Former Hydro Aluminium Smelter

Aboriginal Cultural Heritage Assessment

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Aboriginal Cultural Heritage Assessment

Client: Hydro Aluminium Kurri Kurri Pty Ltd

ABN: 55 093 266 221

Prepared by

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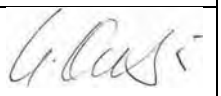
A	21-Apr-2015	Tech review	Geordie Oakes / Archaeologist	
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Glossary of Terms

AHD	Australian Height Datum
ATSIHP Act	Aboriginal and Torres Strait Islander Heritage Protection Act 1984
BP	Before present (i.e., 1950)
DEC	Department of Environment and Conservation (now OEH)
DECCW	Department of Environment, Climate Change and Water (now OEH)
DP&E	Department of Planning and Environment (DP&E)
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GSV	Ground Surface Visibility
GI	Ground Integrity
LHRS	Lower Hunter Regional Strategy
NPW Act	National Parks and Wildlife Act 1974
NPWS	National Parks and Wildlife Service
NTA	Native Title Act 1993
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
SSD	State Significant Development
S&RD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
RAP	Registered Aboriginal Party
RCP	Regional Conservation Plan

Executive Summary

AECOM Australia Pty Ltd (AECOM) was commissioned by Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) to undertake an Aboriginal cultural heritage assessment for the proposed demolition, remediation and waste management facility (the Project) at the former Hydro aluminium smelter off Hart Road, at Kurri Kurri, New South Wales (the Project Area). This assessment forms part of an Environmental Impact Statement (EIS) being prepared by Ramboll ENVIRON Australia Pty Ltd (Ramboll Environ) to support an application for development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project. The Project is State Significant Development (SSD) for the purposes of the EP&A Act because it comes within the category of 'waste and resource management facility' described in clause 23(5) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (S&RD SEPP).

Assessment Methodology

The Aboriginal cultural heritage assessment detailed in this report was undertaken in accordance with the NSW Department of Environment and Conservation's (DEC, now Office of Environment and Heritage (OEH)) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as well as OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b), *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). The assessment involved a combination of background research, Aboriginal community consultation and field survey.

Aboriginal community consultation for the assessment was conducted in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). A total of 32 Registered Aboriginal Parties (RAPs) were consulted for the assessment. Key consultation activities included the provision of information about the Project as part of the registration process, review of the draft assessment methodology, RAP participation in an archaeological survey of the Project area and review of a draft of this Aboriginal cultural heritage assessment report.

Existing Aboriginal Cultural Heritage Values

Searches of the NSW Office of Environment and Heritage's (OEH) Aboriginal Heritage Information Management System (AHIMS) database on 16 February 2014 for a 10 x 10 km area centred on the Project Area identified 161 registered Aboriginal sites. As is typical for the Hunter Valley, open artefact sites (i.e., artefact scatters and isolated finds) are the most common site type represented within the AHIMS search area, accounting for 95.7% (n = 154) of known sites. Remaining sites consist exclusively of areas of Potential Archaeological Deposit (PAD) (n = 7, 4.3%). A review of AHIMS site locations relative to the Project Area indicates that no registered Aboriginal sites are located within the Project Area. However, five sites, consisting of four artefact scatters and one isolated artefact, occur within 50 m of the Project Area. In addition, data held by AECOM indicate the presence of a further one unregistered Aboriginal archaeological site within 50 m of the Project Area.

Archaeological survey of the Project Area was undertaken on Friday 10 April 2015 by a combined field team of two AECOM archaeologists and two RAP field representatives. One new Aboriginal archaeological site was identified during survey. This comprised an isolated stone artefact (Hydro-IA35-15) in a disturbed surface context. An assessment of the scientific significance of Hydro-IA35-15 finds that the site is of low scientific significance.

An assessment of the archaeological sensitivity of land within the Project Area has been undertaken, with three levels of sensitivity - Nil, Low and High - recognised on the basis of the results of previous Aboriginal heritage investigations within and surrounding the Project Area, levels of past land disturbance and the predicted complexity of deposits within each category. The majority of land within the Project Area has been assessed as being of 'Nil' archaeological sensitivity owing to intensive landscape modification associated with the construction/expansion of the Hydro smelter and affiliated ground disturbance activities. Identified areas of low archaeological sensitivity within the Project Area include the vegetated peripheries of the clay borrow pit area to the west of the smelter and the cleared electricity easement to the east of the clay borrow pit area. These areas do not, on the basis of field observations and historical aerial photographs, appear to have been heavily disturbed but are located more than 100 m from a mapped higher order watercourse. One area of high archaeological sensitivity, comprising a cleared section of elevated low gradient terrain overlooking the unnamed 2nd order stream that bisects the Project Area, is recognised.

Potential Impacts of the Project on Aboriginal Cultural Heritage Values

An assessment of the potential impacts of the Project on the identified Aboriginal heritage values of the Project Area finds that newly identified Aboriginal archaeological site Hydro-IA35-15 will be directly impacted by the construction of the containment cell to the west of the smelter site. In the absence of appropriate mitigation measures, complete destruction of this site is anticipated.

The area of high archaeological sensitivity identified in the northernmost portion of the 'Cleared Area West of Line 3 falls within the area earmarked for the ENM stockpile. Physical impacts to the integrity of natural soil profiles within this area may occur as a result of sediment deposition and removal activities (including associated heavy vehicle movements). Identified areas of low archaeological sensitivity in the northwestern portion of the Project Area will be impacted by the construction of the containment cell and ENM stockpiling. Any Aboriginal archaeological materials present within these areas are expected to be severely disturbed or destroyed as a result of these activities.

Mitigation and Management Measures

To manage potential impacts to the known and potential Aboriginal heritage values of the Project Area, a management strategy has been developed. This strategy is proposed to guide the management of Aboriginal cultural heritage within the Project Area for the life of the Project. Key components of the strategy are as follows:

- Surface collection and relocation of newly identified isolated artefact Hydro-IA35-15;
- Precautionary fencing of Hydro-IA35-15 prior to surface collection;
- Geo-matting of the identified area of high archaeological sensitivity, should the Project require the use of this area for stockpiling;
- An a unexpected finds procedure for any Aboriginal sites identified throughout the life of the Project; and
- A standard procedure for the management of any potential human skeletal remains identified throughout the life of the Project.

Subject to the implementation of these management and mitigations measures, it is predicted that the impact of the Project on the identified Aboriginal cultural heritage values of the Project area will be low on both a local and regional scale.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Hydro Aluminium Kurri Kurri Pty Ltd (Hydro), to undertake an Aboriginal cultural heritage assessment for the proposed demolition, remediation and waste management facility (the Project) at the former Hydro aluminium smelter off Hart Road, at Kurri Kurri, New South Wales (the Project Area) (**Figure 1**). This assessment forms part of an Environmental Impact Statement (EIS) being prepared by Ramboll ENVIRON Australia Pty Ltd (Ramboll Environ) to support an application for development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project, described in **Section 1.3**. The Project is State Significant Development (SSD) for the purposes of the EP&A Act because it comes within the category of 'waste and resource management facility' described in clause 23(5) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (S&RD SEPP).

This Aboriginal cultural heritage assessment report documents the results of AECOM's assessment and has been compiled with reference to the NSW Department of Environment and Conservation's (DEC, now Office of Environment and Heritage (OEH)) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as well as OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).

1.1 Assessment Objectives

The overarching objectives of the Aboriginal cultural heritage assessment detailed herein are as follows:

- to identify the Aboriginal cultural heritage values of the Project Area through a combination of background research, archaeological survey and consultation with Registered Aboriginal Parties (RAPs);
- to assess the potential impact(s) of the Project on these values;
- to provide an appropriate management strategy for avoiding and/or mitigating potential harm to identified values; and
- to compile an Aboriginal cultural heritage assessment report that will assist the Director General of the DP&E in his/her assessment of the Project application.

1.2 Project Area

The Project Area for this assessment, shown on **Figure 2**, is an irregularly-shaped *c*.78 ha parcel of land located to the immediate north of the township of Kurri Kurri, approximately 29 km northwest of Newcastle and 5 km southwest of Maitland in the Lower Hunter Valley of NSW. Situated between MGA grid coordinates 356900 and 358200 east and 6370500 and 6371600 north (Zone 56) on the Cessnock 1:100,000 Topographic Map Sheet (9132-2N), the Project Area encompasses the former Hydro aluminium smelter complex (the smelter) and two sections of cleared land to the west of the complex, known as the 'Clay Borrow Pit' (larger) and 'Cleared Area West of Line 3' respectively.

Surrounding townships and hamlets include Kurri Kurri to the south, Abermain to the west-southwest, Heddon Greta to the southeast, Weston to the southwest and Gillieston Heights to the northeast. Parks and reserves in the surrounding area, meanwhile, include the Werakata National Park to the west and southwest, Cessnock State Forest to the west, the Lower Hunter National Park to the south and the Heddon Greta Reserve to the southeast.

Reference to the NSW Geographical Names Register indicates that the Project Area is situated within the Parish of Heddon in the County of Northumberland. Land within the Project Area has been registered as Lots 1 (part), 2 and 3 (part) on DP456769 (part), Lots 318 (part), 319 (part), 769 (part) and 420 on DP755231 (part) and Lots 411, 412, 413, 414 (part) and 415 (part) on DP755231.

1.3 Project Background and Description

The Kurri Kurri aluminium smelter commenced production in 1969 with a single potline. A second potline was commissioned in 1979 and a third added in 1985. In 2002, after assuming ownership of the smelter through its

acquisition of VAW Aluminium AG, Hydro undertook an upgrade program - the Smelter Upgrade and Retrofit (SURF) Project - which raised the production capacity of the smelter to 170,000 tonnes of aluminium per annum.

Cessation of all pot lining occurred in February 2012. In April 2012, Hydro decided to curtail all production at the smelter, with primary metal production ceasing in September 2012 and the production of casthouse products ending the following month. After being in care and maintenance mode since October 2012, the decision to permanently close the Kurri Kurri aluminium smelter was taken in May 2014, allowing for remediation and redevelopment options for the site to be progressed.

Hydro proposes to carry out demolition, remediation and waste management activities within the Project Area to render it suitable for future use. The key elements of the Project, which will be undertaken in six phases, are:

- The demolition of the smelter buildings and structures within the Project Area. This would include safe removal of hazardous materials prior to and during remediation;
- The remediation of contaminated soils located within the Project Area, including materials within the capped waste stockpile (containing mixed smelter wastes) and accessible contaminated soils around and below smelter structures;
- The design and construction of a waste management facility, comprising a state of the art, modern and purpose built containment cell that would encapsulate materials including:
    - Non-recyclable demolition waste from the existing smelter buildings and structures;
    - Contaminated soils from the smelter;
    - Materials within the existing capped waste stockpile located at the smelter site;
    - Stored residual smelting process materials; and
    - Soils and materials derived from remediation elsewhere within Hydro-owned land.
- Validation of the remediated areas of the smelter site and Hydro-owned land as suitable for future employment land uses; and
- The treatment of leachate and leachate impacted groundwater from the capped waste stockpile.

Following completion of the demolition, site remediation and construction of the containment cell, the following activities would be undertaken:

- Establishment and implementation of a containment cell monitoring program; and
- Long term management of the containment cell through an Environmental Management Plan.

The conceptual layout of the Project is shown on **Figure 3**.

1.4 The Proponent

The proponent for this assessment is Hydro Aluminium Kurri Kurri Pty Ltd (Hydro), a subsidiary of the global aluminium company Norsk Hydro ASA. Hydro is a registered Australian company (ACN: 093 266 221; ABN: 55 093 266 221) based in Kurri Kurri, NSW.

1.5 Secretary's Environmental Assessment Requirements (SEARs)

The Secretary of the NSW Department of Planning and Environment (DP&E) issued the Director General's Environmental Assessment Requirements (EARs) for the Project on 18 November 2014. For Aboriginal heritage, the DGRs require the completion of an Aboriginal cultural heritage assessment (including cultural and archaeological significance) which must demonstrate effective consultation with relevant Aboriginal community groups.

Attachment 1 (Technical and Policy Guidelines) of the EARs identifies DEC's *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as well as OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) (the Consultation Requirements), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) (the Code of Practice) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011), as the relevant guidelines for the Aboriginal heritage component of the Project's EIS. The 2005 DEC guidelines require Aboriginal heritage assessments to be conducted in accordance DECCW's (2004) *Interim*

Community Consultation Requirements for Applicants and the NSW National Parks and Wildlife Service's (1997) *Aboriginal Cultural Heritage Standards and Guidelines Kit*. However, it is noted that OEH's Consultation Requirements, Code of Practice and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* have effectively replaced these earlier policies and currently represent best practice guidelines for the assessment of Aboriginal cultural heritage values in NSW.

1.6 OEH Recommended SEARs

OEH recommended SEARs for the Aboriginal cultural heritage component of the Project EIS are listed in **Table 1**. Details of where to locate the report content stipulated by OEH are also provided.

Table 1 OEH recommended SEARs for the Project

OEH recommend the following Aboriginal cultural heritage issues be addressed by the proponent in preparing the EA:	Refer to
The EA must address and document the information requirements set out in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).	This report
The EA must include surveys by suitably qualified archaeological and geomorphological consultants in consultation with all of the local Aboriginal knowledge holders.	**Section 7.0**
The EA should identify the nature and extent of foreseeable impacts on Aboriginal cultural heritage values across the Project Area and clearly articulate strategies proposed to avoid/minimise these impacts. If impacts are proposed as part of the final development, clear justification for such impacts should be provided.	**Section 9.0**
The EA must assess and document the archaeological and Aboriginal significance of the Project Area's Aboriginal cultural heritage values	**Section 8.0**
Describe the actions that will be taken to avoid or mitigate impacts of the Project on Aboriginal cultural heritage values. This must include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.	**Section 10.0**
The EA must provide documentary evidence to demonstrate that effective community consultation with Aboriginal communities has been undertaken in assessing impacts, developing protection and mitigation options and making final recommendations.	**Section 3.0**
If impacts on Aboriginal cultural heritage are proposed as part of the final development, an assessment of the proposed impacts in the context of '*inter-generational equity*' and cumulative impact must be undertaken. This assessment must examine both cultural and archaeological perspectives equally at both the local and regional levels, with consideration given to the site level and broader landscape level.	**Section 9.3**

1.7 Assessment Approach

This assessment has been undertaken in accordance with DEC's *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as well as OEH's Code of Practice, Consultation Requirements and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*. As such, its key requirements have been:

- to conduct a search of OEH's Aboriginal Heritage Information Management System (AHIMS);
- to review the landscape (i.e., environmental) context of the Project Area with specific consideration to its implications for past Aboriginal land use;
- to review relevant archaeological and ethnohistoric information for the Project Area and environs;
- to prepare a predictive model for the Aboriginal archaeological record of the Project Area;
- to undertake an archaeological survey of the Project Area;
- 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 Project 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 assessment methodology;
    - provide information that will enable the cultural significance of Aboriginal objects and/or places within the Project Area to be determined; and
    - have input into the development of cultural heritage management options; and
- to prepare and finalise an Aboriginal cultural heritage assessment report with input from RAPs.

1.8 Project Team

The project team for this assessment included personnel from AECOM and 34 RAPs. Dr Andrew McLaren (Archaeologist, AECOM) managed and participated in all aspects of the assessment detailed herein. Andrew holds a Bachelor of Arts (1st Class Honours) degree from the University of Queensland in Brisbane, a Master of Cultural Heritage from Deakin University in Melbourne and a PhD in archaeology from the University of Cambridge in England. In addition, he has a total of over five years of Australian Aboriginal cultural heritage management experience and thus satisfies the minimum qualifications stipulated in Section 1.6 of the Code of Practice. Andrew was the primary author of this report.

Other AECOM staff involved in this assessment included Darran Jordan (Archaeologist), Geordie Oakes (Archaeologist), Tim Osborne (Designer) and Kelly Pearsall (Associate Director - Environment). Darran participated in the survey and undertook a technical review of this report. Unless otherwise specified, all figures within this report were created by Tim. Technical and QA reviews of this report were provided by Geordie and Kelly respectively. Aboriginal community consultation for this assessment was undertaken in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). Full details of the consultation process undertaken are provided in **Section 3.0**. Aboriginal persons and organisations consulted as part of this assessment are listed in **Table 2**.

