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07-Dec-2020

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

Bayswater Power Station WOAOW Project

Aboriginal Cultural Heritage Assessment

Client: AGL Macquarie Pty Ltd

ABN: 18 167 859 494

Prepared by

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Quality Information

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Prepared by Geordie Oakes

Reviewed by Andrew McLaren

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			Name/Position
1	30/10/2020	Draft	Andrew McLaren / Principal Aboriginal Heritage Specialist
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3	30/11/2020	Finalisation	Geordie Oakes / Principal Aboriginal Heritage Specialist

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Executive Summary

AECOM Australia Pty Ltd (**AECOM**) was commissioned by AGLM Macquarie Pty Ltd (**AGLM**) to prepare an updated Aboriginal Cultural Heritage Assessment report (**ACHAR**) for the Bayswater Water and Other Associated Operational Works (**WOAOW**) project (the Project), located south of Muswellbrook, in the Upper Hunter Valley of New South Wales (**NSW**). This ACHAR forms part of a response to submissions received by AGLM regarding their Environmental Impact Statement (**EIS**) for the Project, which was prepared to accompany a Development Application in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (**EP&A Act**) and included an Aboriginal heritage assessment report prepared by Jacobs (2019).

This ACHAR 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) initial ACHAR for the Project (Appendix A) and the Cultural Values Report (**CVR**) prepared by AECOM (Appendix B).

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.

Searches of the Aboriginal Heritage Information Management System (**AHIMS)** database were undertaken on 23 October 2020 for a 20 x 20 kilometre (km) area centred on 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 (e.g., 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 %), grinding grooves (n = 4, 0.2%) and single example each of a resource / gathering area (n = 1, 0.04%), a ceremonial ring (n = 1, 0.04%), a conflict site (n = 1, 0.04), a stone quarry (n = 1, 0.04), and shell midden (n = 1, 0.04).

Consideration of the location of previously recorded Aboriginal sites indicates that 30 are located wholly or partially within the study area. All comprise open artefact sites. Eight have associated areas of PAD, with one also containing a potential hearth. All 30 sites are listed on the AHIMS database as 'valid'. However, a review of site locations against existing site infrastructure indicates that seven should, in fact, be listed as destroyed, bringing the total number of valid sites to 23. Of these, 13 were recorded by Jacobs (2019) as part of the Project.

In September 2020, AECOM undertook a twelve-day program of archaeological test excavation for the Project, with excavations undertaken within 19 of the PADs identified by Jacobs (2019). As per Requirement 14 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b), the primary aim of the test excavation program was to collect information about the nature and extent of any subsurface Aboriginal objects present within these sites (or parts thereof). Subsidiary objectives included site delineation and an assessment of levels of historical land disturbance. Test excavations at all sites were completed in two phases. Test excavations ultimately identified subsurface archaeological deposits in nine sites, all of which were considered likely to be a product of low intensity Aboriginal use.

Taking into consideration the results of Jacobs' (2019) assessment, as well as AECOM's test excavation program, a total of 24 valid Aboriginal archaeological sites are recognised within the study area. These consist exclusively of surface and/or subsurface artefact scatter sites and have been assessed as being of low scientific significance.

In addition to this ACHAR, a CVR has been prepared by for the Project (Appendix B). It is intended that the CVR be read in conjunction with this ACHAR. Registered Aboriginal Parties (**RAPs**) have indicated that the study area is located within a broader cultural landscape of significance for Aboriginal people. Creeklines and areas of elevated terrain within the study area form part of this landscape, as do the Aboriginal objects (i.e., stone artefacts) that have been identified within the study area.

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 Heritage NSW and the Department of Planning Industry and Environment (**DPIE**). Subject to Development Consent under Division 4.7 of the EP&A Act and DPIE's approval, this ACHMP will guide the management of the known and potential Aboriginal archaeological values of the study area.

Key elements of the ACHMP, detailed in Section 11.0 of this ACHAR, include:

- an archaeological salvage program;
- conservation of non-impacted sites;
- procedures for managing previously unrecorded Aboriginal archaeological evidence;
- Aboriginal cultural heritage awareness training;
- management of potential human remains;
- completion of AHIMS site cards; and
- management of an Aboriginal site database.

1.0 Introduction & Background

1.1 Introduction

AECOM Australia Pty Ltd (**AECOM**) was commissioned by AGLM Macquarie Pty Ltd (**AGLM**) to prepare an updated Aboriginal Cultural Heritage Assessment report (**ACHAR**) for the Bayswater Water and Other Associated Operational Works (**WOAOW**) project (**the Project**), located south of Muswellbrook, in the Upper Hunter Valley of New South Wales (**NSW**) (Figure 1). This ACHAR forms part of a response to submissions received by AGLM regarding their Environmental Impact Statement **(EIS**) for the Project, which was prepared to accompany a Development Application in accordance with Division 4.7 of *the Environmental Planning and Assessment Act 1979* (**EP&A Act**) and included an Aboriginal heritage assessment report prepared by Jacobs (2019).

This ACHAR 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) initial ACHAR for the Project (Appendix A) and the Cultural Values Report (**CVR**) prepared by AECOM (Appendix B).

In 2019, Jacobs prepared an ACHAR for the WOAOW project. As part of the assessment, Registered Aboriginal Parties (**RAP**) consultation and archaeological survey was undertaken across the Project 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 (**PAD**s). 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.

1.2 Project Overview

AGLM's WOAOW project includes the following upgrades to the Bayswater Power Station (**BPS**):

- 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 (**t**) 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 t silo, tanker wash facility and additional truck parking;
- Construction and operation of new coal ash pipelines 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 AGLM 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, shown on Figure 2, comprises six spatially-discrete, irregularly-shaped parcels of land within the greater BPS site. These encompass 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 approximately 731.7 hectares (**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 agriculture and for power station infrastructure, with some areas disturbed as a result.

1.4 Secretary's Environmental Assessment Requirements (SEARs)

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

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

This ACHAR fulfils the Aboriginal heritage components of the SEARs issued for the Project.

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 RAPs;
- to assess the potential impacts 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 DPIE in their assessment of AGLM's State Significant Development (**SSD**) application for the Project.

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 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 archaeological test excavations within areas of PAD identified by Jacobs (2019);
- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to the study area;
- 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 and CVR for the Project, 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 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 thirteen sections. This section - **Section 1.0** - has provided background information on the Project and AECOM's assessment. 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.

Figure 1 Regional context

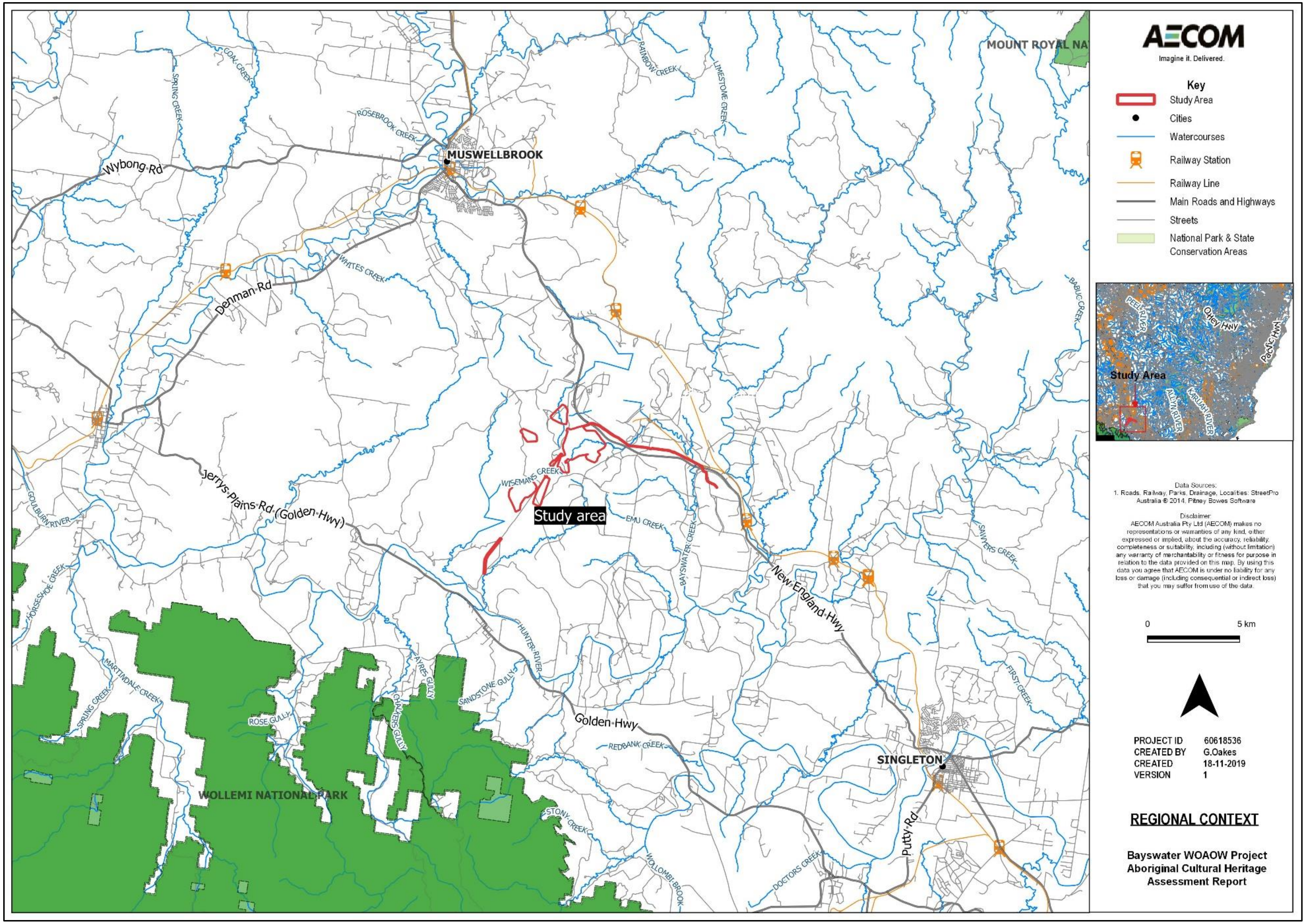
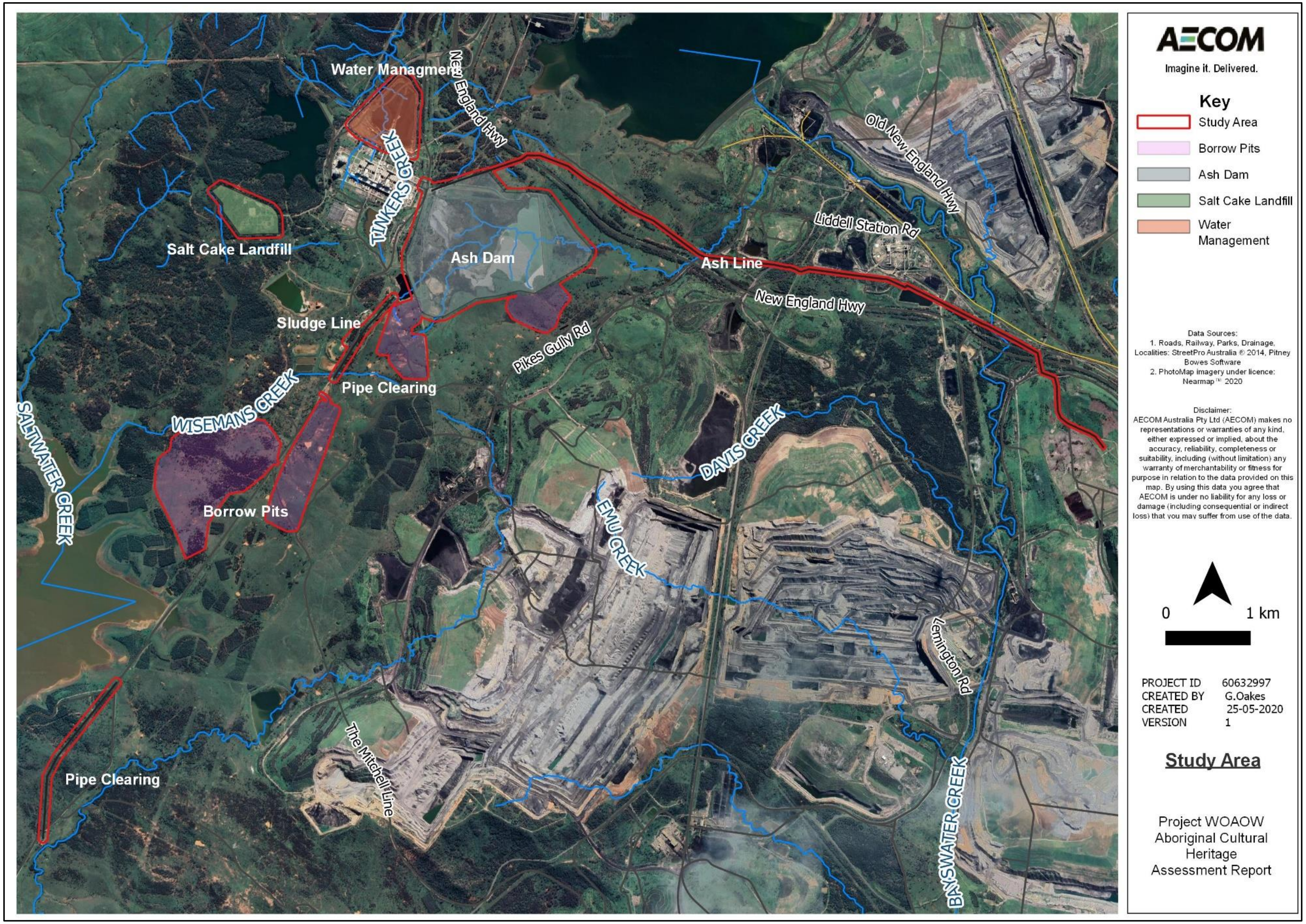


Figure 2 The study area



2.0 Applicable Policy & Legislation

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

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

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

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

a. In the case of an area:

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

b. In the case of an object – it is used or treated in a manner inconsistent with Aboriginal tradition;

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the 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. It is noted that the Plains Clan of the Wonnarua People, has applied for a Section 10 protection order under the ATSIHP Act for a parcel of land that includes some of the proposed ash line in the eastern portion of the study area. AGLM has submitted a representation in response to the Section 10.

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 relevant registered Native Title determinations, claims or land use agreements 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.

A search of the Australian Heritage Database, which includes places listed on the World Heritage List (**WHL**), National Heritage List (**NHL**), Commonwealth Heritage List (**CHL**), Register of the National Estate (RNE) and List of Overseas Places of Historic Significance to Australia, was 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 EP&A Act, administered by DPIE, requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts are interpreted as including impacts to Aboriginal and non-Aboriginal (i.e., European) cultural heritage.

Section 4.36 of the EP&A Act stipulates that a development will be considered 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 DPIE.

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.

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 NPW Act, administered by Heritage NSW, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Secretary of Heritage NSW responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the NPW Act as follows 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 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 DPIE.

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 Local Government Area (**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 Aboriginal heritage significance located within the study area.

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.

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 of 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 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:

- WLALC;
- Heritage NSW;
- Office of Registrar;
- Muswellbrook Shire 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 LALCs 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 by Jacobs to the relevant Heritage NSW regional office and the WLALC.

3.2 Stage 2 - Presentation of Information about the 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 Project 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 with you it's been a while good to hear from you.	None required
Wonnarua Nation Aboriginal Corporation	20/06/2020	Email	Registered 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
Aliera 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
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 information that was supplied.	None required
Cacatua	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.	
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
n/a	Mike Skinner
Aboriginal Native Title Elders Consultants	John Mathews
Aboriginal Native Title Elders Consultants	Margaret Matthews

3.3.3 Test Excavation

Archaeological test excavation was completed by AECOM in September 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
Cacatua	George Sampson
Murra Bidgee Mullangari	Ryan Johnson

Registered Aboriginal Party	Field representative(s)
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 30 October 2020 for review and comment. Of the five responses, four responses were received supporting the assessment and management recommendations and one response noting that a Section 10 protection order is relevant to the study area.

Table 4 RAP responses to draft ACHAR

Registered Aboriginal Party	Date	Method	Response	AECOM response
Murra Bidgee Mullangari	5/11/2020	Email	I have read the project information, ACHAR and CVR for the above project, I endorse the recommendations made.	None required
Tocomwall	6/11/2020	Phone	Notified AECOM that there was a Section 10 protection order over some of the study area.	None required
A1 Indigenous Services	7/11/2020	Email	I have reviewed the document and support the Bayswater Power Station ACHAR.	None required
Widescope Indigenous Group	16/11/2020	Email	I have reviewed the document and support the ACHAR for Baywater Power Station.	None required
Merrigarn	18/11/2020	Email	I have read the ACHAR and CVR for the above project, I agree with the recommendations.	None required

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 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, shown on Figure 2, comprises six spatially-discrete, irregularly-shaped parcels of land within the greater Bayswater Power Station site. These encompass 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 approximately 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 agriculture and for power station infrastructure, with some areas disturbed as a result.

Reference to the Geographical Name Register (**GNR**) of NSW indicates that the study area cross cuts the Muswellbrook Shire Council and Singleton LGAs, as well as suburbs of Muswellbrook, Howick, Lemington, Ravensworth and Liddell. It is situated within the Parishes 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 township of Muswellbrook within Central Lowlands of the Hunter Valley (Story, Galloway, van de Graaf, & Tweedie 1963). Its topography consists of flats associated with various watercourses interspersed with low undulating to steeply sloped hills and crests over open farmland. Slopes range from level and gently inclined flats bordering 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 5. Identified landform units, meanwhile, are shown on Figure 4.

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

Table 5 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 slope	71.2	9.7
Middle slope	196.4	26.8
Simple slope?	9.7	1.3
Upper slope	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 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 (**km²**), with the bulk of the catchment (about 16,000 km²) 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 Ash Dam, which now forms a chain of ponds within the study area as it flows eastward towards Liddell Power Station. A destroyed 2nd order section of Tinkers Creek that historically would have passed through the coal preparation plant is also present. Finally, a heavily incised 3rd order section of Bayswater Creek 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 creeks, 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 several 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, two identified sources of silcrete and tuff cobbles located west of the study area, as well as gravels that may have been present in major creeklines such as Bayswater Creek. 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 outcrops show evidence of exploitation and have been identified as Aboriginal stone quarries.

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 mid-to-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 historical European land use activities and the construction of the power station and associated facilities. Nonetheless, current vegetation regimes and available vegetation mapping provide insight into the pre-European settlement vegetation communities. In general, the study area would have supported a diverse range of natural vegetation communities, with different communities occupying different landscape positions.

Reference to vegetation mapping provided by AGLM for the power station site indicates that the landforms and soils of the study area currently support tracts of exotic non-native exotic grassland, as well as exotic wetland vegetation, with the latter generally occupying land surrounding the Bayswater Ash Dam. In addition to exotic species, communities of regenerating native woodland inhabit much of the study area, with dominant tree species including 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 (e.g., 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 this area, with an extensive array of edible and otherwise useful plant species. Examples include 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 and Hairy Panic Grass.

Figure 3 Slope

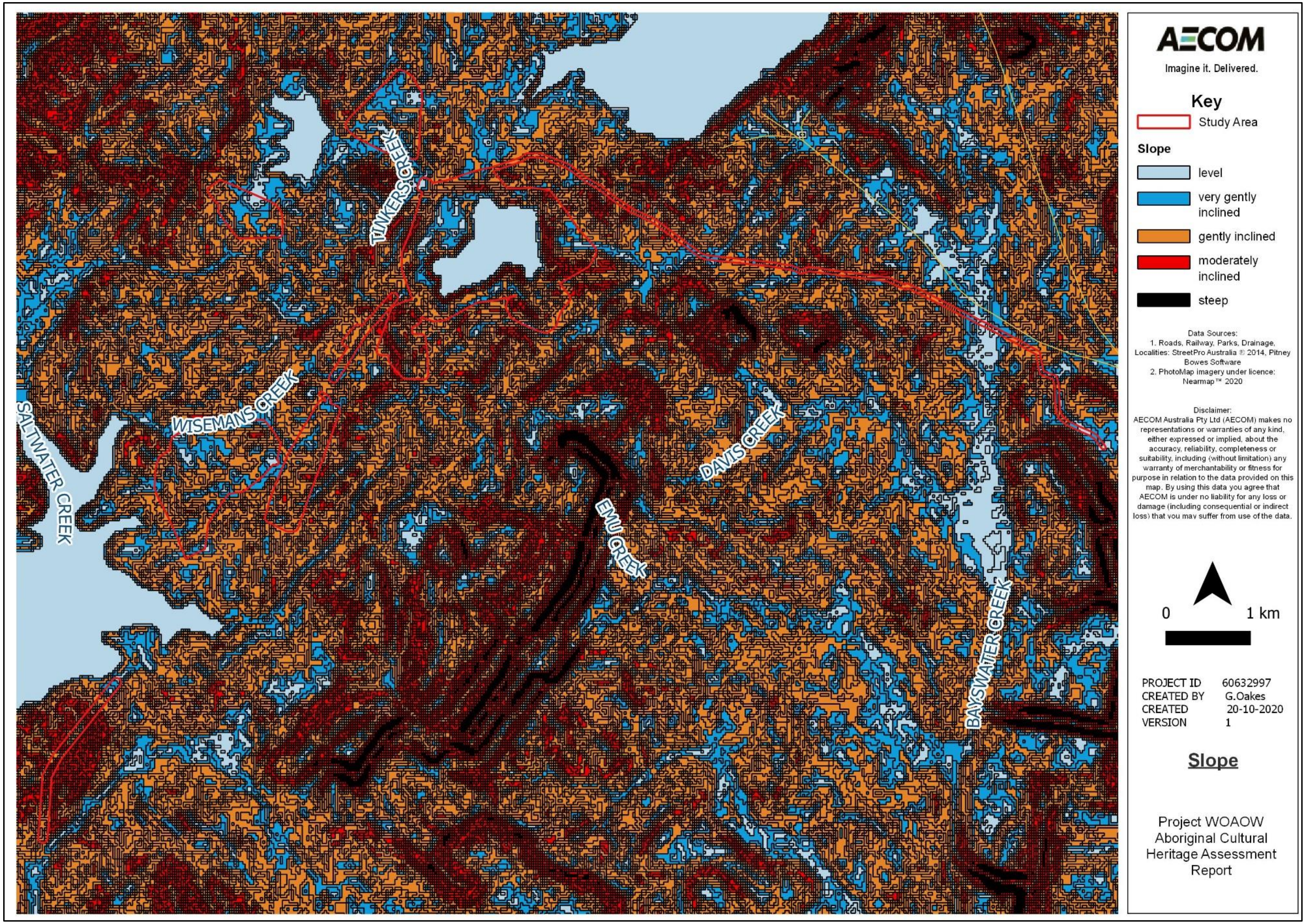


Figure 4 Elevation

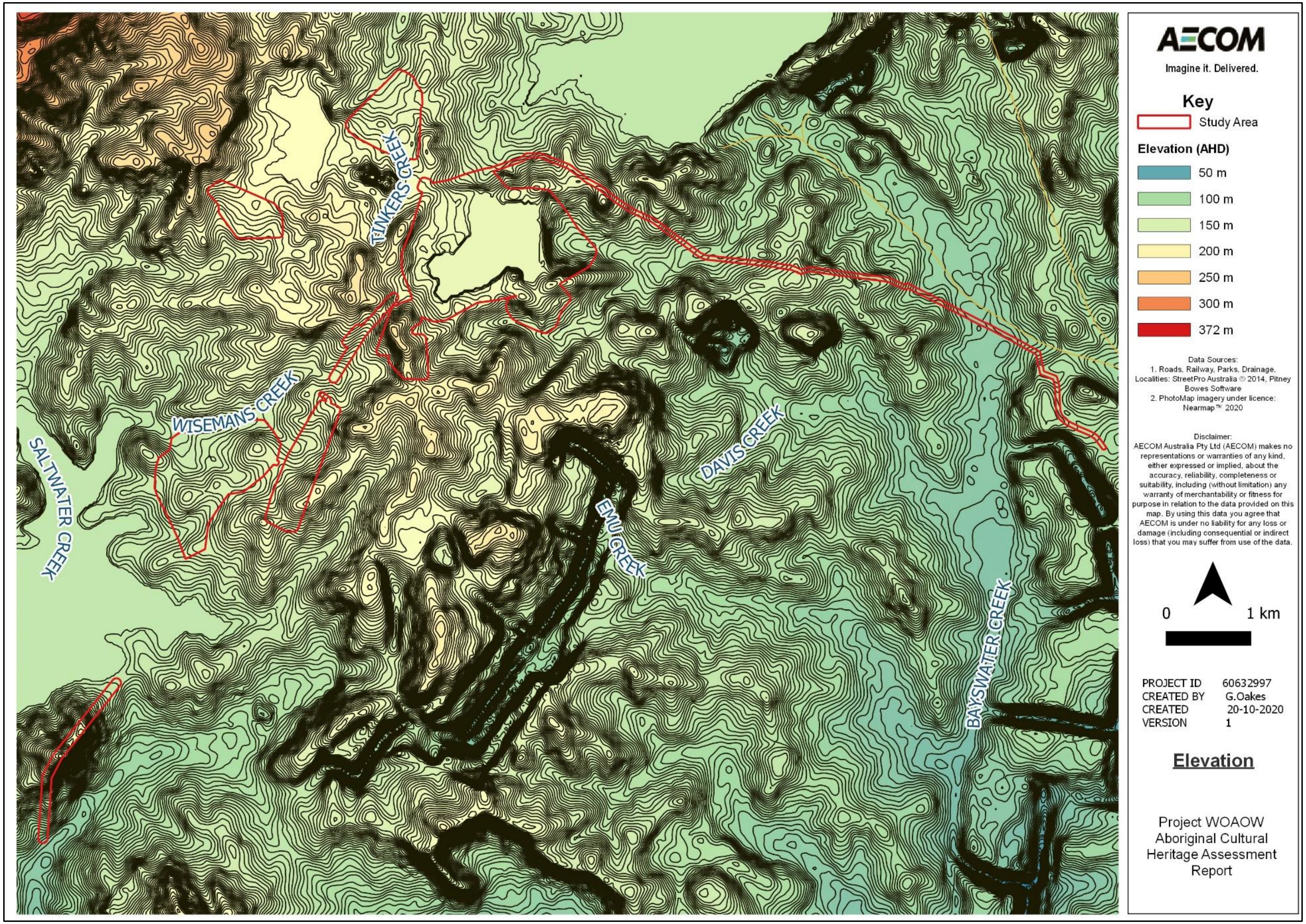


Figure 5 Landform and hydrology

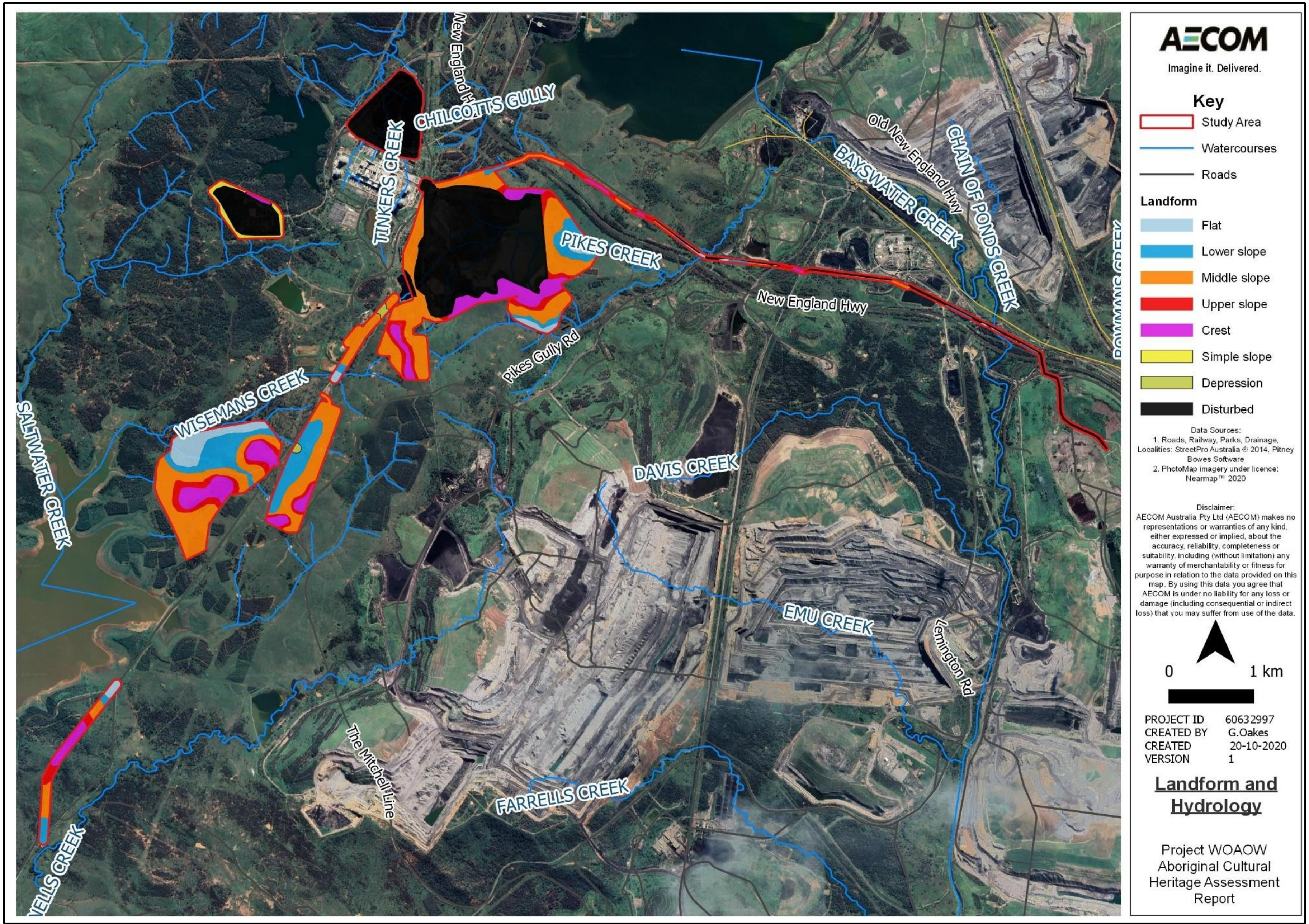


Figure 6 Surface geology

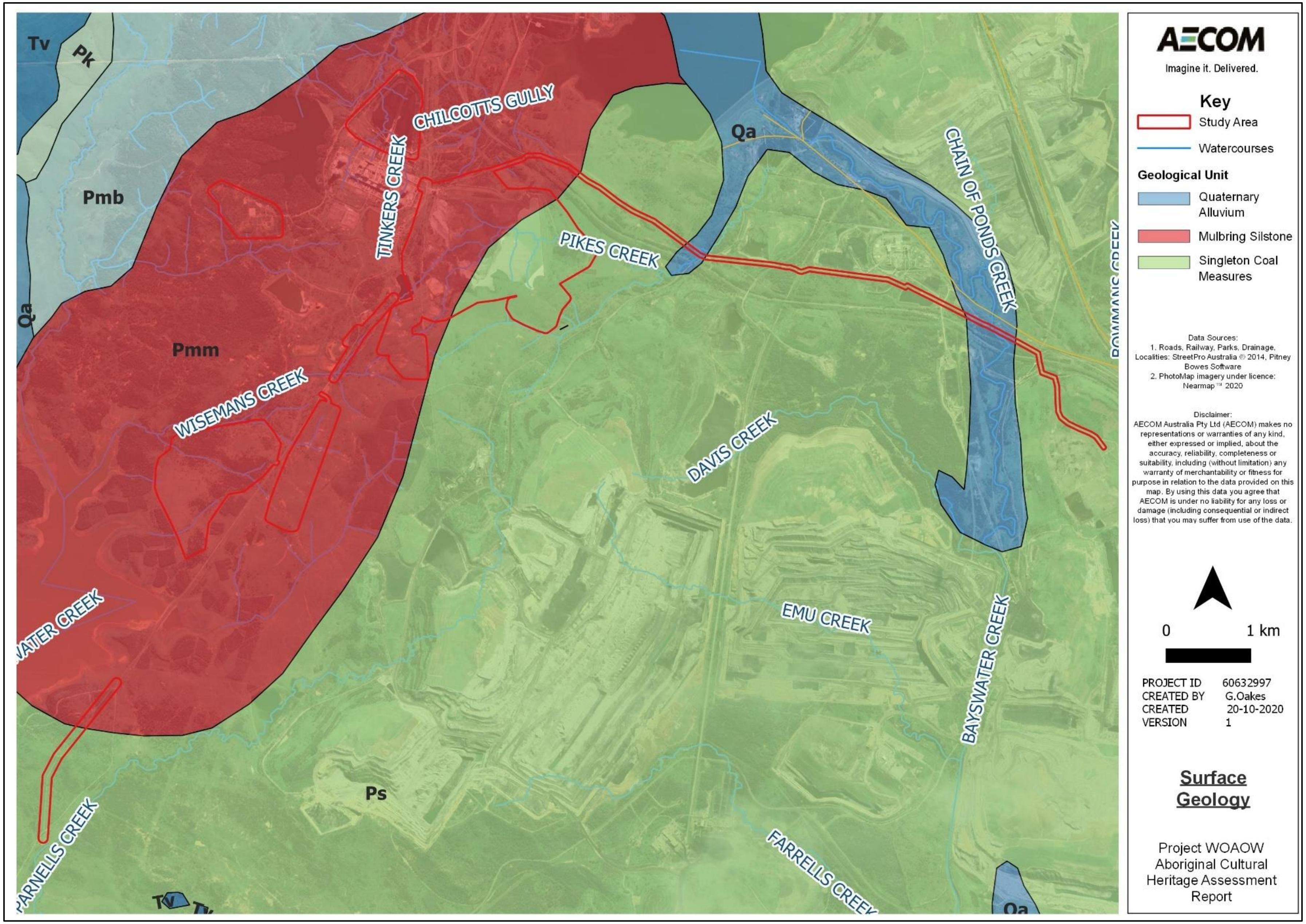


Figure 7 Soil Landscapes

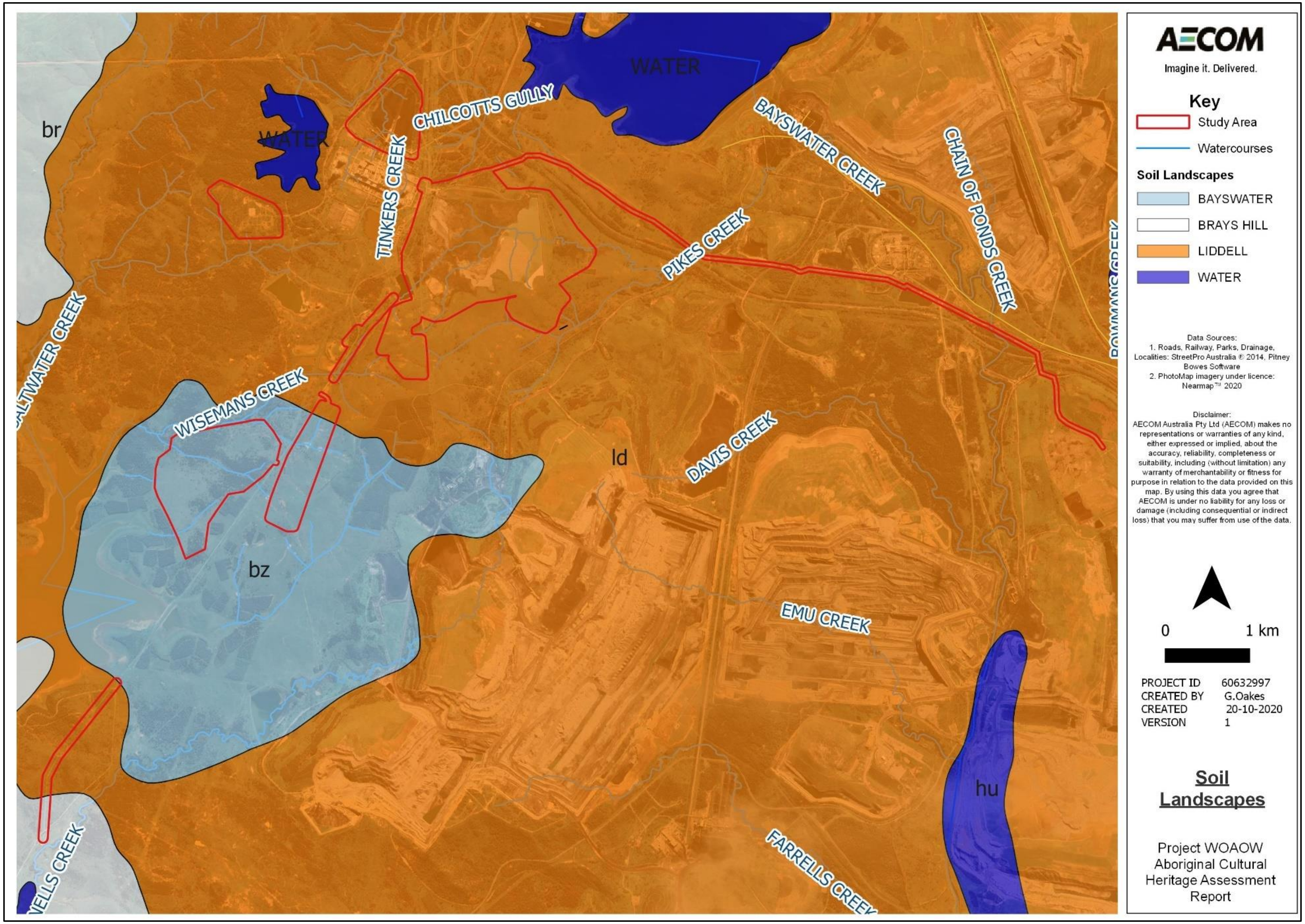
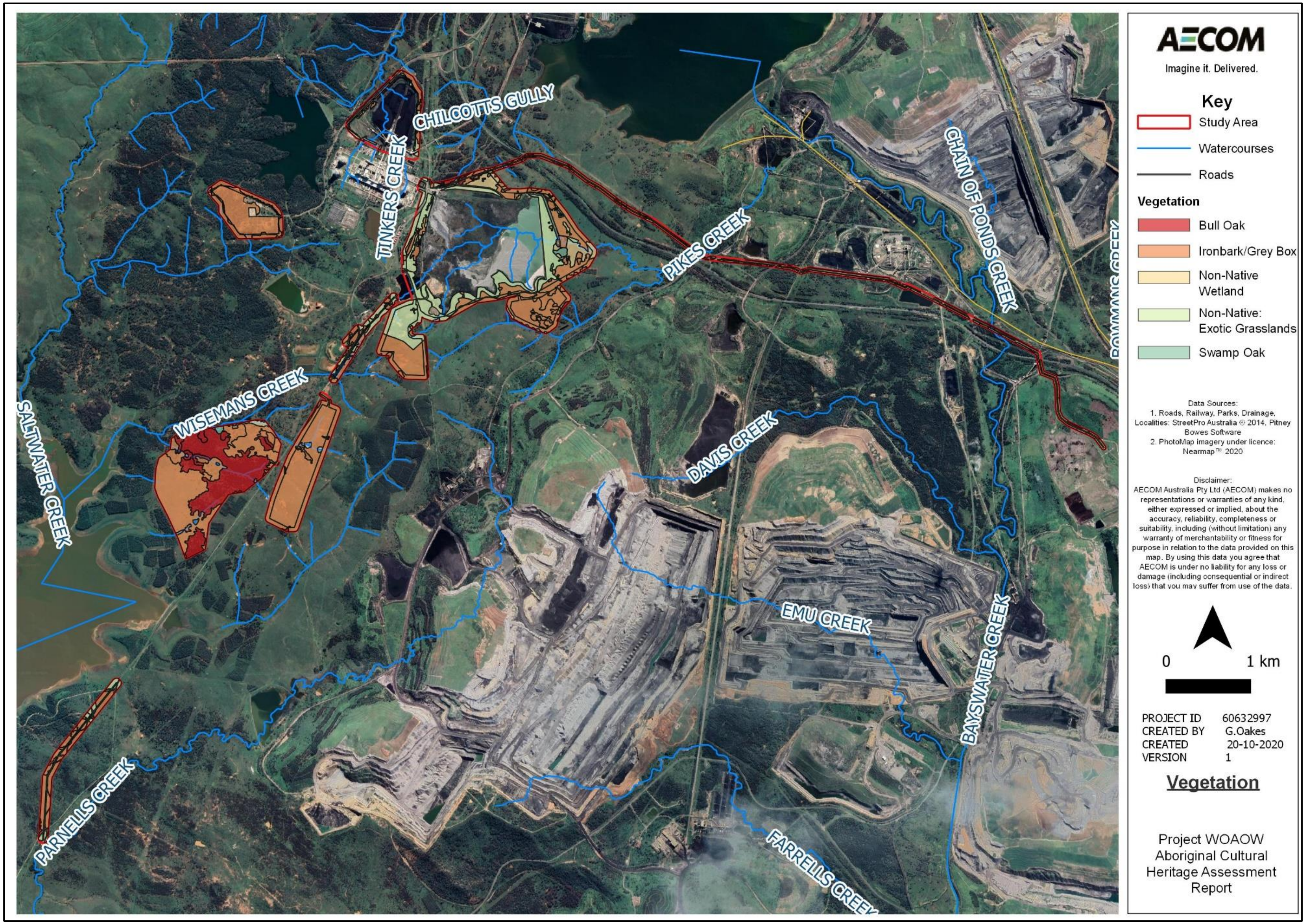


Figure 8 Vegetation



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 the study area were John Burne, Thomas Byrne (Burne), Thomas Joseph Burns, the Bank of Australasia and the Bank of NSW. John Burne, perhaps the earliest landowner in the study area, purchased a large property (295 acres) from the Crown in 1863 encompassing the northeastern portion of the study area. Over 20 years later, Thomas Byrne also purchased a number of properties in the study area from the Crown in the early 1880s, including a 400 acre plot in the northern portion of the study area. Not long after, Thomas Joseph Burns purchased a number of properties surrounding these earlier purchases. Whether the various Byrne, Burne, Burns owners are related or, in fact the same person, is unclear. These early landowners likely utilised the land for agriculture with grazing and dairying the focus.

Reference to land title records (NSW Land Registry Services) indicate that in 1952 much of the original properties within the study area were purchased by the Reynolds family, John and William, notable graziers from Singleton. Accordingly, land within the study area was used for grazing until the mining began in the 1960s and construction of the power station in 1985.

4.8 Land Use

The current dominant land uses within the study area is a special purpose zone for infrastructure(power generation), as well as cattle grazing or rural. Since European settlement of the area in the 1820s, the natural landscape of the study area has 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;
- Open cut mining related activities in the eastern portion of the study area in the 1970s;

- Construction of the Liddell Power Station infrastructure including roads, conveyors, pipelines and various facilities in the 1970s; and
- Construction of the Bayswater Power Station in the 1980s and 1990s, 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 severely disturbed 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 possible 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:

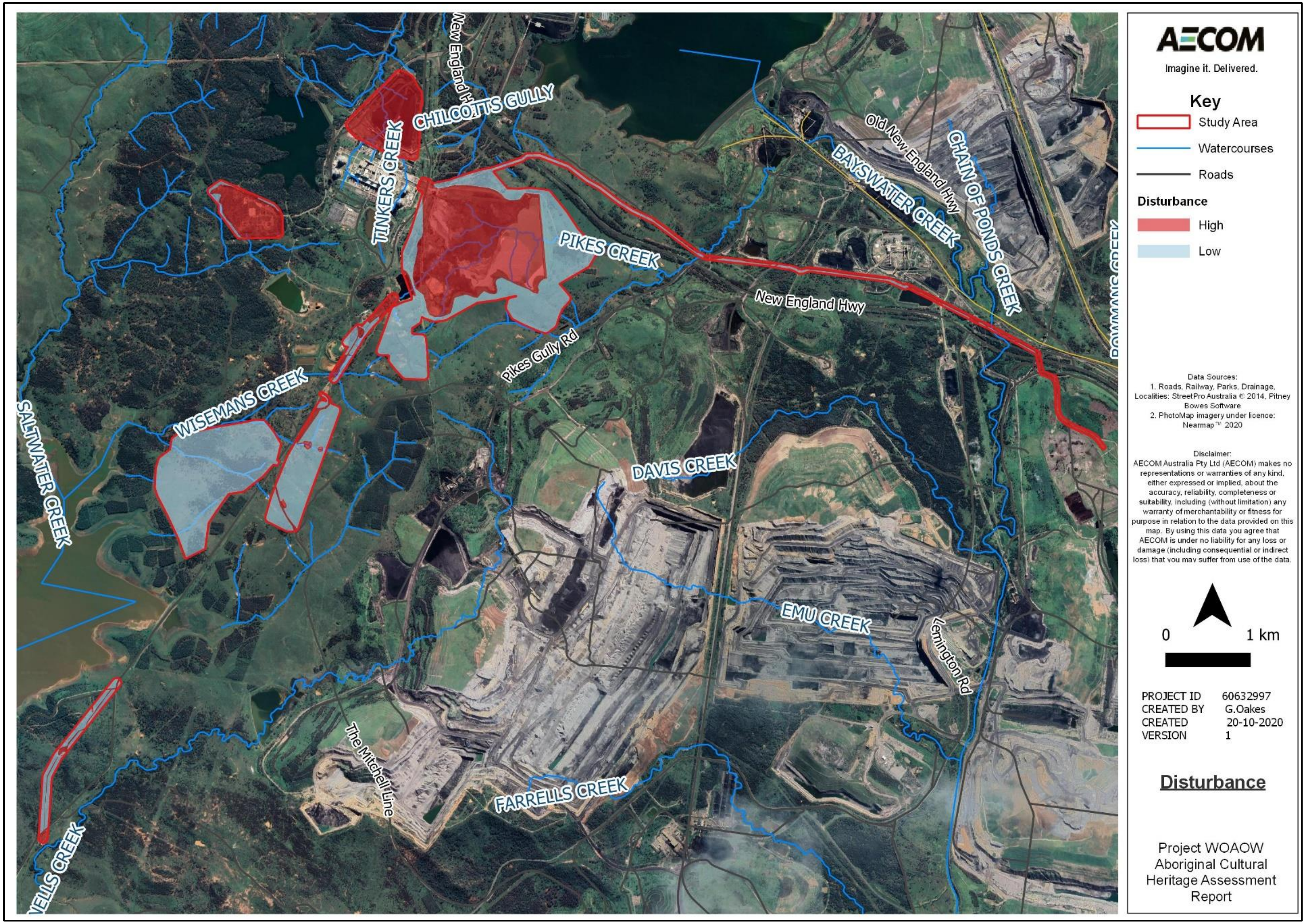
- **High** - Severe disturbance to natural soil profiles including complete-to-near complete topsoil loss through erosion, earthworks, buildings, vehicle tracks and dams; and
- **Low** - Cleared and/or grazed at some time.

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

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)

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:

- The topography of the study area consists of flats associated with various watercourses interspersed with low undulating to steeply sloped hills and crests over open farmland. 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 1^{st} to 3^{rd} order watercourses (after Strahler, 1952) are located directly within the study area. Named watercourses include Wisemans Creek, Pikes Creek, a destroyed 2^{nd} order section of Tinkers Creek and Bayswater Creek. At its closest point, the Hunter River is located 1.3 km south of the study area.
- Reference to the Singleton 1:250,000 geological map sheet 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 have included native vegetation clearance, the construction of farm dams and erosion, as well as significant impacts from the construction of the BPS. However, land in parts of the study area retains a moderate degree of integrity, having been cleared and/or grazed historically but not subject to severe disturbance in the forms of earthworks or the like.

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 NSW and Australia more broadly, non-Aboriginal people occupying the 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 European settlement 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 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 km^2 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.

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 NSW owing to his detailed recordings, with the assistance of influential Awabakal leader Biraban (aka John McGill), of the language and lifeways of the Aboriginal people occupying the Hunter River Estuary.

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

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

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.

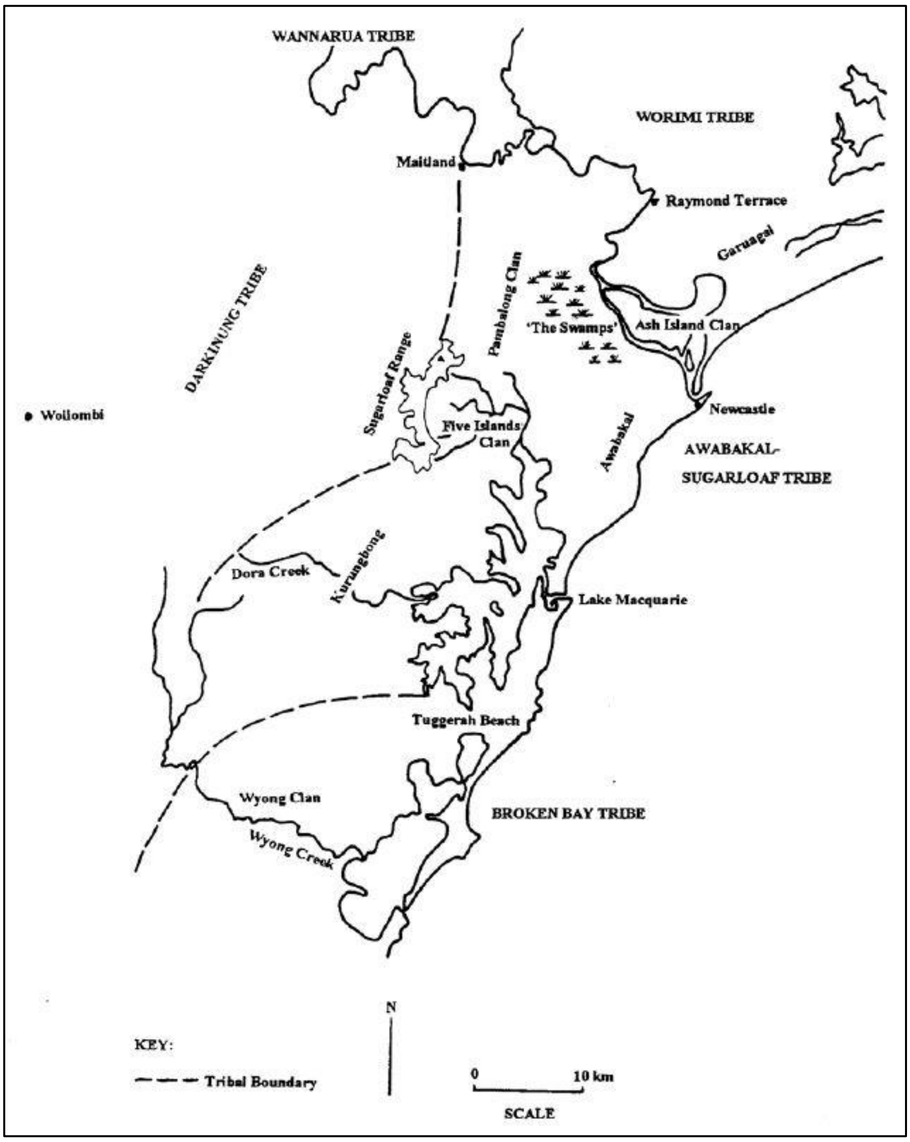


Figure 14 Gunson's (1974) tribal map for the lower Hunter Valley, based on the observations of Reverend Lancelot Threlkeld (from Kuskie, 2012: 39, Fig. 8, after Gunson, 1974)

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).

5.2 Social Organisation

In common with other regions of NSW (e.g., Attenbrow 2010) and Australia more broadly (Peterson 1976), available historical records suggest that the primary units of social organisation amongst the

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

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).

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).

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[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.

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 thousand, 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 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 Hunter 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*'.

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[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 the most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 metre squared (**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 south eastern Australia, including the Hunter Valley, the Australian small-tool and core tool and scraper traditions are most commonly described in terms of McCarthy's (1967) *Eastern Regional Sequence* (**ERS**) of stone artefact assemblages.

[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 6 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 (**SH1**) 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 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 7).

Table 7 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

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.

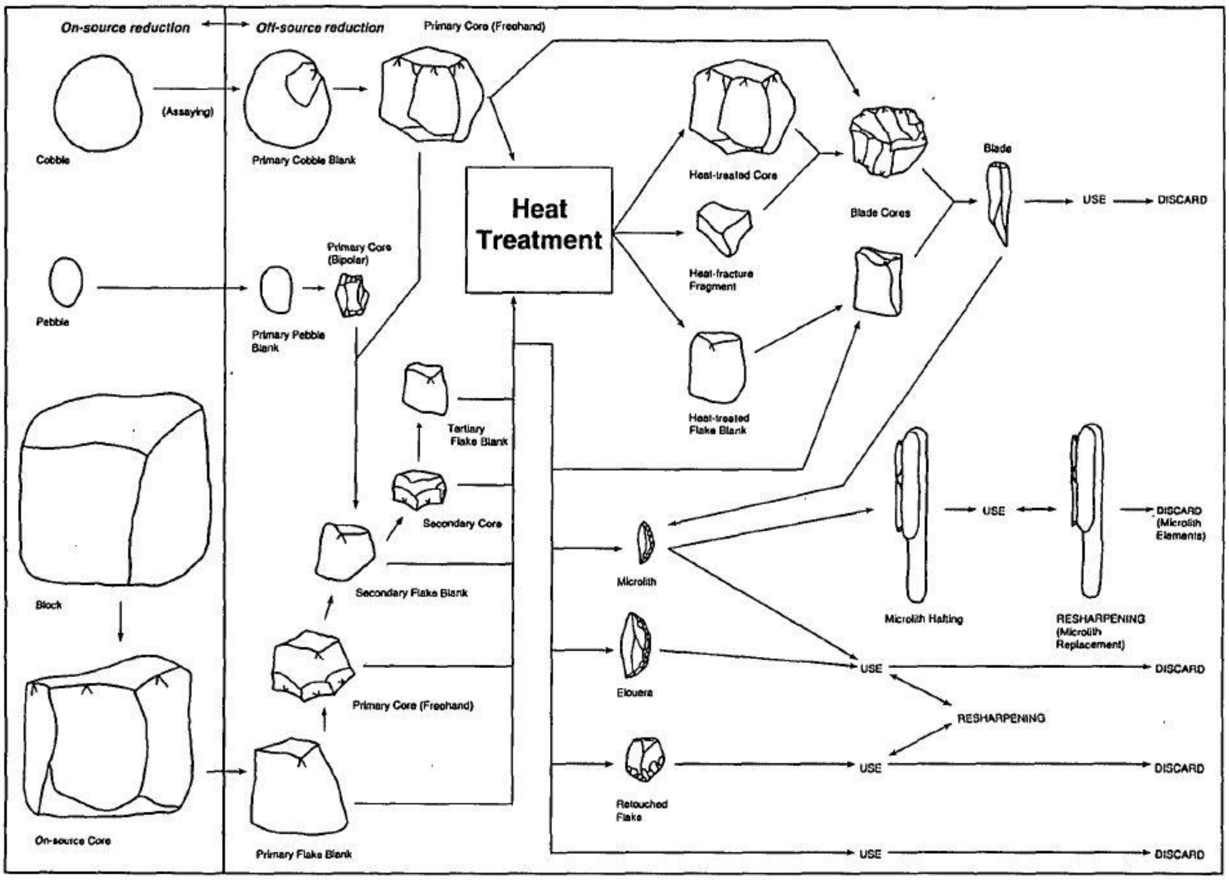


Figure 15 Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (from Moore 2000: 29, Fig. 5)

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 6). 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 have 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

Numerous occupation or land use models have been proposed for the Hunter Valley over the past four decades, with existing models based on varying combinations of archaeological, environmental and ethnohistoric data (eg, Haglund, 1992; Koettig, 1992; Kuskie & Clarke, 2004; Kuskie & Kamminga, 2000). Of the models currently available, Kuskie and Kamminga's (2000) general occupation model remains the most comprehensive. Developed with reference to Foley's (1981) home base model, as well as existing environmental and ethnohistoric data for the Hunter region, Kuskie and Kamminga's (2000) model identifies a series of occupation strategies / patterns and outlines their expected archaeological correlates. The environmental context of each strategy is also considered. A summary of the model is provided in Table 8.

[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 8 Aboriginal occupation models for the Hunter Valley

Occupation strategy / pattern	Behavioural context	Environmental context	Archaeological expectations
Transitory movement	• Individual or group of people moving between base camps, or from a campsite to resources or a ceremonial or other special purpose location • Duration less than a day. Most likely less than a few hours. • Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play or knapping activity	• All landscape zones but frequently on ridge and spur crests, along watercourses and across valley flats • Proximity to water not important • Proximity to food resources not important	• Assemblages of low density and diversity (ie, 'background discard') • Evidence of tool maintenance and/or repair
Hunting and/or gathering (without camping)	• Individual or small group of closely related people engaging in hunting or gathering activities • Duration less than a day, with participants returning to camp to sleep • Evidence may represent accidental discard, loss during use, repair of hunting or gathering equipment, children's play or knapping activity	• All landscape zones • Proximity to water not important • Proximity to food resources important	• Assemblages of low density and diversity (ie, 'background discard') • Evidence of tool loss or discard
Camping by small hunting and/or gathering parties	• Individual or small group of closely related people engaged in hunting or gathering activities camp overnight near the resource being exploited • Duration of one or several days • Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play, knapping activity, food processing or temporary camp fires	• All landscape zones • Proximity to water important • Proximity to food resources important	• Assemblages of low-to-moderate density and diversity, distinguishable from 'background discard' • Reasonably broad range of artefact and stone types • No site furniture (ie, grindstones) • No heat treatment pits or ovens
Nuclear family base camp	• Single nuclear family or extended family camping together • Encampment area may consist of several small huts • Duration dependent on availability of food resources and potable water • Evidence may represent accidental discard, repair of hunting or gathering	• Level to very gently inclined land surfaces • Proximity to water important • Proximity to food resources important	• Assemblages of high density and diversity • Site furniture (ie, grindstones) • Common evidence for expedient stone reduction and tool production • Heat treatment pits and ovens possible

Occupation strategy / pattern	Behavioural context	Environmental context	Archaeological expectations
	equipment, children's play, knapping activity, food processing, campfires, heat treatment and tool manufacture		
Community base camp	• Number of nuclear families camping together • Encampment area may exceed 100 m2 and consist of a number of individual groups and huts • Duration dependent on availability of food resources and potable water	• Level to very gently inclined land surfaces • Proximity to water important • Proximity to food resources important	• Assemblages of high density and diversity • Spatially discrete evidence of individual campsites (where sites not affected by disturbance or superimpositioning) • Site furniture (ie, grindstones) • Common evidence for expedient stone reduction and tool production • Heat treatment pits unlikely • Ochre may be present
Larger congregation of groups	• Special events (ie, major ceremonies) or opportunistic food resource 'events' (eg., migrating eels) • Short duration (<1-2 weeks) • Large encampment or multiple encampments • Variable numbers but potentially >100 individuals	• Level to very gently inclined land surfaces • Proximity to water important • Proximity to food resources important	• Assemblages of high density and diversity (comparable to community base camp) • Spatially discrete evidence of individual campsites (where sites not affected by disturbance or superimpositioning) • Site furniture (ie, grindstones) • Common evidence for expedient stone reduction and tool production • Heat treatment pits unlikely • Evidence for the processing of uncommon food resources

6.2 Local Archaeological Context

6.2.1 AHIMS Database

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

Searches of the AHIMS database were undertaken on 23 October 2020 for a 20 x 20 km area centred on 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 (e.g., PAD, scarred trees, hearths) are the most common site type represented within the search area, accounting for 98.5% (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%), grinding grooves (n = 4, 0.2%) and single example each of a resource / gathering area (n = 1, 0.04%), a ceremonial ring (n = 1, 0.04%), a conflict site (n = 1, 0.04), a stone quarry (n = 1, 0.04), and a shell midden (n = 1, 0.04).

Consideration of the location of previously recorded Aboriginal sites indicates that 30 are located wholly or partially within the study area. All comprise open artefact sites. Eight have associated areas of PAD, with one also containing a potential hearth. All 30 sites are listed on the AHIMS database as 'valid'. However, a review of site locations against existing site infrastructure indicates that seven should, in fact, be listed as destroyed, bringing the total number of valid sites to 23. Of these, 13 were recorded by Jacobs (2019) as part of the WOAOW project. Site details are provided in Table 10.

Table 9 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 10 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
37-2-0048	Pikes Gully;	309541	6413175	Artefact	L. Dyall (1977)	Artefacts collected (Aus Museum)

AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Reference	Comment
		MGAE	MGAN			
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
37-2-6134	BAYS AS and PAD02	305008	6409878	Artefact; PAD	Jacobs (2019)	This project

AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Reference	Comment
		MGAE	MGAN			
37-2-6136	BAYS IF04	305109	6410243	Artefact	Jacobs (2019)	This project
37-2-6135	BAYS AS and PAD15	309058	6412157	Artefact; PAD	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

Excluding Jacob’s (2019) assessment, described in Section below, a review of the AHIMS database indicates that five Aboriginal archaeological investigations have been undertaken directly within the study area. These investigations are summarised in brief below.

- 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. 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.

Figure 16 AHIMS Sites

6.3 Archaeological Predictions

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.
- Open artefact sites will occur in both surface and subsurface contexts;
- 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 severely disturbed through historical land use activities and/or 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, with larger, more complex assemblages occurring on elevated to slightly elevated low gradient landforms adjacent to higher order watercourses;
- 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 of the study area was completed by Jacobs (2019) in September 2019 with the results presented here taken from the Jacobs (2019) ACHAR for the Project (Appendix A).

7.1.1 Methodology

Jacobs (2019: 32) report that all areas proposed to be impacted by the Project were subject to full archaeological survey by a combined survey team of two Jacobs archaeologists and nine RAP field representatives. Areas assessed in the field as having no potential for archaeological material to be present (i.e., due to past land use activities / disturbance) were not surveyed (Jacobs 2019:32). Previously recorded sites within the footprint of the Project were searched for during the survey. If found, these sites were recorded following the same procedure as newly identified sites.

7.2 Survey Results

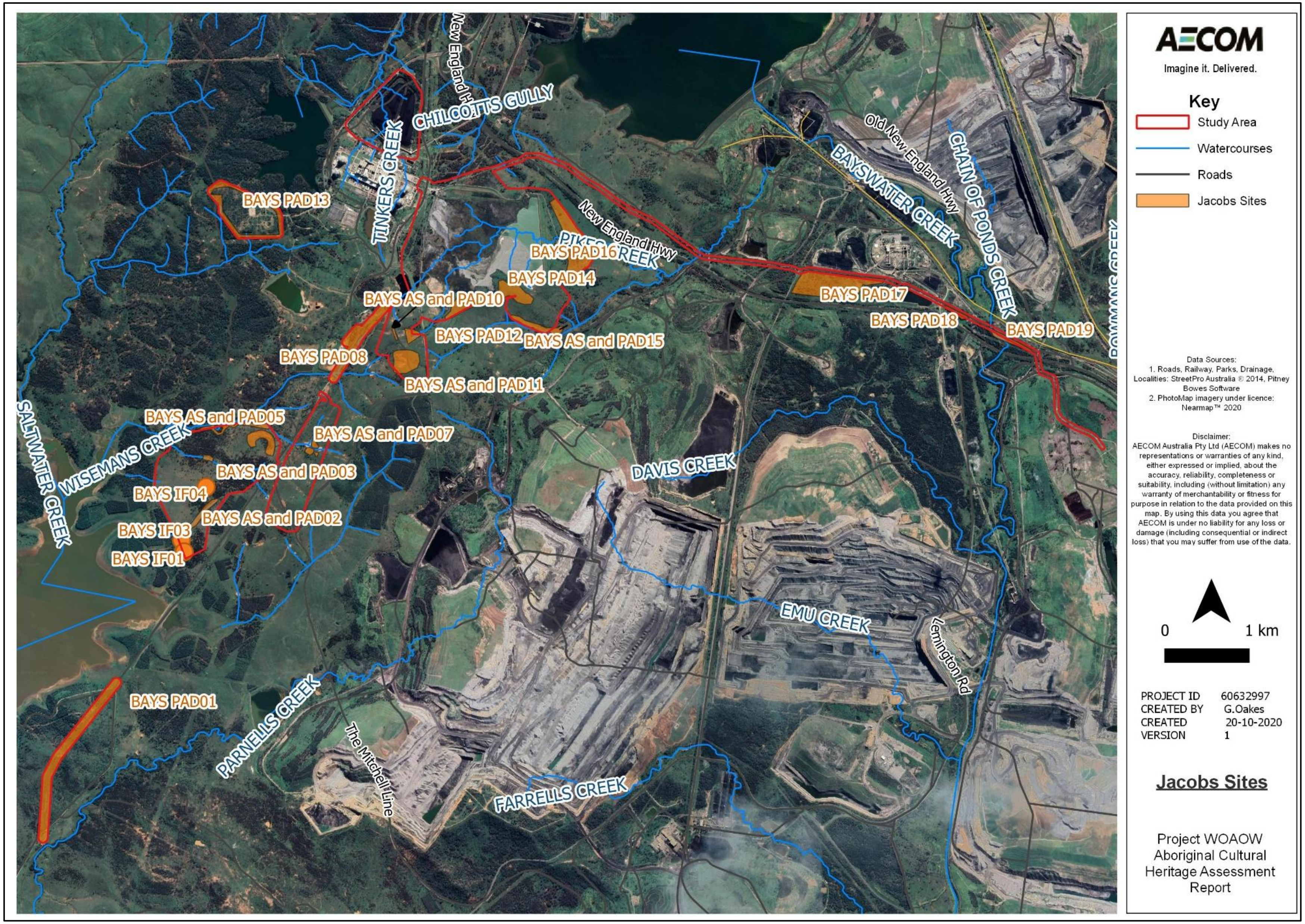
Jacobs (2019) identify a total of 37 Aboriginal sites were identified within the study area, of which 23 were newly recorded and 14 were previously recorded AHIMS sites. Newly recorded sites comprise nine areas of PAD, seven open artefact sites (artefact scatters) with associated areas of PAD, and seven open artefact sites (Table 11). It is noted that the PADs were not registered on AHIMS following the assessment.

Table 11 Sites recorded by Jacobs (2019)

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 Bayswater Ash Dam
Not registered	BAYS PAD16	PAD	Adjacent to Pikes Creek

AHIMS ID	Site Name	Site Type	Comment
Not registered	BAYS PAD17	PAD	Adjacent to coal conveyor
Not registered	BAYS PAD18	PAD	Adjacent to coal conveyor
Not registered	BAYS PAD19	PAD	Adjacent to coal conveyor

Figure 17 Aboriginal sites recorded by Jacobs (2019)



8.0 Archaeological Test Excavation

In total, Jacobs (2019) identified a total of 37 Aboriginal archaeological sites within the study area. Of these, Jacobs (2019) recommended that archaeological test excavations be carried out within 19 sites, with excavations, in all instances, to be restricted to areas of PAD with the potential to be impacted by the Project. Sites subject to test excavation are listed in Table 12, with site locations 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 objects within identified PAD areas.

AECOM notes that a number of the PAD sites designated for test excavation by Jacobs (2019) incorporate multiple landform elements, including some not typically considered archeologically sensitive in the Hunter Valley (e.g. moderately-to-steeply-inclined upper slopes, midslopes etc.). In addition, some PAD boundaries encompassed areas that had been severely 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, for example, elevated low gradient landform elements adjacent to watercourses, were subject to more intensive testing than those of lower potential. Areas of severely disturbed terrain were excluded from the sampling universe.

A two phase program of excavation was completed, with Phase 1 involving systematic testing of PAD areas and Phase 2, the expansion of selected test pits containing high artefact densities (i.e., on a site-based scale).

As part of Phase 1, 229 50 x 50 cm (0.25 m²) test pits were excavated across the 19 PAD areas (Appendix H). 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). In some instances, the presence of Endangered Environmental Communities **(EEC**) and Critically Endangered Ecological Communities (**CEEC**) within proposed excavation areas necessitated the removal of planned test pits (Figure 19). No excavations were undertaken within these areas.

Phase 2 of the test excavation program involved small expansions (0.75 m²) around 17 Phase 1 test pits (Table 13). These pits were selected for expansion on the basis of locally high lithic counts. The purpose of extensions at these test pits was to better characterise the nature and extent of the subsurface archaeological deposit in these areas and to 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 5 millimetre (**mm**) aperture wire-mesh sieves using a combination of wet and dry sieving.

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 pits 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 14 lists the RAP groups and representatives who participated in the excavation.

Table 12 Sites requiring test excavation

Site Name/ID	AHIMS ID	No. of Phase 1 Test Pits	No. of Phase 2 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 13 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
135	0.75 m²	1 m²	BAYS AS and PAD15

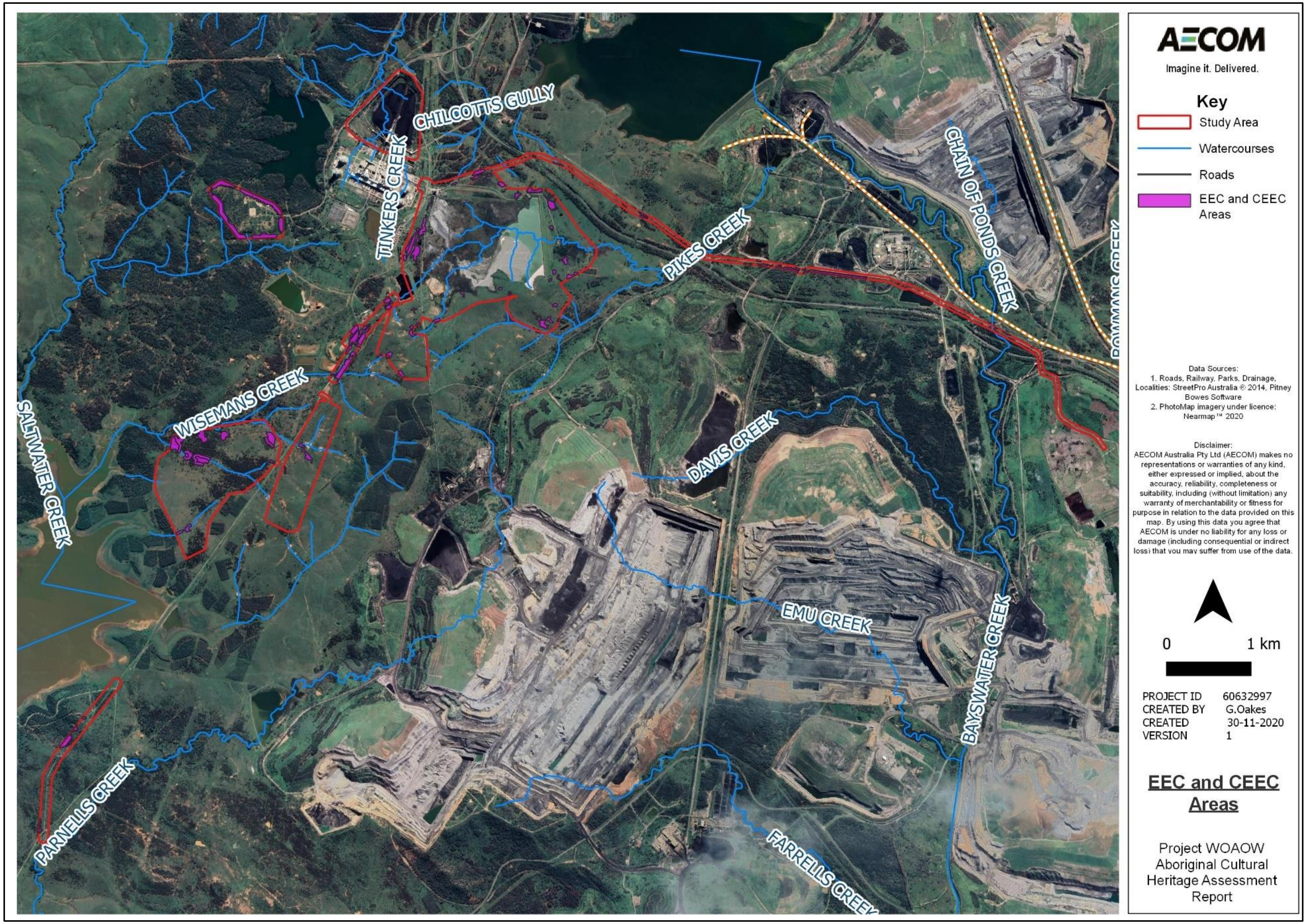
Phase 1 Test Pit	Expansion	Total Excavation	Site
229	0.75 m^2	1 m^2	BAYS AS and PAD05
234	0.75 m^2	1 m^2	BAYS AS and PAD05
241	0.75 m^2	1 m^2	37-2-0556
245	0.75 m^2	1 m^2	BAYS AS and PAD02
281	0.75 m^2	1 m^2	37-2-0556
283	0.75 m^2	1 m^2	37-2-0555
284	0.75 m^2	1 m^2	37-2-0555
285	0.75 m^2	1 m^2	BAYS AS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

Table 14 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

Figure 18 Sites subject to test excavation

Figure 19 EEC and CEEC areas



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 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; and
- One or more negative flake scars.

Attributes recorded for the current lithic analysis are listed and defined in Table 15. Utilised artefact and non-artefact types, meanwhile, are listed and defined in Table 16.

Table 15 Attributes recorded during lithic analysis

Attribute	Definition	Recorded for
Technological Type	Technological type, as per Table 16	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 16 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;Plashette; (37-2-0555)

8.3.1 Site Description

Project component: borrow pit

P8;Plashette 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;Plashette 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;Plashette (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;Plashette involved the excavation of three 0.25 m² test pits, with test pits placed in areas not severely disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 17. Test pit locations are shown on Figure 20.

Table 17 P8;Plashette Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
239	305580	6410433	Flat	Gently inclined	10	0
283	305610	6410403	Flat	Level	13	2
284	605613	6410382	Flat	Gently inclined	16	1

8.3.3 Phase 2 Testing

Phase 2 testing at P8;Plashette involved the excavation of three additional test pits (B, C and D) adjacent to test pits 283 and 284 expanding them to 1m^2 (Plate 3). Summary information on Phase 2 test pits is provided in Table 18.

Table 18 P8;Plashette; 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
283D	Flat	Level	13	13	0
284B	Flat	Gently inclined	16	16	0
284C	Flat	Gently inclined	16	16	0
284D	Flat	Gently inclined	16	16	0

8.3.4 Soils, Stratigraphy and Disturbance

Test pit depths within P8;Plashette varied from 10 to 16 cm in depth, with an average depth of 13 cm. 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 Phase 1 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;Plashette. 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;Plashette 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;Plashette consist almost exclusively of flake debitage items (n = 6) (Table 21). 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 22).

Table 19 P8;Plashette; 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 20 P8;Plashette; 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**

8.3.8 Summary of Testing and Results

- Phase 1 testing at P8;Plashette involved the excavation of three 0.25 m² test pits across the site.
- Two Phase 1 test pits – test pits 283 and 284 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 2 and n = 1 respectively).
- Three additional test pits (B, C and D) were excavated directly adjacent to test pits 283 and 284 expanding them to 1 m^2. An additional four artefacts were recovered from expansions at test pit 283 providing an overall density of six artefacts per m² for test pit 283. No additional artefacts were recovered from test pit 284 expansions.
- Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying light brown clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across P8;Plashette are interpreted as a product of low intensity Aboriginal use of the flat adjacent to the 2nd order tributary of Wisemans Creek. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 20 P8;Plashette; Phase 1 test pits

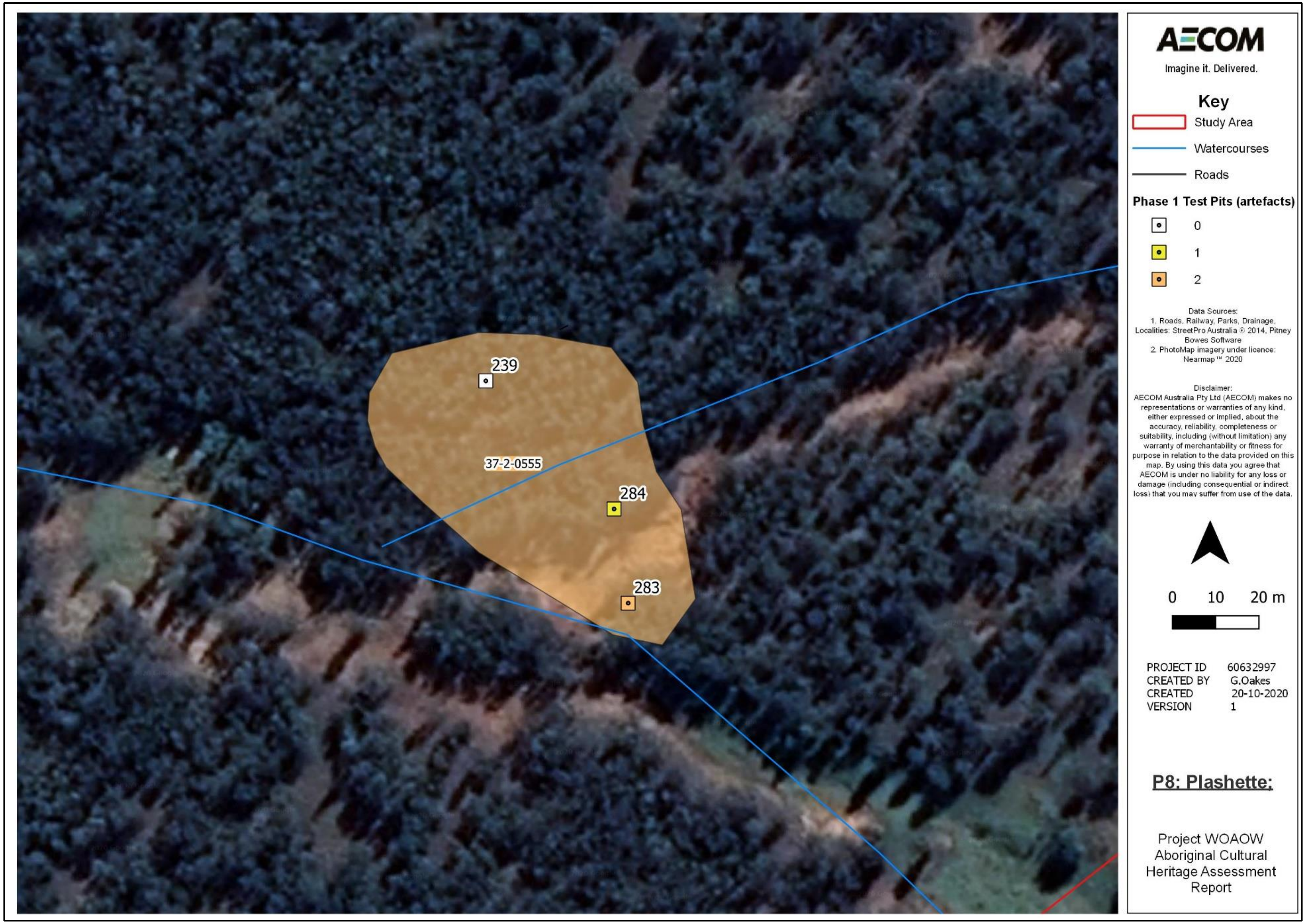


Plate 3 **P8;Plashette Phase 2 test pit (283)**

Plate 4 **P8;Plashette Phase 2 test pit (284)**

8.4 P9;Plashette (37-2-0556)

8.4.1 Site Description

Project component: borrow pit

P9;Plashette; 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 P9;Plashette 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 gross earthworks. However, land directly adjacent to the drainage channel has been subject to significant historical and ongoing erosion. Reference to the report associated with P9;Plashette (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;Plashette involved the excavation of four 0.25 m^2 test pits , with test pits placed in areas not severely disturbed by erosion. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 21. Test pit locations are shown on Figure 21.

Table 21 P9;Plashette; Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
240	305410	6410407	Middle	Very gently inclined	22	0
241	305431	6410403	Middle	Level	15	4
281	305412	6410424	Middle	Very gently inclined	19	5
282	305452	6410397	Middle	Level	10	0

8.4.3 Phase 2 Testing

Phase 2 testing at P9;Plashette involved the excavation of three additional test pits (B, C and D) adjacent to Phase 1 test pits 241 and 281, expanding them to 1 m^2 (Plate 5). Summary information on Phase 2 test pits is provided in Table 22.

Table 22 P9;Plashette; Phase 2 testing results

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

8.4.4 Soils, Stratigraphy and Disturbance

Test pit depths within P9;Plashette varied from 10 to 22 cm in depth with an average depth of 16.5 cm. 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;Plashette. 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;Plashette 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 23) from P9;Plashette 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 (g), 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 24). 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 23 P9;Plashette; 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 24 P9;Plashette; 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**

8.4.8 Summary of Testing and Results

- Phase 1 testing at P9;Plashette involved the excavation of four 0.25 m² test pits.
- Two Phase 1 test pits – test pits 241 and 281 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 4 and n = 5 respectively).
- Three additional test pits (B, C and D) were excavated directly adjacent to test pits 241 and 281 expanding them to 1 m^2. An additional 13 artefacts were recovered from expansions at test pit 241 and an additional two artefacts from expansions at test pit 281. Total artefact density recovered from test pit 241 was 17 artefacts per m² and was seven artefacts per m² from test pit 281. Overall mean overall artefact density for the site was 10.7 artefacts per m².
- Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying light brown clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across P9;Plashette; are interpreted as a product of low intensity Aboriginal use of the flat adjacent to the 2nd order tributary of Wisemans Creek. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 21 P9;Plashett Phase 1 test pits

Plate 5 **P9;Plashette; Phase 2 test pit 241**

Plate 6 **P9;Plashette; Phase 2 test pit 281**

8.5 P11;Plashette (37-2-0558)

8.5.1 Site Description

Project component: borrow pit

P11;Plashette is located on a flat with part of a 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;Plashette 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;Plashette involved the excavation of three 0.25 m² test pits with test pits placed in areas not severely disturbed by erosion or dam construction. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 25. Test pit locations are shown on Figure 22.

Table 25 P9;Plashette; Phase 1 testing results

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

8.5.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.5.4 Soils, Stratigraphy and Disturbance

Test pit depths within P11;Plashette varied from 10 to 12 cm in depth with an average depth of 10.6 cm. 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 topsoil 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.

8.5.6 Summary of Testing and Results

- Phase 1 testing at P11;Plashette involved the excavation of three 0.25 m² test pits across the site.
- No artefacts were identified during Phase 1 excavations.
- Soil profiles varied across the site, with test pits 194 and 196 missing A horizon soils and comprising reddish brown clays from the surface.
- Site P11;Plashette comprises surface artefacts with no subsurface artefacts identified during test excavation. Surface artefacts are considered likely to be in secondary contexts as the site generally encompasses a drainage channel and an associated drainage depression with little topsoil remaining in places.

Figure 22 P11;Plashette; 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 severely 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 PAD02 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
242	305250	6410099	Upper slope	Gently inclined	15	0
243	305202	6410054	Upper slope	Very gently inclined	9	0
244	305150	6410017	Middle slope	Very gently inclined	13	0
245	305101	6409973	Middle slope	Gently inclined	9	1
246	305052	6409911	Middle slope	Gently inclined	41	0
247	304998	6409851	Middle slope	Very gently inclined	22	0
248	304951	6409805	Middle slope	Very gently inclined	36	0
249	304901	6409759	Middle slope	Very gently inclined	30	0
250	304849	6409727	Middle slope	Very gently inclined	24	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
251	304798	6409702	Middle slope	Very gently inclined	17	0

8.6.3 Phase 2 Testing

Phase 2 testing at BAYS AS and PAD02 involved the excavation of the three additional test pits (B, C and D) adjacent to test pit 245, expanding it to 1 m^2 (Plate 7). Summary information on Phase 2 test pits is provided in Table 27.

Table 27 BAYS AS and PAD02 Phase 2 testing results

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

8.6.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD02 varied from 9 to 41 cm in depth, with an average depth of 21.6 cm. 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 g, 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 g, has a single scar platform with no associated overhang removal and exhibits a feather termination.

8.6.8 Summary of Testing and Results

- Phase 1 testing at BAYS AS and PAD02 involved the excavation of ten 0.25 m^2 test pits across the site.
- One Phase 1 test pit – 245 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts.
- Three additional test pits (B, C and D) were excavated directly adjacent to test pit 245 expanding it to 1 m^2. An additional one artefact was recovered from expansions at test pit 245.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying red brown silty clay subsoils.

- Viewed collectively, the results of Phase 1 and 2 testing across BAYS AS and PAD02 are interpreted as a product of low intensity Aboriginal use of the slope adjacent to the unnamed 1st order unnamed tributary of Plashett Reservoir. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 23 BAYS AS and PAD02 Phase 1 test pits

Plate 7 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 m^2 test pits with test pits placed in areas not disturbed by erosion. 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 PAD03 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
238	305152	6410597	Lower slope	Level	58	0
279	305101	6410619	Lower slope	Very gently inclined	10	0
280	305162	6410572	Lower slope	Very gently inclined	16	4

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 m^2 (Plate 8). Summary information on Phase 2 test pits is provided in Table 29.

Table 29 BAYS AS and PAD2 Phase 2 testing results

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

8.7.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD03 varied from 10 to 58 cm in depth, with an average depth of 28 cm. 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 on 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 g, 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 g, 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.

