for Stages 8A, 8B and 8C

Good morning ACH Regulation team and AHIMS team,

On behalf of our client, Benedict, Please find attached for your records and information a copy of EMM's Aboriginal scar tree survey report for Stages 8A, 8B and 8C of the proposed extraction works areas for the Menangle Quarry in Menangle, NSW. This short report is in fulfilment of Section 5.2.2 of the Menangle Quarry expansion project Aboriginal Cultural Heritage Management Plan, which requires us to provide Heritage NSW with a copy of the scar tree report.

The survey identified one culturally-modified tree **outside** of the proposed works area, and this site has been registered on the AHIMS database, for active avoidance and protection into the future. No other Aboriginal sites were identified within the works areas, and extraction works may proceed with caution in the Stage 8A, 8B and 8C areas.

We will be in touch as the project progresses to provide further documentation on upcoming works. A copy of this report has also been supplied to each of the Registered Aboriginal Parties for their records.

Should you have any questions on the above, please do not hesitate to reach out.
Thank you and kind regards,

Laressa Barry
Senior Archaeologist | Aboriginal Heritage Team Leader (A)

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Note: My work days are Monday, Tuesday, and Thursday

From: Laressa Barry
Sent: Tuesday, August 15, 2023 11:13 AM
To: Laressa Barry <lbarry@emmconsulting.com.au>
Subject: Menangle Quarry Expansion Project - Scar Tree Survey for Stages 8A, 8B and 8C

Laressa Barry
Senior Archaeologist | Aboriginal Heritage Team Leader (A)

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Note: My work days are Monday, Tuesday, and Thursday

Appendix D

Plan approval

Ms Alycia Campbell
Environmental Compliance Manager
Benedict Recycling PTY Limited
11 NARABANG WAY
BELROSE NSW 2085

25/03/2022

Dear Ms Campbell

Menangle Quarry (DA85/2865)
Aboriginal Heritage Management Plan - Version 3

I refer to the updated Aboriginal Heritage Management Plan - Version 3 which was submitted in accordance with Conditions B58-B64 of Schedule 2 of the consent for the Menangle Quarry (DA85/2865).

The Department has carefully reviewed the document and is satisfied that it generally meets the requirements of the conditions.

Accordingly, the Secretary has approved the Aboriginal Heritage Management Plan - Version 3 (Revision 3, dated February 2022). Please ensure that the approved plan is placed on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Kevin Reid on 02 92746209.

Yours sincerely

JEvans

Jessie Evans
Director, Resource Assessments
Resource Assessments

As nominee of the Secretary

Appendix E

Scar tree survey – substages 8A–8C

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St Leonards NSW 2065
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St Leonards NSW 1590
02 9493 9500
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13 June 2023

Alycia O'Brien
Environmental Compliance Manager
Benedict Industries Pty Ltd
PO Box 431
Frenchs Forest NSW 1640

Re: Menangle Soil and Sand Quarry, Stage 8 Extraction area (Section 8A, 8B and 8C): Aboriginal Cultural Heritage Management Plan - Additional scar tree survey

Dear Alycia,

Benedict Industries Pty Ltd (Benedict) intends to expand its operations at the Menangle Soil and Sand Quarry, and commissioned EMM Consulting Pty Ltd (EMM) to provide Aboriginal cultural heritage services for the project. An Aboriginal Cultural Heritage Assessment (ACHA) report and an Aboriginal Cultural Heritage Management Plan (ACHMP) were subsequently prepared for the proposed expansion, which identified several cultural sites in the vicinity of the project area that require active management throughout the life of the project. Notably, dense vegetation and weed infestation hindered archaeological survey efforts within the Stage 8 Extraction area; and the ACHMP included a requirement for additional archaeological survey in this location after the understorey is cleared and prior to the removal of mature trees to determine if any feature Aboriginal scarring or carving.

This letter and subsequent report, prepared by Urban Tree Management Australia Pty Ltd (UTMA), detail the results of archaeological survey undertaken within sections 8A, 8B and 8C of the Stage 8 Extraction Area. The survey was conducted on Wednesday 2 May 2023 by UTMA Arboriculturist Danny Draper and EMM Graduate Archaeologist Phillipa O'Brien-Pounde, together with Aboriginal community representatives Duncan Falk and Kirsty Chalker. Preliminary calculations based on earlier biodiversity assessments indicated that the project area contained 57.5 tree specimens per hectare, resulting in approximately ~147 trees requiring further inspection. The survey team examined the trunk of each standing or felled where the tree had a trunk diameter greater than 600 mm, as these trees were considered to have been of sufficient age to contain wounds of Aboriginal cultural origin. All other tree specimens were cursorily inspected but not subject to detailed assessment.

Ultimately, only two specimens were subject to detailed assessment – TN2 within the Stage 8B area, and TN1, located approximately 50 m west of the Stage 8B western boundary (Appendix A). TN2 was described as a 100 to 150-year-old felled (dead) eucalypt specimen with 5 post-mortem wounds (comprising a series of 10 mm-wide parallel cuts to a depth of 20 mm) that were inflicted by a chainsaw ~20 years ago, and were deemed not to have been the result of Aboriginal cultural origin. TN1 was described as a mature 250 to 300-year-old Bangalay or Southern Mahogany (*Eucalyptus botryoides*) upright, forest-form specimen that died between 5 and 15 years ago, with three wounds. Wound 1 was oval and largely symmetrical, located on the south side of the trunk

approximately 100 mm from the base of the tree. It measured approximately 1850 mm (height) x 650 mm (width) and was found to contain adaptive re-growth, with a wound margin depth of 150-175 mm. The wound face comprised fragmented to decayed heartwood, with some sapwood evident. This wound was determined to have been highly likely to be the result of Aboriginal cultural origin and was estimated to have been executed approximately 120-150 years ago. Two other wounds were identified on the trunk of TN1, but were likely formed by insect borers and/or natural formation processes, and deemed not to be of cultural origin.

For cultural heritage management purposes, the culturally modified tree TN1 has been recorded on the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) database as MQ MT1 (AHIMS Site ID #52-2-4888) (Figure 1). The site card is appended to this letter (Appendix B), and a copy of this document should be kept by the Menangle Sand and Soils office for persons working on or in the vicinity of the Stage 8B area. No other Aboriginal objects or scarred/carved trees were identified in the Stage 8A, 8B or 8C areas, and the proposed extraction may proceed with caution, subject to other relevant environmental approvals or requirements. In summary, we conclude that:

- The Stage 8A, 8B and 8C areas were inspected and are considered to have low risk of Aboriginal objects and scarred/carved trees being present. At these locations, the proposed extraction works may proceed with caution, subject to other relevant environmental approvals or requirements.

- A culturally modified tree, MQ MT1 (#52-2-4888) was identified approximately 50 m west of the Stage 8B boundary. The site card is appended to this letter (Appendix B), and a copy of this document should be kept by the Menangle Sand and Soils office for persons working on or in the vicinity of the Stage 8B area.

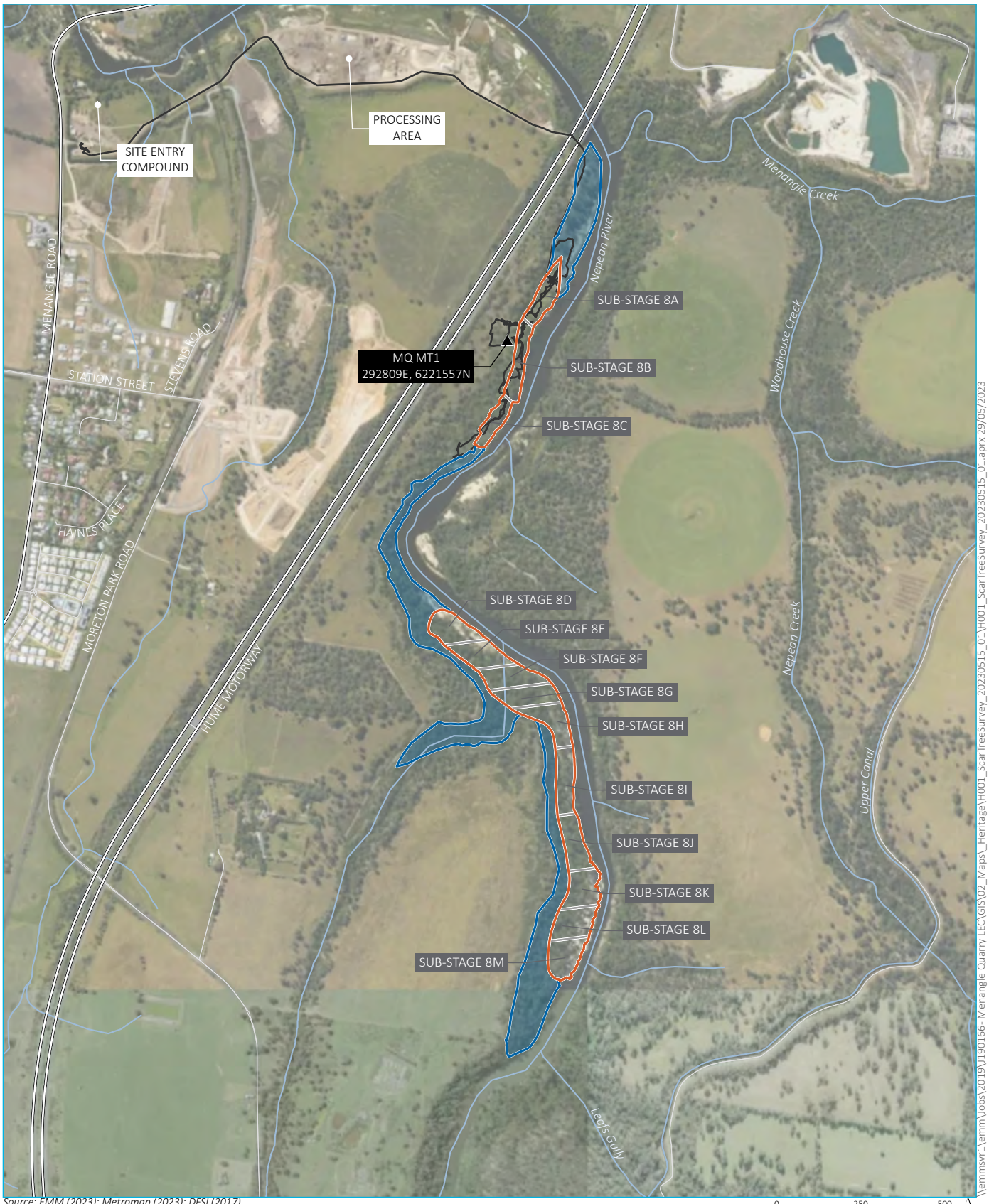
- In the event that unexpected Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during extraction, all works in the vicinity of the find should cease and the proponent should determine the subsequent course of action as detailed in Section 5.4 of the ACHMP, in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate.

- If human remains are discovered, the *Coroners Act 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted, in accordance with the procedures outlined in Section 5.4.3 of the ACHMP. Traditional or contemporary (post-contact) Aboriginal burials which occur outside of designated cemeteries are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the remains prove to be Aboriginal in origin, notification of Heritage NSW and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

Please do not hesitate to contact me on (02) 9493 9500 or 0432 830 813 should you have any questions or wish to discuss anything further.

Yours sincerely

Laressa Barry
Senior Archaeologist | Aboriginal Heritage Team Leader
LBarry@emmconsulting.com.au



\\emmsvr1\emm\Jobs\2019\J190166 - Menangle Quarry LEC\GIS\02_Maps_Heritage\H001_ScarTreeSurvey_20230515_01\H001_ScarTreeSurvey_20230515_01_aprx 29/05/2023

Source: EMM (2023); Metromap (2023); DFSI (2017)

0 250 500 m
GDA 1994 MGA Zone 56

N

KEY

- Stage 8- extraction/rehabilitation area
- Stage 8- restoration area (no extraction)
- Substage boundary
- Aboriginal scar tree
- Survey tracklog

Existing environment

- Main road
- Local road
- Watercourse/drainage line

MQ MT1

Menangle Sand and Soil Quarry
Scar Tree Survey Report
Figure 1.1

EMM
creating opportunities

Appendix A
Arboricultural Assessment

EMM
creating opportunities

URBAN TREE MANAGEMENT

CONSULTING
ARBORICULTURISTS
& HORTICULTURISTS

Urban Tree Management
Australia Pty Ltd
ACN 098 599 805
ABN 56 098 599 805

65 Excelsior Street
Merrylands NSW 2160

D Draper, mobile 0418 471 806

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INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS
IACA
ACCREDITED MEMBER™

REPORT:

ARBORICULTURAL ASSESSMENT

OF

Scarred Tree/s

AT

The Quarry

(Menangle Sand and Soil, part of Benedict Industries)

31 Menangle Road, Menangle NSW

FOR

Benedict Industries

Prepared 23/5/2023.
Reference 25202

Contents

1.0 SUMMARY

Urban Tree Management Australia© (UTMA) has prepared this report for Laressa Barry – senior Archaeologist, Heritage Team Lead (A), Bushfire, Ecology, Heritage and Spatial Solutions Division, EMM, Sydney, Ground floor, 20 Chandos Street, St Leonards NSW 2065, on behalf of Menangle Sand and Soil, part of Benedict Industries.