Table 2 Registered Aboriginal Parties (RAPs) for the current assessment

Registered Aboriginal Party	Contact Person(s)
Steven Talbott	Steven Talbott
Amanda Heard	Amanda Heard
Wurrumay Consultant	Kerrie Slater
Tocomwall Pty Ltd	Scott & Danny Franks
Wallangan Cultural Services	Maree Waugh
Yinarr Cultural Services	Kathie Kinchela
Hunter Valley Cultural Consultants	Christine Archbold
Upper Hunter Heritage Consultants	Darrel Matthews
Giwiirr Consultants	Rodney Matthews/Michele Stair
Aboriginal Native Title Consultants	Margaret Matthews
Kawul Cultural Services	Vicky Slater
Wonn1 (Kauwul Pty Ltd)	Arthur Fletcher
Gidawaa Walang Cultural Heritage Consultancy	Ann Hickey
Wanaruah Local Aboriginal Land Council	Suzie Worth
Wonnarua Culture Heritage	Shannon Griffiths
Lower Hunter Wonnarua Cultural Services	Tom Miller
Culturally Aware	Tracey Skene
Smith Dhagaans Cultural Group	Timothy Smith
Wattaka Wonnarua Cultural Consultancy Services	Des Hickey
Widescope Indigenous Group	Steven Hickey
A1 Indigenous Services	Carolyn Hickey
Amanda Hickey Cultural Services	Amanda Hickey
HTO Environmental Management Services	Paulette Ryan
Murrawan Cultural Consultants Pty Ltd	Robert Smith
Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer
Lower Hunter Aboriginal Incorporated	David Ahoy
Cacatua General Services	Donna Sampson
AGA Services	Adam Sampson
Jarban and Mugrebea	Les Atkinson
Awabakal Descendants Traditional Owners Aboriginal Corporation	Peter Leven
Mindaribba LALC	Lea-Anne Ball
Guringai Traditional Owners	Todd Heard
Crimson Rosie	Jeff Matthews
Kauma Pondee Inc	Jill Green

1.9 Report Structure

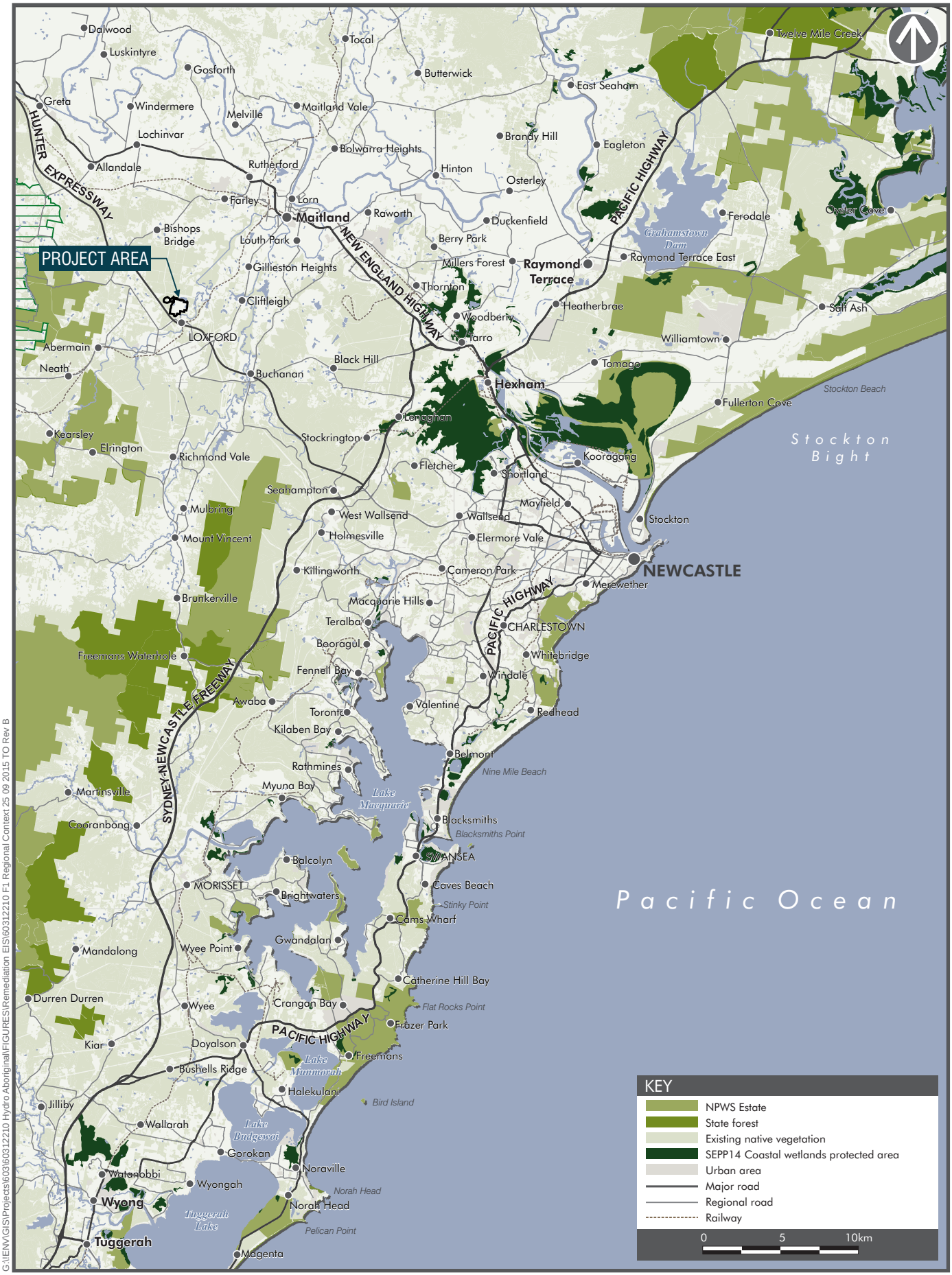
This report contains eleven sections. This section - **Section 1.0** - has provided background information on the Project and assessment undertaken. The remainder of the report is structured as follows:

- **Section 2.0** outlines the statutory framework within which this assessment has been undertaken;
- **Section 3.0** details the Aboriginal community consultation program undertaken for this assessment;
- **Section 4.0** describes the existing environment of the Project Area and its associated archaeological implications;
- **Section 5.0** describes the archaeological context of the Project Area on a regional and local scale. Predictions regarding the nature of the Project Area's Aboriginal archaeological record are also provided;
- **Section 6.0** summarises relevant ethnohistoric information for the Project Area;
- **Section 7.0** describes the archaeological survey component of the assessment;
- **Section 8.0** outlines the significance of identified Aboriginal archaeological sites within the Project Area;
- **Section 9.0** provides an assessment of the potential impacts of the Project on identified Aboriginal heritage values;
- **Section 10.0** details an appropriate management strategy for the identified Aboriginal heritage values of the Project Area; and
- **Section 11.0** lists the references cited in-text.

1.10 Acknowledgements

AECOM gratefully acknowledges the assistance of the following individuals during fieldwork and/or the completion of this report:

- Shaun Taylor (Senior Environmental Scientist, Ramboll ENVIRON)
- Leanne Pringle (Commercial Manager, Hydro); and
- Kerry McNaughton (Environment Officer/Buffer Zone Supervisor, Hydro).



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AECOM

REGIONAL CONTEXT

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 1

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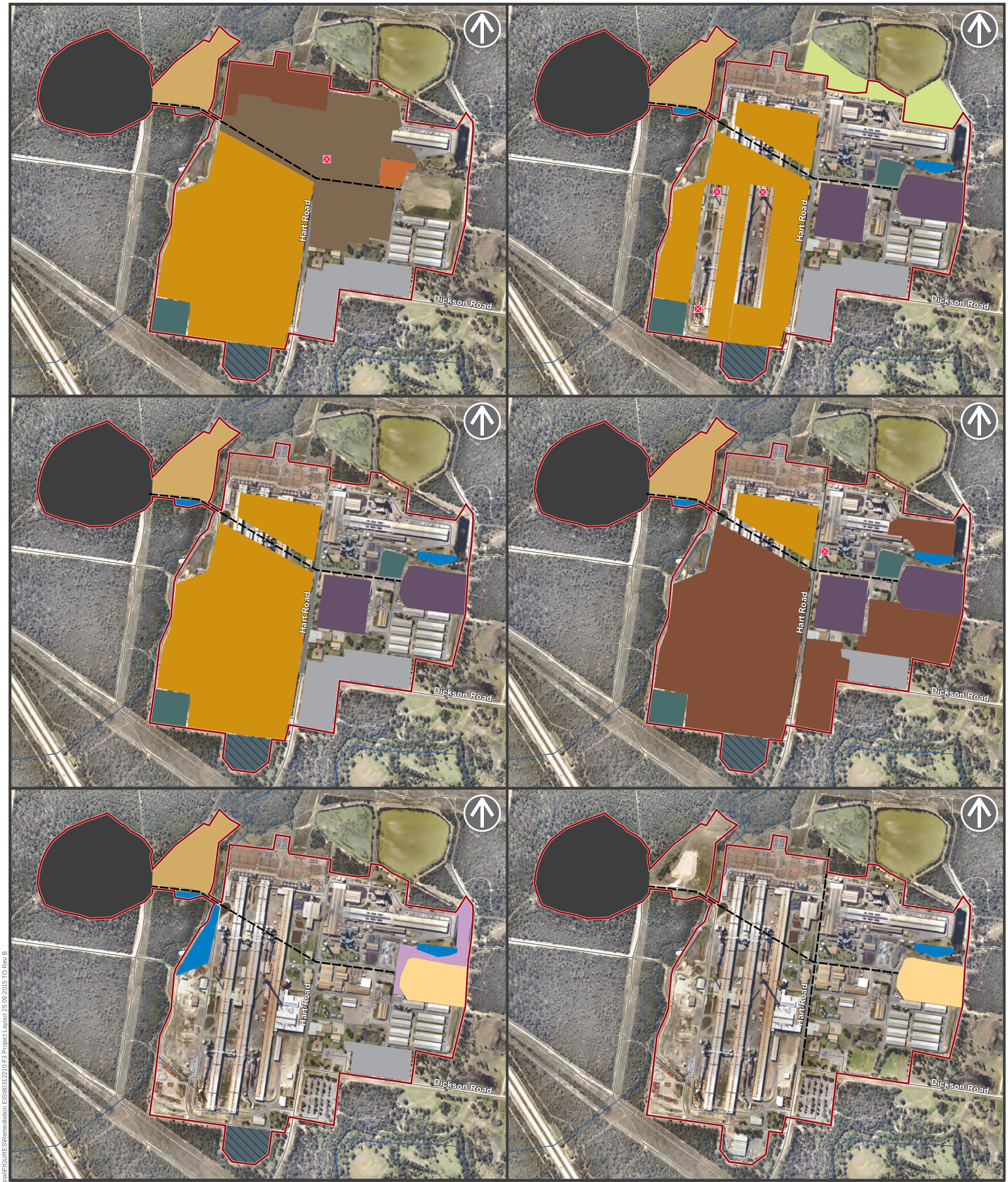
AECOM

PROJECT AREA

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 2



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PROJECT LAYOUT

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 3

2.0 Applicable Policy and Legislation

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

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

Under the 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 Act, an area or object is considered to have been be 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. the use or significance of the area in accordance with Aboriginal tradition is adversely affected; and

   iii. passage through, or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition

b) in the case of an object:

   i. 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 Project Area have been made under the ATSIHP Act.

2.1.2 Native Title Act 1993

The *Native Title Act 1993* (NTA) provides for the recognition and protection of native title for Indigenous peoples. 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* in January 2015 indicate that two registered Native Title Claims (NC2013/002 - Awabakal and Guringai People and NC2013/006 - Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People) apply to Project Area. Registered native title claimants for both parties were consulted as part of the current assessment (**Section 3.0**).

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

Sustainability, Environment, Water, Population and Communities (SEWPAC). 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; and
- 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 items. 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). 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.

The heritage registers mandated by the EPBC Act have been consulted and there are no Aboriginal heritage items located within, or in the immediate vicinity of, the Project Area.

2.2 State Legislation and Policies

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act, administered by the NSW Department of Planning and Environment, 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.

Division 4.1 of the EP&A Act provides a determination regime for State Significant Development (SSD). Section 89C of the EP&A Act stipulates that a development will be considered SSD if it declared to be such by *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD).

Under Clause 8(1) of SEPP SRD, a development is declared to be State Significant Development 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.

The Project was declared SSD by the Secretary of the Department of Planning and Environment on 18 November 2014.

Pursuant to Section 89J of the EP&A Act, Aboriginal Heritage Impact Permits (AHIPs) are not required for projects approved under Division 4.1 of 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). ACHMPs are statutorily binding once approved by the Planning Assessment Commission (PAC) or DP&E under delegation from the Director-General.

2.2.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by OEH, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Director General of OEH responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- an *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- an *Aboriginal place* is a place declared so 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 Regulation 2010* (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened. Consultation with Aboriginal communities is required under OEH policy when an application for an AHIP is considered and is an integral part of the process. 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. Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification.

As indicated in **Section 2.2.1**, AHIPs are not required for projects approved under Division 4.1 of Part 4 of the EP&A Act. Section 89A of the NPW Act, however, 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 Division 4.1 projects.

2.2.3 Lower Hunter Regional Strategy (LHRS) and Regional Conservation Plan (RCP)

The Lower Hunter Regional Strategy (LHRS), finalised in 2006, details the New South Wales Government's planning priorities for the Lower Hunter Valley and identifies proposed areas of growth. The Regional Conservation Plan (RCP) is a partner document to the LHRS and outlines a 25 year program to direct and drive conservation planning and efforts within the Lower Hunter.

Both individually and in combination, the LHRS and RCP recognise the importance of Aboriginal objects and places to contemporary Aboriginal people, as well as the landscapes associated with them. However, both documents also acknowledge that the continued growth of the Lower Hunter's population and industries will raise challenges for their long-term protection. In recognition of these challenges, the LHRS has identified the following key actions for the long-term protection and management of the Aboriginal and Historic (non-Indigenous) heritage resource of the Lower Hunter Valley:

- Councils are to ensure that Aboriginal cultural and community values are considered in the future planning and management of the local government area;
- The Department of Planning and Environment and Councils will review the scope and quality of the existing statutory lists of heritage items and ensure that all places of significance are included in the heritage schedules of local environmental plans; and
- The cultural heritage values of major regional centres and major towns that will be the focus of urban renewal projects will be reviewed, with the aim of protecting cultural heritage.

The RCP proposes a number of mechanisms to ensure that high value conservation lands in the Lower Hunter Valley are identified, protected and managed for their biodiversity values as well as their Aboriginal cultural heritage values. Stage 1 of the RCP, implemented in 2006, involved the transfer of *c*.20,000 hectares of public high value conservation land into conservation reserves. The transfer of an additional 12,000 hectares of private land into the reserve system is expected to occur under the RCP over the next few years.

2.3 Local Government

2.3.1 Cessnock LEP 2011

Clause 5.10 of the Cessnock LEP 2011 provides specific provisions for the protection of heritage items, heritage conservation areas, Aboriginal objects and Aboriginal places of heritage significance within the Cessnock LGA, defined in the LEP as follows:

- A *heritage item* means a building, work, place, relic, tree, object or archaeological site, the location and nature of which is described in Schedule 5 of the LEP;
- A *heritage conservation area* means an area of land of heritage significance:

(a) shown on the Heritage Map as a heritage conservation area, and

(b) the location and nature of which is described in Schedule 5 of the LEP,

and includes any heritage items situated on or within that area.

- An *Aboriginal object* means any deposit, object or other material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of an area of New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.
- An *Aboriginal place of heritage significance* means an area of land, the general location of which is identified in an Aboriginal heritage study adopted by the Council after public exhibition and that may be shown on the Heritage Map, that is:

  (a) the site of one or more Aboriginal objects or a place that has the physical remains of pre-European occupation by, or is of contemporary significance to, the Aboriginal people. It may (but need not) include items and remnants of the occupation of the land by Aboriginal people, such as burial places, engraving sites, rock art, midden deposits, scarred and sacred trees and sharpening grooves, or

  (b) a natural Aboriginal sacred site or other sacred feature. It includes natural features such as creeks or mountains of long-standing cultural significance, as well as initiation, ceremonial or story places or areas of more contemporary cultural significance.

Under the Cessnock LEP 2011, 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.

Schedule 5 of the Cessnock LEP 2011 provides a list of heritage items and conservation areas within the Cessnock LGA. There are no Aboriginal heritage items listed in this schedule that fall within the Project 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 mitigations measures. The successful identification, assessment and management of Aboriginal cultural heritage values are dependent on an inclusive and transparent consultation process.

As indicated in **Section 1.8**, Aboriginal community consultation for the current assessment was undertaken in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010b) (the Consultation Requirements). The results of the consultation process undertaken are detailed below. A consultation log is provided as **Appendix A**.

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 Project 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 Project 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 NSW Office of Environment & Heritage (OEH);

b) the relevant Local Aboriginal Land Council(s);

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) Native Title Services Corporation Limited (NTSCORP Limited);

f) The relevant local council(s); and

g) The relevant catchment management authorities for contact details of any established Aboriginal reference group.

In accordance with this requirement, the following agencies were contacted via letter or email on 14 January 2015 requesting information on relevant Aboriginal persons and organisations:

- OEH - Hunter Central Coast Region Office;
- Mindaribba Local Aboriginal Land Council (Mindaribba LALC);
- Office of the Registrar, *Aboriginal Land Rights Act 1983* (NSW);
- The National Native Title Tribunal (NNTT);
- NTSCORP Limited;
- Cessnock Shire Council; and
- Hunter Local Land Services.

Responses were received from six agencies and are attached as **Appendix B:**

- The Office of the Registrar responded on 19 January 2015 advising that the Project Area does not appear to have Registered Aboriginal Owners pursuant to Division 3 of the *Aboriginal Land Rights Act 1983* (NSW). They also advised that the Mindaribba LALC may be able to assist in the identification of relevant Aboriginal stakeholders.

- OEH responded on 20 January 2015 providing the details of 78 Aboriginal persons and organisations who may wish to be consulted as part of the assessment.
- NTSCORP responded on 21 January 2015 advising that although their privacy guidelines restrict them from providing proponents with contact details for Traditional Owners, they would forward our correspondence to relevant individuals, groups and organisations.
- The NNTT responded on 30 January 2015 advising the results of 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*. The NNTT advised that two registered Native Title Claims (NC2013/002 - Awabakal and Guringai People and NC2013/006 - Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People) apply to the search area.
- Mindaribba LALC responded on 16 February 2015 advising that they would like to register their interest in the Project; and
- Cessnock City Council responded on 16 February 2015 advising AECOM to contact the Mindaribba LALC for the required information.

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, a public notice was placed in the Maitland Mercury on 19 January 2015 (**Appendix C**). The closing date for registration via this notice was 3 February 2015, which provided the necessary *minimum* 14 day period for expressions of interest.

No responses to the notice were received prior to or after this date.

3.1.3 Invitations for Expressions of Interest

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

In accordance with this requirement, on 30 January 2015, 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. A total of 78 Aboriginal stakeholders were invited to register an interest in being consulted. The closing date for expressions of interest was 16 February 2015, which provided the necessary *minimum* 14 day period for expressions of interest.

By the closing date for expressions of interest, 32 parties had registered an interest in the assessment. An additional two parties registered an interest after this date and were included in the consultation process. Summary information on all RAPs, including registration dates, is provided in **Table 3**.

