



MAXWELL UNDERGROUND MINE PROJECT

APPENDIX B

Aboriginal Cultural Heritage Assessment



Prepared for
Malabar Resources Limited
ABN: 73 093 876307

AECOM

Maxwell Underground Mine Project

Mine Entry Area Modification

Aboriginal Cultural Heritage Assessment

3-Aug-2021

Muswellbrook Local Government Area

Near Jerrys Plains, Upper Hunter Valley

Author: Geordie Oakes (AECOM Principal Heritage Specialist)

Aboriginal and Torres Strait Islanders are warned that this publication may contain names and images of deceased people

Maxwell Underground Mine Project – Mine Entry Area Modification

Client: Malabar Resources Limited

ABN: 73 093 876 307

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3-August-2021

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Quality Information

Document Maxwell Underground Mine Project – Mine Entry Area Modification

Date 3-August-2021

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Reviewed by Andrew McLaren

Revision History

Rev	Revision Date	Details	Authorised
			Name/Position
A	30-June-2021	Technical Review	Andrew McLaren (Principal Heritage Specialist)
B	02-July-2021	Client Review	Malabar Resources Limited

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Executive Summary

AECOM Australia Pty Ltd (AECOM) was commissioned by Malabar Resources Limited (Malabar) to complete an Aboriginal Cultural Heritage Assessment (ACHA) for a modification (the Modification) to the approved Maxwell Underground Mine Project (the Project), a proposed underground coal mining operation, located east-southeast of Denman and south-southwest of Muswellbrook, within the Muswellbrook Shire Local Government Area (LGA), New South Wales (NSW) (Figure 1).

This ACHA forms part of a Modification Report that is being prepared to accompany Malabar's application to modify Development Consent for State Significant Development (SSD) 9526 under section 4.55(1A) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Modification Areas comprise four spatially discrete areas encompassing land required for proposed modifications to the mine entry area (MEA) (two minor areas approximately 4 ha) and the realignment of a minor section of the proposed access road to utilise an existing road the Maxwell Infrastructure (approximately 9.2 ha of an existing surface disturbance area) and repositioning of the water treatment facility (0.5 ha) at the Maxwell Infrastructure site. Combined, the Modification Areas cover an area of approximately 14 ha (with the majority of the area previously disturbed by mining). Land associated with the MEA Modification Area is approved for underground mining and has historically been used for grazing and is considered as limited past disturbance. Land within the Maxwell Infrastructure site (i.e. the proposed site access road realignment area and the repositioned water treatment plant for the Modification), has been previously disturbed as part of the former Drayton Mine and is considered highly disturbed.

A search of the AHIMS database was undertaken on 15 January 2021 for the Modification Areas inclusive of a 200 m buffer. Consideration of previously recorded "valid" Aboriginal sites based on AHIMS site coordinates and associated site cards/reports indicates that four AHIMS sites are located within or partially within the Modification Areas. All four comprise open artefact sites (i.e., -isolated artefacts and artefact scatters) including isolated artefact site "DS IF34 11" (#37-2-4359) and three artefact scatters sites "SC-OS-18 (#37-2-1937), "MAS 71" (#37-2-0415) and "DS AS79 11" (#37-2-4303).

Consideration of the location of these sites in relation to the proposed Modification indicates a total loss of value for site 37-2-4359, partial loss of value for site 37-2-1937 (previously approved for partial surface collection) and site 37-2-0415 and no loss of value for site 37-2-4303.

Malabar is committed to developing the Project with limited impacts to Aboriginal heritage values. The Modification was designed in consideration of:

- the location of known Aboriginal heritage sites (i.e. avoiding direct impact to artefacts associated with site 37-2-4303 through refinement of the underground portal design); and
- consideration of historical site disturbances.

The MEA layout was designed to avoid direct impacts to previously recorded Aboriginal artefacts associated with site 37-2-4303. The location of the access road and water treatment plant have been placed on areas of known mine disturbance and as such would not impacted Aboriginal heritage values.

A management strategy to address the impacts of the Modification on the known Aboriginal archaeological values of the Modification Areas is provided in Section 11.0. It is recommended the Project's existing Aboriginal Cultural Heritage Management Plan be updated to include this strategy. Key components of the strategy include the following.

Archaeological Salvage

An archaeological salvage program consisting of surface collection of portions of sites (37-2-1937, 37-2-0415 and 37-2-4359) impacted by the Modification should be undertaken for the Project prior to the commencement of any ground disturbance within the Modification Areas and following Development Consent. The salvage program should be completed in accordance with Section 3.2 of the approved Project ACHMP. Surface collection is considered an appropriate and effective mitigation option for these sites given their contents and level of scientific significance.

Previously Unrecorded Aboriginal Objects and Place

In the event that previously recorded Aboriginal objects or places are identified during the Project, the procedures outlined in Section 3.2 of the Project's approved ACHMP should be followed.

Management of Potential Human Remains

In the event that potential human skeletal remains are identified at any point during the life of the development, the procedures outlined in Section 3.2 of the Project's approved ACHMP should be followed.

AHIMS Site Cards

AHIMS site cards have been completed and submitted to the Heritage NSW for all recorded sites within the Modification Areas.

In the event that a previously unidentified Aboriginal site is discovered within the Modification Areas at any point during the operational life of the Project, an AHIMS site card for that site should be submitted to the Heritage NSW as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the Project.

Aboriginal Site Database

A comprehensive Aboriginal Site Database for the modified Project and its immediate environs be maintained over the life of the Project. Malabar is responsible for the creation and maintenance of this database which, at a minimum, contains the name, type, size (where applicable), MGA coordinates and status of all Aboriginal sites within and directly adjacent to the Project and its immediate environs. The database would continue to be regularly updated throughout the operational life of Project. Printed site lists and maps would be made available to RAPs upon request.

1.0 Introduction & Background

1.1 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Malabar Resources Limited (Malabar) to complete an Aboriginal cultural heritage assessment for a modification (the Modification) to the approved Maxwell Underground Mine Project (the Project), a proposed underground coal mining operation, located east-southeast of Denman and south-southwest of Muswellbrook, within the Muswellbrook Shire Local Government Area (LGA), New South Wales (NSW) (Figure 1).

This Aboriginal Cultural Heritage Assessment (ACHA) forms part of a Modification Report that is being prepared to accompany Malabar's application to modify Development Consent for State Significant Development (SSD 9526) under section 4.55(1A) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This ACHA documents the results of AECOM's assessment and has been compiled with reference to Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

1.2 Maxwell Underground Mine Project Overview

The approved Project is in the Upper Hunter Valley of NSW, east-southeast of Denman and south-southwest of Muswellbrook (Figure 1).

Development Consent SSD 9526 for the Project was granted by the Independent Planning Commission (IPC) on 22 December 2020. The Project was subsequently approved under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 10 March 2021 (EPBC 2018/8287).

The Project is an underground mining operation that is approved to operate for 26 years (until 2047). The Project involves extraction of run-of-mine (ROM) coal from four seams within the Wittingham Coal Measures, using the following underground mining methods:

- underground bord and pillar mining with partial pillar extraction in the Whynot Seam; and
- underground longwall extraction in the Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam.

The substantial existing Maxwell Infrastructure is approved for handling, processing and transportation of coal for the life of the Project. The Maxwell Infrastructure includes existing coal handling and preparation plant (CHPP), train load-out facilities and other infrastructure and services (including water management infrastructure, administration buildings, workshops and services).

The Project comprises the following main domains (Figure 2):

- Maxwell Underground – comprising the approved area of underground mining operations and the Mine Entry Area (MEA) within Mining Lease Application (MLA) 597.
- Maxwell Infrastructure – within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395 comprising the substantial existing infrastructure (including the CHPP) and previous mining areas.
- The transport and services corridor between the Maxwell Underground and Maxwell Infrastructure –within CL 229, MLA 597 and MLA 598 comprising the proposed site access road, a covered, overland conveyor, power supply and other ancillary infrastructure and services.
- The realignment of Edderton Road.

1.3 Modification

The Modification is located wholly within the approved Development Application Area, would not require a significant alteration to the Project and would comprise the following components (Figure 2):

- repositioning of the underground portal;
- realignment of a minor section of the access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to established mine rehabilitation;
- repositioning of part of the clean water diversions at the MEA;
- repositioning of the water treatment facility to the Maxwell Infrastructure site; and
- other minor works and ancillary infrastructure components within existing/approved surface development areas (e.g. works associated with the reconfiguration of the MEA, pumps/pipelines associated with the water treatment facility).

1.3.1 Underground Portal

A revised, proposed location for the underground portal (Figure 2) has been identified that would provide the following benefits:

- A safer, straight drift at a reduced grade that would remove the requirement for turning machinery along the decline.
- A small reduction in the time required to achieve first ROM coal.
- A reduction in capital costs associated with the structural support of the underground portal.
- A reduction in the number of conveyors and transfer stations required at the MEA due to the straight drift.

The proposed location of the underground portal is located partially outside of the approved surface development area and would require some other infrastructure to be repositioned within the MEA.

1.3.2 Maxwell Infrastructure

The Modification would also include the realignment of the site access road (within the transport and services corridor) along an existing internal haul road. The revised alignment of the site access road is shown on Figure 2. Realignment of the site access road would result in a reduction to the disturbance of previously rehabilitated areas at the Maxwell Infrastructure.

1.3.3 Water Management

Temporary and permanent up-catchment diversion structures would be constructed over the life of the Project to divert runoff from undisturbed areas around the MEA and the transport and services corridor. An approved clean water diversion around the MEA would be repositioned as part of the Modification to integrate with the reconfiguration of the underground portal. The proposed disturbance associated with the modified clean water diversion is shown on Figure 2.

The Modification would also involve the repositioning of the water treatment facility and associated ancillary infrastructure (e.g. pumps, pipelines) to previously disturbed land at the Maxwell Infrastructure. A treatment plant, would treat water for supply to underground mining operations (e.g. for cooling and underground dust suppression).

1.4 Modification Areas

The Modification Areas, as shown on Figure 3, comprise four spatially discrete areas encompassing land required for proposed modifications to the MEA (two minor areas approximately 4 ha) and the realignment of a minor section of the proposed access road to utilise an existing road at the Maxwell Infrastructure (9.2 ha of an existing surface disturbance area) and repositioning of the water treatment facility (0.5 ha) at the Maxwell Infrastructure site. Combined, the Modification Areas cover an area of approximately 14 ha (with the majority of the area previously disturbed). Land associated with the MEA Modification Area is approved for underground mining and has historically been used for grazing and is considered as limited past disturbance. Land within the Maxwell Infrastructure site (i.e., the proposed site access road realignment area and the repositioned water treatment plant for the Modification), has been previously mined as part of the former Drayton Mine and is considered highly disturbed.

Reference to the Geographical Name Register (GNR) of NSW indicates that the Modification Areas fall wholly within the boundaries of the Muswellbrook Shire Council LGA and are situated within the Parishes of Wynn and Savoy in the County of Durham. Surrounding suburbs include Edderton to the north, Jerrys Plains to the south, Howick to the east and Denman to the west.

1.5 Proponent and Planning Approval Process

Approval for the Modification is being sought under section 4.55(1A) of the EP&A Act. A Modification Report and supporting appendices are being prepared to accompany the application to modify Development Consent SSD 9526.

On 4 June 2021, Malabar provided a letter to the Department of Planning, Industry and Environment (DPIE) regarding the Modification, proposed approval pathway and the proposed scope of the environmental assessment, including the scope of this ACHA. DPIE subsequently provided a response to Malabar on 17 June 2021, confirming that DPIE agreed with the proposed approval pathway and outlined the environmental assessment matters to be considered as part of the Modification, including the preparation of this ACHA.

1.6 Assessment Objectives

The overarching objectives of this ACHA are as follows:

- to identify the Aboriginal cultural heritage values of the Modification Areas by way of background research and consultation with Registered Aboriginal Parties (RAPs);
- to assess the potential impact of the Modification on the identified Aboriginal cultural heritage values of the Modification Areas;
- to provide an appropriate management strategy for avoiding or minimising potential harm to the identified Aboriginal cultural heritage values of the Modification Areas; and
- to compile an ACHA that will assist the DPIE in their assessment of Malabar's modification application.

1.7 Scope of Current Assessment

This assessment has been undertaken in accordance with the environmental assessment matters outlined in the letter provided by DPIE, clause 60 of the NSW *National Parks and Wildlife Regulation 2019* (NPW Regulation) and with reference to the following guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b);
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia International Council on Monuments and Sites [ICOMOS] 2013);
- *Ask First: A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission 2002); and
- *Engage Early* (Australian Government Department of the Environment 2016).

As such, its key requirements have been:

- to conduct a search of Heritage NSW's Aboriginal Heritage Information Management System (AHIMS);
- to review the landscape context of the Modification Areas, with specific consideration to its implications for past Aboriginal land use;
- to review relevant archaeological and ethnohistoric information for the Modification Areas and their environs;
- to prepare a predictive model for the Aboriginal archaeological records of the Modification Areas;
- to review previous field investigations across the Project, the Modification Areas and surrounds;
- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Modification Areas;
- to provide RAPs with information about the scope of the proposed works and Aboriginal heritage assessment process;
- to facilitate a process whereby RAPs can:
 - contribute culturally appropriate information to the proposed assessment methodology;
 - provide information that will enable the cultural significance of Aboriginal objects and/or places within the Modification Areas to be determined;
 - have input into the development of cultural heritage management options; and
- to prepare and finalise an ACHA with input from RAPs.

1.8 Project Team

Geordie Oakes (Principal Heritage Specialist, AECOM) managed all aspects of the Aboriginal heritage assessment process and was the primary author of this ACHA. Dr Andrew McLaren (Principal Heritage Specialist, AECOM) provided technical review of this ACHA.

Geordie holds a Bachelor of Arts (Honours) degree in historic and prehistoric Archaeology from Sydney University and a Graduate Certificate in Paleo-anthropology from the University of New England. Geordie has over 13 years of Australian Aboriginal cultural heritage management experience.

Andrew holds a Bachelor of Arts (Honours) degree from the University of Queensland, a Masters of Cultural Heritage from Deakin University, and a PhD from the University of Cambridge in England and has over 10 years of Australian Aboriginal cultural heritage management experience.

1.9 Report Structure

This report contains twelve sections. This section, **Section 1.0**, has provided background information on the Project, the Modification and assessment undertaken. The remainder of this ACHA is structured as follows:

- **Section 2.0** outlines the statutory framework within which this assessment has been undertaken;
- **Section 3.0** details the Aboriginal community consultation program undertaken for this assessment;
- **Section 4.0** describes the existing environment of the Modification Areas and their associated archaeological implications;
- **Section 5.0** summarises relevant ethnohistoric information for the Modification Areas;
- **Section 6.0** describes the archaeological context of the Modification Areas on a regional and local scale. Predictions regarding the nature of the Aboriginal archaeological records within the Modification Areas are also provided;
- **Section 7.0** describes the results of previous archaeological surveys within the Modification Areas and surrounds;
- **Section 8.0** assesses the archaeological (scientific) and cultural significance of Aboriginal sites within the Modification Areas;
- **Section 9.0** provides an assessment of the potential impacts of the Modification on identified Aboriginal heritage values;
- **Section 10.0** provides details on the design of the Modification and strategies to avoid and minimise harm to Aboriginal heritage values;
- **Section 11.0** details an appropriate management strategy for the identified Aboriginal heritage values of the Project and the Modification Areas; and
- **Section 12.0** lists the references cited in-text.

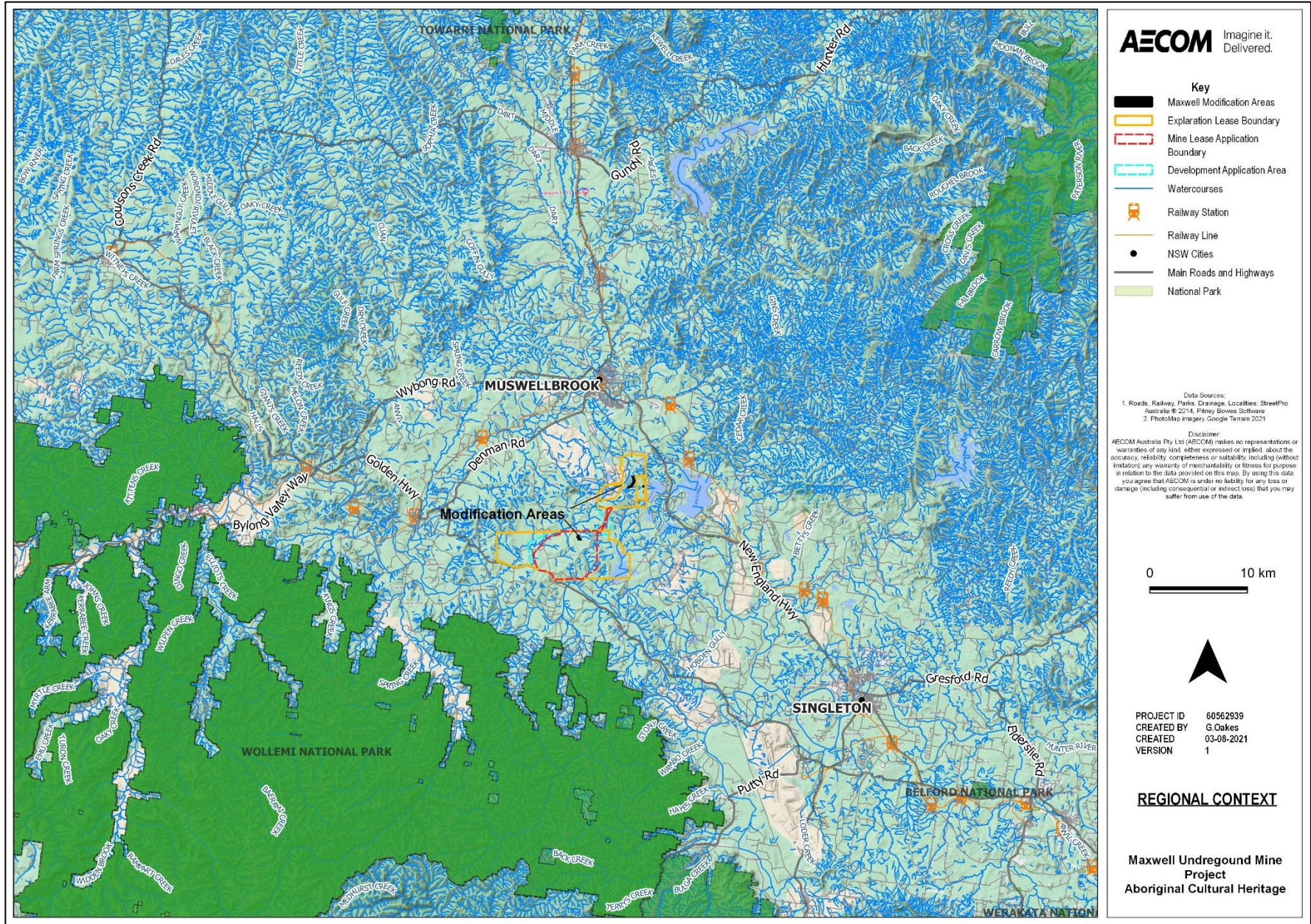


Figure 1 Regional context

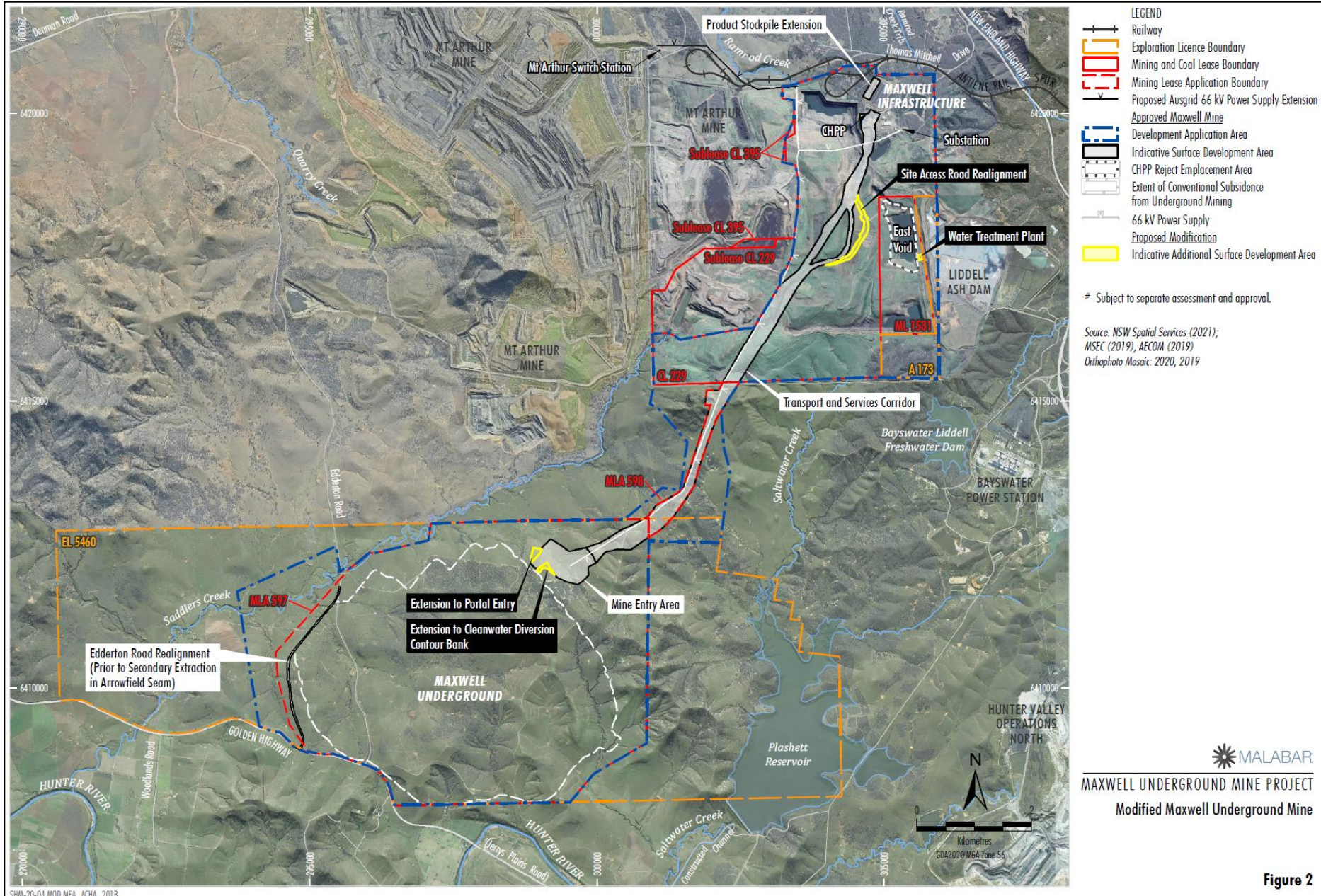


Figure 2 Project general arrangement (Source: Malabar 2021)

Figure 2

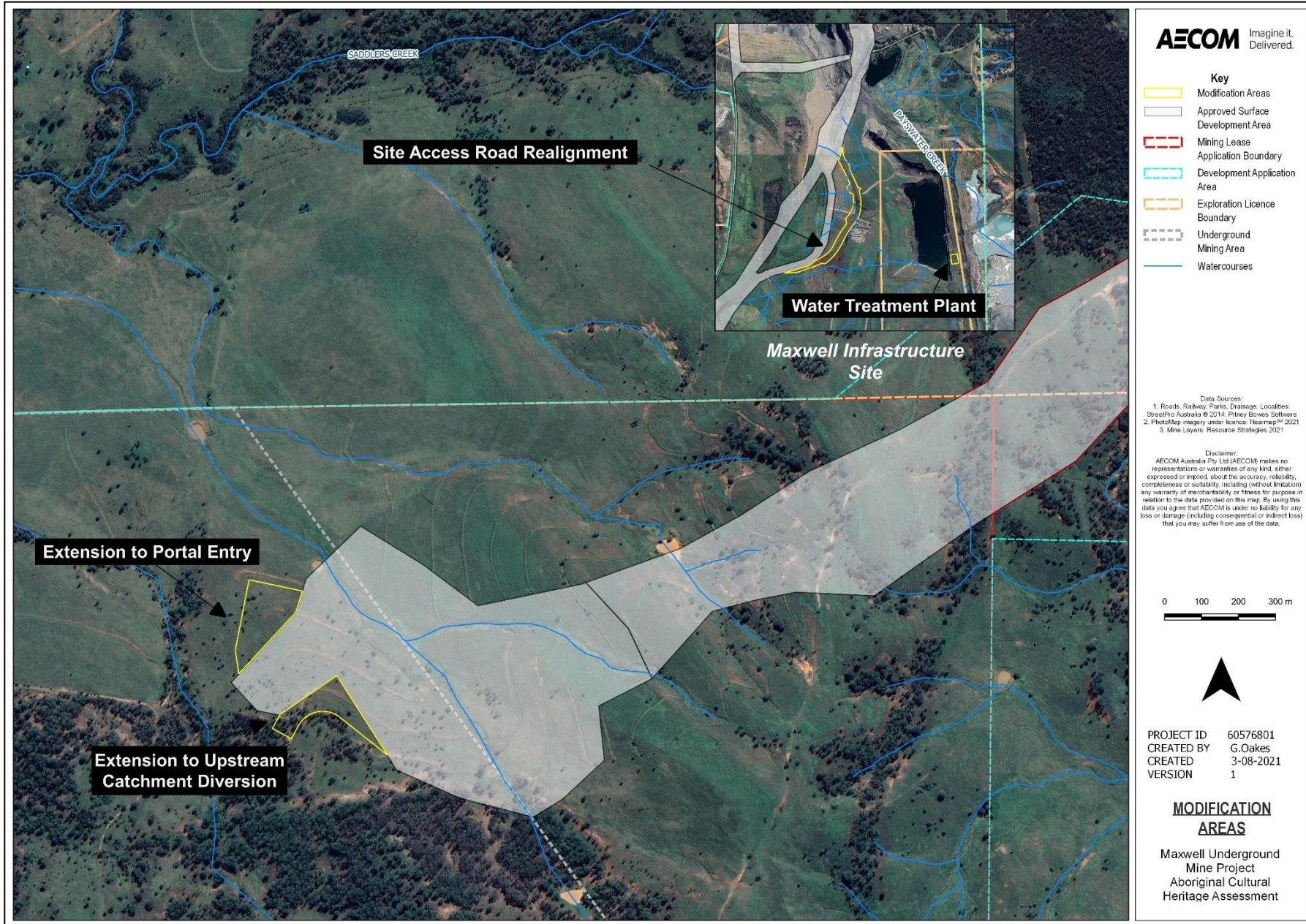


Figure 3 Modification Areas

2.0 Applicable Policy & Legislation

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the “*preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition*” (Part I, Section 4).

Under the ATSIHP Act, ‘*Aboriginal tradition*’ is defined as “*the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships*” (Part I, Section 3). A ‘*significant Aboriginal area*’ is an area of land or water in Australia that is of “*particular significance to Aboriginals in accordance with Aboriginal tradition*” (Part I, Section 3). A ‘*significant Aboriginal object*’, on the other hand, refers to an object (including Aboriginal remains) of like significance.

For the purposes of the ATSIHP Act, an area or object is considered to have been injured or desecrated if:

- a. *In the case of an area:*
 - i. *it is used or treated in a manner inconsistent with Aboriginal tradition;*
 - ii. *by reason of anything done in, on or near the area, the use or significance of the area in accordance with Aboriginal tradition is adversely affected; or*
 - iii. *passage through or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition; or*
- b. *In the case of an object – it is used or treated in a manner inconsistent with Aboriginal tradition;*

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Commonwealth Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long-term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate minister of that state or territory (Part 2, Section 13).

No declarations relevant to the Modification Areas have been made under the ATSIHP Act.

2.1.1.1 Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NT Act recognises native title for land over which native title has not been extinguished and where persons able to establish native title are able to prove continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUAs) to be formed as well as a framework for notification of native title Stakeholders for certain future acts on land where native title has not been extinguished.

Searches of the *Schedule of Applications (unregistered claimant applications)*, *Register of Native Title Claims*, *National Native Title Register*, *Register of Indigenous Land Use Agreements* and *Notified Indigenous Land Use Agreements* were undertaken in June 2021. No Native Title Registration Claims were identified in the Modification Areas for the Modification.

2.1.2 Environment Protection and Biodiversity Act 1999

Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a matter of National Environmental Significance may only progress with approval of the Commonwealth Minister for the Environment (or delegate). An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

- it is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- it is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; or
- it is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines ‘environment’ as incorporating both natural and cultural environments and therefore includes Aboriginal heritage. Under the EPBC Act, protected heritage items are listed on the National Heritage List (items of National significance) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate, which was closed in 2007 and is no longer a statutory list. Statutory references to the Register of the National Estate in the EPBC Act were removed on 19 February 2012. However, the Register of the National Estate remains an archive of over 13,000 heritage places throughout Australia.

Searches of the National Heritage List, Commonwealth Heritage List and Register of the National Estate were undertaken in June 2021, with no relevant listings identified for the Modification Areas.

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act, administered by DPIE, requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts are interpreted as including impacts to Aboriginal and non-Aboriginal (i.e., European) cultural heritage.

In accordance with Section 4.41 of the EP&A Act, Aboriginal Heritage Impact Permits (AHIPs) are not required for projects classified as SSD and approved under Part 4 of the EP&A Act (i.e. the Project). As the Project was granted under Part 4 of the EP&A Act impacts to Aboriginal heritage values associated would be managed under the approved Aboriginal Cultural Heritage Management Plan (ACHMP) required under the conditions of the Development Consent SSD 9526. The ACHMP is statutorily binding once approved by the DPIE.

2.2.2 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was established to return land in NSW to Aboriginal peoples through a process of lodging claims for certain Crown lands. The ALR Act, administered by the Special Minister of State, Minister for the Public Service and Employee Relations, Aboriginal Affairs, and the Arts, is a compensatory regime which recognises that land is of spiritual, social, cultural and economic importance to Aboriginal people. The ALR Act established the NSW Aboriginal Land Council (NSWALC) and a network of over 120 autonomous Local Aboriginal Land Councils (LALCs) and requires these bodies to:

- a. take action to protect the culture and heritage of Aboriginal persons in the LALC’s area, subject to any other law; and
- b. promote awareness in the community of the culture and heritage of Aboriginal persons in the LALC’s area.

LALCs constituted under the ALR Act can make claims. The Registrar of the ALR Act is responsible for maintaining the Register of Aboriginal Land Claims under section 166 of the ALR Act. All land claims that have been made since the Act came into force in 1983 have been recorded in the Register.

Consultation with the Registrar of the ALR Act in June 2021 has indicated that the Modification Areas do not have any Registered Aboriginal Owners pursuant to Division 3 of the ALR Act.

2.2.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Minister for Energy and Environment and the Special Minister of State, Minister for the Public Service and Employee Relations, Aboriginal Affairs, and the Arts, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives Heritage NSW and DPIE the joint responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- An *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- An *Aboriginal place* is a place so declared by the Minister administering the NPW Act because the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them and includes a 'strict liability offence' for such harm. A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted. Defences against the 'strict liability offence' in the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in clause 58 of the NPW Regulation, and the demonstration of due diligence.

An AHIP issued under section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened. Applications for an AHIP must be accompanied by assessment reports compiled in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b). Applications must also provide evidence of consultation with the Aboriginal communities. Consultation is required under Part 5 of the NPW Regulation and is to be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a). AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

As indicated in Section 2.2.1, pursuant to section 4.41 of the EP&A Act, AHIPs are not required for projects classified as SSD and approved under Part 4 of the EP&A Act, with impacts typically managed under ACHMPs required under the conditions of the consent.

Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances, including for SSD projects.

2.3 Local Government

2.3.1 Muswellbrook Local Environmental Plan 2009

Clause 5.10 of the *Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP) provides specific provisions for the protection of heritage items, heritage conservation areas, archaeological sites, Aboriginal objects and Aboriginal places of heritage significance within the Muswellbrook LGA.

Under subsection 2 of clause 5.10 of the Muswellbrook LEP, development consent is required for any of the following:

- a. *demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):*
 - (i) *a heritage item,*
 - (ii) *an Aboriginal object,*
 - (iii) *a building, work, relic or tree within a heritage conservation area,*
- b. *altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,*
- c. *disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,*
- d. *disturbing or excavating an Aboriginal place of heritage significance,*
- e. *erecting a building on land:*
 - (i) *on which a heritage item is located or that is within a heritage conservation area, or*
 - (ii) *on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,*
- f. *subdividing land:*
 - (i) *on which a heritage item is located or that is within a heritage conservation area, or*
 - (ii) *on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.*

In relation to Aboriginal heritage, subsection 8 of clause 5.10 of the Muswellbrook LEP states the consent authority must, before granting consent under this clause to the carrying out of development in an Aboriginal place of heritage significance:

- a. *consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and*
- b. *notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.*

Schedule 5 of the Muswellbrook LEP provides a list of heritage items, conservation areas and archaeological sites within the Muswellbrook LGA. A review of the list indicates there are no Aboriginal objects or places of heritage significance located within the Modification Areas.

The consent authority is required to comply with relevant requirements of clause 5.10 of the Muswellbrook LEP for the Modification.

The consent authority is required to comply with relevant requirements of Clause 5.10 for the Project.

3.0 Aboriginal Community Consultation

Aboriginal community consultation acknowledges the right of Aboriginal people to be involved, through direct participation, on matters that directly affect their heritage. Involving Aboriginal people in all facets of the assessment process ensures that they are given adequate opportunity to share information about cultural values, and to actively participate in the development of appropriate management and/or mitigation measures. The successful identification, assessment and management of Aboriginal cultural heritage values are dependent on an inclusive and transparent consultation process.

Aboriginal community consultation for the current assessment was undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a) (referred to as the Consultation Requirements in this Section) and clause 60 of the NPW Regulation. The results of the consultation process undertaken for the current assessment are detailed below.

Stage 1 of the Consultation Requirements was recently completed as part of the broader Maxwell Project ACHA and Malabar has maintained ongoing consultation and engagement with these groups since their individual expressions of interest (including during development of the approved ACHMP). A description of Stage 1 of the Consultation Requirements completed for broader Maxwell Project ACHA is provided in Section 3.1. Consultation with these same RAPs is considered appropriate for this Modification assessment.

3.1 Stage 1 - Notification and Registration

The aim of Stage 1 of the Consultation Requirements is to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Modification Areas.

3.1.1 Consultation with Regulatory Agencies

Section 4.1.2 of the Consultation Requirements stipulates that proponents are responsible for ascertaining, from reasonable sources of information, the names of Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places. Proponents are required to compile a list of Aboriginal people who may have an interest for the proposed Modification Areas and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places by writing to:

- a. the relevant regional office of the Heritage NSW;
- b. the relevant LALCs;
- c. the Registrar, ALR Act for a list of Aboriginal owners;
- d. the National Native Title Tribunal for a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements;
- e. NTSCORP Limited;
- f. the relevant local council(s); and
- g. the relevant catchment management authorities for contact details of any established Aboriginal reference group (now Local Land Services).

In accordance with this requirement, the following agencies were contacted via letter or email on 31 May 2018 for the Maxwell Project ACHA requesting information on relevant Aboriginal persons and organisations:

- Heritage NSW;
- Wanaruah Local Aboriginal Land Council (WLALC);
- Office of the Registrar, ALR Act (NSW);
- National Native Title Tribunal;
- NTSCORP Limited;

- Muswellbrook Shire Council;
- Singleton Council; and
- Hunter Local Land Services (HLLS).

Responses were received from four agencies for the Maxwell Project ACHA, including:

- Singleton Council responded on 5 June 2018 indicating the WLALC was the peak body representing Aboriginal people in the area;
- Office of Registrar responded on 6 June 2018 stating the Project does not have Registered Aboriginal Owners pursuant to Division 3 of the ALR Act and suggesting AECOM contact the WLALC;
- The National Native Title Tribunal responded on 13 June 2018 indicating that one Native Title Claimant was registered within the Modification Areas - Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People¹;
- Muswellbrook Shire Council responded on 15 June 2018 providing the names of two Aboriginal stakeholder groups - WLALC and Hunter Valley Aboriginal Corporation (Manager Ross Pahuru); and
- Heritage NSW responded on 15 June 2018 providing the contact details for 50 groups and individuals that may have an interest in the development.

In addition to the above, in July 2021 AECOM completed a search of the National Native Title Tribunal's online database (Native Title Vision) which holds a list of Native Title Registrations, Claims and Determinations and Indigenous Land Use Agreements. None of the above were mapped within the study area.

An updated letter the Office of Register was also mailed out in July 2021.

3.1.2 Public Notification

Section 4.1.3 of the Consultation Requirements requires that, in addition to writing to the Aboriginal people identified by the agencies listed in Section 3.1.1, the proponent must also place a notice in the local newspaper circulating in the general location of the proposed project. The notification must outline the project (or the Modification) and identify its location.

In accordance with this requirement, a public notice was placed in the Hunter Valley News on 20 June 2018 for the Maxwell Project ACHA. The closing date for registration via this notice was 4 July 2018, which provided the necessary minimum 14-day period for expressions of interest.

No responses were provided to the newspaper advertisement.

3.1.3 Invitations for Expressions of Interest

Section 4.1.3 of the Consultation Requirements requires that proponents must write to the Aboriginal people whose names were obtained through the regulatory agencies and the relevant LALC(s) to notify them of the proposed project and invite them to register an interest in participating in a process of community consultation.

In accordance with this requirement, on 15 June 2018, a letter inviting expressions of interest and containing summary information on the project was sent to all Aboriginal persons and organisations identified by the regulatory agencies for the Maxwell Project ACHA. A total of 50 Aboriginal stakeholders were invited to register an interest in being consulted. The closing date for registrations was 4 July 2018 allowing the necessary minimum 14-day period for expressions of interest.