8.7.8 Summary of Testing and Results

- Phase 1 testing at BAYS AS and PAD03 involved the excavation of three 0.25 m^2 test pits.
- One Phase 1 test pit – 280 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 4).
- Three additional test pits (B, C and D) were excavated directly adjacent to test pit 280, expanding it to 1 m^2. One additional artefact was recovered from expansions at test pit 280 providing a mean overall artefact density of 3.3 artefacts per m^2 for the site and 5 artefacts per m^2 for test pit 280.
- Soil profiles across the site were generally consistent in textural terms, with orange brown silty clay loam topsoils overlying orange clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across BAYS AS and PAD03 are interpreted as a product of low intensity Aboriginal use of the flat adjacent to the 2nd order tributary of Wisemans Creek. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 24 BAYS AS and PAD03 Phase 1 test pits

Plate 8 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 30. Test pit locations are shown on Figure 25.

Table 30 BAYS AS and PAD05 Phase 1 testing results

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

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
222	305799	6410846	Mid slope	Gently inclined	12	0
224	305597	6410798	Mid slope	Gently inclined	13	0
225	305653	6410806	Upper slope	Gently inclined	26	0
226	305700	6410798	Crest	Gently inclined	7	0
229	305649	6410748	Crest	Gently inclined	15	1
230	305699	6410749	Crest	Gently inclined	17	0
231	305847	6410755	Crest	Gently inclined	16	0
233	305853	6410709	Crest	Gently inclined	27	0
234	305903	6410700	Crest	Very gently inclined	26	1
235	305850	6410652	Crest	Very gently inclined	21	0
236	305898	6410652	Crest	Very gently inclined	19	0
285	305626	6410776	Upper slope	Gently inclined	10	1
286	305673	6410784	Upper slope	Gently inclined	8	0
287	305872	6410677	Crest	Very gently inclined	4	0
321	305797	6410960	Flat	Very gently inclined	18	1
322	305704	6410970	Flat	Gently inclined	6	0
323	305589	6410991	Flat	Level	10	0
324	305456	6410972	Flat	Very gently inclined	15	4
325	305263	6410879	Flat	Gently inclined	8	0
326	304866	6410880	Flat	Very gently inclined	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 and 28,5 expanding them to 1 m^2 (Plate 9, Plate 10, Plate 11, and Plate 12. The remaining artefact bearing pit was not expanded due to time constraints. Summary information on Phase 2 test pits is provided in Table 31.

Table 31 BAYS AS and PAD5 Phase 2 testing results

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

8.8.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD05 varied from 4 to 28 cm in depth, with an average depth of 15.3 cm. 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 were 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 25, 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 I for details). Four raw materials are represented: silicified tuff (n = 4), silcrete (n = 3), Fine Grained Siliceous (FGS) (n = 1) and quartz (n = 1).

8.8.8 Summary of Testing and Results

- Phase 1 testing at BAYS AS PAD05 involved the excavation of 32 0.25 m^2 test pits across the site.
- Seven Phase 1 test pits – test pits 220, 221, 229, 234, 285, 321 and 324 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts.
- Three additional test pits (B, C and D) were excavated directly adjacent to test pits 220, 221, 229, 234, 285 and 321 expanding them to 1 m^2. No additional artefacts were recovered from Phase 2 test pits. Overall mean overall artefact density for the site was 0.2 artefacts per m^2.
- Soil profiles across the site were generally consistent in textural terms, with brown grey silty loam topsoil overlying brown orange clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across BAYS AS and PAD05 are interpreted as a product of low intensity Aboriginal use of the hillslope and flat overlooking Wisemans Creek. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 25 BAYS AS and PAD05 Phase 1 test pits

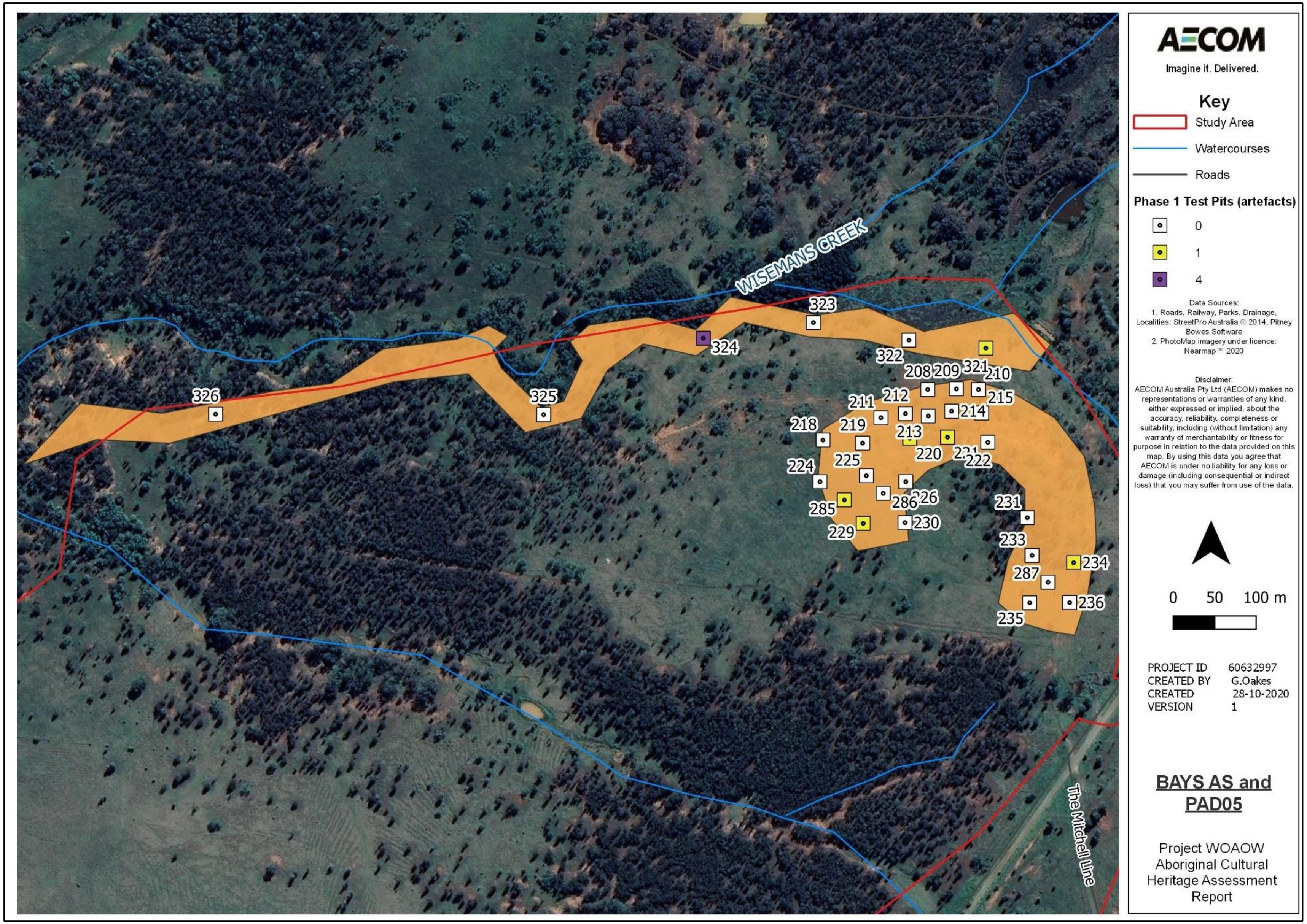


Plate 9 BAYS AS and PAD05 Phase 1 test pit 220

Plate 10 BAYS AS and PAD05 Phase 2 test pit 229

Plate 11 BAYS AS and PAD05 Phase 2 test pit 234

Plate 12 BAYS AS and PAD05 Phase 2 test pit 285

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, 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 26.

Table 32 BAYS AS and PAD07 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
191	306420	6410848	Lower slope	Gently inclined	1	0
192	306390	6410816	Lower slope	Gently inclined	5	0
193	306390	6410790	Lower slope	Very gently inclined	10	0
197	306389	6410762	Lower slope	Very gently inclined	20	0

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

8.9.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.9.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD07 varied from 1 to 20 cm in depth, with an average depth of 10.5 cm. 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.

8.9.6 Summary of Testing and Results

- Phase 1 testing at BAYS AS and PAD07 involved the excavation of ten 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying dark reddish brown clay subsoils.
- Site BAYS AS PAD07 comprises surface artefacts only with no subsurface artefacts identified during test excavation. Surface artefacts are considered to be a product of low intensity Aboriginal use of the 1st order drainage channel located partially within the site.

Figure 26 BAYS AS and PAD07 Phase 1 test pits

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 ,with test pits placed roughly on a 50 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 33. Test pit locations are shown on Figure 27.

Table 33 BAYS AS and PAD10 Phase 1 testing results

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

8.10.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.10.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD010 varied from 5 to 17 cm in depth, with an average depth of 12 cm. 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 were 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.

8.10.6 Summary of Testing and Results

- Phase 1 testing at BAYS AS PAD10 involved the excavation of four 0.25 m² test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying brown clay subsoils
- Site BAYS AS PAD10 comprises surface artefacts only with no subsurface artefacts identified during test excavation. Surface artefacts are considered to be a product of low intensity Aboriginal use of the crest with short-stay camping and/or hunting/gathering without camping likely (Kuskie and Kamminga, 2000).

Figure 27 BAYS AS and PAD10 Phase 1 test pits

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 with test pits placed on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 34. Test pit locations are shown on Figure 28.

Table 34 BAYS AS and PAD05 Phase 1 testing results

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

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

8.11.3 Phase 2 Testing

No Phase 2 testing was completed due to low artefact counts and shallow topsoil.

8.11.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD11 varied from 7 to 32 cm in depth, with an average depth of 14.9 cm. 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 were 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. The reddened soil noted by Jacobs (2019) was not evident during the excavation or is apparent in Figure 6-18 of the report.

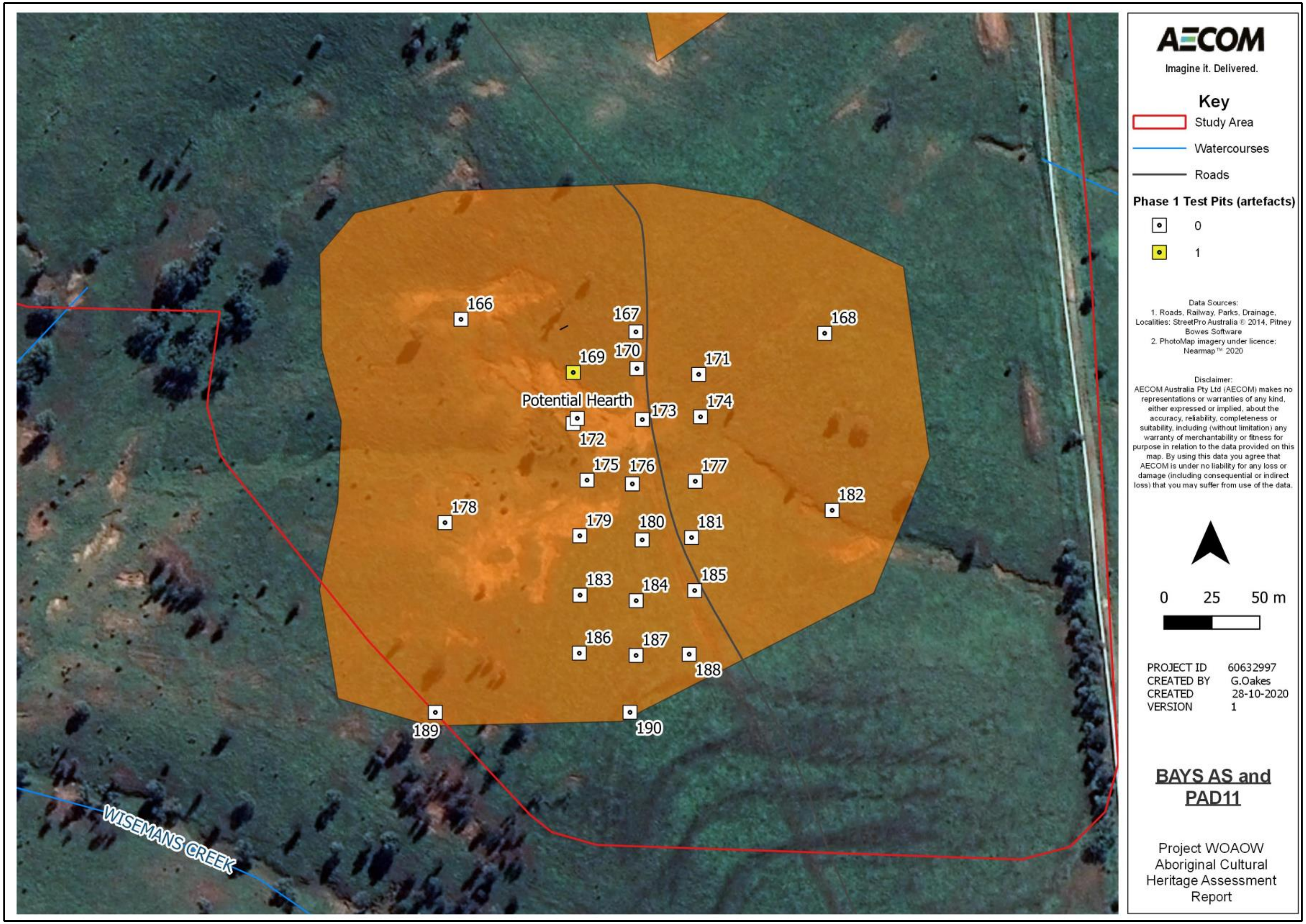
8.11.5 Aboriginal Objects

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.

8.11.6 Summary of Testing and Results

- Phase 1 testing at BAYS AS and PAD11 involved the excavation of 26 0.25 m² test pits across the site.
- One Phase 1 test pit – 169 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 1).
- No Phase 2 test pits were excavated due to low artefact counts and shallow topsoil encountered.
- Soil profiles across the site were generally consistent in textural terms, with thin orange brown silty clay loam topsoils overlying brown orange clay subsoils.
- The potential hearth identified by Jacobs (2019) was excavated with no charcoal, artefacts or burnt features identified.
- Viewed collectively, the results of Phase 1 and 2 testing across BAYS AS and PAD11 are interpreted as a product of low intensity Aboriginal use of the slope and crest overlooking Wisemans Creek. Hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 28 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 with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 35. Test pit locations are shown on Figure 28.

Table 35 BAYS AS and PAD15 Phase 1 testing results

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

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
127	308925	6412172	Flat	Very gently inclined	20	0
128	308939	6412171	Flat	Level	23	0
129	308971	6412169	Flat	Level	21	0
132	309038	6412131	Flat	Very gently inclined	15	1
134	309090	6412136	Flat	Gently inclined	19	0
135	309062	6412111	Flat	Gently inclined	20	3
136	309092	6412106	Flat	Gently inclined	10	0
137	309113	6412103	Flat	Gently inclined	20	0
138	309144	6412108	Flat	Gently inclined	23	0
139	309204	6412122	Flat	Gently inclined	12	0
140	309148	6412081	Flat	Gently inclined	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 13 and Plate 14). The remaining pits artefact bearing pits were not expanded due to time constraints. Summary information on Phase 2 test pits is provided in Table 36.

Table 36 BAYS AS and PAD15 Phase 2 testing results

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

8.12.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS AS and PAD15 varied from 10 to 43 cm in depth, with an average depth of 22.7 cm. 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 its landscape position and proximity to a 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 m 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 37. 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 (1) x 12.2 (w) x 5.4 (Th) mm while the elouera from TP135D measured 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 38). 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 37 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 38 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**

8.12.8 Summary of Testing and Results

- Phase 1 testing at BAYS AS and PAD15 involved the excavation of 14 0.25 m² test pits across the site.
- Two Phase 1 test pits – test pits 132 and 135 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 1 and n = 3 respectively).
- Three additional test pits (B, C and D) were excavated directly adjacent to test pits 132 and 135 expanding them to 1 m^2. An additional 11 artefacts were recovered from expansions at test pit 132 and an additional 13 artefacts from expansions at test pit 135. Total artefact density recovered from test pit 132 was 12 artefacts per m² and was 16 artefacts per m² from test pit 135. Overall mean overall artefact density for the site was 0.8 artefacts per m².
- Soil profiles across the site were generally consistent in textural terms, with orange brown silty loam topsoils overlying brown clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across BAYS AS and PAD15 are interpreted as a product of low intensity Aboriginal use of the flat adjacent Pikes Creek Gully. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 29 BAYS AS and PAD15 Phase 1 test pits

Plate 13 BAYS AS and PAD15 Phase 2 test pit 132

Plate 14 BAYS AS and PAD15 Phase 2 test pit 135

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 (AGLM 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 ,with test pits placed roughly on a 30 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 39. Test pit locations are shown on Figure 30.

Table 39 **BAYS PAD01 Phase 1 testing results**

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

8.13.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.13.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD01 varied from 8 to 36 cm in depth, with an average depth of 16.8 cm. 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.

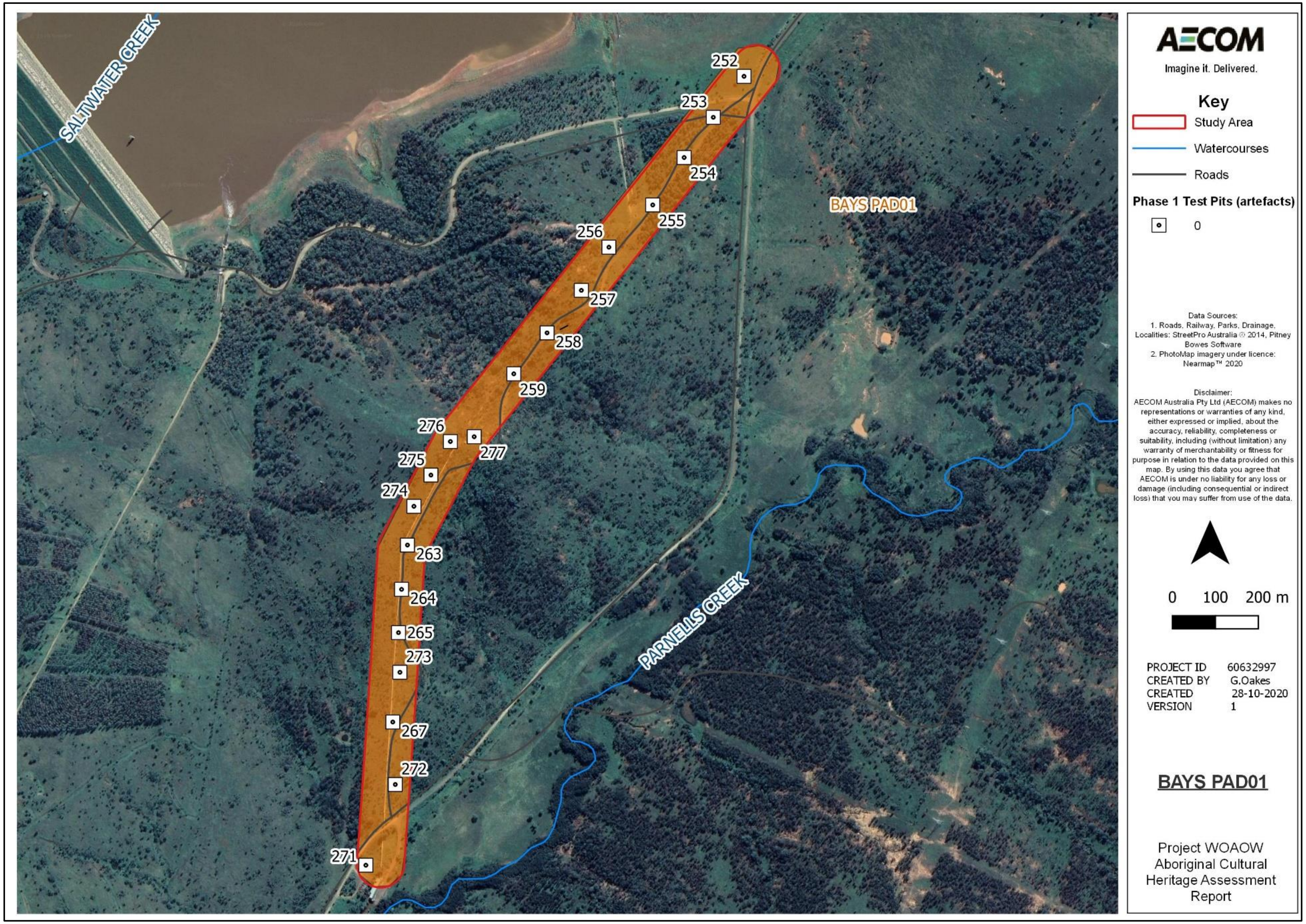
8.13.5 Aboriginal Objects

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

8.13.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD01 involved the excavation of 19 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with orange brown sandy to silty clay loam topsoils overlying brown clay subsoils.
- The results of Phase 1 and 2 testing, alongside Jacobs (2019) survey results, provide no evidence for Aboriginal use of BAYS PAD01.

Figure 30 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 (AGLM 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 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 40. Test pit locations are shown on Figure 31.

Table 40 BAYS PAD08 Phase 1 testing results

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

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

8.14.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.14.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD08 varied from 7 to 29 cm in depth, with an average depth of 13.1 cm. Soil profiles across the site were generally consistent in textural terms, with dark brown silty clay loam topsoils overlying reddish brown clay subsoils. No topsoil was present in test pit 289 due to erosion. Roots were few throughout. Boundaries between A and B horizons were generally between 20-50 mm.

8.14.5 Aboriginal Objects

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

8.14.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD08 involved the excavation of eight 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with dark brown silty clay loam topsoils overlying reddish brown clay subsoils
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019) survey results, provide no evidence for Aboriginal use of BAYS PAD08.

Figure 31 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 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 41. Test pit locations are shown on Figure 32

Table 41 BAYS PAD12 Phase 1 testing results

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

8.15.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.15.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD12 varied from 6 to 16 cm in depth, with an average depth of 19.5 cm. 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 were generally between 20-50 mm.

8.15.5 Aboriginal Objects

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

8.15.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD12 involved the excavation of six 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying brown clay subsoils.
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019) survey results, provide no evidence for Aboriginal use of BAYS PAD12.

Figure 32 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 with test pits placed in areas not significantly disturbed by power station infrastructure and outside of mapped areas of EEC. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 41. Test pit locations are shown on Figure 33.

Table 42 BAYS PAD13 Phase 1 testing results

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

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

8.16.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.16.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD13 varied from 8 to 49 cm in depth with an average depth of 21.2 cm. 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 were generally between 20-50 mm.

8.16.5 Aboriginal Objects

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

8.16.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD13 involved the excavation of eight 0.25 m² test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying orange clay subsoils
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019) survey results, provide no evidence for Aboriginal use of BAYS PAD13.

Figure 33 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 ,,with test pits placed on a 100 m grid. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 43. Test pit locations are shown on Figure 34.

Table 43 BAYS PAD14 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
111	308700	6412601	Crest	Very gently inclined	10	0
112	308799	6412596	Crest	Very gently inclined	18	0
113	308206	6412493	Crest	Gently inclined	20	0
114	308302	6412493	Crest	Gently inclined	19	0
115	308404	6412493	Crest	Very gently inclined	18	0
116	308497	6412502	Crest	Very gently inclined	18	0
117	308598	6412495	Crest	Gently inclined	21	0
118	308806	6412503	Crest	Gently inclined	8	0
119	308906	6412498	Crest	Very gently inclined	15	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
120	308104	6412398	Crest	Very gently inclined	28	0
121	308197	6412396	Crest	Very gently inclined	14	0
122	308003	6412299	Crest	Gently inclined	14	0
123	308096	6412300	Crest	Very gently inclined	21	0

8.17.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.17.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD14 varied from 8 to 28 cm in depth, with an average depth of 17.2 cm. 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.

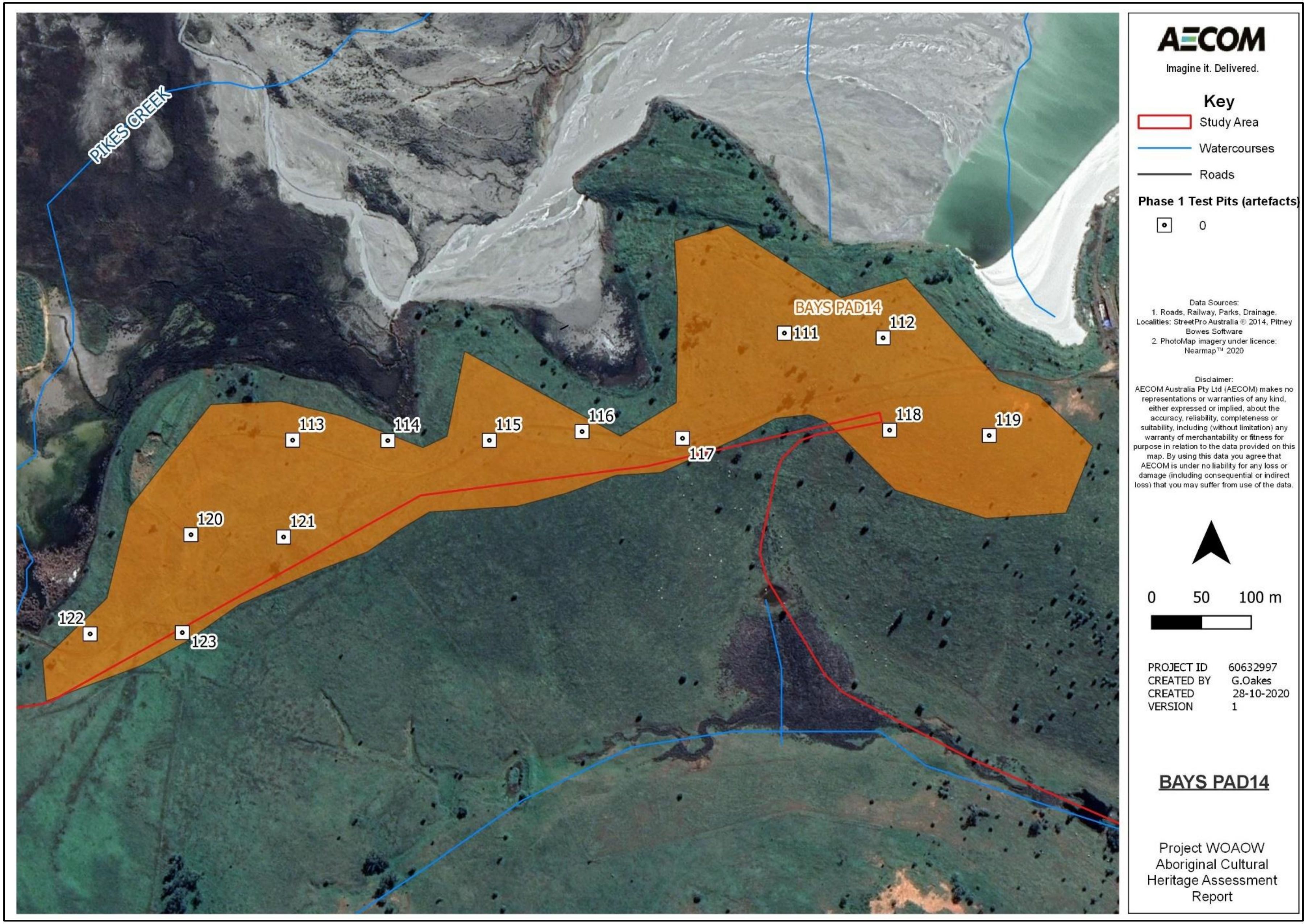
8.17.5 Aboriginal Objects

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

8.17.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD14 involved the excavation of 13 0.25 m² test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying red brown clay subsoils
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019)survey results, provide no evidence for Aboriginal use of BAYS PAD14.

Figure 34 BAYS PAD14 Phase 1 test pits



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, 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 44. Test pit locations are shown on Figure 35.

Table 44 BAYS PAD16 Phase 1 testing results

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
26	309301	6413603	Mid slope	Gently inclined	19	0
27	309291	6413504	Mid slope	Gently inclined	33	0
28	309390	6413503	Mid slope	Gently inclined	13	0
29	309404	6413399	Lower slope	Very gently inclined	15	0
30	309396	6413297	Lower slope	Gently inclined	26	0
31	309444	6413297	Lower slope	Moderately inclined	22	0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
32	309496	6413297	Lower slope	Moderately inclined	14	0
33	309400	6413250	Lower slope	Moderately inclined	9	0
34	309454	6413253	Lower slope	Moderately inclined	8	0
35	309499	6413252	Lower slope	Moderately inclined	10	0
36	309544	6413254	Lower slope	Gently inclined	10	0
37	309507	6413193	Lower slope	Gently inclined	5	0
38	309545	6413187	Flat	Gently inclined	10	0
39	309564	6413184	Flat	Gently inclined	10	0
40	309600	6413189	Flat	Gently inclined	18	0
41	309629	6413189	Flat	Gently inclined	15	0
44	309487	6413161	Flat	Gently inclined	12	0
45	309508	6413162	Flat	Gently inclined	14	0
46	309538	6413162	Flat	Gently inclined	10	1
47	309569	6413159	Flat	Gently inclined	8	0
48	309598	6413160	Flat	Gently inclined	12	1
49	309634	6413162	Flat	Gently inclined	8	0
50	309658	6413163	Flat	Gently inclined	18	0
55	309568	6413137	Flat	Level	6	0
56	309606	6413131	Flat	Gently inclined	10	1
58	309663	6413131	Flat	Gently inclined	10	0
59	309693	6413132	Flat	Gently inclined	16	1
63	309543	6413110	Flat	Level	8	0
64	309567	6413106	Flat	Level	7	0
65	309598	6413101	Flat	Level	4	0
66	309635	6413101	Flat	Level		0

Test Pit ID	Coordinates (MGA Easting & Northing, Zone 56)		Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
68	309688	6413095	Flat	Gently inclined	9	0
69	309722	6413100	Flat	Gently inclined	19	0
72	309687	6413070	Flat	Gently inclined	7	0
73	309716	6413069	Flat	Gently inclined	24	0
82	309549	6412998	Very gently inclined	Gently inclined	15	0
84	309644	6412996	Very gently inclined	Gently inclined	36	0
85	309688	6412995	Very gently inclined	Gently inclined	12	0
86	309500	6412896	Mid slope	Gently inclined	36	0
87	309604	6412903	Mid slope	Moderately inclined	24	0
88	309499	6412797	Mid slope	Moderately inclined	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 15, Plate 16, Plate 17 and Plate 18). Summary information on Phase 2 test pits is provided in Table 45.

Table 45 BAYS PAD16 Phase 2 testing results

Test Pit ID	Landform unit	Slope class	Max depth (cm)	Stone artefacts (*N*)
46B	Flat	Gently inclined	10	0
46C	Flat	Gently inclined	10	0
46D	Flat	Gently inclined	10	0
48B	Flat	Gently inclined	12	0
48C	Flat	Gently inclined	12	1
48D	Flat	Gently inclined	12	0
56B	Flat	Gently inclined	10	0
56C	Flat	Gently inclined	10	1
56D	Flat	Gently inclined	10	1
59B	Flat	Gently inclined	16	1
59C	Flat	Gently inclined	16	4
59D	Flat	Gently inclined	16	2

8.18.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD16 varied from 4 to 36 cm in depth, with an average depth of 14.6 cm. 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 were 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 expansion 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 46), 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 g, 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 47). Cortex is poorly represented (n = 4).

Table 46 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**
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 47 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**

8.18.8 Summary of Testing and Results

- Phase 1 testing at BAYS PAD16 involved the excavation of 41 0.25 m² test pits across the site.
- Four Phase 1 test pits – test pits 46, 48, 56 and 59 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 1 each).
- Three additional test pits (B, C and D) were excavated directly adjacent to test pits 46, 48, 56 and 59 expanding them to 1 m². No additional artefacts were recovered from test pit 46. An additional 1 artefact was recovered from expansions at test pit 48, an additional two artefacts from expansions at test pit 56 and an additional seven artefacts from test pit 59. Total artefact density recovered from test pit 46 was one artefact per m², two from test pit 48, three from test pit 56 and eight artefacts per m² from test pit 59. Overall mean overall artefact density for the site was 4.1 artefacts per m².
- Soil profiles across the site were generally consistent in textural terms, with brown silty clay loam topsoils overlying brown clay subsoils.
- Viewed collectively, the results of Phase 1 and 2 testing across BAYS PAD16 are interpreted as a product of low intensity Aboriginal use of flats adjacent to Pikes Creek. Short-stay camping and/or hunting/gathering without camping is inferred (Kuskie and Kamminga, 2000).

Figure 35 BAYS PAD16 Phase 1 test pits

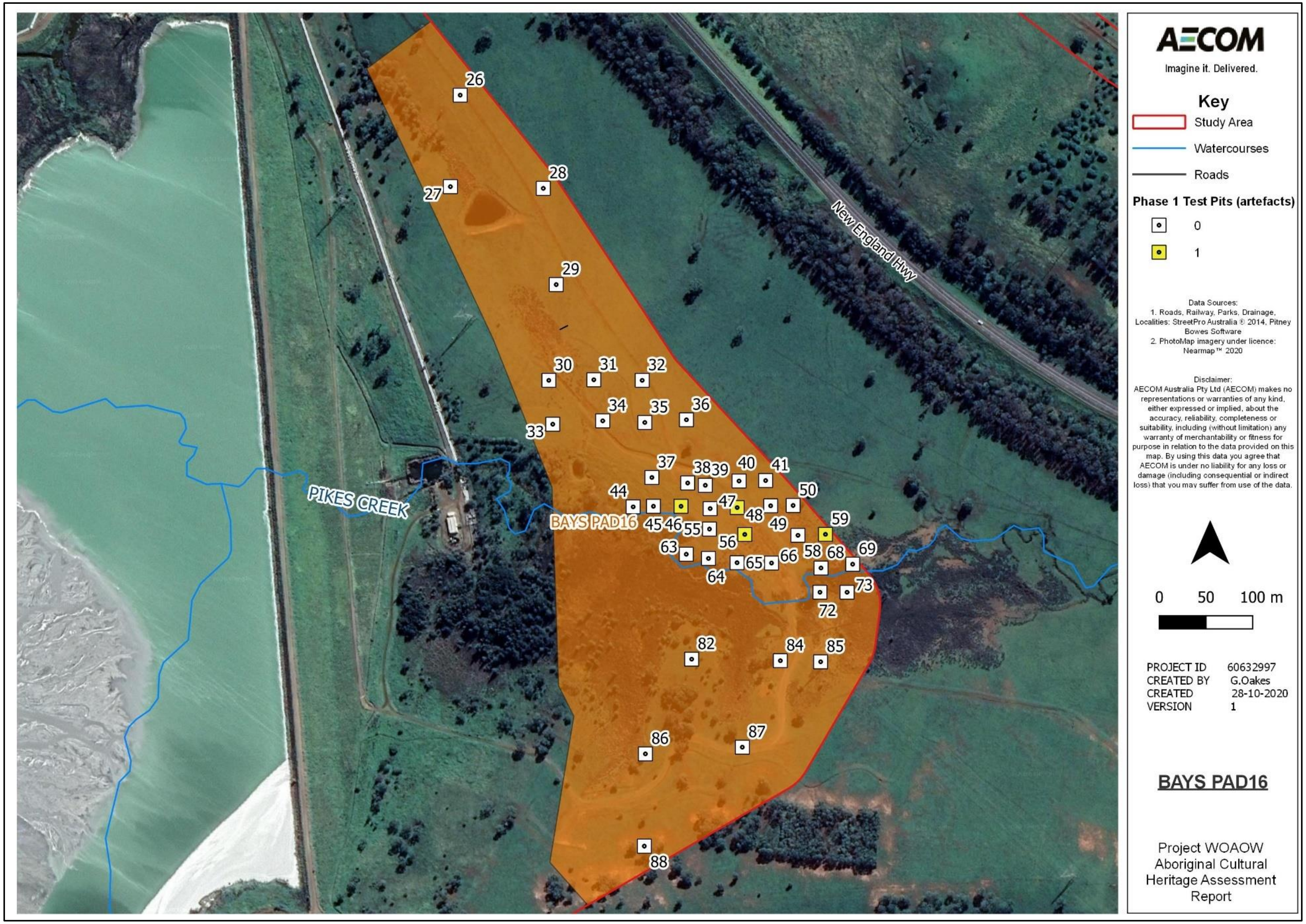


Plate 15 BAYS PAD16 Phase 2 test pit 46

Plate 16 BAYS PAD16 Phase 2 test pit 48

Plate 17 BAYS PAD16 Phase 2 test pit 56

Plate 18 BAYS PAD16 Phase 2 test pit 59

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, with test pits placed in areas not disturbed by power station infrastructure and outside of mapped areas of EEC and CEECs. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 48. Test pit locations are shown on Figure 36.

Table 48 BAYS PAD17 Phase 1 testing results

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

8.19.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.19.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD17 varied from 3 to 15 cm in depth, with an average depth of 10.6 cm. 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.

8.19.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD17 involved the excavation of five 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- Soil profiles across the site were generally consistent in textural terms, with brown silty grey clay loam topsoils overlying red brown clay subsoils.
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019) survey results, provide no evidence for Aboriginal use of BAYS PAD17.

Figure 36 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 with test pits placed at roughly 50 m intervals. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 49. Test pit locations are shown on Figure 37.

Table 49 BAYS PAD18 Phase 1 testing results

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

8.20.3 Phase 2 Testing

As no artefacts were identified during Phase 1 testing Phase 2 excavations were not required at this site.

8.20.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD18 varied from 9 to 33 cm in depth, with an average depth of 22.4 cm. 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.

8.20.6 Summary of Testing and Results

- Phase 1 testing at BAYS PAD18 involved the excavation of five 0.25 m^2 test pits across the site.
- No Phase 1 test pits contained artefacts.
- 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.
- The results of Phase 1 and 2 testing, alongside Jacobs' (2019) survey results provide no evidence for Aboriginal use of BAYS PAD18.

Figure 37 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, with test pits placed roughly at 50 m intervals in non-disturbed areas and outside EEC and CEECs. Summary information on Phase 1 test pits, including topsoil depths, are provided in Table 50. Test pit locations are shown on Figure 38.

Table 50 BAYS PAD19 Phase 1 testing results

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

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

8.21.3 Phase 2 Testing

Phase 2 excavations were not completed due to low artefact counts.

8.21.4 Soils, Stratigraphy and Disturbance

Test pit depths within BAYS PAD16 varied from 10 to 70 cm in depth with an average depth of 34.8 cm. Soil profiles across the site were generally consistent in textural terms, with grey very fine sandy loam alluvial topsoils overlying dark brown red or grey sandy clay subsoils. A number of pits were assessed as likely containing artificial fill (i.e., TPs 8, 310 and 311. Roots were rare throughout all A horizons with boundaries between A and B horizons were 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 g, 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.

8.21.8 Summary of Testing and Results

- Phase 1 testing at BAYS PAD19 involved the excavation of 11 0.25 m^2 test pits across the site.
- Two Phase 1 test pits – test pits 8 and 9 - contained Aboriginal objects which satisfied technical criteria for identification as flaked stone artefacts (n = 1 each).
- No Phase 2 test pits were excavated due to low artefact counts.
- Soil profiles across the site were generally consistent in textural terms, with grey very fine sandy loam alluvial topsoils overlying dark brown red or grey sandy clay subsoils. A number of pits were assessed as likely containing artificial fill.
- The location and small size of the recovered artefacts suggest they likely to be in secondary contexts forming part of alluvial materials associated with Bayswater Creek.

Figure 38 BAYS PAD19 Phase 1 test pits

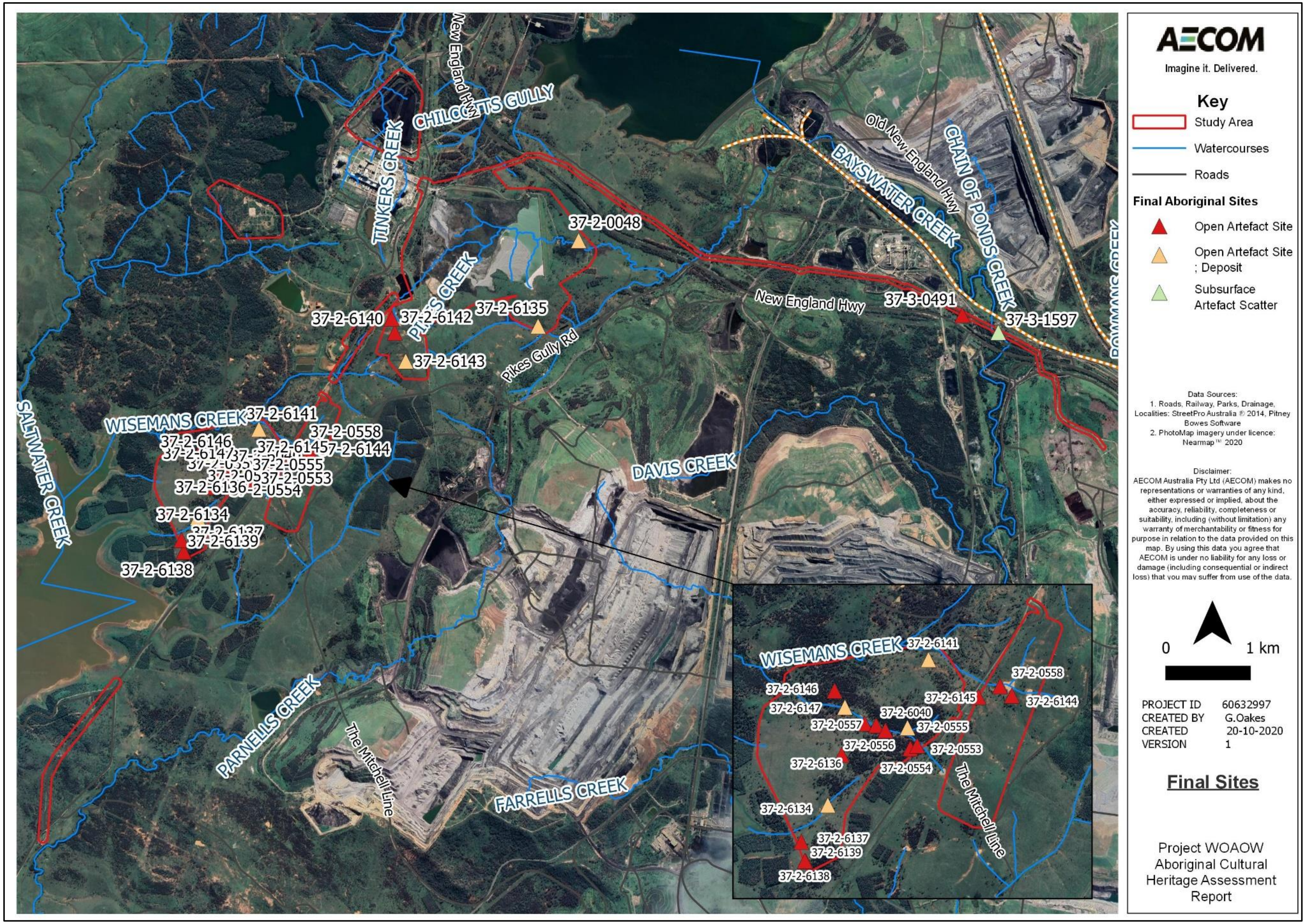
8.22 Final Sites

Taking into consideration the results of Jacobs' (2019) assessment and the current test excavation program, a total of 24 Aboriginal archaeological sites are recognised within the study area. A summary of results is provided in Table 51 and sites shown on Figure 39.

Table 51 Final sites summary

Site Name	AHIMS	Testing Results	Validity	Updated site type
BAYS PAD16	37-2-0048	Artefacts recovered	Valid	Open artefact site and subsurface scatter
P6;Plashette;	37-2-0553	Not tested	Valid	Open artefact site
P7;Plashette;	37-2-0554	Not tested	Valid	Open artefact site
P8;Plashette;	37-2-0555	Artefacts recovered	Valid	Open artefact site and subsurface scatter
P9;Plashette;	37-2-0556	Artefacts recovered	Valid	Open artefact site and subsurface scatter
P10;Plashette;	37-2-0557	Not tested	Valid	Open artefact site
P11;Plashette;	37-2-0558	No artefacts	Valid	Open artefact site
Wisemans Creek OS1	37-2-6040	Not tested	Valid	Open artefact site
BAYS AS and PAD02	37-2-6134	Artefacts recovered	Valid	Open artefact site and subsurface scatter
BAYS AS and PAD15	37-2-6135	Artefacts recovered	Valid	Open artefact site and subsurface scatter
BAYS IF04	37-2-6136	Not tested	Valid	Open artefact site
BAYS IF03	37-2-6137	Not tested	Valid	Open artefact site
BAYS IF02	37-2-6138	Not tested	Valid	Open artefact site
BAYS IF01	37-2-6139	Not tested	Valid	Open artefact site
BAYS AS09	37-2-6140	Not tested	Valid	Open artefact site
BAYS AS and PA 05	37-2-6141	Artefacts recovered	Valid	Open artefact site and subsurface scatter
BAYS AS and PAD 10	37-2-6142	No artefacts	Valid	Open artefact site
BAYS AS and PAD11	37-2-6143	Artefacts recovered	Valid	Open artefact site and subsurface scatter
BAYS AS and PAD07	37-2-6144	No artefacts	Valid	Open artefact site
BAYS AS06	37-2-6145	Not tested	Valid	Open artefact site
BAYS AS04	37-2-6146	Not tested	Valid	Open artefact site
BAYS AS and PA 03	37-2-6147	Artefacts recovered	Valid	Open artefact site and subsurface scatter
BAYS PAD18 (NARDELL N2)	37-3-0491	No artefacts	Valid	Open artefact site
BAYS PAD19	37-3-1597	Artefacts recovered	Valid	Subsurface scatter

Figure 39 Final sites



8.23 Discussion

Archaeological investigations undertaken for this assessment have resulted in the identification of 24 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 focal features for Aboriginal peoples occupying the study area, with both 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 m^2 from test pit 280 located directly adjacent to a 2^{nd} order tributary of Wisemans Creek. The highest number of artefacts recovered from a Phase 2 test pits was 17 artefacts per 1 m^2 from test pit 241 lying directly adjacent to the same 2^{nd} 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 El Niño Southern Oscillation (**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) ERS 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 a Bondi point) 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).

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 52). 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 52 Values relevant to determining cultural significance (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).

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 53 below and shown on Figure 40. 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 53 Scientific significance assessment

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

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	2	1	Low
BAYS AS and PAD03	Open artefact site and subsurface scatter	1	1	1	1	2	1	Low
P9;Plashett	Open artefact site and subsurface scatter	1	1	1	2	2	2	Low
P8; Plashett	Open artefact site and subsurface scatter	1	1	1	1	2	1	Low
BAYS AS and PAD02	Open artefact site and subsurface scatter	1	1	1	1	2	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

All 23 sites have been assessed as being of low scientific significance (Table 53). 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 (i.e., 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.

9.3 Social (Cultural) Value

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

9.3.1 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.

9.3.2 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.

9.4 Historic Value

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

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.

9.5 Aesthetic Value

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

The study area is assessed as having low aesthetic value due to past historical disturbances related to its use as a power station.

9.6 Statement of Significance

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 which are present in the study area, 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, though none were specifically noted for the study area. Moreover, it was noted by RAPs that the study area has been subjected to significant historical impacts from the construction of the Bayswater and Liddell Power Stations.

Figure 40 Significance assessment

10.0 Impact Assessment

10.1 Summary of Proposed Impacts

As described in Section 1.2, the Project includes the following upgrades to the BPS:

- 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 t 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 t 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 AGLM 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 24 Aboriginal archaeological sites, comprising 23 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 (Figure 41).

Table 54 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	Whole	Total Loss of Value
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	Whole	Total Loss of Value
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	Whole	Total Loss of Value
37-2-6137	Open Artefact Site	BAYS IF03	304816	6409613	Directly	Whole	Total Loss of Value
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	Whole	Total Loss of Value

AHIMS Site ID	Site type	Site name	Easting (GDA 56)	Northing (GDA 56)	Type of Harm	Degree of Harm	Consequence of Harm
37-2-6140	Open Artefact Site	BAYS AS09	307318	6412247	Directly Harmed	Whole	Total Loss of Value
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 PAD 10	307353	6412080	Directly Harmed	Whole	Total Loss of Value
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 PAD07	306341	6410671	Directly	Whole	Total Loss of Value
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	Whole	Total Loss of Value
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
37-3-1597	Subsurface Artefact Scatter	BAYS PAD19	314533	6412083	Directly Harmed	Whole	Total Loss of Value

10.3 Impacts to Cultural Values

The CVR completed for the project identified that the Aboriginal heritage values of the study area rest principally with the Aboriginal archaeological sites identified within it as well as general landscape features (i.e., creeks and elevated landforms). Archaeological sites attest to past Aboriginal use of the study area and indicate that it formed part of a larger cultural landscape that was utilised by Aboriginal people while landscape features such as creek and elevated vantage points were important features for Aboriginal people occupying the region.

Proposed upgrade activities within the study area are anticipated to directly impact 24 Aboriginal archaeological sites comprising 23 open artefact sites, eight with demonstrated low density deposit, and one subsurface scatter. In addition, parts of four 1^{st} to 3^{rd} order watercourses are located directly within the study area, some of which have associated Aboriginal sites, will be directly impacted. This includes 1^{st} and 2^{nd} order sections of Wisemans Creek, a 3^{rd} order section of Pikes Creek, a destroyed 2^{nd} order section of Tinkers Creek and a heavily incised 3^{rd} order section of Bayswater Creek. In addition to creeklines, the study area contains crests and ridgelines associated with several prominent hills that provide views of the surrounding the local landscape which will likewise be impacted by the project.

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, 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 0, 24 previously identified artefact sites will be subject to direct impacts from the proposed upgrades. AHIMS data obtained from Heritage NSW in October 2020 indicates that the 24 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 archaeological resources 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 55).

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 e 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 55. This analysis indicates that grossly modified or disturbed terrain (e.g., mining and quarrying, urban and industrial areas) accounts for approximately 47.9% of land within the region. Outside of disturbed areas, fully to semi-cleared grazing land is particularly well represented, accounting for approximately 44.4% of land within the region. Tree and shrub cover is moderately well represented at 2.7%. Cropping, conservation and horticulture are poorly represented at 0.4%, 0.3% and 0.1% respectively.

Table 55 Land use analysis for study region (20 x 20 km)

Existing Land Use	Km²	%	Archaeological Potential?
Conservation Area	1.2	0.3	Yes
Cropping	1.7	0.4	Yes
Grazing	176.9	44.3	Yes
Horticulture	0.2	0.0	Yes
Intensive Animal Production	1.2	0.3	No
Mining & Quarrying	182.5	45.8	No
Power Generation	4.1	1.0	No
River & Drainage System	26.0	6.5	No
Transport & Other Corridors	3.8	1.0	No
Tree and Shrub Cover	0.1	0.1	Yes
Urban	0.7	0.2	No
Wetland	0.4	0.1	Yes
Total	**398.8**	**100**	

Source: NSW Landuse Data 2017 obtained from Heritage NSW.

As indicated, land upon which open artefact deposits are unlikely to survive accounts for 54.7% of land within the region. Viewed from an Aboriginal archaeological perspective, the results of the land use analysis presented in Table 55 suggest that approximately 45.5% of the study region (*c*.180.4 km²) can reasonably be considered to have 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 the project 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*.180.4 km²). On this basis, it can be stated that the Project will result in an approximate 0.78% 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 Creek, 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.

Figure 41 Impact Assessment

11.0 Avoiding and Minimising Harm

This assessment finds that the Aboriginal heritage values of the study area rest principally with the Aboriginal archaeological sites identified within it. In addition to the archaeological sites, 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 which are present in the study area. Archaeological sites within the study area attest to past Aboriginal use and indicate that it formed part of a larger cultural landscape that was utilised by Aboriginal people.

As indicated in Section 10.0, proposed upgrade activities within the study area are anticipated to directly impact 24 Aboriginal archaeological sites comprising 23 open artefact site, eight with demonstrated low density deposit, and one subsurface scatter. Considering the nature, condition and significance of all 24 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.

The nature of the proposed upgrades and their necessary locations in relation to existing power station infrastructure make conservation and/or avoidance not practicable in this instance. Community collection is considered an effective strategy to mitigate impacts to identified Aboriginal sites.

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 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 AGLM to their EIS which was prepared to accompany a Development Application for the Project in accordance with Division 4.7 of *the* 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 24 Aboriginal archaeological sites, all comprising surface and/or subsurface open artefact sites. The impact assessment undertaken in Section 10.0 has identified that all 24 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 ACHMP for the Project, prepared in consultation with RAPs, and to the satisfaction of the Heritage NSW and the DPIE. Subject to the grant of a Development Consent under Division 4.7 of the EP&A Act and DPIE approval, 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 Community Collection

Community collection 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. Community collection is considered an appropriate and effective mitigation option for these sites given their content and level of scientific significance. Table 56 provides a list of sites to be collected.

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 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.

12.2.2 Aboriginal Cultural Heritage Awareness Training

An Aboriginal cultural heritage awareness training package should be developed for use throughout the life of the Project, as part of either the induction or ground disturbance permit process.

12.2.3 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 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 should be subject to community 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 AGLM and RAPs;
    b. **Scarred trees** identified within the study area subject to project related impacts would be managed through discussions between a qualified archaeologist, AGLM 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, AGLM 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, AGLM 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.

12.2.4 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 (NSW 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 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.

12.2.5 AHIMS Site Cards

AHIMS site cards have been completed and submitted to 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 Heritage NSW as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the Project.

12.2.6 Aboriginal Site Database

A comprehensive Aboriginal Site Database for the study area and its immediate environs should be established upon commencement of the Project. AGLM would be responsible for the creation and maintenance of this database which will, at a minimum, contain the name, type, size (where applicable), MGA coordinates and status of all Aboriginal sites within and directly adjacent to the study area. The database should be regularly updated throughout the operational life of the project.

12.3 Summary of Management Mitigation Measures

Table 56 presents a summary of management mitigation measures for identified Aboriginal sites within the study area.

Table 56 Summary of mitigation measures

Site Name	AHIMS	Scientific Significance	Updated site type	Management
BAYS PAD19	37-3-1597	Low	Subsurface scatter	ASIR
Pikes Gully;	37-2-0048	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS PAD18 (NARDELL N2)	37-2-0491	Low	Open artefact site	Community collection/ASIR
P6;Plashette;	37-2-0553	Low	Open artefact site	Community collection/ASIR
P7;Plashette;	37-2-0554	Low	Open artefact site	Community collection/ASIR
P8;Plashette;	37-2-0555	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
P10;Plashette;	37-2-0557	Low	Open artefact site	Community collection/ASIR
P11;Plashette;	37-2-0558	Low	Open artefact site	Community collection/ASIR
Wisemans Creek OS1	37-2-6040	Low	Open artefact site	Community collection/ASIR
BAYS AS and PAD02	37-2-6134	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 IF04	37-2-6136	Low	Open artefact site	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 AS09	37-2-6140	Low	Open artefact site	Community collection/ASIR
BAYS AS and PAD 05	37-2-6141	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 AS and PAD11	37-2-6143	Low	Open artefact site and subsurface scatter	Community collection/ASIR
BAYS AS and PAD07	37-2-6144	Low	Open artefact site	Community collection/ASIR
BAYS AS06	37-2-6145	Low	Open artefact site	Community collection/ASIR

Site Name	AHIMS	Scientific Significance	Updated site type	Management
BAYS AS04	37-2-6146	Low	Open artefact site	Community collection/ASIR
BAYS AS and PA 03	37-2-6147	Low	Open artefact site and subsurface scatter	Community collection/ASIR

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Appendix A

Jacobs (2019) ACHAR

Appendix A Jacobs (2019) ACHAR

Bayswater Water and Other Associated Operational Works

AGL Macquarie

Aboriginal Cultural Heritage Assessment Report

D4 | R2

November 2019

Bayswater Water and Other Associated Operational Works

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D3 R0	October 24, 2019	Draft ACHAR following AGL review	Oliver Macgregor	Rose Overberg, Kirsty Flynn	Rose Overberg, Kirsty Flynn
D4	November 27, 2019	Final ACHAR following RAP review	Oliver Macgregor	Kirsty Flynn	

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Executive Summary

AGL Macquarie Pty Limited (**AGL Macquarie**) owns and operates the Bayswater Power Station, located south-east of Muswellbrook in the Local Government Areas (**LGA**) of Muswellbrook and Singleton.

Jacobs Group Australia Pty Ltd (**Jacobs**), on behalf of AGL Macquarie is currently preparing an Environmental Impact Statement (**EIS**) for the Bayswater Water and Other Associated Operational Works (**WOAOW**) project (**Project**) in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW) (**EP&A Act**). This assessment forms part of the EIS for the Project and responds to the Secretary's Environmental Assessment Requirements (**SEARs**) issued on 30 November 2018.

The Project is located within Bayswater on the New England Highway within the Local Government Areas of Muswellbrook and Singleton.

The features of the Project are presented in Figure 1-1 and include:

- 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 vegetation clearing associated with maintaining existing infrastructure, including along pipeline/transmission corridors.

This document presents the results of an assessment of Aboriginal cultural heritage within the study area. This Aboriginal cultural heritage assessment involved:

- Consultation with Aboriginal stakeholders (following the procedures outlined in DECCW 2010a) to obtain feedback on the assessment process and input on significance and cultural values associated with the study area;
- An archaeological assessment including a desktop study and an archaeological survey of the study area in full;
- A significance assessment of Aboriginal objects and places within the study area. This includes scientific and cultural significance for Aboriginal sites and places. Cultural significance has been informed by consultation with the Registered Aboriginal Parties (**RAPs**);
- Assessment of the potential impact to Aboriginal archaeological sites; and
- Recommendation of management measures to prevent or mitigate impacts to archaeological sites.

Prior to this assessment 14 Aboriginal heritage sites have previously been recorded within the study area. This assessment identified an additional Aboriginal heritage 23 sites (including isolated artefacts, artefact scatters, potential archaeological deposits (**PAD**), and artefact scatters with associated PAD). Surface artefacts and artefact scatters ranged from low to moderate archaeological significance. The archaeological significance of the areas of PAD cannot be assessed at this stage. It is proposed to carry out test excavations to assess the nature and significance of any subsurface material present in those areas of PAD which subject to detailed design will be impacted by the Project. Test excavations will be carried out prior to determination of the Project's development application.

For the purposes of this assessment the study area has been defined to include all land within the project construction footprint (the Project area), plus a buffer area, which ranges from around 25 to 50 metres (**m**), included in the assessment to account for any potential indirect (inadvertent) impacts (see Figure 1-1 and Figure 6-3 to Figure 6-8). Following the precautionary principle, it is conservatively assumed for the purpose of this assessment that all sites, including areas of PAD, discussed in this document would be impacted by the proposed works of the Project. Impacts would range from potential indirect impact only, to direct impacts ranging from partial to total destruction. Opportunities to limit the area required for construction activities will be considered where practicable as part of detailed design to minimise impacts.

As the Project is State Significant Development (**SSD**), if development consent is granted for the Project, Section 4.41(d) of the EP&A Act operates so that an Aboriginal Heritage Impact Permit (**AHIP**) is not required for the Project. However, the following mitigation actions are recommended for the Project, to minimise impacts to cultural heritage:

1. Investigate opportunities to avoid identified Aboriginal sites and areas of PAD were practicable as part of the detailed design of the Project.
2. Where direct impacts are proposed to occur to areas of PAD (including those areas of PAD associated with surface artefact scatters), a program of detailed survey and test excavation will be carried out to assess the nature and significance of any subsurface archaeological material. A list of sites that this recommendation applies to is provided in Table 9-1.
3. The results of test excavations on each PAD will inform decisions around subsequent management of the areas of PAD. Depending on the results of the test excavations, management options to be carried out prior to impact to sites may potentially include salvage excavation of areas currently designated as PADs. An alternative mitigation action at that point of the process might be to change the Project design to avoid impact to areas of PAD, where this is practicable.
4. Collection of surface artefacts from all sites or portions of sites that would be impacted.
5. Collection of surface artefacts and archaeological excavations (both test and salvage) would be undertaken by qualified archaeologist(s) and Site Officers supplied by the RAPs.

This report will be provided to the Department of Planning, Industry and Environment (**DPIE**) for review and assessment as a part of development application SSD-9697 for the Project.

Glossary

ACHAR	Aboriginal Cultural Heritage Assessment Report
AGL Macquarie	AGL Macquarie Pty Ltd
AHIMS	Aboriginal heritage information management system
AHIP	Aboriginal Heritage Impact Permit
AHD	Australian Height Datum
DECCW	Department of Environment, Climate Change and Water NSW
DPIE	Department of Planning, Industry and Environment
Jacobs	Jacobs Group (Australia) Pty Ltd
km	Kilometres
LGA	Local Government Area
m	Metres
NSW	New South Wales
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
WOAOW	Water and Other Associated Operational Works

1. Introduction

1.1 Project background

AGL Macquarie owns and operate the Bayswater Power Station (**Bayswater**). As Bayswater was commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Baywater until its expected retirement in 2035.

Jacobs, on behalf of AGL Macquarie is preparing an EIS for the assessment of infrastructure and water upgrade works forming part of the the Project, in accordance with Division 4.7 of the EP&A Act.

Bayswater is located approximately 20 kilometres (**km**) south of Muswellbrook, to the west of the New England Highway.

AGL Macquarie acquired the Bayswater and Liddell Power Stations, from Macquarie Generation in September 2014. AGL Macquarie is one of Australia's major electricity generators. Over recent years Bayswater has produced approximately 15,000 GWh of electricity per annum, enough power for two million average Australian homes. In conjunction with the adjoining Liddell Power Station, Bayswater produces approximately 12% of the electricity demand in eastern Australia and 30% of New South Wales' total electricity demand.

The Project will ensure the continued safe, efficient and reliable operation of Bayswater until its planned retirement. The Project also provides the opportunity for improvements to implement advances in water and wastewater management.

The study area is characterised by low hills with elevations ranging from 130 to 220m Australian Height Datum (**AHD**). In proximity to the study area are two dammed water bodies, Lake Liddell to the north east and Plashett Reservoir to the south west, both with an elevation of approximately 130m AHD. Bayswater Power Station lies on top of a small hill (approximately 210m AHD) sloping towards the water body with a 3% slope to the north towards Lake Liddell and a 2% slope south towards Plashett Reservoir. To the west, a steep hill drains towards Saltwater Creek which flows west out of the study area and then south into the reservoir. A low ridge runs along the eastern boundary of the study area.

Within the vicinity of the study area, there are a number of hydrological features, including:

- Tinkers Creek, running along the western boundary of the study area and draining to Lake Liddell
- Lake Liddell, a dammed water body located to the north east of the Bayswater Power Station
- Plashett Reservoir, a dammed water body located about 300m to the west of the proposed borrow pits (Borrow Pit 4)
- Saltwater Creek located to the west of Bayswater Power Station, which drains to Plashett Reservoir
- Wisemans Creek, which runs from east to west across Bayswater, before discharging to Plashett Reservoir
- Pikes Creek, located to the north of the proposal area, intersecting with the existing Ash Dam and running parallel to the proposed Ravensworth Ash Line
- Bayswater Creek, draining from Lake Liddell before ultimately discharging to Hunter River.

1.2 Project description

The key features of the Project are presented in Figure 1-1 and include:

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity (**Ash Dam Augmentation**);

- Improvements to water management structures and systems to ensure continued collection and reuse of process water and return waters from the Bayswater ash dam (**Ash Dam water management works**);
- Improvements to the management of water and waste materials within the coal handling plant sediment basin and associated drainage system (**Coal Handling Plant upgrades**);
- 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 (**Ash harvesting**);
- 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 (**Ash harvesting**);
- Construction and operation of a new coal ash pipeline to Ravensworth Void No. 3 for ash emplacement (**Ravensworth ash line**);
- Construction and operation of a salt cake landfill facility to dispose of salt cake waste (**Salt cake landfill**);
- Construction and operation of up to four borrow pits to facilitate the improvements proposed for the Project and other works on AGL Macquarie land (**Borrow pits 1 to 4**); and
- Ancillary infrastructure works including vegetation clearing associated with maintaining existing infrastructure, including along two pipeline/transmission corridors (**HP pipe clearing (south)** and **HP pipe (north) and LSP pipe clearing**).

The impacts associated with these Project components would vary in nature and severity. Excavation of the borrow pits would constitute a severe impact to any sites and areas of PAD located within the footprint of these components. Construction of the salt cake landfill would involve earthworks and would constitue a severe impact within the Project area. Clearing of vegetation along the HP pipeline and the LSP pipeline would involve ground disturbance through the grubbing out of tree roots, and would constitute a moderate to severe impact within this project component's footprint, depending on the density of vegetation existing in different parts of these two areas. In other project components, impacts are likely to range in severity and be localised, depending upon the final detailed Project design. For the purposes of this assessment, the precautionary principle has been employed and it has been assumed that direct impacts would occur to all sites located within each project component's footprint (the Project area).

A discussion of anticipated impacts associated with each Project component is provided in Section 8.

1.3 Site location and study area

The Project is located within Bayswater on the New England Highway within the Local Government Areas of Muswellbrook and Singleton.

The Project is predominately located on land owned by AGL Macquarie although some Project infrastructure also crosses road reserves owned by RMS and Singleton and small areas of Crown land. The Project is located within the following land:

- Lot 610 DP 1019325
- Lot 112 DP 1059007
- Lot 2 DP 1095515
- Lot 1 DP 113655
- Lot 1 DP 1142103
- Lot 2012 DP 1151790
- Lot 1 DP 1158700

- Lot 120 DP 1174907
- Lot 1 DP 1175303
- Lot 3 DP 1193253
- Lot 10 DP 1204457
- Lots 4, 6, 9 & 11 DP 247943
- Lot 13 DP 247945
- Lot 1 DP 252530
- Lot 1 DP 369326
- Lots 1 & 2 DP 574168
- Lot 1 DP 616025
- Lot 2 DP 619383
- Lot 10 DP 700554
- Lots 19, 30, 62, 75, 86, 88, 89 & 151 DP 752468
- Lot 331 DP 752486
- Lots 1 & 2 DP 774679
- Lot 5 DP 966589
- Lot 107 DP547864
- Lot 4 DP 1193254.

For the purposes of this assessment, the following definitions are used:

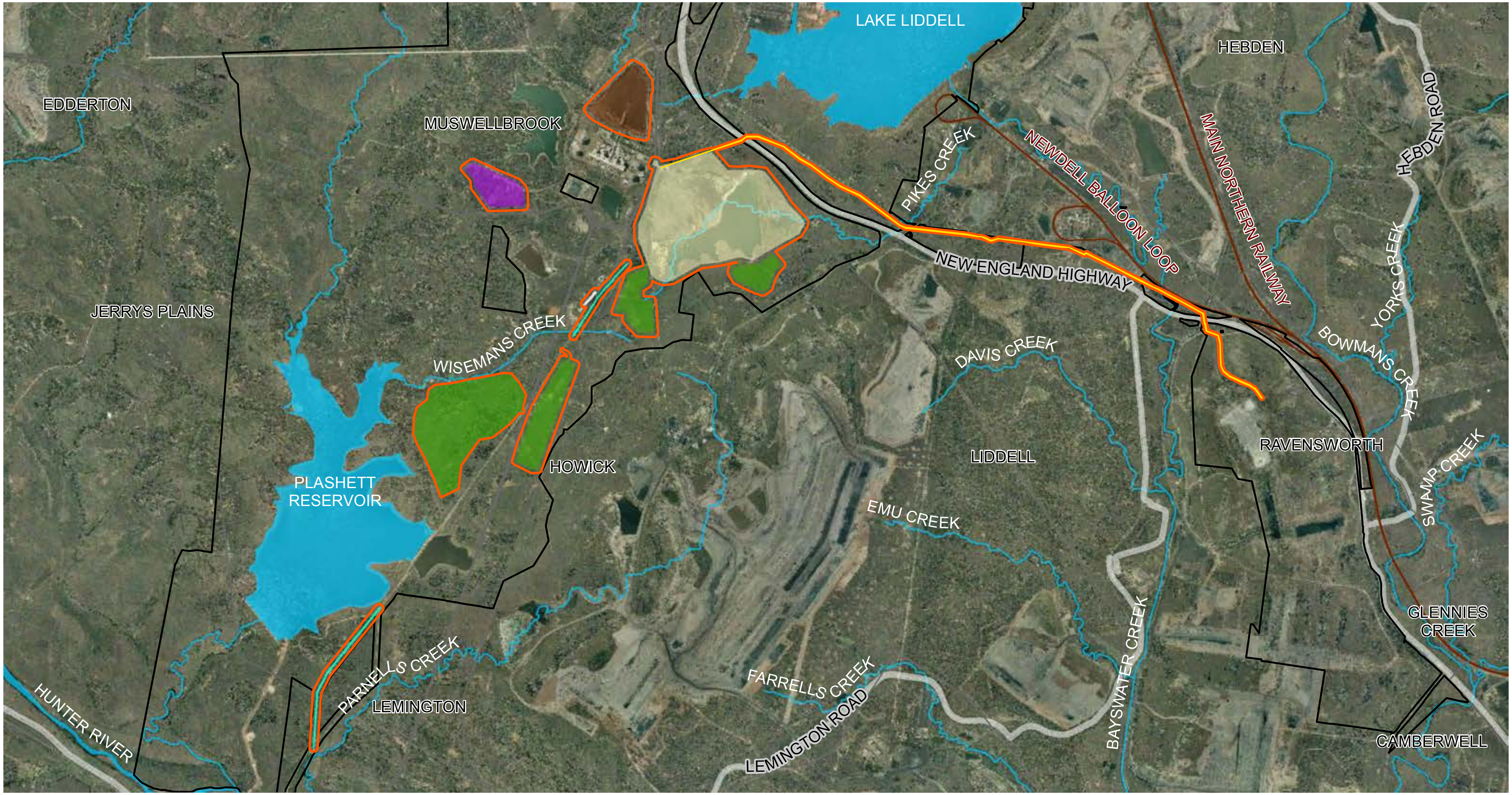
- **Project area**: which is defined as the maximum disturbance footprint that may be impacted by the Project. Works within the project area would be dependent on the activities proposed for each Project element. Further details are provided in Section 6.
- **Study area**: includes all land within the Project area, plus a buffer area, which ranges from around 25 m to 50 m, to account for possible indirect impacts. No ground disturbance would occur outside of the Project area. Note that the southwest borrow pit (borrow pit 4) has no buffer zone, so for this project component the Project area and the study area are the same.

The study area boundary is shown in Figure 1-1, and the Project area boundary is presented in Figure 6-3 to Figure 6-8.

Detailed information on Aboriginal sites, objects and areas of potential archaeological deposit (**PAD**) that are located within the study area and so, subject to detailed design, will be directly or indirectly impacted by the Project, are provided in Section 6. A description of activities proposed within the Project area has been included in Section 8.

A description of the environmental context of the study area is provided in Section 4.1.

A discussion of past Aboriginal land-use of the region the study area sits within is provided in Section 4.2.



Study area
AGL owned land

Project elements:
- Ash Dam Augmentation, Ash Harvesting and Water Management Works
- Salt Cake Landfill
- Coal Handling Plant Water and Wastewater Infrastructure Upgrades
- HP Pipe Clearing
- LSP Sludge Line Clearing
- Borrow Pits
- Ravensworth Ash Line

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Data sources

Jacobs 2019, AGL 2019
NSW Spatial Services 2019

GDA94 MGA56

Figure 1-1 Overview of study area

1.4 Scope and objectives

This document presents the results of an assessment of Aboriginal cultural heritage within the study area.

The Aboriginal cultural heritage assessment reported here involved:

- Consultation with Aboriginal stakeholders (following the procedures outlined in DECCW 2010a) to obtain feedback on the assessment process and input on significance and cultural values associated with the study area;
- An archaeological assessment including a desktop study and an archaeological survey of the study area in full;
- A significance assessment of Aboriginal objects and places within the study area. This includes scientific and cultural significance for Aboriginal sites and places. Cultural significance has been informed by consultation with RAPs;
- Assessment of the potential impact to Aboriginal archaeological sites; and
- Recommendation of management measures to prevent or mitigate impacts to archaeological sites.

This method of assessing Aboriginal cultural heritage was designed to meet the requirements of the following guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a); and
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).

The objectives of this document are:

- To document the archaeological investigation undertaken to locate, identify and study Aboriginal objects, archaeological deposits and historical, oral and environmental sources to provide an assessment of the archaeological and cultural heritage significance of the study area;
- To prepare an Aboriginal and Cultural Heritage Assessment Report (**ACHAR**) that complies with legislative requirements, codes of practice and assessment procedures relevant to the proposal (refer to Section 2); and
- To respond to the SEARs issued on November 30, 2018 and inform the content of the EIS.

1.5 Compliance with the heritage elements of the Secretary's Environmental Assessment Requirements (SEARs)

The SEARs for the Project were issued on November 30, 2018. This ACHAR has been prepared in accordance with the SEARs. The Table below summarises the SEARs and outlines the relevant sections of this report where they have been addressed.

Table 1-1 Compliance with the heritage components of the SEARs

SEARs	Addressed in this report
Heritage – including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community	Throughout

SEARs	Addressed in this report
Environmental planning instruments, policies, guidelines and plans • Aboriginal cultural heritage consultation requirements for proponents • Code of practice for archaeological investigations in NSW • Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW	Section 2

1.6 Report outline

The report is structured as follows:

- **Chapter 2** outlines the legislative and policy framework relevant to the investigation and assessment of Aboriginal heritage in New South Wales;
- **Chapter 3** presents an overview of consultation undertaken with the Aboriginal community in relation to the proposal, with supporting information provided in **Appendix A**. Consultation was carried out in accordance with the *Aboriginal Cultural Heritage Requirements for Proponents 2010* (DECCW 2010a);
- **Chapter 4** presents background information relevant to the proposal, including environmental information (geology, soils, climate and vegetation) as well as a discussion of ethnographic data;
- **Chapter 5** presents a summary of the identified Aboriginal cultural values associated with the study area. This information has been sourced directly from the RAPs;
- **Chapter 6** describes the method and results of the Aboriginal archaeological assessment of the study area. This includes the archaeological research, fieldwork and analysis that have been conducted in support of this report;
- **Chapter 7** assesses the heritage significance of the identified Aboriginal sites assessed as part of this report using the NSW heritage significance criteria;
- **Chapter 8** assesses the Project’s direct and indirect impact on identified Aboriginal sites and PADs and their significance; and
- **Chapter 9** presents recommended management measures to mitigate the impact of the Project on Aboriginal sites and associated cultural values within the study area.

1.7 Authorship

The report was authored by:

- Oliver Macgregor (Senior Archaeologist, Jacobs). Oliver holds a PhD in Archaeology and Palaeoanthropology from the Australian National University and has over ten years’ experience as an archaeologist.
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The report was reviewed by:

- Rose Overberg (Principal Archaeologist and Heritage Consultant, Technical Lead, Jacobs).
- Kirsty Flynn (Project Manager, Jacobs).

Mapping was prepared by Kasia Dworniczac (Senior Spatial Consultant, Jacobs).

2. Legislative requirements

The project is State Significant Development (SSD) under the EP&A Act. The legislation and regulations that protect Aboriginal heritage in NSW are outlined below.

2.1 Commonwealth legislation

2.1.1 *Environment Protection and Biodiversity Conservation Act* 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) provides for the protection of the environment, especially in matters of national environmental significance (**MNES**). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the MNES without approval from the Commonwealth Minister for the Environment. The definition of the environment under the EPBC Act includes both natural and cultural elements. Under the EPBC Act, heritage items can be listed on the National Heritage List (for items of National heritage significance) or the Commonwealth Heritage List (for items of heritage significance on land owned or managed by the Commonwealth).

2.2 State legislation

2.2.1 *Environmental Planning and Assessment Act* 1979

The EP&A Act regulates environmental planning and assessment for NSW. Land use planning requires that environmental impacts are considered as part of the assessment of development, including impacts on Aboriginal cultural heritage.

Division 4.7 of Part 4 of the EP&A Act applies to development declared to be SSD. The Project is declared to be SSD under the *State Environmental Planning Policy (State and Regional Development) 2011* (**SEPP SRD**). The consent authority for SSD development applications is the Minister for Planning and Public Spaces (Minister). The Minister has delegated the determination of SSD development applictions to senior officers of the DPIE and the Independent Planning Commission (**IPC**).

An AHIP under section 90 of the *National Parks and Wildlife Act 1974* is not required for development for which a SSD development consent has been granted (Section 4.41(d) of the EP&A Act). However an EIS is required for SSD projects and the SEARs issued for the Project include provisions requiring the assessment of Aboriginal heritage, as well as consultation with Aboriginal stakeholders.

2.2.2 National Parks and Wildlife Act 1974 and National Parks and Wildlife Amendment Act 2010

The *National Parks and Wildlife Act 1974* (NSW) (**NPW Act**) protects Aboriginal heritage within NSW. Protection of Aboriginal heritage is outlined in Section 86 of the NPW Act, as follows:

- “a person must not harm or desecrate an object that the person knows is an Aboriginal object” (Section 86(1))
- ”a person must not harm an Aboriginal object” (Section 86(2)), and
- “a person must not harm or desecrate an Aboriginal place” (Section 86(4)).

Section 87(1) of the NPW Act provides that it is a defence to these provisions if the harm or desecration is authorised by an AHIP.

Harm is defined under the NPW Act as ‘any act that destroys, defaces or damages the object including moving the object from the land on which it has been situated or causes or permits the object to be harmed’.

As outlined in Section 2.2.1, an AHIP is not required for development for which a SSD development consent has been granted and the provisions of the NPW Act that prohibit an activity without such an authority do not apply (Section 4.41(d) of the EP&A Act).

2.2.3 Local Environment Plans

Local Environment Plans (**LEPs**) are a type of environmental planning instrument, which are legal documents that control development and set out how land is to be used. LEPs apply either to all or part of a local government area. LEPs guide planning decisions for local government areas. They do this by allocating 'zones' to different parcels of land, such as rural, residential, industrial, public recreational, environmental conservation, and business zones. Each zone has a number of objectives, which indicate the principal purpose of the land, such as agriculture, residential or industry. Each zone also lists which developments are permitted with consent, permitted without consent, or prohibited. All land, whether privately owned, leased or publicly owned, is subject to the controls set out in the LEP. LEPs determine the form and location of new development, and provide for the protection of open space and environmentally sensitive areas.

The study area is located within the Muswellbrook and Singleton local government areas (**LGA**). In accordance with the local planning instruments, being the *Muswellbrook Local Environment Plan* (NSW 2009) and *Singleton Local Environment Plan* (NSW 2013), Aboriginal heritage is protected as follows:

In respect to places of Aboriginal heritage significance the consent authority must, before granting consent under this clause to the carrying out of development in a place of Aboriginal 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; and

b) notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.

3. Aboriginal stakeholder consultation

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (*DECCW 2010a) establishes the requirements for consultation with Aboriginal stakeholders as part of the heritage assessment process to determine potential impacts of proposed activities on Aboriginal objects and places. These requirements include four stages with associated timeframes which **must** be adhered to:

Stage 1 — Notification of project proposal and registration of interest (14 days from date letter sent to register as registered Aboriginal stakeholders).

Stage 2 — Presentation of information about the proposed project.

Stage 3 — Gathering information about cultural significance (28 days for registered Aboriginal stakeholders to provide a review and feedback to consultants regarding the methodology).

Stage 4 — Review of draft cultural heritage assessment report (registered Aboriginal stakeholders have 28 days from sending of the report to make a submission).

Aboriginal stakeholder engagement and involvement is important for the identification of Aboriginal cultural values relevant to the project. This section summarises the consultation process relating to the organisation and conduct of the ACHAR. Details of consultation including meeting minutes, examples of letters sent to RAPs and knowledge holders, conversations undertaken during archaeological survey, native title search results, records of cultural heritage values interviews and a detailed consultation log are included in Appendix A.

This section summarises the consultation process throughout the archaeological assessment to date (Table 3-1) and outlines the stages of consultation.

Table 3-1 Summary of consultation process

Task Name	Start	Finish
Stage 1- Agency Letters	May 10, 2019	May 10, 2019
Stage 1- Newspaper advertisements	May 15, 2019	May 29, 2019
Stage 1- Project Notification and invitation to register supplied to potential Aboriginal stakeholders	June 20, 2019	July 5, 2019
Stage 1- Supply of the list of RAPs to DPIE and Wanaruah LALC	July 11, 2019	July 11, 2019
Stage 2- RAP review of project information and methodology	Aug 7, 2019	Sep 4, 2019
Stage 2- Engage Aboriginal stakeholders to undertake a site survey	Aug 7, 2019	Sep 4, 2019
Stage 3- Seek the names of Aboriginal people with cultural knowledge by letter or notify native title holders	May 10, 2019	July 5, 2019
Stage 3- Notify Aboriginal people with cultural knowledge by letter, and invite input on cultural significance	June 20, 2019	Nov 25, 2019
Stage 4- Carry out archaeological survey and prepare a draft ACHAR	Sep 9, 2019	Oct 2, 2019
Stage 4- Present the draft ACHAR to RAPs for review and comment	Oct 23, 2019	Nov 25, 2019

3.1 Stage 1 - Notification of project proposal and registration of interest

Stage 1 of the consultation process is to identify, notify and register any Aboriginal people or groups who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and / or places in the Study area.

Notification was initiated on 10 May 2019 to all relevant organisations listed under section 4.1.2 in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a). These organisations are listed below in Table 3-2.

Table 3-2 List of contacted organisations (stage 1 consultation)

Name of Organisation	Date of Notification Sent	Date of Response Received
Wanaruah Local Aboriginal Land Council	May 10, 2019	May 13, 2019
NTSCorp	May 10, 2019	None
Office of Environment and Heritage – Hunter office	May 10, 2019	May 30, 2019
Office of the Registrar, Aboriginal Land Rights Act 1983	May 10, 2019	May 27, 2019
Muswellbrook Council	May 10, 2019	May 17, 2019
Singleton Council	May 10, 2019	May 13, 2019
Singleton Local Land Services	May 10, 2019	May 13, 2019

In accordance with Section 4.1.3 (DECCW 2010a) a notice in the local newspaper circulating in the general location of the proposed project must be completed, with information explaining the project and its exact location. Notices were placed in the Koori Mail and Singleton Argus. These advertisements provided additional opportunity for Aboriginal people who are interested in the Project to register. A copy of the advertisement is included in Appendix A.

Project notifications were sent to all groups and individuals identified as a result of the above consultation process. A total of 26 groups and individuals registered their interest. These are listed in Table 3-3.

Table 3-3 RAPs identified through Stage 1 consultation

Organisation	Contact Person
A1 Indigenous Services	Carolyn Hickey
Aboriginal Native Title Elders Consultants	John and Margaret Matthews
AGA Services	Ashley, Gregory and Adam Sampson
Aliera French Tracing	Aliera French
Cacatua Culture Consultants	Donna and George Sampson
[redacted]	[redacted]
Crimson-Rosie	Jeffery Matthews
Didge Ngunawal Clan	Paul Boyd and Lilly Carroll
Gidawaa Walang Cultural Heritage Consultancy	Craig Horne
Hunter Traditional Owner	Paulette Ryan
Hunter Valley Cultural Surveying	Luke Hickey
Jarban and Mugrebea	Les Atkinson

Organisation	Contact Person
Kawul Pty Ltd trading as Wonn1Sites	Arthur Fletcher
Lower Hunter Wonnarua Cultural Services	Thomas Miller
Lower Wonnaruah Tribal Consultancy	Barry Anderson
Merrigarn	Shaun Carroll
Muragadi	Jesse Johnson
Murra Bidgee Mullangari	Ryan Johnson
Nunawanna Aboriginal Corporation	Colin Ahoy
Tocomwall (acts on behalf of the Plains Clan of the Wonnarua People (PCWP))	Scott Franks
Ungooroo Aboriginal Corporation	Alan Paget
Wanaruah Local Aboriginal Land Council	Noel Downs
Wattaka Wonnarua CC Service	Des Hickey
Widescope Indigenous Group	Steven Hickey
Wonnarua Nation Aboriginal Corporation	Laurie Perry
Yinarr Cultural Services	Kathleen Stewart Kinchela

Following Section 4.1.6 of Stage 1 of the Consultation Requirements (DECCW 2010a), a list of RAPs for the project and copies of the notifications from Section 4.1.3 were submitted to OEH (now part of the DPIE) and Wonnarua Local Aboriginal Land Council on July 11, 2019.

A copy of the notification is provided in Appendix A.

3.2 Stage 2 – Presentation of information about the proposed project

Stage 2 of the consultation process provides RAPs with information about the scope of the proposed project and the proposed cultural heritage assessment process.

The RAPs were provided with a letter outlining the Project and a copy of the document *AGL Bayswater Project Information and Methodology* (please refer to Appendix B). Comments on this document were invited from RAPs and they were invited to contact Jacobs at any time throughout the assessment process to discuss the Project.

Site Officers were selected for the archaeological survey and were issued a checklist to ensure safety and preparedness for work.

3.3 Stage 3 – Gathering information about cultural significance

Stage 3 of the consultation process is to facilitate a process whereby RAPs can contribute to culturally appropriate information gathering and the research methodology, provide information that will enable the cultural significance of Aboriginal objects and/or places on the study area to be determined, and have input into the development of any cultural heritage management options.