Table 3 Registered Aboriginal Parties

Organisation	Date of registration	Method	Primary contact person
Steven Talbott	27/01/2015	Email	Steven Talbott
Amanda Heard	27/01/2015	Email	Amanda Heard
Wurrumay Consultant	3/02/2015	Email	Kerrie Slater
Tocomwall Pty Ltd	3/02/2015	Email	Danny Franks
Wallangan Cultural Services	4/02/2015	Email	Maree Waugh
Yinarr Cultural Services	4/02/2015	Phone	Kathie Kinchela
Hunter Valley Cultural Consultants	5/02/2015	Email	Christine Archbold

Organisation	Date of registration	Method	Primary contact person
Upper Hunter Heritage Consultants	5/02/2015	Email	Darrel Matthews
Giwiirr Consultants	5/02/2015	Email	Rodney Matthews/Michele Stair
Aboriginal Native Title Consultants	5/02/2015	Email	Margaret Matthews
Kawul Cultural Services	12/02/2015	Email	Vicky Slater
Wonn1 (Kauwul Pty Ltd)	6/02/2015	Email	Arthur Fletcher
Gidawaa Walang Cultural Heritage Consultancy	5/02/2015	Fax	Ann Hickey
Wanaruah Local Aboriginal Land Council	6/02/2015	Email	Suzie Worth
Wonnarua Culture Heritage	6/02/2015	Phone	Shannon Griffiths
Lower Hunter Wonnarua Cultural Services	7/02/2015	Email	Tom Miller
Culturally Aware	8/02/2015	Email	Tracey Skene
Smith Dhagaans Cultural Group	10/02/2015	Email	Timothy Smith
Wattaka Wonnarua Cultural Consultancy Services	10/02/2015	Email	Des Hickey
Widescope Indigenous Group	11/02/2015	Email	Steven Hickey
A1 Indigenous Services	11/02/2015	Email	Carolyn Hickey
Amanda Hickey Cultural Services	11/02/2015	Email	Amanda Hickey
HTO Environmental Management Services	12/02/2015	Email	Paulette Ryan
Murrawan Cultural Consultants Pty Ltd	12/02/2015	Phone	Robert Smith
Awabakal Traditional Owners Aboriginal Corporation	13/02/2015	Email	Kerrie Brauer
Lower Hunter Aboriginal Incorporated	13/02/2015	Email	David Ahoy
Cacatua General Services	14/02/2015	Email	Donna Sampson
AGA Services	14/02/2015	Email	Adam Sampson
Jarban and Mugrebea	15/02/2015	Email	Les Atkinson
Awabakal Descendants Traditional Owners Aboriginal Corporation	16/02/2015	Email	Peter Leven
Mindaribba LALC	16/02/2015	Email	Lea-Anne Ball
Guringai Traditional Owners	16/02/2015	Email	Todd Heard
Crimson Rosie	17/02/2015	Letter	Jeff Matthews
Kauma Pondee Inc	19/02/2015	Email	Jill Green

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 EOI letter forwarded to the Aboriginal parties, to the relevant OEH 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 30 March 2015, a list of the 34 Aboriginal individuals and organisations that had registered an interest in the assessment, as well as a copy of the EOI letter sent out on 30 January 2015, was forwarded to the relevant OEH regional office (i.e., Hunter Central Coast) and the Mindaribba LALC. No RAPs requested their details be withheld.

3.2 Stage 2 - Presentation of Information about Project

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

For the current assessment, presentation of information about the Project Area and Hydro's planning proposal was provided to RAPs as part of the registration of interest process detailed in **Section 3.1.3**. Basic information on the proponent and planning proposal was included in the EOI letter mailed on 11 March 2014.

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 Project 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 Project Area included:

- A request with the draft assessment methodology for any initial comments regarding the Aboriginal cultural heritage values of the Project Area;
- Discussion of cultural heritage values during fieldwork; and
- The provision of a draft report to all RAPs for comment prior to finalisation.

3.3.1 Draft Survey 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.

In accordance with these requirements, all RAPs were sent a draft of AECOM's proposed methodology for this cultural heritage assessment. A request for any initial comments or thoughts regarding the cultural values was also made in the covering letter accompanying the methodology. The specified closing date for comments was 22 March 2015.

Three responses to the draft methodology were received from RAPs, all written. These responses are summarised in **Table 4** and are attached as **Appendix D**.

As indicated in **Table 4**, information regarding the cultural values of the Project Area was provided by one RAP (i.e., Wurrumay Consultant) in their response to the draft methodology. Wurrumay Consultant, Ms Kerrie Slater, advised that the Project Area is significant to Aboriginal people as it contains watercourses and food sources.

No other specific cultural heritage values relating to the Project Area were identified by RAP respondents.

Table 4 RAP responses to draft methodology

Registered Aboriginal Party (RAP)	Date of response	Method of response	Summary of response	AECOM response to RAP comments
Awabakal Traditional Owners Aboriginal Corporation (ATOAC)	22-03-15	Email with letter attachment	ATOAC recognise that the draft survey methodology provided by AECOM is comprehensive and agree with the proposed assessment approach. ATOAC are pleased to share verbally any relevant cultural knowledge regarding the Project Area while attending the field assessment but reserve the right to withhold this knowledge.	None required
Gidawaa Walang Cultural Heritage Consultancy (GWCHC)	10-03-15	Email	GWCHC support the draft methodology	None required
Wurrumay Consultant (WC)	3-03-15	Email	WC agrees with the methodology. The Project Area is significant to Aboriginal people as it contains watercourses and food sources.	None required

3.3.2 Archaeological Survey

A total of six RAPs were invited to participate in the field survey component of the current assessment. Notification of the field survey, including insurance requirements, was provided in writing to relevant RAPs on 30 March 2015.

Two out of the six RAPs invited to participate in the survey provided field representatives on the day. RAP field representatives are listed by organisation in **Table 5**.

RAP field representatives involved in the field survey did not identify any specific social or cultural values for the Project Area in conversations with AECOM field staff. However, Danny Franks of Tocomwall Pty Ltd did remark that areas of minimally to moderately terrain within the Project Area retain potential for the presence of subsurface archaeological deposits.

Table 5 RAP field representatives by organisation

Registered Aboriginal Party (RAP)	Field representative(s)
Tocomwall Pty Ltd	Danny Franks
Gidawaa Walang Cultural Heritage Consultancy	Jake Dacey

3.4 Stage 4 - Review of Draft Assessment Report

The aim of Stage 4 of the Consultation Requirements is to prepare and finalise an Aboriginal cultural heritage assessment report with input from RAPs.

In accordance with Section 4.4.2 of the Consultation Requirements, on 3 July 2015, all RAPs were sent a draft of the Aboriginal cultural heritage assessment for review and comment. The specified closing date for comments was 3 August 2015, which provided the necessary minimum 28 day review period.

Three written responses to the draft report were received from RAPs by the closing date for comment. These responses, provided in **Appendix E**, are summarised in **Table 6**. No other RAPs provided comment on the draft report.

Table 6 RAP Reponses to draft report

Registered Aboriginal Party (RAP)	Date of response	Summary of response to draft report	AECOM Response
Culturally Aware	26-07-15	Culturally Aware agree to the collection of isolated artefact Hydro-IA35-15 but hold some concerns for the other sensitive locations that are to be impacted by stockpiling and machinery. Ms Skene advises that she knows the cultural landscape of the Project area and environs well, having grown up in the area, and is "quite aware of the highly significance of the waterway in the surrounding landscape and within the boundaries of this smelter and also the mythological and Traditional Ecological systems around this site [sic]". Culturally Aware feel that RAP field representatives should be present in sensitive areas when impacts are to take place. In addition, Culturally Aware believe that there should be a management plan and Aboriginal cultural values report completed for the Project area, with the latter to be prepared by the Aboriginal community. Culturally Aware note that '[i]t's important to respect the wishes of Aboriginal people when recommending any mitigation into identified sites, consultation and negotiation with relevant Aboriginal people is the best means of addressing Aboriginal heritage issues, as they are the primary source of information on the value of their heritage [sic]".	Culturally Aware's agreement to the proposed collection and relocation of newly identified Aboriginal site Hydro-IA35-15 is noted. Regarding potential impacts to the area of high archaeological sensitivity identified within the Project area, AECOM, on advice from Hydro, can advise that it is highly unlikely that this area would be required to be used for stockpiling. Regardless, in the event that stockpiling is required, access to this area would be restricted to avoid the potential for disturbance. In addition, as a precautionary measure a suitably qualified contractor (under the supervision of an archaeologist and RAP field representative) would be engaged to lay geo-matting across this area using techniques to minimise disturbance of natural soils. Additional mitigation measures (such as fencing and access restrictions) would be implemented as required. Upon completion of the Project, appropriate removal methods would be implemented so that natural soils are not disturbed. Culturally Aware's requests for an Aboriginal Cultural Heritage Management Plan (ACHMP) and Aboriginal Cultural Values Report are noted. Regarding the ACHMP, AECOM can advise that the Aboriginal heritage management measurements detailed in **Section 10.0** of this report would be included in an overarching Environmental Management Plan (EMP) to be developed and implemented for the Project. Accordingly, a standalone ACHMP is unwarranted. A standlone Aboriginal cultural values report for the Project area is likewise unwarranted as the cultural values of the Project area were assessed and documented as part of the current assessment, with Aboriginal community consultation undertaken in accordance with OEH's Consultation Requirements. Opportunities for RAP input on cultural values have been provided at all stages of the assessment (i.e., request for initial comments with EOI letter, discussions during fieldwork and review of draft report). All comments regarding the cultural values of the Project area have been integrated into this report.
Wallangan Cultural Services	28-07-15	Wallangan Cultural Services are happy with the collection of isolated artefact Hydro-IA35-15. RAP field representatives should be present in areas to be impacted by stockpiling. In addition, Wallangan Cultural Services believe that there should be a management plan and	Wallangan Cultural Services' agreement to the proposed collection and relocation of newly identified Aboriginal site Hydro-IA35-15 is noted. Regarding potential impacts to the area of high archaeological sensitivity identified within the Project area, AECOM, on advice from Hydro, can advise

Registered Aboriginal Party (RAP)	Date of response	Summary of response to draft report	AECOM Response
		Aboriginal cultural values report completed for the Project area, with the latter to be prepared by the Aboriginal community.	that it is highly unlikely that this area would be required to be used for stockpiling. Regardless, in the event that stockpiling is required, access to this area would be restricted to avoid the potential for disturbance. In addition, as a precautionary measure a suitably qualified contractor (under the supervision of an archaeologist and RAP field representative) would be engaged to lay geo-matting across this area using techniques to minimise disturbance of natural soils. Additional mitigation measures (such as fencing and access restrictions) would be implemented as required. Upon completion of the Project, appropriate removal methods would be implemented so that natural soils are not disturbed. Wallangan Cultural Services' request for an Aboriginal Cultural Heritage Management Plan and Aboriginal Cultural Values Report are noted. Regarding the ACHMP, AECOM can advise that the Aboriginal heritage management measures detailed in **Section 10.0** of this report would be included in an overarching Environmental Management Plan (EMP) to be developed and implemented for the Project. Accordingly, a standalone ACHMP is unnecessary. A standlone Aboriginal cultural values report for the Project area is likewise unnecessary as the cultural values of the Project area were assessed and documented as part of the current assessment, with Aboriginal community consultation undertaken in accordance with OEH's Consultation Requirements. Opportunities for RAP input on cultural values have been provided at all stages of the assessment (i.e., request for initial comments with EOI letter, discussions during fieldwork and review of draft report). All comments regarding the cultural values of the Project area have been integrated into this report.
Tocomwall	03-08-15	The general location and proximity of the Project area to swamps and waterways suggest that the area would have been a prime one for the exploitation of resources. However, it is hard to assess AECOM's conclusions. Tocomwall believe that AECOM's conclusions regarding the depth, nature and degree of disturbance across the Project area cannot be supported on the basis of the data presented in this ACHAR. Tocomwall note that highly disturbed areas can retain subsurface archaeological deposit at depth. Levels of disturbance cannot be	Levels of ground disturbance across the Project area were assessed and quantified through examination of historical aerial photographs and 'ground-truthed' during the field survey. The vast majority of the Project area, as described in this report, has been grossly disturbed as a result of the construction and subsequent expansion of the Smelter, with most areas subject to significant earthworks, including both excavation and filling. A large part of the Smelter has been constructed on fill material. As such, the demolition of surface structures and excavation of contaminated soils are highly unlikely to disturb natural soils, should these

Registered Aboriginal Party (RAP)	Date of response	Summary of response to draft report	AECOM Response
		qualified. Rather, they should be quantified through relevant subsurface data such as geological trenches or borehole data. Tocomwall do not support the significance assessment or the proposed management strategy due principally to the fact that AECOM has made no attempt to understand the potential of subsurface contexts through some form of subsurface testing. In addition, Tocomwall do not support the idea geo-matting in the area of high archaeological sensitivity as this would cause serious damage to the any potential archaeological resources through processes such as loading via the overburden. Tocomwall would like to see further investigation of the Aboriginal archaeological record of the Project area and a more scientific approach to assessing the potential of archaeological deposits in areas of high, medium and low disturbance.	exist at depth. Most Smelter buildings, structures and infrastructure required excavation for construction of footings and basements. Excavation for the Project would be limited to that required to facilitate demolition and removal of subsurface structures to a depth of 1.5 metres below ground level. As such excavations would occur in areas that were disturbed by construction of these footings, basements and other subsurface structures. As such, it is highly unlikely that subsurface archaeological deposits would be encountered. In the unlikely event that such deposits are encountered, the procedures outlined in **Section 10.1.4** of this report would be implemented. Tocomwall's request for a program of subsurface testing within the Project area is noted. However, in view of the low probability of impacts to the area of high archaeological sensitivity identified at the northern end of the Cleared Area West of Line 3 (see responses above) and assessed levels of archaeological sensitivity across the Project area, AECOM propose that such testing is unwarranted. OEH guidelines hold that archaeological test excavation is necessary when it can be demonstrated through a review of existing background data that sub-surface Aboriginal objects with potential conservation value have a high probability of being present in an area, and the area cannot be substantially avoided by the proposed activity. For the current Project area, background data and field observations suggest that the only portion of the Project area with the potential to contain sub-surface Aboriginal objects with conservation value is the identified area of high archaeological sensitivity at the northern end of the Cleared Area West of Line 3. Testing in this instance is unwarranted given a low likelihood of Project impacts and proposed in-situ protection through geo-matting. Geo-matting, in this instance, is advocated over archaeological excavation, which is an inherently destructive process.

4.0 Landscape Context

The nature and distribution of Aboriginal archaeological materials are closely linked to the environments in which they occur. Environmental variables such as topography, geology, hydrology and vegetation will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country. Amongst other things, these variables affected the availability of suitable campsites, drinking water, plant and animal resources and raw materials for the production of stone and organic implements. Accordingly, any attempt to predict or interpret the character and distribution of Aboriginal sites in a given landscape must take such environmental factors into account. At the same time, an assessment of historical land use activities and geomorphic processes, both contemporary and historic, allows predictions to be made concerning the survival, visibility and integrity of Aboriginal archaeological materials within the same landscape.

4.1 Physical Setting

As indicated in **Section 1.2**, the Project Area is located to the immediate north of the township of Kurri Kurri, approximately 29 km northwest of Newcastle and 5 km southwest of Maitland in the Lower Hunter Valley of NSW. Reference to the Cessnock 1:100,000 Topographic Map Sheet (9132-2N) indicates that the Project Area, which covers an area of approximately 78 hectares across the Cessnock LGA, is situated between MGA grid coordinates 356900 and 358200 east and 6370500 and 6371600 north (Zone 56).

Surrounding townships and hamlets include Abermain to the west-southwest, Heddon Greta to the southeast, Weston to the southwest and Gillieston Heights to the northeast. Parks and reserves in the surrounding area, meanwhile, include the Werakata National Park to the west and southwest, Cessnock State Forest to the west, the Lower Hunter National Park to the south and the Heddon Greta Reserve to the southeast.

Reference to the NSW Geographical Names Register indicates that the Project Area is situated within the Parish of Heddon in the County of Northumberland. Land within the Project Area has been registered as Lots 1 (part), 2 and 3 (part) on DP456769 (part), Lots 318 (part), 319 (part), 769 (part) and 420 on DP755231 (part) and Lots 411, 412, 413, 414 (part) and 415 (part) on DP755231.

4.2 Topography

The natural topography of the Project Area has, for the most part, been grossly modified by the construction of the Smelter and affiliated ground disturbance activities. Nonetheless, available topographic data indicate that prior to Smelter construction, the land now occupied by the main Hydro Smelter complex comprised part of a broad elevated flat or 'plateau' separating Swamp Creek in the east and an unnamed 2nd order tributary of Black Waterholes Creek in the west. To the northwest of the Smelter, a bordering open drainage depression associated with the unnamed tributary appears to have given way, to the west, to a very gently to gently inclined simple slope (1-10%) associated with a locally prominent hill (25 m AHD). Historical disturbances to the crest and side slopes of this hill within the Project Area have included clean fill storage, clay extraction and powerline installation.

Elevations within the Project Area range from 10 to 27 m Australian Height Datum (AHD) providing a total local relief of up to 17 m. Natural slopes are predominantly very gently to gently (1-10%) inclined. Following Speight (2009), a breakdown of the relative representation of morphological landform units within the Project Area is provided in **Table 7**. Identified landform units are shown on **Figure 4**.

Table 7 Morphological landform units within the Project Area

Landform unit	Area (ha)	%
Disturbed	76.2	94.2
Simple slope	2.6	3.3
Elevated flat	1.8	2.2
Crest	0.2	0.3
Total	**80.8**	**100**

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AECOM

LANDFORM UNITS

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 4

4.3 Hydrology

The Project Area falls within the Swamp Creek sub-catchment of the broader Hunter River catchment and, as shown on **Figure 5**, is bisected by an unnamed 2nd order tributary of Black Waterholes Creek (**Plate 1**). Named watercourses in the immediate vicinity of the Project Area include Black Waterholes Creek and Swamp Creek[1], both of which discharge into Wentworth Swamp to the north of the Smelter. Black Waterholes Creek enters Hydro-owned land to the west of the Smelter as a 3rd order stream, while Swamp Creek enters it to the southeast of the Smelter as a >4th order stream. Terraces along the latter attest to its lateral and vertical migration over time. Swamp Creek joins Wallis Creek at Louth Park *c*.3.4 km northeast of the Project Area which, in turn, discharges into the Hunter River at Horseshoe Bend approximately 6 km northeast of the site. Both creeks are susceptible to flooding from the Hunter River, particularly in their lower reaches.

