Bayswater Power Station WOAOW Project

Aboriginal Cultural Heritage Assessment

Muswellbrook and Singleton Local Government Areas

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

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Bayswater Power Station WOAOW Project

Aboriginal Cultural Heritage Assessment

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Executive Summary

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Ltd (AGL) to complete an Aboriginal cultural heritage assessment for the prepared for the Bayswater Water and Other Associated Operational Works (WOAOW) project (the Project), located south of Muswellbrook, within the local government areas (LGAs) of Muswellbrook and Singleton, New South Wales (NSW).

This assessment forms part of a response to submissions received by AGL on their Environmental Impact Statement (EIS) which was prepared to accompany a Development Application for the Project in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (EP&A Act).

This Aboriginal Cultural Heritage Assessment Report (ACHAR) 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). This ACHAR should be read in conjunction with Jacobs (2019) assessment (Appendix A) and the Cultural Values Report (CVR) prepared by AECOM (Appendix B).

Searches of the AHIMS database were undertaken on 23 October 2020 for a 20 x 20 km area surrounding the study area resulting in the identification of 2,556 site entries. As is typical for the Hunter Valley, open artefact sites with and without other forms of archaeological evidence (eg, PAD, scarred trees, hearths) are the most common site type represented within the search area, accounting for 98.5 per cent (n = 2517) of known sites. Other, less common sites types represented include scarred trees (n = 19, 0.7%), Potential Archaeological Deposits (PADs) (n = 7, 0.3 per cent), grinding grooves (n = 4, 0.2%), resource / gathering areas (n = 1, 0.04%), ceremonial ring (n = 1, 0.04%), conflict site (n = 1, 0.04), stone quarry (n = 1, 0.04), shell midden (n = 1, 0.04).

Consideration of the location of previously recorded Aboriginal sites indicates that 29 are located wholly or partially within the study area comprising 29 open artefact sites, five with associated areas of PAD and one with a hearth as well as PAD. All 29 sites are listed are 'valid', however a review of the site locations against existing site infrastructure indicates that seven should be listed as destroyed (i.e., 37-2-007, 37-2-0047, 37-2-0062, 37-2-0063, 37-2-0065, 37-3-0007 and 37-3-1128). It is noted that 13 sites were recorded by Jacobs as part of the WOAOW project.

A twelve-day program of archaeological test excavation was completed in September 2020 across 19 PAD areas identified by Jacobs (2019). Taking into consideration the results of Jacobs' (2019) assessment and the current test excavation program 23 valid sites are recognised to be located within the study area. These all comprise open or closed artefact scatter sites and have been assessed as of low scientific significance.

In addition to completion of the ACHAR, a Cultural Values Report (CVR) was prepared by AECOM and is provided as Appendix B of this ACHAR. It is intended that the CVR be read in conjunction with the ACHAR. 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 are important landscape features such as creeklines and elevated terrain within the study area as well as the Aboriginal objects (i.e., stone artefacts) identified during the archaeological survey for the Project. Landscape features, as well as Aboriginal sites, are often associated with stories or songs and form links along Aboriginal pathways.

A management strategy to address the impacts of the Project on the known Aboriginal archaeological values of the study area is provided in Section 12.0. It is recommended that this strategy be detailed in an Aboriginal Cultural Heritage Management Plan (ACHMP) for the Project, prepared in consultation with RAPs, and to the satisfaction of the OEH and the Department of Planning and Environment. Subject to the grant of a Development Consent under Division 4.7, this ACHMP will guide the management of the known and potential Aboriginal archaeological values of the study area.

Key elements of the ACHMP would include the following, which are detailed in Section 11.0 of this report:

- an archaeological salvage program;

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- conservation of non-impacted sites;
- the procedure for managing previously unrecorded Aboriginal archaeological evidence;
- management of potential human remains; and
- completion of AHIMS site cards.

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1.0 Introduction & Background

1.1 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Ltd (AGL) to complete an Aboriginal cultural heritage assessment for the prepared for the Bayswater Water and Other Associated Operational Works (WOAOW) project (the Project), located south of Muswellbrook, within the local government areas (LGAs) of Muswellbrook and Singleton,, New South Wales (NSW) (Figure 1).

This assessment forms part of a response to submissions received by AGL on their Environmental Impact Statement (EIS) which was prepared to accompany a Development Application for the Project in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (EP&A Act).

This Aboriginal Cultural Heritage Assessment Report (ACHAR) 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). This ACHAR should be read in conjunction with Jacobs (2019) assessment (Appendix A) and the Cultural Values Report (CVR) prepared by AECOM (Appendix B).

1.2 Project Overview

AGL's WOAOW project includes the following upgrades to the Bayswater Power Station ():

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity;
- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam;
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system;
- Increasing coal ash recycling activities to produce up to 1,000,000 tonnes per annum of ash derived product material and reuse of coal ash;
- Upgrades to existing fly ash harvesting infrastructure including the installation of weighbridges, construction of a new 240 tonne silo, tanker wash facility and additional truck parking;
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement;
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste;
- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land; and
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of aging pipelines, vegetation clearing associated with maintaining existing infrastructure, including along existing pipeline corridors as is necessary.

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1.3 Study Area

The study area for this assessment includes six spatially discrete irregular shaped parcels of land encompassing the proposed ash line, ash dam augmentation, coal handling plant water and wastewater infrastructure upgrades, salt cake landfill, sludge line clearing, pipe clearing and borrow pits. Combined, these areas produce a study area of c. 731.7 ha commencing with the augmentation of the ash dam in the northern portion of the power station site and extending southward to within 1.2 km of the Hunter River. Land within the study area has historically, been used for both grazing and for power station infrastructure with much of it grossly disturbed land.

1.4 Secretary's Environmental Assessment Requirements (SEARs)

The Secretary of the NSW Department of Planning and Environment (DP&E) issued the Secretary's Environmental Assessment Requirements (SEARs) for the Project on 30 November 2018. For Aboriginal heritage, the SEARs require the proponent to undertake:

- *including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community;*

In preparing this ACHAR the SEARs issued for the Project have been addressed.

1.5 Assessment Objectives

The overarching objectives of this ACHAR are as follows:

- to identify the Aboriginal cultural heritage values of the study area by way of background research, archaeological test excavation and consultation with Registered Aboriginal Parties (RAPs);
- to assess the potential impact of the Project on the identified Aboriginal cultural heritage values of the study area;
- to provide an appropriate management strategy for avoiding or minimising potential harm to the identified Aboriginal cultural heritage values of the study area; and
- to compile an ACHAR that will assist the Secretary of the DP&E in their assessment of the SSD 9697 application.

1.6 Scope of Current Assessment

This assessment has been undertaken in accordance with the SEARs, clause 80C of the NSW *National Parks and Wildlife Regulation 2009* 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 study area, with specific consideration to its implications for past Aboriginal land use;
- to review relevant archaeological and ethnohistoric information for the study area and environs;
- to undertake a detailed review of Jacobs' (2019) ACHAR report for the project;
- to prepare a predictive model for the Aboriginal archaeological record of the study area;
- to undertake an archaeological test excavation of Potential Archaeological Deposit (PAD) areas identified by Jacobs (2019);
- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to
- 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 test excavation and CVR methodology;
    - provide information that will enable the cultural significance of Aboriginal objects and/or places within the study area to be determined;
    - have input into the development of cultural heritage management options; and
- to prepare and finalise an ACHAR with input from RAPs.

1.7 Project Team

Geordie Oakes (Principal Heritage Specialist, AECOM) managed all aspects of the Aboriginal heritage assessment and was the primary author of this report. Dr Darran Jordan (Principal Heritage Specialist, AECOM), Dr Andrew McLaren (Principal Heritage Specialist), Luke Wolfe (Senior Heritage Specialist), and Julia Atkinson (Graduate Heritage Specialist) assisted Geordie with fieldwork. Dr Andrew McLaren (Senior Heritage Specialist, AECOM) provided technical review of this assessment report.

The archaeological test excavation was undertaken by a combined field team of AECOM archaeologists and RAP field representatives (as described in Section 3.3.2).

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.

Darran holds a Bachelor of Arts (Honours) degree and a PhD from Sydney University and has over 14 years of Australian Aboriginal cultural heritage management experience.

Andrew holds a Bachelor of Arts (Honours) degree from the University of Queensland, a Master 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.

1.8 Report Structure

This report contains eleven sections. This section - **Section 1.0** - has provided background information on the Project and assessment undertaken. The remainder of the report 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 study area and its associated archaeological implications;
- **Section 5.0** summarises relevant ethnohistoric information for the study area;

- **Section 6.0** describes the archaeological context of the study area on a regional and local scale. Predictions regarding the nature of the study area's Aboriginal archaeological record are also provided;
- **Section 7.0** describes the results of Jacobs' (2019) archaeological survey and AECOM's test excavation results;
- **Section 8.0** describes the results of AECOM's test excavation program;
- **Section 9.0** assesses the archaeological (scientific) and cultural significance of Aboriginal sites within the study area;
- **Section 10.0** provides an assessment of the potential impacts of the Project on identified Aboriginal heritage values;
- **Section 11.0** provides details on the design of the Project and strategies to avoid and minimise harm to Aboriginal heritage values;
- **Section 12.0** details an appropriate management strategy for the identified Aboriginal heritage values of the study area; and
- **Section 13.0** lists the references cited in-text.

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Figure 1 Regional context

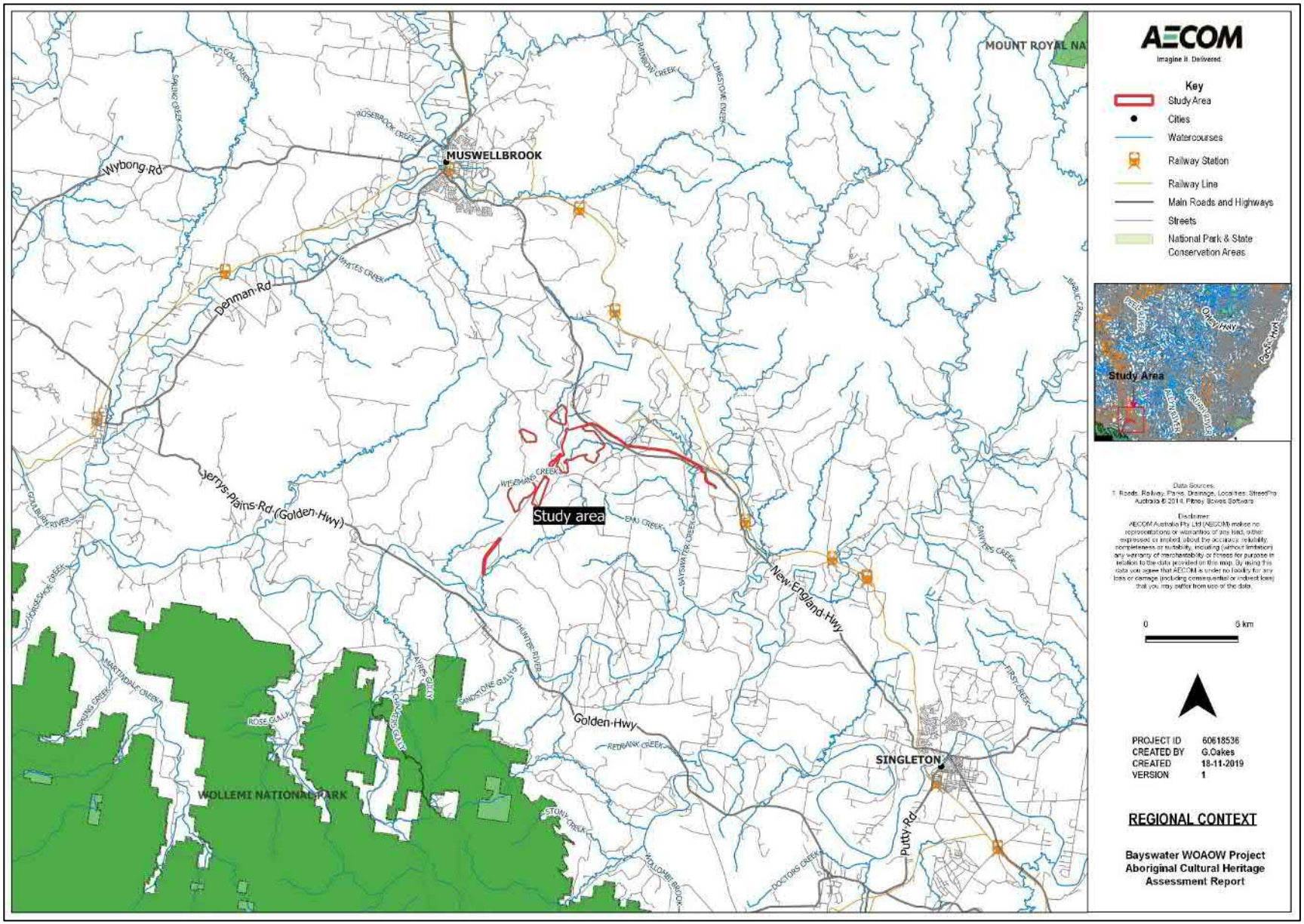

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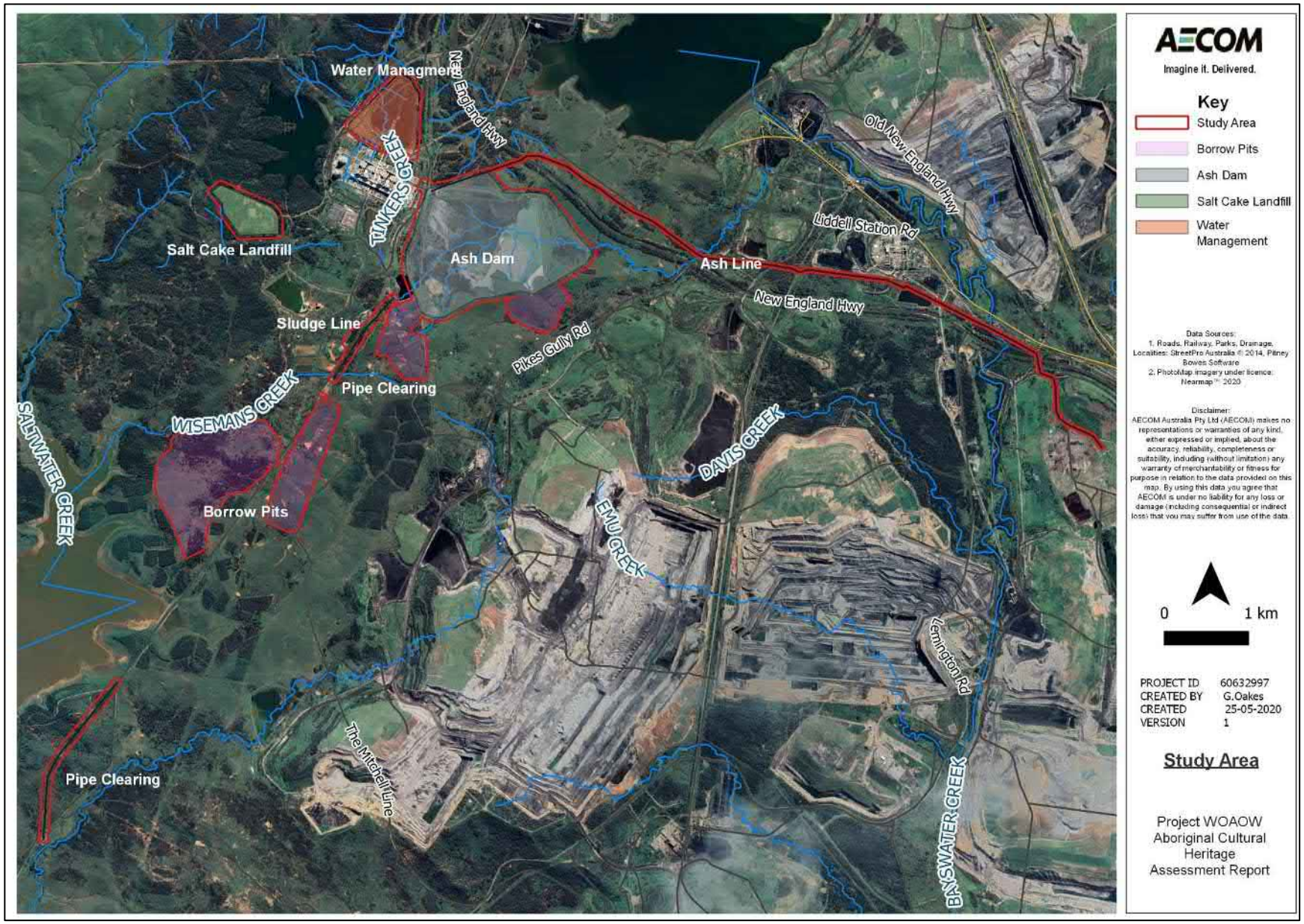
Figure 2 The study area



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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* (the 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 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 study area have been made under the ATSIHP Act.

2.1.2 Native Title Act 1993

The *Native Title Act 1993* (NTA) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NTA 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 (ILUA) 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 October 2020, with no Native Title Registration Claims identified for the study area.

2.1.3 Environment Protection and Biodiversity Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) took effect on 16 July 2000. 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 Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE), which was closed in 2007 and is no longer a statutory list. Statutory references to the RNE in the EPBC Act were removed on 19 February 2012. However, the RNE remains an archive of over 13,000 heritage places throughout Australia.

Searches of the National Heritage List, Commonwealth Heritage List and RNE were undertaken in October 2020, with no relevant listings identified for the study area.

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act), administered by DP&E, 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.

Section 4.36 of the EP&A Act stipulates that a development will be considered State Significant Development (SSD) if it is declared to be such by a State environmental planning policy.

Under Clause 8(1) of *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD), a development is declared to be SSD if:

a. the development on the land concerned is, by the operation of an environmental planning instrument, permissible with development consent under Part 4 of the EP&A Act; and

b. the development is specified in Schedule 1 or 2 of SEPP SRD.

The Project is SSD as it meets both of these criteria, namely:

- it is permissible with development consent on the land on which it is located; and
- it is development that is specified in Schedule 1 of SEPP SRD.

Pursuant to 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. Impacts to Aboriginal heritage values associated with approved SSD projects are typically managed under Aboriginal Cultural Heritage Management Plans (ACHMPs), required under the conditions of the consent. ACHMPs are statutorily binding once approved by the DP&E.

Section 89A of the *National Parks and Wildlife Act 1974* (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.

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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 Act, administered by the NSW Department of Aboriginal Affairs, 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 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 May 2019 has indicated that the study area does 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 Heritage NSW, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Secretary of the Heritage NSW 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 80B of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (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 8A 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. ACHMPs are statutorily binding once approved by the DP&E.

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* (MLEP 2009) 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 MLEP 2009, 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 5.8 of the MLEP 2009 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 MLEP 2009 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 study area.

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

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2.3.2 Singleton Local Environmental Plan 2013

Clause 5.10 of the *Singleton Local Environmental Plan 2013* (SLEP 2013) provides specific provisions for the protection of heritage items, heritage conservation areas, archaeological sites, Aboriginal objects and Aboriginal places of heritage significance within the Singleton LGA.

Under Subsection 2 of Clause 5.10 of the SLEP 2013, development consent is required for any of the following:

g. 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,

h. 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,

i. 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,

j. disturbing or excavating an Aboriginal place of heritage significance,

k. 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,

l. 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 5.8 of the SLEP 2013 states the consent authority must, before granting consent under this clause to the carrying out of development in an Aboriginal place of heritage significance:

c. 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

d. 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 SLEP 2013 provides a list of heritage items, conservation areas and archaeological sites within the Singleton LGA. A review of the list indicates there are no Aboriginal objects or places of heritage significance located within the study area.

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

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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) (Consultation Requirements) and clause 80C of the NSW *National Parks and Wildlife Regulation 2009*. The results of the consultation process undertaken are detailed below. Associated correspondence is provided in Appendices D to J.

It is noted that a full program for Aboriginal community consultation was undertaken as part of Jacobs (2019) ACHAR. Consultation for AECOM's ACHAR (this report) builds on the program completed by Jacobs.

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 study area.

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 study area 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 Local Aboriginal Land Council(s) (LALCs);

c. the Registrar, *Aboriginal Land Rights Act 1983* 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, Jacobs (2019) contacted the following agencies via letter or email on 10 May 2019 requesting information on relevant Aboriginal persons and organisations (Appendix A):

- Heritage NSW;
- Wanaruah Local Aboriginal Land Council (WLALC);
- Office of the Registrar, *Aboriginal Land Rights Act 1983* (NSW);
- NTSCORP Limited;
- Muswellbrook Shire Council;
- Singleton Council; and

- Hunter Local Land Services (HLLS).

Responses were received from six agencies and are included in Jacobs (2019) report:

- Wanaruah Local Aboriginal Land Council;
- Heritage NSW (OEH);
- Office of Registrar;
- Muswellbrook Council;
- Singleton Council; and
- Singleton Local Land Services.

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 and identify its location.

In accordance with this requirement, public notices were placed in the Koori Mail and Singleton Argus on 15 May 2019 (Jacobs, 2019). The closing date for registration via this notice was 29 May 2019, which provided the necessary minimum 14-day period for expressions of interest.

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 Local Aboriginal Land Council(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 20 June 2019, 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. The closing date for registrations was 5 July 2019 allowing the necessary minimum 14-day period for expressions of interest.

A total of 26 Aboriginal organisations registered an interest in the Project. Summary information on all RAPs is provided in Table 1. One RAP requested that their information be withheld.

Table 1 Registered Aboriginal Parties

Organisation	Contact Person
Didge Ngunawal Clan	Paul Boyd
WLALC	Noel Downs
Aboriginal Native Title Elders Consultants	Margaret Mathews
Wattaka Wonnarua Cultural Consultancy Services	Des Hickey
Ungooroo Aboriginal Corporation	Allen Paget
Tocomwall Pty Ltd/ Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People (PCWP)	Scott Franks
AGA Services	Ashley Sampson
Cacatua Culture Consultants	George Sampson
Lower Hunter Wonnarua Cultural Services	Tom Miller
Murra Bidgee Mullangari	Ryan Johnson
Gidawaa Walang Cultural Heritage Consultancy	Craig Horne
Yinarr Cultural Services	Kathie Steward Kinchela

Organisation	Contact Person
Merrigarn	Shaun Carrol
Muragadi	Jessie Carrol-Johnson
A1 Indigenous Services	Carolyn Hickey
Widescope Indigenous Group	Steven Hickey
Kauwul Wonn1	Arthur Fletcher
Aliera French Trading	Aliera French
Crimson-Rosie	Jefferry Mathews
Hunter Traditional Owner	Paulette Ryan
Hunter Valley Cultural Surveying	Luke Hickey
Jarban and Mugrebea	Les Atkinson
Lower Wonnaruah Tribal Consultancy	Barry Anderson
Nunawanna Aboriginal Corporation	Colin Ahoy
Wonnarua Nation Aboriginal Corporation	Laurie Perry

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 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 11 July 2019, 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.

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 study area and proposed development was provided to RAPs as part of the registration of interest process detailed in Section 3.1.3. Basic information on the proponent and proposed development was included in the EOI letter and as part of the methodology issued to all RAPs.

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 on the proposed study area to be determined; and

c. To have input into the development of any cultural heritage management measures.

For current assessment, consultation with RAPs regarding the cultural heritage values of the study area included:

- a request with the draft assessment methodology and draft test excavation methodology for any comments regarding the Aboriginal cultural heritage values of the study area;
- discussion of cultural heritage values during fieldwork;
- offers made to RAPs for private interviews and site visits as part of the CVR preparation;

- provision of Jacobs' ACHAR report to all RAPs for comment prior to finalisation; and
- provision of AECOM's updated ACHAR report to all RAPs for comment prior to finalisation.

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 methodology for the cultural heritage assessment to RAPs and that RAPs be given a minimum of 28 days to review and provide feedback on this methodology (Appendix C).

Jacobs (2019) provided a copy of the ACHAR methodology to all RAPs on 7 August 2019, allowing 28 days for RAPs to respond (Appendix A).

AECOM provided a copy of the test excavation methodology to all RAPs on 19 June 2020. RAPs were given a minimum of 28 days to review and provide feedback on this methodology with the closing date for comments on 17 July 2020.

Twelve responses were received from RAPs relating to the draft test excavation methodology. No specific cultural heritage values relating to the study area were identified by RAP respondents. RAP responses are summarised in Table 2, with written responses attached as Appendix D.

Table 2 RAP responses to draft methodology

Registered Aboriginal Party	Date	Method	Summary of response	Response
Didge Ngunawal Clan	19/06/2020	Email	DNC would love to work on this project wth you it's been a while good to here from you.	None required
Wonnarua Nation Aboriginal Corporation	20/06/2020	Email	I will register WNAC….	None required
A1 Indigenous Services	21/06/2020	Email	Provided insurances	None required
Murrabidgee Mullangari	22/06/2020	Email	I have read the project information and methodology, I endorse the recommendations made	None required
Aleira French trading	22/06/2020	Email	I have read the proposed methodology and think you guys have done a thorough job in your recommendations therefore I have no comments to add.	None required
A1 Indigenous Services	21/06/2020	Email	I have reviewed the information and support the Methodology.	None required
Wonnarua Nation Aboriginal Corporation	20/06/2020	Email	I will register WNAC….	None required
WLALC	25/06/2020	Email	Provided insurance details for Margaret Matthews and registering her interest	GO emailed back confirming receipt
AGA	26/06/2020	Email	Both AGA and Cacatua agree with the methodologies and the	None required

Registered Aboriginal Party	Date	Method	Summary of response	Response
			information that was supplied.	
Cacatua	26/06/2020	Email	Both AGA and Cacatua agree with the methodologies and the information that was supplied.	None required
Muragadi	29/06/2020	Email	I have read the project information and methodology for the above project, I endorse the recommendations made	None required
Widescope Indigenous Group	16/07/2020	Email	I have reviewed and support the recommendations out line in the draft	None required

3.3.2 Archaeological Survey

Archaeological survey of the study area was completed by Jacobs in 2019. The following RAPs participated in the survey component of this ACHAR:

Registered Aboriginal Party	Field representative(s)
WLALC	Kylie Saunders
Widescope Indigenous Group	Steven Hickey
Murra Bidgee Mullangari	Gareth Conyard
Muragadi	Kody Mcutchen-King
Gidawaa Walang Cultural Heritage Consultancy	Craig Horne
Didge Ngunawal Clan Corroboree	Adam King
	Mike Skinner
Aboriginal Native Title Elders Consultants	John Mathews
Aboriginal Native Title Elders Consultants	Margaret Matthews

Archaeological test excavation was completed by AECOM in 2020. The following RAPs participated in the test excavation component of this ACHAR:

Table 3 RAP field representatives by organisation

Registered Aboriginal Party	Field representative(s)
Didge Ngunawal Clan	Paul Boyd
Tocomwall	Mary Franks
Aboriginal Native Title Elders Consultants	Christine Archibald
Ungooroo Aboriginal Corporation	Allen Paget
AGA Services	Ashley Sampson

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Registered Aboriginal Party	Field representative(s)
Cacatua	George Sampson
Murra Bidgee Mullangari	Ryan Johnson
Muragadi	Shaun Johnson
A1 Indigenous Services	Steven Hickey

3.4 Stage 4 - Review of Draft ACHAR

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

In accordance with Section 4.4.2 of the Consultation Requirements, all RAPs were sent a draft of Jacobs' (2019) ACHAR on 24 October 2019 for review and comment (either by email or mail). Jacobs' ACHAR states the following:

"One written submission was received by Jacobs. The submission was from A1 Indigenous Services. The submission stated that A1 Indigenous Services support the draft ACHAR, and wish to be included in any future fieldwork and meetings associated with the project. The submission did not recommend any changes be made to the ACHAR" (Jacobs, 2019:15).

Likewise, all RAPs were sent a draft of this ACHAR on [xx-xx-xx] for review and comment.

[TO BE COMPLETED]

D R A F T

4.0 Landscape Context

This section reviews the landscape context of the study area 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 study area 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, economic[1] 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 study area for this assessment includes six spatially discrete irregular shaped parcels of land encompassing the proposed ash line, ash dam augmentation, coal handling plant water and wastewater infrastructure upgrades, salt cake landfill, sludge line clearing, pipe clearing and borrow pits. Combined, these areas produce a study area of c. 731.7 ha commencing with the augmentation of the ash dam in the northern portion of the power station site and extending southward to within 1.2 km of the Hunter River. Land within the study area has historically, been used for both grazing and for power station infrastructure with much of it grossly disturbed land.

Reference to the Geographical Name Register (GNR) of NSW indicates that the study area falls partially within the Muswellbrook Shire Council and Singleton LGAs, the suburbs of Muswellbrook, Howick, Lemington, Ravensworth and Liddell. It is situated within the Parishs of Howick, Liddell, and Savoy, in the County of Durham. Surrounding suburbs include Edderton and Jerrys Plains to the west, Glennies Creek to the east and Warkworth to the south.

4.2 Topography

The study area is located approximately 13 km southwest of the town of Muswellbrook within Central Lowlands of the Hunter Valley (Story, Galloway, van de Graaf, & Tweedie 1963). Its topography consists flats associated with various watercourses interspersed with low undulating to steeply sloped hills and crests over open farmland which is typical of the region as well as highly disturbed land associated with construction of the power station. Slopes range from level and gently inclined flats that border watercourses, to steeper slopes found on hills in the central and southern portions of the study area. Elevations across the study area range from 84 metres (m) Australian Height Datum (AHD) to 216 m AHD, providing a total local relief of 132 m (Figure 3). Following Speight (2009), a breakdown of the relative representation of morphological landform units within the study area is provided in Table 4. Identified landform units, meanwhile, are shown on Figure 4.

[1] i.e., edible and/or otherwise useful (e.g., medicine, clothing).

Table 4 Morphological landform units within the study area

Landform unit	Area (ha)	%
Crest	71.1	9.7
Depression	2.7	0.4
Disturbed	300.5	41.1
Flat	36.5	5.0
Lower	71.2	9.7
Middle	196.4	26.8
Slope	9.7	1.3
Upper	43.6	6.0
Total	731.7	100

4.3 Hydrology

The study area is located within the Hunter River catchment, with the Hunter River located around 1.3 km m from the study area's southern boundary. The Hunter River is the most significant watercourse in the Hunter Valley Region, and in the area near the study area generally flows in westerly direction through a channel approximately 30 m wide and approximately 3-6 m deep. The Hunter River generally cuts across a well-developed floodplain, which can be up to several kilometres wide at its widest point and drains the largest coastal catchment in NSW. The Hunter River drains a catchment area of approximately 21,000 square kilometres, with the bulk of the catchment (about 16,000 square kilometres) located upstream of Singleton. Downstream of Denman, in the Upper Hunter Valley, the river flows in an easterly direction across the gently undulating terrain of the Central Lowlands, eventually reaching the Tasman Sea at Newcastle.

Parts of four 1st to 3rd order watercourses (after Strahler, 1952) are located directly within the study area (Figure 5). This includes 1st and 2nd order sections of Wisemans Creek, a relatively small watercourse that is 3.5 km in length that rises in the Bayswater Power Station, flowing westward and feeding into Plashett Reservoir. A 3rd order section of Pikes Creek whose headwaters, prior to modification, were located within the Bayswater central dam, which now forms a chain of ponds within the study area as it flows eastward to Liddell Power Station. A destroyed 2nd order section of Tinkers Creek that historically would have passed through the coal preparation plant. Finally, a heavily incised 3rd order section of Bayswater Creek that intersects with the coal conveyer in the eastern portion of the study area before flowing southward to join the Hunter River.

4.4 Surface 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 study area comprises three distinct formations: Quaternary alluvial deposits (Qa), Permian coal measures, of which the Singleton Supergroup (Ps)(formerly known as the Singleton Coal Measures) comprises the overwhelming majority, and Permian Mulbring Siltstone (Pmm) that forms part of the Maitland Group. Quaternary alluvial deposits are associated with Bayswater and Pikes, and comprise gravels, sand, silt and clays derived from Permian shales and sandstones. The Singleton Supergroup is mapped in the very southern and eastern portions of the study area and 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. Mulbring Siltstone, which encompasses the majority of the study area includes siltstone and sandstone rocks.

While no sources of stone suitable for the manufacture of Aboriginal stone tools have been identified within the study area two locally occurring geological features are of note and are likely to have had a direct bearing on the nature and composition of any Aboriginal stone assemblages within it - the Hunter River Gravels, and two identified sources of silcrete and tuff cobbles west located west of the study area. The Hunter River Gravels are a well-known source of indurated mudstone, often referred to as tuff (see Hughes et al. 2011 for a discussion), silcrete, and quartz raw material that was utilised by Aboriginal people in the manufacture of stone tools in the Central Lowlands. The gravels are exposed at numerous locations along the Hunter River, both as active gravel bars within the creek channel and on former terraces. Gravel locations have been noted at Muswellbrook, Denman, Jerrys Plains and Singleton (Dean-Jones & Mitchell 1993).

In an assessment of several Hunter River gravel bars MacDonald & Davidson (1998) found that the bars consist primarily of local materials, reflecting the River's underlying geology, and smaller deposits of non-local material transported from other parts of the system. Both indurated mudstone/tuff and silcrete are considered locally derived; indurated mudstone/tuff being part of the Singleton Supergroup, and silcrete being derived from Tertiary fluvial sands and gravels. Surveys undertaken by Esteves (1999) along the Hunter River concluded that while these raw materials are present throughout the Hunter River gravel bars, there is spatial variability in their availability.

Naturally occurring outcrops of silcrete cobbles have been identified at two confirmed locations in the local area, one 8.5 km to the west and another 12 km to the west both associated with Saddlers Creek. 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 study area form part of the Brays Hill, Bayswater and Liddell soil landscapes. The Brays Hill soil landscape is characterised by red clays (*Vertosol*) on the mid-slopes, black earths on steeper slopes and grey and brown clays (*Vertosols*) with linear gilgai (small 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.

The Bayswater soil landscape is characterised by yellow solodic soils (*Sodosols)* on slopes with alluvial soils in drainage lines. Within this landscape grouping, yellow solodic soils and red-brown earth (*Chromosols and Dermosols*) intergrades also occur. Brown and yellow earths and prairie soils (a soil type occurring in temperate areas formerly under prairie grasses and characterised by a black A horizon) are present in some drainage lines. Soils on slopes also comprise yellow and brown podzolic soils (*Chromosols)* (Environmental Earth Sciences NSW 2012). Moderate sheet and gully erosion is common on slopes (Kovac & Lawrie 1991). As a result, archaeological sites present on slopes may have been subject to varying degrees of disturbance.

The Liddell landscape grouping is generally duplex in character with varying degrees of change between A and B horizons. Lower-slopes are comprised of Yellow Solodic Soils, which consist of weakly structured dark brown loam A_1 horizons over bleached orange clay loam A_2 horizons. Below these, a clearly changed soil profile of blocky bright reddish-brown light clay, becoming more yellow at depth is located. Mid-slopes are comprised of Earthy/Siliceous Sands, which consist of brown sand/loamy sand to brown sandy loams, gradually changing to dull yellow-brown sandy loam or bright brown loamy sand in the B horizon. Upper-slopes are comprised of Yellow Soloths, which consist of Brown loamy sand to sandy loam over a bleached light grey/yellow orange sandy loam or sandy clay loam, clearly changing to bright brown/dull orange sandy clay in the B horizon (Environmental Earth Sciences NSW 2012). Soils on the lower and upper-slopes (Soloths and Solodics) are susceptible to

moderate to high erosion, particularly sheet, gully and, to a lesser extent, rill erosion. Soils on the mid-slopes (sands) have a low potential for erosion. Mass movement hazard is low throughout the soil landscape (Kovac & Lawrie 1991). In these contexts, archaeological sites may be well preserved.

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 encountered 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).

Archaeologically, the widespread presence of such profiles is of particular significance given 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). As highlighted by Dean-Jones & Mitchell (1993) and others (eg, 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 (eg, hearths and heat treatment pits) representing the only reliable means of dating 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 (ie, the base of the biomantle). Where biomantles remain relatively undisturbed, horizontal patterns of artefact discard may be preserved. However, in heavily disturbed contexts, the preservation of such patterning is unlikely (Mitchell, 2009: 4).

4.6 Flora & Fauna

Native vegetation within the study area has been significantly modified as a result of historic European land use practices and the construction of the power station and associated facilities, with the current vegetation providing insight into the pre-European settlement floral regime of the site. In general, the study area supports a diverse range of natural vegetation communities, with different communities occupying different landscape positions.

Reference to vegetation mapping provided by AGL for the power station site, current vegetation across the study area comprises tracts of exotic non-native exotic grasslands and exotic wetland vegetation which generally occupy land surrounding the central dam. In addition to exotic species communities of regenerating native woodland inhabit much of the study area, comprising narrow-leaved ironbark (*Eucalyptus crebra*), grey box (*Eucalyptus macrocarpa*), bull *oak (Allocasuarina luehmannii)* and swamp oak (*Casuarina glauca*) (Figure 8). These vegetated areas provide reasonable interior habitat for native fauna and flora and these areas support a diversity of species in the understorey.

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 study area will have supplied Aboriginal people camping within, and passing through the site, with an extensive array of edible and otherwise useful plant species. Published material on locally occurring 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 would likely have been located within the study area 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.

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Figure 3 Slope

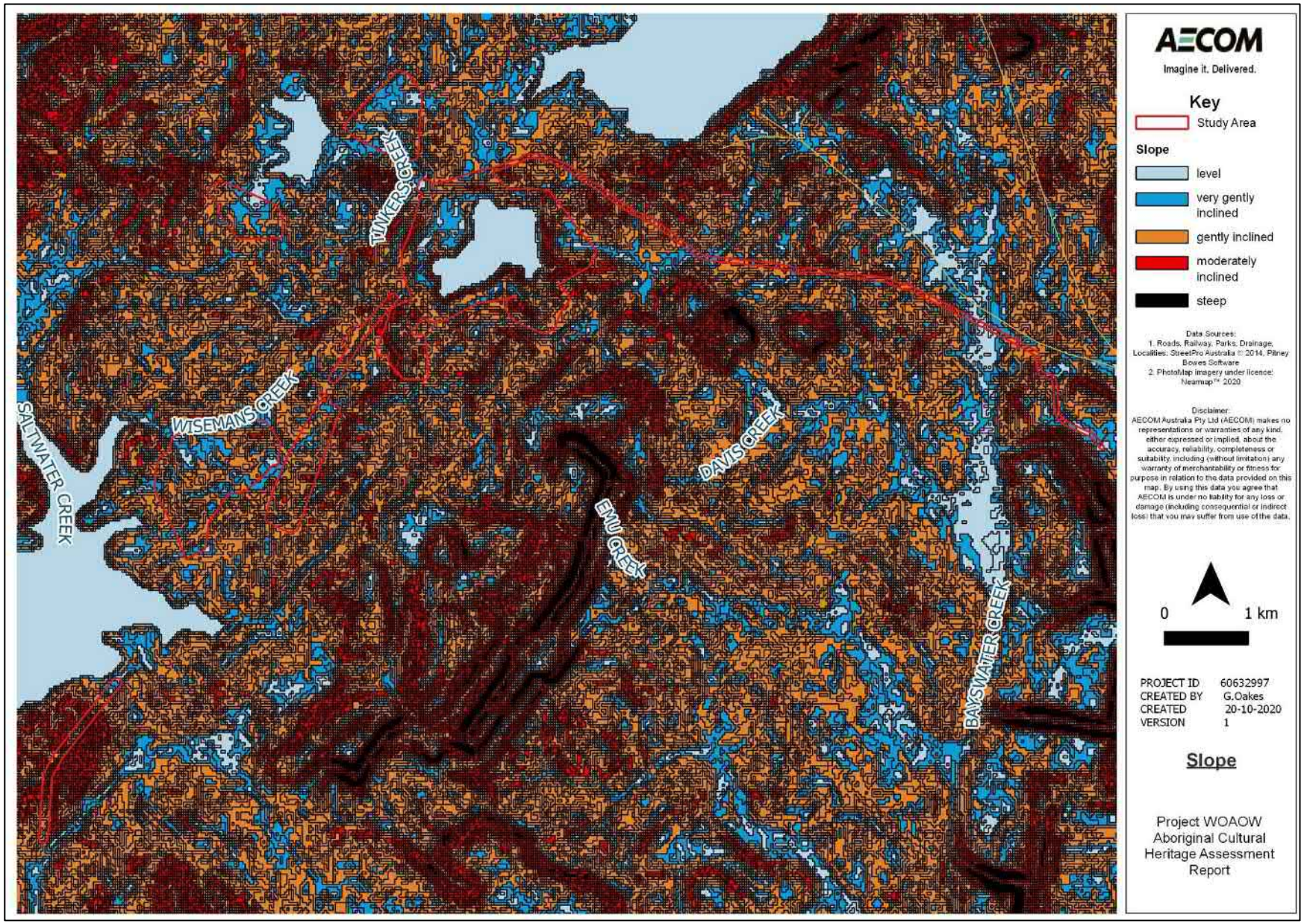

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Figure 4 Elevation

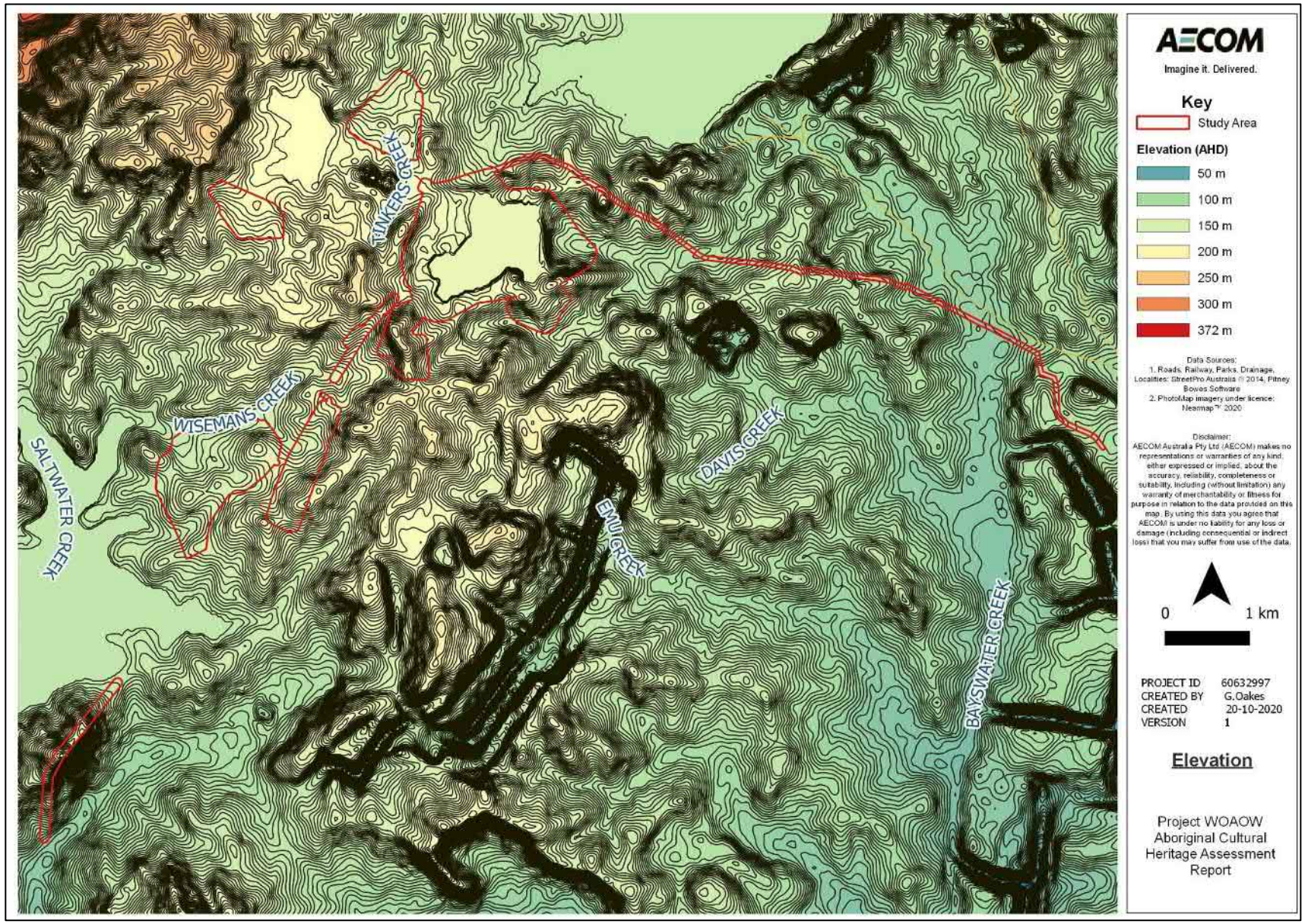

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Figure 5 Landform and hydrology

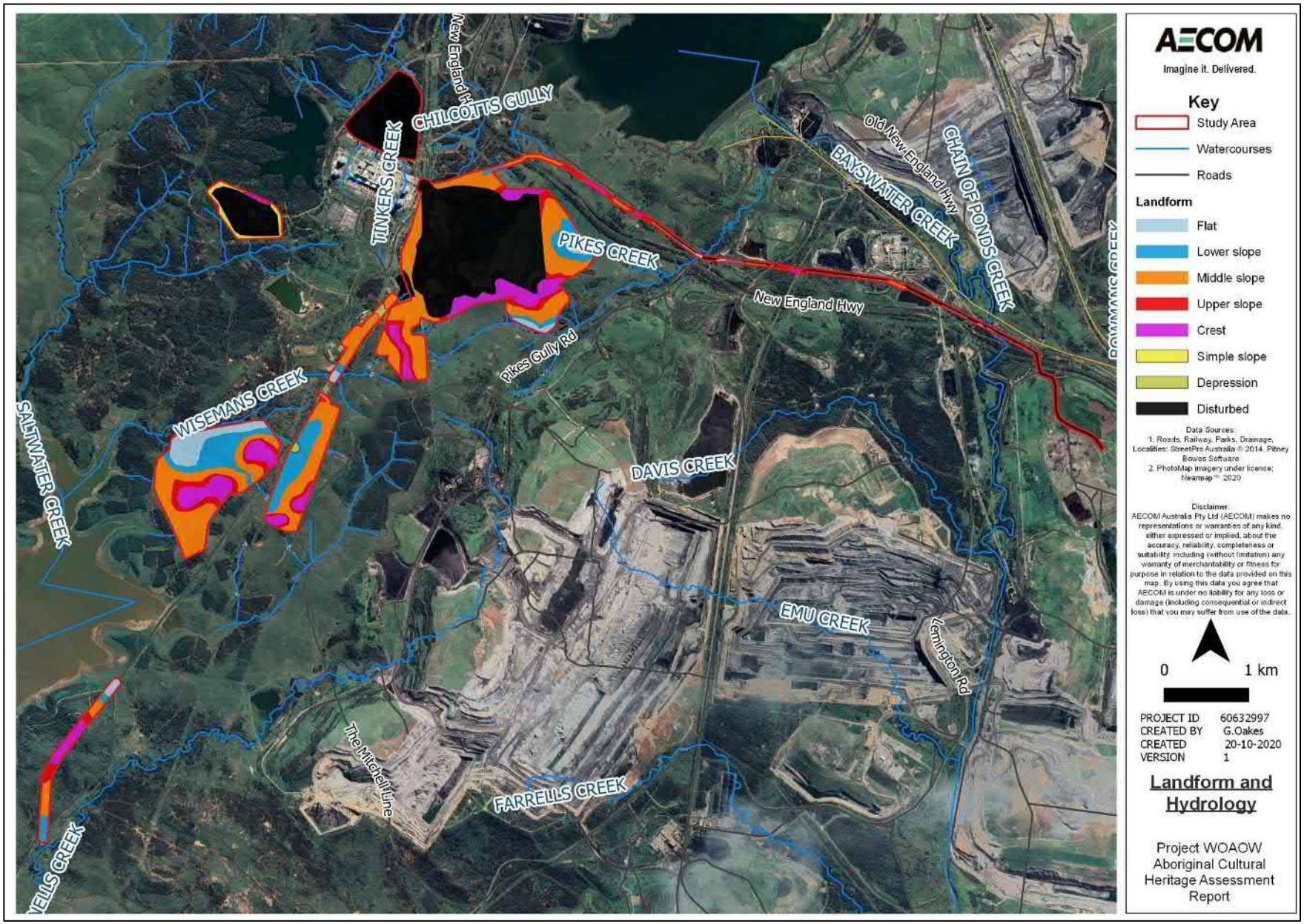

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Figure 6 Surface geology

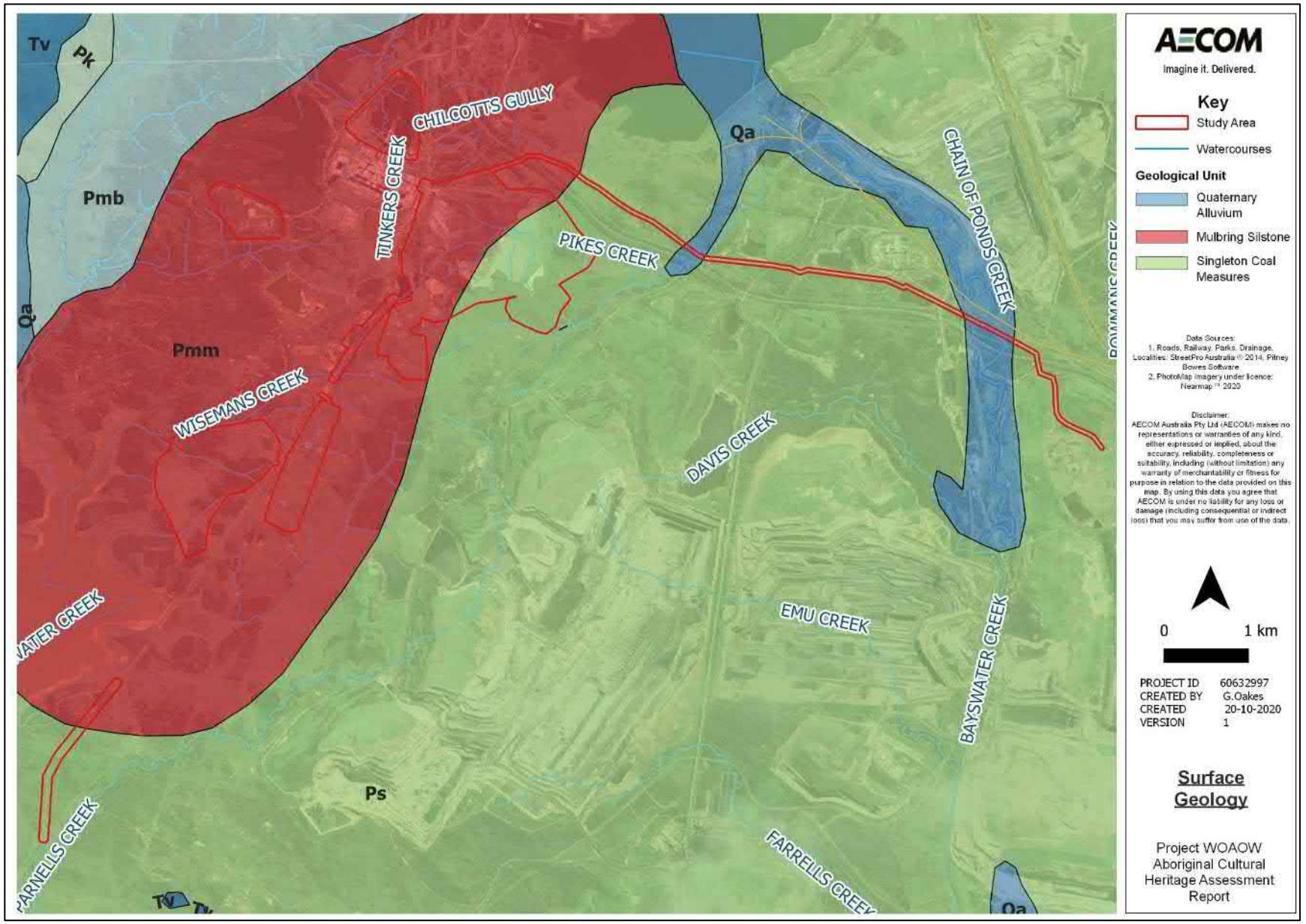

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Figure 7 Soil Landscapes

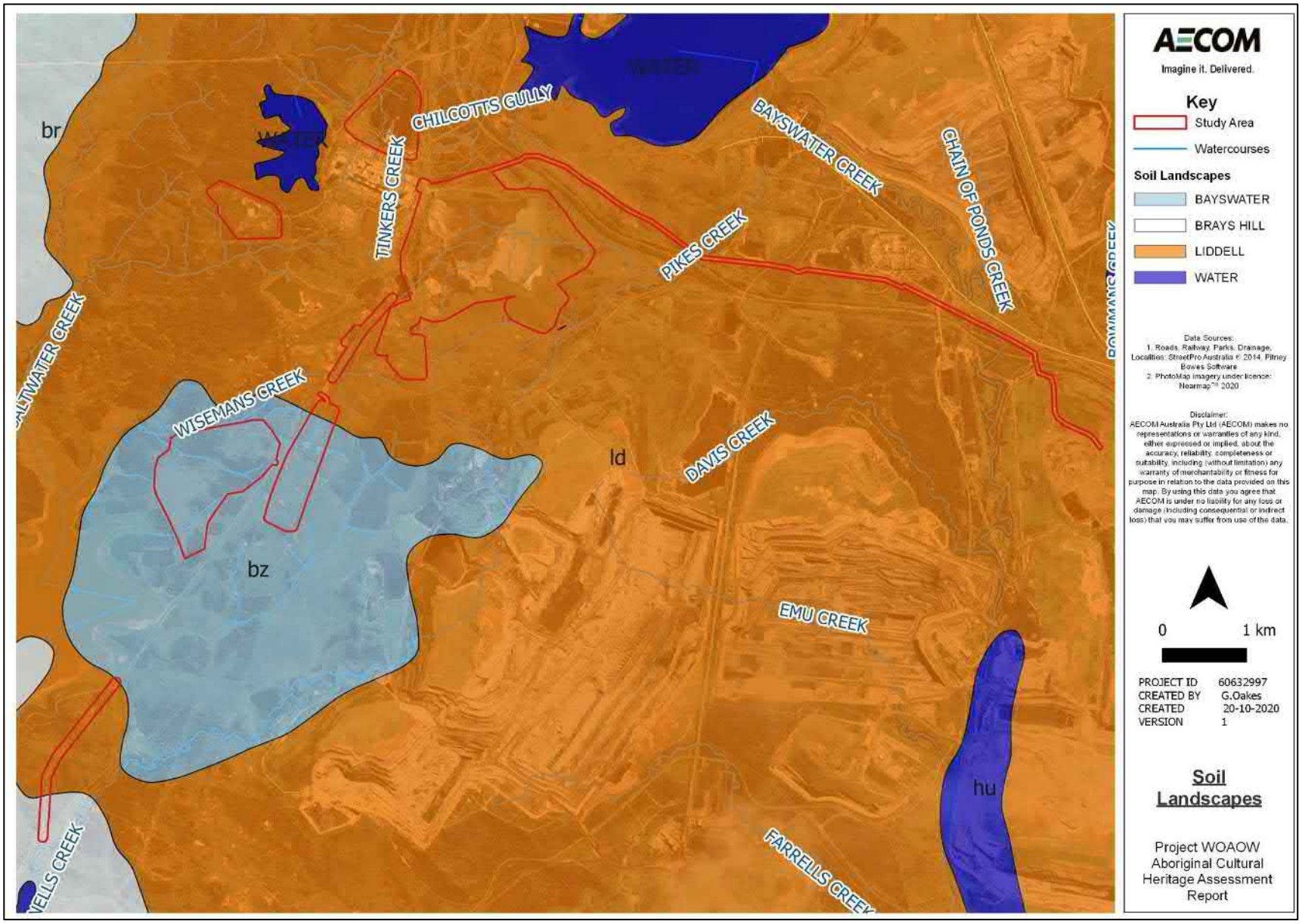

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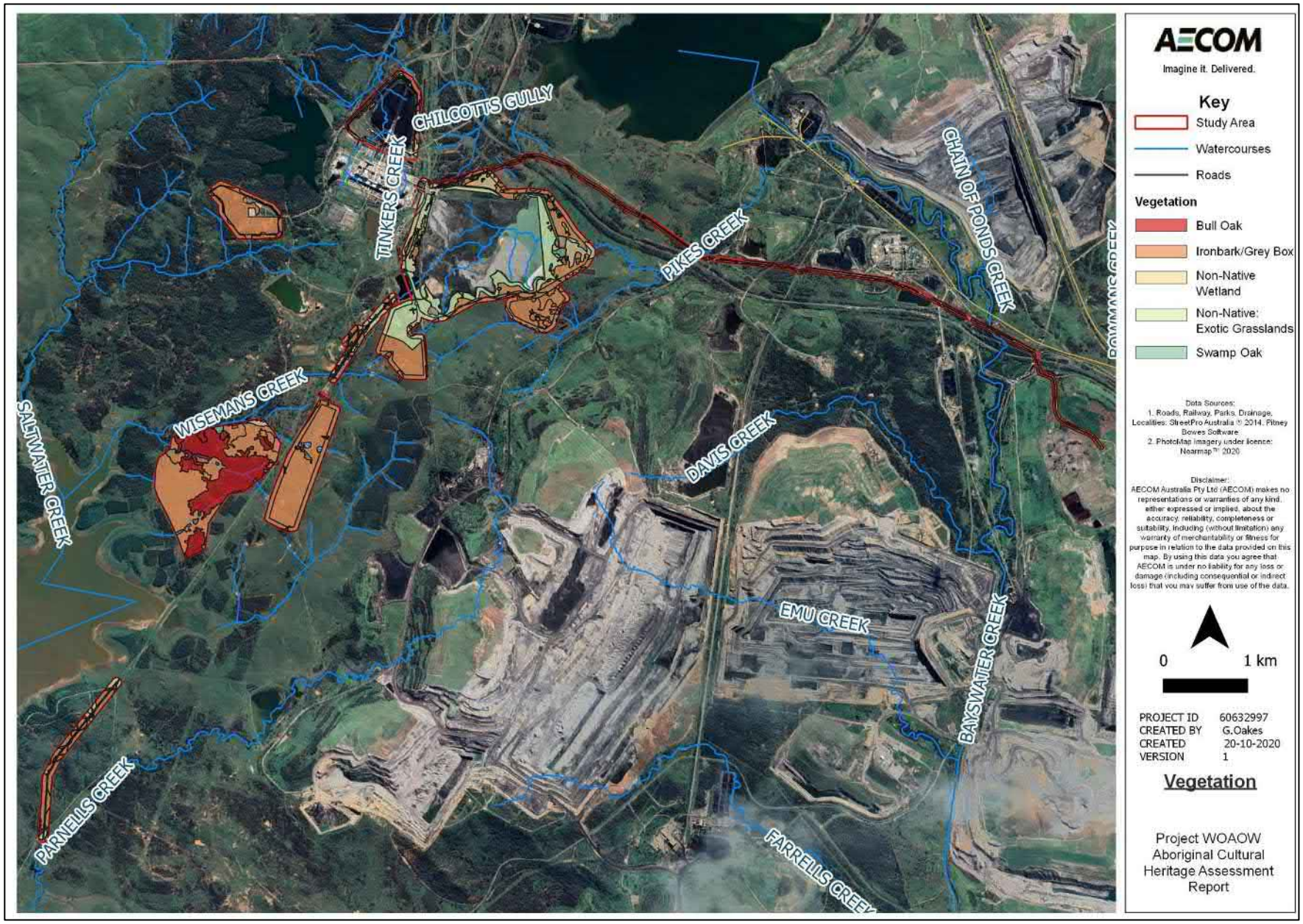
Figure 8 Vegetation



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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 parish maps for Howick indicates that the major early landowners in he study area were the Byrne (burn/burns) family and the Bank of Australasia. The properties were used for agriculture with grazing and dairying the focus until the construction of the power station which was commissioned in 1985.