The report examined 2 trees located at 31 Menangle Road, Menangle, Sub-stages 8A-8C (*the site),* see Photographs A.0 and A.1. The assessment examined the trunk of each standing or felled where the tree had a trunk diameter greater than 600 mm as these trees may have been of sufficient age to contain wounds of Aboriginal cultural origin and this was discussed with and agreed by the team members. Inspections were undertaken by examining the circumference and length of each candidate tree trunk which included gaining access by removing deep surrounding weed vegetation such as *Lantana camara* L. – Lantana.

Photograph A.0 Aerial photograph showing the location of area inspected (Source: EMM). and
Photograph A.1 Aerial photograph showing detail of Sub-stages 8A, 8B and 8C (Source: EMM) showing trees with wounds TN1 and TN2.

Table 1.0 Summary of each tree including likely age, wound/s, and cause.

Tree No. / Archaeological No.	Genus and species / Common name	1. Age range of tree in yrs. approx. / 2. Age range of wound/s in yrs. approx.	Likely origin of wound/s
1	*Eucalyptus botryoides* S. Bangalay or Southern Mahogany	**1.** 200 - <300 **2.1** 120 - <150 (W1) **2.2** 120 - <150 (W2) **2.3** 5 - <20 (W3)	Wound 1 (W1) of Aboriginal cultural origin. Wound 2 (W2) wound margin remains of a mature epicormic shoot that arose in response to the stimulus of the initial wounding (W1) or when the tree leaned. Wound 3 (W3), insect borer.
2	*Eucalyptus sp.*? Eucalypt	**1.** 100 - <150 **2.1** 10 - <20 (W1x5)	Wound 1x5 (W1x5), a series of 5 wound positions as mechanical abrasion of wood (as tree deceased when conducted) caused by chainsaw.

2.0 INTRODUCTION

Danny Draper *(the author)* attended *the site* containing the 2 trees on Wednesday 2 May 2023, and *the trees* and their growing environments and wounding, were examined and assessed from the ground. This was undertaken to determine the likely causes and estimated age of scarring, the wounds' longevity and protection if shown to be of Aboriginal cultural origin, subject to proposed works nearby or removal and conservation, where appropriate.

The dimensions of the tree wound/s were recorded, and each tree and wound/s photographed by the author. The age of each tree provided is an estimate only and offered within a range due to the uncertainty of such unsubstantiated field observations without the application of Dendrochronology or other records. Without such precise data the age of trees is usually considered in stages of life span against their biomass *in situ* as Young (0-20%), Mature (20-80%) and Over-mature (senescent) (80-100%).

3.0 METHODOLOGY

Each inspection was undertaken by a visual assessment conducted from the ground and considered as part of the assessment/s the remaining lifespan of a live tree or durability of the remains of a dead tree where the scarred section is to be preserved.

A glossary of terms is included as Appendix B covering the description of the tree/s.

Assessment of Trees

The following criteria were recorded to reflect the status of the trees being: Age class, Condition class, Form class, Dimensions, Crown cover (live foliage as %), Crown density (density of live foliage evident as %), vigour class and Sustainable Retention Index Value (SRIV) version 4 (IACA, 2010) of each live tree (Appendix A), where appropriate.

The age of the trees was estimated from a sound professional knowledge or research of the individual tree taxa, growth of trees within the region based on habitat, rainfall, soil type and land use practices and considered against the dimensions of each tree encountered and the limitations of its growing environment *in situ*. A tree may be described in greater detail than others where it was considered appropriate to describe the location of the wound or the circumstances which may have led more accurately to its formation.

The height of the remains of the tree was recorded using a Nikon Forestry Pro laser guided clinometer or by approximation.

Assessment of Wounds to Determine Arboricultural Status of Scarred Tree/s

As a tree grows vascular cambium as a thin layer of dynamic cells close to the surface produces xylem to form wood on the inner side, and phloem to form bark on the outer side. The cambium grows as a continuous ring and is laid down as fibres along the trunk, stems, and roots when a new growth increment layer is developed. The vascular cambium translocates nutrients in solution through the fibres from the roots to the leaves through the xylem and sugars produced in the leaves as photosynthates through the phloem and ray cells and to the roots. Their structural importance allows for strength and flexibility as energy from loading forces from the trees mass and wind movement stimulates adaptive growth and reactive growth. The shape and form of a tree is affected as wind moves energy along stems from the distal to proximal end dissipating and diminishing through damping, through the trunk and roots, and out into the ground (James *et al* 2006, Mattheck & Breloer 1994, pp. 14-19).

When the vascular cambium is disrupted, a wound occurs. If the vascular cambium is severed to a sufficient depth, fibres above and below will become desiccated and die forming a wound with the extent of tissue dieback often unpredictable and extending beyond the initial point of wounding. The coating of live tissue allows for dispersal of energy through damping to be distributed over the entire tree, with additional or less wood produced locally on trunk, branches and roots depending on loading forces of compression, tension, torsion, and shear. The stimulus of wounding usually changes the distribution of loading forces and the growth responses from the tree which can manifest as altered growth patterns as the load bearing capacity of the tree is modified and the crown and growing conditions alter over the life of the tree. Such changes may be caused by shedding branches, hollowing from termites, ants, fungal decay or fire, clearing of nearby trees increasing exposure to winds, branch shedding, further wounding, e.g., by borer insects, bird grazing or fire, and root damage from excavation, root pruning, soil cultivation or erosion.

When wounding occurs the tree's biomechanics predispose it to attempt to restore the alignment of its fibres and to protect it from pathogens by the growth of new wood and to isolate the wound through 4 walls of defence as provided by (CODIT) Compartmentalization of Decay In Trees (Shigo and Marx 1977, and Shigo 1989, p. 45 and Kevin T. Smith and Walter C. Shortle US Dept Agriculture 2020) by chemically altering surrounding wood and walling off the damage using barriers provided by existing cellular structures as Walls 1-3 and finally to conceal the wound separating it from the damage caused at the time of wounding beneath layers of new wood as Wall 4. While the CODIT model interprets compartmentalisation as defence against microorganisms, the response of trees is also considered biological to seal a wound from penetrating air, to prevent an embolism where air is required for wood fungi spores to settle and colonise the disrupted tissue (Schmidt, 2006, p. 175 and Liese & Dujesiefkem, 1996).

At the time of wounding Wall 1 is formed by plugging xylem vessels vertically above and below the wound. Wall 2 is formed tangentially in growth rings by the concentration of lignin in the cells of late season's growth acting to prevent the inward spread of pathogens. Wall 3 forms at the sides of the wound from ray cells producing toxins which limits the spread laterally. Wall 4 is formed from intensified cell formation in the cambium forming callus as undifferentiated and unlignified wood around the wound site after wounding and forms the wound margins initially to wall off and separate damaged wood tissue from live tissue (Schmidt, 2006, p. 175 and Stobbe *et al*. 2002, 1996). Later outside the callus the cambium produces *Wound wood* differentiated to produce lignin (Schmidt, 2006, p. 177). Research on callus tissue formed after trunk wounding (Stobbe *et al*, 2002) noted that surface callus were usually clearly divided into three stages: an initial stage of parenchyma cell formation (first stage), and two stages of restructuring, being the formation of a wound periderm in the outer callus (second stage) and the subsequent formation of a wound cambium in the inner tissue (third stage), and noted that surface callus was only fully developed when the wound cambium had formed. Allowing a fully functional tissue of bark,

cambium, and wood to develop on the wound surface (wound face) where bark and most of the cambium had been removed (Stobbe *et al*, 2002).

Wound wood cells may be slightly larger and stronger and can be stimulated by loading forces, particularly as the wounded trunk or branch becomes hollow. The sides of the wound are *wound margin left* and *wound margin right* which slowly converge and usually form an oblong, circular, awl or elliptical shape (Draper and Richards 2009). The distal and proximal ends of a wound are the *wound apex* and *wound base* respectively and may be irregular, jagged, obtuse, rounded, truncate to acute (<90^{O}) where the margins converge often forming a wound seam or partial occlusion (Draper and Richards 2009). The sapwood exposed by the removal of the bark is the *wound face* although on older wounds this may be absent if a void is evident as a *cavity* or a deeper void as a *hollow* in heartwood (Draper and Richards 2009). The sapwood of most species has very poor durability once exposed to the atmosphere (Bootle, 2005, p. 234).

No matter what the shape of the wound the tree will ultimately attempt to align the fibres to grow over and conceal the wound to restore the cover of living wood around and along the stem. Ultimately most margins converge and graft to conceal the *wound face* and it is then that the tree has achieved wound *occlusion* (Draper and Richards 2009). The living tissue disrupted at the time of wounding will always die, remain damaged and continue to deteriorate even when a wound is occluded by successive growth rings because trees do not heal, they can only conceal the damaged cells with consecutive layers formed by each season's growth (Mattheck and Breloer 1994, pp. 12-16) of cells added radially as rings in the diameter of stems and roots by the elongation of roots and stems by tip extension.

Wound margins encroach over the wound face as new growth ring increments are added around the tree. The *wound margin depth* on the left and right sides usually deepens over time before the wound is occluded and can be measured perpendicular from the wound face to the outer edge of the trunk, or from the outer edge of the trunk to the inner edge of the void if the wound face is absent and margins incurved (Draper and Richards 2009). It is not uncommon for the depth of the *wound margin right* and *wound margin left* or the distances from the *initial wound margin* to the *wound margin* to be different because of reactive growth stimulated by differential loading along the stem in compression, tension, torsion or shear stimulating more wood to be laid down on the side bearing the greatest load and cell distortion (Mattheck and Breloer 1994, pp. 12-16). Where margins are of a similar width and depth they are usually equally loaded or both neutrally loaded (Mattheck, 2004, p. 17).

As the wound wood margins grow across the wound face from the point of initial wounding a general differentiation in the colour of bark and its texture from surrounding unwounded tissue will sometimes be evident and can assist to indicate the extent of the width of the wound and the approximate location or extent of the *initial wound margin* (Draper and Richards 2009). However, this may become less apparent over time with wounds that have been *occluded* for long periods due to the successive growth increments added sometimes concealing the wound entirely, or on trees with thick bark.

By measuring the width of the wound between the left and right *initial wound margin* the diameter of the trunk at the time of wounding and the approximate age of the tree can be estimated. The location of a wound on a trunk is static although the diameter of the stem is increased circumferentially by rings as growth increments, hence the wound margins and wound occlusion. The circumference of the trunk and stems of large old trees increases with age and the layers may be slightly thinner over a radial distance where such growth has slowed, than for younger trees or where they are not stimulated by loading.

The trees *in situ* were expected to have had a relatively good growth rate due to their location on well-drained soil with a comparable average annual rainfall of 638.4 mm recorded at the nearby Station: Menangle Bridge (Nepean River), Number: 68216, Opened: 1963, Now: Open, Latitude: 34.12° S and Longitude: 150.74° E, Elevation: unknown (Australian Government Bureau of Meteorology, 2023) approximately 5 km away.