At its closest point, Wentworth Swamp, a permanent wetland system that covers an area of approximately 1,300 hectares downstream of Kurri Kurri, is located approximately 900 m north of the Project Area. Today, Wentworth Swamp comprises a freshwater wetland and is one several Lower Hunter wetland systems that has been incorporated into the NSW Scientific Committee's *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Endangered Ecological Community*. However, prior to the construction of the Wallis Creek Floodgates[2] and the implementation of other Lower Hunter Valley Flood Mitigation Scheme measures, the swamp would have consisted of an estuarine environment subject to the daily tidal cycle of the Pacific Ocean[3], albeit one characterised by a complex mosaic of brackish and freshwater micro-environments.

Plate 1 **View across part of unnamed 2nd order stream that bisects the Project Area. Note extensive modification associated with smelter and causeway construction.**

[1] Downstream of Wentworth Swamp, Swamp Creek is also known as Fishery Creek.
[2] First constructed in 1870, the Wallis Creek Floodgates were reconstructed in 1876 and again in 1941
[3] The tidal limit in the Hunter River occurs in the vicinity of Oakhampton, approximately 64 km from the Pacific Ocean.

HUNTER EXPRESSWAY
Frame Drive
Sawyers Gully Road
M15
Black Waterholes Creek
Wentworth Swamp
Swamp Creek
Dickson Road
Metcalfe Lane
Bishops Bridge Road
Hart Road
Scales Road
Horton Road
Loxford
Heddon Greta

KEY

- Project area
- Road
- Railway
- Watercourse

Stream Order

- 1st
- 2nd
- 3rd
- 4th
- > 4th

0 0.5 1km

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AECOM

HYDROLOGY

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 5

4.4 Soils and Geomorphology

4.4.1 The Hunter 'Delta'

As shown on **Figure 6**, the Project Area is located at the western extremity of the Hunter "delta", a term first used by David and Etheridge (1890) to describe the broad expanse of floodplains, swamps and channels extending some 35 km inland from the coast at Newcastle. More recently, this same region has been described by Chappell (1993) as a coastal or fluvio-deltaic lowland, the boundaries of which correspond to those portions of bedrock palaeovalleys occupied by Pleistocene and Holocene estuaries now infilled with a "complex assemblage of fluvial, estuarine and coastal-marine sediments of various ages" (Roy et al., 1995: 70). The present day floodplains, swamps and channels of the lower Hunter, Patterson and Williams Rivers define a large infilled estuary whose upper reaches were just west of Maitland (Roy et al., 1995: 70) (**Figure 7**). In common with other southeastern Australian coastal river valleys, formation of the Hunter delta's former Pleistocene and Holocene estuaries was closely tied to glacio-eustatic fluctuations in sea level, the last major cycle of which commenced around 130,000 years ago with the Last Interglacial phase of high sea levels and warm temperatures (Roy et al., 1995: 61) (**Figure 8**).

During the Last Interglacial, *c*.130,000 to 115,000 years ago, conditions in the Hunter delta are believed to have been similar to the present day with an extensive deltaic floodplain blanketing the Lower Hunter Valley (Roy et al., 1995: 70). Raised estuarine shell beds in the greater Maitland area, investigated by David and Etheridge (1890) and others (e.g., Thom & Murray-Wallace, 1988), have been assigned to this phase of sedimentation and are indicative of a sea level around 5 m higher than that of today (Roy et al., 1995: 70). Associated terrace deposits, the modern distribution of which has been mapped by Roy et al. (1995) (**Figure 7** and **Figure 8**), are remnants of the Last Interglacial floodplain that once covered the lower Hunter valley. The 'Inner Barrier' of the Newcastle Bight Sand Barrier System was also deposited at this time (Roy et al., 1995: 70).

Incision of the present day rivers of the Hunter delta into their respective valleys commenced with the onset of glacial cooling and its attendant (progressive) reduction in sea levels. Erosion and transportation of much of the Last Interglacial floodplain in the millennia leading up to and comprising the Last Glacial Maximum (LGM) (*c*.24,000 to 17,000 years ago) have been attributed to prolonged sub-aerial weathering and the lateral migration of river channels across this low gradient floodplain (Roy et al., 1995: 71). During the LGM, the coastline of the Hunter River 'delta' was on the continental shelf around 25km east of its present position. A zone of gravelly sands on the inner shelf marks the course of the Hunter palaeo channel (Roy & Crawford, 1980). Rising sea levels associated with the Post-glacial marine transgression (*c*.20-6.5ka) subsequently inundated the inner shelf and much of the Lower Hunter Valley, resulting, at the end of the transgression, in an estuary extending approximately 35 km inland from present coastline (**Figure 9**). Initiation of the Outer Barrier of the Newcastle Bight Sand Dune System can also be traced to this period, with sandy shelf deposits reworked landward from *c*.18,000 years ago (Dean-Jones, 1990: 24). Progradation of the Outer Barrier followed the cessation of sea level rise *c*.6,500-6,000 years ago and marked the commencement of "a new cycle of estuarine and deltaic sedimentation" in the Lower Hunter Valley (Roy et al., 1995: 71).

Mid-to-late Holocene sedimentation in the Hunter delta has been discussed in detail by Roy et al. (1995) who describe a dual infilling process involving the building of tidal delta marine sand into the estuary mouth from the open ocean and the deposition of land-supplied fluvial-estuarine sediments through rivers and creeks. Estuarine environments were most common during the mid-Holocene (*c*.6-4 ka) but have progressively decreased in size through estuary infilling. In the case of Wentworth Swamp, progressive infilling associated with a prograding Hunter River delta and sediment influx from local creeks will have slowly transformed what was a shallow estuarine water body into the terrestrial swamp system of today.

Estuarine muds associated with the Hunter palaeoestuary vary laterally in response to existing environmental conditions. Towards the coast, where salinity levels are relatively stable and the estuary is marine-dominated, the muds are shell-rich. However, further inland, organic-rich muds with less shell predominate, a product of significantly higher freshwater inflows (Roy et al., 1995: 76). At Maitland, *c*.8 km northeast of the Project Area, estuarine muds are up to 17 m thick and contain fluvial deltaic sand units. These muds are overlain by up to 8 m of Holocene flood plain alluvium, with well-developed levees present (Roy et al., 1995: 77). Flood plain deposits in this and other portions of the Hunter palaeoestuary have been described as consisting of "complexly interbedded muddy sands and sandy muds with minor organics" (Roy et al., 1995: 71). Sand levels are highest in levees adjacent to the Hunter River and decrease towards backswamps such as Wentworth Swamp.

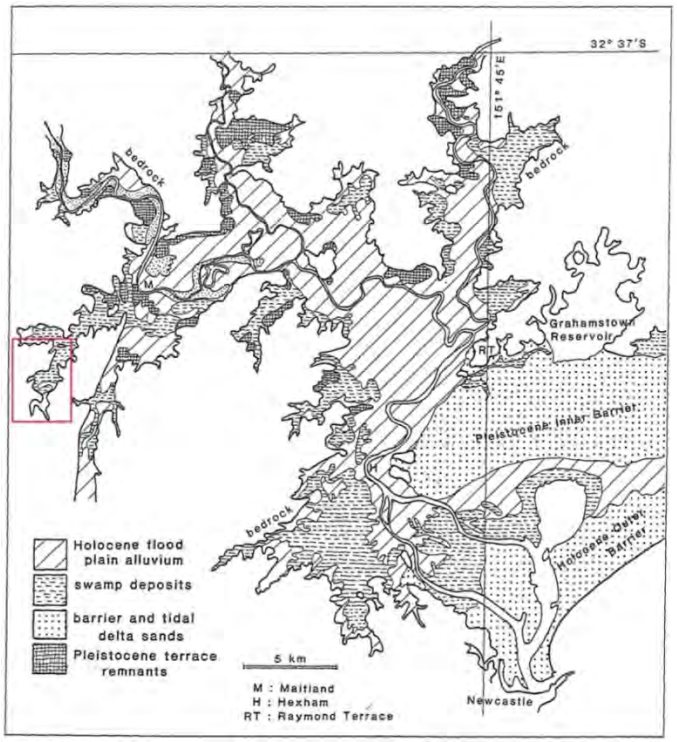

Figure 6 **Map of the Hunter "delta" showing the floodplain and backswamps of the lower Hunter, Williams and Patterson Rivers as well as remnant Pleistocene terrace deposits and the coastal sand barriers of the Newcastle Bight Sand Dune System (from Roy et al., 1995: 66, Fig. 2). Approximate location of Hydro smelter and its surrounding buffer land marked in red.**

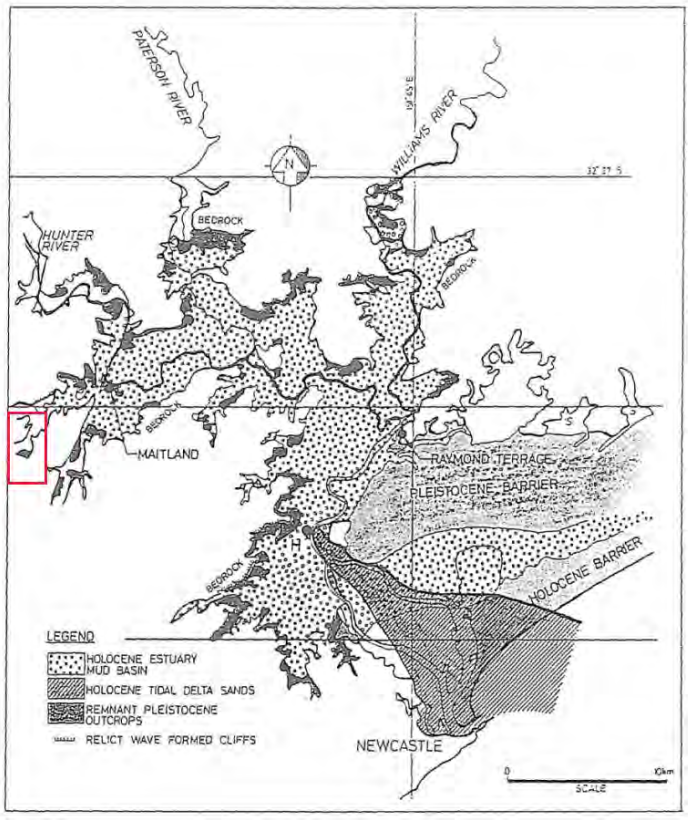

Figure 7 **Map showing the aerial extent of the main Holocene valley fill lithofacies of the Hunter "delta" (from Roy et al., 1995: 72, Fig. 6). Approximate location of Hydro smelter site and its surrounding buffer landmarked in red.**

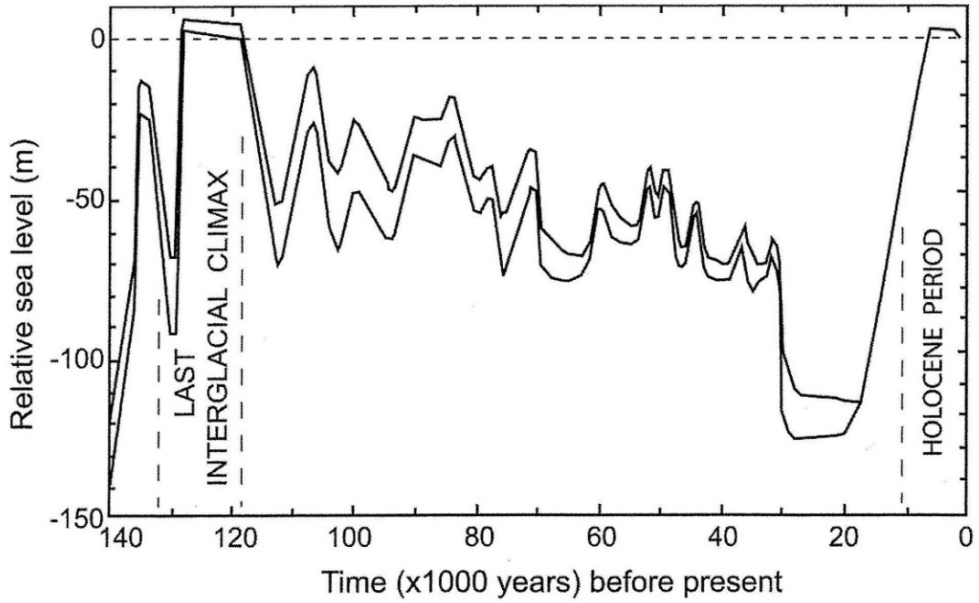

Figure 8 **Sea-level changes since the last Inter-glacial period (from Lambeck & Chappell, 2001)**

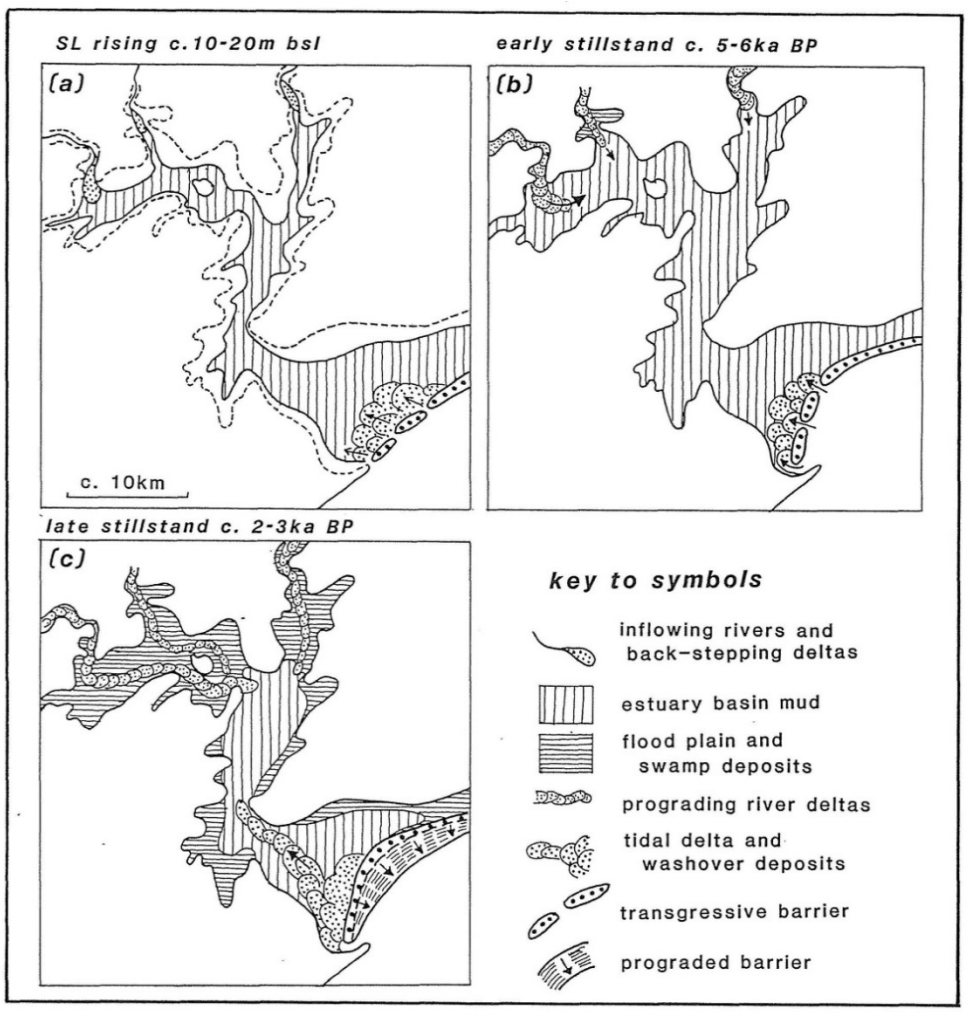

Figure 9 **Evolutionary model of the Hunter "delta" (from Roy et al., 1995: 75, Fig. 9).**

4.4.2 Soils and Soil Landscapes

Reference to the soil landscape maps produced for the Singleton 1:250,000 Map Sheet (Kovac & Lawrie, 1991) and Newcastle 1:100,000 Map Sheet (Matthei, 1995) indicates that soils within the Project Area have been mapped as belonging to the Neath (nh) Soil Landscape, with surrounding landscapes including the Hunter (hu & hua), Branxton (bx) and Bolwarra Heights (bh & bha) landscapes. **Table 8** summarises the key characteristics of these landscapes and their dominant soil materials.

More broadly, available soils data for the Project Area and environs suggest a strong spatial correlation between extant soils and underlying geological units. In floodplain and swampy backplain contexts, A horizon soils consisting of weakly to well-structured clays and pedal loams are inferred from type locations and are expected to overlie medium clays (B Horizons) (Matthei, 1995: 172). Outside of these contexts, texture contrast soil profiles with gravelly loam, sandy loam, sandy clay loam and loamy sand A horizons and clay B Horizons are anticipated (after Kovac & Lawrie, 1991; Matthei 1995), as are deep (>1m) but relatively localised fluvial sand deposits. The latter are expected to be concentrated on landform elements associated with Swamp and Black Waterholes Creeks (e.g., low bordering spur crests and terraces).

Aeolian sand deposits associated with Story et al.'s (1963) Warkworth Land System may also occur in the vicinity of the Project Area, with the valley housing Black Waterholes Creek, in particular, retaining significant potential for the presence of such features in view of available land systems mapping (**Figure 10**). These deposits are principally Pleistocene in age but contain loose surface layers that were likely remobilised and reworked during the Holocene. Previous geomorphological investigations of an aeolian sand sheet identified along the western side of Chinamans Hollow Creek to the southwest of the Project Area concluded that A horizon sands in that feature were likely of Holocene antiquity on the basis of their looseness and lack of weathering (Hughes, 2002b in ERM, 2003). The typological characteristics of the flaked stone assemblage recovered from these sands were likewise deemed consistent with a Holocene date (ERM, 2003: 51). No stone artefacts were recovered from, or observed within, the coarser, more compact and variably weathered B Horizon sands of the Chinamans Hollow Creek sand sheet, which were assigned, by analogy with other Hunter Valley aeolian sand deposits, a Pleistocene date (Hughes, 2002b in ERM, 2003).