4.8 Land Use

The current dominant land uses within the study area is industrial (power generation), as well as cattle grazing. 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 and construction of the power station.

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 study area. Examination of aerial photographs from 1958 (Figure 9), 1974 (Figure 10) and 1993 (Figure 11) 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 and the construction of multiple farm dams;
- fluvial erosion activity, particularly along creeklines and on cleared hillslopes;
- construction of essential services including power lines and roads
- Construction of power station infrastructure including roads, conveyors, pipelines and various facilities in the 1970s; and
- Full power station development in the 1980s and 1990 including coal stockpiles, dams and water infrastructure etc.

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 study area. 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., earthworks 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 study area; 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 12. 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.

Figure 9 1958 aerial photograph of the study area (Source: Land & Property Information NSW)

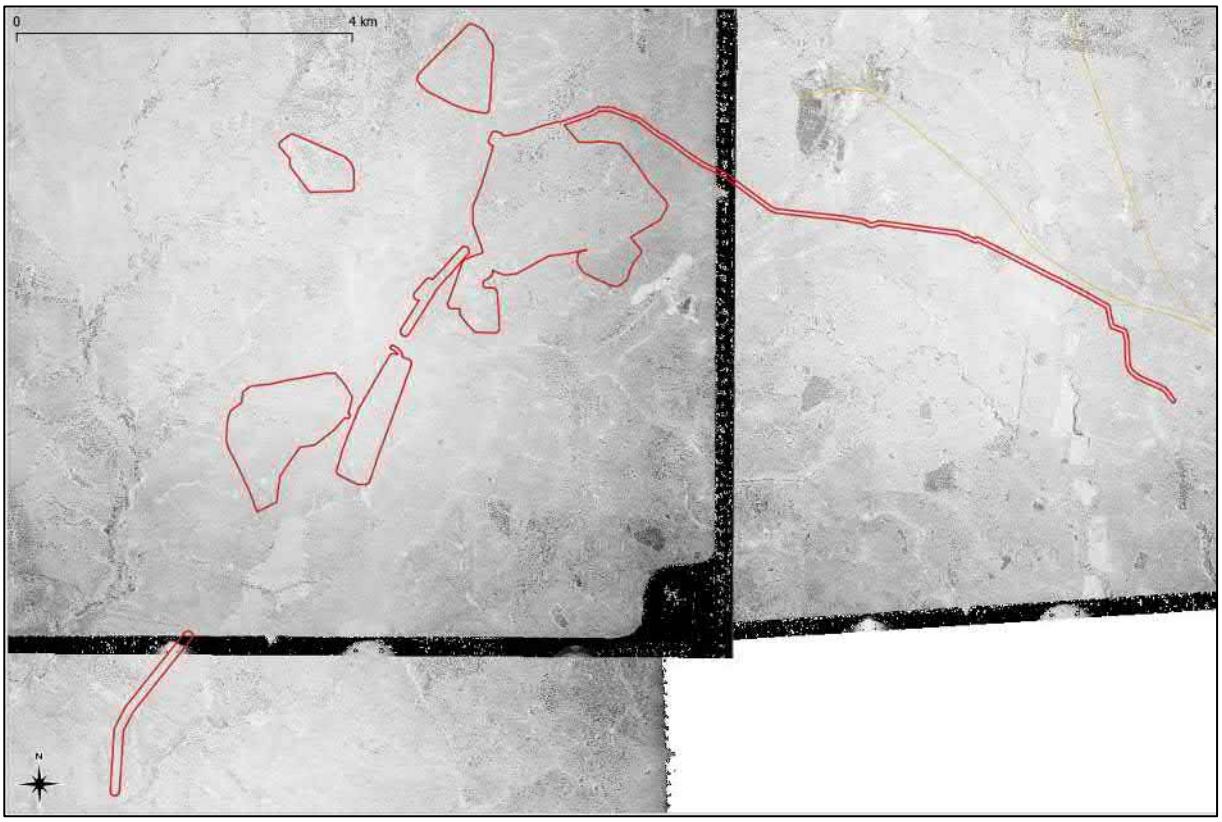

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Figure 10 1974 aerial photograph of the study area (Source: Land & Property Information NSW)

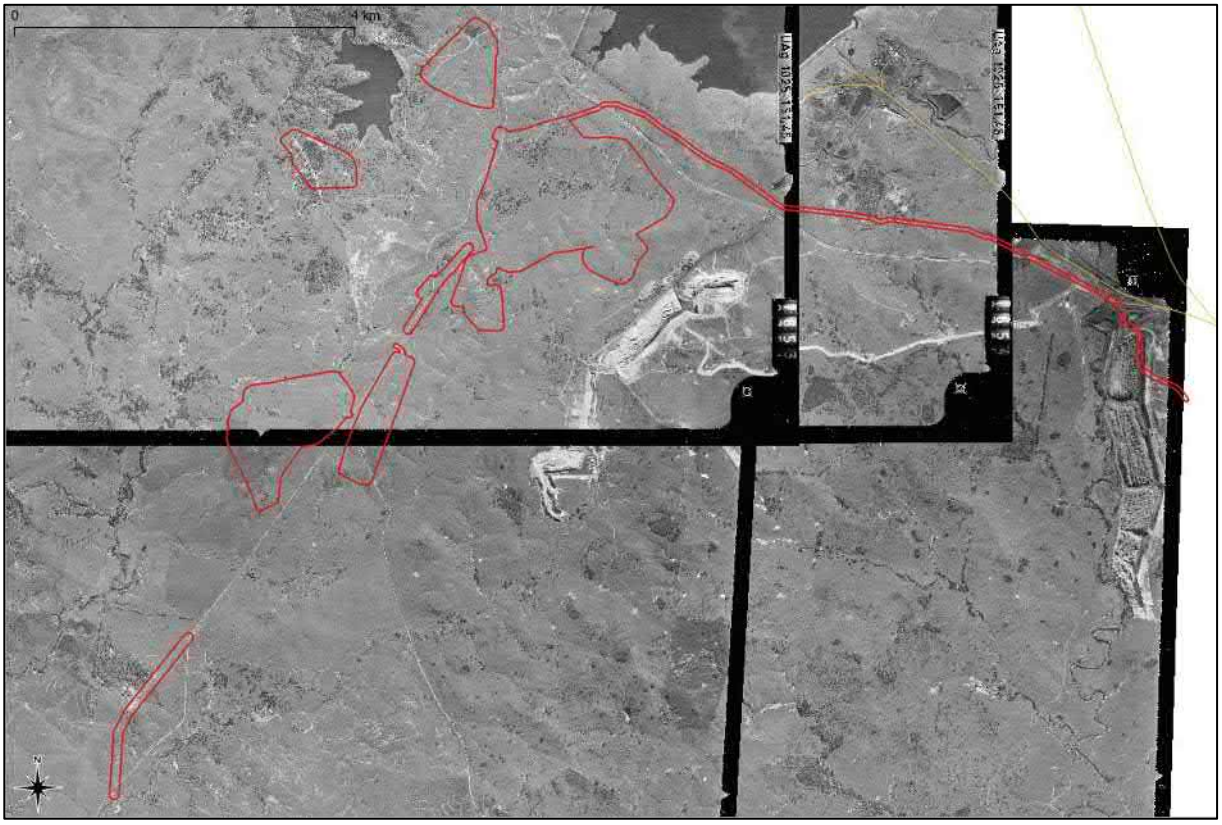

Figure 11 1993 aerial photograph of the study area (Source: Land & Property Information NSW)

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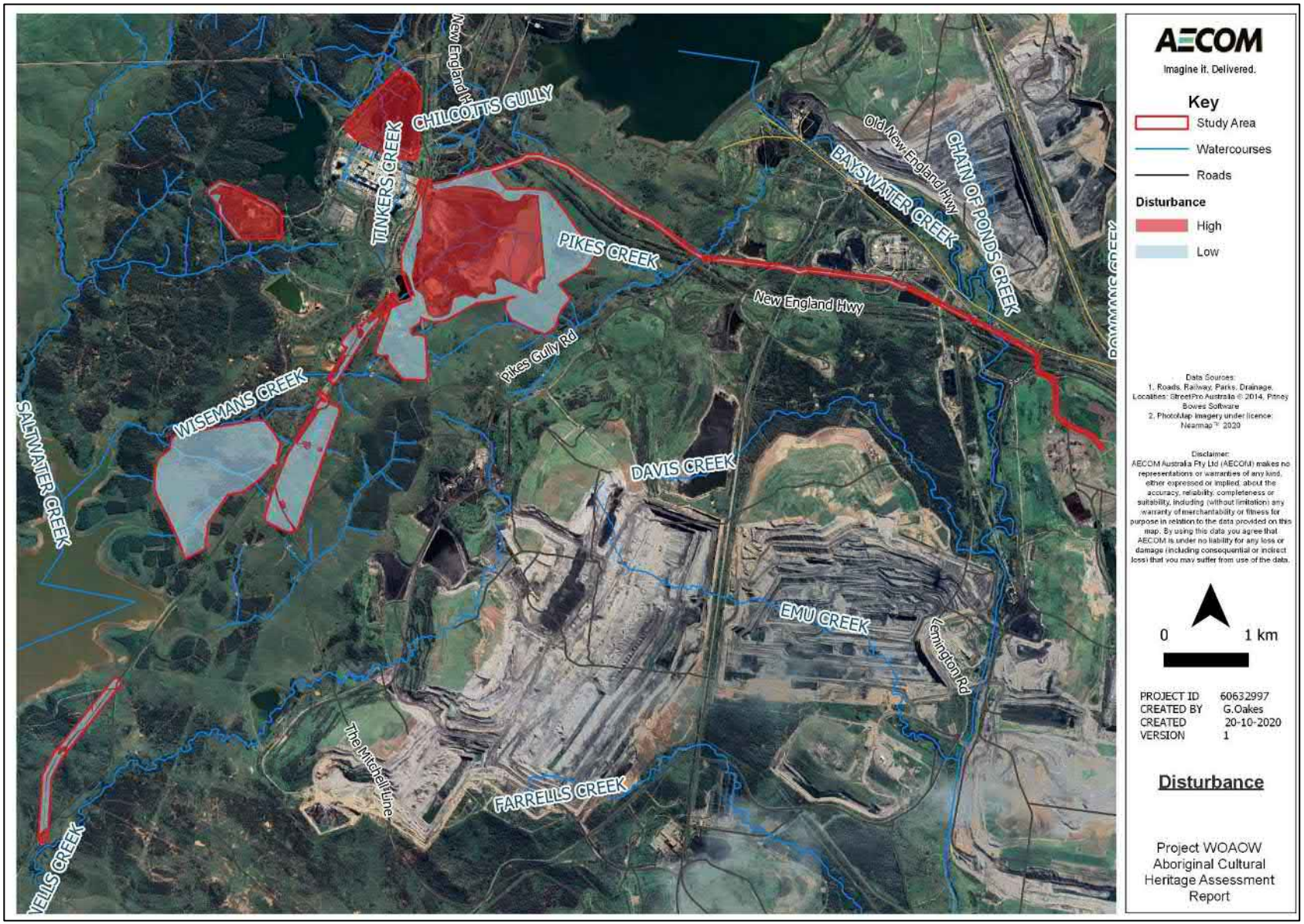
Figure 12 Disturbance



4.9 Key Observations

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

- topography consists flats associated with various watercourses interspersed with low undulating to steeply sloped hills and crests over open farmland which is typical of the region as well as highly disturbed land associated with construction of the power station. Slopes range from level and gently inclined flats that border watercourses, to steeper slopes found on hills in the central and southern portions of the study area.
- Parts of four 1st to 3rd order watercourses (after Strahler, 1952) are located directly within the study area.
- Reference to the Singleton 1:250,000 geological mapsheet indicates that the surface geology of the study area comprises three distinct formations: Quaternary alluvial deposits (Qa), Permian coal measures, of which the Singleton Supergroup (Ps)(formerly known as the Singleton Coal Measures) comprises the overwhelming majority, and Permian Mulbring Siltstone (Pmm) that forms part of the Maitland Group.
- Prior to European settlement, the floral and faunal resources of the study area and environs will have been sufficient to facilitate intensive and/or repeated occupation by Aboriginal people.
- Examination of historical aerial imagery for the study area indicates a range of historical land use activities and associated ground surface impacts. Major activities/impacts include native vegetation clearance, the construction of farm dams and erosion, as well as significant impacts from the construction of the Bayswater Power Station. However, land in parts of the study area retains moderate integrity.

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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 study area on both a regional and local scale. This section builds on this foundation by summarising relevant ethnohistoric information for the study area and environs. Further information is also provided in the CVR (Appendix B).

As in other parts of New South Wales 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 study area is located within Wonnarua territory, close to the boundary with the Geawegal (Figure 13). Tindale (1974) describes the territory of the Wonnarua as a 5,200 square kilometres (km^2) 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 km^2 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 km^2 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 km^2 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.

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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 1826[2] (the 'Bahtahbah' mission) and is widely regarded as one of the pioneers of Aboriginal studies in New South Wales 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 14)

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 13 Excerpt from Tindale's (1974) tribal map (Tindale, 1974)

[2] Subsequently relocated to Toronto in 1831and named 'Ebenezer' mission

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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.

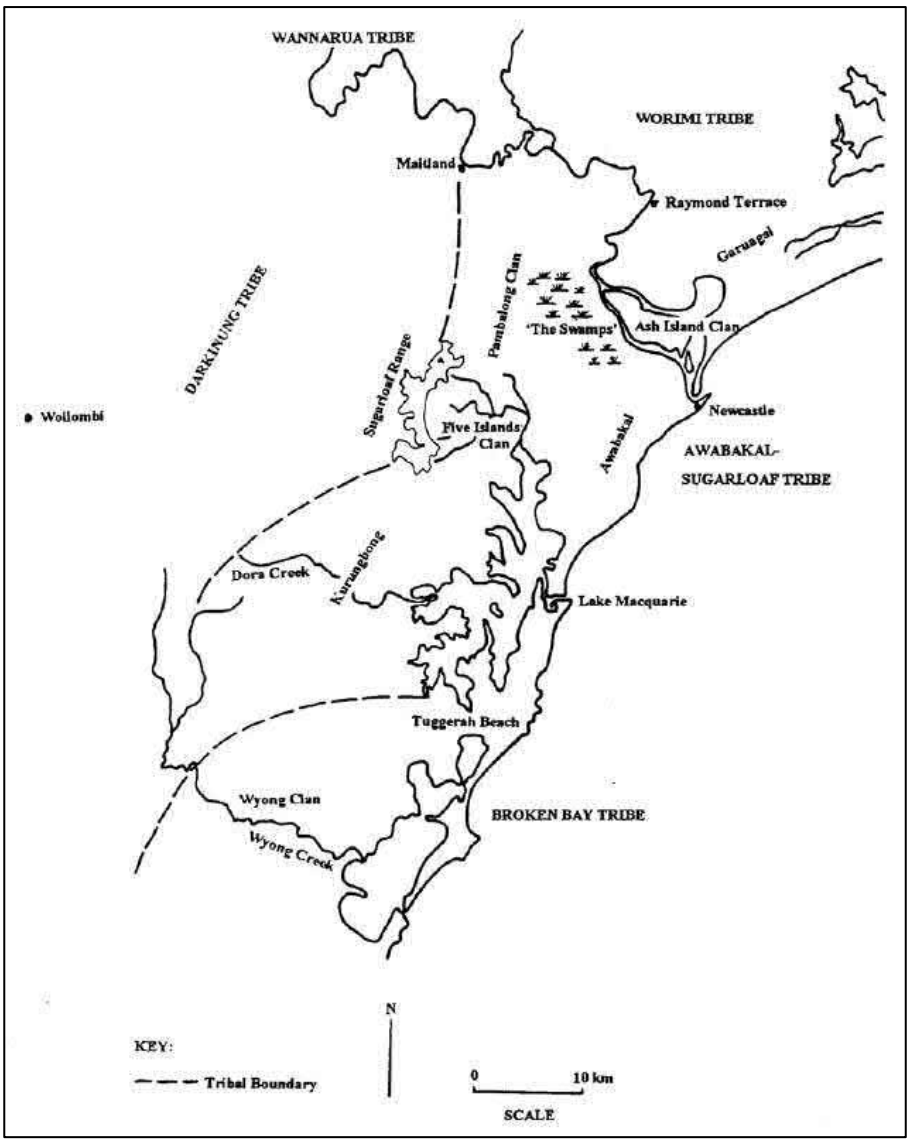

Figure 14 Gunson's (1974) tribal map for the lower Hunter Valley, based on the observations of Reverend Lancelot Threlkeld (from Kuskie, 2012: 39, Fig. 8, after Gunson, 1974)

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 range[3]. 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 study area 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 study area, 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 (Appendix B).

[3] From north to south: the Sugarloaf Range, the Watagan Range and Peats Ridge.

5.2 Social Organisation

In common with other regions of New South Wales (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 clan[4], 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.

[4] 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).

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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, Dyall'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)[5]. 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.

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 two[6] 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 "prepatrory [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 is 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).

[5] 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.
[6] Where two circles were used, these were separated by a distance of up to 400 m.

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 Macquarie[7], 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*.

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

[7] 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.*

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 New South Wales 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. This 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.

D R A F T

6.0 Archaeological Context

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

6.1 Regional Context - The Hunter Valley

6.1.1 Introduction

Formal archaeological interest in the Aboriginal archaeological record of the Hunter Valley can be traced to the late 1930s, with the then Curator of Anthropology at the Australian Museum Fred McCarthy undertaking an archaeological reconnaissance of the Valley in 1939 (Moore 1970: 29). McCarthy's subsequent investigation, with F.A. Davidson, of an extensive open artefact site on a terrace of the Hunter River at Gowrie, near Singleton, is widely regarded as the first serious archaeological study of stone artefacts in the Hunter Valley proper (McCarthy & Davidson 1943). MCarthy's early endeavours aside, more detailed investigation of the Valley's Aboriginal archaeological record did not begin until the mid-to-late 1960s, a period that witnessed a series of archaeological surveys and site excavations completed as part of the Australian Museum's long term and wide ranging archaeological research project into the Aboriginal prehistory of the Hunter Valley (Moore 1969, 1970, 1981).

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 hundreds, if not thousands, of Aboriginal archaeological investigations involving survey and/or excavation having now been undertaken, the majority as part of larger 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, with thousands of Aboriginal sites now registered on Heritage NSW's AHIMS database. Together with Dean-Jones and Mitchell's (1993) pioneering environmental study, existing syntheses of the Aboriginal archaeological record of the Hunter Valley (e.g., ERM 2004; Hughes 1984; Koettig 1990; MacDonald & Davidson 1998) provide a suitable interpretive framework for the current assessment. 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, open sites and open camp sites, are by far and away the most common and widely distributed form of Aboriginal archaeological site in the Hunter Valley (ERM 2004; Hughes 1984; MacDonald & Davidson 1998). 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 distribution, site structure and the technology of backed artefact manufacture, in particular, comprising key research topics (Baker 1992a, 1992b, 1992c; Hiscock 1986a, 1986b, 1993a; Koettig 1992, 1994; Moore 1997, 2000; White 1999, 2012).

As highlighted by Hughes (1984) and reiterated by numerous other researchers (e.g., ERM 2004; Koettig & Hughes 1983, 1985; Koettig 1992,1994; Kuskie 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 salvage projects (e.g., Koettig 1992, 1994; Kuskie & Clarke 2004; Kuskie 2000; MacDonald & Davidson 1998; OzArk 2013; Rich 1992; and 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[8] assemblages concentrated on elevated, low gradient landform elements adjacent to higher order streams.

In the Lower Hunter Valley, a similar pattern has been identified for the permanent to semi-permanent wetlands of the Hunter 'delta' (e.g., Kuskie 1994; Kuskie & Kamminga 2000). 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'.

Flaked stone artefacts dominate archaeological assemblages from recorded open artefact sites within the Hunter Valley (Hiscock 1986a), with heat fractured rock also well represented. Items such as complete and fragmentary grindstones, hammerstones, edge-ground hatchet-heads, ochre and shell have also been identified though comparatively infrequently. With the notable exception of 'knapping floors', a relatively common component of the open artefact site record of the Hunter Valley, associated archaeological features (e.g., hearths and heat treatment pits) have likewise proven elusive (for examples see Koettig 1992; Kuskie & Kamminga 2000).

Defined in slightly different ways by different researchers, knapping floors can be broadly defined as spatially-discrete activity areas in which primacy was given to the reduction of one or more stone packages (White 1999:152). Recorded knapping floors in the Hunter Valley vary considerably in size and complexity, with some of the largest and most complex examples identified through excavation as opposed to survey. 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 floor 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 1986a; 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, colluvial/fluvial aggradation and aeolian transportation 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 visibility and distribution of open artefact sites within the region are, for the most part, 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 invariably 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.

Such evidence has posed a significant analytical and interpretive dilemma for archaeologists working in the Hunter Valley. Defining sites on the basis of surface artefacts alone is clearly problematic, with modern site boundaries frequently reflecting the size and distribution of surface exposures as opposed to the actions of Aboriginal people in the past. Nonetheless, for pragmatic reasons, this has been the most commonly used approach, with 'distance' and 'density-based' definitions dominating. In the Hunter Valley, two of the most commonly employed distance-definitions are '*two artefacts within 50m of each other*' and '*two artefacts within 100 m of each other*'.

[8] Those containing a wider variety of raw materials and technological types and/or higher mean artefact densities and features such as knapping floors and hearths.

Neither definition is derived from a particular theoretical approach or body of empirical research - they are simply pragmatic devices for site definition. Definitions based on artefact density also vary in their particulars. However, one of most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 m², higher density clusters that are subsequently defined as 'sites'.

While not widely employed, Kuskie's (1994, 2000a) system of open artefact site definition, developed for use in the Hunter Valley and other surrounding regions, is also worthy of note here. In short, this system is predicated on the definition of 'survey areas' within broader 'Archaeological Terrain Units' (ATUs), with the latter comprising discrete, recurring areas of land defined on the basis of landform element and slope class, and the former, an area of a single ATU bounded on all sides by different ATUs (Kuskie 2000: 65-67).

Within this overarching environmental scheme, open artefact sites are defined by the presence of one or more stone artefacts within a survey area, with site boundaries corresponding with the boundaries of the broader survey area irrespective of the visible extent of artefacts within it. Spatially discrete occurrences of stone artefacts within a given site boundary are referred to as 'loci' (Kuskie 2000: 65-66).

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 pre-eminent role in archaeological reconstructions of past Aboriginal land use in the region. To date, hundreds, if not thousands, of surface-collected and excavated chipped stone assemblages from the Hunter 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, in some instances, 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), 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 the first appearance, in the mid- Holocene[9], of a new suite of chipped 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, 2014). 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 southeastern 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.

[9] Note that more recent research into the chronology of backed artefacts and points in Australia (e.g., Hiscock & Attenbrow, 1998, 2004; Hiscock, 1993b) has demonstrated a long history of production and use for these implement types, with both now known to have been produced in the early Holocene and likely in the late Pleistocene as well.

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.

Table 5 McCarthy's Eastern Regional Sequence (ERS) of stone artefact assemblages

Current phasing	McCarthy's (1967) Phasing	Approximate date range	Backed artefact frequency	Bipolar artefacts	Edge-ground hatchet heads
Pre-Bondaian	Capertian	40,000-8,000 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 occupying 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 and colluvial gravel deposits[10] associated with the Hunter River and its tributaries (Raggatt 1938; see also Hiscock 1986a:14-16). Widely distributed and easily accessible, it would appear that these deposits functioned as the primary source of lithic raw materials for Aboriginal flaked stone tool manufacture in the Hunter Valley proper.

In the Hunter Valley, asymmetrical and symmetrical backed artefacts dominate the retouched components of surface collected/recorded and excavated flaked stone assemblages. 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 (Figure 15). 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 alternation of indurated mudstone blanks is rare (e.g., Koettig 1992) and likely reflects the generally higher 'raw' flaking quality of this material.

[10] i.e., active point and mid-channel gravel bars, as well as elevated terrace and palaeochannel remnants.

Alongside the reconstruction of backed artefact manufacturing processes, the identification of diachronic change in Bondaian lithic technology in the Hunter Valley has also received considerable analytical and interpretive attention (e.g., Baker 1992c; Haglund 1989; Hiscock 1986a, 1986b). Hiscock's (1986a) pioneering attribute analysis of a sample of unretouched mudstone flakes recovered from the Sandy Hollow 1 rockshelter excavated by Moore (1970) is of particular significance in this regard and can be regarded as the foundation upon which subsequent studies have been carried out. This analysis sought to test a tripartite division of the Sandy Hollow 1 (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. Attribute analysis of a sample of 742 complete mudstone flakes from Square AA 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 (see Table 6).

Table 6 Hiscock's 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	• 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	• 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	• 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

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Having established the validity of the three phase Bondaian sequence at SH1, 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. On this basis, Hiscock (1986b) proposed that the attribute analysis employed at SH1 could serve as a relative dating system for open sites in the Hunter Valley. Given the number 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 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, variability itself linked to variables such as raw material type and accessibility, site function and stylistic differences between Aboriginal groups.

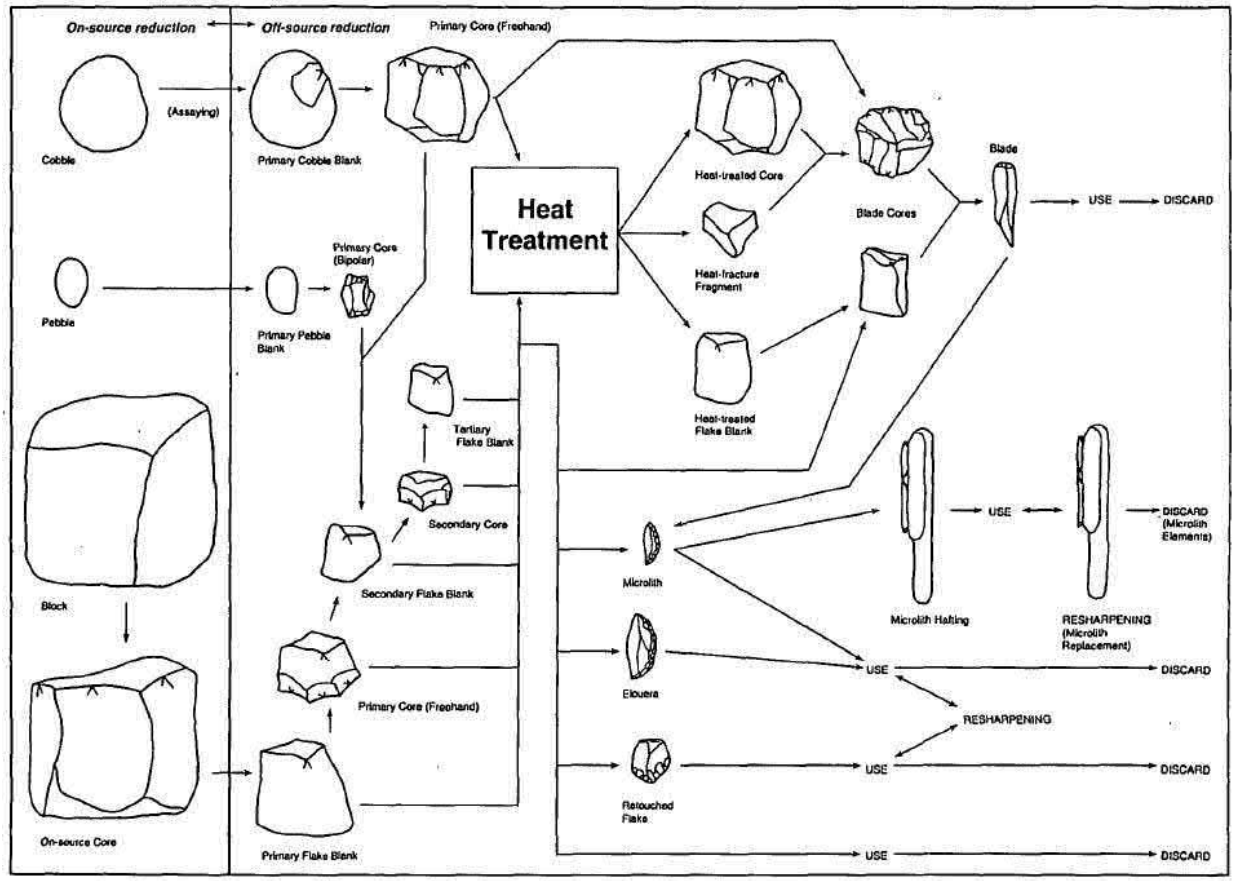

Figure 15 Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (from Moore 2000: 29, Fig. 5)

6.1.4 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 artefacts 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 m^2 section of large gravel bar (80 m wide and 1.5 km long) at the mouth of the Goulburn River near Denman.

6.1.5 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 (in prep.) 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 profiles[11], 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 lines[12]. 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).

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).

6.1.6 Occupation models

A number of Aboriginal occupation models have been proposed for the Hunter Valley over the past three decades, with existing models based on varying combinations of archaeological, environmental and ethnohistoric data. Key models for the Central and Lower Hunter Valley include those developed by Haglund (1992), Koettig (1992, 1994), Kuskie (2000) and Kuskie and Kamminga (2000). These models are summarised in Table 7.

[11] 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.

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

Table 7 Aboriginal occupation models for the Hunter Valley

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
Koettig	1992 & 1994	Salvage of sites within the Camberwell and Bulga Coal Mine Leases	Central lowlands	• Repeated occupation of an area is likely to be represented by continuous, or near continuous, distributions of archaeological sites and/or features; • Sporadic or less intensive occupation of an area is likely to be represented by non-continuous or more widely dispersed archaeological sites and/or features; • Continuous to near- continuous distributions of archaeological evidence along watercourses suggest that Aboriginal people did not camp at specific locations; • Frequency of occupation at a given location is likely to have been related to the availability of subsistence resources (e.g., food, water, lithic raw materials); • Some locations may have been foci for Aboriginal occupation owing to the presence of particular resources (e.g., sandstone exposures suitable for grinding hatchet-heads); and • The duration of occupation at a given location may be evidenced by levels of disturbance to associated archaeological deposits, with sites occupied for shorter duration potentially having more intact deposits, as the length of stay may have been insufficient to disperse artefacts or mask the original form of knapping floors.	Koettig 1992, 1994
Haglund	1992	Salvage of sites along Doctors Creek, Warkworth	Doctors Creek area, Central Hunter Valley	• Kangaroos, wallabies, and other large and small game would have been abundant in the area during dry periods, and would have been hunted by small hunting parties of men who would prepare and repair their hunting equipment in close proximity to watercourses; • Larger family groups likely visited the area during wetter periods when watercourses would be flowing more reliably and moisture dependent plants occurred in greater abundance; • Women and children would procure and process plant foods, such as ferns, yams and other tubers, in the vicinity of creeks and watercourses; • Sporadic visits would have resulted in debris left behind being incorporated into the turf or buried by leaf litter and Casuarina needles more quickly than more intensive, long term visits; and	Haglund 1992

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Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• While some equipment such as grindstones may have been retained and carried throughout the landscape, flakes and other implements were likely manufactured, utilised and discarded on an "as needed" basis.	
Kuskie	2000	Archaeological survey of Mount Arthur North Coal Mine Lease	Mount Arthur Area, Central Hunter Valley	• The area has been occupied for at least the past 5,000 years; • Occupation may extend as far back as 30,000 - 40,000 years; • The area has predominantly been occupied by tribes of the Wonnarua language group, although members of neighbouring groups may also have sporadically visited and occupied the area. • The Mount Arthur North area was likely utilised and occupied by Aboriginal people at varying intensities on a seasonal basis; • Occupation was most intensive within 50m of the main watercourses (3rd and 4th order streams); • Aboriginal occupants had a strong preference for camping on level ground adjacent to reliable water sources and potentially more abundant subsistence resources; • Individual campsites were mainly occupied by single nuclear family groups and multiple family groups (bands); • Larger campsites from broader gatherings of people likely took place along the nearby Hunter River flats; • A greater range and frequency of activities were undertaken at camp sites, rather than in the surrounding landscape; • Camp sites along the major watercourses were occupied by small groups of people for varying lengths of time, during both the course of the seasonal round and in different years; • Occupation of camp sites throughout the entire Mount Arthur North area was predominantly sporadic rather than continuous; • Occupation, such as focussed camping, likely also occurred along level to very gentle drainage depressions (particularly 1st and 2nd order streams). These water sources were likely to be intermittent and occupation along these lower order streams may only have occurred when standing water was available; • Most camp sites involved overnight visits of small hunting parties rather than entire family groups;	Kuskie 2000

D R A F T

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Other than focused camping, activities engaged in across the survey area involved hunting activities (larger game) by small hunting parties of men, and gathering activities by small parties of women and children, along with transitory movement, procurement of lithic resources, and cultural activities. • The utilisation of areas such as simple slopes, ridge crests, spur crests and minor watercourses was less intense than the valley flats where base camps were situated; • Simple slopes were used during hunting or gathering activities in the course of the normal daily or seasonal round, to access higher ground or stone resources, or to move between camp sites. Ridge and spur crests were also used for these purposes and for accessing vantage points or moving to special ceremonial sites; • Vantage points were important to the Aboriginal occupants of the area, particularly gentle to steep upper slopes adjacent to several ridges, which were mainly accessed by groups of men on hunting expeditions, or for security and/or cultural purposes; • Silcrete and tuff were the preferred stone materials, both of which are locally available and likely procured from local sources during the course of the normal daily or seasonal round, with tuff being the preferred material for manufacture of flaked stone tools; • These materials were also procured from other sources within the region, most notably the alluvial gravels of the nearby Hunter River; • Chert, quartz, petrified wood, chalcedony, and porcellanite were also utilised to a lesser extent and were also procured from local sources, probably during the course of the normal seasonal round; • Silcrete was deliberately heat treated to improve its flaking properties. This may have been undertaken at single locations (e.g., a campsite adjacent to a watercourse) or in different locations reflecting the stages of procurement, heat treatment, reduction and use); • Manufacturing stone tools, particularly flaked implements, was likely a casual or opportunistic activity, conducted on an “as needed” basis;	

D R A F T

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• There was little emphasis on rationing or conservation of the use of most stone materials, due to their wide availability; and • The manufacture of microblades (e.g., hunting spear barbs) was also widely undertaken. While likely a planned and organised activity, it did not necessarily occur at base camps, but may also have occurred in places traversed during the course of hunting expeditions on a more casual or opportunistic basis.	
Kuskie & Kamminga	2000	Salvage of sites impacted by the construction of the Hunter Expressway, near Black Hill	Black Hill - Woods Gully - Hexham Wetlands Locality, Lower Hunter Valley	• The locality was occupied by Aboriginal people of the Pambalong Clan and potentially clans of the broader Awabakal language group; • Occupation focused on wetlands, swamps, lakes, estuaries, the coastline, and potentially also the junctions of multiple resource zones; • Occupation of the area has predominantly occurred within the past 4,000 years; • Occupation may have extended as far back as 30,000 – 40,000 years, but few landscape contexts exist in which archaeological evidence of older occupation would be conserved; • Occupation encompassed the entire region, but at varying intensities, on a seasonal basis, and across different time periods within the overall time-span of occupation; • Seasonal occupation of some resources and localities may not be evidenced in the extant archaeological record; • Occupation of the area reflects a wide range of activities, including transition between locations, hunting, gathering, procurement and utilisation of lithic and other resources, camping, ceremonial and spiritual activities, and burial practices; • Activities conducted and engaged in by the Aboriginal occupants of the area likely included: food procurement, processing, and consumption; production and maintenance of stone and wooden tools and implements; resource procurement; erection of shelters, children's play, ceremonial and spiritual activity, and social and political activity; • Landscape features and variables such as topography, resources, proximity to water, aspect, slope, and cultural preference likely influenced the activities conducted by the Aboriginal occupants of the area;	Kuskie & Kamminga 2000

D R A F T

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Few of the activities engaged in by past Aboriginal people are likely to be evident within the archaeological record, other than those involving the use of stone or where preservation conditions permit; • Locally available indurated rhyolitic tuff was the preferred material for knapping and stone tool production, followed by silcrete, which was also able to be procured locally in terrace and alluvial gravels; • Both tuff and silcrete were likely obtained during both daily and seasonal movements throughout the landscape on an “as needs” basis, not during “special purpose trips”, and conservation of these materials was not a priority due to their wide availability; • Other locally available stone materials including quartz, quartzite, acidic volcanics, chalcedony and chert were also utilised to a lesser extent; • Non-locally available stone materials such as dacite and rhyodacite (used for grindstones) may have been obtained through trade or exchange with other cultural groups, through special purpose trips, or during visits to other areas during the seasonal round; • Ochre was utilised for ceremonial purposes and may have been procured from sources near Lake Macquarie, the Hunter River, or from outside the region; • Heat treatment of silcrete was undertaken to improve flaking qualities and possibly to obtain desired colours; • A reasonably high proportion of silcrete used in knapping activities was deliberately heat treated, but tuff was not; • Microblade production was a widespread, likely planned and organised, activity with the primary goal of producing microliths (e.g., bondi points) for hunting implements/purposes. • Microblade production may have occurred at both campsites and also in places on transitory routes during hunting expeditions, which may represent more casual or opportunistic behaviour; • Production of microliths was time-consuming and the end result was likely highly desirable and socially valuable; • The investment of time and energy in activities such as heat treatment of silcrete and production of microliths for hunting and fighting spears may	

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Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				have more social than utilitarian values, as floral and smaller faunal subsistence resources would probably have been most prominent in the economy of the local Aboriginal people.; • Casual and opportunistic knapping or selection of flakes to meet requirements on an "as needs" basis was widespread. • A high proportion of knapping products were likely discarded at the site of their manufacture, without use; • Use of bipolar technique was uncommon; • Floral subsistence resources were locally abundant, predominantly obtained and processed by women, and were consumed at campsites and at the site of procurement; • Ferns may have been a staple of the local diet, along with the bulbs and roots of other wetland plants; • Plant preparation sites may include camping places around the margins of Hexham Wetland and other swamps. Tools such as Worimi cleavers were utilised to pound the starch-rich rhizomes of bracken and swamp fern and the roots of other plants obtained from the wetlands; • Eloueras may have been used for extracting the perennial herb cumbungi (*Typha australis*), abundant in the freshwater parts of wetlands, or less likely, tall spike rush (*Eleocharis sphacelata*); • Less portable special tools such as Worimi cleavers and grindstones may have been deliberately stored at base camps; • Faunal resources were processed and consumed at temporary hunters or gatherers camps, at nuclear base camps, campsites of larger congregations of people, and at the site of procurement; • Men hunted for larger game, while women played a key role in gathering plants and obtaining smaller game; • Hunting was a planned and coordinated event; • Fish were obtained by several methods, including boating, hooks and lines, spearing, using hand nets, and creating fish traps; • Strategic management of resources such as fish traps was aimed at increasing the reliability and productivity of food resources;	

D R A F T

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Nuclear family base camps may have been strategically positioned in relation to food resources, at the conjunction of two or more subsistence zones, close to potable water, and on level or very gently inclined ground. Visual aspect and security may have also been important considerations; • Site occupants of nuclear family base camps may have foraged within an area of up to 10 km radius from the campsite; • Campsites in more favourable locations may have been subject to more intensive occupation; and • Community base camps or camps of larger congregations of people tended to be situated on level ground adjacent to plentiful food resources and potable water such as river terraces or flats.	

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 *National Parks and Wildlife Act 1974*. 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'.

Searches of the AHIMS database were undertaken on 23 October 2020 for a 20 x 20 km area surrounding the study area resulting in the identification of 2,556 site entries. As is typical for the Hunter Valley, open artefact sites with and without other forms of archaeological evidence (eg, PAD, scarred trees, hearths) are the most common site type represented within the search area, accounting for 98.5 per cent (n = 2517) of known sites (Table 8). Other, less common sites types represented include scarred trees (n = 19, 0.7%), Potential Archaeological Deposits (PADs) (n = 7, 0.3 per cent), grinding grooves (n = 4, 0.2%), resource / gathering areas (n = 1, 0.04%), ceremonial ring (n = 1, 0.04%), conflict site (n = 1, 0.04), stone quarry (n = 1, 0.04), shell midden (n = 1, 0.04). The locations of AHIMS registered sites within and surrounding the study area are shown on Figure 16.

Consideration of the location of previously recorded Aboriginal sites indicates that 29 are located wholly or partially within the study area comprising 29 open artefact sites, five with associated areas of PAD and one with a hearth as well as PAD. All 29 sites are listed are 'valid', however a review of the site locations against existing site infrastructure indicates that seven should be listed as destroyed (i.e., 37-2-007, 37-2-0047, 37-2-0062, 37-2-0063, 37-2-0065, 37-3-0007 and 37-3-1128). It is noted that 13 sites were recorded by Jacobs as part of the WOAOW project. Site details are provided in Table 9.

Table 8 Site search results (20 x 20 km area)

Site Type	Site features	Count	%
Open artefact site	AFT;GDG, PAD; ARG; ETM; HTH; TRE	2517	98.5
Modified Tree	TRE	19	0.7
PAD		7	0.3
Grinding Groove	GDG; TRE	5	0.2
Art	ART	3	0.1
Ceremonial Ring	CER	1	0.04
Conflict	CFT	1	0.04
Stone Quarry	STQ	1	0.04
Resource and Gathering	ARG	1	0.04
Shell Midden	SHE	1	0.04
Total		**2556**	**100**

Table 9 Sites within the study area

AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Reference	Comment
		MGAE	MGAN			
37-2-0047	Pikes Gully;	308993	6413165	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum). Destroyed as part of power station

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AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Reference	Comment
		MGAE	MGAN			
37-2-0048	Pikes Gully;	309541	6413175	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum)
37-2-0050	Pikes Gully;	308993	6413165	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum). Destroyed as part of power station
37-2-0062	Tinkers Creek;Liddell;	307315	6414871	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum). Destroyed as part of power station
37-2-0063	Liddell;Tinkers Creek;	307132	6414868	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum). Destroyed as part of power station
37-2-0065	Liddell;Pikes Gully;	308532	6413339	Artefact	L. Dyall (1977)	Not collected. Destroyed as part of power station
37-2-0553	P6;Plashette;	305655	6410309	Artefact	Margrit Koettig & Hughes (1985)	Not collected
37-2-0554	P7;Plashette;	305605	6410289	Artefact	Margrit Koettig (1992)	Not collected
37-2-0555	P8;Plashette;	305585	6410439	Artefact	Margrit Koettig (1992)	Not collected
37-2-0556	P9;Plashette;	305425	6410419	Artefact	Margrit Koettig (1992)	Not collected
37-2-0557	P10;Plashette;	305275	6410469	Artefact	Margrit Koettig (1992)	Not collected
37-2-0558	P11;Plashette;	306255	6410739	Artefact	Margrit Koettig (1992)	Not collected
37-2-6040	Wisemans Creek OS1	305358	6410456	Artefact	OzArk Environmental and Heritage Management	Not collected

AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Reference	Comment
		MGAE	MGAN			
37-2-6134	BAYS AS and PAD02	305008	6409878	Artefact; PAD	Jacobs (2019)	This project
37-2-6136	BAYS IF04	305109	6410243	Artefact	Jacobs (2019)	This project
37-2-6137	BAYS IF03	304816	6409613	Artefact	Jacobs (2019)	This project
37-2-6138	BAYS IF02	304841	6409474	Artefact	Jacobs (2019)	This project
37-2-6139	BAYS IF01	304848	6409471	Artefact	Jacobs (2019)	This project
37-2-6140	BAYS AS09	307318	6412247	Artefact	Jacobs (2019)	This project
37-2-6141	BAYS AS and PAD05	305737	6410932	Artefact; PAD	Jacobs (2019)	This project
37-2-6142	BAYS AS and PAD10	307353	6412080	Artefact; PAD	Jacobs (2019)	This project
37-2-6143	BAYS AS and PAD11	307483	6411740	Artefact; Hearth; PAD	Jacobs (2019)	This project
37-2-6144	BAYS AS and PAD07	306341	6410671	Artefact; PAD	Jacobs (2019)	This project
37-2-6145	BAYS AS06	306099	6410662	Artefact	Jacobs (2019)	This project
37-2-6146	BAYS AS04	305057	6410707	Artefact	Jacobs (2019)	This project
37-2-6147	BAYS AS and PAD03	305132	6410587	Artefact; PAD	Jacobs (2019)	This project
37-3-0007	Pikes Gully;	309179	6412985	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum). Destroyed as part of power station
37-3-0491	NARDELL N2	314105	6412289	Artefact	Umwelt (1997)	Not collected
37-3-1128	REA256	313859	6412438	Artefact	Umwelt (1997)	Destroyed as part of power station

6.2.2 Previous Archaeological Investigations within the Study Area

A review of the AHIMS database indicates that five Aboriginal archaeological investigations have been undertaken directly within the study area. With the exception of the Jacobs (2019) report completed for this project, these reports are discussed below.

D R A F T

- Dyall LK. 1977. Environmental Studies – Mt Arthur Project (Hunter Valley). Dyall undertook a survey for the Electricity Commission of NSW into areas south and west of the Bayswater Colliery. A number of sites were located and collected including along Pikes Gully (Wisemans Creek). These consisted of artefact scatters numbering around 50 artefacts in total all of which were collected and submitted to the Australian Museum.
- 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 artefacts 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 study area, 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.
- Koettig M (1992). *Assessment of Cultural Heritage Stage 2: Hunter Valley Aboriginal Sites*. This study followed on from the review of Aboriginal, historic and landscape heritage items (Burton et al 1990). Its aim was to set out procedures and guide-lines for the conservation and management of Aboriginal sites in the Hunter Valley. Field inspections were undertaken of both known sites and areas not previously surveyed. Existing sites were assessed for impacts due to development, however, no impacts were noted. Four new sites (artefact scatters) were recorded in the Plashett Dam area and seven open artefact scatters were recorded in the Bayswater-Liddell area.
- Umwelt Pty.Ltd. (1997.) *Archaeological Assessment – Proposed Modifications to Coal Preparation and Transportation System – Bayswater Coal Mine Projec*t. In 1997 Umwelt Pty Ltd undertook an archaeological assessment of proposed modifications to the coal preparation and transportation system at Bayswater Colliery. The assessment, which included field survey, reviewed three areas of impact in the southern section of the Bayswater No 3 mining lease; the coal processing plant, haul road, and mine access road; the overland conveyer and; the stockpile area at the RCT. The proposed conveyer route passed through the current study area. A total of 36 sites were recorded during the survey, including 28 open camp sites and eight isolated finds. The majority of sites were located on stream banks, particularly around Saddlers Creek and its tributaries. A number of sites were also found on upper slopes and ridges adjacent to watercourses. Artefacts consisted primarily of flakes and flaked pieces. Retouched flakes and cores were also located as well as a hammerstone.

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Figure 16 AHIMS Sites

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6.3 Archaeological Predictions

A review of the existing archaeological and environmental context of the study area suggests that material evidence of past Aboriginal activity within the area is likely to be restricted to flaked stone artefacts in surface and subsurface contexts. Accordingly, key predictions for the study area's Aboriginal archaeological record are as follows:

- open artefact sites (i.e., artefact scatters and isolated artefacts) will be the dominant site type;
- site types with reasonable potential to occur include scarred trees, stone quarries and grinding grooves;
- site types with limited potential to occur include stone arrangements and burials;
- excluding those portions of the study area that have been grossly disturbed through historical land use activities or severely affected by erosion[13], most areas, irrespective of the presence or absence of associated surface evidence, will contain subsurface archaeological deposits, albeit of highly variable character and extent;
- surface and subsurface artefact distribution within the study area will vary significantly in relation to landform, distance to water and stream order;
- most, if not all, of the Aboriginal archaeological materials present within the study area will be of mid-to-late Holocene antiquity;
- grinding groove sites, if present, will occur in direct association with watercourses;
- burial sites, if present, will occur in floodplain or terrace contexts;
- the dominant raw material for flaked stone artefact production within the study area 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; and
- tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts.