A total of 28 Aboriginal organisations registered an interest in the Maxwell Project ACHA. Summary information on all RAPs, including registration dates, is provided in Table 1.

¹ It is understood that at the time of writing this report, this Native Title Application has been withdrawn.

Table 1 Registered Aboriginal Parties

Organisation	Registration Date	Method	Contact Person
DNC	19-Jun-18	Email	Paul Boyd
WLALC	20-Jun-18	Email	Jamie-Lee
Aboriginal Native Title Elders Consultants	20-Jun-18	Phone	John Mathews
Divine Diggers	20-Jun-18	Phone	n/a
Wallagan Cultural Services	20-Jun-18	Phone	Maree Waugh
Culturally Aware	20-Jun-18	Phone	Tracey Skene
ELM Corp	21-Jun-18	Email	Des Hickey
Wattaka Wonnarua Cultural Consultancy Services	21-Jun-18	Email	Des Hickey
Ungooroo Aboriginal Corporation	21-Jun-18	Email	Allen Paget
Tocomwall Pty Ltd/ Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People (PCWP)	21-Jun-18	Email	Scott Franks
AGA Services	24-Jun-18	Email	Ashley Sampson
Cacatua	24-Jun-18	Email	George Sampson
Hunter Valley Aboriginal Corporation	27-Jun-18	Email	Ross Pahuru
Lower Hunter Wonnarua Cultural Services	28-Jun-18	Email	n/a
Murra Bidgee Mullangari	28-Jun-18	Email	Ryan Johnson
Ungooroo culture & community service	28-Jun-18	Email	Rhonda Ward
Gidawaa Walang Cultural Heritage Consultancy	29-Jun-18	Email	Craig Horne
Yinarr Cultural Services	29-Jun-18	Email	Kathie Steward Kinchela
Merrigarn	02-Jul-18	Email	Shaun Carrol
Muragadi	03-Jul-18	Email	Jessie Carrol-Johnson
Wailwan Aboriginal Digging Group	04-Jul-18	Phone	Phil Boney
Amanda Hickey Cultural Services	04-Jul-18	Email	Amanda Hickey
A1 Indigenous Services	04-Jul-18	Email	Carolyn Hickey
Widescope	03-Jul-18	Email	Steven Hickey
Kauwul Wonn1	8-Jul-18	Email	Suzie Worth for Arthur Fletcher
Gomeroy Cultural Consultants	18-Jul-18	Email	Dave Horten
Aliera French Trading	20-Aug-18	Email	Aliera French
Wonnarua Elders Council	2020	Phone	Richard Edwards

3.1.4 Notification of Registered Aboriginal Parties (RAPs)

Section 4.1.6 of the Consultation Requirements requires that the proponent make a record of the names of each Aboriginal person who registered an interest and provide a copy of that record, along with a copy of the Expression of Interest (EOI) letter forwarded to the Aboriginal parties, to the relevant Heritage NSW regional office and the LALC. Section 4.1.5 of the Consultation Requirements provides the opportunity for Aboriginal persons to withhold their details from being forwarded to these parties.

In accordance with these requirements, on 20 September 2018, a list of all RAPs that had not requested their details be withheld was forwarded to the relevant Heritage NSW regional office and the WLALC. A copy of the EOI letter and the newspaper advertisement was included in this correspondence.

3.2 Stage 2 - Presentation of Information about Project

The aim of Stage 2 of the Consultation Requirements is to provide RAPs with information about the scope of the proposed project and the proposed cultural heritage assessment process.

For the current assessment, presentation of information about the Modification Areas and proposed development was provided to RAPs as part of the consultation requirements for the draft assessment methodology. The draft assessment methodology was sent to all RAPs on 26 May 2021 and in addition, a RAP information session was also held at the Maxwell Infrastructure site office on Friday 18 June 2021. Representatives from Hunter Valley Aboriginal House Corporation (Allen Smith), AGA Services (Ashley Sampson), and Cacatua (George Sampson) attended the meeting.

3.3 Stage 3 – Gathering Information about Cultural Significance

The aim of Stage 3 of the Consultation Requirements is to facilitate a process whereby RAPs can:

- a. contribute to culturally appropriate information gathering and the assessment methodology;
- b. provide information that will enable the cultural significance of Aboriginal objects and/or places within the Modification Areas to be determined; and
- c. provide input into the development of any cultural heritage management measures.

For current assessment, consultation with RAPs regarding the cultural heritage values of the Modification Areas included:

- a request with the draft assessment methodology for any initial comments regarding the Aboriginal cultural heritage values of the Modification Areas;
- a request during the information session held on Friday 18 June 2021 for any information regarding the Aboriginal cultural heritage values of the Modification Areas;
- discussion of cultural heritage values during AECOM's (2012; 2018) fieldwork;
- offers made to RAPs for private interviews, in case the information is considered culturally sensitive; and
- provision of the draft ACHA to all RAPs for comment prior to finalisation.

Existing publicly available information from previous studies in the Modification Areas, as well as the surrounds, was also reviewed for information regarding the Aboriginal cultural heritage values of the Modification Areas. This included review of the *Aboriginal Archaeological and Cultural Heritage Impact Assessment* (AECOM 2012, 2015) completed for the Drayton South Coal Project, which encompassed the current Modification Areas. AECOM (2018) also completed a cultural values report for the Maxwell Project ACHA which included the current Modification Areas.

3.3.1 Draft Assessment Methodology

Sections 4.3.1 and 4.3.2 of the Consultation Requirements require that the proponent present and/or provide the proposed draft ACHA methodology (Appendix A) for the cultural heritage assessment to RAPs. It also requires the RAPs be given a minimum of 28 days to review and provide feedback on this methodology.

All RAPs for this ACHA were provided the proposed draft ACHA methodology on 26 May 2021 (either by email or mail). RAPs were given a minimum of 28 days to review and provide feedback on this methodology with the closing date for comments on 23 June 2021.

Two responses were received from RAPs relating to the proposed draft ACHA methodology. No specific cultural heritage values relating to the Modification Areas were identified by RAP that provided responses. The responses are summarised in Table 2, with written responses attached in Appendix A.

Table 2 RAP responses to draft methodology

Registered Aboriginal Party	Date	Method	Summary of response	AECOM Response
Culturally Aware	26/05/2021	Email	"Thanks I will review and get back to you also shall have chat soon it's been hectic"	n/a
A1 Indigenous Services	7/06/2021	Email	"I have reviewed the document and support the Methodology"	n/a

3.4 Stage 4 - Review of Draft Assessment Report

The aim of Stage 4 of the Consultation Requirements is to prepare and finalise an ACHA with input from RAPs.

In accordance with Section 4.4.2 of the Consultation Requirements, all RAPs were sent a draft of this ACHA on 2 July 2021 for review and comment (either by email or mail). RAP responses are summarised in Table 3 with written and verbal responses attached as Appendix B. All consultation undertaken for this ACHA is also provided in Appendix C. A total of three responses were received.

Table 3 RAP responses to draft ACHAR

Registered Aboriginal Party	Date	Method	Summary of response	AECOM response
Tocomwall	2/07/2021	Email	"Thank you for sending this over. Tocomwall on the behalf of the PCWP cannot support the recommendations. Could you also send me a map of all crown lands and TSRs with the proposed boundary of the mine? Also until such time as the Peter Kuskie report is reference in the draft including a fully including its findings of that assessment we could not support this project. The kuskie assessment is be held by resource strategy and has and is being withheld from the Raps and Planning NSW to date, could you also	"Thanks Scott. I can confirm there is no Crown Land or Travelling Stock Reserves within the Modification Area (Figure 1). With reference to the report completed by Peter Kuskie, I understand that this assessment is in draft form that is not publicly available and is for the Spur Hill Underground Project, a project located to the west of the Maxwell Underground Mine Project (Figure 2). The existing Gateway Certificate and Mining Lease Applications (MLAs) for the Spur Hill Underground Project were based on a 'stand-alone' project with the surface infrastructure positioned in the

Registered Aboriginal Party	Date	Method	Summary of response	AECOM response
			provide a copy of that assessment to all raps."	northwest of its proposed Mining Lease. The applications for this project have now been withdrawn and if resubmitted would be subject to significant redesign."
Muragadi	5/07/2021	Email	"I agree with the recommendations made"	None required
Kauwul Wonn1	29/07/2021	Email	"Yes we are happy to move forward with ACHA with this Project at this point in time"	None required

4.0 Landscape Context

This section reviews the landscape context of the Modification Areas as a basis for predicting the character of past Aboriginal occupation within it and its associated archaeological record. Consideration of the landscape context of the Modification Areas is predicated on the now well established proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local floral and faunal communities will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country. Amongst other things, these variables will have affected the availability of suitable campsites, drinking water, economic² plant and animal resources, and raw materials for the production of stone and organic implements. At the same time, an assessment of historical and contemporary land use activities, as well as geomorphic processes such as soil erosion and aggradation, is critical to understanding the formation and integrity of archaeological deposits, as well as any assessments of Aboriginal archaeological sensitivity.

4.1 Physical Setting

The Modification Areas, as shown on Figure 3, comprises four spatially discrete areas encompassing land required for proposed modifications to the MEA (two minor areas approximately 4 ha) and the realignment of a minor section of the proposed access road to utilise an existing road the Maxwell Infrastructure (approximately 9.2 ha of an existing surface disturbance area) and repositioning of the water treatment facility (0.5 ha) at the Maxwell Infrastructure site. Combined, the Modification Areas cover an area of approximately 14 ha (with the majority of the area previously disturbed). Land associated with the MEA Modification Area is approved for underground mining and has historically been used for grazing and is considered as limited past disturbance. Land within the Maxwell Infrastructure site (i.e., the proposed site access road realignment area and the repositioned water treatment plant for the Modification) has been previously disturbed as part of the former Drayton Mine and is considered highly disturbed.

Reference to the GNR of NSW indicates that the Modification Areas falls wholly within the boundaries of the Muswellbrook Shire Council LGA and is situated within the Parishes of Wynn and Savoy in the County of Durham. Surrounding suburbs include Edderton to the north, Jerrys Plains to the south, Howick to the east and Denman to the west.

4.2 Topography

The Modification Areas are located approximately 10 kilometre (km) south of the town of Muswellbrook within Central Lowlands of the Hunter Valley (Story, Galloway, van de Graaf, & Tweedie 1963). Topography within the MEA consists of the middle slope portion of the northern flank of a broad ridgeline that runs through the eastern part of the Project boundary. The area is cross-cut with multiple historical farm related contour drains.

Topography within the Maxwell Infrastructure site, in particular where the Modifications Areas are planned has largely been disturbed and today consists of highly disturbed mine land along with areas of rehabilitation. North of the site office, sections of land retain some degree of integrity comprising slopes associated with a ridgeline located outside the mine site. However, it is noted that no project disturbances are planned for undisturbed land within the Maxwell Infrastructure site.

Elevations across the MEA range from approximately 170 metres (m) Australian Height Datum (AHD) to 186 m AHD, providing a total local relief of 16 m (Figure 4 and Figure 5). Elevations across the Maxwell Infrastructure site range from 162 to 264 m AHD, providing a total local relief of 102 m. Following Speight (2009), a breakdown of the relative representation of morphological landform units within the Modification Areas is provided in Table 4. Identified landform units, meanwhile, are shown on Figure 5.

²i.e., edible and/or otherwise useful (e.g., medicine, clothing).

Table 4 Morphological landform units within the Modification Areas

Landform unit	Area (ha)	%
Disturbed	14.2	77.2
Middle	4.2	22.8
Total	18.4	100

4.3 Hydrology

The Modification Areas are located within the Hunter River catchment, with the Hunter River located around 4 km south of the MEA. The Hunter River is the most significant watercourse in the Hunter Valley Region, and in the area near the Modification Areas generally flows in west to east direction through a channel approximately 30 m wide and 3-6 m deep. The Hunter River cuts across a well-developed floodplain, which can be up to several kilometres wide at its widest point.

The closest watercourse to the Modification Areas is Saddlers Creek which is located approximately 1 km north of the MEA. Saddlers Creek flows intermittently and is a fourth order stream to the north of the MEA and a fifth order stream downstream of Edderton Road (closer to the Hunter River). Saddlers Creek is fed by a number of minor ephemeral creeks and drainage lines, one of which is located approximately 90 m east of the MEA and comprises a first order stream. The drainage channel is dry for much of the year and likely only flows after large rain events when it will feed Saddlers Creek. The channel shows evidence of heavy erosion associated with historic native vegetation clearance activities, particularly along its mid and lower reaches.

Within the Maxwell Infrastructure site, no unmodified watercourses are present with all historical alignments having been altered as part of mine-related disturbances and subsequent rehabilitation activities. Prior to mining and rehabilitation, the principal watercourse associated with the Maxwell Infrastructure site was Ramrod Creek, a fourth order creekline that flowed in a north westerly direction from the Maxwell Infrastructure to its junction with the Hunter River 8 km to the north-west.

4.4 Geology

Reference to the Singleton 1:250,000 geological mapsheet (Singleton 1:250,000 Geological Series Sheet SI 56-1) indicates that the surface geology of the MEA comprises Permian coal measures (Ps), of which the Singleton Supergroup (formerly known as the Singleton Coal Measures) comprises the overwhelming majority. The Singleton Supergroup incorporates several geological sub-groups including the Newcastle Coal Measures, Tomago Coal Measures, Watts Sandstone and the Wittingham Coal Measures. Lithic materials associated with the Singleton Supergroup include coal seams, claystone, siltstone, sandstone, conglomerate, tuff, and shale. For the Maxwell Infrastructure site, prior to mine related impacts the surface geology comprised Muswellbrook Coal Measures and Branxton Formation lithics including mudstone, sandstone and conglomerate. The geology of much of this area now comprises a mixture of original surface geology and underlying rock material that have been utilised in the rehabilitation process.

Two geological features of note are associated with the Modification Areas and are likely to have had a direct bearing on the nature and composition of any Aboriginal stone assemblages found within it: the Hunter River Gravels, and two identified sources of silcrete and tuff cobbles located within 6 km of the MEA. The Hunter River gravel deposits, which occur along and adjacent to the River in the form of gravel banks and elevated “palaeochannel remnants”, contain a range of rock types suitable for flaked and/or edge ground stone tool manufacture, with two of the most commonly exploited materials comprising silicified tuff and silcrete. Other, less commonly utilised materials include chert, chalcedony, quartz, quartzite, petrified wood, basalt and other volcanics. Clasts are typically rounded to well-rounded in shape and range in size from pebbles to boulders. Gravel locations have been noted at Muswellbrook, Denman, Jerrys Plains and Singleton (Dean-Jones & Mitchell 1993).

Compared with those associated with Sydney's Hawkesbury-Nepean river system and its major tributaries, the gravels of the Hunter River have been subject to little concentrated research, with the most notable investigations to date undertaken as part of archaeological salvage projects and geological assessments linked to sand and gravel extraction (e.g., Brownlow, 1980; Esteves, 1998; MacRae, 1989; McDonald & Davidson, 1998; Webb, 1989; White, 1998; see also Raggatt, 1938).

Naturally occurring outcrops of silcrete cobbles have been identified at two confirmed locations in the local area, one approximately 3 km west and another approximately 6 km to west. Neither site has been subject to intense study, with the source of the cobbles not determined. However, both these natural outcrops of silcrete show evidence of exploitation and would have been a source of raw material for stone tool production and are an important factor in characterising the local archaeology.

4.5 Soils

Reference to the 1:250,000 Singleton Soil Landscape Series Sheet (SI 56-1) (Kovac & Lawrie 1991) indicates that soils within the MEA form part of the Brays Hill soil landscapes. The Brays Hill soil landscape is characterised by red clays (*Vertosols*) on the mid-slopes, black earths on steeper slopes and grey and brown clays (*Vertosols*) with linear gilgai (minor ephemeral water bodies) and yellow solodic soils (soils with a strong texture contrast between the A and B horizon and a bleached A2 horizon) (*Sodosols*) on some lower slopes. The crests and upper slopes are characterised by red-brown earths (*Chromosols and Dermosols*) and alluvial soils are present in drainage lines. Soil erodibility varies from low to moderate throughout the soil landscape, although Alluvial subsoils have a high level of erodibility (Environmental Earth Sciences NSW 2012). Soils on cleared hillslopes are susceptible to minor sheet erosion and drainage lines may have moderate gullying. Potential for mass movement of soils is moderate to low (Kovac & Lawrie 1991). Both erosion and mass movement of soils are factors that potentially contribute to disturbance of archaeological sites.

Soils across the Modification Areas within the Maxwell Infrastructure site have been, for the most part, disturbed with topsoils removed and surface materials comprising a mixture of original surface geology (Liddell and Bayswater soil landscapes) and underlying rock material that have been utilised in the rehabilitation process.

A large number of archaeological sites within the Hunter Valley occur within texture contrast (duplex) soils (Hughes 1984, Koettig & Hughes 1985). Texture contrast soils, as defined by Hughes (1984), consist of an A horizon of massive, sandy to silty material overlaying a B horizon of clayey material with a blocky structure. These soils are prevalent in the Central Lowlands and mantle the undulating to hilly landscapes on Permian and Carboniferous rocks and the older alluvial terraces and valley fills (Hughes 1984). Archaeological excavations in the Hunter Valley have consistently shown Bondaian assemblages, dated to the late Holocene, associated with the A soil horizon. This result has led Hughes and others to conclude that soil materials that make up the A horizon are sedimentary in origin and have accumulated over the last 5,000 years (Hughes 1984).

Texture contrast soils (particularly the A horizon, due to its loose sandy and silty material) are prone to extensive erosion resulting in the exposure and subsequent disturbance of subsurface archaeological deposit in its original context. During excavations in the Modification Areas in the mid-1980s, Hughes (1984) noted that sheet erosion was the dominant erosional process in the area, resulting in the partial stripping of A horizon soils, with only a little deep riling and gullying of the underlying B unit.

As in other parts of the Hunter Valley, existing archaeological, environmental and historic reference materials for the Modification Areas suggest that a range of geomorphic processes are likely to have affected the Aboriginal archaeological record of the site. Potentially significant phenomena from an archaeological perspective include bioturbation, erosion, alluvial/colluvial aggradation and aeolian processes. Possible effects of these processes include:

- increased archaeological site visibility in eroded areas;
- reduced archaeological site visibility in areas of sediment deposition;
- horizontal and vertical translocation of artefacts;

- stratigraphic mixing;
- truncation of archaeological deposits; and
- creation of thicker (potentially stratified) archaeological deposits in floodplain, slope base and fluvial/aeolian sand deposit contexts.

4.6 Flora & Fauna

Native vegetation within the Modification Areas has been significantly modified as a result of historic European land use practices. In the MEA, the current vegetation comprises sparse patches of Dry Sclerophyll Forest as well as managed and unmanaged native/exotic grasses with forest typically found in gully and riparian areas that have historically been difficult to farm (Hunter Eco 2019). Vegetation in the Maxwell Infrastructure site largely comprises recently planted rehabilitation vegetation with minor patches of regenerating woodland in the north.

The flora assessment completed by Hunter Eco (2019) for the Project indicates that Dry Sclerophyll Forest in the MEA and surrounds is dominated by White Box, Narrow-leaved Ironbark, Blakely's Red Gum shrubby open forest commonly found in the central and upper Hunter Valley. Native derived grassland, typically located between patches of forest and woodland, is largely dominated by a variety of native perennial grass and forb species but many exotic species are also present as is typical of grazing lands (Cumberland Ecology 2012).

Although available historical records provide only limited insight into Aboriginal exploitation of plants within the Hunter Valley (Brayshaw 1987: 74), it can be confidently asserted that the original vegetation communities of the Modification Areas and surrounds will have supplied Aboriginal people camping within, and passing through the site, with an extensive array of edible and otherwise useful plant species. Recorded native vegetation communities and locally occurring wetland will likewise have supported a large and diverse range of economic terrestrial, aquatic and avian fauna. Historical evidence for the Aboriginal exploitation of faunal and floral resources within the Hunter Valley is discussed in further detail in Section 5.3.

4.7 Historical Context

The Hunter region was initially identified as an area of rich resources in 1797 when Lieutenant John Shortland found coal at the mouth of the Hunter's River, as it was then known. A convict settlement was established at the mouth of the River in 1801 to gather coal and timber and burn shells for lime (Hunter 2010: 6).

The 1810s saw increased pressure on land around Sydney, especially following several years of drought. The farmers on the Hawkesbury River around Windsor petitioned Governor Macquarie to allow exploration inland. In 1819, Macquarie authorised men to find an overland route into what is now the Hunter Valley. The leader of this party, Windsor chief constable John Howe, exclaimed it was the best pasture he had seen since leaving England. Confirmation of the overland route was undertaken in 1820 (Hunter 2010:7). Macquarie rewarded the men in this second party with land grants around the area now known as Singleton.

Land was quickly surveyed and by 1823 grants along rivers and creeks had been issued. Settlement, however, seems to have been made at a slower pace. A traveller in 1827 said that the area was inhabited by single shepherds with their flocks (Hunter 2010:8).

In 1829, Jerrys Plains was surveyed as a town, although it had been a campsite for travellers for some years previous. The town was not proclaimed until 1840 and official grants were not given until several years later. Despite the absence of official land ownership, development of the town continued.

Muswellbrook was proclaimed in 1833, although again, there had been earlier settlement in the vicinity. The surrounding area was largely used for grazing and cropping, with an increasing focus on dairying. Coal mining began in the 1890s but did not become prolific until more recently.

Reference to the map of the Parish of Wynn indicates that the MEA was originally part of a 2,560 acre land grant to George Bowman and was part of the historic Arrowfield Estate. The property was subsequently purchased by a Mr Ryder, and Edderton Homestead was then built in 1908 (approximately 4 km west of the Modification Areas). Ryder named the property after the Edderton Meat Works in Brisbane, one of his business interests. It was then acquired by a Mr Osborne.

The property was acquired by the McDonald family c. 1910 and increased in acreage. It was purchased by Hector Cameron McDonald and then passed on to his son Douglas. When first purchased by McDonald, the property was approximately 4,000 acres. Over a period of 25 years, McDonald consolidated Edderton with other lands into a large pastoral property, increasing it to about 13,000 acres. Originally, McDonald ran about 16,000 sheep and today a six stand galvanised iron shearing shed remains, together with the old shearers' quarters. After some time, sheep were replaced by cattle as a result of the damage caused to the land. The homestead was extended by the McDonalds from its original four rooms. The building is of quite unusual detail and is in excellent condition. Following World War 2, the Edderton property steadily became less economically viable and was gradually broken up.

Reference to parish maps for Brougham and Savoy indicates that the majority of land within the Mawell Infrastructure site was acquired by the White family initially by the parents James White who arrived in Sydney in 1826 on the *Fairfield* and wife Sarah nee Crossman, and later their sons, brothers James, George and Francis. The brothers leased property Belltrees, near Scone later purchasing it. From the late 1840's the brothers acquired freehold properties in the Hunter District including Edinglassie, Merton and Dalwinston as well as land within the study area (Rutledge, 1976). In total by 1885 the family had over 35,000 acres. The family initially ran sheep on the properties but in the 1880's began farming cattle for which they began known and enjoyed a great deal of success (Tickle, 2005). Son James later was a notable horse breeder and racer. Francis was well known in public matters in Muswellbrook where he was chairman of the bench of magistrates and president of the hospital board and the agricultural society. By the 1950s most of the family had sold off their properties (Tickle, 2005).

4.8 Land Use

The current dominant land uses within the MEA is cattle/sheep grazing and is approved for underground mining and associated infrastructure. Since European settlement of the area in the 1820s, the flora and fauna, hydrology regimes and general landform have been subject to considerable modification as a result of European agricultural activities. Within the Maxwell Infrastructure site land use over the past 40 years has been mining.

Together with available documentary sources and field observations, historical aerial photographs provide a framework for assessing the nature and extent of previous land disturbance across the Modification Areas. Examination of aerial photographs from 1958 (Figure 8), 1967 (Figure 9), 1974 (Figure 10), 1989 (Figure 11), 1998 (Figure 12), and 2009 (Figure 13) provided below, attest to a range of land use activities and associated ground surface impacts across the site including:

- extensive native vegetation clearance (prior to 1958);
- pastoral activities including livestock grazing, fencing, the construction of multiple farm dams and contour banks for erosion control;
- fluvial erosion activity, particularly along creeklines and on cleared hillslopes; and
- construction of the former Drayton Mine and associated coal mining activities in the mining lease areas and minor excavation for exploratory drilling activities in the Maxwell Underground area.

To varying degrees, all the above-cited land use activities and associated ground impacts are relevant to the survival, integrity and identification of Aboriginal archaeological evidence within the Modification Areas. Key implications for the current assessment include:

- the likely destruction, in areas of grossly modified terrain, of any pre-existing sites and deposit(s);
- the disturbance of pre-existing archaeological deposits through both direct (e.g., ploughing, bulldozing) and indirect (e.g., erosion) means, resulting in a loss of archaeological integrity;
- the likely removal of any culturally scarred trees that once existed within the Modification Areas; and

- an increase, in areas affected by erosion, of archaeological site visibility.

A disturbance map combining these various ground surface impacts is provided as Figure 14. Levels of disturbance are defined as:

- **High** - Severe disturbance to natural soil profiles including complete-to-near complete topsoil loss through erosion, earthworks, buildings, vehicle tracks and dams; and
- **Low** - Cleared and/or grazed at some time.

4.9 Key Observations

Key observations to be drawn from a review of the existing environment of the Modification Areas are as follows:

- Topography within the MEA consists of a portion of middle slope of the northern flank of a broad ridgeline that runs through the eastern part of the Maxwell Underground area. Topography within the Maxwell Infrastructure site has largely been altered and today consists of rehabilitated and highly disturbed mine land.
- No watercourses are located directly within the Modification Areas. The closest watercourse to the MEA is a first order drainage channel located approximately 90 m to the east.
- For the Modification Areas within the Maxwell Infrastructure site, no unmodified watercourses are present with all historical alignments having been altered as part of mine-related disturbances and subsequent rehabilitation activities
- Reference to the Singleton 1:250,000 geological mapsheet indicates that the surface geology of the MEA comprises Permian coal measures.
- Prior to mine related impacts at the Maxwell Infrastructure site, the surface geology comprised Muswellbrook Coal Measures and Branxton Formation lithics including mudstone, sandstone and conglomerate. The geology of much of this area now comprises a mixture of original surface geology and underlying rock material that have been utilised in the rehabilitation process.
- Three geological features of note are associated with the Modification Areas and are likely to have had a direct bearing on the nature and composition of any Aboriginal stone assemblages found within it: the Hunter River Gravels, and two identified sources of silcrete and tuff cobbles near the MEA (within 6 km).
- Prior to European settlement, the floral and faunal resources of the Modification Areas and environs would have been sufficient to facilitate intensive and/or repeated occupation by Aboriginal people.
- Examination of historical aerial imagery for the MEA indicates a range of minor historical land use activities and associated ground surface impacts. Activities/impacts include native vegetation clearance, the construction of farm dams, contours and erosion. However, the majority of land within the MEA retains moderate integrity. Meanwhile, the majority of land within the Maxwell Infrastructure site is considered highly disturbed.

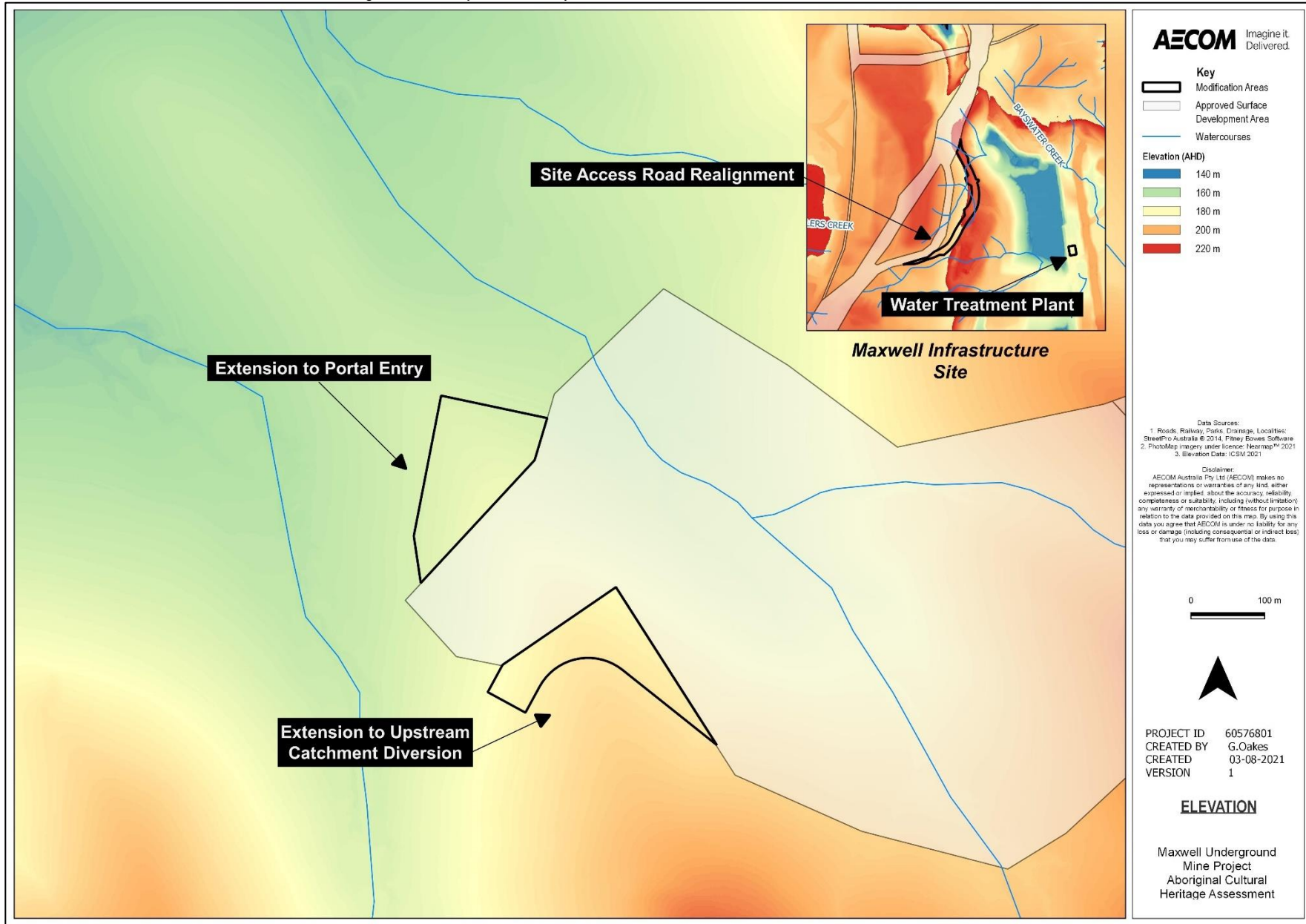


Figure 4 Elevation

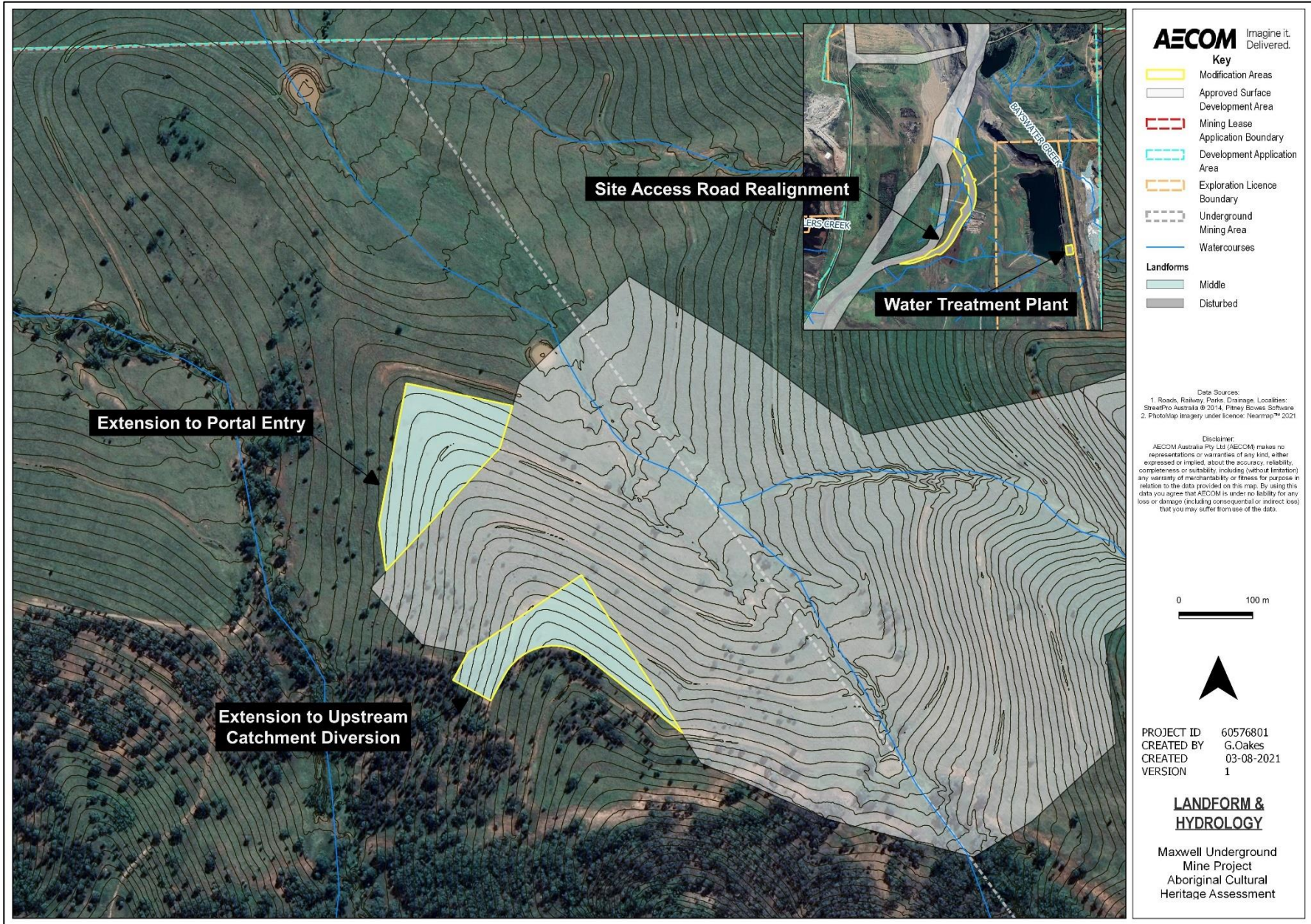
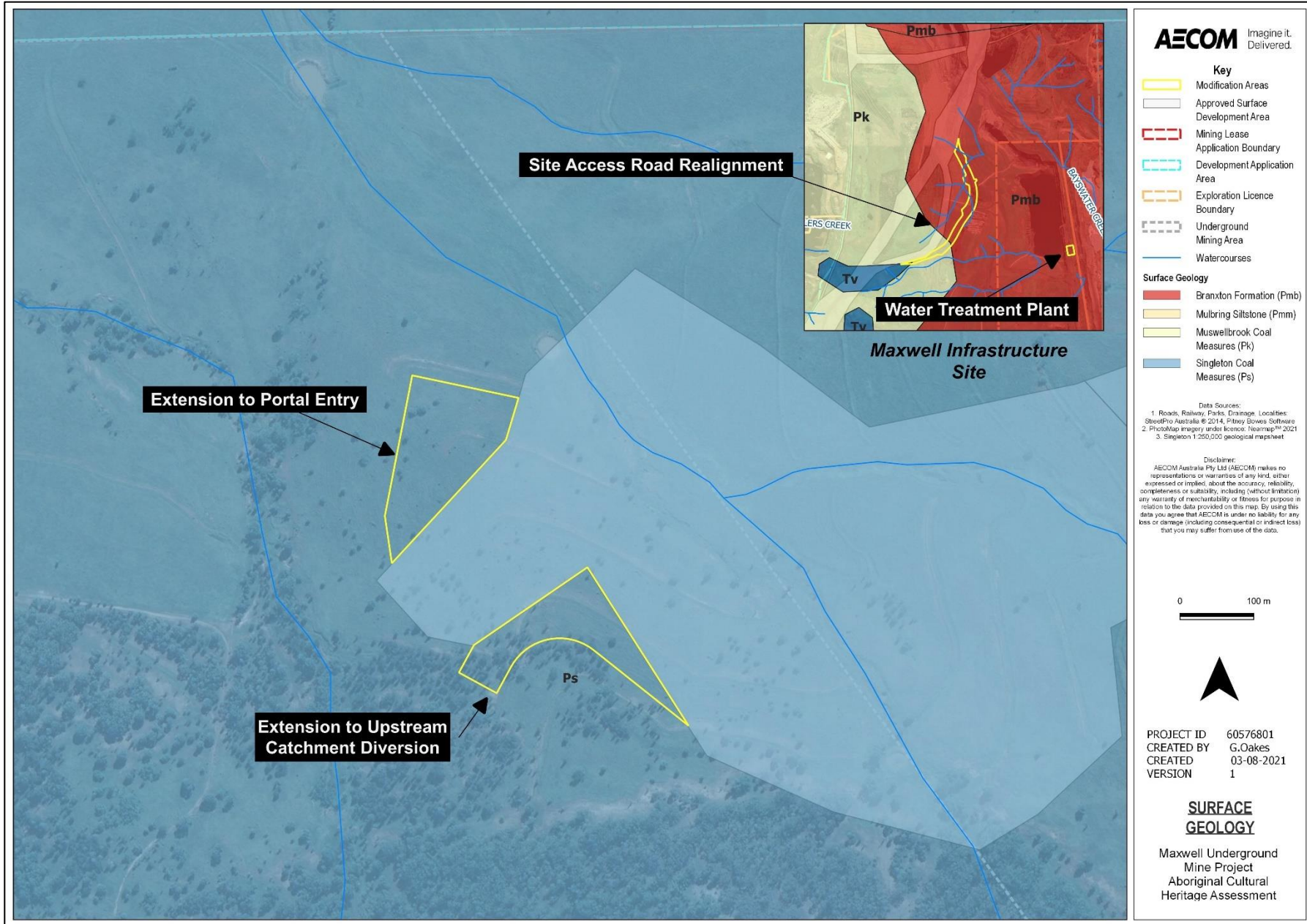