RAPs were invited to submit information relevant to the cultural significance of the study area and any areas and objects within it, at all stages of the consultation process.

3.4 Stage 4 – Review of draft ACHAR

Stage 4 of the consultation process involves the RAPs review and feedback on the draft ACHAR. The ACHAR was drafted to document the assessment process.

The draft ACHAR was sent to all RAPs on Oct 24, 2019 (email) and Oct 25, 2019 (post), so that they could review the document and supply comments and feedback.The ACHAR has been updated to incorporate the input from all RAPs at the close of the review period, which ended on Nov 25, 2019. Copies of written submissions received from RAPs are included in Appendix A (following section 4.4 of DECCW 2010a).

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 (see Appendix A).

3.5 Sensitive cultural information and management protocol

It is possible that during the consultation process, RAPs will provide sensitive cultural information to which access needs to be restricted.

In the event that such information is supplied, the RAP supplying the information should state to Jacobs how they wish that information to be treated, and how access to the information should be restricted.

Jacobs will follow the stated wishes provided by the RAP group in question when managing and using the information provided to Jacobs. All stated restrictions of access, communication and publication of the information will be followed. These might include:

- Restrictions on reproducing the information (in whole or in part) in reports;
- Restrictions on reproducing the information in reports provided to different audiences (for example, the version provided to the client, the version provided to DPIE and the AHIMS database);
- Restrictions on communication of the information in other ways;
- Restrictions on the location/storage of the information;
- Other required processes relating to handling the information;
- Any names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the information, and their degree of authorisation;
- Any details of any consent given in accordance with customary law; and
- Any restrictions on access to and use of the information by RAPs.

The above list should be considered when providing a statement of requirements regarding any culturally sensitive information.

3.6 Consultation log

A log summarising the consultation carried out with RAPs in relation to the project to date is provided in Appendix A.

4. Background information

4.1 Environmental context

4.1.1 Topography

The study area lies within the catchment area of the Upper Hunter Valley (Upper Hunter). The Upper Hunter is the largest coastal catchment in NSW, with an area of about 21,500 square kilometres (Biswas 2010). Elevations across the catchment vary from over 1,500 m above sea level (**ASL**) in the high mountain ranges north of the catchment, to less than 50 m asl on the floodplains of the lower valley. The largest tributary of the Hunter River is the Goulburn River which joins the Hunter River approximately 25 km to the west of the study area. The Hunter River flows to the west and then around the south of the study area. The Hunter River is located approximately 8 km from the study area.

4.1.2 Geology and soils

The study area is underlain by the Late Permian age Whittingham Coal Measures and Wollombi Coal Measures. These are primarily sub-horizontally bedded sedimentary strata comprising interbedded coal seams, claystones, tuffs, siltstones, sandstones and conglomerates (Geoscience Australia 2019).

Soil landscape mapping suggests that shallow soils comprising residual and colluvial shallow loams and sands would be anticipated on ridgelines, with brown solodic soils on the lower slopes. Sandy earths and possible siliceous sands may be observed within drainage lines on the lower slopes (Anonymous 2019).

4.1.3 Vegetation and hydrology

The study area is located within the Hunter sub-region of the Sydney Basin Bioregion as defined by Thackway and Cresswell (1995). The majority of the study area is located with the Central Hunter Foothills Mitchell Landscape as mapped by the NSW National Parks and Wildlife Service (2002).

Vegetation in the Upper Hunter is characterised by forest and open woodland of White Box, Forest Red Gum, Narrow-leaved Ironbark, Grey Box, Grey Gum, Spotted Gum, Rough-barked Apple and extensive of stands of Swamp Oak in upper reaches and foothills. River Oak and River Red Gum are characteristic of vegetation along the streams.

The Upper Hunter Valley contains a range of ecological zones within a relatively small area. Major rivers and smaller watercourses would have provided relatively easy access to fresh water across most of the region. Ecological communities would have varied considerably from low lying watered areas around rivers and streams, to open and forested areas on valley floors, hills and mountainous regions bordering the valley to the north, south and west. The area would likely have supported a large population of Aboriginal people.

4.1.4 Climate

The climate of the study area is characterised as warm temperate. Summers are warm to hot and humid, while winters are cool to mild. Rainfall is summer-autumn dominated, with rainfall minimums during late winter and early spring (Muswellbrook Shire Council n.d.). Annual rainfall is lower than on the coast. The average monthly maximum temperatures are highest in January (32 degrees Celsius at Denman) and lowest in July (four degrees Celsius at Denman). Humidity is highest during summer and autumn and lowest in September. During the summer the prevailing winds are from the east and south-east, while winter winds are generally from the west.

4.2 Ethnohistoric background

Ethnographic information which relates to the Aboriginal occupation of the study area is derived from publications and other forms of documentation which were compiled by early non-Aboriginal explorers, settlers, missionaries and government officials who went to the region during the mid to late 19th century. Unfortunately, within the ethnographic record, early researchers sometimes referred to tribes as having as few as 10 members, to as many as 500, which makes the determination of social organisation within certain groups difficult.

It must be noted that the information provided here does not necessarily reflect the opinions of the Aboriginal knowledge holders for the project regarding their tribal affiliations and boundaries. The following information was compiled from a number of written sources based on language research and ethno-historic observations.

4.2.1 Tribal groups and boundaries

According to Tindale (1974) in relation to Australian Aboriginal people, the term ‘tribe’ describes a group of people that share a common language. Tindale (1974) describes Aboriginal tribal boundaries as the limits beyond which it is dangerous to move without adequate recognition, while Stanner (1965) argues that a tribe’s territory is the sum of its constituent clan estates. According to the tribal boundaries as defined by Tindale, the study area traverses the traditional lands of the Wonnarua people to those of the Gamilaroi (Tindale 1974). Tindale defines the territory of the Wonnarua as the Hunter River valley from a few miles above Maitland west to the Dividing Range. The southern boundary with the Darkinjung is on the divide north of Wollombi.

David R. Moore, Curator of Anthropology of the Australian Museum in 1969, described the Aboriginal groups who lived in the Hunter Valley. He wrote that at the time of the first European arrival the Hunter Valley was divided between many Aboriginal communities, such as:

- The Geawegal in the Upper Hunter from the Mount Royal Range to Muswellbrook;
- The Wonarua from the Middle Hunter down to Maitland;
- The Gaddhng from the Hunter estuary and Port Stephens;
- The Gamilaroi to the north and the Wirandhuri to the south of the upper Goulburn;
- The Awabagal around Lake Macquarie (south of the Hunter Valley);
- The Darginung on the northern side of the Hawkesbury (Moore 1969).

Moore’s description is consistent with Tindale’s mapping of Aboriginal groups, the only point of difference being that Tindale depicts the Worimi group covering an area along the coast from the Hunter estuary to Wallis Lake (Horton 1996; Tindale 1940; Tindale 1974). The groups identified by Tindale, and by earlier European researchers, are generally language groups. Finer-grained groupings almost certainly existed within these language groups. It should be noted also that various alternative spellings exist for the groups listed above.

The grammar and vocabulary published by Hale (1845) ostensibly of the Gamilaroi tribe relates to the Geawegal of the lower Hunter River. Mathews (1904) broadly suggested the Gamilaroi language extended to Jerry's Plains, but this included about one half of the Geawegal territory and also some Wonarua country. Historical records from the 19th century are severely limited by disruptions prior to the first ethno historical observations (see section 4.2.5) and the lack of anthropological expertise from the observers. More recent attempts to delineate the grammar of languages in the Hunter and Lake Macquarie region have indicated that indeed there was a degree of bilingualism and shared lexicon amongst the tribes in the district (Lissarrangue 2006).

Contradictory interpretations of tribal boundaries to those of Tindale and Moore are provided by O'Rourke (2009) and Ford (2010). O’Rourke states that Gamilaraay (alternative spellings Gamilaroi, Kamilaroi) language-speaking groups lived in the Upper Hunter Valley, above Singleton, rather than their territory starting in the upper Goulburn

River valley to the west. This interpretation is based on observations of the earliest explorer, Howe in 1819, an early tourist, Breton in the 1830's, and G.W. Rusden, a resident of Maitland from 1834-41. O'Rourke concludes that Geawegal language-speaking groups occupied the middle and lower Hunter Valley, contrary to Tindale (1940), Moore (1969) and Horton (1996)'s view that this language was spoken in the Upper Hunter.

Ford (2010) states that the Darkinung's territory extended into the Hunter Valley, and that the Gamilaroi 'had penetrated over the Liverpool Range down the upper Hunter River valley and bordered the Darkinung on the mid Hunter River floodplain at the time of settlement' (Ford 2010: 10). This interpretation extends the territory of the Darkinung into the Hunter River valley, rather than being restricted to the ranges to the south of the valley, as indicated by Tindale. The boundaries between the Darkinung, Wonarua, and Gamilaroi drawn on Tindale's map are designated as 'approximate', signaling his lack of certainty on precise tribal territories in and around the Hunter Valley (Tindale 1940).

Other interpretations exist concerning the distribution and number of different languages and dialects within the Upper Hunter Valley (Downs pers. comm.).

It should be noted that the identification of names and boundaries of tribal groups in the Upper Hunter regions remains unclear and might never be resolved.

4.2.2 Social organisation, subsistence, and land-use

Aboriginal society is generally depicted as being comprised of a hierarchy of organisational levels and groups with fluid boundaries between them (e.g. Tindale 1974). The smallest group in the hierarchy is the family comprised of a man with one or more wives, their children and some of their parents. The second level of the hierarchy consisted of bands, small groups consisting of members of several nuclear families who conduct hunting and gathering tasks together for most of the year. The third level of the hierarchy consists of regional networks or clans which comprise a number of bands. Members of these regional networks usually share beliefs in a common language dialect and assemble for specific ceremonies. The tribe is the next highest unit which is recognised as a linguistic unit with flexible territorial boundaries. The highest level of the hierarchy is the 'cultural area', which consists of groups who share certain cultural characteristics, such as initiation ceremonies and closely related languages.

The main subsistence strategy employed by Aboriginal people in the Hunter region focused on a hunter-gather lifestyle. The most basic unit in Aboriginal society was a 'band' that consisted of a collection of families, who grouped together for subsistence (Habermann 2003). Land ownership resided with the larger 'clan' or descendent group, of which the bands formed a part (Habermann 2003).

Single men were said to have lived separately to married men, single women and children. A single male entering a married man's camp without invitation would be met with violence. Campsites were thought to be on the banks of rivers:

> 'In choosing the site [for their camps], proximity to fresh water was one essential, some food supply a second, whilst a vantage ground in case of attack from an enemy was a third.' (Fawcett 1898, cited in Habermann 2003).

Kinship was an integral part of Aboriginal society, and created complex relationships between individuals, which governed the foods people consumed, their social and environmental interactions and the land they used. The kinship network extended social links beyond the band and even the language territory, resulting in economic ties outside the core group. As such, other territories could be visited; social gatherings promoted and maintained these extended rights and ties. Inter-clan and inter-tribal participation was also known to occur for ceremonies, such as initiation rites, and trade was a physical expression of these inter-tribal and clan networks (Habermann 2003).

The Hunter River system contains many fertile and well-watered valleys. Aboriginal people were documented living in the Hunter Valley by Europeans who first visited and settled in the area (Gunson 1974). The Hunter Valley was first described in writing by Sir Thomas Mitchell in 1831 who defined it as “being park-like” with light forest and grassy glades, populated by many different animals such as marsupials, birds and rivers full of shellfish and fish (Mitchell 1839). The area contained many species of edible nuts, wild grains and berries. Today the native animal and plant communities within the study area are extensively modified as a result of European land use practices and introduced species.

The traditional use of resources for the Hunter region was perhaps best described in ethnographical terms by Threlkeld at Lake Macquarie. Whereas this is some way from the study area, in the Upper Hunter, it does comprehensively describe the variety of the diet available to people at the time. At his mission, Threlkeld (cited in Gunson 1974) noted that Aboriginal people ate a variety of different fauna and flora. Threlkeld observed that people used the resources year round, eating certain species when they were available, such as wild plums, cobra (maggots from grass trees), snakes, cockles, lizards, fish, flying-foxes, ducks, pigeons, kangaroo, possum, swans, wallaby, kangaroo rat, eels, craw-fish, geese, oysters, honey and goanna (Gunson 1974; Neal and Stock 1986). Even whale was consumed when stranded on the beaches, and was feasted on by all Aboriginal people within reasonable travelling distance (Gunson 1974; Thomas 2008).

Hunting practices, such as beating grasslands with waddies to flush out bandicoots, and the trapping of kangaroos through the use of fire, were also recorded (Gunson 1974). Trees were climbed in search of honey. In addition, women would dive for lobster among the rocks, and would fish with lines, while men used spears. Fishing was such an important role for women, that a mother would select a female child and appoint her in the same role; this was signified by amputating the little finger on her right hand (Gunson 1974). Fish was usually consumed after being cooked, with fires kept alight on canoes during angling (Thomas 2008). Threlkeld noted that:

> ‘Their mode of fishing is curious, sometimes angling with hook and line thrown by the hand as they are seated in the bark canoe, sometimes diving for shell fish, sometimes standing in their frail bark darting their spears into the fish as they pass, or at other times, using hand nets forming a circle in shallow waters and enclosing the fish, but the most curious method is that of planting sprigs of bushes in a zig-zag form across the streams leaving an interval at the point of every angle where the men stand with their nets to catch what others frighten towards them by splashing in water.’ (Gunson 1974: 30).

Plant resources such as ferns potentially Bracken Fern (*Pteridum esculentum*) or Swamp Fern (*Blechnum sp*.) were crushed or sometimes roasted, before being ground to produce a flour for bread-making (Gunson 1974; Habermann 2003; Thomas 2008). Bracken Ferns comprise an edible starchy rhizome, and are available from late summer to autumn (Thomas 2008). Aboriginal people also ate the root of the Gigantic Lily (*Doryanthus excelsa*), which needed to be soaked to be edible. The yam daisy (*Microseris lanceolata* and *Microseris scapigera*),abundant in grasslands and dry sclerophyll woodlands across southeast Australia, was exploited for its edible root (Gott 2008). Cultivation practices were employed by Aboriginal people to increase the plant’s productivity and expand yam beds (Denham 2008). Harvesting of yams was carried out in ways that ensured the long-term survival and productivity of yam beds (Berndt and Berndt 1993). There is uncertainty on whether the yam daisy grew in the Hunter River valley, but there are certainly multiple historical accounts of Aboriginal people there exploiting tuber-bearing plants (Ford 2010). If these were not yam daisy, they were probably the marsh club-rush, Bolboschoenus fluviatilis, which grows on stream banks and floodplains (Ford 2010). The consumption of *Macrozamia* nuts is also documented, which due to their toxic nature had to be soaked for two to three weeks prior to being consumed (Asmussen 2008; 2009; Asmussen and McInnes 2013; Thomas 2008). The Macrozamia seeds or nuts were also roasted prior to consumption. It is also possible that Kangaroo Grass seeds were ground and eaten, although there is no direct ethnographic evidence to support this (Thomas 2008).

The Hunter people were great proponents of fire farming, which altered the landscape. ‘Fire-stick farming’ resulted in both long and short term gain, with cleared areas exposing the burrows and nests of prey, and in the long term, created breaks in forest cover, attracting herbivores (Gammage 2012; Vigilante and Bowman 2004).

Brayshaw (1987:21) describes the use of fire carried out one month prior to a hunt to attract game to the new grass (Dyall 1971:4.1; Kuskie 1997). Sokoloff notes fire was also used in burials, for fishing, and farming (Sokoloff 1978a:73; 1978b:125). Burning of bushy vegetation would result in clearing vegetation that competed with food resource plants such as the daisy yam, and could therefore have functioned as a strategy of cultivating and expanding yam beds (Denham 2008; Gammage 2012; Gott 2008).

4.2.3 Material culture

Aboriginal people were recorded within the Hunter region as utilising a variety of bark and wood resources. Bark and wood was harvested from a variety of Stringybark species (Stringybark, White Stringybark, and Thin-leaved Stringybark), Tea-Tree (*Melaleuca quinquenervia*), Grass Trees (*Xanthorrhoea australis*), Cabbage-tree (*Livistona australis*), River Gum, Kurrajong (*Brachychiton populneus*), Iron Bark (*Eucalyptus crebra* or *E paniculata*) and Swamp Mahogany (*Eucalyptus robusta*) (Neal and Stock 1986). The extraction of bark from the Nettle Tree (*Urticaceae*) and the Giant Fig Tree (*Ficus sp.*) was also recorded for use in shield making (Threlkeld cited in Gunson 1974). Bark and timber were used to make canoes; spears, clubs, and shelter, among many other items were crafted from bark and timber resources. They were also used in burial practices (Neal and Stock 1986).

Up to four different types of spears have been recorded for the region, and these could be thrown up to a distance of 36.6 m (Dawson 1830, cited in Thomas 2008). Spears were crafted from the stem of Grass Trees (White 1790). The fish spear – the 'Kul-là-ra' and 'Mo-ting' – was approximately 1.83 m in length, with four pieces of hardwood at the base, which added approximately an extra 0.61 m to the length. The hardwood pieces were fastened with bark-thread covered with Grass Tree gum, and held apart through small wedges, also smeared with gum. The wooden points were fire hardened and had gum-fastened bone barbs at the tips. The hunting spear, or the 'wa-rai', had one hardened joint of wood at the base. The battle spear was also constructed similarly, although it had pieces of quartz stuck along one side of the wooden joint and were likened to the teeth of a saw. Following European settlement, glass was substituted for quartz (Threlkeld and Browne cited in Gunson 1974; Thomas 2008) (Gunson 1974). Spears were thrown using a 'wom-mur-rur', which was tapered at the end where the barb was fixed and were 1.22 m in length and half an inch thick. Spears were traded for possum skin cloaks and 'hanks of line, spun by hand from the fur of animals of the opossum tribe' further inland (Gunson 1974).

Canoes were observed at Maitland (Gunson 1974; Heritage Alliance 2008), and described as being from four to 14 feet (1.17 m to 4.27 m) in length and three to four feet (0.91 to 1.22 m) wide (Gunson 1974; Barrallier 1802, cited in Heritage Alliance 2008). Three types of canoe have been recorded, one made from a strong strip of gum bark, which was scraped and fire hardened. The second type was made from bark that was closed and pointed at both ends, sometimes kept taut by wedges, with the third type ('mooten'), crafted from fire. A log would be selected that was still aflame, and Aboriginals would control the fire to form a canoe.

Other implements known to have been used included – waddies (often crafted from ironbark), yamsticks (up to 2 m long and 40 mm in diameter), fire sticks, wooden bowls (crafted from tree burls), bark water carriers with twig handles, shields (oval and up to 0.91 m long, 0.46 m wide and painted white with two red bands or stripes), clubs, boomerangs, baskets (made from palm leaves), and lances (up to 5.48 m to 6.70 m in length) (Gunson 1974; Barrallier 1802, cited in Heritage Alliance 2008; Neal and Stock 1986; Thomas 2008). Plant fibres (and fur cords) were also used to make fishing nets and twined dilly bags (Gunson 1974; Thomas 2008). Women were described as making string from bark, and also being the crafters of fishing nets (Thomas 2008).

Few ethnographic references describe the stone artefacts used by Aboriginal people in the Hunter region (Thomas 2008), however, stone axes were observed and an Australian Museum collection of implements included 'primitive flaked celts' made from chert (Thomas 2008). Stone axes had ground edges and were often made from basalt or diorite, with the stone fastened to a handle with gum. The handle was crafted from vines or saplings, which were heat treated (Thomas 2008). Stone axes were used for cutting saplings, peeling bark, and cutting notches into trees (Gunson 1974; Thomas 2008). Axe grinding grooves have been described as being indicative of a large scale manufacturing industry.

While not specified as being made from stone, Mathews (1894, cited in Thomas 2008) stated that the 'largest knives' were used for skinning and dressing prey. Barrallier (1802, cited in Heritage Alliance 2008) also noted the use of a fish weir at Newcastle. Near Merewether, chert (silicified tuff) was described as being abundant (Thorpe 1928, cited in Thomas 2008). The toolkit included stone artefacts that could be used as chisels, scrapers, gravers and rasps.

Shell was used to make fish hooks and tools. Fish hooks were made from oyster shell, while shell tools could be used to sharpen spears (until the arrival of glass) (Gunson 1974; Neal and Stock 1986; Thomas 2008). Kangaroo bones were made into combs or awls, the latter of which were used for sewing kangaroo and possum skin, belts and headbands (Heritage Alliance 2008; Neal and Stock 1986; Thomas 2008). Shell and glass were traded for possum skins, yarn and headbands (Dawson 1830, cited in Thomas 2008).

4.2.4 Spiritual locations and culture

Other aspects of Aboriginal culture, such as burials, initiation ceremonies, corroborrees and cosmological beings have been described in the ethnographic record (Thomas 2008). The following sites were considered to be of importance to Aboriginal people (Department of Transport Planning and Local Infrastructure 2014; Gunson 1974; Thomas 2008):

- 'Pòr-ro-bung' a bora ring.
- 'Yu-lung' a ring where tooth extraction occurred.
- 'Ko-pur-ra-ba' another volcano on the Hunter River, where red ochre ('ko-pur-ra') was sourced.
- 'Pit-to-ba' a source of pipe-clay ('pit-to').
- 'Pu-r-ri-bang-ba', the ants' nest place, and another source of yellow ochre ('Pur-ro-bàng').
- 'Nir-rit-ti-ba' island, or Moon Island, where mutton bird and their eggs are eaten.
- 'Nul-ka-nul-ka' at Reid's Mistake, a source of silicified tuff.

The Eaglehawk was an important bird to the many tribal groups, and was significant in astronomy, legend and social structure (Gunson 1974). The use of fire has also been described as an integral part of the Aboriginal way of life, as it was used in farming, hunting, cooking, warmth, communication, initiation ceremonies, burials, mourning, weapon making, canoe construction, and fishing (Thomas 2008).

Initiation ceremonies often took place within one or two cleared circles, with the circles sometimes up to 350 m apart (Habermann 2003). Carved trees often marked the area around the circle. One known initiation ceremony included the extraction of a front tooth for boys (Brayshaw 1987; Gunson 1974). Burials were often deposited in the ground, with the body placed in various positions, often covered in a bark shroud (Habermann 2003). Grave goods, such as spears and stone tools, were often buried with the deceased (Habermann 2003).

Kuskie documented significant and widespread traditional, historical and contemporary cultural values identified by registered Aboriginal parties and ethno-historical evidence. Associations and cultural values included a number of gender related sites, the association of Mount Sugarloaf with the supreme being 'Koe-in', burial locations, and pathways throughout the landscape, such as through Black Hill Spur, Hexham Swamp and along Sugarloaf Ridge (Kuskie 1997).

4.2.5 European and Aboriginal interaction

Many of the initial interactions between Aboriginal people and non-Aboriginal settlers (such as timber cutters, convicts and settlers) have been described as friendly (Allom Lovell and Associates 1998; Graeme Butler & Associates 2007; Gunson 1974; Thomas 2008). In 1790, four convicts landed at Port Stephens after seizing a small vessel and sailing from Port Jackson. After landing, they lived with local Aboriginals for five years (Goold 1981; Thomas 2008). Another group of convicts, this time of 15 individuals, stole the Norfolk and wrecked it at Stockton, where six men chose to live with the local Aboriginal people. After several months, three men made their way back to Sydney, assisted by Aboriginal guides (Goold 1981).

In 1799, conflict arose on the shores of the Hunter River, where the Aboriginal people gathered in great numbers on the foreshores' and drove the non-Aboriginal people away. An armed party was sent to rescue the remaining men, who the Aboriginal people had said had returned to Sydney overland, but they were not believed. Several Aboriginal people were wounded as a consequence of the resulting attack (Goold 1981). The early 1800s saw a variety of conflicts between escaped convicts and farmers, but in 1821, when Governor Macquarie visited Maitland, he was greeted by the chief of the 'Boan Native Tribe', Bungaree, who with his family, held a corroborree in welcome (Heritage Alliance 2008).

Aboriginal people worked as guides and trackers. In 1842, the explorer FW Ludwig Leichhardt was guided by Bo-win-bah (Gorman, chief of the Pambalong) and Biraban (Johnny M'Gill) from Ash Island to Minmi cattle station, around the margins of Hexham Wetlands (Department of Transport Planning and Local Infrastructure 2014; Thomas 2008). Peaceful encounters were soon replaced with serious conflict, however, and were generated from the mistreatment of Aboriginal women, misunderstandings with pastoral settlers, and violent behaviour from the convicts towards Aboriginal people (Gunson 1974; O'Rourke 2009; Dawson 1830, cited in Thomas 2008). Timber harvesting and hunting soon became other causes of conflict, due to spiritual beliefs (trees were believed to house the souls of Aboriginal people awaiting rebirth, with some fauna being totem animals to Aboriginal people) (Allom Lovell and Associates 1998). From the 1830s, Aboriginal groups raided settlers for food and those who were captured were tried before the Supreme Court in Sydney; some were acquitted, others sentenced to death.

Aboriginal populations suffered a dramatic decline after the arrival of non-Aboriginal settlers, with disease, the loss of traditional hunting grounds, and conflict with settlers (including massacres of Aboriginal people) all contributing to the reduced number of Aboriginal people. In 1821 in the Lake Macquarie area, over 100 individuals were observed by Reverend Middleton, whereas in 1840, only 15 adult males, seven adult females and four children were recorded (Thomas 2008). Diseases such as smallpox, chicken pox, tuberculosis, typhoid, influenza, scarlet fever, measles, diphtheria, whooping cough and croup were all disastrous to the Aboriginal people (Thomas 2008). The smallpox, and possibly chickenpox, epidemics alone, in 1789, 1829 and 1831, meant that it was impossible for non-Aboriginal settlers to understand the population sizes of Aboriginal people prior to European arrival (Gunson 1974; Thomas 2008).

The overall number of different Aboriginal groups and the location of their territorial boundaries were severely affected by an epidemic beginning in or before 1789. Soon after the first European settlement in NSW, the arrival of a disease with symptoms similar to smallpox (Tench 1788) in the local Aboriginal population was recorded. Despite the coincidence of these two events, it is now hypothesised that smallpox had originally been contracted by Aboriginal people living in Arnhem Land, who caught the disease from fishermen from Southeast Asia (Butlin 1985; Campbell 2002; Macknight 1986). If this hypothesis is correct, the disease had spread across the continent to arrive in NSW. It should be noted that some researchers contend that the epidemic originated from the Sydney colonists, and that it might have been chicken pox rather than smallpox (Wright 1987). Wright's argument in support of the epidemic being smallpox rests on the fact that no cases of smallpox were recorded among the European settlers, either on the voyage out or in the months they had been in Port Jackson. The hypothesis of Macassan origin would also explain the lack of cases among the European population. An argument against a smallpox outbreak originating with the Macassans is provided by Hunter and Carmody (2015), who view the transmission of smallpox across the continent as being unlikely, due to the low infectiousness of smallpox and the sparse populations of Aboriginal people across the centre of the continent. This argument, it should be noted, rests on the assumption that there were no ‘corridors’ of dense Aboriginal population existing between northern and southeastern Australia, which would seem to ignore the probably dense populations that existed around the coastline of the continent. Hunter and Carmody in fact acknowledge the probable existence of the coastal transmission corridor (Hunter and Carmody 2015: 128) and the fact that this represents a plausible pathway for smallpox to travel from north Australia to the Sydney colony. The difficulty of a hypothetical transmission of smallpox across the continent, which argues against the 1789 epidemic being smallpox travelling in from the north, coupled with the lack of smallpox infection in the European settler population, which argues against the epidemic being smallpox originating from the First Fleet settlers, leads Hunter and Carmody to the conclusion that the epidemic was probably not smallpox at all. Instead, they view chickenpox as being the more plausible disease. Whichever disease was responsible for the epidemic, its severe effects are documented in historical records.

Mortality rates from the epidemic are difficult to measure precisely, but are likely to have been around 80 percent (Butlin 1983). Mortality could plausibly have been as high as 90 percent (Wright 1987) or even 98 percent if the epidemic were smallpox, based on observations of smallpox’s effects on previously unexposed populations in other continents (Hiscock 2008: 14). The epidemic resulted in movements of people across the landscape, and possibly the disappearance of some previously existing groups. Governor Arthur Phillip recorded that, in the Sydney region, many Aboriginal people migrated inland, away from the European settlement, in an attempt to escape the disease (Phillip 1789). Lieutenant-Governor David Collins recorded a group that had been reduced to three survivors negotiating to merge with another group, and also observed a group that had been reduced to a single survivor (Collins 1798). Similar migrations, and mergers of groups in response to the appearance of diseases and their associated death toll are likely to have occurred in the Hunter Valley.

The impact of the 1789 epidemic on the distribution of Aboriginal groups across the landscape is likely to have been severe. Hiscock (2008: 14) sums up the effect of the epidemic by stating it would have “altered the operation of Aboriginal life”. This alteration resulted from the reduction in population and other effects flowing on from this. The possible disappearance of some groups through mortality and group mergers, the mass migration of people fleeing the disease, the depopulation of areas, and the incursion of groups into abandoned or depopulated lands, would have substantially altered the social landscape of Aboriginal groups that had existed prior to the epidemic. The tribal boundaries mapped by European researchers after contact are those of a population that had survived the epidemic (and further epidemics that followed) and had adapted their occupation of the landscape in response to it. Subsequent disease epidemics of smallpox, measles, influenza, tuberculosis, and venereal diseases followed in the years after European settlement (Hunter and Carmody 2015).

The farming of the land by European settlers displaced Aboriginal groups and populations of plants and animals they subsisted upon. Due to the loss of traditional hunting grounds, and the modification of the landscape, food resources such as kangaroo, wallaby, emu and possum became scarce (Graeme Butler & Associates 2007). Prime agricultural land, on alluvial soils adjacent to rivers, was also land where daisy yams and other tuber plants had flourished and where yam beds had been actively cultivated and expanded by Aboriginal people (Denham 2008; Ford 2010; Gammage 2012; Goodall 1996; Kohen 1993). Farming of this land deprived Aboriginal people of access to an important plant resource (Goodall 1996). Normal hunting processes were also restricted, due to the clearance of vegetation and draining of lagoons (Ford 2010; Graeme Butler & Associates 2007). The culmination of general violence, landscape alteration and diseases would have all contributed to the massive reduction in the Aboriginal population of the region. The population loss affected traditional practices, such as kinship systems, marriage, subsistence strategies and more (Thomas 2008).

By the 1840s, Aboriginal people were reliant on settlers for clothing, food and money (Thomas 2008) and were employed in a variety of functions, such as timber cutters, water drawers, farm assistants, and errand runners, among others. Near the end of the 19th century, concern over the Aboriginal peoples’ plight took root, with the Aborigines Protection Association formed in 1881. In 1883, a Board for the Protection of Aborigines was established by the government, and rural stations were developed to allow Aboriginal people to stay on traditional lands (Thomas 2008). Yet by the mid-20th century, Aboriginal people had begun to move to Newcastle and Lake Macquarie to escape the oppression of the Aborigines Protection Board and to gain employment (Thomas 2008). Between 1909 and 1967, 5,300 Aboriginal children had been removed from their families and placed in institutions (Thomas 2008). The main sources of employment during this time were Broken Hill Propriety Limited and the Department of Railways, with Aboriginal people living in shanty settlements or in tent villages near the railway lines. In the 1930s, the new policy of assimilation was created, to try and absorb Aboriginal people into the wider community, and by the 1940s, the concept of re-settlement was established. By the 1960s, Aboriginal people were once again occupying Newcastle (at the university). Those living at the university were ‘removed’ from the premises.

Although disease and violence had substantial effects on the demographics of Aboriginal groups, its effects on Aboriginal cultural practises are impossible to estimate. It is important to note that these processes did not extinguish Aboriginal culture. Aboriginal traditional knowledge and elements of pre-contact Aboriginal culture, both tangible and intangible, survive today.

4.2.6 Summary

The Aboriginal people of the Hunter region would have used the wide variety of natural resources present within the fertile landscape, and ethno-historical accounts list some of the methods through which Aboriginal people harvested fruits, nuts, marine resources, terrestrial fauna, birds and so forth. While there are gaps in the ethno-historical account, such as the lack of description regarding stone artefact manufacture and use, it does provide a basis that can be used to understand how Aboriginal people used the landscape prior to non-Aboriginal colonisation.

Modification of the landscape by Aboriginal people took place through the use of fire farming and reed planting/weir development, but little evidence of such activities is likely to have been preserved in the archaeological record due to the perishable nature of the materials used and the consequent alteration of the landscape through non-Aboriginal occupation. Evidence of campsites, through deposits of stone artefacts and shell, hearths or middens are, in contrast, likely to be found where the landscape has not suffered severe ground disturbance or sedimentation. While ethno-historical accounts refer to camps being located near waterways, campsites would not have been limited to river banks. These descriptions do, however, aid in developing a predictive model for the location of Aboriginal sites.

Scarred trees, which were a result of the production of items such as canoes, containers, shelters and bowls also have the potential to be present within the region. Carved trees, which were decorated with designs and could be associated with ceremonial sites, are much rarer. However, the prevalence of logging in the Hunter region would have severely reduced remaining scarred and carved tree numbers.

Other sites, such as grinding grooves, stone quarries, burials and ceremonial grounds (bora rings, stone arrangements), while rarer, are discussed in the ethno-historical records and are known to be focal points within the current cultural landscape.

5. Aboriginal cultural values

5.1 Method of obtaining information

Input and feedback can be provided by RAPs at any time throughout the assessment process. Jacobs has sought input and feedback from RAPs at several points during the process (following proceedures outlined in DECCW 2010a):

- During Stage 2 – Initial presentation of information about the proposed Project.
- During Stage 3 - Providing RAPs with the draft proposed methodology. RAPs were invited to provide feedback on the proposed methodology, and to identify cultural heritage values associated with the study area.
- During fieldwork.
- During Stage 4 - Providing RAPs with the draft Aboriginal Cultural Heritage Assessment Report. RAPs are invited to provide feedback on the report, and any further information they wish to be included.

5.2 Identified cultural heritage values relevant to study area

The landscape of the Hunter Valley as a whole has cultural value to Aboriginal people, being a landscape that their ancestors lived on, travelled through, and utilised for subsistence. Landmarks visible in the natural landscape are known to the present-day Aboriginal community to have been important in enabling Aboriginal groups to navigate through the landscape, and to identify where the territory of their tribes and clans were. The importance and cultural significance of visible landmarks in the landscape was communicated to Jacobs by representatives from RAP groups assisting with fieldwork. Large landmarks such as individual hills and mountains in surrounding ranges were cited as being important for navigation through the landscape. In addition, smaller and less obvious local high-points in the landscape would have had importance for the same purpose: small hills and ridgelines that were higher than their immediate surrounding landscape would have been points that travelling groups would have used as vantage points to identify landmarks and orient themselves in the landscape.

Rivers, creeks and other watercourses hold cultural value for similar reasons, as river valleys were followed when travelling through the landscape and would consequently have functioned as navigational aids. The importance of watercourses as travel routes, as well as the importance of the food resources they provided, were both cited by RAPs as attaching watercourses with cultural significance.

Stone artefacts, both individually and as assemblages, were cited as having cultural significance for a number of reasons. As items produced and in some cases used by Aboriginal people, stone artefacts provide a tangible and direct link to the lifeways and thought processes of ancestral people. In the Hunter Valley, the distribution and source areas of various distinctive materials are well understood. Particular artefacts can consequently be identified as having been made from material sourced from a specific location in the landscape. For this reason, an artefact can carry information on where Aboriginal people had travelled in the landscape, or where they had obtained traded material from. The variability of materials found on sites in the region was cited by RAPs as evidence for interactions between groups whose home territories were in different areas. The ability to identify distinctive materials with specific groups, who travelled in from specific areas of the Hunter Valley and its surrounds, adds to the cultural value of stone artefacts in this region.

6. Summary of archaeological assessment

6.1 Desktop assessment

The desktop assessment included a search of the Aboriginal Heritage Information Management System (**AHIMS**) and a review of existing data (including any previous archaeological investigations specific to the proposal and register searches) to identify any gaps in the assessments. Information compiled as part of the background review provided the framework for the development of a predictive model for site location.

6.1.1 AHIMS search results

Jacobs carried out a search of the AHIMS on 15 July 2019. The footprint of the Project and a 50 m buffer zone was used as the search area.

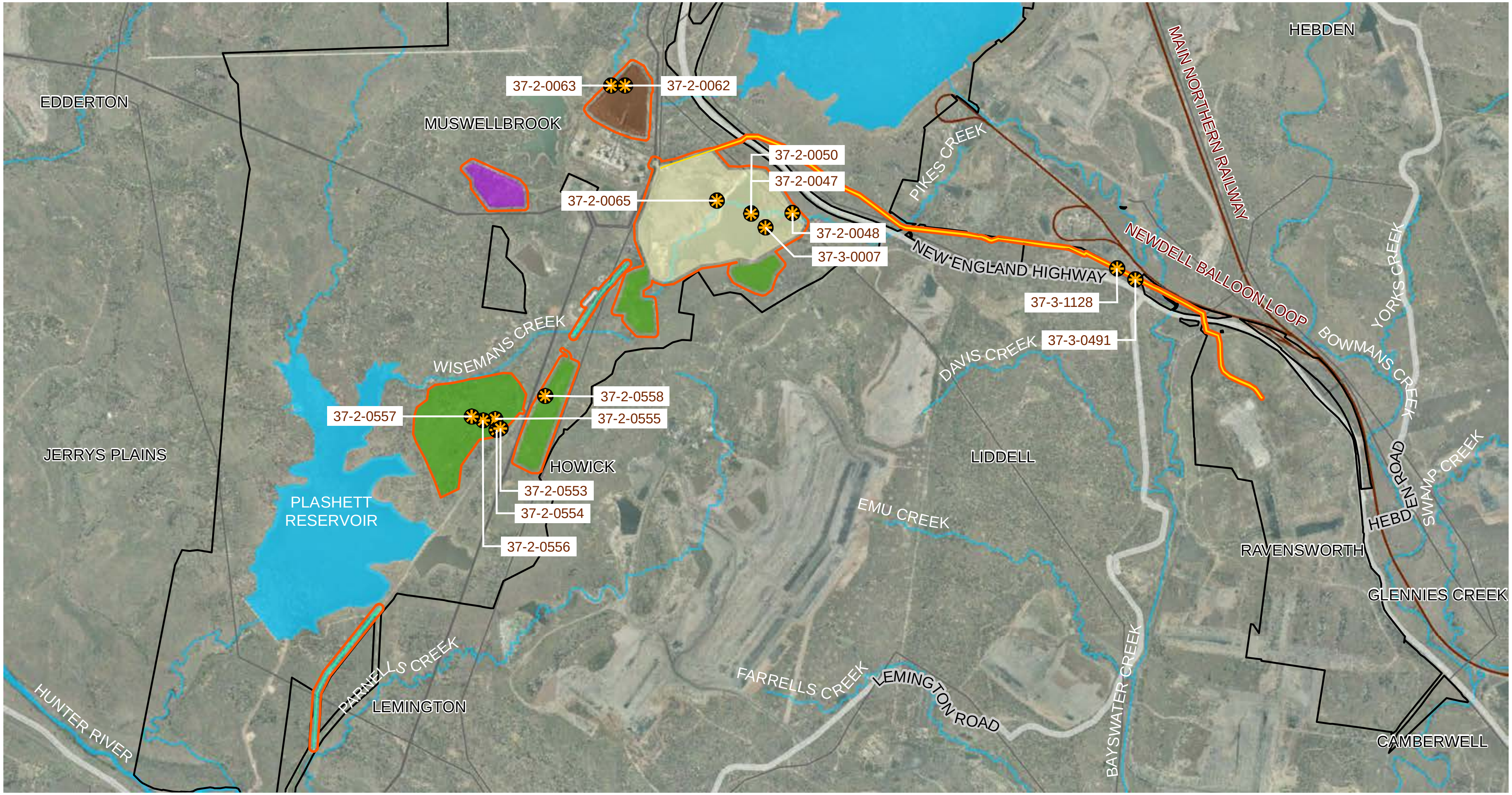
Fourteen previously recorded sites are present within the search area, one of which is recorded as being destroyed. One of the sites is recorded under two AHIMS numbers (37-2-0047 and 37-2-0050). Four sites were partially collected during their original recording. All sites are scatters of stone artefacts on open ground. One of the sites also contained hearths.

The list of AHIMS site records is provided in Appendix C. Figure 6-1 shows the location and extent of Aboriginal sites listed on the AHIMS within and near the study area.

Table 6-1 Summary of previously recorded AHIMS sites located within the study area

AHIMS ID	Site name	Recorded by	Date	Site context	Aboriginal objects recorded	Recommendations	Salvage carried out
37-2-0047 (this is a duplicate record of 37-2-0050)	Pikes Gully	L. K. Dyall	1978	Open site	Flakes and cores (unquantified)	None	10 cores were collected
37-2-0048	Pikes Gully	L. K. Dyall	1978	Open site	Flakes and cores (unquantified)	None	3 cores collected
37-2-0050 (this is a duplicate record of 37-2-0047)	Pikes Gully	L. K. Dyall	1978	Open site	Flakes and cores (unquantified)	None	10 cores collected
37-2-0062	Tinkers Creek/Liddell	L. K. Dyall	1978	Open site	Four separate scatters of stone artefacts, including flakes, cores and retouched flakes. Implements recorded are utilised flakes, battered cobble, cleaver, elouera, a large blade). Two of the scatters were associated with hearths. Numbers of artefacts and hearths unquantified.	None	18 cores and implements collected

37-2-0063	Tinkers Creek/Liddell	L. K. Dyall	1978	Open site	Four separate scatters of stone artefacts. Over 240 artefacts in total. One backed blade recorded.	None	No artefacts collected
37-2-0065	No site card exists for this site						
37-2-0553	P6	M. Koettig	1991	Open site	Artefact scatter (unquantified)	None	No collection recorded.
37-2-0554	P7	M. Koettig	1991	Open site	Artefact scatter	None	No collection recorded.
37-2-0555	P8	M. Koettig	1991	Open site	Artefact scatter	Requires testing prior to impact	No collection recorded.
37-2-0556	P9	M. Koettig	1991	Open site	Artefact scatter	Requires testing prior to impact	No collection recorded.
37-2-0557	P10	M. Koettig	1991	Open site	Scatter of 20 stone artefacts	Requires salvage prior to impact	No collection recorded.
37-2-0558	P11	M. Koettig	1991	Open site	Artefact scatter and PAD	Requires testing prior to impact	No collection recorded
37-3-0007	Pike's Gully	L. K. Dyall	1978	Open site	Scatter of four artefacts, two of which are ground	None	Two ground artefacts collected
37-3-0491	Nardell-N2	R. Fife & V. Perry	2000	Open site	Scatter of at least three stone artefacts	Requires surface salvage prior to impact	No collection recorded
37-3-1128	REA256	Reynolds	2010	Open site	Isolated stone artefact	None	Collected in entirety



Study area
AGL owned land

Project elements:
Ash Dam Augmentation, Ash Harvesting and Water Management Works
Salt Cake Landfill
Coal Handling Plant Water and Wastewater Infrastructure Upgrades
HP Pipe Clearing
LSP Sludge Line Clearing
Clay Borrow Pits
Ravensworth Ash Line

AHIMS

0 1 2 km
1:75,000 at A4

Data sources
Jacobs 2019, AGL 2019, OEH 2019
NSW Spatial Services 2019

GDA94 MGA56

Figure 6-1 AHIMS search results for the study area

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Created by : XX | QA by : XX

6.1.2 Previous archaeological assessments in the study area and surrounding region

One of the first archaeological investigations of the study area was carried out between 1976-1979 as part of the Mt. Arthur Mine Project. Associate Professor L.K. Dyall from Newcastle University surveyed three mining sites with the intent of discovering Aboriginal artefacts. He found artefacts in three small areas of open ground (The Electricity Commission of New South Wales 1979).

In 1979, the Electricity Commission of New South Wales in relation to the Bayswater Power Station project concluded that the only Aboriginal sites within the area were located within the Saltwater Creek reservoir area. It recommended salvage of these Aboriginal heritage sites before the area was flooded to create Lake Liddell (The Electricity Commission of New South Wales 1979).

Dyall (1980) carried out a survey immediately south of the Bayswater Colliery, recording three sites on the banks of Saddler's Creek. The sites were scatters of flaked stone artefacts, including cores and backed artefacts. The artefacts were made from chert, rhyolite and quartz.

Dyall (1981a) carried out a survey immediately south of Mount Arthur, recording 24 open sites along Saltwater and Saddlers Creeks. The sites were stone artefact scatters, two of which contained more than 500 artefacts. Artefacts recorded included backed artefacts, ground stone axes, choppers and grindstones.

Dyall (1981b) reviewed all Aboriginal sites recorded during surveys of the Mount Arthur Coal Lease area. This report records a number of sites along the banks of Saltwater creek. One scatter of stone artefacts recorded covered more than one acre, extending up to 100m back from the creek bank. The report also records 27 axe grinding grooves on a sandstone shelf. The great majority of sites recorded are open artefact scatters and are located adjacent to the creek.

Hughes (1981) carried out a survey of a proposed extension to the Bayswater Colliery, recording nine Aboriginal sites. The sites were open artefact scatters, six of which are located on creek lines.

In 1992 Pacific Power carried out a survey of a proposed slurry pipeline and water storage pond within the Bayswater Ash Disposal Project. The area was assessed as being highly modified by European settlement and Aboriginal sites were likely to have been disturbed or destroyed (McIntyre 1992). Six sites were identified: five artefact scatters and one isolated artefact. The number of artefacts found per site varied from 2 to greater than 200. These sites were identified as outside the proposed area of impact. Avoidance and protection were recommended. Subsequent test excavation in the area of the proposed work identified an absence of artefacts in subsurface deposits.

In 1993 an Environmental Impact Assessment of Bayswater was undertaken as part of the Fly Ash Disposal in Ravensworth No.2 Mine Void and Mine Rehabilitation project. As part of the assessment an examination of Heritage registers and field examination was performed. The research showed no European heritage items along the transport corridor and two Aboriginal open artefacts scatter sites and an isolated Aboriginal artefact (Pacific Power 1993).

Umwelt Australia (1997) carried out a survey of three areas of the southern section of the Bayswater No. 3 mining lease. These areas included a coal processing plant, haul road and mine access road, overland conveyer and stockpile area. The survey recorded 36 sites comprising 28 open artefact scatters and eight isolated artefacts. The majority of sites were located adjacent to watercourses, namely Saddlers Creek and its tributaries. Sites were located on the watercourses' banks, as well as on elevated ground such as upper slopes and ridge tops adjacent to the watercourses. Artefacts included retouched flakes and cores, and one hammerstone.

In 2007 an assessment of Bayswater was undertaken as part of the Bayswater Power Station River Intake Project. During the survey an isolated mudstone flake was identified. Due to the lack of further sites in the study area, it was inferred that extensive levels of past disturbance had impacted and destroyed sites in the area (McCardle Cultural Heritage Pty Ltd 2007).

An archaeological assessment of the Bayswater and Liddell Power Generation complex was carried out in 2009, recording 47 Aboriginal sites. All sites were open artefact scatters and isolated artefacts. The number of artefacts per scatter varied from 11 up to 250 with the majority of sites (n.36) containing fewer than 10 artefacts. It was noted that flat areas associated with Saltwater Creek and its tributaries contained surface sites and potential for associated PAD and that elevated landforms and hillslopes were landforms with low archaeological sensitivity (AECOM 2009).

In 2017 a survey was undertaken as part of the Aboriginal due diligence assessment for the Bayswater Ash Dam Overland Water Pipeline. The survey recorded ground surface visibility (GSV) within the study area between 31-50%. No surface artefacts were identified during this inspection. A search of the AHIMS, covering an area approximately 17.8 km by 13.5 km identified a total of 102 sites outside the pipeline's footprint. These 102 sites included artefact scatters (n.78), isolated artefacts (n.15), sites destroyed under the condition of an AHIP (n.8) and a single modified tree. The majority of sites consisted of artefacts identified on exposed ground surfaces. From these results it was concluded that the area did not contain areas of subsurface potential, and that this was probably due to erosion and past disturbance (AECOM 2017).

A preliminarily Aboriginal heritage assessment for proposed electrical works modifications at the Bayswater Brine Concentrator Decant Basin (BCDB) was carried out in 2018 and as part of the assessment a search of the AHIMS database was completed. This search identified 113 Aboriginal archaeological sites (two sites were classified as "destroyed") (AECOM 2018).

These assessments demonstrate that the area has been subject to past disturbance, particularly during the post-contact period, which has probably impacted the Aboriginal heritage of the area and reduced the overall number of sites. Previous assessments suggest also that Aboriginal sites are most likely to occur in flat areas associated with water sources and that their number is expected to be higher in areas near permanent water sources. Elevated areas away from watercourses, and slopes are expected to contain fewer Aboriginal sites. These results feed into the predictive model outlined in the following section.

6.1.3 Predictive model

The following predictive model is used to identify areas of archaeological sensitivity. The model is based on a 'land system' or 'archaeological landscape' model of site location. This type of model predicts site location based on known patterns of site distribution in similar landscape regions.

The predictive model is based on:

- A review of previous models developed for the study area;
- An assessment of the results of the previous archaeological assessments reviewed in Section 6.1.2;
- The interpretation of the distribution patterns of known sites close to the study area; and
- A study of previous impacts to the study area and the potential effects of these impacts on the archaeological record.

The following specific predictive points are noted for the landscape the proposed Project area sits within:

- Elevated landforms adjacent to watercourses have high archaeological potential. Existing archaeological data for the Hunter Valley indicate a strong trend for the presence of open sites along watercourses, specifically, on creek banks and 'flats' (i.e. flood/drainage plains), terraces and bordering slopes.
- Landforms adjacent to permanent watercourses have a higher archaeological potential than those adjacent to ephemeral watercourses.

- The most common site type will be surface and sub-surface scatters of stone artefacts.
- Other site types that may present in the landscape are quarries, grinding grooves and scarred trees.
- The most commonly occurring material will be indurated mudstone or silicified tuff followed by silcrete. Other materials such as chert and quartz are also likely to be present.
- Where present, sub-surface archaeological deposits are most likely to be within 200 m of a water source (river or creek).
- Ridgelines and hills will have a lower density of sites than basal slopes and valley floors.
- Within the areas of infrastructure associated with Bayswater power station (such as around the CHP, existing roads and access tracks, or adjacent to pipelines) surface and sub-surface deposits are likely to be heavily disturbed and may contain areas of imported fill.

A number of post-depositional processes can result in disturbance or destruction of archaeological sites. Identifying areas of high disturbance is an important factor in the predictive model. Disturbance can alter the patterns of site location expected from the points above. The following general predictive points relate to the effects of site disturbance:

- Landforms adjacent to watercourses and which have been subject to frequent or high-energy flooding events will have reduced archaeological potential.
- Steep hillslopes have reduced archaeological potential, as sites will be more likely to have been displaced by downslope movement and surface erosion.
- European land-use practises can have a range of impacts to sites. Areas that have been excavated, inundated, or buried under fill or stockpiled materials will have low archaeological potential.

Many post-depositional processes result in the movement of artefacts away from their original location and context, without resulting in damage or destruction to the artefacts themselves. Some post-depositional processes will result in the destruction of some, but not all, artefacts within a site. Only severe impacts will destroy or remove all Aboriginal objects from a landform. Factoring post-depositional disturbance into the assessment of a landform's archaeological potential should consequently take a precautionary approach. A landform should be assumed to retain archaeological potential unless there is compelling evidence for severe disturbance that can be confidently inferred to have removed all sites from the landform.

6.2 Archaeological survey method

The field survey systematically investigated the areas proposed to be impacted by the Project. The survey was carried out on foot by a team of archaeologists and Aboriginal Sites Officers from the RAPs.

The survey investigated the proposed impact areas in full. No sub-sampling of these areas was employed. Areas that were assessed by field teams as having no potential for archaeological material to be present, for example because of previous impacts and ground disturbance, were not surveyed. Decisions to exclude areas in this way were made in the field, through a consensus of all field team members.

The ground survey team consisted of two archaeologists as well as nine Sites Officers.

Table 6-2 List of survey team members

Name	Organisation
Kylie Saunders	Wanaruah Local Aboriginal Land Council
Steven Hickey	Widescope Indigenous Group
Garreth Conyard	Murra Bidgee Mullangari
Kody Mcutchen-King	Muragadi
Craig Horne	Gidawaa Walang Cultural Heritage Consultancy
Adam King	Didge Ngunawal Clan
Mike Skinner	[redacted]
John Matthews	Aboriginal Native Title Elders Consultants
Margaret Matthews	Aboriginal Native Title Elders Consultants
Oliver Macgregor	Jacobs
Clare Leevers	Jacobs
Nicholas Woodard	AGL Macquarie

The field survey was aimed at locating Aboriginal sites, objects and areas of PAD .

Where archaeological sites or objects were encountered, the following attributes were recorded:

- Site location (single point for isolated artefacts, or as a boundary drawn around larger sites such as artefact scatters);
- Site type;
- Landform context;
- Vegetation type;
- Land use;
- Categories of features and artefacts present on the site;
- Orientation/aspect of the site;
- Observations on individual stone artefacts: stone material type; artefact type; platform surface; platform type; termination type; cross-section category; length, width and thickness in millimetres;

- Observations on modified trees: living status of tree; condition of tree; condition of scar; tree species; length and width of scar; height above ground; presence of regrowth; depth of scar (height of regrowth); shape of scar; orientation of scar; presence/absence of axe marks;
- Observations of other specific site types (grinding groove, art, shell scatter, closed site) following the requirements of DPIE site recording forms;
- Photographs of the site and individual site features/artefacts will be taken as judged necessary by the field team; and
- Any other comments or information as judged relevant by the field team.

Previously recorded sites within the footprint of the Project were searched for during the survey. If found, these sites were recorded following the same procedure as newly identified sites. If survey teams were unable to find previously recorded sites, this was noted in the report.

The survey also recorded land disturbance, survey coverage variables (ground exposure and archaeological visibility) and landform types across the study area.

Data were captured using iPad notebooks, handheld GPS, and compact digital camera.

6.2.1 In-field lithic artefact measurement

The following measurements and observations were taken on all stone artefacts identified during the survey.

Type: Classification of artefacts was based on technological criteria. The term “type” is sometimes used to refer to formal implement types such as backed artefacts, but in this document the term is used to classify all artefacts based on the process through which they were made. The following categories were used:

- Core: Cores are a piece of rock from which flakes have been detached. Cores are characterised by one or more identifiable negative flake scars, which are surfaces created when flakes have been detached. Cores do not have a positive (ventral) fracture surface.
- Flake: A piece of stone detached by fracture from a core, through the application of force. Flakes have a positive, or ventral, fracture surface which is characterised by a number of features which may include a bulb of percussion, a bulbar scar, ripple marks and fissures on the ventral surface and negative flake scars on the dorsal surface. A complete flake retains its platform surface and termination.
- Retouched flake: A flake which has had flakes removed from it after it was struck. A retouched flake has an identifiable ventral surface, and negative scars that are derived from or intrude onto this ventral surface.
- Flaked piece: A flaked piece is an artefact that exhibits negative flake scars, and one surface which could possibly be a ventral surface. A flaked piece does not have any other features that would enable identification as a flake, a retouched flake or core. This category is therefore an ambiguous one, and is used only for artefacts which cannot confidently be categorised more specifically.
- Hammer: A piece of stone, usually a pebble, which possesses pitting or furrowing indicative of hammer impacts.
- Anvil: A piece of stone which possesses pitting usually on a wide flat surface, indicating that it was struck repeatedly.
- Ground artefact: Any piece of stone showing an area or areas which have been ground or polished.
- Eraillure: A lens-shaped piece of stone which shatters off the bulb of a flake as the flake is struck (Faulkner 1972).

Material: The following raw materials were identified as present in the assemblage:

- IMSTC: (Indurated Mudstone, Silicified Tuff, Chert). An acronym for fine-grained siliceous rock types including chert, mudstone and other indurated fine-grained sedimentary rock, and silicified tuff (White 2018). Distinguishing between these different rock types is often impossible in the field, and confident classification requires petrological analysis (Hughes 2011). These fine-grained rock types are all isotropic and are consequently favoured materials for artefact manufacture.
- Quartz: The mineral quartz is crystalline silica with a hardness value of 7 (Mohs hardness scale). Given this property quartz flakes possess highly durable sharp edges (Domanski *et al.* 1994). Quartz often has internal flaws and cleavage planes, however, meaning it typically flakes in an unpredictable manner (Cotterell and Kamminga 1987; Driscoll 2011; Tallavaara *et al.* 2010).
- Silcrete: This rock is formed by the impregnation of a quartz-rich sediment with silica; it consists of quartz grains in a matrix of either amorphous or fine-grained silica (Rowney and White 1997; Sullivan and Simmons 1979). The fracture properties of silcrete are dependent largely of the size of the quartz grains, with finer-grained silcretes having superior fracture properties (Domanski and Webb 1992; Domanski *et al.* 1994; Webb and Domanski 2008).
- Quartzite**:** Quartzite is formed by the cementing together of siliceous grains through pressure, heat and chemical processes. Fracture properties and flaking quality are variable, depending on how cohesively the individual grains have been cemented together.
- Igneous: This category includes all igneous rock types. Categorising igneous rock into finer-grained categories is difficult to achieve in the field, on artefacts that are weathered or patinated, and was not attempted in this study.

Platform type:The platform surface is the surface from which fractures begin propagating. The following classifications of platform surfaces were used:

- Single: The platform is a single fracture surface.
- Multiple: The platform is made up of two or more fracture surfaces.
- Cortical: The platform is partially or fully composed of a cortical surface.
- Shattered: The platform has been sheared away during flake production: platform attributes cannot be identified.
- Facetted: The platform includes multiple small flake scars, initiated from the dorsal surface, which were removed prior to the flake being struck.
- Focalised: Fracture initiates close to the edge of the platform, and only a very small platform surface is present (usually no more than twice the area of the ring crack formed at the initiation point).

Termination type: Termination refers to the manner in which the fracture ceases to propagate by running to meet a free surface. The termination type is classified according to how the fracture surface and the free surface (i.e. the distal surface of the flake) meet (Cotterell and Kamminga 1987).

- Feather: Exhibits minimal thickness at the distal end and acute angle between ventral and dorsal surface.
- Hinge: Forms when the fracture curves sharply and meets the surface of the core at c. 90º to the longitudinal axis of the flake.
- Step: Forms when flake terminates abruptly in a right angle break.
- Inflex: A hinge termination on which the fracture surface deviates in the distal direction just before termination, leaving a "finial" or "lip" on the flake (Cotterell and Kamminga 1986; Sollberger 1986). Also known as a "languette" fracture (Bordes 1970a; 1970b; Lenoir 1975).

- Retroflex: Similar to an inflex, except that the deviation of the fracture surface is toward the proximal end of the flake: that is, the fracture curves back in the direction of the platform surface (Cotterell and Kamminga 1979; Cotterell and Kamminga 1986).
- Outrepassé: Forms when the fracture plane curves away from the face of the core and terminates on the opposite side of the core, removing the core's base. Also known as a plunging termination (Inizan *et al.* 1999; Whittaker 1994).

Completeness: This category records whether an artefact is complete or a fragment of a complete artefact. Cores were coded simply as complete or incomplete. Flakes (including retouched flakes) were coded as one of the following categories (following Hiscock 2002):

- Complete: A complete flake, in which the platform surface and all original flake margins are intact.
- Distal fragment: A broken flake which is missing its proximal end. These fragments do not possess their original platform surface.
- Medial fragment: A broken flake that is missing its proximal and distal ends. This fragment is the original flake's mid section, exhibiting dorsal scars and ventral surface features.
- Proximal fragment: A broken flake which is missing its distal margin, but retains the platform and initiation.
- Longitudinal cone spit (LCS left and right): A flake broken longitudinally, in which the break bifurcates the bulb of force and the ring crack (Inizan *et al.* 1999). This distinctive breakage pattern occurs during flaking event. Separate categories for left and right LCS portions were used to facilitate artefact number estimates. Note that the LCS category can only be applied if the bifurcated ring crack and bulb of force are present. Also known as a 'Siret' break, or (historically) a 'burin de Siret' (Inizan *et al.* 1999; Waechter *et al.* 1970)
- Marginal fragment: A flake broken transversely or longitudinally, which is lacking both its initiation and termination, and has a section of only one of the original flake's lateral margins.
- Margin missing: A flake which has been broken and is missing a portion, or several portions of its lateral margins, but which has retained both its platform and its distal margin.

Length: On flakes (including retouched flakes) this measurement was taken from the initiation point, along the percussion axis (Figure 6-2).

Width: On flakes (including retouched flakes) this measurement was taken perpendicular to length, and half way along length, from one margin of the flake to the other (Figure 6-2).

Thickness: On flakes (including retouched flakes) this measurement was taken at the intersection of length and width, and perpendicular to both length and width.

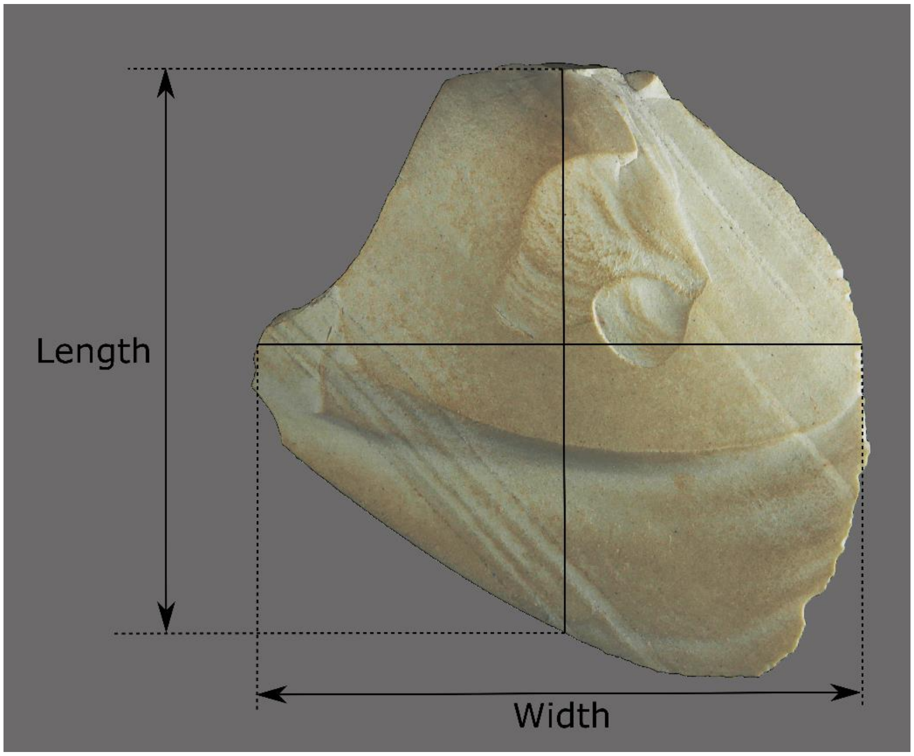


Figure 6-2 Length, width and platform width measurements on a flake.

Implement type: If artefacts had a suitable morphology to be classified into any existing formal tool types, this was recorded. Only types which are commonly in use in Australia were employed. These include backed artefacts (triangles, trapezes, crescents, trapezoids, woakwines, bondi points), juan knives, tula adzes, burren adzes, gravers, horsehoof cores, scrapers, unifacial points, pirri points and bifacial points. Retouched flakes that do not fall into any established implement type were recorded as 'amorphously retouched flakes'.

6.3 Archaeological survey results

6.3.1 Survey coverage

Figure 1-1 illustrates the for location of project components within the study area, describing surface visibility and resulting surface coverage. A summary of the survey coverage and effective survey coverage is provided in Table 6-3.

Survey of each project component was restricted to areas within the study area's boundary. Note that the study area for each project component consists of the project area for that component (the area anticipated to be directly impacted) as well as a buffer zone surrounding the project area. Following the survey method, no effort was expended in surveying areas outside and adjacent to the boundaries of each project component's study area.

6.3.2 Ravensworth ash line

The proposed Ravensworth ash line passes through a landform of low rolling hills with low-gradient slopes, rounded tops, and flat-floored valleys free of erosion incision. Ephemeral drainage lines follow most of the valleys, as well as two semi-permanent or permanent creeklines: Pike's Creek and Bayswater Creek.

Existing above-ground pipelines run along the entire length of the ash line corridor. The ground under and adjacent to these pipelines shows remnant signs of earthworks carried out to level the ground surface when the pipelines were laid. The ground underneath and for two to four metres each side of the existing pipelines is interpreted as being highly disturbed as a result, and having neglible archaeological potential. Graded and stone-capped vehicle tracks run alongside the existing pipeline for most of the length of the ash-line corridor. These vehicle tracks and the ground immediately adjacent to them are highly disturbed by the grading, drain excavation, capping, and other earthworks required to construct the tracks. The vehicle tracks have negligible archaeological potential as a consequence. Various locallised areas of disturbance occur along the ash line corridor, where it is crossed by road bridges and conveyors; and where graded and gravel-capped laydown yards have been constructed. As a result, remnant intact areas of ground that appear to be free of prior disturbance make up only a minority of the ash line corridor.

Areas of the corridor that appeared free of major prior disturbance were surveyed on foot. Areas that had obviously been subject to major ground disturbance, resulting in negligible remaining archaeological potential, were not surveyed on foot. The decision to exclude such areas from the on-foot survey was made by consensus of all fieldworkers, following the agreed survey method (see Appendix B).

The areas of ground surveyed (those areas free from major prior disturbance) were vegetated with thick grass and undergrowth cover, as well as leaf litter accumulated in treed areas. Exposed areas were rare to absent along the ash line corridor.

6.3.3 Ash dam augmentation

The ash dam augmentation area consists of a landform of low rolling hills, with low to medium gradient slopes and rounded tops. Pike's Creek, a 1st order stream, runs through the area from the southwest to southeast. The landscape is hillier in the south of the area, and flatter in the north of the area.

The existing ash dam sits in the centre and covers the majority of the area. The dam wall runs north-south across the eastern end of the area, and areas inundated by water and ash slurry cover the majority of the area to the west of the dam. The construction of the dam wall and inundation of the ground surface by ash and water both represent a major disturbance to the original ground surface. Archaeological potential within these areas is negligible as a result.

The areas outside the existing ash dam can be divided into four contiguous sections: a section along the eastern edge, lying to the east of the existing dam wall; a section along the southern edge, running east-west along the southern edge of the currently inundated dam area; a section along the western edge, running north-south along the western edge of the currently inundated dam area; and a section along the northern edge, running east-west along the northern edge of the currently inundated dam area.

The section to the north of the dam area has been impacted by various prior ground-disturbing works. The proposed Ravensworth ash-line (see section 6.3.2) runs along the northern edge of this area. Adjacent to the ash dam itself, existing buildings, vehicle parking and laydown yards, vehicle tracks, and a pipeline have been constructed. A high-voltage powerline runs northwest-southeast through this section. The majority of this area has been subject to ground-disturbing works during the operational life of the ash dam and the power station. Areas without any signs of prior disturbance are rare, and the majority of the section has low to negligible archaeological potential as a result. The ground surface across this section has thick grass cover with eroded exposures. Exposures are randomly distributed and variable in size.

The section to the east of the dam wall shows no visible signs of disturbance, apart from those areas underneath or immediately adjacent to the dam wall itself, where buildings and other infrastructure, and earthworks to dam and control the course of Pike's Creek, which operate as seepage controls to manage and return seepage from the ash dam (AGL Macquaire, advise received 15/10/19) have been constructed. 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. 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 section to the south of the ash dam 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 are is interpreted as being intact. The original course of Pike's Creek would have run just to the north of this section. 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 area overall, however. Across most of the area the regolith consists of soils.

The section to the west of the ash dam consists of low rolling hills, which are round-topped, with low gradient sides and rounded flat-floored valleys. There are various visible signs of prior disturbance to the ground surface in the western section. Various vehicle tracks run through the section. Artificial ponds have been constructed, and signs of water ponding against the western edge of the ash dam are identifiable. Ponding of water in this section is probably the result of rainwater runoff from the ground to the west, which ponds against the artificially raised ground along the western edge of the ash dam. High voltage powerlines also run through this section. The ground is patterned with linear plough lines and furrows, indicating that the entire area has probably been subject to the low-level disturbance of ground ploughing and perhaps contour bank formation in the recent past. The ground surface is vegetated with thick grass cover. Eroded exposures, randomly distributed and of varying size, are present across this section.

6.3.4 Salt cake landfill

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.

6.3.5 Coal handling plant

The coal handling plant lies within a landscape of low rolling round-topped hills, which are forested with moderately dense tree cover. The area itself is highly disturbed by prior works, and is surrounded by areas that are similarly highly disturbed.

The majority of the area is currently buried underneath a coal stockpile, which itself sits on an area of ground that has been artificially lowered several metres by prior earthwork. The coal stockpile is surrounded by a drainage trench and a vertical excavation face rising up to the surrounding ground surface. The pre-contact ground surface, along with any archaeological material that might have existed there, has been removed in the process of excavating this lowered area of ground.

Areas of ground outside the coal stockpile itself also have signs of major prior ground disturbance. An encircling chain-link fence has been placed around the coal stockpile, on the ground surface above and adjacent to the vertical excavation face. The ground surface adjacent to this fence shows signs of earthwork associated with its construction, in the form of graded or flattened ground, and incised drainage channels diverting water runoff away from the fence and the coal stockpile within it.

Sealed roads encircle the coal handling plant on three sides (west, north and east). The roads are associated with visible signs of major ground disturbance, including earthworks to level the ground surface and to cut drainage channels adjacent to the roads. It is probable that areas of ground between the encircling roads and the coal handling plant were subject to extensive disturbance during construction of the roads either through direct impact of road-creating earthworks or through the movement of roadwork vehicles.

The ground surface lying between the roads and the coal stockpile fence is covered in thick mown grass, with dense plantings of trees in some areas. In planted areas, the ground surface is covered with leaf and bark litter.

To the south, the coal handling plant area is immediately adjacent to the power station itself. A dense array of buildings, conveyors, vehicle tracks, carparks and other infrastructure cover all the ground between the coal stockpile and the power station.

The entirety of the coal handling plant area is interpreted as having been subjected to major ground disturbance during the construction and operation of the power station. Archaeological potential in this area is negligible as a result.

6.3.6 Borrow pit 1

This area consists of low rolling hills, round topped, with low to medium gradient slopes, and flat-floored valleys. The ground surface rises upward to the north, toward the hilltops bordering the ash dam. To the south the ground surface slopes downward into a flat-floored valley running east-west along the area's southern border. A 1st order stream runs east through this valley, eventually joining Pike's Creek to the northeast.

Some small farm dams have been constructed along drainage lines within the area. No other signs of prior ground disturbance, aside from erosion, were identified in this area during the survey.

The ground surface is covered in thick grass, with sparse to no tree cover. Exposed areas of ground are rare. No areas of exposed bedrock were observed – instead, the ground surface consists of topsoil, the thickness of which could not be gauged.

The stream running along the southern edge of the area is slightly incised. Adjacent to the stream is a flattened benched area, probably a remnant of the banks of the stream prior to its incising down. Immediately adjacent to the current streambed, eroded exposed ground is present. The course of the stream is meandering, with areas of swampy ground and signs of ephemeral ponds visible in the ground surface. It is probable that this creek incorporated ponds and swampy areas prior to European land clearing.

6.3.7 Borrow pit 2

This area consists of rolling hills that are round-topped with medium to steep gradient slopes. The ground is highest in the centre of the area, dropping away to the north, east and west. The slopes running eastward drain into the headwaters of Pike's Creek. The slopes in the west and south of the area drain into Wiseman's Creek, which runs past the southern boundary of the area.

Erosion has stripped away the soil from several of the steepest slopes, and in some areas has exposed the underlying bedrock. In most areas, erosion has stripped away all topsoil and exposed the underlying yellow-orange subsoil. The edges of these eroded areas indicate that topsoil across the area is less than 10 cm thick.

Some small farm dams have been constructed along drainage lines within the area. No other signs of prior ground disturbance, aside from erosion, were identified in this area during the survey.

The ground surface is covered in thick grass, with sparse to no tree cover.

6.3.8 Borrow pit 3

This area consists of rolling hills that are round-topped with low to medium gradient slopes. The ground between the hills forms flat-floored valleys. The ground slopes downward toward the west of the area. An ephemeral creek runs from east to west through the centre of the area. This creek eventually joins Wisemans Creek to the west.

The ground surface is covered in moderate to thick grass cover, with sparse to no tree cover. Eroded exposures are moderately common across the area, are randomly distributed and of varying size.

Two farm dams have been constructed on the ephemeral creek running through the area. No other signs of prior ground disturbance, aside from erosion, were identified in this area during the survey.

6.3.9 Borrow pit 4

This area consists of rolling hills, with rounded tops, low gradient slopes and flat-floored valleys. The ground slopes downward to the northwest and south of the area. The southern half (approximately) of the area drains southward into a small ephemeral creek that runs southwest into Plashett Reservoir. The northern half of the area drains to the northwest into Wisemans Creek. Wisemans Creek runs west to east along the area's northern boundary.

The ground surface is covered in moderate to thick grass cover, with sparse to no tree cover. Eroded exposures are rare across the area, are randomly distributed and of varying size.

Some farm dams have been constructed on the ephemeral creek running through the area. Contour banks have been cut into the side of the hillslope toward the northern edge of the area, to control water runoff into Wisemans Creek. No other signs of prior ground disturbance, aside from erosion, were identified in this area during the survey.

6.3.10 HP pipe clearing (south)

This area consists of low rolling hills, with rounded tops, low to medium 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.

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 kilometer to the southwest. Just over a kilometer 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 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.

A number of roads and vehicle tracks run through the area. These have created areas of localised high prior disturbance, with no remaining archaeological potential. The installation of the HP pipe has similarly created areas of localised disturbance. The ground immediately underneath the HP pipe can be assumed to be severely disturbed, as ground-disturbing works such as stripping of topsoil and excavation of platforms for the pipe's concrete footings; and levelling of terrain in areas between the footings to enable alignment of the pipe, would have been carried out along most or all of the above-ground pipeline's length (see Figure 6-20). It can be inferred from this that the ground immediately beneath the pipe has no archaeological potential.

Areas adjacent to the HP 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 pipeline 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). If the disturbance of the ground resulting from these processes was sufficiently severe, it would remove any archaeological potential the area had. At present, however, it is not clear whether the impacts were this severe, based on observations made during the archaeological survey. The ground surface around the pipeline shows no visible signs of severe disturbance, such as downcut or flattened areas created through excavation or track grading. At this point, the precautionary conclusion is drawn that disturbance around the pipe would have functioned to reduce, but not entirely remove, the area's archaeological potential. Further investigation of the area, consisting of detailed survey and test excavations (see Section 9) would enhance our understanding of the nature and severity of prior disturbance.

In addition, sections of the HP pipeline are installed below ground and would have involved excavations approximately three metres wide and four metres deep (AGL Macquarie, advice received 15/10/19). In these areas the level of surface and subsurface disturbance would have been high, and any Aboriginal objects that might have been present on or under the original ground surface would now be destroyed, removed from the area, or scattered and distributed within the fill material around the subsurface pipe. As a consequence, the sections of pipeline in which the pipe is installed below the ground have no remaining archaeological potential.

6.3.11 HP pipe (north) and LSP pipe clearing

This area 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 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.

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.

A number of roads and vehicle tracks run through the area. These have created areas of localised high prior disturbance, with no remaining archaeological potential. The installation of the HP and LSP pipes have similarly created areas of localised disturbance. The ground immediately underneath the HP and LSP pipe can be assumed to be severely disturbed, as ground-disturbing works such as stripping of topsoil and excavation of platforms for the pipe's concrete footings; and levelling of terrain in areas between the footings to enable alignment of the pipe, would have been carried out along most or all of the above-ground pipeline's length. It can be inferred from this that the ground immediately beneath the pipe has no archaeological potential.

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). If the disturbance of the ground resulting from these processes was sufficiently severe, it would remove any archaeological potential the area had. At present, however, it is not clear whether the impacts were this severe, based on observations made during the archaeological survey. The ground surface around the pipeline shows no visible signs of severe disturbance, such as downcut or flattened areas created through excavation or track grading. At this point, the precautionary conclusion is drawn that disturbance around the pipe would have functioned to reduce, but not entirely remove, the area's archaeological potential. Further investigation of the area, consisting of detailed survey and test excavations (see Section 9) would enhance our understanding of the nature and severity of prior disturbance.

In addition, sections of the HP pipeline are installed below ground and would have involved excavations approximately three metres wide and four metres deep (AGL Macquarie, advice received 15/10/19). In these areas the level of surface and subsurface disturbance would have been high, and any Aboriginal objects that might have been present on or under the original ground surface would now be destroyed, removed from the area, or scattered and distributed within the fill material around the subsurface pipe. As a consequence, the sections of pipeline in which the pipe is installed below the ground have no remaining archaeological potential.

Table 6-3 Summary of survey coverage by project component

Survey Unit	Landform	Survey unit area (square km)	Visibility within exposures %	Exposure %	Effective coverage area (square km)	Effective coverage %
Ravensworth ash line	Rolling hills, low gradient slopes	0.4	90	1	0.0036	0.9
Ash dam augmentation	Rolling hills, low to medium gradient slopes	2.2	100	2.5	0.055	2.5
Salt cake landfill	Rolling hills, low gradient slopes	0.3	5	50	0.0075	2.5
Coal handling plant	Rolling hills, low gradient slopes	0.5	100	5	0.025	5
HP pipe clearing (south)	Rolling hills, low to medium gradient slopes	0.05	100	1	0.0005	1

Survey Unit	Landform	Survey unit area (square km)	Visibility within exposures %	Exposure %	Effective coverage area (square km)	Effective coverage %
HP pipe (north) and LSP pipe clearing	Rolling hills, low gradient slopes	0.05	100	1	0.0005	1
Borrow pit 1	Rolling hills, low to medium gradient slopes	0.2	100	2.5	0.005	2.5
Borrow pit 2	Rolling hills, medium to steep gradient slopes	0.2	100	5	0.01	5
Borrow pit 3	Rolling hills, low to medium gradient slopes	0.3	100	5	0.015	5
Borrow pit 4	Rolling hills, low gradient slopes	1.1	100	2.5	0.275	2.5

6.3.12 Aboriginal sites

Fourteen sites have previously been recorded within the study area (Table 6-4, see also Section 6.1.1).

This assessment identified an additional 23 sites (including isolated artefacts, artefact scatters, areas of PAD, and artefact scatters with associated areas of PAD).

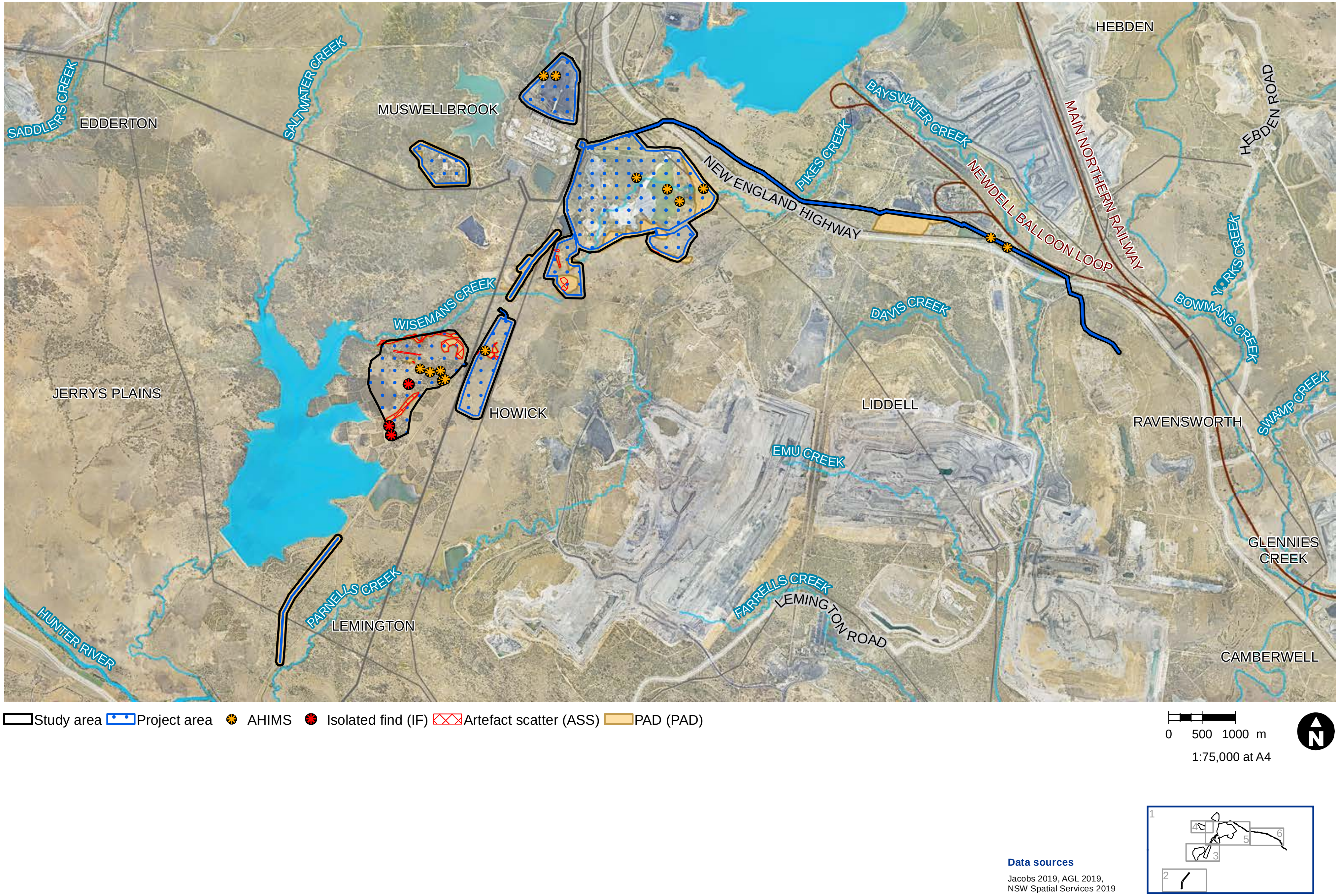
Table 6-4 Summary of sites in the study area.

Site ID	Project component area	Recorded by	Site type	Number of stone artefacts recorded	Other site features	Current status
37-3-1128	Ravensworth ash line	Umwelt, 2010	Isolated artefact	1		Recorded as destroyed
37-3-0491	Ravensworth ash line	Umwelt, 2000	Artefact scatter	3		Intact
37-2-0063	Coal handling plant	Dyall, 1978	Artefact scatter	More than 240		Presumed destroyed [1]
37-2-0062	Coal handling plant	Dyall, 1978	Artefact scatter	Unquantified	Hearths	Presumed destroyed [1]
37-2-0065	Ash dam augmentation	Unknown (no site card exists for this site)	Unknown	Unknown	Unknown	Presumed destroyed [1]
37-2-0047 / 37-2-0050	Ash dam augmentation	Dyall, 1978	Artefact scatter	Unquantified		Presumed destroyed [1]
37-3-007	Ash dam augmentation	Dyall, 1978	Artefact scatter	6		Presumed destroyed [1]
37-2-0048	Ash dam augmentation	Dyall, 1978	Artefact scatter	Unquantified		Intact

Site ID	Project component area	Recorded by	Site type	Number of stone artefacts recorded	Other site features	Current status
37-2-0058	Borrow pits	Koettig 1992	Artefact scatter	4		Intact
37-2-0557	Borrow pits	Koettig, 1992	Artefact scatter	20		Intact
37-2-0556	Borrow pits	Koettig, 1992	Artefact scatter	Unquantified		Intact
37-2-0555	Borrow pits	Koettig, 1992	Artefact scatter	Unquantified		Intact
37-2-0553	Borrow pits	Koettig, 1992	Artefact scatter	Unquantified		Intact
37-2-0554	Borrow pits	Koettig, 1992	Artefact scatter	Unquantified		Intact
BAYS PAD17	Ravensworth ash line	This assessment	PAD	0		Intact
BAYS PAD18	Ravensworth ash line	This assessment	PAD	0		Intact
BAYS PAD19	Ravensworth ash line	This assessment	PAD	0		Intact
BAYS PAD13	Salt cake landfill	This assessment	PAD	0		Intact
BAYS PAD08	HP and LSP pipe clearing	This assessment	PAD	0		Intact
BAYS PAD16	Ash dam augmentation	This assessment	PAD	0		Intact
BAYS PAD14	Ash dam augmentation	This assessment	PAD	0		Intact
BAYS AS and PAD15	Borrow pits	This assessment	Artefact scatter and PAD	13		Intact
BAYS AS09	Borrow pits	This assessment	Artefact scatter	4		Intact
BAYS AS and PAD10	Borrow pits	This assessment	Artefact scatter and PAD	6		Intact
BAYS PAD12	Borrow pits	This assessment	PAD	0		Intact
BAYS AS and PAD11	Borrow pits	This assessment	Artefact scatter and PAD	27	Probable Aboriginal hearth	Intact
BAYS AS and PAD07	Borrow pits	This assessment	Artefact scatter and PAD	17		Intact
BAYS AS06	Borrow pits	This assessment	Artefact scatter	6		Intact
BAYS AS and PAD05	Borrow pits	This assessment	Artefact scatter and PAD	135		Intact
BAYS AS04	Borrow pits	This assessment	Artefact scatter	25		Intact
BAYS AS and PAD03	Borrow pits	This assessment	Artefact scatter and PAD	8		Intact
BAYS IF04	Borrow pits	This assessment	Isolated artefact	1		Intact
BAYS AS and PAD02	Borrow pits	This assessment	Artefact scatter and PAD	1		Intact
BAYS IF03	Borrow pits	This assessment	Isolated artefact	1		Intact

Site ID	Project component area	Recorded by	Site type	Number of stone artefacts recorded	Other site features	Current status
BAYS IF02	Borrow pits	This assessment	Isolated artefact	1		Intact
BAYS IF01	Borrow pits	This assessment	Isolated artefact	1		Intact
BAYS PAD01	HP and LSP line clearing	This assessment	PAD	0		Intact

[1] Site presumed destroyed as its recorded location is within an area severely impacted by existing operational infrastructure.