To differentiate between ***cultural scarring***, historical scarring, recent mechanical damage or natural causes, the following were considered:

1. Age class
2. Ease of access to the location of wounding
3. Tree and its dimensions at the time of wounding
4. Extent of wounding, its symmetry (symmetrical / asymmetrical)
5. Extent of growth around wound site since initial wounding whether tree alive/dead
6. Impact of that wounding on the tree since the wounding event
7. Land use history
8. Condition class
9. Vigour class
10. Influence of its growing environment and its constraints
11. Proximity to other trees, shape and growth habit
12. Crown form
13. Shading
14. Rainfall
15. Insect damage
16. Fire
17. Soil
18. Aspect
19. Slope
20. Drainage

This Arboricultural assessment will assist to determine the status of scarred tree/s and to manage the tree/s. This is achieved by eliminating natural or mechanical causes of wounding, and by determining the estimated remaining safe life span or works to prolong a live tree *in situ* or to conserve and protect remaining sections that may be recovered and relocated to a *Keeping Place,* or similar, as appropriate.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – 1

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
1 *Eucalyptus botryoides* Sm. Bangalay or Southern Mahogany	1. M 2. 250 - <300 3.1 120 - <150 (W1) 3.2 120 - <150 (W2) 3.3 5 - <20 (W3) 4. 5 - <15	D	F	30 x 20 approx.	1100x700, 900 Av., E/W	N/A	N/A

Description

Eucalyptus botryoides Sm. – Bangalay or Southern Mahogany is small to tall forest tree, coastal (Brooker and Kleinig, 1999, p. 78, Boland *et al*, 2006, p. 296) and can attain a height of 12-40 m (Elliot and Jones, 1986, p. 36) or 30-40 m with a trunk diameter up to 1 m (Boland *et al*, 2006, p. 296) and a crown spread of 10-25 m (Elliot and Jones, 1986, p. 36).

E. botryoides Sm. heartwood has a green density of 1180 kg / m^3 approx. (Bootle 2005, p. 302) and air dry density (ADD) 920 kg / m^3 (Bootle 2005, p. 302) and 765 – 985 kg / m^3 (Boland *et al*, 2006, p. 296). Sapwood not susceptible to Lyctid borers (Boland *et al*, 2006, p. 296, Bootle 2005, p. 302) and heartwood is termite resistant (Bootle 2005, p. 296) the wood is durable and used for general structural purposes, panelling, and flooring (Bootle 2005, p. 302, Boland *et al*, 2006, p. 296). The tree grows within a rainfall range of 700-1300 mm (Boland *et al*, 2006, p. 296).

Tree of forest form, straight, upright, lost apical meristem at 26 m. Tree with a slight lean of 12.9^O to north. The tree was growing in the Nepean River riparian zone in an area with an average rainfall of 638.4 mm and appeared to have been of good vigour before it died 5- <15 years ago. Three trunk wounds were recorded and discussed.

Wound 1 (W1)

Trunk wound on south side, oval, symmetrical (Photographs 1.0 and 1.1). Wound margins extended from 150 -1550 mm and 300 mm at widest at 600 mm. The wound extended to from 100 - 1950 mm and 650 mm at widest at centre, with the approximate extent of the initial wound margins shown in Photograph 1.1. Wound margin depth, right 175 mm spread broadly and shallowly, and left 150 mm. Wound margin left developed in response to the straight tree leaning 12.9^O with adaptive growth as a wound wood rib 220 x 300 mm wide located on the tension side of the trunk, from 750 - 1850 mm (Photograph 1.1). Adjacent the length of the wound wood rib was a convex area up to 30 mm deep that had developed like with minimally loading interbuttress zone (Photograph 1.1 and 1.2). Wound margin depth, right 180 mm and left 150 mm, tending to be thinner circumferentially over the right, likely to be associated with the tree's decline or reduced wound wood stimulus from less loading of the trunk in this area. Wound face fragmented to decayed heartwood (Photograph 1.1).

Wound face present as necrotic heartwood, save for an absent section from 100-700 mm and 250 mm wide adjacent wound margin left (Photographs 1.1 and 1.3). The wound face was a thin fragment 25 mm deep, separated from decayed heartwood (Photographs 1.1). The wound face has been squeezed by the wound margin development, particularly wound margin left and had protruded vertically along its centre breaking along desiccated ray cells. A fragment of the wound margin right unaffected by margin growth was evident from 600-900 mm. A fragment of sapwood was evident adjacent the apex and wound margin left, where it was sheltered from weathering by the protruding wound margin.

Wound 2 (W2)

A small basal wound adjacent Wound 1 (W1) wound base right, asymmetrical (Photographs 1.1 and 1.4). The wound extended from ground to 180 mm and 230 mm widest at base. Wound margin depth, right 70 mm and left 80 mm. Wound face absent extending to trunk cavity.

Wound 3 (W3)

Wound on wound margin right base of Wound 1 (W1), shaped like a simple leaf of elliptical shape, asymmetrical (Photographs 1.4 and 1.5). The wound extended from 350 – 500 mm and was 35 mm at widest at centre. Wound margins right and left both <2mm. Wound margins entire, apex and base acute. Apex rounded and base truncated at ground.

Conclusion

Wound 1 – Highly likely to be a wound of Aboriginal cultural origin, 120 - <150 years old affecting 30% of trunk circumference.

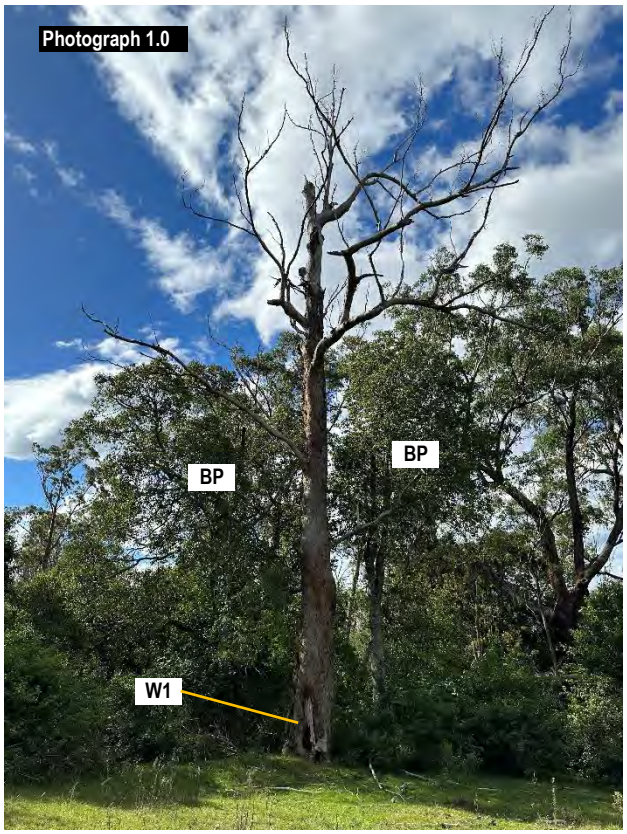
Wound 2 – Likely to be the wound margin remains surrounding a mature epicormic shoot that arose in response to the tree leaning or being wounded and had died and was consumed by fire or decay. Wound expected to be 120 - <150 years old affecting <3% of trunk circumference.

Wound 3 – A contemporary small shallow wound, formed by insect borers prior to the tree's death and exposed after dead bark sloughed away. Wound 5 - <20 years old affecting <2% of trunk circumference.

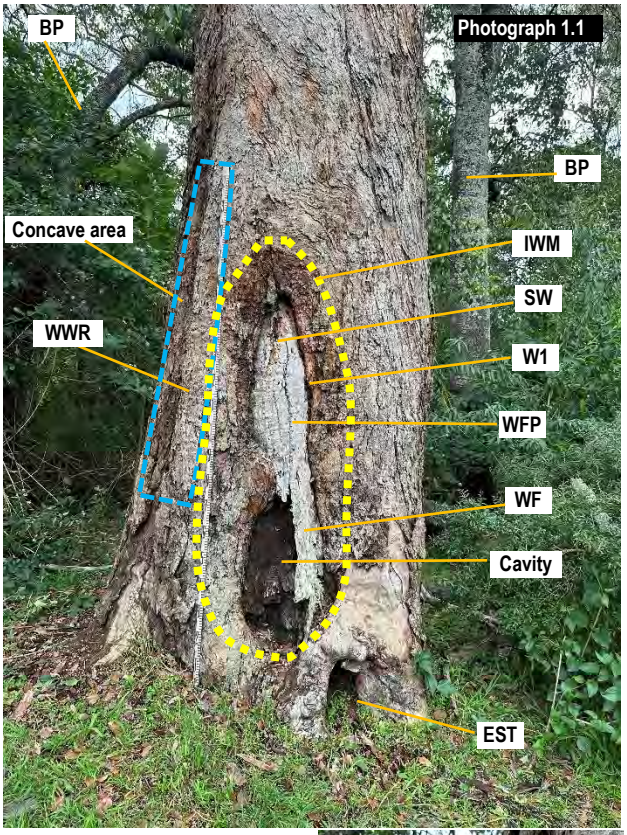
Risks to tree

As the tree is dead it will continue to weather and physically deteriorate over time if retained *in situ*. The tree remains at risk from fire, termites, and decay.

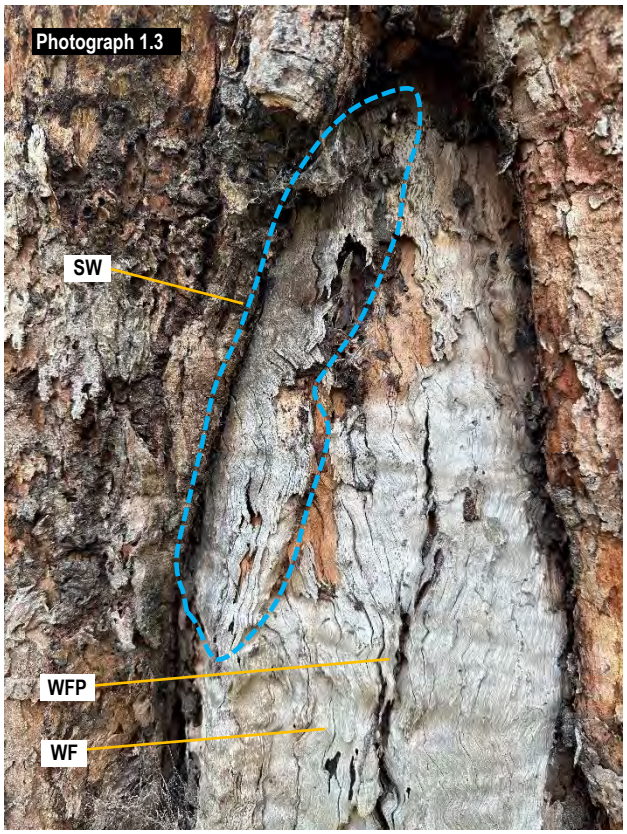
The tree could be retained *in situ* reduced in height to 1 m above the wound apex to reduce the loading from the crown or from damage as the branches decay and collapse which is likely to be unpredictable and could damage the cultural scar. Also providing enough trunk length above the wound apex to protect it from decay if the trunk was not hollow at this point and to assist in relocation if required. The trunk section containing the wound could be retained *ex situ* with the trunk cut near ground and at 1 m above the wound apex to recover the wound baring section for it to be retained on site or relocated to *keeping place* as determined by the Aboriginal stake holders.



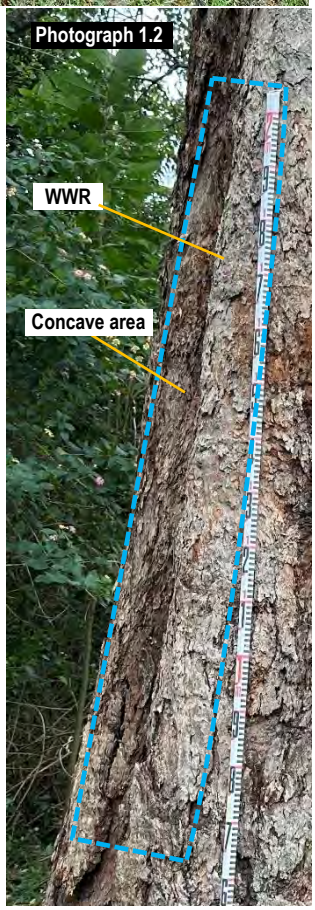
Photograph 1.0 Taken 2/5/2023 by Danny Draper. View to north of Tree 1 *Eucalyptus botryoides* S. – Bangalay or Southern Mahogany, showing Wound 1 (W1) on south side of trunk and 2 a *Brachychiton populneus* (Schott & Endl.) R.Br. – Kurrajong (BP) growing close by.