Figure 5 Landform & Hydrology



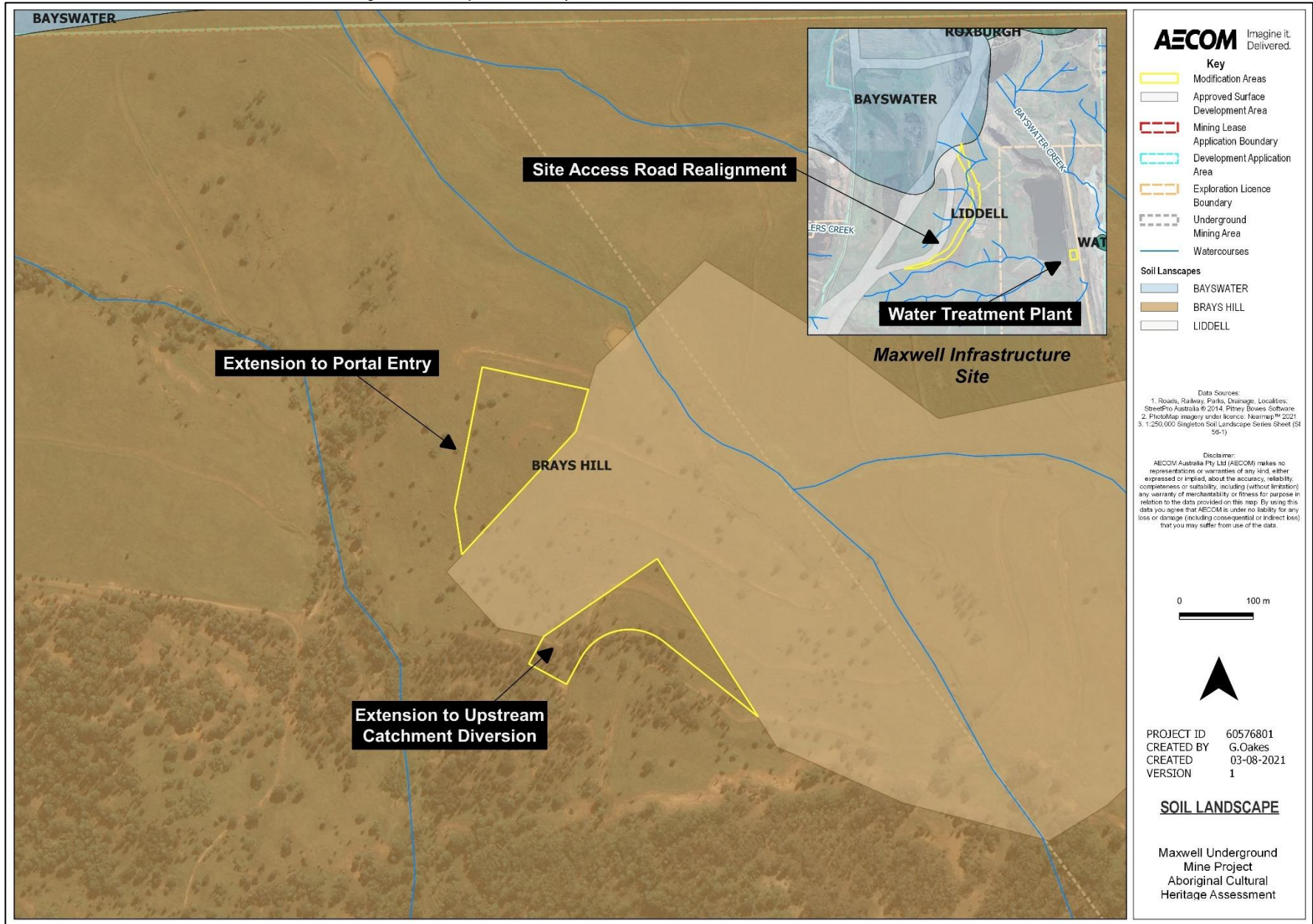


Figure 7 Soil Landscapes

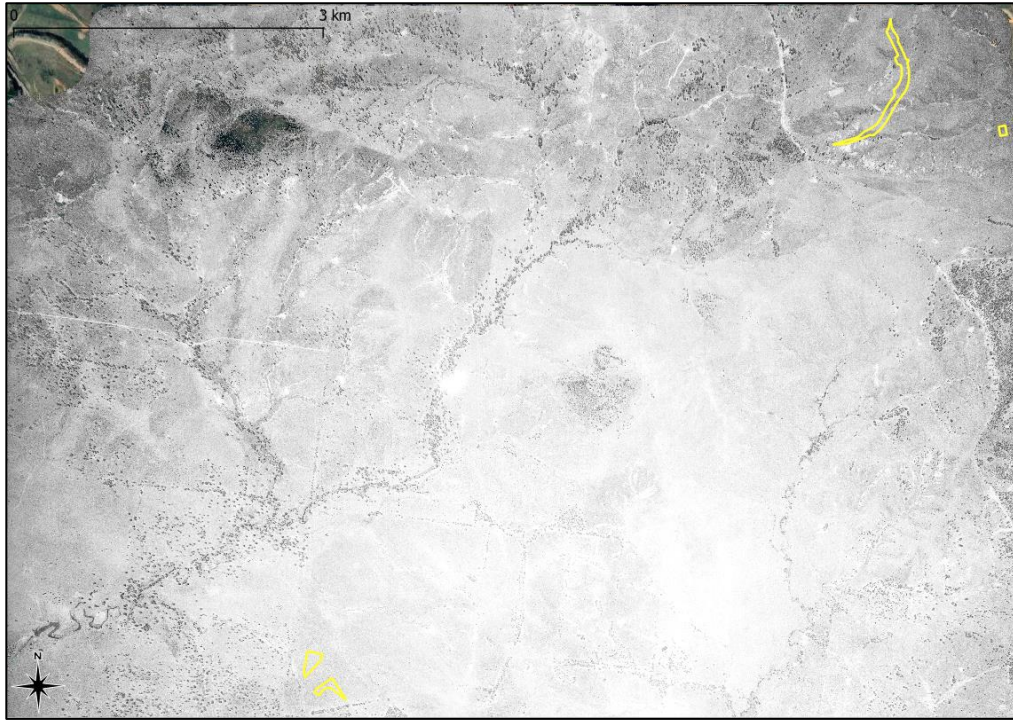


Figure 8 1958 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)

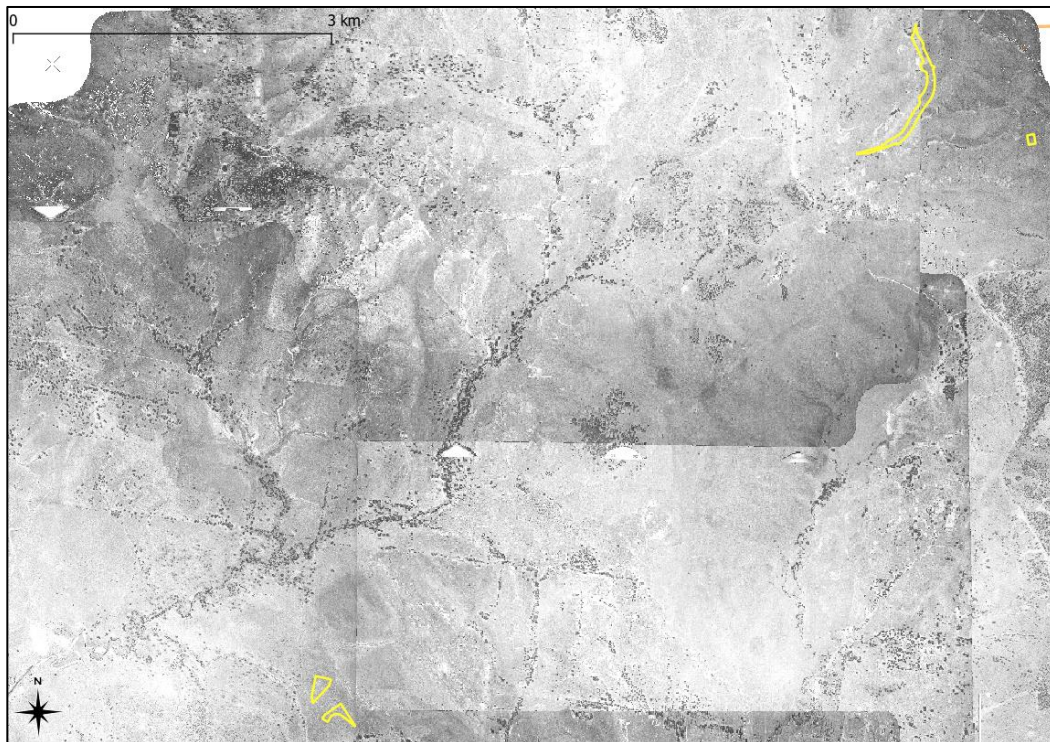


Figure 9 1967 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)

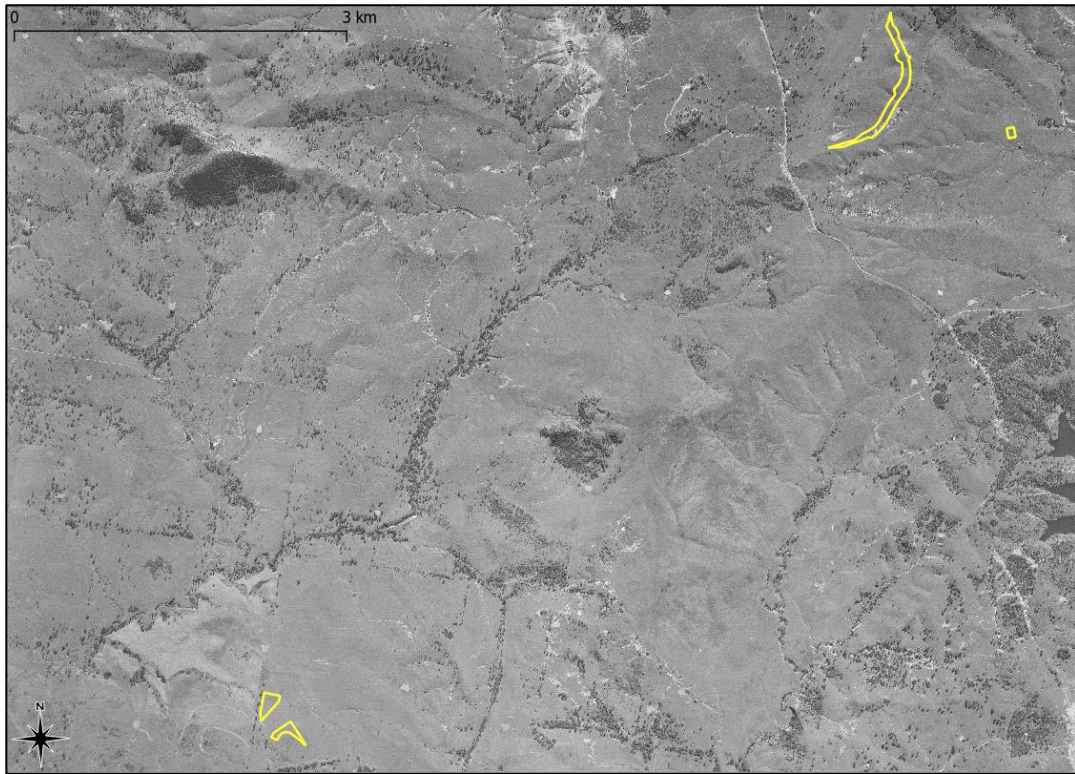


Figure 10 1974 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)

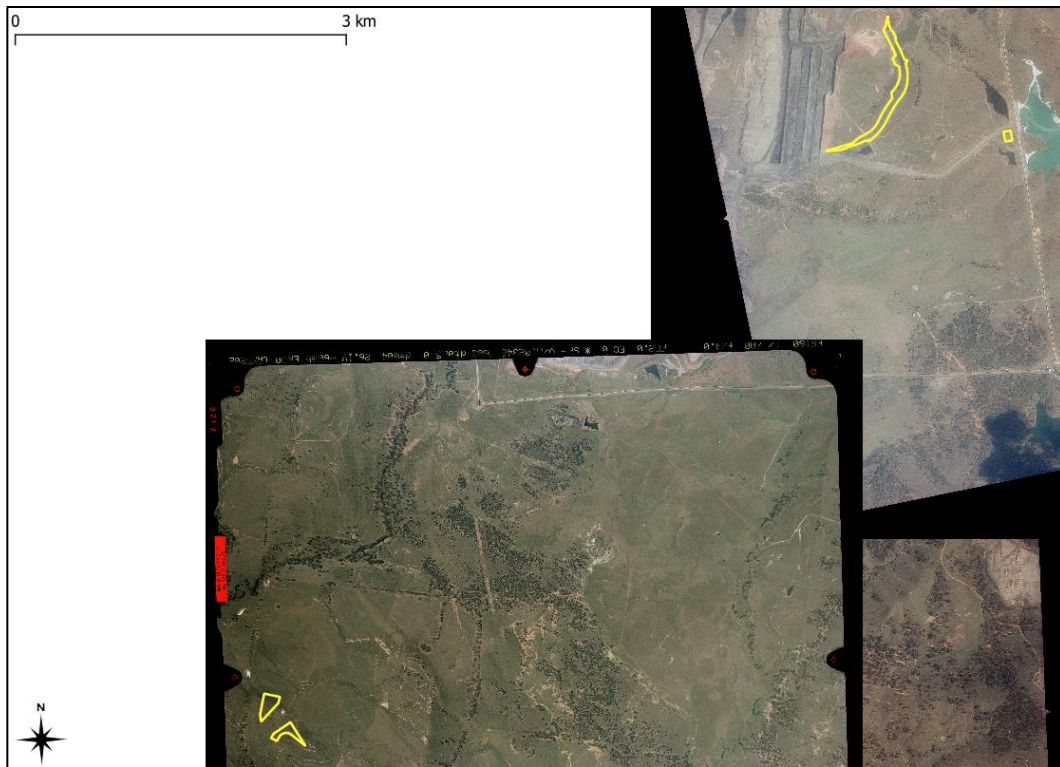


Figure 11 1989 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)

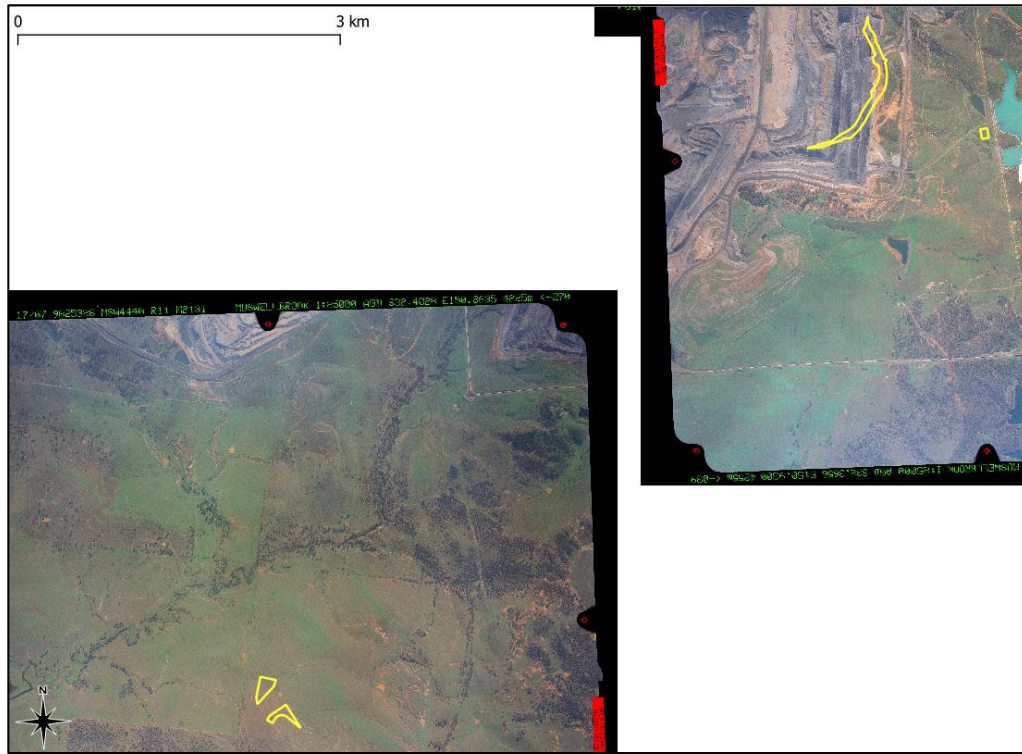


Figure 12 1998 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)

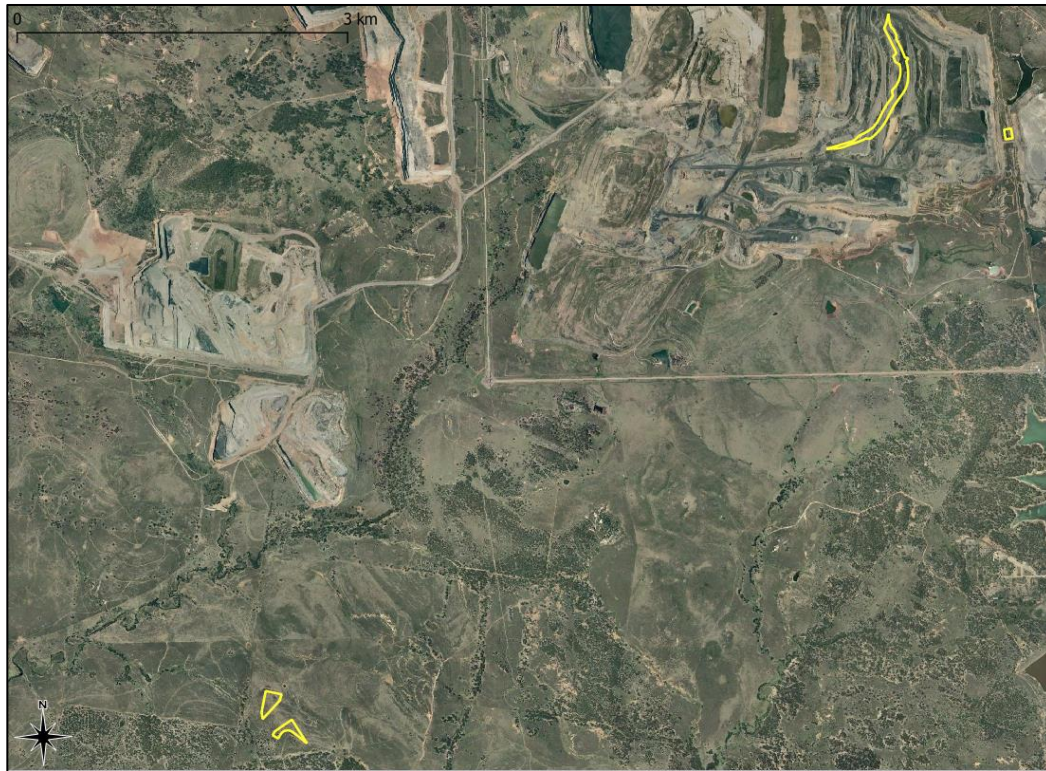


Figure 13 2009 aerial photograph of the Modification Areas (Source: Land & Property Information NSW)



Figure 14 Disturbance Mapping

5.0 Ethnohistoric Context

5.1 Introduction

Information regarding the ways in which Aboriginal people likely used pre-contact landscapes is available to archaeologists through two primary sources: archaeological (i.e., survey and excavation) data and historical records. Section 6.0 summarises the Aboriginal archaeological context of the Modification Areas on both a regional and local scale. This section builds on this foundation by summarising relevant ethnohistoric information for the Modification Areas and environs.

As in other parts of NSW and Australia more broadly, non-Aboriginal people occupying the Upper Hunter Valley began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

Key sources, both primary and secondary, for the post-contact languages and lifeways of the Aboriginal people occupying the Hunter Valley at the time of contact include: Backhouse (1843), Barrallier (1802), Brayshaw (1987), Caswell (1841), Capell (1970), Dawson (1830), Ebsworth (1826), Enright (1900, 1901, 1932, 1933, 1936, 1937), Elkin (1932), Fawcett (1898a, 1898b), Ford (2010), Gunson (1974), Hale (1846), Fraser (1892), Haslam et al. (1984), Larmer (1898), Lissarrague (2006), Matthews (1898, 1903), Miller (1887), McKiernan (1911), Threlkeld (1827, 1834, 1836, 1850), Scott (1929) and Sokoloff (1980). Although a detailed review of these sources is beyond the scope of this report, information of particular relevance to the current assessment is summarised below.

5.1.1 Language Groups and Boundaries

As highlighted by Brayshaw (1987) and a number of other researchers (e.g., ERM 2004; Kuskie 2000a), reconstructing the social and territorial organisation of the Aboriginal groups occupying the Hunter Valley at contact is extremely difficult given the enormous social upheaval that preceded any formal investigations into their languages and lifeways. The sometimes contradictory nature of primary historical records has likewise complicated the situation as has the tendency of early observers to describe all named groups of Aboriginal people, regardless of size and/or composition, as ‘tribes’ (Brayshaw 1987: 36).

According to Tindale’s (1974) oft-cited tribal map, the current Modification Areas is located within Wonnarua territory, close to the boundary with the Geawegal (Figure 15). Tindale (1974) describes the territory of the Wonnarua as a 5,200 square kilometres (km²) area stretching from “a few miles” north of Maitland west to the Dividing Range and south to the divide north of Wollombi. To the south of the Wonnarua, Tindale (1974) places the Darkinjung, whose tribal territory is described as a 4,700 km² area extending south of the Hunter River watershed, from “well south” of Jerrys Plains, east toward Wollombi and Cessnock, south to Wisemans Ferry on the Hawkesbury River, and west to the divide east of Rylstone. To the west of the Wonnarua were the Wiradjuri, one of the largest groups in NSW occupying an area of 97,100 km² extending from the Lachlan River to Rylstone and Mudgee. To the east of the Wonnarua were the Worimi and Awabakal. The Worimi, according to Tindale (1974), occupied a 3,900 km² area extending from the Hunter River to Forster, near Cape Hawke, inland to near Gresford and south to Maitland, while he describes the Awabakal as occupying a 1,800 km² area centred on Lake Macquarie, south of Newcastle. Finally, to the north of the Wonnarua, Tindale (1974) places the Geawegal tribe, who are described as occupying the northern tributaries of the Hunter River to Murrurundi and being present at Muswellbrook, Aberdeen, Scone and the Mount Royal Range.

Although widely cited, it should be noted that Tindale's boundaries for the Awabakal 'tribe' do not accord with those provided by the missionary Reverend Lancelot Threlkeld, who established an Aboriginal mission at Belmont on Lake Macquarie in 1826³ (the 'Bahtahbah' mission) and is widely regarded as one of the pioneers of Aboriginal studies in NSW owing to his detailed recordings, with the assistance of influential Awabakal leader Biraban (aka John McGill), of the language and lifeways of the Aboriginal people occupying the Hunter River Estuary.

Writing in 1828, for example, Threlkeld described the territory of the Awabakal as consisting of:

"The land bounded (to the South) by Reid's Mistake the entrance to Lake Macquarie, (to the North) by Newcastle & Hunter's River, (to the West) by five islands on the head of Lake Macquarie 10 miles west of our station. This boundary, about 14 miles N and S by 13 E and W, is considered as their own land" (Threlkeld 1828 in Ford 2010: 339) (Figure 16)

Tindale's (1974) and Threlkeld's (1828) contradictory accounts notwithstanding, what is clear from available historical records is that the former's oft-cited division of the Awabakal and Wonnarua into two separate 'tribes' does not adequately capture what was at contact a complex system of social and territorial organisation involving numerous local descent groups (i.e., clans) and bands who, critically, spoke the same language. As Lissarrague (2006: 7) has recently observed, "the evidence from archival sources suggests that the language described by Threlkeld as 'The language of the Hunter River and Lake Macquarie' was spoken by people now known as Awabakal, Kuringgai and Wonnarua". Lissarrague (2006), for her part, has named this language the Hunter River and Lake Macquarie language (HRLM language) and notes that it may also have been spoken by Tindale's (1974) Geawegal 'tribe'.



Figure 15 Excerpt from Tindale's (1974) tribal map (Tindale, 1974)

³ Subsequently relocated to Toronto in 1831 and named 'Ebenezer' mission

Critical to current interpretations of the boundaries of the HRLM language are the observations of Reverend Threlkeld. Threlkeld’s own account of the boundaries of this language, which comes from his 1838 report to the then NSW Legislative Council’s Committee on the Aborigines Question, is reproduced below:

“The native languages throughout New South Wales, are, I feel persuaded, based upon the same origin; but I have found the dialects of various tribes differ from those which occupy the country around Lake Macquarie; that is to say, of those tribes occupying the limits bounded by North Head of Port Jackson, on the south, and Hunter’s River on the north, and extending inland about sixty miles, all of which speak the same dialect.

The native of Port Stephen’s use a dialect a little different, but not so much so as to prevent our understanding one another’ but at Patrick’s Plains the difference is so great, that we cannot communicate with each other; there are blacks who speak both dialects” (Threlkeld 1838 in Ford 2010).

Threlkeld’s (1825 in Ford 2010: 328) earlier observation that “the natives here [i.e., at Lake Macquarie] are connected in a kind of circle extending to the Hawkesbury and Port Stephens” is also worthy of note here.

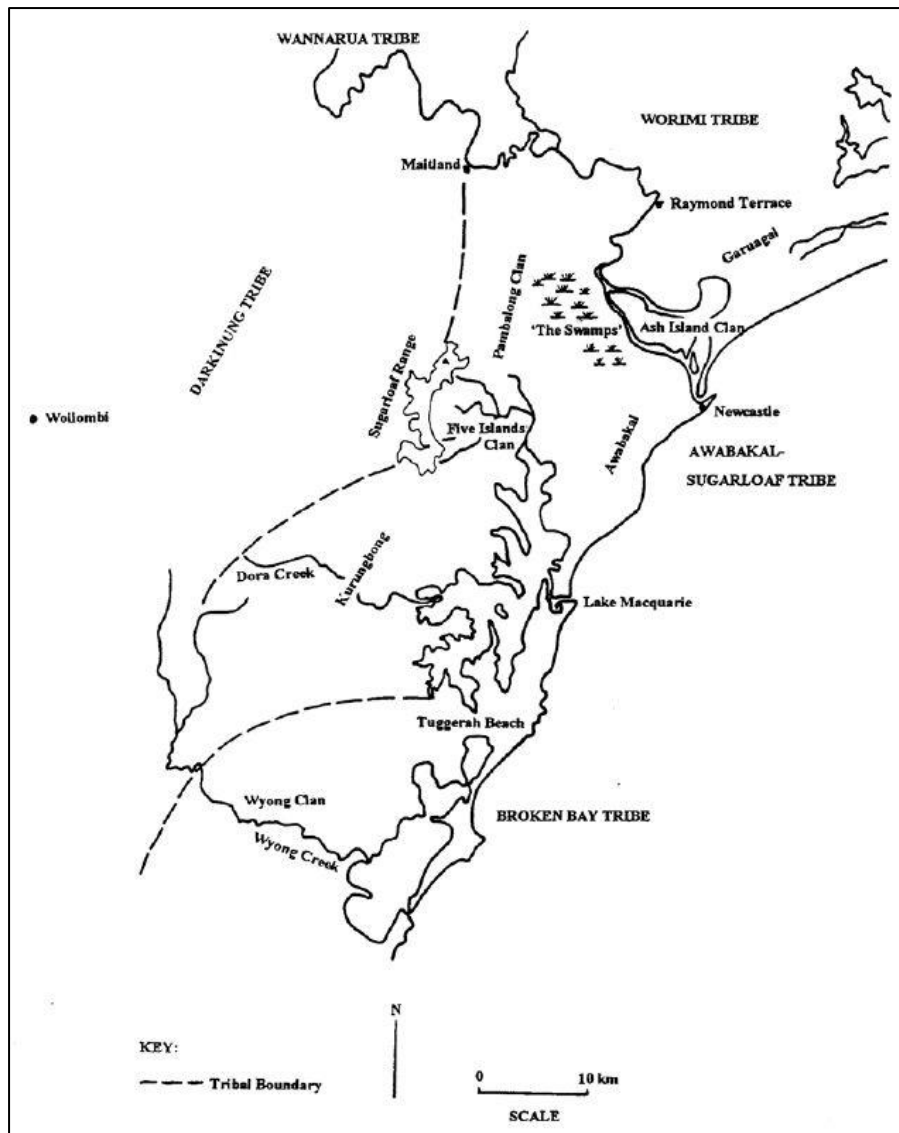


Figure 16 Gunson’s (1974) tribal map for the lower Hunter Valley, based on the observations of Reverend Lancelot Threlkeld (from Kuskie, 2012: 39, Fig. 8, after Gunson, 1974)

Threlkeld's observations provide strong *primary* evidence for the existence of a single shared language for Tindale's (1974) Awabakal and Wonnarua 'tribes'. At the same time, they suggest that this language differed from that spoken by the Worimi around Port Stephens, being the Kutthung or Kattang language described by Enright (1900, 1901), and those spoken by Aboriginal groups occupying the Middle and Upper Hunter Valley, namely Darkinjung and Kamilaroi (Brayshaw 1987; Ford 2010). Although Threlkeld's proposed southern extent for the HRLM language does not accord with the observations of other early sources, principally R.H. Matthews, his suggestion of a single shared language for the Aboriginal groups occupying the catchments between the Hawkesbury River estuary of Broken Bay and the estuarine areas of the Lower Hunter River is well supported by available historical records and associated linguistic research (see, in particular, Capell 1970; Ford 2010).

Ford's (2010) recently completed historiographic analysis provides further insight into the social and territorial organisation of the Aboriginal groups occupying the Hunter Valley at contact. Based on his own detailed review of available historical records, Ford (2010) has argued that the actual 'tribal' and/or language name for the HRLM-speaking Aboriginal groups occupying the estuarine areas of the lower Hunter River at contact was *Wannungine* and not Awabakal, with the latter term coined, alongside *Guringai* (now *Kuringgai*), by Scottish ex-school teacher and Maitland resident John Fraser in 1892 (Fraser 1892).

The term *Wannungine*, Ford (2010: 343) notes, was the term that celebrated surveyor and self-taught anthropologist R.H. Matthews recorded as the language or tribal name for Aboriginal peoples occupying the coastline southward from the Hunter River estuary to 'Lane Cove', but not extending to the north shore of Port Jackson, and east to the coastal range⁴. Matthews also identified the term *Wannerawa*, applying it to the southern part of the identified Wannungine area (i.e., around Broken Bay) (Ford 2010: 344).

Thus, although correctly identified by Matthews, it is Ford's contention that Miller's (1887) misapplication of the term *Wannerawa*, as *Wonnarua*, to the Middle and Upper Hunter Valley, an error subsequently reinforced through the publications of disgraced journalist J.W. Fawcett (1898a, 1898b), that has resulted in the historical anomaly of the *Wannerawa* (Miller's (1887) 'Wonnarua') being placed in the Middle and Upper Hunter. Miller's (1887: 352) reference to the principal ornament of the Wonnarua being a "nautilus shell cut into an oval shape and suspended from the neck" is cited as further evidence that Miller should actually have meant the Wonnarua to be coastal people (Ford, 2010: 354). Contrary to Miller's (1887) and Fawcett's (1898a, 1898b) widely cited accounts, Ford's research suggests that at the time of first European settlement, the mid Hunter was, in fact, occupied by Darkinjung-speaking peoples, whose territory encompassed the ranges bounded by the Hawkesbury River floodplain to the south and the Hunter River floodplain to the north and was bordered to the east-northeast by the coastal *Wannungine* (aka *Wannerawa*) (Ford 2010: 10). Bordering the Darkinjung to the west/northwest, in the Upper Hunter, were Kamilaroi-speaking peoples, who Ford (2010: 467) suggests had penetrated over the Liverpool Range and were occupying the Hunter Valley as early as 1819.

As to the name of the group occupying the Modification Areas at the time of contact, available sources are unclear. Reference to historic documents suggest four named groups occupied the area referred to as Patricks Plains, an area surrounding Singleton, including the 'Plains clan', the Bulcara, the Micarrawillang, and the Kinkigyne (or Hungary Hill) (Colonial Secretary Letters 1829 [4/2045]). The Return of Aboriginal Natives dated 2nd June 1834 (4/22191.1, Reel 3706, Slide 0186) indicates that the Kinkigyne occupied the Fal Brook area near Singleton. It is unclear what part of Patricks Plains the remaining groups occupied. Further west it is noted that Edward Ogilvie of the Merton property (near Denman) suggested four groups occupied this area including the Marawancal, the Tooloom-pikilal, the Gundical and the Panin-pikilal (Wood 1972). Returning to the Modification Areas, it's possible that this area occupied an interface between the Patricks Plains district groups and the Merton district groups. Further discussion is provided in the CVR prepared for the Maxwell Project ACHA (AECOM 2019).

⁴ From north to south: the Sugarloaf Range, the Watagan Range and Peats Ridge.

5.2 Social Organisation

In common with other regions of NSW (e.g., Attenbrow 2010) and Australia more broadly (Peterson 1976), available historical records suggest that the primary units of social organisation amongst the Aboriginal language groups present in the Hunter Valley at contact were the clan and band. Although these terms are often used interchangeably (e.g., Kohen 1993), following Attenbrow (2010), a distinction can, in fact, be drawn between the two, with clans comprising local descent groups and bands, land-using groups who, though not necessarily all of the same clan⁵, camped together and cooperated daily in hunting, fishing and gathering activities. Individual bands will have habitually occupied and exploited the resources of particular tracts of land within the overall territory of their clan. However, the territorial boundaries of each band will have been permeable or elastic in the sense of complex kinship ties facilitating inter-band territorial movements and the reciprocal use and/or exchange of resources (Brayshaw 1987: 36).

The size of the individual bands occupying the Hunter Valley at contact appears to have varied considerably and was no doubt activity and season dependent (Brayshaw 1987). However, an upper limit of around 70 individuals, consisting of several families, is suggested by available historical records (see, in particular, Table B in Brayshaw 1987). Individual band sizes notwithstanding, much larger groups of Aboriginal people, numbering in the hundreds, are known to have come together for events such as corroborees, ritual combats and feasts (e.g., Anon 1877a; Scott 1929: 32; Threlkeld in Gunson 1974: 55).

Fawcett (1898b) notes the existence of four exogamous clans amongst the Wonnarua, with different clan names for men and women:

“The Wonnah-ruah tribe, like most other tribes, was divided into four classes or clans, and the laws of consanguinity, which existed in this tribe, as other tribes, effectually barred a man’s marriage with the women of his own class or clan and also with the class or clan of his mother. Every man in the Wonnah-ruah tribe was either an Ippye (Ipai), a Kumbo, a Murree (Murri), or a Kubbee (Kubbi); and every women an Ippatha (Ipatha), a Butha, a Matha or a Kubbeetha (Kubbitha)” (Fawcett, 1898b: 180).

5.3 Settlement and Subsistence

Available historical records attest to exploitation, for food and other resources (e.g., skins for clothing), of a large and diverse range of terrestrial, avian and aquatic fauna by Aboriginal peoples occupying the Hunter Valley at contact. A broad economic division between ‘coastal’ and ‘inland’ groups is also evidenced, with the subsistence regimes of those living along the coast geared principally towards the exploitation of marine foods and those of inland groups based chiefly on the exploitation of land mammals (e.g., Ebsworth 1826: 80).

The diet of inland Aboriginal groups occupying the Hunter Valley at contact consisted of a variety of freshwater animal foods, with kangaroos, wallabies, bandicoots, echidnas, possums, flying foxes, kangaroo-rats, koalas, dingos, lizards, goannas and snakes variously reported as having been hunted and/or eaten (see Brayshaw 1987; Haslam et al. 1984 and Sokoloff 1980 for primary references). Various species of freshwater and estuarine fish, eels and mussels were also consumed, as were turtles (e.g., Anon 1877b; Cunningham 1828: 151; Grant 1803: 61). Possums appear to have been a favoured food, particularly in inland areas, with a number of early accounts detailing their method of capture and remarking on the tree climbing skills of the Aboriginal people involved (e.g., Dawson 1830: 238; Scott 1929: 21). Flying foxes, too, appear to have been actively sought out by groups in both areas (e.g., Anon 1877a; Scott 1929: 23), though not by the Awabakal at Lake Macquarie who held the animal in high esteem (Threlkeld in Gunson 1974: 206). Macropods were sometimes stalked and speared by individual huntsmen (Dawson 1830: 216; Threlkeld in Gunson 1974: 190). However, their capture was more commonly a communal exercise (Dawson 1830: 182; Scott 1929: 20; Threlkeld in Gunson 1974: 191). Threlkeld (in Gunson 1974: 206) and Fawcett (1898a: 153) report the burning off of particular tracts of land to promote new growth and attract kangaroos and wallabies.

⁵ Some individuals may have been related through marriage.