Data sources

Jacobs 2019, AGL 2019, NSW Spatial Services 2019

GDA94 MGA56

Figure 6-3 Overview of study area showing all Aboriginal sites

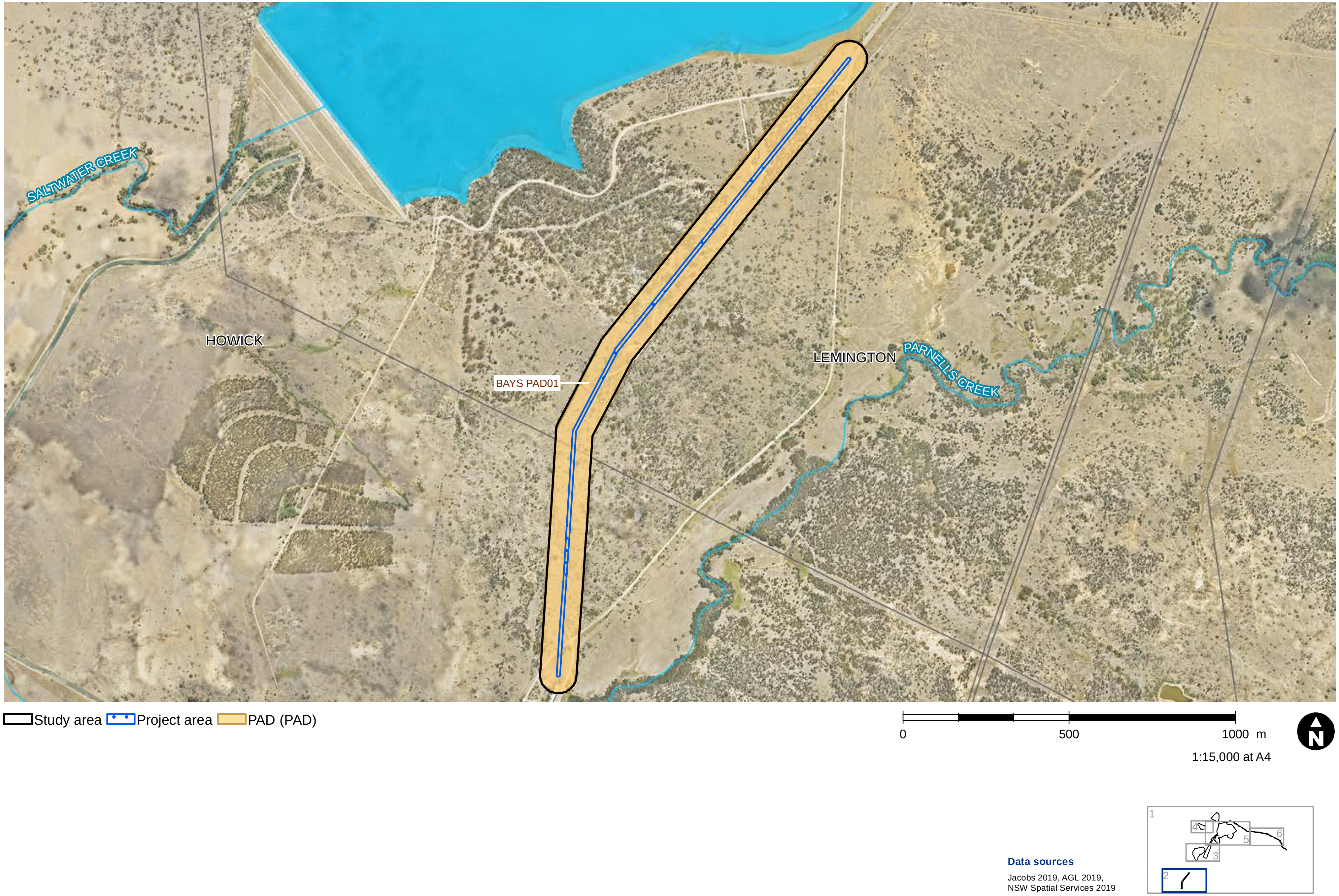
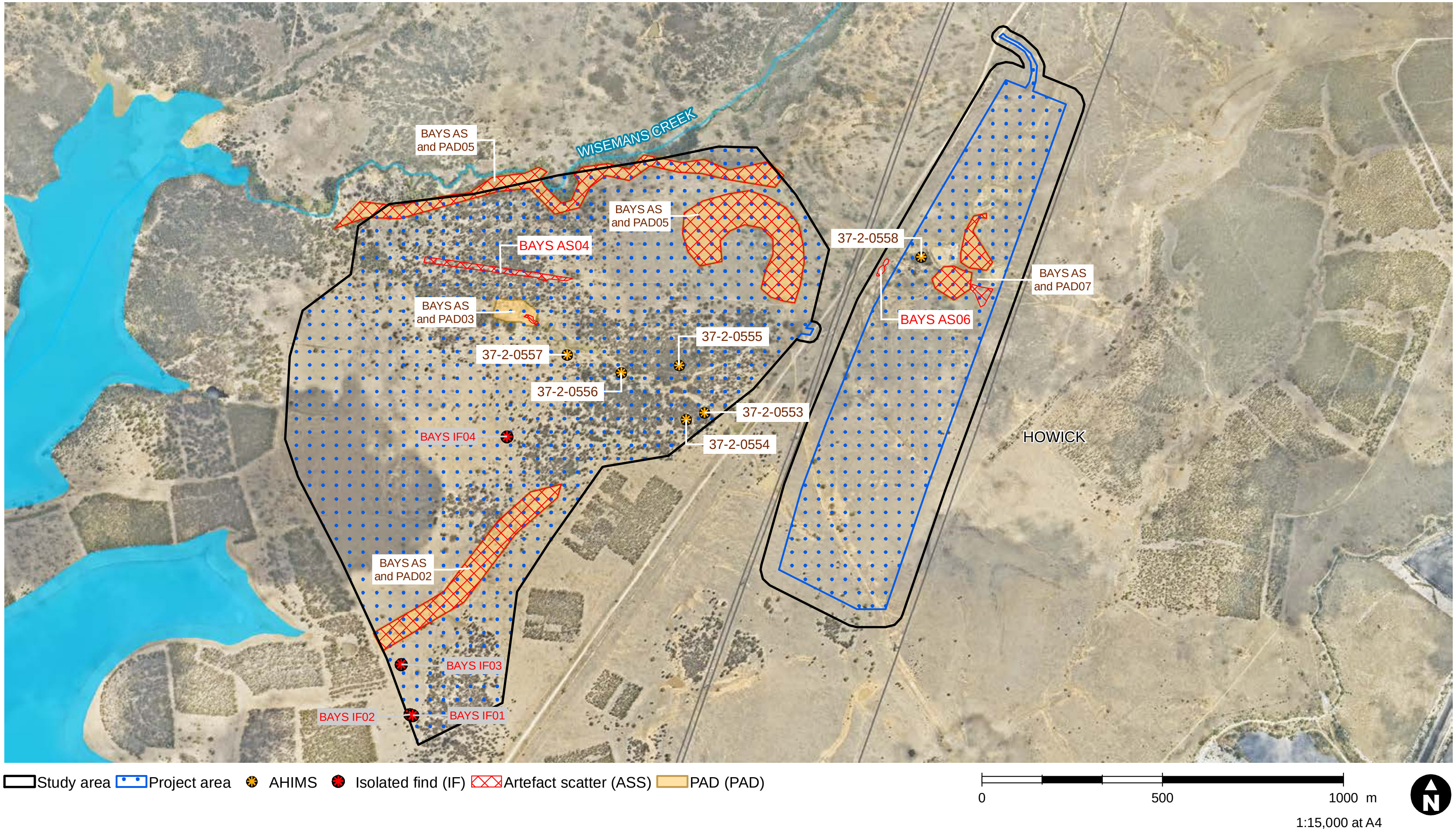


Figure 6-4 Aboriginal sites within the HP pipe clearing (south)

Date: 18/10/2019 Path: J:\IE\Projects\04_Eastern\IA215400\22_Spatial\GIS\Directory\Templates\Figures\WOAOW_ACHAR\IA215400_GIS_ACHAR_F002_r2v1_Aboriginal_survey.mxd
Created by : XX | QA by : XX

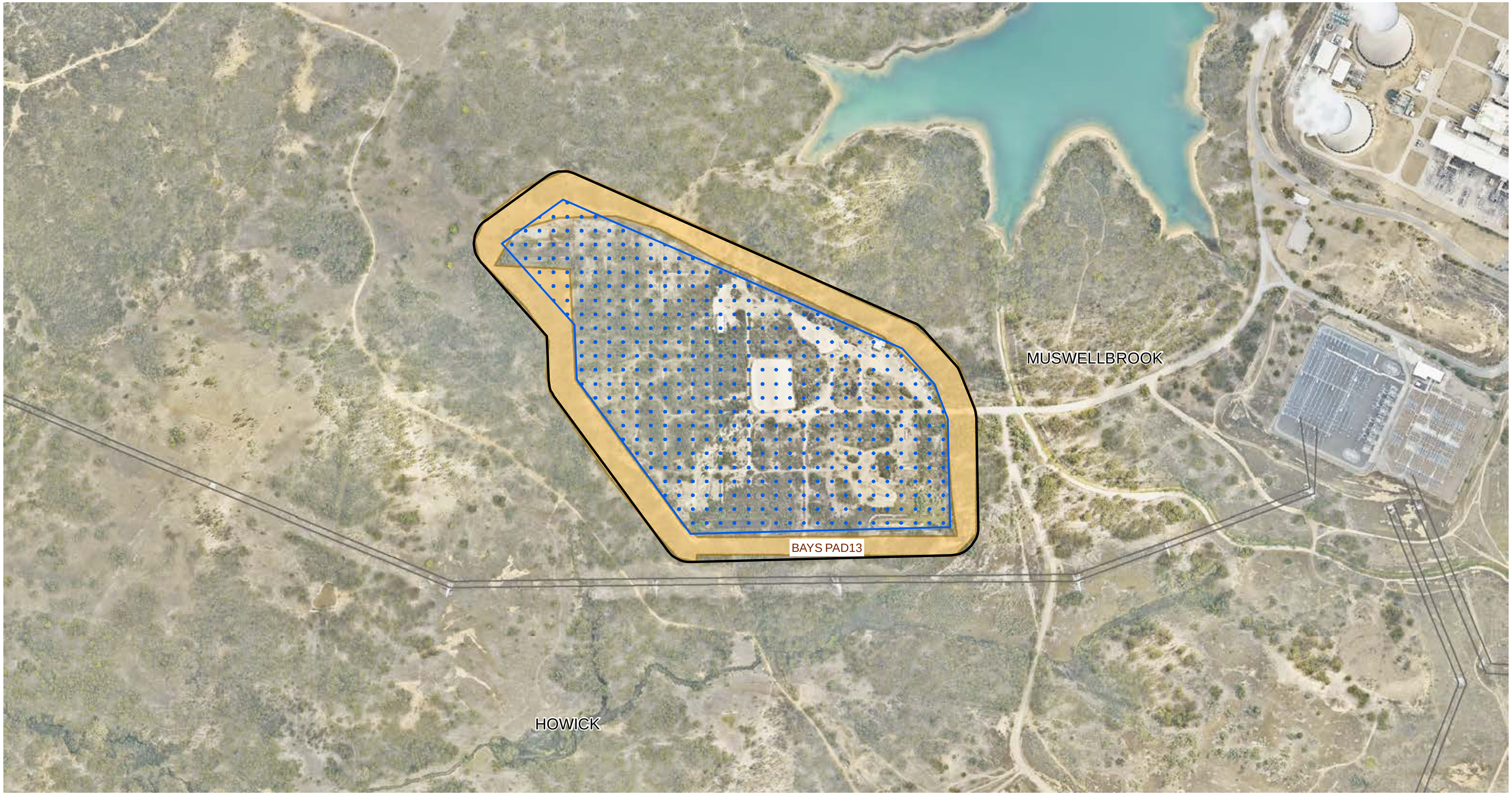


Data sources

Jacobs 2019, AGL 2019,
NSW Spatial Services 2019

GDA94 MGA56

Figure 6-5 Aboriginal sites within borrow pit 3 and borrow pit 4

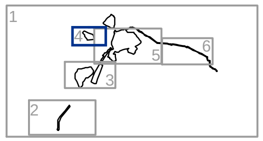


Study area Project area PAD (PAD)

0 500 1000 m

1:10,000 at A4

N

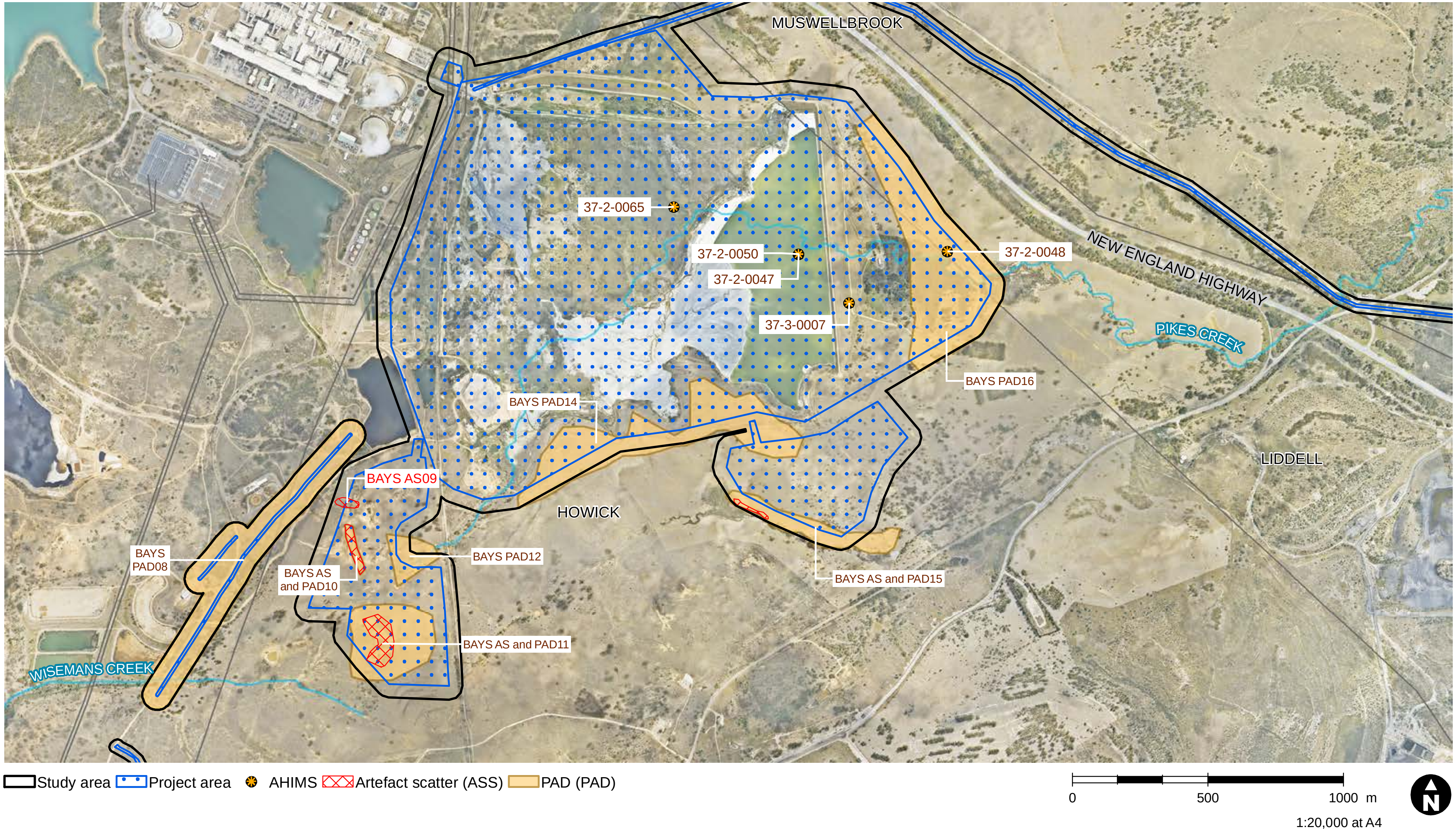


Data sources

Jacobs 2019, AGL 2019,
NSW Spatial Services 2019

GDA94 MGA56

Figure 6-6 Aboriginal sites within the salt cake landfill

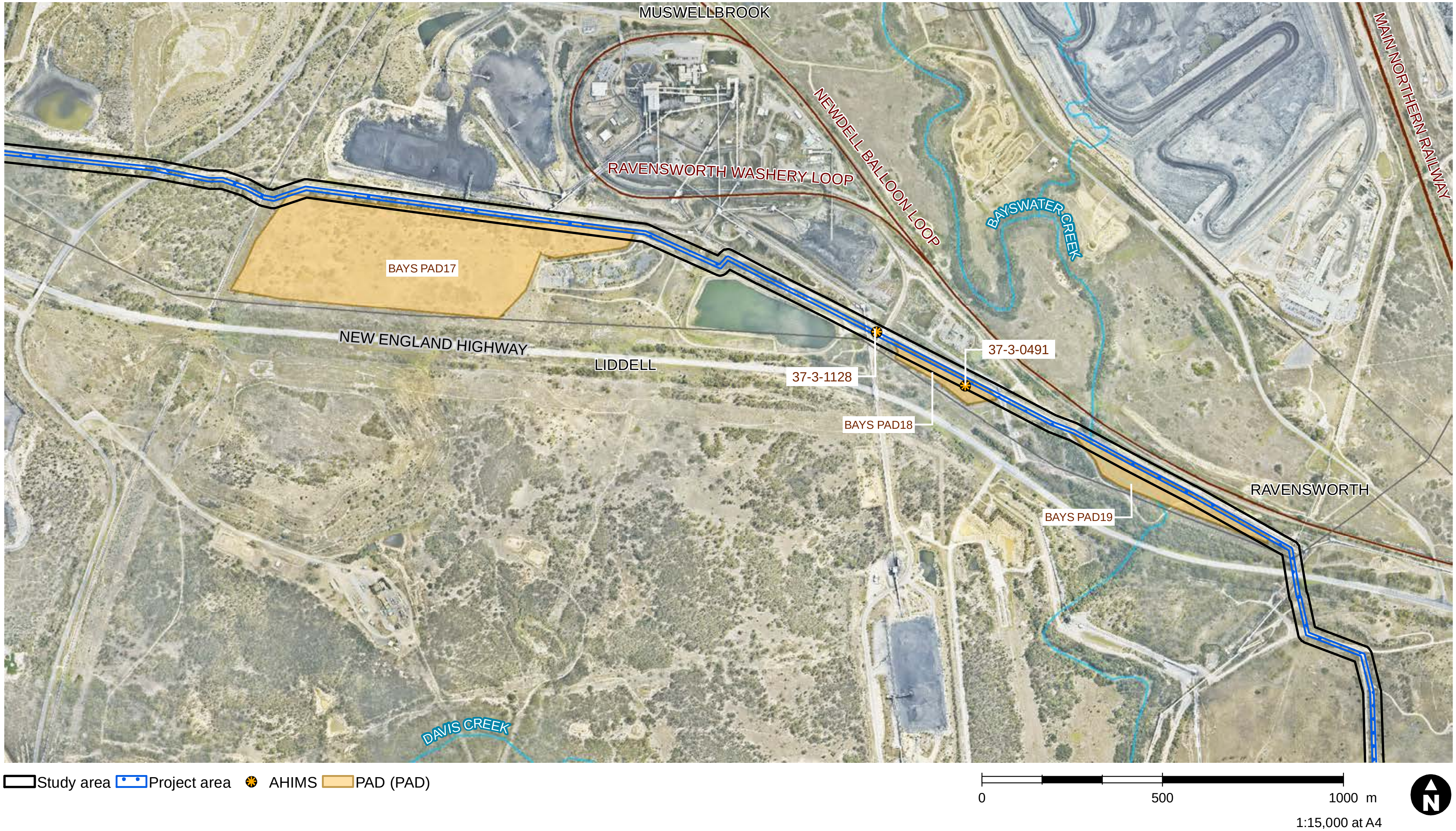


Data sources

Jacobs 2019, AGL 2019, NSW Spatial Services 2019

Figure 6-7 Aboriginal sites within the HP pipe (north) and LSP pipe clearing; borrow pit 1; borrow pit 2; and ash dam augmentation

Date: 18/10/2019 Path: J:\IE\Projects\04_Eastern\IA215400\22_Spatial\GIS\Directory\Templates\Figures\WOAOW_ACHAR\IA215400_GIS_ACHAR_F002_r2v1_Aboriginal_survey.mxd
Created by : XX | QA by : XX



Data sources

Jacobs 2019, AGL 2019, NSW Spatial Services 2019

GDA94 MGA56

Figure 6-8 Aboriginal sites within the Ravensworth ash line

6.3.12.1.1 BAYS AS and PAD05

Project component: Borrow pit 4 (Figure 6-5)

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 (Figure 6-9), and extend downward to the banks of Wisemans Creek to the northwest. An area of PAD extends along the southern bank of Wisemans Creek (Figure 6-10) (the northern bank lies outside the area of Borrow pit 4 and so was not assessed).

Figure 6-9 Exposed area on a midslope looking east, part of BAYS AS and PAD05

Figure 6-10 Area of PAD along the southern bank of Wisemans Creek looking west, part of BAYS AS and PAD05

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 (Table 6-5). 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.

Table 6-5 Artefacts found at BAYS AS and PAD05 by type and material

Type	IMSTC	Silcrete	Quartz	Quartzite	Sum
Unretouched flake	65	35	6	1	107
Retouched flake	8	3	0	0	11
Flaked piece	7	1	0	0	8
Core	5	2	0	0	7
Hammer	0	0	0	2	2
Sum	85	41	6	3	135

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 pre-contact 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.

6.3.12.1.2 BAYS AS04

Project component: Borrow pit 4 (Figure 6-5)

This site is a sparse scatter of stone artefacts on the ground surface, found in the exposed ground created by a vehicle track and its associated erosional exposures. The vehicle track is uncapped and shows no signs of having been graded (Figure 6-11).

Figure 6-11 Exposure along vehicle track (foreground) looking southwest, BAYS AS04

Wisemans Creek lies approximately 200 m to the north. An ephemeral creek lies approximately 100 m to the south.

Twenty-five artefacts were recorded (Table 6-6). Most artefacts were unretouched flakes, with flaked pieces, a retouched flake, a core and a hammer also present. IMSTC was the most common material, followed by silcrete, igneous rock, and quartzite.

Table 6-6 Artefacts found at BAYS AS04 by Type and Material

Type	IMSTC	Silcrete	Igneous	Quartzite	Sum
Unretouched flake	13	5	0	1	19
Flaked piece	3	0	0	0	3
Core	0	1	0	0	1
Hammer	0	0	1	0	1

Type	IMSTC	Silcrete	Igneous	Quartzite	Sum
Retouched flake	0	1	0	0	1
Sum	16	7	1	1	25

The potential for artefacts to be present in subsurface deposits in the immediately surrounding landscape is assessed as being low. The surface assemblage along the vehicle track is sparse. It is likely that the ground surrounding the site contains subsurface artefacts, but these are likely to be similarly sparse and consequently would be difficult to detect through a typical program of test excavation.

6.3.12.1.3 BAYS AS and PAD03

Project component: Borrow pit 4 (Figure 6-5)

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 (Figure 6-12).

Figure 6-12 BAYS AS and PAD03 looking east

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 (Table 6-7). 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.

Table 6-7 Artefacts found at BAYS AS and PAD03 by type and material

Type	Silcrete	IMSTC	Sum
Unretouched flake	6	1	7
Retouched flake	1	0	1
Sum	7	1	8

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.

6.3.12.1.4 BAYS IF04

Project component: Borrow pit 4 (Figure 6-5)

This site is an isolated artefact, found in a small eroded exposure on a saddle between two low round-topped hills. The artefact is an unretouched flake made from IMSTC (Table 6-8).

An ephemeral creek lies around 200 m to the southeast of the artefact.

Table 6-8 Artefacts found at BAYS IF04 by type and material

Type	IMSTC	Sum
Unretouched flake	1	1
Sum	1	1

The potential for additional artefacts to be present in subsurface deposits in this area is assessed as being low. The isolated surface artefact is not associated with any larger scatter. If artefacts are present in subsurface deposits in the immediately surrounding area, they are unlikely to be in sufficiently high density to be detectable through a typical program of test excavation.

6.3.12.1.5 BAYS AS and PAD02

Project component: Borrow pit 4 (Figure 6-5)

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 (Table 6-9). The artefact was on an erosional surface at the edge of the incised course of the ephemeral creek.

Table 6-9 Artefacts found at BAYS AS and PAD02 by type and material (needs updating)

Type	IMSTC	Sum
Unretouched flake	1	1
Sum	1	1

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.

6.3.12.1.6 BAYS IF01

Project component: Borrow pit 4 (Figure 6-5)

This site is an isolated surface artefact, on the mid-slope of a low gradient slope of a round-topped hill. The slope faces north, with the ground dropping down to the ephemeral creek on which BAYS AS and PAD02 is situated. The artefact is an unretouched flake made from IMSTC (Table 6-10).

The ephemeral creek lies approximately 200 m to the north.

Table 6-10 Artefact found at BAYS IF01 by type and material

Type	IMSTC	Sum
Unretouched flake	1	1
Sum	1	1

The potential for additional artefacts to be present in subsurface deposits in this area is assessed as being low. The isolated surface artefact is not associated with any larger scatter. If artefacts are present in subsurface deposits in the immediately surrounding area, they are unlikely to be in sufficiently high density to be detectable through a typical program of test excavation.

6.3.12.1.7 BAYS IF02

Project component: Borrow pit 4 (Figure 6-5)

This site is an isolated surface artefact, on the mid-slope of a low gradient slope of a round-topped hill. The slope faces north, with the ground dropping down to the ephemeral drainage line on which BAYS AS and PAD02 is situated. The artefact is an unretouched flake made from IMSTC (Table 6-11).

The ephemeral creek lies approximately 200 m to the north.

Table 6-11 Artefact found at BAYS IF02 by type and material

Type	IMSTC	Sum
Unretouched flake	1	1
Sum	1	1

The potential for additional artefacts to be present in subsurface deposits in this area is assessed as being low. The isolated surface artefact is not associated with any larger scatter. If artefacts are present in subsurface deposits in the immediately surrounding area, they are unlikely to be in sufficiently high density to be detectable through a typical program of test excavation.

6.3.12.1.8 BAYS IF03

Project component: Borrow pit 4 (Figure 6-5)

This site is an isolated surface artefact, on the mid-slope of a low gradient slope of a round-topped hill. The slope faces north, with the ground dropping down to the ephemeral drainage line on which BAYS AS and PAD02 is situated. The ephemeral creek lies approximately 75 metres to the north.

The artefact is a core made from IMSTC (Table 6-12).

Table 6-12 Artefact found at BAYS IF03 by type and material

Type	IMSTC	Sum
Core	1	1
Sum	1	1

The potential for additional artefacts to be present in subsurface deposits in this area is assessed as being low. The isolated surface artefact is not associated with any larger scatter. If artefacts are present in subsurface deposits in the immediately surrounding area, they are unlikely to be in sufficiently high density to be detectable through a typical program of test excavation.

6.3.12.1.9 BAYS AS and PAD07

Project component: Borrow pit 3 (Figure 6-5)

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 (Figure 6-13). 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.

Figure 6-13 BAYS AS and PAD07 looking south

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 (Table 6-13).

Table 6-13 Artefacts found at BAYS AS and PAD07 by type and material

Type	Silcrete	IMSTC	Sum
Unretouched flake	10	5	15
Core	1	0	1
Flaked piece	1	0	1
Sum	12	5	17

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.

6.3.12.1.10 BAYS AS06

Project component: Borrow pit 3 (Figure 6-5)

This site is a scatter of artefacts located on the edges of an ephemeral drainage line that flows from east to west across the area of Borrow pit 3. 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 larger artefact scatter and associated area of PAD (BAYS AS and PAD06) lies approximately 200m to the east, on the same creekline.

The ground surface is vegetated by thick grass cover, with sparse to no tree cover (Figure 6-14). On the banks of the ephemeral creek, erosional exposures are common, many of which have been downcut to depths of 5-20 cm below the surrounding ground surface. The ground adjacent to the creek bank rises to the north and the south, with no flattened areas of old creek bank identifiable in the immediately surrounding area.

Figure 6-14 BAYS AS 06 looking east

The immediate surrounds of this site have been substantially disturbed by the construction of a road, which runs along a raised embankment immediately to the west of the site, and by a farm dam to the east that has caused erosion of the creekline immediately adjacent to the site to the east.

Six artefacts were recorded, all of which are in eroded exposures immediately adjacent to the ephemeral creek. The majority are unretouched flakes, with one core and one flaked piece also present. Silcrete is the most common material, followed by IMSTC and quartzite (Table 6-14).

Table 6-14 Artefacts found at BAYS AS06 by type and material

Type	Silcrete	IMSTC	Quartzite	Sum
Unretouched flake	2	2	0	4
Core	0	0	1	1
Flaked piece	1	0	0	1
Sum	3	2	1	6

The potential for artefacts to be present in the subsurface deposits adjacent to the artefact scatter is assessed as being low. The surrounding ground shows signs of substantial erosion in the recent past, associated with the construction of the farm dam to the east, which has probably functioned to scour away much of the topsoil in this area. Unlike BAYS AS and PAD06 (lying to the east of this site), the creek here does not possess any flat raised areas of ground that could plausibly be surviving remnants of the pre-contact creek banks. Any creek bank areas that were present have presumably been scoured away by erosion during periods when the creek was flowing or in flood. The potential for subsurface artefacts to be buried in the soils and sediments surrounding the site is judged to be low as a consequence.

6.3.12.1.11 BAYS AS09

Project component: Borrow pit 2 (Figure 6-7)

This site is a small sparse scatter of artefacts lying on exposed bedrock and saphrolitic bedrock on a steep mid slope. The slope, which runs downward toward the north, has been heavily eroded, with no topsoil or subsoil remaining in this eroded area (Figure 6-15).

The surrounding landscape consists of rolling hills with moderate to high gradient slopes. Vegetation consists of thick grass cover, with frequent patches of exposed erosional ground.

Figure 6-15 BAYS AS09 looking east

Four artefacts were recorded on this site. Two are unretouched flakes, with one core and one retouched flake also present. Three of the artefacts are made from IMSTC, and one from silcrete (Table 6-15).

Table 6-15 Artefacts found at BAYS AS09 by type and material

Type	IMSTC	Silcrete	Sum
Unretouched flake	1	1	2
Core	1	0	1
Retouched flake	1	0	1
Sum	3	1	4

There is negligible potential for subsurface artefacts to be present within or surrounding this surface scatter of artefacts. Severe erosion in this area of Borrow pit 2 has stripped away all topsoil and subsoil from the entire mid slope of the hill, exposing the underlying bedrock. No patches of remnant sediment or soil are present, and as a consequence there is no potential for subsurface artefacts to be present.

6.3.12.1.12 BAYS AS and PAD10

Project component: Borrow pit 2 (Figure 6-7)

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 (Figure 6-16).

Figure 6-16 BAYS AS and PAD10 looking west

Six artefacts were recorded, all of which are unretouched flakes made from IMSTC (Table 6-16). 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.

Table 6-16 Artefacts found at BAYS AS and PAD10 by type and material

Type	IMSTC	Sum
Unretouched flake	6	6
Sum	6	6

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.

6.3.12.1.13 BAYS AS and PAD11

Project component: Borrow pit 2 (Figure 6-7)

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 (Figure 6-17). 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.

Figure 6-17 BAYS AS and PAD11 looking north

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 (Table 6-17).

Table 6-17 Artefacts found at BAYS AS and PAD11 by material and type

Type	IMSTC	Silcrete	Quartz	Sum
Unretouched flake	18	4	1	23
Core	1	1	0	2
Flaked piece	1	0	0	1
Retouched flake	0	1	0	1
Sum	20	6	1	27

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 (Figure 6-18).

Figure 6-18 Probable Aboriginal hearth at BAYS AS and PAD11, looking west

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.

6.3.12.1.14 BAYS PAD12

Project component: Borrow pit 2 (Figure 6-7)

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.

6.3.12.1.15 BAYS PAD14

Project component: Ash dam augmentation and Borrow pit 1 (Figure 6-7)

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 (Figure 6-19). 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.

Figure 6-19 BAYS PAD14 looking northeast

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.

6.3.12.1.16 BAYS PAD01

Project component: HP Pipe clearing (south) (Figure 6-4)

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 (Figure 6-20). Ground surface visibility is close to zero, with no areas of ground exposure being observed during the survey.

Figure 6-20 BAYS PAD01 looking northwest

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.

6.3.12.1.17 BAYS PAD08

Project component: HP pipe (north) and LSP pipe clearing (Figure 6-7)

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 (Figure 6-21). Ground surface visibility is close to zero, with no areas of ground exposure being observed during the survey.

Figure 6-21 BAYS PAD08 looking northeast

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.

6.3.12.1.18 BAYS PAD13

Project component: Salt cake landfill (Figure 6-6)

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 (Figure 6-22). 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.

Figure 6-22 A section of BAYS PAD13 (top left of frame) looking west with disturbed ground in foreground

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.

6.3.12.1.19 BAYS PAD16

Project component: Ash dam augmentation (Figure 6-7)

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.

6.3.12.1.20 BAYS PAD17

Project component: Ravensworth ash line (Figure 6-8)

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.

Figure 6-23 BAYS PAD17 (top of frame) looking west, showing existing pipeline

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.

6.3.12.1.21 BAYS PAD18

Project component: Ravensworth ash line (Figure 6-8)

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 (Figure 6-24).

Figure 6-24 BAYS PAD18 looking southwest

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.

6.3.12.1.22 BAYS PAD19

Project component: Ravensworth ash line (Figure 6-8)

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 (Figure 6-25).

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.

Figure 6-25 BAYS PAD19 (top right of frame) showing existing pipeline

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.

6.3.12.1.23 BAYS AS and PAD15

Project component: Borrow pit 1 (Figure 6-7)

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 (Table 6-18).

Table 6-18 Artefacts found at BAYS AS and PAD15 by type and material

Type	IMSTC	Silcrete	Sum
Unretouched flake	8	3	11
Core	1	0	1
Retouched flake	0	1	1
Sum	9	4	13

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.

6.3.13 Artefact types and materials

In this section, and in Section 6.3.14, the artefacts found across all sites have been pooled into a single dataset, to provide information about the stone artefacts found within the study area as a whole. This analysis does not attempt to discuss variability between individual sites, as the number of artefacts found and recorded on most sites is too small to enable a robust analysis of inter-site variation.

Most of the stone artefacts identified during the survey are flaked artefacts, with three hammers being the only non-flaked stone artefacts (Figure 6-26). Unretouched flakes are the most common artefact type, followed by retouched flakes and cores. Flaked pieces (ambiguous broken or damaged artefacts which could either be cores or flakes) are also present. The high proportion of unretouched flakes in relation to other artefact types is typical for stone artefact assemblages.

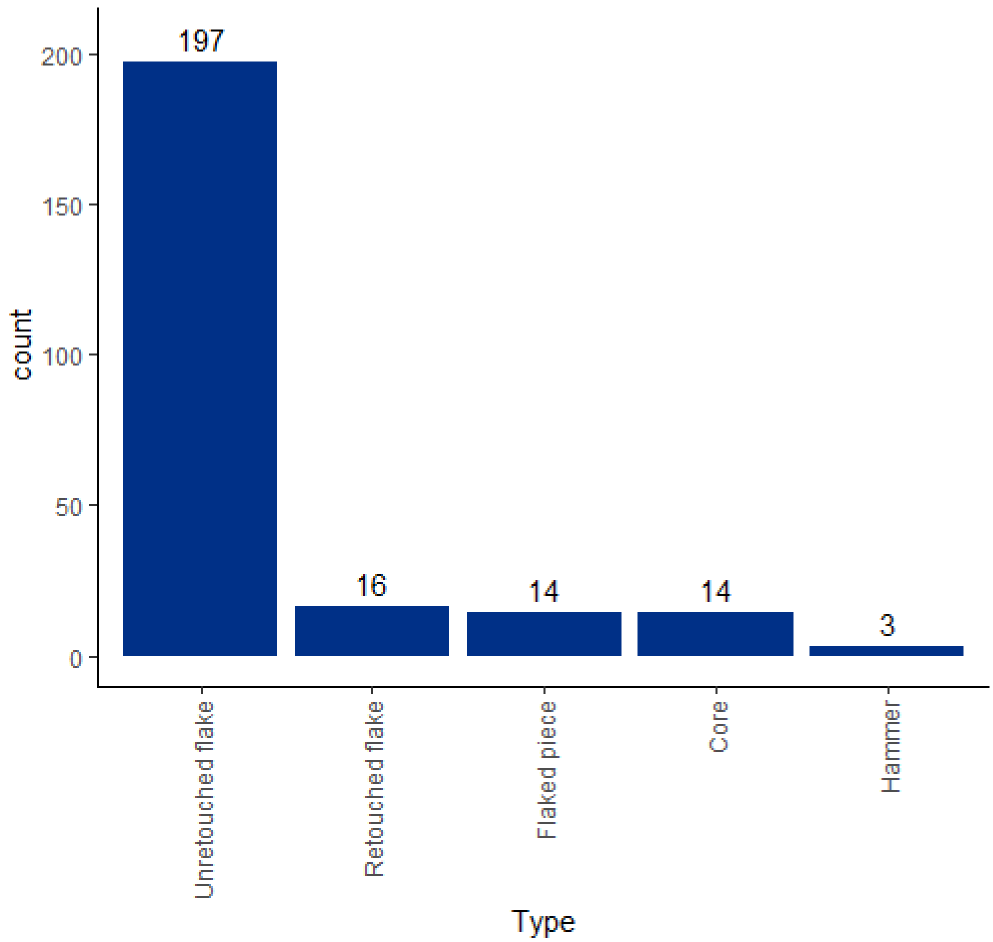


Figure 6-26 Barplot of all artefacts recorded, by type

A diverse variety of implement types were recorded during the survey (Figure 6-27). Two backed artefacts (one triangle and one of indeterminate shape); two burins; two nose scrapers; one side scraper; and one end-scraper (similar to a tula in size, shape, and location of retouch - but not thick and robust enough, and lacking the prominently convex bulbar ventral surface). Eight amorphously retouched flakes, which do not fall into any established implent type, were also recorded. These preliminary results indicate that a diverse range of technological strategies were being employed across the study area, in terms of the ways in which flakes were retouched. The production of retouched flakes does not seem to be geared toward the production of any single implement type.

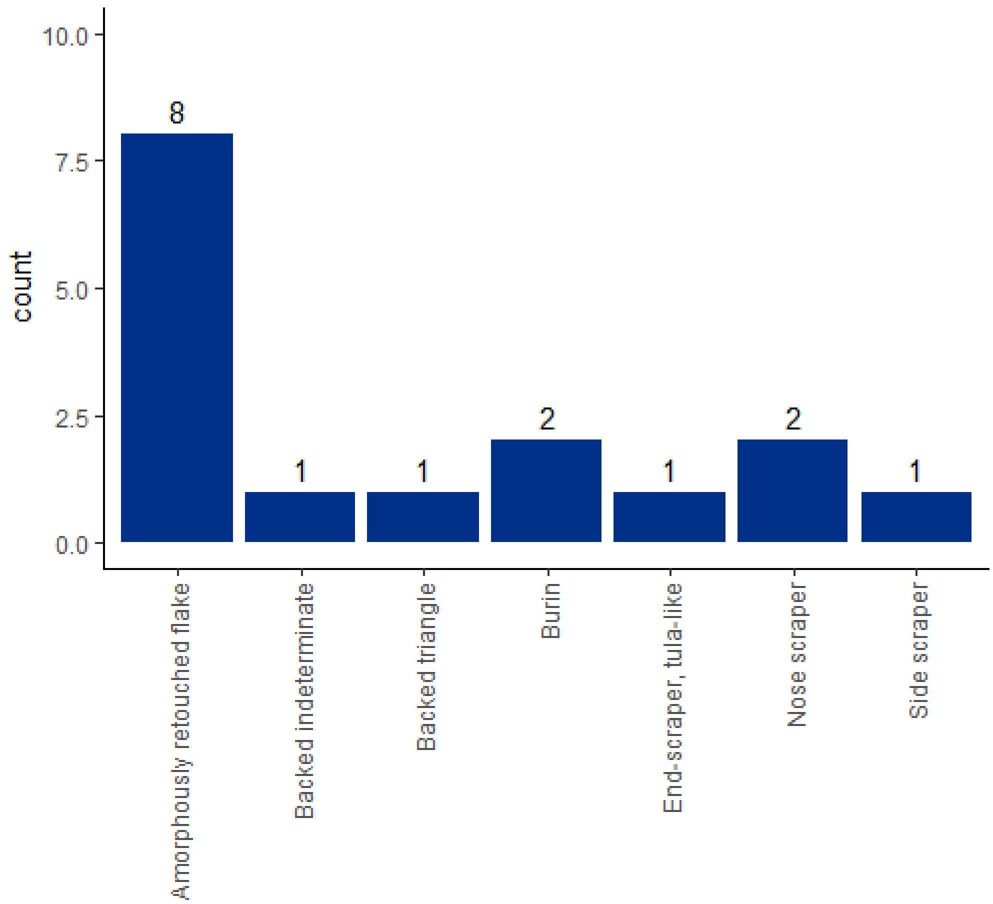


Figure 6-27 Barplot of all retouched flakes, by implement type

The artefacts recorded during the survey are made from five material categories (Figure 6-28). IMSTC (Indurated mudstone, silicified tuff, chert) is the most common material type. Silcrete is the next most common type for artefacts to be made from, with quartz, quartzite and igneous artefacts present in lower numbers.

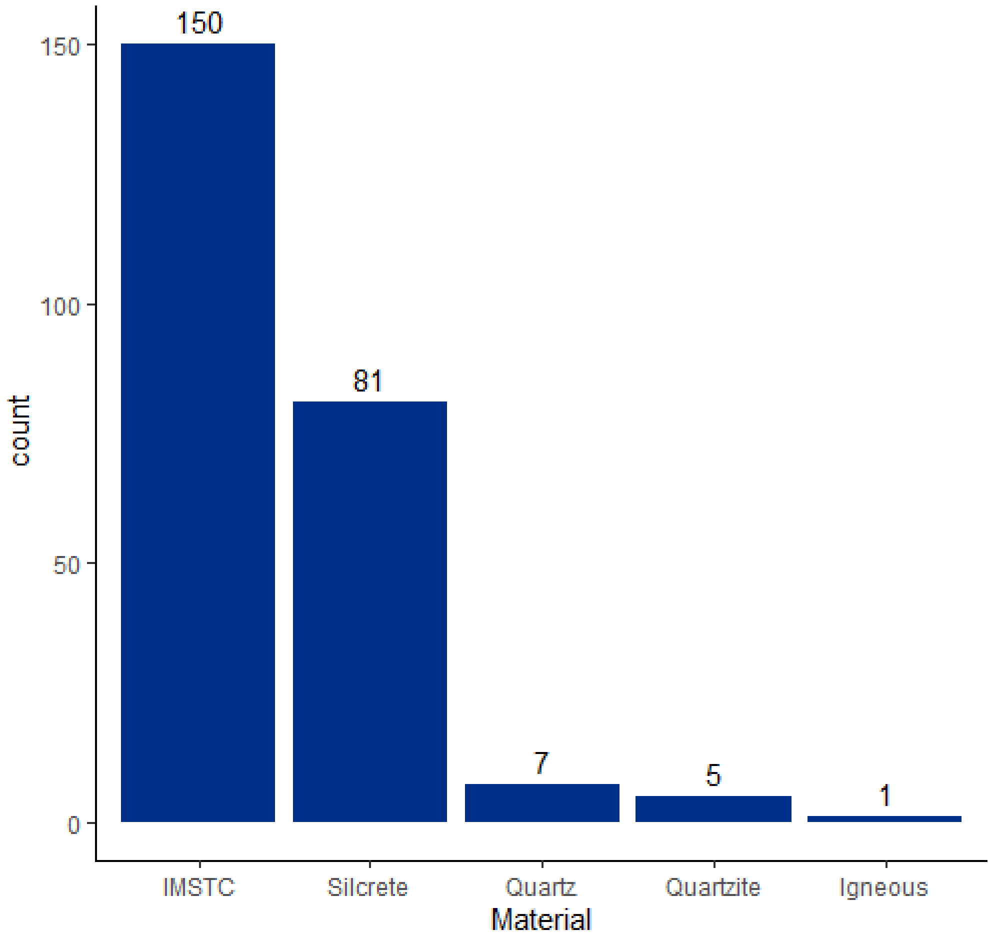


Figure 6-28 Barplot of all artefacts recorded, by material

IMSTC is a material category that is highly variable in colour and texture. Artefacts made from this material ranged in colour from white to grey, brown, red, and yellow. Fracture surfaces ranged from fresh in appearance to patinated and slightly chalky and friable. Fracture surfaces ranged from smooth and glassy to moderately rough and grainy. Much of this variability probably results from the different geological origin of the materials from which the artefacts are made. Some of the artefacts might well be true cherts, with a microcrystalline structure and composed entirely of silica. Other artefacts might be indurated mudstone, and retain the colour and grain-structure of the sediments they are derived from. Others again might be silicified tuff, retaining the colour and texture of the tuff deposits they are derived from. In some cases, materials might be indurated sediments that were mixtures of sedimentary material and reworked tuffaceous deposits, in which case individual nodules of material could retain complex variability in mineral composition and texture. The variability could indicate that materials have been procured from different source areas. Specific geographical locations have been identified for several distinctive types of mudstone in this part of the Hunter Valley (Hickey pers. comm.).

Silcrete also showed a range of variability in appearance across artefacts. Colours ranged across red, yellow, grey, brown, and cream. Grain size ranged from under a tenth of a millimeter to over two millimetres in diameter. Fracture surfaces ranged from smooth surfaces that cut through individual grains, to rough surfaces where fractures travelled preferentially around grains. The variability of material appearance across artefacts could indicate that the silcrete being utilised in this area has been procured from a number of different source areas.

This interpretation is supported by previous observations of sites in this part of the Hunter Valley, which have identified sources for some distinctive silcrete types (Hickey pers. comm.).

Detailed recording of material colour, texture and appearance for individual artefacts was beyond the scope of this survey. A large sample of artefacts were photographed in the field, however, to provide a record of the variability in material appearance.

The quartz artefacts identified in this survey are relatively consistent in appearance. The quartz utilised is universally high-quality white vein quartz, with few internal flaws. Fracture surfaces were relatively smooth, with little evidence that the crystal structure of the quartz was dictating fracture paths or causing fractures to be diverted or perturbed as they travelled through the material. The total number of quartz artefacts found in the survey is small, but these preliminary results indicate that Aboriginal people in this area were able to preferentially target high quality quartz for artefact manufacture.

Quartzite artefacts were made from fine-grained quartzites. Fracture surfaces were relatively smooth, preferentially travelling around the small and uniformly-sized grains in the material. The total number of quartzite artefacts found in the survey is small, but these results indicate that Aboriginal people were able to preferentially target high quality quartzite for artefact manufacture.

The data from the artefacts identified during the survey indicate that Aboriginal people in this area preferentially utilised particular materials for the production of different types of artefact. None of the quartz or quartzite flakes have been retouched (Table 6-19). All retouched flakes are made from IMSTC or from silcrete. Although the small number of quartz and quartzite artefacts mean that this pattern could plausibly be due to sampling error, the data we have indicate that retouching of flakes was preferentially carried out on IMSTC and silcrete.

The three hammers found during the survey are made from igneous rock and quartzite, with no hammers made from IMSTC, quartz or silcrete. This indicates that Aboriginal people preferentially utilised these materials for use as hammers, which is consistent with the fact that igneous rock and quartzite are typically tougher and more fracture resistant than quartz, chert, and indurated sedimentary rocks such as silcrete and mudstone (Domanski *et al.* 1994).

Table 6-19 All artefacts by type and material

Type	IMSTC	Silcrete	Quartz	Quartzite	Igneous	Sum
Unretouched flake	122	66	7	2	0	197
Retouched flake	9	7	0	0	0	16
Core	8	5	0	1	0	14
Flaked piece	11	3	0	0	0	14
Hammer	0	0	0	2	1	3
Sum	150	81	7	5	1	244

6.3.14 Artefact morphology and technological systems

The majority of flakes, both retouched and unretouched, discovered during the survey are broken. Of the 197 unretouched flakes, 87 are complete. Of 16 retouched flakes, 7 are complete. The majority of cores (13 of 14) are complete, while one out of the three hammers is complete.

The high rate of flake breakage observed is not unusual for surface artefacts in a landscape that has been farmed, probably ploughed, and used to graze livestock. Heat-fracturing of artefacts during bushfires and controlled burning, trampling by stock and vehicles, and movement across the surface during erosion and floods are all possible causes of flake breakage. Prior to deposition in the archaeological record, flakes can be broken during use, or can break during manufacture.

Table 6-20 All artefacts by type and completeness

Type	Complete	Proximal fragment	Medial fragment	Distal fragment	LCS	Margin missing	Broken
Unretouched flake	87	11	36	51	9	3	0
Retouched flake	7	2	0	7	0	0	0
Core	13	-	-	-	-	-	1
Flaked piece	14	-	-	-	-	-	-
Hammer	1	-	-	-	-	-	2

The length of unretouched flakes varies between 5mm and 75mm (Figure 6-29). The distribution of flake length is right-skewed, meaning that the majority of flakes fall toward the lower end of the range of flake lengths. A small number of flakes lie at the upper end of the range, forming an extended 'tail' at the upper end of the distribution. A right-skewed distribution of flake size is typical for most stone artefact assemblages, as knapping typically produces a large number of small flakes relative to the number of large flakes produced (Andrefsky 2007; Bertran *et al.* 2012; Morrow 1997). The distributions of flake width and thickness are also right-skewed, with the mean and median of both variables falling toward the lower end of the range (Table 6-21).

Median flake length is 20mm, median width is 20mm and median thickness is 5mm. The largest values recorded are 75mm for flake length, 50mm for flake width and 30mm for flake thickness. These data indicate that flakes in the study area are generally small in size. These data are consistent with a technological system in which small nodules of material are being reduced, or nodules are being transported away from their source areas and have been reduced in size before being transported onto the study area.

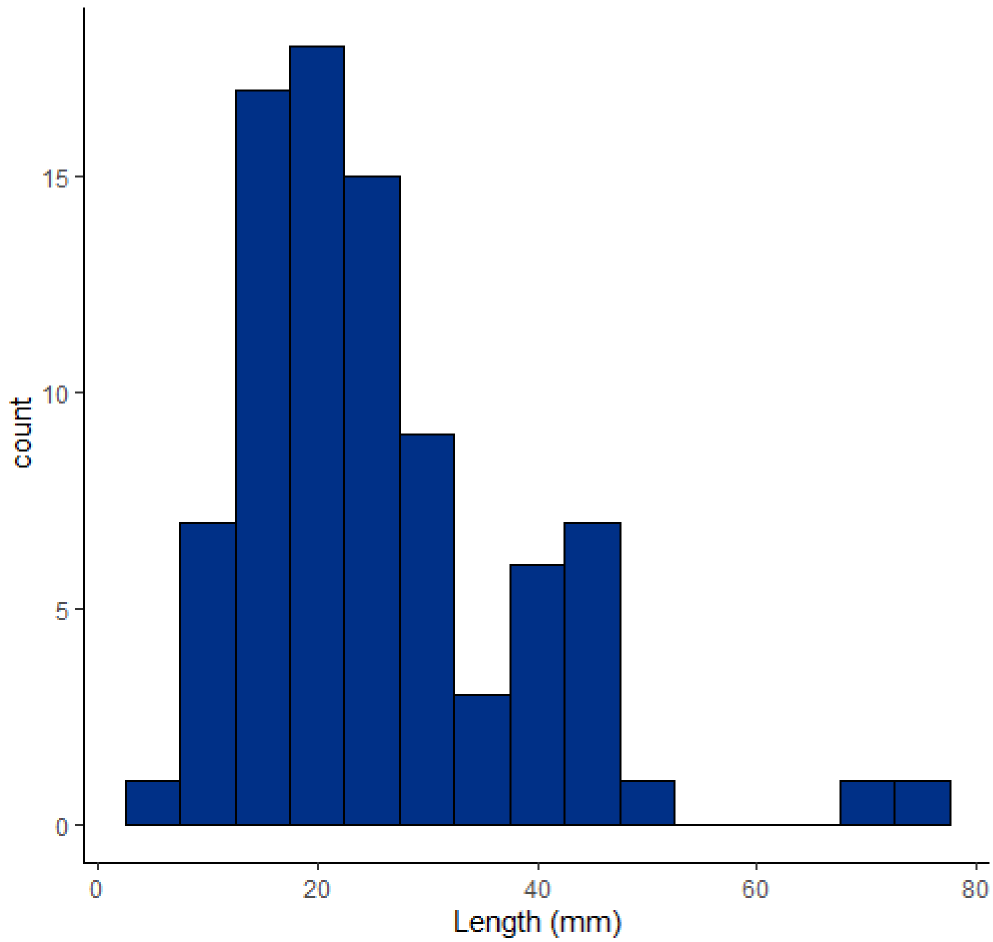


Figure 6-29 Histogram of the length of all complete unretouched flakes

Table 6-21 Summary statistics of the dimensions of all complete unretouched flakes

Measuremnt	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length (mm)	5	15	20	30	75	25.4
Width (mm)	5	15	20	25	50	20.63
Thickness (mm)	2.5	5	5	10	30	7.529

Flake length and thickness are significantly different between materials (at p=0.05 level), while flake thickness shows no significant difference between flakes made of different materials (Table 6-22).

The significant difference in flake length between materials is due to silcrete flakes being significantly longer (at the p = 0.01 level) than flakes made from IMSTC (Dunn Test, z = -2.72488796, p = 0.01). All other between-groups tests (Dunn tests) yielded non-significant results, meaning that no compelling differences in flake length exist between materials. The fact that silcrete flakes are typically longer than IMSTC flakes can be seen in the boxplot provided in Figure 6-30, which shows that the median length of silcrete flakes is higher than that of IMSTC flakes, and that the inter-quartile range (the range in which the middle 50% of flakes fall) occurs across a higher range of values for silcrete flakes than it does for IMSTC flakes.

Table 6-22 Kruskal-wallis test comparison of complete unretouched flake dimensions by material

Attribute	Chi-squared	d.f.	p
Length	8.7635	3	**0.033**
Width	4.2564	3	0.235
Thickness	10.134	3	**0.017**

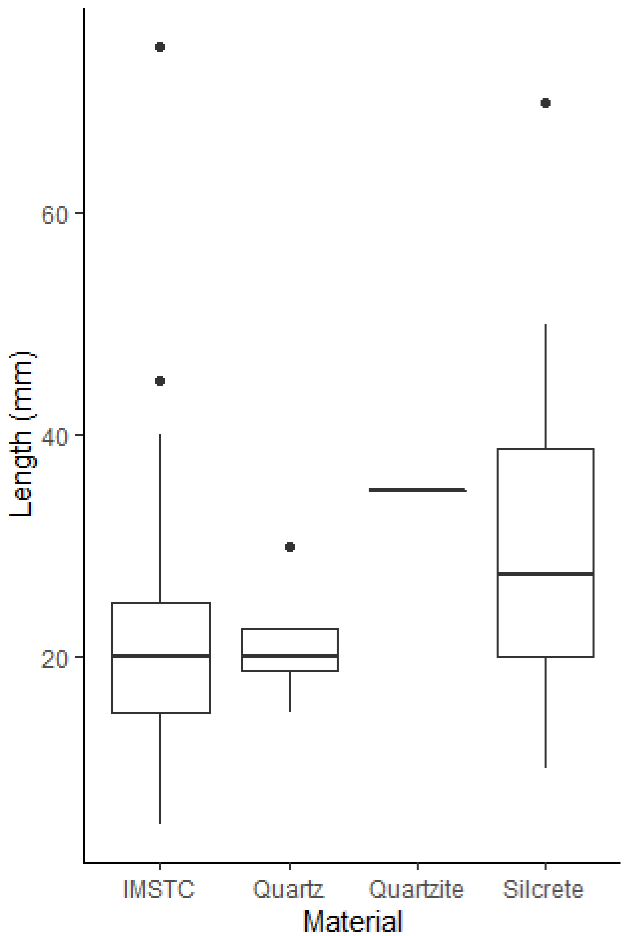


Figure 6-30 Boxplot of length of complete unretouched flakes separated by material

The significant difference in flake thickness is due to quartz flakes being significantly thicker (at the p = 0.01 level) than flakes made from IMSTC (Dunn test, z = -2.5581338, p = 0.01), and to silcrete flakes being significantly thicker (at the p = 0.05 level) than IMSTC flakes (Dunn test, z = -2.0501958, p = 0.04). All other between-groups tests (Dunn tests) yielded non-significant results, meaning that no compelling differences exist in the thickness of flakes across other materials. The between-groups tests show that IMSTC flakes are thinner than flakes made from quartz and silcrete, a result that can be seen clearly in the boxplot of flake thickness provided in Figure 6-31. The boxplot shows that flakes made from IMSTC have the lowest median thickness, with an inter-quartile range lower than quartz flakes and the same as silcrete flakes.

The data on flake dimensions indicate that IMSTC was knapped in ways that produced shorter and thinner flakes than is the case for other materials. The smaller size of IMSTC flakes could be the result of smaller nodules of this material being available in the landscape – if this were the case, then the production of smaller flakes would be dictated by the nature of pieces of stone that could be procured. Another possible explanation is that pieces of IMSTC were flaked more intensively than pieces of other materials. If pieces of IMSTC were reduced to a greater degree than other materials, the result would be that IMSTC cores would be smaller at the end of their use-lives than cores of other materials, and consequently the flakes struck toward the end of the reduction process would be smaller. More intensive reduction could occur if IMSTC was more highly prized than other materials, or if it involved a higher cost in terms of time or energy to procure. If sources of IMSTC were located further away from the study area, for example, obtaining replacement material would require a greater investment of time and energy from Aboriginal groups, creating an impetus to extend the reduction process on IMSTC cores relative to other materials.

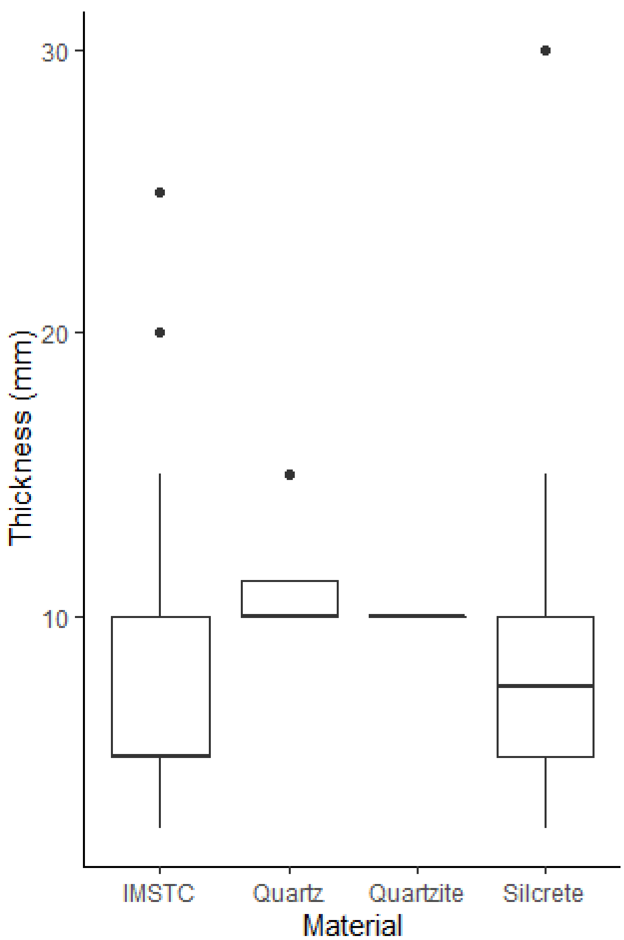


Figure 6-31 Boxplot of thickness of complete unretouched flakes separated by material

It should be noted that the flakes recorded during the survey are quite small, regardless of material. The longest flake recorded is 75 mm long, and only two flakes are longer than 50 mm. Seventy-five percent of flakes are 30 mm or shorter. This is consistent with a technological system in which materials were procured from some distance away, and reduced prior to being transported onto the study area. An alternative possible explanation is that the nodules of material were already small when they were procured, and that the small size of is consequently not evidence for prior reduction of stone outside the study area. If this were the case, then the assemblage of flakes in the study area should include primary flakes, or flakes whose dorsal surfaces are entirely covered in cortex.

Cores recorded during the survey are also generally small in size. Median core length is 30 mm, with the smallest core being 20 mm in length, and the largest being 100 mm in length (Table 6-24). Half of the cores are between 30 mm and 40 mm long. As core length is measured along the plane of the largest flaking surface, it is indicative of the size of flakes that could have been struck from the core just prior to it being discarded. The small size of cores is consistent with the small size of flakes recorded during the survey. No statistically detectable difference exists in the length of cores made from different materials (Kruskal-Wallis chi-squared = 1.4912, d.f. = 2, p = 0.47), though the small number of cores found during the survey would hamper the identification of any difference in core size that might exist between materials in the larger population of artefacts within the study area. Plotting the length of cores by material illustrates the fact that almost all cores are below 50 mm in length, with one core with a length of 100 mm being an outlier (Figure 6-32).

Table 6-23 Summary statistics of the length of all complete cores

Attribute	Minimum	1st quartile	Median	3rd quartile	Maximum	Mean
Length	20.00	30.00	30.00	40.00	100.00	36.54

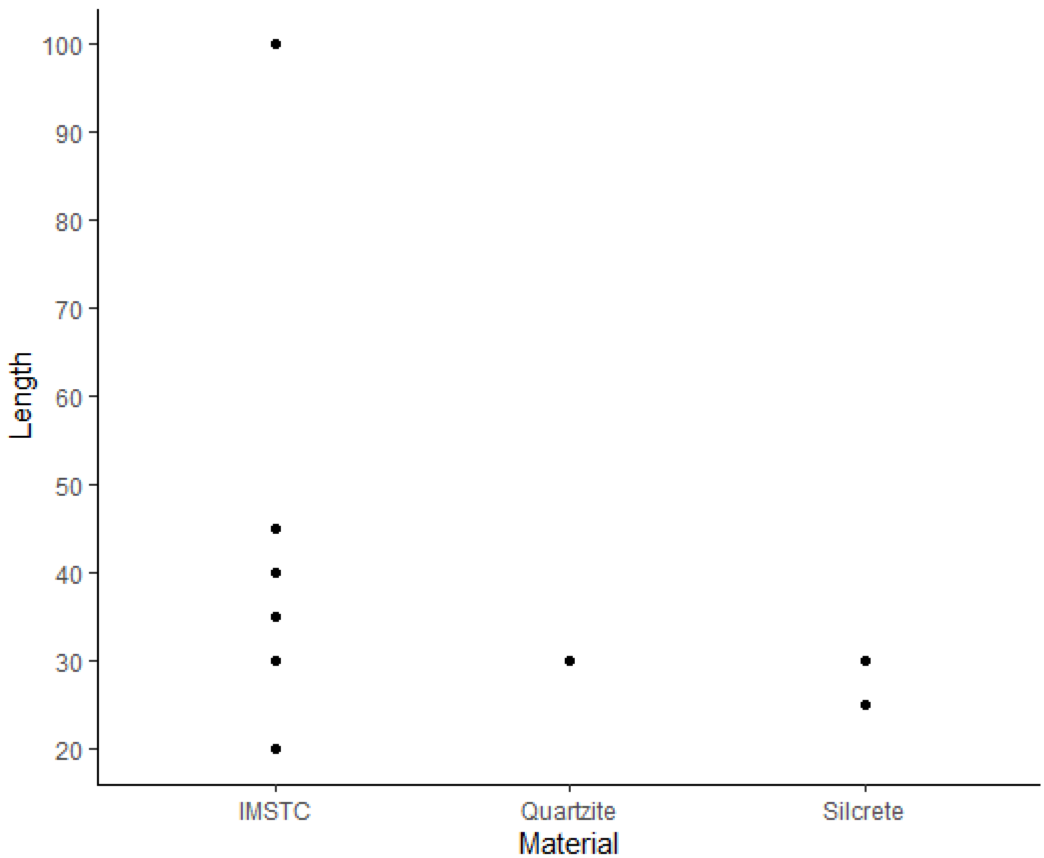


Figure 6-32 Scatterplot of the length of all complete cores, separated by material

Flakes with dorsal cortex are rare, with the great majority of flakes having no cortex on their dorsal surfaces (Figure 6-33). Of the 213 flakes recorded, 187 are tertiary flakes – flakes that retain no cortex on their dorsal surface. The low proportion of cortical flakes is consistent with an assemblage created from nodules which had undergone preliminary flaking elsewhere prior to being transported onto the study area. This is consistent with a technological system that procured materials from outside the study area, and processed materials on other sites prior to transporting stone into the study area.

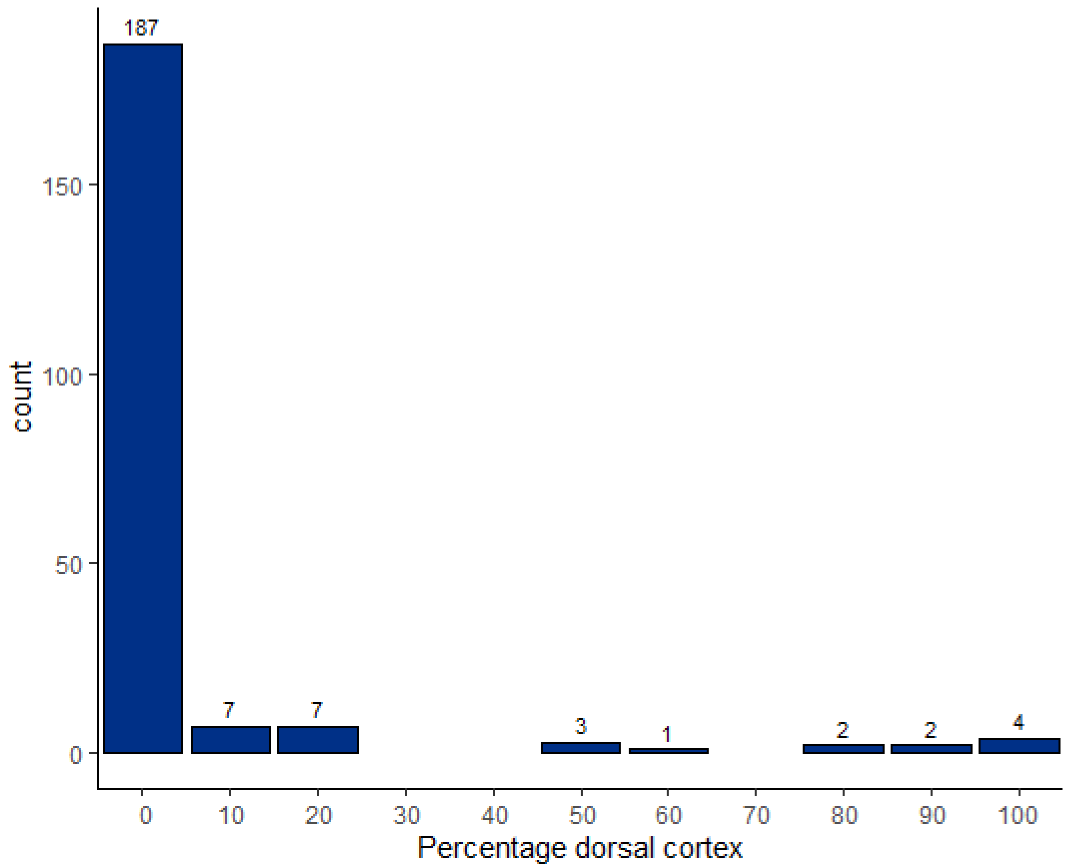


Figure 6-33 Barplot of all flakes, by percentage dorsal cortex

There are no differences in the frequency of dorsal cortex on flakes made from different materials, as far as can be identified from the flakes recorded during the survey (Figure 6-34). Silcrete and IMSTC, the two most common materials, both have a small proportion of flakes with cortex, and a great majority of flakes without any cortex. Only one quartz flake, and no quartzite flakes, have any dorsal cortex. The extreme rarity of dorsal cortex on flakes of these two materials could well be the result of the small size of the sample of flakes recorded, however. The data available do not indicate any substantial difference in the frequency of cortex across materials, and are consistent with a technological system that procured all materials from source areas outside the study area, and carried out preliminary flaking of all materials on other sites prior to transport into the study area.

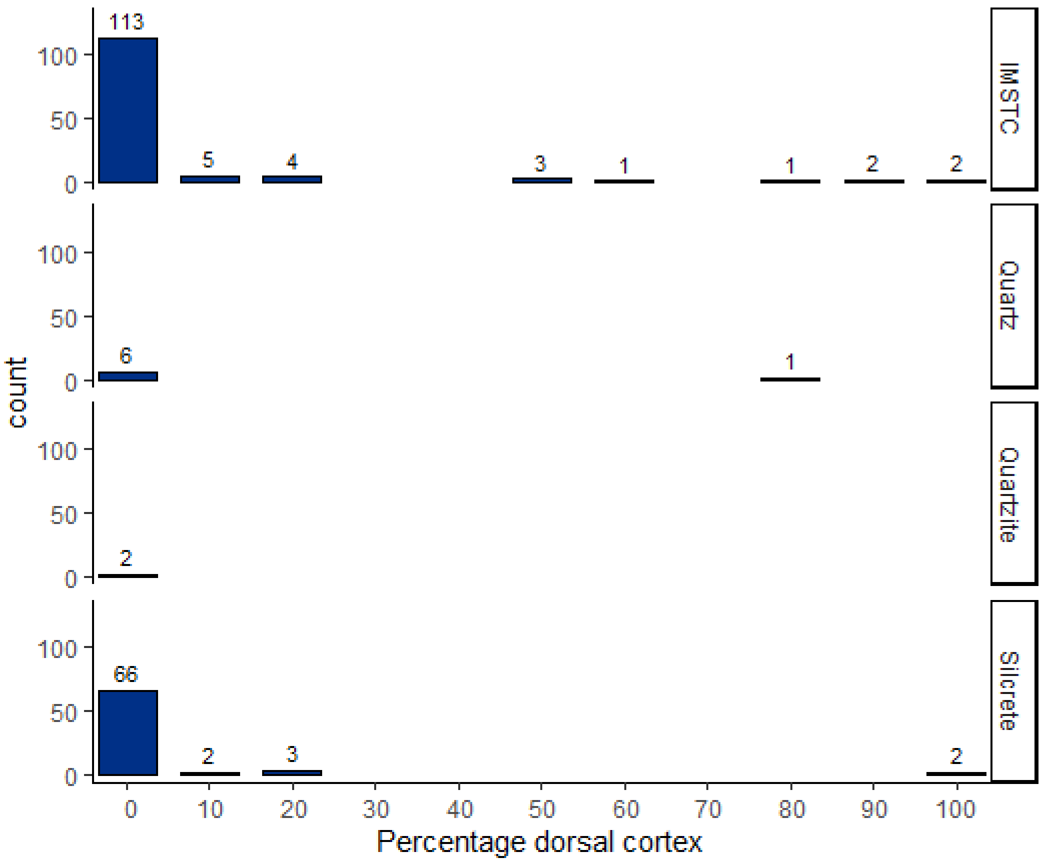


Figure 6-34 Barplot of all flakes, by percentage dorsal cortex, separated by material

The relationship between flake length and width provides an impression of the general flake shapes that a technological system produced, and can signal when systems are geared toward the production of specific flake shapes. Plotting flake length against flake width, for all complete unretouched flakes recorded during the survey, shows that there is considerable variability in the relationship between these two dimensions (Figure 6-35). Length and width are positively correlated with one another (Spearman's rho = 0.6411569, $p < 0.001$), which is an unsurprising result – large flakes are both wider and longer than small flakes. A linear trend-line, with 95% confidence interval, is included in the scatterplot to show the nature of this positive relationship. There is a large spread of datapoints around this trendline, however, showing that individual flakes have widely varying ratios of length to width. The dotted red line on the plot shows where flake length is twice flake width. Having a length that is more than twice its width is a criterion on which 'blades' are identified. Other characteristics are also cited as necessary characteristics of blades, such as parallel margins and a triangular or trapezoidal cross-section.

The small number of flakes lying above the threshold ratio of length to width do not support the possibility that flake production in the study area was specifically geared toward the production of blades. The flakes which do lie above the threshold seem to be the upper end of a more or less continuous range of variability of length to width ratios, rather than being an isolated and separate cluster on the scatterplot. It is the case, however, that the small number of complete flakes recorded during the survey could well be insufficient to identify instances where knapping was geared toward the production of elongated flakes. The dataset of flakes being analysed here is pooled from all sites identified across the study area. If knapping on particular sites was targeted toward the production of flakes with a particular shape, this patterning could well be invisible in the pooled dataset. Based on the available data, however, there is no reason to conclude that flake production within the study area was geared toward the production of any specific flake shape.

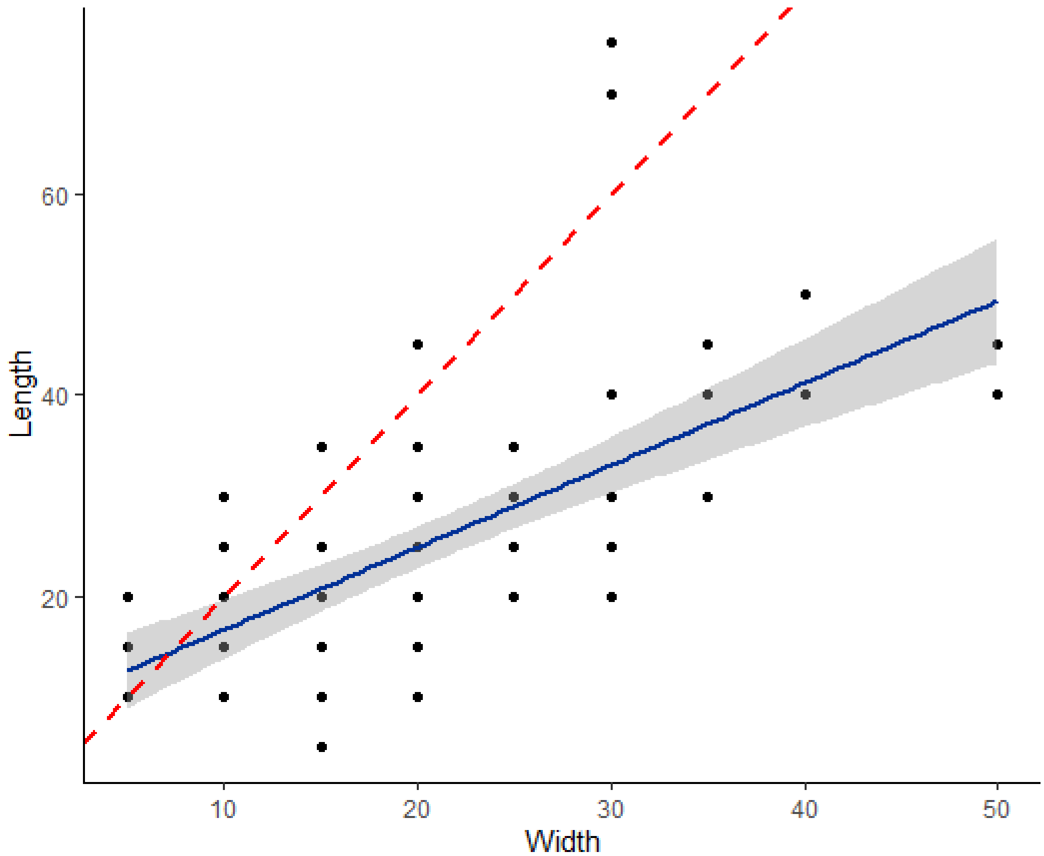


Figure 6-35 Scatterplot of length vs width of all complete unretouched flakes, with linear trendline and 95% confidence interval, and dashed line showing length = 2 x width

The ratio of flake length to flake width can be expressed as a flake's 'elongation'. Elongation is calculated by dividing flake length by flake width: consequently, a flake twice as long as it is wide would have an elongation of two. Elongation of flakes varies between a minimum of 0.33 and a maximum of 4 (Table 6-24). Half of the flakes (the inter-quartile range) have an elongation between 1.00 and 1.58. In other words, half of the flakes fall within a relatively narrow range in terms of elongation, varying between being as long as they are wide, and one and a half times longer than they are wide. Above and below this interquartile range, however, there is a substantial upper and lower 'tail' of artefacts that vary between being around one third as long as they are wide, and being four times as long as they are wide. As discussed above, these data do not indicate that knapping was specifically geared toward the production of any specific flake shape. Instead, it appears that knapping was flexible and variable in nature, resulting in a variety of flake shapes.

Table 6-24 Summary statistics of the elongation of all complete unretouched flakes

	Minimum	1st Quartile	Median	3rd Quartile	Maximum	Mean
Elongation	0.3333	1.0000	1.2500	1.5833	4.0000	1.3623

The distribution of flake elongation is not significantly different between materials (Kruskal-wallis chi-squared = 2.6495, d.f. = 3, p = 0.4489). This means that there is no reason to think, based on the available data, that Aboriginal knappers were flaking different materials in ways that would result in differently shaped flakes. These results are consistent with a technological system in which different materials were knapped in equivalent ways, and that knapping resulted in assemblages of similarly shaped flakes regardless of the material being worked.

6.4 Summary

Fourteen sites have previously been recorded within the study area (Table 6-4, see also Section 6.1.1).

This assessment identified an additional 23 sites (including isolated artefacts, artefact scatters, areas of PADs, and artefact scatters with associated areas of PAD) within the study area. Of these 23 sites, nine were areas of PAD only, on which no surface artefacts were found during this assessment. The remaining 14 sites had a surface artefact or multiple surface artefacts.

Two hundred and forty-four stone artefacts were recorded during the survey. Of these, 197 were unretouched flakes, 16 were retouched flakes, 14 were cores, 14 were flaked pieces, and 3 were hammers. The retouched flakes included burins, scrapers, and backed artefacts. Four material types were recognized. One hundred and fifty artefacts were made from IMSTC (Indurated Mudstone, Silicified Tuff or Chert), 81 from silcrete, seven from quartz, five from quartzite, and one from igneous rock.

Slightly more than half of the artefacts are broken fragments. The complete flakes and cores found during the survey are generally small in size, and flakes with dorsal cortex are rare relative to flakes with no cortex on their dorsal surfaces. The data indicate that nodules of stone were procured from source areas outside the study area, and that nodules were flaked at sites elsewhere prior to being brought into the study area. This data is consistent with information provided by representatives from the RAPs on site, indicating that stone was sourced from various locations elsewhere in the Hunter Valley, and that Aboriginal groups travelled into the study area from other parts of the Hunter Valley and surrounding regions. These groups would frequently carry stone into this part of the Hunter Valley as they travelled in from neighbouring areas.

The different material types identified in this analysis show considerable internal diversity in colour, texture, grain size and other qualities. Analysis of this intra-type variability is beyond the scope of the current analysis, but should be explored further if future archaeological work examines a larger sample of stone artefacts from the study area. Variability in material is likely to be relevant to discussions of material quality as well as reconstructing the mobility, procurement strategies, and material optimisation strategies of Aboriginal groups in the region.

The analyses of stone artefact assemblage composition carried out here have pooled the artefacts found from all sites to provide an overview of the stone artefacts found within the study area. Pooling all artefacts was necessary to provide a large enough body of data to enable analyses to be carried out. It does, however, create some limitations in the interpretations that can be drawn from the analyses. Most importantly, it would function to mask any fine-grained variability that might exist between the artefacts found on different sites across the study area. If differences exist between sites, the pooled data set is not able to reveal the existence of these differences.

The artefacts examined in this study are all surface artefacts found during the survey. Discovery of artefacts during a surface survey would tend to favour large artefacts, and artefacts made from obtrusive or unusual materials. For these reasons, it is possible that the sample of artefacts made from materials such as chert, mudstone, tuff and silcrete, which are fine-grained and consequently exhibit smooth fracture surfaces, and which are different from the background geology of the region, could be over-represented in the dataset. Artefacts made from quartz and quartzite, which tend to exhibit rougher and less recognizable fracture surfaces, and which are more frequently found in the background geology and are less visually obtrusive as a result, might be under-represented in the dataset.

7. Significance assessment

7.1 Method of significance assessment

7.1.1 Basis for assessment

A significance assessment is made up of several significance criteria that attempt to define why a site is important. Such assessment recognises that sites may be important for different reasons to different people, and even at different times. The assessment of Aboriginal cultural heritage in this assessment is based upon the four values of the Australia ICOMOS Burra Charter (Australia ICOMOS 2000).

- Social values
- Historical values
- Scientific values
- Aesthetic values.

Each of these values is assessed below for Aboriginal sites in or adjacent to the study area, and an overall significance is assigned based on an average across the values. This is inherently a reductive process, and oversimplifies what is important for different reasons to a range of different stakeholders, but is a necessary process in being able to create comparative values between sites. The significance of each site ultimately informs the management of sites and places.

It should be noted that only existing Aboriginal sites within the study area or adjacent (within 50 m) to the study area are assessed for significance here. Aboriginal sites within or adjacent to the project corridor that could not be relocated during the archaeological survey are not assessed in this chapter.

7.1.2 Social significance

The significance of a heritage item does not relate only to its scientific or research value. Aboriginal people's views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although some Aboriginal people also value any scientific information a site may be able to provide.

Aboriginal cultural significance was assessed from consultation with the nominated Site Officers for the relevant RAPs during and following field assessments. It should be noted that Aboriginal significance assessed in this manner may not reflect the views of all members of the community.

7.1.3 Historic significance

The historic value of a site is determined through its association with historically important people, events or activities.

A place or object can have cultural significance if it is significant in exhibiting particular historic characteristics. Such as:

- It is significant in the evolution or pattern of the history of a locality, region, state, nation or people.
- Importance for the density or diversity of cultural features illustrating the human occupation and evolution of the locality, region, state or nation.
- Importance in relation to an event, phase or activity of historic importance in the region, state or nation.
- Importance for close association with an individual or individuals whose life, works or activities have been significant within the history of the region, state or nation.

- Importance as an example of technical, creative, design or artistic excellence, innovation or achievement in a particular period.

7.1.4 Scientific significance

A concept, place or object can have cultural significance if it is significant in exhibiting particular scientific characteristics. Such as:

- It has demonstrable potential to yield information that will contribute to an understanding of the natural or cultural history of the region, state or nation.
- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the locality, region, state or nation.
- It is significant in demonstrating a high degree of technical innovation or achievement.

Research potential or scientific significance of an Aboriginal archaeological site can be assessed by using the criteria set out below. Each criterion is rated as low, moderate or high.

- Site integrity – The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors including natural erosion processes, destructive land use practices or repeated use of a site in the past by both humans and animals
- Site structure – Structure refers to a site's physical dimensions, that is, size and stratigraphy. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts
- Site contents – This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non-organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. For scarred trees, contents may refer to the size and type of scar and/or how many scars there are on the one tree
- Representativeness and rarity – Representativeness refers to how much variability exists between the subject site and others inside or outside the subject area. It also considers the types of sites already conserved in the area and how much connectivity between sites exists. Rarity considers how often a particular site type occurs in an area. Assessment of representativeness and rarity requires some knowledge of the background archaeology of the area or region in which a study is being carried out. Rarity also relates to whether the subject site or area is important in demonstrating a distinctive way of life, custom, process, land use, function or design which is no longer practiced (OEH 2011).

7.1.5 Aesthetic significance

This refers to the sensory value of a place, and can include aspects such as form, texture, and colour, and can also include the smell and sound elements associated with use or experience of a site (Australia ICOMOS 2000). Aesthetic significance can be closely linked to the social value of a site.

A place or object can have cultural significance if it is significant in exhibiting particular aesthetic characteristics, such as:

- Importance to a community for aesthetic characteristics.

- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas orotherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.

7.2 Statements of significance

The significance of all sites in the study area is set out in Table 7-1. The significance assessment here is limited by the nature of the data available from the archaeological work carried out to date. Surface survey provides an understanding of the nature, and consequently the significance, of Aboriginal objects currently visible on the ground surface only. The significance of areas of PAD cannot be assessed on the basis of the data gathered during the archaeological survey. It is proposed to carry out test excavations to assess the nature and significance of any subsurface material present in areas of PAD which detailed design confirms will be impacted by the Project. Test excavations would be carried out prior to the determination of the Project's development application.