[13] ie., complete loss of potential artefact-bearing topsoils

7.0 Archaeological Survey

7.1 Survey

Archaeological survey for this project was completed by Jacobs (2019) with the results presented here taken from the Jacobs (2019) ACHAR (Appendix A).

7.1.1 Methodology

The study area was subject to full archaeological survey without the employment of a sampling strategy. However, areas assessed in the field as having no potential were not were not survey (Jacobs 2019:32). A field team of two Jacobs Archaeologists (Oliver Macgregor and Clare Leevers) and RAP representatives completed the archaeological survey of the study area in September 2019.

7.2 Survey Results

A total of 23 sites were identified within the study area during the archaeological survey completed by Jacobs (2019). These comprise eight areas of PAD, seven open artefact sites (artefact scatters) with associated areas of PAD, and five open artefact sites. It is noted that the PADs have not been registered on AHIMS.

AHIMS ID	Site Name	Site Type	Comment
37-2-6134	BAYS AS and PAD02	Artefact Scatter and PAD	One artefact and PAD
37-2-6147	BAYS AS and PAD03	Artefact Scatter and PAD	Eight artefacts and PAD
37-2-6141	BAYS AS and PAD05	Artefact Scatter and PAD	135 artefacts and PAD
37-2-6144	BAYS AS and PAD07	Artefact Scatter and PAD	17 artefacts and PAD
37-2-6142	BAYS AS and PAD10	Artefact Scatter and PAD	Six artefacts and PAD
37-2-6143	BAYS AS and PAD11	Artefact Scatter and PAD	27 artefacts and PAD
37-2-6135	BAYS AS and PAD15	Artefact Scatter and PAD	13 artefacts and PAD
37-2-6146	BAYS AS04	Artefact Scatter	25 artefacts
37-2-6145	BAYS AS06	Artefact Scatter	Six artefacts
37-2-6140	BAYS AS09	Artefact Scatter	Four artefacts
37-2-6139	BAYS IF01	Isolated Artefact	One artefact
37-2-6138	BAYS IF02	Isolated Artefact	One artefact
37-2-6317	BAYS IF03	Isolated Artefact	One artefact
37-2-6136	BAYS IF04	Isolated Artefact	One artefact
Not registered	BAYS PAD01	PAD	Southern hill
Not registered	BAYS PAD08	PAD	Located around central road
Not registered	BAYS PAD12	PAD	Adjacent to Pikes Creek
Not registered	BAYS PAD13	PAD	Enveloping salt cake landfill
Not registered	BAYS PAD14	PAD	On ridge overlooking central dam
Not registered	BAYS PAD16	PAD	Adjacent to Pikes Creek
Not registered	BAYS PAD17	PAD	Adjacent to coal conveyor
Not registered	BAYS PAD18	PAD	Adjacent to coal conveyor

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AHIMS ID	Site Name	Site Type	Comment
Not registered	BAYS PAD19	PAD	Adjacent to coal conveyor

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Figure 17 Aboriginal sites recorded by Jacobs (2019)

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8.0 Archaeological Test Excavation

In total Jacobs (2019) identified 37 Aboriginal sites within the study area. Of these sites, Jacobs (2019) recommended archaeological test excavations be carried out in parts of 19 sites where areas of PAD were located with areas identified as having the potential to be impacted by the project. Sites recommended for archaeological test excavation are listed in Table 10 and shown on Figure 18.

8.1 Purpose, Sampling Strategy & Methods

A twelve-day program of archaeological test excavation was completed in September 2020. A copy of the Heritage NSW testing notification is provided in Appendix G. In accordance with Requirement 3.1 of the Code Practice, the overarching objective of the test excavation program was to collect information about the nature and extent of subsurface Aboriginal within identified PAD areas.

AECOM notes that a number of the PAD sites designated for test excavation by Jacobs (2019) comprise large areas incorporating landforms not typically considered archeologically sensitive in the Hunter Valley (e.g. steeply inclined upper slopes, midslopes etc.). In addition, some PAD boundaries encompassed areas that had been grossly disturbed from construction of the power station. As such, AECOM proposed an archaeological testing methodology tailored to assessed levels of subsurface archaeological potential within the identified PAD areas. Areas assessed by AECOM as having a high potential for subsurface archaeological deposit were subject to more intensive testing than those of lower potential.

A two phase program of excavation was completed with Phase 1 involving systematic testing of PAD areas located within the study area and Phase 2 involving the expansion of selected test pits containing high artefact densities (i.e., on a site-based scale) and/or archaeological features such as hearths. As part of Phase 1, 229 50 x 50 cm (0.25 m²) test pits were excavated across the 19 PAD areas. In accordance with Requirement 16(a) of the Code of Practice, all Phase 1 test pits were placed on a systematic grid appropriate to their respective archaeological potential (i.e., 30 m intervals for high potential, 50 m intervals for moderate potential and 100 m for low potential) and were hand excavated as 50 x 50 cm units (0.25 m²). It is noted that multiple Endangered Environmental Communities (EEC) areas are located across the Bayswater site and in many of the PAD areas and test excavation was not permitted in these areas resulting the removal of proposed test pits.

Phase 2 of the test excavation program involved small expansions (0.75 m²) around 17 Phase 1 test pits (Table 11) bringing the total to 1 m² at these locations. These were selected for expansion as they represented pits with high counts of identified lithics. The purpose of extensions at these test pits were to better characterise the nature and extent of the subsurface archaeological deposit in these areas and provide a larger comparative dataset.

Clause 5(ii) of Requirement 16a of the Code of Practice stipulates that the maximum surface area of all test excavation units must be no greater than 0.5% of the area - either PAD or site - being investigated. The test excavation program carried out for the current investigation was executed in compliance with this clause, with the combined surface area of excavated Phase 1 and 2 test pits within each sampled site constituting less than 0.5 per cent of its total surface area.

In accordance with the Code of Practice, all test pits were hand excavated as 50 x 50 cm units, with 5 cm spits employed during the excavation of the first Phase 1 test pit (TP#1) and 10 cm spits thereafter. In accordance with the Code of Practice Requirement 16a (point 8) all excavated sediment was sieved through a 5 mm aperture wire-mesh sieve. Due to silty nature of the soils, a combination of wet and dry sieving was deemed appropriate for the program of test excavation.

Requirement 16a (9) of the Code of Practice states that test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units and must continue to confirm the soils below are culturally sterile. In accordance with these requirements, all test pits were excavated to the base of the Aboriginal object bearing units at a minimum and partially into the clay subsoils (B horizons) in order to define the subsoils and test for sterility.

All definite and potential cultural lithic items were collected at the sieves and bagged by square and spit. In order to guide Phase 2 testing, total artefact counts for each Phase 1 test pit were made and recorded at the sieves by the applicable supervising archaeologist.

Section drawings and photographs were taken for all Phase 1 test pits and Phase 2 open plan excavations with test pit stratigraphy recorded on an digital logging program Fulcrum using standard sedimentological terms and criteria (after McDonald & Isbell 2009). All pits were backfilled after excavation.

RAP representatives participated in the excavation and were present each day. Table 12 lists the RAP group and representative who participated in the excavation.

Table 10 Sites requiring test excavation

Site Name/ID	AHIMS ID	No. of Test Pits	No. of Expansions (1m²)
37-2-0555	P8;Plashett	3	2
37-2-0556	P9;Plashett	4	2
37-2-0558	P11;Plashett	3	0
BAYS AS and PAD02	37-2-6134	10	1
BAYS AS and PAD03	37-2-6147	3	0
BAYS AS and PAD05	37-2-6141	31	3
BAYS AS and PAD07	37-2-6144	10	0
BAYS AS and PAD10	37-2-6142	4	0
BAYS AS and PAD11	37-2-6143	26	0
BAYS AS and PAD15	37-2-6135	14	3
BAYS PAD01	Not registered	19	0
BAYS PAD08	Not registered	7	0
BAYS PAD12	Not registered	6	0
BAYS PAD13	Not registered	12	0
BAYS PAD14	Not registered	15	1
BAYS PAD16	Not registered	41	5
BAYS PAD17	Not registered	5	0
BAYS PAD18	Not registered	5	0
BAYS PAD19	Not registered	11	0
Total		229	17

Table 11 Phase 2 test pits

Phase 1 Test Pit	Expansion	Total Excavation	Site
44	0.75 m²	1 m²	BAYS PAD16
47	0.75 m²	1 m²	BAYS PAD16
48	0.75 m²	1 m²	BAYS PAD16
56	0.75 m²	1 m²	BAYS PAD16
59	0.75 m²	1 m²	BAYS PAD16
119	0.75 m²	1 m²	BAYS PAD14
132	0.75 m²	1 m²	BAYS AS and PAD15
134	0.75 m²	1 m²	BAYS AS and PAD15

Phase 1 Test Pit	Expansion	Total Excavation	Site
135	0.75 m²	1 m²	BAYS AS and PAD15
229	0.75 m²	1 m²	BAYS AS and PAD05
234	0.75 m²	1 m²	BAYS AS and PAD05
241	0.75 m²	1 m²	37-2-0556
245	0.75 m²	1 m²	BAYS AS and PAD02
281	0.75 m²	1 m²	37-2-0556
283	0.75 m²	1 m²	37-2-0555
284	0.75 m²	1 m²	37-2-0555
285	0.75 m²	1 m²	BAYS AS and PAD05

Table 12 RAP participation in the test excavation

Organisation	Representative
Didge Ngunawal Clan	Paul Boyd
Aboriginal Native Title Elders Consultants	Christine Archibald
Ungooroo Aboriginal Corporation	Allen Paget
Tocomwall Pty Ltd/ Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People (PCWP)	Mary Franks
AGA Services	Ashley Sampson
Cacatua Culture Consultants	George Sampson
Murra Bidgee Mullangari	Ryan Johnson
Muragadi	Shaun Carrol
A1 Indigenous Services	Steven Hickey

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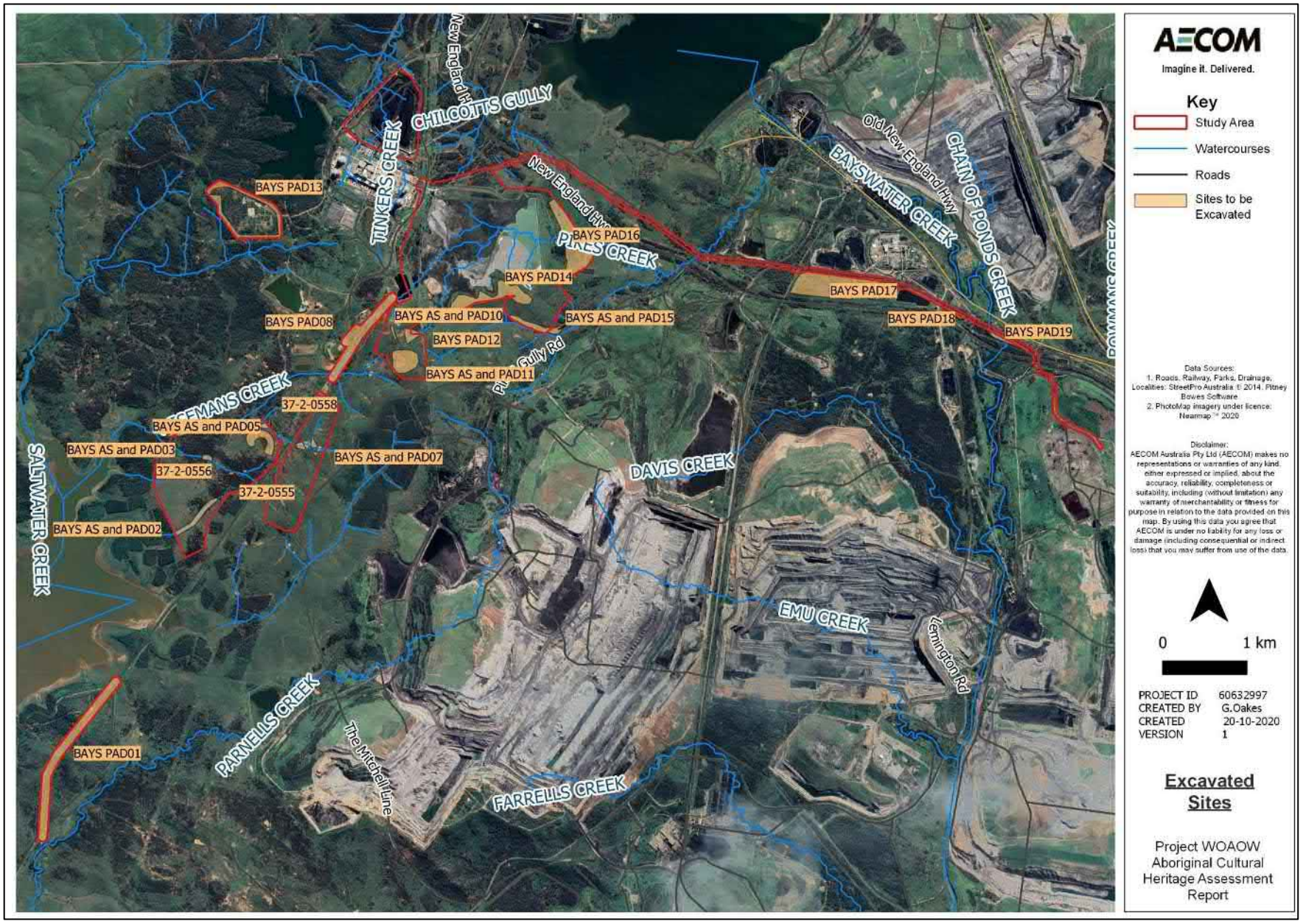
Figure 18 Excavated sites



8.2 Lithic Analysis Methodology

All flaked stone artefacts recovered as a result of the test excavation program were subject to macroscopic attribute analysis, with the number of attributes recorded per specimen differing by technological type. Heat shatters were also subject to macroscopic attribute analysis but were not counted as artefacts. Following Hiscock (2005), recovered lithic items were only accepted as artefacts if they possessed one or more of the following diagnostic attributes of stone flaking:

- A striking platform
- Signs of an external initiation to the fracture surface, namely a ring crack or cone of force
- A bulb of force on the ventral surface of a flake
- A termination to the conchoidal fracture plane
- One or more negative flake scars

Attributes recorded for the current lithic analysis are listed and defined in Table 13. Utilised artefact and non-artefact types, meanwhile, are listed and defined in Table 13.

Table 13 Attributes recorded during lithic analysis

Attribute	Definition	Recorded for
Technological Type	Technological type, as per Table 14	All lithic items
Raw material	Lithic raw material (e.g., silcrete, silicified tuff, chert, quartz, FGS)	All lithic items
Weight	Weight to nearest 0.01 gram, measured using an electronic scale	All lithic items
Maximum Linear Dimension (MLD)	Maximum linear dimension of artefact in millimetres	All lithic items
Cortex	Presence/absence of cortical surfaces	All lithic items
Colour	Primary/secondary colour of lithic item (e.g., red, red/grey, yellow, yellow/red)	All lithic items
Lustre	Presence/absence of lustrous flaked surfaces	All lithic items
Thermal damage	Presence/absence of evidence of thermal damage (e.g., potlid scars; crenated surface(s) and/or fracture(s); crazing)	All lithic items
Flake length (mm)	Distance between the point of percussion and the furthest distal point of the flake (ie, length to the most distal point) (after Holdaway and Stern 2004: 138).	All complete flakes
Flake width (mm)	Longest line that can be drawn at right angles to the length dimension (ie, maximum width) (after Holdaway and Stern 2004: 139).	All complete flakes
Flake thickness (mm)	Maximum distance from dorsal to ventral face (ie, maximum thickness) (after Holdaway and Stern 2004: 140).	All complete flakes
Platform surface	Nature of the platform surface on complete and proximal flakes: 1) Single scar; 2) Multiple scar; 3) Punctiform; 4) Crenated; 5) Cortical; and 6) Collapsed / crushed	All complete and proximal flakes
Platform width (mm)	Maximum distance between the two lateral margins of a flake, measured across the platform surface.	All complete and proximal flakes

Attribute	Definition	Recorded for
Platform thickness (mm)	Maximum distance between the ventral and dorsal surfaces of a flake.	All complete and proximal flakes
Dorsal cortex	Amount of cortex on dorsal surface of flake: 1) None; 2) 1-25%; 3) 26-50%; 4) 51-75%; 76-99%; and 5) 100%.	All complete flakes
Dorsal Flake Scar Orientation	Direction of scars on dorsal surface of flake: 1) 90 degrees; 2) Irregular; 3) Parallel; 4) Opposed; and 5) Indeterminate	All complete flakes
Flake termination	Shape of the distal end of complete flakes: 1) Feather; 2) Hinge; 3) Step; 4) Plunging; and 5) Abrupt.	All complete flakes
Core flaking pattern	Pattern of flake removals evident on core, after White (1999): 1) Unifacial; 2) Bifacial; 3) Asymmetric Alternating; and 4) Bipolar	All cores
Core length (mm)	Maximum linear dimension of core	All cores
Core width (mm)	Width at mid-point of maximum dimension	All cores
Core thickness (mm)	Thickness at mid-point of maximum dimension	All cores
Core blank	Stone package on which the core was made: 1) Pebble / Cobble, 2) Flake; 3) Heat shatter; and 4) Indeterminate.	All cores
Cortex (core)	Amount of cortex remaining on core at discard: 1) None; 2) 1-25%; 3) 26-51%; 4) 51-75%; and 5) 76-99%	All cores
Number of striking platforms	Number of striking platforms preserved on core at discard	All cores
Number of removals	Number of complete and partial flake scars (>5 mm) preserved on core.	All cores
Core scars	Length and width of all complete core scars >5 mm in MLD	All cores
Longest flake scar	Length of longest complete flake scar preserved on core.	All cores
Aberrant terminations	Presence/absence of aberrant terminations on core	All cores
Raw material quality	Subjective assessment of raw material quality: 1) Good; 2) Average; and 3) poor	All cores
Backed artefact type	Backed artefact type: 1) Bondi point; 2) Geometric microlith; 3) Elouera; and 4) Indeterminate	All backed artefacts
Backed artefact state	Completeness: 1) Complete; and 2) Broken	All backed artefacts
Blank	Stone package on which the backed artefact was made	All backed artefacts
Completeness	Completeness, after AMBS (2000): 1) Complete; 2) Proximal (just tip missing, ≥75% of original); 3) Tip (distal broken point, ≤25% of original)); 4) Distal (larger than tip, 50-75% of original); 5) Butt (broken fragment including butt, <75% of original); 6) Medial (broken fragment lacking butt or distal tip)	All Bondi points

Attribute	Definition	Recorded for
Tool length (mm)	Maximum linear dimension of backed artefact, in mm.	All backed artefacts
Tool width (mm)	Maximum width of backed artefact, in mm.	All backed artefacts
Tool thickness (mm)	Maximum thickness of back artefact, in mm.	All backed artefacts
Platform type	Nature of the flake platform surface: 1) Single scar; 2) Multiple scar; 3) Faceted; 4) Punctiform; 5) Natural flaw; 6) Crenated; 7) Cortical; 8) Collapsed / crushed; 9) Backed; 10) Absent	All backed artefacts
Platform width	As per complete and proximal flakes (excluding backed platforms)	All backed artefacts
Platform thickness	As per complete and proximal flakes (excluding backed platforms)	All backed artefacts
Backing direction	Direction of backing scars: 1) Unidirectional; and 2) Bidirectional	All backed artefacts
Chord length (mm)	Length of the chord	All complete backed artefacts
Backed edge angle	Backed edge angle, taken by hand at three evenly spaced locations along the longest backed edge using a goniometer	All backed artefacts
Unretouched edge angle	Unretouched edge angle, taken by hand at three evenly spaced locations along the chord using a goniometer	All backed artefacts
Chord damage / wear	Edge-damage and/or wear: 1) No macroscopic edge damage/wear; 2) Unifacial edge damage; 3)Bifacial edge damage; 4) Edge rounding; 5) [4] with [2] or [3]	All backed artefacts
Backing extent	Extent of backing along margin: 1) complete; 2) proximal; 3) medial/distal; and 4) distal	All backed artefacts
Orientation	Lateral margin selected for backing: 1) Right lateral margin; 2) Left lateral margin; 3) Indeterminate	All backed artefacts

Table 14 Artefact and non-artefact type definitions

Type	Definition	Reference
Complete flake	A flake that has a striking platform or impact point, lateral margins, a termination and a ventral surface that preserves a compete fracture plane	Holdaway and Stern (2004: 111)
Proximal flake	Broken flake that lacks termination but retains one or more of the following: platform and/or impact point, bulb of percussion, bulbar scar, fissures.	Holdaway and Stern (2004: 111)
Split flake	Flake that has been split longitudinally. Split flakes retain portions of platforms and/or impact points and have identifiable terminations.	Holdaway and Stern (2004: 111)
Redirecting flake	Complete or proximal flake whose dorsal surface preserves an old platform edge	Attenbrow (2010: 207)
Flake shatter fragment	Flake fragment with no recognizable striking platform or impact point	Andrefsky (2005: 83)

Type	Definition	Reference
Angular shatter fragment	Non-flake debitage item analogous to Hiscock's (1986) 'Flaked piece'	Andrefsky (2005: 84)
Heat shatter	Thermally affected lithic item lacking readily distinguishable diagnostic flaking attributes	This report
Unidirectional core	Core with scars originating from a single platform.	Holdaway and Stern (2004: 180)
Multidirectional core	Core with scars originating from two or more platforms.	Holdaway and Stern (2004: 180)
Bondi point	Flake, broken flake or flake fragment that has been backed along one lateral margin and comes to a point at its distal end. Bondi points are asymmetrical around their longitudinal axes.	Holdaway and Stern (2004: 261)
Elouera	Backed artefact with a crescent-like form, reminiscent of an orange segment. Elouera are symmetrical around their transverse axes but asymmetrical around their longitudinal axes. Elouera have a maximum linear dimension greater than 30 mm.	Holdaway and Stern (2004: 264)

8.3 P8;Plashett (37-2-0555)

8.3.1 Site Description

P8;Plashett is located on a flat at the confluence of two 1st order ephemeral drainage lines that, combined, feed into Wisemans Creek 1.1 km to the west. The site occupies an area of approximately 0.3 ha. Vegetation within and immediately surrounding P8;Plashett consists principally of bull oak grassy woodland. For the most part, land within the mapped boundary of the site retains a moderate degree of integrity, having been cleared historically for grazing but not subject to severe disturbance. However, land directly adjacent to the drainage channel has been subject to severe historical and ongoing erosion. Reference to the report associated with P8;Plashett (i.e., Koettig 1992) indicates that at the time of recording in 1992 the site comprised four surface artefacts.

8.3.2 Phase 1 Testing

Phase 1 testing at P8;Plashett involved the excavation of three 0.25 m² test pits across the entirety of the site, with test pits placed in areas not disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 15. Test pit locations are shown on Figure 19.

Table 15 P8;Plashett Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
239	305580	6410433	Flat	Gently inclined	10	10	0
283	305610	6410403	Flat	Level	13	13	1
284	605613	6410382	Flat	Gently inclined	16	16	0

8.3.3 Phase 2 Testing

Phase 2 testing at P8;Plashett involved the excavation of three additional test pits (B, C and D) adjacent to test pit 283 expanding it to 1m² (Plate 3). Summary information on Phase 2 test pits is provided in Table 16.

Table 16 P8;Plashett Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
283B	Flat	Level	13	13	3
283C	Flat	Level	13	13	1
284D	Flat	Level	13	13	0

8.3.4 Soils, Stratigraphy and Disturbance

Test pit depths within P8;Plashett varied from 10 to 16 centimetres in depth, with an average depth of 13 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying light brown clay subsoils. Roots were common throughout all A horizons with boundaries between A and B horizons generally between 5-20 mm. All three test pits were located on flats directly adjacent to the watercourse.

8.3.5 Aboriginal Objects

8.3.6 Artefact Distribution

A total of seven Aboriginal objects, all of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across P8;Plashett. Three came from Phase 1 test pits TP283 (n = 2) and one from TP284 (n = 1), with a further four recovered from Phase 2 expansion squares adjacent to TP283. Of the three Phase 2 expansion squares excavated around TP283, two - TP283B and TP283C - contained artefacts, with individual square totals of three artefacts and one artefact respectively.

Artefacts recovered as a result of subsurface testing across P8;Plashett provide a mean overall artefact density of 4.7 artefacts per m^2. With one exception, recovered from Spit 2 (10-20 cm) in TP283C, all artefacts occurred in Spit 1 (0-10 cm).

8.3.7 Assemblage composition

Artefacts recovered from P8;Plashett consist almost exclusively of flake debitage items (n = 6) (Table 19). No formed objects (i.e., cores or retouched implements) are present. Recovered flake debitage items consist of two proximal flakes, one complete flake and a three flake shatter fragments. A single angular shatter fragment is also present. Three raw materials are represented: silcrete (n = 3), silicified tuff (n = 3) and quartz (n = 1), with silcrete and silicified tuff co-dominant (Table 20).

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Table 17 P8;Plashett: typological breakdown of excavated lithic assemblage

Test pit	Phase	Technological type				Total	% Total
		Complete flake	Proximal flake	Flake shatter	Angular shatter		
283	1	-	1	1	-	**2**	**28.6**
283B	2	1	1	1	-	**3**	**42.8**
283C	2	-	-	-	1	**1**	**14.3**
284	1	-	-	1	-	**1**	**14.3**
Total	**-**	**1**	**2**	**3**	**1**	**7**	**100**

Table 18 P8;Plashett: lithic raw materials

Test pit	Phase	Raw material			Total	% Total
		Silcrete	S.tuff	Quartz		
283		1	1	-	**2**	**28.6**
283B		1	1	1	**3**	**42.8**
283C		1	-	-	**1**	**14.3**
284		-	1	-	**1**	**14.3**
Total	**-**	**3**	**3**	**1**	**7**	**100**

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Figure 19 P8;Plashett Phase 1 test pits

Plate 3 P8;Plashett Phase 2 test pit (283)

8.4 P9;Plashett (37-2-0556)

8.4.1 Site Description

P9;Plashett is located on a flat adjacent to a 1st order ephemeral drainage lines that feeds into Wisemans Creek 1 km to the west. The site occupies an area of approximately 0.2 ha. Vegetation within and immediately surrounding P8;Plashett consists principally of bull oak grassy woodland. For the most part, land within the mapped boundary of the site retains a moderate degree of integrity, having been cleared historically for grazing but not subject to severe disturbance. However, land directly adjacent to the drainage channel has been subject to severe historical and ongoing erosion. Reference to the report associated with P9;Plashett (i.e., Koettig 1992) indicates that at the time of recording in 1992 the site comprised five surface artefacts.

8.4.2 Phase 1 Testing

Phase 1 testing at P9;Plashett involved the excavation of four 0.25 m² test pits across the entirety of the site with test pits placed in areas not disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 19. Test pit locations are shown on Figure 20.

Table 19 P9;Plashett Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
240	305410	6410407	Middle	Very gently inclined	22	22	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
241	305431	6410403	Middle	Level	15	15	4
281	305412	6410424	Middle	Very gently inclined	19	19	5
282	305452	6410397	Middle	Level	10	10	0

8.4.3 Phase 2 Testing

Phase 2 testing at P9;Plashett involved the excavation of three additional test pits (B, C and D) adjacent to Phase 1 test pits 241 and 281 expanding them to 1m^2 (Plate 4). Summary information on Phase 2 test pits is provided in Table 20.

Table 20 P9;Plashett Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
241B	Flat	Level	15	15	6
241C	Flat	Level	15	15	7
241D	Flat	Level	15	15	0
281B	Flat	Level	19	19	1
281C	Flat	Level	19	19	0
281D	Flat	Level	19	19	1

8.4.4 Soils, Stratigraphy and Disturbance

Test pit depths within P9;Plashett varied from 10 to 22 centimetres in depth with an average depth of 16.5 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying light brown clay subsoils. Roots were common throughout all A horizons with boundaries between A and B horizons generally between 5-20 mm. All four test pits were located adjacent to the southern side of the watercourse.

8.4.5 Aboriginal Objects

8.4.6 Artefact Distribution

A total of 24 Aboriginal objects, all of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across P9;Plashett. Of these, seventeen (85%) came from Phase 1 test pit TP241 and its adjoining Phase 2 expansion squares, located in the central portion of the site, on the southern bank of an unnamed 2nd order tributary of Wisemans Creek. The remaining seven artefacts came from Phase 1 test pit TP281 and its adjoining expansion squares, located on the same landform element, approximately 24 metres north-northwest of TP241.

Artefacts recovered as a result of subsurface testing across P9;Plashett provide a mean overall artefact density of 10.7 artefacts per m^2. Vertical distribution data indicate comparable artefact numbers for Spits 1 (n = 11, 45.8%) and 2 (n = 13, 54.2%), with artefacts slightly more common in Spit 2.

8.4.7 Assemblage composition

A typological breakdown of the combined lithic assemblage (Table 21) from P9;Plashett shows that it is dominated by flake debitage items (n = 18, 75%), with non-flake debitage items comparatively poorly represented (n = 5, 20.8%). Recovered flake debitage items include seven complete flakes, three proximal flakes, two split flakes, one redirecting flake and five flake shatter fragments. A single formed object, consisting of a multidirectional silcrete core, is also present. The core, which weighs

198.6 grams, has four striking platforms, retains 1-25% cortex and exhibits ten removals. The original blank appears to have been a water rolled cobble or cobble fragment. No evidence of heat treatment is apparent.

Silicified tuff is the dominant raw material (n = 15), accounting for 62.5% of the assemblage by count (Table 22). Silcrete is the second most common material (n = 7, 29.1%), followed by quartz (n = 2, 10%). Cortex is well represented (n = 9, 37.5%), with extant cortical surfaces indicating the exploitation of water rolled clasts. Of the seven silcrete items recovered, five (71.4%) appear have been heated.

Table 21 P9;Plashett: typological breakdown of excavated lithic assemblage

Test pit	Phase	Technological type							Total	Total %
		Complete flake	Proximal flake	Redirecting flake	Split flake	Flake shatter	Angular shatter	Multidirectional core		
241	1	-	-	-	1	2	-	1	4	**16.7**
241B	2	2	-	-	1	1	2	-	6	**25**
241C	2	3	2	-	-	1	1	-	7	**29.2**
281	1	2	1	1	-	-	1	-	5	**20.8**
281B	2	-	-	-	-	1		-	1	**4.2**
281D	2	-	-	-	-	-	1	-	1	**4.2**
Total	**-**	7	3	1	2	5	5	1	24	**100**

Table 22 P9;Plashett: lithic raw materials

Test pit	Phase	Raw material			Total	% Total
		Silcrete	S.tuff	Quartz		
241	1	2	2	-	4	**16.7**
241B	2	-	5	1	6	**25**
241C	2	1	5	1	7	**29.2**
281	1	3	2	-	5	**20.8**
281B	2	**-**	1	**-**	1	**4.2**
281D	2	1	**-**	**-**	1	**4.2**
Total	**-**	**7**	**15**	**2**	**24**	**100**

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Figure 20 P9;Plashett Phase 1 test pits

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Plate 4 P9;Plashett Phase 2 test pit 241

Plate 5 P9;Plashett Phase 2 test pit 281

8.5 P11;Plashett (37-2-0558)

8.5.1 Site Description

P11;Plashett is located on a flat with depression associated with a 2nd order tributary of Wisemans Creek. The site occupies an area of approximately 0.7 ha. Vegetation within and immediately surrounding P11;Plashett consists of narrow-leaved ironbark and grey box grassy woodland. Land within the mapped boundary of the site generally retains a poor degree of integrity, having been cleared historically for grazing, partially dammed and heavily eroded. The report associated with the site (i.e., Koettig 1992) does not provide an indication of the number of artefacts originally identified at the site.

8.5.2 Phase 1 Testing

Phase 1 testing at P11;Plashett involved the excavation of three 0.25 m² test pits across the entirety of the site with test pits placed in areas not disturbed by erosion or the dam. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 23. Test pit locations are shown on Figure 21.

Table 23 P9;Plashett Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
194	306212	6410749	Depression	Very gently inclined	12	12	0
196	306265	6410756	Flat	Very gently inclined	10	10	0
204	306242	6410700	Flat	Gently inclined	10	10	0

8.5.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.5.4 Soils, Stratigraphy and Disturbance

Test pit depths within P11;Plashett varied from 10 to 12 centimetres in depth with an average depth of 10.6 centimetres. Soil profiles varied across the site with test pits 194 and 196 missing A horizon soils and comprising reddish brown clays from the surface. Test pit 204 comprised a brown silty clay loam topsoils overlying brown clay subsoil. Roots were few throughout all A horizons. All three test pits were located adjacent to the watercourse.

8.5.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this site.

D R A F T

Figure 21 P11;Plashett Phase 1 test pits

8.6 BAYS AS and PAD02 (37-2-6134)

8.6.1 Site Description

Jacobs (2019) provide the following description of BAYS AS and PAD02:

Project component: Borrow pit 4

This site is a sparse scatter of artefacts associated with an ephemeral drainage line in the south of the Borrow pit 4 area. This ephemeral creek drains southwest into Plashett Reservoir. The valley the creek flows through is flat-floored, with low gradient slopes rising to the northwest and southeast. A farm dam has been constructed on the creek. The creekline is incised to a depth of 0.5-1m below the surrounding ground surface.

One stone artefact was found on this site. The artefact was on an erosional surface at the edge of the incised course of the ephemeral creek.

The ground adjacent to the creekline has the potential to contain subsurface artefacts in densities high enough to be detected through a program of test excavation. The regolith of the flat floor of the valley is likely to consist of old alluvial deposit and remnant pre-contact topsoil, although this topsoil might have been depleted through erosion in the post-contact period, and might have been substantially reworked and mixed with newer alluvium. The presence of the creek, and consequent availability of water and associated resources, and the presence of visible artefacts on the current ground surface, means there is a plausible possibility of subsurface artefacts being present in detectable numbers.

The potential for artefacts to be present in subsurface deposits within the area of PAD, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.6.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD02 involved the excavation of ten 0.25 m² test pits across the entirety of the site with test pits placed in areas not disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 24. Test pit locations are shown on Figure 22.

Table 24 BAYS AS and PAD02 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
242	305250	6410099	Upper	Gently inclined	15	15	0
243	305202	6410054	Upper	Very gently inclined	9	9	0
244	305150	6410017	Middle	Very gently inclined	13	13	0
245	305101	6409973	Middle	Gently inclined	9	9	1
246	305052	6409911	Middle	Gently inclined	41	41	0
247	304998	6409851	Middle	Very gently inclined	22	22	0
248	304951	6409805	Middle	Very gently inclined	36	36	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
249	304901	6409759	Middle	Very gently inclined	30	30	0
250	304849	6409727	Middle	Very gently inclined	24	24	0
251	304798	6409702	Middle	Very gently inclined	17	17	0

8.6.3 Phase 2 Testing

Phase 2 testing at BAYS AS and PAD02 involved the excavation of three additional test pits (B, C and D) adjacent to test pit 245 expanding it to 1 m^2 (Plate 6). Summary information on Phase 2 test pits is provided in Table 25.

Table 25 BAYS AS and PAD02 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
245B	Mid slope	Gently inclined	9	9	1
245C	Mid slope	Gently inclined	9	9	0
245D	Mid slope	Gently inclined	9	9	0

8.6.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD02 varied from 9 to 41 centimetres in depth with an average depth of 21.6 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying red brown silty clay subsoils. Roots were common throughout all A horizons with boundaries between A and B horizons generally between 50-100 mm. All ten test pits were located adjacent to the southern side of the watercourse.

8.6.5 Aboriginal Objects

8.6.6 Artefact Distribution

Two Aboriginal objects, both of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS AS and PAD02. One was recovered from Phase 1 test pit TP245, located in the northern portion of the site, while the other came from a Phase 2 expansion square adjoining this pit (i.e., TP245B). No other Phase 1 pits yielded artefacts.

Artefacts recovered as a result of subsurface testing across BAYS AS and PAD02 provide a mean overall artefact density of 0.62 artefacts per m^2. Both artefacts were recovered from the top 10 cm of excavated deposit in their respective squares (i.e, Spit 1).

8.6.7 Assemblage Composition

The two artefacts recovered from this site consist of complete silicified tuff flakes, likely struck from the same core. Neither retains any cortex. That from Phase 1 test pit TP245 measures 18.3 (l) x 15.3 (w) x 4.6 (th) mm, weighs 1.2 grams, has a punctiform platform with no associated overhang removal and exhibits a hinge termination. That from Phase 2 expansion square TP245B measures 23 (l) x 22.7 (w) x 11.8 (th) mm, weighs 2.6 grams, has a single scar platform with no associated overhang removal and exhibits a feather termination.

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Figure 22 BAYS AS and PAD02 Phase 1 test pits

D R A F T

Plate 6 BAYS AS and PAD02 Phase 2 test pit 245

8.7 BAYS AS and PAD03 (37-2-6147)

8.7.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD03:

> Project component: Borrow pit 4
>
> This site is a scatter of surface artefacts clustered around an incised ephemeral creek. The artefacts are lying on flat areas of ground immediately adjacent to the creek, which has been downcut by 0.5 – 1 m. Artefacts were found in eroded exposures within this flat area of ground, most of which is thickly grassed and retains topsoil.
>
> The creek follows a slightly meandering course through a flat-floored valley, and retains some visible signs of ephemeral ponds. It is probable that prior to European land-clearing, this creek consisted of a chain of ponds and swampy areas.
>
> Eight artefacts were recorded, seven of which are unretouched flakes and one of which is a retouched flake. Silcrete is the most common material, with one artefact made from IMSTC. The pieces of silcrete are similar in grain size and general appearance, and it is possible these artefacts could be part of a knapping floor.
>
> The ground adjacent to the artefact scatter has the potential to contain subsurface artefacts in densities high enough to be detected through a program of test excavation. The regolith of the flat floor of the valley is likely to consist of old alluvial deposit and remnant pre-contact topsoil, although this topsoil might have been depleted through erosion in the post-contact period, and might have been substantially reworked and mixed with newer alluvium. The presence of a moderately dense surface scatter of artefacts in area of eroded ground within this landform

makes it likely that a subsurface assemblage of similar density extends through the adjacent ground.

The potential for artefacts to be present in subsurface deposits within the area of PAD, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.7.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD03 involved the excavation of three 0.25 m² test pits across the entirety of the site with test pits placed in areas not disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 26. Test pit locations are shown on Figure 23.

Table 26 BAYS AS and PAD03 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
238	305152	6410597	Lower	Level	58	58	0
279	305101	6410619	Lower	Very gently inclined	10	10	0
280	305162	6410572	Lower	Very gently inclined	16	16	1

8.7.3 Phase 2 Testing

Phase 2 testing at BAYS AS and PAD03 involved the excavation of three additional test pits (B, C and D) adjacent to test pit 280 expanding it to 1 m² (Plate 7). Summary information on Phase 2 test pits is provided in Table 27.

Table 27 BAYS AS and PAD2 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
280B	Middle slope	Gently inclined	9	9	0
280C	Middle slope	Gently inclined	9	9	0
280D	Middle slope	Gently inclined	9	9	1

8.7.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD03 varied from 10 to 58 centimetres in depth with an average depth of 28 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying orange clay subsoils. Roots were common throughout all A horizons with boundaries between A and B horizons generally between 20-50 mm. All three test pits were located adjacent to the northern side of the watercourse.

8.7.5 Aboriginal Objects

8.7.6 Artefact Distribution

Five Aboriginal objects, all of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS AS and PAD03. Four came from Phase 1 test pit TP280, located in the eastern portion of the site, adjacent to an unnamed 2nd order tributary of Wisemans Creek, while the fifth came from a Phase 2 expansion square adjoining this pit (i.e., TP280D). No other Phase 1 pits yielded artefacts.

Artefacts recovered as a result of subsurface testing across BAYS AS and PAD03 provide a mean overall artefact density of 3.3 artefacts per m^2. Three artefacts were recovered from Spit 1 (0-10 cm) and two from Spit 2 (10-20 cm).

8.7.7 Assemblage Composition

The five artefacts recovered from this site consist of a multidirectional silcrete core, a proximal silcrete flake, a complete silcrete flake and two silicified tuff angular shatter fragments.

The complete flake, which appears to have struck from a heat treated core, measures 18.4 (l) x 25.9 (w) x 8.1 (th) mm, weighs 3.9 grams, has a single scar platform with no associated overhang removal and exhibits a step termination. The proximal flake, which also appears to have struck from a heat treated core, weighs 0.32 gm, has a maximum linear dimension of 10.8 mm and exhibits a single scar platform with no associated overhang removal. Neither artefact retains cortex nor exhibits evidence of thermal damage.

The core, which weighs 28.8 grams, has two striking platforms, retains 1-25% cortex and exhibits seven removals. Original blank form cannot be determined. Differential gloss is apparent and consistent with heat treatment.

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Figure 23 BAYS AS and PAD03 Phase 1 test pits

D R A F T

Plate 7 BAYS AS and PAD03 Phase 2 test pit 280

8.8 BAYS AS and PAD05 (37-2-6141)

8.8.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD05:

Project component: Borrow pit 4

This site is a scatter of surface artefacts and an overlapping area of PAD. Artefacts occur on the upper, mid and lower slopes of a round-topped hill and extend downward to the banks of Wisemans Creek to the northwest. An area of PAD extends along the southern bank of Wisemans Creek (the northern bank lies outside the area of Borrow pit 4 and so was not assessed).

Wisemans Creek is a semi-permanent or permanent creek, and lies immediately adjacent to the site. The creek flows along a slightly incised meandering course, with areas of swampy ground and visible signs of ephemeral ponds associated with the current watercourse. It is probable that this creek consisted of a chain of ponds and swamps prior to European land clearing.

One hundred and thirty five surface artefacts were recorded. Most of these were unretouched flakes, with retouched flakes, flaked pieces, cores and hammers also present. IMSTC was the most common material, followed by silcrete, quartz, and quartzite.

The middle and upper slopes of the hill, on which most surface artefacts were found, is assessed as having low potential for artefacts to be present in subsurface deposits. This part of the site appears to have been heavily eroded following European contact, with thin or no topsoils present. Patches of remnant pre-European topsoil might survive in isolated areas across the hill, but identifying these would be difficult without an exhaustive program of archaeological excavation. It is likely that soils now present on the upper and mid slopes are reworked deposits of material

washed from further upslope. These soils are likely to be very thin. They could contain some artefactual material, but subsurface material is likely to be sparser than the surface assemblage, and consequently would be difficult to detect through a typical program of test excavation.

The lower slopes of the hill, and the adjacent banks of Wisemans Creek, by contrast, have a high potential to contain artefactual material. In these areas, the regolith is likely to be a complex layering or mixture of the precontact creek bank alluvium, pre-contact soil formation on this alluvium or on the lower slope subsoil, and more recent alluvial material from creek flood events, and recent colluvial material from downslope erosion of the slopes above.

Artefacts that were deposited in the pre-contact creek bank sediments or the pre-contact lower slope soils are likely to be present in the present subsurface sediments and soils as a result, having been buried under recent alluvial and colluvial deposit.

This possibility is strengthened by the finding, during this survey, of a number of artefacts on the surface in erosional surfaces immediately adjacent to the current creek line. These artefacts have probably eroded out of the current creek bank at times when the water level is higher and the creek banks are scoured back by flooding. Intact areas of creek bank are therefore likely to contain artefacts as well.

The potential for subsurface artefacts to be present in sufficiently high density to be detectable by test excavation is assessed as being moderate to high. The archaeological and cultural significance of this artefactual material is currently unknown.

8.8.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD05 involved the excavation of 32 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 28. Test pit locations are shown on Figure 24.

Table 28 BAYS AS and PAD05 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
208	305727	6410910	Lower slope	Gently inclined	10	10	0
209	305761	6410911	Lower slope	Moderately inclined	13	13	0
210	305788	6410910	Lower slope	Gently inclined	20	20	0
211	305670	6410876	Lower slope	Moderately inclined	15	15	0
212	305700	6410881	Lower slope	Moderately inclined	15	15	0
213	305728	6410878	Lower slope	Moderately inclined	16	16	0
214	305756	6410884	Lower slope	Moderately inclined	16	16	0
215	305792	6410881	Lower slope	Moderately inclined	15	15	0
218	305600	6410849	Lower slope	Gently inclined	18	18	0
219	305648	6410845	Mid slope	Moderately inclined	13	13	0
220	305705	6410851	Mid slope	Moderately inclined	19	19	1
221	305751	6410852	Mid slope	Moderately inclined	17	17	1

D R A F T

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
222	305799	6410846	Mid slope	Gently inclined	12	12	0
224	305597	6410798	Mid slope	Gently inclined	13	13	0
225	305653	6410806	Upper slope	Gently inclined	26	26	0
226	305700	6410798	Crest	Gently inclined	7	7	0
229	305649	6410748	Crest	Gently inclined	15	15	1
230	305699	6410749	Crest	Gently inclined	17	17	0
231	305847	6410755	Crest	Gently inclined	16	16	0
233	305853	6410709	Crest	Gently inclined	27	27	0
234	305903	6410700	Crest	Very gently inclined	26	26	1
235	305850	6410652	Crest	Very gently inclined	21	21	0
236	305898	6410652	Crest	Very gently inclined	19	19	0
285	305626	6410776	Upper slope	Gently inclined	10	10	1
286	305673	6410784	Upper slope	Gently inclined	8	8	0
287	305872	6410677	Crest	Very gently inclined	4	4	0
321	305797	6410960	Flat	Very gently inclined	18	18	1
322	305704	6410970	Flat	Gently inclined	6	6	0
323	305589	6410991	Flat	Level	10	10	0
324	305456	6410972	Flat	Very gently inclined	15	15	4
325	305263	6410879	Flat	Gently inclined	8	8	0
326	304866	6410880	Flat	Very gently inclined	25	25	0

8.8.3 Phase 2 Testing

Phase 2 testing at BAYS AS and PAD05 involved the excavation of three additional test pits (B, C and D) adjacent to test pits 220, 229, 234, 285 expanding them to 1 m^2 (Plate 8, Plate 9, Plate 10, and Plate 11. The remaining pits artefact bearing pits were not expanded due to time constraints. Summary information on Phase 2 test pits is provided in Table 29.

Table 29 BAYS AS and PAD5 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
220A	Mid slope	Moderately inclined	19	19	0
220B	Mid slope	Moderately inclined	19	19	0
220B	Mid slope	Moderately inclined	19	19	0
229A	Crest	Gently inclined	19	19	0
229B	Crest	Gently inclined	19	19	0
229B	Crest	Gently inclined	19	19	0
234A	Crest	Very gently inclined	26	26	0
234B	Crest	Very gently inclined	26	26	0
234B	Crest	Very gently inclined	26	26	0
285A	Upper slope	Gently inclined	10	10	0
285B	Upper slope	Gently inclined	10	10	0
285B	Upper slope	Gently inclined	10	10	0

8.8.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD05 varied from 4 to 28 centimetres in depth with an average depth of 53 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown grey silty loam topsoil overlying brown orange clay subsoils. Roots were common throughout all A horizons as were gravels. Boundaries between A and B horizons generally between 20-50 mm. Disturbance was minimal.

8.8.5 Aboriginal Objects

8.8.6 Artefact Distribution

A total of nine Aboriginal objects, eight of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS AS and PAD05. A single silcrete heat shatter was also recovered. Seven Phase 1 test pits (TPs 220, 221, 229, 234, 285, 321 and 324), three of which were expanded in Phase 2 (TPs 229, 234 and 285), yielded artefacts.

Artefact-bearing Phase 1 pits, as shown on Figure 24, were widely distributed across BAYS AS and PAD05, with TPs 220, 221, 229, 234 and 285 spread across the northern and eastern flanks of a locally prominent hill (178 m AHD) with views across adjoining creek valleys, and TPs 321 and 324 situated within two of these valleys proximate to Wisemans Creek (TP324) and an unnamed 2nd order tributary of same (TP321). Individual Phase 1 artefact counts across BAYS AS and PAD05 were

universally low, with all but one pit - TP324 adjacent to Wisemans Creek - yielding a single artefact each. TP324 contained three artefacts.

Artefacts recovered as a result of subsurface testing across BAYS AS and PAD05 provide a mean overall artefact density of 0.2 artefacts per m^2. Vertical distribution data, meanwhile, indicate a near even split between Spits 1 (0-10cm, n = 5) and 2 (10-20 cm, n = 4). All artefacts within TP324 were recovered from Spit 2.

8.8.7 Assemblage Composition

Excluding heat shatter, the combined BAYS AS and PAD05 assemblage consists exclusively of flake debitage, with recovered flake debitage items comprising four complete flakes, two proximal flakes and two flake shatter fragments (see Appendix H for details). Four raw materials are represented: silicified tuff (n = 4), silcrete (n = 3), Fine Grained Siliceous (FGS) (n = 1) and quartz (n = 1).

D R A F T

Figure 24 BAYS AS and PAD05 Phase 1 test pits

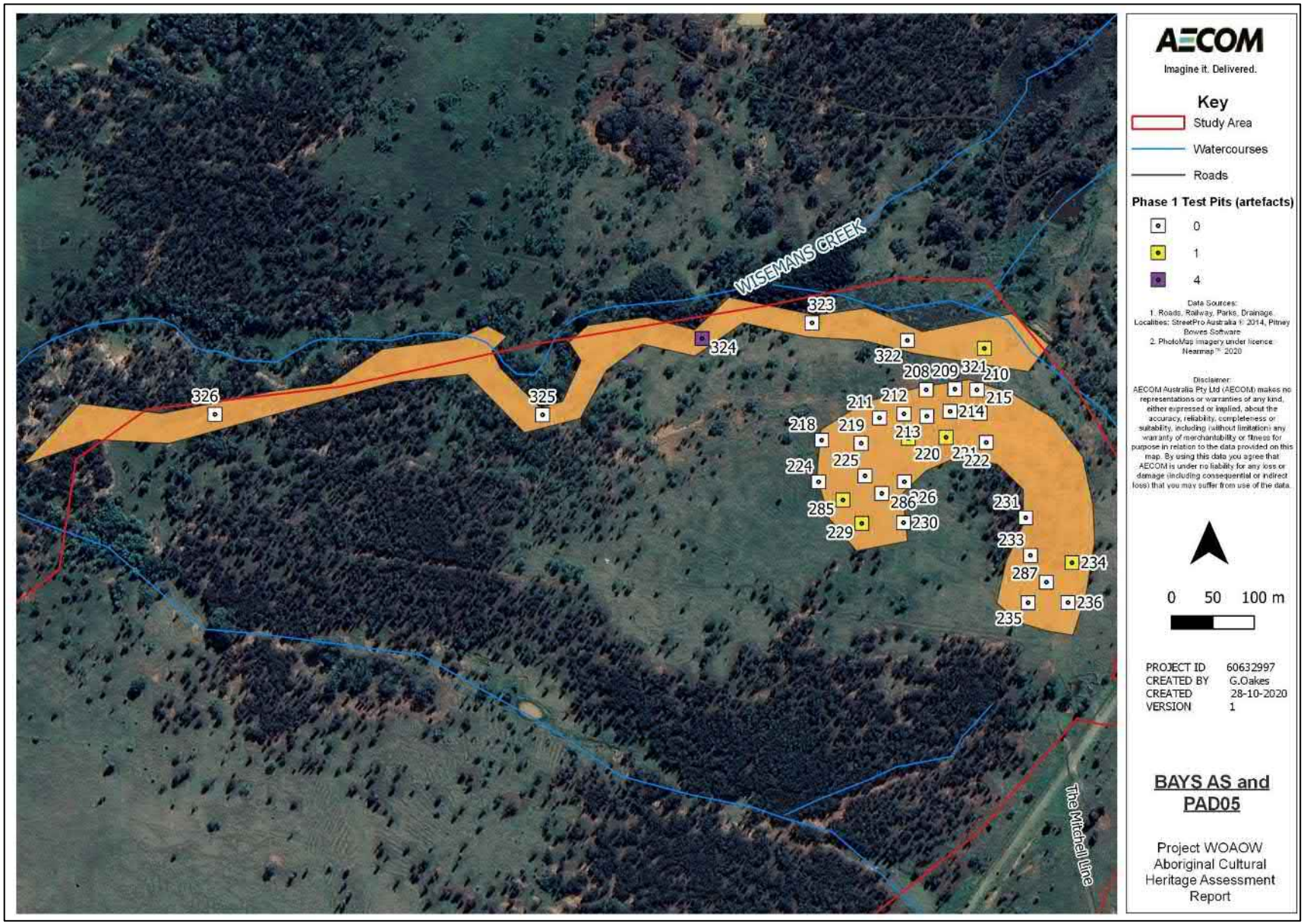

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Plate 8 BAYS AS and PAD05 Phase 2 test pit 220

Plate 9 BAYS AS and PAD05 Phase 2 test pit 229

D R A F T

Plate 10 BAYS AS and PAD05 Phase 2 test pit 234

Plate 11 BAYS AS and PAD05 Phase 2 test pit 285

D R A F T

8.9 BAYS AS and PAD07 (37-2-6144)

8.9.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD07:

Project component: Borrow pit 3

This site is an artefact scatter and associated PAD areas, located on the confluence of two ephemeral drainage lines. The surrounding landscape is rolling hills with rounded tops, which rise up to the north and east of the site. An ephemeral creek runs from east to west across the Borrow pit 3 area, on which two farm dams have been constructed. A second, smaller ephemeral drainage line runs from north to south, joining the first drainage line at the location of the larger and westernmost of the two dams.

The ground surface is generally covered in thick grass cover, with very sparse to no tree cover. In the two drainage lines, eroded exposures are common, some of which are downcut by 10 – 30 cm below the current ground surface. The ground surface lying between the two ephemeral creeklines, and to the south of the east-west creekline, is raised above the level of the drainage lines themselves, and is generally free of eroded areas.

Seventeen artefacts were recorded, all of which were found in erosional exposures adjacent to one or the other ephemeral creekline. The majority of these are unretouched flakes, with one core and one flaked piece also present. Silcrete is the most common material, with IMSTC also present.