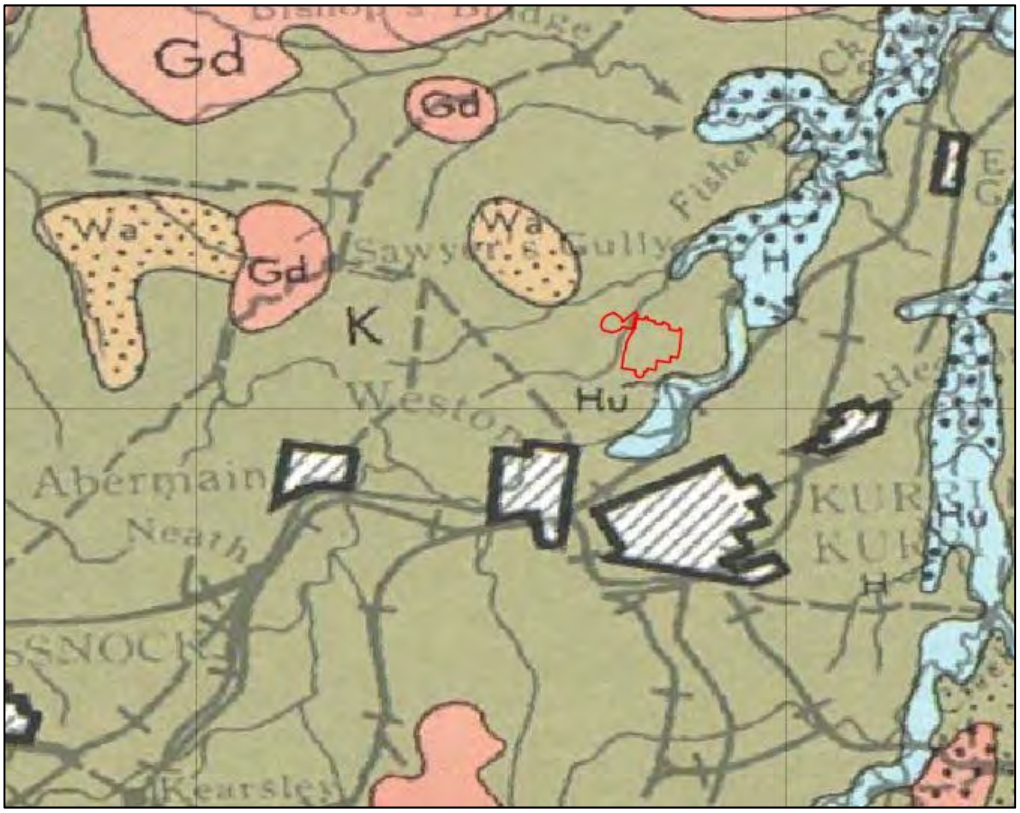

Figure 10 **Georeferenced excerpt from Galloway et al.'s (1963) Land Systems of the Hunter Valley Area Map Sheet showing the location and extent of the Warkworth Land System (Wa) adjacent to the Project Area.**

Table 8 Soil landscapes of the Project Area and environs and their dominant soil materials. Soil and landscape data from Kovac & Lawrie (1991) and Matthei (1995).

Soil Landscape & Associated Codes	Geological Unit(s)	Topography	Dominant soils (horizon)	Soil pH	Erodibility[1]	Permeability	Occurrence & Relationships
Neath (nh)	Branxton Formation	Undulating low rises and swamps. Slope gradients up to 3%. Elevations from 40 to 80m. Local relief under 30m.	Grey Solodic Soils *Topsoil*: Clayey sands to loamy sands *Subsoil:* Sandy clay	 9.0 8.5	*Topsoil*: Low *Subsoil:* High	*Topsoil & Subsoil*: High	Melaleuca flats *Topsoil:* Depth to 35 cm *Depth to bedrock:* +50 cm
			Yellow Solodic Soils	N/A	N/A	N/A	N/A
Hunter (hu, hua & hub)	Quaternary alluvium	Extensive alluvial plains on recent alluvium. Slope gradients <1%. Elevation 2-11m. Local relief to 2m. *Landscape variant hua*: swampy backplains *Landscape variant hub*: ox-bows, recent overbank deposits, crevasse splays and broad levees	hu1 - Friable brown pedal loam (A Horizon)	6.0-7.5	NC: moderate C: moderate W: very low	Moderate	*On floodplains:* Typically, 10-80 cm of hu1 overlies >150 cm of hu5. *On backplains & backswamps*: 10-65 cm of hu2 overlies >80 cm of hu5
			hu2 - Brownish black well-structured clay (A Horizon)	5.5-7.0	NC: moderate C: moderate W: very low	Moderate to low	
			hu3 - Weakly structured brown sand clay loam (A Horizon)	6.0-7.5	NC: moderate C: moderate W: low	Moderate	
			hu4 - Loose dark brown sand (A_1 Horizon)	6.0-6.5	NC: very low C: high W: moderate	High	
			hu5 - Pedal brownish black silty clay to medium clay (B horizon)	6.0-7.5	NC: moderate C: high W: very low	Slow	
			hu6 - Brown well-structured loam (B horizon)	7.0-7.5	NC: very low C: high W: moderate	Moderate	
Bolwarra Heights (bh & bha)	Branxton Formation, Muree Sandstone, Greta Coal Measures and Farley Formation	Rolling low hills. Slope gradients 5-20%. Elevation up to 100 m. Local relief to 80 m. *Landscape variant bha*:	bh1 – Brownish black gravelly loam (A_1 Horizon)	5.5-6.0	NC: moderate C: high W: very low	Moderate to high	*Generally*: Up to 25 cm of bh1 overlies 15-20 cm of bh2, which in turn overlies 75-103 cm of bh3. *Some well drained upper slopes and crests*: up to 25 cm of bh1 overlies
			bh2 – Earthy gravelly sandy clay loam (A_2 Horizon)	5.0-6.5	NC: high C: high W: very low	Moderate	

Soil Landscape & Associated Codes	Geological Unit(s)	Topography	Dominant soils (horizon)	Soil pH	Erodibility[1]	Permeability	Occurrence & Relationships
		shallow (<50 cm) soils	Yellowish brown pedal clay (B_2 Horizon)	4.5-5.5	NC: moderate C: moderate W: very low	Moderate to slow	15-30 cm of bh2, which in turn overlies 30-45 cm of bh4. Occasionally, up to 35 cm of bh1 directly overlies bh4. *Poorly drained slopes*: up to 25 cm of bh1 overlies up to 20 cm of bh2, which in turn overlies up to 30 cm of bh3 *In drainage lines:* >100 cm of bh1
			Reddish brown pedal mottled clay (B Horizon)	5.5-6.0	NC: moderate C: moderate W: very low	Moderate to slow	
Branxton (bx)	Farley Formation, Rutherford Formation, Mulbring siltstone, Muree Sandstone, Branxton Formation and Singleton Coal Measures	Undulating rises to low hills and creek flats. Slope gradients 3-5%. Elevations from 50 to 80m. Local relief is 10-40m.	Yellow Podzolic Soils *Topsoil*: Sandy loams to loamy sands *Subsoil:* medium clays	5.5-6.5 5.5	*Topsoil*: Moderate *Subsoil:* Low	*Topsoil & Subsoil*: Slow	Midslopes *Topsoil:* Depth to 20 cm *Depth to bedrock:* +100 cm
			Red Podzolic Soils *Topsoil*: Fine sandy loams to sandy loams *Subsoil:* medium clays	5.5-6.0 6.0	*Topsoil*: Moderate *Subsoil:* Low to Moderate	*Topsoil & Subsoil*: Moderate	Crests and upper slopes *Topsoil:* Depth to 25 cm *Depth to bedrock:* +65 cm
			Yellow Soloths *Topsoil*: Loamy sands to fine sandy loams *Subsoil:* medium clay	6.0-6.5 5.5	*Topsoil*: Moderate *Subsoil:* High	*Topsoil & Subsoil*: Moderate	Lower slopes and drainage lines *Topsoil:* Depth to 25 cm *Depth to bedrock:* +140 cm
			Alluvial Soils (Sands) *Topsoil*: Loamy sands	6.0	*Topsoil*: Low *Subsoil:* Low	*Topsoil & Subsoil*: High	Creek flats and slopes *Topsoil:* Depth to 20 cm *Depth to bedrock:* +60 cm

Soil Landscape & Associated Codes	Geological Unit(s)	Topography	Dominant soils (horizon)	Soil pH	Erodibility[1]	Permeability	Occurrence & Relationships
			Siliceous Sands *Topsoil*: Sandy loams *Subsoil:* Loamy sand	 6.0-7.0 5.5	*Topsoil*: Moderate *Subsoil:* Moderate	*Topsoil & Subsoil*: High	Large valley flats *Topsoil:* Depth to 70 cm *Depth to bedrock:* +100 cm
Neath (nh)	Branxton Formation	Undulating low rises and swamps. Slope gradients up to 3%. Elevations from 40 to 80m. Local relief under 30m.	Grey Solodic Soils *Topsoil*: Clayey sands to loamy sands *Subsoil:* Sandy clay	 9.0 8.5	*Topsoil*: Low *Subsoil:* High	*Topsoil & Subsoil*: High	Melaleuca flats *Topsoil:* Depth to 35 cm *Depth to bedrock:* +50 cm
			Yellow Solodic Soils	N/A	N/A	N/A	N/A

[1] NC = Non-concentrated flows; C = Concentrated flows; and W = Wind

4.5 Flora and Fauna

Native vegetation within the Project Area has been significantly modified as a result of historical European land use practices, with the majority cleared historically as a result of the construction and subsequent expansion of the Hydro aluminium smelter (FloraSearch, 2004, 2008). Nonetheless, areas of regenerating native vegetation within and surrounding the Project Area provide insight into the pre-European settlement floral regime of the site. Specifically, these suggest that the native vegetation of the Project Area would have comprised a mixture of low open woodland and tall open forest, with the former covering the majority of the site and the latter restricted to more elevated areas in the west of the Project Area.

Characteristic canopy and sub-canopy species in woodland areas will have included the Narrow-leaved Apple (*Angophora bakeri*), Parramatta Redgum (*Eucalyptus parramattensis* ssp. *decadens*), Brown Stringybark (*E. capitellata*) and Tea Trees (*Melaleuca* spp.). A floristically diverse shrub and ground will also have been present, with the Epacridaceae, Proteaceae, Fabaceae, Myrtaceae, Cyperaceae, Lomandraceea and Orchidaceae families particularly well represented. In open forest areas, a canopy dominated by Broad-leaved Ironbark (*E. fibrosa*) will have given way to a very dense tall shrub/low tree layer dominated by Tea Trees (*Melaleuca* spp.), Blackthorn (*Bursari spinosa*) and Yellow Tea-tree (*Leptospermum polygalifolium* ssp. *cismontanum*).

More broadly, the buffer zone surrounding the Smelter supports a diverse range of natural vegetation communities, with different communities occupying different landscape positions. Permanent and ephemeral wetlands associated with Wentworth Swamp support a characteristic suite of freshwater wetland vegetation, albeit one that varies across in relation to water permanency and depth. Wetland-bordering forest communities, now almost completely cleared, would have included species such as Forest Redgum (*Eucalyptus tereticornis*), Swamp Oak (*Casuarina glauca*), Snow-in-Summer (*Melaleuca linariifolia*) and Cabbage Gum (*Eucalyptus amplifolia*). For the most part, existing wetlands are surrounded by cleared pasture land characterised by introduced pasture grasses, legumes and weeds. Where clearance has not occurred, slopes above the Project Area's wetlands support a clear succession of Redgum and Grey Gum sub-communities which give way, on poorly drained soils, to low heathy woodlands. Woodland composition changes upslope becoming more open and grassy. Upper slopes and crests support tall dry forests Ironbark and Spotted Gum while riparian forest communities of variable floristic composition are also present along watercourses and on adjoining lower slopes.

Although available historical records provide only limited insight into Aboriginal exploitation of plants within the Hunter Valley (Brayshaw, 1987: 74), it can be confidently asserted that the original vegetation communities of the Project Area and environs will have supplied Aboriginal people camping within or passing through the site with an extensive array of edible and otherwise useful plant species (**Table 9**). Recorded native vegetation communities and locally occurring aquatic features (e.g., Wentworth Swamp, Blackwater Holes Creek) will likewise have supported a large and diverse range of economic terrestrial, aquatic and avian fauna. Historical evidence for the Aboriginal exploitation of faunal and floral resources within the Lower Hunter Valley is discussed in further detail in **Section**.

Table 9 Selection of economic plant species identified within the Project Area and surrounding buffer zone

Botanical name	Common name	Potential Use(s)	Reference(s)
Acacia spp.	Acacia	Seeds & gum edible; wood suitable for making range of implements; bark & gum have medicinal properties	Stewart & Percival, 1997
Eucalypt spp.	Eucalypts	Bark has multiple uses (e.g., shelter, shields, baskets, fish nets); wood suitable for making range of implements (e.g., spears, clubs); leaves, gum & bark have medicinal properties	Stewart & Percival, 1997; Isaacs, 2002
Banksia spp.	Banksia	Nectar can be sucked from flowers or flowers soaked in water to make sweet liquid	Stewart & Percival 1997; Isaacs, 2002: 218

Botanical name	Common name	Potential Use(s)	Reference(s)
Lambertia formosa	Mountain Devil	As above	Stewart & Percival, 1997
Grevillea spp.	Grevillea	As above	Isaacs, 2002: 224
Hypoxis hygrometrica	Golden Weather-grass	Tubers edible	Isaacs, 2002: 224
Dianella revoluta	Blue Flax Lily	Fruits and seeds edible; roots also edible after pounding and roasting; leaf fibres can be used for string	Stewart & Percival, 1997
Eleocharis sphacelata	Tall Spike-rush	Onion-shaped tubers edible fresh (young) or roasted (older)	Stewart & Percival, 1997
Bursaria spinosa	Blackthorn	Nectar can be sucked from flowers	Isaacs, 2002: 219
Gahnia radula	Thatch Saw-sedge	Seeds can be pounded to produce flour; leaf bases are edible	Stewart & Percival, 1997
Lomandra longifolia	Spiny-headed Matrush	Leaf bases and flowers edible; leaves can be used to make baskets	Stewart & Percival, 1997
Marsilea spp.	Nardoo	Roots can be pounded, meal mixed with water and resulting dough baked	Isaacs, 2002: 225
Melaleuca spp.	Paperbark & Honeymyrtle	Nectar-filled flowers can be soaked in water to sweeten it; bark has multiple uses; (e.g., shelter, dressing for wounds, wrapping)	Stewart & Percival, 1997
Callistemon spp.	Bottlebrush	Flowers can be sucked for nectar	Isaacs, 2002: 219
Persoonia linearis	Narrow-leaved Geebung	Fruits edible	Stewart & Percival, 1997
Portulaca oleracea	Pigweed	Leaves, stems and seeds edible	Stewart & Percival 1997
Cassytha spp.	Devil's Twine	Fruits edible	Low, 1988
Pteridium esculentum	Bracken Fern	Rhizomes and fronds edible; rhizomes must be baked or roasted to destroy toxins; young stems can be rubbed on insect bites to relieve stinging/itching	Stewart & Percival, 1997
Typha orientalis	Cumbungi	Rhizomes edible after roasting; fibres can be used to make string; young shoots can be eaten raw; flower spikes can be steamed and eaten	Stewart & Percival, 1997
Xanthorrhoea glauca	Grass Tree	Leaves produce hard waterproof resin that melts when warmed as can be	Stewart & Percival, 1997

Botanical name	Common name	Potential Use(s)	Reference(s)
		used as binding agent; flowers can be sucked or soaked in water to make sweet drink; leaf bases and growing points edible	
Phragmites australis	Common Reed	Roots edible; Straight flowering stems can be used as spear shafts; leaves can be twisted into rope	Zola & Gott, 1992: 12
Triglochin procerum	Water Ribbons	Tubers edible	Zola & Gott, 1992: 12
Bolboschoenus fluviatilis	Marsh Clubrush	Round corms can be roasted, pounded and made into edible starchy cakes	Zola & Gott, 1992: 13
Arthropodium minus	Small Vanilla Lily	Tubers edible	Zola & Gott, 1992: 25
Clematis glycinoides	Headache Vine	Roots edible; crushed leaves can be inhaled to relieve headache	Zola & Gott, 1992: 25
Eustrephus latifolius	Wombat Berry	Tuberous roots edible	Cribb & Cribb, 1974: 174
Exocarpus strictus	Dwarf Cherry	Fruits edible	Zola & Gott, 1992: 39
Burchardia umbellata	Milkmaids	Roots edible after cooking	Zola & Gott, 1992: 43
Caesia parviflora	Pale Grass-lily	Tubers edible	Zola & Gott, 1992: 44
Thysanotus tuberosus	Fringed Lily	Tubers edible	Zola & Gott, 1992: 44
Diuris sulphurea	Tiger Orchid	Tubers edible	Zola & Gott, 1992: 45
Exocarpus cupressiformis	Native Cherry	Fruits edible	Cribb & Cribb, 1974: 34
Angophora floribunda	Rough-barked Apple	Sap has medicinal properties	Lassak & McCarthy, 2001
Pterostylis spp.	Greenhood orchids	Tubers edible	Zola & Gott,1992: 46
Thelymitra spp.	Sun orchids	Tubers edible	Zola & Gott, 1992: 46
Geranium spp.	Native Geranium	Tubers edible	Zola & Gott, 1992: 47
Rubus parvifolius	Native raspberry	Fruits edible	Zola & Gott, 1992: 49
Billardiera scandens	Apple-berry	Fruits edible	Zola & Gott, 1992: 49
Astroloma humifusum	Cranberry heath	Fruits edible	Zola & Gott, 1992: 50
Centipeda cunninghamii	Common Sneezeweed	Plant can be soaked/boiled and resulting liquid used as a tonic for colds and chest complaints	Zola & Gott, 1992: 53
Amyema guadichaudii	Mistletoe	Fruits edible	Zola & Gott, 1992: 53
Themeda australis	Kangaroo Grass	Seeds edible (ground and baked as cakes); leaves and stems contain fibre that can be used to produce string	Zola & Gott, 1992: 58
Poa sp.	Tussock grass	Fibre from grass can be used to make string nets for nets, baskets and mats.	Zola & Gott, 1992: 58

Botanical name	Common name	Potential Use(s)	Reference(s)
Panicum effusum	Hairy panic grass	Seeds edible (ground and baked)	Issacs, 2002: 226

4.6 European Settlement

Formal European settlement of the greater Kurri Kurri area can be traced to the first half of the 19th century, with John Howe's pioneering expeditions to the Hunter Valley in 1819 and 1820 prompting the construction of the Great North Road (1826-1836) and opening up the Swamp and Wallis Creek valleys for free settlement (Pike et al., 1994). With the access afforded by the Great North Road and Hunter River at nearby Maitland, the 1820s and 30s saw numerous land grants made and taken up in the greater Kurri Kurri area. The earliest of these grants, dated 21 February 1821, was made to one Benjamin Blackburn. Blackburn was granted a 400 acre parcel of land on the banks of Wallis Creek at Richmond Vale. To the northwest of Blackburn's grant, around present day Kurri Kurri, available historical records (including parish maps) indicate that for most, if not all, of the 19th century, the southern half of the Project Area comprised part of a 600 acre property granted to, or purchased by, John Callaghan, a servant of local identity Captain Hungerford (**Figure 11**). The northern half of the Project Area, in contrast, appears to have been reserved as a Village Reserve (V.R.) Regarding the use(s) of the land owned by John Callaghan, available historic reference materials suggest an emphasis on beef cattle rearing / grazing, which appears to have comprised the surrounding district's dominant industry until the development of the South Maitland Coalfields in the early 1900s. Unlike areas further to the west, local soils were reportedly unfavourable for crop farming (i.e., principally wheat, but also maize, potatoes and tobacco) (Pike et al., 1994: 6).