References to the hunting and consumption of a variety of birds, including the emu, are also present in the writings of a number of early observers (e.g., Fawcett 1898a; Scott 1929: 23; Threlkeld in Gunson 1974: 55, 65). Fawcett (1898a: 153) reports the use of nets to trap emus and use of returning boomerangs to bring down “ducks and other birds”. Larvae, namely ‘Cabra’ or shipworm (*Teredo navalis*) and other tree dwelling grubs, appear to have been a popular foodstuff in both coastal and inland areas (Anon 1877b; Scott 1929: 21-22). Honey collected from the hives of native bees was both eaten directly and mixed with water to form a sweetened drink (Breton 1833: 195; Dawson 1830: 60; Scott 1929: 34-35; Threlkeld in Gunson 1974: 67, 124).

Compared with their faunal counterparts, the plant food resources of coastal and inland groups are poorly represented in the writings of early colonial observers. Nonetheless, available descriptions do suggest that plants formed a regular part of the diets of groups in both areas. Fern roots, likely those of the bracken fern (*Pteridium esculentum*) and various water ferns (*Blenchum spp.*), appear to have played an important role in the diets of those Aboriginal people occupying the estuarine reaches of the Hunter River (Barrallier 1802: 81-82; Dawson 1830: 92; Ebsworth 1826: 71; Threlkeld in Gunson 1974: 19). Other plant foods mentioned in the writings of early observers include yams, macrozamia seeds, various fruits and the stems of the water lily (Backhouse 1843: 380; Caswell 1841; Scott 1929: 41; Threlkeld in Gunson 1974: 74). Nectar obtained from the blossoms of the grass tree (*Xanthorrhoea spp.*) and flower spikes of the dwarf banksia was also consumed (Dawson 1830: 244).

Regarding levels of residential mobility, available records suggest that this was generally quite high. Fawcett (1898a), for example, notes of the Wonnarua that: “they had no permanent settlements, but roamed about from place to place within their tribal district, in pursuit of game and fish, which was their chief sustenance, making use periodically of the same camping grounds, generation after generation, unless some special cause operated to induce them to abandon them”. Dawson’s (1830: 172) observation that “they [being the Aboriginal people of the Port Stephens area] seldom...stay more than a few days at these places [their camps], frequently not more than one night” is similarly suggestive, as is the 1877 observation, by an anonymous long-term resident of Maitland, that the Aboriginal people with whom he was familiar in the Maitland area “appeared to lead a very restless kind of life, constantly on the move, shifting their camps from one place to another, seldom remaining more than three or four days in one camp” (Anonymous, 1877d). Along the coast, Sokoloff (1980: 8) has suggested seasonal differences in settlement duration, noting that “the relative abundance of marine sources of food in summer tended to make the natives more sedentary at this time”.

As for the selection of campsites, we are limited to Fawcett’s (1898a: 152) observation that “in choosing the site, proximity to freshwater was one essential, some food supply a second, while a vantage ground in case of attack from an enemy was a third important item”.

5.4 Material Culture

Aboriginal material culture is explicitly linked to the natural environment and resource availability. For the Hunter Valley, available historical records identify an extensive array of hunting and gathering ‘gear’ and provide detailed insight into associated materials and manufacturing processes. The form and construction of everyday domestic structures are likewise well documented. Brayshaw (1987), in particular, provides a useful synthesis of both forms of material culture and highlights regional variability in raw material acquisition and utilisation between coastal and inland groups.

Campsites and domestic structures are well-represented in the accounts of early observers and were often the subject of illustration (Plate 1 and Plate 2). Huts, commonly referred to as “gunyers” or “gunyahs”, were of timber and bark construction. Fawcett (1898a: 152) describes the form and construction of huts as follows:

“A couple, or three, forked sticks, a few straight ones, and some sheets of bark, stripped from trees growing nearby, supplied the requisites for the construction of their home. The forked sticks were thrust into the ground and the straight ones placed horizontally in the forks. The sheets of bark were then set up against the horizontal poles in a slanting position, the bark of the structure being toward the windy point of the compass. The sides were frequently enclosed for further shelter, but the front was generally open. Before each one was a small fire, which was seldom allowed to go out, and which was used for warmth, or to cook by”.

Similar hut forms and construction methods can be found in the accounts of several other early observers, for example, Scott (1929: 13), Dawson (1830: 171-72), Caswell (1841) and Threlkeld (in Gunson 1974: 45).

Alongside its use in hut manufacture, tree bark also served as the primary construction medium for canoes, an integral component of the material culture repertoire of Aboriginal peoples occupying the Hunter Valley at contact. Available descriptions indicate that canoes were manufactured by bending, with the assistance of fire, a suitable sheet of bark into shape and securing the ends with bark cord or other 'wild vines' (Ebsworth 1826: 82; Dawson 1830: 79; Fawcett 1898a; Mrs Ellen Bundock in Brayshaw 1987: 60; Scott 1929: 38-39; Threlkeld in Gunson 1974;). Scott (1929: 39) reports that the gaps between the cord bindings at either end of the canoe were plugged with clay. Clay hearths were also added for warmth and cooking (Threlkeld in Gunson 1974; Scott 1929: 39). At Lake Macquarie, leaking canoes were repaired by sewing patches of tea tree bark over damaged areas and sealing them with melted grass tree resin (Threlkeld in Gunson 1974: 54).

Spears, which feature prominently in the literature, were an important component of men's 'gear' and were used in hunting, fishing, combat and ceremony (Scott 1929: 35; Threlkeld in Gunson 1974: 67-68). Spears for all purposes, Brayshaw (1987: 65) notes, were of composite manufacture and alongside sea shells, iron tomahawks and pieces of bottle glass, were important trade items, with significant numbers traded inland for possum skin rugs and fur cord (Dawson 1830: 135-136; Threlkeld in Gunson 1974: 65). Various hard woods and grass tree stems served as primary spear shafts and were shaped using shell scrapers and pieces of glass (Dawson 1830: 67, 135; Scott 1929: 35; Threlkeld in Gunson 1974: 67-68).



Plate 1 Joseph Lycett's 'Aborigines resting by camp fire, near the mouth of the Hunter River', c.1820 (Source: National Library of Australia)



Plate 2 Augustus Earle's 'A Native Camp of Australian Savages near Port Stevens, New South Wales', 1826 (Source: National Library of Australia)

Threlkeld (in Gunson 1974: 67) describes the manufacture and use of three different types of spears in the Lake Macquarie area, namely the fishing spear, the hunting spear and the battle spear. Primary shafts, in all three instances, comprised grass tree stems. However, differing types of points were added according to function. For the fishing spear, Threlkeld (in Gunson 1974) describes the affixing of bone barbs onto three or four 'shorter spears' of fire-hardened wood, themselves fastened to the main spear shaft with bark thread and grass-tree gum, while the hunting spear is described as being equipped with a single hard wood point. The battle spear, Threlkeld (in Gunson 1974: 67) reports, also had a single hard wood point but differed from its hunting counterpart in having "pieces of sharp quartz stuck along the hard wood joint on one side so as to resemble the teeth of a saw" (Threlkeld in Gunson 1974: 66). The substitution of glass for quartz on battle spears is also known to have occurred. In common with the Lake Macquarie area, Scott (1929: 35) notes the use, around Port Stephens, of different types of spears for hunting, fishing and combat. Differing functions aside, spears of all varieties were launched using spearthrowers or woomeras, also of composite manufacture (Brayshaw 1987: 66).

Hatchets, like spears, were an important component of men's 'gear' and were used for variety of tasks including bark and wood removal, animal butchery, cutting toeholds in trees to facilitate climbing and extracting game and honey from logs and trees (Anon 1877a; Dawson 1830: 202; Scott 1929: 41; Threlkeld in Gunson 1974: 67). Known as *mogo*, hatchets were composite implements consisting of an edge-ground stone hatchet head and withe or flat, hardwood handle, the former secured to the latter using grass tree resin and cord (Dawson 1830: 202; Fawcett 1898a: 153; Scott 1929: 40). Hatchets, Scott (1929: 5) notes, were carried by men in belts worn around the waist. Post-contact, stone hatchets appear to have been rapidly replaced by iron substitutes (Brayshaw 1987: 66; Dawson 1830: 16).

Other notable items of men's gear described in the accounts of early observers include several types of hard wood clubs, two types of shield (one broad and one narrow) and returning and non-returning hard wood boomerangs (Anon 1877b; Scott 1929: 36-38; Threlkeld in Gunson 1974: 41, 68). Threlkeld (in Gunson 1974: 68) also describes the use of a "wooden sword" similar to a boomerang but with "a handle at one end with a bend contrary to the blade".

As for women's gear, Brayshaw (1987: 65) notes that, in addition to their daily use in gathering activities, digging sticks, also known as yamsticks, were status symbols that were sometimes used during altercations. These implements, up to 2 m long and around 4 centimetres (cm) in diameter, were manufactured out of hardwoods, were fire-hardened and typically not decorated (Brayshaw 1987: 65). Cord used in the manufacture of fishing lines and nets was made by women using the bark of various trees (e.g., the Cabbage-tree (*Livistona australis*) and the Kurrajong (*Brachychiton populneus*)) and is reported as having been extremely strong and durable (Ebsworth 1826: 79; Dawson 1830: 67; Scott 1929: 17). Dilly-bags were used by women for carrying small items such as fish-hooks, prepared bark cord, lumps of grass tree resin and food (e.g., fish and shellfish) and were worn slung around the head and draped down the back (Ebsworth 1826: 79-80).

Fish-hooks were reportedly manufactured out of oyster and pearl shell (Caswell 1841; Dawson 1830: 66, 308; Ebsworth 1826: 79; Threlkeld in Gunson 1974: 54). Threlkeld (in Gunson 1974: 54) reports that a suitable shell was simply "ground down on a stone until it became the shape they wished". However, Dyal's (2004) analysis of excavated examples from the Birubi Point midden complex suggests a more complex, multi-stage production process. Pieces of fine sandstone, shale and quartzite were used for filing down the hooks (Sokoloff 1980: 23).

Awls or 'needles' manufactured out of kangaroo bone were used in the repair of canoes and the sewing of skin cloaks (Fawcett 1898a; Threlkeld in Gunson 1974: 54). Items of clothing, where worn, included spun possum-fur belts, worn only by men, possum fur headbands and cloaks or rugs made from sewn kangaroo and possum skins (Dawson 1830: 15-16; Scott 1929: 5). Cloaks were worn by both men and women.

Alongside women's dilly bags, early accounts indicate the production and use of a variety of other containers, with tea tree bark a common construction material. Threlkeld (in Gunson 1974: 67, 156), for example, refers to tea-tree bark 'cups' and wooden 'bowls' "formed from some large protuberance of a growing tree" while Dawson (1830: 250) refers to "small baskets" made from tea tree bark.

Notably, references to the production and/or use of flaked stone artefacts are virtually absent from the historical record. Excluding hatchets, Threlkeld's (in Gunson 1974: 67) reference to the use of "pieces of sharp quartz" for barbing battle spears remains the only known primary reference in this respect. Brayshaw (1987: 68), for her part, has proposed that effective absence of flaked stone artefacts from the historical record may be a product of the fact that such artefacts were not being used at the time of European settlement, having been replaced with other materials (e.g., shell, glass, wood and bone)⁶. However, she also acknowledges that their use may simply have escaped the notice or interest of early observers.

5.5 Ceremony and Ritual

Evidence for ceremonial or ritual behaviour amongst the Aboriginal groups occupying the Hunter Valley at contact can be found in the accounts of a number of early observers (e.g., Anon 1877c; Dawson 1830; Enright 1936; Fawcett 1898a, 1898b; Scott 1929; Threlkeld in Gunson 1974), with documented 'ceremonial' activities including corroborees, male initiation ceremonies, marriage, ritual combat and various burial, body adornment and modification practices. Although limited in number, references to spiritual beliefs of the Aboriginal groups occupying the region are also present and attest to regional variability in belief systems.

⁶ Historic references (e.g., Dawson 1830: 67, 135; Scott 1929: 35) to the use of shell scrapers and/or fragments of bottle glass for the shaping/sharpening of wooden spears provide some support for this suggestion.

Male initiation ceremonies, in which boys were “initiated into the privileges of manhood” (Fawcett 1898a: 153), are described by Enright (1936), Fawcett (1898a), Scott (1929) and Threlkeld (in Gunson 1974). Amongst the Wonnarua, Fawcett (1898a: 152) notes that the male initiation ceremony was known as *Boorool*. Enright (1936: 86), writing on the Worimi people, refers to the ceremony as the *Keeparra* while Scott (1929: 29) cites the terms *poombit* and *bora* in his recollections, noting that the latter was a colloquial term for the former. Initiation grounds, referred to by Scott (1929: 29) as ‘poombit grounds’, were elaborately prepared and consisted of one or two⁷ cleared circles in secluded areas of bushland. Images of animals and other designs were carved into surrounding trees and, in some cases, “figures of raised earth were created on the ground” (Brayshaw 1987: 83). Threlkeld (in Gunson 1974: 50-51, 63-65) describes attending, in November 1825, a ceremony “prepatory [sic] to removing the front tooth of several young men who would then be capable of marrying a wife”. The site of this ceremony, Threlkeld (in Gunson 1974) reports, was known as the “Mystic Ring, or “Porrobung” and consisted of a circle “thirty-eight feet in diameter” with a small hillock at its centre. Trees near the ring were marked with “representations of locusts, serpents &c on the bark chopped with an axe”.

As for the ceremonies themselves, Enright (1936: 87) reports that the *Keeparra*, in which “candidates learnt all those laws which governed his future life”, lasted approximately one month but was “only a prelude to a long system of instruction which lasted some five years”. Fawcett (1898a: 154), meanwhile, describes a ceremony involving tests of skill and endurance, the teaching of tribal laws, “emblematical dances” and the restricted involvement of women. Scott (1929: 28-34), too, describes the restricted involvement of women and dancing in the *poombit* or *bora* ceremonies of the Port Stephens area. Alongside their other important roles, medicine men or native doctors, known as *Karaji* (also spelt *Karadjys*), appear to have played an active role in initiation ceremonies and, together with group elders, were responsible for overseeing initiates’ observance of instructed laws (Enright 1936; Fawcett 1898a).

Alongside its use in the initiation ceremonies described above, body painting with animal fat and/or ochre was undertaken as part of corroborees and for the purposes of ritual combat. For men, tooth avulsion, body scarification and septum piercing appear to have been undertaken in ceremonies subsequent to that associated with initiation (Fawcett 1898b; Scott 1929). Regarding items of personal adornment, Miller (1887: 3543) notes that the “principal ornament” of the Wonnarua was a “nautilus shell cut into an oval shape and suspended from the neck” while Fawcett (1898a: 153), also writing on the Wonnarua, reports that “the girls often adorned themselves with flowers, bone or reed ornaments, and shell necklaces”. References to the dressing of men’s hair in a conical form with tufts of grass attached are present in Dawson (1830) and Anon (1877c).

Available historical records suggest that burial in the earth was the most common form of burial practised by Aboriginal groups occupying the Hunter Valley at contact, with tea tree bark widely used as a burial shroud (Fawcett 1898b: 180; McKiernan 1911: 889; Miller 1887: 354; Scott 1929: 3; Threlkeld in Gunson 1974: 47, 89, 100). Grave goods consisted of items of personal gear such as spear and hatchets (McKiernan 1911: 889; Threlkeld in Gunson 1974: 47, 89, 100). Cremation is also known to have been practiced but is poorly represented in the historical record (Threlkeld in Gunson 1974: 99).

Regarding inter-group conflict, Haslam et al. (1984) have noted of the Hunter Valley as a whole that, although skirmishes were common, major clashes were infrequent. Ritual combat appears to have been linked principally to unsanctioned territorial incursions and the abduction of women (Fawcett 1898b).

Gunson (1974) notes a distinct difference between the spiritual beliefs of the Aboriginal groups occupying the inland and coastal portions of the Hunter Valley at contact. In contrast to the Awabakal of Lake Macquarie⁸, for example, whose supreme spiritual entity was known as *Koun* (pronounced cone), the inland Wonnarua and Kamilaroi are believed to have venerated the prominent sky cult hero *Biame*.

⁷ Where two circles were used, these were separated by a distance of up to 400 m.

⁸ Dawson’s (1830: 153, 158, 163, 219, 220, 322) multiple references to an “evil spirit of woods” known as “Coen” suggest that the Worimi of the Port Stephens area, like the Awabakal, venerated *Koun* as opposed to *Biame*.

5.6 Post-contact History

As in other parts of NSW and Australia more generally, the early post-contact history of the Aboriginal people of the Hunter Valley is primarily one of dispossession and loss, with traditional hunting and camping grounds rapidly claimed and settled by Europeans and populations decimated by introduced diseases. However, active resistance and friendly relations are also attested in available records.

As highlighted by Brayshaw (1987), the introduction of European diseases had a devastating impact on the Aboriginal population of the Hunter Valley, with diseases such as smallpox, typhoid, influenza, scarlet fever, measles, diphtheria, whooping cough and croup causing or contributing to the deaths of large numbers of Aboriginal people. Major small pox epidemics between April and May 1789 and from 1829 to 1831 are known to have had a particularly deleterious impact on the valley's Aboriginal population (Butlin 1983).

The loss of traditional hunting grounds and a decline in the abundance of game that populated these areas have also been identified as factors relevant to the marked population decline that accompanied European settlement of the Hunter Valley, as has the sexual violence perpetrated by non-Aboriginal men against Aboriginal women (Turner & Blyton 1995). The destruction, over time, of the complex systems of social and territorial organisation that existed prior to contact has likewise been attributed to such factors, as has the collapse of traditional settlement and subsistence regimes. The effects of alcohol was also felt with alcoholism becoming a major contributor, alongside disease, to depopulation (Wilton, 1846).

Relations between Aboriginal people and the earliest European settlers of the Hunter Valley appear to have been relatively peaceful, with the *Sydney Gazette* reporting no incidents of conflict between 1822 and 1825 (Miller, 1985: 33). As Miller (1985) notes, the apparent absence of evidence for conflict during these early years of settlement is of particular note given both the rapidity of European settlement at this time and well documented racial conflict occurring in the Bathurst area to the west of the valley. Conflict, however, soon arose, with tensions over access to traditional camping and hunting/fishing grounds, the breaking of traditional laws and the abuse of Aboriginal women precipitating what Miller (1985) has referred to as the 'Wonnarua Uprising of 1826'. Retaliatory actions by groups of Aboriginal people at this time involved the plundering of crops, the killing or wounding of wrong-doers and a single abduction (Miller, 1985: 36). In September 1826, a troop of the 40th regiment under the command of Lieutenant Nathaniel Lowe was sent to the Hunter Valley to suppress the uprising, with a number of atrocities occurring as a result. Subsequent decades would see Aboriginal-settler conflict in the Valley decrease in frequency and magnitude, with Aboriginal people increasingly dependent upon European settlers and town's people for old clothing and would work at inns or farms for money or rations (Wilton, 1846). However, "spasmodic outbreaks of violence" were still a feature of relations between the two parties (Miller, 1985: 42).

By the late 1800s, growing concerns over the plight of Aboriginal people across NSW led to a series of Governmental initiatives aimed at both 'protecting' and 'civilising' the state's Aboriginal population. In 1881, the Aborigines Protection Association was formed, with George Thornton appointed as 'Protector of the Aborigines' in the same year. Thornton was charged with investigating the status of Aboriginal people across NSW and to make recommendations for further action. Shortly thereafter, in 1883, the NSW Government established the Aborigines Protection Board (APB), which operated without any statutory power until the passing of the *Aborigines Protection Act* in 1909. The *Aborigines Protection Act* provided the board with extensive legal powers to control the lives of Aboriginal people, including powers to dictate where people lived and to remove children from their families. George Thornton, the APB's founding chairman, was a strong advocate for the creation of Aboriginal reserves across the colony, arguing that such reserves would "enable them [Aboriginal people] to form homesteads, to cultivate grain, vegetables, fruit etc, etc, for their own support and comfort". The reserves, Thornton proposed, would also "provide a powerful means of domesticating, civilizing and making them comfortable" (Thornton, 1881 in Goodall, 2008: 105).

Blyton et al. (2004), in their history of Aboriginal and European contact in the upper Hunter Valley, note that by the turn of nineteenth century “there were few outward signs that aspects of traditional Aboriginal society had survived in the Hunter Valley”. In July 1890, the APB designated a 58 acre (23 hectare) parcel of land at Carrowbrook, north of Singleton, as an Aboriginal reserve, with a community of Aboriginal people having lived in this area since at least the 1850s (Miller, 1985: 107). Three years later, in 1893, Reverend James S. White established the St Clair Mission here, with the APB increasing the original reserve by 24 acres (10 hectares) (Miller, 1985: 107). Aboriginal people whose traditional Country encompassed the Hunter Valley comprised a significant proportion of the mission’s population, with Wonnarua, Awabakal, Worimi and Darkinjung peoples represented. Occupants farmed the land, successfully growing and harvesting a variety of vegetables, but also engaged in traditional subsistence practices (Blyton et al., 2004: 57; Gray, 2018). In 1905, the mission came under the control of the Aborigines’ Inland Mission (AIM), an evangelical organisation founded by Baptist Missionary Retta Long (nee Dixon) and responsible, amongst other initiatives, for the establishment of the Singleton Girls’ Home (later Singleton Aboriginal Children’s Home) at ‘Glasgow Place’, on George Street in Singleton. The St Clair Mission operated under the control of the AIM until 1916 when control was taken over by the APB. The APB appointed a station manager to control the mission and its occupants and renamed it ‘Mount Olive Reserve’. Aboriginal people living at the Mount Olive Reserve, Blyton et al. (2004: 58-59) note, were subjected to the “absolute control of the manager”, with a significant number expelled for failing to adhere to strict regulations. In 1923, the reserve was closed to Aboriginal people.

The mid-to-late 1800s saw communities of Aboriginal people living on Reverend J S White’s property at Gowrie, as well as at Redbourneberry (Miller, 1985: 106-108). Those at Redbourneberry camped principally on the Redbourneberry Hill common, with the flood-free site comprising a traditional camping area and offering easy access town (Miller, 1985: 107-108). Court records indicate that Aboriginal people were living in this location from at least 1862, with many later records citing Redbourneberry as the place of residence for Aboriginal witnesses and defendants (Miller, 1985: 107). The APB’s Register of Reserves indicates that a portion of land to the south of Redbourneberry Bridge, around 3 km east of Singleton’s Central Business District (CBD), was designated as an Aboriginal reserve in July 1896. In the late 1930s, the construction of a large army camp outside Singleton saw a number of Aboriginal families evicted from their rented accommodation in town, with Miller (1985: 157) reporting their relocation to Redbourneberry Hill and the construction of make-shift houses from old kerosene tins and hessian bags.

Today, modern Wonnarua people retain strong cultural connections to the Hunter Valley and are actively involved in the protection and promotion of their culture for future generations.

6.0 Archaeological Context

This section describes the archaeological context of the Modification Areas on a regional and local scale. Archaeological data of relevance to this area, including the results of previous archaeological investigations within and surrounding the Modification Areas, are reviewed in order to contextualise the results of the current assessment.

6.1 Regional Context - The Hunter Valley

6.1.1 Introduction

Scientific interest in the Aboriginal archaeological record of the Hunter Valley can be traced to the late 19th century, with surveyor and self-taught anthropologist R.H Matthews' 1892 investigation of Aboriginal rock art at two rockshelter sites in the Bulga-Milbrodale area comprising one of the earliest investigations of its kind in the state (Matthews 1893). Amongst others (e.g., W.W.Thorpe), Matthews' interest in the Aboriginal prehistory of the Valley was shared by pioneering Australian archaeologist Fred McCarthy who undertook an archaeological reconnaissance of the Hunter and Wollombi Valleys in 1939 (Moore 1970: 29). McCarthy's subsequent investigation, with F.A. Davidson, of an extensive open artefact site on Gowrie terrace, near Singleton, is widely regarded as the first serious archaeological study of stone artefacts in the Hunter Valley proper (McCarthy & Davidson 1943). More detailed investigation of the Valley's Aboriginal archaeological record commenced in the mid-to-late 1960s, with McCarthy's successor at the Australian Museum, David Moore, initiating a wide ranging archaeological research project into the Aboriginal prehistory of the Valley (Moore 1969, 1970, 1981). Moore's archaeological survey of the Hunter Valley, completed in two phases, would ultimately involve archaeological surveys and site excavations in both the Hunter and McDonald river catchments.

Intensive development activities since this time have secured the Hunter Valley's place as one of the most intensively investigated archaeological regions in Australia, with thousands of Aboriginal archaeological investigations involving survey and/or excavation having now been carried out, the majority as part of environmental impact assessments associated with coal mining projects. Not surprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. Nonetheless, together, they have generated a large and diverse body of evidence for past Aboriginal occupation. Key research themes are detailed in brief in the following sections.

6.1.2 Open Artefact Sites: Distribution, Contents and Definition

Surface and subsurface distributions of stone artefacts, variously referred to as open artefact sites, artefact scatters and open camp sites, are the most common and widely distributed form of Aboriginal archaeological site in the Hunter Valley. Other site types, such as scarred trees, shell middens, quarries, grinding grooves, burials and rock shelters with deposit and/or art or potential archaeological deposit (PAD), have also been identified but are comparatively rare. Accordingly, open artefact sites remain the most intensively investigated component of the Aboriginal archaeological record of the Hunter Valley, with site chronology, distribution, structure and the technology of backed artefact manufacture, in particular, comprising key research topics (Baker 1992a, 1992b, 1992c; Hiscock 1986a, 1986b, 1993a; Hughes et al, 2014; Koettig 1992, 1994; Moore 1997, 2000; White 1997, 1999, 2012).

As highlighted by Hughes (1984) and reiterated by numerous other researchers (e.g., ERM 2004; Hiscock & Koettig 1985; Koettig & Hughes 1983; Koettig 1990, 1992, 1994; Kuskie & Clarke 2004; Kuskie & Kamminga 2000; Rich 1992), existing archaeological survey data for the Hunter Valley indicate a strong trend for the presence of open artefact sites along watercourses, specifically, on creek banks and 'flats' (i.e., flood/drainage plains), terraces and bordering slopes. Although this distribution pattern can be attributed in part to geomorphic dynamics and archaeological sampling bias, with extensive fluvial erosion activity along watercourses resulting in higher levels of surface visibility and, by extension, concentrated survey effort, an occupational emphasis on watercourses is supported by the results of several large scale subsurface testing and salvage projects (e.g., Koettig 1992, 1994; Kuskie & Clarke 2004; Kuskie & Kamminga 2000; MacDonald & Davidson 1998; OzArk 2013; Rich 1992; Umwelt 2006). Collectively, these projects have also shown that assemblage size and complexity tend to vary significantly in relation to both landform and stream order, with larger, more complex assemblages concentrated on elevated, low gradient landform elements adjacent to higher order streams.

In the lower Hunter region, a similar pattern has been identified for the permanent to semi-permanent wetlands of the Hunter 'delta' (e.g., Kuskie 1994; Kuskie & Kamminga 2000; Umwelt 2006, in prep). Outside of these contexts, surface and subsurface artefact distributions have typically been found to be sparse and discontinuous and are often referred to as 'background scatter' or 'background discard' (Brayshaw McDonald 1993; Kuskie & Kamminga 2000).

Flaked stone artefacts dominate archaeological finds assemblages from investigated open artefact sites across the Hunter Valley, with heat shatters also well represented (Hiscock, 1986). Other stone artefacts, such as complete and broken grindstones, anvils, hammerstones and edge-ground hatchet heads⁹ have also been recorded, though comparatively infrequently, as have artefacts manufactured out of bottle glass. Faunal remains have likewise proven elusive. Associated archaeological features, meanwhile, have included 'knapping floors', hearths, heat treatment pits and ground "ovens", with identified hearths and ovens taking the form of surface or subsurface concentrations of burnt clay and/or charcoal or heat retainers (e.g., see Brayshaw 1986; Dallas & McDonald 1986; Kuskie & Kamminga 2000; Koettig 1992).

Defined in slightly different ways by different researchers, knapping floors can be broadly defined as spatially-discrete activity areas in which one or more stone packages was reduced (White 1999:152). Recorded knapping floors in the Hunter Valley have varied considerably in size and complexity, with some of the largest and most complex examples identified through excavation as opposed to survey (White 1997). Backed artefacts are a common feature of knapping floors and most of these features were likely specifically associated with their production. At Narama, near Ravensworth, a detailed analysis of the contents of knapping floor and non-knapping floor assemblages revealed significant differences between the two, including variation in the frequency of backed artefacts, other retouched and/or utilised tools and cores, and the application of different reduction strategies (Rich, 1992). Together with differences in the spatial distribution of the two forms of assemblage, this evidence was used to suggest that backed artefact production within the Narama landscape was a highly structured activity, and that knapping floors assemblages were the product of a more restricted range of behaviours than more generalised scatters. Although limited to a single landscape, evidence from other parts of the Valley (e.g., Hiscock 1986; Koettig 1992, 1994) provides further support for the suggestion that backed artefact manufacture in the Hunter Valley was a highly structured activity.

Although relevant to a variety of site types, geomorphic processes such as soil erosion and fluvial aggradation are of particular relevance to the identification and definition of open artefact sites. As in other archaeological contexts (e.g., Attenbrow, 2010; Fanning & Holdaway, 2004; Fanning *et al*, 2009; Holdaway *et al*, 2000), it is now widely accepted by archaeologists working in the Hunter Valley that the archaeological visibility and distribution of open artefact sites across the region are, for the most part at least, products of contemporary and historical geomorphic processes which have variously exposed and obscured them. As demonstrated by numerous large scale archaeological salvage projects within the Valley (e.g., Koettig 1992, 1994; Kuskie & Clarke 2004; Kuskie & Kamminga 2000; MacDonald & Davidson 1998; OzArk 2013; Rich 1992; Umwelt 2006) surface artefacts frequently represent only a fraction of the total number of artefacts present within recorded surface open artefact sites, with the majority occurring in subsurface contexts. Artefact exposure, unsurprisingly, is highest on erosional surfaces and lowest on depositional ones. At the same time, in many areas, surface artefacts have been shown through large-scale subsurface testing to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as distance to water, stream order and landform. The presence or absence of surface artefacts, therefore, is not a reliable indicator of Aboriginal archaeological sensitivity in the Hunter Valley.

⁹ Note that some hatchet-heads were manufactured on unifacially or bifacially-flaked blanks

6.1.3 Flaked Stone Artefact Technology

Flaked stone artefacts are a ubiquitous element of the Aboriginal archaeological record of the Hunter Valley and, as such, have assumed a preeminent role in archaeological reconstructions of past Aboriginal land use across the region. To date, hundreds, if not thousands, of surface-collected and excavated flaked stone assemblages from the Valley have been analysed, with individual assemblage sizes, research questions, aims, analytical methodologies and terminological schemes varying significantly between researchers and projects. Studies to date have ranged from basic descriptive accounts of assemblage composition in typological terms to detailed reconstructions of specialised knapping techniques through rigorous technological analyses (including conjoining) and experimental research. Particularly informative analyses in the context of the Hunter Valley include those undertaken by Hiscock (1986a, 1986b, 1993a), Koettig (1992, 1994), Moore (1997, 2000), White (1999, 2012) and Baker (1992a, 1992b, 1992c).

As highlighted by Koettig (1994) and others (e.g., Hiscock 1986a; Hughes 1984; Hughes *et al.* 2014), available technological and typological data for surface collected and excavated flaked stone artefact assemblages from the Hunter Valley suggest that the majority of these assemblages belong to what is known as the ‘Australian small-tool tradition’, a term coined by Gould (1969) to describe what was then thought to be first the first appearance, in the mid- Holocene¹⁰, of a new suite of flaked stone tool forms in the Aboriginal archaeological record of Australia, including Bondi points, geometric microliths, adzes and points (both unifacially and bifacially flaked). Complex, hierarchically-organised reduction sequences associated with the production of these tools contrast markedly with the simple sequences of earlier periods (Moore 2011). Tools of the Australian small-tool tradition, it has been suggested, formed part of a portable, standardised and multifunctional tool kit aimed specifically at risk reduction (Hiscock 1994, 2006). Stone artefact assemblages from late Pleistocene and early Holocene contexts, in contrast, are described by archaeologists as belonging to the ‘Australian core tool and scraper tradition’, a term first used by Bowler *et al.* (1970) to describe the Pleistocene assemblages recovered from Lake Mungo in western New South Wales. Bowler *et al.* (1970) saw the main components of these assemblages - core tools, steep-edged scrapers and flat scrapers - as characteristic of early Australian Aboriginal assemblages and as being of a distinctly different character to those associated with small-tool tradition.

In south-eastern Australia, including the Hunter Valley, the Australian small-tool and core tool and scraper traditions are most commonly described in terms of McCarthy’s (1967) Eastern Regional Sequence (ERS) of stone artefact assemblages (Table 5). Based on appreciable changes in the composition of chipped stone artefact assemblages over time, the ERS hypothesises a three phase sequence of ‘Capertian’ (earliest), ‘Bondaian’ and ‘Eloueran’ (most recent) assemblages and was developed on the basis of McCarthy’s (1948, 1964) pioneering analyses of stratified chipped stone assemblages from Lapstone Creek rockshelter, on the lower slopes of the Blue Mountains eastern escarpment, and Capertee 3 rockshelter in the Capertee Valley north of Lithgow. At present, the most widely cited characterisation of the ERS is that of a four-phase sequence beginning with the *Pre-Bondaian* (McCarthy’s *Capertian*) and moving successively through the Early, Middle and Late phases of the *Bondaian*, the last of which equates to McCarthy’s (1967) *Eloueran* phase. The tripartite division of the *Bondaian* is based principally on the presence/absence and relative abundance of backed artefacts (Attenbrow, 2010: 101). However, other factors, such as changes in the abundance of bipolar artefacts and different stone materials, as well as the presence/absence of edge-ground hatchet-heads are also relevant.

¹⁰ Note that more recent research into the chronology of backed artefacts and points in Australia (eg, Hiscock & Attenbrow, 1998, 2004; Hiscock, 1993b) has demonstrated a long history of production and use for these implement types. Backed artefacts, in particular, are now known to have been produced in the early Holocene and late Pleistocene periods.

Table 5 McCarthy's ERS of Stone Artefact Assemblages, as proposed by McDonald (2008) for the Sydney Region

Current phasing	McCarthy's (1967) Phasing	Approximate Date Range	Backed Artefact Frequency	Bipolar Artefacts	Edge-Ground Hatchet Heads
Pre-Bondaian	Capertian	30,000-8,000 BP	Absent	Rare	Absent
Early Bondaian	Bondaian	8,000-4,000 BP	Very low	Rare	Absent
Middle Bondaian		4,000-1,000 BP	Very high	Increasingly common	Present
Late Bondaian	Eloueran	1,000 BP to European contact	Very low	Very common	Present

Existing assemblage data indicate that Aboriginal knappers within the Hunter Valley utilised a diverse range of lithic raw materials for flaked stone artefact manufacture (Hughes 1984). However, two rock types - silcrete and silicified tuff (also known as mudstone) - overwhelmingly dominate the region's existing stone artefact record and appear to have been routinely selected for this task, likely due to both basic raw material abundance and their desirable flaking qualities (Hiscock, 1986a). Alongside other, less-commonly exploited raw materials, such as quartz, quartzite, chalcedony, chert, petrified wood and various fine-grained volcanics, both are available in alluvial gravel deposits associated with the Hunter River. These deposits occur along and adjacent to the river in the form of gravel banks and elevated palaeochannel remnants. Available data suggest that these gravels functioned as the primary source of lithic raw materials for Aboriginal flaked stone tool manufacture in the Hunter Valley proper (Hiscock 1986a; Moore 2000). However, the use of materials imported from outside of the central lowlands (e.g., porcellanite) is also attested (Hughes 1984).

As highlighted by Moore (2000), both 'on-source' and 'off-source' reduction were practiced by Aboriginal knappers within the Hunter Valley, with the former taking place in both gravel bank and Tertiary terrace contexts (see Hiscock 1986a; Moore 2000; White 1998) (Figure 17). To date, very few Aboriginal stone quarries have been recorded in the Hunter Valley, with White's (1998) investigation of the B10 quarry site at Bengalla, in the upper Hunter Valley, comprising the only detailed study of an Aboriginal stone quarry in the region. First identified and recorded in 1993 (Rich 1993), White's (1998) subsequent salvage investigation at this site demonstrated Aboriginal exploitation of a high level Tertiary gravel deposit. Together with in-field observations, White's (1998) analysis of the cultural lithic assemblages recovered from two spatially discrete open area excavations within the B10 quarry site indicated that a range of stone working activities were undertaken at this site including (but not limited to) the *in-situ* flaking of embedded sub-angular silcrete boulders for the purposes of removing flakes and blocks for subsequent on-site reduction and the heating of silcrete blanks to improve their flaking quality (White 1998: 52). Interestingly, no evidence for backed artefact manufacture was identified in either of the areas excavated by White (1998). Notable differences in the composition of the assemblages recovered from the two excavation areas were interpreted as a product of spatial variability in stone working and associated settlement-subsistence activities (White 1998: 52). At the same time, they were used to suggest that the then available technological data for the B10 quarry site should not be considered representative (White 1998).

In the Hunter Valley, asymmetrical and symmetrical backed artefacts dominate the retouched components of surface collected/recorded and excavated flaked stone assemblages¹¹. Accordingly, the technology of backed artefact manufacture has been a particular focus of research (e.g., Baker 1992a; Hiscock 1993a; Koettig 1992, 1994; Moore 2000). Studies by Hiscock (1993a), Moore (2000) and others (e.g., Baker 1992a; Koettig 1992, 1994; White 1999, 2012) have demonstrated that backed artefact manufacture in the Hunter Valley was a highly structured activity involving a complex system of raw material procurement, transportation, preparation and reduction. Differences in the technological character of recovered cores and conjoin sets across the Valley indicate a significant degree of variability in the strategies used by Aboriginal knappers to produce blanks for backed artefact manufacture. Heat treatment, notably, appears to have been an integral component of the backed artefact manufacturing process, with evidence for the thermal alteration of stone packages throughout the reduction process both abundant and widespread. As Hiscock (1993:66) has observed, “the thermal alteration of Hunter Valley silcrete drastically improves flaking qualities and increases the lustre and smoothness of the fracture surface”. Compared with silcrete, evidence for the thermal alteration of silicified tuff blanks is rare (e.g., Koettig 1992) and likely reflects the generally higher ‘raw’ flaking quality of this material.