The ground adjacent to the two ephemeral creeks has the potential to contain subsurface artefacts in densities high enough to be detected through a program of test excavation. The regolith of the flat floor of the valley is likely to consist of old alluvial deposit and remnant pre-contact topsoil, although this topsoil might have been depleted through erosion in the post-contact period, and might have been substantially reworked and mixed with newer alluvium. The raised areas of ground adjacent to the two creeklines could have retained remnant pre-contact soils and sediments, within which artefacts could be buried in their original context or a reworked context. The surface artefacts found during survey are lying in eroded areas, making it likely that a buried assemblage of artefacts is present in the raised areas of ground immediately adjacent, which have not been eroded and scoured by the flow of water down the two drainage lines. The presence of the creeks, and consequent availability of water and associated resources, and the presence of visible artefacts on the current ground surface, means there is a plausible possibility of subsurface artefacts being present in detectable numbers.

The potential for artefacts to be present in subsurface deposits within the area of PAD, at densities sufficiently high to enable detection through test excavation, is assessed as being high. The archaeological and cultural significance of subsurface material is unknown.

8.9.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD07 involved the excavation of ten 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 30. Test pit locations are shown on Figure 25.

Table 30 BAYS AS and PAD07 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
191	306420	6410848	Lower slope	Gently inclined	1	1	0
192	306390	6410816	Lower slope	Gently inclined	5	5	0
193	306390	6410790	Lower slope	Very gently inclined	10	10	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
197	306389	6410762	Lower slope	Very gently inclined	20	20	0
198	306419	6410764	Mid slope	Very gently inclined	12	12	0
202	306391	6410731	Mid slope	Very gently inclined	20	20	0
203	306420	6410732	Mid slope	Very gently inclined	13	13	0
206	306423	6410640	Mid slope	Gently inclined	2	2	0
207	306417	6410612	Mid slope	Gently inclined	12	12	0
327	306342	6410680	Lower slope	Very gently inclined	19	19	0

8.9.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.9.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD07 varied from 1 to 20 centimetres in depth with an average depth of 10.5 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying dark reddish brown clay subsoils. Roots were common throughout all A horizons with some gravels. Boundaries between A and B horizons generally between 20-50 mm. Topsoils were generally thin, likely having been removed through erosion.

8.9.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this site.

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Figure 25 BAYS AS and PAD07 Phase 1 test pits

D R A F T

8.10 BAYS AS and PAD10 (37-2-6142)

8.10.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD10:

Project component: Borrow pit 2

This site is a small scatter of artefacts in an eroded exposure on a high rounded hill top. The ground slopes away steeply to the north, and moderately steeply to the east and west. To the south the ground slopes gently to form an isolated ridgeline.

The ground surface in this area is vegetated with thick grass cover, with occasional areas of erosional exposure being randomly distributed. No tree cover is present.

Six artefacts were recorded, all of which are unretouched flakes made from IMSTC. The material from which all the artefacts are made is of similar colour and texture, and it is probable that this scatter is a knapping floor – an artefact scatter produced by flaking activities carried out on this location.

The potential for artefacts to be present in the subsurface deposits adjacent to the scatter is assessed as being moderate. The ground surrounding the eroded exposure that the artefacts are in retains topsoil and grass cover. The density of this scatter, and the fact that it is likely to be part of a knapping floor, makes it probable that additional artefacts from this scatter of knapping debris are present in the subsurface deposits in the surrounding ground.

The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.10.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD010 involved the excavation of four 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 50 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 31. Test pit locations are shown on Figure 26.

Table 31 BAYS AS and PAD10 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
154	307335	6412157	Crest	Very gently inclined	14	14	0
155	307343	6412110	Crest	Very gently inclined	12	12	0
159	307358	6412052	Crest	Very gently inclined	17	17	0
164	307379	6412004	Crest	Gently inclined	5	5	0

8.10.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.10.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD010 varied from 5 to 17 centimetres in depth with an average depth of 12 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying brown clay subsoils. Roots were common throughout all A horizons with some gravels. Boundaries between A and B horizons generally between 20-50 mm. Topsoils were generally thin, likely having been removed through erosion.

8.10.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this site.

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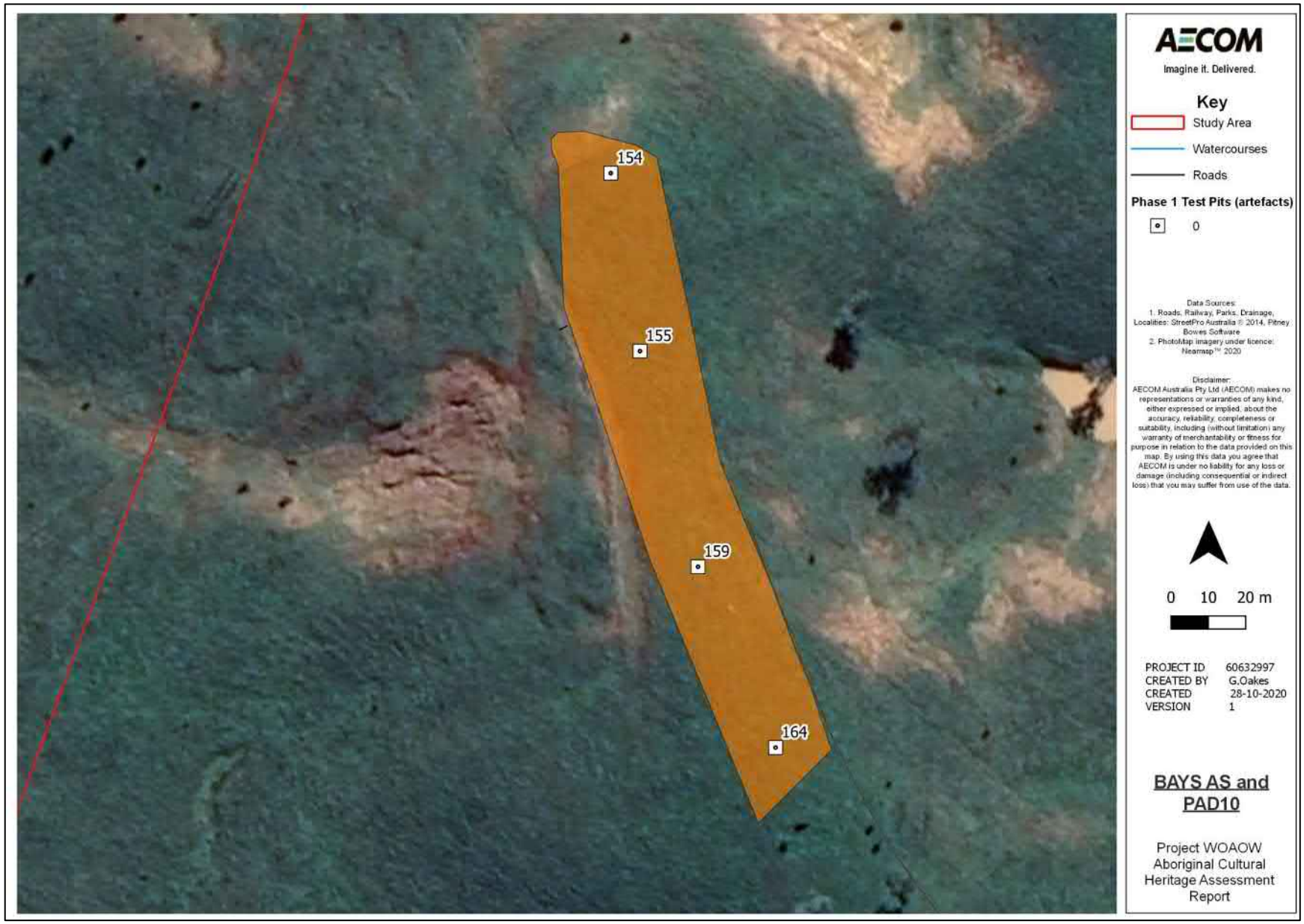
Figure 26 BAYS AS and PAD10 Phase 1 test pits



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8.11 BAYS AS and PAD11 (37-2-6143)

8.11.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD11:

Project component: Borrow pit 2

This site is a scatter of surface artefacts in an eroded exposure adjacent to a saddle on a north-south ridgeline. The ground rises up toward round topped hills to the north and south, and drop away to the east and west. Slopes to the east and west are moderate gradient, while slopes to the north and south are low gradient.

The ground surface is vegetated with thick grass cover, with no tree cover present. The regolith in the area is topsoil, which could be remnant pre-contact soil or a secondary post-contact soil. Exposed sections in downcut erosional areas indicate that the topsoil is around 5 cm thick.

Twenty-seven artefacts were recorded, all of which are located in a heavily eroded area on the upper slope at the western edge of the saddle. This eroded area has eroded down to a depth of around 20 cm lower than the ground surface upslope. The eroded area is sheet wash erosion that is gradually working its way upslope, incising and downcutting the ground surface as it progresses uphill. The majority of artefacts are unretouched flakes, with cores, a flaked piece and a retouched flake also present. IMSTC is the most common material, followed by silcrete and quartz.

Also present in the erosional area is a semi-circular formation of angular cobbles, each around 10-20 cm in diameter. The semi-circular formation seems to extend into the currently uneroded area of ground at the upper edge of the erosional exposure. Within the semicircle, the clay-rich sediments are reddened and have probably been heated. This feature is a probable Aboriginal hearth.

There is a potential for artefacts to be present in subsurface deposits in the areas surrounding the erosional exposure, and to be present in densities high enough to be detected through test excavations. The scatter of artefacts present in the erosional exposure have probably eroded out of the soil as it has been washed downslope, and remain on the erosional surface as a lag deposit. This being the case, there is a likelihood that an assemblage of subsurface artefacts is present in the adjacent ground, which has not experienced the same severe level of erosion. The density of artefacts present in the eroded area makes it likely that a similarly dense scatter of artefacts are present in adjacent subsurface deposits.

The potential for artefacts to be present in subsurface deposits within the area of PAD, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.11.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD11 involved the excavation of 26 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 32. Test pit locations are shown on Figure 27.

Table 32 BAYS AS and PAD05 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
166	307410	6411806	Mid slope	Moderately inclined	12	12	0
167	307501	6411799	Crest	Gently inclined	9	9	0
168	307600	6411798	Upper slope	Moderately inclined	29	29	0
169	307468	6411778	Upper slope	Gently inclined	9	9	1

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
170	307502	6411780	Crest	Gently inclined	7	7	0
171	307534	6411777	Upper slope	Gently inclined	16	16	0
172	307468	6411751	Upper slope	Gently inclined	15	15	0
173	307505	6411753	Crest	Gently inclined	18	18	0
174	307535	6411755	Upper slope	Gently inclined	26	26	0
175	307476	6411722	Crest	Gently inclined	17	17	0
176	307499	6411720	Crest	Gently inclined	7	7	0
177	307532	6411721	Crest	Gently inclined	17	17	0
178	307401	6411699	Mid slope	Moderately inclined	11	11	0
179	307472	6411692	Crest		14	14	0
180	307504	6411690	Crest	Level	15	15	0
181	307530	6411692	Crest	Gently inclined	19	19	0
182	307604	6411706	Mid slope	Gently inclined	19	19	0
183	307472	6411661	Crest	Gently inclined	9	9	0
184	307501	6411659	Crest	Level	11	11	0
185	307532	6411664	Crest	Gently inclined	22	22	0
186	307472	6411631	Crest	Gently inclined	10	10	0
187	307501	6411630	Crest	Level	12	12	0
188	307529	6411631	Crest	Very gently inclined	13	13	0
189	307396	6411600	Mid slope	Moderately inclined	8	8	0
190	307498	6411600	Crest	Level	11	11	0
Potential Hearth	307471	6411754	Crest	Gently inclined	32	32	0

8.11.3 Phase 2 Testing

No Phase 2 testing was completed.

8.11.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD11 varied from 7 to 32 centimetres in depth with an average depth of 14.9 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying brown orange clay subsoils. Roots were common throughout. Boundaries between A and B horizons generally between 20-50 mm. Topsoils were generally thin, likely having been removed through erosion. A potential hearth identified by Jacobs (2019) was excavated with no charcoal, artefacts or burnt features identified.

8.11.5 Aboriginal Objects

A single Aboriginal object, consisting of a unidirectional silicified tuff core, was recovered as a result of subsurface testing across BAYS AS and PAD11. The artefact was recovered from Spit 1 (0-10 cm) in Phase 1 test pit TP169, located in the north-central portion of the site. The core, manufactured on a large flake with 26-50% water rolled dorsal cortex, measures 76.9 (l) x 67 (w) x 32.7 (Th) mm and exhibits a single flake removal with a length of 46.3 mm. Raw material quality is good. No heat damage is evident.

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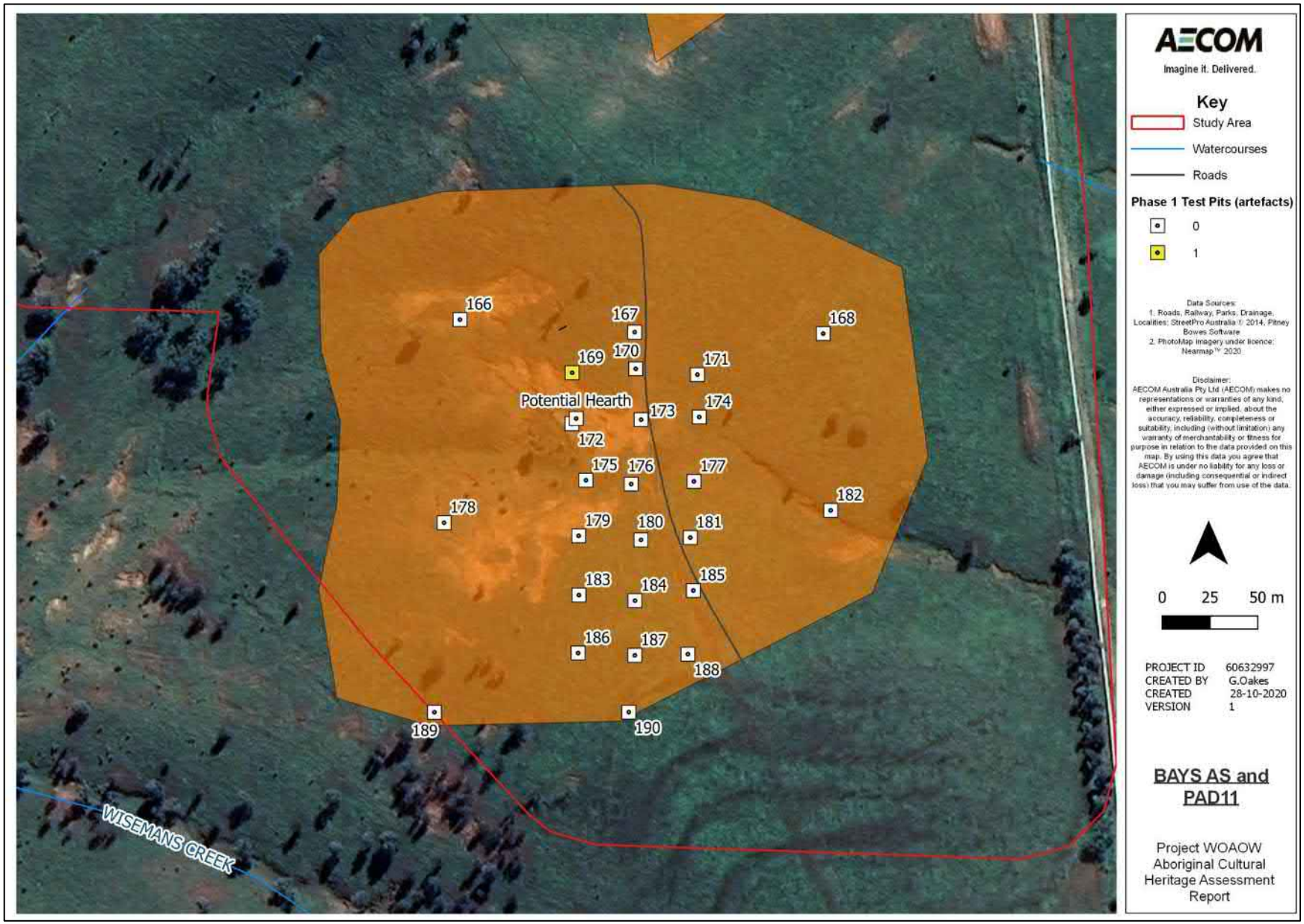
Figure 27 BAYS AS and PAD11 Phase 1 test pits



8.12 BAYS AS and PAD15 (37-2-6135)

8.12.1 Site Description

Jacobs (2019) provide the following description of BAY AS and PAD15:

Project component: Borrow pit 1

This site is an artefact scatter and associated PAD on the bank of a creekline running from west to east along the southern boundary of the Borrow Pit 1 area. The artefact scatter is within eroded exposures immediately adjacent to the current course of the creek, and the PAD extends from the creek up onto a flattened raised area of ground above the current creekline and extending onto the lower slopes of a ridge rising toward the north.

The ground surface slopes up to the north towards a round-topped series of hills along the southern edge of the current ash dam.

The creek currently follows a slightly meandering course through a flat-floored valley. The creek has areas of swampy ground, and signs of ephemeral ponds are visible in the current ground surface. It is likely that this creek consisted of a chain of swampy areas and ponds prior to European land clearing. It flows eastward, eventually meeting Pike's Creek to the northeast. The creekline is slightly incised, to a depth of around half a metre below its current banks. Behind the current bank is a slightly raised and flat area of ground, which appears to be a remnant of an older creek bank. This is possibly part of the bank of the creek during the pre-contact period, before it began to incise following European land clearing.

Thirteen artefacts were recorded, all of which were found in eroded areas immediately adjacent to the current creekline. The majority of the artefacts are unretouched flakes, with one core and one retouched flake also present. IMSTC is the most common material, followed by silcrete.

There is a potential for artefacts to be present in subsurface deposits in the areas of ground between the current course of the creek and the lower slopes of the ridge to the north. There is the potential for these artefacts to be present in densities high enough to be detected through test excavations. The artefacts present in the erosional exposures along the creek have probably eroded out of the soil as it has been scoured back during creek flood events, and remain on the erosional surface as a lag deposit. This being the case, there is a likelihood that an assemblage of subsurface artefacts is present in the adjacent ground, which has not experienced the same severe level of erosion. The density of artefacts present in the eroded area makes it likely that a similarly dense scatter of artefacts are present in adjacent subsurface deposits. The presence of the creek, and the consequent availability of water and associated resources, also raise the potential for archaeological sites to be present within the PAD area.

The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being high. The archaeological and cultural significance of subsurface material is unknown.

8.12.2 Phase 1 Testing

Phase 1 testing at BAYS AS and PAD15 involved the excavation of 14 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 33. Test pit locations are shown on Figure 28.

Table 33 BAYS AS and PAD15 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
124	308799	6412268	Lower slope	Gently inclined	16	16	0
125	308905	6412224	Flat	Gently inclined	43	43	0
126	308885	6412200	Flat	Level	38	38	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
127	308925	6412172	Flat	Very gently inclined	20	20	1
128	308939	6412171	Flat	Level	23	23	0
129	308971	6412169	Flat	Level	21	21	0
132	309038	6412131	Flat	Very gently inclined	15	15	1
134	309090	6412136	Flat	Gently inclined	19	19	0
135	309062	6412111	Flat	Gently inclined	20	20	3
136	309092	6412106	Flat	Gently inclined	10	10	0
137	309113	6412103	Flat	Gently inclined	20	20	0
138	309144	6412108	Flat	Gently inclined	23	23	0
139	309204	6412122	Flat	Gently inclined	12	12	0
140	309148	6412081	Flat	Gently inclined	38	38	0

8.12.3 Phase 2 Testing

Phase 2 testing at BAYS AS and PAD15 involved the excavation of two additional test pits (B, C and D) adjacent to test pits 132 and 135 expanding them to 1 m^2 (Plate 12 and Plate 13). The remaining pits artefact bearing pits were not expanded due to time constraints. Summary information on Phase 2 test pits is provided in Table 34.

Table 34 BAYS AS and PAD15 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
132B	Flat	Very gently inclined	15	15	0
132C	Flat	Very gently inclined	15	15	5
132D	Flat	Very gently inclined	15	15	6
135B	Flat	Gently inclined	20	20	4
135C	Flat	Gently inclined	20	20	5
135D	Flat	Gently inclined	20	20	4

8.12.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD15 varied from 10 to 43 centimetres in depth with an average depth of 22.7 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown silty loam topsoils overlying brown clay subsoils. Roots were few throughout.

Boundaries between A and B horizons generally between 20-50 mm. Topsoils were generally thicker, in this area due to valley context and proximity to creek.

8.12.5 Aboriginal Objects

8.12.6 Artefact Distribution

A total of 28 Aboriginal objects, 25 (89.3%) of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS AS and PAD15. Artefacts occurred in two Phase 1 pits only (i.e., TPs 132 and 135), both located on the proximal floodplain of an unnamed 2nd order tributary of Pikes Creek, c.40 metres apart, in the central portion of the site. TP132 yielded one artefact while TP135 yielded three. Subsequent expansion excavations around these pits yielded a further 11 and 13 artefacts respectively.

Artefacts recovered as a result of subsurface testing across BAYS AS and PAD15 provide a mean overall artefact density of 0.8 artefacts per m^2. Vertical distribution data for combined BAYS AS and PAD15 assemblage indicate that the majority of objects occurred in Spit 2 (n = 21, 75%), with the remainder recovered from Spit 1 (n = 7, 25%).

8.12.7 Assemblage composition

A typological breakdown of the combined BAYS AS and PAD15 lithic assemblage is provided in Table 35. The assemblage consists principally of flake debitage (n = 21, 75%), with complete flakes (n = 9), proximal flakes (n = 3) and flake shatter fragments (n = 9) represented. Two angular shatter fragments and three heat shatters are also present, as are two backed artefacts (one Bondi point and one elouera), both manufactured out of silicified tuff.

Both backed artefacts were recovered from Phase 2 expansion squares adjoining TP135 and are complete. The Bondi point from TP135C measures 21.6 (l) x 12.2 (w) x 5.4 (Th) mm while the elouera from TP135D measures 28 (l) x 17.1 (w) x 8.4 (Th). Both examples have edge-damaged chords.

Silcrete is the dominant raw material (n = 17), accounting for 60.7% of the assemblage by count (Table 36). Silicified tuff is the second most common material (n = 10, 35.7%), followed by FGS (n = 1, 3.6%). Cortex is poorly represented (n = 4, 14.2%). All silcrete items appear have been heated.

Table 35 BAYS AS and PAD15: typological breakdown of excavated lithic assemblage

Test pit	Phase	Technological type							Total	Total %
		Complete flake	Proximal flake	Flake shatter	Angular shatter	Bondi point	Elouera	Heat shatter		
132	1	-	-	1	-	-	-	-	**1**	**3.6**
132C	2	1	1	2	1	-	-	-	**5**	**17.9**
132D	2	2	2	1	1	-	-	-	**6**	**21.4**
135	1	1	-	1	-	-	-	1	**3**	**10.7**
135B	2	1	-	1	-	-		2	**4**	**14.3**
135C	2	2	-	2	-	1	-	-	**5**	**17.9**
135D	2	2	-	1	-	-	1	-	**4**	**14.3**
Total	**-**	**9**	**3**	**9**	**2**	**1**	**1**	**3**	**28**	**100**

Table 36 BAYS AS and PAD15: lithic raw materials

Test pit	Phase	Raw material			Total	% Total
		Silcrete	S.tuff	FGS		
132	1	1	-	-	**1**	**3.6**
132C	2	5	-	-	**5**	**17.9**
132D	2	6	-	-	**6**	**21.4**
135	1	1	2	-	**3**	**10.7**
135B	2	1	3	**-**	**4**	**14.3**
135C	2	2	2	1	**5**	**17.9**
135D	2	1	3	**-**	**4**	**14.3**
Total	**-**	**17**	**10**	**1**	**28**	**100**

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Figure 28 BAYS AS and PAD15 Phase 1 test pits

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Plate 12 BAYS AS and PAD15 Phase 2 test pit 132

Plate 13 BAYS AS and PAD15 Phase 2 test pit 135

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8.13 BAYS PAD01

8.13.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD01:

Project component: HP Pipe clearing (south)

This area of PAD encompasses the area of the southern proposed HP pipe clearing works. This PAD consists of low rolling hills, with rounded tops, low gradient slopes, and flat-floored valleys. The ground surface generally slopes downward toward the south and the east, though the area passes through a landscape in which the topography is undulating and the orientation of slopes is variable.

The ground surface is covered in thick grass cover, with sparse to moderate tree cover Ground surface visibility is close to zero, with no areas of ground exposure being observed during the survey.

Most of the area of the PAD lies in the buffer zone and outside the area anticipated to be impacted during works on the HP pipe. Areas adjacent to the HP and LSP pipeline would have been disturbed by the creation of access tracks for the vehicles needed for pipeline construction. It can be assumed that a vehicle corridor on either side of the pipelines would have been disturbed through vehicle movements during construction. The ground immediately adjacent to the HP pipe was heavily disturbed during the installation of the pipe and is likely to have low archaeological potential. Other areas along the pipeline corridor might also have been disturbed through the creation of laydown areas for vehicles and equipment, and stockpile areas for excavated materials or fill (AGL Macquarie, advice received 15/10/19). Disturbance around the pipe would have functioned to reduce, but not entirely remove, the area's archaeological potential. The ground immediately adjacent to the HP pipe is likely to have low archaeological potential. In addition, sections of the HP pipeline are installed below ground and would have involved excavations. As a consequence, the sections of pipeline in which the pipe is installed below the ground have no remaining archaeological potential.

Parnell's Creek lies to the southeast of the area, running in a southwest direction toward the Hunter River. Parnell's Creek passes immediately adjacent to the southern end of the HP pipeline, while the Hunter River lies approximately one kilometre to the southwest. Just over a kilometre to the northwest of the area, Saltwater Creek flows in a southeast direction to join with the Hunter River. A number of ephemeral drainage lines run southeast from the HP pipe area to join Parnell's Creek. The presence of multiple watercourses in the surrounding landscape means that the HP pipe area would have been an area frequently travelled through or camped on by Aboriginal groups living in the region. There are currently no areas with permanent or standing water within the HP pipe area, however, so no particular point within the area has high archaeological potential.

The presence of watercourses on both sides of the PAD gives this area a level of archaeological sensitivity. Although there is no sign of permanent or semi-permanent water being present within the PAD, it is likely that this area of the landscape was one through which Aboriginal groups would have frequently travelled. The low undulating terrain would have been easy to travel through and to forage and hunt for resources within. It is likely that this area was frequently visited by groups travelling between the Parnell's Creek and Saltwater Creek valleys. These visits might have involved short-term camps within the PAD, and there is consequently a possibility that archaeological material will be present within the PAD. The lack of surface artefacts within the area is potentially the result of the extremely low surface visibility.

The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being low to moderate. The archaeological and cultural significance of subsurface material is unknown.

8.13.2 Phase 1 Testing

Phase 1 testing at BAYS PAD01 involved the excavation of 19 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 37. Test pit locations are shown on Figure 29.

Table 37 BAYS PAD01 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
252	304014	6407899	Flat	Very gently inclined	8	8	0
253	303943	6407804	Flat	Very gently inclined	29	29	0
254	303875	6407710	Lower slope	Gently inclined	19	19	0
255	303802	6407600	Mid slope	Gently inclined	8	8	0
256	303700	6407501	Upper slope	Moderately inclined	8	8	0
257	303636	6407401	Crest	Gently inclined	36	36	0
258	303556	6407302	Crest	Gently inclined	14	14	0
259	303478	6407206	Crest	Gently inclined	29	29	0
263	303231	6406808	Upper slope	Moderately inclined	16	16	0
264	303217	6406705	Mid slope	Moderately inclined	23	23	0
265	303210	6406604	Mid slope	Moderately inclined	8	8	0
267	303197	6406396	Mid slope	Gently inclined	13	13	0
271	303134	6406063	Lower slope	Gently inclined	13	13	0
272	303202	6406250	Lower slope	Gently inclined	19	19	0
273	303213	6406512	Mid slope	Gently inclined	13	13	0
274	303246	6406898	Upper slope	Moderately inclined	13	13	0
275	303285	6406971	Crest	Moderately inclined	28	28	0
276	303331	6407049	Crest	Moderately inclined	10	10	0
277	303386	6407060	Crest	Gently inclined	13	13	0

8.13.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.13.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD01 varied from 8 to 36 centimetres in depth with an average depth of 16.8 centimetres. Soil profiles across the site were generally consistent in textural terms, with orange brown sandy to silty clay loam topsoils overlying brown clay subsoils. Test pits 253, 254 and 255 consisted of fill from construction of the access track. Roots were few throughout. Boundaries between A and B horizons generally between 20-50 mm.

8.13.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 29 BAYS PAD01 Phase 1 test pits

8.14 BAYS PAD08

8.14.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD08:

Project component: HP pipe (north) and LSP pipe clearing

This area of PAD encompasses the area of the northern proposed HP pipe and LSP pipe clearing works. This PAD consists of the lower slopes and flat valley floor of a landscape of low rolling hills. The ground surface within the area consists of flat or very low gradient slopes.

The ground surface is covered in thick grass cover, with sparse tree cover. Ground surface visibility is close to zero, with no areas of ground exposure being observed during the survey.

The headwaters of Wisemans Creek cross through the southern end of the area. The southern two thirds of the area drain southwards into Wiseman's Creek. The northern third of the area drain northeast toward Pike's Creek, though the exact location of Pike's Creek in relation to the area is now difficult to reconstruct due to the existence of the ash dam and associated earthworks and dams. It is possible that ephemeral ponds and swamps existed within or close to the area, associated with these two Creeks and their feeder drainage lines.

Most of the area of the PAD lies in the buffer zone and outside the area anticipated to be impacted during works on the HP and LSP pipes. Areas adjacent to the HP and LSP pipeline would have been disturbed by the creation of access tracks for the vehicles needed for pipeline construction. It can be assumed that a vehicle corridor on either side of the pipelines would have been disturbed through vehicle movements during construction. Other areas along the pipeline corridor might also have been disturbed through the creation of laydown areas for vehicles and equipment, and stockpile areas for excavated materials or fill (AGL Macquarie, advice received 15/10/19). Disturbance around the pipe would have functioned to reduce, but not entirely remove, the area's archaeological potential. The ground immediately adjacent to the LSP and HP pipe are likely to have low archaeological potential. In addition, sections of the HP pipeline are installed below ground and would have involved excavations. As a consequence, the sections of pipeline in which the pipe is installed below the ground have no remaining archaeological potential. The presence of Wisemans Creek at the southern end of the PAD, and the possibility of ephemeral ponds and swamps existing on the drainage line running north-south through the PAD, give this area heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being low to moderate. The archaeological and cultural significance of subsurface material is unknown.

8.14.2 Phase 1 Testing

Phase 1 testing at BAYS PAD08 involved the excavation of eight 0.25 m² test pits across the entirety of the site with test pits placed within areas not significantly disturbed by power station infrastructure. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 38. Test pit locations are shown on Figure 30.

Table 38 BAYS PAD08 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
147	306806	6411995	Mid slope	Gently inclined	8	8	0
149	306869	6411905	Mid slope	Gently inclined	19	19	0
150	306810	6411825	Mid slope	Gently inclined	29	29	0
288	306652	6411501	Flat	Very gently inclined	9	9	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
289	306573	6411548	Flat	Very gently inclined	10	10	0
295	307114	6412208	Mid slope	Gently inclined	10	10	0
297	307187	6412377	Slope	Gently inclined	7	7	0

8.14.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.14.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD08 varied from 7 to 29 centimetres in depth with an average depth of 13.1 centimetres. Soil profiles across the site were generally consistent in textural terms, with dark brown silty clay loam topsoils overlying reddish brown clay subsoils. Test pit 289 was missing it's a horizon and was clay from the surface. Roots were few throughout. Boundaries between A and B horizons generally between 20-50 mm.

8.14.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 30 BAYS PAD08 Phase 1 test pits

8.15 BAYS PAD12

8.15.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD12:

Project component: Borrow pit 2

This area of PAD is composed of the lower slopes and valley floor at the headwater of Pike's Creek. A moderate gradient slope rises up at the west, southwest, and southeast of the area of PAD, rising to a round-topped ridgeline on which three sites (BAYS AS09, BAYS AS and PAD10, and BAYS AS and PAD11) have been identified. Rainfall on the eastern slopes of this ridge drains into the PAD, where Pike's Creek initiates. The creek flows out of the PAD in a northeasterly direction.

The ground surface within the PAD is vegetated with thick grass cover and sparse tree cover. Surface visibility is close to zero within the PAD. The ground surface across the PAD is flat or has a low gradient. No surface artefacts were identified.

Pike's Creek follows an incised course, downcut to a depth of around 0.5 – 1 m below the surrounding ground surface.

The presence of Pike's Creek, and consequent availability of water and associated resources, gives this area a heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.15.2 Phase 1 Testing

Phase 1 testing at BAYS PAD12 involved the excavation of six 0.25 m² test pits across the entirety of the site with test pits placed within areas not significantly disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 39. Test pit locations are shown on Figure 31.

Table 39 BAYS PAD12 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
160	307500	6412053	Mid slope	Moderately inclined	6	6	0
162	307604	6412054	Mid slope	Gently inclined	6	6	0
163	307646	6412048	Mid slope	Gently inclined	11	11	0
165	307551	6411999	Mid slope	Gently inclined	8	8	0
299	307513	6412124	Mid slope	Gently inclined	16	16	0
300	307548	6412041	Mid slope	Gently inclined	10	10	0

8.15.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.15.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD12 varied from 6 to 16 centimetres in depth with an average depth of 19.5 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown

silty clay loam topsoils overlying brown clay subsoils. Roots were common throughout. Boundaries between A and B horizons generally between 20-50 mm.

8.15.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 31 BAYS PAD12 Phase 1 test pits

8.16 BAYS PAD13

8.16.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD13:

Project component: Salt cake landfill

This PAD encompasses a narrow band of possibly undisturbed or minimally disturbed land around the edge of the salt cake landfill area.

The salt cake landfill area lies within a landscape of low rolling round-topped hills, which are forested with moderately dense tree cover. The area itself, however, has been artificially flattened by prior excavation. A vertical excavation face extends along the northern boundary of the salt cake landfill area, which results from the ground surface of the area having been lowered to bring it level with the natural terrain to the south of the landfill area.

The flattening of the landfill area represents a major disturbance to most if not all of the area. The earthworks involved have removed the pre-contact ground surface, and would have removed all archaeological material that might have existed on this ground surface or in sub-surface soils and sediments.

The flat area of ground created through these earthworks has been subject to further ground-disturbance works. A rectilinear array of vehicle tracks have been formed across most of the area, with the possible exception of the western and southwestern edges of the area. Most of the areas of ground between these vehicle tracks are currently being used as laydown yards for vehicles, equipment and excavated fill material. Much of the landfill area is covered with imported gravel.

It is possible that a narrow band of undisturbed ground remains along the southern and western edges of the landfill area. Similarly, areas above the vertical excavation face running along the north of the area might also be undisturbed and retain some archaeological potential. It is this area that has been designated as BAYS PAD13.

The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being low to moderate. The archaeological and cultural significance of subsurface material is unknown.

8.16.2 Phase 1 Testing

Phase 1 testing at BAYS PAD13 involved the excavation of 12 0.25 m² test pits across the entirety of the site with test pits placed within areas not significantly disturbed by power station infrastructure and large areas of EEC. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 39. Test pit locations are shown on Figure 32.

Table 40 BAYS PAD13 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
105	305601	6413224	Slope	Gently inclined	8	8	0
109	305171	6413800	Slope	Gently inclined	19	19	0
311	305632	6413237	Slope	Gently inclined	Fill	Fill	0
312	305401	6413372	Slope	Gently inclined	Fill	Fill	0
313	305383	6413403	Slope	Gently inclined	Fill	Fill	0
314	305180	6413718	Slope	Gently inclined	14	14	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
315	305146	6413759	Slope	Gently inclined	25	25	0
316	305149	6413792	Slope	Gently inclined	49	49	0
317	305220	6413806	Slope	Gently inclined	Fill	Fill	0
318	305247	6413829	Slope	Gently inclined	20	20	
319	305845	6413623	Crest	Very gently inclined	10	10	
320	305883	6413598	Slope	Very gently inclined	10	10	

8.16.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.16.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD13 varied from 8 to 49 centimetres in depth with an average depth of 21.2 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying orange clay subsoils. Roots were rare throughout. Boundaries between A and B horizons generally between 20-50 mm.

8.16.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 32 BAYS PAD13 Phase 1 test pits

8.17 BAYS PAD14

8.17.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD14:

Project component: Ash dam augmentation and Borrow pit 1

This area of PAD is composed of the rounded tops, upper slopes, and mid slopes of a series of low hills that border the southern edge of the area currently inundated by the ash dam. The PAD consists of low rolling hills, some of which have small sections that have eroded to bedrock. The hills are round-topped, with low to moderate gradient sides and rounded flat-floored valleys. No signs of major prior ground disturbance were identified during the survey, and the ground surface in this area is interpreted as being intact. The original course of Pike's Creek would have run just to the north of the PAD.

The ground surface in this section is covered in thick grass cover. Eroded exposures are rare. Some of the eroded exposures are located on moderate slopes, and have eroded to bedrock, a process that has probably removed all archaeological material that might have existed there. These severely eroded areas are rare across the PAD, however. Across most of the PAD the regolith consists of soils.

This area of ground would have been elevated above the height of Pike's Creek, in its original course prior to establishment of the ash dam. The elevation and presence of water nearby, along with associated resources along the creek, gives this area a heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.17.2 Phase 1 Testing

Phase 1 testing at BAYS PAD14 involved the excavation of 13 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 100 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 41. Test pit locations are shown on Figure 33.

Table 41 BAYS PAD14 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
111	308700	6412601			10	10	0
112	308799	6412596			18	18	0
113	308206	6412493			20	20	0
114	308302	6412493			19	19	0
115	308404	6412493			18	18	0
116	308497	6412502			18	18	0
117	308598	6412495			21	21	0
118	308806	6412503			8	8	0
119	308906	6412498			15	15	0
120	308104	6412398			28	28	0
121	308197	6412396			14	14	0
122	308003	6412299			14	14	0
123	308096	6412300			21	21	0

8.17.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.17.4 Soils, Stratigraphy and Disturbance

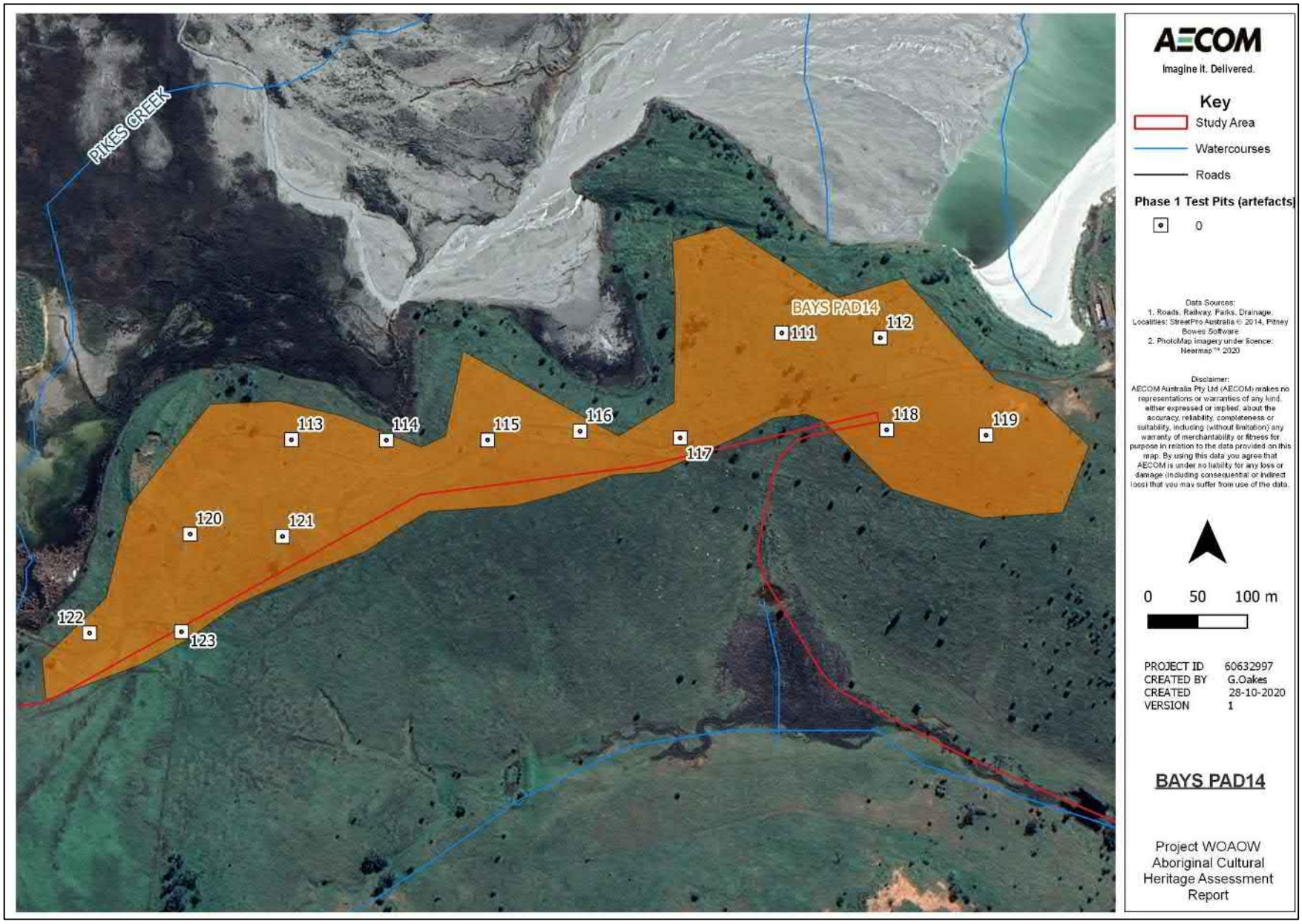
Test pit depths within BAYS PAD14 varied from 8 to 28 centimetres in depth with an average depth of 17.2 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying red brown clay subsoils. Roots were common throughout. Boundaries between A and B horizons were generally between 20-50 mm.

8.17.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 33 BAYS PAD14 Phase 1 test pits



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8.18 BAYS PAD16

8.18.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD16:

> *Project component: Ash dam augmentation*
>
> *This PAD consists of flat or very low-gradient terrain within a wide flat-floored valley through which Pike's Creek runs. It lies to the east of the dam wall of the current ash dam. The area of ground within the PAD shows no visible signs of disturbance, other than some vehicle tracks that run through the PAD and some contour banks. The only other noticeable source of ground disturbance in this area is the high-voltage powerline, which runs northeast-southwest through the section. Areas adjacent to the pylons of this powerline are assumed to be highly disturbed and have negligible archaeological potential.*
>
> *Pike's Creek runs west to east through this section of the ash dam augmentation area. The current creekline is moderately incised, and follows a meandering course across the flat-floored valley. The current course of the creek might have been altered slightly from its course prior to construction of the ash dam, due to reduced flow and construction of dams and seepage collection systems to the west of the PAD, adjacent to the dam wall. Areas of remnant swampy ground are visible in the current landscape adjacent to the creek, and it is probable that prior to European land-clearing and construction of the ash dam the creek possessed swamps and ponds in this section.*
>
> *The ground surface within the PAD is vegetated with moderate to thick grass cover. Ground surface visibility is very low.*
>
> *The presence of Pike's Creek, and the consequent availability of water and associated resources, give this area heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. Areas of localised disturbance within the PAD, for example vehicle tracks and contour banks, would have low archaeological potential. The archaeological and cultural significance of subsurface material is unknown.*

8.18.2 Phase 1 Testing

Phase 1 testing at BAYS PAD16 involved the excavation of 41 0.25 m² test pits across the entirety of the site with test pits placed roughly on a 30 m grid on flats and 50 m grid on slopes. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 42. Test pit locations are shown on Figure 34.

Table 42 BAYS PAD16 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
26	309301	6413603	Mid slope	Gently inclined	19	19	0
27	309291	6413504	Mid slope	Gently inclined	33	33	0
28	309390	6413503	Mid slope	Gently inclined	13	13	0
29	309404	6413399	Lower slope	Very gently inclined	15	15	0
30	309396	6413297	Lower slope	Gently inclined	59	26	0

D R A F T

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
31	309444	6413297	Lower slope	Moderately inclined	22	22	0
32	309496	6413297	Lower slope	Moderately inclined	14	14	0
33	309400	6413250	Lower slope	Moderately inclined	9	9	0
34	309454	6413253	Lower slope	Moderately inclined	8	8	0
35	309499	6413252	Lower slope	Moderately inclined	10	10	0
36	309544	6413254	Lower slope	Gently inclined	10	10	0
37	309507	6413193	Lower slope	Gently inclined	5	5	0
38	309545	6413187	Flat	Gently inclined	10	10	0
39	309564	6413184	Flat	Gently inclined	10	10	0
40	309600	6413189	Flat	Gently inclined	18	18	0
41	309629	6413189	Flat	Gently inclined	15	15	0
44	309487	6413161	Flat	Gently inclined	12	12	0
45	309508	6413162	Flat	Gently inclined	14	14	0
46	309538	6413162	Flat	Gently inclined	10	10	1
47	309569	6413159	Flat	Gently inclined	8	8	0
48	309598	6413160	Flat	Gently inclined	12	12	1
49	309634	6413162	Flat	Gently inclined	8	8	0
50	309658	6413163	Flat	Gently inclined	18	18	0
55	309568	6413137	Flat	Level	6	6	0
56	309606	6413131	Flat	Gently inclined	10	10	1
58	309663	6413131	Flat	Gently inclined	10	10	0
59	309693	6413132	Flat	Gently inclined	16	16	1
63	309543	6413110	Flat	Level	8	8	0
64	309567	6413106	Flat	Level	7	7	0
65	309598	6413101	Flat	Level	4	4	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
66	309635	6413101	Flat	Level			0
68	309688	6413095	Flat	Gently inclined	9	9	0
69	309722	6413100	Flat	Gently inclined	19	19	0
72	309687	6413070	Flat	Gently inclined	7	7	0
73	309716	6413069	Flat	Gently inclined	24	24	0
82	309549	6412998	Very gently inclined	Gently inclined	15	15	0
84	309644	6412996	Very gently inclined	Gently inclined	36	36	0
85	309688	6412995	Very gently inclined	Gently inclined	12	12	0
86	309500	6412896	Mid slope	Gently inclined	36	36	0
87	309604	6412903	Mid slope	Moderately inclined	24	24	0
88	309499	6412797	Mid slope	Moderately inclined	28	28	0

8.18.3 Phase 2 Testing

Phase 2 testing at BAYS PAD 16 involved the excavation of three additional test pits (B, C and D) adjacent to test pits 46, 48, 56 and 59 expanding them to 1 m^2 (Plate 14, Plate 15, Plate 16 and Plate 17). Summary information on Phase 2 test pits is provided in Table 43.

Table 43 BAYS PAD16 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
46B	Flat	Gently inclined	10	10	0
46C	Flat	Gently inclined	10	10	0
46D	Flat	Gently inclined	10	10	0
48B	Flat	Gently inclined	12	12	0
48C	Flat	Gently inclined	12	12	1
48D	Flat	Gently inclined	12	12	0
56B	Flat	Gently inclined	10	10	0
56C	Flat	Gently inclined	10	10	1
56D	Flat	Gently inclined	10	10	1

Test Pit ID	Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
59B	Flat	Gently inclined	16	16	1
59C	Flat	Gently inclined	16	16	4
59D	Flat	Gently inclined	16	16	2

8.18.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD16 varied from 4 to 36 centimetres in depth with an average depth of 14.6 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying brown clay subsoils. Roots were common throughout all A horizons with boundaries between A and B horizons generally between 20-50 mm.

8.18.5 Aboriginal Objects

8.18.6 Artefact Distribution

A total of 14 Aboriginal objects, 13 of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS PAD16. Four Phase 1 test pits (TPs 46, 48, 56 and 59) contained artefacts, with each yielding a single artefact. Phase 2 expansions excavations surrounding test pits 48, 56 and 59 yielded a further ten artefacts, with the majority (n = 7) coming from those around TP59. All artefact-bearing Phase 1 pits were located on the left bank floodplain of Pikes Creek.

Artefacts recovered as a result of subsurface testing across BAYS PAD16 provide a mean overall artefact density of 4.1 artefacts per m^2. The majority of objects (n = 9, 64.3%) came from the top 10 cm of excavated deposit in their respective squares, with the remainder (n = 5, 35.7%) recovered from Spit 2 (10-20 cm).

8.18.7 Assemblage composition

Artefacts recovered from BAYS PAD16 consist largely of flake debitage items (n = 10) (Table 44), with five complete flakes, one proximal flake, one split flake and three flake shatter fragments represented. Two angular shatter fragments, one heat shatter and a multidirectional silicified tuff core complete the assemblage. The core weighs 13.7 grams, measures 36.8 (l) x 30.2 (w) x 26.7(Th) mm and was made on an indeterminate blank. It has two striking platforms, retains no cortex and exhibits eight removals. Raw material quality is good. Silcrete and silicified tuff are co-dominant (Table 45). Cortex is poorly represented (n = 4).

Table 44 BAYS PAD16: typological breakdown of excavated lithic assemblage

Test pit	Phase	Technological type							Total	Total %
		Complete flake	Proximal flake	Split flake	Flake shatter	Angular shatter	Heat shatter	Multidirectional core		
46	1	-	1	-	-	-	-	-	**1**	**7.1**
48	1	-	-	1	-	-	-	-	**1**	**7.1**
48C	2	1	-	-	-	-	-	-	**1**	**7.1**
56	1	-	-	-	-	-	-	1	**1**	**7.1**
56C	2	-	-	-	-	1	-	-	**1**	**7.1**
56D	2	1	-	-	-	-	-	-	**1**	**7.1**
59	1	1	-	-	-	-	-	-	**1**	**7.1**

D R A F T

Test pit	Phase	Technological type							Total	Total %
		Complete flake	Proximal flake	Split flake	Flake shatter	Angular shatter	Heat shatter	Multidirectional core		
59B	2	-	-	-	-	1	-	-	**1**	**7.1**
59C	2	-	-	-	3	-	1	-	**4**	**28.6**
59D	2	2	-	-	-	-	-	-	**2**	**14.3**
Total	**-**	**5**	**1**	**1**	**3**	**2**	**1**	**1**	**14**	**100**

Table 45 BAYS PAD16: lithic raw materials

Test pit	Phase	Raw material		Total	Total %
		Silcrete	S.tuff		
46	1	-	1	**1**	**7.1**
48	1	-	1	**1**	**7.1**
48C	2	-	1	**1**	**7.1**
56	1	1	-	**1**	**7.1**
56C	2	-	1	**1**	**7.1**
56D	2	1	-	**1**	**7.1**
59	1	1	-	**1**	**7.1**
59B	2	-	1	**1**	**7.1**
59C	2	3	1	**4**	**28.6**
59D	2	1	1	**2**	**14.3**
Total	**-**	**7**	**7**	**14**	**100**

D R A F T

Figure 34 BAYS PAD16 Phase 1 test pits

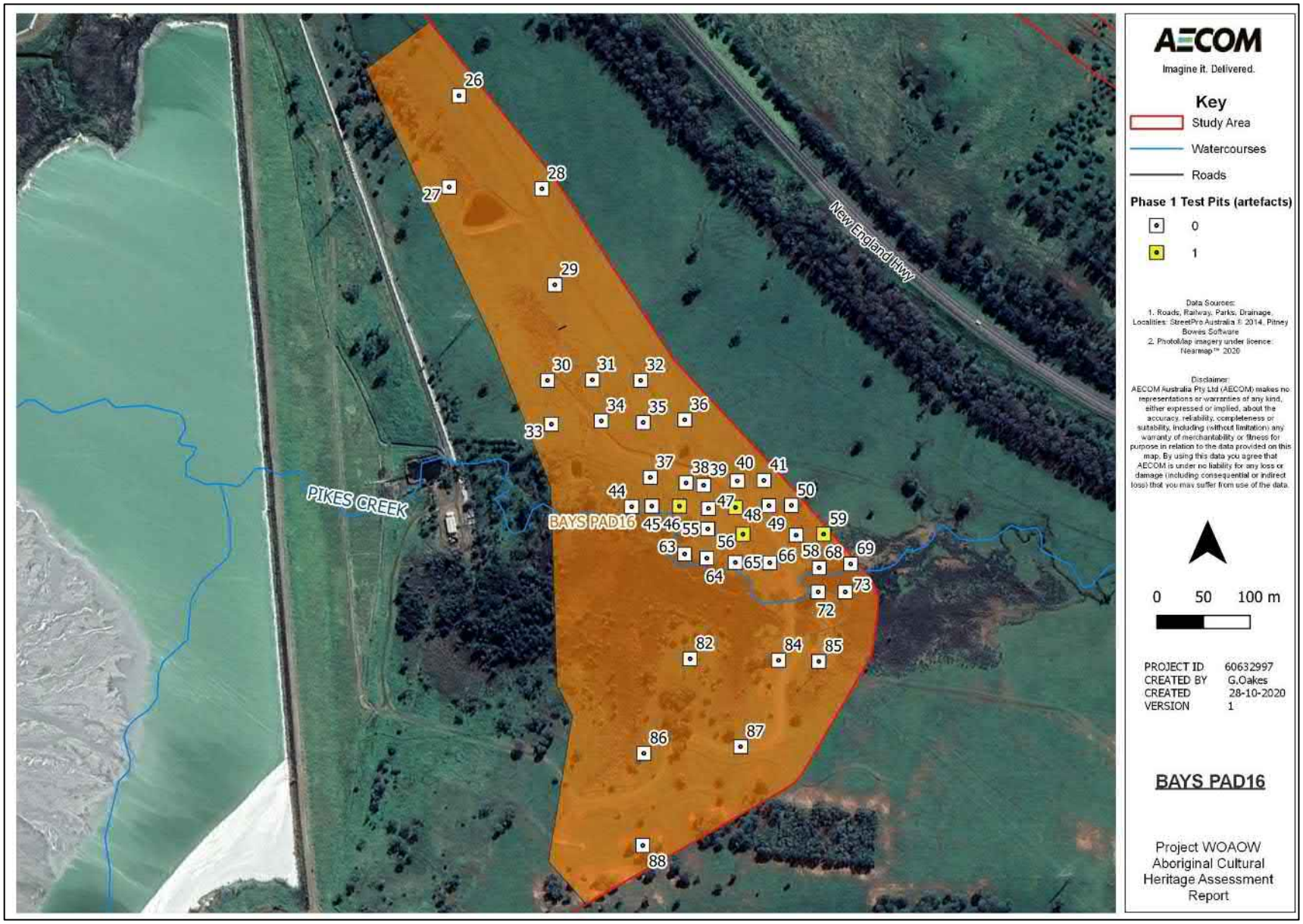

Plate 14 BAYS PAD16 Phase 2 test pit 46

Plate 15 BAYS PAD16 Phase 2 test pit 48

D R A F T

Plate 16 BAYS PAD16 Phase 2 test pit 56

Plate 17 BAYS PAD16 Phase 2 test pit 59

D R A F T

8.19 BAYS PAD17

8.19.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD17:

> *Project component: Ravensworth ash line*
>
> *This area of PAD consists of a low gradient slope within a landscape of rolling round topped hills and flat-floored valleys. The ground surface within the PAD shows no sign of prior disturbance. The current ash-line and adjacent vehicle track run along the northern edge of the PAD (Figure 6-23). The majority of the PAD lies outside the study area. The portion of the PAD within the study area is largely located in the buffer zone around the area anticipated to be impacted during upgrading of the ash line.*
>
> *This area was cited by RAPs involved in the fieldwork as having a heightened archaeological potential, due to other sites having been discovered in the immediately surrounding landscape, and the undisturbed condition of this specific area of ground (Hickey pers. comm.).*
>
> *The ground within the PAD is vegetated with thick grass cover and sparse tree cover. Ground surface visibility within the PAD is close to zero.*
>
> *The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.*

8.19.2 Phase 1 Testing

Phase 1 testing at BAYS PAD17 involved the excavation of five 0.25 m² test pits across the entirety of the site with test pits placed in areas not disturbed by power station infrastructure and outside EECs. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 46. Test pit locations are shown on Figure 35.