The full potential of the South Maitland Coalfields was not realised until Professor T. W. Edgeworth David's detailed survey of 1886. David's discovery of the Greta Coal Measures prompted the then Department of Mines to reserve almost 12,000 hectares of land for coal mining purposes. By 1907, the year in which David's survey report was made public, ten collieries were operating or under development on the South Maitland Coalfields (Pike et al., 1994: 7). Prominent early mines around Kurri Kurri included the Heddon Greta (1900), Stanford Methyr (1900), Pelaw Main (1901) and Hebburn No. 1 (1902) collieries. These were easily sunk tunnel or incline mines. As mining of the seam became increasingly difficult, the 1910s and 20s saw a second generation of predominantly deep, high-cost shaft mines commence operation. Alongside the 1st generation collieries, these second generation collieries were served by an extensive network of privately-owned railway lines, known collectively as the South Maitland Railway. Within the current Project Area, this historically significant rail system is represented by the Aberdare Railway, which traverses the eastern third of the Project Area in a general north-south direction. Constructed between 1901 and 1904, the Aberdare Railway was opened in stages, with the section between Aberdare Junction and Weston completed in 1902, and the remaining section to Cessnock completed in 1904.

The growth of the coal mining industry resulted in a marked increase in the population of the greater Kurri Kurri area. By the early 1900s, the small villages that had been established around the major collieries like Stanford Methyr and Pelaw Main were no longer able to adequately accommodate the increasing number of workers and their families. Consequently, in 1902, a proposal for the establishment of the town of Kurri Kurri was approved by the Executive Council (Smith, 1979: 4). Land sales commenced the following year and the town of Kurri Kurri grew rapidly. The Kurri Kurri electoral roll of 1903 recorded a population of 1,200 persons, and by February of 1904, the town was being supplied with water (Smith, 1979: 5).

The coal mining industry continued to act as the 'economic base' of the Kurri Kurri area until the 1950s, at which time a large number of collieries began to close due to deepening seams, difficult ground conditions and a general reduction in coal markets. Given that the economy of the area had been largely dependent on the success of the coal mining industry, its decline had a devastating impact on the local economy. Widespread unemployment prompted many locals to move away from the area to pursue work elsewhere, resulting in a decline in the local population. At the same time, demand for local goods and services reduced, small business began to fail, real estate prices dropped and both private and public incomes were reduced (James B. Croft & Associates, 1980: 31).

It was in this depressed economic climate that Alcan Australia Limited (Alcan) made its decision in 1965 to build an aluminium smelter at Kurri Kurri. Establishment of the Smelter at Kurri Kurri was part of a State Government initiative to restore economic stability to the area (James B. Croft & Associates, 1980: 31). Construction works began less than two years later, with metal production commencing in 1969. An initial capacity of less than 25,000 tonnes of aluminium per annum was raised, through two expansion projects, to 150,000 tonnes per annum by 1985, with an associated workforce at this time of around 900 employees (Alcan Australia Limited, 1988: 2).

Under Alcan's ownership, approximately half of the aluminium metal from the Kurri Kurri smelter was sent to the company's fabrication plants in Sydney, Melbourne and Brisbane, with the remaining half exported to Japan, Southeast Asia and the USA (Alcan Australia Limited, 1988: 3). In mid-2000, the Kurri Kurri smelter was acquired by the German company VAW Aluminium AG, with the current owner - Norsk Hydro ASA - assuming ownership in 2002.

Alongside the production activities of the Kurri Kurri smelter itself, recent decades have seen land surrounding the Smelter used for a variety of purposes including recreational activities (e.g., Kurri Kurri Speedway), cattle rearing / grazing, dairying, horse rearing / training / grazing, hobby farming, turf cutting, rural residential development, environmental conservation and public/private transportation (e.g., the Hunter Expressway). The 'Wangara' property, which makes up a significant portion of the buffer zone surrounding the Smelter, is currently agisted by Hydro for the grazing of cattle. Under Hydro's ownership, Wentworth Swamp and areas of regenerating native vegetation within the buffer land have been fenced to exclude livestock and are monitored annually as part of Hydro's annual environmental management program.

Figure 11 **Georeferenced excerpt of 1896 Parish map for the Parish of Heddon (County of Northumberland) with Project Area boundary overlaid.**

4.7 Land Disturbance

Together with available literary records, historical aerial photographs for the Project Area provide a framework for assessing the nature and extent of past ground disturbances within it. Examination of aerials from 1952 (**Figure 12**), 1961, 1975 (**Figure 13**), 1980 (**Figure 14**), 1984, 1998 (**Figure 15**) and 2013, for example, indicate a range of land use activities and associated ground surface impacts across the site. These include:

- Native vegetation clearance;
- The construction and expansion of the Kurri Kurri aluminium smelter;
- Pastoral activities including livestock grazing and fencing;
- Hobby farming and ploughing;
- The construction of recreational sporting fields and race tracks; and
- The construction of essential services including power lines and roads.

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

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

Figure 16 comprises a land disturbance map for the Project Area. Two basic levels of disturbance are recognised: minimal to moderate and high. As shown, the majority of land within the Project Area can be characterised as highly disturbed. Areas of highly disturbed terrain within the Project Area are unlikely to retain evidence of past Aboriginal occupation in surface and subsurface contexts owing the severity of past ground surface disturbances that have occurred in these areas. Areas of minimal to moderate disturbance in the northwestern portion of the Project Area, in contrast, retain reasonable potential for the presence of Aboriginal archaeological materials in surface and subsurface contexts.

Figure 12 1952 aerial photograph of the Project Area and environs (Source: Land & Property Information NSW)

Figure 13 1975 aerial photograph of the Project Area and environs (Source: Land & Property Information NSW)

Figure 14 1980 aerial of the Project Area and environs (Source: Land & Property Information NSW)

Figure 15 1998 aerial photograph of the Project Area and environs (Source: Land & Property Information NSW)

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AECOM

LAND DISTURBANCE

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 16

4.8 Key Observations

Key observations to be drawn from a review of the environmental context of the Project Area are as follows:

- The majority of land within the Project Area has been grossly disturbed and retains little to no potential for Aboriginal archaeological materials;
- While limited, areas of minimal to moderate disturbance in the northwestern portion of the Project Area retain reasonable potential for the presence of Aboriginal archaeological materials in surface and subsurface contexts;
- Prior to European settlement, the floral and faunal resources of the Project Area and environs will have been sufficient to facilitate intensive and/or repeated occupation by Aboriginal people;
- Prior to European settlement, locally significant aquatic features (e.g., Wentworth Swamp, Swamp Creek and Black Waterholes Creek) will have been focal resource features for Aboriginal people occupying the Kurri Kurri area;
- Elevated, low gradient land surfaces in the vicinity of Wentworth Swamp and higher order watercourses, are likely to have been favoured for sustained/intensive occupation;
- The Project Area is located at the western extremity of what is known as the Hunter 'Delta', a term first used by David and Etheridge (1890) to describe the broad expanse of floodplains, swamps and channels extending some 35 km inland from the coast at Newcastle. More recently, this same region has been described by Chappell (1993) as a coastal or fluvio-deltaic lowland, the boundaries of which correspond to those portions of bedrock palaeovalleys occupied by Pleistocene and Holocene estuaries now infilled with fluvial, estuarine and coastal-marine sediments of various ages;
- Today, Wentworth Swamp, located *c*.900m to the north of the Project Area, comprises a freshwater wetland. However, prior to the construction to the Wallis Creek Floodgates and implementation of other Lower Hunter Valley Flood Mitigation Scheme measures, the swamp will have consisted of an estuarine environment subject to the daily tidal cycle of the Pacific Ocean, albeit one characterised by a complex mosaic of brackish and freshwater micro-environments;
- Outside of the Project Area, gravel deposits associated with the nearby Hunter River have been identified as a regionally significant source of lithic raw materials for flaked and edge-ground stone tool manufacture;
- If present, outcropping sandstone within the Project Area has the potential to exhibit grooves associated with the sharpening of stone hatchet-heads and/or wooden spears. Grinding groove sites, if present, are most likely to occur in the drainage depression bisecting the Project Area; and
- Native vegetation within the Project Area has been extensively modified as a result of European land use practices. Nonetheless, areas of regenerating native vegetation retain some, albeit limited, potential for mature trees with cultural scarring.

5.0 Archaeological Context

5.1 Regional Context - The Hunter Valley

Formal archaeological interest in the Aboriginal archaeological record of the Hunter Valley can be traced to the late 1930s, with 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-late1960s, 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 Valley (Moore, 1969, 1970, 1981).

Intensive development activities since this time have secured the Hunter Valley's place as one of the most intensively investigated archaeological regions in Australia, with hundreds, if not thousands, of Aboriginal archaeological investigations involving survey and/or excavation having now been undertaken, the majority as part of larger environmental impact assessments associated with coal mining projects. Not surprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. Nonetheless, together, they have generated a large and diverse body of evidence for past Aboriginal occupation, with thousands of Aboriginal sites now registered on OEH's Aboriginal Heritage Information Management System (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.

5.1.1 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 & Kamminga, 2000; MacDonald & Davidson, 1998; OzArk, 2013; Rich, 1992; Umwelt, 2006,Umwelt, in prep). 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[4] 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; Umwelt, 2006, in prep). Outside of these contexts, surface and subsurface artefact distributions have typically been found to be sparse and discontinuous and are often referred to as 'background scatter'.

Flaked stone artefacts dominate archaeological assemblages from recorded open artefact sites within the Hunter Valley (Hiscock 1986), 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

[4] 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.

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 floors assemblages were the product of a more restricted range of behaviours than more generalised scatters. Although limited to a single landscape, evidence from other parts of the Valley (e.g., Hiscock, 1986; Koettig, 1992, 1994) provides further support for the suggestion that backed artefact manufacture in the Hunter Valley was a highly structured activity.

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

Kuskie's (1994, 2000) 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).

5.1.2 Flaked Stone Artefact Technology

Flaked stone artefacts are a ubiquitous element of the Aboriginal archaeological record of the Hunter Valley and, such as, have assumed a preeminent 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 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 first the first appearance, in the mid-Holocene[5], 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, 2011). Tools of the Australian small-tool tradition, it has been suggested, formed part of a portable, standardised and multifunctional tool kit aimed specifically at risk reduction (Hiscock, 1994, 2006). Stone artefact assemblages from late Pleistocene and early Holocene contexts, in contrast, are described by archaeologists as belonging to the 'Australian core tool and scraper tradition', a term first used by Bowler *et al*. (1970) to describe the Pleistocene assemblages recovered from Lake Mungo in western New South Wales. Bowler *et al*. (1970) saw the main components of these assemblages - core tools, steep-edged scrapers and flat scrapers - as characteristic of early Australian Aboriginal assemblages and as being of a distinctly different character to those associated with small-tool tradition.

In southeastern Australia, including the Hunter Valley, the Australian small-tool and core tool and scraper traditions are most commonly described in terms of McCarthy's (1967) *Eastern Regional Sequence* (ERS) of stone artefact assemblages. 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, and the presence/absence of edge-ground hatchet-heads are also relevant.

Table 10 McCarthy's Eastern Regional Sequence (ESR) 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

[5] 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.

alluvial and colluvial gravel deposits[6] associated with the Hunter River and its tributaries as well as other terrestrial conglomerate units (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 17**). Heat treatment, notably, appears to have been 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.

Alongside the reconstruction of backed artefact manufacturing processes, the identification of diachronic change in Bondaian lithic technology in the Hunter Valley has also received considerable analytical and interpretive attention (e.g., Baker, 1992c; Haglund, 1989; Hiscock, 1986a, 1986b). Hiscock’s (1986a) pioneering attribute analysis of a sample of unretouched mudstone flakes recovered from the Sandy Hollow 1 rockshelter excavated by Moore (1970) is of particular significance in this regard and can be regarded as the foundation upon which subsequent studies have been carried out. This analysis sought to test a tripartite division of the Sandy Hollow 1 (SH1) assemblage made on the basis of chronological changes in the frequency of backed artefacts. Three phases were recognised: the *Pre-Bondaian*, with no backed artefacts, the *Phase I Bondaian*, with numerous backed artefacts and the *Phase II Bondaian*, with few backed artefacts. Attribute analysis of a sample of 742 complete mudstone flakes from Square AA revealed technological changes consistent with this division, including, but not limited to, changes in the relative frequency of platform preparation and overhang removal as well as flake shape and platform size (see **Table 11**).

Table 11 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; • Most 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 facetting and larger platform flaking); • Infrequent overhang removal; and	Numerous

[6] I.e., point and mid-channel gravel bars as well as terrace and ridge/slope gravel deposits.

Phase	Date range	Flake type	Knapping practices employed for flake production	Backed artefact frequency
			• High amounts of core rotation.	
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.

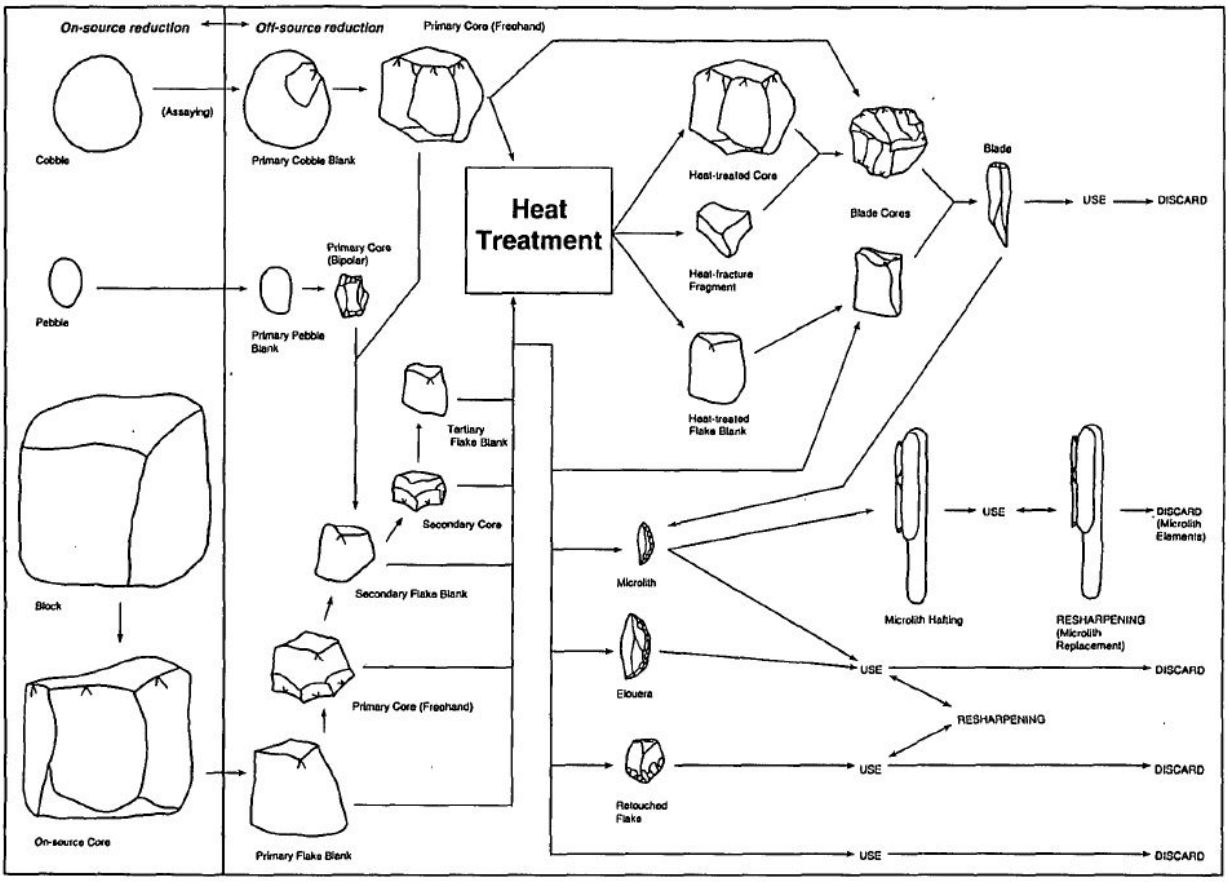

Figure 17: Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (from Moore 2000: 29, Fig. 5)

5.1.3 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 geared towards the production of robust flakes for immediate use or retouch into simple scrapers, with no evidence for the complex, hierarchically-organised reduction sequences typical of the mid-to-late Holocene. Tool edges, Moore (2000:36) notes, were refurbished by unifacial retouching. A preference for volcanic materials over silcrete and mudstone has also been noted (Baker, 1994; Koettig, 1990;1992:5), 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, 2004). 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 is the genesis of the texture contrast or duplex soils that are associated with the majority of the Valley's known open artefact sites/deposits. As Kuskie and Clarke (2004: 228) have noted, an understanding of the genesis of these soils, defined by Hughes (1984: 26) as those consisting of "an A horizon of massive, sandy to silty material which gives way abruptly down the profile to clayey material with a blocky structure", is critical for determining both the antiquity and integrity of any Aboriginal archaeological materials contained within them.