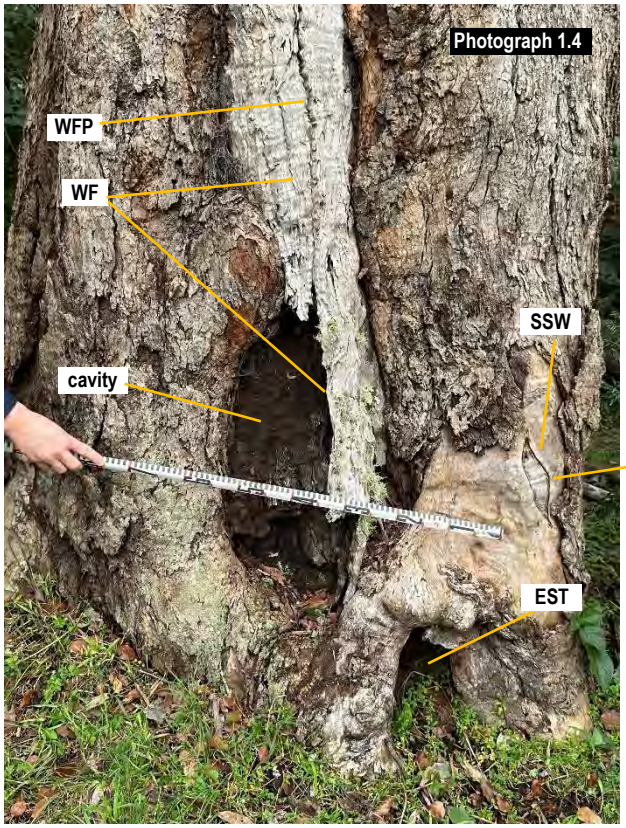
Photograph 1.1 Taken 2/5/2023 by Danny Draper. View to north of Tree 1 *E. botryoides* S. – Bangalay or Southern Mahogany, showing Wound 1 (W1) on south side of trunk and 2 a *B. populneus* (Schott & Endl.) R.Br. – Kurrajong (BP) growing close by. The fragmented wound face (WF) of heartwood was 25 mm thick, and protruding (WFP) being squeezed by the wound margins. The wound face proximally was absent extending to a cavity. A sapwood fragment was evident adjacent the apex and wound margin left (SW). The second small wound (EST) was likely the wound margin remains surrounding a mature epicormic shoot that arose in response to the tree leaning or being wounded. Wound margin left (outlined dotted blue), adaptive growth as a wound wood rib (WWR) located on the tension side of the trunk, from 750 - 1850 mm, with an adjacent convex area up to 30 mm deep like an interbuttress zone. The yellow dotted outline shows the approximate extent of the initial wound margins (IWM).



Photograph 1.2 Taken 2/5/2023 by Danny Draper. Tree 1 *E. botryoides* S. – Bangalay or Southern Mahogany, showing Wound 1 (W1) wound margin left (outlined dotted blue), adaptive growth as a wound wood rib (WWR) located on the tension side of the trunk, from 750 - 1850 mm, with an adjacent convex area up to 30 mm deep like an interbuttress zone.



Photograph 1.3 Taken 2/5/2023 by Danny Draper. Tree 1 *E. botryoides* S. – Bangalay or Southern Mahogany, showing Wound 1 (W1) and the fragmented wound face (WF) of heartwood was 25 mm thick, and protruding (WFP) being squeezed by the wound margins. The wound face proximally was absent extending to a cavity. A sapwood fragment (outlined dotted blue) was evident adjacent the apex and wound margin left (SW).



Photograph 1.4 Taken 2/5/2023 by Danny Draper. Tree 1 *E. botryoides* S. – Bangalay or Southern Mahogany, Wound 1 (W1) showing the fragmented wound face (WF) of heartwood was 25 mm thick, and protruding (WFP) being squeezed by the wound margins. The wound face proximally was absent extending to a cavity. A contemporary small shallow wound (SSW) (150 mm long and 35 mm approx. at widest at centre and shaped like a simple leaf of elliptical shape, was evident on the wound margin right base and was expected to have been formed by insect borers prior to the tree's death. The second small wound (EST) was likely the wound margin remains surrounding a mature epicormic shoot that arose in response to the tree leaning or being wounded.

Photograph 1.5 Taken 2/5/2023 by Danny Draper. Tree 1 *E. botryoides* S. – Bangalay or Southern Mahogany, Wound 1 (W1) showing detail of a contemporary small shallow wound (SSW) (150 mm long and 25 mm approx. at widest at centre and shaped like a simple leaf of elliptical shape, was evident on the wound margin right base and was expected to have been formed by insect borers prior to the tree's death.

4.2 Assessment of Tree/s – 2

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
2 *Eucalyptus sp.*? Eucalypt	1. M 2. 100 - <150 3.1 10 - <20 (W1) 4. 20 - <30	D	F	N/A	500 Approx	N/A	N/A

Description

Section of a cut down dead tree, with remains comprising a section of trunk 3 m approx. long extending 3m approx. to first order structural branches (Figure 1.0).

Wound x 5 (W1x5)

An approximately 6 m section of a cut down dead tree wounded post mortem by chainsaw in 5 locations with a series of approx. 10 mm wide parallel cuts to <20 mm deep (Photographs 2.0-2.5). Wounds appeared to have been inflicted post mortem as no evidence of wound wood as wound margins were evident at the edges of each wound position.

Conclusion

A series of 5 wound positions as mechanical abrasion of wood (as tree deceased when conducted) caused by chainsaw 10 - <20 years ago, after the tree was cut down 20-<30 years ago. Likely inflicted as chainsaw operation practice as concentrated on the upper side of the stem.

Risks to tree

Not applicable as Wounds x 5 not of Aboriginal cultural origin.

Photographs 2.0 – 2.5 Taken 2/5/2023, 2.0 and 2.3-2.5 by Danny Draper and 2.1 and 2.2 by Phillipa O'Brien-Pounde. Tree 2 *Eucalyptus sp?* – Eucalypt, showing location of post mortem wounding, approx. 10 mm wide, parallel and <20 mm deep, caused by chainsaw, corresponding to locations on the trunk and branches shown in Figure 1.0. Branch hollow (BH) (Photographs 2.0 and 2.3). Concave grafted area (CGA) between two converging first order structural branches (Photograph 2.3).

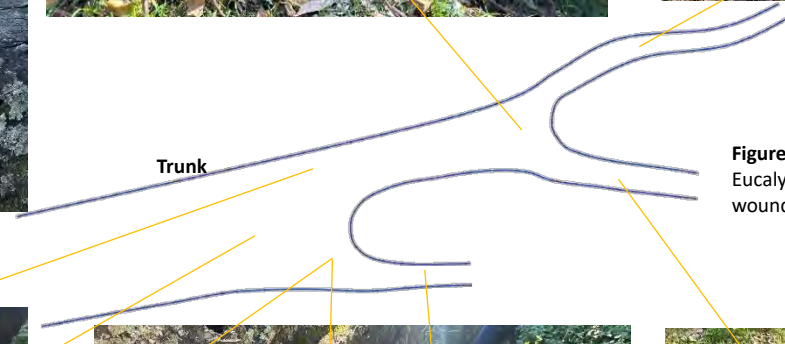


Figure 1.0 Sketch of Tree 2 *Eucalyptus sp*? – Eucalypt showing location of post mortem wounding caused by chainsaw.

5.0 CONCLUSION

This is provided in tabular form and summarizes the key information.

Tree No. / Archaeological No.	**Genus and species / Common name**	**1. Age range of tree** in yrs. approx. / **2. Age range of wound/s** in yrs. approx.	**Likely origin of Scar/s**	**Risk to tree and mitigation**
1	*Eucalyptus botryoides* Sm. Bangalay or Southern Mahogany	**1.** 200 - <300 **2.1** 120 - <150 (W1) **2.2** 120 - <150 (W2) **2.3** 5 - <20 (W3)	Wound 1 (W1) of Aboriginal cultural origin. Wound 2 (W2) wound margin remains of a mature epicormic shoot that arose in response to the stimulus of the initial wounding (W1) or when the tree leaned. Wound 3 (W3), insect borer.	As the tree is dead it will continue to weather and physically deteriorate over time if retained in situ. The tree remains at risk from fire, termites, and decay. The tree could be retained *in situ* reduced in height to 1 m above the wound apex to reduce the loading from the crown or from damage as the branches decay and collapse which is likely to be unpredictable and could damage the cultural scar. The trunk section containing the wound could be retained *ex situ* with the trunk cut near ground and at 1 m above the wound apex to recover the wound baring section and for it to be retained on site or relocated to keeping place as determined by the Aboriginal stake holders.
2	*Eucalyptus sp.*? Eucalypt	**1.** 100 - <150 **2.1** 10 - <20 (W1x5)	Wound 1x5 (W1x5), a series of 5 wound positions as mechanical abrasion of wood (as tree deceased when conducted) caused by chainsaw.	Not applicable as Wound not of Aboriginal cultural origin.

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DISCLAIMER

The author and Urban Tree Management take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent deterioration from modification/s to its growing environment either existing or proposed, either above or below ground, contrary to our advice.

Appendix A

Matrix - Sustainable Retention Index Value (SRIV) ©

Version 4, 2010
Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.
An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions.
(Y) Young.	**YGVG - 9** **Index Value 9** Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability. Retain, move or replace.	**YGVF - 8** **Index Value 8** Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVG - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and adaptability. Retain, move or replace.	**YLVF - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVP - 1** **Index Value 1** Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
(M) Mature.	**MGVG - 10** **Index Value 10** Retention potential -Medium - Long Term.	**MGVF - 9** **Index Value 9** Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** **Index Value 6** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVG - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVF - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVP - 2** **Index Value 2** Retention potential - Likely to be removed immediately or retained for Short Term.
(O) Over-mature.	**OGVG - 6** **Index Value 6** Retention potential - Medium - Long Term.	**OGVF - 5** **Index Value 5** Retention potential - Medium Term.	**OGVP - 4** **Index Value 4** Retention potential - Short Term.	**OLVG - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** **Index Value 2** Retention potential - Short Term.	**OLVP - 0** **Index Value 0** Retention potential - Likely to be removed immediately or retained for Short Term.

Appendix B

Glossary

From
Dictionary for Managing Trees in Urban Environments
Institute of Australian Consulting Arboriculturists (IACA) 2009, CSIRO Publishing.

Wounds

Abrasion Wound *Mechanical wound* causing *laceration* of tissue by an abrasive impact *episode* e.g. grazed by a motor vehicle or the continuous action of the rubbing of *crossed branches* or stems where no graft has formed.

Basal Trunk Wound A wound on the trunk extending to the *root crown* where the base of the wound is open at the ground and usually truncated. Dependent upon the width of its base such a wound may not become *occluded*.

Blaze A wound cut into a tree usually to the sapwood and sometimes extending to heartwood to create a marker point e.g. by a surveyor, the *wound face* may be further incised or painted to denote additional information.

Branch Core After a branch fails or is removed, this is the remaining branch section within the connecting branch or trunk walled off by compartmentalisation.

Branch Tail The tapering underside of a branch at its proximal end where its fibres intertwine to provide some structural support with the fibres of the branch or trunk where it is attached and new layers of such growth are added by each successive growth increment, however, the branch collar forms the greater majority of strength of the branch union (Shigo 1989a, pp. 215–217). *See also Branch core*.

Branch Tear *See Branch Tear Out.*

Branch Tear Out Dislodging of a branch from its point of attachment where it is torn away from the *branch collar* snapping the *branch tail* causing a *laceration*, usually to the underside of the *branch union* of the branch or trunk to which it was attached forming a *tear out wound*.

Branch Tear Wound *See Tear Out Wound.*

Callus Wood Undifferentiated and unlignified wood that forms initially after wounding around the margins of a wound separating damaged existing wood from the later forming lignified wood or *wound wood*.

Canker A *wound* created by repeated localised killing of the *vascular cambium* and bark by wood *decay* fungi and bacterium usually marked by concentric disfiguration. The wound may appear as a depression as each successive *growth increment* develops around the *lesion* forming a *wound margin* (Shigo 1991, p. 140, Keane *et al* 2000, p. 332).

Cavity A usually shallow void often localized initiated by a *wound* and subsequent *decay* within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

Decay Process of degradation of wood by microorganisms (Australian Standard 2007, p. 6) and fungus.

Delaminate A *mechanical wound* caused when the bark is stripped from a tree, usually from the trunk as a continuous sheet back to the vascular cambium. This may occur from an impact or abrasion *episode* such as a collision with a motor vehicle and the tree may become *ringbarked*. See also *Partially Delaminated*.

Delamination The separation of fibres often evident as longitudinal splitting of wood (Lonsdale 1999, p. 313).

Delignification The decomposition of *lignin* from *wood* by chemical deterioration, resulting in loss of strength, evident by separation of fibres into hair like strands. See also *Lignification*.

Depth of Margin Distance from outer trunk perpendicular to the *wound face*. This may assist in determining the age of a wound.

Dieback Wound Wounding where *dieback* extends beyond a branch collar as with *natural pruning* and extends to other branches, trunk or roots. See also *Secondary Crown* and *Stag-headed*.