Table 46 BAYS PAD17 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
16	313103	6412716	Middle slope	Gently inclined	10	10	0
17	313000	6412726	Middle slope	Gently inclined	10	10	0
306	312247	6412818	Upper slope	Gently inclined	15	15	0
307	313058	6412704	Middle slope	Gently inclined	15	15	0
308	313177	6412700	Middle slope	Gently inclined	3	3	0

8.19.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.19.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD17 varied from 3 to 15 centimetres in depth with an average depth of 10.6 centimetres. Soil profiles across the site were generally consistent in textural terms, with brown silty grey clay loam topsoils overlying red brown clay subsoils. Roots were common throughout. Boundaries between A and B horizons were generally between 5-10 mm.

8.19.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 35 BAYS PAD17 Phase 1 test pits

8.20 BAYS PAD18

8.20.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD18:

Project component: Ravensworth ash line

This PAD consists of a low gradient slope within a landscape of rolling round topped hills and flat-floored valleys. The ground surface within the PAD shows no sign of prior disturbance. The current ash-line and adjacent vehicle track run along the northeast edge of the PAD. Bayswater creek lies approximately 200 m north of the PAD.

The ground within the PAD is covered with moderately thick tree cover, which has carpeted the ground surface in thick leaf litter. Ground surface visibility is close to zero.

A previously recorded surface scatter of stone artefacts (AHIMS # 37-3-0491), lies within the area of PAD. This site is currently still intact and protected by a fence, although leaf litter made it impossible to identify whether the originally recorded artefacts are still present.

The presence of Bayswater Creek nearby, and the consequent availability of water and associated resources, along with the identification of surface artefacts in this area by previous archaeological investigations, give this area a heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.20.2 Phase 1 Testing

Phase 1 testing at BAYS PAD18 involved the excavation of five 0.25 m² test pits across the entirety of the site with test pits placed at roughly 50 m intervals. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 47. Test pit locations are shown on Figure 36.

Table 47 BAYS PAD18 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
11	314145	6412277	Lower slope	Very gently inclined	33	33	0
12	314103	6412293	Lower slope	Gently inclined	23	36	0
13	314048	6412335	Lower slope	Gently inclined	25	25	0
14	314002	6412351	Lower slope	Gently inclined	22	22	0
15	313947	6412367	Lower slope	Gently inclined	9	9	0

8.20.3 Phase 2 Testing

As no artefacts were identified during Phase 1 test excavation and therefore Phase 2 excavations were not completed.

8.20.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD18 varied from 9 to 33 centimetres in depth with an average depth of 22.4 centimetres. Soil profiles across the site were generally consistent in textural terms, with grey clay loam topsoils overlying grey silty clays, themselves underlain by yellow brown clay subsoils. Roots were few throughout. Boundaries between A and B horizons were generally between 10-20 mm. A horizons were alluvial in nature due to proximity to Bayswater Creek.

8.20.5 Aboriginal Objects

No Aboriginal objects were recovered as a result of subsurface testing across this PAD.

D R A F T

Figure 36 BAYS PAD18 Phase 1 test pits

8.21 BAYS PAD19

8.21.1 Site Description

Jacobs (2019) provide the following description of BAYS PAD19:

Project component: Ravensworth ash line

This area of PAD consists of a low gradient slope within a landscape of rolling round topped hills and flat-floored valleys. The ground surface within the PAD shows no sign of prior disturbance. The current ash-line and adjacent vehicle track run along the northeast edge of the PAD.

The ground within the PAD is covered with moderately thick tree cover, which has carpeted the ground surface in thick leaf litter. Ground surface visibility is close to zero.

Bayswater Creek crosses through the PAD in a northwest to southeast direction. The creek currently flows along an undulating and incised course, which is downcut to a depth of around 1 – 2 metres below the surrounding ground surface. It is probable that this incision has happened following European land clearing, and the pre-contact course of the creek lay closer to the current ground surface. If this were the case, most of the PAD would still have been elevated above the level of the creek.

The presence of Bayswater Creek, and the consequent availability of water and associated resources, gives this area a heightened archaeological potential. The potential for artefacts to be present in subsurface deposits within the PAD area, at densities sufficiently high to enable detection through test excavation, is assessed as being moderate. The archaeological and cultural significance of subsurface material is unknown.

8.21.2 Phase 1 Testing

Phase 1 testing at BAYS PAD19 involved the excavation of 11 0.25 m² test pits across the entirety of the site with test pits placed roughly at 50 m intervals in non-disturbed areas and outside EEC. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 48. Test pit locations are shown on Figure 37.

Table 48 BAYS PAD19 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
1	314897	6411886	Lower slope	Gently inclined	21	44	0
2	314862	6411896	Lower slope	Gently inclined	35	35	0
4	314749	6411958	Lower slope	Gently inclined	37	37	0
5	314707	6411990	Flat	Gently inclined	10	10	0
6	314642	6412020	Flat	Gently inclined	29	29	0
7	314616	6412046	Flat	Very gently inclined	12	12	0
8	314555	6412072	Flat	Level	70	70	1
9	314514	6412094	Flat	Level	65	65	1
309	314421	6412122	Lower slope	Gently inclined	38	38	0
310	314790	6411933	Lower slope	Gently inclined	22	22	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Topsoil depth (cm)	Max depth (cm)	Stone artefacts (*N*)
311	314817	6411917	Lower slope	Gently inclined	21	21	0

8.21.3 Phase 2 Testing

Phase 2 excavations were not completed.

8.21.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD16 varied from 4 to 36 centimetres in depth with an average depth of 14.6 centimetres. Soil profiles across the site were generally consistent in textural terms, with grey very fine sandy loam alluvial topsoils overlying dark brown red sandy clay subsoils. Roots were rare throughout all A horizons with boundaries between A and B horizons generally between 20-50 mm.

8.21.5 Aboriginal Objects

8.21.6 Artefact Distribution

Two Aboriginal objects, both of which satisfied technical criteria for identification as artefacts, were recovered as a result of subsurface testing across BAYS PAD19. One was recovered from Phase 1 test pit TP8, located on the proximal left bank floodplain of Bayswater Creek, while the other came from TP9, situated on the same landform element, c.47 m to the west of TP8. No other Phase 1 pits yielded artefacts. Artefacts recovered as a result of subsurface testing across BAYS PAD19 provide a mean overall artefact density of 0.7 artefacts per m^2. Artefact recovery depths for TPs 8 and 9 were 40-50 cm (Spit 5) and 60-70 cm (Spit 7) respectively.

8.21.7 Assemblage Composition

The two artefacts recovered from this site consist of a complete silicified tuff flake (TP8) and a quartz flake shatter (TP9). The flake from TP8 measures 10.2 (l) x 6.7 (w) x 2.9 (th) mm, weighs 0.14 grams, has a multiple scar platform with no associated overhang removal and exhibits a feather termination. No dorsal cortex is present. The angular shatter fragment from TP9 has a maximum linear dimension of 18 mm and retains some cortex.

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Figure 37 BAYS PAD19 Phase 1 test pits

8.22 Final Sites

Taking into consideration the results of Jacobs' (2019) assessment and the current test excavation program 23 valid sites are recognised to be located within the study area. A summary of results is provided in Table 49 and sites shown on .

Table 49 Final sites summary

Site Name	AHIMS	Testing Results	Validity	Updated site type	Management
BAYS PAD19	Not registered	Artefacts recovered	Valid	Subsurface scatter	AHIMS site card
BAYS PAD16	37-2-0048	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
BAYS AS and PAD15	37-2-6135	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
BAYS AS and PAD 10	37-2-6142	No artefacts	Valid	Open artefact site	ASIR
BAYS PAD18 (NARDELL N2)	37-2-0491	No artefacts	Valid	Open artefact site	ASIR
BAYS AS and PAD11	37-2-6143	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
P11;Plashette;	37-2-0558	No artefacts	Valid	Open artefact site	ASIR
BAYS AS and PAD07	37-2-6144	No artefacts	Valid	Open artefact site	ASIR
BAYS AS and PA 05	37-2-6141	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
BAYS AS and PA 03	37-2-6147	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
P9;Plashette;	37-2-0556	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
P8;Plashette;	37-2-0555	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
BAYS AS and PAD02	37-2-6134	Artefacts recovered	Valid	Open artefact site and subsurface scatter	ASIR
BAYS IF03	37-2-6137	Not tested	Valid	Open artefact site	None

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Site Name	AHIMS	Testing Results	Validity	Updated site type	Management
BAYS IF02	37-2-6138	Not tested	Valid	Open artefact site	None
BAYS IF01	37-2-6139	Not tested	Valid	Open artefact site	None
BAYS AS06	37-2-6145	Not tested	Valid	Open artefact site	None
P6;Plashette;	37-2-0553	Not tested	Valid	Open artefact site	None
P7;Plashette;	37-2-0554	Not tested	Valid	Open artefact site	None
P10;Plashette;	37-2-0557	Not tested	Valid	Open artefact site	None
Wisemans Creek OS1	37-2-6040	Not tested	Valid	Open artefact site	None
BAYS IF04	37-2-6136	Not tested	Valid	Open artefact site	None
BAYS AS04	37-2-6146	Not tested	Valid	Open artefact site	None
BAYS PAD17	Not registered	No artefacts	Not valid	n/a	None
BAYS PAD14	Not registered	No artefacts	Not valid	n/a	None
BAYS PAD12	Not registered	No artefacts	Not valid	n/a	None
BAYS PAD08	Not registered	No artefacts	Not valid	n/a	None
BAYS PAD13	Not registered	No artefacts	Not valid	n/a	None
BAYS PAD01	Not registered	No artefacts	Not valid	n/a	None
Pikes Gully;	37-2-0047	Not tested	Not valid	n/a	None
Pikes Gully;	37-2-0050	Not tested	Not valid	n/a	None
Tinkers Creek;Liddell;	37-2-0062	Not tested	Not valid	n/a	None
Liddell;Tinkers Creek;	37-2-0063	Not tested	Not valid	n/a	None
Liddell;Pikes Gully;	37-2-0065	Not tested	Not valid	n/a	None
Pikes Gully;	37-3-0007	Not tested	Not valid	n/a	None
REA256	37-3-1128	Not tested	Not valid	n/a	None

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Figure 38 Final sites

8.23 Discussion

Archaeological investigations undertaken for this assessment have resulted in the identification of 23 Aboriginal archaeological sites across the study area, indicating a widespread Aboriginal presence in the past. However, in keeping with local and regional archaeological datasets, the results of the current investigation point to an occupational emphasis on watercourses and slopes adjacent to watercourses.

Wisemans and Pikes Creeks, in particular, appear to have been a focal features for Aboriginal peoples occupying the study area, with the creeklines and their associated economic resources likely facilitating repeated occupation over thousands of years. Surface survey and test excavations on landforms associated with these creeklines have revealed the presence of low subsurface artefact densities that might reasonably be interpreted as a product of an unknown number of short-term occupation episodes. Outside of these areas, surface and subsurface artefact distributions are sparse and discontinuous and are considered 'background scatter', being "artefactual material which is insufficient in number or in association with other material to suggest focussed activity in a particular location" (Douglas and McDonald, 1993).

The highest number of artefacts recovered from a Phase 1 test pits was 5 artefacts per 0.25 m² from test pit 280 located directly adjacent to a 2nd order tributary of Wisemans Creek. The highest number of artefacts recovered from a Phase 2 test pits was 17 artefacts per 1 m² from test pit 241 lying directly adjacent to the same 2nd order tributary of Wisemans Creek. At the same time, it is acknowledged that observed artefact densities within the study area may, at least in part, reflect historical land use practices (i.e., clearing) as well as post-depositional processes linked to historical erosion activity.

In common with other local flaked stone artefact assemblages, surface and subsurface lithic assemblages within the study area indicate an emphasis on the procurement and reduction of silicified tuff and silcrete, with other raw materials, including quartz and FGS, sometimes also used. The presence of thermally altered artefacts and heat shatters within the assemblage, meanwhile, is suggestive of two processes: unintentional post-discard burning and deliberate heat treatment to improve flaking quality. Both phenomena are well represented in the archaeological record the Hunter Valley.

In general, the assemblage was consistent with those previously identified in the Hunter Valley. However, the small sample size restricts interpretation. Backed artefacts, two of which (one Bondi Point and one elouera) were identified as a result of test excavation works, are a near-ubiquitous element of the stone artefact record of the Hunter Valley. Existing residue and use-wear data for this implement type (eg, McDonald et al, 2007; Fullagar et al, 2009; Robertson et al, 2009; Robertson, 2011) suggest that they 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. In southeastern Australia, backed artefacts are known to have been produced as early as 8,500 years BP (Attenbrow & Hiscock, 1998). However, between c.3500 BP and 1500 BP, they were manufactured and discarded in large quantities across numerous sites - the so called "backed artefact proliferation event" (Hiscock, 2002). Research into this phenomenon, spearheaded by Hiscock (1994, 2002), has identified the onset of an ENSO-dominated climatic pattern 4,000 to 5,000 years ago as a key causal trigger, with increased backed artefact manufacture interpreted as one of number of technological strategies employed by Aboriginal people to reduce subsistence risks incurred by increased climatic variability. More recent work on the subject (eg, Hiscock, 2018) has also highlighted the potentially significant social role that backed artefact-containing composite tools may have played during the onset and intensification of conditions of reduced and less predictable resource availability.

In the absence of radiometric dates, establishing a chronological context for the identified Aboriginal archaeological record of the study area is difficult. As in other archaeological contexts, establishing the temporal history of the various soil units and landforms present within the study area will prove crucial to ascertaining the antiquity of the Aboriginal archaeological materials within it. In view of the well documented difficulties associated with the dating of archaeological finds assemblages recovered from texture contrast soil profiles (eg, Dean-Jones & Mitchell, 1993), the identification and dating of features of undoubted or probable Aboriginal origin (eg, hearths, heat treatment pits, ground ovens) will also prove critical.

While acknowledging the small sample size, as well as the limited chronological resolution that it offers, the technological and typological characteristics of the study area's lithic assemblage offers some insight into the antiquity of Aboriginal occupation within the study area. As highlighted in Section 5, McCarthy's (1967) ESR remains, with some modification, the dominant chronological framework for Aboriginal occupation of the Hunter Valley. 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. 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, and the presence/absence of edge-ground hatchet-heads are also relevant.

Noting the interpretive difficulties posed by the so-called 'palimpsest problem', technological and typological affinities between the stone artefact assemblage identified during the current excavation (which includes both Bondi points and edge-ground hatched heads/axes) and other Hunter Valley assemblages, some of which have associated radiometric dates, are suggestive of a broad Middle to Late Bondaian date (i.e., 4000 BP to European contact).

D R A F T

9.0 Significance Assessment

9.1 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 50). 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 50 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).

9.2 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).

9.2.1 Rarity and Representativeness

Rarity and r*epresentativeness* 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 region[14]. 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.

9.2.2 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 substantiative 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).

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.

[14] 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).

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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 study area and its nature and condition, demonstrating connectedness was not possible for this assessment.

9.2.3 Identification Process for Current Assessment

For the current assessment, information on the scientific values of the study area has been obtained through a review of existing environmental and archaeological data for the study area, as detailed in Sections 4.0 and archaeological survey across the study area described in Section 7.2.

9.2.4 Assessment of Scientific Significance

An assessment of the scientific significance of the 23 Aboriginal archaeological sites within the study area is presented in Table 51 below and shown on Figure 39. Following AMBS (2009b, 2009c), a scored ranking system has been employed for the current assessment, with overall significance ratings based on a cumulative ‘score’ derived from a ranked assessment of the research potential, rarity and representativeness of each site on a local and regional scale. Rankings for each of the criteria discussed above are associated with one of three potentials scores: low (score = 1), moderate (score = 2) and high (score = 3). Overall significance ratings are defined as follows:

- Low significance: score 10-15
- Moderate significance: score 16-25
- High significance: score 26-30.

Table 51 Scientific significance assessment

Site	Type	Rarity	Representative-ness	Integrity	Complexity	PAD	Research potential	Overall Significance
BAYS PAD19	Subsurface scatter	1	1	1	1	1	1	Low
BAYS PAD16	Open artefact site and subsurface scatter	1	1	1	1	1	1	Low
BAYS AS and PAD15	Open artefact site and subsurface scatter	1	1	2	2	1	1	Low
BAYS AS and PAD 10	Open artefact site	1	1	2	1	1	1	Low
BAYS PAD18	Open artefact site	1	1	1	1	1	1	Low
BAYS AS and PAD11	Open artefact site and subsurface scatter	1	1	1	1	1	1	Low

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Site	Type	Rarity	Representative-ness	Integrity	Complexity	PAD	Research potential	Overall Significance
P11;Plashett	Open artefact site	1	1	1	1	1	1	Low
BAYS AS and PAD07	Open artefact site	1	1	1	1	1	1	Low
BAYS AS and PAD05	Open artefact site and subsurface scatter	1	1	2	1	1	1	Low
BAYS AS and PAD03	Open artefact site and subsurface scatter	1	1	1	1	1	1	Low
P9;Plashett	Open artefact site and subsurface scatter	1	1	1	2	1	2	Low
P8; Plashett	Open artefact site and subsurface scatter	1	1	1	1	1	1	Low
BAYS AS and PAD02	Open artefact site and subsurface scatter	1	1	1	1	1	1	Low
BAYS IF03	Open artefact site	1	1	1	1	1	1	Low
BAYS IF02	Open artefact site	1	1	1	1	1	1	Low
BAYS IF01	Open artefact site	1	1	1	1	1	1	Low
BAYS AS06	Open artefact site	1	1	1	1	1	1	Low
P6;Plashette;	Open artefact site	1	1	1	1	1	1	Low
P7;Plashette;	Open artefact site	1	1	1	1	1	1	Low
P10;Plashette;	Open artefact site	1	1	1	1	1	1	Low
Wisemans Creek OS1	Open artefact site	1	1	1	1	1	1	Low
BAYS IF04	Open artefact site	1	1	1	1	1	1	Low
BAYS AS04	Open artefact site	1	1	1	1	1	1	Low

9.3 Sites of Low Scientific Significance

All 23 sites have been assessed as being of low scientific significance (Table 51). Identified open artefact sites of sites of low scientific significance within the study area exhibit one or more of the following general characteristics:

- Small assemblage sizes. Five are isolated artefacts;
- Formed objects (ie., cores and retouched implements) are rare or absent in associated lithic assemblages;
- Associated lithic assemblages contain a restricted range of locally and regionally common raw materials;
- Generally poor integrity ;
- Limited or no potential for associated subsurface deposit(s);
- Limited or no research potential; and
- Demonstrably low subsurface artefact densities on a local and regional scale.

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9.4 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 assessment is provided below with greater detail provided in the CVR (Appendix B).

9.4.1 Cultural Landscape

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 are important landscape features, such as watercourses and high points in the landscape, as well as the Aboriginal objects (i.e., stone artefacts) identified during the archaeological survey and test excavation for the Project. Landscape features, as well as Aboriginal sites, are often associated with stories or songs and form links along songlines or pathways.

9.4.2 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 study area. 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).

Further discussion on this is provided in the CVR in Appendix B.

9.5 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 study area itself is assessed as having low historical significance. No evidence of post-contact Aboriginal occupation has been identified within the study area, neither 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 on RAP was employed for some time at Liddell.

9.6 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).

9.7 Statement of Significance

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Figure 39 Significance assessment

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10.0 Impact Assessment

10.1 Summary of Proposed Impacts

As described in Section 1.2, AGL's WOAOW project includes the following upgrades to the Bayswater Power Station ():

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity;
- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam;
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system;
- Increasing coal ash recycling activities to produce up to 1,000,000 tonnes per annum of ash derived product material and reuse of coal ash;
- Upgrades to existing fly ash harvesting infrastructure including the installation of weighbridges, construction of a new 240 tonne silo, tanker wash facility and additional truck parking;
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement;
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste;
- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land; and
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of aging pipelines, vegetation clearing associated with maintaining existing infrastructure, including along existing pipeline corridors as is necessary

Aboriginal sites within the study area would be impacted by the above upgrades resulting in their destruction.

10.2 Impacts to Identified Aboriginal Sites

As discussed in Section 8.22, a total of 23 Aboriginal archaeological sites, comprising 22 open artefact sites (i.e., artefact scatters and isolated artefacts), seven with deposit and one subsurface artefact site have been identified within the study area.

It is noted that stone quarry sites SC-QS-1 (37-2-1955, not located) and SC-QS-2 (37-2-1954) assessed as having high significance would not be directly impacted by the Project. Table 52 presents a list of impacted sites.

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Table 52 Impacted sites

AHIMS Site ID	Site type	Site name	Easting (GDA 56)	Northing (GDA 56)	Type of Harm	Degree of Harm	Consequence of Harm
37-2-0048	Open Artefact Site; Deposit	Pikes Gully;	309541	6413175	Directly Harmed	Whole	Total Loss of Value
37-2-0553	Open Artefact Site	P6;Plashette;	305655	6410309	Directly Harmed	Whole	Total Loss of Value
37-2-0554	Open Artefact Site	P7;Plashette;	305605	6410289	Directly Harmed	Whole	Total Loss of
37-2-0555	Open Artefact Site; Deposit	P8;Plashette;	305585	6410439	Directly Harmed	Whole	Total Loss of Value
37-2-0556	Open Artefact Site	P9;Plashette;	305425	6410419	Directly Harmed	Whole	Total Loss of
37-2-0557	Open Artefact Site	P10;Plashette;	305275	6410469	Directly Harmed	Whole	Total Loss of Value
37-2-0558	Open Artefact Site	P11;Plashette;	306255	6410739	Directly Harmed	Whole	Total Loss of Value
37-2-6040	Open Artefact Site	Wisemans Creek OS1	305358	6410456	Directly Harmed	Whole	Total Loss of Value
37-2-6134	Open Artefact Site; Deposit	BAYS AS and PAD02	305008	6409878	Directly Harmed	Whole	Total Loss of Value
37-2-6135	Open Artefact Site; Deposit	BAYS AS and PAD15	309058	6412157	Directly Harmed	Whole	Total Loss of Value
37-2-6136	Open Artefact Site	BAYS IF04	305109	6410243	Directly Harmed	Whole	Total Loss of
37-2-6137	Open Artefact Site	BAYS IF03	304816	6409613	Directly Harmed	Whole	Total Loss of
37-2-6138	Open Artefact Site	BAYS IF02	304841	6409474	Directly Harmed	Whole	Total Loss of Value
37-2-6139	Open Artefact Site	BAYS IF01	304848	6409471	Directly Harmed	Whole	Total Loss of

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AHIMS Site ID	Site type	Site name	Easting (GDA 56)	Northing (GDA 56)	Type of Harm	Degree of Harm	Consequence of Harm
37-2-6141	Open Artefact Site; Deposit	BAYS AS and PAD05	305737	6410932	Directly Harmed	Whole	Total Loss of Value
37-2-6142	Open Artefact Site	BAYS AS and	307353	6412080	Directly Harmed	Whole	Total Loss of
37-2-6143	Open Artefact Site; Deposit	BAYS AS and PAD11	307483	6411740	Directly Harmed	Whole	Total Loss of Value
37-2-6144	Open Artefact Site	BAYS AS and	306341	6410671	Directly Harmed	Whole	Total Loss of
37-2-6145	Open Artefact Site	BAYS AS06	306099	6410662	Directly Harmed	Whole	Total Loss of Value
37-2-6146	Open Artefact Site	BAYS AS04	305057	6410707	Directly Harmed	Whole	Total Loss of
37-2-6147	Open Artefact Site; Deposit	BAYS AS and PAD03	305132	6410587	Directly Harmed	Whole	Total Loss of Value
37-3-0491	Open Artefact Site	BAYS PAD18 (NARDELL N2)	314105	6412289	Directly Harmed	Whole	Total Loss of Value
Not registered	Subsurface Artefact Scatter	BAYS PAD19	314533	6412083	Directly Harmed	Whole	Total Loss of Value

for these sites.

10.3 Impacts to Cultural Values

[TO BE COMPLETED)

10.4 Cumulative Impact Assessment

10.4.1 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.

10.4.2 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 study area with that of the surrounding region (study region), defined here as an arbitrary 20 x 20 km (400 km^2) area roughly centred on the study area; 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.

10.4.3 Known Resource

Alongside sites identified within the study area, 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 10.2, 23 previously identified artefact sites will be subject to direct impacts from proposed upgrades. AHIMS data obtained from the Heritage NSW in October 2020 indicate that the 23 directly impacted sites represent 1.7% of the valid extant open artefact resource of the study region, with searches of the AHIMS database returning 1,331 'Valid' open artefact sites and 1,174 destroyed or partially destroyed 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, all of which have been assessed as being of low scientific significance, alongside a consideration that there is a large amount of land within this region that has not been physically inspected for Aboriginal sites suggests that impact of this Project is to archaeological resource of the region is not significant.

10.4.4 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 study area 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 53).

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 53. 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 53 Land use analysis for study region (20 x 20 km)

Existing Land Use	Km²	%	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**	**99.9**	

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 53 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 proposed development 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 study area (i.e., 1.4 km² = areas of PAD) with that available in the search area (*c*.289.5 km²). On this basis, it can be stated that the Project will result in an approximate 0.48% decline in the region's potential open artefact resource. As such, it can be concluded that the impact of the Project on the potential Aboriginal archaeological resource of the region would not be significant.

With regards to the existence, outside of the study 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 Wisemans Creek, Pikes Creeek, Bayswater Creek and other unnamed creeklines in the region. On the basis of this evidence, it can be confidently concluded that land outside of the current study area but within the wider region contains a significant, as yet unidentified, open artefact site resource.

10.4.5 The Precautionary Principle

As indicated in Section 10.4.1, 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 study area and that this approach is reflected in our proposed management strategy.

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Figure 40 Impact Assessment

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11.0 Avoiding and Minimising Harm

This assessment finds that the Aboriginal heritage values of the study area rests principally with the Aboriginal archaeological sites identified within it. These sites attest to past Aboriginal use of the study area. As indicated in Section 10.0, proposed upgrade activities within the study area are anticipated to directly impact 23 Aboriginal archaeological sites.

Considering the nature, condition and significance of all 23 sites community collection is considered warranted for all surface sites. In making this recommendation, AECOM notes the following:

- All the sites have been assessed as of low scientific significance. This assessment has been made on the basis of the results of the test excavation program which recovered a deposit of limited complexity (i.e., common artefact types, no formed objects and common raw materials), rarity (i.e., common site type) and research potential (i.e., the site cannot contribute new knowledge or knowledge another site can/has); and
- Portions of similar landscapes outside the study area will offer opportunities for future research and conservation.

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12.0 Management Recommendations

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

- a review of previous archaeological investigations completed within and surrounding the study area;
- the results of the archaeological investigation described in Section 8.0;
- the significance and impact assessments detailed in Sections 9.0 and 10.0; and
- consultation with Registered Aboriginal Parties (RAPs).

12.1 Statutory Requirements

As indicated in Section 1.0, this Aboriginal archaeology and cultural heritage impact assessment forms part of a response to submissions received by AGL to their Environmental Impact Statement (EIS) which was prepared to accompany a Development Application for the Project in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (EP&A Act)..

This ACHAR documents the results of AECOM's assessment and has been compiled with reference to the 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).

12.2 Management Strategy

This assessment has identified Aboriginal heritage constraints across the study area including 23 Aboriginal archaeological sites, all comprising open or closed artefact sites (i.e., artefact scatters and isolated artefacts). The impact assessment undertaken in Section 10.0 has identified that all 23 artefact sites would be directly impacted by the project.

A management strategy to address the impacts of the Project on the known Aboriginal heritage values of the study area is provided below. It is recommended that this strategy be included in an Aboriginal Cultural Heritage Management Plan (ACHMP) for the Project, prepared in consultation with RAPs, and to the satisfaction of the Heritage NSW and the DP&E. Subject to the grant of a Development Consent under Division 4.7 of the EP&A Act, this ACHMP will guide the management of the known and potential Aboriginal archaeological resource of the Project area, as well as identified cultural values.

12.2.1 Archaeological Salvage Program

An archaeological salvage program for all impacted surface sites should be completed for the Project prior to the commencement of any ground disturbance within the study area and following Development Consent. The salvage program should include community collection of all surface aboriginal objects/sites impacted by the project. Surface collection is considered an appropriate and effective mitigation option for these sites given their content and level of scientific significance. Table Table 54 provides a list of sites to be surface collected.

The community collection works should be undertaken by a qualified archaeologist and RAP field representatives. A short report should be prepared detailing the results of the community collection. Aboriginal Site Impact Recording (ASIR) forms for all salvaged sites should be submitted to the Heritage NSW at the completion of the collection.

In accordance with Requirement 16B of the Code of Practice, all stone artefacts recovered from the study area as part of the test excavation program detailed in this report will be stored temporarily at AECOM's head office (Level 8, 420 George Street, Sydney) while they are analysed. Following Project Approval, these artefacts will be combined with those collected as part of the community collection and stored at the Bayswater Power Station site. Details surrounding the long term management of Aboriginal objects recovered will be outlined in the Project's ACHMP with consultation undertaken with RAPs over the proposed long term management of these items.

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12.2.2 Previously Unrecorded Aboriginal Archaeological Evidence

Provisions regarding the appropriate management action(s) for previously unrecorded Aboriginal archaeological evidence identified within the study area throughout the operational life of the Project should be incorporated into the ACHMP. Management action(s) will vary according to the type of evidence identified its significance (both scientific and cultural) and the nature of potential impacts.

The unanticipated finds protocol should include the following steps if an Aboriginal object is identified or harmed:

1. Immediately cease all work at the particular location.
2. Secure the area to avoid further harm to the Aboriginal object.
3. Seek advice from a qualified archaeologist on appropriate management considering the nature, type and significance of the object.
4. Should it be determined the object is Aboriginal, it should be registered on the Heritage NSW's AHIMS database as soon as practicable.
5. The following management should apply for previously unrecorded objects identified within the study area:
    a. **Open artefact sites** (i.e., isolated artefacts and artefact scatters) assessed of low significance subject to Project related direct surface impacts (i.e., excluding subsidence related impacts) should be subject to surface collection. Sites assessed of moderate significance should be subject to surface collection and other forms of mitigation (i.e., detailed recording, test or open area excavation), regardless of impact type (i.e., including direct surface and subsidence related). Management of sites assessed of high significance would be determined through consultation with AGL and RAPs;
    b. **Scarred trees** identified within the study area subject to project related impacts would be managed through discussions between a qualified archaeologist, AGL and RAPs and may include removal and relocation;
    c. **Grinding grooves** identified within the study area subject to project related impacts would be managed through discussions between a qualified archaeologist, AGL and RAPs and may include removal and relocation;
    d. **Other sites** (i.e., stone quarries, ochre quarries, stone arrangements, engravings) identified within the study area subject to project related impacts would be managed through discussions between a qualified archaeologist, AGL and RAPs.
6. A record of the find and management completed should be included in annual reporting.
7. If the site is within the surface development area (i.e., would be impacted), an ASIR form would be completed and submitted to Heritage NSW, prior to disturbance.

12.2.3 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 following standard procedure (New South Wales Police Force 2015; NSW Health 2013) should be followed.

1. all work in the vicinity of the remains should cease immediately;
2. the location should be cordoned off - work can continue outside of this area as long as there is no risk of interference to the remains or the assessment of the remains;
3. where it is reasonably obvious from the remains that they are human, the Project Manager (or a delegate) should inform the NSW Police by telephone (prior to seeking advice from a forensic specialist);
4. where uncertainty over the origin (i.e., human or non-human) of the remains exists, a physical or forensic anthropologist should be commissioned to inspect the exposed remains in situ and make a determination of origin, ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern);

5. if the remains are identified as modern and human, notify NSW Police;
6. if the remains are identified as pre-contact or historic Aboriginal, notify the Heritage NSW using their Environment Line (131 555); and
7. if the remains are identified as historic (non-Aboriginal), notify the NSW Heritage Division.

An Aboriginal community representative must be present where it is reasonably suspected burials or human remains may be encountered. If human remains are unexpectedly encountered and they are thought to be Aboriginal, the Aboriginal community must be notified immediately.

Recording of Aboriginal ancestral remains must be undertaken by, or be conducted under the direct supervision of, a specialist physical anthropologist or other suitably qualified person.

Archaeological reporting of Aboriginal ancestral remains must be undertaken by, or reviewed by, a specialist physical anthropologist or other suitably qualified person, with the intent of using respectful and appropriate language and treating the ancestral remains as the remains of Aboriginal people rather than as scientific specimens.

12.2.4 AHIMS Site Cards

AHIMS site cards have been completed and submitted to the Heritage NSW for all newly recorded sites within the study area.

In the event that a previously unidentified Aboriginal site is discovered within the study area 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.

12.3 Summary of Management Mitigation Measures

Table 54 presents a summary of management mitigation measures for identified Aboriginal sites within the study area.

Table 54 Summary of mitigation measures

Site Name	AHIMS	Scientific Significance	Updated site type	Management
BAYS PAD19	Not registered	Low	Subsurface scatter	ASIR
BAYS PAD16	37-2-0048	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS AS and PAD15	37-2-6135	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS AS and PAD 10	37-2-6142	Low	Open artefact site	Community collection/ASIR
BAYS PAD18 (NARDELL N2)	37-2-0491	Low	Open artefact site	Community collection/ASIR
BAYS AS and PAD11	37-2-6143	Low	Open artefact site and subsurface scatter	Community collection/ASIR
P11;Plashette;	37-2-0558	Low	Open artefact site	Community collection/ASIR
BAYS AS and PAD07	37-2-6144	Low	Open artefact site	Community collection/ASIR
BAYS AS and PA 05	37-2-6141	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS AS and PA 03	37-2-6147	Low	Open artefact site and subsurface scatter	Community collection/ASIR
P9;Plashette;	37-2-0556	Low	Open artefact site and subsurface scatter	Community collection/ASIR
P8;Plashette;	37-2-0555	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS AS and PAD02	37-2-6134	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS IF03	37-2-6137	Low	Open artefact site	Community collection/ASIR
BAYS IF02	37-2-6138	Low	Open artefact site	Community collection/ASIR
BAYS IF01	37-2-6139	Low	Open artefact site	Community collection/ASIR
BAYS AS06	37-2-6145	Low	Open artefact site	Community collection/ASIR
P6;Plashette;	37-2-0553	Low	Open artefact site	Community collection/ASIR

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Site Name	AHIMS	Scientific Significance	Updated site type	Management
P7;Plashette;	37-2-0554	Low	Open artefact site	Community collection/ASIR
P10;Plashette;	37-2-0557	Low	Open artefact site	Community collection/ASIR
Wisemans Creek OS1	37-2-6040	Low	Open artefact site	Community collection/ASIR
BAYS IF04	37-2-6136	Low	Open artefact site	Community collection/ASIR
BAYS AS04	37-2-6146	Low	Open artefact site	Community collection/ASIR

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Appendix A

Jacobs (2019) ACHAR

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Appendix A Jacobs (2019) ACHAR

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Appendix B

Cultural Values Report

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Appendix B Cultural Values Report

AGL Macquarie Pty Ltd
30-Oct-2020

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Bayswater Power Station WOAOW Project

Aboriginal Cultural Values Report

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

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Bayswater Power Station WOAOW Project

Aboriginal Cultural Values Report

Client: AGL Macquarie Pty Ltd

ABN: 18 167 859 494

Prepared by

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Rev	Revision Date	Details	Authorised Name/Position Signature

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1.0 Introduction & Background

1.1 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Ltd (AGL) to complete an Aboriginal cultural heritage assessment for the prepared for the Bayswater Water and Other Associated Operational Works (WOAOW) project (the Project), located south of Muswellbrook, within the local government areas (LGAs) of Muswellbrook and Singleton, New South Wales (NSW) (Figure 1). This assessment forms part of a response to submissions received by AGL on their Environmental Impact Statement (EIS) which was prepared to accompany a Development Application for the Project in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (EP&A Act). This Cultural Values Report (CVR) is an appendix to the Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared for the project.

This CVR documents the results of AECOM's consultation with Registered Aboriginal Parties (RAPs) as well a background historical research. It has been prepared in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Department of Environment, Climate Change and Water [DECCW] 2010) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (Heritage NSW 2011a), with reference to *The Burra Charter: Australian ICOMOS Charter for Places of Cultural Significance* (the Burra Charter) (Australia International Council on Monuments and Sites [ICOMOS] 2013).

1.2 Project Overview

AGL's WOAOW project includes the following upgrades to the Bayswater Power Station ():

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity;
- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam;
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system;
- Increasing coal ash recycling activities to produce up to 1,000,000 tonnes per annum of ash derived product material and reuse of coal ash;
- Upgrades to existing fly ash harvesting infrastructure including the installation of weighbridges, construction of a new 240 tonne silo, tanker wash facility and additional truck parking;
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement;
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste;
- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land; and
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of aging pipelines, vegetation clearing associated with maintaining existing infrastructure, including along existing pipeline corridors as is necessary.

1.3 Study Area

The study area for this assessment includes six spatially discrete irregular shaped parcels of land encompassing the proposed ash line, ash dam augmentation, coal handling plant water and wastewater infrastructure upgrades, salt cake landfill, sludge line clearing, pipe clearing and borrow pits. Combined, these areas produce a study area of c. 731.7 ha commencing with the augmentation of the ash dam in the northern portion of the power station site and extending southward to within 1.2 km of the Hunter River. Land within the study area has historically, been used for both grazing and for power station infrastructure with much of it grossly disturbed land.

1.4 Report Objectives

The overarching objectives of this CVR are as follows:

- to identify the Aboriginal cultural values of the study area by way of background research, archaeological survey, test excavation and consultation with Registered Aboriginal Parties (RAPs); and
- to compile a CVR that will assist the Secretary of the Department of Planning and Environment (DP&E) in their assessment of the current State Significant Development (SSD) application.

1.5 Project Team

Geordie Oakes (Principal Heritage Specialist, AECOM) and Dr Darran Jordan (Principal Heritage Specialist, AECOM) were the primary authors of this report.

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

Geordie holds a Bachelor of Arts (Honours) degree and doctorate in historical/prehistoric Archaeology from Sydney University. Darran has over 14 years of Australian Aboriginal cultural heritage management experience.

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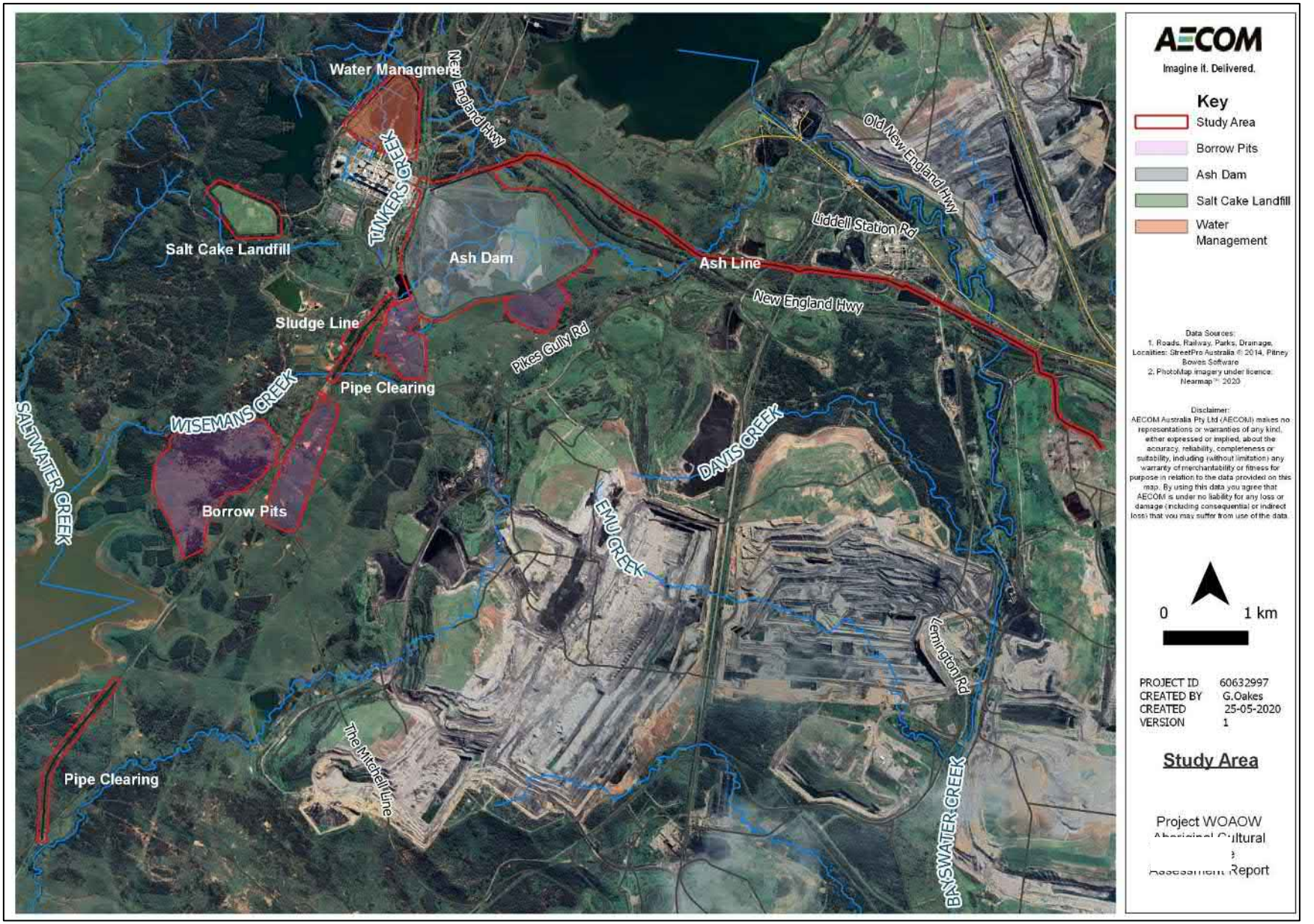
Figure 1 Study area



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2.0 Methodology

This CVR was prepared utilising information provided by RAPs in addition to undertaking background historical research to provide context for identified cultural values. Key tasks completed for the ACHAR, which has informed this CVR, (this assessment) include:

- Consultation with RAPs to identify cultural values;
- Survey and test excavation of the study area with RAPs;
- Review of archaeological literature for the Upper Hunter Valley;
- Review of ethno-historical literature for the Hunter Valley;
- Searches of relevant historic heritage registers and lists; and
- Background research including reviews of relevant reports, publications, historic aerials and parish maps including:
    - State Library of NSW/Mitchell Library;
    - Trove newspaper archives and the Spatial Information Exchange (SIX) maps; and
    - State archives of NSW.

2.1 What are Aboriginal Cultural Values?

Aboriginal cultural values comprise of any place or object of significance to Aboriginal people resulting from their traditions, observances, lore, customs, beliefs and history. These values, which may comprise physical (tangible) or non-physical (intangible) elements are evidence of the lives and existence of Aboriginal people prior to European settlement through to the present. They include objects used by Aboriginal people such as stone tools, art sites and ceremonial or burial grounds as well as more contemporary elements such as old mission buildings, massacre sites and cemeteries which all form part of a broader cultural landscape (Heritage NSW 2011a).

Aboriginal cultural values also relate to the connection and sense of belonging that Aboriginal people have with the landscape and each other. These values are not only confined to sites but also include memories, storylines, ceremonies, language, ‘ways of doing things’, passing on knowledge and looking after cultural traditions and places (Heritage NSW 2011a).

Aboriginal cultural values provide a tangible link between the past and present - it is an essential part of Aboriginal people’s cultural identity, connection and sense of belonging to Country (Heritage NSW 2011a).

2.2 What is Cultural Significance

Assessing the cultural significance of a place or object requires defining the reason why a place is culturally important. This process can be difficult and emotive. However, it is only after understanding which places are culturally significant and why, can decisions be made about managing them. Once all the reasons for a place’s importance are set out, it is possible to assess any changes that may be caused by a proposed activity. This helps ensure any changes do not damage, diminish or remove the reasons for a place’s importance (Heritage NSW 2011a).

In Australia, the primary guide to the assessment of cultural significance is *The Burra Charter: 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 1). 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).

Table 1 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).

2.3 Aboriginal Cultural Landscape

The following is taken from DECCW's Fact Sheet 2 – What is an Aboriginal cultural landscape? (DECCW 2010). An Aboriginal cultural landscape is 'a place or area valued by an Aboriginal group (or groups) as a result of their long and complex relationship with that land. It can embody their traditional knowledge of spirits, places, land uses, and ecology. Material remains of the association may be prominent, but will often be minimal or absent' (Buggey 1999).

The landscape scale of cultural heritage is similar to the concept of 'whole-of-landscape' in ecosystem conservation – just as there is connectivity between all parts of natural ecosystems (e.g. plants, animals, soils and water) there is connectivity between cultural objects and places through past human behaviour patterns. The cultural landscape concept emphasises the landscape-scale of history and the connectivity between people, places and heritage items. It recognises that the present landscape is the product of long-term and complex relationships between people and the environment. Aboriginal cultural landscapes are comprised of:

1. Significant biodiversity and a diverse range of ecological systems and associations, all of which contributed to the continuing existence of Aboriginal peoples in the region over many thousands of years, and which are valued in different ways by Aboriginal communities today.
2. Material remains of this continuing occupation in the form of a diverse array of Aboriginal sites and places known to the Aboriginal communities, some of which will be recorded on the Heritage NSW Aboriginal Heritage Information Management System (AHIMS).
3. Extensive historical records from 1788 through to today which record observations of Aboriginal people and lifestyles, wars, massacres, social and cultural events, population census, social interactions, language, etc., and which influence Aboriginal community values today.
4. An Aboriginal population made up of people who have traditional association and knowledge of the region, as well as others who live, work and play within the region, all of whom may attribute various values with the area, derived from the distant and recent past, through to the present day.

For Aboriginal people, the significance of individual landscape features is derived from their interrelatedness within the cultural landscape. This means features cannot be assessed in isolation and any assessment must consider the feature and its associations in a holistic manner. This may require a range of assessment methods and will always require the close involvement and participation of Aboriginal people (DECCW 2010).

2.4 Consultation Process

Aboriginal community consultation for the CVR was undertaken generally in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) (Consultation Requirements), clause 80C of the NSW *National Parks and Wildlife Regulation 2009* and *Engage Early* (Australian Government Department of the Environment 2016). Further detail on the consultation completed for the project is provided in Section 3.0 of the ACHAR.

2.4.1 Notification and Registration

Stage 1 included identifying (through consultation with regulatory agencies), notifying and registering of Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the study area.

A total of 26 Aboriginal organisations registered an interest in the Project. Summary information on all RAPs, including registration dates, is provided in Table 2.

Table 2 Registered Aboriginal Parties

Organisation	Contact Person
Didge Ngunawal Clan	Paul Boyd
WLALC	Noel Downs
Aboriginal Native Title Elders Consultants	Margaret Mathews
Wattaka Wonnarua Cultural Consultancy Services	Des Hickey
Ungooroo Aboriginal Corporation	Allen Paget
Tocomwall Pty Ltd/ Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People (PCWP)	Scott Franks
AGA Services	Ashley Sampson
Cacatua Culture Consultants	George Sampson
Lower Hunter Wonnarua Cultural Services	Tom Miller
Murra Bidgee Mullangari	Ryan Johnson
Gidawaa Walang Cultural Heritage Consultancy	Craig Horne
Yinarr Cultural Services	Kathie Steward Kinchela
Merrigarn	Shaun Carrol
Muragadi	Jessie Carrol-Johnson
A1 Indigenous Services	Carolyn Hickey
Widescope Indigenous Group	Steven Hickey
Kauwul Wonn1	Arthur Fletcher
Aliera French Trading	Aliera French
Crimson-Rosie	Jefferry Mathews
Hunter Traditional Owner	Paulette Ryan
Hunter Valley Cultural Surveying	Luke Hickey

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Organisation	Contact Person
Jarban and Mugrebea	Les Atkinson
Lower Wonnaruah Tribal Consultancy	Barry Anderson
Nunawanna Aboriginal Corporation	Colin Ahoy
Wonnarua Nation Aboriginal Corporation	Laurie Perry

2.4.2 Presentation of Information about Project

For the current assessment, presentation of information about the study area and proposed development was provided to RAPs as part of the registration of interest process. Basic information on the proponent and proposed development was included in the EOI letter and as part of the methodology issued to all RAPs.

2.4.3 Gathering Information about Cultural Values

For the assessment consultation with RAPs regarding the cultural heritage values of the study area included:

- A request with the draft ACHAR and CVR methodologies for any initial comments regarding the Aboriginal cultural heritage values of the study area;
- Discussion of cultural heritage values during fieldwork;
- Offers made to RAPs for paid private interviews and site visits;
- Phone calls to all RAPs to discuss cultural values during production of the report; and
- Provision of the draft ACHAR to all RAPs for comment prior to finalisation.

2.4.1 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 methodology for the cultural heritage assessment to RAPs and that RAPs be given a minimum of 28 days to review and provide feedback.

Jacobs (2019) provided a copy of the ACHAR methodology to all RAPs on 7 August 2019, allowing 28 days for RAPs to respond (Appendix A).

AECOM provided a copy of the test excavation methodology to all RAPs on 19 June 2020. RAPs were given a minimum of 28 days to review and provide feedback on this methodology with the closing date for comments on 17 July 2020.

Alongside the ACHAR methodology, a CVR methodology was issues to RAPs on 19 June 2020. RAPs were given a minimum of 28 days to review and provide feedback on this methodology with the closing date for comments on 17 July 2020. No responses were received on the CVR methodology.

2.4.2 Review of Draft ACHAR

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

In accordance with Section 4.4.2 of the Consultation Requirements, all RAPs were sent a draft of Jacobs' (2019) ACHAR on 24 October 2019 for review and comment (either by email or mail). Jacobs' ACHAR states the following:

"One written submission was received by Jacobs. The submission was from A1 Indigenous Services. The submission stated that A1 Indigenous Services support the draft ACHAR, and wish to be included in any future fieldwork and meetings associated with the project. The submission did not recommend any changes be made to the ACHAR" (Jacobs, 2019:15).

Likewise, all RAPs were sent a draft of CVR on [xx-xx-xx] for review and comment.

[TO BE COMPLETED]

3.0 Identified Cultural Values

RAPs participating in the assessment identified the following cultural values as relevant to the study area:

- The cultural landscape;
- Watercourses;
- Violence and dispossession;
- High points in the landscape; and
- Archaeology in the study area;

A summary of discussions and background research around these values is provided below.

3.1 Bayswater Power Stations Site

Consultation feedback from RAP groups on the cultural values of the Bayswater Project area covered a number of different aspects and connections. The landscape itself was described as an important point of connection between the present Aboriginal community members and the past of their ancestors. Two particular aspects of it were singled out, being water courses and high points in the landscape, both cited as areas that would have been heavily utilised by Aboriginal people in the past. Regarding high points in the landscape, George Sampson from Cacatua Culture Consultants stated: “The creeks are important… You need to be on a lookout looking over it to really have a good look at it – the landscape itself. High areas would be good lookout places because they can see what’s coming around them.” Margaret Matthews from Aboriginal Native Title Elders Consultants described her own experience locating sites along water courses in this area: “I went out for the survey. At Bayswater we walked a fair way. What I could see out there, there is a lot of significant stuff out that way that we’ve come across. There was a little creek out there and we found a lot out that way, we did find a lot of stuff out there. I think there is a lot of good stuff out there, that’s my opinion but I don’t know what anyone else knows about there. It’s mostly all the creek lines and everything we’ve done along there.”

One important point that was made during consultation, however, was how much the landscape had changed over time. The impacts of vegetation clearance and earthworks for mining, stock grazing, the current Bayswater Power Station facility and associated infrastructure, had effectively removed many of the familiar signs within the landscape that would have spoken to Aboriginal people about the cultural values of the place. George Sampson from Cacatua Culture Consultants stated: “All that has changed out there so it’s hard to say what it would have been like.” As a result, it was the rediscovery of sites, predominantly artefact sites, that became a major focus for many of the RAP representatives. Artefacts were a tangible link to their ancestors, providing a physical footprint within the landscape that could directly connect them with their past.