Of particular relevance to archaeologists is the observation that while the 'A' and 'B' horizons of some texture contrast soils do, in fact, form a pedogenetic entity, having formed from *in-situ* weathering of parent materials, this is not always the case, with some 'A' horizons representing later colluvial deposits (Dean Jones & Mitchell, 1993). In the Hunter Valley, available radiocarbon determinations and typological data for flaked stone assemblages recovered from excavated 'A' soil horizons have tended to support Hughes' (1984:28) widely cited suggestion that these horizons accumulated over the last 5,000 years. Nonetheless, the potential for older A horizon soils has also been demonstrated (Koettig, 1992: 61; see also Kuskie & Clarke, 2004).

Drawing, in particular, on the research of Humphreys and Mitchell (1983) and Mitchell (1988), Dean Jones and Mitchell (1993) have considered in detail the archaeological implications of existing genesis models for texture contrast soils, both within and outside of the Hunter Valley. Key observations to be drawn from Dean Jones and Mitchell's (1993) review are as follows:

1) Duplex soils do not necessarily indicate great age;

2) Open sites located on texture contrast soils can never be truly stratified in a chronologically useful sense;

3) Stone artefacts on open sites will behave in the same way as natural stones on a hill slope and will be subject to surface dispersion, downslope movement, and differential burial or exposure by bioturbation agents and will commonly form a stone layer; and

4) The only possible means of dating open sites in any meaningful way will be from artefact cultural sequences developed on the basis of stratified assemblages and/or intact hearths. All other dates, especially those based on detrital charcoal, will be spurious.

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

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

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

5.1.4 Occupation models

A number of Aboriginal occupation models have been proposed for the Hunter Valley over the past three decades, with existing models based on varying combinations of archaeological, environmental and ethnohistoric data. Key models for the Central and Lower Hunter Valley include those developed by Haglund (1992), Koettig (1992, 1994), Kuskie (2000) and Kuskie and Kamminga (2000). These models are summarised in **Table 12**.

Table 12 Aboriginal occupation models for the Hunter Valley

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
Koettig	1992 & 1994	Salvage of sites within the Camberwell and Bulga Coal Mine Leases	Central lowlands	• Repeated occupation of an area is likely to be represented by continuous, or near continuous, distributions of archaeological sites and/or features; • Sporadic or less intensive occupation of an area is likely to be represented by non-continuous or more widely dispersed archaeological sites and/or features; • Continuous to near- continuous distributions of archaeological evidence along watercourses suggest that Aboriginal people did not camp at specific locations; • Frequency of occupation at a given location is likely to have been related to the availability of subsistence resources (e.g., food, water, lithic raw materials); • Some locations may have been foci for Aboriginal occupation owing to the presence of particular resources (e.g., sandstone exposures suitable for grinding hatchet-heads); and • The duration of occupation at a given location may be evidenced by levels of disturbance to associated archaeological deposits, with sites occupied for shorter duration potentially having more intact deposits, as the length of stay may have been insufficient to disperse artefacts or mask the original form of knapping floors.	Koettig, 1992, 1994
Haglund	1992	Salvage of sites along Doctors Creek, Warkworth	Doctors Creek area, Central Hunter Valley	• Kangaroos, wallabies, and other large and small game would have been abundant in the area during dry periods, and would have been hunted by small hunting parties of men who would prepare and repair their hunting equipment in close proximity to watercourses; • Larger family groups likely visited the area during wetter periods when watercourses would be flowing more reliably and moisture dependent plants occurred in greater abundance; • Women and children would procure and process plant foods, such as ferns, yams and other tubers, in the vicinity of creeks and watercourses; • Sporadic visits would have resulted in debris left behind being incorporated into the turf or buried by leaf litter and Casuarina needles more quickly than more intensive, long term visits; and • While some equipment such as grindstones may have been retained and carried throughout the landscape, flakes and other implements were likely manufactured, utilised and discarded on an “as needed” basis.	Haglund, 1992
Kuskie	2000	Archaeological survey of Mount Arthur North Coal Mine Lease	Mount Arthur Area, Central Hunter Valley	• The area has been occupied for at least the past 5,000 years; • Occupation may extend as far back as 30,000 - 40,000 years; • The area has predominantly been occupied by tribes of the Wonnarua language	Kuskie, 2000

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				group, although members of neighbouring groups may also have sporadically visited and occupied the area. • The Mount Arthur North area was likely utilised and occupied by Aboriginal people at varying intensities on a seasonal basis; • Occupation was most intensive within 50m of the main watercourses (3rd and 4th order streams); • Aboriginal occupants had a strong preference for camping on level ground adjacent to reliable water sources and potentially more abundant subsistence resources; • Individual campsites were mainly occupied by single nuclear family groups and multiple family groups (bands); • Larger campsites from broader gatherings of people likely took place along the nearby Hunter River flats; • A greater range and frequency of activities were undertaken at camp sites, rather than in the surrounding landscape; • Camp sites along the major watercourses were occupied by small groups of people for varying lengths of time, during both the course of the seasonal round and in different years. • Occupation of camp sites throughout the entire Mount Arthur north area was predominantly sporadic rather than continuous; • Occupation, such as focussed camping, likely also occurred along level to very gentle drainage depressions (particularly 1st and 2nd order streams). These water sources were likely to be intermittent and occupation along these lower order streams may only have occurred when standing water was available; • Most camp sites involved overnight visits of small hunting parties rather than entire family groups; • Other than focussed camping, activities engaged in across the Study Area involved hunting activities (larger game) by small hunting parties of men, and gathering activities by small parties of women and children, along with transitory movement, procurement of lithic resources, and cultural activities. • The utilisation of areas such as simple slopes, ridge crests, spur crests and minor watercourses was less intense than the valley flats where base camps were situated; • Simple slopes were used during hunting or gathering activities in the course of the normal daily or seasonal round, to access higher ground or stone resources, or to move between camp sites. Ridge and spur crests were also used for these purposes and for accessing vantage points or moving to special ceremonial sites;	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Vantage points were important to the Aboriginal occupants of the area, particularly gentle to steep upper slopes adjacent to several ridges, which were mainly accessed by groups of men on hunting expeditions, or for security and/or cultural purposes; • Silcrete and tuff were the preferred stone materials, both of which are locally available and likely procured from local sources during the course of the normal daily or seasonal round, with tuff being the preferred material for manufacture of flaked stone tools; • These materials were also procured from other sources within the region, most notably the alluvial gravels of the nearby Hunter River; • Chert, quartz, petrified wood, chalcedony, and porcellanite were also utilised to a lesser extent and were also procured from local sources, probably during the course of the normal seasonal round; • Silcrete was deliberately heat treated to improve its flaking properties. This may have been undertaken at single locations (e.g. a campsite adjacent to a watercourse) or in different locations reflecting the stages of procurement, heat treatment, reduction and use); • Manufacturing stone tools, particularly flaked implements, was likely a casual or opportunistic activity, conducted on an “as needed” basis; • There was little emphasis on rationing or conservation of the use of most stone materials, due to their wide availability; and • The manufacture of microblades (e.g. hunting spear barbs) was also widely undertaken. While likely a planned and organised activity, it did not necessarily occur at base camps, but may also have occurred in places traversed during the course of hunting expeditions on a more casual or opportunistic basis.	
Kuskie & Kamminga	2006	Salvage of sites impacted by the construction of the Hunter Expressway, near Black Hill	Black Hill - Woods Gully - Hexham Wetlands Locality, Lower Hunter Valley	• The locality was occupied by Aboriginal people of the Pambalong Clan and potentially clans of the broader Awabakal language group; • Occupation focussed on wetlands, swamps, lakes, estuaries, the coastline, and potentially also the junctions of multiple resource zones; • Occupation of the area has predominantly occurred within the past 4,000 years; • Occupation may have extended as far back as 30,000 – 40,000 years, but few landscape contexts exist in which archaeological evidence of older occupation would be conserved; • Occupation encompassed the entire region, but at varying intensities, on a seasonal basis, and across different time periods within the overall time-span of occupation; • Seasonal occupation of some resources and localities may not be evidenced in the	Kuskie & Kamminga, 2000

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				extant archaeological record; • Occupation of the area reflects a wide range of activities, including transition between locations, hunting, gathering, procurement and utilisation of lithic and other resources, camping, ceremonial and spiritual activities, and burial practices; • Activities conducted and engaged in by the Aboriginal occupants of the area likely included: food procurement, processing, and consumption; production and maintenance of stone and wooden tools and implements; resource procurement; erection of shelters, children's play, ceremonial and spiritual activity, and social and political activity; • Landscape features and variables such as topography, resources, proximity to water, aspect, slope, and cultural preference likely influenced the activities conducted by the Aboriginal occupants of the area; • Few of the activities engaged in by past Aboriginal people are likely to be evident within the archaeological record, other than those involving the use of stone or where preservation conditions permit. • Locally available indurated rhyolitic tuff was the preferred material for knapping and stone tool production, followed by silcrete, which was also able to be procured locally in terrace and alluvial gravels; • Both tuff and silcrete were likely obtained during both daily and seasonal movements throughout the landscape on an "as needs" basis, not during "special purpose trips", and conservation of these materials was not a priority due to their wide availability; • Other locally available stone materials including quartz, quartzite, acidic volcanics, chalcedony and chert were also utilised to a lesser extent; • Non-locally available stone materials such as dacite and rhyodacite (used for grindstones) may have been obtained through trade or exchange with other cultural groups, through special purpose trips, or during visits to other areas during the seasonal round; • Ochre was utilised for ceremonial purposes and may have been procured from sources near Lake Macquarie, the Hunter River, or from outside the region; • Heat treatment of silcrete was undertaken to improve flaking qualities and possibly to obtain desired colours; • A reasonably high proportion of silcrete used in knapping activities was deliberately heat treated, but tuff was not; • Microblade production was a widespread, likely planned and organised, activity with the primary goal of producing microliths (e.g. bondi points) for hunting	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				implements/purposes. • Microblade production may have occurred at both campsites and also in places on transitory routes during hunting expeditions, which may represent more casual or opportunistic behaviour; • Production of microliths was time-consuming and the end result was likely highly desirable and socially valuable; • The investment of time and energy in activities such as heat treatment of silcrete and production of microliths for hunting and fighting spears may have more social than utilitarian values, as floral and smaller faunal subsistence resources would probably have been most prominent in the economy of the local Aboriginal people.; • Casual and opportunistic knapping or selection of flakes to meet requirements on an "as needs" basis was widespread. • A high proportion of knapping products were likely discarded at the site of their manufacture, without use; • Use of bipolar technique was uncommon; • Floral subsistence resources were locally abundant, predominantly obtained and processed by women, and were consumed at campsites and at the site of procurement. • Ferns may have been a staple of the local diet, along with the bulbs and roots of other wetland plants; • Plant preparation sites may include camping places around the margins of Hexham Wetland and other swamps. Tools such as Worimi cleavers were utilised to pound the starch-rich rhizomes of bracken and swamp fern and the roots of other plants obtained from the wetlands; • Eloueras may have been used for extracting the perennial herb cumbungi (*Typha australis*), abundant in the freshwater parts of wetlands, or less likely, tall spike rush (*Eleocharis sphacelata*); • Less portable special tools such as Worimi cleavers and grindstones may have been deliberately stored at base camps; • Faunal resources were processed and consumed at temporary hunters or gatherers camps, at nuclear base camps, campsites of larger congregations of people, and at the site of procurement; • Men hunted for larger game, while women played a key role in gathering plants and obtaining smaller game; • Hunting was a planned and coordinated event;	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Fish were obtained by several methods, including boating, hooks and lines, spearing, using hand nets, and creating fish traps; • Strategic management of resources such as fish traps were aimed at increasing the reliability and productivity of food resources; • Nuclear family base camps may have been strategically positioned in relation to food resources, at the conjunction of two or more subsistence zones, close to potable water, and on level or very gently inclined ground. Visual aspect and security may have also been important considerations. • Site occupants of nuclear family base camps may have foraged within an area of up to 10km radius from the campsite; • Campsites in more favourable locations may have been subject to more intensive occupation; and • Community base camps or camps of larger congregations of people tended to be situated on level ground adjacent to plentiful food resources and potable water such as river terraces or flats.	

5.2 Local Context

5.2.1 AHIMS Database

The AHIMS database, administered by OEH, contains records of all Aboriginal objects reported to the Director General of the Department of Premier and Cabinet in accordance with Section 89A of the *National Parks and Wildlife Act 1974*. It also contains information about Aboriginal places, which 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 on 16 February 2014 for a 10 x 10 km area centred on the former Hydro smelter site (AHIMS search area) identified 161 registered Aboriginal sites. As is typical for the Hunter Valley, open artefact sites (i.e., artefact scatters and isolated finds) are the most common site type represented within the AHIMS search area, accounting for 95.7% (n = 154) of known sites. Remaining sites consist exclusively of areas of Potential Archaeological Deposit (PAD) (n = 7, 4.3%).

AHIMS registered sites whose centroid coordinates and/or site card descriptions place them within 50 m of the Project Area are listed in **Table 13**. These sites, all of which are listed as on AHIMS as 'Valid', consist of four artefact scatters and one isolated artefact. A review of associated reports and site cards for these sites indicates that none are located within the Project Area. Site locations and boundaries are shown on **Figure 18**.

Table 13 AHIMS registered sites within 50m of the Project Area

AHIMS Site ID	Site name	MGAE	MGAN	Site type	Current status
37-6-3065	Hydro-AS22-14	357458	6371685	Artefact scatter	Valid
37-6-3068	Hydro-AS26-14	357247	6371141	Artefact scatter	Valid
37-6-3070	Hydro-AS28-14	357219	6370703	Artefact scatter	Valid
37-6-3071	Hydro-AS29-14	358225	6371002	Artefact scatter	Valid
37-6-2008	KR05	357171	6370683	Isolated artefact	Valid

5.2.2 Unregistered Sites

In addition to the AHIMS registered sites described above, data held by AECOM indicate the presence of a further one Aboriginal archaeological site within 50 m of the Project Area. This site consists of an isolated artefact (Hydro-IA25-14) and is located at GDA 358185E 6371413N (Zone 56). The location Hydro-IA25-14 relative to the Project Area is shown on **Figure 18**.

A site card for Hydro-IA25-14 was submitted to the AHIMS registrar in November 2014. However, the site is yet to be registered.

5.2.3 Previous Aboriginal Heritage Assessments

Existing AHIMS data indicate that a relatively large number of Aboriginal cultural heritage assessments incorporating survey and/or subsurface investigations have been undertaken in the greater Kurri Kurri area since the early 1980s. Although the number of investigations undertaken in the vicinity of Kurri Kurri is small when compared with areas to the northeast around Maitland, northwest around Singleton and east around the Hunter Estuary, those that have been carried out have resulted in the identification of a significant number of Aboriginal archaeological sites, both in surface and subsurface contexts.

To date, archaeological investigations undertaken for development works located within and adjacent to the Project Area have included surveys by AECOM (2014), AMBS (2009a, 2009b), Brayshaw McDonald (1994), Umwelt (2003), ERM (2004) and Mills (1999) as well as excavations by AMBS (in prep) and Umwelt (2006c, in prep). Umwelt's (2006c) subsurface investigation, undertaken as part of a broader archaeological salvage program for the recently completed Hunter Expressway, was limited to a program of test excavation within and adjacent to the boundaries of AHIMS registered PAD 'PAD11 Black Waterholes Creek' (37-6-1363), now destroyed. Detailed results for this program are pending (Umwelt, in prep). However, preliminary results are available (Umwelt, 2006c). Excavations by AMBS, meanwhile, are understood to have been undertaken as a mitigation response to EnergyAustralia's proposed upgrade to the 33kV Kurri-Rutherford Feeder Split and to have involved targeted salvage excavations of up to 2.25 m^2 (1.5 x 1.5 m) at 25 pole locations along the feeder route.

AECOM understands that AMBS is currently in the process of finalising their reports for this excavation program. Although detailed results are pending, AMBS have provided AECOM with some baseline data concerning the location, extent and results of these excavations.

The results the above-mentioned investigations are summarised in **Table 14**. Those of a selection of other local assessments are also provided for contextual purposes.