It should be noted that the assessed significance of individual sites provided here does not incorporate, at the time of writing, any input from RAPs on the cultural significance of individual sites.

Table 7-1 Assessment of site significance

Site ID	Project component	Significance assessment of site	Significance assessment of PAD	Relevant notes
BAYS PAD13	Salt cake landfill	NA	Cannot be assessed	Further work required
37-2-0063	Coal handling plant	None	NA	Site presumed destroyed [1]
37-2-0062	Coal handling plant	None	NA	Site presumed destroyed [1]
BAYS PAD16	Ash dam augmentation	NA	Cannot be assessed	Further work required
BAYS PAD12	Ash dam augmentation	NA	Cannot be assessed	Further work required
37-2-0065	Ash dam augmentation	None	NA	Site presumed destroyed [1]
37-2-0047 / 37-2-0050	Ash dam augmentation	None	NA	Site presumed destroyed [1]
37-3-0007	Ash dam augmentation	None	NA	Site presumed destroyed [1]
37-2-0048	Ash dam augmentation	Low-Moderate	NA	Artefact scatter of unspecified size, some artefacts have been removed by previous archaeological surface collection
BAYS PAD08	HP and LSP pipe clearing	NA	Cannot be assessed	Further work required
BAYS PAD01	HP pipe clearing	NA	Cannot be assessed	Further work required
BAYS PAD17	Ravensworth ash line	NA	Cannot be assessed	Further work required
BAYS PAD18	Ravensworth ash line	NA	Cannot be assessed	Further work required
BAYS PAD19	Ravensworth ash line	NA	Cannot be assessed	Further work required
37-3-1128	Ravensworth ash line	None	NA	Site destroyed
37-3-0491	Ravensworth ash line	Low - Moderate	See BAYS PAD09	Small artefact scatter on stable landform, within BAYS PAD09

Site ID	Project component	Significance assessment of site	Significance assessment of PAD	Relevant notes
BAYS AS and PAD15	Borrow pits	Low - Moderate	Cannot be assessed	Artefact scatter on unstable landform (eroding creek bank)
BAYS AS09	Borrow pits	Low	NA	Highly disturbed small artefact scatter on severely eroded steep hillslope
BAYS AS and PAD 10	Borrow pits	Moderate	Cannot be assessed	Minimally disturbed knapping floor on stable landform (hilltop)
BAYS PAD12	Borrow pits	NA	Cannot be assessed	Further work required
BAYS AS and PAD11	Borrow pits	Moderate	Cannot be assessed	Disturbed artefact scatter on unstable landform (sheet eroding slope). Undisturbed probable Aboriginal hearth partially buried in stable ground.
BAYS AS06	Borrow pits	Low	NA	Small artefact scatter on unstable landform (eroding creekline)
BAYS AS and PAD07	Borrow pits	Low-Moderate	Cannot be assessed	Artefact scatter on somewhat unstable landform (erosion exposures associated with adjacent creeklines)
37-2-0558	Borrow pits	Low-Moderate	Cannot be assessed	Artefact scatter on somewhat unstable landform (erosion exposures associated with adjacent creeklines)
BAYS AS and PAD05	Borrow pits	Moderate	Cannot be assessed	Large artefact scatter on stable and unstable landforms (hilltop, low gradient slope, and erosion exposures associated with adjacent creekline)
BAYS AS04	Borrow pits	Low	NA	Artefact scatter on previously impacted landform (vehicle track)
BAYS AS and PAD03	Borrow pits	Low	Cannot be assessed	Small artefact scatter on unstable landform (erosion exposures adjacent to creekline)
BAYS IF04	Borrow pits	Low	NA	Isolated surface artefact
BAYS AS and PAD02	Borrow pits	Low	Cannot be assessed	Small artefact scatter on unstable landform (erosion exposures adjacent to creekline)
BAYS IF03	Borrow pits	Low	NA	Isolated surface artefact
BAYS IF02	Borrow pits	Low	NA	Isolated surface artefact
BAYS IF01	Borrow pits	Low	NA	Isolated surface artefact
37-3-0557	Borrow pits	Low	NA	Small artefact scatter on erosional surface
37-2-0556	Borrow pits	Low-Moderate	Cannot be assessed	Small artefact scatter, recorded as having subsurface potential

Site ID	Project component	Significance assessment of site	Significance assessment of PAD	Relevant notes
37-2-0555	Borrow pits	Low-Moderate	Cannot be assessed	Small artefact scatter, recorded as having subsurface potential
37-3-0554	Borrow pits	Low	NA	Small artefact scatter on erosional surface
37-2-0553	Borrow pits	Low	NA	Small artefact scatter on erosional surface

[1] Site presumed destroyed as its recorded location is within an area severely impacted by existing operational infrastructure.

8. Impact assessment

8.1 Impact avoidance

Where practicable, the detailed design of the project will avoid impacts to Aboriginal sites and areas of PAD (see recommendations in Section 9).

Sites and areas of PAD located outside the Project area, will be protected from indirect impact during construction of the Project. In this way, the potential risk of inadvertent impact to sites located near to the Project area will be avoided.

For this assessment, the precautionary principle has been followed and consequently it is assumed that all sites and areas of PAD within the project footprint will be subject to direct impact resulting from the Project. Similarly it is assumed for the purposes of this assessment that all sites and areas of PAD within the buffer zones (that is, outside the project area but within the study area) are vulnerable to inadvertent impact resulting from the Project.

8.2 Potential impacts

The nature of proposed impacts varies between the separate project components, these are discussed here separately by project component.

8.2.1 Ravensworth ash line

Proposed works

The installation of the Ravensworth Ash Pipelines would generally consist of the following activities:

- vegetation clearance along the pipeline alignments. It has been assumed that all vegetation would be cleared, however opportunities to minimise clearance would be considered where feasible;
- laying above ground pipelines, held on plinths which would rest on the ground;
- trenching or underboring below ground sections of the pipelines. Depending on the trench depths, shoring or benching the trench may be required;
- removal of any disused pipelines as required and rehabilitation of relevant areas; and
- the pipeline would be installed adjacent to the existing ash pipeline in previously disturbed areas where practicable.

Potential impacts to Aboriginal sites

Proposed works in the Ravensworth ash line area have the potential to impact the following Aboriginal sites (Table 8-1):

Table 8-1 Potential impact to Aboriginal sites in the Ravensworth ash line area

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD17	PAD	Direct and indirect	Partial destruction	Partial loss of value	Most of PAD is outside the study area. A portion of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD18	PAD	Direct and indirect	Partial destruction	Partial loss of value	Most of PAD is outside the study area. A portion of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)
BAYS PAD19	PAD	Direct	Partial destruction	Partial loss of value	Most of PAD is outside the study area. A portion of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)
37-3-1128	Artefact scatter	NA	None (site already destroyed)	None	Site is recorded on AHIMS as destroyed
37-3-0419	Artefact scatter	Indirect	Total destruction	Total loss of value	Site is within the buffer zone, and outside the Project area (footprint)

8.2.2 Coal handling plant water and wastewater infrastructure upgrades

Proposed works

Infrastructure works would generally include:

- Construction of clean water diversions to reduce stormwater inflows to the coal handling plant sediment basin;
- Reuse of water within the coal plant water system where possible for operational purposes which could include water treatment; and
- Changes to the water management structures, including the enlargement/reconfiguration of the coal handling plant sediment basin to allow for a larger volume of water to be stored with increased detention time and improved settlement of coal fines to better enable the treatment of water.

Potential impacts to Aboriginal sites

No impacts to any Aboriginal sites would result from proposed works in the coal handling plant project component (Table 8-2).

Table 8-2 Potential impact to sites in the coal handling plant area

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
37-2-0063	Artefact scatter	Direct	None (site presumed destroyed)	None	Site presumed destroyed, as it is within a previously impacted area
37-2-0062	Artefact scatter	Direct	None (site presumed destroyed)	None	Site presumed destroyed, as it is within a previously impacted area

8.2.3 Salt cake landfill

Proposed works

The following activities would be undertaken to construct the salt cake landfill:

- Site clearing, including the removal of contractor facilities and materials. It is assumed that these materials would be relocated to other areas of AGL Macquarie land, as required;
- Establishment of clean water diversions;
- Establishment of erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and construction - Volume 1* (the Blue Book)
- Excavation and minor earthworks to create landfill cells, including installation of appropriate lining, and surface water diversion structures, where required; and
- Clay materials for construction of cells, and capping, would be sourced from the proposed borrow pits.

Potential impacts to Aboriginal sites

While no Aboriginal objects were identified during the survey, proposed works involved in construction and operation of the salt cake landfill have the potential to harm the following PAD (Table 8-3).

Table 8-3 Potential impact to PAD in the salt cake landfill area

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD13	PAD	Direct and indirect	Total destruction	Total loss of value	Most of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)

8.2.4 Ash dam augmentation, ash harvesting and water management works

Proposed works

The augmentation of the ash dam would generally consist of the following works:

- A levee embankment on the western perimeter to a rendered level (RL) of 184.5 metres (11.5 metre high embankment);
- Increasing the existing levee embankment on the eastern perimeter by about 3.5 metres to RL 176;
- Construction of a concrete parapet wall along the main embankment crest to increase flood attenuation within the dam;
- Construction of two new southern saddle dams to prevent ash from spilling out of a low point along the southern ridgeline;
- Extensions to the ash dispersion and water supply and management systems;
- Installation of ash dam divider walls allowing ash discharge to be undertaken in alternating cells and deployment of dust suppression (water sprays or polymers) during dust events where necessary in accordance with existing dust management processes;
- Works may include relocation/replacement of existing pipelines to current standards;
- Upgrade to ancillary infrastructure associated with ash disposal such as pumps, pipelines and power infrastructure; and
- Water management improvement works associated with the main and saddle dam walls including diversion of clean runoff around the site, installation of new seepage capture and return infrastructure and upgrading existing seepage capture and return infrastructure.

Potential impacts to Aboriginal sites

Augmentation of the ash dam has the potential to directly impact the following Aboriginal sites (Table 8-4):

Table 8-4 Potential impact to Aboriginal sites in the ash dam area

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD14	PAD	Direct and indirect	Total or Partial destruction	Total or Partial loss of value	A portion of the PAD is within the buffer zone. Most of the PAD is within the Project area (footprint)
BAYS PAD16	PAD	Direct and indirect	Total or partial destruction	Total or partial loss of value	A portion of the PAD is within the buffer zone. Most of the PAD is within the Project area (footprint)
37-2-0065	Artefact scatter	Direct	None (site presumed destroyed)	None	Site presumed destroyed, as it is within the ash dam inundation area
37-2-0047 / 37-2-0050	Artefact scatter	Direct	None (site presumed destroyed)	None	Site presumed destroyed, as it is within the ash dam inundation area
37-3-0007	Artefact scatter	Direct	None (site presumed destroyed)	Non	Site presumed destroyed, as it is within the ash dam inundation area
37-2-0048	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)

8.2.5 HP pipeline clearing corridor and LSP sludge pipeline clearing corridor

Proposed works

Clearing the HP pipe areas and the LSP pipe area would generally involve the following:

- Clearing of vegetation. This ACHAR assumes, following the precautionary principle, that clearing vegetation would involve ground disturbance resulting from grubbing out of roots and the movement of vehicles across the area. Vegetation clearing is consequently assumed to represent an impact to any subsurface archaeological material that might exist within the HP pipe clearing and LSP pipe clearing areas; and
- Establishment of vehicle tracks enabling ongoing access to the pipes for routine maintenance clearing.

Potential impact to Aboriginal sites

While no Aboriginal objects were identified during the survey, proposed works in the HP pipe and LSP pipe areas has the potential to impact the following PADs (Table 8-5):

Table 8-5 Potential impact to Aboriginal sites in the HP and LSP pipe areas

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD01	PAD	Direct and indirect	Total destruction	Total loss of value	Most of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)
BAYS PAD08	PAD	Direct and indirect	Total destruction	Total loss of value	Most of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)

8.2.6 Borrow pits

Proposed works

Construction of the borrow pits would consist of the following works:

- Site clearance, including vegetation removal where necessary.
- Establishment of clean water diversions;
- Establishment of erosion and sediment controls;
- Clearing vegetation and either mulching for onsite reuse or used to created habitat piles; and
- Stripping of topsoil for later use in rehabilitation.

The borrow pits operational stage would comprise:

- Excavation of clay material using benching techniques;
- Transport of material to point of use using existing internal access tracks; and
- Progressive rehabilitation, or soil binding, of exposed areas to manage dust and sediment runoff.

Potential impacts to Aboriginal sites

Construction of the borrow pits has the potential to directly impact the following Aboriginal sites (Table 8-6). Note that in the case of borrow pit 4, it is anticipated that the entire area will be disturbed as part of the Project. This borrow pit does not have a buffer zone not subject to direct impacts (see Figure 6-5). Consequently all sites and areas of PAD within the borrow pit 4 area are anticipated to be directly impacted.

Table 8-6 Potential impact to Aboriginal sites in the borrow pit areas

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS PAD14	PAD	Direct and indirect	Total destruction	Total loss of value	A portion of the PAD is within the buffer zone. Most of the PAD is within the Project area (footprint)
BAYS AS and PAD15	Artefact scatter and PAD	Direct and indirect	Complete destruction of artefact scatter, partial destruction of PAD	Partial loss of value	Most of the site is within the buffer zone. A portion of the site is within the Project area (footprint)

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
BAYS AS 09	Artefact scatter	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS AS and PAD 10	Artefact scatter and PAD	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS AS and PAD11	Artefact scatter and PAD	Direct and indirect	Total destruction	Total loss of value	A portion of the site is within the buffer zone. A portion of the site is within the Project area (PAD)
BAYS PAD12	PAD	Direct and indirect	Total destruction	Total loss of value	A portion of the PAD is within the buffer zone. A portion of the PAD is within the Project area (footprint)
BAYS AS and PAD07	Artefact scatter and PAD	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS AS06	Artefact scatter	Indirect	Total destruction	Total loss of value	Site is entirely within the buffer zone, and outside the Project area (footprint)
BAYS AS and PAD05	Artefact scatter and PAD	Direct and indirect	Partial destruction	Partial loss of value	Most of the site is within the Project area (footprint). A portion of the site lies extends outside the Project area.
BAYS AS04	Artefact scatter	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS AS and PAD03	Artefact scatter and PAD	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS IF04	Isolated artefact	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS AS and PAD02	Artefact scatter and PAD	Direct	Total destruction	Total loss of value	Site is entirely within the Project area (footprint)
BAYS IF03	Isolated artefact	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
BAYS IF02	Isolated artefact	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
BAYS IF01	Isolated artefact	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)

Name	Site type	Type of harm	Degree of potential harm	Consequence of harm	Notes
37-2-0557	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
37-2-0556	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
37-2-0555	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
37-2-0553	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
37-2-0554	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)
37-2-0558	Artefact scatter	Direct	Total destruction	Total loss of value	Site is within the Project area (footprint)

8.3 Significance of impact

The significance of the sites identified in this assessment is discussed in Section 7.

Potential impact to each site is detailed in Section 8.2.

In summary, the proposed works would directly impact isolated surface artefacts and surface artefact scatters that range from low to moderate archaeological significance. Proposed works would also directly impact areas of PAD (some of which are associated with surface artefacts).

There are sites and areas of PAD that lie wholly or partially within the buffer zone that was included in the study area. Sites and areas of PAD in the buffer zone are not anticipated to be subject to direct impacts, but would be vulnerable to indirect impact. In other words, these areas could plausibly be inadvertently impacted as a result of Project works. Sites and areas of PAD subject to inadvertent impact are recommended to be protected during the Project's construction phase.

The significance of areas of PAD cannot be assessed based on the archaeological survey detailed in this report. Assessing the significance of PADs would require further archaeological work including subsurface testing to be carried out. It is proposed to carry out test subsurface excavations to assess the nature and significance of any subsurface material present in areas of PAD which detailed design confirms will be impacted by the Project. Test excavations will be carried out prior to the determination of the Project's development application (see Section 9)

Pending these further investigations, the overall significance of the proposed impacts represented by the Project cannot comprehensively be evaluated at this point, due to a lack of data on subsurface archaeological material.

8.4 Cumulative impacts

8.4.1 Introduction

Assessing cumulative impacts involves the consideration of the proposed impact in the context of existing developments and past destruction of heritage sites, as well as the population of heritage sites that still exist in the region of interest (Godwin 2011). The concept of assessing cumulative impacts aims to avoid discussing the impact of a development in isolation, and aims to assess the impact in terms of the overall past and future degradation of a region's heritage resource.

8.4.2 Assessment

The cumulative impact to the archaeological resource of the region cannot be gauged at present, due to the significance of PAD areas requiring further work to be assessed (see Section 8.3). The cumulative impact represented by the project will be assessed following test excavations, as these will establish the nature and significance of any subsurface archaeological material present within each of the areas of PAD.

It is noted that impacts to AGL land has been cited by RAPs as a concern due to it being a pocket of relatively undisturbed land in an area that has been subject to extensive impact from mining operations. Prior impact to large areas of land in the immediate surrounding region, and across the Hunter Valley overall, have increased the concern that the Aboriginal community has with impacts proposed by future projects. This concern with the cumulative impact of successive development projects is consistent with feedback on other projects in the region (for a review, see Sutton *et al.* 2013).

9. Management and mitigation recommendations

The management recommendations presented here are based on the assessment of impacts in Section 8.2.

For this assessment, the precautionary principle has been followed and consequently it is assumed that all sites and areas of PAD within the project footprint will be subject to direct impact resulting from the Project. Similarly it is assumed for the purposes of this assessment that all sites and areas of PAD within the buffer zones (that is, outside the project area but within the study area) are vulnerable to inadvertent impact resulting from the Project.

The significance of sites has been assessed based on the surface artefacts identified during the archaeological survey (see Section 7.2). The significance of any subsurface Aboriginal objects that might be present within areas of PAD cannot be assessed at this stage, as no archaeological excavations have taken place.

Table 9-1 outlines the areas of PAD where a program of test excavations is recommended to be carried out prior to construction occurring. These test excavations would establish the nature and significance of any subsurface assemblages of Aboriginal objects present in each of the PADs.

Test excavations would be carried out only within portions of PAD that were anticipated to be subject to direct impact. The final detailed design of the project would be used to identify the areas of PAD that would be directly impacted and so would require test excavation to establish the nature and significance of subsurface archaeological material.

The results of test excavations on each PAD would inform decisions around subsequent management of the areas of PAD. Depending on the significance of subsurface archaeological materials, subsequent mitigation actions carried out on a PAD might involve amending the Project’s design so as to avoid impacting the PAD to the extent practicable.Mitigations might involvecarrying out salvage excavations to recover a sample of material from the PAD prior to impact; or might involve carrying out the proposed construction works without any further excavations taking place. Decisions of management and mitigation actions to be carried out on areas of PAD would be dependent upon the practicality of amending the Project’s design, and on the significance of the archaeological material found within the PAD.

It is recommended that Aboriginal artefacts that have been identified on the ground surface be collected and removed from all sites (or portions of sites) that are proposed to be impacted. Collection of these artefacts would represent a mitigation action for destruction of the site, in that it would protect the surface artefacts from harm during the proposed works. All Aboriginal artefacts hold cultural significance for present-day Aboriginal people (see Section 5.2), as well as having archaeological (scientific) significance resulting from their potential to provide information about pre-contact Aboriginal society.

Collected artefacts would be held in secure temporary storage during construction, and could be returned to country on an area of ground outside the impact zone. Any artefacts recovered from archaeological excavations would similarly be returned to country in a safe location. The final location of collected artefacts would be decided through discussion with the RAPs.

As outlined in Section 2.2.1, an AHIP will not be required for impacts to cultural heritage authorised by any SSD consent granted for the project. However, the following mitigation actions are recommended following development consent of the project, to minimize the risk of impacts to cultural heritage:

- Investigate opportunities to avoid identified Aboriginal sites and areas of PAD were practicable.
- Sites and areas of PAD (or portions thereof) that have been assessed as subject to potential indirect (inadvertent) impact will be protected from these impacts during Project works through fencing or other appropriate measures.

- Where direct impacts are proposed to occur to areas of PAD (including those areas of PAD associated with surface artefact scatters), a program of detailed survey and test excavation would be carried out to assess the nature and significance of any subsurface archaeological material. A list of sites that this recommendation applies to is provided in Table 9-1.
- The results of test excavations on each PAD would inform decisions around subsequent management of the areas of PAD. Future work to be carried out prior to impact to sites might include salvage excavation of areas currently designated as PADs. The decision to recommend salvage excavation on a site would be contingent upon the results of test excavation.
- Collection of surface artefacts from all sites or portions of sites that would be impacted.
- Collection of surface artefacts and archaeological excavations (both test and salvage) would be undertaken by a qualitied archaeologist and Site Officers supplied by the RAPs.

Table 9-1 Sites and areas of PAD where test excavation is recommended

Site	Potential for subsurface artefacts to be present
BAYS AS and PAD05	Moderate to high
BAYS AS and PAD03	Moderate
BAYS AS and PAD02	Moderate
BAYS AS and PAD07	High
BAYS AS and PAD10	Moderate
BAYS AS and PAD11	Moderate
BAYS PAD12	Moderate
BAYS PAD14	Moderate
BAYS PAD01	Low to moderate
BAYS PAD08	Low to moderate
BAYS PAD13	Low to moderate
BAYS PAD16	Moderate
BAYS PAD17	Moderate
BAYS PAD18	Moderate
BAYS PAD19	Moderate
BAYS AS and PAD15	High
37-2-0555	Potential for subsurface artefacts, and recommendation for test excavation, identified in original site recording
37-2-0556	Potential for subsurface artefacts, and recommendation for test excavation, identified in original site recording
37-2-0558	Potential for subsurface artefacts, and recommendation for test excavation, identified in original site recording

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Appendix A. Consultation documents

Level 7, 177 Pacific Highway
North Sydney NSW 2060 Australia
PO Box 632 North Sydney
NSW 2059 Australia
T +61 2 9928 2100
F +61 2 9928 2444
www.jacobs.com

13 May 2019

Subject: Seeking Aboriginal knowledge holders to assist AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

To Whom It May Concern,

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035.

The Bayswater Water and Other Associated Operational Works Project (the Project) would ensure the continued efficient operation of Bayswater until its retirement, replace and/or upgrade ageing infrastructure, and provide the opportunity for improvements based on post-installation advances in water and wastewater management.

The key features of the project may include:

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity, involving minimal additional ground disturbance.
- 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 from the approved salt caking plant to be constructed at the Bayswater water treatment plant.

- Construction and operation of a borrow pit(s) on AGL Macquarie land to facilitate the improvements proposed for the Project and other works on AGL Macquarie land.
- Seepage water return system improvement works at Lake Liddell.
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of ageing pipelines, vegetation clearing associated with maintaining existing infrastructure, including along pipeline/transmission corridors and drainage canals as well as necessary for the construction of feedlines as required.

The Project area is shown in **Figure 1** and will be refined to a disturbance footprint and provided to Registered Aboriginal Parties upon their identification.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 5.7 of the *Environmental Planning and Assessment Act 1979 (NSW)*. Jacobs, on behalf of AGL Macquarie, is therefore seeking Aboriginal knowledge holders to assist in the assessment of the Project and provide input into the preparation of a cultural heritage assessment report (CHAR).

In accordance with section 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010), it would be appreciated if your organisation could please provide a list of the names of, or pass this request along to, Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects or Aboriginal places for the proposal within the concept proposal area.

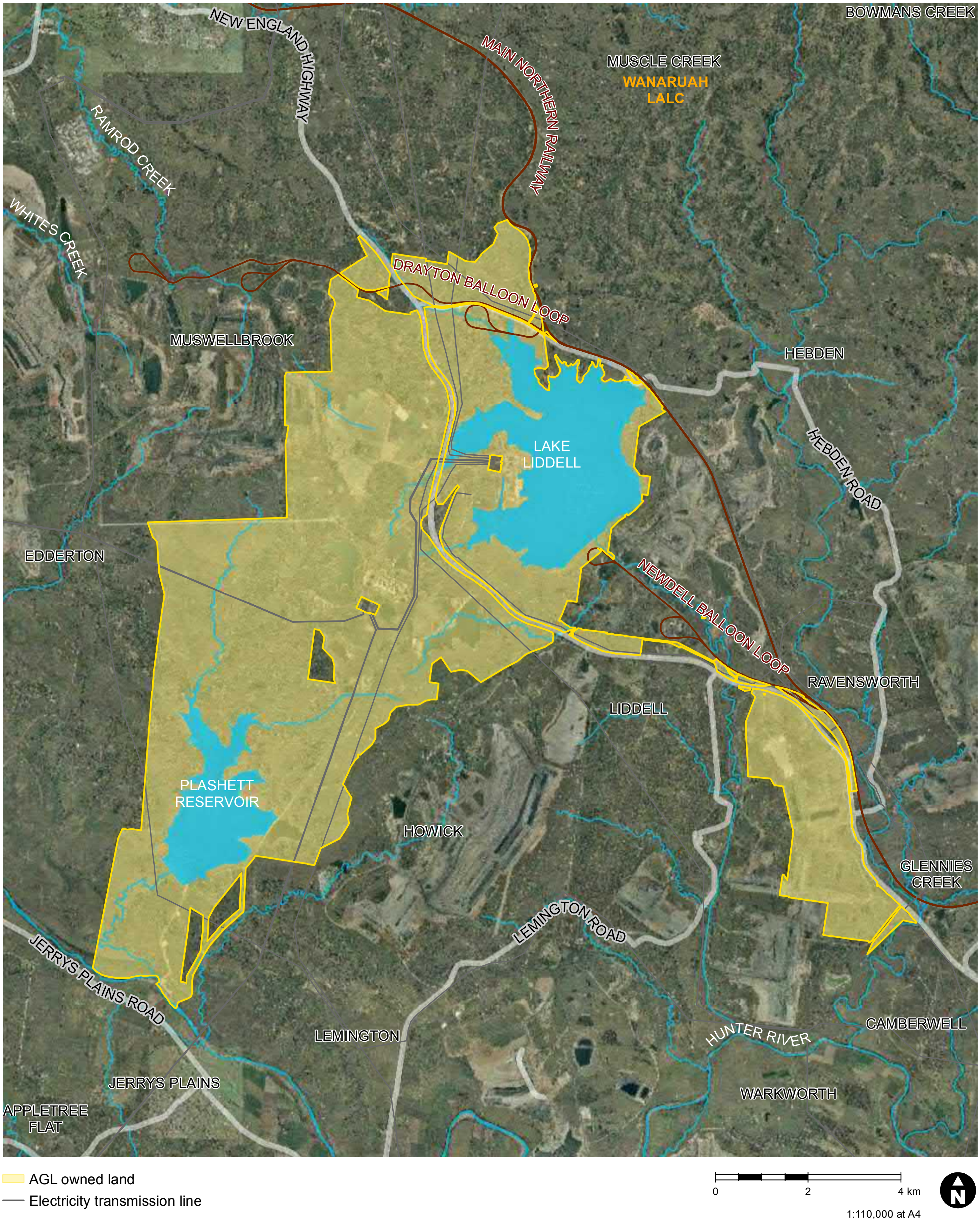
Thank you for your assistance and advice in this matter. If you have any questions or would like to discuss this further, please contact me as per the contact details below:

Clare Leevers
Level 7, 177 Pacific Highway, North Sydney NSW 2060
clare.leevers@jacobs.com

Yours sincerely,

Clare Leevers
Project Archaeologist

Clare Leevers
Archaeologist
+61 2 9032 1815
clare.leevers@jacobs.com



Data sources

Jacobs 2019,
AGL 2019,
NSW Spatial Services 2019

GDA94 MGA56

Figure 1 Project location

From: Jess Wegener <jess.wegener@lls.nsw.gov.au>
Sent: Monday, 13 May 2019 1:34 PM
To: Leevers, Clare
Subject: [EXTERNAL] Fwd: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project
Attachments: image006.jpg

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Clare,

Please see below correspondence and contact details for Noel Downs CEO of WLALC

Wanaruah Local Aboriginal Land Council
PO Box 127
MUSWELLBROOK NSW 2333
19 Maitland St, Muswellbrook NSW 2333
Mobile: 0429773900
Ph: 02 6543 1288
ceo.wanaruah@bigpond.com

Jess Wegener | SLSO Aboriginal Communities Officer
Natural Resources Management
Hunter Local Land Services | Healthy Landscapes
816 Tocal Road | PATERSON | NSW 2421
M: 0429 426 257 | T: (02) 4938 4946 |
E: jess.wegener@lls.nsw.gov.au
W: www.hunter.lls.nsw.gov.au : www.facebook.com/HunterLLS

I pay my respects to all First Nations people of the lands in which i work and acknowledge their long connections to the land we are on and extend that respect to all custodians today.

---------- Forwarded message ---------
From: **Noel Downs** <ceo.wanaruah@bigpond.com>
Date: Mon, May 13, 2019 at 1:28 PM
Subject: RE: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project
To: Jess Wegener <jess.wegener@lls.nsw.gov.au>, Suzie Worth <suzieworth17@bigpond.com>

Yes please

From: Jess Wegener [mailto:jess.wegener@lls.nsw.gov.au]
Sent: Monday, 13 May 2019 10:59 AM
To: Noel Downs <ceo.wanaruah@bigpond.com>; Suzie Worth <suzieworth17@bigpond.com>
Subject: Fwd: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

Good Morning

Please see below email send from Jacobs seeking Registered Aboriginal Parties nomination, let me know if you are happy to pass on your details and if you would like further RAP's details passed on

regards

Jess Wegener | SLSO Aboriginal Communities Officer
Natural Resources Management
Hunter Local Land Services | Healthy Landscapes
816 Tocal Road | PATERSON | NSW 2421
M: 0429 426 257 | T: (02) 4938 4946 |
E: jess.wegener@lls.nsw.gov.au
W: www.hunter.lls.nsw.gov.au : www.facebook.com/HunterLLS

I pay my respects to all First Nations people of the lands in which i work and acknowledge their long connections to the land we are on and extend that respect to all custodians today.

---------- Forwarded message ---------
From: **Leevers, Clare** <Clare.Leevers@jacobs.com>
Date: Mon, May 13, 2019 at 10:40 AM
Subject: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project
To: jess.wegener@lls.nsw.gov.au <jess.wegener@lls.nsw.gov.au>

13 May 2019

Attention: Jess Wegener

Singleton Local Land Services

816 Tocal Road, Paterson, NSW 2421

Via Email: jess.wegener@lls.nsw.gov.au

Subject: Seeking Aboriginal knowledge holders to assist AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

Dear Jess Wegener,

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035.

The Bayswater Water and Other Associated Operational Works Project (the Project) would ensure the continued efficient operation of Bayswater until its retirement, replace and/or upgrade ageing infrastructure, and provide the opportunity for improvements based on post-installation advances in water and wastewater management. The Project area shown in the attached document will be refined to a disturbance footprint and provided to Registered Aboriginal Parties upon their identification.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 5.7 of the *Environmental Planning and Assessment Act 1979 (NSW)*. Jacobs, on behalf of AGL Macquarie, is therefore seeking Aboriginal knowledge holders to assist in the assessment of the Project and provide input into the preparation of a cultural heritage assessment report (CHAR).

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Thank you for your assistance and advice in this matter. If you have any questions or would like to discuss this further, please don't hesitate to contact me.

Yours sincerely,

Clare Leevers
Project Archaeologist
+61 2 9032 1815
clare.leevers@jacobs.com

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

From: Sharon Pope <Sharon.Pope@muswellbrook.nsw.gov.au>
Sent: Friday, 17 May 2019 11:39 AM
To: Leevers, Clare
Subject: [EXTERNAL] RE: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Clare

Recognised Aboriginal Groups in Muswellbrook Shire Council area are:

Wanaruah Local Aboriginal Land Council; CEO Noel Downs; admin.wanaruah@bigpond.com;

Hunter Valley Aboriginal Corporation; Manager Ross Pahuru; Manager@hvabcorp.org.au; and

Tocomwall, is a Registered Aboriginal Party and the organisation that acts on behalf of the Plains Clan of the Wonnarua People (PCWP), the Registered Native Title Claimants for the Hunter Valley region.

Contact:

Scott Franks
Native Title & Environmental Services Manager
Tocomwall Pty Ltd
PO Box 76
CARINGBAH NSW 1495

m: 0404 171544
p: 02 9542 7714
f: 02 9524 4146
e: scott@tocomwall.com.au

www.tocomwall.com.au

Regards

Sharon Pope | Assistant Director Environment and Community Services
muswellbrook shire council
P: (02) 6549 3868 | F: (02) 6549 3701
PO Box 122, Muswellbrook NSW 2333
Sharon.Pope@muswellbrook.nsw.gov.au
www.muswellbrook.nsw.gov.au

From: Leevers, Clare [mailto:Clare.Leevers@jacobs.com]
Sent: Monday, 13 May 2019 11:04 AM
To: Muswellbrook Shire Council
Subject: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

13 May 2019

Attention:
Muswellbrook Council
PO Box 122, Muswellbrook, NSW 2333

Via Email: council@muswellbrook.nsw.gov.au

Subject: Seeking Aboriginal knowledge holders to assist AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

To Whom It May Concern,

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035.

The Bayswater Water and Other Associated Operational Works Project (the Project) would ensure the continued efficient operation of Bayswater until its retirement, replace and/or upgrade ageing infrastructure, and provide the opportunity for improvements based on post-installation advances in water and wastewater management. The Project area shown in the attached document will be refined to a disturbance footprint and provided to Registered Aboriginal Parties upon their identification.

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In accordance with section 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010), it would be appreciated if your organisation could please provide a list of the names of, or pass this request along to, Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects or Aboriginal places for the proposal within the concept proposal area.

Thank you for your assistance and advice in this matter. If you have any questions or would like to discuss this further, please don't hesitate to contact me.

Yours sincerely,

Clare Leevers
Project Archaeologist
+61 2 9032 1815
clare.leevers@jacobs.com

Doc19/398931-3
Bayswater Water and Other Works

Ms Clare Leevers
Jacobs
Clare.leevers@jacobs.com

Dear Clare

Bayswater Water and Other Works – Aboriginal Stakeholder List – Singleton Council and Muswellbrook Council

In response to your request under Section 4.1.2(a) of the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010), please find attached a list of known Aboriginal parties that have self-nominated for Singleton Council and Muswellbrook Council Local Government Areas (LGA). Please note the following information with respect to Aboriginal consultation for your project.

Aboriginal stakeholder lists maintained by OEH are comprised of self-nominated individuals and organisations

Please note that the attached list is comprised only of self-nominated individuals and Aboriginal organisations who could have an interest in your project. The list is not vetted by OEH. As the list comprises only of self-nominated individuals and Aboriginal organisations, it is not necessarily an exhaustive list of all Aboriginal parties who may hold an interest in the project. Further consultation in accordance with step 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010) is required to identify Aboriginal people who may hold either cultural or historical knowledge relevant to determining the significance of Aboriginal objects or places within your proposed project area.

Aboriginal stakeholder lists may cover multiple Local Aboriginal Land Council boundaries

Please note that the attached list may contain two or more Local Aboriginal Land Councils (LALCs) that occur in the LGA. Please review the boundary of your specific project area and ensure you consult with all LALC(s) that overlap with your project area. OEH does not require you to contact any LALCs on the attached list that you determine are wholly located outside your project area.

Ensure you document the consultation process

Please ensure all consultation undertaken in accordance with the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010) is documented within an Aboriginal Cultural Heritage Assessment Report (ACHAR). This must include copies of all correspondence sent to or received from all Registered Aboriginal Parties (RAPs) throughout the entire consultation process. Omission of these records in the final ACHAR may cause delays in the assessment of an Aboriginal Heritage Impact Permit (AHIP) application or a major project Aboriginal cultural heritage assessment, and could require parts of the consultation process to be repeated if the evidence provided to OEH does not demonstrate that the consultation process has been conducted in accordance with our consultation requirements.

Demonstrate that reasonable consultation attempts have been made

Please ensure you provide evidence to demonstrate that reasonable attempts have been made to contact the relevant parties identified through step 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010). If this evidence is not provided, OEH may deem that the consultation process has not complied with the consultation requirements. Similarly, the proponent is required to record all feedback received from RAPs, along with the proponent's response to the feedback. Where concerns or contentious issues are raised by RAPs during the consultation process, OEH expects that reasonable attempts are made to address and resolve these matters, however OEH acknowledges that in some cases, this may not be achievable. In the case where conflict cannot be resolved, it is the responsibility of the proponent to record these differences and provide the necessary information in their ACHAR with their AHIP application or major project ACHAR.

Consultation should not be confused with employment

As outlined in Section 3.4 of the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010), the consultation process involves getting the views of, and information from, Aboriginal people and reporting on these. It is not to be confused with other field assessment processes involved in preparing a proposal and an application. OEH does not have any role with respect to commercial engagement. Where RAPs are engaged commercially to provide field services as part of an assessment process, that is a matter for the proponent to manage as they see fit. However, if a proponent is proposing to undertake consultation processes or elicit cultural information from RAPs during the course of conducting a field survey, OEH considers this to form part of the consultation process, and expects that all RAPs would be afforded the opportunity to be involved in the process.

Contacting our office

To ensure we can respond to enquiries promptly, please direct future correspondence to our central mailbox: rog.hcc@environment.nsw.gov.au.

Should you require any further information, please do not hesitate to contact us.

Yours sincerely

30 May 2019

STEVEN COX
Senior Team Leader Planning
Hunter Central Coast Branch
Conservation and Regional Delivery Division

27 May 2019

By email: clare.leevers@jacobs.com

Clare Leevers
Project Archaeologist
Jacobs Group Australia Pty Ltd
PO Box 632
NORTH SYDNEY NSW 2059

Dear Ms Leevers,

Request - Search for Registered Aboriginal Owners

We refer to your letter dated 10 May 2019 ("Letter") regarding an Aboriginal Cultural Heritage Assessment for the proposed developments within the study area indicated on the map attached to the Letter, located approximately 16 kms south-east of Muswellbrook, NSW.

Under Section 170 of the *Aboriginal Land Rights Act 1983* the Office of the Registrar is required to maintain the Register of Aboriginal Owners (RAO). A search of the RAO has shown that there are not currently any Registered Aboriginal Owners in the project area.

We suggest you contact Wanaruah Local Aboriginal Land Council on 02 6543 1288 as they may be able to assist you in identifying Aboriginal stakeholders who wish to participate.

Yours sincerely

ELoane

Elizabeth Loane
Project Officer, Aboriginal Owners
Office of the Registrar, ALRA

From: Lourens, Rean <rlourens@singleton.nsw.gov.au>
Sent: Monday, 13 May 2019 2:08 PM
To: Leevers, Clare
Subject: [EXTERNAL] FW: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Clare,

Council can advise that the primary contact for all consultation relating to Aboriginal Heritage is the Wanaruah Land Council.

Address: 128 George Street, Singleton NSW 2330

Phone: (02) 6571 5111

Email: admin@ungooroo.com.au

Please feel free to give me a call for any further information.

Regards,

SINGLETON COUNCIL

REAN LOURENS
Acting Coordinator Planning & Development

T 02 6578 7331
E rlourens@singleton.nsw.gov.au
W singleton.nsw.gov.au

From: Leevers, Clare <Clare.Leevers@jacobs.com>
Sent: Monday, 13 May 2019 10:41 AM
To: recordsmbx <council@singleton.nsw.gov.au>
Subject: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

13 May 2019

Attention:
Singleton Council
PO Box 314, Singleton, NSW 2330

Via Email: council@singleton.nsw.gov.au

Subject: Seeking Aboriginal knowledge holders to assist AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

To Whom It May Concern,

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Yours sincerely,

Clare Leevers
Project Archaeologist
+61 2 9032 1815
clare.leevers@jacobs.com

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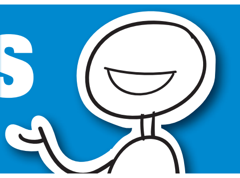

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11.30am
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- 35 Angus C/Calves-Angus/Charolais Calves
- 15 Santa Cows
- 5 Angus X Steers
- 10 Angus Cows
- 20 Mixed Weaners
- 10 Mixed C/Calves
- 12 Angus X Wnrs
- 20 Limo/Limo X Weaner Heifers
- 10 Limo/Limo X Weaner Steers
- 12 Mixed blk bldy Heifers
- 12 X Bred Lambs
- 12 Dorper Lambs 8mths
- 20 Mixed Sheep

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Public Notice
Road Closures Due to Blasting Activities - Wybong Road

Mangoola Coal Operations wish to advise that Wybong Road closures due to blasting activities may take place between:

Monday 20th May 2019 and
Friday 24th May 2019

The road will be closed between west of the mine entrance road for up to 3kms west along Wybong Road. The road closure will occur between 10am and 2pm and be closed for 15 minutes but most likely between ~12:00pm and ~12:30pm. These times are subject to change depending on environmental conditions. Roadside signs will display the date and approximate time of each closure.

For further information, please contact our Blasting and Community Response Hotline:
1800 014 339

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Mothers Day Raffle Results

United Hospital Auxiliary
1st Ticket D19156 Matt,
2nd Ticket D19572 L.Upton,
3rd Ticket D19208 D.Douglas,
Thank you for your support.

RED CROSS RAFFLE 1st Alison Burfitt, 2nd Judy Holdsworths 3rd Lisa Hillier Your support welcomed

Public Notices

JACOBS

AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)

Notice and registration of Aboriginal interests

AGL Macquarie are proposing water and wastewater infrastructure and site improvements to ensure continued operational efficiency of Bayswater Power Station. Works may include the augmentation of the existing ash dam, increase in coal ash recycling activities, development of a new salt cake landfill facility, installation of a new coal ash pipeline, water management improvement works, and ancillary infrastructure works. These activities will be located at the Bayswater Power Station on the New England Highway within the Muswellbrook and Singleton Local Government Areas.

As per the consultation guidelines, Jacobs, on behalf of AGL Macquarie is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the work area. The purpose of consultation with the Aboriginal community is to assist AGL Macquarie in the preparation of a cultural heritage assessment report, and to assist the Director General of OEH in his/her consideration and determination of any subsequent permit applications (if required).

Jacobs are inviting registrations of interest in the process of community consultation from Aboriginal person(s) or groups who hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places at or between Muswellbrook, Howick, Lemington, Liddell and Ravensworth.

You can register in writing (email or letter) to:
Clare Leevers
Jacobs Engineering Group
Level 7, 177 Pacific Highway,
North Sydney, NSW 2060
Email: clarealeevers@ jacobs.com
Registrations must be received by close of business 29 May 2019.

Positions Vacant

All Seasons Irrigation

Office Manager

All Seasons Irrigation located in Aberdeen are currently seeking a new Office Manager.

Key duties will include but not limited to: Payroll, Accounts Receivable/Payable, Bookkeeping.

Required Skills: Proficient in MYOB, Liaising with Accountant, Strong Computer/Office skills.

This position is Part-time with the opportunity to lead to Full-time.

Salary negotiable based on experience.

If you would like more details, please ring
Brad: 0408 885 997

Please send resume's to:
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Clare Leevers
Jacobs Engineering Group
Level 7, 177 Pacific Highway,
North Sydney, NSW 2060
Email: clarealeevers@jacobs.com

Registrations must be received by close of business 5 June 2019.

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PO Box 632 North Sydney
NSW 2059 Australia
T +61 2 9928 2100
F +61 2 9928 2444
www.jacobs.com

20th June 2019

Subject: Seeking Aboriginal knowledge holders to assist Jacobs, on behalf of AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

Dear <Name>

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035.

The Bayswater Water and Other Associated Operational Works Project (the Project) would ensure the continued safe, efficient and reliable operation of Bayswater until its retirement and provide the opportunity for improvements based on post-installation advances in water and wastewater management.

The key features of the project may include:

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity, involving minimal additional ground disturbance.
- 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 from the approved salt caking plant to be constructed at the Bayswater water treatment plant.
- Construction and operation of a borrow pit(s) on AGL Macquarie land to facilitate the improvements proposed for the Project and other works on AGL Macquarie land.
- Ancillary infrastructure works including repositioning of underground pipelines to above ground, replacement or upgrading of ageing pipelines, vegetation clearing associated with maintaining existing infrastructure, including along pipeline/transmission corridors and drainage canals as well as necessary for the construction of feedlines as required.

20th June 2019

Subject: Seeking Aboriginal knowledge holders to assist Jacobs, on behalf of AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

The Project is located within the Bayswater Power Station on the New England Highway within the Local Government Areas of Muswellbrook and Singleton, as shown in Attachment A.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW).

As per the consultation guidelines, Jacobs, on behalf of AGL Macquarie is seeking registrations of interest from Aboriginal people who hold cultural knowledge relevant to the Project area. The purpose of consultation with the Aboriginal community is to assist AGL Macquarie in the preparation of a cultural heritage assessment report, and to assist in the assessment and approval of the Project by the NSW Minister for Planning.

Jacobs are inviting registrations of interest in the process of community consultation from Aboriginal person(s) or groups who hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places at or between Muswellbrook, Howick, Lemington, Liddell and Ravensworth.

Please note that Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010) requires the proponent to advise OEH and the LALC of Aboriginal people who have registered an interest in the Project. Please advise if you **do not** want your details forwarded to OEH.

We hope you or your organisation choose to participate in this Project and enclose for your completion a Notice to Register. **These completed forms need to be returned to Jacobs by 5pm 5th July 2019.**

Yours sincerely,

Clare Leevers
Project Archaeologist
Level 7, 177 Pacific Highway, North Sydney NSW 2060
clare.leevers@jacobs.com
(02) 9032-1815

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I,____(NAME)

____(ORGANISATION)

____(POSITION)

____(ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☐ Mail ☐ Fax ☐ Phone

Email Address:____

Mailing address:____

Fax:____

Phone:____

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, CAROLYN HICKEY

A1 INDIGENOUS SERVICES____(ORGANISATION)

OWNER____(POSITION)

[redacted]____________________________(ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☐ Mail ☐ Fax ☐ Phone

Email Address; [redacted] (PREFERRED METHOD CONTACT)

Mailing address: [redacted]

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, ABORIGINAL NATIVE TITTLE CONSULTANTS (NAME)

MARGARET MATTHEWS (ORGANISATION)

JOHN MATTHEWS - 2 WORKERS (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☑ Mail ☐ Fax ☑ Phone

Email Address:

Mailing address: [redacted]

Fax:

Phone: [redacted]

From: Robinson, Amna
Sent: Wednesday, 26 June 2019 4:30 PM
To: Leevers, Clare
Subject: FW: [EXTERNAL] heritage Culture Bayswater

Follow Up Flag: Follow up
Flag Status: Flagged

FYI

Amna Robinson | Jacobs | Environmental Planner | Buildings and Infrastructure | Eastern Asia Pacific
[redacted]
Level 7, 177 Pacific Highway North Sydney NSW 2060 Australia | PO Box 632 North Sydney NSW 2059 www.jacobs.com

---

From: [redacted]
Sent: Wednesday, 26 June 2019 3:54 PM
To: Robinson, Amna <[redacted]
Subject: [EXTERNAL] heritage Culture Bayswater

Amna,

AGA Services would like to express an interest in being involved in the Bayswater Power Station Project.

AGA Services is an Aboriginal owned partnership business that aims to assist proponents in undertaking cultural heritage work according to all processes and approved conditions, while ensuring compliance to work specific practices.

Our Organisation is fully insured and registered with OEH. We have undertaken work on all types of sites. Please do not hesitate to contact us if you require more information.

Yours truly

A Sampson *G Sampson* *A Sampson*

Please note that all emails and information for AGA Services should be done via [redacted] at present.
thank you

From: Aliera French <[redacted]>
Sent: Wednesday, 29 May 2019 2:57 PM
To: Leevers, Clare
Subject: [EXTERNAL] Registration of Interest - AGL Bayswater Water and Other Associated Operational Works Project.

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Clare,

Please accept my registration of interest for Aliera French Trading to be included in the consultation process and upcoming Aboriginal Cultural fieldworks for the AGL Bayswater Water and Other Associated Operational Works Project.

I am Aliera French the Owner/Operator of Aliera French Trading.
Should you require any further information please feel free to contact me as necessary. My details are as follows:

Contact Name: Aliera French
Address: 17 Kalinda Street,
Blacksmiths NSW 2281
Contact Number:[redacted]
Email:[redacted]

I look forward to working with you.

Aliera French
Owner/Manager
Aliera French Trading

Aliera French
Owner/Manager
Aliera French Trading

From: Kerrie Brauer <[redacted]>
Sent: Sunday, 23 June 2019 11:07 PM
To: Leevers, Clare
Subject: [EXTERNAL] RE: Cultural Heritage Assessment Report for the Bayswater Water and Other Associated Operational Works Project

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Clare,

Thank you for your email.

The Awabakal Traditional Owners Aboriginal Corporation appreciates Jacobs in contacting us regarding the AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project, however would like to inform Jacobs that the AGL Project is not within our Traditional Cultural Boundary and therefore are unable to make any comments on the Aboriginal Cultural Heritage for the area.

If you require any further information please do not hesitate in contacting me.

Kind regards,
Kerrie Brauer

ATOAC
Kerrie Brauer | Director | Administration | Awabakal Traditional Owners Aboriginal Corporation
[redacted]

From: Robinson, Amna [redacted]
Sent: Thursday, 20 June 2019 1:15 PM
To: [redacted]
Subject: Cultural Heritage Assessment Report for the Bayswater Water and Other Associated Operational Works Project

Dear Kerrie,

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035. The Project is located within the Bayswater Power Station on the New England Highway within the Local Government Areas of Muswellbrook and Singleton, as shown in Attachment A.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 4.7 of the Environmental Planning and Assessment Act 1979 (NSW). As per the consultation guidelines, Jacobs, on behalf of AGL Macquarie, has been made aware that you may hold cultural knowledge relevant to the Project area. The purpose of consultation with the Aboriginal community is to assist AGL Macquarie in the preparation of a cultural heritage assessment report, and to assist in the assessment and approval of the Project by the NSW Minister for Planning.

Jacobs are therefore inviting registrations of interest in the process of community consultation from Aboriginal person(s) or groups who hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places at or between Muswellbrook, Howick, Lemington, Liddell and Ravensworth. If you wish to be included in the consultation for this project, please complete the Notice to Register attached to this email by **5pm 5th July 2019**.

Thank you in advance for your response.
Yours sincerely,

Amna Robinson, on behalf of

Clare Leevers
BArch, GradDipArch | Jacobs
Archaeologist | Asia Pacific Buildings & Infrastructure
Acting Team Leader – Environmental Sciences
+61 2 9032 1815 | +61 431 709 550
clare.leevers@jacobs.com | www.jacobs.com

From: Robinson, Amna
Sent: Wednesday, 26 June 2019 4:30 PM
To: Leevers, Clare
Subject: FW: [EXTERNAL] Heritage Culture Bayswater

Follow Up Flag: Follow up
Flag Status: Flagged

FYI

Amna Robinson | Jacobs | Environmental Planner | Buildings and Infrastructure | Eastern Asia Pacific
[redacted]
Level 7, 177 Pacific Highway North Sydney NSW 2060 Australia | PO Box 632 North Sydney NSW 2059 www.jacobs.com

---

From [redacted]
Sent: Wednesday, 26 June 2019 3:46 PM
To: Robinson, Amna [redacted]
Subject: [EXTERNAL] Heritage Culture Bayswater

Amna,

Cacatua would like to express and interest in being involved in Heritage Culture Bayswater project.

Cacatua is an Aboriginal owned business created to assist proponents and Archaeologists to undertake cultural heritage archaeological assessment according to all processes and approved conditions. Our aim is to provide quality Aboriginal cultural heritage works, while ensuring compliance to work specific practices.
Our Organisation is fully insured and registered with OEH. The staffs of Cacatua have undertaken work on all types of sites.
Please do not hesitate to contact us if you require more information.
Yours truly
G Sampson George Sampson
Manager

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, MARILYN Carroll-Johnson
____(NAME)

CORROBOREE ABORIGINAL CORPORATION
____(ORGANISATION)

DIRECTOR
____(POSITION)

[redacted]
____(ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☑ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☐ Mail ☐ Fax ☐ Phone

Email Address: [redacted]
____

Mailing address [redacted]
____

Mob [redacted]
____

Phone [redacted]
____

From: lilly carroll [redacted]
Sent: Monday, 3 June 2019 7:22 PM
To: Leevers, Clare
Subject: Re: [EXTERNAL] EOI

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Clare ,

DNC would like to register an interest into The Bayswater powerstation project,

Kind regards
Paul Boyd & Liu Carroll
Directors DNC

Sent from Yahoo Mail for iPhone

On Tuesday, January 22, 2019, 2:20 pm, Leevers, Clare <Clare.Leevers@jacobs.com> wrote:

Dear Lilly,

Thank you for registering your interest in the Snowy 2.0 Transmission Project. I have added your details to our list of Registered Aboriginal Parties, and you will be included in the future consultation for this project. I will send through further project information and the project methodology once the Stage One consultation deadline has passed and the list of RAPs has been finalized.

I look forward to working with you.

Regards,

Clare Leevers

BArch, GradDipArch | Jacobs

Archaeologist | Asia Pacific Buildings & Infrastructure

+61 2 9032 1815 | +61 431 709 550

clare.leevers@jacobs.com | www.jacobs.com

I acknowledge the Traditional Owners of Country upon which I work, and pay my respects to them, their culture and their Elders past, present and future.

From: lilly carroll [redacted]
Sent: Wednesday, December 19, 2018 12:12 PM
To: Leevers, Clare <Clare.Leevers@jacobs.com>
Subject: [EXTERNAL] EOI

Hi Clare,

DNC would like to register an interest into connection site proposed Snowy 2.0 cableyardWest of Talbingo reservoir as Line 64 in Bago State Forest for Transgrid,

Kind regards

Paul Boyd & Lilly Carroll

Directors DNC

Sent from Yahoo Mail for iPhone

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Craig Horne (NAME)

Gidawaa Walang Cultural Heritage Consultancy (ORGANISATION)

Cultural Project Officer (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☐ Mail ☐ Fax ☐ Phone

Email Address: [redacted]

Mailing address:

Fax:

Phone:

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, PAULETTE RYAN (NAME)

HTO (ORGANISATION)

MANAGER. (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☐ Mail ☐ Fax ☐ Phone

Email Address: [redacted]

Mailing address: AS ABOVE

Fax:

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, LUKE HICKEY (NAME)

HUNTER VALLEY CULTURAL SURVEYING (ORGANISATION)

MANAGER (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☐ Mail ☐ Fax ☑ Phone

Email Address: [redacted]

Mailing address: AS ABOVE

Fax:

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I,____Les Atkinson
____(NAME)

____Jarban + Mugrebea
____(ORGANISATION)

______Owner manager
____(POSITION)

[redacted]______________________________(A

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☒ x Email ☒ x Mail ☐ Fax ☐ Phone

Email Address:____[redacted]
____

Mailing address:____[redacted]
____

Fax:____

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

ARTHUR FLETCHER	NAME
KAUWUL WONN1 CONTRACTING	ORGANISATION
DIRECTOR	POSITION
[redacted]	ADDRESS

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

X☐ Email **X**☐ Phone

Email Address: [redacted]

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Thomas Miller (NAME)

Lower Hunter Wonnarua Cultural Services (ORGANISATION)

Wonnarua Elder (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **<u>AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)</u>**

I confirm that I am authorised to register on behalf of this organisation. ✓

(Tick if relevant)

I **<u>DO NOT</u>** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

Email ✓ Mail Fax Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax:

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Barry Anderson (NAME)

Lower Wonnarua Tribal Consultancy (ORGANISATION)

Manager (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

✓ I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☑ Mail ☐ Fax ☑ Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax: ______

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Shaun Carroll (NAME)

Merrigarn (ORGANISATION)

Director (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☒ Email ☐ Mail ☐ Fax ☐ Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax:

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers

Heritage Consultant

Jacobs

Level 7, 177 Pacific Highway

NORTH SYDNEY NSW 2060

Email: clare.leevers@jacobs.com

I Jesse Johnson (NAME)

Muragadi Heritage ORGANISATION)

Director _(POSITION)

[redacted] ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

0 I DO NOT wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW 2010).

My preferred method of communication is (Please tick preferred method and provide details below):

Email Mail Fax Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax: N/A

Phone [redacted]

Notice of Registration

To: Miss Clare Leevers

Heritage Consultant

Jacobs

Level 7, 177 Pacific Highway

NORTH SYDNEY NSW 2060

Email: clare.leevers@jacobs.com

I Ryan Johnson (NAME)

Murra Bidgee Mullangari (ORGANISATION)

Director (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

0 I DO NOT wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW 2010).

My preferred method of communication is (Please tick preferred method and provide details below):

Email Mail Fax Phone

Email Address: n[redacted]

Mailing address: [redacted]

Fax: N/A

Phone [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Colin Ahoy (NAME)

Nunawanna Aboriginal Corporation (ORGANISATION)

Chairperson (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☑ Mail ☐ Fax ☐ Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax:

Phone: [redacted]

From: Scott Franks[redacted]
Sent: Thursday, 20 June 2019 2:09 PM
To: Leevers, Clare
Subject: [EXTERNAL] Re: Cultural Heritage Assessment Report for the Bayswater Water and Other Associated Operational Works Project

Follow Up Flag: Follow up
Flag Status: Flagged

Clare,

Thank you for the notification, could you please register our interest in this project on the behalf of the PCWP Registered Native title claimant for the Wonnarua people.

Regards
Scott Franks
Registered native title claimant PCWP
Tocomwall PTY Limited
[redacted]

On 20 Jun 2019, at 2:04 pm, Robinson, Amna [redacted]rote:

> Dear Scott,
>
> AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035. The Project is located within the Bayswater Power Station on the New England Highway within the Local Government Areas of Muswellbrook and Singleton, as shown in Attachment A.
>
> Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 4.7 of the Environmental Planning and Assessment Act 1979 (NSW). As per the consultation guidelines, Jacobs, on behalf of AGL Macquarie, has been made aware that you may hold cultural knowledge relevant to the Project area. The purpose of consultation with the Aboriginal community is to assist AGL Macquarie in the preparation of a cultural heritage assessment report, and to assist in the assessment and approval of the Project by the NSW Minister for Planning.
>
> Jacobs are therefore inviting registrations of interest in the process of community consultation from Aboriginal person(s) or groups who hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places at or between Muswellbrook, Howick, Lemington, Liddell and Ravensworth. If you wish to be included in the consultation for this project, please complete the Notice to Register attached to this email by **5pm 5th July 2019**.
>
> Thank you in advance for your response.
> Yours sincerely,
>
> Amna Robinson, on behalf of
>
> **Clare Leevers**
> BArch, GradDipArch | Jacobs
> Archaeologist | Asia Pacific Buildings & Infrastructure
> Acting Team Leader – Environmental Sciences
> +61 2 9032 1815 | +61 431 709 550
> clare.leevers@jacobs.com | www.jacobs.com
>
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>
>
>
> <ScottFranks.pdf>
>
> <Notice of Registration_dft02.docx>

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, Allen Stuart Paget (NAME)

Ungooroo Aboriginal Corporation (ORGANISATION)

Chairperson (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant) ✓

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☐ Mail ☐ Fax ☑ Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax: [redacted]

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I,___________ Noel Downs _________________(NAME)

Wanaruah Local Aboriginal Land Council ____________(ORGANISATION)

CEO ____(POSITION)

___[redacted] _____________(ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☐ Mail ☐ Fax ☐ Phone

Email Address:___[redacted]_____

Mailing address:__[redacted]

Fax:______ Email NOT Fax ____

Phone:__ [redacted] or 02[redacted] ____

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, DES HICKEY (NAME)

WATTAKA W.C.C SERVICES (ORGANISATION)

MANAGER (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☐ Mail ☐ Fax ☑ Phone

Email Address: [redacted]

Mailing address: AS ABOVE

Fax:

Phone: [redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I Steven Hickey________________________________(NAME)

Widescope Indigenous Group ____________________(ORGANISATION)

RAP____(POSITION)

[redacted]_____________________(ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☐ Email ☐ Mail ☐ Fax ☐ Phone

Email Address: [redacted]____

Mailing address:____

Fax:____

Phone: [redacted] or Admin [redacted]____

From: Laurie Perry <[redacted]
Sent: Monday, 13 May 2019 2:33 PM
To: Leevers, Clare
Subject: [EXTERNAL] FW: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project
Attachments: Template.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Clare

Jess has forwarded this on to me seeking knowledge holders, the WNAC are knowledge holders and would like to be consulted on this project

cheers

Laurie Perry
CEO - Wonnarua Nation Aboriginal Corporation
[redacted]
Singleton Delivery Centre 2330
[redacted]

From: Jess Wegener [redacted]
Sent: Monday, 13 May 2019 12:28 PM
To: Laurie Perry
Subject: Fwd: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project

FYI for your information see attachment and information for your reference please contact Clare and let her know if you are interested

Jess Wegener | SLSO Aboriginal Communities Officer
Natural Resources Management
[redacted]
W: www.hunter.lls.nsw.gov.au : www.facebook.com/HunterLLS

I pay my respects to all First Nations people of the lands in which i work and acknowledge their long connections to the land we are on and extend that respect to all custodians today.

---------- Forwarded message ---------
From: **Leevers, Clare** <Clare.Leevers@jacobs.com>
Date: Mon, May 13, 2019 at 11:04 AM
Subject: Seeking Aboriginal knowledge holders for the Bayswater Water and Other Associated Operational Works Project
To[redacted]

13 May 2019

Attention: Jess Wegener

Singleton Local Land Services

[redacted]

Via Email[redacted]

Subject: Seeking Aboriginal knowledge holders to assist AGL Macquarie to prepare a cultural heritage assessment report for the Bayswater Water and Other Associated Operational Works Project

Dear Jess Wegener,

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of Bayswater until its expected retirement in 2035.

The Bayswater Water and Other Associated Operational Works Project (the Project) would ensure the continued efficient operation of Bayswater until its retirement, replace and/or upgrade ageing infrastructure, and provide the opportunity for improvements based on post-installation advances in water and wastewater management. The Project area shown in the attached document will be refined to a disturbance footprint and provided to Registered Aboriginal Parties upon their identification.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement in accordance with Division 5.7 of the *Environmental Planning and Assessment Act 1979 (NSW)*. Jacobs, on behalf of AGL Macquarie, is therefore seeking Aboriginal knowledge holders to assist in the assessment of the Project and provide input into the preparation of a cultural heritage assessment report (CHAR).

In accordance with section 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010), it would be appreciated if your organisation could please provide a list of the names of, or pass this request along to, Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects or Aboriginal places for the proposal within the concept proposal area.

Thank you for your assistance and advice in this matter. If you have any questions or would like to discuss this further, please don't hesitate to contact me.

Yours sincerely,

Clare Leevers
Project Archaeologist
+61 2 9032 1815
clare.leevers@jacobs.com

[redacted]

Notice of Registration

To: Miss Clare Leevers
Heritage Consultant
Jacobs
Level 7, 177 Pacific Highway
NORTH SYDNEY NSW 2060
Email: clare.leevers@jacobs.com

I, KATHLEEN (KATHIE) STEWARD KINCHELA (NAME)

YINARR CULTURAL SERVICES (ORGANISATION)

CEO - STAKEHOLDER (POSITION)

[redacted] (ADDRESS)

wish to be registered by Jacobs, on behalf of AGL Macquarie as an Aboriginal Party to be consulted as part of the **AGL Bayswater Water and Other Associated Operational Works Project (WOAOW)**

I confirm that I am authorised to register on behalf of this organisation.

(Tick if relevant)

☐ I **DO NOT** wish for my details to be forwarded to OEH pursuant to Section 4.1.6 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010).

My preferred method of communication is *(Please tick preferred method and provide details below)*:

☑ Email ☑ Mail ☐ Fax ☐ Phone

Email Address: [redacted]

Mailing address: [redacted]

Fax: —

Phone: [redacted]

1/64 Allara Street,
Canberra City ACT 2600
PO Box 237, Civic Square ACT 2608
Australia
T +61 2 6246 2700
F +61 2 6246 2799
www.jacobs.com

August 6, 2019

Project Name: AGL Bayswater Water and Other Associated Works Project

Subject: Supply of project information and methodology document

Dear [redacted]

Jacobs (on behalf of AGL) are providing an archaeological survey methodology document to all Registered Aboriginal Parties (RAPs) and cultural knowledge holders for the Bayswater Water and Other Associated Works Project.

A field survey is scheduled to take place in early to mid-September, and is anticipated to take 1-2 days. Further details and requirements for site officers can be found within the attached methodology document. Please provide the name and availability of any site officer who will participate in the field survey . If available, provide a copy of relevant insurances to Jacobs to allow registration on our supplier database, otherwise a third party provider may have to be used to engage site officers with the requisite insurance coverage.

Please carefully review the attached document for further information and if you have any questions don't hesitate to contact me via phone, email, or postal addresses provided below.

Yours sincerely

Oliver Macgregor
Senior Archaeologist
0262462716
oliver.macgregor@jacobs.com

Macgregor, Oliver

From: Costello, Andrew
[redacted]

[redacted]

[redacted]

[redacted]

A1

Indigenous Services

Contact: Carolyn

[redacted]

[redacted]

[redacted]

[redacted]

Hi,
A1 supports the Draft ACHAR.
A1 would like to be involved in any future field works and meetings
Thank you
Carolyn Hickey

From: Andrew.Costello@jacobs.com <Andrew.Costello@jacobs.com>
Sent: Thursday, 24 October 2019 2:45 PM
To: [redacted]

Jacobs File Transfer System

Andrew.Costello@jacobs.com has sent you a file archive, with the following message:

Please provide comment back by 21 November 2019

If you trust Andrew.Costello@jacobs.com, use the URL below to pick up the file archive (you may need to copy and paste it into your browser):

[redacted]

You have 15 days to pick up this file archive; after 15 day(s) (Midnight 11/7/2019), it will be deleted. This is an automated e-mail. Thank you for using the Jacobs File Transfer System.

Appendix A: Consultation log

Date	To	From	Medium	Brief Description
26/Apr/19	National Native Title Tribunal	Jacobs	Online search	Search for Native Title owners or claimants
10/May/19	Office of the Registrar, *Aboriginal Land Rights Act 1983*	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Wanaruah LALC	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	NTSC	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Newcastle OEH	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Singleton Local Land Services	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Muswellbrook Council	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Singleton Council	Jacobs	Mail	Requesting details of potential RAPs - Agency Letter
10/May/19	Office of the Registrar, *Aboriginal Land Rights Act 1983*	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	Wanaruah LALC	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	NTSC	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	Newcastle OEH	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	Singleton Local Land Services	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	Muswellbrook Council	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
10/May/19	Singleton Council	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	Muswellbrook Council	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	Singleton Local Land Services	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	Office of Environment and Heritage - Hunter	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	NTSCorp	Jacobs	Email	Requesting details of potential RAPs - Agency Letter

Date	To	From	Medium	Brief Description
13/May/19	Wanaruah Local Aboriginal Land Council	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	Office of the Registrar, Aboriginal Land Rights Act 1983	Jacobs	Email	Requesting details of potential RAPs - Agency Letter
13/May/19	Jacobs	Post master - mail administrator	Email	The message to the Wanaruah Local Aboriginal Land Council was undelivered
13/May/19	Jacobs	Singleton Local Land Services	Email	Automatic reply - email received
13/May/19	Jacobs	Office of the Registrar, *Aboriginal Land Rights Act 1983*	Email	Requesting more details
13/May/19	Jacobs	Singleton Local Land Services	Email	The SLSO Officer will pass our request to the HLL's Aboriginal Advisory Committee members from the Muswelbrook area
13/May/19	Jacobs	Wanaruah Local Aboriginal Land Council	Email	Registered their interest
13/May/19	Jacobs	Singleton Local Land Services	Email	Informing us that the primary contact for all consultation relating to Aboriginal Heritage is the Wanaruah Land Council.
17/May/19	Jacobs	Muswellbrook Council	Email	Informing us that the Aboriginal Groups in Muswellbrook Shire Council area are: Wanaruah Local Aboriginal Land Council, Hunter Valley Aboriginal Corporation and Tocomwall.
23/May/19	Jacobs	Jacobs - Senior Environmental Planner	Email	Suggested to contact the Wonnarua Nation Aboriginal Corporation
27/May/19	Jacobs	Office of the Registrar,	Email	Suggested to contact the Wanaruah Local Aboriginal Land Council

Date	To	From	Medium	Brief Description
		Aboriginal Land Rights Act 1983		
30/May/19	Jacobs	Office of Environment and Heritage - Hunter	Email	Aboriginal Stakeholder List
Supply of invitations to register for the project				
20/Jun/19	Aboriginal Native Title Elders Consultants - John and Margaret Matthews	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Crimson-Rosie - Jeffery Matthews	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Lower Wonnaruah Tribal Consultancy Pty Ltd - Berry Anderson	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Roger Matthews Consultancy - Roger Matthews	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Wonnarua Culture Heritage - Gordon Griffiths	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Wonnarua Elders Council - Richard Edwards	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Carol Ridgeway- Bissett	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	Upper Hunter Wonnarua Council Inc	Jacobs	Mail	Sending invitation letter to register as RAP
20/Jun/19	A1 Indigenous Services	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	AGA Services	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Aliera French Trading	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Awabakal Traditional Owners Aboriginal Corportion	Jacobs	Email	Sending invitation letter to register as RAP

Date	To	From	Medium	Brief Description
20/Jun/19	Bathrust Local Aboriginal Land Council	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Cacatua Culture Consultants	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Cacatua Culture Conultants	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Corroboree Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Culturally Aware	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	D F T V Enterprises	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Deslee Talbott Consultants	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Didge Ngunawal Clan	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Divine Diggers Aboriginal Cultural Consultants	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Gidawaa Walang & Barkuma Neighbourhood Centre Inc.	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Gomeroi People (c/- NTSCORP Ltd)	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Hunter Traditional Owner	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Hunter Valley Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Hunter Valley Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Hunters & Collectors	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Indigenous Learning	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Jarban & Mugrebea	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Jumbunna Traffic Management Group Pty Ltd	Jacobs	Email	Sending invitation letter to register as RAP

Date	To	From	Medium	Brief Description
20/Jun/19	Karuah Local Aboriginal Land Council	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Kauma Pondee Inc.	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Kawul Cultural Services	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Kawul Pty Ltd (trading as Wonn1 Sites)	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Lower Hunter Aboriginal Incorporated	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Lower Hunter Wonnarua Cultural Services	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Mayaroo	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Merrigarn	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Mindaribba Local Aboriginal Land Council	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Muragadi	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Murra Bidgee Mullangari Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Myland Cultural & Heritage Group	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Nunawanna Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Tocomwall (acting on behalf of the Plains Clan of the Wonnarua People (PCWP))	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Ungooroo Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Wallagan Cultural Services	Jacobs	Email	Sending invitation letter to register as RAP

Date	To	From	Medium	Brief Description
20/Jun/19	Wanaruah Local Aboriginal Land Council	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Wattaka Wonnarua CC Service	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Widescope Indigenous Group	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Wonnarua Nation Aboriginal Corporation	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Yarrawalk (A division of Tocomwall Pty Ltd)	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Yinarr Cultural Services	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Steve Talbott	Jacobs	Email	Sending invitation letter to register as RAP
20/Jun/19	Kevin Duncan	Jacobs	Email	Sending invitation letter to register as RAP
Supply of 'AGL Bayswater Project Information and Methodology'				
6/Aug/19	A1 Indigenous Services	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	AGA Services	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Aliera French Trading	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Cacatua Culture Conultants	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Corroboree Aboriginal Corporation	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Didge Ngunawal Clan	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'

Date	To	From	Medium	Brief Description
6/Aug/19	Hunter Traditional Owner	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Jarban &Mugrebea	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Kawul Pty Ltd trading as Wonn1 Sites	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Lower Hunter Wonnarua Cultural Services	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Merrigarn	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Muragadi	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Murra Bidgee Mullangari	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Nunawanna Aboriginal Corporation	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Tocomwall (acts on behalf of the Plains Clan of the Wonnarua People (PCWP))	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Ungooroo Aboriginal Corporation	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Wanaruah Local Aboriginal Land Council	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Wattaka Wonnarua CC Service	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Widescope Indigenous Group	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'

Date	To	From	Medium	Brief Description
6/Aug/19	Wonnarua Nation Aboriginal Corporation	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
6/Aug/19	Yinarr Cultural Services	Jacobs	Email	Email bounced
6/Aug/19	Yinarr Cultural Services	Jacobs	Email	Supplied 'AGL Bayswater Project Information and Methodology'
7/Aug/19	Aboriginal Native Title Elders Consultants	Jacobs	Mail	Supplied 'AGL Bayswater Project Information and Methodology'
7/Aug/19	Crimson-Rosie	Jacobs	Mail	Supplied 'AGL Bayswater Project Information and Methodology'
7/Aug/19	Gidawaa Walang Cultural Heritage Consultancy	Jacobs	Mail	Supplied 'AGL Bayswater Project Information and Methodology'
7/Aug/19	Hunter Valley Cultural Surveying	Jacobs	Mail	Supplied 'AGL Bayswater Project Information and Methodology'
7/Aug/19	Lower Wonnaruah Tribal Consultancy Pty Ltd	Jacobs	Mail	Supplied 'AGL Bayswater Project Information and Methodology'
Responses to method document, and survey preparation				
6/Aug/19	Jacobs	Corroboree Aboriginal Corporation	Email	Wishes to supply a site officer. Supplied insurance.
6/Aug/19	Jacobs	Nunawanna Aboriginal Corporation	Email	Wishes to supply a site officer. No insurance supplied.
7/Aug/19	Jacobs	Didge Ngunawal Clan	Email	Wishes to supply a site officer. Supplied insurance.
9/Aug/19	Jacobs	Widescope (Steven Hickey)	Email	Wishes to supply a site officer. Supplied insurance.

Date	To	From	Medium	Brief Description
14/Aug/19	Jacobs	Aboriginal Native Title Elders Consultants (Margaret Matthews)	Phone	Wishes to take part in survey, along with husband John. Will send email with insurance. Asked about another project ('Musswellbrook bypass') which they feel aggrieved about as only Scott Franks and 'the land council' were involved. Wished to know whether Jacobs were the company carrying out that project.
14/Aug/19	Jacobs	Aboriginal Native Title Elders Consultants (Margaret Matthews)	Email	Margaret sent her insurance documents via the Wanaruah Land Council's email address.
14/Aug/19	Jacobs	Aboriginal Native Title Elders Consultants (Margaret Matthews)	Phone	Checking that email with insurance had come through. Stated that she is happy to be contacted via the Land Council's email address (Wanaruah Admin <admin@wanaruahlandcouncil.com.au>)
15/Aug/19	Jacobs	Muragadi	Email	Wishes to supply a site officer. No insurance supplied.
19/Aug/19	Jacobs	Wonnarua Nation Aboriginal Corporation	Email	Wishes to supply a site officer (Laurie Perry). Insurance supplied.
19/Aug/19	Jacobs	Murrabidgee Mullangari	Email	Wishes to supply a site officer. No insurance supplied.
20/Aug/19	Jacobs	Gidawaa Walang Cultural Heritage Consultancy	Email	Wishes to supply a site officer (Craig Horne). Insurance supplied.
20/Aug/19	Jacobs	Wanaruah Local Aboriginal Land Council	Email	Happy with methodology. Looks forward to hearing from Jacobs re the project in future. Doesn't state a desire to supply a site officer

Date	To	From	Medium	Brief Description
5/Sep/19	Aboriginal Native Title Elders Consultants (Margaret Matthews)	Jacobs	Phone	Informed Margaret of the timetable for fieldwork. Informed that an invitation to online induction needs to be supplied to her. Margaret said that Wanaruah Land Councils email address would be the appropriate address to send it to. Margaret stated that both she and John Matthews would attend the survey, but they would only invoice for one person.
5/Sep/19	Wanaruah Local Aboriginal Land Council (Noel Downs)	Jacobs	Phone	Asked Noel which email address is currently valid for Wanaruah LALC. Notified Noel that Jacobs would be sending through invitations to carry out online inductions to John and Margaret Matthews. Checked whether Wanaruah LALC would be supplying a fieldworker - Noel confirmed they will be.
9/Sep/19	Jacobs	Wanaruah Local Aboriginal Land Council	Email	Supplied insurance
4/Sep/19	All RAPs supplying field representatives	Jacobs	Email	Notification of upcoming fieldwork dates and expected duration
4/Sep/19	Jacobs	Didge Ngunawal Clan	Email	Stated that they would provide a field representative on the upcoming survey
5/Sep/19	Wanaruah Local Aboriginal Land Council (Noel Downs)	Jacobs	Email	Notified the land council that invitations for online induction would be sent through soon. Asked for the land council to supply insurance documents covering their representative.
6/Sep/19	Jacobs	Wonnarua Nation Aboriginal Corporation	Email	Informed Jacobs that WNAC is unable to supply a field representative for the survey
13/Sep/19	Wanaruah Local Aboriginal Land Council (Noel Downs)	Jacobs	Email	Informed Jacobs that there are several problems with the 'existing cultural heritage knowledge' section of the Method document. Supplied some background literature on Aboriginal groups in the study area, and stated that the pre

Date	To	From	Medium	Brief Description
				1830's epidemic was chicken pox rather than smallpox as Jacobs' report states.
13/Sep/19	Jacobs	Didge Ngunawal Clan	Email	Supplied invoice for survey fieldwork
16/Sep/19	Wanaruah Local Aboriginal Land Council (Noel Downs)	Jacobs	Email	Thanked WLALC for the literature they supplied on Aboriginal groups in the Hunter Valley, and stated that these works will be incorporated into the upcoming ACHAR.
17/Sep/19	Didge Ngunawal Clan	Jacobs	Email	Forwarded Didge Ngunawal Clan's invoice to Nicholas Woodard (AGL), cc'd DNC on email.
17/Sep/19	Jacobs	Corroborree Aboriginal Corporation	Email	Requested invoicing details.
17/Sep/19	Corroboree Aboriginal Corporation	Jacobs	Email	Supplied Nicholas Woodard's email address, for invoicing.
Supply of draft ACHAR				
24/Oct/19	Cacatua Culture Consultants	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Nunawanna Aboriginal Corporation	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	A1 Indigenous Services	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Wanaruah Local Aboriginal Land Council	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Corroboree Aboriginal Corporation	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Didge Ngunawal Clan	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Jarban &Mugrebea	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Muragadi	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Lower Hunter Wonnarua Cultural Services	Jacobs	Email	Supplied draft ACHAR.

Date	To	From	Medium	Brief Description
24/Oct/19	Widescope Indigenous Group	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Yinarr Cultural Services	Jacobs	Email	Supplied draft ACHAR.
25/Oct/19	Aboriginal Native Title Elders Consultants	Jacobs	Mail	Supplied draft ACHAR.
25/Oct/19	Crimson-Rosie	Jacobs	Mail	Supplied draft ACHAR.
25/Oct/19	Hunter Valley Cultural Surveying	Jacobs	Mail	Supplied draft ACHAR.
25/Oct/19	Lower Wonnaruah Tribal Consultancy Pty Ltd	Jacobs	Mail	Supplied draft ACHAR.
24/Oct/19	AGA Services	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Aliera French Trading	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Gidawaa Walang Cultural Heritage Consultancy	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Hunter Traditional Owner	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Kawul Pty Ltd trading as Wonn1 Sites	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Merrigarn	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Murra Bidgee Mullangari	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Tocomwall (acts on behalf of the Plains Clan of the Wonnarua People (PCWP))	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Ungooroo Aboriginal Corporation	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Wattaka Wonnarua CC Service	Jacobs	Email	Supplied draft ACHAR.
24/Oct/19	Wonnarua Nation Aboriginal Corporation	Jacobs	Email	Supplied draft ACHAR.
Responses to draft ACHAR				

Date	To	From	Medium	Brief Description
3/Nov/19	Jacobs	A1 Indigenous Services	Email	Advised that A1 Indigenous Services support the draft ACHAR, and would like to be involved in any future fieldwork and meetings associated with the project.

Appendix B. Archaeological Project Information and Methodology Document

AGL Bayswater

AGL Macquarie

Aboriginal Cultural Heritage Assessment Project Information and Methodology

Draft | D1

06 August, 2019

IA215400

Contents

Executive Summary

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located south-east of Muswellbrook in the Local Government Areas of Muswellbrook and Singleton.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement (EIS) for the Bayswater Water and Other Associated Works (WOAOW) project in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979 (NSW).*

This document presents the proposed method for the assessment of Aboriginal cultural heritage. The information and results of the survey will be documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Project.

The features of the Project would include (see Figure 2-1):

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity while involving minimal ground disturbance.
- 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.
- Ancillary infrastructure works including vegetation clearing associated with maintaining existing infrastructure, including along pipeline/transmission corridors.

The Aboriginal cultural heritage assessment process will involve the following tasks:

- Desktop assessment of what is known about the archaeological resource of the project area and its surrounds from previous research
- Development of a methodology for archaeological survey (this document)
- Survey of the areas proposed to be impacted by the project
- Reporting – an ACHAR will be prepared to the requirements of the *Code of Practice* (DECCW, 2010b), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011). The report will:
    - Synthesise the results of technical investigations, including the desktop assessment and archaeological survey
    - Include an assessment of the significance of any Aboriginal objects and record any Aboriginal cultural heritage values identified

- Include an impact assessment and provide management and mitigations measures to inform any AHIP application as required.

- Site records on the AHIMS database will be updated as necessary.

The field survey will systematically investigate the areas proposed to be impacted by the proposed works.

The survey will endeavour to investigate the proposed impact areas in full. No sub-sampling of these areas will be employed.

This document is provided to all Registered Aboriginal Parties (RAPs) to invite comments and feedback on the proposed Aboriginal cultural heritage assessment process. RAPs are also invited to provide information on the cultural significance and values of Aboriginal objects and places relevant to the area of proposed works.

Abbreviations and acronyms

ACHAR	Aboriginal Cultural Heritage Assessment Report
AGL Macquarie	AGL Macquarie Pty Ltd
AHIMS	Aboriginal heritage information management system
AHIP	Aboriginal Heritage Impact Permit
DECCW	Department of Environment, Climate Change and Water NSW
Jacobs	Jacobs Group (Australia) Pty Ltd
NSW	New South Wales
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
WOAOW	Water and Other Associated Operational Works

1. Introduction

1.1 Background and purpose of this document

AGL Macquarie Pty Limited (AGL Macquarie) own and operate the Bayswater Power Station, located approximately 16 km south-east of Muswellbrook. Commissioned in 1985, water and wastewater infrastructure and site improvements are required to ensure the continued operational and environmental performance of the power station until its expected retirement in 2035.

The proposed Water and Other Associated Operational Works (WOAOW) project (referred to here as 'the Project') at the Bayswater Power Station would ensure the continued safe, efficient and reliable operation of Bayswater until its retirement. This project provides the opportunity for improvements based on post-installation advances in water and wastewater management.

The Project is located within the Bayswater Power Station on the New England Highway within the Local Government Areas of Muswellbrook and Singleton.

Jacobs, on behalf of AGL Macquarie is currently drafting an Environmental Impact Statement (EIS) for the assessment of infrastructure and water upgrade works, in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979 (NSW).*

This document presents the proposed method for the assessment of Aboriginal cultural heritage through the archaeological survey of the area of proposed works (hereafter referred to as the 'project area'). The results of this assessment will be presented in an Aboriginal Cultural Heritage Assessment Report (ACHAR).

This proposed methodology has been designed to conform to the requirements of the following advisory documents and guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH, 2011).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Part 6 National Parks and Wildlife Act, 1974)* (DECCW, 2010a)

1.2 Objective of community consultation

Consultation provides the Aboriginal community the opportunity to improve assessment results by:

- Sharing relevant information about the cultural significance and values of Aboriginal object(s) and/or place(s).
- Contributing to the assessment of cultural and scientific significance of Aboriginal object(s) and/or place(s).
- Reviewing and commenting on the proposed methods of assessing cultural heritage within the project area (this document).
- Contributing to the development of cultural heritage management options and recommendations for Aboriginal object(s) and/or place(s) within the subject area.
- Commenting and providing feedback on the draft Aboriginal Cultural Heritage Assessment Report (ACHAR) before it is submitted to the relevant government agency.