Alongside backed artefact technology, chronological changes in Bondaian lithic technology have also received considerable analytical and interpretive attention (e.g., Baker 1992c; Haglund 1989; Hiscock 1986a, 1986b), with Hiscock’s (1986a) pioneering attribute analysis of a sample of unretouched mudstone flakes recovered from the Sandy Hollow 1 (SH1) rockshelter excavated by Moore (1970) of particular significance in this regard. This analysis sought to test a tripartite division of the SH1 assemblage made on the basis of chronological changes in the frequency of backed artefacts. Three phases were recognised: the *Pre-Bondaian*, with no backed artefacts, the *Phase I Bondaian*, with numerous backed artefacts and the *Phase II Bondaian*, with few backed artefacts (Table 6). Attribute analysis of a sample of 742 complete mudstone flakes from Square AA within SH1 revealed technological changes consistent with this division, including, but not limited to, changes in the relative frequency of platform preparation and overhang removal as well as flake shape and platform size.

Hiscock applied the same attribute analysis to a series (n = 15) of flaked stone assemblages recovered from open artefact sites on the Mount Arthur North and Mount Arthur South coal leases and found that individual assemblages could be assigned to one of the three Bondaian phases recognised at SH1, leading him to propose that the attribute analysis employed at SH1 could serve as a relative dating system for open sites in the Hunter Valley. Given the ubiquity of open artefact sites within the region, this argument was particularly ground-breaking and has prompted several archaeologists to apply Hiscock’s analysis to assemblages from other sites and areas, albeit with mixed success (e.g., Dean-Jones 1992; Baker 1992c; Haglund 1989; Rich 1991). Difficulties in replicating Hiscock’s results, Holdaway (1993:29) has suggested, likely stems from spatial variability in the methods used by Aboriginal knappers to reduce stone, with said variability linked to factors such as raw material type and accessibility, site function and stylistic differences between Aboriginal groups.

¹¹ Residue and use-wear analyses of backed artefacts recovered from archaeological contexts outside of the Hunter Valley (e.g., Fullagar et al., 2009; McDonald et al., 2007; Robertson et al., 2009; Robertson, 2011) suggest that these implements typically served as elements in flexible, multi-functional composite tools used variously for cutting, incising and drilling plant and animal materials, as well as projectile use.

Table 6 Hiscock's (1986a) relative dating scheme for the Sandy Hollow 1 flaked stone assemblage (after Hiscock 1986a: 100)

Phase	Date Range	Flake Type	Knapping Practices Employed for Flake Production	Backed Artefact Frequency
Pre-Bondaian	>1300 BP	Medium-sized, relatively squat flakes with very large platforms	<ul style="list-style-type: none"> • Large amounts of force applied with little control; • Mostly normal or inward directions of force application; • Imprecise blow application; • Use of relatively low platform angles on cores; • Very little platform preparation of any kind; • Many blows delivered to cortical surfaces; • No platform faceting; • Infrequent overhang removal; and • Low to moderate amounts of core rotation. 	Absent
Phase I Bondaian	1300-800 BP	Larger and more elongate flakes with medium sized platforms	<ul style="list-style-type: none"> • Relatively high amounts of force; • Mostly normal or inward directions of force application; • Imprecise blow applications; • High platform angles; • Large amounts of platform preparation (principally faceting and larger platform flaking); • Infrequent overhang removal; and • High amounts of core rotation. 	Numerous
Phase II Bondaian	800 BP - Contact	Relatively small and squat flakes with small platforms	<ul style="list-style-type: none"> • Low to moderate amounts of force; • Outward directions of force application; • Precise application of force; • High platform angles; • Moderate amounts of platform preparation (flaking onto platform but no faceting) • Frequent overhang removal; and • Moderate to low amounts of core rotation. 	Few

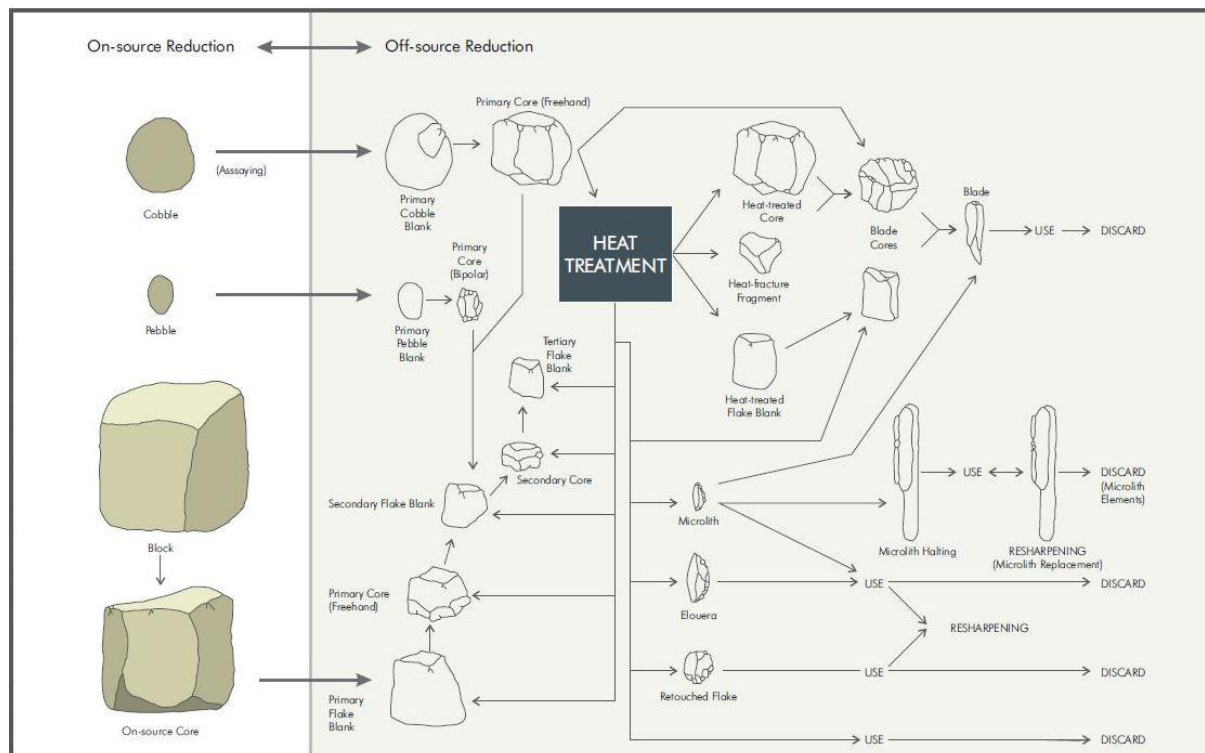


Figure 17 Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (after Moore 2000)

6.1.4 Chronology of Occupation

Evidence for late Pleistocene/early Holocene Aboriginal occupation of the Hunter Valley is rare, with dated and undated evidence from these periods obtained from only a handful of sites, two of which (i.e., Moffats Swamp Dune & Galloping Swamp) are located on the region's coastal plain (AMBS 2002; Baker 1994; Hughes & Hiscock 2000; Koettig 1986; Kuskie 2001; Rich 1993; Scarp Archaeology 2009). For the central lowlands of the Valley, this paucity of evidence has been attributed to long-term geomorphic and soil formation processes, with Hughes et al. (2014) arguing that such processes will have acted to completely remove or widely disperse older occupation deposits. This observation notwithstanding, geomorphic contexts shown to have the potential to contain recognisable older archaeological materials include late Pleistocene windblown sand dunes/sheets (e.g., Scarp Archaeology, 2009), stream terraces (e.g., Kuskie 2001) and late Pleistocene/early Holocene colluvial deposits (e.g., Hughes & Hiscock 2000).

Studies by Koettig (1990), Baker (1994) and Kuskie (2001) indicate that the flaked stone technology employed by Aboriginal knappers occupying the Hunter Valley during the terminal Pleistocene/early Holocene was focused on the opportunistic or non-specific reduction of 'primary' blanks (*sensu* Moore, 2000) - some of which were very large. Core reduction appears to have geared towards the production of robust flakes for immediate use or retouch into simple scrapers, with no evidence for the complex, hierarchically-organised reduction sequences typical of the mid-to-late Holocene. Tool edges, Moore (2000:36) notes, were refurbished by unifacial retouching. A preference for volcanic materials over silcrete and mudstone has also been noted (Baker 1994; Koettig 1990, 1992:5), though available evidence points to intra-regional variation in raw material preferences (see, for example, Hughes et al. 2014: 39-40). There is also a dearth of evidence for deliberate heat treatment in early assemblages (Moore 2000).

In contrast to the late Pleistocene/early Holocene, evidence for mid-to-late Holocene Aboriginal occupation of the Hunter Valley abounds, with hundreds of excavated sites producing flaked stone artefact assemblages that can be confidently ascribed to these periods on the basis of radiometric dates and/or their technological/typological profiles. In keeping with broader Australian developments (e.g., Allen and O'Connell 1995; Beaton 1985; Brumm and Moore 2005; Attenbrow et al 2009; Lourandos 1983, 1997; Lourandos and Ross 1994), the social and economic systems of Aboriginal groups living in the Hunter Valley in the mid-to-late Holocene appear to have become increasingly complex, with researchers pointing to various structural changes in the archaeological record as evidence of this 'complexity'. Well documented examples include substantial increases in artefact accumulation rates at various sites and the emergence and/or proliferation of complex fishing and stoneworking technologies (e.g., hook and line fishing, backed artefacts). On a broader scale, dramatic mid-to-late Holocene increases in implement and sediment accumulation rates at various sites across south-eastern Australia have been linked by some researchers to population increase (e.g., Hughes & Lampert 1982; Lampert & Hughes 1974). However, the probable influence of other factors, such as changes in stone artefact technologies, differential site preservation and shifting subsistence and mobility patterns, has also been noted (e.g., Hiscock 1981; Attenbrow 2006; Hiscock 2008).

Critical to any discussion concerning the antiquity of Aboriginal occupation in the Hunter Valley are the well-documented difficulties surrounding the dating of open artefact sites with active 'biomantles' (*sensu* Paton et al 1995; see Dean-Jones & Mitchell 1993; Balek 2002; Hofman 1986; Johnson et al. 2005; Johnson 1989; Paton et al. 1995; Peacock & Fant 2002; Stein 1983). In the Hunter Valley, the term biomantle is typically used as a collective descriptor for the 'A' soil horizons of the region's dominant texture contrast or duplex soil profiles¹², which tend to be relatively thin (<30 centimetres), and exhibit extensive evidence of bioturbation in the form of roots, open/infilled burrows, live insects and/or earthworms and stone lines¹³. As highlighted by Dean-Jones & Mitchell (1993) and others (e.g., Balek 2002; Johnson 1989), excavated finds assemblages from archaeological sites with active biomantles are subject to a range of interpretive constraints, with intact depositional stratigraphy unlikely to be preserved and inset archaeological features (e.g., hearths and heat treatment pits) representing the only reliable means of dating (with any specificity) intercepted archaeological events (Mitchell 2009: 4). Any stone artefacts discarded on the surface in landscapes with active biomantles are likely, over time, to have been incorporated into the soil profile through bioturbation, with depth of artefact burial ultimately corresponding to the base of major biological activity (i.e., the base of the biomantle). Where biomantles remain relatively undisturbed, patterns of artefact discard may be preserved. However, in heavily disturbed contexts, the preservation of such patterning is unlikely (Mitchell 2009: 4).

For archaeologists working in the Hunter Valley, the analytical and interpretive constraints posed by intensive bioturbation have, in combination with a general paucity of dateable features, led to a reliance on the dating of excavated archaeological finds assemblages through relative means, specifically, through consideration of the typological and technological composition of associated flaked stone artefact assemblages and reference to a modified version of McCarthy's (1967) ERS, the broad temporal parameters of which are now well established. While offering a useful chronological framework within which to assess diachronic changes in the stone artefact technologies and raw material use, the largely undated and palimpsest character of the Valley's lithic record represents a significant analytical and interpretive obstacle for period-specific reconstructions of Aboriginal mobility regimes (cf. Cowan 1999).

¹² Such profiles are characterised by loamy topsoils and silty clay to clay subsoils, with boundaries between these two units typically clear to abrupt. Clayey subsoils have formed by *in situ* weathering of the parent material, while topsoils are derived from a combination of *in situ* weathering and the deposition of colluvially and/or fluvially transported materials.

¹³ Stone lines, where present, typically occur at the interface between the A and B horizons.

More broadly, Dean Jones and Mitchell (1993: 63-64) have highlighted a series of geomorphic contexts within the Hunter Valley that they believe represent favourable locations for the preservation of Pleistocene and/or early Holocene archaeological evidence. These include:

- rock shelters and large middens;
- Aeolian sand deposits (e.g., source bordering dunes);
- the distal portions of low angle alluvial fans;
- stream junctions where each tributary has a different rate of sediment supply; and
- colluvial deposits at the base of steeply inclined surfaces.

6.1.5 Aboriginal Stone Quarrying: Australia & the Hunter Valley

Investigations of Aboriginal stone quarry sites in Australia began more than a century ago (Helms 1895; Noetling 1907, 1908). From the late 19th Century to the mid-20th Century these investigations largely comprised simple descriptive accounts of quarry sites and their contents, focusing on artefact typologies, types of activities undertaken and site ownership (Doleman 2008). During the 1970's, reflecting broader changes to archaeological theory and development of processual methodologies (Binford 1980; Binford & Binford 1968), quarry sites were incorporated into studies of settlement system organisation and their role in such systems explored.

However, despite the long history, comparatively few quarry sites in Australia have been subject to detailed investigations, particularly on mainland Australia in comparison to Tasmania (Reid 1998).

In their evaluation of previous work on stone quarries in Australia, Hiscock et al. (1993:78-80) recognised four major areas of research involving quarries including:

1. Manufacturing technology;
2. Organisation of production;
3. Organisation of stone distribution; and
4. Logistical and settlement patterns.

A fifth area of research, the focus of Doleman's (2008) BAR Series, is the study of technical organisation, that is, studies that link artefact patterning and variability to technological strategies used by hunter-gatherers to adapt to their particular environment. Combined, these studies have produced a wealth of information about how stone was procured and reduced at quarry sites alongside the organisation of behaviour and distribution of material across the landscape. However, as noted by Hiscock & Mitchell (1993) despite the potential for quarries to reveal important information about past societies, overall our knowledge of quarries is "diminutive and patchy".

As to the definition of what constitutes a quarry, definitions have varied amongst researchers ranging from simply a source of stone artefact raw material in the form of pebbles, cobbles and/or boulders (utilised or not) through to sites where only particular types of reduction activities were taking place (e.g., tool manufacture). In search of a definition that was inclusive of the full range of activities linked to stone procurement, Hiscock & Mitchell (1993) proposed the definition – "the location of an exploited stone source" as this incorporates both mines and non-mines, alongside quarries where visible manifestations of use are not available. On the basis of this broad definition, three attributes might reasonably be expected at quarry sites. Firstly, there must be a source of raw material suitable for the production of stone tools. Secondly, there may be either evidence of modification of this raw material (artefacts) or thirdly evidence of procurement in the form of excavation and/or gathering. Evidence of modification/procurement will vary according to the type of quarry e.g., underground or surface, hardstone or ochre. For surface hardstone quarries, Hiscock & Mitchell (1993:61) suggest the main indications of quarrying will be a source of stone with an associated reduction activity, petrological distinctiveness of material and debris created from breaking stone too large to transport, or evidence of rock removal i.e., impact scars, use of wedges or fires to shatter rock.

In terms of reduction activities associated with raw material sources, Moore (2000:29) divides these into on-source reduction activities and off-source reduction, and notes that both were practiced by Hunter Valley knappers, with procurement generally focused on Hunter River gravels. Researchers in the Hunter Valley have contended that evidence of quarrying at gravel sources will tend to produce a low density background scatter of flakes and flaked cobbles that are the results of assaying (and cobble rejection) through to high densities associated with systematic reduction activities (i.e., flaking and heat shattering of stone) (Jones & White 1988; White 1998; Moore 2000). Moreover, on-source reduction is argued to produce flake blanks considerably larger than those produced off-source, with the blanks considered to be early stages in the reduction sequence (Hiscock & Mitchell 1993; Moore 2000). Heating may also have also been utilised to split boulders into more manageable packages (White 1998). Moore (1997) suggests that raw material procurement and on-site reduction may have been undertaken during logistical forays or 'embedded' during the carrying out of subsistence tasks.

As discussed in Section 6.1.3, existing artefact assemblage data for the Hunter Valley indicate that Aboriginal people utilised a diverse range of lithic raw materials for flaked stone artefact manufacture albeit with a focus on silcrete and silicified tuff. Other, less-commonly exploited raw materials, such as quartz, quartzite, chalcedony, chert, petrified wood and various fine-grained volcanics have also been identified. Accordingly, quarry sites in the Hunter Valley would be expected to contain exploitable clasts of these materials with higher frequencies of silcrete and silicified tuff. Previous studies have suggested that the Hunter River Gravels are the most well-known source of silicified tuff, silcrete, and quartz raw materials in the Hunter Valley (Dean-Jones & Mitchell 1993; Moore 2000). Exposed at numerous locations in the valley, both as active gravel bars and elevated terrace/palaeochannel remnants, they have been recorded at Muswellbrook, Denman, Jerrys Plains and Singleton (Dean-Jones & Mitchell 1993). Raw materials, including silicified tuff and silcrete, are thought to be locally derived, reflecting the Hunter River's underlying geology, and smaller deposits of non-local material transported from other parts of the system (MacDonald and Davidson 1998).

In context of the Hunter Valley, Aboriginal stone quarry sites are a comparatively rare component of the archaeological record, with only eight instances, for example, recorded on the AHIMS database (search completed in 2012) of which two are recorded as potential raw material sources without associated evidence of exploitation. The remaining known six sites vary in relation to raw materials present, intensity of use and their topographical locations. A review of available site cards for the sites indicates that exposed silcrete cobbles of varying sizes were an almost universally present raw material, being recorded at five of the six locations and exclusively at three locations. Cobbles of silicified tuff (i.e., mudstone, chert) were recorded, alongside silcrete at three sites, and quartzite/quartz at three locations. Estimates of the total number of artefacts were recorded on only four site cards with artefact numbers ranging from five to several hundred. In three instances, initial stages of reduction were noted, including shattered cobbles, large flakes and minimally modified cores. In almost all cases, quarry sites were recorded within 1 km of the Hunter River or its major tributaries, amongst alluvial and colluvial gravel deposits. Despite the presence of quarry sites in both the Upper and Lower Hunter Regions, only one has been excavated and subject to detailed investigation - the B10 quarry site (White 1998).

Nonetheless, Moore (2000:29) noted, during an inspection of riverbed gravels near Jerrys Plains and a gravel quarry south of Maison Dieu Road, a number of silcrete and tuff cores thought to represent on-source reduction. No detailed recording was made of these finds. In addition, Hughes and Lance (in Hiscock 1986:14-16) identified 22 Aboriginal mudstone cores within a 1,200 m² section of large gravel bar (80 m wide and 1.5 km long) at the mouth of the Goulburn River near Denman.

6.1.6 Chronology and Texture-Contrast Soils

Evidence for late Pleistocene and/or early Holocene Aboriginal occupation of the Hunter Valley is rare, with dated and undated evidence from these periods obtained from only a handful of sites, two of which (i.e., Moffats Swamp Dune & Galloping Swamp) are located on the Valley's coastal plain (AMBS 2002; Baker 1994; Hughes & Hiscock 2000; Koettig 1986; Kuskie in prep.; Rich 1993; Scarp Archaeology 2009). As recently discussed by Hughes et al. (2014), the dearth of early sites in the central lowlands of the Hunter Valley can be attributed to long term geomorphic and soil formation processes which have acted to either remove completely or widely disperse older archaeological materials.

Studies by Koettig (1990), Baker (1994) and Kuskie (2001) suggest that the flaked stone technology employed by Aboriginal knappers occupying the Hunter Valley during the terminal Pleistocene/early Holocene was focused on the opportunistic or non-specific reduction of early reduction cores (*sensu* Moore 2000) - some of which were very large. Core reduction appears to have been geared towards the production of robust flakes for immediate use or retouching into simple scrapers, with no evidence for the complex, hierarchically-organised reduction sequences typical of the mid-to-late Holocene. Tool edges, Moore (2000: 36) notes, were refurbished by unifacial retouching. A preference for volcanic materials over silcrete and mudstone has also been noted (Baker 1994; Koettig 1990, 1992:5), as has the paucity of evidence for deliberate heat treatment (Moore 2000).

In contrast to the late Pleistocene/early Holocene, evidence for mid-to-late Holocene Aboriginal occupation of the Hunter Valley abounds, with numerous excavated sites producing assemblages that can be confidently ascribed to these periods on the basis of radiometric dates and/or their typological/technological profiles. Taken at face value, available radiocarbon determinations suggest a progressive increase in the Aboriginal population of the Hunter Valley over the course of the Holocene (Attenbrow 2006). However, as argued by Hiscock (2008) on a national scale, it seems likely that the directional population growth suggested by such data is, to a certain extent at least, a product of differential site preservation, with younger sites better preserved than older ones. Other factors, such as the burial of older sites through sediment deposition and aeolian processes and bias in the location of archaeological surveys and excavations, may also be relevant.

Critical to any discussion concerning the antiquity of Aboriginal occupation within the Hunter Valley are the well-documented difficulties surrounding the dating of open artefact sites with active 'biomantles' (*sensu* Paton et al. 1995; see Dean-Jones & Mitchell 1993; Balek 2002; Hofman 1986; Johnson et al. 2005; Johnson 1989; Paton et al. 1995; Peacock & Fant 2002; Stein 1983). In the Hunter Valley, the term biomantle is typically used as a collective descriptor for the 'A' soil horizons of the Valley's dominant texture contrast or duplex soil profiles¹⁴, which tend to be relatively thin (<30 cm), and exhibit extensive evidence of bioturbation in the form of roots, open/infilled burrows, live insects and/or earthworms and stone lines¹⁵. As highlighted by Dean-Jones and Mitchell (1993) and others (e.g., Balek 2002; Johnson 1989), excavated finds assemblages from archaeological sites with active biomantles are subject to a range of interpretive constraints, with intact depositional stratigraphy unlikely to be preserved and inset archaeological features (e.g., hearths and heat treatment pits) representing the only reliable means of dating (with any specificity) intercepted archaeological events (Mitchell 2009: 4). Any stone artefacts discarded at the surface in landscapes with active biomantles are likely, over time, to have been incorporated into the soil profile through bioturbation, with depth of artefact burial ultimately corresponding to the base of major biological activity (i.e., the base of the biomantle). Where biomantles remain relatively undisturbed, patterns of artefact discard may be preserved. However, in heavily disturbed contexts, the preservation of such patterning is unlikely (Mitchell 2009: 4).

For archaeologists working in the Hunter Valley, the analytical and interpretive constraints posed by intensive bioturbation have, in combination with a real paucity of dateable features, led to a reliance on the dating of excavated archaeological finds assemblages through relative means, specifically, through consideration of the typological and technological composition of associated flaked stone artefact assemblages and reference to a modified version of McCarthy's (1967) ERS (Table 5). While offering a useful chronological framework within which to assess diachronic changes in the stone artefact technologies and raw material use, the largely undated and palimpsest character of the Valley's lithic record represents a significant analytical and interpretive obstacle for period-specific reconstructions of Aboriginal mobility regimes (cf. Cowan 1999).

¹⁴ Such profiles are characterised by loamy topsoils and silty clay to clay subsoils, with boundaries between these two units typically clear to abrupt. Clayey subsoils have formed by *in situ* weathering of the parent material, while topsoils are derived from a combination of *in situ* weathering and the deposition of colluvially and/or fluvially transported materials.

¹⁵ Stone lines, where present, typically occur at the interface between the A and B horizons.

More broadly, Dean-Jones and Mitchell (1993: 63-64) have highlighted a series of geomorphic contexts within the Hunter Valley that they believe represent favourable locations for the preservation of Pleistocene and/or early Holocene archaeological evidence. These include:

- rock shelters and large middens;
- Aeolian sand deposits (e.g., source bordering dunes);
- the distal portions of low angle alluvial fans;
- stream junctions where each tributary has a different rate of sediment supply; and
- colluvial deposits at the base of steeply inclined surfaces.

To date, the two contexts that been shown to have the potential to contain recognisable older archaeological materials include late Pleistocene windblown sand dunes/sheets (e.g., AMBS 2002) and late Pleistocene/early Holocene colluvial deposits (e.g., Hughes & Hiscock 2000).

6.1.7 Occupation Models

Numerous occupation or land use models have been proposed for the Hunter Valley over the past four decades, with existing models based on varying combinations of archaeological, environmental and ethnohistoric data (e.g., Haglund 1992; Koettig 1992; Kuskie & Clarke 2004; Kuskie & Kamminga 2000).

Of the models currently available, Kuskie and Kamminga's (2000) general occupation model remains the most comprehensive. Developed with reference to Foley's (1981) home base model, as well as existing environmental and ethnohistoric data for the Hunter region, Kuskie and Kamminga's (2000) model identifies a series of occupation strategies/patterns and outlines their expected archaeological correlates. The environmental context of each strategy is also considered. A summary of the model is provided in Table 7.

Table 7 Kuskie and Kamminga's (2000) general occupation model for the Hunter region

Occupation Strategy/Pattern	Behavioural Context	Environmental Context	Archaeological Expectations
Transitory movement	<ul style="list-style-type: none"> Individual or group of people moving between base camps, or from a campsite to resources or a ceremonial or other special purpose location. Duration less than a day. Most likely less than a few hours. Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play or knapping activity. 	<ul style="list-style-type: none"> All landscape zones but frequently on ridge and spur crests, along watercourses and across valley flats. Proximity to water not important. Proximity to food resources not important. 	<ul style="list-style-type: none"> Assemblages of low density and diversity (i.e., 'background discard'). Evidence of tool maintenance and/or repair.
Hunting and/or gathering (without camping)	<ul style="list-style-type: none"> Individual or small group of closely related people engaging in hunting or gathering activities. Duration less than a day, with participants returning to camp to sleep. Evidence may represent accidental discard, loss during use, repair of hunting or gathering equipment, children's play or knapping activity. 	<ul style="list-style-type: none"> All landscape zones. Proximity to water not important. Proximity to food resources important. 	<ul style="list-style-type: none"> Assemblages of low density and diversity (i.e., 'background discard'). Evidence of tool loss or discard.
Camping by small hunting and/or gathering parties	<ul style="list-style-type: none"> Individual or small group of closely related people engaged in hunting or gathering activities camp overnight near the resource being exploited. Duration of one or several days. Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play, knapping activity, food processing or temporary camp fires. 	<ul style="list-style-type: none"> All landscape zones. Proximity to water important. Proximity to food resources important. 	<ul style="list-style-type: none"> Assemblages of low-to-moderate density and diversity, distinguishable from 'background discard'. Reasonably broad range of artefact and stone types. No site furniture (i.e., grindstones). No heat treatment pits or ovens.
Nuclear family base camp	<ul style="list-style-type: none"> Single nuclear family or extended family camping together. Encampment area may consist of several small huts. Duration dependent on availability of food resources and potable water. Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play, knapping activity, food processing, campfires, heat treatment and tool manufacture. 	<ul style="list-style-type: none"> Level to very gently inclined land surfaces. Proximity to water important. Proximity to food resources important. 	<ul style="list-style-type: none"> Assemblages of high density and diversity. Site furniture (i.e., grindstones). Common evidence for expedient stone reduction and tool production. Heat treatment pits and ovens possible.

Occupation Strategy/Pattern	Behavioural Context	Environmental Context	Archaeological Expectations
Community base camp	<ul style="list-style-type: none"> • Number of nuclear families camping together. • Encampment area may exceed 100 m² and consist of a number of individual groups and huts. • Duration dependent on availability of food resources and potable water. 	<ul style="list-style-type: none"> • Level to very gently inclined land surfaces. • Proximity to water important. • Proximity to food resources important. 	<ul style="list-style-type: none"> • Assemblages of high density and diversity. • Spatially discrete evidence of individual campsites (where sites not affected by disturbance or superimposition). • Site furniture (i.e., grindstones). • Common evidence for expedient stone reduction and tool production. • Heat treatment pits unlikely. • Ochre may be present.
Larger congregation of groups	<ul style="list-style-type: none"> • Special events (i.e., major ceremonies) or opportunistic food resource 'events' (e.g., migrating eels). • Short duration (<1-2 weeks). • Large encampment or multiple encampments. • Variable numbers but potentially >100 individuals. 	<ul style="list-style-type: none"> • Level to very gently inclined land surfaces. • Proximity to water important. • Proximity to food resources important. 	<ul style="list-style-type: none"> • Assemblages of high density and diversity (comparable to community base camp). • Spatially discrete evidence of individual campsites (where sites not affected by disturbance or superimposition). • Site furniture (i.e., grindstones). • Common evidence for expedient stone reduction and tool production. • Heat treatment pits unlikely. • Evidence for the processing of uncommon food resources.

6.2 Local Archaeological Context

6.2.1 AHIMS Database

The AHIMS database, administered by the Heritage NSW, contains records of all Aboriginal objects reported to the Secretary of the Department of Premier and Cabinet in accordance with section 89A of the NPW Act. It also contains information about Aboriginal places that have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as ‘Aboriginal sites’.

A search of the AHIMS database was undertaken on 15 January 2021 for the Modification Areas inclusive of a 200 m buffer (Figure 18) (Appendix D). Consideration of previously recorded “valid” Aboriginal sites based on AHIMS site coordinates and associated site cards/reports indicates that four AHIMS sites are located within or partially within the Modification Areas. All four comprise open artefact sites (i.e., isolated artefacts and artefact scatters) including isolated artefact site “DS IF34 11” (#37-2-4359) and three artefact scatters sites “SC-OS-18 (#37-2-1937), “MAS 71” (#37-2-0415) and “DS AS79 11” (#37-2-4303) one of which has an associated area of PAD (Table 8).

Table 8 AHIMS Sites within the Modification Areas

Site ID	Easting	Northing	Type	Assessment
37-2-1937	299450	6411670	Artefact scatter	Mills (2000)
37-2-0415	298805	6412088	Artefact scatter	(Koettig & Hughes, 1985)
37-2-4359	298928	6412315	Isolated artefact	AECOM Australia Pty Ltd, (2012)
37-2-4303	298909	6412509	Artefact scatter + PAD	AECOM Australia Pty Ltd, (2012)

Site 37-2-1937 is an artefact scatter site identified by Mills (2000). A sample of five artefacts were recorded including a scraper, core and flakes. The site was assessed as forming part of two adjacent sites – SC-OS-17 and SC-QS-1 due to a near continuum of artefacts present between the sites.

Site 37-2-0415 is an artefact scatter site with PAD that were recorded by Koettig and Hughes (1985). Approximately 32 artefacts were recorded adjacent to an ephemeral drainage line.

Site 37-2-4359 consists of a single artefact recorded by AECOM (2012). The artefact comprised of a single silcrete complete flake with a maximum linear dimension of 25 mm located between two contour drains.

Site 37-2-4303 consisted of an artefact scatter recorded by AECOM (2012). A total of 52 artefacts were recorded on a nearby contour drain comprising a variety of complete flakes and flake debitage items as well as retouched flakes, a basalt axe and a hammerstone.

6.2.2 Previous Archaeological Investigations within the Study Area and Surrounds

Existing AHIMS data indicates that numerous Aboriginal archaeological investigations incorporating surveys and/or test excavations have been undertaken within or directly adjacent to the Modification Areas since the 1980s. Investigations undertaken include targeted surveys by Dyall (1980), Mills (2000), HLA Envirosciences (2002), Archaeological Risk Assessment Services (2006), and AECOM (2012; 2018). Two test excavation programs have been completed within or within close proximity to the Modification Areas including one by Koettig & Hughes (1985) and one by Archaeological Risk Assessment Services (2010). Summaries of these assessments are provided below:

- Dyall (1980) undertook a survey of an area immediately south of the Bayswater Colliery and north of the Modification Areas associated with the Maxwell Underground. Three sites, all artefact scatters, were recorded on the banks of Saddlers Creek. The sites contained flakes, cores and backed blades of chert, rhyolite (tuff) and quartz.
- Koettig & Hughes (1985) undertook an archaeological survey of three separate development areas in the Hunter Valley. The areas included the Plashett Reservoir site and water storage area on Saltwater Creek; a coal mine development on Mount Arthur North; and a coal mine development on Mount Arthur South. Within the Plashett Reservoir area, a total of 86 open campsites consisting of stone artefact scatters were recorded. The sites were concentrated along creeklines, especially Saltwater Creek, with artefacts recorded on bare, eroded exposures. Six of these sites were excavated. Within the Mount Arthur South Modification Areas, a total of 136 archaeological sites were located and recorded. These comprised 135 open campsites with stone artefact scatters and one site consisting of grinding grooves. The survey focused on areas adjacent to Saddlers Creek. Artefact scatters were the most common site type identified during the survey and were identified eroding out of the A soil horizon. The general pattern of site distribution was one of higher numbers of sites along major creeklines, i.e., Saltwater Creek, with numbers decreasing along tributaries. Artefact densities along the whole of Saddlers Creek were typified by sites of high average densities, with a marked increase in the lower section of the creek. Indurated mudstone/tuff and silcrete were the most frequently recorded raw material. Survey of the Mount Arthur North area resulted in the locating of 93 open campsites consisting of stone artefact scatters. A programme of excavation and collection was carried out. The survey focused on areas adjacent to Whites Creek. Koettig and Hughes (1985) noted that sites tended to correspond in area to the surface exposures in which they were identified. Very few sites were recorded on hill slopes, ridges or along the upper portions of some creeklines where there were large areas of eroded ground.
- Mills (2000) undertook an archaeological survey to identify Aboriginal sites, and areas of potential archaeological sensitivity within the proposed mine and haul road areas for the Saddlers Creek Mine. The focus of the survey was Saddlers Creek; however, a number of its tributaries were also surveyed. Forty Aboriginal sites were identified, including seven isolated artefacts, 29 artefact scatters (nine with PAD), two quarry sites, and two scarred trees. The majority of artefact scatters and isolated finds were identified along ephemeral feeder creeks of Saddlers Creek. Mills (2000) found that evidence of Aboriginal activity was associated with the full length of these creeklines from their headwaters to the floodplain. In addition, at least two sites were identified on ridges and eight sites were identified at least 200 m from creeklines. A total of 238 artefacts were recorded, including 127 (53.4%) flakes, 41 (17.2%) block fracture fragments, 28 (11.8%) cores, 19 (8%) flake fragments, seven (2.9%) scrapers, five (2.1%) manuports, four (1.7%) hammerstones, three (1.3%) backed blades, one sharpening stone, one millstone, one anvil and one pebble axe. Indurated mudstone/tuff was the dominant material (48.32%), followed by silcrete (31.51%), quartzite (5.46%), chert (5.04%), quartz (2.94%), porcellanite (2.10%), siltstone (2.10%), sandstone (0.84%), basalt (0.84%), fossilised wood (0.42%), and glass (0.42%).
- HLA Envirosciences (2002) completed an archaeological survey for the Drayton Mine Extension. A total of 14 artefact scatters were located during survey. Indurated mudstone/tuff was the dominant material (51%), followed by silcrete (39%), quartz (5%) and porcellanite (5%). Artefacts comprised flakes (49%), flaked pieces (41%), cores (9%), and backed blades (1%). All sites were located along creeklines, ridgelines or crests.

- ARAS (2006) undertook an assessment for the Drayton Mine Extension. A total of 480 stone artefacts were recorded from 39 sites that were identified, comprising of 22 artefact scatters and 17 isolated finds. A large proportion of the sites contained fewer than 10 artefacts, though five sites had over 50 artefacts and were associated with drainage lines or gullies. Of the 480 artefacts identified, 38% were complete flakes, 31% broken flakes, 26% flaked pieces and 5% cores. A majority of artefacts were of indurated mudstone/tuff (55%), followed by silcrete (25%), porcellanite (14%) and quartz (4.6%).
- ARAS (2010) undertook a program of salvage excavation for 26 Aboriginal sites for the Drayton Mine Extension. The salvage included surface collection of artefacts at 22 sites, mechanical grader scrapes at 11 locations and hand excavation at three locations. A total of 8,505 artefacts were recovered as part of the works. Of these, 7,500 artefacts were recovered from three distinct knapping locations at Ramrod Creek, identifying the creek as archaeologically sensitive. OSL (optically stimulated luminescence) dating of deposits at Ramrod Creek and Delpah returned dates of 3-1.4 thousand years ago, placing them in the Late Holocene. Raw materials utilised included porcellanite, silcrete, tuff and chert. At Ramrod Creek, porcellanite was the dominant raw material, while at Delpah, silcrete and tuff were dominant. ARAS (2010) proposed that two main site types, reflecting two differing site functions, were present within the Modification Areas: fringe sites representing short-term occupation, and sites principally focused on the manufacture of backed artefacts. On the basis of site size (i.e., number of artefacts) and the ratio of discarded tools to waste material, ARAS (2010) proposed that sites adjacent to ridgelines and overlooking ephemeral water systems were the result of 'short term settlement'. Conversely, ARAS (2010) found that sites associated with Ramrod Creek were specific to stone tool manufacturing activities, with particular emphasis on producing Bondi points from porcellanite.
- In 2012, AECOM completed an archaeological survey of the Drayton South Coal Project areas, which overlapped with the Modification Areas. A total of 205 discrete sites were identified during the assessment, including both the existing AHIMS sites and newly recorded sites. Sites comprised 143 artefact scatters, eight of which have associated areas of PAD, 59 isolated artefact sites and three stone quarries. High significance was attributed to four sites, based on their rarity and research potential. Moderate significance was attributed to 18 sites and low significance to 183 sites. Complete flakes dominated the assemblage, accounting for 50.2 per cent of the combined survey assemblage, followed by broken flakes and flake shatter fragments. Raw material most commonly associated with both complete flakes and flake debitage consisted of indurated mudstone/tuff.
- In 2015, AECOM were engaged to undertake an updated archaeological survey for the Drayton South Coal Project with the Modification Areas comprising the original area assessed as part of the previous Drayton South Coal Project application.
- In 2019, AECOM prepared the Maxwell Project ACHA. The surface development areas for the Project partially overlapped with the survey area completed for the Drayton South Coal Project in 2012 so only the areas not previously surveyed were subject to survey. During the survey, a total of 47 new Aboriginal archaeological sites, comprising artefact scatters and isolated artefacts, were identified. Combined, a total of 275 Aboriginal archaeological sites, comprising 274 open artefact sites and one stone quarry were identified within the Modification Areas. A total of 545 individual stone surface artefacts (that form the open artefact sites) were recorded during the archaeological survey. In addition, a Cultural Values Report (CVR) was prepared. For the CVR, RAPs indicated that the Project area sits within a broader cultural landscape that has cultural significance for Aboriginal people. Forming part of this cultural landscape were important landscape features such as Mount Arthur, the Hunter River, and Saddlers Creek which as well as the Aboriginal objects (i.e., stone artefacts) identified during the archaeological survey for the Project.