Alan Paget of Ungooroo Aboriginal Corporation made this point, stating: “Regarding the landscape of that area though, what with the Ash Dam and the other developments out there, really for me the whole place has been disturbed by the Bayswater Power Station. With all that infrastructure and the earthworks that have happened, it has changed so much so really that cultural landscape for me is all gone. Even back when Liddell went in, back in the 1970s, they were putting in dams and doing all those earthworks. So, it’s all destroyed for me. It’s all utilities and infrastructure and that there now. So really, I am concerned with the artefacts but not so much the landscape.” The same issue of disturbance changing the landscape and removing cultural markers was raised by other RAP representatives as well. George Sampson from Cacatua Culture Consultants said: “There’s not much more I can talk about. It’s been disturbed,” commenting on mining stockpiles in the surrounding region by saying: “you’ve got more lookouts now because you’ve got all the mines! They’ve made lookouts nearly a thousand foot high!”

As a result the overriding consensus from RAP representatives was that cultural values in the landscape were most strongly represented by the artefact sites that had been identified. “I am concerned with the artefacts from the area. There are the surface sites and the artefacts that came up during the test excavation. I was working on the sieve during the testing and I saw there were some backed blades and artefacts. I am concerned with those and they certainly have cultural value,” stated

Alan Paget of Ungooroo Aboriginal Corporation. “To be honest I’m happy with what you’ve been doing out there and what we found on the fieldwork. All the artefacts from the testing we did. I think that’s the best thing, finding the sites that are out there and that, but apart from that I don’t have anything to add for cultural values for that area,” commented Paul Boyd from Didge Ngunawal Clan. “The sites are important… When I was working out there I was on the sieve so mostly what I got to see was the dirt that was brought back and the artefacts… I don’t know of any stories about the area. The cultural values are focussed on the sites, that’s exactly right,” stated George Sampson from Cacatua Culture Consultants. “Everything has been recorded already really. Other than knapping and the sites there’s not much you can say really. I’m a Traditional Owner in the Hunter and I’ve been over there once or twice. I think it was 1979 the first survey was done there. It has been a while,” Hunter Traditional Owner Paulette Ryan noted specifically about the Bayswater Project area.

The feedback from RAPs emphasised that the cultural values of the sites in this area went beyond the scientific and research significance that they afforded to learn about the past. As well as a link to the past for the community, they also afforded a very personal and often emotional connection for an individual to their own ancestors. Margaret Matthews from Aboriginal Native Title Elders Consultants raised this, describing her own experiences when identifying sites in the landscape during past surveys, stating: “I’ll tell you this, when you go to a mine and there’s a lot of Aboriginal stuff there you can see, you can have a good look around at the areas, and you can set it in your mind... You get a lot of feeling in you when you’re out there. As I said, I’m Aboriginal and you do get that feeling and there’s a lot of stuff out that way. A lot of places you get a lot of feelings of it, you just stand there and you look around and things like that. I do get some feelings of it all. You can tell, you feel like there are Aboriginal people looking at you, you know. Because I like looking at their stuff, how they survived in them days, you know. That’s what I go for, I look for all that. I like looking at a lot of stuff like that… With Bayswater, I just went out for a week and that was it. We done what we had to do... As I said, you can find some significant places and you get the feeling of it all, you know. Well I do, I don’t know about anyone else but I do. And you just stand there and you just have a good look around and that. But as I said, that’s my opinion of everything. I can’t read other people’s minds. There was sites along that creek. As I said, you do get all that feeling from it. But as I said, I don’t know about anyone else, but I get that feeling.”

The importance of artefact sites though was not just described as a connection to the past, but also was described as a way to teach others in the contemporary community about Aboriginal culture and history in the present. Margaret Matthews from Aboriginal Native Title Elders Consultants found this particularly important, noting: “Artefacts is my main thing because I’ve got a cabinet set up in the Council up here with all different sorts of artefacts and everything all in it. The Council bought me a nice cabinet to put everything all in, a display cabinet and I show the kids and everything when they used to come up to Council. But as I said, artefacts is my main thing. I love looking at stuff like that, artefacts, you know, all different stuff. Especially what they used to use and do to survive and everything. I tell you, they were pretty brainy people, they knew how to make things… A lot of kids are interested in a lot of things now, these days, and the things that I had in that cabinet they would stand there just looking at them. You know, they were very nice. Yeah, kids asking questions and all that, it’s all the school kids and high school kids and things like that. They have that interest in a lot of stuff now. They never used to years ago, but now they are very interested”.

Alan Paget of Ungooroo Aboriginal Corporation also described traditional artefact making skills being demonstrated by the contemporary Aboriginal community as a way of teaching people about Aboriginal cultural values. “Sometimes with Noel Downs and Glen Morris from the Land Council they might have an instruction day or a Site Officer’s course to show them how to knap a stone,” he recalled. “Not far from there is Mount Arthur and they did one at Mount Arthur in 1998, had a knapping school there.”

Although the changed landscape in the Bayswater Project area meant that there was a higher focus on artefact sites, water courses and elevated areas to connect to the past, it was also stressed during consultation that these sites and the Bayswater Project area was also part of a much larger cultural landscape. As such, connections to the wider cultural values of the surrounding region were also noted as important, the context being found for many through inter-site relationships across the region. Scott Franks from Tocomwall stressed the importance of this in relation to a quarry site located to the south of the Bayswater Project area. Although outside of the Project area, Franks stated that the quarry was the source of silcrete that would have been supplying the Bayswater area, directly

connecting the sites at this location to a much larger cultural landscape. Carolyn Hickey from A1 Indigenous Services noted the same thing, describing the connection the sites in the Project area have both to the quarry and to how people moved across and used the wider region in the past, stating: "The stories I have been told from family regarding this Project area, is that it lies directly in the middle of a major gathering area, this location sits in the middle of a song line (traveling route), these lands were used as a travel line between the north and south of the Hunter Region, in that line there was also a stone quarry for tool and weapon making. This area was also used as a gathering area, ceremonies and a central point between clan groups."

George Sampson from Cacatua Culture Consultants also described the heritage that was still to be found in the wider region that contained the Bayswater Project area, stating: "Where the culture is unreal is especially between the Golden Highway and the New England Highway, you have a look and all that area is so rich in Aboriginal culture… You've got the Golden River, you've got the Hunter River… I don't know what's this side. You've got Bayswater and all those creeks, you're too far away from them, you're sort of back in amongst that area away from where all the really good stuff is."

It was also pointed out that this region was one where there had been conflict and violence, as European settlement spread and Aboriginal people were cut off from their traditional resources and stopped from participating in cultural practices. Scott Franks from Tocomwall cited archival evidence of a Lieutenant Lowe having recorded a deposition regarding forming a posse for the purpose of massacring Aboriginal people from Mount Arthur to Ravensworth. Carolyn Hickey from A1 Indigenous Services also mentioned the violence of this area's past, stating: "The only stories I know of after the European settlement is about a hanging tree in the project area and a story about the two brothers and a farmer, I am a little unsure if it's in or near the project area."

It is also important to note that connections to the area are also developed in the present for many Aboriginal community members. Where there are gaps caused by the disruption of cultural knowledge transmission caused by European violence and dispossession, the opportunity to return to areas of traditional country and rediscover cultural footprints in the landscape through participation in survey and test excavation is something that Aboriginal community members have noted to be a positive experience. Evidence of the Aboriginal past is very much a part of the contemporary landscape, and access to find it has allowed for new connections to be forged just as it provides material that can be used to teach others how and why this "always was, always will be Aboriginal land", as the NAIDOC 2020 theme states. Carolyn Hickey from A1 Indigenous Services made this point as well, stating of the region containing the Project area that: "This is still a very culturally significant location to the Indigenous people, there is so much heritage to be found here, heritage that is still unattainable to the Aboriginal people because it is still owned by private enterprise. This is a location the Indigenous people would like to have access to, so they may preserve any heritage that will be found."

In the present, teaching through showing artefacts and demonstrating how they are created, has raised awareness of Aboriginal cultural heritage, just as taking part in survey and test excavation has led to rediscovery, learning opportunities and new connections. New connections have also been formed as people move through and interact with the changed landscape of the contemporary world. As Alan Paget of Ungooroo Aboriginal Corporation commented: "In terms of a personal connection to the area, I used to work at Liddell back in the 1980s. That's not a connection really for cultural reasons, but that's my personal history. Back in 1980 that was livelihood… That's a bit of history. I've talked to Jane-Delaney John about this, she always says that's part of your history. You're living in the here and now. You can't go back 200 years and talk about it, you didn't live then so how can you talk about that, other than what you get by word of mouth or what you can get out of text-books. That's all I can give you."

The evidence of the past, connections through sites and landscape, as well as interactions in the present all attest to the ongoing strength and resilience of Aboriginal people in this area. Cultural values continue to be taught, connections continue to be made and knowledge continues to be shared in the present, demonstrating that cultural values are not a relic of past times in this area. Instead, cultural values are present and alive today and continue to be kept vital through the actions of contemporary Aboriginal people. They provide a direct link from themselves to their ancestors, sharing the cultural values that link from the Aboriginal pioneers of this area's past to the contemporary community, who remain active in this area to this very day

3.2 The Hunter Valley Cultural Landscape

As discussed in Section 2.3, an Aboriginal cultural landscape is 'a place or area valued by an Aboriginal group (or groups) as a result of their long and complex relationship with that land. It can embody their traditional knowledge of spirits, places, land uses, and ecology. Material remains of the association may be prominent, but also may be absent. The World Heritage Convention of United Nations Educational, Scientific and Cultural Organization (UNESCO) suggest that a cultural landscape is one that combines works of nature and those of humankind and express a long and intimate relationship between people and their natural environment.

Aboriginal people have occupied the Hunter Valley region for thousands of years and have a strong connection to the local landscape. They will have moved across the Hunter Valley landscape utilising local landmarks as guides and in doing so creating an interconnecting network of pathways that link the natural environment with resource areas, camping grounds and ceremonial sites together. This connection, created prior to European encroachment, has been maintained and built on since that time.

Aboriginal pathways across the Hunter Valley landscape will have followed ridgelines, creeklines and other landscape features criss-crossing the landscape into places where neighbouring groups met up to trade, for social gatherings or to act out traditional ceremonies. Pathways used by Aboriginal people in the area may retain evidence of use in the form of scarred trees, middens, artefact sites, burials and rock art sites. The relationship between these sites, places and landscape features, including their views are integral elements in the cultural landscape. Elevated landscape positions or vantage points can provide line of sight between features which in themselves have cultural significance.

Previously identified pathways within the Hunter Valley as noted in Heritage NSW's *Pathways Across the Hunter a Cultural Journey* (Heritage NSW 2011b:15) includes a pathway from Muswellbrook travelling through the Goulburn River Valley to Nullo Mountain providing access over the Great Dividing Range and linking the Muswellbrook region to the Cudgegong River and the Liverpool Plains (Wiradjuri Country). Offering a permanent water source, the Goulburn River Valley would have been an ideal pathway, with archaeological evidence suggesting it was commonly utilised (Heritage NSW 2011b:15).

Alongside the Goulburn River Valley and Nullo Mountain, other areas of identified significance include Murrumbo Gap, Mt Dangar, Apple Tree Aboriginal area, Cassilis, Merriwa and Dunns Swamp (Heritage NSW 2011b:16). From Dunns Swamp, pathways likely went across the Wollombi and down to the Putty Road through Howes Valley to Bucketty. Growee Gulf to the Goulburn River has also been highlighted as a potential pathway with easy access and to a permanent water source. Other important sites and features found across the Hunter Valley that would have formed nodes linking pathways together include Mount Yengo, Biame Cave in Milbrodale, the Lizard Rock at Laguna and Burning Mountain at Wingen (Heritage NSW 2011b:16).

Biame Cave at Milbrodale shows an artistic representation depicting Biame the 'Creator' with outstretched arms. The site has been listed on the State Heritage Register (SHR) where the listing explains that Biame Cave is linked to the Creation story, country and totem (the Eagle) of the Wonnarua people, and is interconnected with numerous other Aboriginal cultural and heritage sites and landscapes throughout the Hunter Valley and NSW (SHR 2019).

Mount Yengo located in Yengo National Park west of Wollombi is likewise listed on the SHR. Mount Yengo is an important spiritual and ceremonial site for local Aboriginal people. It is the place where from which Biame jumped back up to the spirit world after he had created all of the mountains, lakes, rivers and caves in the area. Biame flattened the top of Mount Yengo when he jumped skyward and the flat top is still visible today (SHR 2019).

Lizard Rock at Laguna is said to be the birthplace of a giant lizard with a yellow rock considered to be the Lizard's head with its body being the ridgeline and an arch on the rock said to be the lizards eye. The lizard or goanna is said to protect Wonnarua Country, occupying a lookout between Broke and Milbrodale (Heritage NSW 2011b:18).

The story of Burning Mountain and the southern rock face in nearby Wingen Main Nature Reserve describes how a raiding party from the Kamilaroi north of the Liverpool Ranges attempted to steal Wonnarua women for wives. However, friends of the Wonnarua, the Wiradjuri to the west told them of

the raid so they gathered their warriors and sent them to battle the raiding party. One of the warrior's wives sat on the top of a finger of sandstone waiting for her husband to return but he had been killed in the battle. She cried and her tears become flames that set the whole hill on fire. She asked Biame to take her life so Biame turned her to stone. As she turned to stone, she cried tears of fire, which rolled down the hillside and set Burning Mountain alight. It is said she can still be seen today, sitting and waiting on the southern rock face (Heritage NSW 2011b:19).

3.3 Aboriginal Dispossession and Resistance in the Mid to Upper Hunter Valley

Concerted Aboriginal resistance to European colonisation of the mid-to-upper Hunter Valley commenced in the mid-1820s, with the opening of the valley for free settlement in 1822 prompting a land rush that fairly rapidly placed the region's resident Aboriginal population and European colonisers at loggerheads with each other. Initially, at least, the relationship between the two parties appears to have been one of relative peace, with few reported incidents of violence prior to 1825[1] (Dunn, 2015: 188-95; Miller, 1985: 33). As Dunn (2015: 190-91) has observed with reference to the Hunter Valley more broadly:

> *Initially the establishment of European farms did not seriously impinge Aboriginal movements across the country. In the first months and in some cases years after establishment, few of the estates had fence lines or enclosed lands, with large areas of the surrounding forest remaining uncleared. Aboriginal food sources were maintained to some degree, with access to grey kangaroo, possum, bandicoot and other small mammals and reptiles still available in the forests and across the open grassland, as were the freshwater mussels from the river and its tributaries. Yams were a staple through the valley, growing in the alluvial soil close to the river, with the seeds of the Zamia spiralis, berries of the Exocarpos cupressiformis or Native Cherry also included in the diet.*
>
> *However, increasing numbers of European livestock, growing areas of cultivation and European farms along the rivers did begin to compromise traditional food sources by the mid-1820s. European hunting of kangaroos and emus with dogs for sport disrupted this food source, scattering mobs from their feeding grounds. Flocks of sheep tended by shepherds and herds of cattle let loose in the bush gradually trampled native pastures. New settlers now ensconced on their grants, worked to clear the land, erecting huts and planting orchards while their convict servants built fences, systematically locking in land parcels. Their growing sense of entitlement and ownership appears to have worked to harden their views on an Aboriginal presence in their neighbourhood. So, soon after many of these settlers had utilised the skills of Aboriginal guides and interpreters, they were putting in place measures, often threatening or violent, to exclude Aborigines from the very country they had led them through. Evidence of extreme violence and depravity committed by European settlers and their convict servants were seemingly overlooked in the quest to secure land and property.*

[1] As Miller (1985) has noted, the fact that Aboriginal-European relations during the initial years of settlement appear to have been more-or-less cordial is of particular note given both the rapidity of European settlement at this time and well documented violence occurring in the adjoining Bathurst Plains region.

By late 1825, simmering tensions in the mid-to-upper Hunter, rooted in Aboriginal peoples' loss of access to traditional hunting and fishing grounds, a sharp decline in the availability of economic plant and animal resources and individual acts of physical violence against Aboriginal individuals and/or groups, boiled over into violent conflict. Regardless of the terminology used, be it a 'war' or 'uprising', available historical source materials for the mid-to-upper Hunter Valley attest to a short but intense period of Aboriginal-European conflict between late 1825 and mid-1827, with the conflict here, as in many other parts of NSW and Australia more broadly, characterised by a series of 'incidents'[2], each linked to a particular set of circumstances (Dunn, 2015: 189).

Dunn (2015), drawing on the results of an exhaustive review of Aboriginal-European relations in the Hunter Valley between 1820 and 1850, has identified an October 1825 incident on James Greig's farm 'Martindale', south of present-day Denman, as the 'opening act' of the short but intense period of conflict referred to above. On the 28th of October 1825, two settlers, Mr Forsyth and Mr Allen, called at James Greig's farm for breakfast only to discover what they believed to be Greig's dead body on the floor of his hut, as well as his convict servant missing, presumed dead (The Australian, 10 November 1825: 3). The deceased, as it was later confirmed, was actually Greig's cousin, Robert Greig, whom the former had charged with tending to his property and livestock while in Sydney on business. Newspaper reports at the time provided no obvious cause for Greig's killing, though local magistrates sent to investigate raised Greig's known aversion to Aboriginal people as a potential motive (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 610).

James Grieg himself, writing to this brother in Scotland the following year, said he could not tell the exact cause of the attack but noted that he had been informed by a friendly Aboriginal man that Robert had beaten another Aboriginal man, which had "irritated the tribe he belonged to" and caused his "untimely end" (Greig 1826a). In letter to a friend, penned on the same day, Grieg explained the situation further, stating that "[a]lthough the black natives are by no means hostile, [they] are always very revengeful when injured by any white person" (Greig 1826b).That Robert Greig's individual conduct was the motive for his murder was reinforced by Lancelot Threlkeld, who informed then Attorney General, Saxe Bannister, that he had heard that Grieg had struck the Aboriginal man and driven his party from the property (Gunson (ed), 1974: 91). Cunningham's (1827: 36-37) account of the incident identifies an Aboriginal man named Nullan-Nullan ("the beater") as the perpetrator, with Cunningham describing how Nullan-Nullan, after approaching in a friendly manner, had "glided behind" Grieg and killed him with a single blow to the back of the head. Upon killing Greig and plundering the hut, Nullan-Nullan and his party are reported to have withdrawn southward, into the mountains, with Cunningham (1827: 37) and magistrates Scott and McLeod describing this action as a retreat made in fear of European retaliation (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 610). An attack on two European shepherds in the Putty area, one of whom was killed, followed soon after, and prompted the colonial authorities to send a party of soldiers from Windsor to Putty to apprehend the individuals involved. In a clear escalation of violence, the soldiers intercepted and killed several members of what would later be determined to be a friendly Aboriginal group (Cunningham, 1827: 38-39).

[2] Often violent in nature

Although linked to the attack on Grieg's property by Cunningham (1827), available sources suggest that the Putty attacks were, in fact, rooted in events that occurred several years earlier. In an 1839 letter to magistrate Robert Scott, George Bowman of 'Archerfield', near Singleton, recounted how the two men attacked at Putty had played a central role in Governor Macquarie's 1816 punitive military expedition along the Hawkesbury-Nepean River, which would see at least 14 Aboriginal men, women and children massacred at Appin (the so called 'Appin massacre'). Bowman, whose reminiscences of Aboriginal-European conflict in the Hunter Valley were requested by Scott, described the situation as follows:

> *In 1825 a party of Natives from Richmond and another from the Hunter met at Putty on the old Hunters River road and killed one man and left the other as they supposed dead, but who was found by Mr. G. Bowman's overseer and men when driving his sheep to the Hunter, in a speechless state, his head crawling with wormes in the wounds received from the Blacks.*
>
> *This murder was supposed and believed to be true, from information received from other Natives, to have taken place through those two men having been instrumental in having some of the natives apprehended in 1816 or 17, when Governor Macquarie offered the reward for and outlawed by his proclamation. The Natives were not allowed to carry any warlike instruments within a certain distance of any White Man's Dwelling on pain of being dealt with according to Martial Law. The military did not attempt to take the Blacks and make prisoners of them, but shot all they fell in with and received great praise from the Government for so doing.* (Bowman to Scott, 5 January 1839, Indigenous Peoples File: Correspondence on Black Natives, Upper Hunter 1826, Singleton District Historical Society)

In June 1826, colonial authorities, responding to various "acts of violence" in the 'upper districts' of the Hunter[3], deployed ten soldiers, with accompanying bush constables, inland from Newcastle. Several Aboriginal men suspected of involvement in recent robberies and attacks were captured in turn. However, all managed to escape (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 611). An attack on George Forbes' Edinglassie estate around the same time saw one of the settler's Merino sheep killed, a shepherd in his employ speared through the shoulder and a hut on the property plundered[4]. In their report to the Colonial Secretary, magistrates Scott and McLeod note that an Aboriginal man, known as Billy, was subsequently apprehended for his involvement in the raid and jailed in Newcastle.

Shortly after the raid on Forbes' property, a stockman working on the Ravensworth estate of James Bowman, located around 25 km south-west of Edinglassie, was attacked and stripped naked, with the same individual killed two days later. A raid on James Chilcott's farm, located on Fal Brook, a few kilometres east of Bowman's estate, followed only days later, with Scott and McLeod reporting the involvement of the "same Natives", who "attempted by force to plunder the house" before being repelled (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 611).

To assist the troops already deployed to the region, on 24 June 1826, Governor Darling ordered a detachment of Mounted Police, commanded by Lieutenant Nathaniel Lowe of the 40th regiment, to the region (Chaves, 2007: 130). Shortly after Lowe's arrival in the valley, The Australian reported that "the natives who lately committed such havoc among the stockmen …retreated to the other side of the mountains" (The Australian, 24 June 1826). Regardless, continued Aboriginal threats of further raids prompted the deployment of additional troops to support Lowe, with the killing of Aboriginal people commencing in July (Chaves, 2007: 130). Scott and McLeod, for their part, report the shooting of four individuals, one of whom was deemed responsible for the death of Dr Bowman's stockman. All were shot while in custody (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 611).

[3] Alongside the murder of Grieg, Scott and McLeod's report to Colonial Secretary McLeay refers to "several petty robberies" on the road above James Bowman's Ravensworth estate, as well as raids on the farms of Peter McIntyre (Segenhoe) and Francis Little (Invermien), with McIntyre reportedly pursuing the raiders until forced to retreat.

[4] Note that soon after the raid on Forbes' property, local magistrate William Ogilvie, accompanied by a "friendly" Aboriginal man, was able to track down the raiding party and negotiate the return of items taken from the settler's hut.

By August 1826, rumours of Aboriginal people being killed in "peculiar circumstances" were starting to emerge from the region, with Threlkeld, for example, informing the Attorney General that Aboriginal people at the Bahtahbah mission, along with those arriving from the mountains, were reporting indiscriminate shootings and hangings, as well as the massing of bands of warriors in the mountains for a wide-scale attack across the valley (Gunson (ed), 1974: 92). Upon hearing the rumours, and conferring with Captain Allman at Newcastle, Governor Darling ordered an investigation by local magistrates Scott and McLeod, who prepared their report for his review (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12). Despite his earlier instructions from Lord Bathurst to oppose hostile Aboriginal incursions across the Colony with force and his belief, in this particular arena, in the "criminality of the natives", Darling made it clear that "the massacre of prisoners in cold blood" was unacceptable "as a measure of justifiable policy" (Darling to Bathurst, 6 October 1826, HRA, Vol. 12: 623). Unsatisfied with the level of information provided by Scott and McLeod, Darling would soon order a second investigation into Aboriginal-European hostilities in the Hunter, which was undertaken by Scott and another local magistrate, E.C. Close. As part of this second investigation, Lowe and others, including local settlers John Larnach of "Rosemount" and James Glennie of "Dulwich", provided depositions in which they outlined their own versions of events. These depositions document various acts of violence against Aboriginal people, including multiple shootings, with those deposed invariably framing such incidents as justifiable responses to attempted escapes (see Dunn, 2015: 202-204).

In contrast to the 'sanitised' depositions of Lowe and his party, other contemporary sources paint a much darker picture of the unfolding conflict (Dunn, 2015: 204). In an August 1826 letter to Saxe Bannister, for example, Threlkeld described how, upon visiting one of the two fencers attacked on James Bowman's property in Newcastle hospital, he was informed by the fencer that Lowe's troops had captured and summarily executed an Aboriginal man who, while part of the group involved in the attack, was not involved in physically injuring him (Threlkeld to Bannister, 21 August 1826). Ultimately, inconsistencies in Scott and McLeod's initial inquiry, coupled with obfuscations in Scott and Close's second inquiry, prompted Governor Darling to order a third investigation, which saw Acting Attorney General W.H. Moore travel to Newcastle and Wallis Plains in January 1827 (Dunn, 2015: 205). As part of his inquires, Moore sought Threlkeld's opinion on the situation, who informed him, on the basis of information provided by his own Aboriginal informants, of three troubling incidents. These included the execution of a man, reportedly later identified as Jackey Jackey (not to be confused with the Jackey Jackey who accompanied explorer Edmund Kennedy on his expedition to Cape York Peninsula), at the gaol in Wallis Plains, the shooting of an escapee near the Hunter River and a macabre shooting / hanging on James Bowman's Ravensworth estate (Gunson (ed), 1974: 95).

By mid-July 1826, Lowe's actions in the valley appear to have subdued Aboriginal peoples' resistance activities. In a letter to Lieutenant De La Condamine, penned on 18 July 1826, Captain Allman informed his superior that "no acts of violence have been committed by the Aborigines in this District from some weeks past; and, from the preserving exertions of Lieutenant Lowe and his Detachment, there is every reason to hope for permanent tranquillity" (Allman to De La Condamine, 18 July 1826, HRA, Vol. 12: 622).

Hostilities, however, soon resumed, with August 1826 witness to two major incidents, the first occurring on William Ogilvie's Merton estate and the second on Captain Robert Lethbridge's Bridgman estate at Fal Brook. That on Ogilvie's property, which ended without bloodshed, saw around 200 painted and armed warriors, led by an Aboriginal man known as Jerry, approach the farm, their presence prompted by two recent on-property incidents involving the wrongful detainment of Jerry and, earlier, two boys named Tolou and Mirroul[5] (Wood, 1972: 121-123).

[5] Tolou and Mirroul, whose European names were Ben and Denis, had been arrested at Merton in mid-August, allegedly for the spearing of cattle. Both were transferred to Newcastle goal on 16 August 1826.

The confrontation at Merton, which would see Mary Ogilvie and her second son, Edward, who had learnt the local language, deescalate a potentially violent situation, is described in detail in Mrs Ellen Bundock's (1932) memoir of her childhood at Merton:

> *Amongst my recollections of my childhood was playing with my brother Fred outside of the house when on looking up we suddenly saw the whole hill covered with Blacks all armed to the teeth except the King or Chief Jerry who was most amicable to us - a fine dignified looking man. He was clothed in an opossum skin rug and strips of fur round the loins – he kept shaking hands with each of us in turn to convince his subjects that he was on friendly terms with us. Our father was absent in Sydney just then so our Mother was alone with us children and only a few convicts about the place. The only weapon the Chief had was a Waddy stuck in his belt which was worn on all occasions by the natives. He kept going amongst the other blacks trying to quiet them and last they filed away over the hills to our inexpressible relief having only taken a little corn from a shed at hand and having shaken all of the Constable's rations on the ground.*
>
> *The cause of all this trouble and of the Blacks anger was an act of treachery committed by the Constable and soldiers who were left for our protection and who were placed under our Mother's orders. These soldiers had persuaded some of the Blacks to come to Merton under pretence of seeking guides to go after the Bush rangers but when the Blacks came they seized two of them (our chief Jerry and another man) believing that this Jerry was a murderer of the same name for whom a reward was offered. Our Mother…had seen the Constable and soldiers struggling with two Blacks, one of whom escaped and the other they forced into the hut. She…insisted on seeing the Black they had shut up who proved to be Jerry our Chief and on our Mother's declaring who he was and that he was not the murderer the soldiers released him, but fearing the indignation of the Blacks at their treacherous dealing with them they deserted us, clearing away in the night and leaving us to reap the consequences of their bad conduct which might have resulted in the loss of all our lives…[T]he blacks said to the last that if they had found the constable and soldiers they would have murdered them all for their treachery.*

Contemporary accounts of the incident at Merton are full of praise for Mrs Ogilvie's conduct. The Australian, for example, applauded her "great degree of resolution" (The Australian, 9 September 1826: 3), while Governor Darling reported to London that Mrs Ogilvie "had acted with much judgement and spirit" (Darling to Hay, 9 September 1826, HRA, Vol. 12: 574). Cunningham, too, referred to Mrs Ogilvie's actions as "[a] fine instance of intrepidity". While Mary and Edward Ogilvie's actions were undoubtedly brave, as Dunn (2015: 209) has observed, the crisis at Merton also highlights "the intimate nature of the frontier", with the Ogilvie family's personal friendship with Jerry and Edward's knowledge of the local language serving to defuse what could well have been a deadly confrontation.

Unlike that at Merton, the incident at Robert Lethbridge's Bridgman estate would involve significant bloodshed and precipitate what is colloquially known as the 'Ravensworth massacre'. On 28 August 1826, a group of approximately 15 Aboriginal men gathered at the hut of Richard Alcorn, overseer for Lethbridge's Bridgman estate. Alcorn's hut was situated on Fal Brook, around half a mile upstream from Dulwich, the homestead of James Glennie and around a quarter of a mile from James Chillcott's hut, which had, as noted above, been recently raided. Alcorn's wife, Charlotte, is reported to have offered the group some kangaroo to eat, which they took and roasted on a nearby fire (Deposition of John Woodbury, 29 August 1826, HRA, Vol. 12: 613-614).

The warriors also requested maize and bread but were told that there was none. A few of the assembled warriors entered the hut though none showed any signs of violence. Around 4pm, Alcorn returned to the hut and was reportedly unsettled by the presence of so many armed warriors, three of whom he recognised as being involved in the raid on Chilcott's farm. After discussing the situation with John Woodbury, a stockman of Thomas Cullen who was present at the hut, the two men ordered the group to leave. This order, according to Woodbury's testimony, sparked a fierce attack by the assembled warriors, which ultimately resulted in the wounding of Woodbury and Alcorn and the deaths of two other Europeans, Henry Cottle and Morty Kernan. After raiding adjoining workers' huts for bedding and blankets, the warriors are said to have retreated into the bush (Deposition of John Woodbury, 29 August 1826, HRA, Vol. 12: 614). Mounted troops alerted to the unfolding incident pursued the group the same day but were unable to locate them.

Robert Scott, the nearest magistrate, arrived at Alcorn's hut the following day and concluded that the warriors involved were not those involved in other incidents in the district, though Woodbury identified four by name, including three he believed to have been involved in the attack on Chilcott's farm (Deposition of John Woodbury, 29 August 1826, HRA, Vol. 12: 614; Deposition of Robert Scott, 30 August 1826, HRA Vol. 12: 615). Scott was quick to organise a posse to track down the group involved and three days later, approximately 20 miles (32 km) from Alcorn's hut, "came up with the murderers" (Scott and McLeod to McLeay, 3 October 1826, HRA, Vol. 12: 612). According to Scott and McLeod's brief account of the event, a 'skirmish' ensued, with one European speared in the face, two Aboriginal warriors killed and "some more" wounded. However, a more detailed account of the event in The Australian, published on 23 September 1826 and reproduced in part below, listed the number of Aboriginal dead at 18, with two others reportedly taken into custody:

> *Further particulars have been communicated to us of the fight with the blacks in the district of Hunter's River. It appears that as soon as it was made known that the black fellows had committed the outrage on Mr. Lethbridge's farm, three of the Mounted Police, accompanied by Mr. Scott and some prisoners, and some friendly natives, set out in quest of them. Having continued the pursuit for some time, they at length discovered their tract, and afterwards lost it, but on the following day they were fortunate enough to fall in with it again, and by die light of fires which the hostile tribes kindled towards evening, the precise spot they occupied was soon ascertained. Two men, one a white man, and the other a black, were sent forward to reconnoitre their position, &c. and as they came suddenly upon them they were descried by the party of blacks, who immediately set up the cry "Kill white man." Upon this the two being each provided with a musket (the blacks are good shots, we are informed) fired among them, and then retired behind trees to reload. At this moment a spear was hurled which struck the native black on one side of the face, pierced his cheek, and protruded through the opposite cheek, having passed curiously enough through a hollow in the mouth, occasioned by the loss of a tooth! The remainder of the pursuers hearing the firing, hastened to the spot, and as the whole of them, mounting probably to about sixteen, were furnished with muskets — they discharged these among the sable enemy. A hot conflict followed, the natives maintaining their ground, and making the most dexterous use of their spears. At last they were obliged to yield, betake themselves to flight, leaving behind them about eighteen of their comrades who were numbered with the dead. A man and his gin were taken prisoners. The attacking party sustained no loss of lives.* (The Australian, 23 September 1826)

As with most incidents of conflict in the mid-to-upper Hunter, the exact location of the Ravensworth massacre site remains unclear. Gollan (1993), for her part, has argued that the Mount Arthur area is the most likely place for the massacre to have taken place. According to Gollan, this area was the only portion of the upper Hunter that had not been taken up by European settlers by this time and likely functioned as a 'bastion' for post-contact Aboriginal occupation (Figure 3). A contemporary reference[6] to the Aboriginal warriors involved in the attack retreating to the "mountains" is likewise deemed indicative by Gollan, as is the Mount Arthur area's 'strategic' location with respect to launching the kinds of attacks witnessed up to that point (Figures 4 and 5). Contra Gollan's interpretation, Umwelt's (2004) analysis of the incident, undertaken as part of an Aboriginal heritage assessment for the Glendell Open Cut, casts doubt on the suggestion that the massacre took place to the west of Alcorn's hut (i.e., "up" valley, towards Mount Arthur). As Umwelt (2004) explain, contemporary accounts of the incident imply:

> *…that the Aboriginal people that took part in the attack came from the mountains and were returning to the mountains when the reprisal attack (massacre) took place. The account by Scott and MacLeod (HRA XII 1826: 612) also suggests that at least one woman was included in the Aboriginal group attacked. If the Aboriginal attackers had travelled 20 miles (approximately 32 kilometres) in the direction of the mountains (or even into the mountains) they could have travelled in a northerly or easterly or (less likely) southerly direction from Bridgman Farm. There are no mountains in a westerly direction (and no significant range to the south). A westerly direction would have taken the fleeing Aborigines and their pursuers up the valley rather than into the mountains. If the Aboriginal people that attacked the hut at Bridgman Farm travelled towards the mountains they would have travelled away from the area now proposed for the Glendell Open Cut. Thus, the massacre site is highly unlikely to be located within the Glendell ML or within the Ravensworth Estate. Even if the Aboriginal people had travelled in an easterly direction they would have passed through the area of the present Glendell ML and the Ravensworth Estate by the time they had travelled 7 miles, rather than the 20 miles they were reported as travelling prior to the pursuing party catching up with them.*

In common with Umwelt (2004), other, more recent considerations of the massacre (e.g., ACHM, 2013; Dunn, 2015) have placed it outside of Bowman's Ravensworth estate. Dunn (2015), whose exhaustive review of Aboriginal-European hostilities in the Hunter Valley remains one of the most detailed studies of its kind for the region, has mapped it as occurring in mountainous terrain to the northwest of Alcorn's hut (Figure 6). ACHM, meanwhile, have prepared a map which shows an approximate area where the massacre cannot have occurred (ACHM, 2013: 69, Map4-1). While this map allows for the possibility that the massacre could have occurred within the Mount Arthur area, on the basis of available evidence, this seems unlikely.

[6] The Sydney Gazette and New South Wales Advertiser, 9 September 1826:3

D R A F T

Figure 2 Map of the Hunter Valley showing European landholdings up to 1825. Estates of relevance to incidents of Aboriginal-European conflict between 1825 and 1827 marked with arrows and labelled (modified from Campbell, 1926)

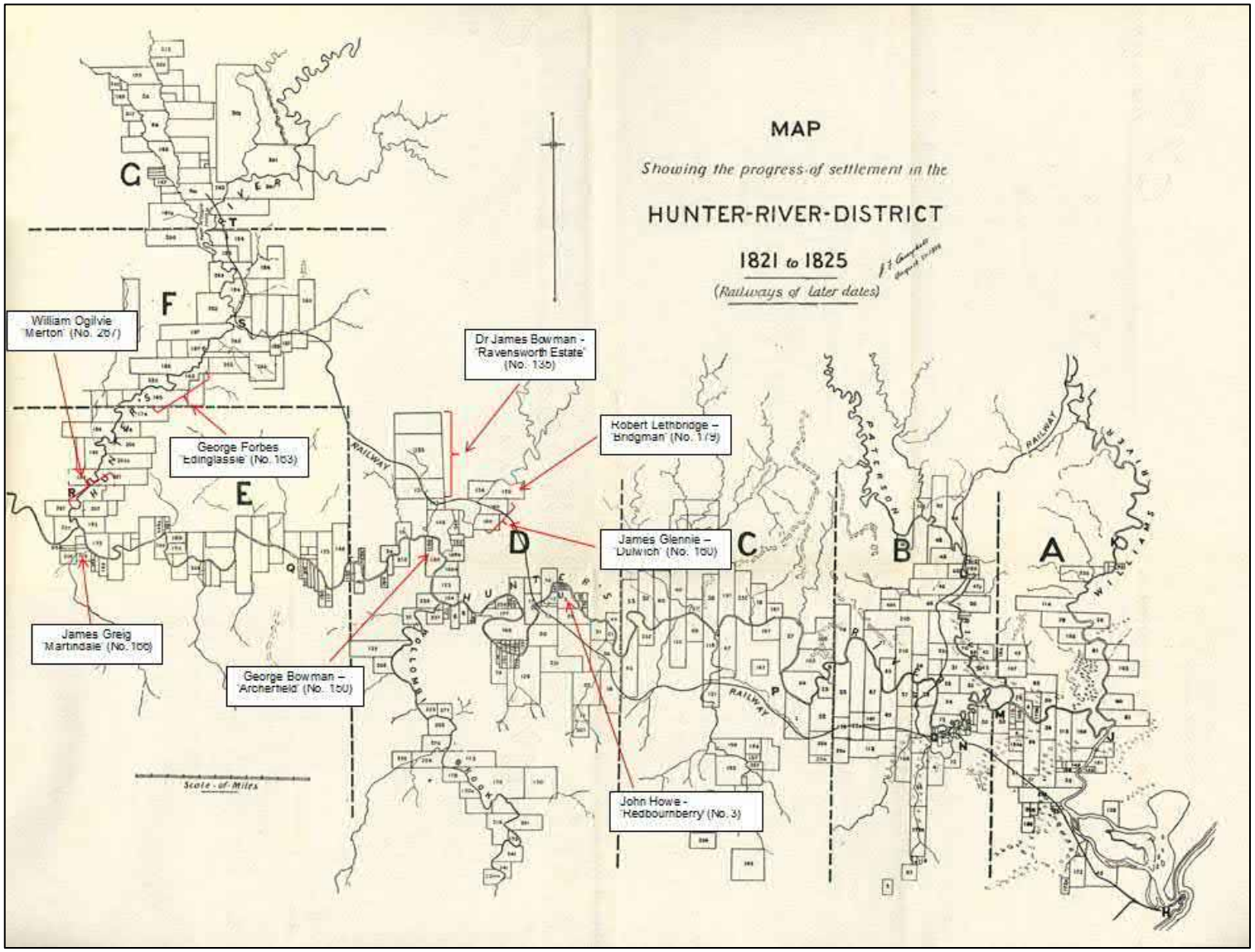

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Figure 3 Gollan's (1993) map of land unsettled by Europeans in 1826 (from Gollan, 1993: Map 1)

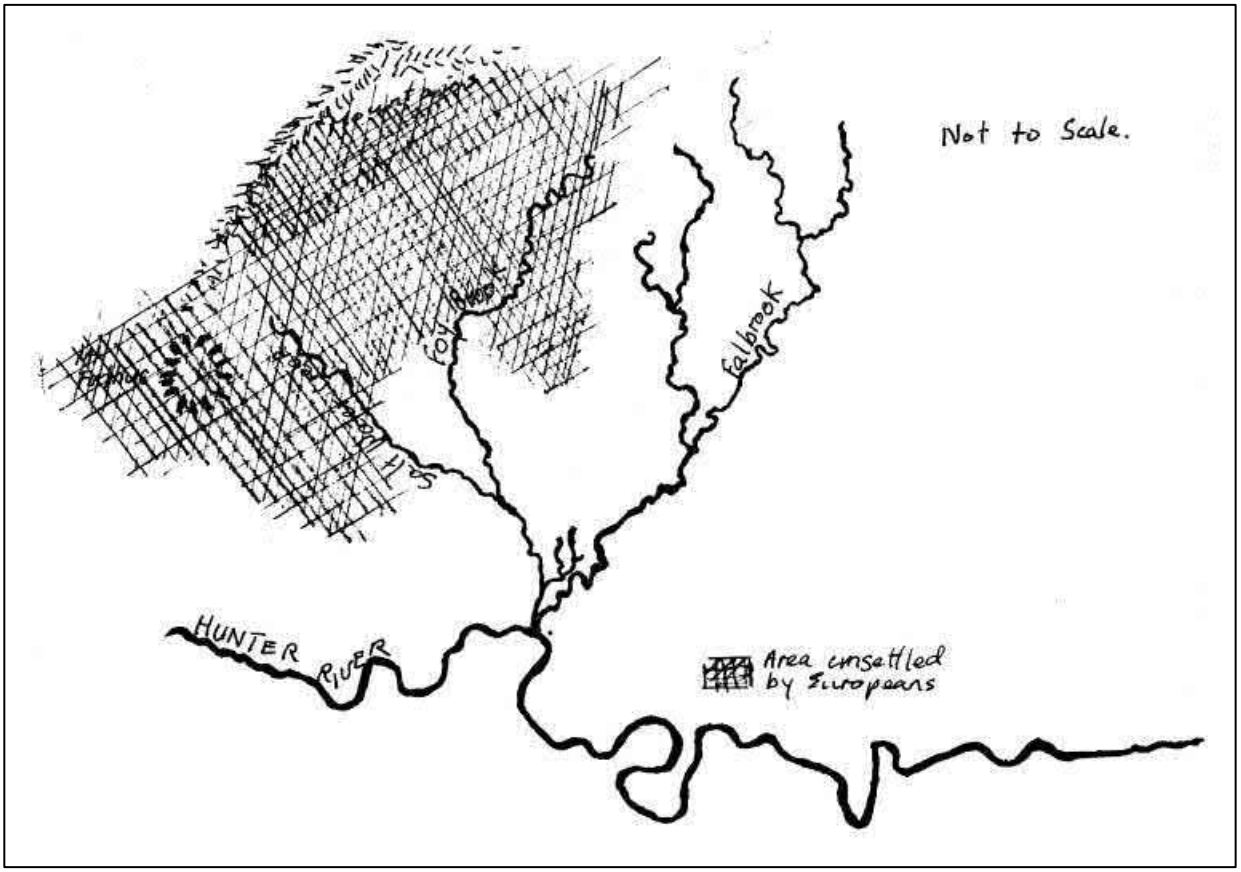

Figure 4 Gollan's (1993) map of Aboriginal 'attacks' leading to the Ravensworth massacre (from Gollan, 1993: Map 3)

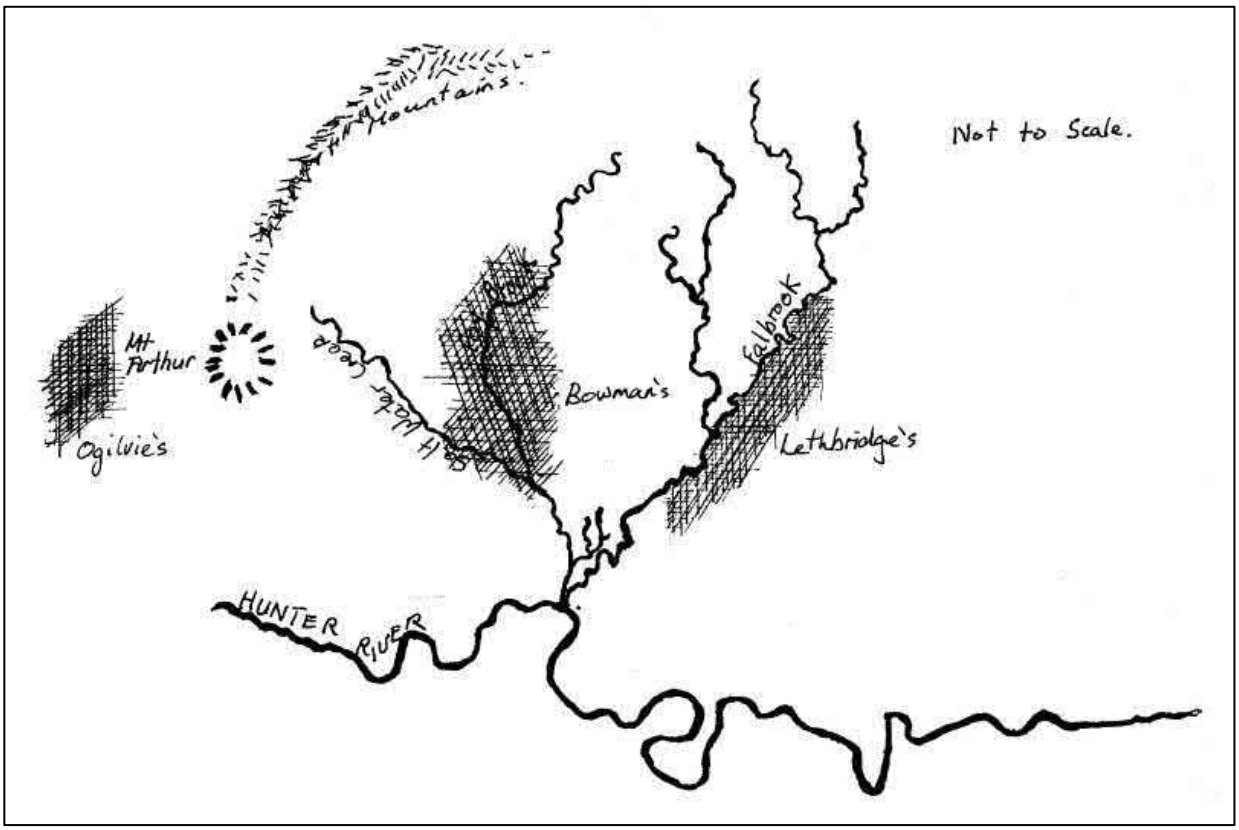

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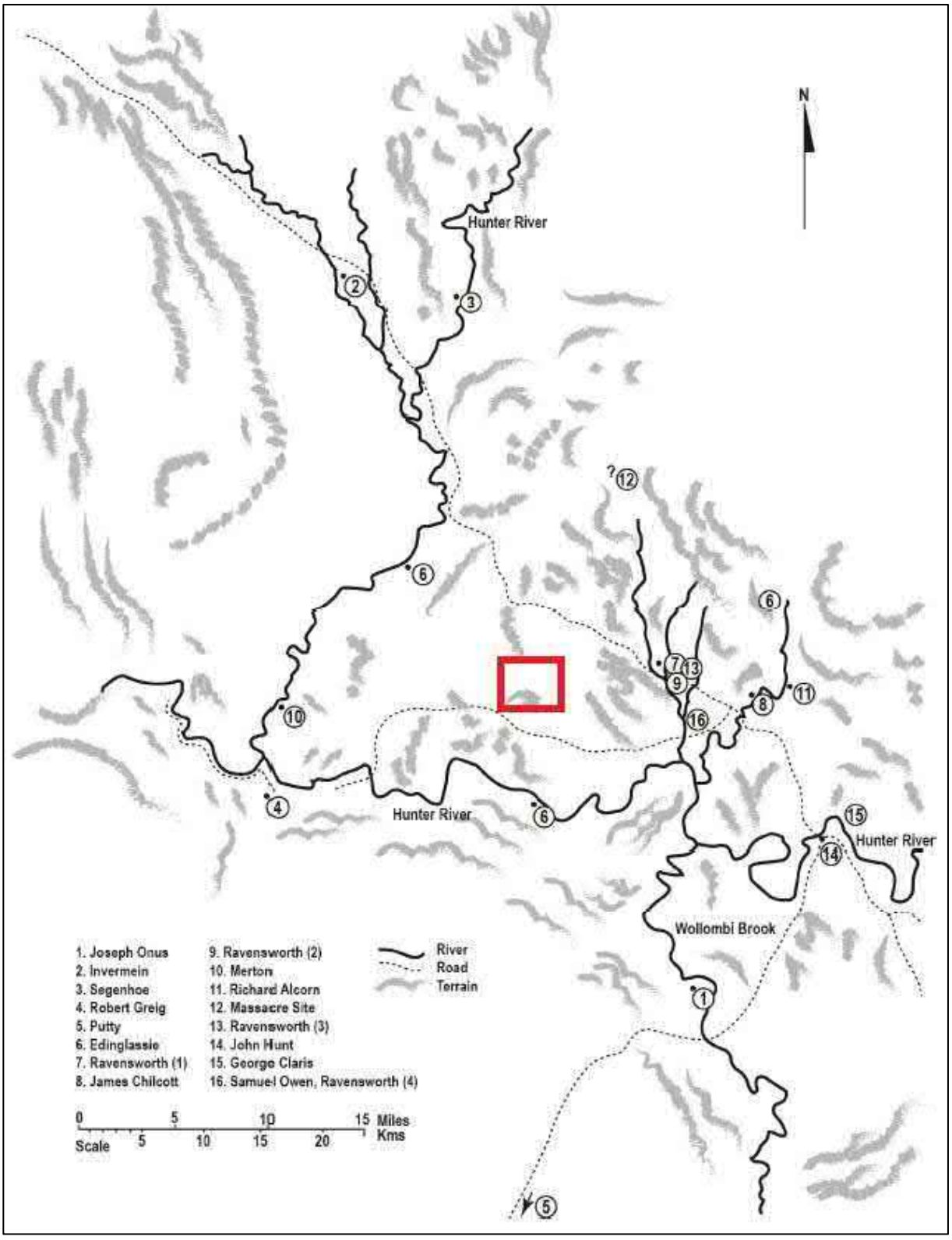
Figure 5 Map showing the location of reported incidents of Aboriginal-European conflict in the Hunter Valley between 1825 and 1827, including the 'Ravensworth massacre' (from Dunn, 2015: 228, Fig. 16) (study area in red).



By September 1826, tensions in the mid-to-upper Hunter had reached fever pitch, with various contemporary observers, such as Threlkeld and Robert Scott's brother, Helenus Scott, talking of war (see Gunson, 1974: 93; Helenus Scott to Augusta Scott, 25 September 1826, Scott Family Correspondence, ML). Fears of Aboriginal attacks amongst the settler population were such that on the 4th of September 1826 a group of concerned landholders, including James Bowman, Peter McIntyre and William Ogilvie, petitioned Governor Darling to maintain the Mounted Police's presence in the district:

> *May it Please Your Excellency,*
>
> *We, the undersigned, Landholders at Hunter's River's river, beg leave most respectfully to represent to Your Excellency the present very disturbed state of the Country by the incursions of numerous Tribes of Black Natives, armed and threatening death to our Servants, and destruction to our property.*
>
> *We are fully impressed with the intentions of Your Excellency by ordering the protection of the Horse Patrole; at this moment; we have received information that some of the Soldiers are withdrawn to attend an Investigation at Newcastle on a subject connected with the marauding conduct of the Natives.*
>
> *We most humbly trust Your Excellency will take this into Your consideration, either by ordering others to take their places, or by suspending the order of their recall to Newcastle, until the threats and murderous designs of the Natives shall have subsided; for, in the event of our losing the protection of the Troops, our property will be exposed to the revenge and depredation of these infuriated and savage people.*
>
> *The Natives lately burnt all the grass on the several Farms, killed some Men, have speared several Cattle, and threatened to destroy the Wheat of the ensuing Harvest.*
>
> *We have, &c.,*
>
> *J.Bowman J.H. Winder.*
>
> *Peter McIntyre David Maziere*
>
> *A.B. Spark William Ogilvie*
>
> *Leslie Duguid, H. Malcom*
>
> *J. Gaggin. John Brown*
>
> *John Cobb*
>
> (Landholders to Governor Darling, 4 September 1826, HRA, Vol. 12: 576)

As highlighted by Dunn (2015: 217), this petition had arisen from Governor Darling's decision to withdraw Lowe and his troops from the district and his ordering of the second inquiry into the actions of the Mounted Police under Lowe's command. The landholders involved were unlikely to have been impressed with Darling's response, with the Governor urging the settlers themselves to unite and adopt "vigorous measures" to establish their "ascendency" over the district's Aboriginal population (Darling to Landholders at Hunter's River, 5 September 1826, HRA, Vol. 12: 576-577). In a closing rebuke, the Governor felt it necessary to point to out the fact that not one of the petitioners, all of whom were based in Sydney, were physically present in the district to witness any of the outrages they were reporting. As hinted at by the signatories themselves, whose petition contains the word 'revenge', the closing sentences of Darling's response, reproduced below, point not to indiscriminate violence on the behalf's of the district's Aboriginal population but rather to retaliatory strikes:

> *As you very properly attach much importance to the preservation of your property, I would remark that your presence and personal example would tend to this object than any measure of the Government. It would have the effect of preventing irregularities on the part of your own people, which I apprehend is in many instances the cause of the disorders committed by the Natives.* (Darling to Landholders at Hunter's River, 5 September 1826, HRA, Vol. 12: 577)

Attorney General Saxe Bannister, for his part, urged Governor Darling to deploy the military to the district, claiming that those "interested upon Hunter's River" would be best served by a show of "overwhelming force" (Bannister to Darling, 5 Septmber 1826, HRA, Vol. 12: 577). Bannister suggested the declaration of martial law, as had occurred in Bathurst in 1824, proposing that this would not only reinforce the government's determination to resolve the matter but also provide legal protection for any soldiers sent to the district. Darling would subsequently dismiss Bannister's call for martial law, informing the Attorney General that the size of the district's settler population was such that the threat posed by the 'natives' was a minor one.