2. Project information

2.1 The Hunter Valley and the Bayswater Power Station

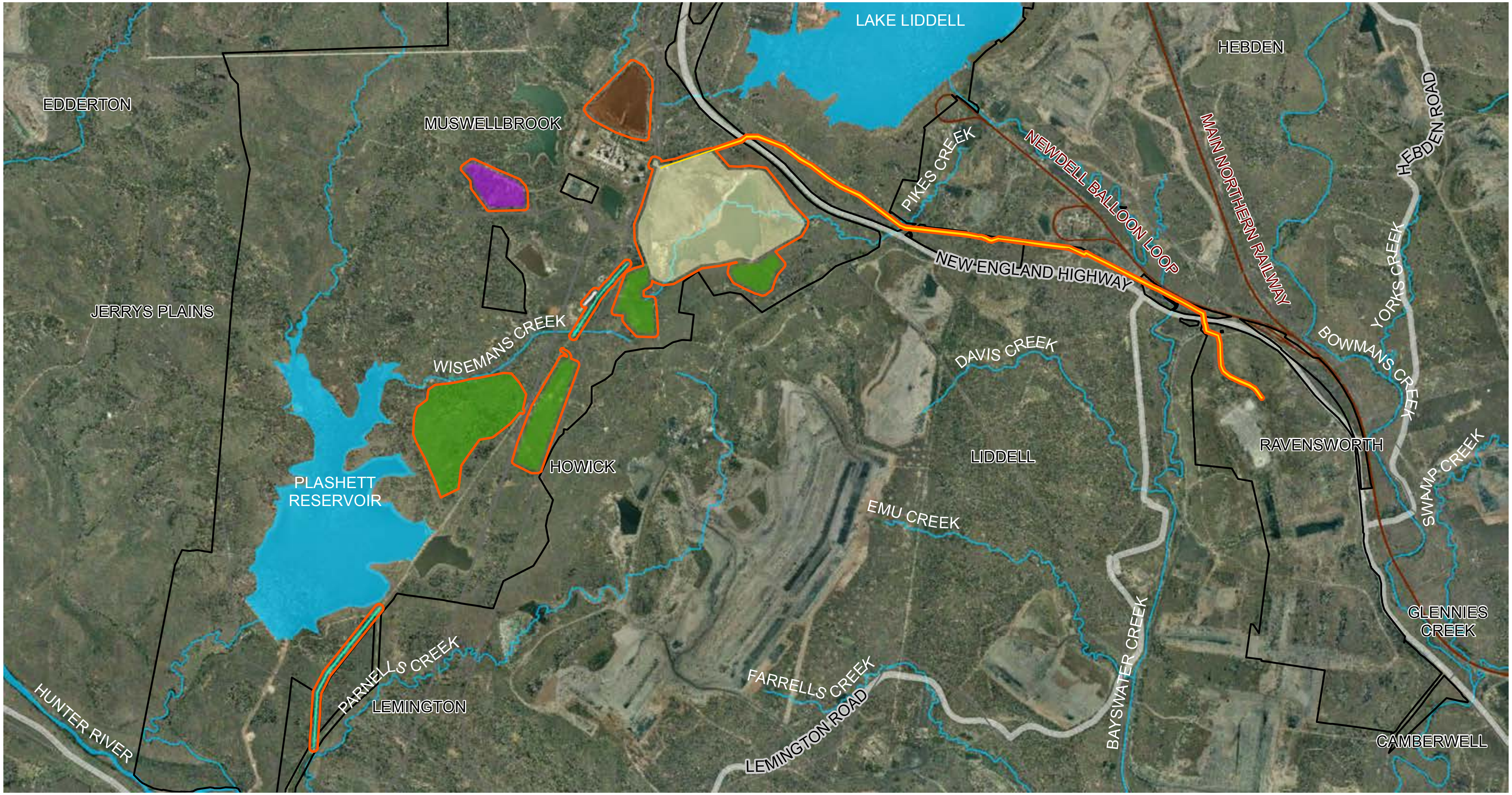
The Bayswater Power Station is located approximately 20km south of Muswellbrook and to the west of the New England Highway. The project area lies within the Central Lowlands landscape, characterised by undulating low hills, ranging in elevation from 140m - 330m. Wisemans Creek and an unnamed 1st order drainage line pass through the project area.

Bayswater Power Station was commissioned in 1985, and its design reflects progress and improvements in power generation technology. Four evaporative cooling towers stand out as the site's most distinctive feature. AGL acquired Liddell and Bayswater power stations – previously known collectively as Macquarie Generation – from the NSW Government in September 2014. AGL Macquarie is one of Australia's major electricity generators. Over recent years Bayswater power station has produced approximately 15,000 GWh of electricity a year, enough power for two million average Australian homes and families. In conjunction with the Liddell Power Station the Bayswater Power Station produces approximately 12% of the electricity needed by consumers in eastern Australia.

2.2 What is being proposed

The features of the Project are presented in Figure 2-1 and would include:

- Augmentation of the existing Bayswater ash dam to provide additional ash storage capacity while involving minimal ground disturbance;
- 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;
- Ancillary infrastructure works including vegetation clearing associated with maintaining existing infrastructure, including along pipeline/transmission corridors.



Study area
AGL owned land

Project elements:

Ash Dam Augmentation, Ash Harvesting and Water Management Works
Salt Cake Landfill
Coal Handling Plant Water and Wastewater Infrastructure Upgrades
HP Pipe Clearing
LSP Sludge Line Clearing
Borrow Pits
Ravensworth Ash Line

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Data sources
Jacobs 2019, AGL 2019
NSW Spatial Services 2019

GDA94 MGA56

Figure 2-1 Indicative plan showing the project features and extent of the proposed project area

Date: 24/06/2019 Path: J:\IE\Projects\04_Eastern\IA215400\22_Spatial\GIS\Directory\Templates\Map\Internal_general_use\IA215400_GIS_GEN_M002_r1v2_Max_disturbance_landscape.mxd
Created by : XX | QA by : XX

3. Existing cultural heritage knowledge

3.1 Aboriginal Context

The Hunter river system, about 160km north of Sydney, contains many fertile and well-watered valleys. Aboriginal people were documented living in the Hunter Valley by Europeans who first visited and settled in the area (Gunson, 1974). The Hunter Valley was first described in writing by Sir Thomas Mitchell in 1831 who defined it as “being park-like” with light forest and grassy glades, populated by many different animals such as marsupials, birds and rivers full of shellfish and fish (Mitchell, 1839). The area contained many species of edible nuts, wild grains and berries. Today the native animal and plant communities within the project area are extensively modified as a result of European land use practices and introduced species.

The Hunter Valley contains a range of ecological zones within a relatively small area. Major rivers and smaller watercourses would have provided relatively easy access to fresh water across most of the region. Ecological communities would have varied considerably from low lying watered areas around rivers and streams, to open and forested areas on valley floors, hills and mountainous regions bordering the valley to the north, south and west. The area would likely have supported a large population of Aboriginal people.

The impact of disease and violence on Aboriginal populations unfortunately makes it difficult to estimate the size of the pre-contact population. The overall number of different Aboriginal groups and the location of their territorial boundaries were severely affected by a smallpox epidemic beginning in or before 1789. Soon after European arrival in Sydney, the arrival of smallpox in the local Aboriginal population was recorded. Despite the coincidence of these two events, it is now known that smallpox had originally been contracted by Aboriginal people living in Arnhem Land, who caught the disease from fishermen from Southeast Asia (Butlin, 1985; Campbell, 2002; Macknight, 1986). The disease had spread across the continent to arrive on the east coast.

Mortality rates from the epidemic are difficult to measure precisely, but are likely to have been around 80 percent (Butlin, 1983). Mortality could plausibly have been as high as 98 percent based on observations of smallpox’s effects on previously unexposed populations in other continents (Hiscock, 2008: 14). The epidemic resulted in movements of people across the landscape, and possibly the disappearance of some previously existing groups. In Sydney, Governor Arthur Phillip recorded that many Aboriginal people migrated inland, away from the settlement, in an attempt to escape the disease (Phillip, 1789). Lieutenant-Governor David Collins recorded a group that had been reduced to three survivors negotiating to merge with another group, and also observed a group that had been reduced to a single survivor (Collins, 1798).

The impact of the smallpox epidemic on the distribution of Aboriginal groups across the landscape is likely to have been severe. Hiscock (2008: 14) sums up the effect of smallpox by stating it would have “altered the operation of Aboriginal life”. This alteration resulted from the reduction in population and other effects flowing on from this. The possible disappearance of some groups through mortality and group mergers, the mass migration of people fleeing the disease, the depopulation of areas, and the incursion of groups into abandoned or depopulated lands, would have substantially altered the social landscape of Aboriginal groups that had existed prior to the epidemic. The tribal boundaries mapped by European researchers after contact are those of a population that had survived the epidemic (and further epidemics that followed) and had adapted their occupation of the landscape in response to it.

Violence toward Aboriginal populations from European settlers would probably have had effects similar to disease. The impact of violence on Aboriginal groups and the operation of Aboriginal society would have been substantial. Conflict with European settlement would have altered the ways in which Aboriginal society functioned, compared with the pre-contact period. As with disease, conflict caused Aboriginal groups to move off land they had previously occupied, to give up sources of food and other resources that they had previously utilized, and to alter their use of the landscape to avoid the risk of encountering European settlers. Conflict, like disease, would have drastically altered the distribution of Aboriginal groups across the landscape. The areas occupied by groups before European contact, and the overall number of groups, is likely to have differed from the picture we have from post-contact historical records.

Although disease and violence had substantial effects on the demographics of Aboriginal groups, its effects on Aboriginal cultural practises are impossible to estimate. It is important to note that these processes did not extinguish Aboriginal culture. Aboriginal traditional knowledge and elements of pre-contact Aboriginal culture, both tangible and intangible, survive today.

Records from the early nineteenth century describe Aboriginal communities living in the Hunter Valley and a textual source dated April 1825 stated that in the lower Goulburn although no Aboriginal had been seen there were found “their recent mark on the Trees and fired country” (Moore, 1969, p. 20). David R. Moore, Curator of Anthropology of the Australian Museum in 1969, described the Aboriginal groups who lived in the Hunter Valley. He wrote that at the time of the first European arrival the Hunter Valley territory was divided between many Aboriginal communities, such as:

- The Geawegal in the upper Hunter from the Mount Royal Range to Muswellbrook;
- The Wonarua from the middle Hunter down to Maitland;
- The Gaddhng from the Hunter estuary and Port Stephens;
- The Gamilaroi to the north and the Wirandhuri to the south of the upper Goulburn;
- The Awabagal around Lake Macquarie (south of the Hunter Valley);
- The Darginung on the northern side of the Hawkesbury (Moore, 1969).

Moore’s description is consistent with Tindale’s later mapping of Aboriginal groups, the only point of difference being that Tindale depicts the Worimi group covering an area along the coast from the Hunter estuary to Wallis Lake (Horton, 1996; Tindale, 1974). The groups identified by Tindale, and by earlier European researchers, are generally language groups. Finer-grained groupings almost certainly existed within these language groups. It should be noted also that various alternative spellings exist for the groups listed above.

In 1965 the first systematic archaeological survey of the Hunter and Goulburn Valley was undertaken by the Australian Museum and by July 1984 the National Parks and Wildlife Service (NPWS) site register contained records of 1.650 archaeological sites in the Hunter Region, revealing the high heritage value of this area (Moore, 1969).

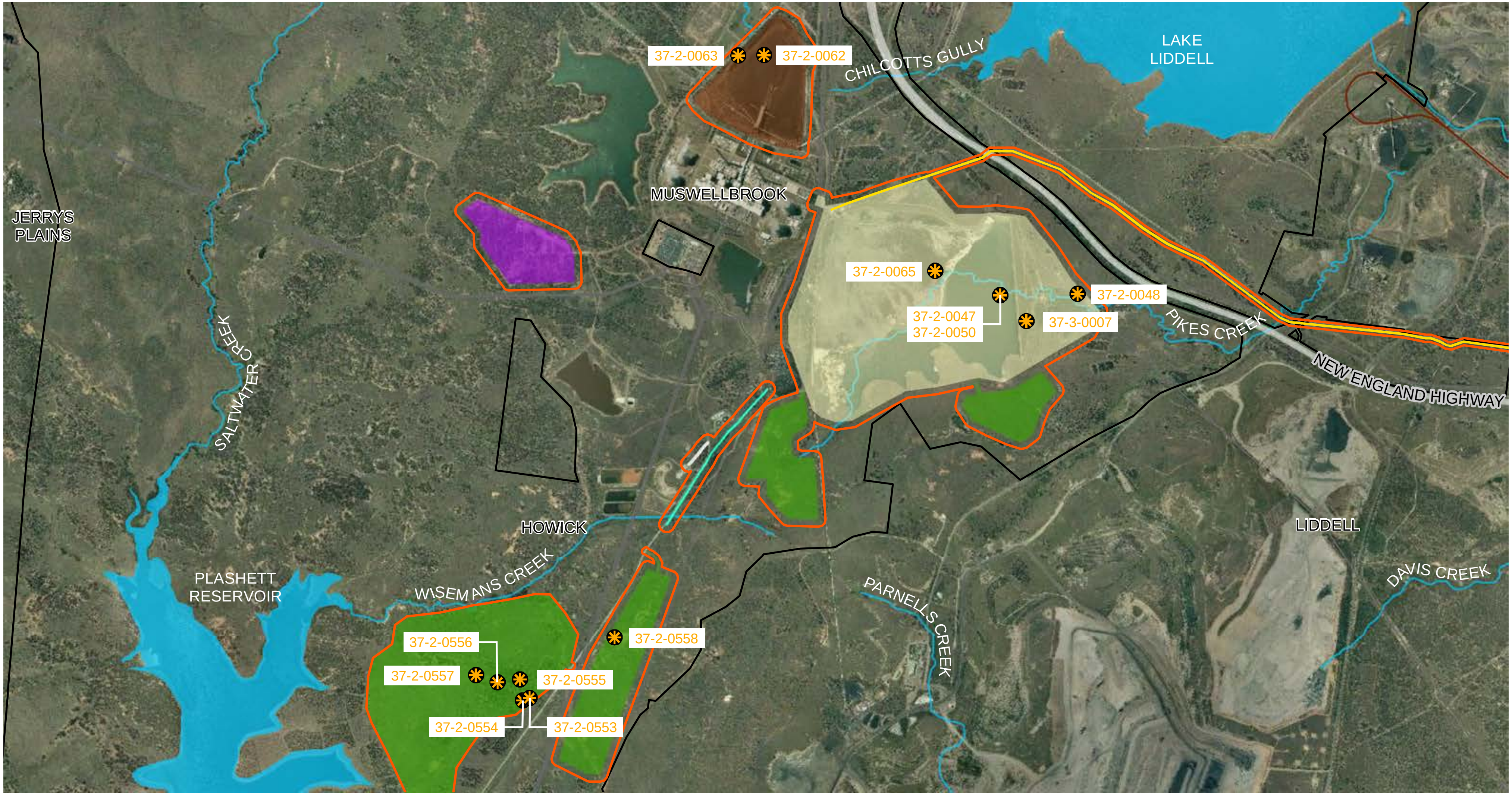
Surface distributions of stone artefacts, variously referred to as artefact scatters, open sites, and open camp sites, are by far the most common and widely distributed form of Aboriginal archaeological site in the Hunter Valley. Flaked stone artefacts dominate the archaeological assemblages of this area and, in the majority of cases, these were recorded on open artefact sites. Grindstones, charcoal, animal bone, shell and ochre both entire or fragmentary have also been recorded (AECOM, 2013). Other types of Aboriginal sites present in the region include scarred trees, shell middens, quarries, grinding grooves, burials and rock shelters.

3.2 Aboriginal Heritage Information Management System (AHIMS) searches

Jacobs carried out a search of the Aboriginal Heritage Information Management System (AHIMS) on 15 July 2019. The footprint of the Project and a 50m buffer zone was used as the search area.

Fifteen previously recorded sites are present within the search area, one of which is recorded as being destroyed. All sites are artefact scatters on open ground.

The list of AHIMS site records is provided in Appendix A. Figure 3-1 overleaf shows the location and extent of Aboriginal sites listed on the AHIMS within and in proximity to the project area.



Study area
AGL owned land
AHIMS site

Project elements:
- Ash Dam Augmentation, Ash Harvesting and Water Management Works
- Salt Cake Landfill
- Coal Handling Plant Water and Wastewater Infrastructure Upgrades
- HP Pipe Clearing
- LSP Sludge Line Clearing
- Clay Borrow Pits
- Ravensworth Ash Line

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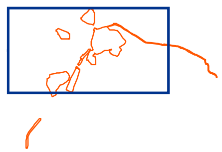

Data sources

Jacobs 2019, AGL 2019,
OEH 2019,
NSW Spatial Services 2019

GDA94 MGA56

Figure 3-1 AHIMS search results for the proposed project area and its surrounds

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3.3 Previous archaeological assessments in the project area and surrounding region

One of the first archaeological investigations of the project area was carried out between 1976-1979 as part of the Mt. Arthur Project. Associate Professor L.K. Dyall from Newcastle University surveyed three mining sites with the intent of discovering Aboriginal artefacts. He found artefacts in three small areas of open ground (The Electricity Commission of New South Wales, 1979).

In 1979, the electricity commission of New South Wales in relation to the Bayswater Power Station project concluded that the only Aboriginal sites within the area were located within the Saltwater Creek reservoir area. It recommended salvage of these Aboriginal heritages before the area was flooded (The Electricity Commission of New South Wales, 1979).

Dyall (1980) carried out a survey immediately south of the Bayswater Colliery, recording three sites on the banks of Saddler's creek. The sites were scatters of flaked stone artefacts, including cores and backed artefacts. The artefacts were made from chert, rhyolite and quartz.

Dyall (1981a) carried out a survey immediately south of Mount Arthur, recording 24 open sites along Saltwater and Saddlers Creeks. The sites were stone artefact scatters, two of which contained more than 500 artefacts. Artefacts recorded included backed artefacts, ground stone axes, choppers and grindstones.

Dyall (1981b)reviewed all Aboriginal sites recorded during surveys of the Mount Arthur Coal Lease area. This report records a number of sites along the banks of Saltwater creek. One scatter of stone artefacts recorded covered more than one acre, extending up to 100m back from the creek bank. The report also records 27 axe grinding grooves on a sandstone shelf. The great majority of sites recorded are open artefact scatters and are located adjacent to the creek.

Hughes (1981) carried out a survey of a proposed extension to the Bayswater Colliery, recording nine Aboriginal sites. The sites were open artefact scatters, six of which are located on creek lines.

In 1992 Pacific Power carried out a survey of a proposed slurry pipeline and water storage pond within the Bayswater Ash Disposal Project. The area was assessed as being highly modified by European settlement and Aboriginal sites were likely to have been disturbed or destroyed (Pacific Power, 1992). Six sites were identified: five artefact scatters and one isolated artefact. The number of artefacts found per site varied from 2 to greater than 200. These sites were identified as outside the proposed area of impact. Avoidance and protection were recommended. Subsequent test excavation in the area of the proposed work identified an absence of artefacts in subsurface deposits.

In 1993 an environmental impact assessment of the Bayswater Power Station was undertaken as part of the Fly Ash Disposal in Ravensworth No.2 Mine Void and Mine Rehabilitation project. As part of the assessment an examination of Heritage registers and field examination was performed. The research showed no European heritage items along the transport corridor and two Aboriginal open artefacts scatter sites and an isolated Aboriginal artefact (Pacific Power, 1993).

Umwelt Australia (1997) carried out a survey of three areas of the southern section of the Bayswater No. 3 mining lease. These areas included a coal processing plant, haul road and mine access road, overland conveyer and stockpile area. The survey recorded 36 sites comprising 28 open artefact scatters and eight isolated artefacts. The majority of sites were located adjacent to watercourses, namely Saddlers Creek and its tributaries. Sites were located on the watercourses' banks, as well as on elevated ground such as upper slopes and ridge tops adjacent to the watercourses. Artefacts included retouched flakes and cores, and one hammerstone.

In 2007 an assessment of the Bayswater Power Station was undertaken as part of the Bayswater Power Station River Intake Project. During the survey an isolated mudstone flake was identified. Due to the lack of further sites in the project area, it was inferred that extensive levels of past disturbance had impacted and destroyed sites in the area (McCardle Cultural Heritage Pty Ltd, 2007).

An archaeological assessment of the Bayswater Liddell Power Generation complex was carried out in 2009, recording 47 Aboriginal sites. All sites were open artefact scatters and isolated artefacts. The number of artefacts per scatter varied from 11 up to 250 with the majority of sites (n.36) containing fewer than 10 artefacts. It was noted that flat areas associated with Saltwater Creek and its tributaries contained surface sites and potential for associated PAD and that elevated landforms and hillslopes were landforms with low archaeological sensitivity (AECOM, 2009).

In 2017 a survey was undertaken as part of the Aboriginal due diligence assessment for the Bayswater Ash Dam Overland Water Pipeline. The survey recorded ground Surface Visibility (GSV) within the project area between 31-50%. No surface artefacts were identified during this inspection. A search of the AHIMS, covering an area approximately 17.8km by 13.5km identified a total of 102 sites outside the pipeline's footprint. These 102 sites included artefact scatters (n.78), isolated artefacts (n.15), sites destroyed under the condition of an AHIP (n.8) and a single modified tree. The majority of sites consist of artefacts identified on exposed ground surfaces. From these results it was concluded that the area did not contain areas of subsurface potential, and that this was probably due to erosion and past disturbance (AECOM, 2017).

A preliminarily Aboriginal heritage assessment for proposed electrical works modifications at the Bayswater Brine Concentrator Decant Basin (BCDB) was carried out in 2018 and as part of the assessment a search of the AHIMS database was completed. This search identified 113 Aboriginal archaeological sites (two sites were classified as "destroyed") (AECOM, 2018).

These assessments demonstrate that the area has been subject to past disturbance, particularly during the post-contact period, which has probably impacted the Aboriginal heritage of the area and reduced the overall number of sites. Previous assessments suggest also that Aboriginal sites are most likely to occur in flat areas associated with water sources and that their number is expected to be higher in areas near permanent water sources. Elevated areas away from watercourses, and slopes are expected to contain fewer Aboriginal sites. These results feed into the predictive model outlined in the following section.

3.4 Predictive model

The following predictive model is used to identify areas of archaeological sensitivity. The model is based on a 'land system' or 'archaeological landscape' model of site location. This type of model predicts site location based on known patterns of site distribution in similar landscape regions.

The predictive model is based on:

- A review of previous models developed for the project area.
- An assessment of the results of the previous archaeological assessments reviewed in Section 3.3.
- The interpretation of the distribution patterns of known sites close to the project area.
- A study of previous impacts to the project area and the potential effects of these impacts on the archaeological record.

The following specific predictive points are noted for the landscape the proposed project footprint sits within:

- Elevated landforms adjacent to watercourses have high archaeological potential. Existing archaeological data for the Hunter Valley indicate a strong trend for the presence of open sites along watercourses, specifically, on creek banks and 'flats' (i.e. flood/drainage plains), terraces and bordering slopes.
- Landforms adjacent to permanent watercourses have a higher archaeological potential than those adjacent to ephemeral watercourses.

- The most common site type will be surface and sub-surface scatters of stone artefacts.
- Other site types that may present in the landscape are quarries, grinding grooves and scarred trees.
- The most commonly occurring material will be indurated mudstone/silicified tuff followed by silcrete. Other materials such as chert and quartz are also likely to be present.
- Where present, sub-surface archaeological deposits are most likely to be within 200 m of a water source (river or creek).
- Ridgelines and hills will have a lower density of sites than basal slopes and valley floors.
- Within the road corridor surface and sub-surface deposits are likely to be heavily disturbed and may contain areas of imported fill.

A number of post-depositional processes can result in disturbance or destruction of archaeological sites. Identifying areas of high disturbance is an important factor in the predictive model. Disturbance can alter the patterns of site location expected from the points above. The following general predictive points relate to the effects of site disturbance:

- Landforms adjacent to watercourses and which have been subject to frequent or high-energy flooding events will have reduced archaeological potential.
- Steep hillslopes have reduced archaeological potential, as sites will be more likely to have been displaced by downslope movement and surface erosion.
- European land-use practises can have a range of impacts to sites. Road corridors will have low archaeological potential, particularly if heavily graded or capped with imported material. Areas that have been excavated, inundated by dammed watercourses, or buried under fill or stockpiled materials will have low archaeological potential.

Many post-depositional processes result in the movement of artefacts away from their original location and context, without resulting in damage or destruction to the artefacts themselves. Some post-depositional processes will result in the destruction of some, but not all, artefacts within a site. Only severe impacts will destroy or remove all Aboriginal objects from a landform. Factoring post-depositional disturbance into the assessment of a landform's archaeological potential should consequently take a precautionary approach. A landform should be assumed to retain archaeological potential unless there is compelling evidence for severe disturbance that can be confidently inferred to have removed all sites from the landform.

4. Proposed methodology for the cultural heritage assessment

4.1 Aboriginal Cultural Heritage Assessment

The Aboriginal cultural heritage assessment will involve the following tasks:

- Desktop assessment of what is known about the archaeological resource of the project area and its surrounds from previous research.
- Development of a method for archaeological survey (this document).
- Survey of the areas proposed to be impacted by the project.
- Reporting – an ACHAR will be prepared. The report will satisfy the requirements of the *Code of Practice* (DECCW, 2010b), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011). The report will:
    - Synthesise the results of technical investigations, including the desktop assessment and archaeological survey
    - Include an assessment of the significance of any Aboriginal objects and record any Aboriginal cultural heritage values identified
    - Include an impact assessment and provide management and mitigations measures to inform any AHIP application as required.
- Each report will be reviewed by RAPs. Information, comments and feedback received from RAPs will be incorporated into the final version of the report.
- Site records on the AHIMS database will be updated as necessary.

4.2 Aboriginal community input points during the assessment process

Input and feedback can be provided by RAPs at any time throughout the assessment process. Jacobs will specifically seek input and feedback from RAPs at several points during the process (following proceedures outlined in DECCW, 2010a):

- During Stage 2 – Initial presentation of information about the proposed project.
- During Stage 3 - Providing RAPs with the draft proposed methodology (this document). RAPs are invited to provide feedback on the proposed methodology, and to identify cultural heritage values associated with the project area.
- During fieldwork.
- During Stage 4 - Providing RAPs with the draft Aboriginal Cultural Heritage Assessment Report. RAPs will be invited to provide feedback on the report, and any further information they wish to be included.

4.3 Archaeological Field Survey

The field survey will systematically investigate the areas proposed to be impacted by the project.

The survey will be carried out on foot by a team of archaeologists and Aboriginal representatives.

The survey will investigate the proposed impact areas in full. No sub-sampling of these areas will be employed. Areas that are assessed by field teams as having no potential for archaeological material to be present, for example because of previous impacts and ground disturbance, will not be surveyed. The decision to exclude areas in this way will be made in the field, through a consensus of all field team members.

The ground survey team will consist of two archaeologists as well as Aboriginal representatives. The field survey is aimed at locating Aboriginal objects and areas of Potential Archaeological Deposit (PAD) containing subsurface archaeological material.

Where archaeological sites are encountered, the following attributes will be recorded:

- Site location (single point for isolated artefacts, or as a boundary drawn around larger sites such as artefact scatters);
- Site type;
- Landform context;
- Vegetation type;
- Land use;
- Categories of features and artefacts present on the site;
- Orientation/aspect of the site;
- Observations on individual stone artefacts: stone material type; artefact type; platform surface; platform type; termination type; cross-section category; length, width and thickness in millimetres;
- Observations on modified trees: living status of tree; condition of tree; condition of scar; tree species; length and width of scar; height above ground; presence of regrowth; depth of scar (height of regrowth); shape of scar; orientation of scar; presence/absence of axe marks;
- Observations of other specific site types (grinding groove, art, shell scatter, closed site) following the requirements of OEH site recording forms;
- Photographs of the site and individual site features/artefacts will be taken as judged necessary by the field team;
- Any other comments or information as judged relevant by the field team.

Any previously recorded sites within the footprint of the project will be searched for during the survey. If found, these sites will be recorded following the same procedure as newly identified sites. If survey teams are unable to find previously recorded sites, this will be noted in the report.

The survey will also record land disturbance, survey coverage variables (ground exposure and archaeological visibility) and landform types across the project area.

Data will be captured using iPad notebooks, handheld GPS, and compact digital camera. Standard measuring tools such as tape measures and callipers will be used.

4.4 Survey logistics and requirements for Aboriginal participants

At least five days prior to fieldwork, Jacobs will contact RAPs with details of fieldwork schedule, including meeting location, start and finish times, and expected fieldwork duration. Details of relevant inductions and safety regulations applying to the areas of the Bayswater site being accessed will also be communicated to RAPS at that time.

4.5 Sensitive cultural information and management protocol

RAPs have the opportunity to provide Jacobs with information on the project area and the surrounding region, including information on cultural heritage values. Information will be accepted at any point during the cultural heritage assessment process prior to the finalisation of the ACHAR (see section 4.2).

It is possible that during this consultation process, RAPs will provide sensitive cultural information to which access needs to be restricted.

In the event that such information is supplied, the RAP supplying the information should state to Jacobs how they wish that information to be treated, and how access to the information should be restricted.

Jacobs will follow the stated wishes provided by the RAP group in question when managing and using the information provided to Jacobs. All stated restrictions of access, communication and publication of the information will be followed. These might include:

- Restrictions on reproducing the information (in whole or in part) in reports
- Restrictions on reproducing the information in reports provided to different audiences (for example, the version provided to the client, the version provided to OEH and the AHIMS database)
- Restrictions on communication of the information in other ways
- Restrictions on the location/storage of the information
- Other required processes relating to handling the information
- Any names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the information, and their degree of authorisation.
- Any details of any consent given in accordance with customary law
- Any restrictions on access to and use of the information by RAPs.

Please consider the above list when providing your statement of requirements regarding any culturally sensitive information.

4.6 Critical timelines

Critical timelines are outlined in Table 1 overleaf. Please note that the following deadlines are estimates at this stage in the process and are provided to allow forward planning of personnel and resources.

Table 1: Critical timelines for the AGL Bayswater Project

Project Item	Date
Provision of comments on the proposed methodology presented in this document	Within 28 days from delivery of this document
Archaeological survey	Early-mid September
Provision of the draft ACHAR (which include the proposed management and mitigation measures) to RAPs for review.	Mid-late September
Provision of comments on the draft ACHAR	Within 28 days from delivery of the draft report
Gathering of information on cultural significance and cultural values associated with Aboriginal objects and places within or relevant to the project area	Ongoing throughout the process until finalisation of the draft ACHAR
Finalisation of the ACHAR in consideration of comments received	October-November

4.7 Contact details

For more information and to discuss this project, please do not hesitate to contact:

Oliver Macgregor

Senior Archaeologist

Jacobs

Level 1, 64 Allara Street, Canberra ACT 2601

oliver.macgregor@jacobs.com

(02) 6246 2716

5. References

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JACOBS

Appendix A. AHIMS search results

Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : IA215400 02

Client Service ID : 434896

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-2-0554	P7;Plashette;	AGD	56	305500	6410100	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits		
37-2-0555	P8;Plashette;	AGD	56	305480	6410250	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits		
37-2-0556	P9;Plashette;	AGD	56	305320	6410230	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits		
37-2-0557	P10;Plashette;	AGD	56	305170	6410280	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits	332	
37-2-0558	P11;Plashette;	AGD	56	306150	6410550	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits		
37-2-0047	Pikes Gully;	AGD	56	308888	6412976	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-2-0048	Pikes Gully;	AGD	56	309436	6412986	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-2-0050	Pikes Gully;	AGD	56	308888	6412976	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	ASRSYS					Permits		
37-2-0063	Liddell;Tinkers Creek;	AGD	56	307027	6414679	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-2-0065	Liddell;Pikes Gully;	AGD	56	308427	6413150	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-3-0491	NARDELL N2	AGD	56	314000	6412100	Open site	Valid	Artefact : -		103364
	Contact	Recorders	Ray Fife,Laurie Perry					Permits		
37-2-0553	P6;Plashette;	AGD	56	305550	6410120	Open site	Valid	Artefact : -	Open Camp Site	2238
	Contact	Recorders	Margrit Koettig					Permits		
37-3-0007	Pikes Gully;	AGD	56	309074	6412796	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-2-0062	Tinkers Creek;Liddell;	AGD	56	307210	6414682	Open site	Valid	Artefact : -	Open Camp Site	4525
	Contact	Recorders	ASRSYS					Permits		
37-3-1128	REA256	GDA	56	313859	6412438	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Umwelt (Australia) Pty Limited,Ms.Alison Lamond					Permits		

Report generated by AHIMS Web Service on 15/07/2019 for Clare Leevers for the following area at Search using shape-file IA215400_Study_Area_Merge.SHP with a buffer of 0 meters.

Additional Info : Target site inspection. Number of Aboriginal sites and Aboriginal objects found is 15

Page 1 of 1

Appendix C. AHIMS site cards

37-2-0047

1. Map Name Singleton .... 5. Site No. 37-2-47 ...
2. Scale ....1:250,000 .... 6. Site type OPEN .....
3. Grid ref ..3967-9936 .... (Campsite) ....
4. Site name(s) .Pikes Gully. .... 7. Classification ....

8. Air photo ref ....
9. Cadastral ....
10. Land Status Coal leases .... 11. ....

12. Directions for site relocation
From New England highway north of Ravensworth, walk across the paddocks.

13. Owner .... 14. Tenant/Manager ....
Address .... Address ....
....
Attitude .... Attitude ....

15. Site Description
The paddock on the south side of the creek had been ploughed. Very few stone flakes, but there were flaking cores 150m along the stream and up to 70m south of it. Core collection 10 (1 yellow chert, 1 red rhyolite, 1 acid volcanic, 1 milky quartz, 2 blueish quartz, 2 bluish quartzite, 2 pinkish quartzite). Labelled Pikes Gully

16. Reasons for investigation Environmental Impact Study for E.C. NSW
17. Condition Material disturbed by stormwater, ploughing.
....
18. Interpretation nil ....
19 Visitation nil ....
20. Recommendations nil ....
....

37-2-47

21. **Environmental description of site locality**
Bare grazing paddocks, with an occasional eucalypt surviving in the watercourse. The creek is permanent at this point, though choked with scum.
No wildlife was seen this far downstream, but there are kangaroos in the headwaters
The summers are very hot (over 40°C). the winters cool.

---

22. **Relation to other sites in locality**
There are surface campsites both upstream and downstream in Pikes Gully; these are reported on seperate sheets.

---

23. **Details of artifact collections**
Australian Museum.

---

24. **Is plan or diagram of site attached?** ~~Yes~~/No

25. **Are annotated photographs attached?** ~~Yes~~/No **How many?** nil

26. **Other additions**

---

27. **Importance of site to Aborigines** Unknown

28. **Source of this information** Nil

---

29. **Oral sources of information** nil

30. **Written references** nil

---

31. **Recorded by** Proof L.K. Dyall. **Filed by**

Address Uni of Newcastle
Shortland NSW 2308

Date 18/12/78 **Date**

37-2-0048

1. **Map Name** ....SINGLETON........ ....Muswellbrook .. 5. **Site No.** 37-2-48 ..
2. **Scale** ......1:250,000........ ......1 : 63360... 6. **Site type** ......OPEN......
3. **Grid ref** ..3973,9936..and..~~3967,9936~~.............. ....
4. **Site name(s)** ..Pikes Gully... .... 7. **Classification** ....

8. **Air photo ref** ....nil...
9. **Cadastral** ....Unknown..
10. **Land Status** ....Coal leases.......... 11. ....

12. **Directions for site relocation**

From the New England highway north of Ravensworth,walk across the paddocks.

13. **Owner** ....Unknown.................. 14. **Tenant/Manager** ....
Address .... **Address** ....
....
Attitude .... **Attitude** ....

15. **Site Description**

At 3973,9936: There are occasional stone flakes along the north bank of Pikes Gully from a site at 3981,9934 (reported separately) to this one.On the southern bank, opposite a minor creek junction,there were a few stone flakes.A collection of cores was made (one chert,one grey quartzite,one bluish quartzite).Labelled "Pikes Gully 973,936 XII-78".In this side creek,at 3980,9930,saw one chert core (not collected). ~~At 3967,9936: The paddock on the south side of the creek had been ploughed.Very few stone flakes,but there were flaking cores for 150 m along the stream and up to 70 m south of it.Core Collection: 10 (1 yellow chert;1 red rhyolite;1 acid volcanic; 1 milky quartz;2 bluish quartz;2 bluish quartzite;2 pinkish quartzite).Labelled "Pikes Gully 967,936 XII 78".~~

~~No scarred trees,faunal remains,charcoal.~~

16. **Reasons for investigation** Environmental impact survey for Electricity Commission of NSW
17. **Condition** Material disturbed by stormwater,ploughing. ....
....
18. **Interpretation** ....nil..
19. **Visitation** ....nil..
20. **Recommendations** ....nil..
....

37-2-48

21. **Environmental description of site locality**

Bare grazing paddocks, with an occasional eucalypt surviving in the watercourse. The creek is permanent at this point, though choked with scum.

No wildlife was seen this far downstream, but there are kangaroos in the headwaters.

The summers are very hot (over 40^0C), the winters cool.

---

22. **Relation to other sites in locality**

There are surface campsites both upstream and downstream in Pikes Gully; these are reported on separate sheets.

---

23. **Details of artifact collections**

See Item 15 for some collections of cores. These are lodged with The Australian Museum.

---

24. **Is plan or diagram of site attached?** ~~Yes~~/No

25. **Are annotated photographs attached?** ~~Yes~~/No **How many?** NIL

26. **Other additions** nil

---

27. **Importance of site to Aborigines** Unknown

28. **Source of this information** nil

---

29. **Oral sources of information** nil

30. **Written references** nil

---

31. **Recorded by** Prof. L.K.Dyall **Filed by** J Evans

Address University of Newcastle
Shortland NSW 2308.

Date 18/12/78. **Date**

37-2-48

37-2-0050

1. Map Name ..SINGLETON ....1 :: 250000..... 5. Site No. 37-2-50
2. Scale ..Muswellbrook......... ...1 :: 63360..... 6. Site type ....OPEN.....
3. Grid ref ~~3973,9936~~ and 3967,9936 ....
4. Site name(s) ..Pikes Gully... .... 7. Classification ....

8. Air photo ref ......nil
9. Cadastral ....Unknown
10. Land Status ..Coal leases.............. 11. ....

12. Directions for site relocation

From the New England Highway north of Ravensworth, walk across the paddocks.

13. Owner ..Unknown.................. 14. Tenant/Manager ....
Address .... Address ....
....
Attitude .... Attitude ....

15. Site Description

~~At 3973,9936: There are occasional stone flakes along the north bank of Pikes Gully from a site at 3981,9934 (reported separately) to this one. On the southern bank, opposite a minor creek junction, there were a few stone flakes. A collection of cores was made (one chert, one grey quartzite, one bluish quartzite). Labelled "Pikes Gully 973,936 XII-78". In the side creek, at 3980,9930, saw one chert core (not collected).~~

At 3967,9936: The paddock on the south bank had been ploughed. Very few stone flakes, but there were flaking cores for 150 m along the stream and up to 70 m south of it. Core collection: 10 (1 yellow chert; 1 red rhyolite; 1 acid volcanic; 1 milky quartz; 2 bluish quartz; 2 bluish quartzite; 2 pinkish quartzites). Labelled "Pikes Gully 967,936 XII-78".

No scarred trees, faunal remains, charcoal.

16. Reasons for investigation Environmental impact survey for Electricity Commission of NSW
17. Condition ...Material disturbed by stormwater, ploughing.............
....
18. Interpretation ......nil
19. Visitation ......nil
20. Recommendations ......nil
....

21. Environmental description of site locality

Bare grazing paddocks, with an occasional eucalypt surviving in the watercourse. The creek is permanent at this point, though choked with scum.

No wildlife was seen this far downstream, but there are kangaroos in the headwaters.

The summers are very hot (over 40^0C), the winters cool.

---

22. Relation to other sites in locality

There are surface campsites both upstream and downstream in Pikes Gully; these are reported on separate sheets.

---

23. Details of artifact collections See item 15 for some collections of cores. These are lodged with The Australian Museum.

---

24. Is plan or diagram of site attached? ~~Yes~~/No

25. Are annotated photographs attached? ~~Yes~~/No **How many?** NIL

26. Other additions nil

---

27. Importance of site to Aborigines Unknown

28. Source of this information nil

---

29. Oral sources of information nil

30. Written references nil

---

31. Recorded by Prof. L.K.Dyall **Filed by** J. Evans

Address University of Newcastle
Shortland NSW 2308.

Date 18/12/78 **Date**

37-2-50

Upper Hunter/Tamworth

from 3949·9958 to 3950-9957 REGISTER COPY

37-2-0062

1. **Map Name** ...SINGLETON.......... 1: 250000.... 5. **Site No.** ..37-2-62......

2. **Scale** ...Muswellbrook........ ....1:63360...... 6. **Site type** ....OPEN.......

3. **Grid ref** 3949,9957;3950,9955;3949,9955;3950,9957...

4. **Site name(s)** ...Tinkers Creek / Liddell......... 7. **Classification** ....

8. **Air photo ref** ....nil..........

9. **Cadastral** ....Unknown.........

10. **Land Status** ..Crown land.............. 11. ....

12. **Directions for site relocation**

These sites are accessible from Electricity Commission service roads.Details are somewhat pointless since a major power station is about to be build here.

13. **Owner** .Electricity.Commission....... 14. **Tenant/Manager** .....

Address ..Liddell.................. **Address** ....

Attitude ....Cooperative......... **Attitude** ....

15. **Site Description**

At 3949,9957: A scatter of stone flakes in cattle tracks,for some 30 m on both sides of the minor creek which joins from the west.Random collection of 3 implements (1 used chert flake;1 used chert elouera;1 large siliceous blade).Labelled "Tinkers Ck A 949,957 XII-78".

At 3950,9955: A series of three scatters of stone flakes along about 80 m of the east bank;Site B had the most (over 50 flakes on 100 sq.m).Random collection. Cores: 4 (2 chert;1 coarse rhyolite;1 coarse siliceous).Implements: 6 (1 broken used chert blade;5 used flakes of which two are chert,two quartzite,two a fine-grained blue siliceous rock). Label "TINKERS CK B (950, 955) XII-78"

At 3949,9955: On opposite bank to previous site,100 m up from road: a scatter of large flaking cores and hearths on flat ground.

At 3950,9957: On the east bank,downstream from the road: a scatter of hearths and flakes on flat ground.There were a few flakes on the high west bank.Random collection. Labelled "Tinkers Ck C XII-78".

Cores: 2 (one yellow rhyolite;one quartzite).

Implements: 3 (one massive edge-used flake 23.0 x 14.0 x 5.0 cm,of coarse quartzite; one battered cobble of blue basalt;one pebble cleaver 14.0 x 10.1 x 4.2 cm,of quartzite)

No faunal remains,charcoal,scarred trees.

16. **Reasons for investigation** Environmental impact survey for Electricity Commission of NSW

17. **Condition** ....The first two sites are disturbed by stormwater.The two with hearths appear to be little disturbed.

18. **Interpretation** ....nil

19 **Visitation** ....nil

20. **Recommendations** ....nil

37-2-62

21. Environmental description of site locality

The creek was a stinking mudpatch in its middle reaches but there was water in the lower reach (Site C). The land is still used for grazing, but in the middle reaches there are stands of casuarinas.

Wildlife: None seen.

Climate: Summers hot (over 40^{o}C), winters cool.

---

22. Relation to other sites in locality Numerous other sites in Tinkers Creek. Over the headwater ridge is Saltwater Creek whose large sites I reported in 1976.

---

23. Details of artifact collections

See Item 15. The material is lodged with The Australian Museum.

---

24. Is plan or diagram of site attached? ~~Yes~~/No

25. Are annotated photographs attached? ~~Yes~~/No **How many?** nil

26. Other additions nil

---

27. Importance of site to Aborigines Unknown

28. Source of this information nil

---

29. Oral sources of information nil

30. Written references nil

---

31. Recorded by Prof. L.K. Dyall **Filed by** Jorain Sutta

Address University of Newcastle
Shortland NSW 2308.

Date 18/12/78 **Date** 7.2.80

upper Hunter / Tamworth

from 3947·9955 3 REGISTER COPY
to 3952·9966

37-2-0063

1. **Map Name** SINGLETON 1 : 250000 5. **Site No.** 37-2-63
2. **Scale** Muswellbrook 1 : 63360 6. **Site type** OPEN
3. **Grid ref** 3952,9966;3952,9962;3948,9956;3947,9955
4. **Site name(s)** Tinkers Creek / Liddell 7. **Classification**

8. **Air photo ref** nil
9. **Cadastral** Unknown
10. **Land Status** Crown land 11.

12. **Directions for site relocation**

Access to upper Tinkers Creek is from Electricity Commission service roads entered through Liddell Power Station.The first two sites are reached by walking up the creek.The last two are downstream from the road giving access to the freshwater storage dam.3948,9956 is 2oo m below the road,on bare ground on the north bank. 3947,9955 is on the south bank,100 m below the road.

13. **Owner** Electricity Commission 14. **Tenant/Manager**
Address Liddell **Address**

Attitude Cooperative **Attitude**

15. **Site Description**

At 3952,9966: Stony ground amongst casuarinas.Occasional stone flakes on the west bank,upstream of a minor fork.Rare flakes on the opposite bank.
At 3952,9962.The low (2-3 m) east bank has eroded areas.In the space of 40 m,saw over 100 flakes.
At 3948,9956: At 200 m downstream from the dam road,on the north bank,there was a scatter of flakes (about 100) on the bare bank,some 4 m high at this point.One (broken) backed blade was noted.
At 3947,9955: The south bank (4 m high) has been recut as a spillway,exposing a few flakes (about 40 were noted) in the space of 50 m.

These are surface scatters.There were no faunal remains,charcoal,or scarred trees,or hearths.

16. **Reasons for investigation** Environmental impact survey for Electricity Commission of NSW
17. **Condition** All material has been moved by stormwater, and one lot by bulldozing
18. **Interpretation** nil
19 **Visitation** nil
20. **Recommendations** nil

21. Environmental description of site locality

The land has been used for grazing,but is now being allowed to return to a natural state.Large casuarinas grow along the watercourse,and casuarina scrub has regenerated.Some grazing continues under lease arrangements.

The creek is permanent,and its flow is now controlled from a dam.

Wildlife: None seen here,but there were kangaroos lower down the creek.

Climate: Summers here are very hot (over 40^{0}C),the winters cool.

---

22. Relation to other sites in locality

Numerous other sites in Tinkers Creek have been reported on separate sheets. This valley connects (via the ridge) with Saltwater Creek (for whose sites see my 1976 reports).

---

23. Details of artifact collections

None collected

---

24. Is plan or diagram of site attached? ~~Yes~~/No

25. Are annotated photographs attached? ~~Yes~~/No **How many?** NIL

26. Other additions nil

---

27. Importance of site to Aborigines Unknown

28. Source of this information nil

---

29. Oral sources of information nil

30. Written references nil

---

31. Recorded by Prof. L.K.Dyall **Filed by** Josie Sutton

Address University of Newcastle
Shortland NSW 2308

Date 18/12/78 **Date** 7.2.80

[X] New recording [ ] Additional Info

REGISTER COPY

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

37-2-0553

1:250,000 map sheet: SINGLETON NPWS Code 132

AMG Grid reference 305550 mE 6410120 mN
Full reference - please include leading digits

Scale of map used for grid reference [X] 25K, 50K (preferred) [ ] 100K [ ] 250K
Please use largest scale available

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:
NPWS Site no: 37-2-553
Site types: 2
Accessioned by: J.D. Date: 11-6-92
Data entered by: S Fields Date: 24-6-92

Owner/Manager:
Address:

Site name: P6 Locality/property name: PLASHETTE

NPWS District. Region: CENTRAL

Reason for investigation

Portion no: 78
Parish: HOWICK

Photos taken? YES
How many attached? 1

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

see map

Other sites in locality? YES
Are sites in NPWS Register?
Site Types include: Artefact scatters

Have artefacts been removed from site? When?
By whom? Deposited where?

Is site important to local Aborigines?
Give contact(s) name(s) + address(es) WANARUAH LALC

Contacted for this recording? YES – assisted in field
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).
Assessment Cultural Heritage Stage 2: Hunter Valley Koettig 1992

NPWS Report Catalogue # 2238

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site:
Poor – construction of drainage under road has cut through bank

Recommendations for management & protection (attach separate sheet if necessary):

none

Site recorded by: M. Koettig
Address/Institution:

Date: August 1991

REGISTER COPY

SITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no: 37-2-553

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:

d. mark on diagram provided *or* on your own sketch the position of the site: e. Describe briefly:

f. Local rock type: g. Land use/effect:

2. Distance from drinking water: Source:

3. Resource Zone associated with site (estuarine, riverine, forest etc):

4. Vegetation:

5. Edible plants noted

6. Faunal resources (include shellfish)

7. Other exploitable resources (river pebbles, ochre, etc)

Site type:

DESCRIPTION OF SITE & CONTENTS.
Note state of preservation of site & contents. Do **NOT** dig, disturb, damage site or contents.

CHECKLIST TO HELP
length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.

DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.

ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.

BURIALS: number & condition of bone, position, age, sex, associated artefacts.

TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.

QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.

OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate


37-2-500
BmPl
37-2-94
369326
334877
327372
Wisemans Creek
Saltwater Creek
P6
234545
Pt. 48
Pt. 10
Elevated Pipeline
Shed
Shearing Shed
Abandoned
Yards
HOWICK
Parnell Creek

BEGISTER COPY

[X] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

37-2-0554

1:250,000 map sheet: SINGLETON NPWS Code 132

AMG Grid reference (Full reference - please include leading digits): 305500 mE 6410100 mN

Scale of map used for grid reference (Please use largest scale available): [X] 25K, 50K (preferred) [ ] 100K [ ] 250K

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:
NPWS Site no: 37-2-554
Site types: 2
Accessioned by: J.D. Date: 11-6-92
Data entered by: SGabb Date: 24-6-92
Owner/Manager:
Address:

Site name: P7 Locality/property name: PLASHETTE

NPWS District. Region: CENTRAL

Reason for investigation

Portion no: 78
Parish: HOWICK

Photos taken? YES
How many attached? 2

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

Other sites in locality? YES Site Types include: Artefact scatters
Are sites in NPWS Register?

Have artefacts been removed from site? When?
By whom? Deposited where?

Is site important to local Aborigines?
Give contact(s) name(s) + address(es) WANARUAH LALC

Contacted for this recording? YES - assisted in field
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report). Assessment Cultural Heritage Stage 2: Hunter Valley Koettig 1992

NPWS Report Catalogue # 2238

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Poor - heavily eroded -

Recommendations for management & protection (attach separate sheet if necessary):

None

Site recorded by: M. Koettig Date: August 1991
Address/institution:

0

0

37-2-554

P7

[X] New recording [ ] Additional Info

REGISTER COPY

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

37-2-0555

1:250,000 map sheet: SINGLETON NPWS Code 1371

AMG Grid reference (250K / 25K): 305480 mE 6410250 mN
Full reference - please include leading digits

Scale of map used for grid reference: [X] 25K, 50K (preferred) [ ] 100K [ ] 250K
Please use largest scale available

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:
NPWS Site no: 37-2-555
Site types: 2
Accessioned by: S.D. Date: 11-6-92
Data entered by: S-fields Date: 24-6-92

Owner/Manager:
Address:

Site name: P8 Locality/property name: PLASHETTE

NPWS District: Region: CENTRAL

Reason for investigation

Portion no: 78
Parish: HOWICK

Photos taken? YES
How many attached? 2

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

Other sites in locality? YES Site Types include: Artefact scatters
Are sites in NPWS Register?

Have artefacts been removed from site? When?
By whom? Deposited where?

Is site important to local Aborigines?
Give contact(s) name(s) + address(es) WANARUAH LALC

Contacted for this recording? YES - assisted in field
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report). NPWS Report Catalogue # 2238
Assessment Cultural Heritage Stag 2: Hunter Valley Koettig 1992

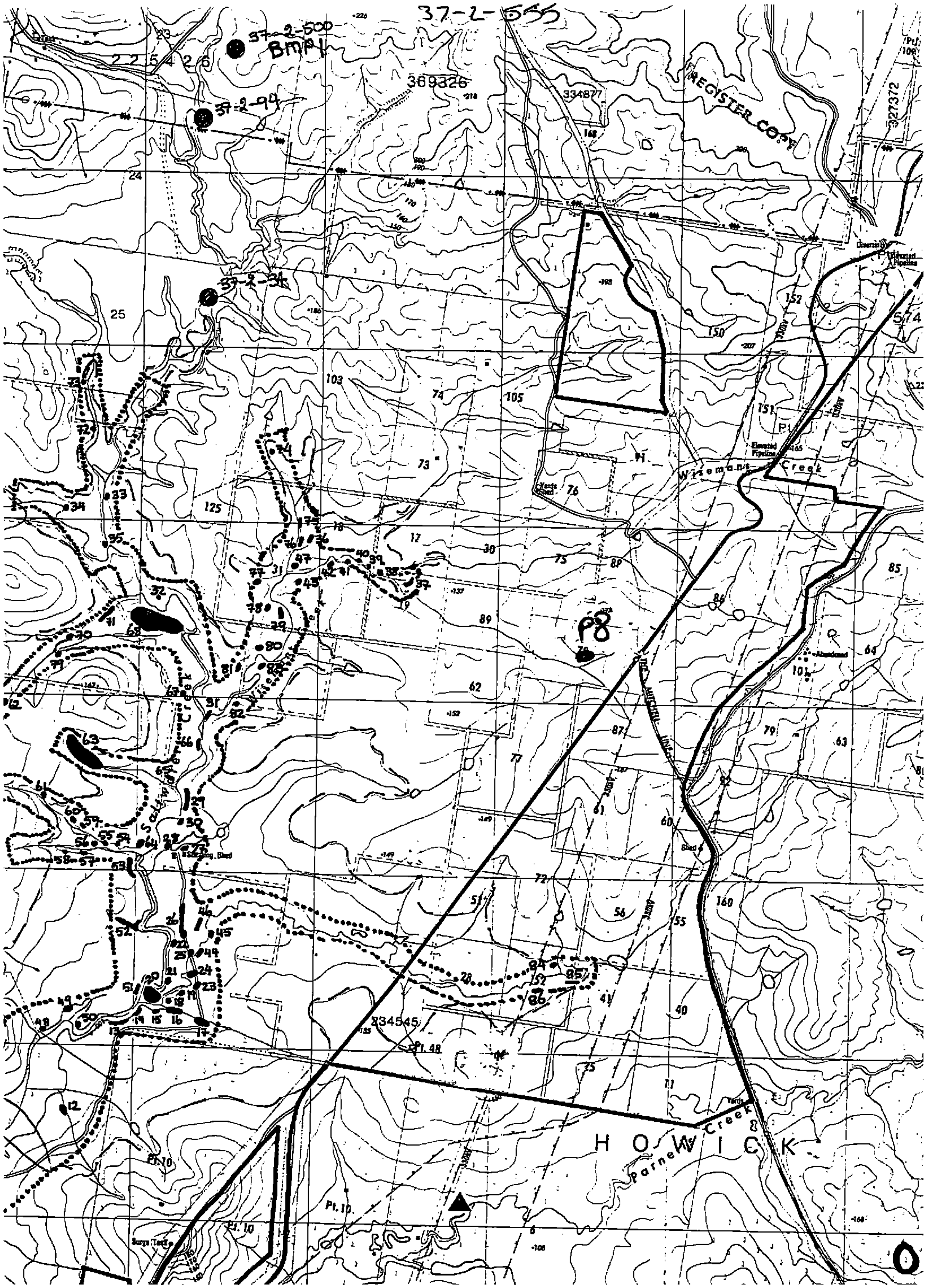
Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site:
Poor at erosion - undisturbed Unit A on flats to north

Recommendations for management & protection (attach separate sheet if necessary):
Would need testing if to be disturbed

Site recorded by: M. Koettig Date: August 1991
Address/institution:

0



37-2-555
37-2-500
BMP1
37-2-94
37-2-31
225426
369326
334877
327372
234545
REGISTER COPY
P8
Wisemans Creek
Creek
Parne
H O W I C K
Elevated Pipeline
Abandoned
Shearing Shed
Shed
Yards
Pt. 48
Pt. 10

37-2-555

P8

0

REGISTER COPY [X] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444
Standard Site Recording Form Revised 5/88

37-2-0556

1:250,000 map sheet: SINGLETON NPWS Code 37

AMG Grid reference (Full reference - please include leading digits): 3053200 mE 6410230 mN

Scale of map used for grid reference (Please use largest scale available): [X] 25K, 50K (preferred) [ ] 100K [ ] 250K

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:
NPWS Site no: 37-2-556
Site types: 2
Accessioned by: J.D. Date: 11-6-92
Data entered by: S Fields Date: 24-6-92

Owner/Manager:
Address:

Site name: P9 Locality/property name: PLASHETTE

NPWS District: Region: CENTRAL

Reason for investigation

Portion no: 78
Parish: HOWICK

Photos taken? YES
How many attached? 1

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

Other sites in locality? YES Site Types include: Artefact scatters
Are sites in NPWS Register?

Have artefacts been removed from site? When?
By whom? Deposited where?

Is site important to local Aborigines?
Give contact(s) name(s) + address(es) WANARUAH LALC

Contacted for this recording? YES - Assisted in field
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).
Assessment Cultural Heritage Stage 2: Hunter Valley Koettig 1992

NPWS Report Catalogue # 2238

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Reasonable

Recommendations for management & protection (attach separate sheet if necessary):
Would require testing prior to impact

Site recorded by: M. Koettig Date: 1991
Address/institution:

REGISTER COPY

SITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no: 37-2-556

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:

d. mark on diagram provided *or* on your own sketch the position of the site: e. Describe briefly:

f. Local rock type: g. Land use/effect:

2. Distance from drinking water: Source:

3. Resource Zone associated with site (estuarine, riverine, forest etc):

4. Vegetation:

5. Edible plants noted

6. Faunal resources (include shellfish)

7. Other exploitable resources (river pebbles, ochre, etc)

Site type:

DESCRIPTION OF SITE & CONTENTS.
Note state of preservation of site & contents. Do **NOT** dig, disturb, damage site or contents.

CHECKLIST TO HELP
length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.

DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.

ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.

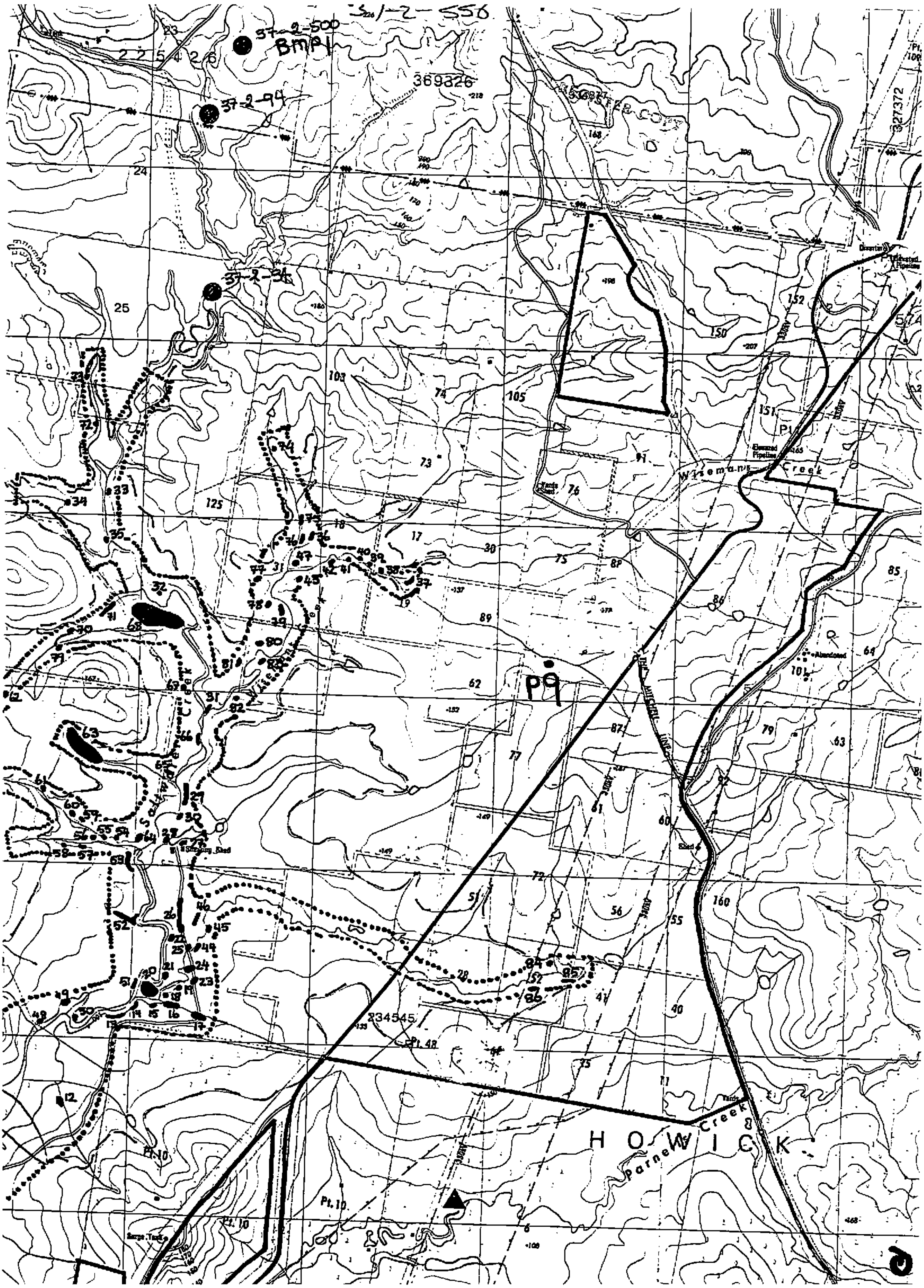
BURIALS: number & condition of bone, position, age, sex, associated artefacts.

TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.

QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.

OTHER SITES EG structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate.

At
inc
At


37-2-500
BMP1
225426
369326
37-2-94
327372
Wiseman's Creek
Elevated Pipeline
Abandoned
P9
Shearing Shed
Shed
234545
Pt. 48
Pt. 10
HOWICK
Creek

[X] New recording [ ] Additional Info

REGISTER COPY

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

37-2-0557

1:250,000 map sheet: SINGLETON NPWS Code 137

AMG Grid reference: 305170 mE 6410280 mN

Full reference - please include leading digits

Scale of map used for grid reference: [X] 25K, 50K (preferred) [ ] 100K [ ] 250K

Please use largest scale available

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:

NPWS Site no: 37-2-557

Site types: 2

Accessioned by: J.D. Date: 11-6-92

Data entered by: Sfields Date: 24-6-92

Owner/Manager:

Address:

Site name: P10 Locality/property name: PLASHETTE

NPWS District: Region: CENTRAL

Reason for investigation

Portion no: 78 or 89

Parish: HOWICK

Photos taken? YES

How many attached?

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

Other sites in locality? YES Site Types include: Artefact scatters

Are sites in NPWS Register?

Have artefacts been removed from site? When?

By whom? Deposited where?

Is site important to local Aborigines?

Give contact(s) name(s) + address(es) WANARUAH LALC

Contacted for this recording? YES - assisted in field

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report): Stage 2: Hunter Valley Koettig 1992

NPWS Report Catalogue # 2238

Checklist: surface visibility, damage/disturbance/ threat to site

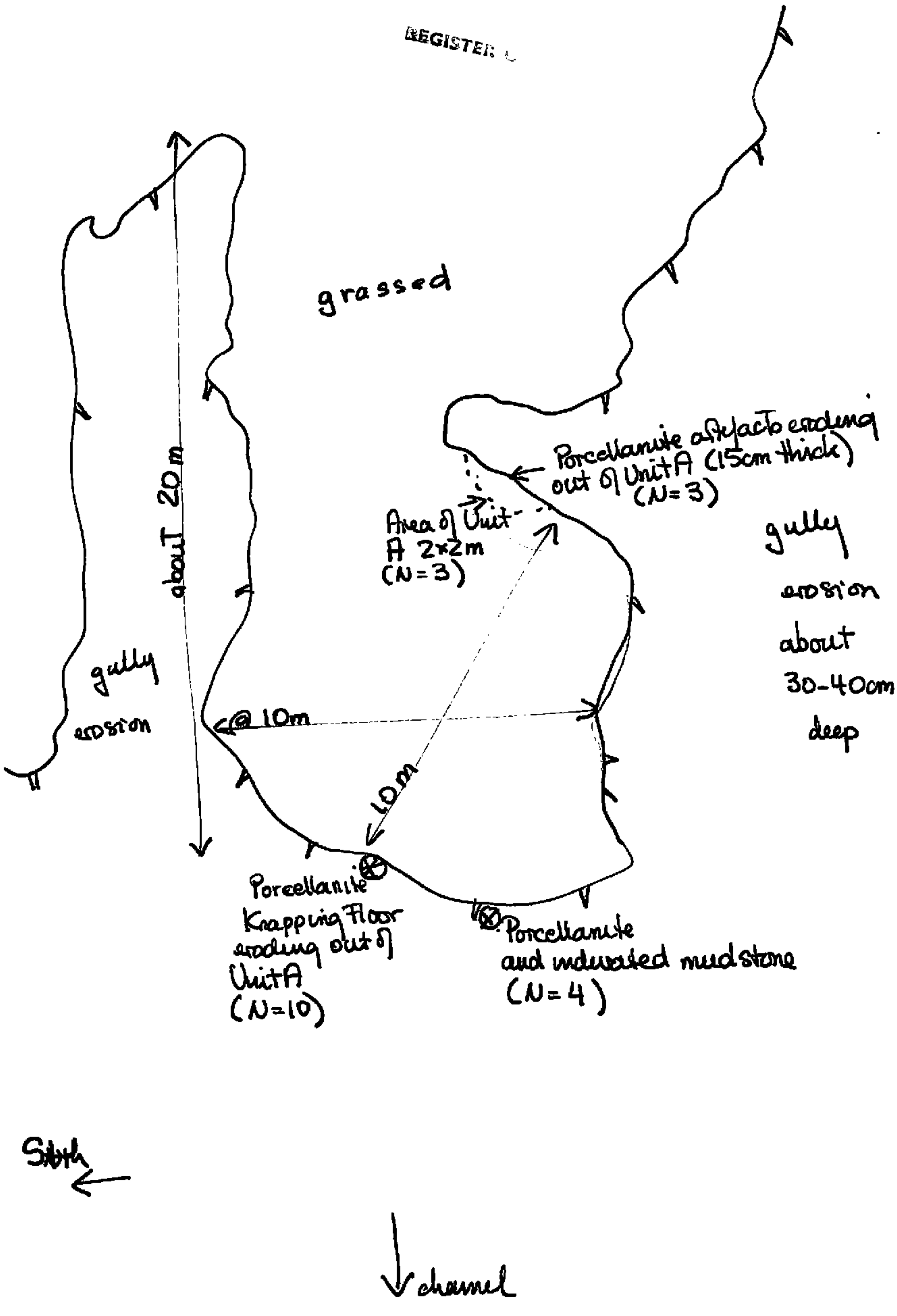
Condition of site: Moderate - eroding

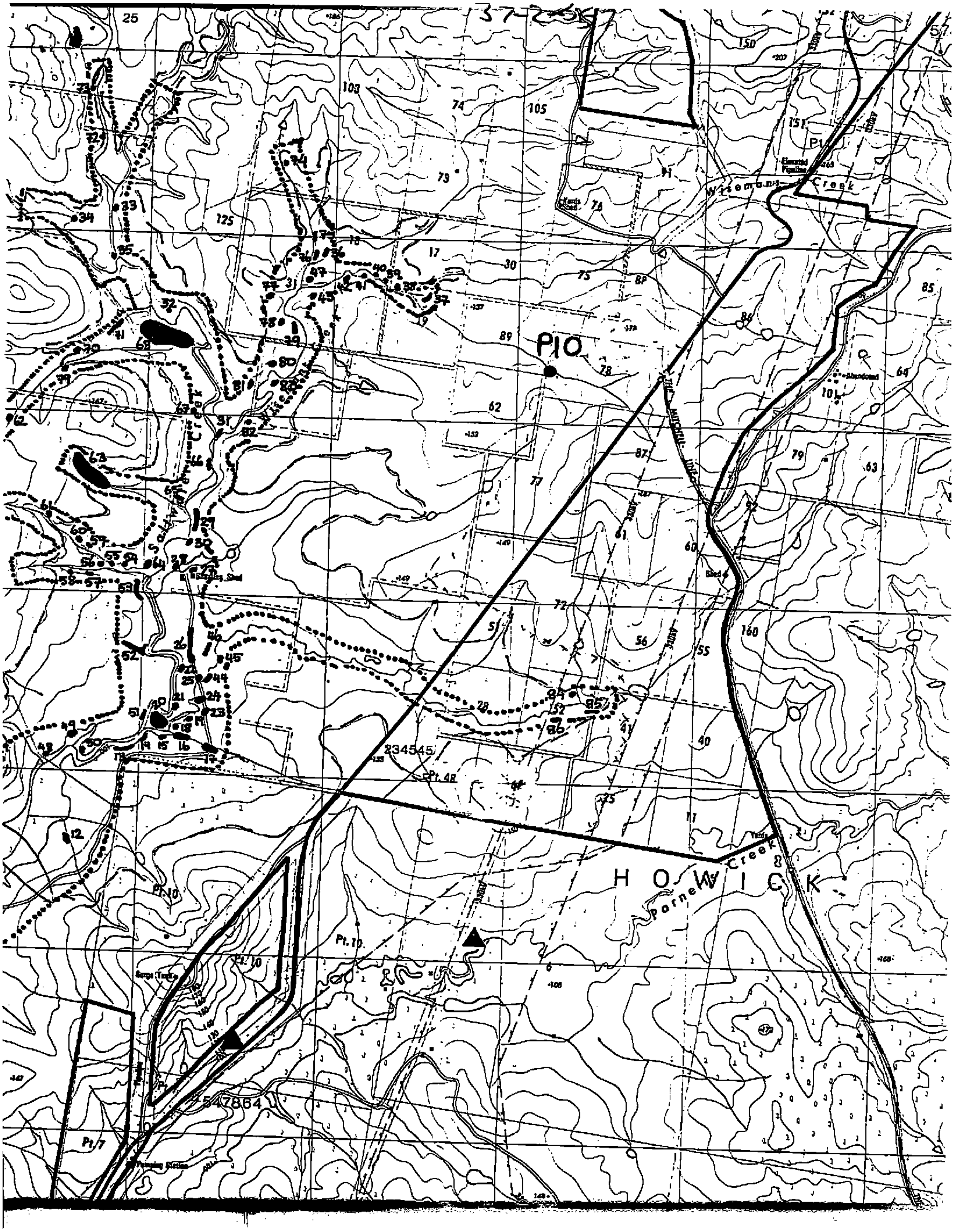
Recommendations for management & protection (attach separate sheet if necessary):

Would require salvage if to be impacted

Site recorded by: M. Koettig Date: August 1991

Address/Institution:


grassed
about 20m
Porcellanite artifacts eroding out of Unit A (15cm thick) (N=3)
Area of Unit A 2x2m (N=3)
gully erosion about 30-40cm deep
gully erosion
@ 10m
10m
Porcellanite Knapping Floor eroding out of Unit A (N=10)
Porcellanite and indurated mudstone (N=4)
South
channel



REGISTER COPY

6

SITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no: 37-6-557

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:

d. mark on diagram provided *or* on your own sketch the position of the site: e. Describe briefly:

f. Local rock type:

2. Distance from drinking water:

3. Resource Zone associated with site (estuarine, riverin

4. Vegetation:

5. Edible plants noted:

6. Faunal resources (include shellfish):

7. Other exploitable resources (river pebbles, ochre, etc

Site type	DESCRIPTION OF SITE & CONT Note state of preservation of site
CHECKLIST TO HELP length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried. OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate	Facing East   Attach sketches etc. eg. plan indicate north, show scale. Attach annotated photos (ste

REGISTER COPY

[X] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

37-2-0558

1:250,000 map sheet: SINGLETON NPWS Code 137

AMG Grid reference: 306150 mE 6410550 mN

Full reference - please include leading digits

Scale of map used for grid reference: [X] 25K, 50K (preferred) [ ] 100K [ ] 250K

Please use largest scale available

1:25K, 50K, 100K map name: JERRYS PLAINS

HEAD OFFICE USE ONLY:

NPWS Site no: 37-2-558

Site types: 2

Accessioned by: J.D. Date: 11-6-92

Data entered by: S Fields Date: 24-6-92

Owner/Manager:

Address:

Site name: P11

Locality/property name: PLASHETTE

NPWS District.

Region: CENTRAL

Reason for investigation

REGISTER COPY

Portion no: 86

Parish: HOWICK

Photos taken? YES

How many attached?

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

Other sites in locality? YES

Are sites in NPWS Register?

Site Types include: Artefact scatters

Have artefacts been removed from site?

By whom?

When?

Deposited where?

Is site important to local Aborigines?

Give contact(s) name(s) + address(es) WANARUAH LALC.

Contacted for this recording? YES - assisted in the field

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).

Stage 2 : Hunter Valley

Koettig 1992

NPWS Report Catalogue # 2238

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Very poor - possible insitu deposits further on bank

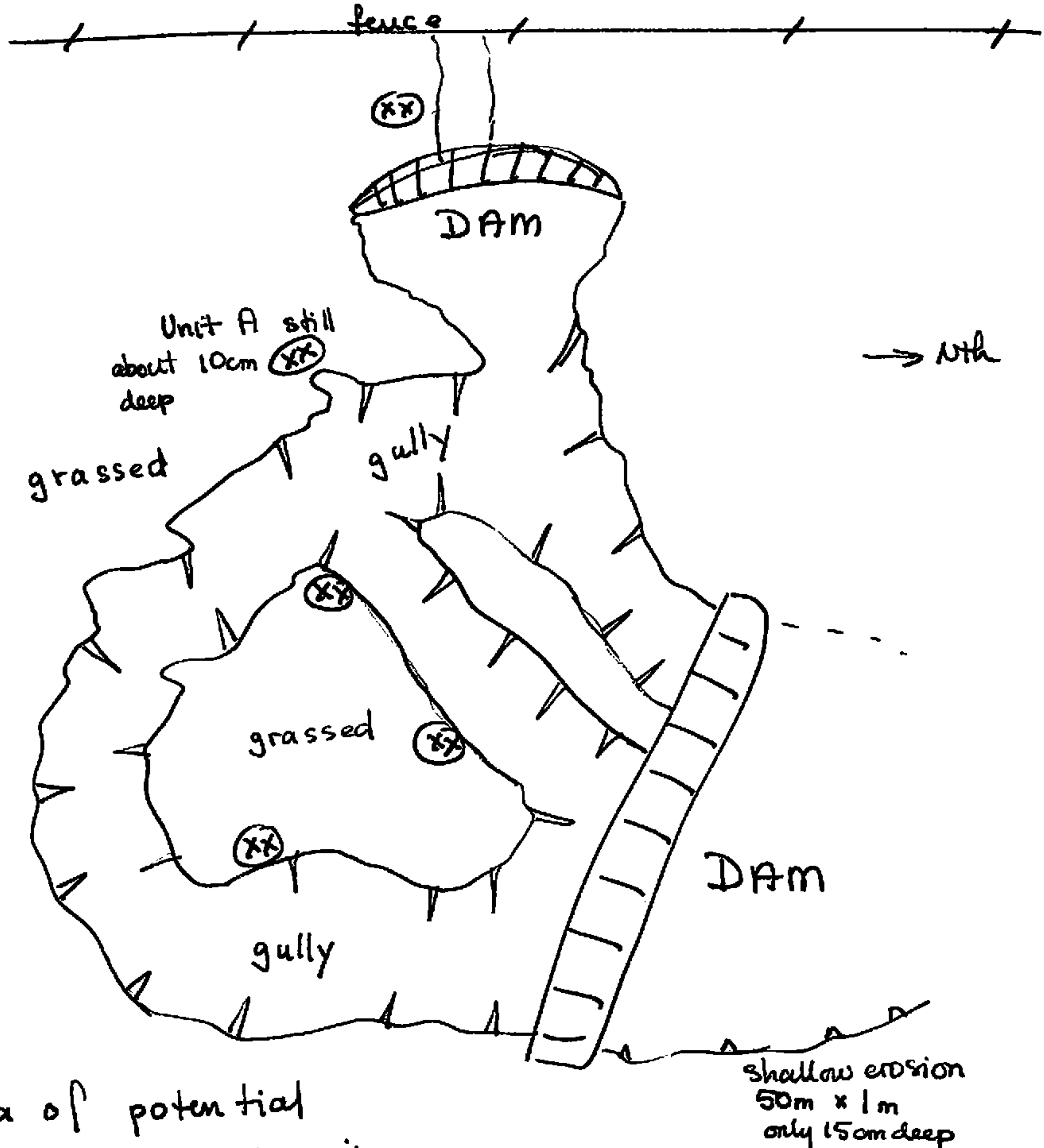
Recommendations for management & protection (attach separate sheet if necessary):

Needs testing to see if undisturbed deposits present if area to be impacted on

Site recorded by: M. Koettig

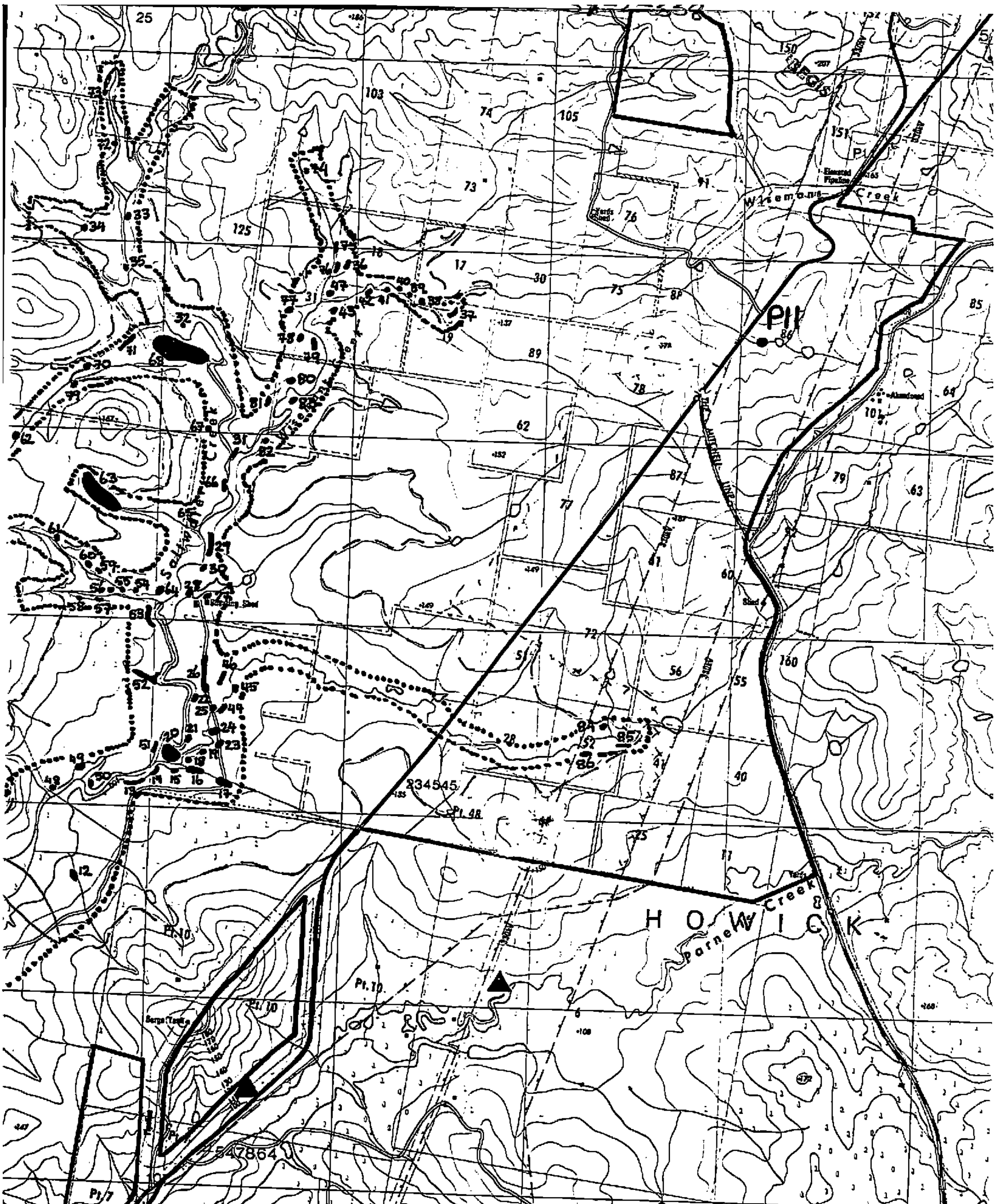
Address/Institution:

Date: August 1991



Area of potential archaeological deposit

XX = artefacts



H O W I C K
Wisemans Creek
Parnell Creek
P11
234545
547864
Pt.10
Pt.7
Pt.48
Shed
Pumping Station

Facing East from below dam wall

37-2-558

SITE P11

1. Map Name ... SINGLETON ... Muswellbrook 5. Site No. 37-3-7

2. Scale ... 1:250,000 ... 1:63360 6. Site type .. OPEN

3. Grid ref ... 3969,9934

4. Site name(s) . PIKES GULLY 7. Classification ...

8. Air photo ref ... nil

9. Cadastral ... unknown

10. Land Status . Coal leases 11. ...

37-3-0007

12. Directions for site relocation

From New England Highway north of Ravensworth, walk across paddocks. The site is on the east bank of a dry gully, but, since there are no convenient landmarks, cannot be precisely located.

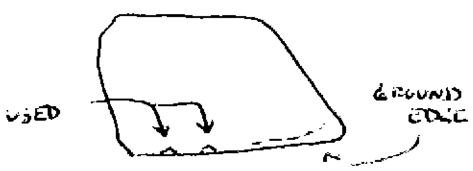
13. Owner . Various coal companies 14. Tenant/Manager ...

Address . Ravensworth Address ...

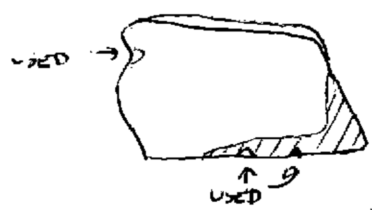
Attitude ... Unknown Attitude ...

15. Site Description

Four heavy slices were seen on the east bank of a deep-cut dry creek. There were no other stone flakes anywhere near, and no other signs of Aboriginal activity. All the slices were of yellow coarse-grained siliceous material. Two were collected. The others did not appear to have edge-grinding though in view of their weathered condition it was hard to be sure.



No. 1. 21.0 x 14.5 x 3.5 cm



No. 2 10.5 x 7.1 x 1.3 cm

No. 1 has one edge which appears to be ground (but is very weathered) and has been used. On no. 2, there are two edges which are definitely ground, and there are signs of use.

Labelled "Pikes Gully G. ref 969,934"

16. Reasons for investigation Environmental impact survey for Electricity Commission of NSW

17. Condition ... Isolated finds lying on the ground

18. Interpretation . May represent tools used in eg. removal of tree bark

19 Visitation ... nil

20. Recommendations ... nil

37-3-7

21. **Environmental description of site locality**

The area has been extensively grazed and has no trees left. The soil is deep alluvial, heavily eroded by the seasonal creek (which was dry when seen in December). The site is on the side of a steep hillside, covered with thistles.

Wildlife : A mob of eleven grey kangaroos was seen on top of the ridge.

Climate: Very hot (over $40^{0}C$) in summer, cool in winter.

---

22. **Relation to other sites in locality**

There are surface campsites in the main watercourse of Pike's Gully (see separate report sheets)

---

23. **Details of artifact collections**

See item 15. The two implements are lodged with the Australian Museum.

---

24. **Is plan or diagram of site attached?** ~~Yes~~/No

25. **Are annotated photographs attached?** ~~Yes~~/No **How many?** NIL

26. **Other additions** nil

---

27. **Importance of site to Aborigines** Unknown

28. **Source of this information** nil

---

29. **Oral sources of information** Mr. W. Reynolds, of "Plashett", Jerry's Plains, has shown me a sandstone pick and an axe (with cutting edges ground on both ends) found "in Pikes Gully". He is the previous owner.

30. **Written references** nil

---

31. **Recorded by** Prof. L. M. Dyall **Filed by**

Address University of Newcastle
Shortland NSW 2308

Date 18/12/78 **Date**

open Artefact

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

37-3-0491

New Recording ☒ Additional information ☐

SITE IDENTIFICATION

Site name	Nardell - N2	**NPWS Site Number**	37-3-0491
Owner/manager	Nardell Coal Corporation		
Owner Address	PO Box 528 Singleton 2330		

LOCATION

Location	The site is in the Upper Hunter valley on the lower slopes of a hill about 100 metres north of the New England Highway, about 4.5 kilometres north east of Ravensworth and about 1.5 kilometres south-east of the Ravensworth Coal Terminal
How to get to the site	Access is gained from the Nardell site office at the Ravensworth Coal Terminal. Follow the haul road west for about 1 kilometre then turn south onto an unsealed track that then runs east along the south side of the Macquarie Generation conveyor. Follow the unmade road east for about 1.5 kilometres. The site is located on the lower slopes of the hill just above a contour drain that runs across the slope.

1:250,000 map name				**NPWS map code**	
AMG Zone	56	**AMG Easting**	314000	**AMG Northing**	6412100
Method for grid reference	Topographic map	**Map scale (if method = map)**	1:25,000	**Map name**	Camberwell 9133-3-S
NPWS District Name (see map)				**NPWS Zone (see map)**	Sydney Zone
Portion no.				**Parish**	Liddel

SITE DESCRIPTION

Site type(s)	Open artefact scatter	**Site type code (NPWS use only)**	

Description of site and contents CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet./dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	The site consisted of at least 3 stone artefacts located on the lower slopes of a hill. The artefacts were identified over an area of about 20 square metres, 2 near the northern boundary of the study area, just south of the Macquarie conveyor and just above a drainage contour cut into and running south across the lower slopes of the hill. The third was located about twenty metres south, also on the lower slopes. The artefacts included: 1x silcrete core, red, 59x39x26 (irregular shape with 3 negative flake scars) 1x mudstone flaked piece orange, 28x22x10 1x mudstone retouched flake, orange yellow mottled, 16x29x7.