6.3 Archaeological Predictions and Observation

A review of the existing archaeological and environmental context of the Modification Areas suggests that material evidence of past Aboriginal activity within the area is likely to be restricted to flaked stone artefacts. Accordingly, key predictions and observations for the Aboriginal archaeological records within the Modification Area are as follows:

- open artefact sites (i.e., artefact scatters and isolated artefacts) will be the dominant site type;
- site types unlikely to occur include scarred trees, stone arrangements and burials;
- most, if not all, of the Aboriginal archaeological materials present within the Modification Areas will be of mid-to-late Holocene antiquity;
- Quaternary alluvial deposits on the Hunter River's contemporary floodplain and its more recent terraces retain the greatest potential for the preservation of early (i.e., late Pleistocene/early Holocene) occupation evidence;
- the dominant raw material for flaked stone artefact production within the Modification Areas will be silicified tuff, with silcrete the second most common material;
- flaked stone assemblages will be dominated by flake debitage items (*sensu* Andrefsky 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented;
- the majority of silcrete artefacts will exhibit evidence of thermal alteration;
- knapping floors, if present, will exhibit evidence indicative of systematic backed artefact manufacture;
- complete and/or fragmentary backed artefacts will dominate the retouched components of recorded flaked stone artefact assemblages;
- tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts;
- a total of four AHIMS sites are located within the Modification Areas, all of which comprise open artefact sites (i.e., isolated artefacts and artefact scatters); and
- the likelihood of previously unidentified Aboriginal sites to be located in the Maxwell Infrastructure site is considered low due to historical disturbances.

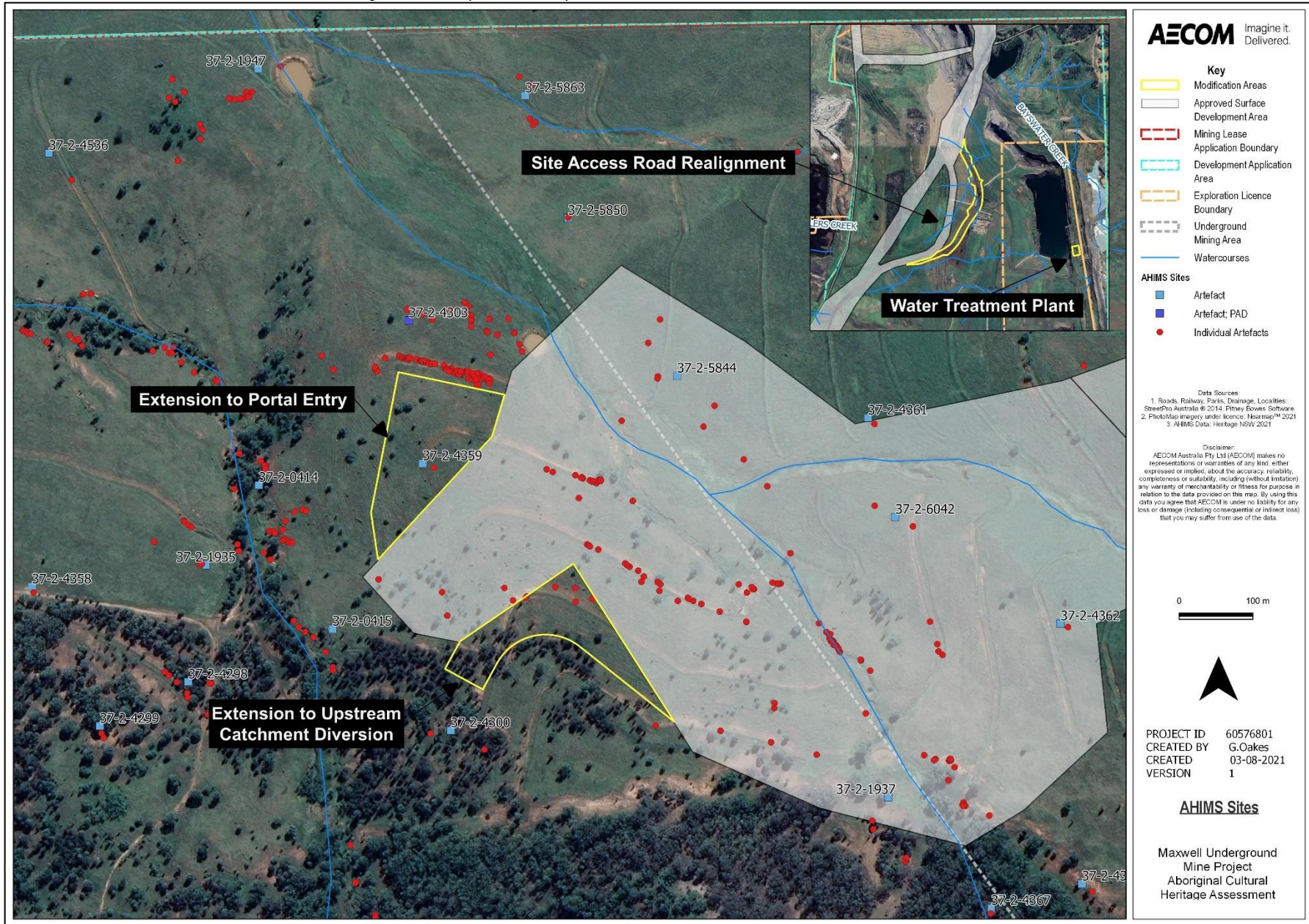


Figure 18 AHIMS Sites

7.0 Archaeological Survey

7.1 Aim and Objectives

Archaeological survey of the MEA, including the Modification Areas, was undertaken by AECOM in 2012 by a combined field team of one AECOM Archaeologist (Geordie Oakes) and RAP field representatives. Archaeological survey of the Maxwell Infrastructure (including the Modification Areas) was completed by HLA-Envirosciences (2002) and ARAS (2006).

The aim of the archaeological surveys was to identify, record and map Aboriginal heritage values within the areas for the relevant assessments. These values include both the tangible remains of past Aboriginal activity (i.e., archaeological evidence) as well as intangible cultural values.

7.1.1 Methodology

During the 2012 survey, AECOM employed a “full coverage” survey strategy with survey transects completed across the entire MEA, including the Modification Areas. All survey was conducted on foot, with parts of several transects executed across the MEA, including the Modification Areas. Participants (on average eight participants per day) were spaced at 10 m intervals during the survey. The location of each transect completed during the survey, including start and end points, was recorded using one of two handheld differential GPS units, with associated transect data (e.g., Ground Surface Visibility [GSV] and Ground Integrity [GI] ratings) entered directly into the same unit upon the completion of each transect.

Summaries of surveys within the Maxwell Infrastructure, including the Modification Areas, are provided in the associated reports (HLA-Envirosciences, 2002; ARAS 2006).

7.2 Survey Results

7.2.1 Survey Coverage and Effective Coverage

As indicated in Section 7.1.1 and shown on Figure 19, parts of several pedestrian transects were completed over the Modification Areas for the MEA. Effective coverage is an estimate of the area in which archaeological materials are ‘detectable’ and is determined through estimating the visibility and exposure of each transect to calculate an effective coverage percentage. Reference to AECOM (2012) assessment indicates that survey coverage across the MEA, including the Modification Areas, was good with “full coverage” achieved. Effective coverage rates were between 0-10% with the varied coverage a result of vegetation cover in some areas and areas of exposure from erosion and contour drains in others.

7.3 Surface Artefacts

7.3.1 Archaeological Survey

A total of seven individual stone artefacts were recorded during the AECOM (2012) archaeological survey with the Modification Areas for the MEA. Artefacts comprised six complete flakes and flake shatter fragment, with six of Indurated Mudstone Tuff Chert (IMTC), and one of silcrete. The locations of individual artefacts area shown on Figure 18.

7.4 Sites

As noted in Section 6.2.1, four Aboriginal sites are located wholly within or partially within the Modification Areas, all of which comprise open artefact sites (i.e., isolated artefacts and artefact scatters) comprising:

- isolated artefact site 37-2-4359;
- artefact scatter site 37-2-1937;
- an artefact scatter site 37-2-0415; and
- an artefact scatter with PAD site 37-2-4303.

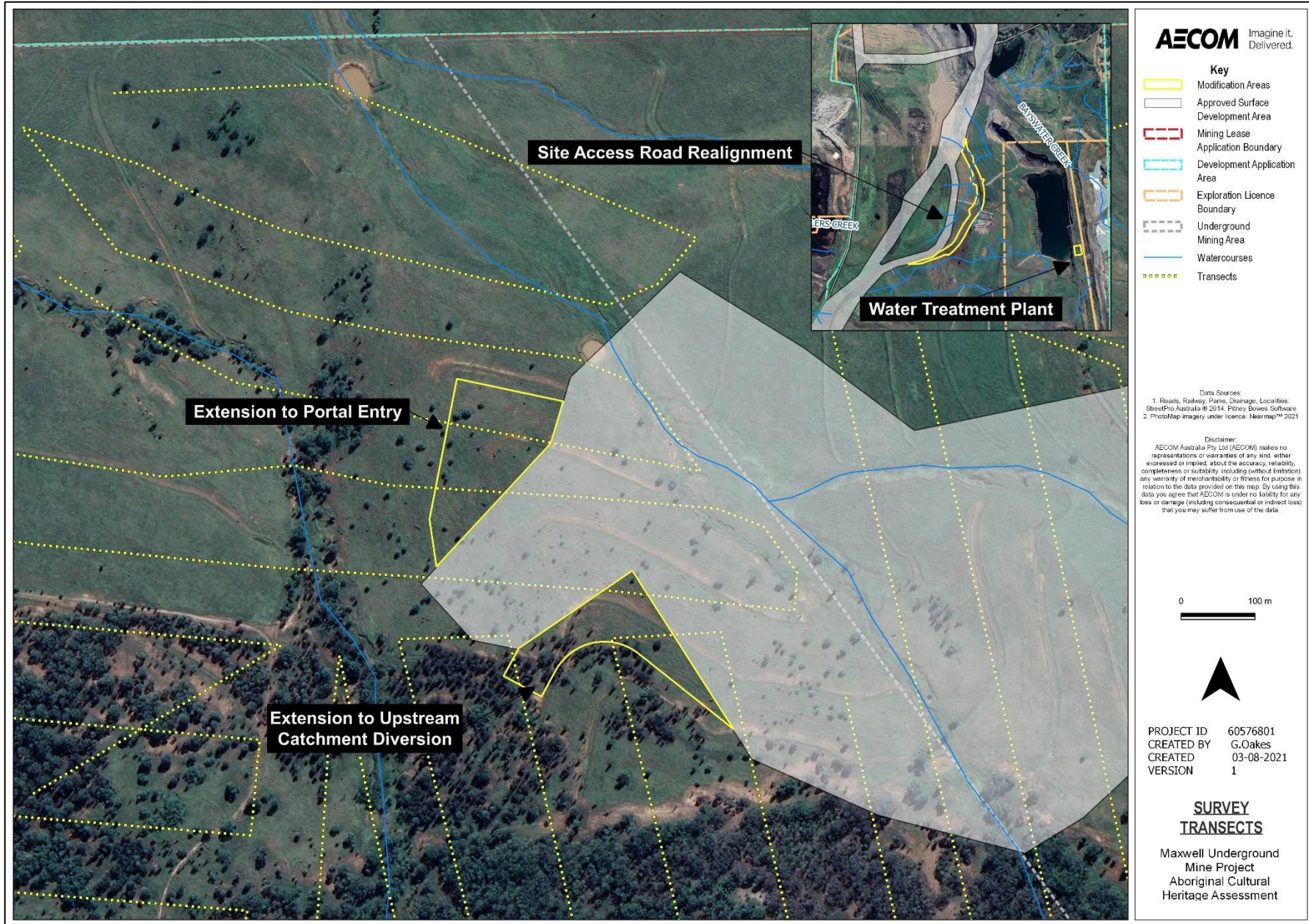


Figure 19 Survey transects

8.0 Significance Assessment

8.1 Principles of Assessment

Heritage sites hold value for different communities in a variety of different ways. All sites are not equally significant and thus not equally worthy of conservation and management (Pearson & Sullivan 1995: 17). One of the primary responsibilities of cultural heritage practitioners, therefore, is to determine which sites are worthy of preservation and management (and why) and, conversely, which are not (and why) (Smith & Burke 2007: 227). This process is known as *the assessment of cultural significance* and, as highlighted by Pearson and Sullivan (1995: 127), incorporates two interrelated and interdependent components. The first involves identifying, through documentary, physical or oral evidence, the elements that make a heritage site significant, as well as the type(s) of significance it manifests. The second involves determining the degree of value that the site holds for society (i.e., its cultural significance) (Pearson & Sullivan 1995: 126).

In Australia, the primary guide to the assessment of cultural significance is the *Australian ICOMOS Charter for Places of Cultural Significance* (2013), informally known as *The Burra Charter*, which defines cultural significance as the “aesthetic, historic, scientific, social or spiritual value for past, present or future generations” of a site or place (ICOMOS 2013: 2). Under the Burra Charter model, the cultural significance of a heritage site or place is assessed in terms of its aesthetic, historic, scientific and social values, none of which are mutually exclusive (Table 9). Establishing cultural significance under the Burra Charter model involves assessing all information relevant to an understanding of the site and its fabric (i.e., its *physical* make-up). The assessment of cultural significance and the preparation of a statement of cultural significance are critical prerequisites to making decisions about the management of any heritage site or place (ICOMOS 2013: 2).

With respect to Aboriginal heritage, it is possible to identify two major streams in the overall significance assessment process: the assessment of *scientific value(s)* by archaeologists and the assessment of *social (or cultural) value(s)* by Aboriginal people. Each is considered separately below.

Table 9 Values relevant to determining cultural significance, as defined by The Burra Charter (ICOMOS 2013)

Value	Definition
Aesthetic	“Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use” (ICOMOS 2013).
Historic	“Historic value encompasses the history of aesthetics, science and society...[a] place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may have historic value as the site of an important event” (ICOMOS 2013).
Scientific	“The scientific or research value of a place will depend on the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information” (ICOMOS 2013).
Social	“Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group” (ICOMOS 2013).

8.2 Scientific Value

Scientific value refers to the importance of a place in terms of its rarity, representativeness and the extent to which it may contribute further information (i.e., its research potential) (OEH 2011: 9).

8.2.1 Rarity and Representativeness

Rarity and *representativeness* are related concepts. *Rarity* refers to the relative uniqueness of a site within its local and regional context. The scientific significance of a site is assessed as higher if it is unique or rare within either context. Conversely, it is considered to be of lower significance if it is common in one or both. The concept of *representativeness*, meanwhile, refers to the question of whether or not a site is “a good example of its type, illustrating clearly the attributes of its significance” (Burke & Smith 2004: 247). *Representativeness* is an important criterion as one of the primary goals of cultural heritage management is to preserve for future generations a representative sample of all archaeological site types in their full range of environmental contexts.

In common with *rarity*, assessments of *representativeness* within a region are dependent on the state of current knowledge concerning the number and type of archaeological sites present within that region¹⁶. This is a critical point, for as suggested by Kuskie (2000) and others (e.g., Bowdler 1981; Godwin 2011; Pearson & Sullivan 1995), the absence across most of Australia of regional-scale quantitative data for Aboriginal sites and places represents a major constraint in assessments of *representativeness* and *rarity*. As stressed by Bowdler (1981) some 30 years ago, detailed regional-scale assessments of the Aboriginal archaeological record of Australia are required to address this issue.

8.2.2 Research Potential

Research potential can be defined as the potential of an archaeological site to address what Bowdler (1981: 129) has referred to as “timely and specific research questions”. These questions may relate to any number of issues concerning past human lifeways and environments and, as suggested by Bowdler’s quote, will inevitably reflect current trends or problems in academic research (Burke & Smith 2004: 249). For their part, Bickford and Sullivan (1984: 23-4) suggest that the research potential of an archaeological site can be determined by answering the following series of questions:

1. Can the site contribute knowledge which no other resource can?
2. Can the site contribute knowledge which no other such site can?
3. Is this knowledge relevant to general questions about human history or other substantive subjects?

Several criteria can be used to assess the research potential of an archaeological site. Particularly important in the context of Aboriginal archaeology are the intactness or integrity of the site in question, its complexity and its potential for archaeological deposit (NSW National Parks and Wildlife Service 1997: 7). The connectedness of the site to other sites or natural landscape features may also be relevant.

Integrity refers to the extent to which a site has been disturbed by natural and/or anthropogenic phenomena and includes both the state of preservation of particular remains (e.g., animal bones, plant remains) and, where applicable, stratigraphic integrity. Assessments of archaeological integrity are predicated on the notion that undisturbed or minimally disturbed sites are likely to yield higher quality archaeological and/or environmental data than those whose integrity has been significantly compromised by natural and/or anthropogenic phenomena. Establishing levels of preservation or integrity in the context of a surface survey is difficult. Nonetheless, useful rating schemes are available for ‘open’ sites (Coutts & Witter 1977: 34) and scarred trees (Long 2003).

¹⁶ There is, of course, a temporal fluidity to this criterion (i.e., as knowledge of the Aboriginal archaeology of a region increases, assessed levels of representativeness may change, a point of equal relevance to rarity).

The *complexity* of a site refers primarily to the nature or character of the artefactual materials or features that constitute it but also includes site structure (e.g., the physical size of the site, spatial patterning in observed cultural materials). In the case of open artefact sites, for example, the principal criteria used to assess complexity are the site's size (i.e., number of artefacts and/or spatial extent), the presence, range and frequency of artefact and raw material types, and the presence of features such as hearths.

Potential for archaeological deposit refers to the potential of a site to contain subsurface archaeological evidence which may, through controlled excavation and analysis, assist in answering questions that are of contemporary archaeological interest. Assessing subsurface potential in the absence of subsurface investigation is difficult. Nonetheless, consideration of a range of factors, including the integrity of the site, the complexity of extant surface evidence, the nature of the local geomorphology (as established through surface observations and documentary research) and the results of previous archaeological excavations in the area, will help inform assessment of this criterion.

Connectedness concerns the relationship between archaeological sites within a given area and may be expressed through a combination of factors such as site location, type and contents. It may, for example, be possible to establish a connection between a stone quarry and hatchet found nearby. Demonstrating connectedness archaeologically, however, is far from straightforward, especially when dealing with surface evidence alone. Ultimately, this difficulty rests with the need to demonstrate contemporaneity between sites that may have been created hundreds, if not thousands, of years apart. As Shiner (2008: 13) has observed, “much of the surface archaeological record documents the accumulation of materials from multiple behavioural episodes occurring over long periods of discontinuous time”. Contemporaneity, then, needs to be demonstrated not assumed. Given the nature of the archaeology within the Modification Areas and its nature and condition, demonstrating connectedness was not possible for this assessment.

8.2.3 Identification Process for Current Assessment

For the current assessment, information on the scientific values of the Modification Areas has been obtained through a review of existing environmental and archaeological data as detailed in Sections 4.0 and archaeological survey across the MEA completed by AECOM in 2012 described in Section 7.2.

8.2.4 Assessment of Scientific Significance

An assessment of the scientific significance of sites within the Modification Areas is presented in Table 10 below and shown on Figure 20. The significance rating of “scientific significance” is offered on the basis of the assessed research potential, rarity, representativeness, PAD, complexity and integrity and assigned low (L), moderate (M) and high (H) values.

Table 10 Scientific significance assessment

Site	Type	Rarity	Representative-ness	Integrity	Complexity	PAD	Research potential	Overall Significance
37-2-4303	Artefact scatter + PAD	M	L	L	M	M	M	Moderate
37-2-4359	Artefact scatter	L	L	L	L	L	L	Low
37-2-0415	Artefact scatter	L	L	L	L	M	L	Low
37-2-1937	Artefact scatter	L	L	L	M	L	L	Low

8.3 Social (Cultural) Value

Social or cultural value refers to the spiritual, traditional, historic and contemporary associations and attachments a place or area has for Aboriginal people and can only be identified through consultation with Aboriginal people (OEH 2011: 8). A summary of key cultural values identified by RAPs participating in the AECOM (2012; 2018) assessments is provided below.

8.3.1 Cultural Landscape

RAPs indicated that the Modification Areas sits within a broader cultural landscape that has cultural significance for Aboriginal people. Forming part of this cultural landscape are important landscape features, such as, Mount Arthur, the Hunter River, and Saddlers Creek which surround the Modification Areas, as well as the Aboriginal objects (i.e., stone artefacts) identified during archaeological surveys for the Project. Landscape features, as well as Aboriginal sites, are often associated with stories or songs and form links along songlines or pathways. More broadly, the Modification Areas forms part of larger collection of Aboriginal places including Mount Yengo, Biame Cave in Milbrodale, the Lizard Rock at Laguna and Burning Mountain at Wingen.

8.3.2 Landscape Features

RAPs who participated in the AECOM (2012, 2018) assessments highlighted Mount Arthur, located 4.5 km north, the Hunter River located south and Saddlers Creek located to the north of the Modification Areas as culturally important features in the local landscape. Mount Arthur is the dominant landscape feature in the local area and has been identified by RAPs as a significant landscape feature both spiritually and as a visual landmark. One of the first references to the importance of Mount Arthur to the local Aboriginal community was from Dyall (1977) during the archaeological assessment, *Environmental Studies - Mt Arthur Project (Hunter Valley): Full Report on Aboriginal Relics* (Dyall 1977). Dyall (1977) noted that during his enquiry with local residents there were 'suggestions that Mount Arthur itself was of special significance' to the Aboriginal people (Dyall 1977: p1). Since that time, several archaeological and cultural heritage assessments have reported on the significance of Mount Arthur to Aboriginal people. Umwelt (2006) noted the significance of Mount Arthur as the dominant topographic feature of the region and additionally identifies the prominent ridgeline that radiates southeast of the mountain towards Saddlers Creek. As a visual landscape feature, Mount Arthur would have formed a landscape point (or node) within an Aboriginal pathway linking with other points or features and drawing together the broader cultural landscape. In addition, RAPs have identified Mount Arthur as the location of a potential massacre site (Section 8.3.3). The identification of an Aboriginal burial site on the Mt Arthur Mine Coal Lease in 2001 likewise forms an important contribution to the significance of Mount Arthur to local Aboriginal people.

8.3.3 Aboriginal Dispossession and Resistance

RAPs indicated that conflict, including massacres of Aboriginal people, between Aboriginal people, local settlers and Mounted Police occurred in the region surrounding the Modification Areas. In particular, Mount Arthur was noted as a massacre location. A review of oral histories recorded by Davidson & Lovell-Jones (1993) suggest a massacre of Aboriginal people by Mounted Police may have occurred immediately south of Mount Arthur in an area called "The Pocket" in the 1820s. While details varied across informants interviewed there was general consensus that a large number of Aboriginal people (c. 300) were either camping or were driven into The Pocket by Mounted Police and shot to death. However, no physical evidence has been identified related to the massacre despite detailed archaeological survey of The Pocket having been completed (Davidson, James & Fife 1993).

8.3.4 Vegetation

RAPs suggested that prior to European settlement, the native vegetation communities of the Modification Areas and surrounds would have contained a variety of edible and otherwise useful plant species. Cross-referencing the results of the flora surveys completed by Hunter Eco (2019) for the Project with material published on bush foods (see Cribb & Cribb 1974; Isaacs 2002; Lassak & McCarthy 2001; Stewart & Percival 1997; and Zola & Gott 1992) suggest a number of useful plant species utilised by Aboriginal people are located within the Modification Areas including Acacia, Eucalypts, Spiny-headed Matrush, Cumbungi, Grass Tree, Common Reed, Small Vanilla Lily, Headache Vine, Wombat Berry, Pale Grass-Lily, Rough-Barked Apple, Greenhood Orchids, Native Geranium, Apple-berry, Kangaroo Grass, Tussock grass, Hairy Panic Grass.

8.3.5 Mount Arthur Burial

RAPs noted that a burial site was located north of the Project at the Mt Arthur Mine. The burial was uncovered as part of salvage works completed by Kuskie and Clarke (2004) at the Mt Arthur Mine. It is understood that details surrounding the burial have not been publicised and remain restricted. However, AECOM understands that the burial was left *in-situ* but is located outside the extents of the Project and would not be impacted by the Modification.

8.4 Historic Value

Historic value refers to the associations that a place has with a historically important person, event, phase or activity in an Aboriginal community (OEH 2011: 9). Historic values can but will not necessarily be represented by physical evidence.

Although situated within a broader landscape of high historical significance for contemporary Aboriginal people, the Modification Areas itself is assessed as having low historical significance. No evidence of post-contact Aboriginal occupation has been identified within the Modification Areas, either during background historical research, archaeological field survey or consultation with RAPs. In addition, no historical records or oral histories specific to the use of the site by Aboriginal people have been identified as part of this assessment. However, it is noted that RAPs have identified that Aboriginal people are known to have been employed on farms in the greater Jerrys Plains/Edderton area.

8.5 Aesthetic Value

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

With respect to Aboriginal heritage, key aesthetic cultural values associated with the Modification Areas include Mount Arthur, the Hunter River and Saddlers Creek, all of which are located outside the Modification Areas. Views of Mount Arthur and Saddlers Creek area available from the MEA.

8.6 Statement of Significance

This assessment finds that the Aboriginal heritage values of the Modification Areas rest principally with the archaeological sites identified within it but are also drawn from its place within the broader cultural landscape. Identified archaeological sites within the Modification Areas attest to its past use by Aboriginal people with these sites identified by RAPs as all highly significant. Sites within the Modification Areas have been assessed as of low and moderate scientific significance.

More broadly, the Modification Areas forms part of a larger and highly significant cultural landscape for Aboriginal people in the Muswellbrook region with Mount Arthur, the Hunter River and Saddlers Creek being three culturally significant landscape features in the local area. The Modification Areas was likely utilised by people travelling to and from Mount Arthur from the south and is visible from multiple locations within the Modification Areas. Likewise, both the Hunter River and Saddlers Creek were likely accessed in places nearby the Modification Areas by Aboriginal people to exploit the diverse range of terrestrial, aquatic and avian resources associated with these watercourses. Two of these culturally significant landscape features are visible from specific sites/locations within the Modification Areas and are considered to hold aesthetic significance.

Although situated within a broader landscape of high historical significance for contemporary Aboriginal people, the Modification Areas itself is assessed as having low historical significance with no evidence of post-contact Aboriginal occupation identified within it. In addition, no historical records or oral histories specific to the use of the site by Aboriginal people have been identified as part of this assessment.

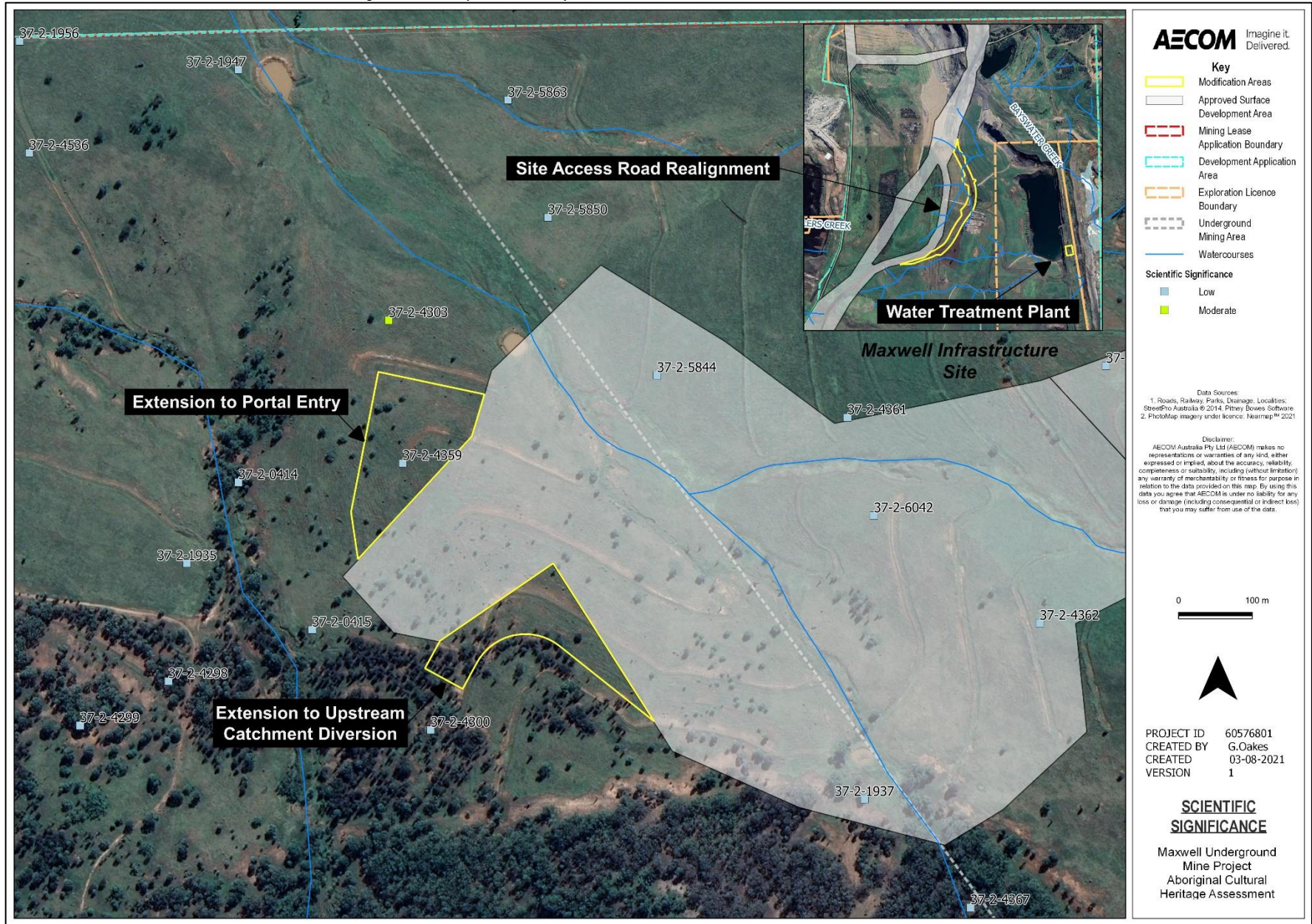


Figure 20 Significance assessment

9.0 Impact Assessment

9.1 Summary of Proposed Impacts

As described in Section 1.3, the Modification would not require a significant alteration to the Project and would comprise the following components, as shown on Figure 2:

- repositioning of the underground portal;
- realignment of a small section of the access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to established mine rehabilitation;
- repositioning of part of the clean water diversions for the MEA;
- repositioning of the water treatment facility to the Maxwell Infrastructure site; and
- other minor works and ancillary infrastructure components (e.g. works associated with the reconfiguration of the MEA, pumps/pipelines associated with the water treatment facility).

9.2 Impacts to Identified Aboriginal Sites

As discussed in Section 7.4, a total of four Aboriginal archaeological sites located wholly within or partially within the Modification Areas, all of which comprise open artefact sites (i.e., isolated artefacts and artefact scatters), with one comprising an isolated artefact and three artefact scatters, with having an associated area of PAD (Figure 21). Consideration of the location of these sites in relation to the proposed Modification indicates a total loss of value for site 37-2-4359, partial loss of value for site 37-2-1937 (previously approved for partial surface collection) and site 37-2-0415 and no loss of value for site 37-2-4303. As part of the Maxwell Project ACHA, site 37-2-1937 was approved to be directly impacted by surface development (direct total loss of value).

It is noted that no recorded Aboriginal artefacts associated with site 37-2-4303 will be impacted. However, impacts will occur within the mapped site boundary (i.e., a 50 m buffer applied to all artefacts). Table 11 provides a summary of impacted sites utilising the format provided in Heritage NSW's AHIP application form.

Table 11 Impact Assessment

AHIMS Site Information							Proposed Harm		
Portion of Site (whole or part – include map reference if part)	AHIMS Site ID	Site Feature (there may be more than one site feature per site ID)	Easting	Northing	Datum (AGD or GDA)	Zone	Type of Harm	Degree of Harm	Consequence of Harm
Part	37-2-1937	Artefact scatter	299450	6411670	GDA	56	Directly harmed	Part	Partial loss of value
Part	37-2-0415	Artefact scatter	298805	6412088	GDA	56	Directly harmed	Part	Partial loss of value
Whole	37-2-4359	Isolated artefact	298928	6412315	GDA	56	Directly harmed	Whole	Total loss of value
Part	37-2-4303	Artefact + PAD	298909	6412509	GDA	56	Direct impact to 50 m buffer for site but no direct harm to artefacts	None	No loss of value

9.3 Impacts to Cultural Values

Three culturally significant landscape features have been identified by RAPs as relevant to the Modification Areas, including Mount Arthur, the Hunter River and Saddlers Creek. All three features are located outside the Modification Areas and would not be directly impacted by the Project. However, views of the MEA and portions of access road and water treatment plant would be visible from both Mount Arthur and Saddlers Creek. Nonetheless, consideration of the minor nature of the proposed modifications to the Project suggests these visual impacts would be minor, particularly when considering the views of large open cut mines north of the Modification Areas from both Mount Arthur and Saddlers Creek.

9.4 Cumulative Impact Assessment

9.4.1 Assessment of Ecologically Sustainable Development (ESD)

In NSW, the NPW Act provides the legislative framework for the protection of Aboriginal objects and places. Section 2A(2) of the NPW Act stipulates that such protection is to be achieved by applying the principles of Ecologically Sustainable Development (ESD). ESD requires the integration of economic and environmental considerations (including cultural heritage) in decision-making processes and, in the context of Aboriginal cultural heritage, can be achieved through the implementation of two key principles: intergenerational equity and the precautionary principle.

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations. With regard to Aboriginal heritage, intergenerational equity can be assessed in terms of cumulative impacts to Aboriginal objects and places in a region. Central to any assessment of intergenerational equity is the proposition that regions with fewer Aboriginal objects and places necessarily retain fewer opportunities for future generations of Aboriginal people to enjoy their cultural heritage. Accordingly, information regarding the known and potential Aboriginal heritage resource of a given region is critical to any assessment of intergenerational equity.

The precautionary principle holds that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In NSW, the precautionary principle is relevant to the Heritage NSW's consideration of potential impacts to Aboriginal cultural heritage in situations where:

- the proposed development involves a risk of serious or irreversible damage to Aboriginal objects or places or to the value of those objects or places; and
- there is uncertainty about the Aboriginal cultural heritage values or scientific or archaeological values, including in relation to the integrity, rarity or representativeness of the Aboriginal objects or places proposed to be impacted.

In these instances, the Heritage NSW has indicated that a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce damage to Aboriginal objects and/or places. In addition to these measures, a cumulative impact assessment should be undertaken to gain an understanding and appreciation of the impacts of development on NSW's Aboriginal cultural heritage resource.

It should be noted that the results of cumulative impact assessments undertaken for cultural heritage sites and places, Aboriginal or otherwise, must be interpreted with caution, not least because they are based (in part) on heritage datasets that are inevitably incomplete and contain various inconsistencies and errors. Godwin (2011), in particular, has questioned the value of cumulative impact assessments to cultural heritage management in Australia, arguing that the 'fundamentals' necessary for undertaking such assessments simply do not exist. The 'fundamentals' Godwin is referring to are robust regional and national datasets for measuring proposed impacts and the determination of acceptable scientific and cultural impact thresholds. While recognising the validity of the issues raised by Godwin (2011), current Heritage NSW guidelines necessitate that a cumulative impact assessment be undertaken as part of any Aboriginal cultural heritage assessment in NSW.

9.4.2 Intergenerational Equity - Cumulative Impact Assessment

Two avenues for assessing the cumulative impact of the Project on Aboriginal heritage can be pursued:

1. a comparison, using the results of AHIMS searches, of the identified Aboriginal archaeological resource of the Project area with that of the surrounding region (study region), defined here as an arbitrary 20 x 20 km (400 km²) area roughly centred on the Project; and
2. the use of existing environmental data sources (e.g., digital land use data and topographic maps) to identify the potential open artefact resource of the study region as a whole.

9.4.3 Known Resource

Alongside sites identified within the Modification Areas, existing open artefact sites in the study region offer opportunities for future research, conservation and education. Accordingly, it is necessary to quantify the impacts of the proposed development on this joint resource.