Enclosed Wound Wound with a perimeter of *wound wood* with a well-defined apex, base and margins and often evident on an older wound. On a pruned branch that is rounded the enclosing wound wood from the branch collar may be circular with no definite apex or base evident. However, on a pruned branch where the *wound face* is oval in shape due to *reaction wood*, the enclosing *wound wood* from the branch collar may form a definite apex, base or margins.

Environmental Wounding/Damage Wounding inflicted by environmental factors or modifications to the growing *environment* of a tree, e.g., sun-scald, drought, fire, water logging, wind damage to leaves, branches, bark or roots, phytotoxic damage from chemicals, or air, soil or water pollution.

Fire Wound Wounding caused by fire. Such wounds may cause initial damage or may be secondary from a previous wounding *episode*/s. Some fire damage may be superficial or may destroy a tree in full or part rendering it potentially vulnerable to failure. Note: fire damaged trees can be potentially hazardous and should be assessed carefully.

Hollow A large void initiated by a *wound* forming a *cavity* in the trunk, branches or roots and usually increased over time by *decay* or other contributing factors,

e.g., fire, or fauna such as birds or insects e.g., ants or termites. A hollow can be categorized as an *Ascending Hollow* or a *Descending Hollow*.

Horizontal Wound Usually superficial horizontal wounding from insects burrowing between bark layers and revealed by decorticating bark. Often evident on smooth bark Eucalypts.

Impact Wound *Mechanical wound* caused by an impact *episode* e.g., collision by a motor vehicle.

Incision Wound caused by cutting or engraving. See also *Laceration*.

Increment strip A linear, usually narrow, *fluted* section of *adaptive wood,* forming in a place of high *stress* indicating the pattern of *force flow* (Mattheck 2004, p. 140). Evident as lighter coloured bark usually occurring around the edges of a *notch* or *branch stub*, along a *buttress*, or along a *sharp-edged rib*.

Initial Wound Margin The site of initial wounding often evident as a faint line of discoloured bark or bark of a different texture to adjacent undamaged trunk. This may assist in determining the age of a wound.

Insect Wound Wounding to any part of a tree caused by insect activity, e.g., borers and termites.

Laceration Wound caused by tearing. See also *Incision*.

Lightning Strike Wound A wound from a lightning strike. Such a wound may kill a tree outright or cause it to catch fire, or may destroy the tree in full or part, or no injury may be evident, and a tree gradually declines through resulting *stress*. Bark may be exploded from the tree by pressure radiating from the core of the lightning path resulting in further compounded damage through water heating and steam explosions in the tissues and the electrical disruption of living cells (Coder 2004, pp. 35-44).

Mechanical Wound Wounding inflicted by abrasion e.g., by motor vehicles, grass mowing equipment, grazing by horses, cows or birds (parrots); impact e.g., by motor vehicle collisions; drilling e.g., with increment cores, Resistograph, cable bracing, hanging pots, hammocks etc.; branch tearing e.g., from wind damage, collision from falling branches, vandalism; and root severance e.g., root pruning for excavation for building or utility services or for agricultural cultivation.

Open Wound Wound with poor to non-existent perimeter or *callus wood* or *wound wood* on an older wound without well-defined apex, base or margins and often this will be associated with a recent wounding *episode* or an older episode on a senescent tree or a tree in *poor condition* or of *low vigour*, or where repeated wounding episodes such as inflicted by ongoing borer activity damages and continually alters wound perimeters, or repeated scalping of exposed roots by lawn mowing equipment.

Occlusion Growth processes where *wound wood* develops to enclose the *wound face* by the merging of *wound margins* concealing the *wound* and restoring the growing surface of the structure with each *growth increment* gradually realigning *fibres* in the wood longitudinally along the stem to maximise uniform stress loading.

Partial Occlusion *Wound wood* growth that encloses some of the *wound face* by the merging and *grafting* of some sections of the *wound margins*. Usually evident by reduced *wound face* width and indicated where an *apex* or *base* is *acute* with the vertical extent often indicated by the length of an *occlusion seam*.

Partially Bridged Occlusion *Wound wood* partly forming an *occlusion* by joining areas of the *wound margins* across the *wound face* at point/s other than the base or apex and may form an *occlusion seam*.

Pruning Wound A wound created by the act of *pruning*.

Ram's Horning *Wound wood* that becomes curled inward and can wrap around itself as it crosses a void such as a *cavity* and may succumb to cracking with those wounds susceptible to further infestation by *decay* pathogens.

Scarred Tree A tree containing a wound of cultural or scientific interest, inflicted initially for a specific purpose, e.g. by indigenous people to extract implements or carved as a marker or with a pattern for ceremonial purposes, or as a marker and *blaze* by a surveyor or explorer, or from an accidental *wound* that has not *occluded*.

Stepped Incision A localised area of deeper wounding often extending to the heartwood, usually proximally within a *blaze*, removing a vertical semi-circular wedge like section from the *wound face* with a horizontal bench like structure formed by deep cuts as its base. Such wound sections usually taper distally and may be cut around the outer edges to assist removal of the semi-circular wedge, and likely undertaken to inhibit regrowth.

Structural Wound Any wound occurring on a tree as a result of a structural failure e.g., branch splitting or *hazard beam*, diminishing its stability in full or part.

Succession Wound Preceding layers of failed wound margin/s forming a step like sequence away from the *wound face*, where present, to the current wound margin/s indicating repeated cycles of formation and failure of *CODIT Wall 4*.

Sun Scald Wounding Wounding usually on the upper side of branches after sudden exposure to sunlight especially in summer e.g., after excessive pruning of the upper crown, or following storm damage stripping foliage or branches e.g., *Ficus spp.*

Survey Marker Wound *See Blaze.*

Tear Out *See Branch Tear Out.*

Tear Out Wound A wound of usually concave shape created by a *branch tear out*.

Wound Damage inflicted upon a tree through injury to its living cells, from biotic or abiotic causes, e.g., where *vascular cambium* has been damaged by branch breakage, impact or insect attack. Some wounds *decay* and cause *structural deterioration* or *defects*. Trees of *normal vigour* are able to resist and contain infection by walling off areas within the wood by *compartmentalization*. See *Compartmentalization Of Decay In Trees (CODIT)*. An *occlusion* may eventually conceal a wound, but the enclosed *defect* remains internally, and *decay* may continue to develop further weakening the *heartwood* and *sapwood* compromising the tree's *structural integrity*. The cause of a wound may be accidental e.g., *branch tear out* or deliberate e.g. *carved tree*.

Wound Apex The distal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Apex Acute Apex of a wound that is tapering and the *occlusion* interface angle is less than <90^{O}.

Wound Apex Irregular The *wound wood* growth at the apex mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Apex Jagged The *wound wood* growth or tissue damaged initially at the apex that is uneven and likely to have been caused by laceration.

Wound Apex Obtuse Apex of a wound that is tapering and the *occlusion* interface angle is greater than >90^{O}.

Wound Apex Rounded The *wound wood* growth at the apex that is curved.

Wound Apex Truncate The *wound wood* growth or tissue damaged initially at the apex that is even and likely to have been caused by incision.

Wound Base The proximal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Base Acute Base of wound that is tapering and the *occlusion* interface angle is less than <90^{O}.

Wound Base Irregular The *wound wood* growth at the base mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Base Jagged The *wound wood* growth or tissue damaged initially at the base that is uneven and likely to have been caused by laceration.

Wound Base Obtuse Base of wound that is tapering and the *occlusion* interface angle is greater than >90^{O}.

Wound Base Rounded The *wound wood* growth at the base that is curved.

Wound Base Truncate The *wound wood* growth or tissue damaged initially at the base that is even and likely to have been caused by incision.

Wound Face Surface area of tissue exposed by injury, e.g. bark, sapwood, heartwood.

Wound Face Cracks Horizontal Transverse cracks in a *wound face* indicative of failure from *tension* force (Mattheck & Breloer 1994, p. 183).

Wound Face Cracks Vertical Longitudinal cracks in a *wound face* indicative of failure from *compression* force (Mattheck & Breloer 1994, p. 183).

Wound Face Entire Surface of exposed tissue is uniform without damage extending to a different layer or unaffected by borers or decay, e.g. possibly described as *wound face* entire to dead sapwood.

Wound Face Incomplete Surface of exposed tissue is not uniform with damage extending to different layers or affected by borers or decay, e.g. possibly described as *wound face incomplete* with cavity at apex. See also *Wound face entire*.

Wound Face Exposed Heartwood Wound extending to reveal the *heartwood*, or has deteriorated through *decay* to reveal this layer of wood.

Wound Face Exposed Sapwood Wound extending to reveal the sapwood, or has deteriorated through *decay* to reveal this layer of wood.

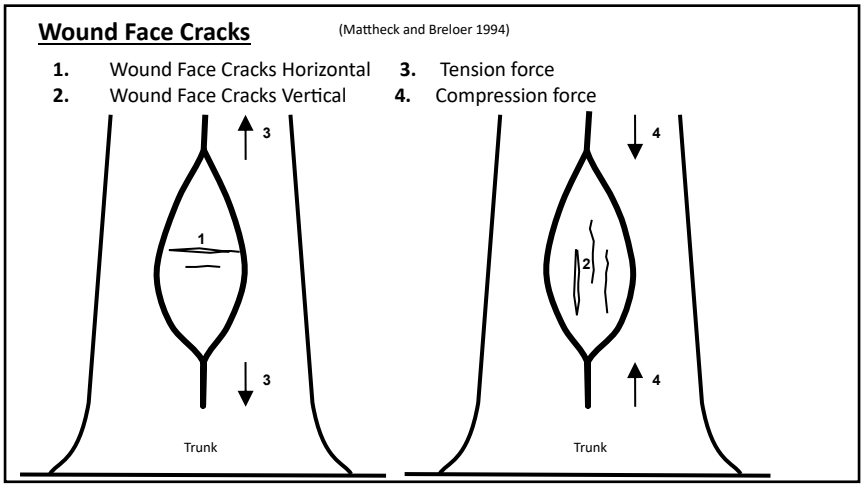
Wound Margin The left and right sides of a *wound* as bound by the alignment of fibres along a stem or root longitudinally, being either the remaining undamaged living cells and new *callus wood* and *wound wood* on older wounds. Here the fibres are usually formed from *meristematic* cells. A wound margin may be circular on a *pruning wound* or form around the perimeter of a *canker*.

Wound Margin Entire The *wound wood* growth in the margin is mostly uninterrupted forming a uniform edge.

Wound Margin Irregular The *wound wood* growth in the margin is mostly interrupted and forms an edge that is not uniform e.g. where repeated wounding *episode*s such as inflicted by ongoing borer activity damages and continually alters the *wound perimeter* with *callus wood* and *wound wood*. See also *Successional Wound*.

Wound Margin Left The left side of a wound margin when the distal and proximal ends of the wound is known, to determine the *wound apex* and *wound base*, respectively.

Wound Margin Right The right side of a wound margin when the distal and proximal end of the wound is known, to determine the *wound apex* and wound base, respectively.



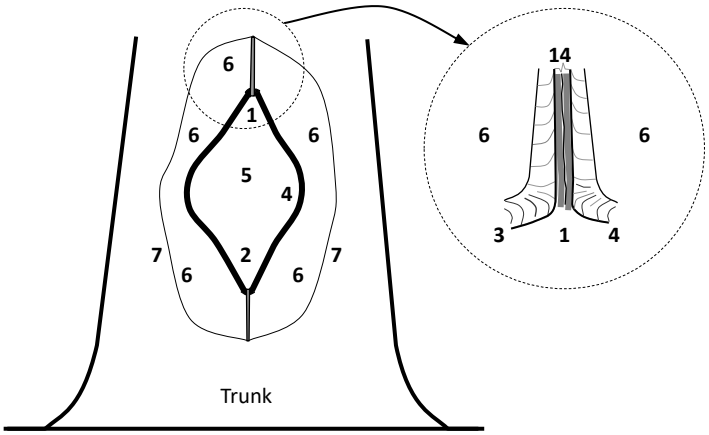
Wound Margin Width Distance from *wound margin* to the site of initial wounding. Where evident the *initial wound margin* may be identified by discoloured bark or bark of a different texture to adjacent undamaged trunk. This may also assist in determining the age of a wound.