The war feared by Threlkeld and others was not to eventuate. Nonetheless, hostilities continued throughout the remainder of 1826 and first half of 1827, with notable incidents from this period including the November 1826 abduction of the 20 month old daughter of John and Catherine Hunt[7], an act attributed to an Aboriginal man known to Europeans as 'Bit-O-Bread' (Byirbyrry), and a bloodless March 1827 confrontation at George Claris' hut on John Howe's Redbourneberry estate, near Singleton, the primary motivation for which appears to have Byirbyrry's anger at being accused of the kidnap of Hunt's daughter. "King" Jerry, who was present with Byirbyrry at Claris' hut, is said to have warned Claris that any harm to Byirbyrry would result in him amassing 1000 warriors to kill any European they encountered. Outside of the Hunter Valley, the first half of 1827 would also bear witness to the Supreme Court trial of Lieutenant Lowe for the August 1826 murder of Jackey Jackey at Maitland Gaol, with Lowe, perhaps predictably, acquitted of the crime (for a detailed review of Lowe's trial see Chaves, 2007).

The accounts of Dunn (2015) and others (e.g., Miller, 1985; Wood, 1972) point to a significant reduction in the scale of Aboriginal-European conflict in the mid-to-upper Hunter from mid-1827. Attacks and confrontations continued to occur. However, the high point of conflict had passed, with the majority of 'prime' land within the region now firmly in European hands[8]. Despite this stranglehold, Aboriginal 'returns' from 1827 onward attest to the continued presence of relatively large numbers of Aboriginal people in the region. Data of relevance to the mid-to-upper Hunter is summarised in Table 3 below, with examples of returns for the Patrick's Plains, Merton, and Wallis Plains districts, provided in Figures 8 to 13. As indicated in Table 3, despite several years of European occupation, 'early' (i.e., 1827-1829) returns for the mid-to-upper Hunter indicate a total Aboriginal population well into the hundreds.

Returns for the mid-to-upper Hunter also provide insight into the social and territorial organisation of the Aboriginal groups occupying this region around the time of European colonisation. While acknowledging the well-documented problems surrounding early European observers' use of the word 'tribe', with many tribal names, for example, comprising European inventions, a number of existing returns for the mid-to-upper Hunter contain the names of individual 'tribes', with places or districts of 'usual resort' sometimes also specified. For the mid-to-upper Hunter, a review of returns prepared for districts[9] and estates within this region (e.g., Patrick's Plains, Wallis Plains, Segenhoe, Invermein and Merton) reveals marked differences in the amount of information available regarding group names and associations. Returns for the Merton district, for example, contain almost no useful information[10], with only one return, prepared in July 1844, containing an Aboriginal group name, the 'Gnarnical' or 'Gnarnoical', which is likely an alternative spelling of 'Gundical'. The Gundical, according to Edward Ogilvie, son of magistrate William Ogilvie, were one of the four 'tribes' that made up the Gummun Kamilaroi of the Upper Hunter - Goulburn River valleys, with the remaining three groups consisting of the "warlike" Marawancal, the Toolomm-pikilal and the "fine Intelligent" Panin-pikilal (Wood, 1972: 137).

[7] John Hunt served as a district constable at Patrick's Plains

[8] Note that Miller (1985: 42) has suggested that, post-1830, the majority of Aboriginal resistance to European colonisation of the Hunter Valley was passive, as opposed to armed, in nature.

[9] Note that the physical extent of historically-documented districts or localities within the mid-to-upper Hunter (e.g., Patrick's Plains, Wallis Plains, Merton) remains poorly defined, with the project area arguably located at the eastern extremity of the Merton district.

[10] As William Ogilvie himself remarked in his April 1827 return: "[T]he Black Natives are very numerous here, but I am not able to distinguish their tribes, nor do I think they are distinctly separated into tribes but assemble in larger or smaller parties according to the object they have in their view – certainly they have no distinct chiefs..."(Ogilvie to McLeay, 22 April 1827, SRNSW 4/2045)

In general, returns for the Patrick's Plains district are the most informative for the region, with James Glennie's August 1829 return (Figures 10 to 12), for example, identifying four distinct 'tribes' within this district; namely, 'The Plains Tribe', 'The Bulcara Tribe', 'The Micarrawillung Tribe' and the 'Kinkigyne or Hungary Hill Tribe'. Glennie's return also contains the European and Aboriginal names of all of the men in each group, including their respective 'kings'. Places of usual resort for the groups listed are not specified. However, it is noted that a June 1834 return for the district (Figure 12) places the 'Kinkigyne or Hungary Hill Tribe' at Fal Brook. Moving further up the valley, Francis Little's June 1828 return lists two 'tribes' within the district under his jurisdiction: the 'Tullong Tribe' and the 'Murawin Tribe', with Little placing the Tullong in the Dartbrook area and the Muarwin along the Paterson and Pages Rivers (Figures 15 and 16). Peter McIntyre's December 1829 return for Segenhoe, in contrast, contains no useful information with respect to group names and localities.

Table 3 Aboriginal returns for districts and estates in the mid-to-upper Hunter valley between 1827 and 1844 (data compiled from originals / facsimiles held at the State Archives of New South Wales, [4/2045], Reel 3706)

Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1827	17-Apr	Patrick's Plains and Luskintyre	-	Scott and McLeod	c. 300	-	Patrick's Plains and Luskintyre including all Wallumby Brook [Wollombi] Brook] and extending westward as high up the River as Dr Bowman's and William Bells Farm"	Recorder refers to the inability to accurately measure numbers, stating they will have a better idea of numbers once they have distributed clothing
1827	22-Apr	Merton	-	William Ogilvie	Up to 300	-	Between Bylong/Mudgee and Liverpool Plains	Recorder refers to the inability to accurately measure numbers
					100	-	Upper hand of the River (Upper district)	Recorder refers to the inability to accurately measure numbers
1827	2-Jul	All districts	-	Colonial Secretary's Office	c. 300	Patrick's Plains and Luskintyre	Patrick's Plains and Luskintyre	-
1827	2-Jul	All districts	-	Colonial Secretary's Office	c. 100	Hunters River	Hunters River	-
1827	2-Jul	All districts	-	Colonial Secretary's Office	c.120	Wallis Plains	Wallis Plains	-
1828	6-May	Wallis Plains	-	A Robertson	95	Wallis Plains	-	-
					20	Wollambi	-	Only includes those individuals known, actual numbers are likely to be higher

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Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1828	5-Jun	-	Invermien	Francis Little	39	Tullong	Dart Brook / Paterson and Pages Rivers	-
1828	5-Jun	-	Invermien	Francis Little	29	Murawin	Dart Brook / Paterson and Pages Rivers	-
1829	14-Apr	Wallis Plains	-	Samuel Wright	120	-	-	-
1829	4-Aug	Patrick's Plains	-	James Glennie	46	Plains Tribe	Patrick's Plains	"Not including the Wollomby Blacks or the Wild Blacks of each tribe" 'King': Black Boy/Pandoba
					11	Bulcara	Patrick's Plains	'King': Billy Bowman/Oonungoonung
					14	Micarrawillung	Patrick's Plains	'King': Jacky/Balboa
					28	Kinkigyne	Patrick's Plains	'King': Coori Jerry/Nimbue
1828	16-Apr	-	Segenhoe	Peter McIntyre	2	-	-	'King': Tom 'Queen': Maria
1828	10-Jun	-	Segenhoe	Peter McIntyre	3	-	-	-
1829	7-Apr	-	Segenhoe	Peter McIntyre	2	-	-	'King': Tom
1829	16-Jun	-	Segenhoe	Peter McIntyre	14	-	-	'Queen': Maria
1832	-	North and North Western Districts	-	-	30	-	Darlington / Patrick's Plains	-
					30	-	Merton	-
					40	-	Invermein	-
					100	-	Casillis	-

D R A F T

Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1833	-	North and North Western Districts	-	-	30	-	Darlington / Patrick's Plains	-
					30	-	Merton	-
					40	-	Invermein	-
					120	-	Casillis	-
1833	3-May	All districts	-	-	50		Maitland (including Patersons River and Wollombi)	-
					30	-	Darlington and Patrick's Plains	- -
					30	-	Merton	-
					20	-	Casillis	-
					40	-	Invermein	-
1833	29-May 5-Jul	Patrick's Plains	Bathurst	-	9	Patrick's Plains	Bathurst	-
1834	-	North and North Western Districts	-	-	55	-	Maitland including Paterson's Plains and Wollombi	-
					30	-	Darlington and Patrick's Plains	
					30	-	Merton	
					40	-	Invermein	
					35		Casillis	

D R A F T

Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1834	25-May	Merton	Merton	William Ogilvie Gregory Blaxland	30	Merton	Merton	-
1834	2-Jun	Patrick's Plains	Patrick's Plains	-	10	Hungary Hill	Fal Brook	-
					14	Patrick's Plains	Patrick's Plains	-
					10	Glendon	Glendon	-
1835	-	North and North Western Districts	-	-	70	-	Maitland, inc. Wollombi	Number of blankets not people
					30	-	Paterson	Number of blankets not people
					60	-	Darlington and Patrick's Plains	Number of blankets not people
					50	-	Merton	Number of blankets not people
					100	-	Invermein	Number of blankets not people
1837	6-Jun	Patrick's Plains	Patrick's Plains	-	11	Fal Brook	Fal Brook	-
					11	Plains Tribe	Patrick's Plains	-
					12	Glendon	Glendon Brook	-
1838	-	Patrick's Plains	Various	L.E.Threlkeld	15	-	Glendon	-
					15	-	Dulwich	-

D R A F T

Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
					15	-	Patrick's Plains	-
					15	-	Wollombi	-
1838	-	Patrick's Plains	-	L.E.Threlkeld	64	-	-	Children not included in numbers
1842	16-May	Patrick's Plains	Singleton	-	18	Patrick's Plains	Patrick's Plains	'Chief' listed with English Name (Cobon Billy) and Aboriginal name (Congoa)
1842	25-May	Patrick's Plains	Glendon	-	14	Glendon	Glendon	-
1842	27-Jun	Patrick's Plains	Wollombi	-	10	Lower Wollombi	Lower Wollombi	-
1842	10-Aug	Patrick's Plains	Dulwich/Falbrook	-	15	KingsKine (Kinkigyne)	Fal Brook	-
1843	May	Patrick's Plains	Singleton/ Glendon/ Wollombi/ Falbrook	James Glennie	14	Patrick's Plains	Patrick's Plains	-
1843	May	Patrick's Plains	Singleton/ Glendon/ Wollombi/ Falbrook	James Glennie	11	Glendon	Glendon	-
1843	May	Patrick's Plains	Singleton/ Glendon/ Wollombi/ Falbrook	James Glennie	7	Wollombi	Wollombi	-
1843	May	Patrick's Plains	Singleton/ Glendon/ Wollombi/ Falbrook	James Glennie		Falbrook	Bridgman, Mount Royal, St Clair, Glendon Brook & 	-

Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1844	30-Jul	Merton	Merton	George Blaxland and William Ogilvie	16		Merton	Additional 20 individuals not listed as there were not enough blankets

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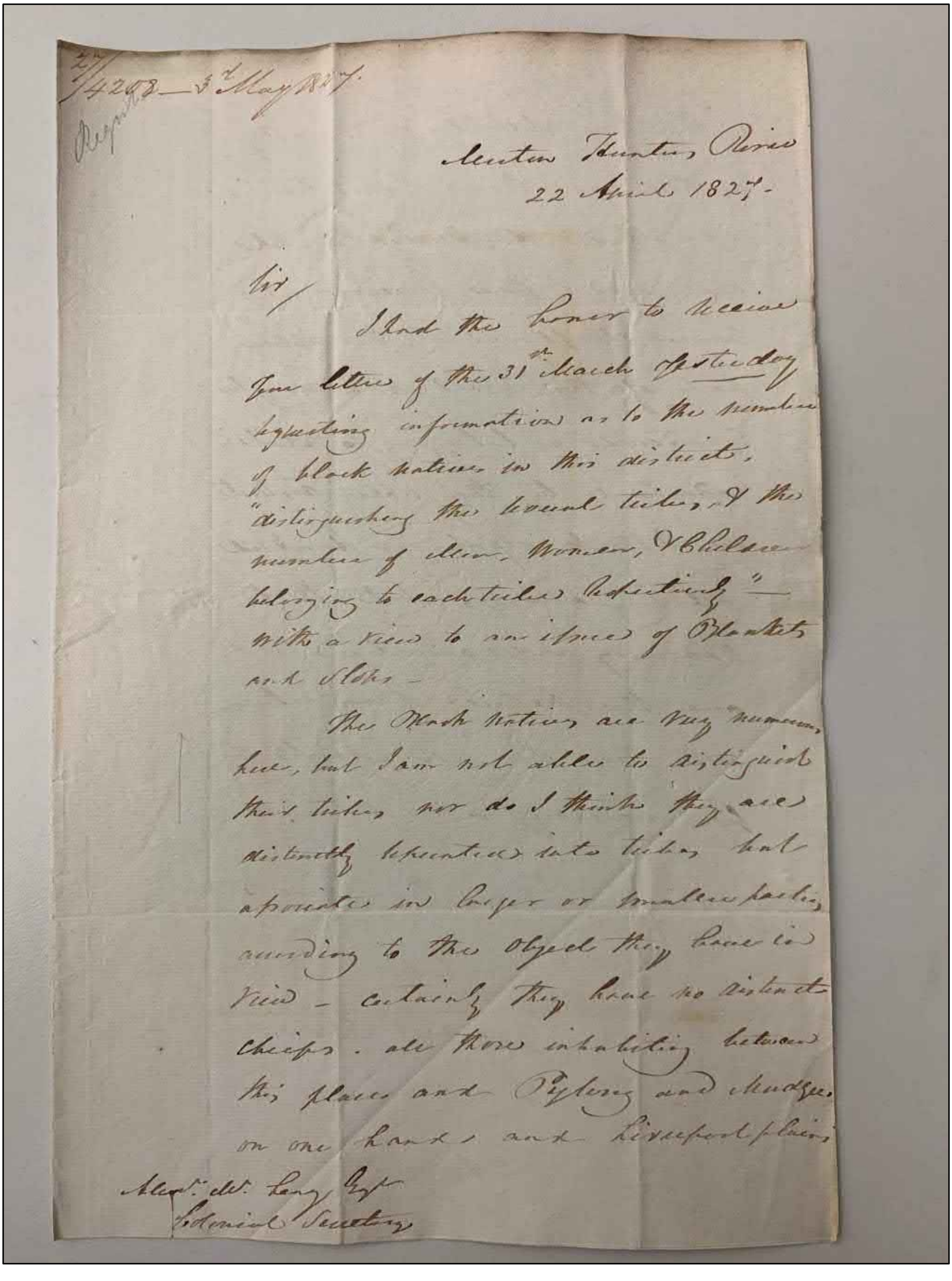
Figure 6 William Ogilvie's April 1827 return for the Merton district, Page 1 of 2 (SRNSW, 4/2045)



2/4208 — 3d May 1827

Reptd

Merton Hunters River
22 April 1827 -

Sir/

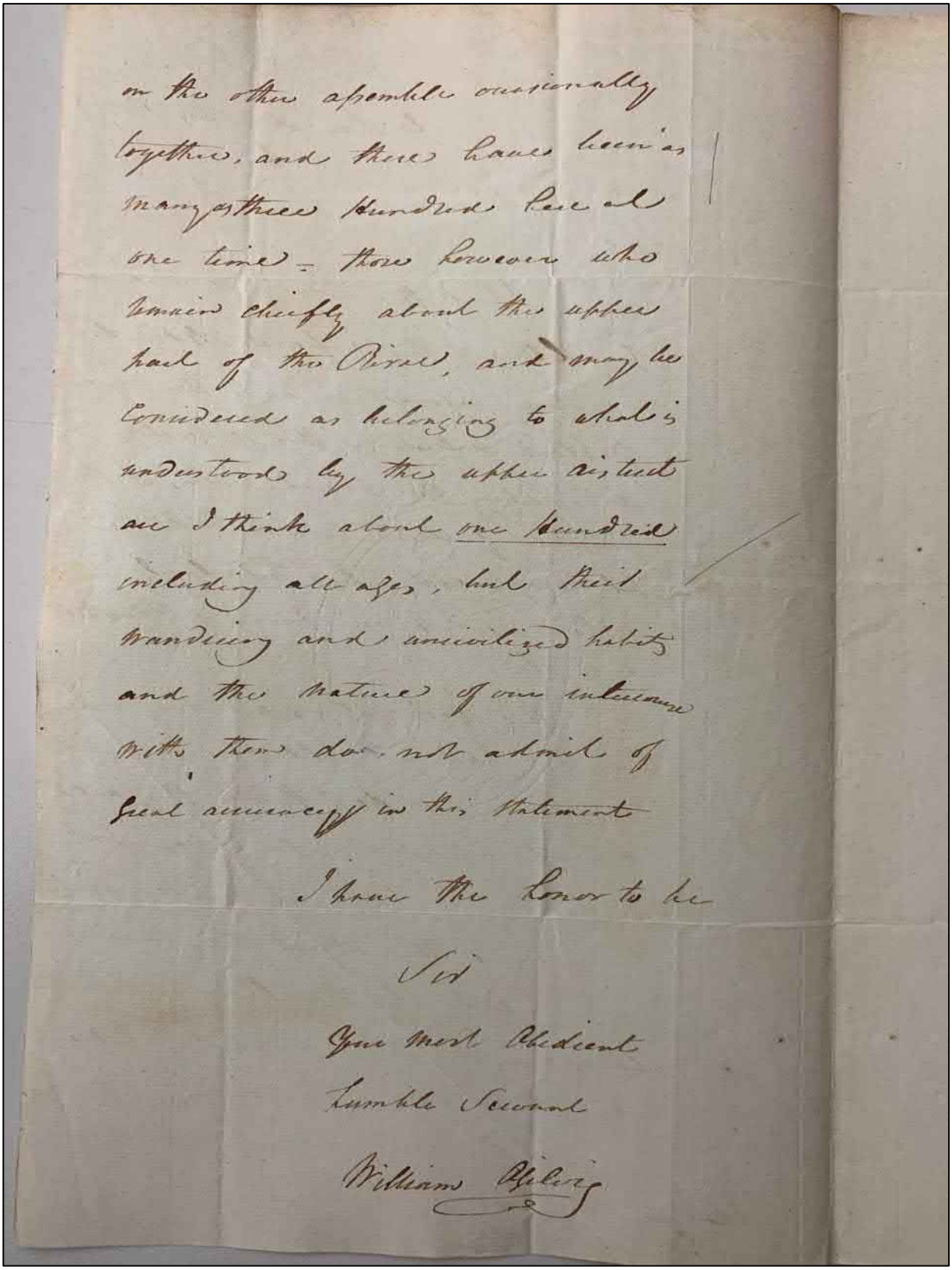
I had the honor to receive yesterday your letter of the 31st March requesting information as to the number of black natives in this district, "distinguishing the several tribes, & the number of Men, Women, & Children belonging to each tribe respectively" — with a view to an issue of Blankets and Slops -

The Black Natives are very numerous here, but I am not able to distinguish their tribes nor do I think they are distinctly separated into tribes but associate in larger or smaller parties according to the Object they have in view - certainly they have no distinct Chiefs. all those inhabiting between this place and [illegible] and Mudgee, on one hand, and Liverpool plains

Alexr. Mc. Leay Esqr
Colonial Secretary

D R A F T

Figure 7 William Ogilvie's April 1827 return for the Merton district, Page 2 of 2 (SRNSW, 4/2045)



on the other assemble occasionally together, and there have been as many as three hundred People at one time – those however who remain chiefly about the upper part of the River, and may be considered as belonging to that is understood by the other district are I think about one Hundred including all ages, but their wandering and uncivilized habits and the nature of our intercourse with them do not admit of great accuracy in this statement

I have the Honor to be

Sir

Your most Obedient

humble Servant

William Ogilvie

D R A F T

Figure 8 James Glennie's August 1829 return for the Patrick's Plains district, Page 1 of 3 (SRNSW, 4/2045)

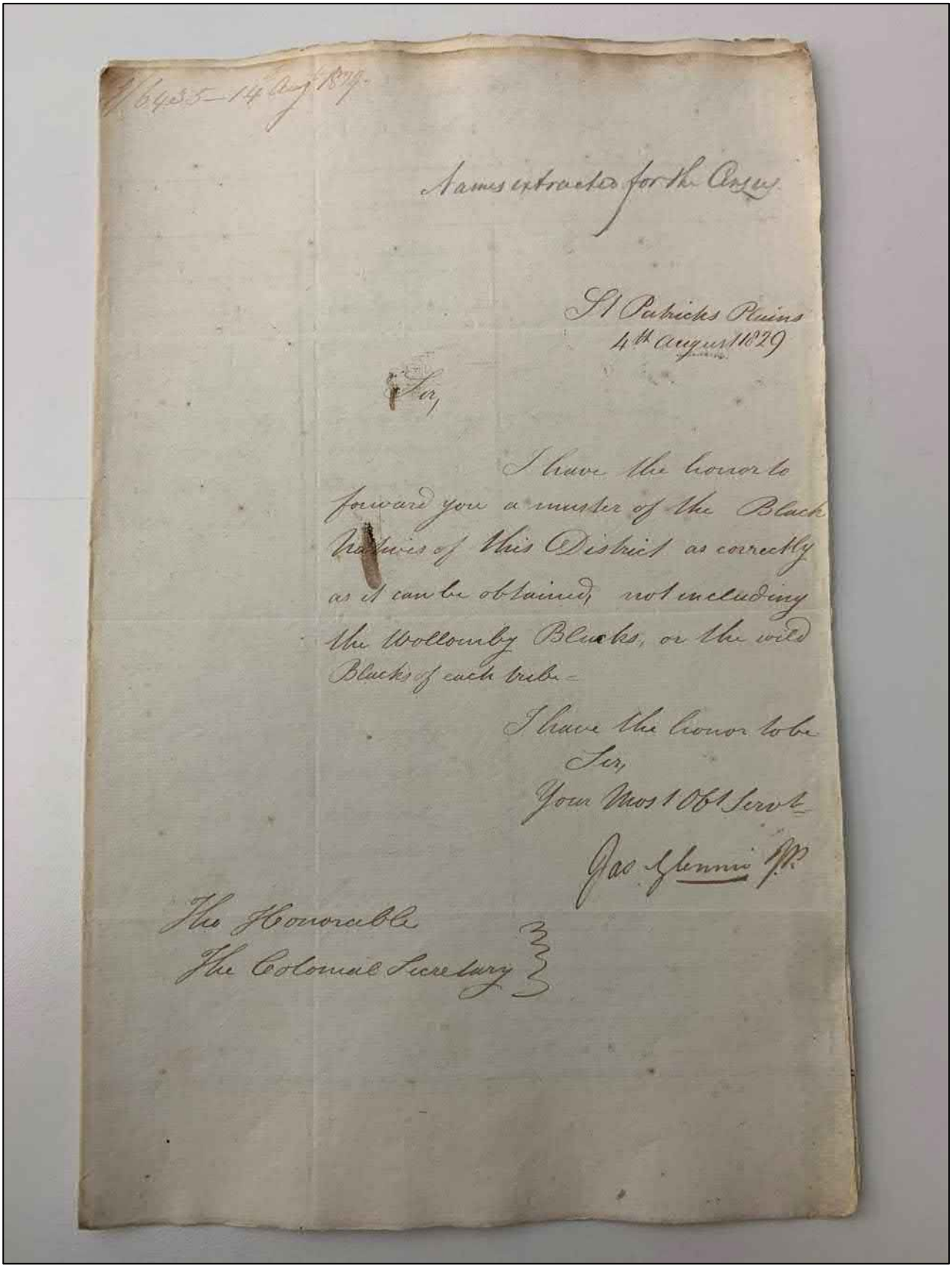


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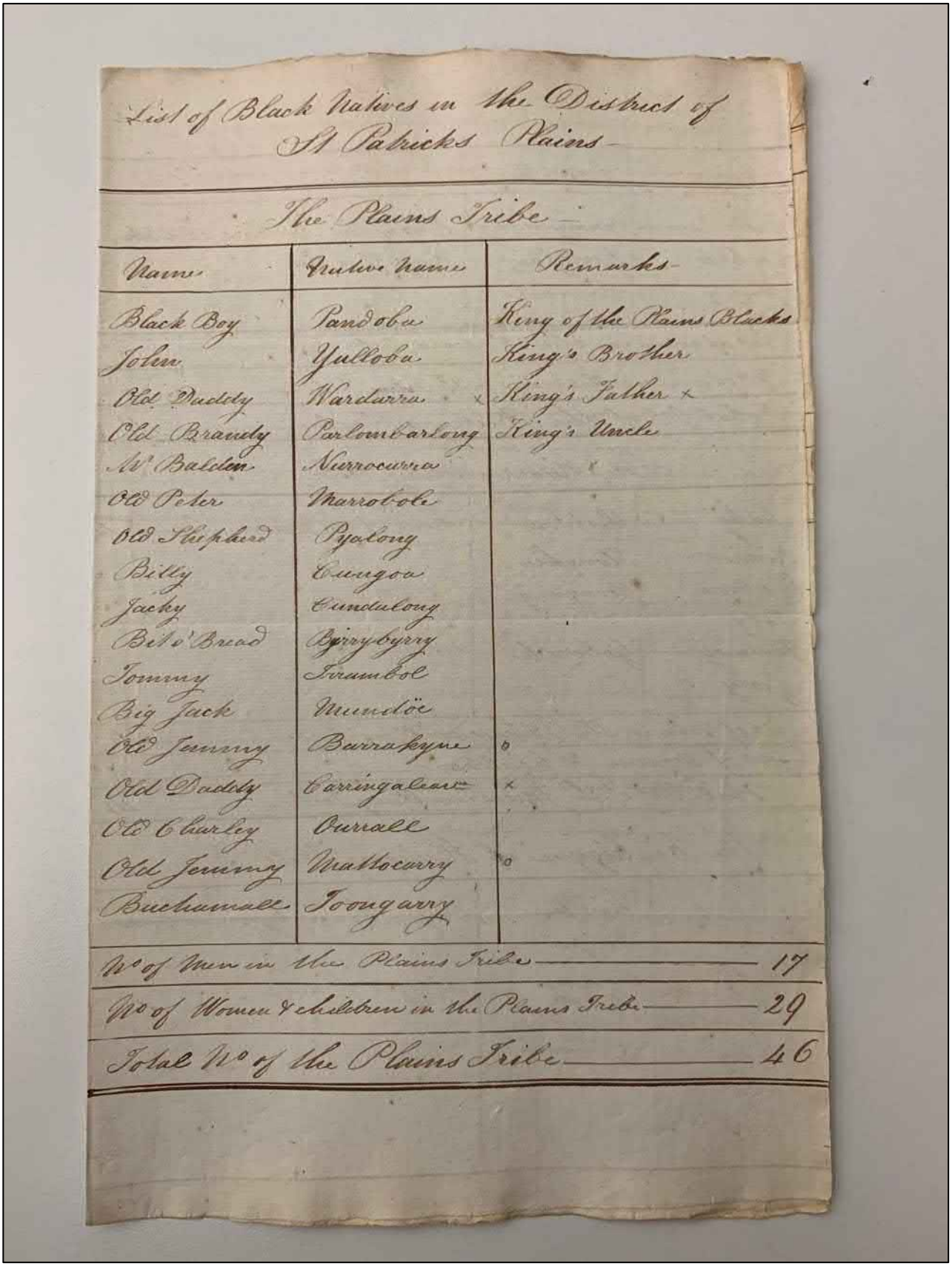
Figure 9 James Glennie's August 1829 return for the Patrick's Plains district, Page 2 of 3 (SRNSW, 4/2045)



List of Black Natives in the District of St Patricks Plains

The Plains Tribe

Name	Native name	Remarks
Black Boy	Pandobe	King of the Plains Blacks
John	Yullooa	King's Brother
Old Daddy	Wardarra x	King's Father x
Old Brandy	Parlombarlong	King's Uncle
Mr Baldem	Nurrocurra	
Old Peter	Marrobole	
Old Shepherd	Pyalong	
Billy	Eungoa	
Jacky	Cundulong	
Bill o' Bread	Byrrybyrry	
Tommy	Irrumbol	
Big Jack	Mundöe	
Old Jemmy	Barrakeyne	
Old Daddy	Carringalear x	
Old Charley	Durrall	
Old Jemmy	Mattocurry	
Buchanall	Toongarry	

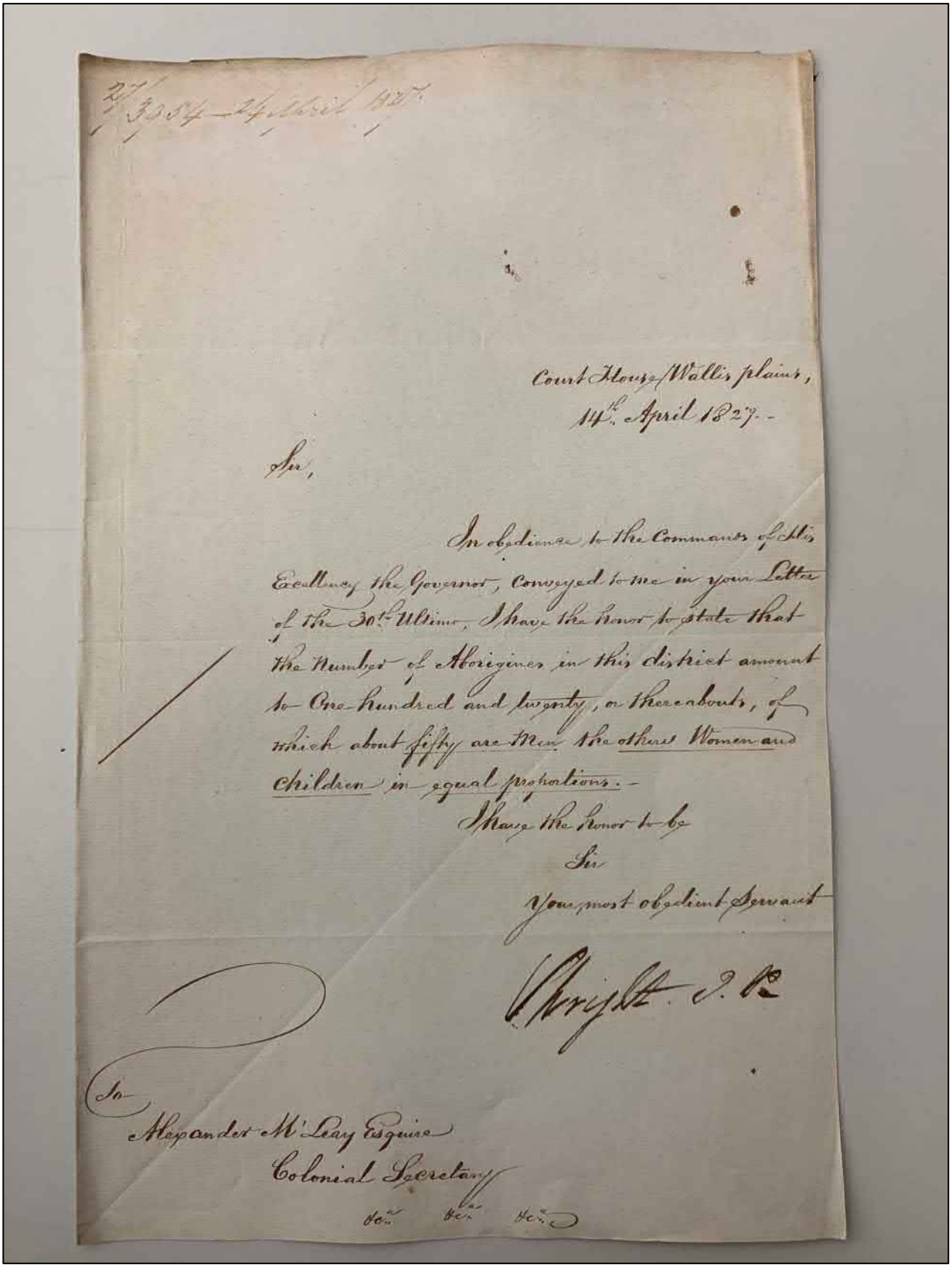
No of Men in the Plains Tribe ——— 17

No of Women & children in the Plains Tribe ——— 29

Total No of the Plains Tribe ——— 46

D R A F T

Figure 10 Samuel Wright's April 1827 return for the Wallis Plains district, Page 1 of 1 (SRNSW, 4/2045)



27 3004 – 4 April 827

Court House Wallis plains,
14th. April 1827. -

Sir,

In obedience to the Commands of His Excellency the Governor, Conveyed to me in your Letter of the 30th Ultimo, I have the Honor to state that the Number of Aborigines in this district amount to One Hundred and Twenty, or thereabouts, of which about fifty are Men the others Women and Children in equal proportions. -

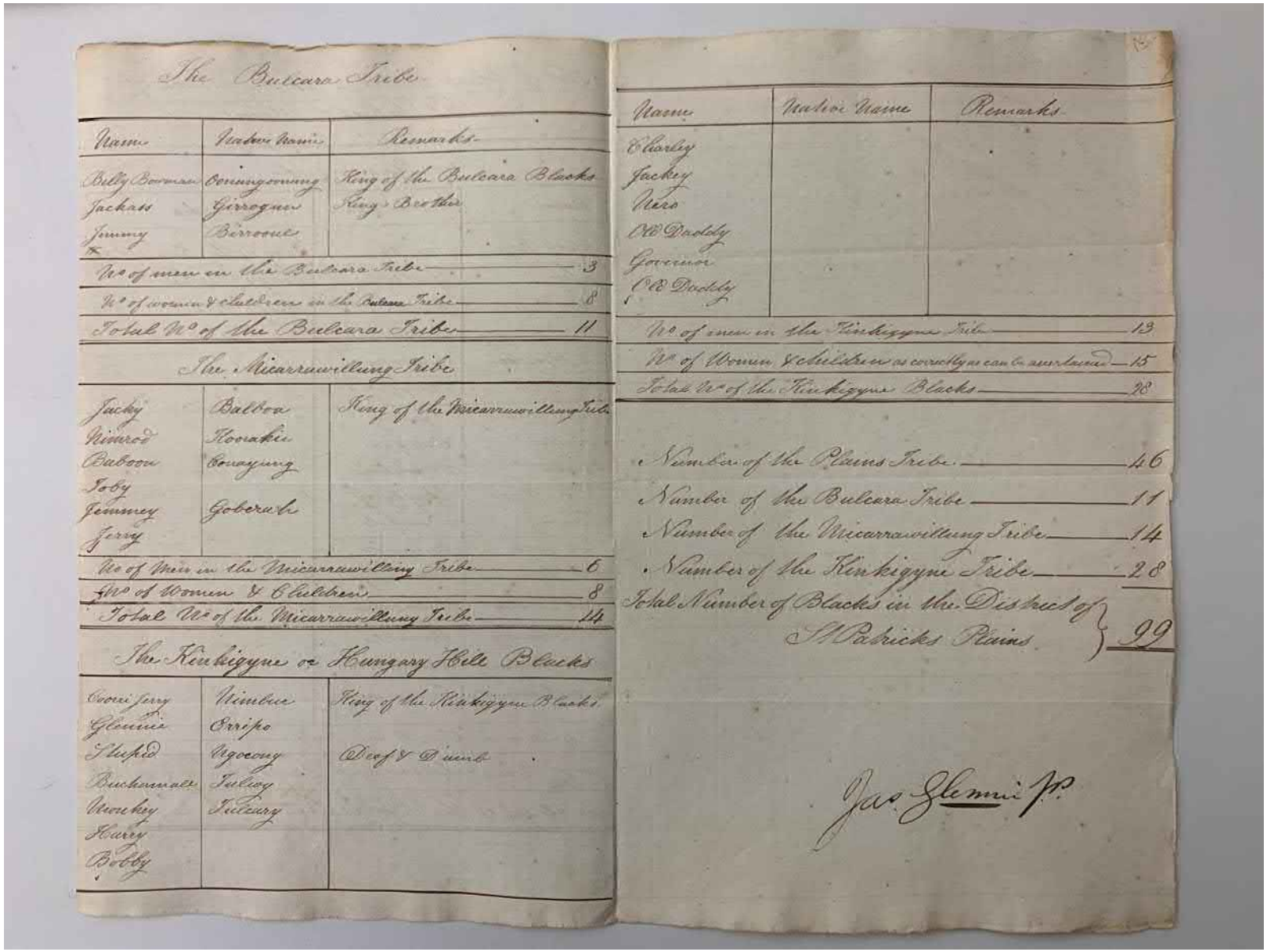
I have the Honor to be
Sir
Your most obedient Servant

Wright. J. P.

To
Alexander M'Leay Esquire
Colonial Secretary
&c. &c. &c.

D R A F T

Figure 11 James Glennie's August 1829 return for the Patrick's Plains district, Page 3 of 3 (SRNSW, 4/2045



The Bulcara Tribe

Name	Native Name	Remarks
Billy Barman	Conungomming	King of the Bulcara Blacks
Jackass	Girrogun	King's Brother
Jimmy	Barroone	

No of men in the Bulcara Tribe — 3
No of women & children in the Bulcara Tribe — 8
Total No of the Bulcara Tribe — 11

The Micarrawilling Tribe

Jacky	Balboa	King of the Micarrawilling Tribe
Nimrod	Koorakie	
Baboon	Conayung	
Joby		
Jemmey	Goberarbe	
Jerry		

No of Men in the Micarrawilling Tribe — 6
No of Women & Children — 8
Total No of the Micarrawilling Tribe — 14

The Kenkigyne or Hungary Hill Blacks

Coonijerry	Nimbee	King of the Kenkigyne Blacks
Glennie	Erripo	
Stupid	Ngoeony	Deaf & Dumb
Buckmaker	Juliey	
Monkey	Juleary	
Harry		
Bobby		

Name	Native Name	Remarks
Charley		
Jackey		
Nero		
No Daddy		
Governor		
No Daddy		

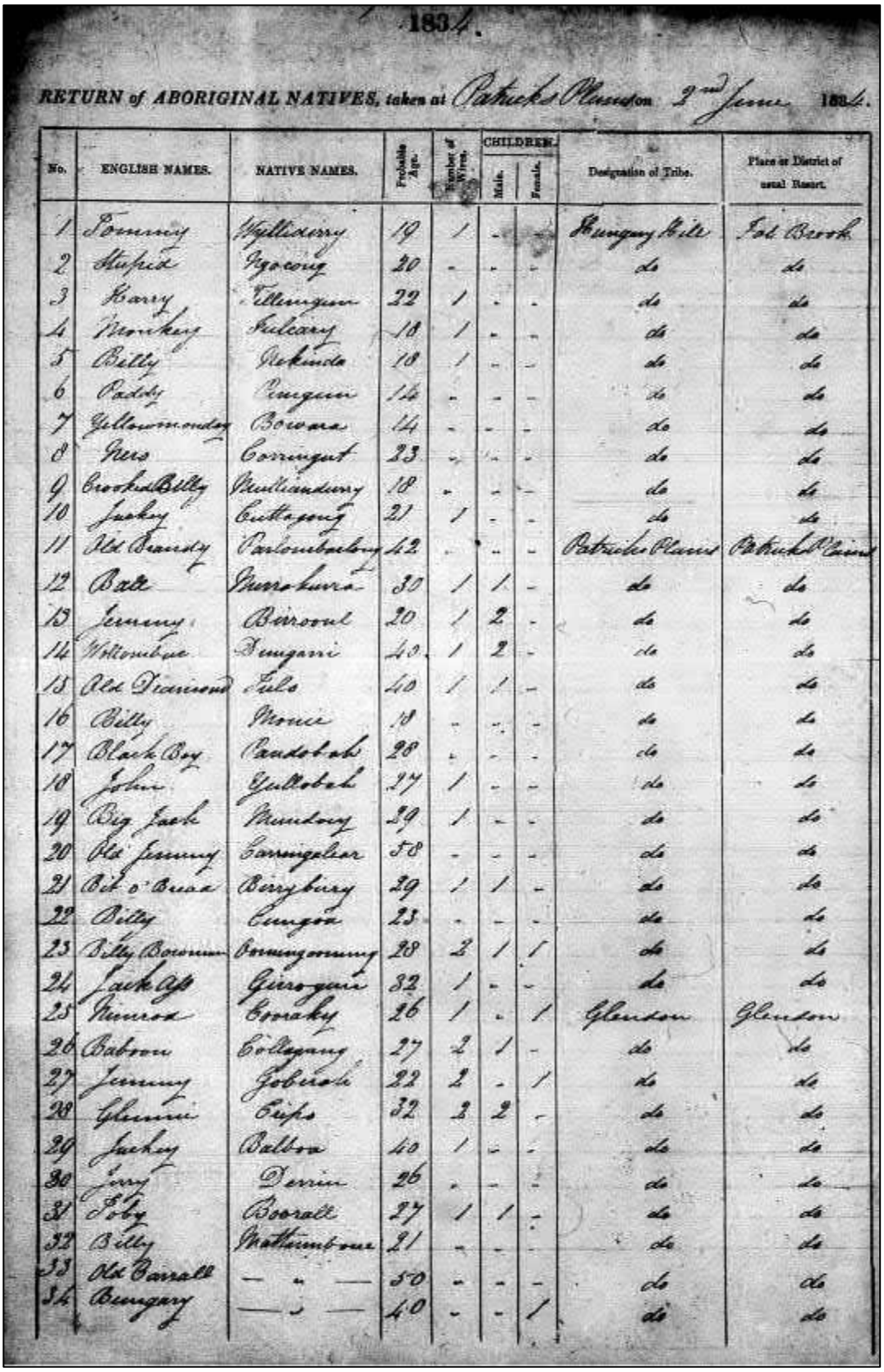
No of men in the Kenkigyne Tribe — 13
No of Women & Children as correctly as can be ascertained — 15
Total No of the Kenkigyne Blacks — 28

Number of the Plains Tribe — 46
Number of the Bulcara Tribe — 11
Number of the Micarrawilling Tribe — 14
Number of the Kenkigyne Tribe — 28
Total Number of Blacks in the District of St Patricks Plains — 99

Jas Glennie JP

D R A F T

Figure 12 Return of Aboriginal Natives, Patrick's Plains, 2 June 1834 1. This return lists the 'place of district of usual resort' for the 'Hungary Hill Tribe' as Fal Brook (SRNSW, Reel 3706)



1834.

RETURN of ABORIGINAL NATIVES, taken at Patricks Plains on 2nd June 1834.

No.	ENGLISH NAMES.	NATIVE NAMES.	Probable Age.	Number of Wives.	CHILDREN. Male.	CHILDREN. Female.	Designation of Tribe.	Place or District of usual Resort.
1	Tommy	Wyllidarry	19	1	-	-	Hungary Hill	Fal Brook
2	Stupid	Igocong	20	-	-	-	do	do
3	Harry	Tillungum	22	1	-	-	do	do
4	Monkey	Pulcany	18	1	-	-	do	do
5	Billy	Pukunda	18	1	-	-	do	do
6	Paddy	Cungum	16	-	-	-	do	do
7	Yellowmondy	Bowana	14	-	-	-	do	do
8	Jews	Corrungut	23	-	-	-	do	do
9	Crooked Billy	Pintlandumy	18	-	-	-	do	do
10	Jacky	Cuttagong	21	1	-	-	do	do
11	Old Brandy	Parlombabby	42	-	-	-	Patricks Plains	Patricks Plains
12	Bate	Murrahura	30	1	1	-	do	do
13	Jemmy	Birroul	20	1	2	-	do	do
14	Wollombua	Dungani	40	1	2	-	do	do
15	Old Diamond	Tulo	40	1	1	-	do	do
16	Billy	Monie	18	-	-	-	do	do
17	Black Boy	Caudobah	28	-	-	-	do	do
18	John	Gullobah	27	1	-	-	do	do
19	Big Jack	Mundoy	39	1	-	-	do	do
20	Old Jemmy	Carringelar	58	-	-	-	do	do
21	Bit o' Beef	Berryberry	29	1	1	-	do	do
22	Billy	Cungoa	23	-	-	-	do	do
23	Billy Boronun	Bonungonung	28	2	1	1	do	do
24	Jack Ash	Giroyan	32	1	-	-	do	do
25	Munroe	Coraky	26	1	-	1	Glendon	Glendon
26	Babroo	Collegang	27	2	1	-	do	do
27	Jemmy	Jobrah	22	2	-	1	do	do
28	Glennie	Cups	32	3	2	-	do	do
29	Jacky	Balbra	40	1	-	-	do	do
30	Jerry	Derrin	26	-	-	-	do	do
31	Toby	Boorall	27	1	1	-	do	do
32	Billy	Mathumbone	21	-	-	-	do	do
33	Old Darrall	— " —	50	-	-	-	do	do
34	Bungary	— " —	40	-	-	1	do	do

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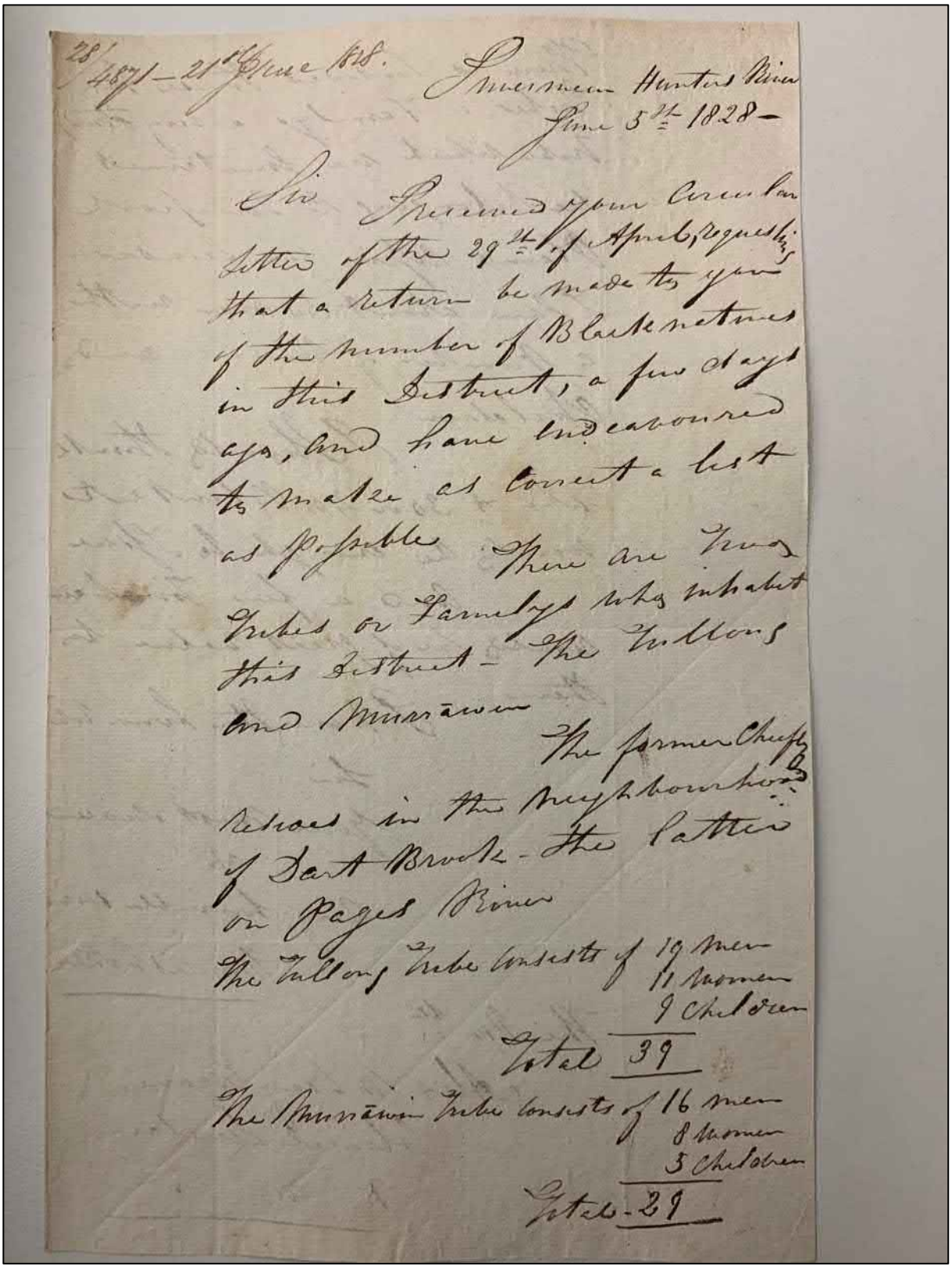
Figure 13 Francis Little's June 1828 return for the district surrounding his Invermien estate in Dartbrook Page 1 of 2 (SRNSW, 4/2045)



28/4871 – 21st June 1828.

Invermein Hunters River
June 5th 1828 –

Sir I Received your Circular letter of the 29th of April, Requesting that a return be made to you of the number of Blacknatives in this District, a few days ago, and have endeavoured to make as Correct a list as possible. There are Two Tribes or Families who inhabit this District – The Wallons and Murrawin

The former Chiefly Reside in the Neighbourhood of Dart Brook – the latter on Pages River

The Wallon Tribe Consists of 19 Men
11 Women
9 Children
Total 39

The Murrawin Tribe Consists of 16 Men
8 Women
5 Children
Total 29

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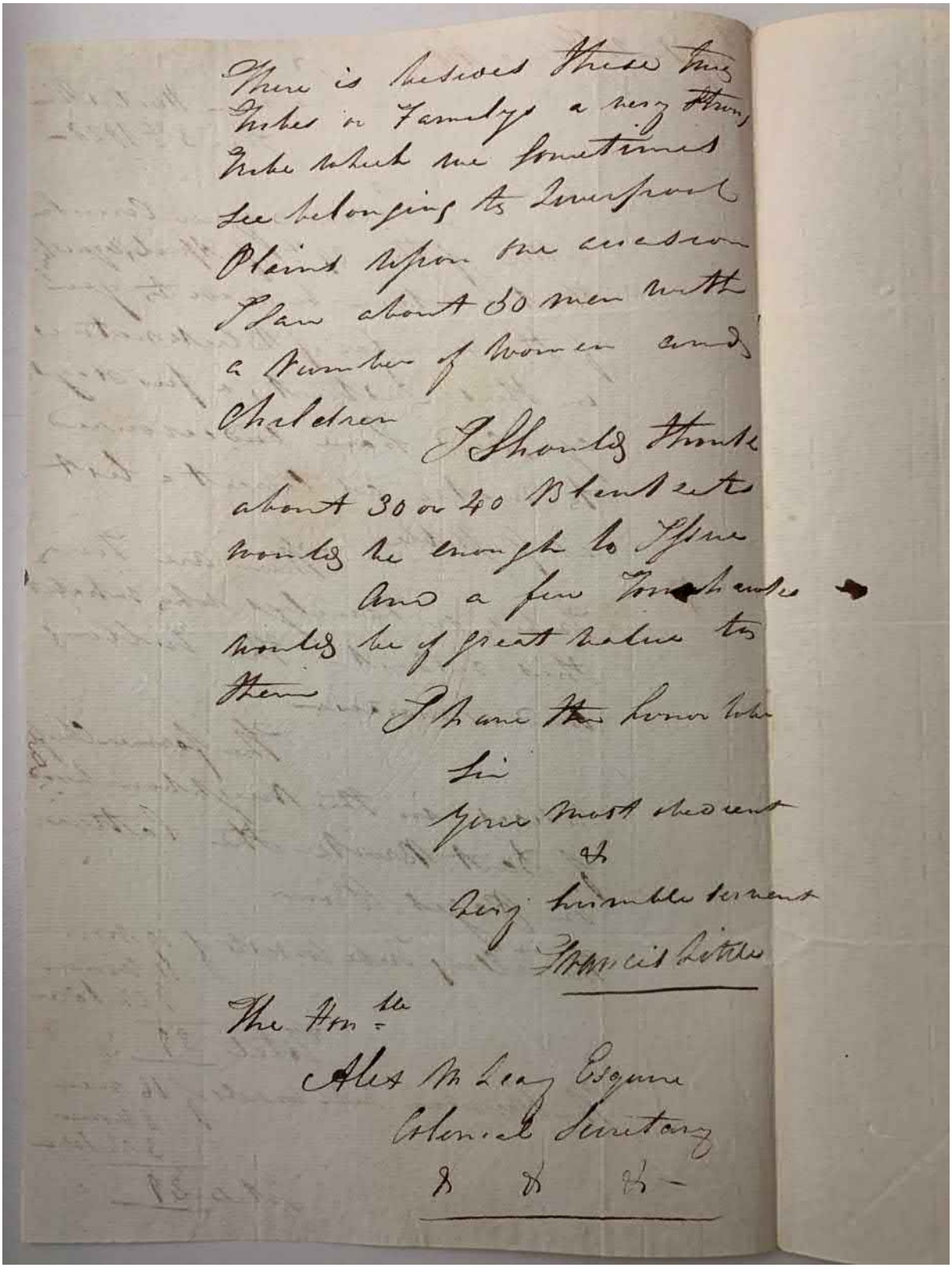
Figure 14 Francis Little's June 1828 return for the district surrounding his Invermien estate in Dartbrook Page 2 of 2 (SRNSW, 4/2045)



There is besides these two
Tribes or Family a very strong
Tribe which we sometimes
see belonging to Liverpool
Plains upon the occasion
I saw about 80 men with
a number of Women and
Children I should think
about 30 or 40 Blankets
would be enough to Issue
And a few Tomahawks
would be of great value to
them I have the honor to be
Sir
your most obedient
&
very humble Servant
Francis Little

The Hon^ble
Alex^r McLeay Esquire
Colonial Secretary
&c &c &c

3.3.1 Mount Arthur Massacre

Specific to the study area, a review of documentary sources for the mid-to-upper Hunter has not identified any reported incidents of Aboriginal-European conflict within or immediately surrounding this area. As indicated above, Gollan (1993) has suggested that the incident known colloquially as the 'Ravensworth massacre' is likely to have occurred within the Mount Arthur area, north-west of the study area. However, other, more recent reviews of this incident (e.g., Dunn, 2015; Umwelt, 2004) cast doubt over this interpretation.