As indicated in Section 9.2, 41 previously identified open artefact sites (39 sites as part of the Project and two additional sites as part of the Modification) will be subject to direct impacts, either fully or partially, from the modified Project. AHIMS data obtained from the Heritage NSW on 11 May 2018 and 15 January 2021 indicate that the 41 directly impacted sites represent 2.6% of the valid extant open artefact resource of the study region, with searches of the AHIMS database returning 1,594 'Valid' open artefact sites for this search region. While acknowledging the limitations of the AHIMS database with respect to the validity of listed site statuses, on the basis of these data, it seems reasonable to conclude that the loss of these sites would not constitute a significant impact to the known open artefact resource of the region. Consideration of the character of these sites, 39 of which have been assessed as being of low scientific significance and two of moderate significance, alongside a consideration that the majority of land within this region has not been physically inspected for Aboriginal sites suggests that impact of this Project is to archaeological resource of the region is not significant.

9.4.4 Potential Resource

AHIMS results only represent a fraction of the likely archaeological resource present within a region, as these results are only representative of land that has been subject to archaeological investigations. Accordingly, an assessment of the *potential* Aboriginal heritage resource of an approximate 20 x 20 km study region centred on the Project is also a useful guide. For the present analysis, land use data (dated 2017) obtained from the Land Assessment Unit at Heritage NSW was utilised (Table 12).

As a starting point, it is necessary to quantify the amount of land within the study region that has the *potential* to retain open artefact sites. A basic assumption here is that existing, grossly disturbed terrain is unlikely to retain such sites whereas non-grossly disturbed terrain does, both in surface and subsurface contexts. Analysis of available digital land use data for the study region is summarised in Table 12. This analysis indicates that grossly modified or disturbed terrain (e.g., mining and quarrying, urban and industrial areas) accounts for approximately 27.6% of land within the region. Outside of grossly disturbed areas, fully to semi-cleared grazing land is particularly well represented, accounting for approximately 63.7% of land within the region. Conservation area is likewise fairly well represented at 4.2%. Tree and shrub cover is moderately well represented at 2.7%. Cropping is poorly represented at 0.6% and horticulture land at 1%.

Table 12 Land use analysis for study region (20 x 20 km)

Existing Land Use	Area (km ²)	Percent (%)	Archaeological Potential?
Conservation Area	16.7	4.2	Yes
Cropping	2.6	0.6	Yes
Grazing	254.9	63.7	Yes
Horticulture	4	1.0	Yes
Intensive Animal Production	23.9	6.0	No
Mining & Quarrying	67.5	16.9	No
Power Generation	2.6	0.6	No
River & Drainage System	13.3	3.3	No
Transport & Other Corridors	2.8	0.7	No
Tree and Shrub Cover	10.9	2.7	Yes
Urban	0.4	0.1	No
Wetland	0.5	0.1	Yes
Total	400.1	100	

Source: NSW Landuse Data 2017 obtained from Heritage NSW.

Viewed from an Aboriginal archaeological perspective, the results of the land use analysis presented in Table 12 suggest that approximately 72.4% of the study region (c.289.5 km²) can reasonably be considered to comprise a *potential open artefact resource*. As indicated, land upon which open artefact deposits are unlikely to survive accounts for just over 27.6% of land within the region. This figure increases to 92% if cropping and grazing land is included. However, as indicated by the results of numerous Aboriginal archaeological investigations, both within and outside of the study region, cropped and grazed areas can and frequently do retain significant surface and subsurface stone artefact records. It can, therefore, be concluded that around 72.4% of land within the study region has the potential to retain open artefact deposits in surface and subsurface contexts. While acknowledging the fact that the nature and distribution of such deposits will vary markedly in relation to environmental variables such as landform and the availability of potable water, analysis of available land use data does help to quantify the extent of the region's potential Aboriginal open artefact resource. Moreover, it provides a basis on which to assess the cumulative impact of the proposed development on this resource.

In order to quantify the impact of the modified Project on the potential open artefact resource of the study region it is necessary to compare the amount of land directly impacted by surface development with the potential for open artefact sites within the modified Project area with that available in the search area (c.289.5 km²). On this basis, it can be stated that impact to the Modification Areas would result in an approximate 0.05% decline in the region's potential open artefact resource, while the Project as a whole would result in an approximate 0.28% decline in region's potential open artefact resource. As such, it can be concluded that the impact of the modified Project on the potential Aboriginal archaeological resource of the region would not be significant.

With regards to the existence, outside of the modified Project area, of environmental contexts that have the potential to contain sites comparable to those identified within it, an examination of relevant topographic maps for the study region indicates that many such contexts exist, including unmodified sections of Saddlers Creek, Saltwater Creek and other unnamed creeklines in the region. On the basis of this evidence, it can be confidently concluded that land outside of the modified Project area but within the wider region contains a significant, as yet unidentified, open artefact site resource.

9.4.5 The Precautionary Principle

As indicated in Section 9.4.1, the precautionary principle holds that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

In the context of the current assessment, it can be stated that AECOM has adopted a precautionary approach in our assessment of the impacts of the proposed development on the Aboriginal archaeological resource of the modified Project area and that this approach is reflected in our proposed management strategy.

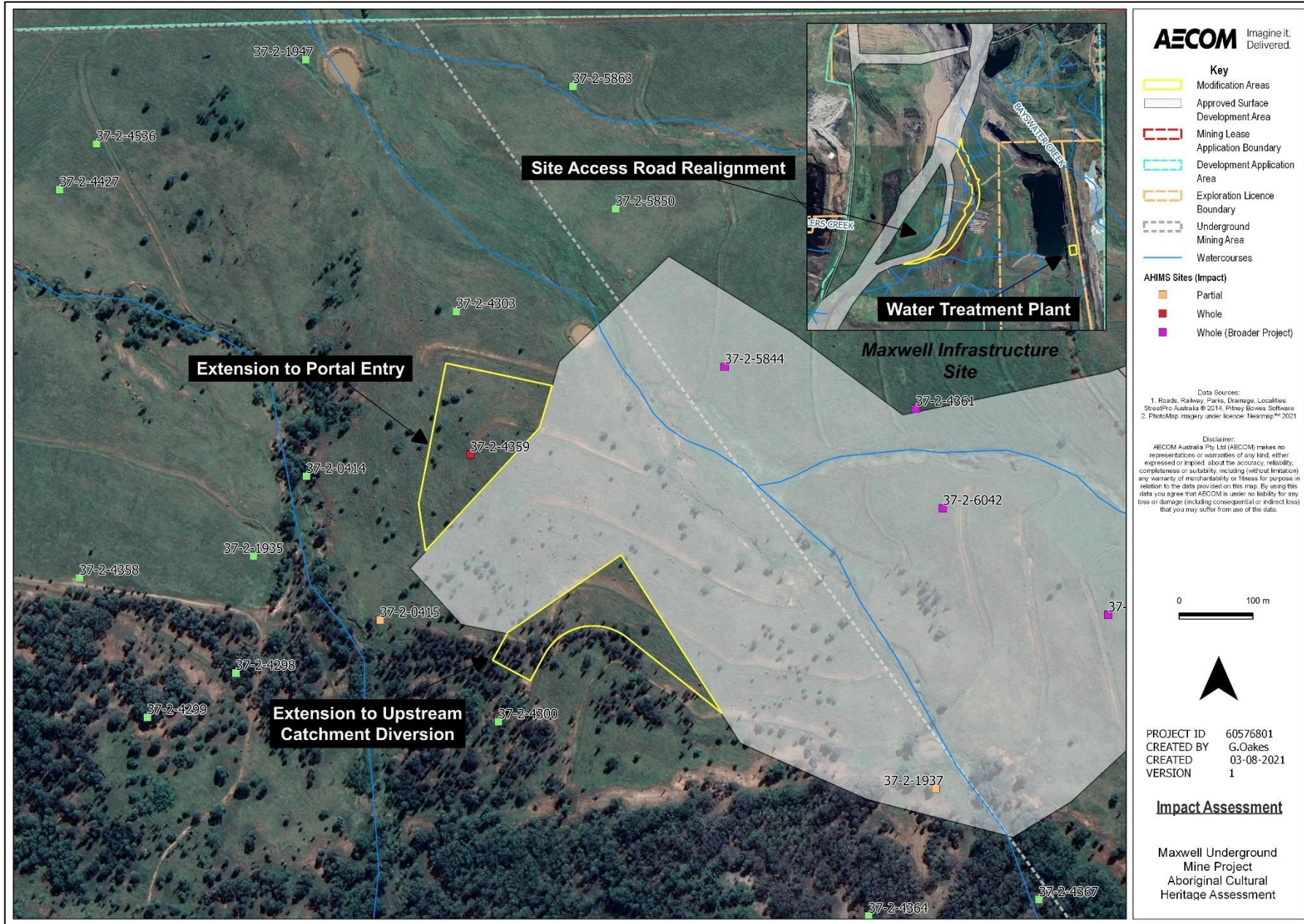


Figure 21 Impact Assessment

10.0 Avoiding and Minimising Harm

Malabar is committed to developing the Project with limited impacts to Aboriginal heritage values. The locations of the Modification Areas were selected in consideration of:

- the location of known Aboriginal heritage sites (i.e. avoiding direct impact to artefacts associated with Site 37-2-4303 through refinement of the underground portal design); and
- consideration of historical site disturbances.

The MEA layout was designed to avoid direct impacts to previously recorded Aboriginal artefacts associated with Site 37-2-4303. The location of the access road and water treatment plant have been placed on areas of known mine disturbance and as such would not impact Aboriginal heritage values.

11.0 Management Recommendations

The following management recommendations are made regarding the identified Aboriginal heritage values of the Modification Areas, with recommendations made on the basis of:

- a review of previous archaeological investigations completed within and surrounding the Modification Areas;
- the results of the archaeological investigation described in Section 7.0;
- the significance and impact assessments detailed in Sections 8.0 and 9.0; and
- consultation with RAPs.

11.1 Statutory Requirements

As indicated in Section 1.0, approval for the Modification is being sought under section 4.55(1A) of the EP&A Act. A Modification Report and supporting appendices are being prepared to accompany the application to modify Development Consent SSD 9526.

This ACHA documents the results of AECOM's assessment and has been compiled with reference to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

11.2 Management Strategy

This assessment has identified Aboriginal heritage site within the Modification Areas comprising four Aboriginal archaeological sites all consisting of open artefact sites (i.e., artefact scatters and isolated artefacts). The impact assessment undertaken in Section 9.0 has identified that three of these sites (37-2-1937, 37-2-0415 and 37-2-4359) would be directly impacted resulting in a partial loss of value for 37-2-1937 and 37-2-0415 and total loss of value for 37-2-4359. While the Modification will partially be located within the boundary of site 37-2-4303, no previously recorded Aboriginal objects will be impacted.

Archaeological test excavation was not considered warranted for the assessment of sites directly impacted by the Modification as robust significance assessments and associated management strategies were deemed possible on surface evidence alone.

A management strategy to address the impacts of the Project on the known Aboriginal heritage values is provided below. It is recommended that Project's existing Aboriginal Cultural Heritage Management Plan be updated to include details of this strategy.

11.2.1 Archaeological Salvage

An archaeological salvage program consisting of surface collection of portions of sites (Sites 37-2-1937, 37-2-0415 and 37-2-4359) impacted by the Modification should be undertaken for the Project prior to the commencement of any ground disturbance within the Modification Areas and following Development Consent. The salvage program should be completed in accordance with Section 3.2 of the approved Project ACHMP. Surface collection is considered an appropriate and effective mitigation option for these sites given their contents and level of scientific significance.

11.2.2 Previously Unrecorded Aboriginal Objects and Place

In the event that previously recorded Aboriginal objects or places are identified during the Project, the procedures outlined in Section 3.2 of the Project's approved ACHMP should be followed.

11.2.3 Management of Potential Human Remains

In the event that potential human skeletal remains are identified at any point during the life of the development, the procedures outlined in Section 3.2 of the Project's approved ACHMP should be followed.

11.2.4 AHIMS Site Cards

AHIMS site cards have been completed and submitted to the Heritage NSW for all recorded sites within the Modification Areas.

In the event that a previously unidentified Aboriginal site is discovered within the Modification Areas at any point during the operational life of the Project, an AHIMS site card for that site should be submitted to the Heritage NSW as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the Project.

11.2.5 Aboriginal Site Database

A comprehensive Aboriginal Site Database for the modified Project and its immediate environs be maintained over the life of the Project. Malabar is responsible for the creation and maintenance of this database which, at a minimum, contains the name, type, size (where applicable), MGA coordinates and status of all Aboriginal sites within and directly adjacent to the Project and its immediate environs. The database would continue to be regularly updated throughout the operational life of Project. Printed site lists and maps would be made available to RAPs upon request.

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Appendix A

Assessment Methodology

Appendix A Assessment Methodology



AECOM Australia Pty Ltd +61 2 8934 0000 tel
Level 21, 420 George Street +61 2 8934 0001 fax
Sydney NSW 2000 ABN 20 093 846 925
PO Box Q410
QVB Post Office NSW 1230
Australia
www.aecom.com

26 May 2021

Dear Registered Aboriginal Party,

RE: Modification to the Maxwell Underground Coal Mine Project - Proposed Aboriginal Cultural Heritage Assessment Methodology

AECOM Australia Pty Ltd (AECOM) is commissioned by Maxwell Ventures (Management) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for a modification application under section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Maxwell Underground Coal Mine Project (Maxwell UG Project).

The Maxwell UG Project (State Significant Development 9528) is located to the south-southwest of Muswellbrook, within the local government area of Muswellbrook, NSW. The Maxwell UG Project involves the development of an underground coal mine and the utilisation of the substantial facilities that already exist at the Maxwell Infrastructure site. It also includes a transport and services corridor between the Mine Entry Area (MEA) and the Maxwell Infrastructure site.

The proposed modification involves some minor changes to the layout of the MEA to provide several safety and operational benefits, and the realignment of a small section of the proposed access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to established mine rehabilitation.

As a Registered Aboriginal Party (RAP) for the Maxwell UG Project, please find enclosed for your review the proposed Aboriginal Cultural Heritage Assessment Methodology for the modification. The proposed methodology details AECOM's proposed approach to the assessment and is being provided to all RAPs in accordance with Sections 4.3.1 and 4.3.2 of the Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) and clause 80 of the *National Parks and Wildlife Regulation, 2019*. A brief review of existing environmental and archaeological data for the indicative study area is also provided for contextual purposes.

All comments on the proposed methodology must be received by 23 June 2021. Comments can be provided in writing or by phone. Comments on the cultural values of the study area can be provided along with your comments on the proposed methodology or at any stage up until the end of the draft ACHA review period.

Geordie Oakes
c/- AECOM Australia Pty Ltd
PO Box Q410, QVB Post Office,
Sydney, NSW 1230
Ph: 0410513509
Fax: +61 2 8934 0001
Email: geordie.oakes@aecom.com



We look forward to your participation in the assessment.

Yours faithfully

Geordie Oakes
Archaeologist
geordie.oakes@aecom.com
Direct Dial: 0410513509
Direct Fax: +64 2 89340001



Modification to the Maxwell Underground Coal Mine Project - Proposed Aboriginal Cultural Heritage Assessment Methodology

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) is commissioned by Maxwell Ventures (Management) Pty Ltd a wholly owned subsidiary of Malabar Resources Limited (Malabar) to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for a modification application under section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Maxwell Underground Coal Mine Project (Maxwell UG Project).

The Maxwell UG Project, State Significant Development (SSD) 9526 is located to the south-southwest of Muswellbrook, within the local government area of Muswellbrook, NSW. The Maxwell UG Project involves the development of an underground coal mine and the utilisation of the substantial facilities that already exist at the Maxwell Infrastructure site. It also includes a transport and services corridor between the Mine Entry Area (MEA) and the Maxwell Infrastructure site.

The proposed modification involves some minor changes to the layout of the MEA to provide several safety and operational benefits, and the realignment of a small section of the proposed access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to established mine rehabilitation.

The objectives of the ACHA are to identify the Aboriginal heritage values, both archaeological and cultural, of the indicative study area and to determine appropriate mitigation and/or management measures. The assessment will involve background research, consultation with Registered Aboriginal Parties (RAPs) and the production of a draft ACHA report and finalisation of the draft report following further consultation with the RAPs.

In accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and clause 60 of the *National Parks and Wildlife Regulation, 2019*, AECOM is providing for your review a draft proposed methodology for the Modification.

All RAPs are invited to comment on this draft proposed methodology and to provide comments regarding the Aboriginal heritage cultural values of the indicative study area.

2.0 Background to the Current Assessment

The Maxwell UG Project is an underground mining operation that has Development Consent to operate for 26 years (until 2047). As part of the Maxwell UG Project and previous project applications that included the study area (i.e., Drayton South and Saddlers Mine) full coverage archaeological survey has been completed over the study area with recorded sites and associated management measures included in AECOM's (2019) assessment. Both the sites and management recommendations will be included in an Aboriginal Cultural Heritage Management Plan (ACHMP) for the Maxwell UG Project. A brief review of AECOM's assessments is included below.

In 2012, AECOM completed an archaeological survey of the Drayton South study area. A total of 205 discrete sites were identified during the assessment, including both the existing Aboriginal Heritage Information Management System (AHIMS) sites and newly recorded sites. Sites comprised 143 artefact scatters, eight of which have associated areas of PAD, 59 isolated artefact sites and three stone quarries. High significance was attributed to four sites, based on their rarity and research potential. Moderate significance was attributed to 18 sites and low significance to 183 sites. Complete flakes dominated the assemblage, accounting for 50.2 per cent of the combined survey assemblage, followed by broken flakes and flake shatter fragments. Raw material most commonly associated with both complete flakes and flake debitage consisted of indurated mudstone/tuff.

In 2019, AECOM completed an ACHA for the Maxwell UG Project. The Maxwell UG Project area overlapped with the survey area completed for the Drayton South project in 2012 so only the areas not previously surveyed were subject to survey as part of the Project. During the survey, a total of 47 new Aboriginal archaeological sites, comprising artefact scatters and isolated artefacts, were identified. Combined, a total of 275 Aboriginal archaeological sites, comprising 274 open artefact sites and one



stone quarry were identified within the study area. A total of 545 individual stone surface artefacts were recorded during the archaeological survey. In addition, a Cultural Values Report (CVR) was prepared. For the CVR, RAPs indicated that the study area sits within a broader cultural landscape that has cultural significance for Aboriginal people. Forming part of this cultural landscape were important landscape features such as Mount Arthur, the Hunter River, and Saddlers Creek which as well as the Aboriginal objects (i.e., stone artefacts) identified during the archaeological survey for the Project.

3.0 Modification Overview

Malabar proposes to commence preparation of a draft ACHA for the proposed modification to the approved Maxwell Underground Mine Development Consent SSD 9526 in order to include various additional infrastructure or reconfiguration of approved components (collectively referred to as the Modification) within the 'indicative study area' (Figure 1).

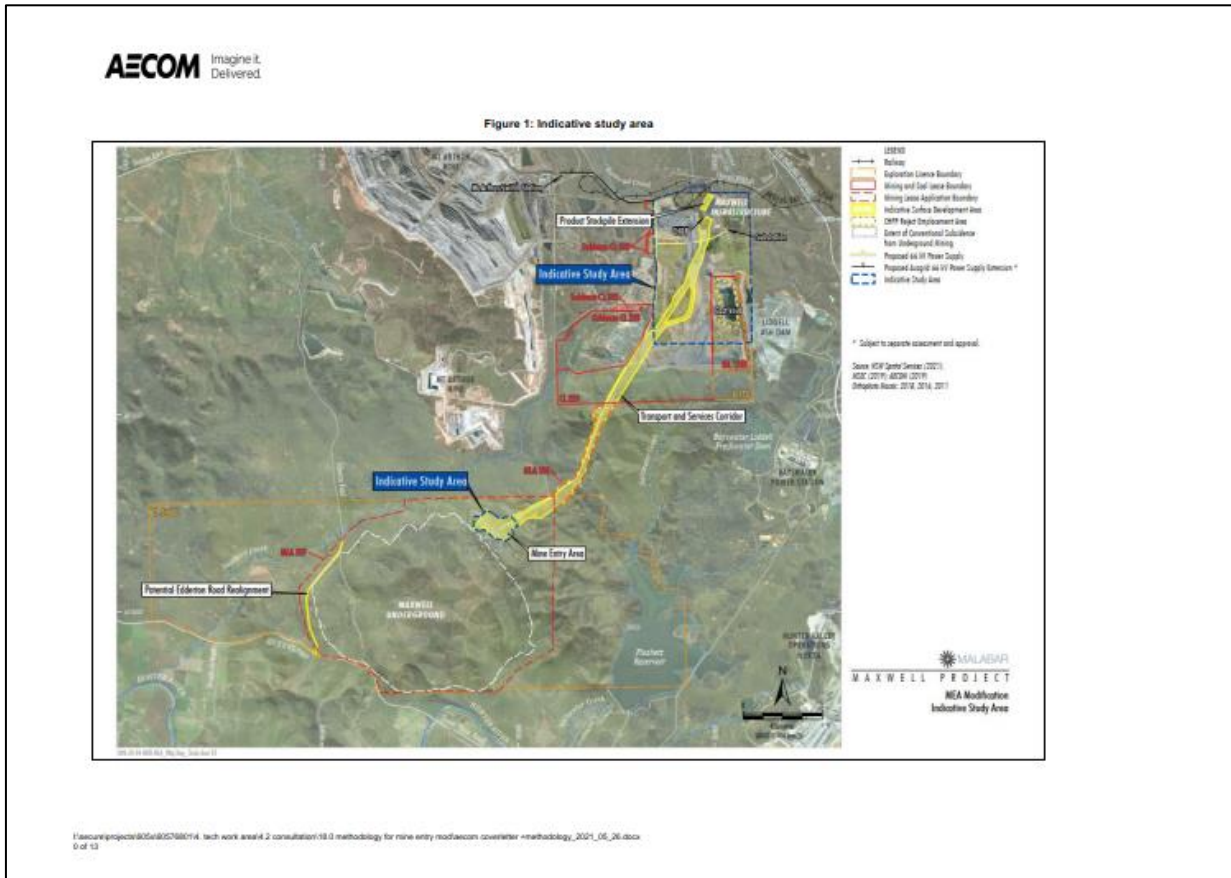
The 'indicative study area' conservatively covers a larger area than that would be required for the additional surface development for the Modification and would allow for infrastructure design to consider the results of the assessment and any Aboriginal heritage sites identified.

The approved Maxwell Underground Mine area comprises the following main domains:

- Maxwell Underground – comprising the proposed area of underground mining operations and the MEA.
- Maxwell Infrastructure – the area within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395 comprising the substantial existing infrastructure (including the coal handling and preparation plant) and previous mining areas.
- The transport and services corridor between the Maxwell Underground and Maxwell Infrastructure – comprising the proposed site access road, a covered, overland conveyor, power supply and other ancillary infrastructure and services.
- The realignment of Edderton Road.

The Modification may include (for example) the following components:

- repositioning of the underground portal to account for localised geotechnical conditions;
- minor changes to the alignment of the access road within existing/approved surface development areas;
- repositioning of approved clean water diversions for the MEA;
- realignment of a small section of the proposed access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to establish mine rehabilitation;
- relocation of the water treatment facility to the Maxwell Infrastructure; and
- other minor works and ancillary infrastructure components.





4.0 Indicative Study Area

The indicative study area for the potential Modification, as shown on Figure 1, comprises an area encompassing the approved MEA located south of Saddlers Creek, west of Saltwater Creek and east of Edderton Road. The indicative study area also includes an area within the Maxwell Infrastructure to account for the realignment of the site access road and the relocation of the water treatment facility. Land within the indicative study area is currently approved for underground mining and associated infrastructure and has historically been used for grazing or has been previously mined for the former Drayton Mine (e.g. for the majority of the indicative study area within the Maxwell Infrastructure).

Reference to the Geographical Name Register (GNR) of NSW indicates that the indicative study area falls wholly within the boundaries of the Muswellbrook Shire Council LGA and is situated within the Parish of Wynn in the County of Durham. Surrounding suburbs include Edderton to the north, Jerrys Plains to the south, Howick to the east and Denman to the west.

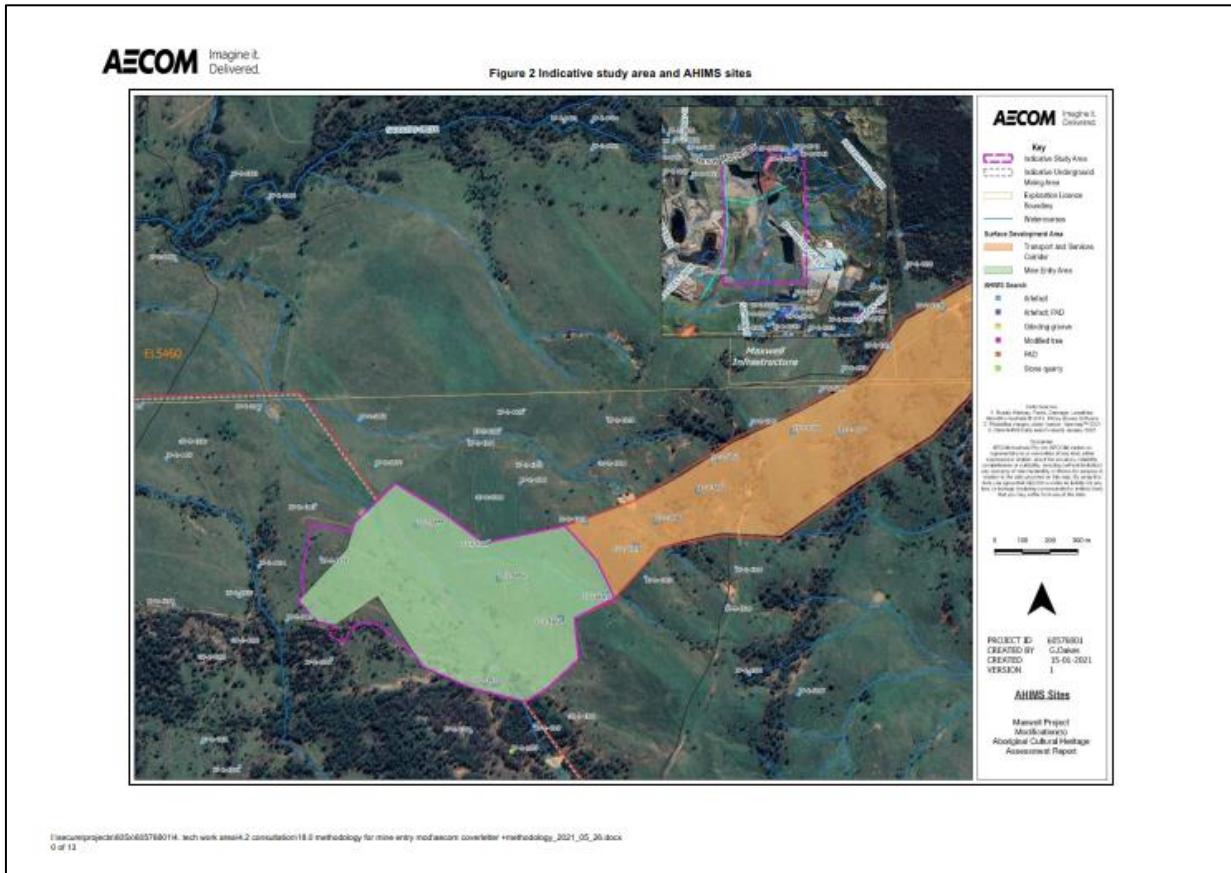
5.0 Archaeological Context

AHIMS Database

A search of the AHIMS database was undertaken on 15 January 2021 for the indicative study area (Figure 2). Consideration of the location of previously recorded "valid" Aboriginal sites, including a review of associated site cards and assessment reports, indicates that eight AHIMS sites are located within the indicative study area, all of which comprise open artefact sites (i.e., isolated artefacts and artefact scatters), with one having an associated area of Potential Archaeological Deposit (PAD) (Table 1).

Table 1 Sites within the indicative study area

Site ID	Site name	Easting	Northing	Type	Assessment
37-2-1937	SC-OS-18	299450	6411670	Artefact scatter	Mills (2000)
37-2-4359	DS IF34 11	298928	6412315	Isolated artefact	AECOM Australia Pty Ltd, (2012)
37-2-4361	DS IF36 11	299532	6412377	Isolated artefact	AECOM Australia Pty Ltd, (2012)
37-2-4362	DS IF37 11	299793	6412098	Isolated artefact	AECOM Australia Pty Ltd, (2012)
37-2-5844	MP-AS25-18	299273	6412434	Artefact scatter	AECOM Australia Pty Ltd, (2019)
37-2-6041	MP-IA2-20	299954	6412188	Isolated artefact	AECOM Australia Pty Ltd, (2019)
37-2-6042	MP-IA1-20	299540	6412257	Isolated artefact	AECOM Australia Pty Ltd, (2019)
37-2-2347	Ramrod R10	305655	6420655	Artefact; PAD	ARAS (2006)





6.0 Proposed Methodology

The approach that AECOM intends to adopt for undertaking the assessment includes the following key components:

1. Background research;
2. Utilisation of the results of previous surveys undertaken for the previous projects in 2012, 2015 and 2018 (i.e., as presented in AECOM [2012, 2015 and 2019]);
3. Consultation with RAPs in order to identify the Aboriginal cultural heritage values of the indicative study area; and
4. Preparation of a draft ACHA for the indicative study area detailing the results of the above. Potential impacts and management/mitigation measures for the identified Aboriginal heritage values of the indicative study area will be provided in the draft ACHA. The following steps would be included during this stage:
 - a. Provision of the draft ACHA report to the RAPs for review and comment.
 - b. RAP provides comments on the draft ACHA report.
 - c. Finalisation of draft ACHA report in consideration of RAP comments.

The proposed methodologies for each of these components are detailed in the sections below. The roles, responsibilities and functions of the RAPs, AECOM (Proponent's representative) and Maxwell Ventures (Management) Pty Ltd (the Proponent) are outlined in Attachment 1.

6.1 Background Research

The following tasks will be undertaken for the background research component of the assessment:

- Updated search of Heritage NSW's AHIMS database;
- A review associated site cards and reports to clarify site contents, extents and statuses;
- A review of the landscape context of the indicative study area, with a particular emphasis on its implications for the nature and distribution of Aboriginal archaeological materials;
- A review of relevant archaeological and ethnohistoric information for the indicative study area and environs; and
- Preparation of a predictive model for the Aboriginal archaeological record of the indicative study area.

6.2 Information Session

Malabar will hold an ACHA information session at the site offices. The purpose of the meeting will be to provide RAPs with project information and discuss the proposed assessment methodology. To register your interest in attending the ACHA information session please contact Geordie Oakes via the contact details provided in the cover letter of this proposed methodology. Please note, attendance at the information session will not be paid.

6.3 Archaeological Survey

AECOM proposes to utilise the survey results from surveys completed by AECOM (2012, 2015 and 2019), ARAS (2006), and HLA-Envirosciences (2002) as well as consultation with the RAPs to guide the assessment. It is noted that a 'full coverage' survey has been previously completed across the indicative study area encompassing the MEA by AECOM and RAPs in 2012 while the study area surrounding Maxwell Infrastructure was surveyed by HLA-Envirosciences (2002) and ARAS (2006). However, if any areas are identified during the assessment process that have not been previously surveyed these would be subject to archaeological survey.



Should any archaeological survey be undertaken it would be completed by a combined field team of two AECOM archaeologists and appropriate number of RAP field representatives, as determined by AECOM and Malabar prior to survey. While vehicles may be used to transport the survey team between survey localities, all survey will be completed on foot. Linear transects of variable length and width, depending on ground conditions and occupational health and safety (OH&S) considerations are proposed. The location of all transects completed during survey, including their start and end points, will be recorded using one of two handheld differential GPS units, with associated transect data (e.g., levels of visibility and exposure, disturbance factors) entered directly into the same unit upon the completion of each transect.

All Aboriginal archaeological sites identified during the survey (if required) will be recorded to the standard required by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b). For each site located or re-visited, individual artefact locations will be captured by differential GPS. As with that recorded for individual survey transects, attribute data for all identified flaked stone artefacts will be entered directly into a GPS unit using AECOM's standard digital open site recording form. All sites will be comprehensively photographed following artefact recording and registered on OEH's AHIMS database.

Refinement to the indicative study area may occur during the preparation of the ACHA as detailed mine planning progresses. In addition, modifications to the proposed methodology may occur in response to survey results, feedback from RAPs or other unanticipated events.

6.4 Cultural Values

RAP representatives are in the best position to provide information on the Aboriginal social/cultural heritage values of a given area. During the assessment process, AECOM archaeologists will consult with RAPs regarding the cultural heritage values of objects and places in the study area. This will include the discussion of cultural heritage values with RAPs throughout the process until the end of the draft ACHA review period and provision of the draft ACHA to all RAPs for comment prior to finalisation.

The identification of cultural values will include places of social, spiritual and cultural value, historic places with cultural significance, and potential places/areas of historic, social, spiritual and/or cultural significance.

As noted in OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), some information obtained from registered Aboriginal parties may be sensitive or have restricted public access. AECOM, in consultation with relevant RAPs, will develop appropriate protocols for sensitive or restricted information, including:

1. Cultural restrictions on access to the material.
2. Cultural restrictions on communication of the material.
3. Cultural restrictions on the location of the material.
4. Cultural recommendations on handling the material.
5. Any other contextual information.
6. The names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the Aboriginal material and the degree of authorisation.
7. Details of any consent given in accordance with customary law.
8. Level of confidentiality to be accorded to the material.
9. Access and use, by the registered Aboriginal parties, of the cultural information in the material.

It is also noted that the purpose of community consultation with Aboriginal people is to assist AECOM and Malabar in the preparation of an application for an Aboriginal Heritage Impact Permit (although such a permit is not expected to be necessary given the Maxwell UG Project is a SSD (DECCW, 2010a)).



6.5 Preparation of an ACHA

AECOM will prepare an ACHA for the Modification detailing the results of the above assessment and consultation with RAPs. The ACHA will provide appropriate management and mitigation measures for the indicative study area's Aboriginal heritage values.

RAPs will be provided a copy of the draft ACHA report and will have the opportunity to comment on management and mitigation options proposed in the draft ACHA report.

The final ACHA report will incorporate any comments from the RAPs.

7.0 Modification Timeline

Current proposed timelines for the ACHA are:

- Collation of culturally significant information – ongoing throughout process until the end of the draft ACHA review period.
- RAP review of this draft proposed methodology – 26 May to 23 June 2021.
- Provision of a draft ACHA report to each RAP for review and comment – June/July 2021
- Period for comment on the draft ACHA report – a minimum of 28 days following provision of the draft report.
- Preparation of a final ACHA report in consideration of comments received.

The above timelines are preliminary only and are subject to change.

8.0 References

AECOM Australia Pty Ltd. (2012). *Drayton South Coal Project: Aboriginal Archaeological and Cultural Heritage Impact Assessment*. Unpublished report for Hansen Bailey.

AECOM Australia Pty Ltd. (2015). *Drayton South Coal Project Aboriginal Archaeological and Cultural Heritage Impact Assessment*. Unpublished report for Hansen Bailey.

AECOM Australia Pty Ltd. (2019). *Maxwell Project: Aboriginal Cultural Heritage Assessment*. Sydney NSW: Unpublished report for Resource Strategies Pty Ltd.

Archaeological Risk Assessment Services. (2006). *Aboriginal Archaeology & Cultural Heritage Assessment Report on Drayton Mine Extension*. Unpublished report for Anglo Coal Pty Ltd.

HLA-Envirosciences Pty Ltd. (2002). *Archaeological Assessment of Proposed Drayton Mine Extension EIS*. Unpublished report for Macquarie Generation.

Mills, R. (2000). *An Archaeological Survey for a Feasibility Study for Saddlers Creek Mine, near Muswellbrook*. Unpublished report for Shell Coal.

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

NSW Department of Environment Climate Change & Water. (2010b). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water.

Attachment 1 – Roles, Responsibilities and Functions (NSW Department of Environment Climate Change & Water 2010a pp.15-17).

5 Roles, responsibilities and functions

For the consultation process to be effective, all parties must appreciate and respect each other's perspective and understand each other's interests, roles and responsibilities.

5.1 Department of Environment, Climate Change and Water

The Director General of DECCW is the decision-maker who decides whether to grant or refuse an AHP application. If an AHP is issued, conditions are usually attached and DECCW is responsible for ensuring the AHP holder complies with those conditions. When considering an application under Part 6 of the NPW Act, the Director General will review the information provided by proponents in line with its internal policies and procedures to assess potential or actual harm to Aboriginal objects or places (DECCW, 2009).

The Environment Protection and Regulation Group (EPRG) of DECCW is responsible for administering the regulatory functions under Part 6 of the NPW Act. A map and list of DECCW EPRG regional offices is in Appendix A.

DECCW expects proponents and Aboriginal people should:

- be aware that Part 6 of the NPW Act establishes the Director General or delegate of DECCW as the decision-maker
- recognise that the Director General's (or delegates) decisions may not be consistent with the views of the Aboriginal community and/or the proponent. However, DECCW will take into account all relevant information it receives as part of its decision-making process.

Further information about the structure of DECCW, and the roles and responsibilities of various groups and the services provided, such as EPRG, Culture and Heritage Division (CHD), and Parks and Wildlife Group (PWG) can be found at: www.environment.nsw.gov.au/whowseans/plansorg.htm

5.2 Registered Aboriginal parties

The interests and obligations of Aboriginal people relate to the protection of Aboriginal cultural heritage. It is only Aboriginal people who can determine who is accepted by their community as being authorised to speak for Country and its associated cultural heritage. Where there is a dispute about who speaks for Country, it is appropriate for Aboriginal people, not DECCW or the proponent, to resolve this dispute in a timely manner to enable effective consultation to proceed.