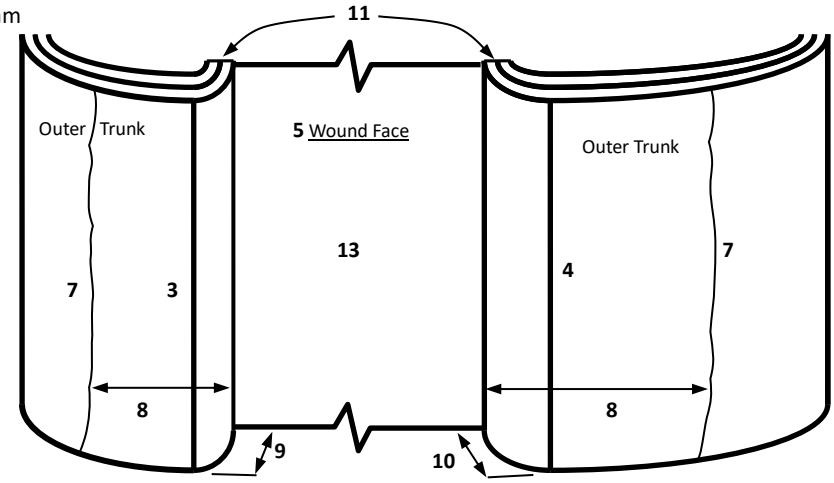
Wound Wood Aged *callus wood* around the margins of a wound that becomes differentiated to form *CODIT Wall 4* producing new lignified wood. This wood may grow to surround a wound and may eventually develop to enclose the wound by *occlusion*.

Wound Diagrams

Wound Parts

1. Apex
2. Base
3. Wound Margin Left
4. Wound Margin Right
5. Wound Face
6. Partial Occlusion
7. Initial Wound Margin
8. Margin Width
9. Left Margin Depth
10. Right Margin Depth
11. Wound Wood
12. Cavity
13. Wound Face Entire
14. Occlusion Seam

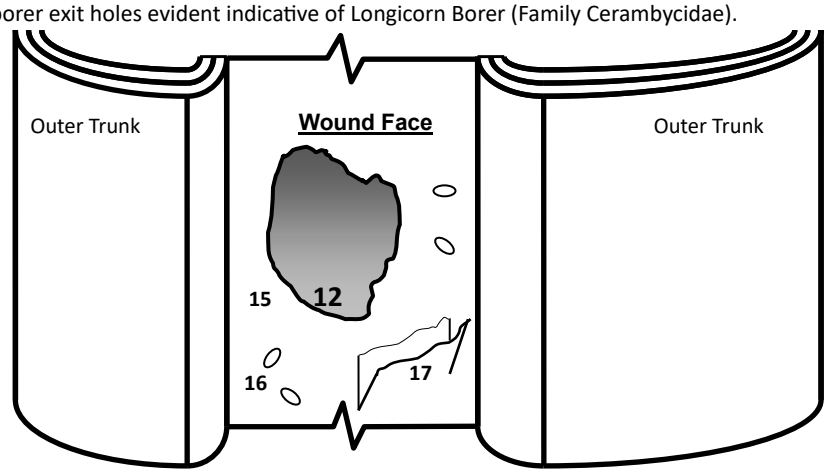




Examples of other Wound Faces

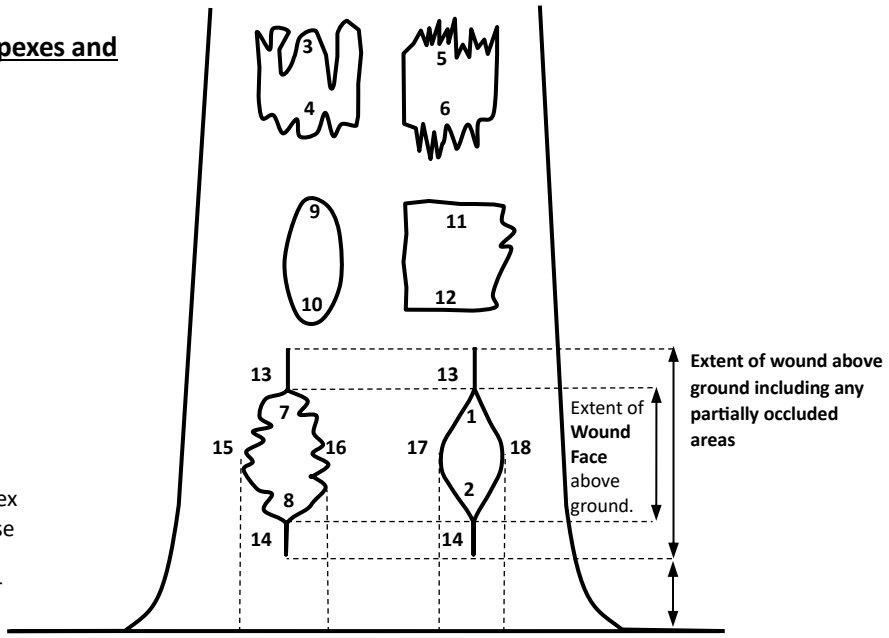
15. Wound face extending from dead sapwood to cavity in heartwood.

16. Oval shaped borer exit holes evident indicative of Longicorn Borer (Family Cerambycidae).



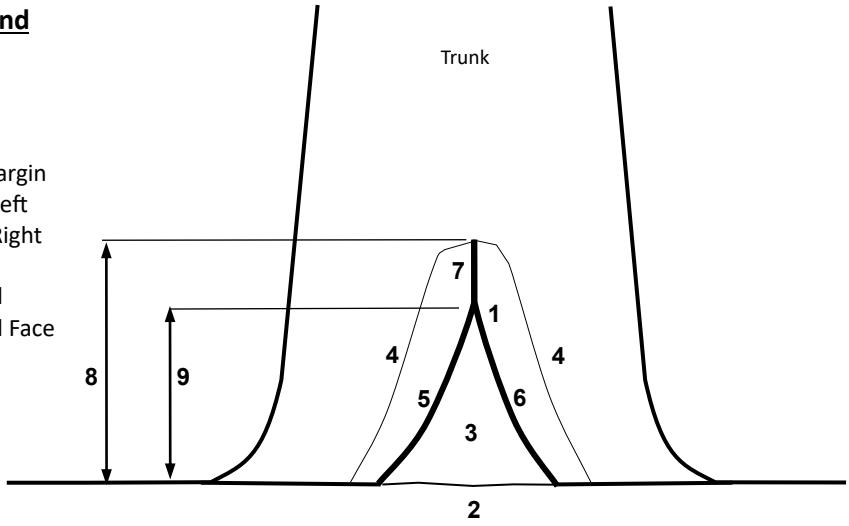
Wounds, Margins, Apexes and Bases

1. Apex Acute
2. Base Acute
3. Apex Irregular
4. Base Irregular
5. Apex Jagged
6. Base Jagged
7. Apex Obtuse
8. Base Obtuse
9. Apex Rounded
10. Base Rounded
11. Apex Truncate
12. Base Truncate
13. Partially Occluded Apex
14. Partially Occluded Base
15. Left Margin Irregular
16. Right Margin Irregular
17. Left Margin Entire
18. Right Margin Entire



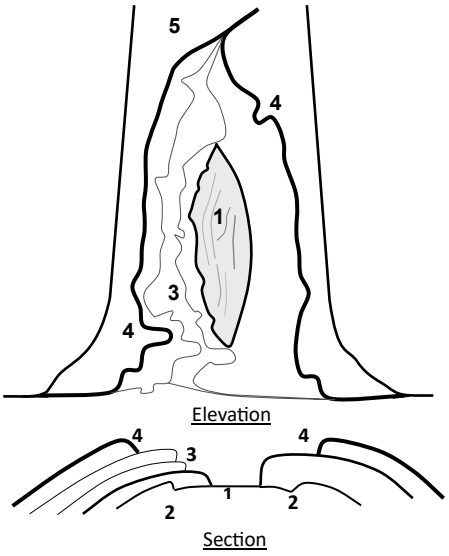
Basal Trunk Wound

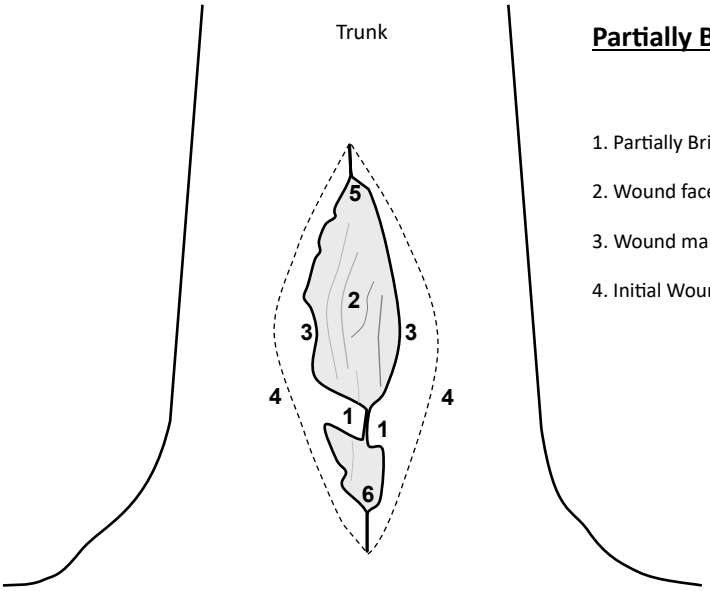
1. Apex
2. Base
3. Wound Face
4. Initial Wound Margin
5. Wound Margin Left
6. Wound Margin Right
7. Partial Occlusion
8. Extent of Wound
9. Extent of Wound Face



Successional Wound

1. Initial wound face
2. Initial wound margins (concealed when viewed in Elevation)
3. Successive wound margins





Partially Bridged Occlusion

1. Partially Bridged Occlusion
2. Wound face
3. Wound margins
4. Initial Wound Margins

Condition of Trees

Condition A tree's *crown form* and growth habit, as modified by its *environment* (aspect, suppression by other trees, soils), the *stability* and *viability* of the *root plate*, trunk and structural branches (first (1st) and possibly second (2nd) order branches), including structural defects such as wounds, cavities or hollows, *crooked* trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with *vigour* and it is possible for a tree to be of *normal vigour* but in *poor condition*. Condition can be categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

Good Condition Tree is of good habit, with *crown form* not severely restricted for space and light, physically free from the adverse effects of *predation* by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour. See also *Condition*, *Fair Condition* and *Poor Condition*.

Fair Condition Tree is of good habit or *misshapen*, a form not severely restricted for space and light, has some physical indication of *decline* due to the early effects of *predation* by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the *environment* essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Poor Condition*.

Poor Condition Tree is of good habit or *misshapen*, a form that may be severely restricted for space and light, exhibits symptoms of advanced and *irreversible decline* such as fungal, or bacterial infestation, major die-back in the branch and *foliage crown*, *structural deterioration* from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local *environment* that would normally be sufficient to provide for its basic survival if in *good* to *fair* condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and *predation* by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Fair Condition*.

Moribund Advanced state of decline, dying or nearly dead.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;
Processes
Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
Osmosis (the ability of the root system to take up water);
Turgidity (the ability of the plant to sustain moisture pressure in its cells);
Epicormic shoots or *epicormic strands* in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a *lignotuber*);
Symptoms
Permanent leaf loss;
Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots);
Abscission of the *epidermis* (bark desiccates and peels off to the beginning of the sapwood).

Removed No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

Periods of Time

Periods of Time The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

Immediate An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger. See also *Short Term*, *Medium Term* and *Long Term*.

Short Term A period of time less than <1 – 15 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Long Term*.

Medium Term A period of time 15 – 40 years. See also *Periods of Time*, *Immediate*, *Short Term* and *Long Term*.

Long Term A period of time greater than >40 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Short Term*.

Vigour

Vigour Ability of a tree to sustain its life processes. This is independent of the *condition* of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. dormant, deciduous or semi-deciduous trees. Vigour can be categorized as *Normal Vigour, High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

Normal Vigour Ability of a tree to maintain and sustain its life processes. This may be evident by the *typical* growth of leaves, *crown cover* and *crown density*, branches, roots and trunk and *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Low Vigour* and *High Vigour*.

High Vigour *Accelerated growth* of a tree due to incidental or deliberate artificial changes to its growing *environment* that are seemingly beneficial, but may result in *premature aging* or failure if the favourable conditions cease, or promote *prolonged senescence* if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

Low Vigour Reduced ability of a tree to sustain its life processes. This may be evident by the *atypical* growth of leaves, reduced *crown cover* and reduced *crown density*, branches, roots and trunk, and a deterioration of their functions with reduced *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Normal Vigour* and *High Vigour*.

Dormant Tree Vigour Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last *extension growth* is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.

Good Vigour See *Normal Vigour*.

Poor Vigour See *Low Vigour*.