Version: June 1998 Data entered by: NSP Date entered: 30/05/02

0

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT

Land form	lower slopes	**Aspect**	east	**Slope**	3 degrees

Mark position of the site

Local rock type	sandstone	**Land use/effect**	clearing, grazing, land rehabilitation
Distance from drinking water	500 metres	**Source**	Bayswater Creek
Resource zone (eg. estuarine, river, forest)	woodland	**Vegetation**	
Edible plants		**Faunal resources (include shellfish)**	
Other exploitable resources (eg. ochre)			

Are there other sites in the locality	Yes	**Are they in the Sites Register**	Yes	**Other site types include**	Open artefact scatters

SITE MANAGEMENT

Site condition	Disturbed	The area has been cleared and grazed. The Macquarie conveyor is about 10 metres north. A contour drainage line crosses the foot of the slope adjacent to the site.
Management recommendations	Surface artefacts should be salvaged prior to further disturbance or destruction	

Have artefacts been removed from site	No	**When**	
By whom		**Deposited at**	
Consent applied for	☐	**Consent issued**	☐
Date of issue		**Consent number**	

SITE INSPECTION AND RECORDING

Reason for investigation	Part of an environmental impact assessment for Nardell Coal Mine		
Were local Aborigines contacted or present for the recording	☐ Not contacted ☒ Contacted and present ☐ Contacted but not present	**Names and addresses**	V. Perry, Wonnarua Tribal Council PO Box 184 Singleton NSW 2330
Is the site important to local Aborigines	Yes		
Verbal/written reference sources	Archaeological Assessment of Proposed Mine Water Storage Dam Enlargement and Adjacent Areas, Nardell Coal Mine, Hunter Valley, NSW, Umwelt (Australia) P/L, 2000	**ASR report number(s) (or title)**	C- C-

Version: June 1998	Data entered by:	Date entered:

Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

Photographs taken	Yes	No. of Photos attached	1
Site recorded by	R. Fife, V. Perry	Date of recording	29 August, 2000
Address/institution	Umwelt (Australia) Pty Ltd PO Box 838, Toronto, NSW 2283		

AHIMS Aboriginal Heritage Information Management System

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Department of Environment & Climate Change NSW

Office Use Only

Site Number 37-3-1128

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

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

Office Use Only

For Further Information Contact:

☐ **Nominated Trustee**

Title Surname First Name Initials

Organisation

Address

Phone number Fax

Client on system ☐

☐ **Knowledge Holder**

Title Surname First Name Initials

Organisation

Address

Phone number Fax

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

North East Branch

Geographic Location

Site Name: REA256

Easting: 313859 Northing: 6412438 AGD/GDA: GDA

Mapsheet: Camberwell 1:25000

Zone 56 Location Method: Differential GPS

Other Registration

Primary Recorder

Title	Surname	First Name	Initials
Ms	Reynolds	Amanda	

Organisation: Umwelt Australia Pty Limited

Address: 2/20 The Boulevarde Toronto

Phone number: 02 49505322 Fax: 02 49505737

Date recorded: 08/04/2010

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

OPEN/CLOSE SITE Open Site

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [ ] Rolling hills
- [ ] Steep hills
- [x] Undulating plain

Slope

0 degrees

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [x] Crest
- [ ] Flat
- [ ] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [ ] Valley flat
- [ ] Levy
- [ ] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Vegetation

- [ ] Closed forest
- [x] Grasslands
- [ ] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [x] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [x] Mining
- [ ] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] Residential

Water

Distance to permanent water source: 550 metres

Distance to temporary water source: 150 metres

Name of nearest permanent water source: Bayswater Creek

Name of nearest temporary water: 2nd order tributary

Directions for Relocation

See attached map. As access to the site is restricted to those suitably inducted and/or escorted by Ravensworth Operations personnel, please contact Ravensworth Operations on (02) 6570 0700 if access to the site is required.

Current Land Tenure

- [ ] Public
- [x] Private

National Park / other Government Dept.

Primary report

I.D. (I.D. Office Use only)

Site Location Map

NW N NE

W E

SW S SE

N

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation
- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Shelter Aspect
- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

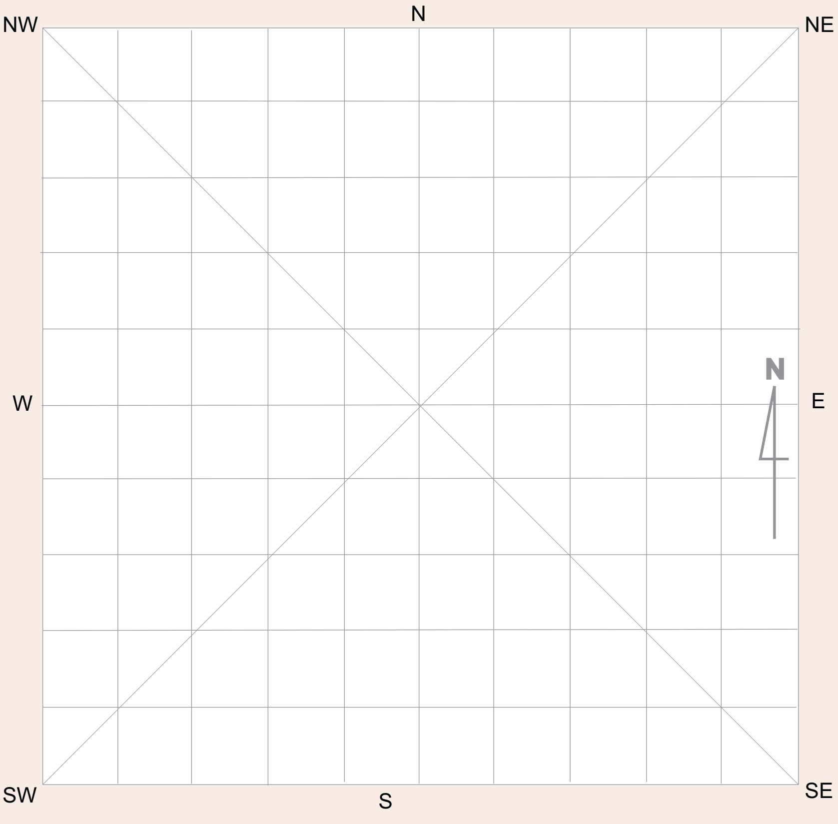
Site Orientation
- [ ] N-S
- [x] NE-SW
- [ ] E-W
- [ ] SE-NW
- [ ] N/A

Features

- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [x] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [ ] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan

Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

15	Total length of visible site
2	Average width of visible site
30	Estimated area of visible site
	Length of assessed site area

Aboriginal Community Interpretation and Management Recommendations

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

REA 256 is an isolated artefact located on a partly modified spur in an exposure with good visibility, 150 metres from a second order tributary and 550 metres from the main channel of Bayswater Creek. The spur has a southerly outlook, . There is very little vegetation at the site, with small amounts of introduced grasses. The site was determined to be in poor condition and has been modified by pipes that form the southwest boundary of the site, and impacts from a nearby coal conveyor.

Aboriginal stakeholders involved in the Ravensworth EA (Umwelt 2010) have identified that all archaeological sites within the Ravensworth Project area are of cultural significance.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title | Surname | First Name | Initials

Organisation

Address

Phone number | Fax

Attachments (No.)

- ☑ A4 location map
- ☐ B/W photographs
- ☑ Colour photographs
- ☐ Slides
- ☐ Aerial photographs
- ☐ Site plans, drawings
- ☐ Recording tables
- ☐ Other
- ☐ Feature inserts-No. ☐

Comments

NPWS FEATURE RECORDING FORM - ARTEFACT

Site I.D. REA256

Site Name REA256

First recorded date April 2009

Importance Cannot be presently determined

No. of instances 1

Recorded by Umwelt P/L

	Yes / No
Stone artefacts only	Yes
Artefacts collected	No
Permit issued	No

Percentage of Non-stone Artefacts to Percentage of Stone Artefacts

0-9% 10-19% 20-29% 30-39% 40-49% 50-59% 60-69% 70-79% 80-89% 90-100%

0-9%

Feature Context & Condition

Scatter No.

Easting 3 1 3 8 5 9

Northing 6 4 1 2 4 3 8

Density (Artefact count per square metre) 1

Dimensions 15 Length (m) 2 Width (m) Depth (m)

	Yes / No
In situ	No
Stratified	No

Feature Condition

- [ ] Very good
- [ ] Good
- [x] Poor

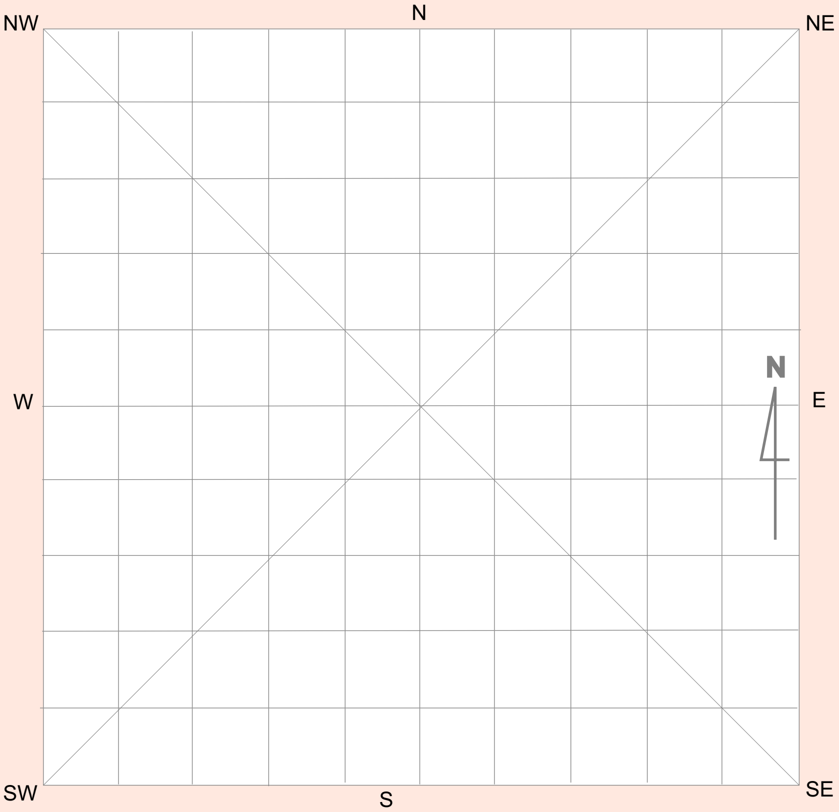
General Condition

- [ ] Weathered
- [ ] Vehicle damage
- [ ] Surface water wash
- [ ] Fire damage
- [x] Erosion
- [ ] Stock damage
- [x] Exposed archaeological material

Recommended Action

- [ ] Boardwalk
- [ ] Fencing
- [ ] Closure to public
- [ ] Continued inspection
- [ ] Fire hazard reduction
- [ ] Expert assessment
- [ ] Meeting with land manager
- [ ] Revegetation
- [ ] Signage
- [ ] Soil erosion control
- [ ] Track closure/re-routing
- [ ] Additional recording

Feature Plan (Indicate scale, location of instances)



Feature Environment

(Complete when *feature* environment differs to *site* environment, use attributes from cover card, p. 2)

Land form

Land form unit

Slope

Vegetation

Land use

Water

Distance to permanent water source metres

Distance to temporary water source metres

Name of nearest permanent water source

Name of nearest temporary water

NPWS FEATURE RECORDING TABLE - ARTEFACT

Stone Artefact

Instance No.	Recording Date	Artefact Material	Artefact Type	Platform Surface	Platform Type	Termination	Cross Section	Length (mm)	Width (mm)	Thickness (mm)
1	08/04/2010	Silcrete	Flake							

Other Artefact Type

Instance No.	Recording Date	Artefact Material	Artefact Type	Description	Length (mm)	Width (mm)	Thickness (mm)

Material

Basalt
Chert
Fine grained siliceous
Granite
Quartz
Quartzite
Sandstone
Silcrete
Green glass
Amber glass
Amethyst glass
Clear glass
Ceramic
Porcelain
Tin can
Wire
Nail
Button
Shell
Bone
Wood
Resin

Artefact Description

Adze
Anvil
Axe
Backed blade
Blade
Core
Core tool
Cyclon
Distal fragment
Eloura
Flake
Flake tool
Flaked piece
Hammerstone
Manuport
Milling slab
Mortar
Muller
Nuclear tool
Pirri
Proximal fragment
Tula
Other diagnostic type
Modified
Unworked

Platform Surface

Cortex
Flake scar
More than one flake scar
Faceted
Ground
Indeterminate
Bipolar

Platform Type

Wide
Focal
Shattered
Indeterminate
Bipolar

Termination

Feather
Hinge
Step
Outrepasse
Bipolar

Cross Section

High/strong
High/weak
Low/weak
Irregular

Comments:

The site boundary is defined by surface artefact distribution (1 m²) on a 30 m² exposure exhibiting 90 per cent visibility and consists of one silcrete flake. The majority of these artefacts are located on the dam wall. The site has also been impacted by past vegetation clearing, stock trampling, and active sheet erosion which have acted to redeposit the observed artefacts. The above has also eroded the A1 and exposed the A2 soil horizons within the site.

NPWS FEATURE RECORDING FORM - MODIFIED TREE

Site I.D. ______

Site Name ______

First recorded date ______

Importance ______

Aboriginal Information Recorded? ______

No. of instances ______

Recorded by ______

Feature description

Easting ______

Northing ______

No. of scars ______

No. of carved panels ______

Feature Condition

- [ ] Very good
- [ ] Good
- [ ] Poor

Condition

- [ ] Weathered
- [ ] Ringbarked
- [ ] Fire damage
- [ ] Vehicle damage
- [ ] Insects/termites
- [ ] Rot
- [ ] Limb fall
- [ ] Stock damage

Recommended Action

- [ ] Fencing
- [ ] Closure to public
- [ ] Continued inspection
- [ ] Expert assessment
- [ ] Fire hazard reduction
- [ ] Insect removal
- [ ] Meeting with land manager
- [ ] Rubbish removal
- [ ] Signage
- [ ] Tree health assessment
- [ ] Track closure/re-routing
- [ ] Additional recording

Feature environment

(Complete when *feature* environment differs to *site* environment, use attributes from cover card, page 2)

______ Land form

______ Land form unit

______ Slope

______ Vegetation

______ Land use

Water

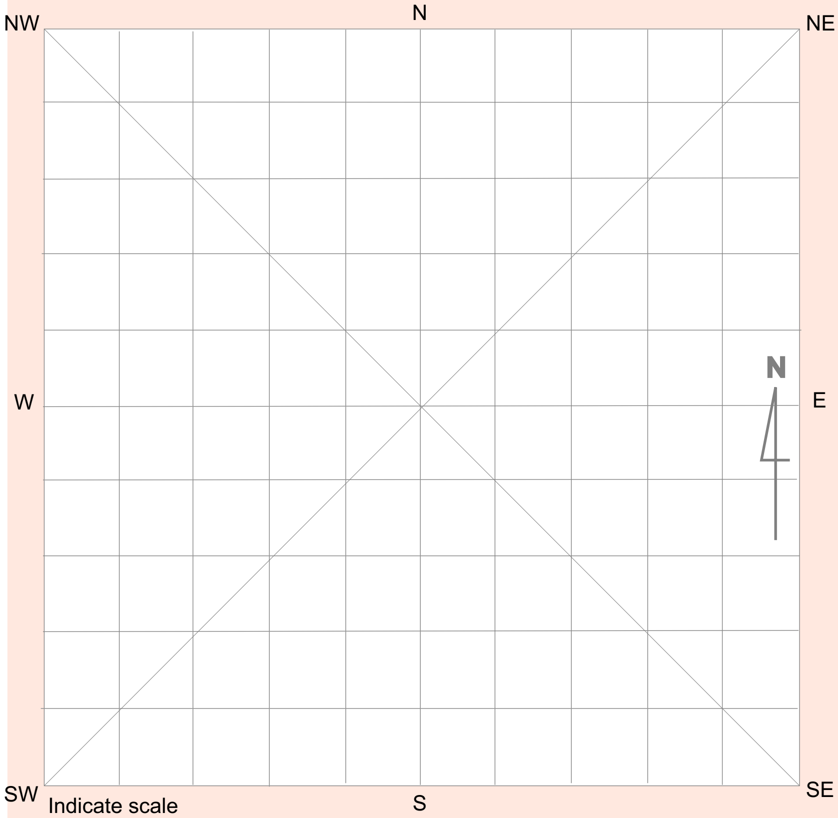
Distance to permanent water source ______ metres

Distance to temporary water source ______ metres

Name of nearest permanent water source ______

Name of nearest temporary water ______

Feature Location Plan



Indicate scale

Scar/Carved Panel Drawing

Attach additional drawings

NPWS FEATURE RECORDING TABLE - MODIFIED TREE *page 2*

Instance No.	Recording Date	Type	Species	Living Status	Tree Status	Regrowth	Length of Scar	Width of Scar	Depth	Height Above Ground	No. of Scars	Shape	No. of Carved Panels	Carving Type	Orientation	Axe Marks

Type of Tree
Carved Tree
Scarred Tree
Carved/Scarred Tree

Tree Species
Eucalypt
Red Gum
Angotha

Living Status
Dead
Alive
Dying

Tree Status
Standing
Lying down
Partially felled
Subject to salinity
Not *in situ*

Regrowth
Yes
No

Scar Shape
Oval
Rectangular
Square
Round
Other

Carving Type
Linear
Geometric
Pictorial

Axe Marks
Metal
Stone
Indeterminate

Orientation
North East
East
South East
South
South West
West
North West
North

Comments:

NPWS FEATURE RECORDING FORM - GROOVE

Site I.D. ______

Site Name ______

First recorded date __/__/__

Importance ______

Aboriginal Information Recorded? ______

No. of instances ______

Recorded by ______

Feature Description

Recording date __/__/__

Type of Grinding Feature

- [ ] Broad
- [ ] Narrow/point
- [ ] Hollow
- [ ] Flat

Seed Species Present ______

Groove Function ______

Profile Shape

- [ ] 'U' shaped
- [ ] 'V' shaped
- [ ] Flat

Dimensions

Smallest		**Largest**			
Length (mm)		Length (mm)		Groove count	
Width (mm)		Width (mm)		Cluster count	
Depth (mm)		Depth (mm)			

Feature Context & Condition

Easting ______ Northing ______

Dimensions of Whole Feature ______ Length (m) ______ Width (m)

Feature Condition

- [ ] Very good
- [ ] Good
- [ ] Poor

General Condition

- [ ] Weathered
- [ ] Vandalised

General Condition ctd

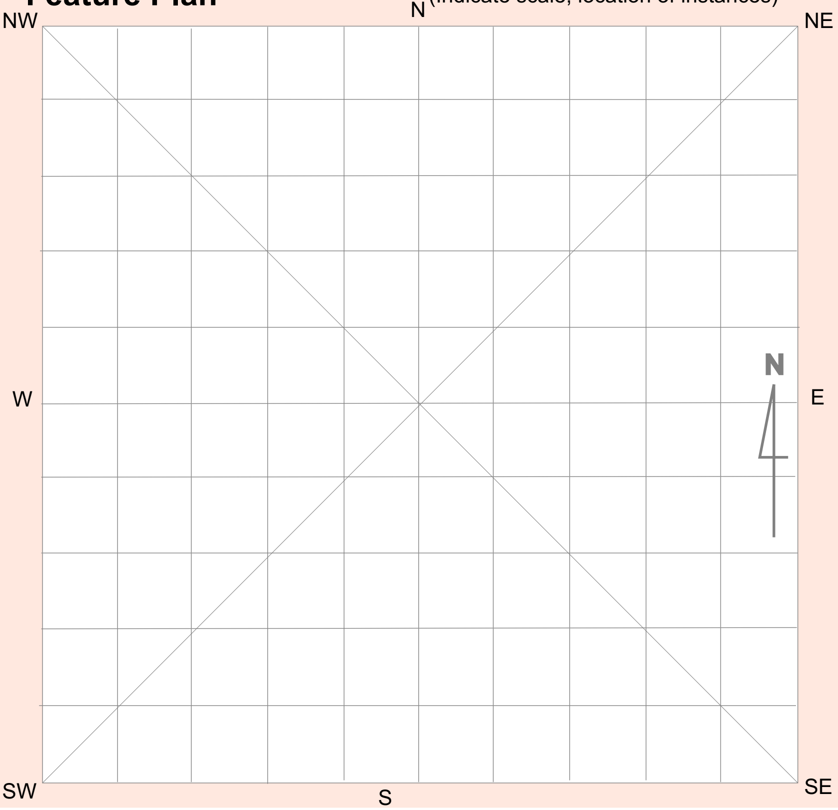
- [ ] Fire damage
- [ ] Surface water wash
- [ ] Graffiti
- [ ] Vehicle damage
- [ ] Erosion
- [ ] Stock damage

Recommended Action

- [ ] Boardwalk
- [ ] Cage/barrier/fencing
- [ ] Closure to public
- [ ] Continued inspection
- [ ] Expert assessment
- [ ] Graffiti removal
- [ ] Meeting with land manager
- [ ] Revegetation
- [ ] Rubbish removal
- [ ] Signage
- [ ] Erosion control
- [ ] Track closure/re-routing
- [ ] Additional recording

Feature Plan

(Indicate scale, location of instances)



Feature Environment

(Complete when *feature* environment differs to *site* environment, use attributes from cover card, p. 2)

______ Land form

______ Land form unit

______ Slope

______ Vegetation

______ Land use

Water

Distance to permanent water source ______ metres

Distance to temporary water source ______ metres

Name of nearest permanent water source ______

Name of nearest temporary water ______

NPWS FEATURE RECORDING FORM - ART

Site I.D.

Site Name

First recorded date / /

Importance

Aboriginal Information Recorded?

No. of instances

Recorded by

Feature Context & Condition

Easting

Northing

Pigment

Engraved

Super-impositioning

Artwork Condition

- Very good
- Good
- Poor

General Condition

- Weathered
- Vandalised
- Surface water wash
- Mineralisation
- Graffiti
- Fire damage
- Insects/termites
- Erosion
- Stock
- Unstable structure

Recommended Action

- Boardwalk
- Cage/barrier/fencing
- Closure to public
- Continued inspection
- Dripline
- Expert assessment
- Fire hazard removal
- Graffiti removal
- Insect/bird nest removal
- Meeting with land manager
- Rubbish removal
- Signage
- Erosion control
- Track closure/re-routing
- Additional recording

Feature Environment

(Complete when *feature* environment differs to *site* environment, use attributes from cover card, p. 2)

Land form

Land form unit

Slope

Vegetation

Land use

Water

Distance to permanent water source metres

Distance to temporary water source metres

Name of nearest permanent water source

Name of nearest temporary water

Art Sketch Plan

Sketch and number motif groups

NPWS FEATURE RECORDING TABLE - ART MOTIF

Instance	Recording Date	Motif	Application Technique	Form	Main Colour	Location	Condition

Motif

Anthropomorphic
Bird
Bird Track
Canoe
Circle
Contact material culture
Duck
Eel
Emu
Emu track
European figure
Female
Fish
Foot
Hand
Jellyfish
Kangaroo
Line
Lizard
Macropod
Macropod Track
Male
Marine-Other
Other
Pattern
Quadruped
Reptile
Rifle
Shield
Ship
Snake
Spear
Wallaby

Application Technique

Abraded
Drawn
Other
Painted
Pecked
Pigment & Engraved
Stencilled

Form

Fill
Line
Line+ Fill
Other
Pattern

Main Colour

Black
Mauve *
N/A
Orange *
Other
Red *
White *
Yellow *

Art Location

All over shelter surfaces
ceiling
Floor
Mostly near largest sheltered space
Mostly on out of the way surfaces
Other
Wall

Condition

Faded
Stained
Mineralisation Evident
V brant Colours
Unweathered
Weathered

Comments:

NPWS FEATURE RECORDING FORM - SHELL

Site I.D. ____

Site Name ____

First recorded date __ / __ / __

Importance ____

Aboriginal Information Recorded? ____

No. of instances ____

Recorded by ____

Feature Context & Condition

Easting ____ Northing ____

Dimensions of Whole Feature

____ Length (m) ____ Width (m) ____ Depth (m)

Shell Distribution

- [ ] Surface scatter
- [ ] Stratified deposit
- [ ] Mounded

____ Distance to high water mark (m)

Feature Condition

- [ ] Very good
- [ ] Good
- [ ] Poor

General Condition

- [ ] Weathered
- [ ] Vandalised
- [ ] Surface water wash
- [ ] Mineralisation
- [ ] Graffiti

General Condition ctd

- [ ] Fire damage
- [ ] Vehicle damage
- [ ] Insects/termites
- [ ] Erosion
- [ ] Stock damage
- [ ] Unstable structure
- [ ] Exposed bone material
- [ ] Exposed archaeological material

Recommended Action

- [ ] Boardwalk
- [ ] Cage/barrier/fencing
- [ ] Closure to public
- [ ] Continued inspection
- [ ] Expert assessment
- [ ] Fire hazard removal
- [ ] Graffiti removal
- [ ] Meeting with land manager
- [ ] Insect/bird nest removal
- [ ] Revegetation
- [ ] Rubbish removal
- [ ] Signage
- [ ] Erosion control
- [ ] Track closure/re-routing
- [ ] Additional recording

Feature Plan

(Indicate scale, location of instances)

NW N NE

W E

SW S SE

N

Feature Environment

(Complete when *feature* environment differs to *site* environment, use attributes from cover card, p. 2)

____ Land form

____ Land form unit

____ Slope

____ Vegetation

____ Land use

Water

Distance to permanent water source ____ metres

Distance to temporary water source ____ metres

Name of nearest permanent water source

____

Name of nearest temporary water

____

NPWS FEATURE RECORDING TABLE - SHELL

Instance No.	Recording Date	Shell Species	% of this species shell to % total of other shell

Species

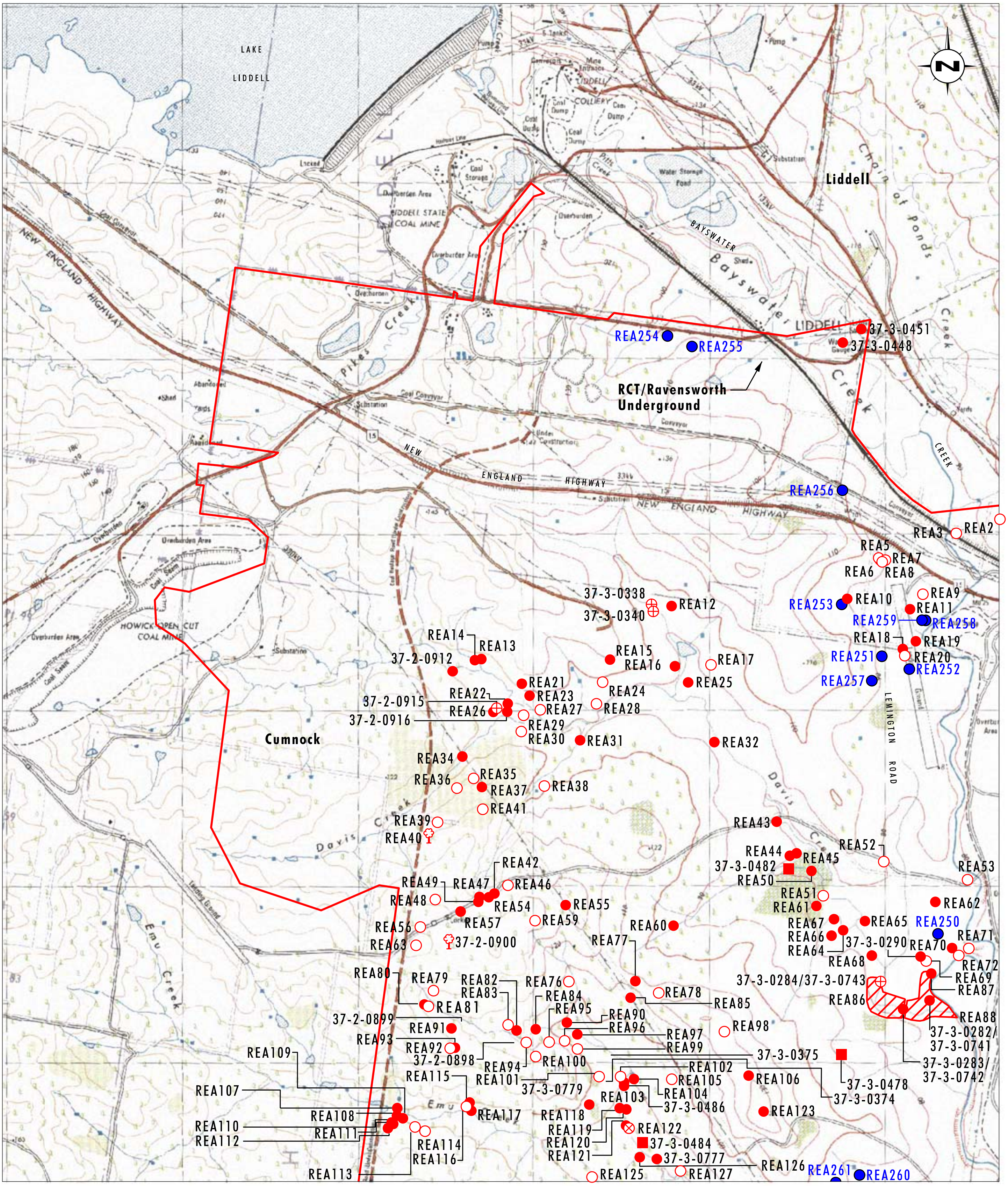
Anadara	Nerita
Bimbala	Ocean Snail
Chiton	Periwinkle
Cowrie	Pippi
Dog Cockle	Ribbed Cockle
Duck Bill	Rock Oyster
Limpit	Thiad
Mud oyster	Triton
Mutton Fish	Turban (large)

Percentage of this Species Shell to Percentage Total of other Shell

0 – 9%
10 – 19%
20 – 29%
30 – 39%
40 – 49%
50 – 59%
60 – 69%
70 – 79%
80 – 89%
90 – 100%

Comments:

Umwelt
Environmental Consultants



Source: Ravensworth Operations 2009, HLA 2001 and ERM 1998, DECC 2009

Legend

Project Area

Located Archaeological Site Type:

- Artefact Area
- Artefact Scatter
- Engraving Site
- Isolated Find
- Open Camp Site
- Scarred Tree
- Scarred Tree and Artefact Scatter
- Not Provided

Site Located During Due Diligence Inspection

REA Site Locations

File Name (A4): Site_Cards_V1/2383_777.dgn

PLATE 1
View south-east over REA 256

Aboriginal Site Impact Recording Form

Office of Environment & Heritage
NSW Government

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW
December 2010 DECCW 2010/1022

1 This form must be completed following impacts to AHIMS sites that are:
   a) an outcome of test excavation carried out in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW*
   b) authorised by an Aboriginal Heritage Impact Permit (AHIP)
   c) undertaken for the purpose of complying with environmental assessment requirements issued by the Department of Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), or
   d) authorised by a Part 3A project approval under the EP&A Act.
2 Completed forms must be submitted to the AHIMS Registrar (www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm).
3 This form is intended to complement (not replace) the AHIMS Site Recording Form. Where there is a need to provide detailed information about the nature of a site, use the AHIMS Site Recording Form.
4 This form does not replace the need to submit reports to DECCW (as specified by a condition of an AHIP or Part 3A approval). This form must be submitted in addition to any reports.

AHIMS site ID: 37-3-1128

Site impact authorisation (select one)	Reference numbers, dates
☐ Archaeological Code (The impacts to this site were the result of test excavation carried out in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW*.)	Date DECCW was notified (under requirement 15c of the Code): DECCW Regional office notified:
☐ AHIP (The impacts to this site were authorised by an AHIP.)	AHIP number: Date issued/signed: AHIMS permit ID/number:
☐ Part 3A application (The impacts to this site were undertaken for the purposes of complying with Part 3A environmental assessment requirements issued by the Department of Planning.) ☐ Part 3A approved project (The impacts to this site were authorised by a project approval under Part 3A of the EP&A Act.)	Major project number: 09_0176 Date environmental assessment requirements issued: or Date of project approval: 11/02/2011

Site status following impacts:

☐ Not a site (The investigations concluded that this is not a site.)

☐ Valid site (The investigations confirmed that this is an Aboriginal site.)

☐ Partially destroyed (The site was partially destroyed following authorised impacts; a portion of the site remains in situ.)

☐ Destroyed (The site was completely destroyed following authorised impacts.)

Geographic location

Site name: REA256

Easting: 313859 **Northing:** 6412438 **Coordinates must be in GDA (MGA)**

Map sheet: Camberwell 1:25000

Zone: 56 **Location method:** Hand Held/Non Differential GPS

Primary recorder

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

Title	Surname	First name
Ms	Lamond	Alison

Organisation: Umwelt (Australia)

Address: 75 York Street Teralba NSW 2284

Phone: 49505322 **E-mail:** alamond@umwelt.com.au

Date recorded: 13/07/2012 **Fax:** 49505737

Site information

Open/closed site: Open

Features:

☐	1.	Aboriginal ceremony and dreaming	☐	11.	Habitation structure
☐	2.	Aboriginal resource and gathering	☐	12.	Hearth
☐	3.	Art	☐	13.	Non-human bone and organic material
☒	4.	Artefact	☐	14.	Ochre quarry
☐	5.	Burial	☐	15.	Potential archaeological deposit
☐	6.	Ceremonial ring	☐	16.	Stone quarry
☐	7.	Conflict	☐	17.	Shell
☐	8.	Earth mound	☐	18.	Stone arrangement
☐	9.	Fish trap	☐	19.	Modified tree
☐	10.	Grinding groove	☐	20.	Water hole

Site condition

Written description of the condition of the AHIMS site (including relevant features) following the authorised impact of the site

REA 256 was recorded as an isolated artefact located on a partly modified spur in an exposure with good visibility, 150 metres from a second order tributary and 550 metres from the main channel of Bayswater Creek. The spur had a southerly outlook. There was very little vegetation at the site, with small amounts of introduced grasses. The site was determined to be in poor condition and had been modified by pipes that form the southwest boundary of the site, and impacts from a nearby coal conveyor.
The site boundary was defined by surface artefact distribution (1 m²) on a 30 m² exposure exhibiting 90 per cent visibility and consists of one silcrete flake. The majority of these artefacts were located on the dam wall. The site had also been impacted by past vegetation clearing, stock trampling, and active sheet erosion which had acted to redeposit the observed artefacts. The above had also eroded the A1 and exposed the A2 soil horizons within the site.

The site was collected on the 5/8/11 in accordance with the Ravensworth North Aboriginal Cultural Heritage Management Plan (Umwelt 2011).

The site is the location of a bridge over the New England Highway.

Site map

Clearly demarcate the original AHIMS site boundary, show the boundaries of impacted areas and the areas where the site remains in situ. Display map coordinates.

Methodology and results

Summary of the methodology and results of the activity or works undertaken through the authorised impacts, as relevant to the AHIMS site

The site was visited for collection on the 5/8/11 by a group of representatives of registered Aboriginal parties and an archaeologist.

Prior to collection all surface artefacts observed were individually flagged so that their distribution could be photographed and recorded. The coordinate of each artefact was recorded with sub-metre accuracy and bagged individually. Each bag was annotated with the coordinate and site name for later analysis.

One silcrete flake was collected.

Full details will be provided in the Ravensworth North salvage report.

Management recommendations

Summary of any management recommendations for the AHIMS site

None, site destroyed.

Post-investigation significance

Discuss if the scientific/archaeological or cultural significance of the site has changed in light of the results of the investigations or works conducted at the site.

The significance of the site will be addressed in the Ravensworth North salvage report.

Additional comments

Full details will be provided in the Ravensworth North salvage report.

Site photographs

Include photographs of the authorised impacts activity, as relevant to the AHIMS site. Please keep photo size to a maximum of 200 kb.

Description: Across site, view to the east.

Description: Across site, view to the west.

Description:

Description:

Description:

Description:

Appendix B

Cultural Values Report

Appendix B Cultural Values Report

AECOM Imagine it. Delivered.

AGL Macquarie Pty Ltd
03-Dec-2020

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

The AECOM heritage team would like to acknowledge the Traditional Owners of the lands in which they work and pay their respects to Indigenous Elders past, present and future. They would also like to sincerely thank the many Indigenous communities they work with across Australia for sharing their knowledge and allowing us all the opportunity to learn from Indigenous cultures

Bayswater Power Station WOAOW Project

Aboriginal Cultural Values Report

Client: AGL Macquarie Pty Ltd

ABN: 18 167 859 494

Prepared by

AECOM Australia Pty Ltd
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ABN 20 093 846 925

03-Dec-2020

Job No.: 60632997

AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

Quality Information

Document Bayswater Power Station WOAOW Project

Date 03-Dec-2020

Prepared by Darran Jordan

Reviewed by Geordie Oakes

Revision History

Rev	Revision Date	Details	Authorised Name/Position Signature
1	29-Oct-20	Draft	Darrran Jordan/AECOM Principal Heritage Specialist
2	30-Oct-20	Review	Geordie Oakes/AECOM Principal Heritage Specialist
3	03-Dec-20	Client review	Todd Fuller/AGLM

Table of Contents

AECOM Imagine it. Delivered.

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.

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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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1.0 Introduction & Background

1.1 Introduction

AECOM Australia Pty Ltd (AECOM**) was commissioned by AGL Macquarie Pty Ltd (**AGLM**) to complete an Aboriginal cultural heritage assessment 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 AGLM 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 as 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

AGLM's WOAOW project includes the following upgrades to the Bayswater Power Station (BPS**) (**

Figure 1):

- Augmentation of the existing Bayswater ash dam (**BWAD**) 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 BWAD;
- 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 (t) 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 t silo, tanker wash facility and additional truck parking;
- Construction and operation of new coal ash pipelines 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 AGLM; 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 approximately 731.7 hectares (ha) commencing with the augmentation of the ash dam in the northern portion of the BPS 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 and consultation with RAPs; and
- to compile a CVR that will assist the Secretary of the Department of Planning, Industry and Environment (**DPIE** in their assessment of the current State Significant Development (**SSD**) application.

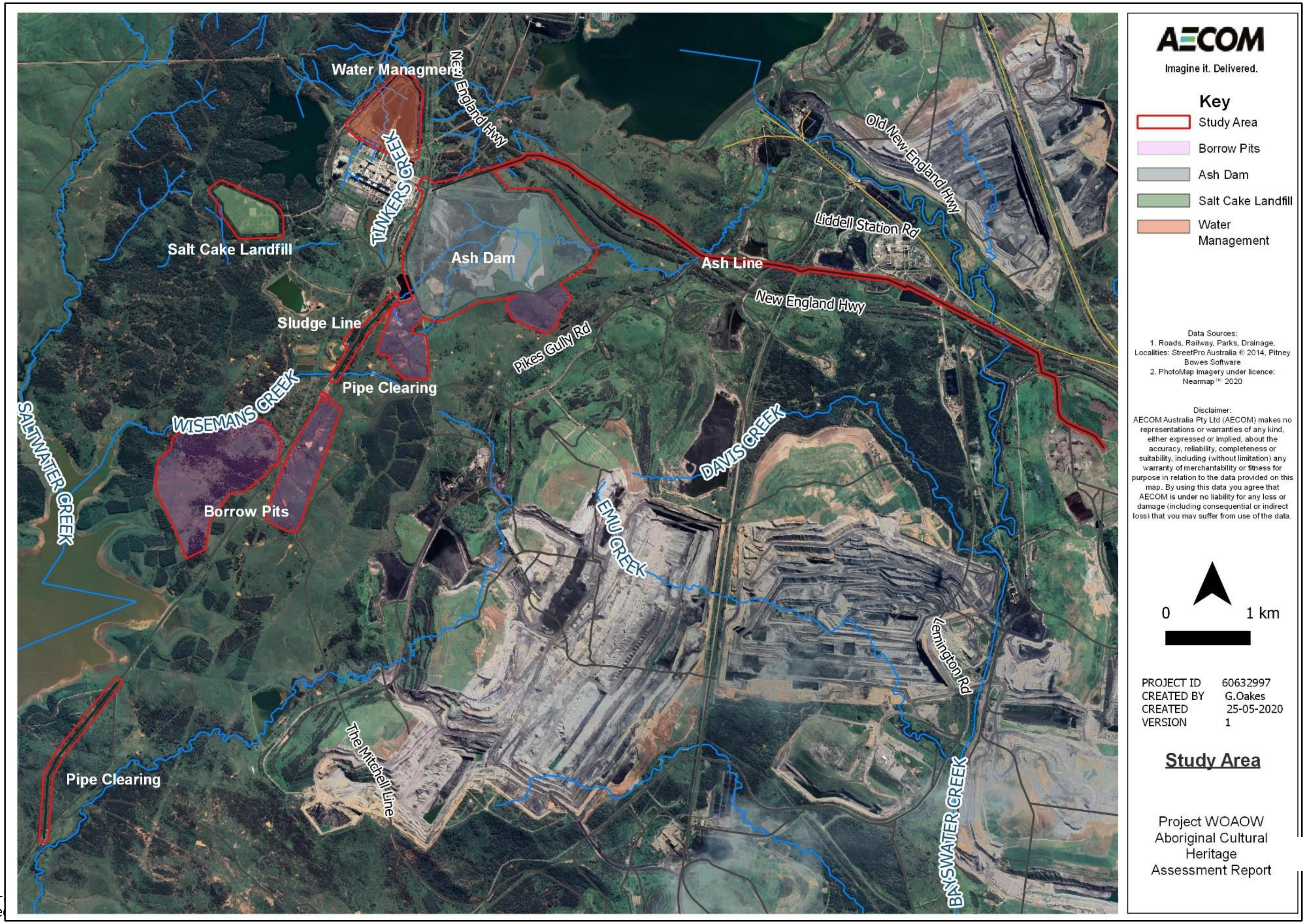
1.5 Project Team

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.

Darran 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.

Figure 1 Study area


Water Managment
New England Hwy
TINKERS CREEK
Salt Cake Landfill
Ash Dam
Ash Line
Old New England Hwy
Liddell Station Rd
New England Hwy
Sludge Line
Pikes Gully Rd
Pipe Clearing
WISEMANS CREEK
SALTWATER CREEK
Borrow Pits
DAVIS CREEK
EMU CREEK
Lemington Rd
The Mitchell Line
Pipe Clearing
BAYSWATER CREEK
AECOM
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Key
Study Area
Borrow Pits
Ash Dam
Salt Cake Landfill
Water Management
Data Sources:
1. Roads, Railway, Parks, Drainage, Localities: StreetPro Australia © 2014, Pitney Bowes Software
2. PhotoMap imagery under licence: Nearmap™ 2020
Disclaimer:
AECOM Australia Pty Ltd (AECOM) makes no representations or warranties of any kind, either expressed or implied, about the accuracy, reliability, completeness or suitability, including (without limitation) any warranty of merchantability or fitness for purpose in relation to the data provided on this map. By using this data you agree that AECOM is under no liability for any loss or damage (including consequential or indirect loss) that you may suffer from use of the data.
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PROJECT ID 60632997
CREATED BY G.Oakes
CREATED 25-05-2020
VERSION 1
Study Area
Project WOAOW Aboriginal Cultural Heritage Assessment Report

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 (OEH 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 (OEH 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 (OEH 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

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 the project was provided to RAPs as part of the registration of interest process. Basic information on the proponent and proposed development was included in the Expression Of Interest letter and as part of the methodology issued to all RAPs. Discussion of the project was also had in the field as well as over the phone.

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.

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, AECOM issued a CVR methodology to the 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 (Appendix A). No responses were received on the CVR methodology.

2.4.2 Cultural Values Consultation

Attempts were made to contact all RAPs via phone and email in October 2020 to provide input into the study area's cultural values. Offers were also made for paid meetings and site visits. Appendix B provides a summary of this consultation with the cultural values provided in Section 3.2.

2.4.3 Review of Draft ACHAR and CVR

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 ACHAR and CVR on 30 October 2020 for review and comment. Of the five responses, four responses were received supporting the assessment and management recommendations and one response noting that a Section 10 protection order is relevant to the study area.

Table 3 RAP responses to draft ACHAR and CVR

Registered Aboriginal Party	Date	Method	Response	AECOM response
Murra Bidgee Mullangari	5/11/2020	Email	I have read the project information, ACHAR and CVR for the above project, I endorse the recommendations made.	None required
Tocomwall	6/11/2020	Phone	Notified AECOM that there was a Section 10 protection order over some of the study area.	None required
A1 Indigenous Services	7/11/2020	Email	I have reviewed the document and support the Bayswater Power Station ACHAR.	None required
Widescope Indigenous Group	16/11/2020	Email	I have reviewed the document and support the ACHAR for Baywater Power Station.	None required
Merrigarn	18/11/2020	Email	I have read the ACHAR and CVR for the above project, I agree with the recommendations.	None required

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 and high points in the landscape;
- Violence and dispossession; and
- Archaeology in the study area.

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

3.1 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 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).

3.2 Bayswater Power Stations Site

Discussion with RAP groups on the cultural values of the study 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 their past 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 from vegetation clearance and earthworks for mining, stock grazing, the current BPS 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 focused 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 study 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 study 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 study 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 study area. Although outside of the study area, Scott 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 study 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 study 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 study 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 study 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

3.3 Watercourses

The study area is located within the Hunter River catchment, with the Hunter River located around 1.3 km 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. It would have formed an important landscape feature for past Aboriginal people occupying the Hunter Valley, providing critical resources and forming part of an important pathway.

While the Hunter River is not located within the study area, parts of four 1st to 3rd order watercourses (after Strahler, 1952) are. 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 BPSt, flowing westward and feeding into what is now Plashett Reservoir. Prior to construction of the reservoir, Wisemans Creek was a tributary of the much larger Saltwater Creek and at its lower reaches was a 3rd order channel that likely held water most of the year.

A 3rd order section of Pikes Creek, whose headwaters, prior to modification, were located with the Bayswater Ash Dam(**BWAD**), forms a chain of ponds within the study area as it flows in a westerly direction to Liddell Power Station. Reference to the 1958 aerial for the creekline indicates it was a relatively minor watercourse with little or no incision visible. Rather, it appears to be a chain of ponds similar to its appearance today.

A destroyed 2nd order section of Tinkers Creek that historically would have previously passed through the coal handling plant is also located within the study area. Today, the coal handling plant entirely encompasses the section of creekline and has been modified beyond recognition. Reference to the 1958 aerial for the creekline indicates that the section located within the study area was not significantly incised.

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. Bayswater Creek is a locally significant watercourse and has been the subject of multiple archaeological assessments inclusive of test and salvage excavations (e.g., Baker et al. 1992). Within the study area the creek is quite heavily incised, a feature which is likely the result of vegetation land clearance associated with historic European land practices. Supporting this, reference to the 1958 aerial for the creekline indicates that the section located within the study area was not significantly incised but rather was a chain of ponds.

All the of the above watercourses, to varying degrees, would have been known and utilised landscape features. Aboriginal people likely would have used these creeklines as pathways, travelling through the region, utilising available flora and faunal resources. Though, nothing specific has been identified by RAPs, some watercourses may have been associated with stories or songs and formed links along songlines.

3.4 High Points in the Landscape

The study area contains crests and ridgelines associated with several prominent hills that provide views of the surrounding the local landscape. In the south, a large unnamed hill and associated crest provides views southward to the Hunter River and Wollemi National Park (Plate 1), as well as views of Saltwater Creek to the west, Parnell Creek to the east and BPS to the north. While no Aboriginal sites/objects were identified within the area, such views were likely utilised by past Aboriginal people to view the surrounding landscape. Towards the centre of the study area, several low hills are present around Wisemans Creek that offer restricted local views to the south and far reaching views northward towards Mount Arthur and Muswellbrook (Plate 2). This hill, including its northern slopes and crest contain numerous Aboriginal objects indicating short-stay camping and/or hunting/gathering without camping. The hill would've offered an amenable camping area with access to resources available from Wisemans Creek but above any swampy creek margins as well as excellent views northward of the region. Likewise, a crest/rigeline located in the northern portion of the study area adjacent to the BWAD offers significant views of the region including the BPS to the north, Wollemi National Park plateaus in the south and extensive views east and west. Aboriginal objects identified on the crest and its associated side slopes indicates that the hill was utilised by past Aboriginal people who were likely accessing resources available from Wisemans and Pikes Creek.

The crests and ridges identified above would have formed part of a broader Aboriginal cultural landscape that incorporated watercourses, flats and a variety of landforms utilised by past Aboriginal people in a complex relationship of cultural meaning and resource utilisation. They would have moved across the crests and ridgelines using local landmarks visible from elevated terrain as guides as they moved between resource areas, camping grounds and ceremonial sites.

Plate 1 View south from southern hill showing Hunter River floodplain and Wollemi National Park in the background

Plate 2 View northwest from adjacent to Wisemans Creek showing local terrain and a prominent hill approximately 5 km in the distance

Plate 3 View east from the ridgeline crest in the northern portion of the study area

Plate 4 View north from the ridgeline/crest in the northern portion of the study area showing BPS and land to the north towards Muswellbrook

Plate 5 View south from the ridgeline/crest in the northern portion of the study area showing land to the south towards the Hunter River and Wollemi National Park

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

RAPs participating in the assessment noted that conflict between Aboriginal people and European settlers occurred within the surrounding region. Reference to historical documents indicates that 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.*

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

[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.

[2] Often violent in nature

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 a 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).

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 worms 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

[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.

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 FalBrook, 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).

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 FalBrook. 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).

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 FalBrook, 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).

[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 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, &. 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 (Figure 4 and Figure 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 5). ACHM, meanwhile, have prepared a map which shows an approximate area where the massacre cannot have occurred (ACHM, 2013: 69, Map 4-1). 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

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. Approximate location of study area in red (modified from Campbell, 1926)

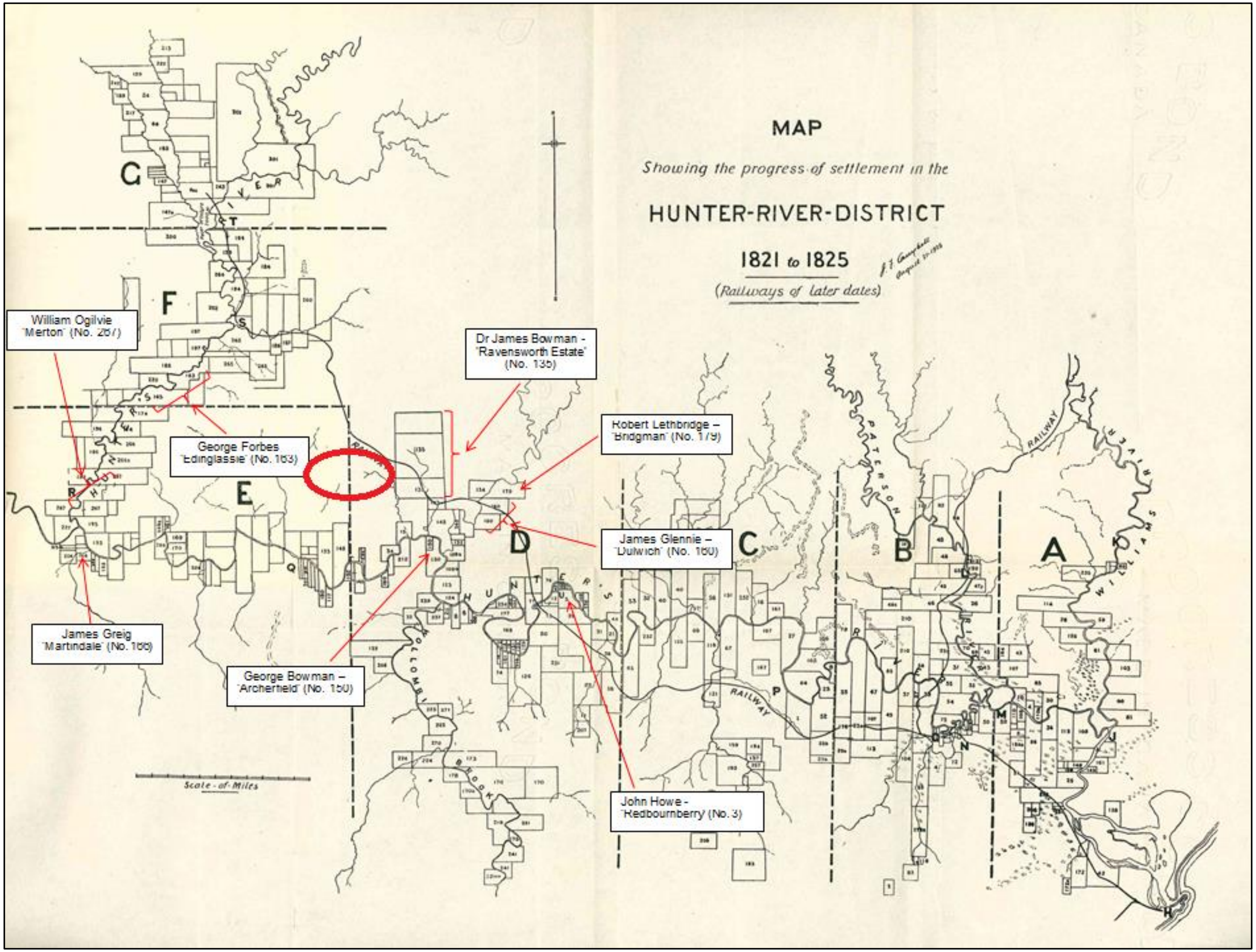


Figure 3 Gollan's (1993) map of land unsettled by Europeans in 1826 (from Gollan, 1993: Map 1)

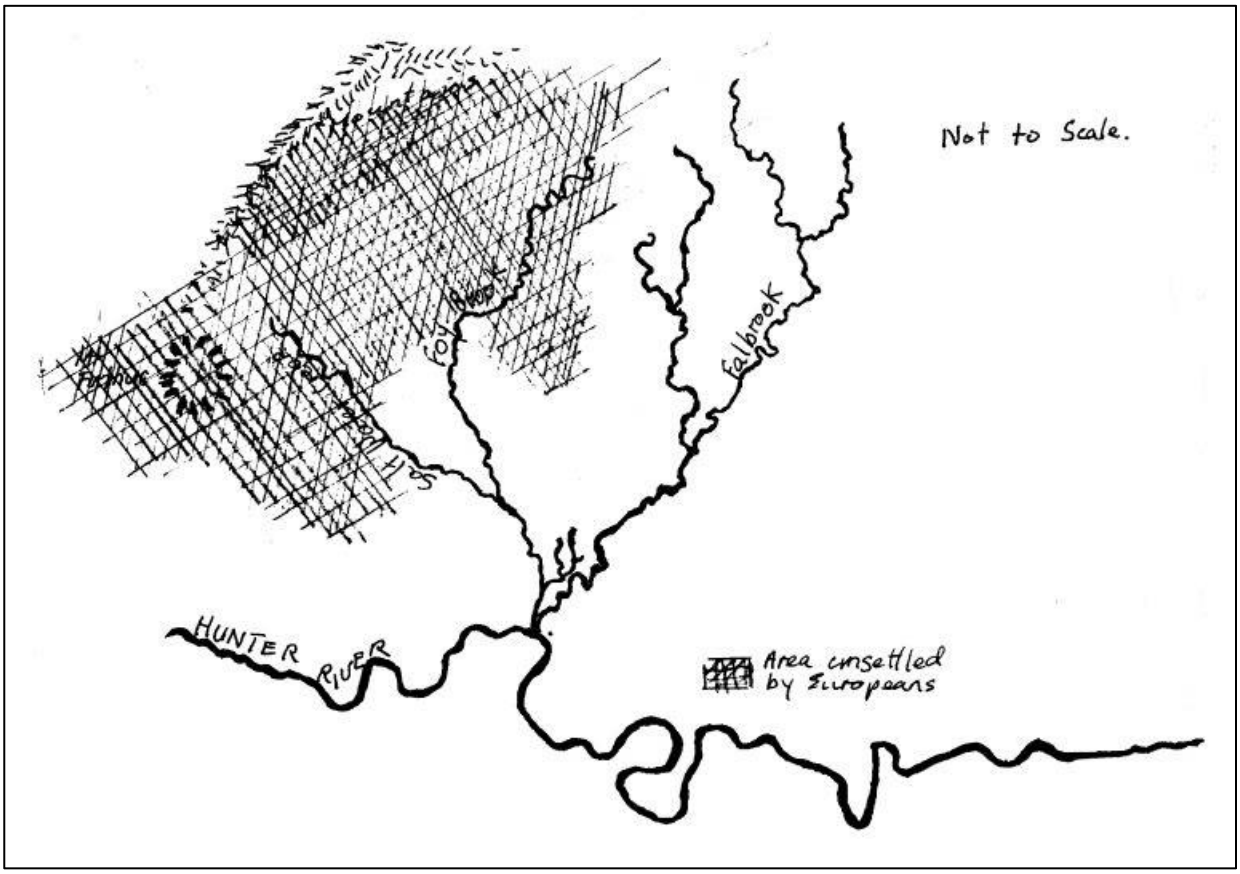


Figure 4 Gollan's (1993) map of Aboriginal 'attacks' leading to the Ravensworth massacre (from Gollan, 1993: Map 3)

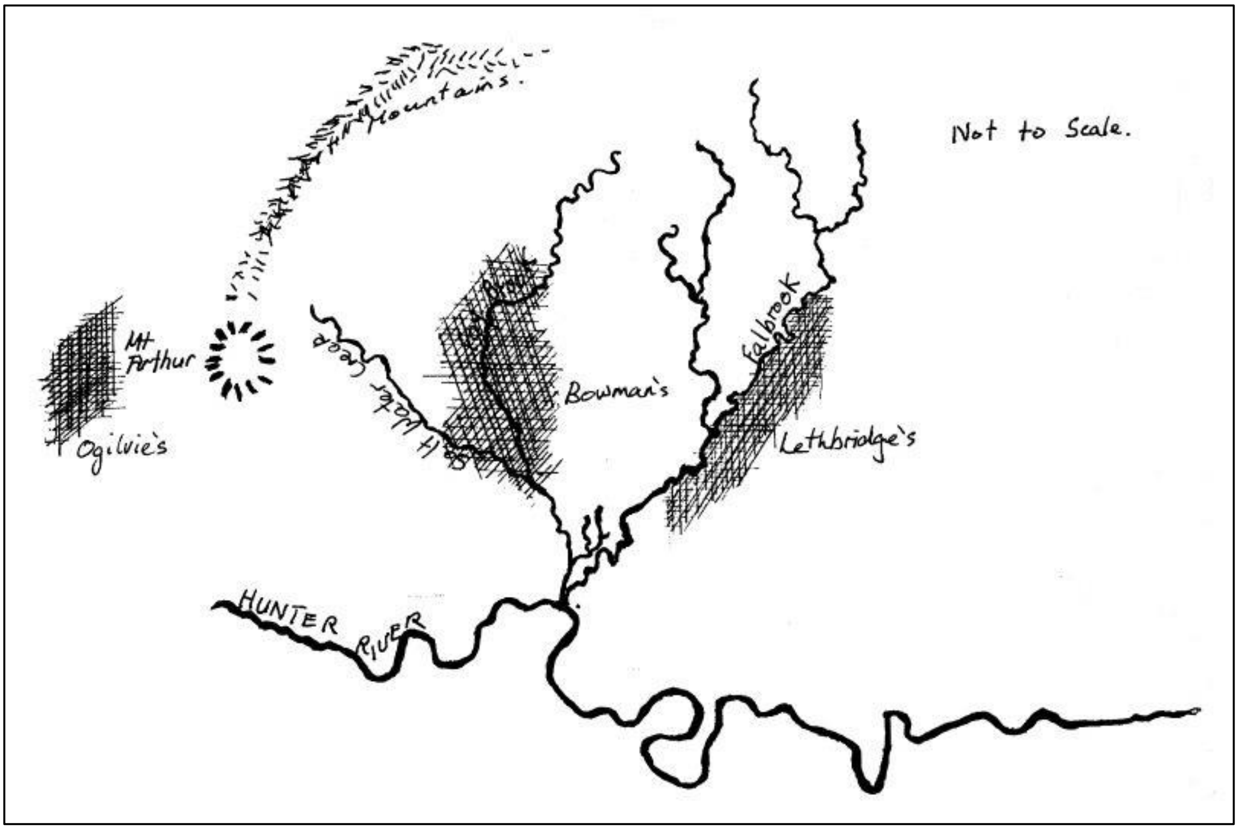
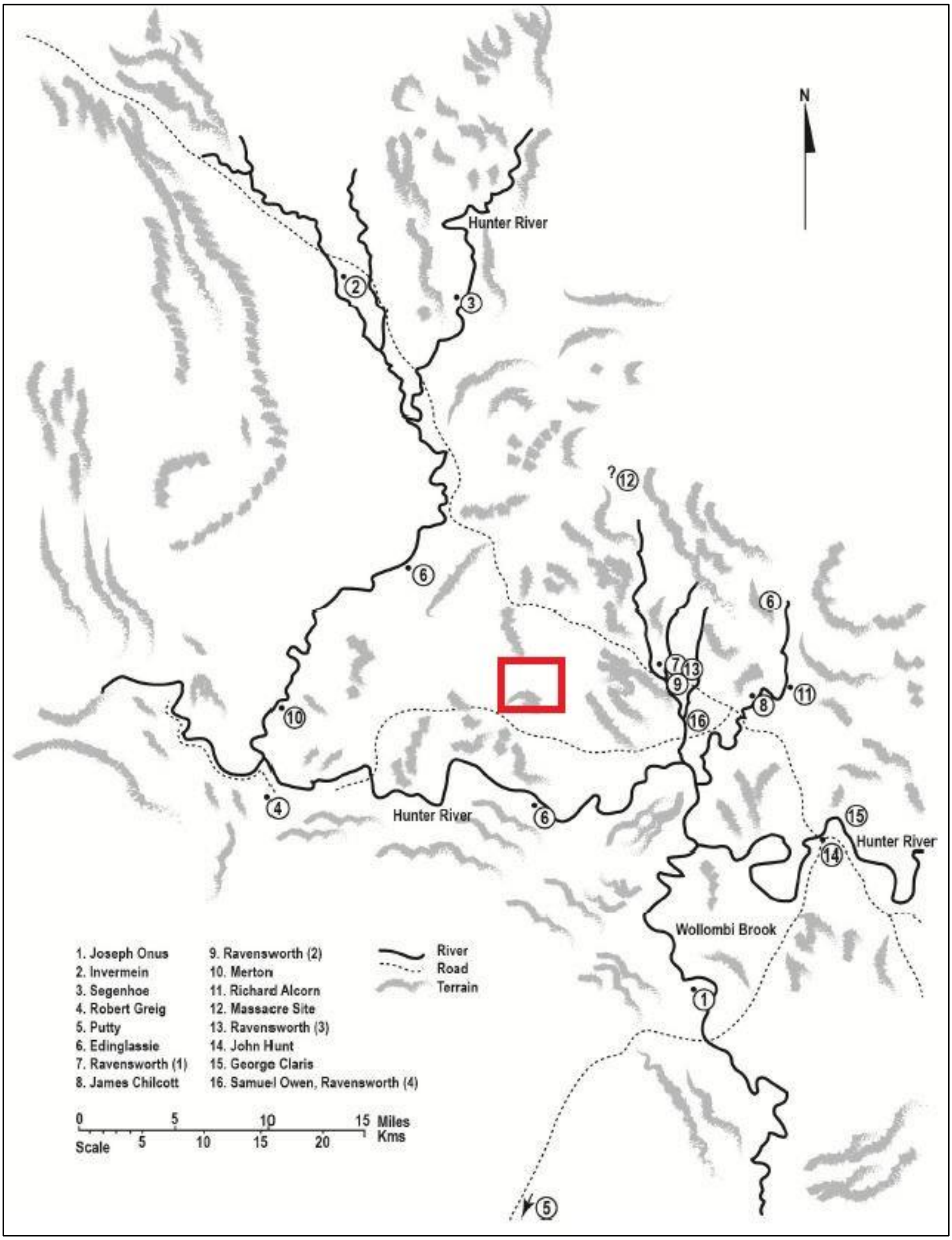


Figure 5 Map showing the location of reported incidents of Aboriginal-European conflict in the Hunter Valley between 1825 and 1827, including the 'Ravensworth massacre' (from Dunn, 2015: 228, Fig. 16) (study area in red).



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 4 below, with examples of returns for the Patrick's Plains, Merton, and Wallis Plains districts, provided in Figures 6 to 12. As indicated in Table 4, 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 Figure 8,Figure 9Figure 11), 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 FalBrook. 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 (Figure 13 and Figure 14). Peter McIntyre’s December 1829 return for Segenhoe, in contrast, contains no useful information with respect to group names and localities.

Table 4 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

<table>
<tr><th>Year</th><th>Date(s)</th><th>District</th><th>Record taken at</th><th>Recorder(s)</th><th>Total # of people</th><th>Tribal affiliation</th><th>Place / district of usual resort</th><th>Comments</th></tr>
<tr><td>1828</td><td>5-Jun</td><td>-</td><td>Invermien</td><td>Francis Little</td><td>39</td><td>Tullong</td><td>Dart Brook / Paterson and Pages Rivers</td><td>-</td></tr>
<tr><td>1828</td><td>5-Jun</td><td>-</td><td>Invermien</td><td>Francis Little</td><td>29</td><td>Murawin</td><td>Dart Brook / Paterson and Pages Rivers</td><td>-</td></tr>
<tr><td>1829</td><td>14-Apr</td><td>Wallis Plains</td><td>-</td><td>Samuel Wright</td><td>120</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">1829</td><td rowspan="4">4-Aug</td><td rowspan="4">Patrick’s Plains</td><td rowspan="4">-</td><td rowspan="4">James Glennie</td><td>46</td><td>Plains Tribe</td><td>Patrick’s Plains</td><td>“Not including the Wollomby Blacks or the Wild Blacks of each tribe”

‘King’: Black Boy/Pandoba</td></tr>
<tr><td>11</td><td>Bulcara</td><td>Patrick’s Plains</td><td>‘King’: Billy Bowman/Oonungoonung</td></tr>
<tr><td>14</td><td>Micarrawillung</td><td>Patrick’s Plains</td><td>‘King’: Jacky/Balboa</td></tr>
<tr><td>28</td><td>Kinkigyne</td><td>Patrick’s Plains</td><td>‘King’: Coori Jerry/Nimbue</td></tr>
<tr><td>1828</td><td>16-Apr</td><td>-</td><td>Segenhoe</td><td>Peter McIntyre</td><td>2</td><td>-</td><td>-</td><td>‘King’: Tom
‘Queen’: Maria</td></tr>
<tr><td>1828</td><td>10-Jun</td><td>-</td><td>Segenhoe</td><td>Peter McIntyre</td><td>3</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>1829</td><td>7-Apr</td><td>-</td><td>Segenhoe</td><td>Peter McIntyre</td><td>2</td><td>-</td><td>-</td><td>‘King’: Tom</td></tr>
<tr><td>1829</td><td>16-Jun</td><td>-</td><td>Segenhoe</td><td>Peter McIntyre</td><td>14</td><td>-</td><td>-</td><td>‘Queen’: Maria</td></tr>
<tr><td rowspan="4">1832</td><td rowspan="4">-</td><td rowspan="4">North and North Western Districts</td><td rowspan="4">-</td><td rowspan="4">-</td><td>30</td><td>-</td><td>Darlington / Patrick’s Plains</td><td>-</td></tr>
<tr><td>30</td><td>-</td><td>Merton</td><td>-</td></tr>
<tr><td>40</td><td>-</td><td>Invermein</td><td>-</td></tr>
<tr><td>100</td><td>-</td><td>Casillis</td><td>-</td></tr>
</table>

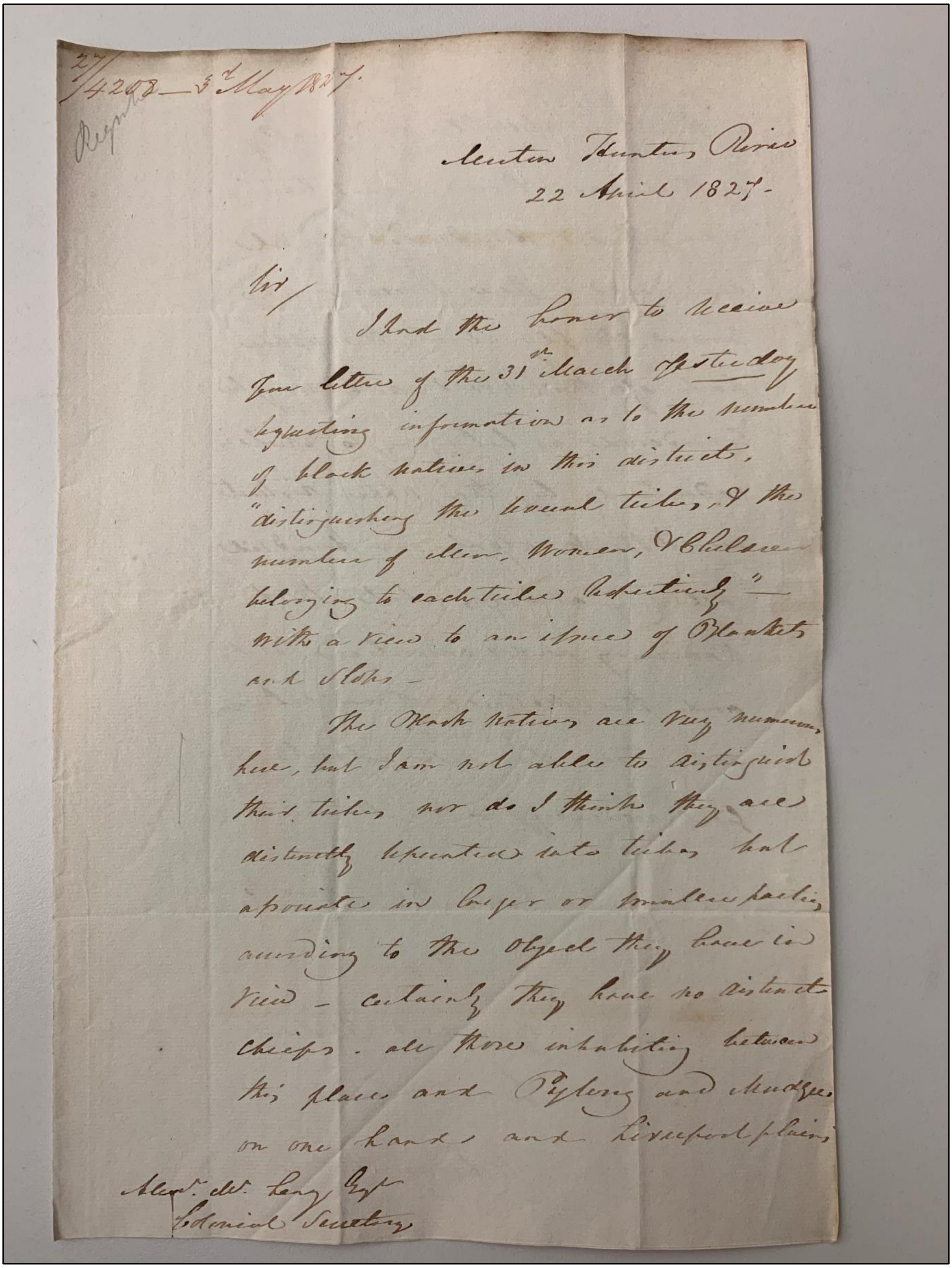
Year	Date(s)	District	Record taken at	Recorder(s)	Total # of people	Tribal affiliation	Place / district of usual resort	Comments
1833	-	North and North Western Districts	-	-	30	-	Darlington / Patrick's Plains	-
					30	-	Merton	-
					40	-	Invermein	-
					120	-	Casillis	-
1833	3-May	All districts	-	-	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	

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	-
1834	2-Jun	Patrick's Plains	Patrick's Plains	-	14	Patrick's Plains	Patrick's Plains	-
1834	2-Jun	Patrick's Plains	Patrick's Plains	-	10	Glendon	Glendon	-
1835	-	North and North Western Districts	-	-	70	-	Maitland, inc. Wollombi	Number of blankets not people
1835	-	North and North Western Districts	-	-	30	-	Paterson	Number of blankets not people
1835	-	North and North Western Districts	-	-	60	-	Darlington and Patrick's Plains	Number of blankets not people
1835	-	North and North Western Districts	-	-	50	-	Merton	Number of blankets not people
1835	-	North and North Western Districts	-	-	100	-	Invermein	Number of blankets not people
1837	6-Jun	Patrick's Plains	Patrick's Plains	-	11	Fal Brook	Fal Brook	-
1837	6-Jun	Patrick's Plains	Patrick's Plains	-	11	Plains Tribe	Patrick's Plains	-
1837	6-Jun	Patrick's Plains	Patrick's Plains	-	12	Glendon	Glendon Brook	-
1838	-	Patrick's Plains	Various	L.E.Threlkeld	15	-	Glendon	-
1838	-	Patrick's Plains	Various	L.E.Threlkeld	15	-	Dulwich	-

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

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



27/4208 — 3d May 1827.
Reported

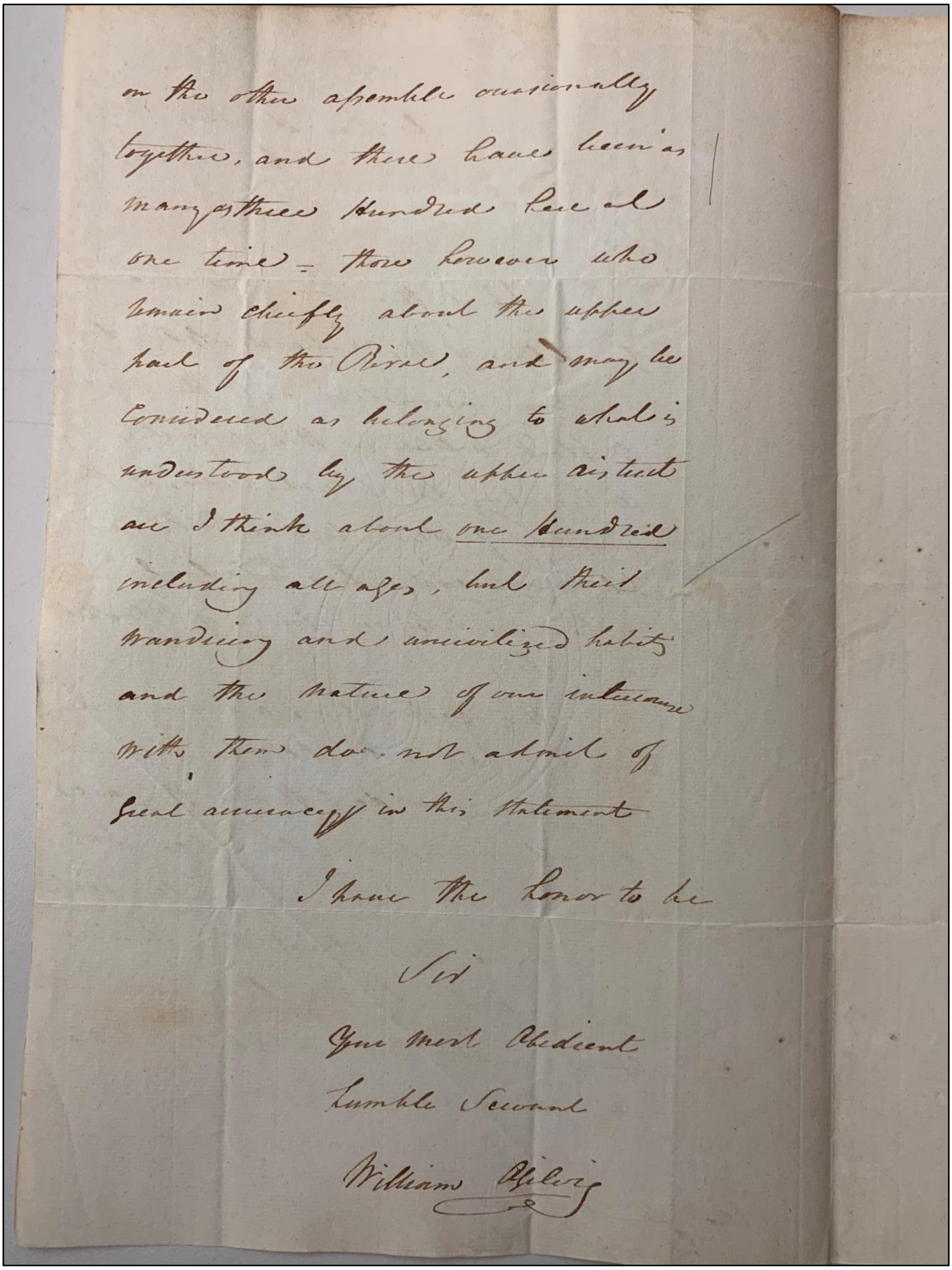
Merton Hunters River
22 April 1827 -

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. McLeay Esqr
Colonial Secretary

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 here at
one time – those however who
remain chiefly about the upper
part of the River, and may be
Considered as belonging to what is
understood by the upper district
are I think about <u>one Hundred</u>
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

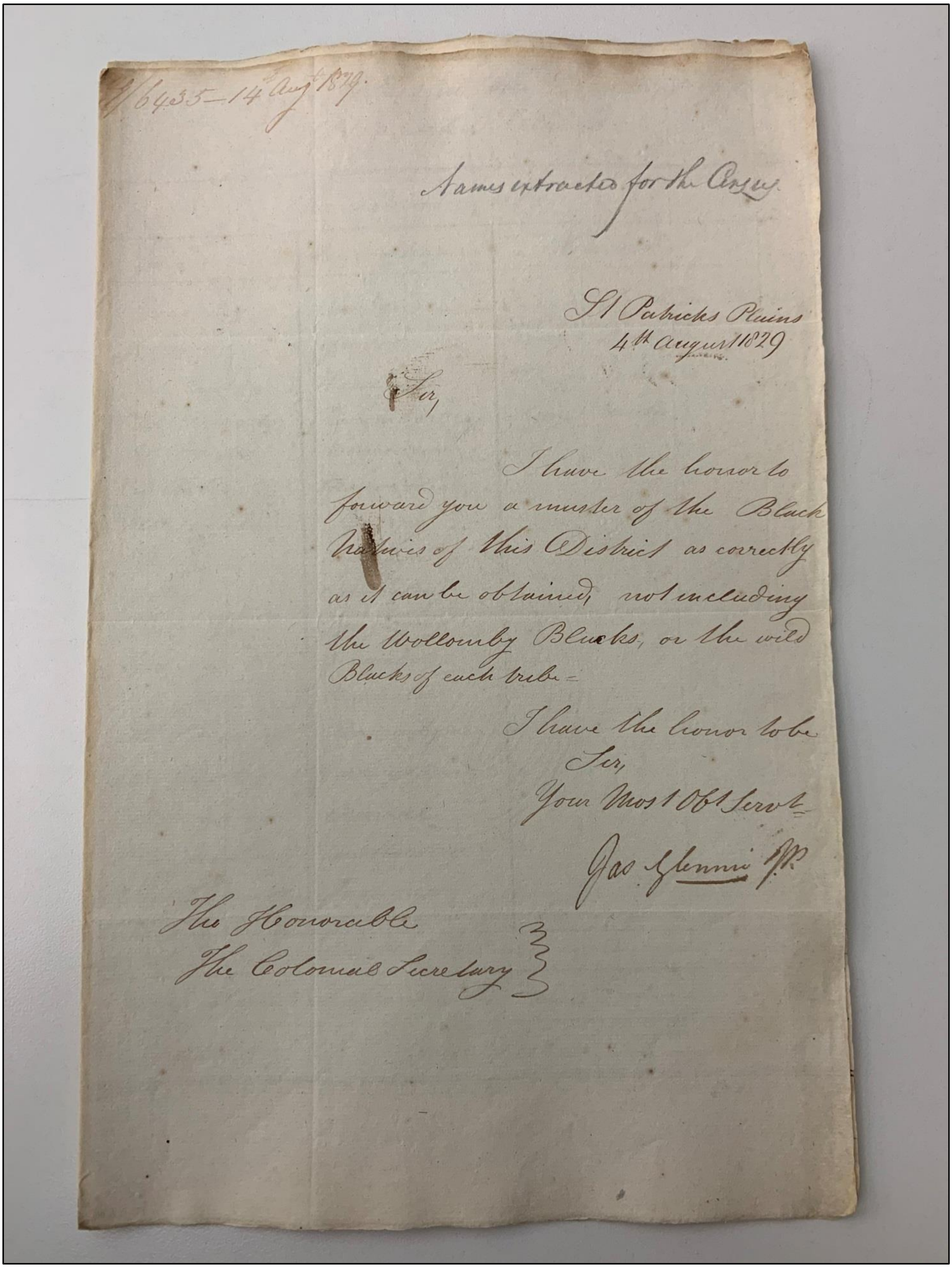
I have the honor to be

Sir

Your most Obedient
humble Servant

William Ogilvie

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



4/6435 – 14th Augt 1829.

Names extracted for the [illegible]

St Patricks Plains
4th August 1829

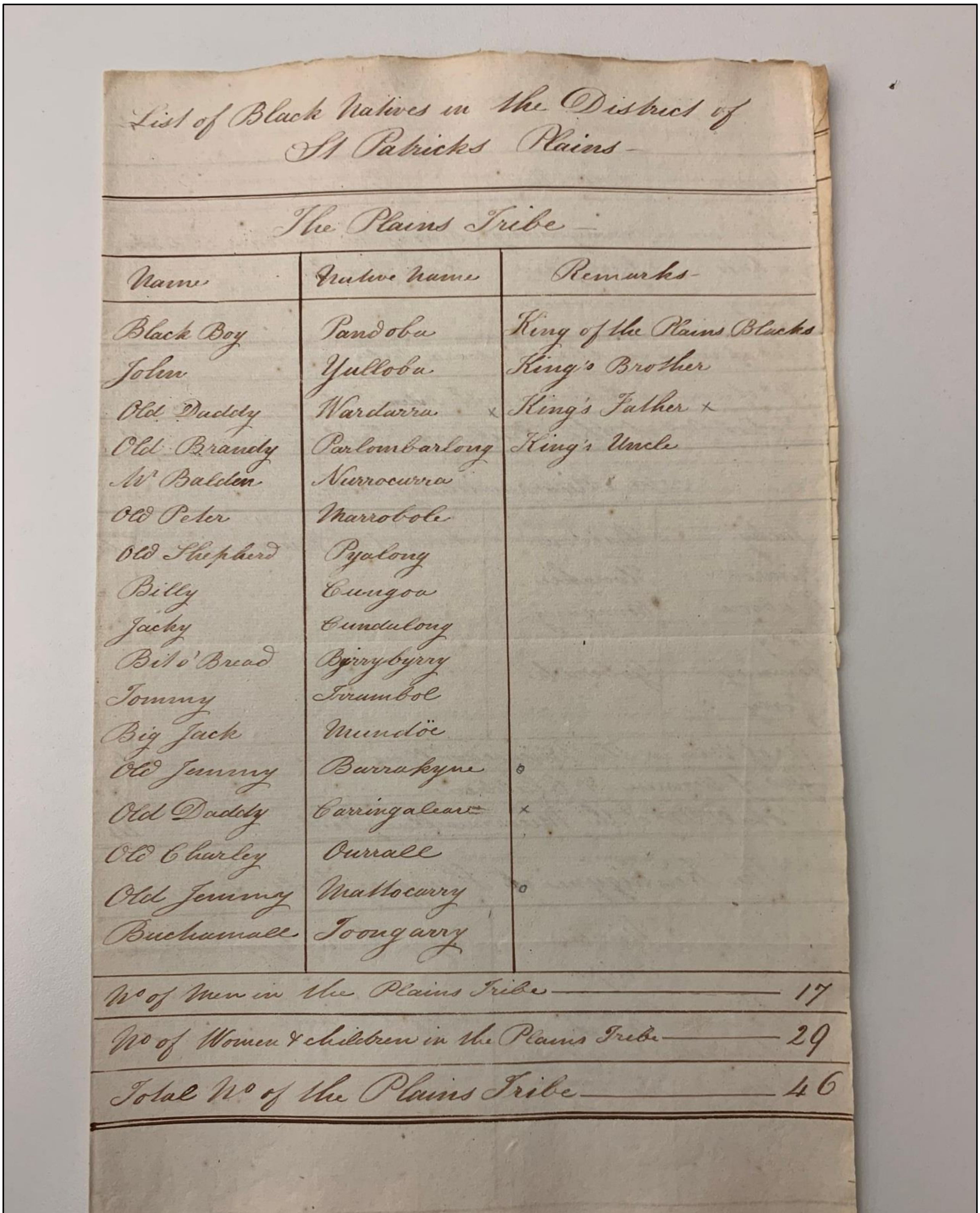
Sir,

I have the honor to forward you a muster of the Black Natives of this District as correctly as it can be obtained, not including the Wollomby Blacks, or the wild Blacks of each tribe =

I have the honor to be
Sir,
Your Most Obt Servt
Jas. Glennie J.P.