It is expected that DECCW, proponents and service providers that act on their behalf should:

- display a meaningful appreciation, understanding and respect for the belief system, spiritual connection and sense of belonging that Aboriginal people have to their land, people and environment, which includes plants, animals, waterways, sacred sites and other places of cultural significance and importance
- uphold and respect the traditional rights, obligations and responsibilities of Aboriginal people who hold cultural knowledge in accordance with traditional lore and custom, particularly as these relate to the cultural business of men and women
- encourage active participation of culturally experienced and appropriate Aboriginal people who hold cultural knowledge in the consultation process
- encourage opportunities for the effective transfer of cultural knowledge from older to younger generations in accordance with traditional lore and custom through the consultation process
- have an awareness and understanding of how colonisation has impacted the Aboriginal people of Australia

- have an understanding and respect for the lore and customs, cultural practices, responsibilities and obligations that Aboriginal people have toward the continued care and conservation of Aboriginal objects and places.

Aboriginal people should:

- have an awareness and understanding of the commercial environment and constraints in which proponents operate
- develop and display an awareness and understanding of the opportunities to input into regulatory processes to contribute to decision making by proponents and government authorities.

5.2.1 NSW Aboriginal Land Council and Local Aboriginal Land Councils

The NSW Aboriginal Land Council (NSWALC) and Local Aboriginal Land Councils (LALCs) have statutory functions relevant to the protection of Aboriginal culture and heritage under the NSW Aboriginal Land Rights Act 1983. These requirements do not extend the role of NSWALC and LALCs in the significance assessment process. That is, these requirements do not provide NSWALC and/or LALCs any additional or specific decision-making role in the assessment of significance of Aboriginal object(s) and/or place(s) that are subject to an AHP application under Part 6 of the NPW Act.

LALCs may choose to register an interest to be involved in the consultation process, or may assist registered Aboriginal parties to participate in the consultation process established by these requirements. In order to ensure effective consultation and the subsequent informed heritage assessment, LALCs are encouraged to identify and make contact with Aboriginal people who hold cultural knowledge in their area.

For further information on LALCs and the role they can play in these requirements, see DECCW's Fact sheet 4: Local Aboriginal Land Councils.

5.3 Proponents

Proponents operate within a commercial environment which includes:

- financial and management issues, priorities and deadlines
- the need to obtain broad community support and acceptance in order to secure any necessary approval/consent/licence/permit to operate
- the desire for clearer processes and certainty of outcomes
- the need for suitable access to land for the purpose of their development project
- a need to work efficiently within the project's time, quality and cost planning and management parameters
- the need for culturally appropriate assessment findings relevant to their project.

Under these requirements, proponents should:

- bring the registered Aboriginal parties or their nominated representatives together and be responsible for ensuring appropriate administration and management of the consultation process
- consider the cultural perspectives, views, knowledge and advice of the registered Aboriginal parties involved in the consultation process in assessing cultural significance and developing any heritage management outcomes for Aboriginal object(s) and/or place(s)
- provide evidence to DECCW of consultation by including information relevant to the cultural perspectives, views, knowledge and advice provided by the registered Aboriginal parties
- accurately record and clearly articulate all consultation findings in the final cultural heritage assessment report



- provide copies of their cultural heritage assessment report to the registered Aboriginal parties who have been consulted
- submit an application to DECCW for an AHP in a timely manner and with all required information.

Appendix B

RAP Responses to Draft Methodology

Appendix B RAP Responses to Draft Methodology

Oakes, Geordie

From: Tracey Skene <tracey@marrung-pa.com.au>
Sent: Wednesday, 26 May 2021 12:37 PM
To: Oakes, Geordie
Subject: [EXTERNAL] Re: Maxwell Underground Coal Mine Project - Modification Application - ACHA Methodology

Thanks Geordie
Thanks I will review and get back to you also shall have chat soon it's been hectic
Trace

On Wed, 26 May 2021 at 12:35 pm, Oakes, Geordie <Geordie.Oakes@aecom.com> wrote:

Dear RAP,

AECOM is commissioned by Maxwell Ventures (Management) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for a modification application under section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Maxwell Underground Coal Mine Project.

In accordance with Section 4.3.1 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), please find attached for your review the proposed Aboriginal Cultural Heritage Assessment methodology for the modification.

If you have any comments on the proposed methodology these can be provided in writing or by phone. Please note that the closing date for comments is 23 June 2021.

All the best,

Geordie

Geordie Oakes
Principal Archaeologist and Heritage Specialist
M +61410513509
Geordie.Oakes@aecom.com

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T +61 2 8008 1700
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Please consider the environment before printing this email.

--

Kind regards

Oakes, Geordie

From: Carolyn .H <cazadirect@live.com>
Sent: Sunday, 6 June 2021 6:22 PM
To: Oakes, Geordie
Subject: [EXTERNAL] Re: Maxwell Underground Coal Mine Project - Modification Application - ACHA Methodology
Attachments: A1.PL2022.pdf, A1.WC2022.pdf



Contact: Carolyn Hickey
M: 0411650057
E: Cazadirect@live.com
A: 10 Marie Pitt Place, Glenmore Park, NSW 2745
ACN: 639 868 876
ABN: 31 639 868 876

Hi,
I have reviewed the document and support the Methodology.
A1 would like to be involved in any future Meetings and field work.
INSURANCES ARE ATTACHED
Kind regards
Carolyn Hickey

From: Oakes, Geordie <Geordie.Oakes@aecom.com>
Sent: Wednesday, 26 May 2021 12:35 PM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Maxwell Underground Coal Mine Project - Modification Application - ACHA Methodology

Dear RAP,

AECOM is commissioned by Maxwell Ventures (Management) Pty Ltd to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for a modification application under section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Maxwell Underground Coal Mine Project.

In accordance with Section 4.3.1 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), please find attached for your review the proposed Aboriginal Cultural Heritage Assessment methodology for the modification.

If you have any comments on the proposed methodology these can be provided in writing or by phone. Please note that the closing date for comments is 23 June 2021.

All the best,
Geordie

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Appendix C

RAP Responses to Draft
Report

Appendix C RAP Responses to Draft Report

Oakes, Georgie

From: Scott Franks <scott@tocomwall.com.au>
Sent: Friday, 2 July 2021 4:19 PM
To: Oakes, Georgie; OEH HD Heritage Mailbox
Subject: [EXTERNAL] Re: Maxwell MEA Modification draft ACHA for review

Geordie,

Thank you for sending this over. Tocomwall on the behalf of the PCWP cannot support the recommendations. Could you also send me a map of all crown lands and TSRs with the proposed boundary of the mine? Also until such time as the Peter Kuskie report is reference in the draft including a fully including its findings of that assessment we could not support this project.

The kuskie assessment is be held by resource strategy and has and is being withheld from the Raps and Planning NSW to date, could you also provide a copy of that assessment to all raps.

Regards
Scott Franks
CEO

Native Title & Environmental Services Consultant
Native title applicant for the PCWP

Tocomwall Pty Ltd
Po box 145, Miranda NSW 1490.
m: 0404 171544
e: scott@tocomwall.com.au
www.tocomwall.com.au



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From: Oakes, Georgie <Geordie.Oakes@aecom.com>
Date: Friday, 2 July 2021 at 4:09 pm

Oakes, Geordie

From: Oakes, Geordie
Sent: Tuesday, 3 August 2021 3:48 PM
To: 'Scott Franks'
Subject: RE: Maxwell MEA Modification draft ACHA for review

Hi Scott,

Thanks for the response. I can confirm there is no Crown Land or Travelling Stock Reserves within the Modification Area (see Figure 1). With reference to the report completed by Peter Kuskie, I understand that this assessment is in draft form that is not publicly available and is for the Spur Hill Underground Project, a project located to the west of the Maxwell Underground Mine Project (Figure 2). The existing Gateway Certificate and Mining Lease Applications (MLAs) for the Spur Hill Underground Project were based on a 'stand-alone' project with the surface infrastructure positioned in the northwest of its proposed Mining Lease. The applications for this project have now been withdrawn and if resubmitted would be subject to significant redesign.

Figure 1 – Travelling Stock Reserves

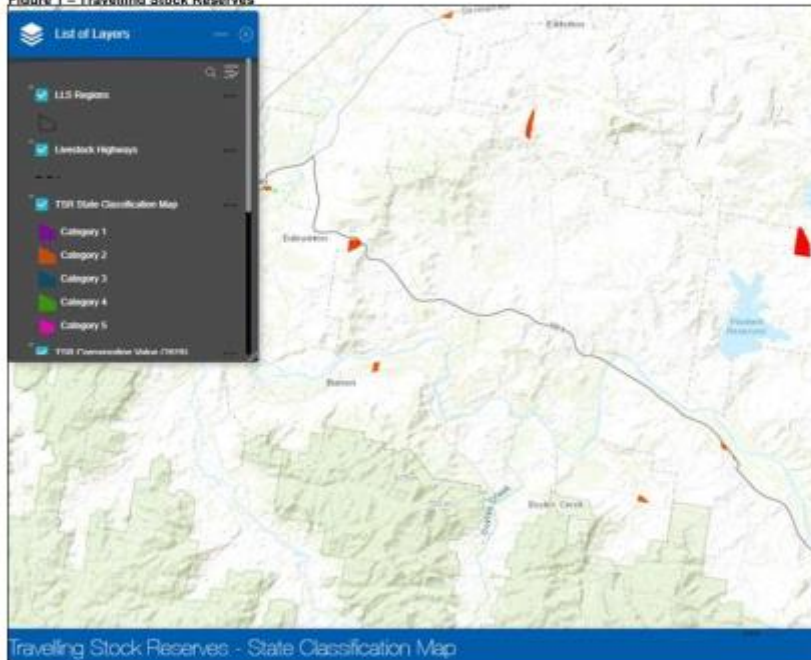


Figure 2 – Project Boundaries

Oakes, Geordie

From: jesse johnson <muraqadi@yahoo.com.au>
Sent: Monday, 5 July 2021 11:42 AM
To: Oakes, Geordie
Subject: [EXTERNAL] Re: Maxwell MEA Modification draft ACHA for review
Attachments: AECOM_DftRpt_MEA Modification_ACHAR_2021_07_02.pdf

Hi Geordie,
I have read the project information and draft ACHA for the above project, I agree with the recommendations made.
Thanks
Jesse Johnson
0418970389

On Friday, 2 July 2021, 04:10:21 pm AEST, Oakes, Geordie <geordie.oakes@aecom.com> wrote:

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment (ACHA) for the Maxwell Underground Mine Project – Mine Entry Modification for your review.

Should you have any cultural values or comments you would like included in the ACHAR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is 30 July 2021.

All the best,

Geordie

Geordie Oakes
Principal Archaeologist and Heritage Specialist
M +61410513509
Geordie.Oakes@aecom.com

AECOM
Level 21, 420 George Street, Sydney, NSW 2000
PO Box Q410, QVB PO, Sydney, NSW, 1230
T +61 2 8008 1700
www.aecom.com

Please consider the environment before printing this email.

Oakes, Geordie

From: Arthur Fletcher <wonn1sites@gmail.com>
Sent: Thursday, 29 July 2021 1:59 PM
To: Oakes, Geordie
Subject: [EXTERNAL] Re: Maxwell MEA Modification draft ACHA for review

Hi Geordie .

We hope all is well with you. Yes we are happy to move forward with ACHA with this Project at this point in time. Ps All the best Regards Arthur-Kauwul and Lynne..

On Fri, 2 Jul 2021 at 4:06 pm, Oakes, Geordie <Geordie.Oakes@aecom.com> wrote:

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment (ACHA) for the Maxwell Underground Mine Project – Mine Entry Modification for your review.

Should you have any cultural values or comments you would like included in the ACHAR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is 30 July 2021.

All the best,

Geordie

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Principal Archaeologist and Heritage Specialist
M +61410513509
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Appendix D

Consultation Log

Appendix D Consultation Log


Date	RAP	RAP Representative	Contact	Correspondence/Comments
8/01/2021	Draft ACHMP sent to RAPs			
8/01/2021	Kauwul Wonn1	Arthur Fletcher	Email	As far as this D A C H M P we are ready to support it. Our concern at this point in time is who and or whom should and or will be delivering said Cultural inductions for the workers-employees etc. We would hope that proposed instructors would be Wonnarua Knowledge Holders etc
12/01/2021	Wailan Aboriginal Group	Phil Boney	Email	I do not have a problem with the methodology on this project or measures to be taken on treatment of aboriginal artefacts. Overall, I am happy with your approach to this project
12/01/2021	DNC	Paul Boyd	Email	DNC is happy with the ACHA for the Maxwell Underground Project
12/01/2021	Culturally Aware	Tracey Skene	Email	A number of recommendations are provided by Tracey. AECOM responded to Tracey directly. See correspondence.
13/01/2021	Murra Bidgee Mullangari	Ryan Johnson	Email	I have read the project information and draft ACHMP for the above project, I endorse the recommendations made.
26/05/2021	Methodology for Modification Sent			
26/05/2021	Culturally Aware	Tracey Skene	Email	"Thanks Geordie Thanks I will review and get back to you also shall have chat soon it's been hectic"
6/06/2021	A1	Carolyn Hickey	Email	"I have reviewed the document and support the Methodology"
11/06/2021	Invitation to AFG sent to all RAPs			
11/06/2021		Rhonda Griffiths	Email	Provided apology for not attending
11/06/2021	Culturally Aware	Tracey Skene	Email	Responded that she would attend the meeting
14/06/2021	Hunter Valley Aboriginal Corporation	Kylie Pascoe	Email	Stated that Allen Smith will attend the meeting
15/06/2021	Cacatua and AGA Services	Donna Sampson	Email	Stated that George and Ashleigh will attend the meeting
18/06/2021	AFG Held			
18/06/2021	A1 Indigenous	Carolyn Hickey	Email	"I have reviewed the document and support the Information and Methodology"
18/06/2021	Kauwul Wonn1	Arthur Fletcher	Email	Apologies for not attending the meeting
18/06/2021	Culturally Aware	Tracey Skene	Email	Apologies for not attending the meeting
2/07/2021	ACHAR Sent Out			

2/07/2021	Tocomwall	Scott Franks	Email	"Thank you for sending this over. Tocomwall on the behalf of the PCWP cannot support the recommendations. Could you also send me a map of all crown lands and TSRs with the proposed boundary of the mine? Also until such time as the Peter Kuskie report is reference in the draft including a fully including its findings of that assessment we could not support this project. The kuskie assessment is be held by resource strategy and has and is being withheld from the Raps and Planning NSW to date, could you also provide a copy of that assessment to all raps." AECOM Responded "Thanks Scott. I can confirm there is no Crown Land or Travelling Stock Reserves within the Modification Area (Figure 1). With reference to the report completed by Peter Kuskie, I understand that this assessment is in draft form that is not publicly available and is for the Spur Hill Underground Project, a project located to the west of the Maxwell Underground Mine Project (Figure 2). The existing Gateway Certificate and Mining Lease Applications (MLAs) for the Spur Hill Underground Project were based on a 'stand-alone' project with the surface infrastructure positioned in the northwest of its proposed Mining Lease. The applications for this project have now been withdrawn and if resubmitted would be subject to significant redesign."
5/07/2021	Muragadi	Jesse Johnson	Email	"I agree with the recommendations made"
29/07/2021	Kauwul Wonn1	Arthur Fletcher	Email	"Yes we are happy to move forward with ACHA with this Project at this point in time"

Appendix E


Site Cards

Appendix E Site Cards



National Parks and Wildlife Service

Standard Site Recording Form



37-2-0415


REGISTER COPY

MAP NAME	EDITION	SCALE	REFERENCE	HEAD OFFICE USE ONLY:
Singleton SI56-1	1st	1:250,000	3850 9925	NWPS site no: 37-2-415
Jerrys Plains 9033-II-S	1st	1:25,000	<i>2/987/19</i>	Site types: Open Site (Artefacts)
Site name: MAS 71				File nos:
<div style="border: 2px solid black; padding: 5px; display: inline-block; font-weight: bold; font-size: 1.2em;">SITE DESTROYED</div>				Report filed with site no:
				Classification: Site status: C-D.
Local post office: Jerrys Plains 2330				Filed by: <i>RA</i>
Locality/property name: Mount Arthur South Lease Area				Date: 22/10/85.
NPWSDistrict: Upper Hunter		Region: Central		

Reason for investigation (give H.O. instruction no. or full title of accompanying report where applicable):
Koettig, M. & Hughes, P.J. 1985 AN ARCHAEOLOGICAL SURVEY OF THE PLASHETT DAM AND THE MOUNT ARTHUR NORTH AND MOUNT ARTHUR SOUTH COAL MINING PROJECT AREAS, HUNTER VALLEY, NSW. A report to ELCOM NSW and MOUNT ARTHUR SOUTH COAL PTY LTD.

Portion no:	Other land category:	Plan/sketch/section of site attached? Yes/No.
Parish: Wagman	County: Durham	How many?
Air photo refs. (for stereo pair)		Annotated photos attached? Yes/No
		How many?
Condition of site:	Causes of damage/disturbance/threat to site: (Fill in separate management/protection recommendations sheet if necessary)	

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. Draw diagram on separate sheet if necessary).
See Report



Other sites in locality? Yes/ <input checked="" type="checkbox"/> No	Site Types include: Surface scatter of stone artefacts, grinding grooves.
Are sites in NPWS Register? Yes/ <input checked="" type="checkbox"/> No	Unregistered sites-plans for future recording? Yes/No.
Have artefacts been removed from site? Yes No/ Yes When?	Deposited where?
Is site important to local Aborigines? Yes/No/don't know.	Statement of interest in the project prepared by the Sites Committee of the Wanaruah Local Aboriginal Land Council.
Give contact(s) name(s) + address(es)	
Contacted for this recording? Yes/No. (Attach additional information separately) If not, why not?	
Verbal/written reference sources:	

Site recorded by: **M. Koettig** Date: **January 1984**

Address/institution: **ANU Archaeological Consultancies, ANUTECH Pty Ltd, GPO Box 4, CANBERRA CITY ACT 2601**

37-2-415

HUNTER VALLEY - OPEN SITES

Site No. MAS 71 Survey Area H. Adams South

Map Sheet Name & Grid Ref _____ Name(s) of recorder(s) _____

1:250,000 3850 9925 S. section

1:25,000 987 119 Leung Plains

Level of Recording: Total Sample Summary

ENVIRONMENTAL SETTING

	Cross	Name		Cross
Topographic Location			Vegetation Cover	
major creek/river	<input type="checkbox"/>		Surrounding site	
minor creek	<input checked="" type="checkbox"/>		dense woodland	<input type="checkbox"/>
diffuse drainage line	<input type="checkbox"/>		open woodland	<input type="checkbox"/>
			parkland	<input type="checkbox"/>
creek flats	<input type="checkbox"/>		scrub thicket	<input type="checkbox"/>
creek banks	<input checked="" type="checkbox"/>		grassland	<input checked="" type="checkbox"/>
creek junction	<input type="checkbox"/>		other (specify) <u>cultivated</u>	<input type="checkbox"/>
			<u>excavated pits - add one</u>	
valley floor				
footslope	<input checked="" type="checkbox"/>			
hillslope	<input type="checkbox"/>			
ridgetop	<input type="checkbox"/>			
saddle	<input type="checkbox"/>			
knoll	<input type="checkbox"/>			
spur	<input type="checkbox"/>			
Slope				
Flat (2°)	<input type="checkbox"/>			
gentle (2-5°)	<input checked="" type="checkbox"/>			
moderate (5-10°)	<input type="checkbox"/>			
steep (10°)	<input type="checkbox"/>			

CONSENT TO DESTROY

ISSUED 37000 2

Distance to nearest creek/river _____

0-50m	<input checked="" type="checkbox"/>
50-100m	<input type="checkbox"/>
100-200m	<input type="checkbox"/>
200-300m	<input type="checkbox"/>
more than 300m (specify)	<input type="checkbox"/>

SITE DESTROYED

Aspect, i.e. direction of site faces _____

Distance to, and nature of nearest drinking water source _____

SITE CONTEXT AND CONDITION

Visibility of Ground Surface on the Site _____


Vegetation cover, nature & extent grass beyond site

Organic litter cover, nature & extent _____

1


4

S6 Audeford [] New recording [] Additional Info




National Parks and Wildlife Service




Box 1967, Hurstville NSW 2220. Tel: (02) 9585 6444
Standard Site Recording Form Revised 5/88



37-2-1937


<p>1:250,000 map sheet: _____ NPWS Code _____</p> <p>AMG Grid reference 299450 mE 6411670 mN</p> <p style="font-size: x-small;">Full reference - please include leading zeros</p> <p>Scale of map used for grid reference [] 25K, 50K (preferred) [] 100K [] 250K Please use largest scale available</p> <p>1:25K, 50K, 100K map name: <u>JERRANG PLAINS</u></p>	<p>HEAD OFFICE USE ONLY:</p> <p>NPWS Site no: <u>37-2-1937</u></p> <p>Site types _____</p> <p>Accessioned by: _____ Date: _____</p> <p>Data entered by: <u>NSP</u> Date: <u>27/05/02</u></p> <p>Owner/Manager _____</p> <p>Address _____</p>
<p>Site name: SC-OS-18 Locality/property name _____</p> <p>NPWS District _____ Region _____</p>	
<p>Reason for investigation: Shell Coal Pty Ltd has been evaluating the Saddlers Creek Coal Development Area, EL5480 on behalf of the Saddlers Creek Exploration Joint Venture Partners (Map 1). It is proposed to develop an open cut and underground mining operation in the Edderton Resource Block. The open cut mine will be developed in the Whybrow and Redbank Creek Coal seams and the underground mine on the Whynot Seam</p>	
<p>Portion no: _____</p> <p>Parish: _____</p>	
<p>Photos taken? <input checked="" type="checkbox"/></p> <p>How many attached? <u>see report</u></p>	
<p>How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along creek) (Draw diagram on separate sheet.)</p> <p style="text-align: center;">Saddlers Creek Mine site is located approximately 16km south of Muswellbrook (Map 1). It is bounded to the north by Saddlers Creek, Edderton Road to the west, Jerry's Plains Road to the south and Saltwater Creek to the east.</p>	
<p>Other sites in locality? <u>No</u> Site Types include: _____</p> <p>Are sites in NPWS Register? _____</p>	
<p>Have artefacts been removed from site? <u>No</u> When? _____</p> <p>By whom? _____ Deposited where? <u>N/A</u></p>	
<p>Is site important to local Aborigines? Give contact(s) name(s) + address(es)</p> <p style="text-align: right;">Wonnarua Tribal Council (WTC) and Wonnarua Local Aboriginal Land Council (WLALC) Victor Perry and John Miller 0265721889</p>	
<p>Contacted for this recording? _____ (Attach additional information separately) If not, why not?</p>	
<p>Verbal/written reference sources (including full title of accompanying report) _____ NPWS Report _____</p> <p style="text-align: center;">An Archaeological Survey for a Feasibility Study for Saddlers Creek Mine, near Muswellbrook.</p>	
<p>Checklist Surface visibility damage/disturbance/ threat to site</p> <p>Condition of site <u>See Over</u></p>	
<p>Recommendations for management & protection (attach separate sheet if necessary)</p> <p><u>Avoidance - Consent to Disturb should not be recommended.</u></p>	
<p>Site recorded by: <u>Robynne Mills</u> Date: <u>August 2000</u></p> <p>Address/institution: <u>60 Watkin Street</u> <u>Nyngon NSW 2342</u></p>	


SITE POSITION & ENVIRONMENT		OFFICE USE ONLY: NPWS site no:
1. Land form a. beach/hill slope/ridge top, etc:		b. site aspect:
d. mark on diagram provided or on your own sketch the position of the site:		c. slope:
		e. Describe briefly:
1. Local rock type: <i>Slate / Sandstone</i>	g. Land use/effect: <i>on tributary of Suckley Ck.</i>	
2. Distance from drinking water: <i>10m</i>	Source: <i>contaminated</i> ↓	
3. Resource Zone associated with site (estuaries, rivers, forest etc): <i>Riverine / Forest.</i>		
4. Vegetation: <i>Regrowth Timber - some old growth remaining.</i>		
5. Edible plants noted: <i>Nil</i>		
6. Faunal resources (include shellfish): <i>Nil</i>		
7. Other exploitable resources (river pebbles, ochre, etc): <i>Quarry adjacent.</i>		
Site type: <i>Open Camp Site</i>	DESCRIPTION OF SITE & CONTENTS. Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.	
<p>CHECKLIST TO HELP: length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.</p> <p>DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.</p> <p>ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.</p> <p>BURIALS: number & condition of bone, position, age, sex, associated artefacts.</p> <p>TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.</p> <p>QUARRIES: rock type, ochre, recognisable artefacts, percentage quarried.</p> <p>OTHER SITES EG: structures (fish traps, stone arrangements, bone rings, ma mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate.</p>	<p>This site is located on the lower reaches of Creeklime D in the north eastern sector of the mine impact area. Site SC-OS-18 should be assessed as part of a complex of sites including SC-OS-17 and SC-QS-1 (Map 7).</p> <p>Potential for Development Related Impact This site is on the boundary of the proposed open cut mining area and has the potential to be destroyed by the development.</p> <p>Site Description This site is located to the north of Site SC-OS-17 and indeed may be an extension to that site (Sketch 10). However there was a physical break between the two sites created by the construction of an earth dam. No artefacts were identified in this section of the creekline for a distance greater than 50m so the area was identified as a separate site. The western extension of the site is located approximately 80m west of the creekline and separated from it by a series of contour banks which have destroyed the integrity of this section of the floodplain (Photos 61, 62). As visibility was poor, vehicle transects were made across this contoured area and areas with any visibility were examined on foot. No artefacts were identified in association with the contour banked area. A full on foot survey of the creek banks was conducted and artefacts continued to be identified along all areas surveyed. Two reference recording points within site SC-OS-18 were made. SC-OS-18(a) is on a raised knoll 80m west the creekline. A sample five (5) artefacts were recorded in this area. They included one basalt, indeterminate core (scraper), one (1) quartzite core and three silcrete flakes (Photo 62). A photographic record of artefacts collected along a section of creek bank 60m x 20m SC-OS-18(b) was made (Photo 63). This photograph identifies twenty (20) flaked artefacts including silcrete, mudstone, quartz, chert and quartzite.</p> <p>Significance Assessment This site considered in association with adjacent sites SC-OS-17 and SC-QS-1 has been assessed as having high scientific significance, aesthetic and social significance. The vegetation in this section of the mine impact area contains old growth white box trees and is one of the few areas where there is a sense of "place". The site complex has a high potential for future scientific research, especially with regard to questions relating to the relationship between the quarry site and tool manufacture at sites SC-OS-17 and SC-OS-18.</p> <p>Educational/public significance These sites have potential educational value as an educational resource. indicate north, snow scale.</p> <p>Attach annotated photos (stereo where useful) showing scale, particularly for art sites.</p>	

		Aboriginal Site Recording Form			
AHIMS Registrar PO Box 1967, Hurstville NSW 2220					
Office Use Only					
		Site Number 3 7 1 2 1 4 3 0 3			
Date received	///	Date entered into system	///	Date catalogued	///
Entered by (I.D.) _____					
Information Access					Office Use Only
<input type="checkbox"/> Gender/male <input type="checkbox"/> Gender/female <input type="checkbox"/> Location restriction <input type="checkbox"/> General restriction <input type="checkbox"/> No access					
For Further Information Contact:					
<input type="checkbox"/> Nominated Trustee					
Title	Surname	First Name	Initials		
Organisation _____					
Address _____					
Phone number _____		Fax _____			
<input type="checkbox"/> Knowledge Holder					
Title	Surname	First Name	Initials		
Organisation _____					
Address _____					
Phone number _____		Fax _____			
Aboriginal Heritage Unit or Cultural Heritage Division Contacts					

Geographic Location					
Site Name DS-A579-11					
Easting	298909	Northing	6412509	AGD/GDA	GDA
Mapsheet _____					
Zone	56	Location Method Differential GPS			
Other Registration _____					
Primary Recorder					Client on system
Title	Surname	First Name	Initials		
Mr	Dakes	Geordie			
Organisation AECOM					
Address Level 6, 420 George St Sydney 2000					
Phone number 89340000		Fax _____			
Date recorded 1/04/2011					

NPWS Aboriginal Site Recording Form - Site Information		page 2																																																		
OPEN/CLOSE SITE <input type="text" value="Open"/>																																																				
Site Context																																																				
Landform	Landform Unit																																																			
<input type="checkbox"/> Mountainous	<input type="checkbox"/> Beach	<input type="checkbox"/> Tidal Flat																																																		
<input type="checkbox"/> Plain	<input type="checkbox"/> Coastal rock platform	<input type="checkbox"/> Cliff																																																		
<input checked="" type="checkbox"/> Rolling hills	<input type="checkbox"/> Dune	<input type="checkbox"/> Crest																																																		
<input type="checkbox"/> Steep hills	<input type="checkbox"/> Intertidal flat	<input type="checkbox"/> Flat																																																		
<input type="checkbox"/> Undulating plain	<input type="checkbox"/> Lagoon	<input type="checkbox"/> Lower slope																																																		
	<input type="checkbox"/> Tidal Creek	<input type="checkbox"/> Mid slope																																																		
		<input type="checkbox"/> Upper slope																																																		
		<input type="checkbox"/> Plain																																																		
		<input type="checkbox"/> Ridge																																																		
		<input type="checkbox"/> Tor																																																		
		<input type="checkbox"/> Valley flat																																																		
		<input type="checkbox"/> Levy																																																		
		<input checked="" type="checkbox"/> Stream bank																																																		
		<input type="checkbox"/> Stream channel																																																		
		<input type="checkbox"/> Swamp																																																		
		<input type="checkbox"/> Terrace																																																		
		<input type="checkbox"/> Terrace flat																																																		
Slope																																																				
<input type="checkbox"/> degrees																																																				
Vegetation	Land use	Water																																																		
<input type="checkbox"/> Closed forest	<input type="checkbox"/> Conservation	Distance to permanent water source <input type="text"/> metres																																																		
<input type="checkbox"/> Grasslands	<input type="checkbox"/> Established urban	Distance to temporary water source <input type="text"/> metres																																																		
<input type="checkbox"/> Isolated clumps of trees	<input type="checkbox"/> Farming-intensive	Name of nearest permanent water source <input type="text" value="Saddlers Creek"/>																																																		
<input type="checkbox"/> Open forest	<input type="checkbox"/> Farming-low intensity	Name of nearest temporary water <input type="text"/>																																																		
<input type="checkbox"/> Open woodland	<input type="checkbox"/> Forestry																																																			
<input type="checkbox"/> Scrub	<input type="checkbox"/> Industrial																																																			
<input type="checkbox"/> Woodland	<input type="checkbox"/> Mining																																																			
<input checked="" type="checkbox"/> Cleared	<input checked="" type="checkbox"/> Pastoral/grazing																																																			
<input type="checkbox"/> Revegetated	<input type="checkbox"/> Recreation																																																			
<input type="checkbox"/> N/A	<input type="checkbox"/> Semi-rural																																																			
	<input type="checkbox"/> Service corridor																																																			
	<input type="checkbox"/> Transport corridor																																																			
	<input type="checkbox"/> Urban expansion																																																			
	<input type="checkbox"/> N/A																																																			
Directions for Relocation																																																				
See attached figure																																																				
Site Location Map																																																				
Current Land Tenure																																																				
<input type="checkbox"/> Public	National Park / other Government Dept.																																																			
<input checked="" type="checkbox"/> Private	<input type="text"/>																																																			
Primary report I.D. <input type="text"/> (I.D. Office Use only)																																																				
Drayton South Coal Project Aboriginal Archaeological and Cultural Heritage Assessment (AECOM 2012)																																																				
<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>																																																				


NPWS Aboriginal Site Recording Form - Site Information			page 3
General Site Information			Features
<p>Closed Site</p> <p>Shelter/Cave Formation</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Wind erosion <input type="checkbox"/> Water erosion <input type="checkbox"/> Rock collapse <p>Condition of Ceiling</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Sandstone platform <input type="checkbox"/> Silica gloss <input type="checkbox"/> Tessellated <input type="checkbox"/> Weathered <input type="checkbox"/> Other platform	<p>Rock Surface Condition</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Sandstone platform <input type="checkbox"/> Silica gloss <input type="checkbox"/> Tessellated <input type="checkbox"/> Weathered <input type="checkbox"/> Other platform <p>Shelter Aspect</p> <input type="checkbox"/> North <input type="checkbox"/> North East <input type="checkbox"/> East <input type="checkbox"/> South East <input type="checkbox"/> South <input type="checkbox"/> South West <input type="checkbox"/> West <input type="checkbox"/> North West	<p>Open Site</p> <p>Site Orientation</p> <input type="checkbox"/> N-S <input type="checkbox"/> NE-SW <input type="checkbox"/> E-W <input type="checkbox"/> SE-NW <input type="checkbox"/> N/A	<input type="checkbox"/> 1. Aboriginal Ceremony & Dreaming <input type="checkbox"/> 2. Aboriginal Resource & Gathering <input type="checkbox"/> 3. Art <input checked="" type="checkbox"/> 4. Artefact <input type="checkbox"/> 5. Burial <input type="checkbox"/> 6. Ceremonial Ring <input type="checkbox"/> 7. Conflict <input type="checkbox"/> 8. Earth Mound <input type="checkbox"/> 9. Fish Trap <input type="checkbox"/> 10. Grinding Groove <input type="checkbox"/> 11. Habitation Structure <input type="checkbox"/> 12. Hearth <input type="checkbox"/> 13. Non Human Bone & Organic Material <input type="checkbox"/> 14. Ochre quarry <input type="checkbox"/> 15. Potential Archaeological Deposit <input type="checkbox"/> 16. Stone Quarry <input type="checkbox"/> 17. Shell <input type="checkbox"/> 18. Stone Arrangement <input type="checkbox"/> 19. Modified Tree <input type="checkbox"/> 20. Water Hole
Site Plan Indicate scale, boundaries of site, features			
			<p>Site Dimensions</p> <p>Closed Site Dimensions (m)</p> <input type="text"/> Internal length <input type="text"/> Internal width <input type="text"/> Shelter height <input type="text"/> Shelter floor area <p>Open Site Dimensions (m)</p> <input type="text" value="250"/> Total length of visible site <input type="text" value="100"/> Average width of visible site <input type="text"/> Estimated area of visible site <input type="text"/> Length of assessed site area



AHIMS
Aboriginal Heritage Information Management System

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220



Office of
Environment
& Heritage

Office Use Only

Site Number

Date received Date entered into system Date catalogued

Entered by (I.D.)

Information Access

Gender/male
 Gender/female
 Location restriction
 General restriction
 No access

For Further Information Contact:

Nominated Trustee

Title	Surname	First Name	Initials
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Organisation

Address

Phone number Fax

Knowledge Holder

Title	Surname	First Name	Initials
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Organisation

Address

Phone number Fax

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name

Easting Northing AGD/GDA

Mapsheet

Zone Location Method

Other Registration

Primary Recorder

Title	Surname	First Name	Initials
<input type="text" value="Mr"/>	<input type="text" value="Oakes"/>	<input type="text" value="Geordie"/>	<input type="text"/>

Organisation

Address

Phone number Fax


Date recorded

Office Use Only

Client on system

Client on system

Client on system

NPWS Aboriginal Site Recording Form - Site Information			page 3
General Site Information			Features
<p>Closed Site</p> <p>Shelter/Cave Formation</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Wind erosion <input type="checkbox"/> Water erosion <input type="checkbox"/> Rock collapse <p>Rock Surface Condition</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Sandstone platform <input type="checkbox"/> Silica gloss <input type="checkbox"/> Tessellated <input type="checkbox"/> Weathered <input type="checkbox"/> Other platform <p>Condition of Ceiling</p> <input type="checkbox"/> Boulder <input type="checkbox"/> Sandstone platform <input type="checkbox"/> Silica gloss <input type="checkbox"/> Tessellated <input type="checkbox"/> Weathered <input type="checkbox"/> Other platform <p>Shelter Aspect</p> <input type="checkbox"/> North <input type="checkbox"/> North East <input type="checkbox"/> East <input type="checkbox"/> South East <input type="checkbox"/> South <input type="checkbox"/> South West <input type="checkbox"/> West <input type="checkbox"/> North West	<p>Open Site</p> <p>Site Orientation</p> <input type="checkbox"/> N-S <input type="checkbox"/> NE-SW <input type="checkbox"/> E-W <input type="checkbox"/> SE-NW <input type="checkbox"/> N/A	<input type="checkbox"/> 1. Aboriginal Ceremony & Dreaming <input type="checkbox"/> 2. Aboriginal Resource & Gathering <input type="checkbox"/> 3. Art <input checked="" type="checkbox"/> 4. Artefact <input type="checkbox"/> 5. Burial <input type="checkbox"/> 6. Ceremonial Ring <input type="checkbox"/> 7. Conflict <input type="checkbox"/> 8. Earth Mound <input type="checkbox"/> 9. Fish Trap <input type="checkbox"/> 10. Grinding Groove <input type="checkbox"/> 11. Habitation Structure <input type="checkbox"/> 12. Hearth <input type="checkbox"/> 13. Non Human Bone & Organic Material <input type="checkbox"/> 14. Ochre quarry <input type="checkbox"/> 15. Potential Archaeological Deposit <input type="checkbox"/> 16. Stone Quarry <input type="checkbox"/> 17. Shell <input type="checkbox"/> 18. Stone Arrangement <input type="checkbox"/> 19. Modified Tree <input type="checkbox"/> 20. Water Hole	
Site Plan Indicate scale, boundaries of site, features			Site Dimensions
			<p>Closed Site Dimensions (m)</p> <input type="text"/> Internal length <input type="text"/> Internal width <input type="text"/> Shelter height <input type="text"/> Shelter floor area <p>Open Site Dimensions (m)</p> <input type="text"/> Total length of visible site <input type="text"/> Average width of visible site <input type="text"/> Estimated area of visible site <input type="text"/> Length of assessed site area