Health A tree's *vigour* as exhibited by *crown density*, *crown cover*, leaf colour, presence of epicormic shoots ability to withstand *predation* by pests and diseases, *resistance* and the degree of *dieback*.

Age of Trees

Age Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the Knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

Young Tree aged less than <20% of life expectancy, *in situ*. See also *Age*, *Mature* and *Over-mature*.

Mature Tree aged 20-80% of life expectancy, *in situ*. See also *Age*, *Young* and *Over-mature*.

Over-mature Tree aged greater than >80% of life expectancy, *in situ,* or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death. See also *Age*, *Young* and *Mature*.

Premature Aging Apparent hastened aging and deterioration of a tree where it has been subject to conditions or practices adverse to expected normal growth, resulting in a *spiral of decline*. The following are examples of processes that may start such cycles:

- Top lopping of a mature tree
- In a new car park, the excavation of soil severing the roots of a tree close to its trunk and then sealing the soil surface with asphalt or concrete up to the trunk
- Open trenching alongside a street tree severing all roots in the trench, then top lopping it for power line clearance, and then extensive damage to bark by abrasion by trucks and excavation equipment as tree is adjacent to a construction site
- Root damage from *soil compaction* to substantial areas of the root plate.

Prolonged Senescence A phenomenon in an *over-mature* tree or tree with *structural deterioration* in its *condition* and often *vigour* as *abnormal vigour* as a result of modifications to the tree or the growing environment essential for its survival where it is sustained beyond the *typical* extent of its life cycle, or prevented from failing in full or part from *structural deterioration* by a beneficial artificial modification to its growing environment either by deliberate or incidental intervention, e.g. water from a leaking tap, water and nutrients from a leaking sewer pipe creating a *hydroponic* environment, or by physically propping up a tree with *structural deterioration* as with a *veteran tree*, or by it *leaning* or growing against another tree or structure for support.

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify *defects* or to reinforce weak areas subject to additional loading forces of compression, tension, torsion and shear. Such assessments should only be undertaken by suitably competent practitioners.

Drop Zone The distance away from a tree that may be physically influenced by a falling branch.

Fall Zone The distance away from a tree that may be physically influenced if it was cut down or subject to *collapse*.

Leaning Trees

Leaning A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0^{O}-15^{O} from upright.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15^{O}-30^{O} from upright.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30^{O}-45^{O} from upright.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than $>45^{O}$ from upright.

Progressively Leaning A tree where the degree of *leaning* appears to be increasing over time.

Static Leaning A leaning tree whose lean appears to have stabilized over time.

Windthrow Tree failure and collapse when a *force* exerted by wind against the *crown* and *trunk* overcomes resistance to that force in the *root plate*, such that the *root plate* is lifted from the soil on one side as the tree tips over.

Symmetry

Symmetry Balance within a *crown,* or *root plate,* above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown From Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west. See also *Symmetrical* and *Symmetry*.

Symmetrical Balance within a crown, where there is an even distribution of branches and the *foliage crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical. See also *Symmetry* and *Asymmetrical*.

Crown Spread Orientation Direction of the *axis* of *crown spread* which can be categorized as *Orientation Radial* and *Orientation Non-radial*.

Crown Spread Orientation Non-radial Where the crown extent is longer than it is wide, e.g. east/west or E/W. Further examples, north/south or N/S, and may be *Crown Form Codominant*, e.g. **A** or **B**, *Crown Form Intermediate* e.g. **A**, or *Crown Form Suppressed* e.g. **B***, and* crown symmetry is *symmetrical* e.g. **A**, or *asymmetrical* e.g. **B**.

Crown Spread Orientation Radial Where the *crown spread* is generally an even distance in all directions from the trunk and often where a tree has *Crown Form Dominant* and is *symmetrical.*

Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk* length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

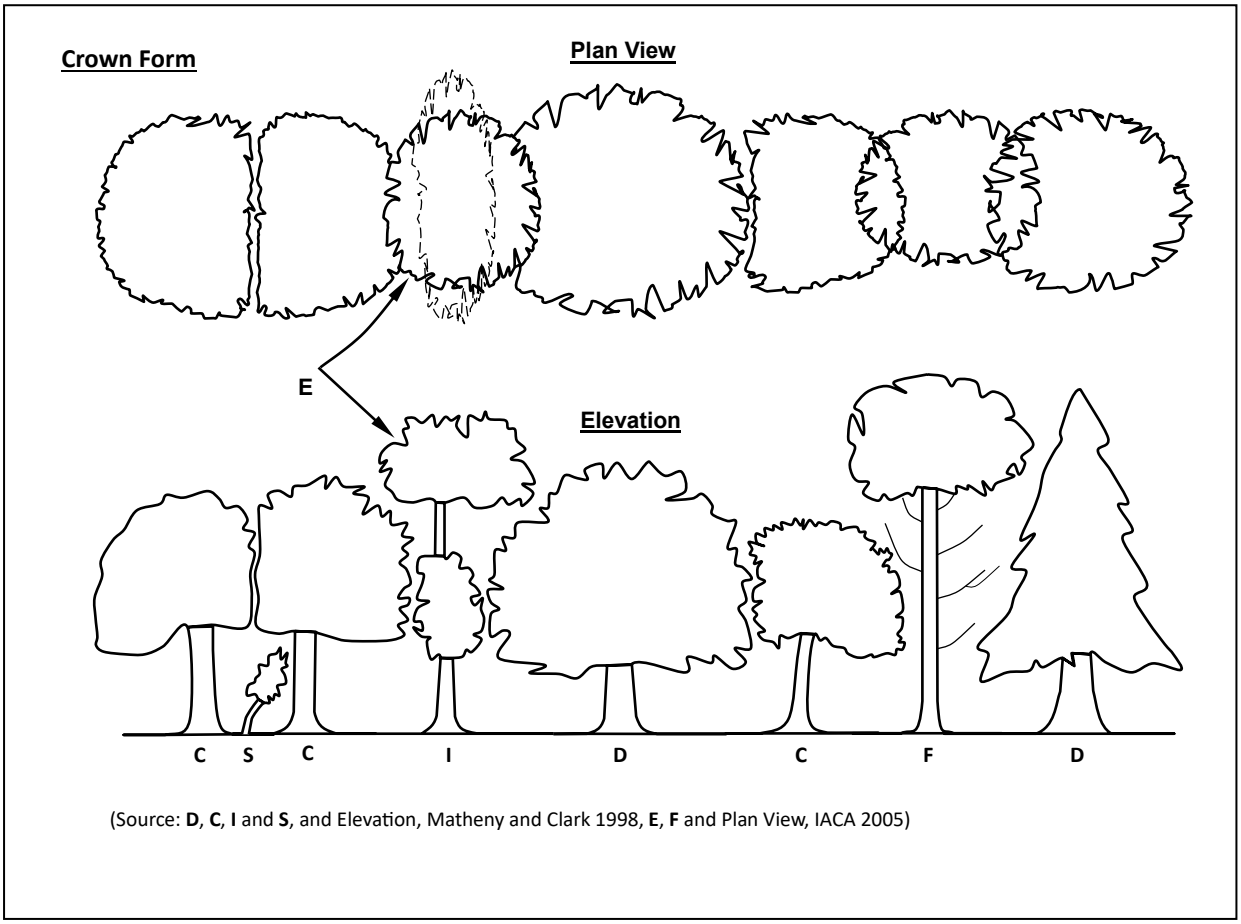
Sustainable Retention Index Value (SRIV) A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

Form of Trees

Crown Form The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*. See also *Forest Grown* and *Open Grown*.

Good Form Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light. See also *Poor Form*.

Poor Form Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism. See also *Good Form*.



(Source: **D**, **C**, **I** and **S**, and Elevation, Matheny and Clark 1998, **E**, **F** and Plan View, IACA 2005)

Crown Form Codominant Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides. See also *Crown Form Emergent* and *Open Grown*.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.

Forest Grown A tree with *crown form forest* grown in a group with competition for space and light protected from wind, often resulting in a taller tree with a narrow

spreading crown that is concentrated towards the top of the tree (Matheny & Clark 1998, p. 18).

Open Grown A tree with *crown form dominant*, grown singly without competition for space and light, exposed to wind, often resulting in a shorter tree with a broad spreading crown that extends towards the ground (Matheny & Clark 1998, p. 18).

Deadwood

Deadwood Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback.*

Deadwooding Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.

Small Deadwood A dead branch up to 10 mm diameter and usually <2 metres long, generally considered of low *risk* potential.

Large Deadwood A dead branch >10 mm diameter and usually >2 metres long, generally considered of high *risk* potential.

Low Volume Deadwood Where <5 dead branches occur that may require *removal*.

Medium Volume Deadwood Where 5-10 dead branches occur that may require *removal*.

High Volume Deadwood High Volume Deadwood Where >10 dead branches occur that may require *removal*.

Dieback

Dieback The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance, stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

Low Volume Dieback Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

Medium Volume Dieback Where 10-50% of the *crown cover* has died.

High Volume Dieback Where >50% of the *crown cover* has died.

Epicormic Shoots

Epicormic Shoots Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

Low Volume Epicormic Shoots Where <10% of the c*rown cover* is comprised of live *epicormic shoots.*

Medium Volume Epicormic Shoots Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

High Volume Epicormic Shoots Where >50% of the *crown cover* is comprised of live *epicormic shoots.*

Epicormic Strands In some taxa of the Myrtaceae family narrow bands of meristematic tissue radiate in stems from pith extending to the outer bark containing bud primordia evident as small prickle or dimple structures up to 10 mm diameter, that after the stimulus of a trauma event such as fire or defoliation develop to form new buds allowing *crown regeneration* (Burrows 2001, Pp. 111-131).

Trunk

Acaulescent A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent.*

Caulescent Tree grows to form a *trunk*. See also *Acaulescent*.

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

Appendix B
AHIMS Site Card

EMM
creating opportunities

Aboriginal Site Recording Form

Manager, Information Systems
Locked Bag 5020, Parramatta 2124 NSW

AHIMS site ID: 52-2-4888 **Date recorded:** 07-06-2023

Site Location Information

Site name: MQ MT1

Easting: 292809 **Northing:** 6221557 **Coordinates must be in GDA94 (MGA)**

Horizontal Accuracy (m): 3

Zone: 56 Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Ms.	OBrienPounde	Phillipa

Organisation: EMM Consulting

Address: 20 Chandos St, St Leonards, NSW, 2065

Phone: 0294939500 **E-mail:** pobrienpounde@emmconsulting.com.au

Site Context Information

Land Form Pattern: Steep Hills **Land Use:** Forestry

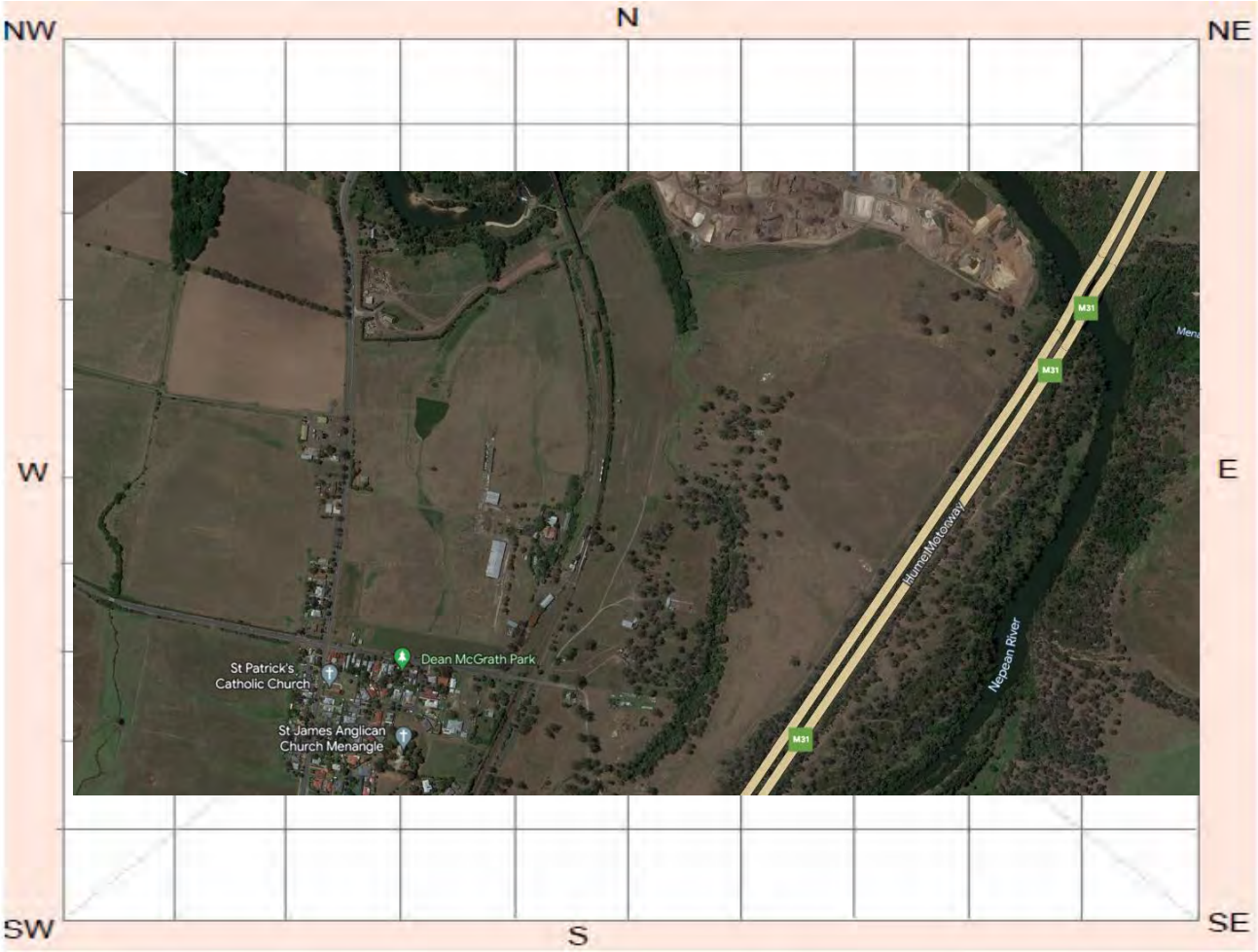
Land Form Unit: Flat **Vegetation:** Open Forest