The Honorable
The Colonial Secretary

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 -

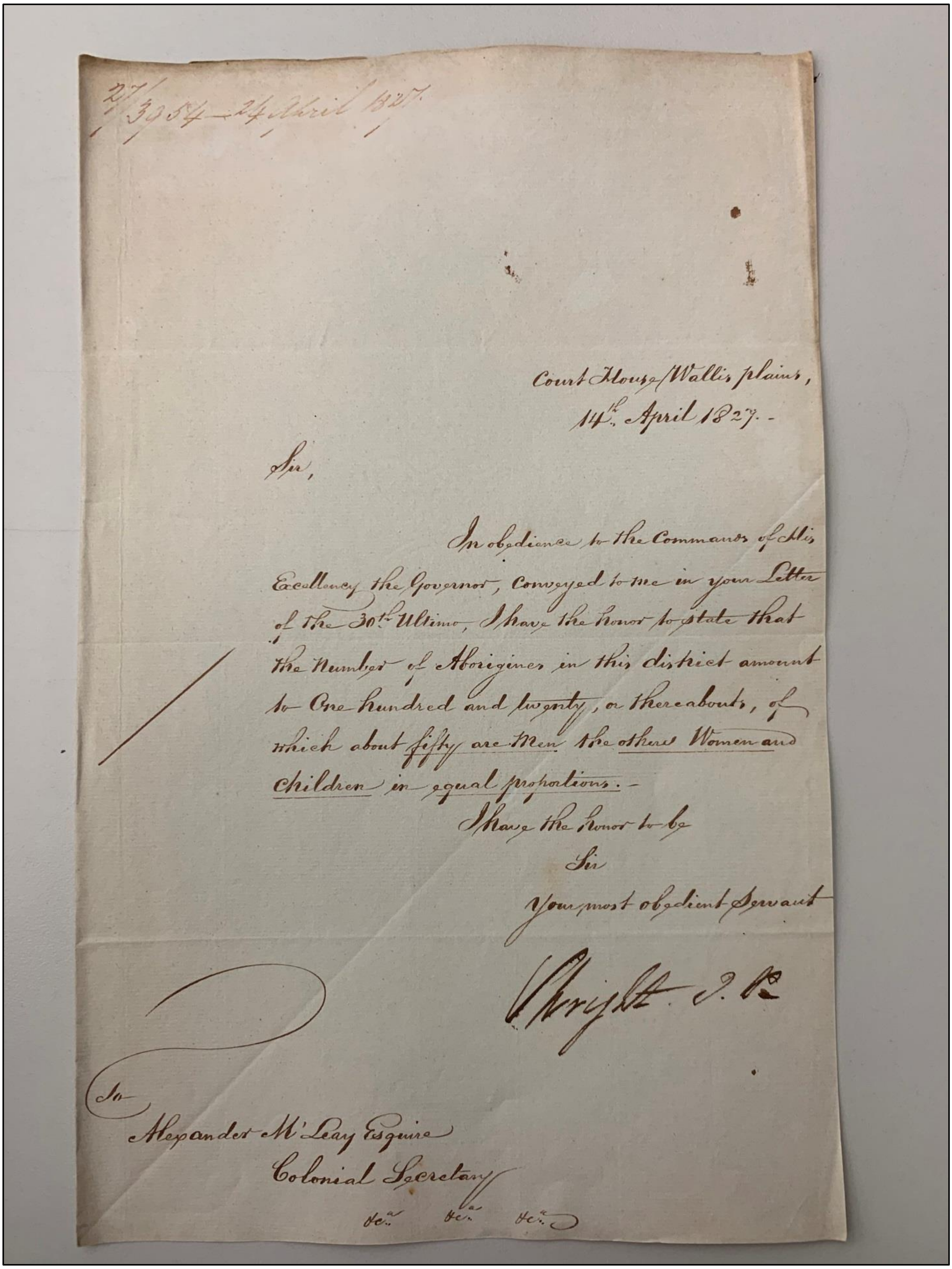
Name	Native name	Remarks
Black Boy	Pandoba	King of the Plains Blacks
John	Yulloba	King's Brother
Old Daddy	Wardarra ×	King's Father ×
Old Brandy	Parlombarlong	King's Uncle
Mr Balden	Nurrocurra	
Old Peter	Marrobole	
Old Shepherd	Pyalong	
Billy	Cungoa	
Jacky	Cundulong	
Bit o' Bread	Byrrybyrry	
Tommy	Irrumbol	
Big Jack	Mundöe	
Old Jemmy	Barrakyne	o
Old Daddy	Carringalean	×
Old Charley	Ourralle	
Old Jemmy	Mallocurry	o
Buchamalle	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

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



27/3354 – 24 April 1827.

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

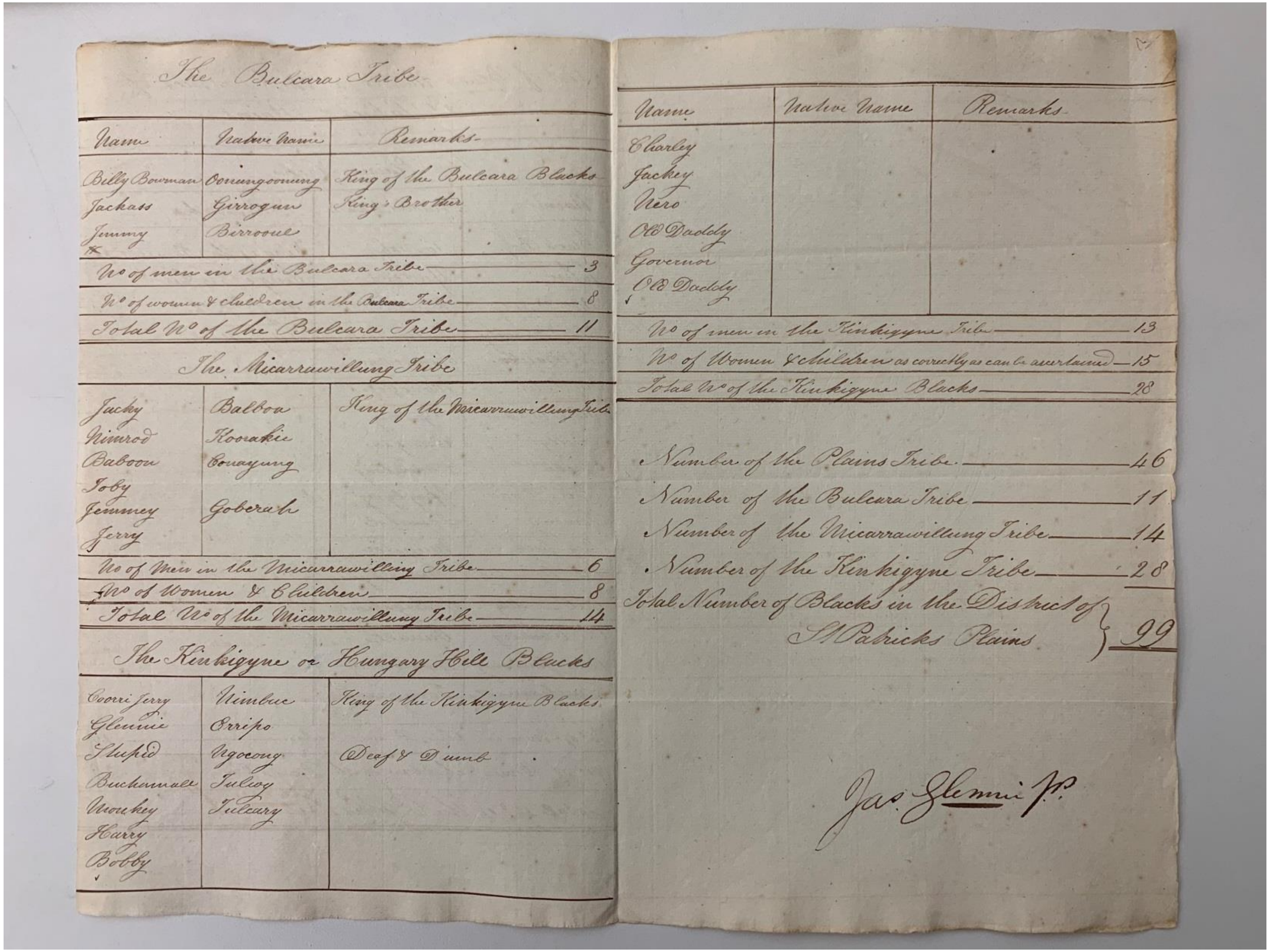
Sir,

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.

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 Bowman	Oonungoonung	King of the Bulcara Blacks
Jackass	Girrogun	King's Brother
Jimmy	Birrooue	

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 Micarrawillung Tribe

Name	Native Name	Remarks
Jacky	Balboa	King of the Micarrawillung Tribe
Nimrod	Koorakie	
Baboon	Conayung	
Toby		
Jemmey	Goberah	
Jerry		

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

The Kinkiggyne or Hungary Hill Blacks

Name	Native Name	Remarks
Coorri Jerry	Nimbue	King of the Kinkiggyne Blacks
Glennie	Orripo	
Stupid	Ngocony	Deaf & Dumb
Buckanall	Tulcoy	
Monkey	Tulcury	
Harry		
Bobby		
Charley		
Jackey		
Nero		
Old Daddy		
Governor		
Old Daddy		

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

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

Jas. Glennie J.P.

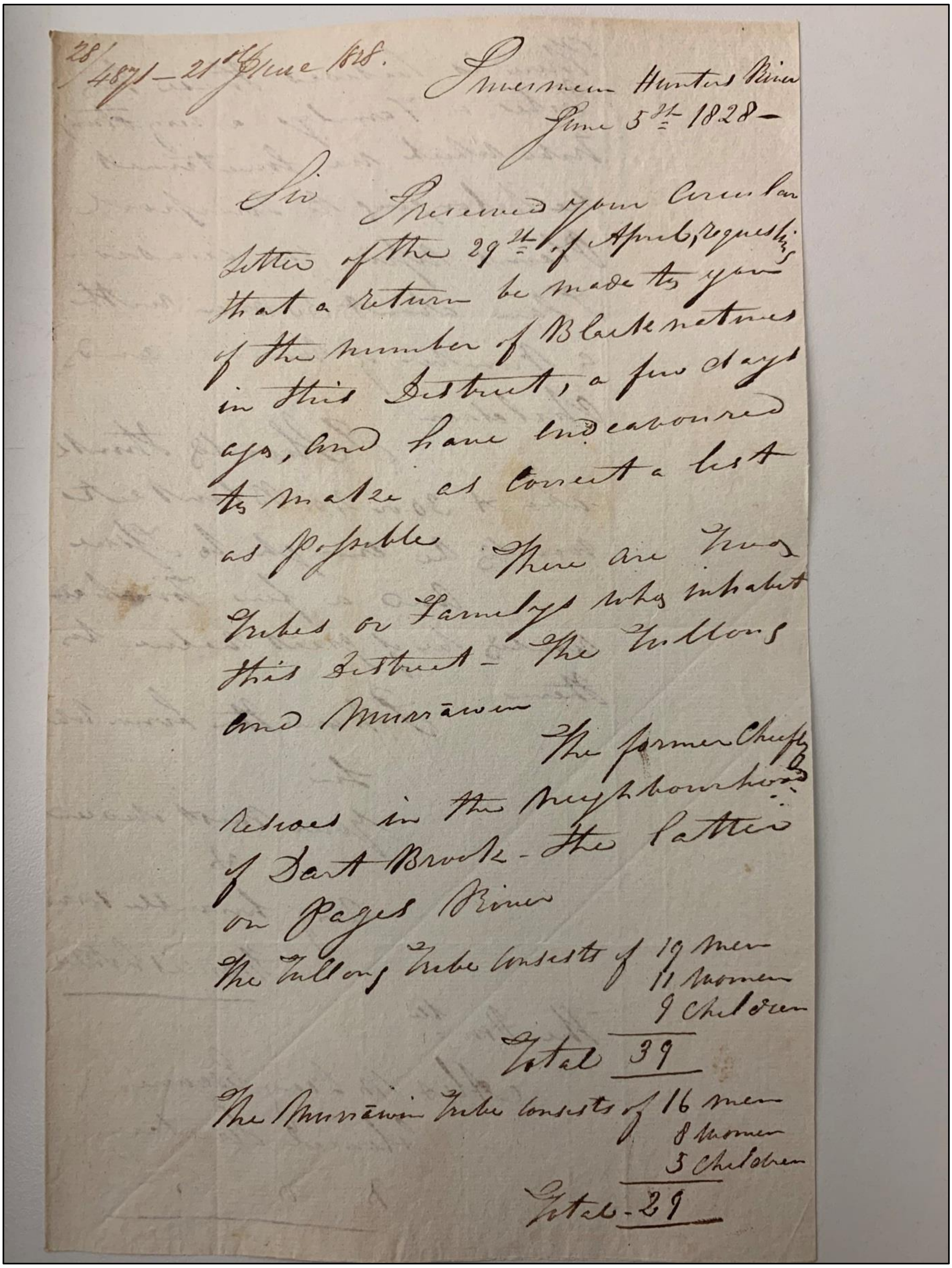
Figure 12 Return of Aboriginal Natives, Patrick's Plains, 2 June 1834 1. This return lists the 'place of district of usual resort' for the 'Hungary Hill Tribe' as Fal Brook (SRNSW, Reel 3706)

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	Wylliderry	19	1	-	-	Hungary Hill	Fal Brook
2	Stupid	Ngocong	20	-	-	-	do	do
3	Harry	Tillengun	22	1	-	-	do	do
4	Monkey	Kulcary	18	1	-	-	do	do
5	Billy	Nekinda	18	1	-	-	do	do
6	Paddy	Pungun	14	-	-	-	do	do
7	Yellowmonday	Bowara	14	-	-	-	do	do
8	Nero	Corringut	23	-	-	-	do	do
9	Crooked Billy	Mulliandurry	18	-	-	-	do	do
10	Jacky	Cuttagong	21	1	-	-	do	do
11	Old Brandy	Parlombarbong	42		-	-	Patricks Plains	Patricks Plains
12	Ball	Murrakurra	30	1	1	-	do	do
13	Jenny	Birrooul	20	1	2	-	do	do
14	Wollombee	Dungarri	40	1	2	-	do	do
15	Old Diamond	Julo	40	1	1	-	do	do
16	Billy	Monie	18	-	-	-	do	do
17	Black Boy	Pandobah	28	-	-	-	do	do
18	John	Yullobah	27	1	-	-	do	do
19	Big Jack	Mundong	29	1	-	-	do	do
20	Old Jenny	Carringalear	58	-	-	-	do	do
21	Bit o' Bread	Berrybirry	29	1	1	-	do	do
22	Billy	Cungoa	23	-	-	-	do	do
23	Billy Bowman	Ownngowning	28	2	1	1	do	do
24	Jack ass	Guirogurri	32	1	-	-	do	do
25	Nimrod	Cooraky	26	1	-	1	Glendon	Glendon
26	Babron	Collagany	27	2	1	-	do	do
27	Jimmy	Goberoh	22	2	-	1	do	do
28	Glennie	Cupo	32	2	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	Mattambone	21	-	-	-	do	do
33	Old Barrall	— " —	50	-	-	-	do	do
34	Bungary	— " —	40	-	-	1	do	do

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.

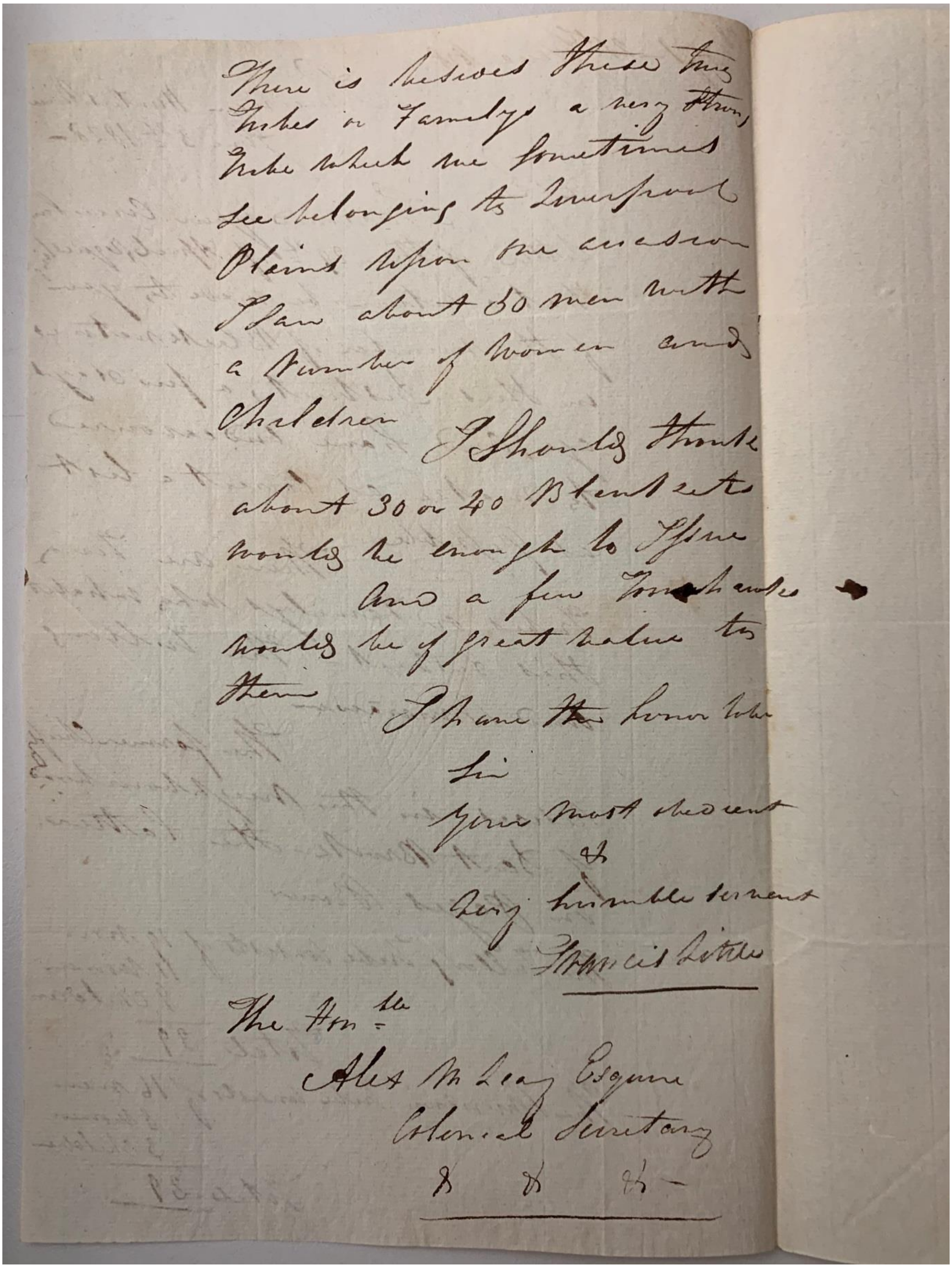
Invermein Hunters River
June 5th 1828 –

Sir I received your Circular Letter of the 29th of April, requesting that a return be made to you of the number of Black natives in this District, a few days ago, and have endeavoured to make as correct a list as possible. There are two Tribes or Familys who inhabit this District – The Tullong and Murrawin. The former Chiefly reside in the neighbourhood of Dart Brook – the latter on Pages River

The Tullong Tribe consists of 19 men
11 women
9 Children
Total 39

The Murrāwin Tribe consists of 16 men
8 women
5 Children
Total – 29

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 Familys a very strong
Tribe which we sometimes
see belonging to Liverpool
Plains upon one 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 McLeay Esquire
Colonial Secretary
&c &c &c

3.5.1 Mount Arthur Massacre

RAPs mentioned the Mount Arthur Massacre as part of the assessment. 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 10 km north west 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)

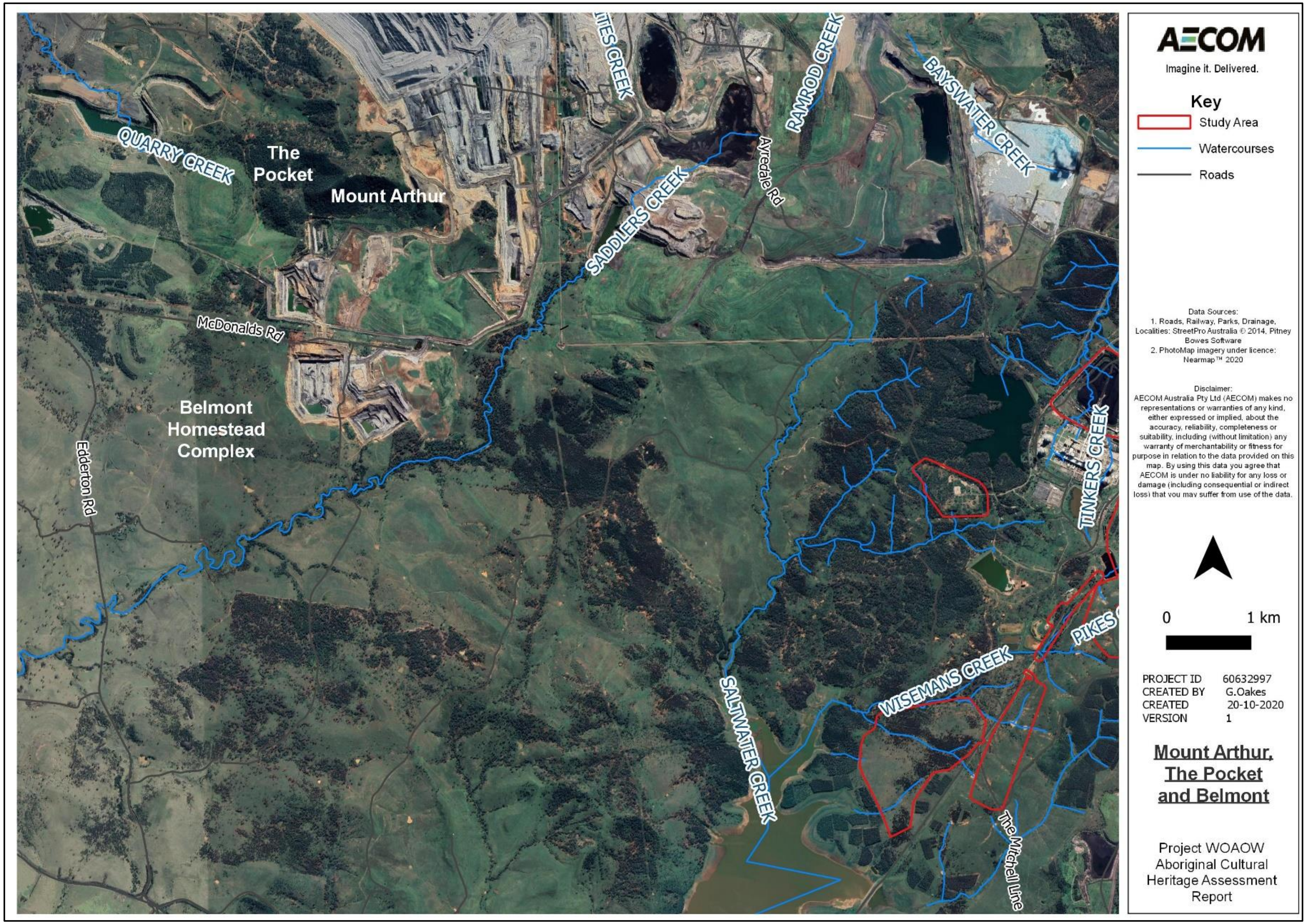
These observations aside, Davidson and Lovell-Jones (1993: 20) noted a lack of corroborating material evidence for the massacre reported by their informants:

> *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.

Figure 15 Map 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



3.6 Resilience and Adaption

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 major estates of this area. 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…".

3.7 Archaeology in the Study Area

The archaeological investigation completed for the assessment has revealed 24 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 which are present in the study area, 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 BPS.

5.0 Impact Assessment

As noted above, the CVR finds that the Aboriginal heritage values of the study area rest principally with the Aboriginal archaeological sites identified within it as well as general landscape features (i.e., creeks and elevated landforms). Archaeological sites attest to past Aboriginal use of the study area and indicate that it formed part of a larger cultural landscape that was utilised by Aboriginal people while landscape features such as creeks and elevated vantage points were important features for Aboriginal people occupying the region.

Proposed upgrade activities within the study area are anticipated to directly impact 24 Aboriginal archaeological sites comprising 23 open artefact sites, eight with demonstrated low density deposit, and one subsurface scatter. In addition, parts of four 1^{st} to 3^{rd} order watercourses are located directly within the study area, some of which have associated Aboriginal sites, that will be directly impacted. This includes 1^{st} and 2^{nd} order sections of Wisemans Creek, a 3^{rd} order section of Pikes Creek, a destroyed 2^{nd} order section of Tinkers Creek and a heavily incised 3^{rd} order section of Bayswater Creek. In addition to creeklines, the study area contains crests and ridgelines associated with several prominent hills that provide views of the surrounding the local landscape which will be impacted by the project.

6.0 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:

- the results of the archaeological investigation described in the ACHAR;
- the significance and impact assessments detailed in the ACHAR;
- the results of the background research for this CVR; and
- consultation with RAPs.

6.1 Aboriginal Archaeological Sites

Considering the nature, condition and significance of all 24 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.

The nature of the proposed upgrades and their necessary locations in relation to existing BPS infrastructure make conservation and/or avoidance not practicable in this instance. Community collection is considered an effective strategy to mitigate impacts to identified Aboriginal sites.

6.2 Landscape Features

The project will impact both creeklines and elevated terrain, some of which have evidence of past Aboriginal occupation. It is recommended, where possible, these landscape features be retained. Where retention is not possible, documentation, including a photographic record be taken and consideration given to reinstatement of these elements in the future.

7.0 Acknowledgments

AGLM 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.

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9.0 Appendix A – CVR Methodology

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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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10.0 Appendix B – Cultural Values Consultation

Date	RAP	RAP Representative	Contact	Correspondence/Comments
21/10/2020	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Phone	DJ spoke to Marilyn Carroll-Johnson 23/10/20 - she stated she didn't have anything to add regarding the cultural values of the Bayswater PowerStation that hadn't already been captured (agreed with sites, water courses and elevated areas having cultural sensitivity).
21/10/2020	Nunawanna Aboriginal Corporation	Colin Ahoy	Email	No response
21/10/2020	Hunter Valley Cultural Surveying	Luke Hickey	Phone	Phone doesn't connect
21/10/2020	WLALC	Noel Downs	Phone	Noel Downs - 6543 1288 - stated he is unavailable until Friday 30 October 2020 and asked to be called back at 1pm on that date. He asked if we had called a community meeting with all community members to discuss this. DJ said I had been calling people individually and asked if he was happy to discuss cultural values by phone in that way, he said he was but was too busy to talk about it until next Friday at 1pm. Called on Friday 30 October 2020 and was told Noel was on leave. Jean Hands stated she had no comments but would review the report when it came.
21/10/2020	Merrigarn Indigenous Corporation	Shaun Carroll	Phone	Called Shaun Carroll but no response 23/10/20
21/10/2020	Yinarr Cultural Services	Kathleen Steward Kinchela	Phone	Called Kathleen Steward Kinchela but no answer - left a message to call back if able to add any cultural information. 23/10/2020
21/10/2020	Wonnarua Nation Aboriginal Corporation	Laurie Perry	Phone	Laurie Perry said he owned the mission not far from there and had done various work around that area. He said he'd think about it and either call me back or email Geordie if there was any cultural information he could provide. 23/10/2020
21/10/2020	Widescope Indigenous Group	Steven Hickey	Phone	Steven Hickey wasn't available, but DJ spoke to Donna who said she was happy with the existing information in the report, he supported that and didn't have anything to add. I said he could call me back if there was anything else he wanted noted about cultural values in that area. 23/10/2020
21/10/2020	Wattaka Wonnarua CC Service	Des Hickey	Phone	Spoke to Des Hickey, he didn't have anything to add but said he'd think about it and either email or call DJ back if there

Date	RAP	RAP Representative	Contact	Correspondence/Comments
				was anything he could add about cultural values in that area. 23/10/2020
21/10/2020	Lower Hunter Wonnarua Cultural Services	Tommy Miller	Phone	Called Tommy Miller left message as no answer 23/10/2020
21/10/2020	Crimson-Rosie	Jeffrey Mathews	Phone	Called Jeffrey Mathews 23/10 - no answer - left message
21/10/2020	Didge Ngunawal Clan	Paul Boyd	Phone	Notes - called Paul Boyd 21/10/20 - left message. 22/10 - spoke to Lily - she advised Paul was out of range but would be able to call later that afternoon to discuss. Paul called back that afternoon with a brief statement.
21/10/2020	Jarban & Mugrebea	Les Atkinson	Phone	Tried calling Les Atkinson but phone would not connect
21/10/2020	AGA Services	Ashley Sampson	Phone	22/10 - Ash's number went to voice mail. Left message to call back and sent text. Also asked if he had a number for John. 23/10 - called again and left voice message saying if he could share any cultural information to please call back
21/10/2020	Aliera French Trading	Aliera French	Phone	Called Aliera - she said she'd call back later today
21/10/2020	Cacatua Culture Consultants	Donna and George Sampson	Phone	Left message and sent text to Donna and George
21/10/2020	Gidawaa Walang Cultural Heritage Consultancy	NA	Phone	DJ spoke to someone at Gidawaa Walang - they said they'd get the appropriate person to call back
21/10/2020	Murra Bidgee Mullangari Aboriginal Corporation	Darlene Johnson	Phone	Spoke to Darlene - she said she'd call back
21/10/2020	A1 Indigenous Services	Carolyn Hickey	Phone	Carolyn said she'd respond by email by Monday 26/10
21/10/2020	Muragadi Heritage Indigenous Corporation	Jessie Johnson	Email and phone	Email bounced back and mobile number not connected for Muragadi
21/10/2020	Lower Wonnaruah Tribal Consultancy Pty Ltd	Barry Anderson	Phone	Called Barry Anderson 23/10/20 - no answer - left message

Appendix C

Testing Methodology

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.

Geordie Oakes
c/- AECOM Australia Pty Ltd
PO Box Q410, QVB Post Office,
Sydney, NSW 1230
Ph: +61 2 8934 0610
Mob: 0410 513 509
Email: geordie.oakes@aecom.com

We look forward to your participation in the assessment of this project.

Yours faithfully

G.Oakes

Geordie Oakes
Archaeologist
geordie.oakes@aecom.com

Direct Dial: +64 2 89340610
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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.

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

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.

Figure 1 Indicative test pit locations

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Project WOAOW: Cultural Values Report Proposed Methodology

1.0 Introduction

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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).

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3.0 Aboriginal Cultural Landscapes

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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,

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.

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

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

9.0 References

Buggey, S. (1999). *An approach to Aboriginal cultural landscapes*. Historic Sites and Monuments Board of Canada, Ottawa.

Department of Environment, C. C. and W. N. (2010). *FACT SHEET 2 What is an Aboriginal cultural landscape?* Department of Environment, Climate Changeand Water NSW.

ICOMOS (Australia). (2013). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Retrieved from Australia ICOMOS website: http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf

McDonald, R. C., & Isbell, R. F. (2009). Soil Profile. In *Australian Soil and Land Survey Field Handbook* (Third Edit, pp. 147–200). Collingwood: CSIRO Publishing.

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

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

United States Geological Survey. (2015). *U.S. Geological Survey Luminescence Dating Laboratory Optically Stimulated Luminescence (OSL) Sampling Instructions*. U.S. Geological Survey.

Appendix D

RAP Responses to Methodology

Appendix D RAP Responses to Methodology

Oakes, Geordie

From:	cacatua4service@tpg.com.au
Sent:	Friday, 26 June 2020 10:24 AM
To:	Oakes, Geordie
Subject:	[EXTERNAL] Cacatua EOI site officer Bayswater Power Station
Attachments:	Workers compCert of Currency2021.pdf; Business Insurance 2020.gif

Geordie,

Cacatua General Services wish to express an interest in being involved in the test excavations that are proposed for the Bayswater Power station project.

Attached is our insurances as per requirements.

Please do not hesitate to contact Donna on 0403765019 or via email: cacatua4servcie@tpg.com.au if you require and more information.

Cheers
George Sampson

1

Oakes, Geordie

From:	Aliera French Trading <aliera.french.trading@hotmail.com>
Sent:	Monday, 22 June 2020 12:27 PM
To:	Oakes, Geordie
Subject:	[EXTERNAL] Re: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station
Attachments:	2020:2021CERTIFICATE_OF_CURRENCY_-_60375638.pdf; BIZPACK_InsurerCertificateOfCurrency.pdf

Hi Geordie,

How are you going? Well I hope.

Just forwarding Insurances as requested in order for Aliera French Trading to be included on the roster for the upcoming field work pertaining to the Bayswater AGL Project.

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.

Looking forward to working with you again.

Aliera French.

Owner/ Manager
Aliera French Trading

From: Oakes, Geordie <Geordie.Oakes@aecom.com>
Sent: Friday, 19 June 2020 9:40 AM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station

Dear RAP,

AECOM is commissioned by AGL to prepare an 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 participate in the 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.

Oakes, Geordie

From:	cacatua4service@tpg.com.au
Sent:	Friday, 26 June 2020 10:20 AM
To:	Oakes, Geordie
Subject:	[EXTERNAL] AGA Services EOI site officer Bayswater Power Station
Attachments:	Workers Certificate of Currency 2020.pdf; Business Insurance 2020.gif

Geordie,

AGA Services with to express an interest in being involved in the test excavations that are proposed for the Bayswater Power station project.

Attached is our insurances as per requirements.

Please do not hesitate to contact Donna on 0403765019 or via email: cacatua4servcie@tpg.com.au if you require and more information.

Thank you Thank you Thank you
Ashley Sampson Greg Sampson Adam Sampson
Partner Partner Partner

1

Oakes, Geordie

From: Lilly Carroll <didgengunawalclan@yahoo.com.au>
Sent: Friday, 19 June 2020 11:44 AM
To: Oakes, Geordie
Subject: [EXTERNAL] Re: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station
Attachments: image-19-06-20-11-43.png; image-19-06-20-11-43-1.png; image-19-06-20-11-43-2.png

Hi Geordie

DNC would love to work on this project wth you it's been a while good to here from you

Kind regards
Paul Boyd
0426823944

Sent from myMail for iOS

Friday, 19 June 2020, 9:42 am +1000 from Geordie.Oakes@aecom.com <Geordie.Oakes@aecom.com>:

> Dear RAP,
>
> AECOM is commissioned by AGL to prepare an 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 participate in the 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.

Oakes, Geordie

From:	Laurie Perry <l.perry@optusnet.com.au>
Sent:	Saturday, 20 June 2020 8:10 AM
To:	Oakes, Geordie
Subject:	[EXTERNAL] RE: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station

Hi Geordie

I will register WNAC....

Cheers

Laurie Perry
Chief Executive Officer
Wonnarua Nation Aboriginal Corporation
T 02 6571 8595 **M** 0412 593 020 **E** L.Perry@optusnet.com.au
Ground Floor 254 John St Singleton NSW 2330
https://www.wonnarua.org.au
PO BOX 3066 Singleton Delivery Centre 2330

From: Oakes, Geordie
Sent: Friday, 19 June 2020 9:41 AM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station

Dear RAP,

AECOM is commissioned by AGL to prepare an 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 participate in the 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.

All the best,

Geordie

Geordie Oakes

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Oakes, Geordie

From: admin@wanaruahlandcouncil.com.au
Sent: Thursday, 25 June 2020 2:23 PM
To: Oakes, Geordie
Subject: [EXTERNAL] Margaret Matthews - Bayswater Power Station Project
Attachments: Margaret Matthews - Insurence.pdf

Hi Geordie,

Sorry I could not get you on the phone today. Aunty Margaret has asked me to forward you on her details and current insurance.

She was wanting to know if she needed to reregister to the Bayswater Power Station Project as she was a part of it before? If she does she would like to register.

Her phone number is 0421 930 438

Please see attached her current insurance.

Kind Regards

Roz

Rosslyn Thomson
Administration Officer

Wanaruah Local Aboriginal Land Council
PO Box 127
Muswellbrook NSW 2333
Ph: 02 6543 1288
admin@wanaruahlandcouncil.com.au
https://wanaruahlalc.wixsite.com/bindi
https://www.facebook.com/wanaruah.aboriginallandcouncil/

I acknowledge the Traditional Owners of the land I work upon, The Wanaruah People and pay my respects to Elders past, present and future.

Oakes, Geordie

From: Muragadi <muragadi@yahoo.com.au>
Sent: Monday, 29 June 2020 10:39 AM
To: Oakes, Geordie
Subject: [EXTERNAL] RE: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station
Attachments: muragadi workers compensation 2020.pdf; gio muragadi.pdf

Hi Geordie,
I have read the project information and methodology for the above project, I endorse the recommendations made. We would like to be included in the test excavation works, please feel free to contact me if you require further information

Thanks
Anthony Johnson

From: Oakes, Geordie [mailto:Geordie.Oakes@aecom.com]
Sent: Friday, 19 June 2020 9:48 AM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station

Dear RAP,

AECOM is commissioned by AGL to prepare an 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 participate in the 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.

All the best,

Geordie

Geordie Oakes
Principal Heritage Specialist
D +61 2 8934 0610
Geordie.Oakes@aecom.com

AECOM
Level 21, 420 George Street, Sydney, NSW 2000
PO Box Q410, QVB PO, Sydney, NSW, 1230
T +61 2 8934 0000 F +61 2 8934 0001

Oakes, Geordie

From:	WIDESCOPE . <widescope.group@live.com>
Sent:	Thursday, 16 July 2020 3:03 PM
To:	Oakes, Geordie
Subject:	[EXTERNAL] RE: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station
Attachments:	WIG Workers Comp 2019-2020.jpg; WIG Public Liability Insurance 2019.2020 .pdf

Hi Geordie,

Thank you for providing me with the Proposed test excavation and cultural values report methodologies for the project WOAOW Bayswater Power Station

I have reviewed and support the recommendations out line in the draft

I would like to be considered for field work, I am a recognised cultural Knowledge holder with many years of experience in Cultural and heritage work. I have attached copies of Insurances

Regards
Steven Hickey

From: Oakes, Geordie
Sent: Friday, 19 June 2020 9:41 AM
To: Oakes, Geordie
Subject: Proposed test excavation and cultural values report methodologies for project WOAOW Bayswater Power Station

Dear RAP,

AECOM is commissioned by AGL to prepare an 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 participate in the 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.

All the best,

Geordie

Geordie Oakes

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Appendix E

RAP Responses to Draft Report

Appendix E RAP Responses to Draft Report

Oakes, Geordie

From:	Carolyn .H <cazadirect@live.com>
Sent:	Saturday, 7 November 2020 6:34 PM
To:	Oakes, Geordie
Subject:	[EXTERNAL] Re: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

A1 INDIGENOUS SERVICES PTY LTD

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

Hi Geordie,
I have reviewed the document and support the Bayswater Power Station ACHAR.
Kind Regards
Carolyn Hickey

From: Oakes, Geordie <Geordie.Oakes@aecom.com>
Sent: Friday, 30 October 2020 4:34 PM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010*), please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment Report (ACHAR) and Cultural Values Report (CVR) for the Bayswater Power Station WOAOW project for your review. Should you have any cultural values or comments you would like included in the ACHAR or CVR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is **Friday 27 November 2020**.

All the best,
Geordie

Geordie Oakes
Principal Heritage Specialist
D +61 2 8934 0610 M 0410 513 509
Geordie.Oakes@aecom.com

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Level 21, 420 George Street, Sydney, NSW 2000
PO Box Q410, QVB PO, Sydney, NSW, 1230
T 0410 513 509 F +61 2 8934 0001
www.aecom.com

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Oakes, Geordie

From:	Shaun Carroll <Merrigarn@hotmail.com>
Sent:	Wednesday, 18 November 2020 5:02 AM
To:	Oakes, Geordie
Subject:	[EXTERNAL] RE: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

Hi Geordie,
I have read the ACHAR and CVR for the above project, I agree with the recommendations.
Kind regards
Shaun Carroll

Sent from Mail for Windows 10

From: Oakes, Geordie
Sent: Friday, 30 October 2020 4:36 PM
To: Oakes, Geordie
Subject: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)*, please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment Report (ACHAR) and Cultural Values Report (CVR) for the Bayswater Power Station WOAOW project for your review. Should you have any cultural values or comments you would like included in the ACHAR or CVR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is **Friday 27 November 2020**.

All the best,
Geordie

Geordie Oakes
Principal Heritage Specialist
D +61 2 8934 0610 M 0410 513 509
Geordie.Oakes@aecom.com

AECOM
Level 21, 420 George Street, Sydney, NSW 2000
PO Box Q410, QVB PO, Sydney, NSW, 1230
T 0410 513 509 F +61 2 8934 0001
www.aecom.com

Oakes, Geordie

From:	Darleen Johnson <murrabidgeemullangari@yahoo.com.au>
Sent:	Thursday, 5 November 2020 7:53 PM
To:	Oakes, Geordie
Subject:	[EXTERNAL] Re: Bayswater Power Station WOAOW Project – ACHAR and CVR Review
Attachments:	AECOM_DftRpt_WOAOW Project_ACHAR_2020_10_30_Optimized.pdf

Hi Geordie
I have read the project information, ACHAR and CVR for the above project, I endorse the recommendations made.
Kind regards
Darleen Johnson

On Friday, 30 October 2020, 04:39:02 pm AEDT, Oakes, Geordie <geordie.oakes@aecom.com> wrote:

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)*, please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment Report (ACHAR) and Cultural Values Report (CVR) for the Bayswater Power Station WOAOW project for your review. Should you have any cultural values or comments you would like included in the ACHAR or CVR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is **Friday 27 November 2020**.

All the best,

Geordie

Geordie Oakes
Principal Heritage Specialist
D +61 2 8934 0610 M 0410 513 509
Geordie.Oakes@aecom.com

AECOM
Level 21, 420 George Street, Sydney, NSW 2000
PO Box Q410, QVB PO, Sydney, NSW, 1230
T 0410 513 509 F +61 2 8934 0001
www.aecom.com

Oakes, Geordie

From:	WIDESCOPE . <widescope.group@live.com>
Sent:	Monday, 16 November 2020 2:32 PM
To:	Oakes, Geordie
Subject:	[EXTERNAL] Re: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

Widescope Indigenous Group
ABN : 85 534 438 671
Contact : Steven Hickey
Address H/O: 73 Russell St, Emu Plains NSW 2750
E-mail : Widescope.group@live.com
Mobile : 0425 230 693

Hi,
I have reviewed the document and support the ACHAR for Baywater Power Station.
Thank you
Steven Hickey

From: Oakes, Geordie <Geordie.Oakes@aecom.com>
Sent: Friday, 30 October 2020 4:34 PM
To: Oakes, Geordie <Geordie.Oakes@aecom.com>
Subject: Bayswater Power Station WOAOW Project – ACHAR and CVR Review

Dear RAP,

In accordance with Section 4.4.2 of Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)*, please find attached a draft of AECOM's Aboriginal Cultural Heritage Assessment Report (ACHAR) and Cultural Values Report (CVR) for the Bayswater Power Station WOAOW project for your review. Should you have any cultural values or comments you would like included in the ACHAR or CVR please provide those by mail, fax, e-mail or phone to Geordie Oakes via the contact details on this email. Please note that the closing date for comments is **Friday 27 November 2020**.

All the best,
Geordie

Geordie Oakes
Principal Heritage Specialist
D +61 2 8934 0610 M 0410 513 509
Geordie.Oakes@aecom.com

AECOM
Level 21, 420 George Street, Sydney, NSW 2000

Appendix F

Consultation Log

Appendix F Consultation Log

Date	RAP	RAP Representative	Contact	Correspondence/Comments	AECOM Response
19/06/2020	**Methodology sent to RAPs**				
19/06/2020	DNC	Paul Boyd	Email	DNC would love to work on this project with you it's been a while good to here from you.	None required
20/06/2020	Wonnarua Nation Aboriginal Corporation	Laurie Perry	Email	I will register WNAC….	None required
21/06/2020	A1 Indigenous Services	Carolyn Hickey	Email	Provided insurances	None required
22/06/2020	Murrabidgee Mullangari	Ryan Johnson	Email	I have read the project information and methodology, I endorse the recommendations made	None required
22/06/2020	Aliera French trading	Aliera French	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
21/06/2020	A1 Indigenous Services	Carolyn Hickey	Email	I have reviewed the information and support the Methodology.	None required
20/06/2020	Wonnarua Nation Aboriginal Corporation	Laurie Perry	Email	I will register WNAC….	None required
25/06/2020	WLALC	Rosslyn Thomson	Email	Provided insurance details for Margaret Matthews and registering her interest	GO emailed back confirming receipt
26/06/2020	AGA	not provided	Email	Both AGA and Cacatua agree with the methodologies and the information that was supplied.	None required
26/06/2020	Cacatua	not provided	Email	Both AGA and Cacatua agree with the methodologies and the information that was supplied.	None required
29/06/2020	Muragadi	Anthony Johnson	Email	I have read the project information and methodology for the above project, I endorse the recommendations made	None required

16/07/2020	Widescope	Steven Hickey	Email	I have reviewed and support the recommendations out line in the draft	None required
21/10/2020	**CVR Consultation**				
21/10/2020	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Phone	DJ spoke to Marilyn Carroll-Johnson 23/10/20 - she stated she didn't have anything to add regarding the cultural values of the Bayswater PowerStation that hadn't already been captured (agreed with sites, water courses and elevated areas having cultural sensitivity).	21/10/2020
21/10/2020	Nunawanna Aboriginal Corporation	Colin Ahoy	Email	No response	21/10/2020
21/10/2020	Hunter Valley Cultural Surveying	Luke Hickey	Phone	Phone doesn't connect	21/10/2020
21/10/2020	WLALC	Noel Downs	Phone	Noel Downs - 6543 1288 - stated he is unavailable until Friday 30 October 2020 and asked to be called back at 1pm on that date. He asked if we had called a community meeting with all community members to discuss this. DJ said I had been calling people individually and asked if he was happy to discuss cultural values by phone in that way, he said he was but was too busy to talk about it until next Friday at 1pm. Called on Friday 30 October 2020 and was told Noel was on leave. Jean Hands stated she had no comments but would review the report when it came.	21/10/2020
21/10/2020	Merrigarn Indigenous Corporation	Shaun Carroll	Phone	Called Shaun Carroll but no response 23/10/20	21/10/2020
21/10/2020	Yinarr Cultural Services	Kathleen Steward Kinchela	Phone	Called Kathleen Steward Kinchela but no answer - left a message to call back if able to add any cultural information. 23/10/2020	21/10/2020
21/10/2020	Wonnarua Nation Aboriginal Corporation	Laurie Perry	Phone	Laurie Perry said he owned the mission not far from there and had done various work around that area. He said he'd think about it and either call me back or email Geordie if there was any cultural information he could provide. 23/10/2020	21/10/2020
21/10/2020	Widescope Indigenous Group	Steven Hickey	Phone	Steven Hickey wasn't available, but DJ spoke to Donna who said she was happy with the existing information in the report, he supported that and didn't have anything to add. I said he could call me back if there was anything else he wanted noted about cultural values in that area. 23/10/2020	21/10/2020

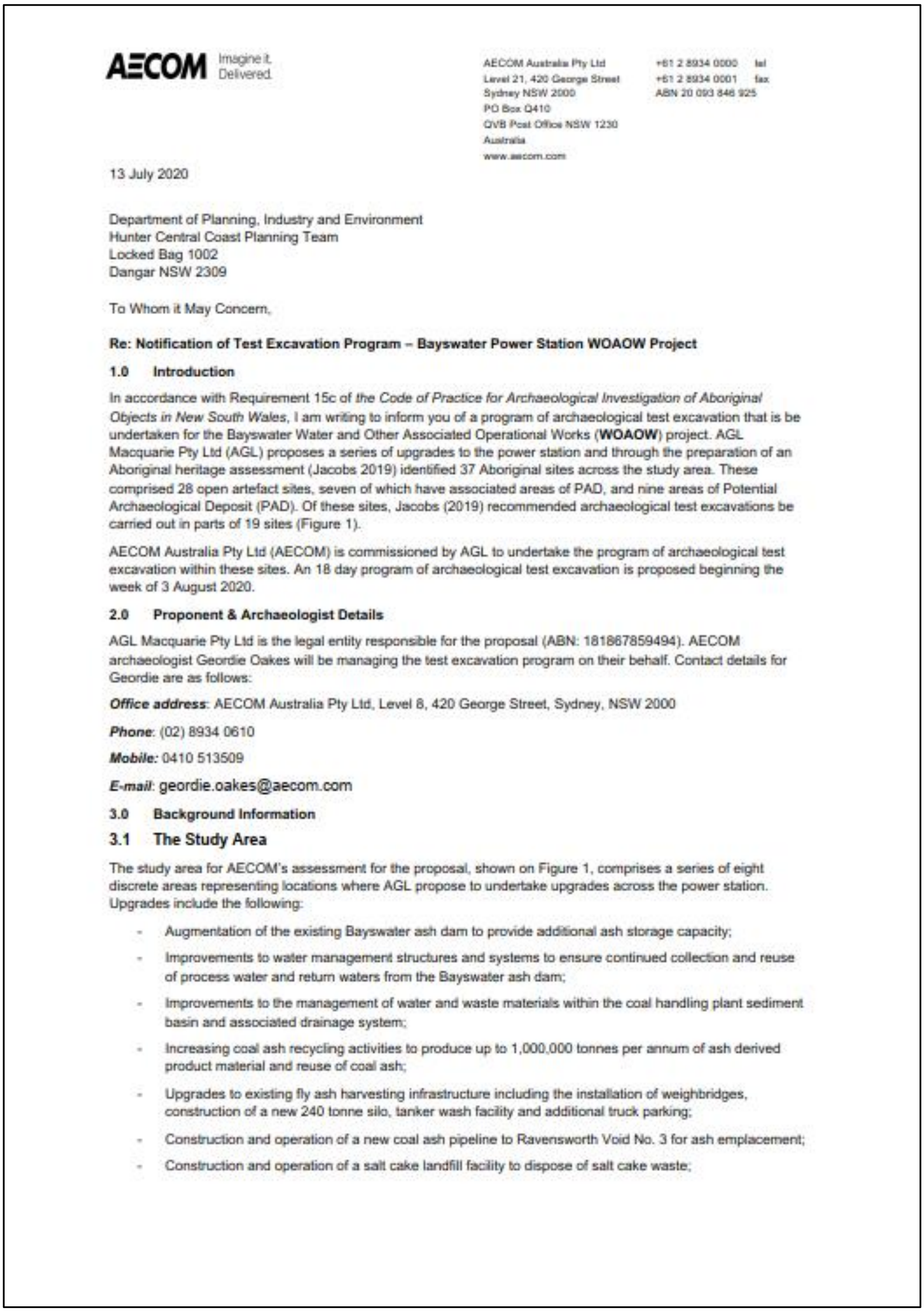
21/10/2020	Wattaka Wonnarua CC Service	Des Hickey	Phone	Spoke to Des Hickey, he didn't have anything to add but said he'd think about it and either email or call DJ back if there was anything he could add about cultural values in that area. 23/10/2020	21/10/2020
21/10/2020	Lower Hunter Wonnarua Cultural Services	Tommy Miller	Phone	Called Tommy Miller left message as no answer 23/10/2020	21/10/2020
21/10/2020	Crimson-Rosie	Jeffrey Mathews	Phone	Called Jeffrey Mathews 23/10 - no answer - left message	21/10/2020
21/10/2020	Didge Ngunawal Clan	Paul Boyd	Phone	Notes - called Paul Boyd 21/10/20 - left message. 22/10 - spoke to Lily - she advised Paul was out of range but would be able to call later that afternoon to discuss. Paul called back that afternoon with a brief statement.	21/10/2020
21/10/2020	Jarban & Mugrebea	Les Atkinson	Phone	Tried calling Les Atkinson but phone would not connect	21/10/2020
21/10/2020	AGA Services	Ashley Sampson	Phone	22/10 - Ash's number went to voice mail. Left message to call back and sent text. Also asked if he had a number for John. 23/10 - called again and left voice message saying if he could share any cultural information to please call back	21/10/2020
21/10/2020	Aliera French Trading	Aliera French	Phone	Called Aliera - she said she'd call back later today	21/10/2020
21/10/2020	Cacatua Culture Consultants	Donna and George Sampson	Phone	Left message and sent text to Donna and George	21/10/2020
21/10/2020	Gidawaa Walang Cultural Heritage Consultancy	NA	Phone	DJ spoke to someone at Gidawaa Walang - they said they'd get the appropriate person to call back	21/10/2020
21/10/2020	Murra Bidgee Mullangari Aboriginal Corporation	Darlene Johnson	Phone	Spoke to Darlene - she said she'd call back	21/10/2020
21/10/2020	A1 Indigenous Services	Carolyn Hickey	Phone	Carolyn said she'd respond by email by Monday 26/10	21/10/2020
21/10/2020	Muragadi Heritage Indigenous Corporation	Jessie Johnson	Email and phone	Email bounced back and mobile number not connected for Muragadi	21/10/2020

21/10/2020	Lower Wonnaruah Tribal Consultancy Pty Ltd	Barry Anderson	Phone	Called Barry Anderson 23/10/20 - no answer - left message	21/10/2020
30/10/2020	**Draft ACHAR and CVR sent to RAPs**				
5/11/2020	Murrabidgee Mullangari	Darleen Johnson	Email	I have read the project information, ACHAR and CVR for the above project, I endorse the recommendations made.	None required
6/11/2020	Tocomwall	Scott Franks	Phone	Notified AECOM that there was a Section 10 protection order over some of the study area.	None required
7/11/2020	A1 Indigenous Services	Carolyn Hickey	Email	I have reviewed the document and support the Bayswater Power Station ACHAR.	None required
16/11/2020	Widescope	Steven Hickey	Email	I have reviewed the document and support the ACHAR for Baywater Power Station.	None required
18/11/2020	Merrigarn	Shaun Carroll	Email	I have read the ACHAR and CVR for the above project, I agree with the recommendations.	None required

Appendix G

Testing Notification

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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Figure 1 Study area

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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

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,

G. Oakes

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

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Appendix H

Test Pit Data

Size	50cmx50cm
Test Pit Number	1
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	44
Spit Size (cm)	10
Number of Spits	5
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	21
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Abundant
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	O horizon - very high organic content. May be artificial. TP located next to earthwork cut.
Boundary	

Spit - 2. 21

Spit Number	2
Top (cm)	21
Bottom (cm)	44
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 3. 44

Spit Number	3
Top (cm)	44
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

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Size	50cmx50cm
Test Pit Number	2
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	35
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	35
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Spit - 3. 35

Spit Number	3
Top (cm)	35
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	4
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	37
Spit Size (cm)	10
Number of Spits	4
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Very sandy loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	37
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Light, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 37

Spit Number	3
Top (cm)	37
Bottom (cm)	
Soil Texture	Sandy Clay
Moisture	Dry
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	5
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Overbank deposit?
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Same as layer above. TP terminated early.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	6
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	29
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	21
Top (cm)	0
Bottom (cm)	2
Soil Texture	Sandy Loam, O horizon
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 2

Spit Number	2
Top (cm)	2
Bottom (cm)	29
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 29

Spit Number	3
Top (cm)	29
Bottom (cm)	
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	7
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	2
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	O horizon
Boundary	

Spit - 2. 2

Spit Number	2
Top (cm)	2
Bottom (cm)	12
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 12

Spit Number	3
Top (cm)	12
Bottom (cm)	
Soil Texture	Sandy Clay
Moisture	Dry
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	8
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	70
Spit Size (cm)	10
Number of Spits	7
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	70
Soil Texture	Sand, Very fine sand
Moisture	Dry
Colour	Greyish brown to brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Top 20 cm darker. Tp has been excavated in soil stockpile. Artificial.
Boundary	

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Photos

Size	50cmx50cm
Test Pit Number	9
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	65
Spit Size (cm)	10
Number of Spits	7
Comments	TP adjacent to Bayswater Creek

Spit (4 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	3
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	O horizon
Boundary	

Spit - 2. 3

Spit Number	
Top (cm)	3
Bottom (cm)	17
Soil Texture	Loamy Sand
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	Few

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Spit Comments	
Boundary	

Spit - 3. 17

Spit Number	
Top (cm)	17
Bottom (cm)	65
Soil Texture	Loamy Sand
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 4. 65

Spit Number	4
Top (cm)	65
Bottom (cm)	
Soil Texture	Loamy Sand
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	As per spit above
Boundary	

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Size	50cmx50cm
Test Pit Number	11
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	33
Spit Size (cm)	10
Number of Spits	4
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	3
Soil Texture	O horizon, organic mat
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 3

Spit Number	2
Top (cm)	3
Bottom (cm)	33
Soil Texture	Silty Loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 3. 33

Spit Number	3
Top (cm)	33
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	12
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	36
Spit Size (cm)	10
Number of Spits	4
Comments	

Spit (4 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	6
Soil Texture	O horizon - organic mat
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 6

Spit Number	2
Top (cm)	6
Bottom (cm)	23
Soil Texture	Silty Loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 23

Spit Number	3
Top (cm)	23
Bottom (cm)	36
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 4. 36

Spit Number	3
Top (cm)	36
Bottom (cm)	
Soil Texture	Sandy Loam, Shale bedrock
Moisture	Dry
Colour	Pink
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	13
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	25
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	3
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	O Horizon - organic rich mat
Boundary	

Spit - 2. 3

Spit Number	2
Top (cm)	3
Bottom (cm)	25
Soil Texture	Silty Loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 25

Spit Number	3
Top (cm)	25
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	14
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	3
Comments	TP on slope.

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	4
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Abundant
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	High organic content
Boundary	

Spit - 2. 4

Spit Number	2
Top (cm)	4
Bottom (cm)	22
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Light, Grey
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Spit - 3. 22

Spit Number	3
Top (cm)	22
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	15
Date	August 21, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	16
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	3
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Dark, Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 3

Spit Number	2
Top (cm)	3
Bottom (cm)	10
Soil Texture	Sandy Clay
Moisture	Dry
Colour	Brown, Yellow
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Saprolite?
Boundary	

Spit - 3. 10

Spit Number	3
Top (cm)	10
Bottom (cm)	
Soil Texture	Sandy Clay
Moisture	Dry
Colour	Brown, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Saprolite. Two large sandstone floaters in base of pit.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	17
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	TP located in artificial contour drain

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Same as layer above.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	26
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	27
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	33
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	33
Soil Texture	Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Spit - 2. 33

Spit Number	2
Top (cm)	33
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	28
Date	August 11, 2020
Excavator	Lw
Recorder	Go B
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	29
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Clay Loam
Moisture	Moist
Colour	Black
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Black
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	30
Date	August 11, 2020
Excavator	Lw
Recorder	Go B
Max Depth (cm)	59
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	29
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 26

Spit Number	2
Top (cm)	26
Bottom (cm)	59
Soil Texture	Silty Clay, Clay
Moisture	Dry
Colour	Brown, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	20-50 mm

Spit - 3. 59

Spit Number	3
Top (cm)	59
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	31
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	22
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Black
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 22

Spit Number	2
Top (cm)	22
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	32
Date	August 11, 2020
Excavator	
Recorder	Go B
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Black
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	33
Date	August 11, 2020
Excavator	Lw
Recorder	Go B
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Clay
Moisture	Moist
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	34
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown, Light
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	35
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	1
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	36
Date	August 11, 2020
Excavator	Dj
Recorder	Go B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	37
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	5
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	5
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Dark, Greyish brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 5

Spit Number	
Top (cm)	5
Bottom (cm)	
Soil Texture	Clay Loam
Moisture	Moist
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	38
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	1
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	39
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	40
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	41
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 15

Spit Number	
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	1mx1m
Test Pit Number	44
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	45
Date	August 11, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Wet
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	Few
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	46
Date	August 11, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Yellow, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	47
Date	August 11, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	47
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	11
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	48
Date	August 11, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Yellow
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	48
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	49
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	50
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Yellow, Brown, Other
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	55
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	6
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	6
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 6

Spit Number	2
Top (cm)	6
Bottom (cm)	
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	1mx1m
Test Pit Number	56
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	58
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Yellow, Dark, Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc
Boundary	

Photos

Size	1mx1m
Test Pit Number	59
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

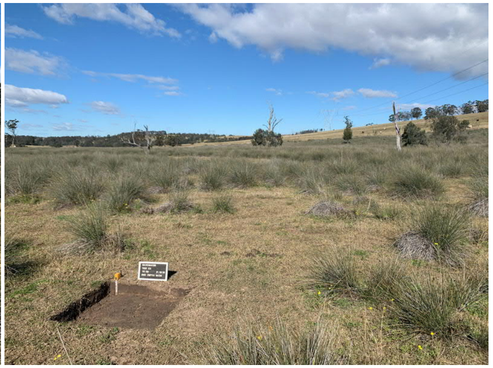
Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Grey, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Yellow, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos



Size	50cmx50cm
Test Pit Number	63
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

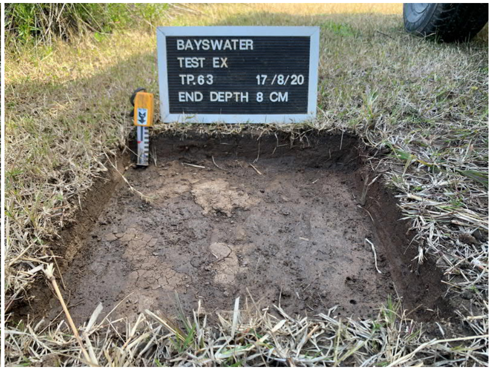
Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos



Size	50cmx50cm
Test Pit Number	64
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	7
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	10
Soil Texture	Clay
Moisture	Moist
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	65
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	4
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	4
Soil Texture	Clay, Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark, Mottled, Red, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Cattle have trampled area. Horizon appears to be a mix of topsoil and subsoil. Disturbed.
Boundary	

Spit - 2. 4

Spit Number	2
Top (cm)	4
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Mottled, Grey, Red, Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	66
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown, Mottled, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	68
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	10
Soil Texture	Clay
Moisture	Moist
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	69
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Salt staining
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	72
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	7
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Yellow, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	73
Date	August 17, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	24
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	24
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 24

Spit Number	2
Top (cm)	24
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	82
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	84
Date	August 11, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	36
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	36
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 36

Spit Number	2
Top (cm)	36
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	85
Date	August 11, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	86
Date	August 11, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	36
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	36
Soil Texture	Sandy Clay Loam
Moisture	Wet
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 36

Spit Number	2
Top (cm)	36
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	87
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	24
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	24
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	24
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	88
Date	August 11, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	28
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	28
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 28

Spit Number	2
Top (cm)	28
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	105
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Light
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	109
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Orange
Roots	Common
Gravel	Abundant
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	111
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	112
Date	
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	113
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Brown, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	114
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	115
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Grey, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	116
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	117
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	21
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	21
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 21

Spit Number	2
Top (cm)	21
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	118
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	1mx1m
Test Pit Number	119
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	120
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	28
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	28
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 28

Spit Number	2
Top (cm)	28
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	121
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	122
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	123
Date	August 18, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	21
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	21
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 21

Spit Number	3
Top (cm)	21
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	124
Date	August 7, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	125
Date	August 7, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	43
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	43
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark, Light
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	>100 mm

Spit - 2. 43

Spit Number	2
Top (cm)	43
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Light
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	126
Date	August 7, 2020
Excavator	
Recorder	Go
Max Depth (cm)	38
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	33
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Light, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 33

Spit Number	2
Top (cm)	33
Bottom (cm)	38
Soil Texture	Clay Loam
Moisture	Dry
Colour	Brown, Light
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	127
Date	August 14, 2020
Excavator	
Recorder	Go
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Wet
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Silty Clay, Clay
Moisture	Wet
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	128
Date	August 14, 2020
Excavator	
Recorder	Go
Max Depth (cm)	23
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	23
Soil Texture	Silty Clay Loam
Moisture	Wet
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 23

Spit Number	2
Top (cm)	23
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	129
Date	August 7, 2020
Excavator	
Recorder	Go
Max Depth (cm)	21
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	21
Soil Texture	Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 21

Spit Number	2
Top (cm)	21
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	132
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Clay Loam
Moisture	Wet
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	132
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	1mx1m
Test Pit Number	134
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay, Silty Clay
Moisture	Moist
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	135
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	136
Date	August 14, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	137
Date	August 14, 2020
Excavator	
Recorder	Go
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Wet
Colour	Brown, Light, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	138
Date	August 14, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	23
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	23
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Light, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 23

Spit Number	2
Top (cm)	23
Bottom (cm)	
Soil Texture	Clay
Moisture	Wet
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	139
Date	August 14, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	139
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay, Silty Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	140
Date	August 7, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	38
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	38
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Black
Roots	Few
Gravel	None
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 38

Spit Number	
Top (cm)	38
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	147
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	TP located on side of unsealed vehicle track. Vegetation suggests gross disturbance in this area.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Mottled, Yellow
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Mottled, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None

Insects	None
Spit Comments	Same as layer above
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	149
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	150
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	29
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	29
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 29

Spit Number	2
Top (cm)	29
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	154
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 14

Spit Number	
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	155
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	0
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	159
Date	August 10, 2020
Excavator	
Recorder	Go
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	17
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Light, Dark
Roots	Few
Gravel	None
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay, Silty Clay
Moisture	Moist
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	160
Date	August 10, 2020
Excavator	
Recorder	Go
Max Depth (cm)	6
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	6
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 6

Spit Number	2
Top (cm)	6
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	162
Date	August 10, 2020
Excavator	
Recorder	Go
Max Depth (cm)	6
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	6
Soil Texture	Silty Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 6

Spit Number	2
Top (cm)	6
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	163
Date	August 10, 2020
Excavator	
Recorder	Go
Max Depth (cm)	11
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Silty Clay
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	164
Date	August 10, 2020
Excavator	
Recorder	Go
Max Depth (cm)	5
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	5
Soil Texture	Silty Clay
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 5

Spit Number	2
Top (cm)	5
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	165
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	166
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Slopewash
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	167
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	Common
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	168
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	29
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	29
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 29

Spit Number	2
Top (cm)	29
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	169
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	170
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	7
Spit Size (cm)	10
Number of Spits	1
Comments	TP located on western edge of unsealed vehicle track. Steep slope. No Topsoil.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Same as layer above
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	171
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	172
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Clay
Moisture	Dry
Colour	Mottled, Grey, Reddish brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Mottled, Grey, Reddish brown
Roots	None
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Same as layer above
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	173
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, White, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	174
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	26
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	26
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 26

Spit Number	2
Top (cm)	26
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	175
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	17
Soil Texture	Clay
Moisture	Dry
Colour	Mottled, Grey, Reddish brown
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Mottled, Grey, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc. Same as layer above.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	176
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	7
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Looks like slopewash veneer. TP located in saddle. Sediment “pooling”.
Boundary	

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	177
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	17
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	178
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	11
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Silty Loam
Moisture	Dry
Colour	Light, Orange brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Suspect slopewash
Boundary	

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	179
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	180
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	181
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	182
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Loam
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	183
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 9

Spit Number	2
Top (cm)	9
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	184
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	11
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	185
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	22
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 22

Spit Number	2
Top (cm)	22
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	186
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	187
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	188
Date	August 7, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	189
Date	August 12, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	190
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	11
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	11
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 11

Spit Number	2
Top (cm)	11
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	191
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	1
Spit Size (cm)	10
Number of Spits	1
Comments	TP located in erosion scour. Topsoil has been removed. Thin veneer of slopewash present. No surface artefacts noted in surrounding scour.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	1
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Slopewash. Abundant ironstone gravel lag on and within.
Boundary	

Spit - 2. 1

Spit Number	2
Top (cm)	1
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None

Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	192
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	5
Spit Size (cm)	10
Number of Spits	1
Comments	TP located on edge of erosion scour

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	5
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Slopewash. Abundant ironstone gravels on and within.
Boundary	

Spit - 2. 5

Spit Number	2
Top (cm)	5
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	193
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	194
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	TP located on southern side of artificial channel, at base of drag. slope. Suspect severely disturbed.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None

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Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	196
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	TP located at base of dam bank

Spit (3 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	2
Soil Texture	Silty Loam
Moisture	Dry
Colour	Greyish brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 2

Spit Number	2
Top (cm)	2
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Spit - 3. 10

Spit Number	3
Top (cm)	10
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc. Same as layer above.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	197
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	198
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	Few
Earthworms	None
Insects	Few
Spit Comments	
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	202
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 20

Spit Number	2
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	203
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	204
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	TP located in drainage depression. Extensive evidence of cattle trampling in vicinity.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc. Same as layer above. Pit deeper on eastern side.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	206
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	2
Spit Size (cm)	10
Number of Spits	1
Comments	TP located in erosion scald. No topsoil remaining. Thin veneer of slopewash including gravel lag.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	2
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	Abundant
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Thin veneer of slope wash
Boundary	

Spit - 2. 2

Spit Number	
Top (cm)	2
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None

Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	207
Date	August 6, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	2
Comments	TP next to large scour with ant nest. No surface artefacts noted in scour.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 12

Spit Number	2
Top (cm)	12
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Dark, Reddish brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	208
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay
Moisture	Moist
Colour	Brown, Black
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	209
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	210
Date	August 4, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	20
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

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Size	50cmx50cm
Test Pit Number	211
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	212
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Grey
Roots	None
Gravel	Few
Charcoal	Few
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Spit - 2. 15

Spit Number	
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	213
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	214
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	19
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	215
Date	August 4, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	218
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Moist, Dry
Colour	Brown, Grey
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	219
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	220
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	221
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	17
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Light
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	222
Date	August 4, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	12
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	12
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Photos

Size	50cmx50cm
Test Pit Number	224
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	225
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	26
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Black
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 26

Spit Number	2
Top (cm)	26
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	226
Date	August 5, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	7
Spit Size (cm)	
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	7
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Spit - 2. 7

Spit Number	2
Top (cm)	7
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	229
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	230
Date	August 5, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	17
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	231
Date	August 4, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	233
Date	August 4, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	27
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	234
Date	August 4, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	26
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Clay Loam
Moisture	Moist
Colour	Brown, Light, Mottled
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	1mx1m
Test Pit Number	TP234 Exp
Date	August 13, 2020
Excavator	LW
Recorder	LW
Max Depth (cm)	26
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	25
Soil Texture	Silty Clay Loam
Moisture	Moist, Wet
Colour	Brown
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 23

Spit Number	2
Top (cm)	23
Bottom (cm)	26
Soil Texture	Silty Clay
Moisture	Dry
Colour	Red, Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	235
Date	August 4, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	21
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	21
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Photos

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Size	50cmx50cm
Test Pit Number	236
Date	August 4, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown, Dark
Roots	Abundant
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	238
Date	August 5, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	58
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	58
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Photos

Size	50cmx50cm
Test Pit Number	239
Date	August 5, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	240
Date	August 5, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	22
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 22

Spit Number	2
Top (cm)	22
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	241
Date	August 5, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Red
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexcavated
Boundary	

Photos

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Size	1mx1m
Test Pit Number	TP241 Exp.
Date	August 13, 2020
Excavator	DJ
Recorder	Luke Wolfe
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Loam, Silty Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Red, Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	242
Date	August 4, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	15
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Photos

Size	50cmx50cm
Test Pit Number	243
Date	August 4, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Photos

Size	50cmx50cm
Test Pit Number	244
Date	August 4, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Photos

Size	50cmx50cm
Test Pit Number	245
Date	August 4, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	9
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	9
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Photos

Size	50cmx50cm
Test Pit Number	246
Date	August 4, 2020
Excavator	Am
Recorder	Go
Max Depth (cm)	41
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	41
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Photos

Size	50cmx50cm
Test Pit Number	247
Date	August 4, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	22
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown, Red
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Photos

Size	50cmx50cm
Test Pit Number	248
Date	August 4, 2020
Excavator	Go
Recorder	Go
Max Depth (cm)	36
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	36
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	249
Date	August 4, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	30
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	30
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Photos

Size	50cmx50cm
Test Pit Number	250
Date	August 4, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	24
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	24
Soil Texture	Sandy Clay Loam
Moisture	Moist
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Photos

Size	50cmx50cm
Test Pit Number	251
Date	September 24, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	17
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	17
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	50-100 mm

Spit - 2. 17

Spit Number	2
Top (cm)	17
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	252
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	4
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 4

Spit Number	2
Top (cm)	4
Bottom (cm)	8
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Spit - 3. 8

Spit Number	3
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	253
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	29
Spit Size (cm)	10
Number of Spits	3
Comments	TP located on roadside bund. Grossly disturbed.

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	26
Soil Texture	Fill - silty loam
Moisture	Dry
Colour	Brown, Mottled, Grey
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 29

Spit Number	2
Top (cm)	29
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	254
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Loam, Fill
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	255
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren - B
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown, Dark, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	256
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	2
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 2

Spit Number	2
Top (cm)	2
Bottom (cm)	8
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Mottled, Yellow, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Spit - 3. 8

Spit Number	3
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Mottled, Yellow, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	As per layer above
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	257
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	36
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (3 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	36
Soil Texture	Very fine sandy loam
Moisture	Dry
Colour	Yellowish Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Spit - 3. 36

Spit Number	3
Top (cm)	36
Bottom (cm)	10
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	258
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	14
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 14

Spit Number	2
Top (cm)	14
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Black
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	259
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	29
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	29
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Abundant
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 29

Spit Number	2
Top (cm)	29
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Grey, Mottled, Yellow
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	263
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Red, Dark
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	264
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	23
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	23
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 23

Spit Number	2
Top (cm)	23
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	265
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 8

Spit Number	2
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	267
Date	August 19, 2020
Excavator	
Recorder	Andy McLaren
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Sandy Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	2
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark, Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unexc.
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	271
Date	
Excavator	
Recorder	13
Max Depth (cm)	
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Fill
Moisture	
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Light
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	272
Date	September 24, 2020
Excavator	
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 19

Spit Number	
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	273
Date	September 24, 2020
Excavator	Lw
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 13

Spit Number	
Top (cm)	13
Bottom (cm)	
Soil Texture	Sandy Loam, Clay
Moisture	Dry
Colour	Brown, Red
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	274
Date	September 24, 2020
Excavator	La
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 13

Spit Number	
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	275
Date	September 24, 2020
Excavator	Lw
Recorder	Go
Max Depth (cm)	28
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Sandstone gravel
Boundary	20-50 mm

Spit - 2. 20

Spit Number	
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	276
Date	September 24, 2020
Excavator	La
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Sandy Clay Loam
Moisture	Dry
Colour	Brown, Dark
Roots	Common
Gravel	Abundant
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Rubble at base
Boundary	

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	277
Date	September 24, 2020
Excavator	Lw
Recorder	Go
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Spit - 2. 13

Spit Number	
Top (cm)	13
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	279
Date	September 24, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Dark
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	280
Date	September 24, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	281
Date	September 24, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	19
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 19

Spit Number	2
Top (cm)	19
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	282
Date	September 24, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 10

Spit Number	
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	283
Date	September 23, 2020
Excavator	Darran Jordan
Recorder	Geordie Oakes
Max Depth (cm)	13
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	13
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 0

Spit Number	2
Top (cm)	0
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	284
Date	September 24, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	16
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Orange, Yellow
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 16

Spit Number	2
Top (cm)	16
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	Unex
Boundary	

Photos

Size	1mx1m
Test Pit Number	285
Date	September 22, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Photos

Size	50cmx50cm
Test Pit Number	286
Date	September 22, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Photos

Size	50cmx50cm
Test Pit Number	287
Date	September 25, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	4
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	4
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 4

Spit Number	2
Top (cm)	4
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	288
Date	September 25, 2020
Excavator	
Recorder	Perri Braithwaite
Max Depth (cm)	
Spit Size (cm)	10
Number of Spits	
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	289
Date	September 25, 2020
Excavator	
Recorder	Perri Braithwaite
Max Depth (cm)	
Spit Size (cm)	10
Number of Spits	
Comments	Clay from surface

Spit

Photos

Size	50cmx50cm
Test Pit Number	295
Date	September 25, 2020
Excavator	Ja
Recorder	Perri Braithwaite
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	297
Date	September 25, 2020
Excavator	
Recorder	Perri Braithwaite
Max Depth (cm)	7
Spit Size (cm)	10
Number of Spits	
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	299
Date	September 25, 2020
Excavator	
Recorder	Perri Braithwaite
Max Depth (cm)	16
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Photos

Size	50cmx50cm
Test Pit Number	300
Date	September 25, 2020
Excavator	Dj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (1 Item)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	306
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	307
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	308
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	3
Spit Size (cm)	10
Number of Spits	1
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	309
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	38
Spit Size (cm)	10
Number of Spits	4
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	310
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	22
Spit Size (cm)	10
Number of Spits	
Comments	

Spit

Photos

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Size	50cmx50cm
Test Pit Number	311
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	21
Spit Size (cm)	10
Number of Spits	
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	312
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	31
Spit Size (cm)	10
Number of Spits	4
Comments	Disturbed fill

Spit

Photos

Size	50cmx50cm
Test Pit Number	313
Date	September 25, 2020
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	30
Spit Size (cm)	10
Number of Spits	
Comments	Disturbed fill

Spit

Photos

Size	50cmx50cm
Test Pit Number	314
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	14
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	315
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	25
Spit Size (cm)	10
Number of Spits	3
Comments	

Spit

Photos

Size	50cmx50cm
Test Pit Number	316
Date	September 25, 2020
Excavator	Rj
Recorder	Geordie Oakes
Max Depth (cm)	49
Spit Size (cm)	10
Number of Spits	5
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	49
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 0

Spit Number	
Top (cm)	0
Bottom (cm)	10
Soil Texture	Clay
Moisture	Dry
Colour	Red
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	317
Date	September 25, 2020
Excavator	Rj
Recorder	Geordie Oakes
Max Depth (cm)	27
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	27
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	Few
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 27

Spit Number	
Top (cm)	27
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	318
Date	September 25, 2020
Excavator	Rj
Recorder	Geordie Oakes
Max Depth (cm)	20
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	20
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 20

Spit Number	
Top (cm)	20
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	319
Date	September 25, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

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Spit Comments	
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	320
Date	September 25, 2020
Excavator	Rj
Recorder	Geordie Oakes
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	Disturbed mottled

Spit

Photos

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Size	50cmx50cm
Test Pit Number	321
Date	September 25, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	18
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	18
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 18

Spit Number	2
Top (cm)	18
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	322
Date	September 25, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	6
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	6
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Common
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Spit - 2. 6

Spit Number	
Top (cm)	6
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	323
Date	September 25, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	10
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	10
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5-20 mm

Spit - 2. 10

Spit Number	2
Top (cm)	10
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	324
Date	September 25, 2020
Excavator	Ja
Recorder	Go
Max Depth (cm)	15
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	
Top (cm)	0
Bottom (cm)	15
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 15

Spit Number	2
Top (cm)	15
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

Size	50cmx50cm
Test Pit Number	325
Date	September 25, 2020
Excavator	Sc
Recorder	Go
Max Depth (cm)	8
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	8
Soil Texture	Silty Clay Loam
Moisture	Dry
Colour	Brown
Roots	Few
Gravel	None
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	5 mm

Spit - 2. 8

Spit Number	
Top (cm)	8
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	None
Gravel	None
Charcoal	None
Earthworms	None
Insects	None

Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	326
Date	September 25, 2020
Excavator	Rj
Recorder	Go
Max Depth (cm)	25
Spit Size (cm)	10
Number of Spits	
Comments	

Spit (2 Items)

Spit - 1. 0

Spit Number	1
Top (cm)	0
Bottom (cm)	25
Soil Texture	Silty Loam
Moisture	Dry
Colour	Brown, Grey
Roots	Common
Gravel	Common
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	
Boundary	20-50 mm

Spit - 2. 25

Spit Number	2
Top (cm)	25
Bottom (cm)	
Soil Texture	Clay
Moisture	Dry
Colour	Brown, Orange
Roots	Few
Gravel	Abundant
Charcoal	None
Earthworms	None
Insects	None
Spit Comments	Unex
Boundary	

Photos

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Size	50cmx50cm
Test Pit Number	327
Date	
Excavator	
Recorder	Geordie Oakes
Max Depth (cm)	19
Spit Size (cm)	10
Number of Spits	2
Comments	

Spit

Photos

Appendix I

Lithics

Appendix I 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	DF SO	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
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
34	BAYS AS and PAD15	132D	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	135B	0-10	2	Heat shatter	Silcrete	N	RP	N	N	Y	2.4	20.1										
36	BAYS AS and PAD15	135B	10-20	2	Heat shatter	S.tuff	N	N	Y	N	Y	1.47	35.2										
37	BAYS AS and PAD15	135B	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	135B	10-20	2	Flake shatter	S.tuff	Y	BR	Y	N	N	0.68	22										
39	BAYS AS and PAD15	135C	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	135C	10-20	2	Flake shatter	Silcrete	N	P	Y	N	N	0.14	7.3										
41	BAYS AS and PAD15	135C	10-20	2	Flake shatter	FGS	N	GB	Y	N	N	0.94	16.9										
42	BAYS AS and PAD15	135C	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	135C	10-20	2	Bondi point	S.tuff	N	Be	N	N	N	1.3	21.6										

44	BAYS AS and PAD15	135D	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	135D	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	135D	10-20	2	Flake shatter	Silcrete	N	P	Y	N	N	0.15	8.7										
47	BAYS AS and PAD15	135D	10-20	2	Elouera	S.tuff	N	BeP	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	241B	10-20	2	Split flake	S.tuff	Y	B	N	N	N	1	20.1										
50	37-2-0556	241B	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	241B	10-20	2	Angular shatter	Quartz	N	W	N	N	N	0.17	8.1										
52	37-2-0556	241B	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	241B	0-10	2	Flake shatter	S.tuff	N	YR	N	N	N	0.06	11.03										
54	37-2-0556	241B	0-10	2	Angular shatter	S.tuff	Y	B	N	N	N	0.51	14.4										
55	37-2-0556	241C	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	241C	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	241C	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	241C	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	241C	10-20	2	Proximal flake	Silcrete	N	P	Y	N	N	0.22	12.1				Single	N	na	na			

60	37-2-0556	241C	10-20	2	Flake shatter	S.tuff	N	Y	N	N	N	0.35	14.4										
61	37-2-0556	241C	10-20	2	Angular shatter	Quartz	N	W	N	N	N	0.09	8.2										
62	BAYS AS and PAD02	245B	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	280D	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	281B	0-10	2	Flake shatter	S.tuff	Y	YB	N	N	N	1.4	27.4										
67	37-2-0556	281D	0-10	2	Angular shatter	Silcrete	N	RP	Y	N	N	0.18	11.6										
68	37-2-0555	283B	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
69	37-2-0555	283B	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	283B	0-10	2	Flake shatter	Quartz	Y	W	N	N	N	0.25	11.8										
71	37-2-0555	283C	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	59 C	10 - 20	2	Flake shatter	S.tu ff	N	B	N	N	Y	17.9	41.9										
78	BAYS PAD16	59 C	0- 10	2	Flake shatter	S.tu ff	N	B	N	N	Y	14.4	45.4										
79	BAYS PAD16	59 C	0- 10	2	Flake shatter	Silcr ete	N	YR	N	N	N	0.83	18.3										
80	BAYS PAD16	59 C	0- 10	2	Heat shatter	S.tu ff	N	B	N	N	N	0.85	13.3										
81	BAYS PAD16	59 D	10 - 20	2	Complet e flake	Silcr ete	N	R	Y	N	N	0.44		18	15.2	9.2	Sing le	N	14.8	9.6	N	Ind	Feath er
82	BAYS PAD16	59 D	10 - 20	2	Complet e flake	S.tu ff	N	B	N	N	N	0.02		11.3	12.8	5.7	Line ar	N	7.1	0.3	N	Uni	Feath er
83	37-2- 0556	28 1	0- 10	1	Proximal flake	Silcr ete	N	P	Y	N	N	7.8	32				Line ar	N	5	0.18			
84	37-2- 0556	28 1	0- 10	1	Angular shatter	Silcr ete	N	P	N	N	Y	0.51	14.5										
85	37-2- 0555	28 4	0- 10	1	Flake shatter	S.tu ff	N	B	N	N	Y	9.5	40.4										
86	37-2- 0555	28 3	0- 10	1	Flake shatter	Silcr ete	N	P	N	N	N	0.15	11.5										
87	37-2- 0556	28 1	10 - 20	1	Complet e flake	Silcr ete	N	YP	N	N	N	12.3		40.1	38.1	11.6	Sing le	N	39.9	12.8	N	Uni	Feath er
88	37-2- 0556	28 1	10 - 20	1	Redirecti ng flake	S.tu ff	N	YB	N	N	N	1.3		28.6	10.1	3.9	Multi ple	N	6.7	3.3	N	Ind	Feath er
89	BAYS AS and PAD03	28 0	10 - 20	1	Multidire ctional core	Silcr ete	Y	P	Y	Y	N	28.8											
90	BAYS AS and PAD03	28 0	10 - 20	1	Angular shatter	S.tu ff	N	B	N	N	N	0.34	16.4										
91	BAYS AS and PAD03	28 0	0- 10	1	Complet e flake	Silcr ete	N	P	Y	N	N	3.99		18.4	25.9	8.1	Sing le	n	5.6	4.6	N	Irre gul ar	Step
92	BAYS AS and PAD05	28 5	0- 10	1	Complet e flake	S.tu ff	N	B	N	N	N	2.81		24.6	20.3	3.4	Sing le	n	8.6	2.1	N	Uni	Hing e