Historically documented incidents of conflict notwithstanding, RAPs involved in the current assessment have identified Mount Arthur, located approximately .5 km north of the study area, as the location of a massacre. While no details of this incident were provided to AECOM as part of the current assessment, it is likely that the incident to which the RAPs are referring is the same incident reported by Aboriginal informants involved in Davidson and Lovell-Jones' (1993) ethnographic investigation for the then proposed Bayswater No. 3 Colliery. Davidson and Lovell-Jones (1993: 20) report several of their informants as having told them of a massacre within 'The Pocket', a prominent re-entrant to the west of Mount Arthur proper (Figure 15). As described in their report:

> *Several people told the same story, with few contradictions (related below), in the course of this study. This story relates to The Pocket or The Little Pocket on the southern side of Mount Arthur. It is believed by these people that a group of approximately 300 local Aboriginal people were either camping in, or were driven into, The Pocket by the Mounted Police (numbers of police unknown). The story goes on to relate that the Aboriginal people, who were thought to be the last survivors in the district, were subsequently all shot to death, men, women and children, by the mounted police from 'on top of the pocket'. No one could then relate what they may have been told had happened to the bodies.*
>
> *All but one of the informants believed the massacre at The Pocket to be accurate, as, all informants trusted that the person who told them was a reliable and honest source (usually a parent or grandparent). They also related their fears of the area and spoke of 'horses always being spooked near The Pocket', they would also 'get this feeling that someone was watching me' and their own 'hair rising on the back of the neck' and of nearby 'windmill spinning tail first' with or without accompanying wind.* (Davidson and Lovell-Jones 1993: 20)

These observations aside, Davidson and Lovell-Jones (1993: 20) noted a lack of corroborating material evidence for the massacre reported by their informants:

> *None the informants who worked around Mount Arthur or played in the rock shelters or 'caves' of Mount Arthur, as children, ever saw any human remains or other material culture remains of Aboriginal people. One informant indicated that in one 'cave', in Mount Arthur, there is a crack along the back where 'if you throw a rock down it you can't hear it land'. The archaeological survey in The Pocket revealed three locations with artefacts, but no other signs of past Aboriginal occupation. Moreover, James and Fife* [i.e., Rosalind James and Ray Fife] *were of the opinion that the slopes and their wooded nature would not have allowed the sort of attack from above being described.*

In addition to 'The Pocket', Davidson and Lovell-Jones (1993: 20) report that two of the archaeologists involved in the archaeological survey component of the Bayswater No.3 Colliery, namely Rosalind James and Ray Fife, were told of "another possible site of the same, or another, massacre" while surveying in the field. This site was located in a gully behind the property of 'Belmont', itself located around 3 km southwest of Mount Arthur, on the northern side of Saddlers Creek (Figure 15). However, "this rumour was not corroborated by any of the other informants" (Davidson and Lovell-Jones, 1993: 20).

In offering their conclusions on the massacre reported by their informants, Davidson and Lovell-Jones (1993: 27) stressed the point that, while their inquiry failed to identify any documentary evidence of a massacre within the Mount Arthur area, the oral histories provided by their informants were to be considered equally authoritative.

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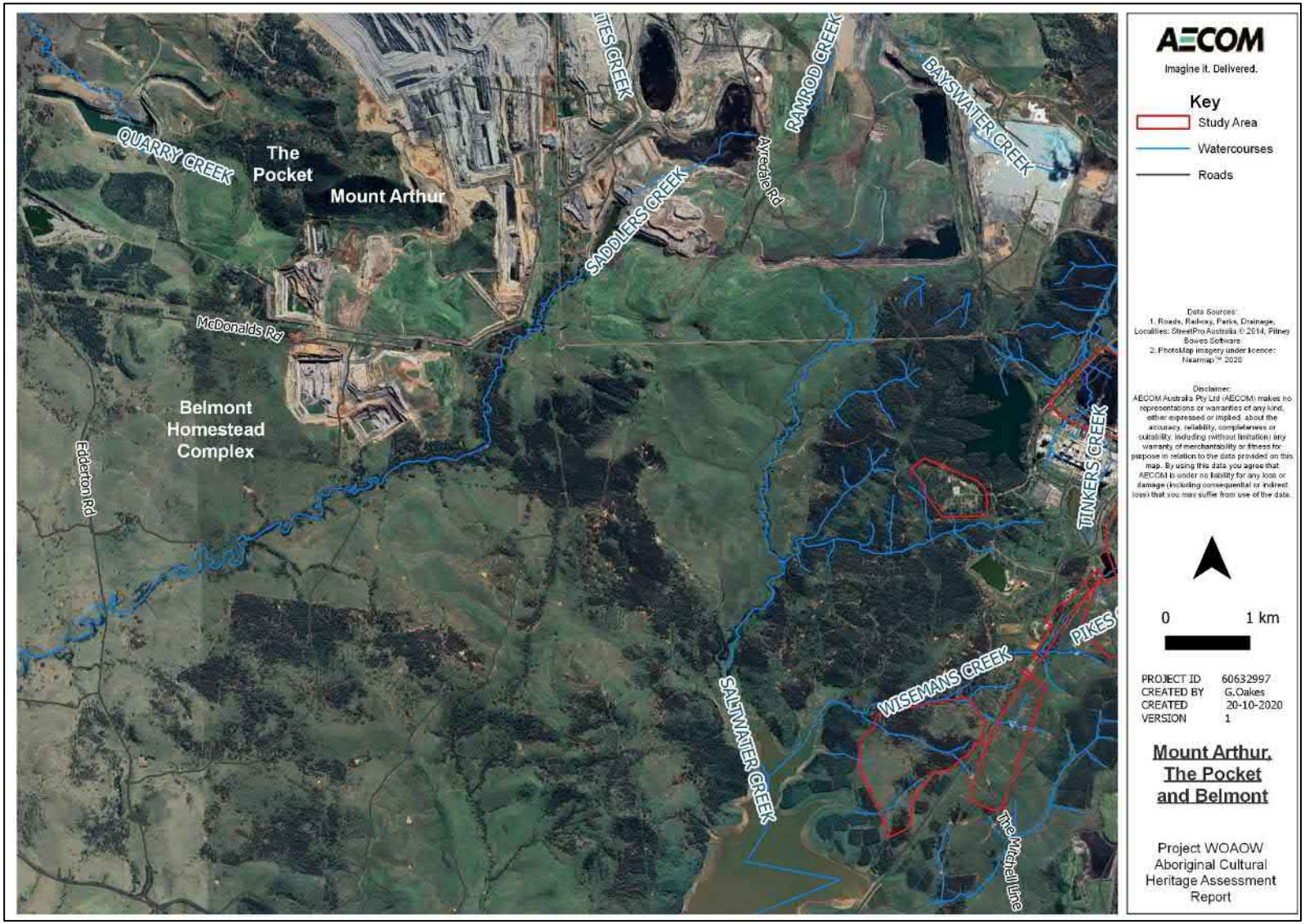
Figure 15Map showing the location of 'The Pocket', adjacent to Mount Arthur proper, as well as Belmont homestead. The gully behind the property Belmont is also marked



3.4 Resilience and Adaption

Perhaps predictably, historical accounts of Aboriginal-European relations within the Hunter Valley have tended to focus on the violence that took place across the valley during the first two decades of European settlement, with other aspects of interaction, such as co-operation, friendship and positive working relationships, largely overlooked. For the Hunter Valley, in particular, the historical emphasis on Aboriginal-settler conflict has obscured what available historical sources indicate a complex pattern of interaction. As Dunn (2015: 236) has stressed, the reaction of the valley's resident Aboriginal population to the invasion of their Country:

> *…was a complex and varied one. Violence and confrontation was one response, with clashes particularly intense during the period between the mid-1820s and mid-1830s as more Europeans moved into the valley. The drama and tragedy of the violence on both sides of the frontier, which for many people was inescapable, has in part obscured the cooperation, friendships and working relationships that also formed throughout the region during the same period. Some relationships transitioned through friendship, violence and co-existence: these highlight the blurred and fluid nature of alliances and affiliations in the colonial Hunter.*

As in other parts of New South Wales and Australia more broadly, the majority of Aboriginal-European interaction across the Hunter Valley in the years following the region's colonisation by Europeans was "driven by the need for and value of Aboriginal labour, which was the most important component of the exchange between the two cultures" (Dunn, 2017: 44). Recent considerations of Aboriginal peoples' involvement in the colonial economy of the Hunter Valley (e.g., Blyton, 2012; Dunn, 2015, 2017) have highlighted the many and varied roles that Aboriginal played in its establishment and operation. Alongside their frequent appointment as guides and trackers, Aboriginal people were regularly employed on the estates and farms of the region for tasks such as shepherding, shearing, harvesting, clearing land, cutting wood, stripping bark, carrying water and tracking lost animals (for a detailed review see (Dunn 2017)).

Specific to the study area and environs, AECOM has been unable to identify any documentary evidence of Aboriginal people having worked on the two major estates of this area: George Bowman's 'Arrowfield' and James Robertson's 'Plashett'. Nonetheless, it is highly considered likely that Aboriginal people were employed to work on one or both of these estates in some capacity at some time. Indeed, as Dunn (2017:55) has observed, "[b]etween the opening of the Hunter Valley to settlement in the early 1820s and the middle of the century, most if not all of the colonial estates and farms in the Hunter Valley employed Aboriginal workers…".

3.5 Archaeology in the Study Area

The archaeological investigation completed for the assessment has revealed 23 Aboriginal archaeological sites, all comprising open or closed artefact sites (i.e., artefact scatters and isolated artefacts). RAPs involved in the assessment have noted that all Aboriginal sites are of significance to contemporary Aboriginal people. A detailed description of the identified sites is provided in the Project's ACHAR.

4.0 Summary of Findings

While no specific cultural values were identified within the study area, RAPs indicated that it 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 watercourses and high points in the landscape, as well as the Aboriginal objects (i.e., stone artefacts) identified during the archaeological survey and test excavation for the Project. Landscape features, as well as Aboriginal sites, are often associated with stories or songs and form links along songlines or pathways. However, it was noted by RAPs that the study area has been subjected to significant historical impacts from the construction of the power station.

5.0 Acknowledgments

AGL and AECOM would like to acknowledge the Traditional Owners of the study area, the Wonnarua People, and pay respect to their cultural heritage, beliefs and continuing connection to the land. We also would like to pay respect to the Elders past, present and future and to all Aboriginal People who participated in the assessment.

D R A F T

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Appendix C

Testing Methodology

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Appendix C Testing Methodology

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19 June 2020

Dear RAP,

RE: Proposed test excavation and cultural values report methodologies for WOAOW SSD 9697 Project at Bayswater Power Station

AECOM Australia Pty Ltd (**AECOM**) is commissioned by AGL Macquarie Pty Ltd (**AGL**) to prepare a Aboriginal Archaeological Report (**AAR**) and Cultural Values Report (**CVR**) to form part of the Aboriginal Cultural Heritage Assessment Report (**ACHAR**) that Jacobs (2019) prepared for the Bayswater Water and Other Associated Operational Works (**WOAOW**) project, located south of Muswellbrook, NSW.

Please find enclosed the proposed test excavation and CVR methodologies for the project for your review. The draft assessment methodologies detail the proposed approach AECOM will use to complete the test excavation and CVR, and are being provided to all Registered Aboriginal Parties (**RAPs**) in accordance with Sections 4.3.1 and 4.3.2 of the NSW Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

Aboriginal site officers will be required to assist with the test excavation works for this project. If you would like to be considered for site test excavation works, please forward a copy of relevant business insurances (i.e., public liability insurance and NSW workers compensation insurance) to Geordie Oakes by COB 17 July 2020 via the contact details provided below.

All comments on the proposed methodology must be received by COB 17 July 2020. Comments can be provided in writing, email 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 ACHAR review period.

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Sydney, NSW 1230
Ph: +61 2 8934 0610
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We look forward to your participation in the assessment of this project.

Yours faithfully

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Project WOAOW: Proposed Archaeological Test Excavation Methodology

1.0 Introduction

AECOM Australia Pty Ltd (**AECOM**) is commissioned by AGL Macquarie Pty Ltd (**AGL**) to prepare a Aboriginal Archaeological Report (**AAR**) to form part of the Aboriginal Cultural Heritage Assessment Report (**ACHAR**) that Jacobs (2019) prepared for the Bayswater Water and Other Associated Operational Works State Significant Development 9697 (**WOAOW**) project, located south of Muswellbrook, NSW.

2.0 Purpose of this Document

This document provides Registered Aboriginal Parties (**RAPs**) the proposed methodology for the archaeological test excavation. AECOM welcomes the input of RAPs to develop and improve the proposed test excavation method.

3.0 Background to the Test Excavation

AGL's WOAOW project includes the following upgrades to the Bayswater Power Station (Figure 1):

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity;
- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam;
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system;
- Increasing coal ash recycling activities to produce up to 1,000,000 tonnes per annum of ash derived product material and reuse of coal ash;
- Upgrades to existing fly ash harvesting infrastructure including the installation of weighbridges, construction of a new 240 tonne silo, tanker wash facility and additional truck parking;
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement;
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste;
- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land; and
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of aging pipelines, vegetation clearing associated with maintaining existing infrastructure, including along existing pipeline corridors as is necessary.

4.0 Aboriginal Cultural Heritage Assessment Report (ACHAR)

In 2019, Jacobs prepared an ACHAR for the WOAOW project. As part of the assessment, RAP consultation and archaeological survey was undertaken across the WOAOW study area. While no specific cultural values were identified through consultation, Jacobs identified 37 Aboriginal sites across the study area. These comprised 28 open artefact sites, seven of which have associated areas of PAD, and nine Potential Archaeological Deposits (**PADs**). Of these sites, Jacobs (2019) recommended archaeological test excavations be carried out in the portions of 19 sites where areas PAD were located with the study area (Table 1 and Figure 1).

5.0 Test Excavation Methodology

AECOM notes that a number of the PAD sites designated for test excavation by Jacobs (2019) comprise large areas incorporating landforms not typically considered archeologically sensitive in the Hunter Valley (e.g. steeply inclined upper slopes, midslopes etc.). As such, AECOM proposes an archaeological testing methodology tailored to assessed levels of subsurface archaeological potential within the identified PAD areas (see Table 1). Areas assessed by AECOM as having a high potential for subsurface archaeological deposit will be subject to more intensive testing than those of lower potential.

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A two phase program of excavation is proposed, with Phase 1 involving systematic testing of PAD areas located within the study area and Phase 2 involving the expansion of selected test pits containing high artefact densities (i.e., on a site-based scale) and/or archaeological features such as hearths. All Phase 1 test pits will be placed on a systematic grid appropriate to their respective archaeological potential (i.e., 30 m intervals for high potential, 50 m intervals for moderate potential and 100 m for low potential) and will be hand excavated as 50 x 50 cm units (0.25 m²). Test pits in Phase 2 may be expanded to a maximum of 3 m^2 in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (NSW DECCW, 2010b).

All test pits will be excavated to culturally sterile horizons. Excavated sediment will be dry-sieved or wet sieved, depending on soil conditions, through 5 mm wire-mesh sieves. Any Aboriginal objects recovered during sieving will be bagged by square and spit. Representative profiles in each excavation unit will be drawn and photographed. Test pit stratigraphy will be recorded on pro forma test pit recording sheets using standard sedimentological terms and criteria (after McDonald & Isbell, 2009). AECOM will be responsible for backfilling test pits after excavation.

On the basis of the above, AECOM estimates that approximately 270 0.25 m² test pits will be excavated as part of the program.

General excavation procedures include the following:

- All excavation will be carried out manually using trowels, shovels and mattocks;
- Test excavation will proceed in 0.25 m² units placed on varying grids across the PAD areas;
- Expansion excavation will proceed in 0.25 m² units, with each unit assigned an alpha-numeric identifier;
- With the exception of the first test unit which will be excavated in 5 cm spits, all test units will be excavated in 10 cm spits down to the base of the identified A_2 soil horizon;
- Photographic and scale-drawn records of representative soil profiles will be made;
- If specific archaeological features (e.g., hearths, heat treatment pits) are identified, the entire feature will be excavated and recorded prior to the continuation of excavation. Features will be photographed and scale plans drawn;
- If encountered, charcoal deemed suitable for radiocarbon dating will be collected using 'best practice' guidelines (e.g., Burke and Smith, 2004: 154);
- Soil samples will be retained for pH testing and soil description;
- Where appropriate, soil samples for Optical Stimulated Luminescence (OSL) dating will be collected from selected strata using best practice guidelines (e.g., United States Geological Survey 2015);
- Excavated soils will be dry or wet-sieved, depending on soil conditions, through 5 mm gauge sieves;
- Artefacts recovered from sieving will be retained in plastic zip-lock bags and labelled with appropriate provenance data; and
- All excavation units will be backfilled upon conclusion of excavation.

Table 1 Sites to be excavated

Site Name/ID	Assessed Potential	Excavation strategy
37-2-0555	High	30 intervals
37-2-0556	High	30 intervals
37-2-0558	High	30 intervals
BAYS AS and PAD02	Moderate	50 m intervals
BAYS AS and PAD03	Moderate	50 m intervals
BAYS AS and PAD05	High/moderate	30 m and 50 m intervals
BAYS AS and PAD07	High	30 intervals

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BAYS AS and PAD10	Moderate	50 intervals
BAYS AS and PAD11	High/low	30 and 100 m intervals
BAYS AS and PAD15	High/low	30 and 100 m intervals
BAYS PAD01	Low	100 intervals
BAYS PAD08	Low	100 intervals
BAYS PAD12	Moderate	50 intervals
BAYS PAD13	Low	100 m intervals
BAYS PAD14	Low	100 m intervals
BAYS PAD16	High/moderate/low	30 m ,50 m, and 100 m intervals
BAYS PAD17	Low	100 m intervals
BAYS PAD18	Moderate	50 m intervals
BAYS PAD19	Moderate	50 m intervals

6.0 Reporting

AECOM will prepare an AAR detailing the results of the test excavation program and incorporate the findings into the previously completed ACHAR (Jacobs 2019). The AAR will form an appendix to the project's updated ACHAR. Both reports will be provided to RAPs for review following their completion.

7.0 Artefact Storage and Handling

In accordance with Requirement 16B of the Code of Practice, all stone artefacts recovered from the study area as part of the test excavation program will be stored temporarily at AECOM's head office (Level 8, 420 George Street, Sydney) while they are analysed. Details for the long term management of Aboriginal objects recovered as part of the test excavation program will be outlined in the Project's ACHAR for RAP review with consultation undertaken with RAPs over the proposed long term management of these items.

8.0 Field Team

AECOM Principal Heritage Specialist Geordie Oakes will manage the field program. Geordie will be assisted in the field by AECOM Heritage Specialists, Dr Andrew McLaren, Dr Darran Jordan, Luke Wolfe and Julia Atkinson. In addition, a team of RAP site officers will be engaged each day to assist with the excavations, as will AGL representative Nick Woodward.

9.0 Site Health and Safety Requirements

All site workers are required to complete AGL Bayswater's online induction prior to entering site. This should be completed by the individual attending the site prior to any rostered day of fieldwork. During fieldwork site workers will be required to sign onto AECOM's Health and Safety Plan.

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Figure 1 Indicative test pit locations

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Project WOAOW: Cultural Values Report Proposed Methodology

1.0 Introduction

AECOM Australia Pty Ltd (**AECOM**) have been engaged to produce a Cultural Values Report (**CVR**), the purpose of which is to identify and document any tangible and/or intangible Aboriginal cultural values as part of the Bayswater Water and Other Associated Operational Works (**WOAOW**) project. This document provides Registered Aboriginal Parties (**RAPs**) with the proposed methodology for completing the CVR, including the background on the information the report will seek to capture, such as the cultural values of the study area, their significance, as well the cultural landscape the study area occupies. This letter has been sent to you for your input and feedback, and to ensure from the outset that you have an active part of the process that will be used to capture this information.

2.0 Defining Aboriginal Cultural Values

You may have your own ideas of what Aboriginal cultural values are and the best way to describe them. For the purposes of preparing this CVR, Aboriginal cultural values have been defined as any place or object of significance to Aboriginal people resulting from traditions, observances, lore, customs, beliefs and history. These values, which can comprise physical (tangible) or non-physical (intangible) elements, are evidence of the legacy of Aboriginal people stretching from the ancestors of the past right through to present day.

Cultural values may be attached to physical markers in the landscape, such as objects used for practical purpose or ceremony, such as stone tools, art sites, ceremonial areas or burial grounds. As Aboriginal history stretches through to the present day these values can also be attached to historical or even contemporary structures, such as mission buildings, houses, community areas and cemeteries. All of these varied elements combine to form part of the broader cultural landscape (OEH 2011a).

Aboriginal cultural values are critical to the connection and sense of belonging that Aboriginal people have with the landscape and each other. These values are not only confined to physical sites but also include memories, stories, ceremonies, language, 'ways of doing things', passing on knowledge and looking after cultural traditions and places. It is in this way that Aboriginal cultural values provide continuity and context, forging a tangible link between the past and the present. Community and individual identity, connection and a sense of belonging to Country are all essential parts of Aboriginal Cultural Values (OEH 2011a).

3.0 Aboriginal Cultural Landscapes

As has been stated in the previous section, individual objects and places derive their significance from being interrelated pieces of a larger and more complex cultural landscape. For this reason, features should not be assessed in isolation but rather understanding should be sought into how they contribute to the wider landscape, seeking an understanding of connections holistically (DECCW 2010).

An Aboriginal cultural landscape is generally defined in heritage documentation as: "a place or area valued by an Aboriginal group (or groups) as a result of their long and complex relationship with that land. It can embody their traditional knowledge of spirits, places, land uses, and ecology. Material remains of the association may be prominent, but will often be minimal or absent" (Buggey, 1999).

The purpose of the proposed CVR is to seek an understanding of the connectivity between all parts of a linked cultural landscape through consultation with Aboriginal people. The point of this is to contextualise the present landscape as the product of long-term and complex relationships between people and the environment (DECCW 2010).

4.0 Defining Cultural Significance

Whereas scientific significance is determined by a hierarchy of values, cultural significance resists definition in this way. Assessing the cultural significance of a place or object requires defining the reason why a place is culturally important, but cultural values are often intentionally excluded from a sliding scale to characterise sites. One common response to requests to define cultural significance is to state that all Aboriginal sites have high cultural significance, as each artefact, place or structure,

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from a single flake to a stone arrangement to a mission building, provides a tangible link to the ancestors of the past just as it connects the community of the present.

The process of understanding which places are culturally significant and why, can therefore be an emotional experience. The importance of sharing the reasons for a place's importance are so that it can be appropriately managed and protected, so that any changes do not damage, diminish or remove the reasons for a place's importance (OEH 2011a).

In Australia, one method of assessing cultural significance is to use *The Burra Charter: 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 2). 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).

Table 2 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).

5.0 Information sought for this Cultural Values Report

The purpose of this CVR is to capture any relevant cultural information that can be shared through consultation, including interviews with members of the Aboriginal community, as one of the ways this information will be sought. Some types of information that will be sought through consultation are:

- Knowledge of the plants and animals that have contributed to the continuing existence of Aboriginal peoples in the region over many thousands of years, and how they are valued in today's community;
- Known sites within the landscape and how these material remains connect to people and other places in the landscape through tradition and story;
- Following reference to historical records with observations on Aboriginal people, lifestyles, wars, massacres, social and cultural events, population census, social interactions and language, to seek a complementary but different understanding of these through the shared memories of the contemporary Aboriginal community; and
- Shared stories of how traditional cultural practise and values are experienced by the contemporary Aboriginal community.

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6.0 Methodology

Key tasks for completing the CVR will include:

- Updating this methodology based on the feedback received from RAPs, to ensure the process is relevant to the needs of the Aboriginal community;
- Undertaking phone calls to all RAPs to discuss the project, obtain preliminary cultural values and arrange meetings/site inspections;
- Review of archaeological literature for the Upper Hunter Valley;
- Review of ethno-historical literature for the Hunter Valley;
- Searches of relevant historic heritage registers and lists;
- Background research including reviews of relevant reports, publications, historic aerials and parish maps including:
    - State Library of NSW/Mitchell Library;
    - Trove newspaper archives and the Spatial Information Exchange (SIX) maps;
    - State archives of NSW;
- Undertake interviews and site visits (if appropriate) with Aboriginal community members; and
- Preparation of a report including the results, with details on the shared knowledge of cultural values, specific site history, ethnohistory, and management recommendations for any culturally significant places or objects that are identified by the Aboriginal community.

7.0 Sensitive Information

As noted in OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), some information obtained from RAPs may be sensitive or have restricted public access. AECOM, in consultation with relevant RAPs, will develop appropriate protocols for sensitive or restricted information (as required), 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 AGL in the preparation of an application for an Aboriginal Heritage Impact Permit (although such a permit is not expected to be necessary given the Project will be assessed as a State Significant Development (**SSD**) [Section 3]), and to assist with consideration and determination of the application.

8.0 Contact

Your participation in the production of this CVR and sharing of this important body of knowledge is greatly appreciated. Please contact Darran Jordan with any comments or edit requests you have for this methodology. You can reach him at the below contact details.

Darran Jordan
AECOM Australia Pty Ltd
darran.jordan@aecom.com
0401 606 057
Level 21, 420 George Street Sydney NSW 2000

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PO Box Q410, QVB PO, Sydney, NSW, 1230

9.0 References

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Appendix D

RAP Responses to Methodology

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Appendix D RAP Responses to Methodology

Appendix E

RAP Responses to Draft Report

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Appendix E RAP Responses to Draft Report

Appendix F

Consultation Log

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Appendix F Consultation Log

Appendix G

Testing Notification

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Appendix G Testing Notification

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13 July 2020

Department of Planning, Industry and Environment
Hunter Central Coast Planning Team
Locked Bag 1002
Dangar NSW 2309

To Whom it May Concern,

Re: Notification of Test Excavation Program – Bayswater Power Station WOAOW Project

1.0 Introduction

In accordance with Requirement 15c of *the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, I am writing to inform you of a program of archaeological test excavation that is be undertaken for the Bayswater Water and Other Associated Operational Works (**WOAOW**) project. AGL Macquarie Pty Ltd (AGL) proposes a series of upgrades to the power station and through the preparation of an Aboriginal heritage assessment (Jacobs 2019) identified 37 Aboriginal sites across the study area. These comprised 28 open artefact sites, seven of which have associated areas of PAD, and nine areas of Potential Archaeological Deposit (PAD). Of these sites, Jacobs (2019) recommended archaeological test excavations be carried out in parts of 19 sites (Figure 1).

AECOM Australia Pty Ltd (AECOM) is commissioned by AGL to undertake the program of archaeological test excavation within these sites. An 18 day program of archaeological test excavation is proposed beginning the week of 3 August 2020.

2.0 Proponent & Archaeologist Details

AGL Macquarie Pty Ltd is the legal entity responsible for the proposal (ABN: 181867859494). AECOM archaeologist Geordie Oakes will be managing the test excavation program on their behalf. Contact details for Geordie are as follows:

Office address: AECOM Australia Pty Ltd, Level 8, 420 George Street, Sydney, NSW 2000

Phone: (02) 8934 0610

Mobile: 0410 513509

E-mail: geordie.oakes@aecom.com

3.0 Background Information

3.1 The Study Area

The study area for AECOM's assessment for the proposal, shown on Figure 1, comprises a series of eight discrete areas representing locations where AGL propose to undertake upgrades across the power station. Upgrades include the following:

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity;
- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam;
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system;
- Increasing coal ash recycling activities to produce up to 1,000,000 tonnes per annum of ash derived product material and reuse of coal ash;
- Upgrades to existing fly ash harvesting infrastructure including the installation of weighbridges, construction of a new 240 tonne silo, tanker wash facility and additional truck parking;
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement;
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste.

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- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land; and
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of aging pipelines, vegetation clearing associated with maintaining existing infrastructure, including along existing pipeline corridors as is necessary.

The study area is situated in the upper Hunter region, approximately 110 kilometres northwest of Newcastle's CBD and 15 kilometres southeast of the town of Muswellbrook. The study area falls partly within the boundaries of the Muswellbrook Local Government Area (LGA) and the Singleton LGA. It cross-cuts the parishes of Savoy, Howick and Liddell (County of Durham) and lies across the suburbs of Howick and Liddell.

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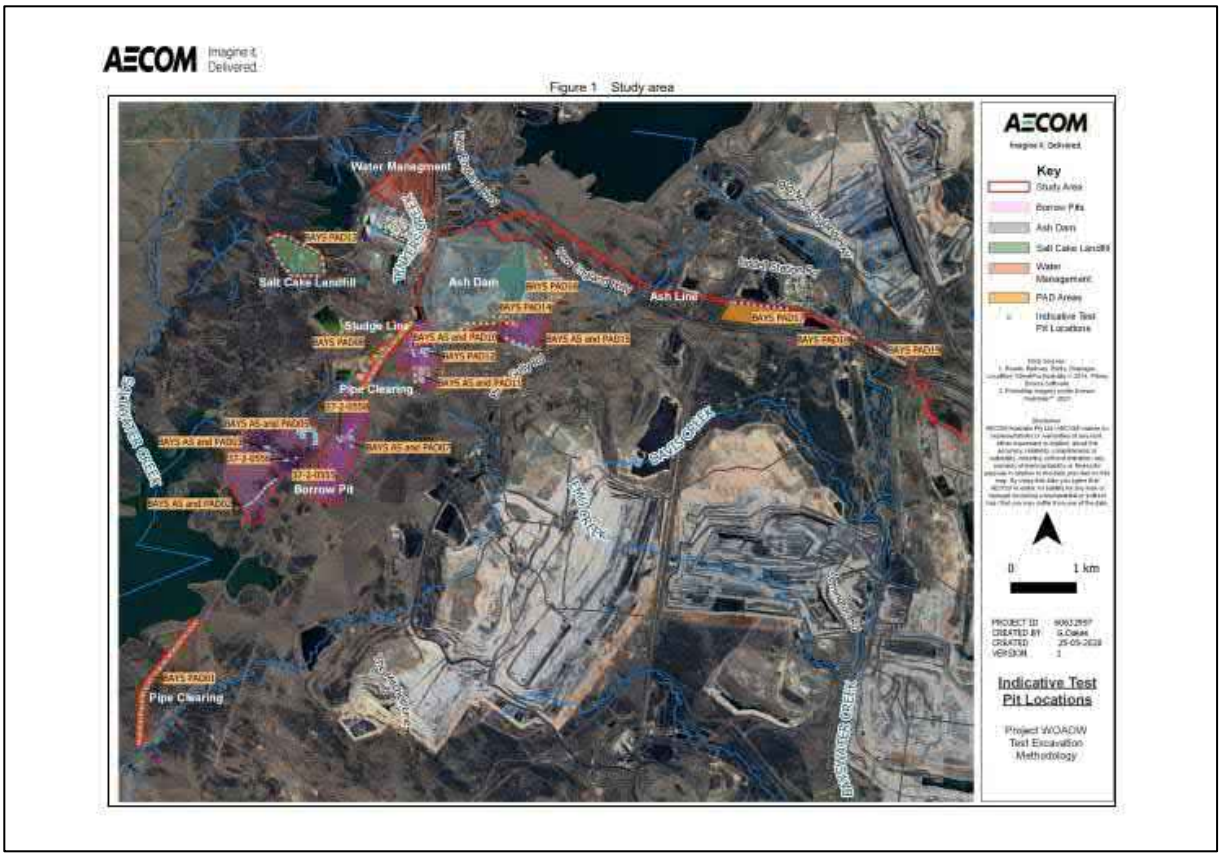
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Figure 1 Study area
Water Management
Salt Cake Landfill
Ash Dam
Sludge Line
Pipe Clearing
Borrow Pit
Ash Line
BAYS PAD12
BAYS PAD13
BAYS PAD15
BAYS PAD11
Key
Study Area
Borrow Pits
Ash Dam
Salt Cake Landfill
Water Management
PAD Areas
Indicative Test Pit Locations
0
1 km
Indicative Test Pit Locations
Project WOAOW Test Excavation Methodology

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3.1.1 Archaeological Context

3.1.2 AHIMS Database

A search of the AHIMS undertaken by Jacobs (2019) on 15 July 2019 for the study area including a 50 m buffer returned 14 site entries. Of these one was listed as destroyed, two are duplicates, four sites were partially collected during their original recording. As is typical for the Hunter Valley, open artefact sites with and without other forms of archaeological evidence (eg. PAD, scarred trees, hearths) are the most common site type represented within the AHIMS search area, accounting for all known sites (Table 1). Summary information on these sites, including their contents and previously assessed levels of significance (where available), is provided in **Table 1**.

Table 1 AHIMS search results

AHIMS Site ID	Site name	Site type	Comment
37-2-0047	Pikes Gully	Open artefact site	Dyall (1978)
37-2-0048	Pikes Gully	Open artefact site	Dyall (1978)
37-2-0050	Pikes Gully	Open artefact site	Dyall (1978) Duplicate of 37-2-0047
37-2-0062	Tinkers Creek/Liddell 1	Open artefact site	Dyall (1978)
37-2-0063	Tinkers Creek/Liddell 1	Open artefact site	Dyall (1978)
37-2-0065	Pikes Gully/Liddell	Open artefact site	Dyall (1978)
37-2-0553	P6	Open artefact site	Koettig (1991)
37-2-0554	P7	Open artefact site	Koettig (1991)
37-2-0555	P8	Open artefact site	Koettig (1991)
37-2-0556	P9	Open artefact site	Koettig (1991)
37-2-0557	P10	Open artefact site	Koettig (1991)
37-2-0558	P11	Open artefact site	Koettig (1991)
37-3-0007	Pike's Gully	Open artefact site	Dyall (1978
37-3-0491	Nardell-N2	Open artefact site	Fife & Perry (2000)
37-3-1128	REA256	Open artefact site	Reynolds (2010)

3.1.3 Aboriginal Cultural Heritage Assessment Report (ACHAR)

In 2019, Jacobs prepared an ACHAR for the WOAOW project. As part of the assessment, RAP consultation and archaeological survey was undertaken across the WOAOW study area. While no specific cultural values were identified through consultation, Jacobs identified 37 Aboriginal sites across the study area. These comprised 28 open artefact sites, seven of which have associated areas of PAD, and nine areas of PAD. Of these sites, Jacobs (2019) recommended archaeological test excavations be carried out in the portions of 19 sites where areas PAD were located with the study area.

4.0 Test Excavation Methodology

An 18 day program of archaeological test excavation will be completed beginning the week of 3 August 2020. AECOM notes that a number of the PAD sites designated for test excavation comprise large areas incorporating landforms not typically considered archeologically sensitive in the Hunter Valley (e.g. steeply inclined upper slopes, midslopes etc.). As such, AECOM proposes an archaeological testing methodology tailored to assessed levels of subsurface archaeological potential within the identified PAD areas (see Table 2). Areas assessed by

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AECOM as having a high potential for subsurface archaeological deposit will be subject to more intensive testing than those of lower potential.

A two phase program of excavation is proposed, with Phase 1 involving systematic testing of PAD areas located within the study area and Phase 2 involving the expansion of selected test pits containing high artefact densities (i.e., on a site-based scale) and/or archaeological features such as hearths. All Phase 1 test pits will be placed on a systematic grid appropriate to their respective archaeological potential (i.e., 30 m intervals for high potential, 50 m intervals for moderate potential and 100 m for low potential) and will be hand excavated as 50 x 50 cm units (0.25 m²). Test pits in Phase 2 may be expanded to a maximum of 3 m² in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (NSW DECCW, 2010b).

All test pits will be excavated to culturally sterile horizons. Excavated sediment will be dry-sieved or wet sieved, depending on soil conditions, through 5 mm wire-mesh sieves. Any Aboriginal objects recovered during sieving will be bagged by square and spit. Representative profiles in each excavation unit will be drawn and photographed. Test pit stratigraphy will be recorded on pro forma test pit recording sheets using standard sedimentological terms and criteria (after McDonald & Isbell, 2009). AECOM will be responsible for backfilling test pits after excavation.

On the basis of the above, AECOM estimates that approximately 270 0.25 m² test pits will be excavated as part of the program.

General excavation procedures include the following:

- All excavation will be carried out manually using trowels, shovels and mattocks;
- Test excavation will proceed in 0.25 m² units placed on varying grids across the PAD areas;
- Expansion excavation will proceed in 0.25 m² units, with each unit assigned an alpha-numeric identifier;
- With the exception of the first test unit which will be excavated in 5 cm spits, all test units will be excavated in 10 cm spits down to the base of the identified A_2 soil horizon;
- Photographic and scale-drawn records of representative soil profiles will be made;
- If specific archaeological features (e.g., hearths, heat treatment pits) are identified, the entire feature will be excavated and recorded prior to the continuation of excavation. Features will be photographed and scale plans drawn;
- If encountered, charcoal deemed suitable for radiocarbon dating will be collected using 'best practice' guidelines (e.g., Burke and Smith, 2004: 154);
- Soil samples will be retained for pH testing and soil description;
- Where appropriate, soil samples for Optical Stimulated Luminescence (OSL) dating will be collected from selected strata using best practice guidelines (e.g., United States Geological Survey 2015);
- Excavated soils will be dry or wet-sieved, depending on soil conditions, through 5 mm gauge sieves;
- Artefacts recovered from sieving will be retained in plastic zip-lock bags and labelled with appropriate provenance data; and
- All excavation units will be backfilled upon conclusion of excavation.

Table 2 Sites to be excavated

Site Name/ID	*Assessed Potential*	*Excavation Strategy*
37-2-0555	High	30 intervals
37-2-0556	High	30 intervals
37-2-0558	High	30 intervals
BAYS AS and PAD02	Moderate	50 m intervals
BAYS AS and PAD03	Moderate	50 m intervals
BAYS AS and PAD05	High/moderate	30 m and 50 m intervals
BAYS AS and PAD07	High	30 intervals

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BAYS AS and PAD10	Moderate	50 intervals
BAYS AS and PAD11	High/low	30 and 100 m intervals
BAYS AS and PAD15	High/low	30 and 100 m intervals
BAYS PAD01	Low	100 intervals
BAYS PAD08	Low	100 intervals
BAYS PAD12	Moderate	50 intervals
BAYS PAD13	Low	100 m intervals
BAYS PAD14	Low	100 m intervals
BAYS PAD16	High/moderate/low	30 m ,50 m, and 100 m intervals
BAYS PAD17	Low	100 m intervals
BAYS PAD18	Moderate	50 m intervals
BAYS PAD19	Moderate	50 m intervals

Any Aboriginal objects recovered from the test excavations will be retained by AECOM at their office at 420 George Street, Sydney, until completion of recording and analysis. Once analysis is completed, all Aboriginal objects will be stored in accordance with the Code of Practice.

Should you require any additional information regarding the test excavation program detailed above please feel free to contact me.

Yours faithfully,

Geordie Oakes
Principal Heritage Specialist
geordie.oakes@aecom.com

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Appendix H

Lithics

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Appendix H Lithics

Rec .No.	PAD name	Test pit	Spit	Phase	Tech. Type	Raw Mat.	Cortex	Colour	Lustre	Flaw	Ther. Dam.	Weight (g)	MLD (mm)	Flk. lngth (mm)	Flk. wdth (mm)	Flk. thk (mm)	Plat. Type	Overhang	Plat. wdth (mm)	Plat. thk (mm)	Dorsal Cortex	DFSO	Termination
1	BAYS PAD19	8	40-50	1	Complete flake	S.tuff	N	B	N	N	N	0.14		10.2	6.7	2.9	Multiple	N	6.2	2.8	N	Ind	Feather
2	BAYS PAD19	9	60-70	1	Flake shatter	Quartz	Y	W	N	N	N	1.33	18										
3	BAYS PAD16	46	0-10	1	Proximal flake	Silcrete	N	RP	Y	Y	N	1.6	24.9				Single	N	9.9	8.3			
4	BAYS PAD16	56	0-10	1	Multidirectional core	S.tuff	N	Y	N	N	N	13.7											
5	BAYS PAD16	59	10-20	1	Complete flake	S.tuff	N	B	N	N	N	0.18		13.7	7.8	1.6	Single	N	3.9	1.7	N	Uni	Feather
6	BAYS AS and PAD15	135	0-10	1	Complete flake	S.tuff	N	B	N	N	N	0.39		10.6	14.8	2.9	Single	N	7.2	3.7	N	Irregular	Hinge
7	BAYS AS and PAD15	135	10-20	1	Flake shatter	Silcrete	N	P	Y	N	N	0.14	10.9										
8	BAYS AS and PAD15	135	10-20	1	Heat shatter	S.tuff	N	B	Y	N	Y	0.13	11.9										
9	BAYS AS and PAD11	169	0-10	1	Unidirectional core	S.tuff	Y	YB	N	N	N	129.7											
10	BAYS AS and PAD05	220	0-10	1	Flake shatter	S.tuff	Y	WP	N	N	N	2.8	22.6										
11	BAYS AS and PAD05	229	10-20	1	Heat shatter	Silcrete	N	P	Y	N	Y	3.3	32.9										
12	37-2-0556	241	0-10	1	Flake shatter	Silcrete	N	G	N	N	N	0.3	14.4										
13	37-2-0556	241	0-10	1	Flake shatter	S.tuff	N	GB	Y	N	Y	0.25	16.4										
14	37-2-0556	241	10-20	1	Multidirectional core	Silcrete	Y	Y	N	N	N	198.6											
15	37-2-0556	241	10-20	1	Split flake	S.tuff	Y	YP	N	N	N	0.79	25.3										
16	BAYS AS and PAD02	245	0-10	1	Complete flake	S.tuff	N	YB	N	N	N	1.15		18.3	15.3	4.6	Punctiform	N	1.1	0.85	N	Ind	Hinge

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17	37-2-0555	283	0-10	1	Proximal flake	S.tuff	Y	BP	N	N	Y	1.5	26.2				Single	Y	13.2	10.9			
18	BAYS AS and PAD05	321	0-10	1	Complete flake	S.tuff	N	RB	N	N	N	1.12		27.6	12.9	4.4	Crushed				N	Irregular	Feather
19	BAYS AS and PAD05	324	10-20	1	Flake shatter	Silcrete	N	PR	Y	N	N	0.92	15										
20	BAYS AS and PAD05	324	10-20	1	Proximal flake	Silcrete	N	P	N	N	N	0.26	11.6				Single	N	10.1	2.5			
21	BAYS AS and PAD05	324	10-20	1	Complete flake	FGS	Y	G	N	N	N	0.22		10.6	17.2	7.3	Single	N	13.5	7.3	100	na	Feather
22	BAYS AS and PAD05	221	0-10	1	Proximal flake	Quartz	Y	W	N	Y	N	1.85	19.3				Cortical	N	16.3	5.8			
23	BAYS AS and PAD15	132	0-10	1	Flake shatter	Silcrete	N	R	Y	N	N	0.07	8.4										
24	BAYS AS and PAD15	132C	0-10	2	Complete flake	Silcrete	N	P	N	N	N	0.44		16.1	10.2	2.6	Crushed				N	Ind	Feather
25	BAYS AS and PAD15	132C	0-10	2	Angular shatter	Silcrete	N	P	N	Y	N	1.51	18.6										
26	BAYS AS and PAD15	132C	10-20	2	Flake shatter	Silcrete	N	R	N	N	N	0.14	18.7										
27	BAYS AS and PAD15	132C	10-20	2	Flake shatter	Silcrete	N	P	Y	N	N	0.23	15.1										
28	BAYS AS and PAD15	132C	10-20	2	Proximal flake	Silcrete	N	RP	Y	N	N	0.09	7.9				Linear	N	1.8	0.2			
29	BAYS AS and PAD15	132D	10-20	2	Complete flake	Silcrete	N	R	Y	Y	N	1.28		27.3	18.1	10.4	Crushed				N	Uni	Hinge
30	BAYS AS and PAD15	132D	10-20	2	Proximal flake	Silcrete	N	P	Y	N	N	1.1	31.3				Crushed						
31	BAYS AS and PAD15	132D	10-20	2	Flake shatter	Silcrete	N	YR	N	Y	Y	1.07	25										
32	BAYS AS and PAD15	132D	10-20	2	Angular shatter	Silcrete	N	R	N	N	N	0.09	10.5										
33	BAYS AS and PAD15	132D	0-10	2	Complete flake	Silcrete	N	PR	N	N	N	0.72		22.6	9.2	2.9	Single	N	4.8	2.3	N	Uni	Step

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34	BAYS AS and PAD15	132 D	0-10	2	Proximal flake	Silcrete	N	P	Y	Y	Y	2.1	20.6				Single	N	8.8	4.8			
35	BAYS AS and PAD15	135 B	0-10	2	Heat shatter	Silcrete	N	RP	N	N	Y	2.4	20.1										
36	BAYS AS and PAD15	135 B	10-20	2	Heat shatter	S.tuff	N	N	Y	N	Y	1.47	35.2										
37	BAYS AS and PAD15	135 B	10-20	2	Complete flake	S.tuff	Y	B	N	N	N	0.35		18.9	10.7	2.4	Crushed				1-25	Uni	Feather
38	BAYS AS and PAD15	135 B	10-20	2	Flake shatter	S.tuff	Y	BR	Y	N	N	0.68	22										
39	BAYS AS and PAD15	135 C	10-20	2	Complete flake	Silcrete	N	RP	Y	N	N	1.1		18	14.4	3.2	Single	N	7.3	2.7	N	Ind	Feather
40	BAYS AS and PAD15	135 C	10-20	2	Flake shatter	Silcrete	N	P	Y	N	N	0.14	7.3										
41	BAYS AS and PAD15	135 C	10-20	2	Flake shatter	FGS	N	GB	Y	N	N	0.94	16.9										
42	BAYS AS and PAD15	135 C	10-20	2	Complete flake	S.tuff	Y	B	N	N	N	0.43		9.9	22.1	7.8	Single	N	8.6	6.7	0-25	Irregular	Axial
43	BAYS AS and PAD15	135 C	10-20	2	Bondi point	S.tuff	N	Be	N	N	N	1.3	21.6										
44	BAYS AS and PAD15	135 D	10-20	2	Complete flake	S.tuff	Y	BP	N	N	N	2.63		17.9	25.1	8.7	Single	N	17.6	5.4	1-25	Irregular	Feather
45	BAYS AS and PAD15	135 D	10-20	2	Complete flake	S.tuff	N	R	N	N	N	0.04		5.9	7.4	1.3	Crushed				N	Uni	Feather
46	BAYS AS and PAD15	135 D	10-20	2	Flake shatter	Silcrete	N	P	Y	N	N	0.15	8.7										
47	BAYS AS and PAD15	135 D	10-20	2	Elouera	S.tuff	N	Be P	N	N	N	4.41											
48	BAYS AS and PAD05	234	0-10	1	Complete flake	S.tuff	N	YB	N	N	N	0.12		6.7	9.7	2.6	Facetted	N	7.4	2.8	N	Ind	Hinge
49	37-2-0556	241 B	10-20	2	Split flake	S.tuff	Y	B	N	N	N	1	20.1										

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50	37-2-0556	241 B	10 - 20	2	Complete flake	S.tuff	N	B	N	N	N	0.07		7.5	9.4	1.6	Crushed					Ind	Hinge
51	37-2-0556	241 B	10 - 20	2	Angular shatter	Quartz	N	W	N	N	N	0.17	8.1										
52	37-2-0556	241 B	0-10	2	Complete flake	S.tuff	Y	YR	N	N	N	2.86		22.6	22.4	5.9	Single	N	21.2	6.7	100	na	Feather
53	37-2-0556	241 B	0-10	2	Flake shatter	S.tuff	N	YR	N	N	N	0.06	11.03										
54	37-2-0556	241 B	0-10	2	Angular shatter	S.tuff	Y	B	N	N	N	0.51	14.4										
55	37-2-0556	241 C	0-10	2	Complete flake	S.tuff	Y	BR	N	N	N	0.85		18.4	17.2	2.6	Single	N	7.4	2.1	N	Uni	Hinge
56	37-2-0556	241 C	0-10	2	Complete flake	S.tuff	Y	BR	N	N	N	0.75		13.1	15.8	4.1	Cortical	N	13	4.9	N	Para	Hinge
57	37-2-0556	241 C	10 - 20	2	Proximal flake	S.tuff	Y	YB	N	N	Y	0.55	19.2				Cortical	N	7.1	3.1			
58	37-2-0556	241 C	10 - 20	2	Complete flake	S.tuff	N	P	N	N	N	0.62		14.2	18.5	4.1	Single	N	7.1	3.1	N	Irregular	Hinge
59	37-2-0556	241 C	10 - 20	2	Proximal flake	Silcrete	N	P	Y	N	N	0.22	12.1				Single	N	na	na			
60	37-2-0556	241 C	10 - 20	2	Flake shatter	S.tuff	N	Y	N	N	N	0.35	14.4										
61	37-2-0556	241 C	10 - 20	2	Angular shatter	Quartz	N	W	N	N	N	0.09	8.2										
62	BAYS AS and PAD02	245 B	0-10	2	Complete flake	S.tuff	N	BR	N	N	Y	2.6		23	22.7	11.8	Single	N	17.1	9.1	N	Uni	Feather
63	BAYS AS and PAD03	280	0-10	1	Angular shatter	S.tuff	Y	B	Y	N	N	0.79	15.4										
64	BAYS AS and PAD03	280 D	0-10	2	Proximal flake	Silcrete	N	P	Y	N	N	0.32	10.8				Single	N	5.1	2.6			
65	37-2-0556	281	10 - 20	1	Complete flake	S.tuff	N	Y	N	N	N	20.9		34.8	52	12.9	Single	N	37.7	16.2	N	Irregular	Hinge
66	37-2-0556	281 B	0-10	2	Flake shatter	S.tuff	Y	YB	N	N	N	1.4	27.4										
67	37-2-0556	281 D	0-10	2	Angular shatter	Silcrete	N	RP	Y	N	N	0.18	11.6										
68	37-2-0555	283 B	0-10	2	Complete flake	S.tuff	N	B	N	N	N	0.86		20.1	18.9	11.4	Single	N	15.4	11	N	Uni	Feather

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69	37-2-0555	283 B	0-10	2	Proximal flake	Silcrete	N	R	Y	N	N	0.18	14.3				Facetted	N	10.9	7.3			
70	37-2-0555	283 B	0-10	2	Flake shatter	Quartz	Y	W	N	N	N	0.25	11.8										
71	37-2-0555	283 C	10-20	2	Angular shatter	Silcrete	N	B	N	N	N	0.73	13.9										
72	BAYS PAD16	48	0-10	1	Split flake	Silcrete	N	P	Y	Y	Y	11.4	29.1										
73	BAYS PAD16	48C	0-10	2	Complete flake	Silcrete	N	P	Y	N	N	0.67		14.3	14.2	3.1	Single	N	10.5	3.2	N	Ind	Step
74	BAYS PAD16	56C	0-10	2	Angular shatter	Silcrete	N	G	Y	N	N	1.16	21.6										
75	BAYS PAD16	56D	0-10	2	Complete flake	S.tuff	Y	B	N	N	N	3.3		22.6	25.7	6.9	Single	N	8.7	2.9	26-50	Uni	Hinge
76	BAYS PAD16	59B	10-20	2	Angular shatter	Silcrete	Y	R	Y	N	Y	6.1	31.7										
77	BAYS PAD16	59C	10-20	2	Flake shatter	S.tuff	N	B	N	N	Y	17.9	41.9										
78	BAYS PAD16	59C	0-10	2	Flake shatter	S.tuff	N	B	N	N	Y	14.4	45.4										
79	BAYS PAD16	59C	0-10	2	Flake shatter	Silcrete	N	YR	N	N	N	0.83	18.3										
80	BAYS PAD16	59C	0-10	2	Heat shatter	S.tuff	N	B	N	N	N	0.85	13.3										
81	BAYS PAD16	59D	10-20	2	Complete flake	Silcrete	N	R	Y	N	N	0.44		18	15.2	9.2	Single	N	14.8	9.6	N	Ind	Feather
82	BAYS PAD16	59D	10-20	2	Complete flake	S.tuff	N	B	N	N	N	0.02		11.3	12.8	5.7	Linear	N	7.1	0.3	N	Uni	Feather
83	37-2-0556	281	0-10	1	Proximal flake	Silcrete	N	P	Y	N	N	7.8	32				Linear	N	5	0.18			
84	37-2-0556	281	0-10	1	Angular shatter	Silcrete	N	P	N	N	Y	0.51	14.5										
85	37-2-0555	284	0-10	1	Flake shatter	S.tuff	N	B	N	N	Y	9.5	40.4										
86	37-2-0555	283	0-10	1	Flake shatter	Silcrete	N	P	N	N	N	0.15	11.5										
87	37-2-0556	281	10-20	1	Complete flake	Silcrete	N	YP	N	N	N	12.3		40.1	38.1	11.6	Single	N	39.9	12.8	N	Uni	Feather
88	37-2-0556	281	10-20	1	Redirecting flake	S.tuff	N	YB	N	N	N	1.3		28.6	10.1	3.9	Multiple	N	6.7	3.3	N	Ind	Feather
89	BAYS AS and PAD03	280	10-20	1	Multidirectional core	Silcrete	Y	P	Y	Y	N	28.8											

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90	BAYS AS and PAD03	280	10 - 20	1	Angular shatter	S.tuff	N	B	N	N	N	0.34	16.4									
91	BAYS AS and PAD03	280	0-10	1	Complete flake	Silcrete	N	P	Y	N	N	3.99		18.4	25.9	8.1	Single	n	5.6	4.6	N	Irregular	Step
92	BAYS AS and PAD05	285	0-10	1	Complete flake	S.tuff	N	B	N	N	N	2.81		24.6	20.3	3.4	Single	n	8.6	2.1	N	Uni	Hinge

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Appendix I

Site Cards

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