Distance to Water (m): 80 **Primary Report:**

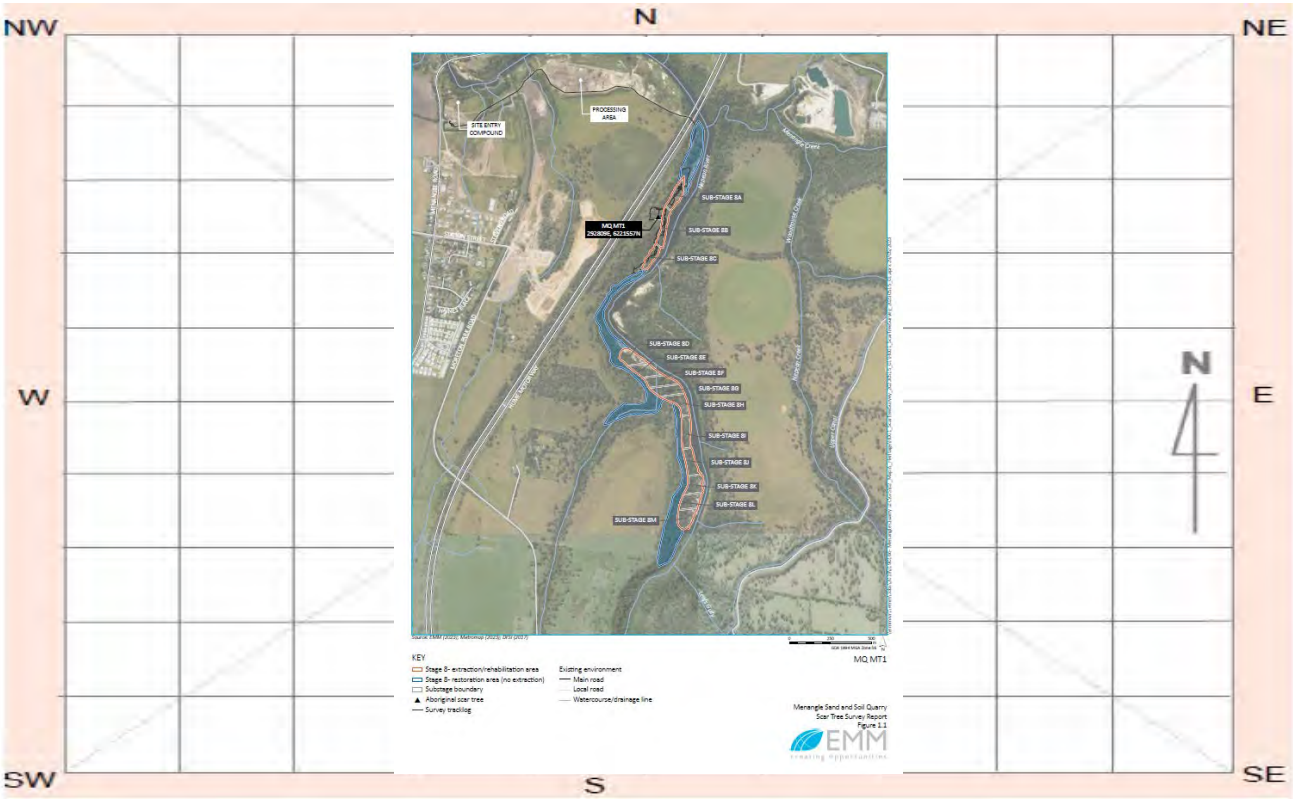
How to get to the site: Site is located on private property, access must be sought through Benedict Sands Menangle.

Other site information: Two other wounds identified on trunk but likely formed by insect borers and/or natural formation processes, and not of cultural origin. Tree is dead & will continue to weather and physically deteriorate over time if retained in situ. The tree remains at risk from fire, termites, and decay.

Site location map



Site plan



Site contents information

open/closed site: Open **Site condition:** Disturbed

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
1. Modified Tree	3	185	65	15	17.5	Oval	

Feature condition: Regrowth Over Scar

Description:

Mature 250-300 year old Bangalay or Southern Mahogany (Eucalyptus botryoides) upright forest-form specimen. Wound 1, deemed of Aboriginal cultural origin, was oval & largely symmetrical located on south side of trunk approx. 100mm from base of tree. Wound face found to contain adaptive re-growth, with fragmented/decayed heartwood and sapwood fragment. Wound inflicted approx. 120-150 years ago.

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
2.							

Feature condition:

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.							

Feature condition:

Description:

Features:

		Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
4.								

Feature condition:

Other Eucalypt

Description:

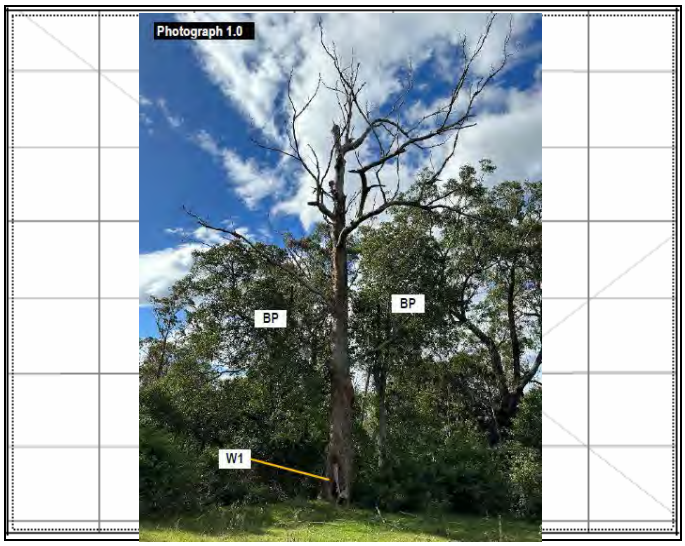
Features:

		Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
5.								

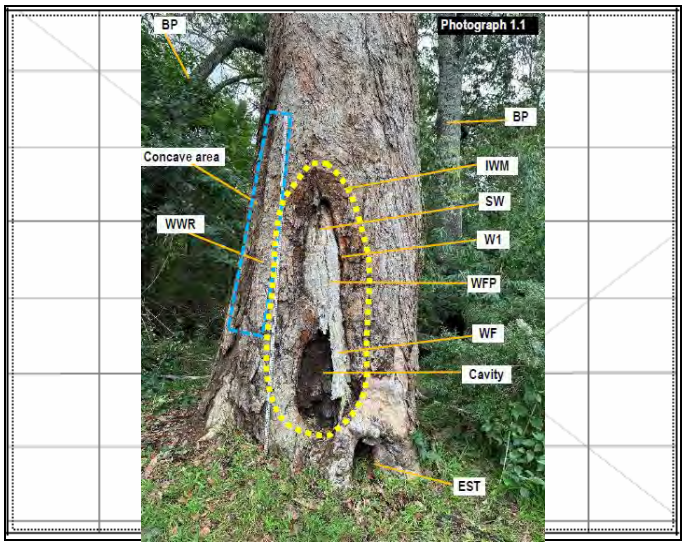
Feature condition:

Description:

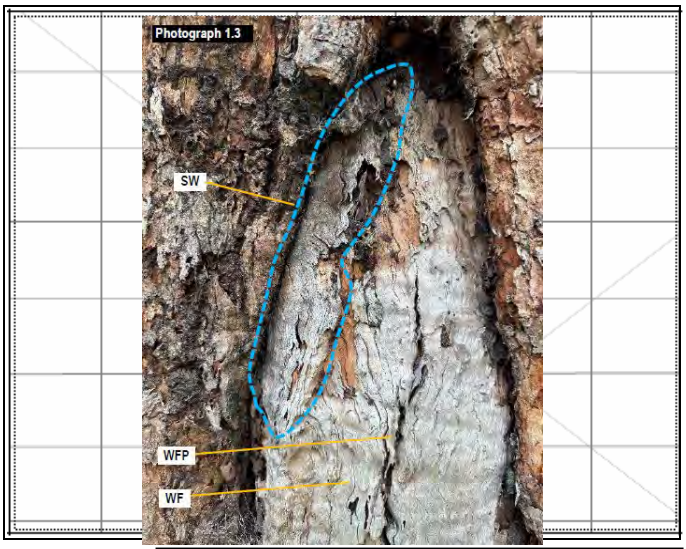
Site photographs



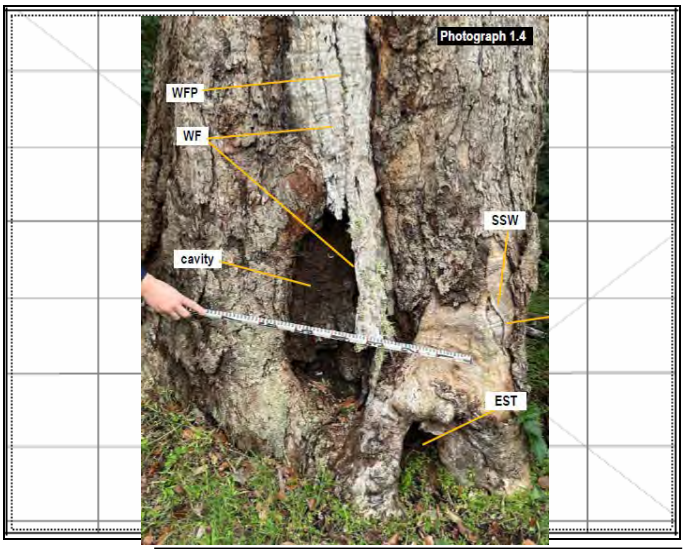
Description: View to north of scarred tree showing wound 1 (W1) on south side of trunk.



Description: View north of scarred tree wound 1 (W1). The yellow outline shows the ~extent of the initial wound



Description: Close up of wound 1 (W1) and fragmented wood face, a sapwood fragment was evident (blue outline)



Description: Wound 1 showing fragmented wound face squeezed by wound margins. A cavity in wound face is apparent

Site restrictions

Do you want to Restrict this site?: ☐

Restriction type: Gender ☐ N/A | General ☐ | Location ☐

Why is this site restricted?:

Further information contact

Title	Surname	First name
Ms.	O'Brien-Pounde	Phillipa

Organisation: EMM Consulting

Address: Ground Floor, 20 Chandos Street, St Leonards, NSW 2065

Phone: 0294939500 **E-mail:** pobrienpounde@emmconsulting.com.au

Site interpretation and community statement

The tree could be retained in situ reduced in height to 1m above the wound apex to reduce the loading from the crown or from damage as the branches decay and collapse which is likely to be unpredictable and could damage the cultural scar. The trunk section containing the wound could be retained ex situ with the trunk cut near ground and at 1 m above the wound apex to recover the wound baring section and for it to be retained on site or relocated to keeping place as determined by the Aboriginal stake holders.

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