Hydro-IA23-14
Hydro-AS22-14
KK04
KK09
KK05
Hydro-IA24-14
Hydro-AS23-14
Hydro-IA25-14
Bishops Bridge Road
Hydro-IA26-14
Hydro-IA27-14
Hart Road
Hydro-AS26-14
Hydro-AS30-14
Hydro-AS29-14
Hydro-IA28-14
M15
Hydro-AS27-14
HUNTER EXPRESSWAY
Hydro-IA29-14
Kurri Kurri/
Loxford Park
Speedway
Swamp Creek
Catchment 5 (SCC5)
Dickson Road
Hydro-IA30-14
Hydro-AS28-14
KR05
Swamp Creek
KR04
Hart Road

KEY

- Project area
- Road
- Watercourse

Aboriginal Sites

- Artefact scatter
- Isolated artefact

0 100 200m

G:\ENVVGIS\Projects\60306312210 Hydro Aboriginal\FIGURES\Remediation EIS\60312210 F18 Aboriginal Sites 25 09 2015 TO Rev B

AECOM

ABORIGINAL SITES

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 18

Table 14 Previous Aboriginal Heritage Assessments

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
L.K. Dyall	1980	Proposed Alumax aluminium smelter, Farley	Survey	Pedestrian survey of proposed smelter site and associated buffer land. Particular attention paid to creek banks, sandstone exposures in creek beds and sandstone-mantled ridgelines. Eighteen open artefact sites and three grinding groove sites identified. Former included one isolated artefact and seventeen artefact scatters. Counts for recorded artefact scatters ranged from two to 195. Largest site located on Stoney Creek. Most sites (n = 12) contained less than ten artefacts. Raw materials recorded as cherts, rhyolite [silicified tuff], quartzites and quartz. Retouched implements restricted to backed blades (n = 4) and scrapers (n = 17). All three grinding groove sites located on exposed sandstone bedrock in creek beds. Largest site contained 68 grooves in three spatially discrete 'lots' of 42, 25 and one groove respectively. Remaining two sites contained 38 and nine grooves respectively, the former in four lots.	Dyall (1980)
H. Brayshaw	1982	Proposed residential development, near Stanford Merthyr	Survey	Pedestrian and vehicle survey of proposed urban development site. No Aboriginal archaeological sites identified during survey. Generally poor GSV conditions noted. "Considerable disturbance" associated with localized bulldozing, rubbish dumping and the construction of transmission lines (n = 5), a bitumen road and railway embankment observed. Brayshaw (1982: 4) concluded that while Aboriginal people were likely to have frequented the study area to hunt and forage the lack of a major resource features(s) would have precluded intensive occupation.	Brayshaw (1982)
A. Djekic	1984	Kurri Kurri to Alcan 132Kv transmission line	Survey	Pedestrian survey of entire transmission line route. Generally poor GSV conditions noted. Five open artefact sites consisting of one isolated artefact and four artefact scatters identified in exposures in vicinity of unnamed creek to north of Kurri Kurri substation. All considered opportunistic surface expressions of associated subsurface deposits. Chert [silicified tuff] dominant raw material, with four quartzite hammerstones also recorded. Areas adjacent to watercourses and swamplands assessed as having high archaeological potential.	Djekic (1984)
E. Rich	1990	Proposed recycling facility, Alcan Aluminium Smelter	Survey	Pedestrian survey of proposed recycling facility site on Lot 811 of DP 728985. Three transects completed across *c*.2.5 ha study area. All areas of exposed ground inspected for stone artefacts. No Aboriginal archaeological sites identified during survey. Lack of sites attributed, in part, to landscape position.	Rich (1990)
M. Koettig	1990	ICI Mining Services Technology Park, near Richmond Vale	Survey	Pedestrian survey of proposed ICI Mining Services Technology Park site. GSV conditions generally poor but several tracks and associated exposures present. No Aboriginal archaeological sites identified during survey. Flood prone alluvial flats on eastern side of 'main' unnamed creek within study area assessed as unsuitable for occupation (Koettig, 1990: 3). Survey results interpreted as a reflection of an absent or "extremely sparse" Aboriginal archaeological record.	Koettig (1990b)
I. Stuart	1994	Proposed Dross Mill, north of Mitchell	Survey	Targeted pedestrian survey of proposed Dross Mill site comprising 8 ha parcel of land bordered to north by Swamp Creek and the south by Mitchell Avenue and a disused railway line. Survey	Stuart (1994)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
		Avenue and south of Swamp Creek		restricted to pre-existing tracks owing to dense vegetation cover. 6.4% of study area surveyed with effective coverage of 3.2%. Single open artefact site identified. Site comprised two stone artefacts - a yellow coarse-grained chert core and a grey chert flake - *c*.9 m apart on vehicle track. Absence of any 'substantial Aboriginal sites' attributed to poor GSV.	
T. Griffiths	1995	Proposed optic fibre cable, Kurri Kurri to Mulbring	Survey	Pedestrian survey of *c*.9 km fibre optic route. GSV along route ranged from 0 to 90% and was highest at creek and gully crossings. No Aboriginal archaeological sites identified.	Griffiths (1995)
R. Mills	1999	Proposed wastewater treatment plant	Survey	Full coverage pedestrian survey of impact areas associated with proposed wastewater treatment plant. Survey area situated on gently sloping land approximately 300 m southeast of Swamp Creek. Unnamed tributary of Swamp Creek also present in the north-eastern portion of the survey area. Southern section of this tributary had been modified by the construction of concrete canal. Western bank noted as having been disturbed via the dumping of soil, brick and concrete materials but retaining some relatively undisturbed sections. Area within and adjacent to existing treatment plant assessed as grossly disturbed. GSV in vicinity of Swamp Creek tributary was poor (<10%) but generally higher on gently inclined hillslope unit owing to presence of vehicle and animal tracks, drainage lines and areas of surface disturbance associated with dam construction. Two isolated stone artefacts and one area of PAD identified. Isolated artefacts consisted of yellow/red 'chert' [silicified tuff] flake and a quartzite hammerstone. Area of PAD encompassed the southern bank of the unnamed tributary of Swamp Creek. Portions of PAD noted to have been subject to considerable impacts from spoil/rubble dumping and the mounding of topsoil. Undisturbed sections of PAD assessed as having "potentially high archaeological sensitivity" (Mills 1999: 12).	Mills (1999)
ERM	2003	Hunter Economic Zone (HEZ)	Test excavation	Archaeological test excavations conducted within the boundary of the Hunter Economic Zone (HEZ). Three landform areas identified as being of archaeological interest prior to fieldwork: 1) valley side slopes along Chinamans Hollow Creek; 2) the north-south trending ridgeline comprising the watershed between Chinamans Hollow Creek and several unnamed tributaries of Wallis Creek (the 'eastern tributaries'); and 3) the headwaters of the 'eastern tributaries'. Geomorphological investigations undertaken prior to test excavation identified previously undescribed aeolian sand deposits on the western side of Chinamans Hollow Creek and confirmed a marked contrast between extant soil units on the eastern and western sides of this watercourse. Topsoils on the ridgeline were assessed as deriving from a combination of *in-situ* weathering of sandstone/conglomerate bedrock and colluvial processes. A horizon sands along the western side of Chinamans Hollow Creek were assessed as being of Holocene antiquity on the basis of their looseness and lack of weathering.	ERM (2003)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				Two transects consisting of up to 21 backhoe-excavated test pits (2 x 1 m) completed within each targeted landform area. Stone artefacts identified in most test pits with good outlook over Chinamans Hollow Creek. Total of 66 stone artefacts and 57 'shattered fragments' of artefactual stone recovered from test pits along Chinamans Hollow Creek. Artefacts generally recovered from 20 cm below the ground surface to a depth of 1 m. No indications of cultural or natural stratification evident in excavated sand deposits. Artefact-bearing deposits assessed as likely being of Holocene antiquity. Excluding 'shattered pieces', silcrete was the dominant raw material (n = 44), followed by silicified tuff (n = 17), quartz (n = 4) and quartzite (n = 1). In typological terms, the assemblage was dominated by flake debitage (i.e., complete flakes and flake fragments). Formed objects were limited to three backed artefacts. No artefacts were identified in the ridgeline transects and only one in eastern tributary transects. Results interpreted as a reflection of the presence of a "dispersed but readily detectable distribution of artefacts along western side of Chinamans Hollow Creek interfluve" (ERM: 2003: 45). Two surface sites (HEZ1 and HEZ2) also fortuitously identified during fieldwork.	
ERM	2004	Proposed gas pipeline, Seahampton to Rutherford	Survey	*c*.37 km long gas pipeline route assessed via pedestrian and vehicle survey. 4.2 km section of route within Hunter Employment Zone (HEZ) excluded from survey. Four broad landscape units identified for interpretive purposes: 1) Mt Sugarloaf rugged terrain; 2) Wallis Creek gently undulating terrain; 3) Swamp Creek catchment undulating terrain; and 4) Northern swamp tributaries gently undulating terrain. Alluvial and aeolian sands noted as occurring in Units 2, 3 and 4. Total of 21 Aboriginal archaeological sites, consisting of twelve artefact scatters and nine isolated finds, identified during survey. Mudstone [silicified tuff] dominant raw material, with silcrete also well represented. Undisturbed soils within 150 m of Wallis Creek, Swamp Creek and associated 'major' tributaries assessed as having high archaeological potential. Northern swamp tributary area identified as "perhaps the most archaeologically sensitive area" (ERM 2004: 78) due, in part, to the presence of aeolian sands.	ERM (2004)
Umwelt and others	1994-2010	Hunter Expressway	Survey and test excavation	Surface collections and subsurface investigations of Aboriginal sites, areas of PAD and landform units identified as a result of archaeological surveys/inspections undertaken for the F3 to Branxton Highway Link (i.e., Hunter Expressway). Route alignment divided into two sections for the purposes of archaeological assessment, with 'Section 1' comprising the easternmost 4 km of the route near Southampton and 'Section 2' that portion of the route west of Southampton to the Belford Deviation west of Branxton. Archaeological salvage and subsurface testing works completed in three stages prior to development of the Hunter Expressway Aboriginal Cultural Heritage Plan of Management (Umwelt, 2010a). Stage 1 (Section 1) investigations were undertaken under Section 90 Consent #1940 (approved 7 June 2004) and included surface collection of three open artefact sites within the Blue Gum Creek	(Brayshaw, 2001; Brayshaw McDonald, 1994; Umwelt, 2003, 2006a, 2006b, 2006c, 2010a, in prep)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				catchment, surface collections and subsurface investigations excavations at two sites in the Blue Gum Creek and Minmi Creek catchments, and subsurface testing within the Bluegum Creek landform unit. Stage 2 (Sections 1 & 2) investigations were undertaken under Section 90 Consent #2102 (approved 14 February 2005) and Section #87 Consent #2096 (approved 14 February 2005) and included surface collection of 68 open artefact sites within the Anvil Creek, Bishops Creek, Black Creek, Black Waterholes Creek, Sawyers Gully, Surveyors Creek and Wallis Creek catchments, subsurface investigations of four sites in the Anvil Creek, Black Creek, Swamp Creek and Wallis Creek catchments, subsurface testing of nineteen areas of PAD and subsurface testing of nine landform units across nine different creek catchments. Stage 3 (Section 2) investigations were completed under Section 90 Consent #2562 (approved 19 December 2006) and involved the surface collection of six open artefact sites in the Anvil Creek, Black Creek, Sawyers Gully, Swamp Creek and Wallis Creek catchments and open area excavations at six sites in the Anvil Creek, Sawyers Gully, Surveyors Creek, Wallis Creek, Black Creek and Redhouse Creek catchments. Detailed results for Umwelt's Stage 1, 2 and 3 archaeological salvage/investigation programs are pending (Umwelt, in prep). However, for sites, PADs and landform units subject to subsurface investigations in Stages 1 and 2, Umwelt (2006c): 4.51, Table 4.4) report artefact totals ranging from 0 to 409.	
Mary Dallas Consulting Archaeologists	2007-2008	Proposed residential development, Lot 114 on DP703265	Survey and test excavation	Pedestrian survey of *c.*30 ha study area located on a prominent north-south trending ridgeline on the eastern side of Cessnock Rd. Study area divided into three survey units for purposes of field survey. Survey Unit 1 comprised the elevated land associated with the prominent north-south trending ridgeline and an associated arm extending eastward into the study area. Survey Unit 2 comprised the east facing and generally steep slopes above Wallis Creek while Survey Unit 3 comprised south facing gently to moderately inclined slopes. Effective survey coverage in all units was very low (1-7%) to dense grass cover. One artefact scatter (GH Campsite 1) and three areas of PAD (GH PAD 1 to 3) identified during survey. GH Campsite 1 located near the base of an east trending spur running from main ridgeline. Site comprised a scatter of "at least 30" artefacts over an area of approximately 75m^2 (15 x 5m). Silcrete dominant raw material. Artefact types included complete and broken flakes and blades, flake/blade fragments and cores. Identified PADs comprised part of a southerly trending spur off main ridgeline (GH PAD 1), an undisturbed low mound on the Wallis Creek floodplain (GH PAD 2) and a portion of the main ridgeline trending in an easterly direction (GH PAD 3). Subsequent to the survey described above, in 2008, a program of archaeological test excavation	Mary Dallas Consulting Archaeologist (2007, 2008)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				was undertaken within GH PAD1 under Section 90 Consent #2962. This involved the hand excavation of fifteen 1 m^2 pits. Flaked stone pieces representing at least 50 individual stone artefacts were recovered from 13 pits, with an average density of less than eight stone pieces or four individual artefacts per square metre. Silcrete and mudstone co-dominant raw materials. Formal implements restricted to backed artefacts. Results interpreted as a product of transitory movement/casual discard over time.	
Australian Museum Business Services (AMBS)	2009-2010	33kV Kurri-Rutherford Feeder Split	Survey & salvage excavation	*c*.8.25 km long electricity easement between Kurri Kurri and Rutherford subject to full pedestrian survey in 2009. Easement divided into fourteen survey units (transects). Most of the easement (study area) comprised crests and simple slopes over 20 m elevation. The study area also traversed the upper reaches of Swamp Creek and four unnamed drainage lines. Levels of effective coverage uniformly low due to generally poor GSV conditions. Total of eighteen sites, consisting of ten artefact scatters and eight isolated finds, identified during survey. Three previously registered on AHIMS. Artefact counts for scatter sites ranged from two to 103, with three sites (KK04, 37-6-1650 and 37-6-1651) containing over fifty artefacts. Six sites identified as having PAD. Distribution and contents of recorded sites interpreted as reflecting an occupational emphasis on Wentworth Swamp. Of the eighteen identified sites, ten were assessed as being of low scientific significance, four as being of moderate significance and four as being of high significance. Artefacts identified on vehicle tracks at sites KK01, KK02, KK04, KK07, 37-6-1650 and 37-6-1652 subsequently moved off-track under AHIP#1103798. Subsequent to the survey described above, in 2010, salvage excavations were undertaken at 25 pole locations along the feeder route. In all but one instance, in which excavation was restricted to a 1m^2 pit, excavations at each pole consisted of a 2.25 m^2 (1.5 x 1.5 m) hand excavated pit. Detailed results for these excavations are pending. However, preliminary results data provided to AECOM by AMBS indicate that a total of 300 flaked stone artefacts and six pieces of ochre of potential cultural origin were recovered from 12 pits, with the highest artefact frequencies occurring within AMBS's 'creek terrace' landform unit. Artefacts recovered from test pits excavated in creek terrace landform unit adjacent to Swamp Creek occurred in deep (>1 m) sand deposits interpreted as being of aeolian origin.	AMBS (2009a)
AMBS	2009	Kurri-Redbank Feeder 953/95R (132kV) upgrade	Survey	*c*.54 km long electricity easement between Kurri Kurri and Redbank subject to full pedestrian survey in 2009. Topography of route characterised by undulating terrain with intermittent watercourses as well as large creek flats associated with permanent water courses. Easement divided into 21 survey units on the basis of available soil landscape mapping. Total of 65 sites containing 321 flaked stone artefacts one ground stone hatchet-head and one grinding slab identified during survey. Sites types comprised artefact scatters (n = 41), isolated finds (n = 19),	AMBS (2009b)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				artefact scatters with PADs (n = 4) and one grinding slab site. Artefact counts for scatter sites ranged from two to 40. Silcrete dominant raw material (n = 158, 49.2%), with silicified tuff also reasonably well represented (n = 109, 33.9%). Majority of sites (82%) located within 200 m of watercourses and on flats (n = 35, 53.9%). Results of site distribution analyses interpreted as indicating a similar frequency/intensity of occupation between upland and lowland areas.	
RPS Harper Somers O'Sullivan (RPS HSO)	2009	Farley Waste Water Treatment Works, Owlpen Lane off Wollombi Road	Survey	Full coverage pedestrian survey of Farley Waste Water Treatment Works site. Study area located on alluvial flats associated with Wentworth Swamp. Land to west and north of the site reported as 'elevated' and forming part of a flat-topped ridge. Study area divided into two Survey Units: the area comprising the main waste water works treatment compound (SU 1) and two maturation ponds to the east (SU 2). GSV within SU1 was recorded as 'good' owing to widespread erosion activity. GSV in SU2 was likewise recorded as 'good' with extensive exposures occurring along the banks of the two maturation ponds. Total of five sites identified during survey, all isolated finds within SU2. None considered to be *in-situ*. Study area, in general, assessed as highly disturbed.	RPS HSO (2009)
McCardle Cultural Heritage Pty Ltd	2010	Farley Investigation Area, c. 2km southwest of Rutherford	Survey	Study area included a ridge grading into gently-inclined slopes with numerous drainage lines running north into Stony Creek and south into an unnamed 3rd order creek that discharges into Wentworth Swamp. Study area divided into fourteen survey units for survey. GSV across all survey units was very low due principally to grass cover. Overall effective coverage of 2.15% achieved. Disturbances noted during survey included clearing, fences, grazing, and construction for housing, infrastructure and dams. Total of three sites identified: one artefact scatter (FIA/1) and two isolated finds (FIA/2 and FIA/3). Scatter located on 3rd order stream in an area of exposure measuring 2 m x 1m. Artefacts included three silcrete flake pieces, one silcrete proximal flake and one mudstone complete flake. Area of PAD (PAD FIA/1) comprising the unnamed 3rd order creek situated in the southern portion and land within 50 metres of this creek also identified. PAD assessed as having been subject to minimal disturbance.	McCardle Cultural Heritage (2010)
Umwelt Australia Pty Ltd (Umwelt)	2010-2011	Saddlers Ridge housing subdivision, Gillieston Heights	Monitoring of ground disturbance works	Subsurface testing and monitoring programs undertaken for Mirvac's Stage 1 to 3 and Stage 4 to 11 development areas. Archaeological works for Stage 1 to 3 area included monitoring, test pitting and limited open area excavation. Forty-two test pits (50 cm^2) excavated on slope adjacent to unnamed, spring-fed drainage line. Artefacts located in seven pits, with the highest numbers occurring in TP38 (n = 5) and TP39 (n = 17). TP38 and 39 were subsequently expanded resulting in the recovery of an additional 307 artefacts (10 from TP38 and 297 from TP39). Silcrete dominant raw material, with silicified tuff and chert also represented. Artefact types included complete and broken flakes, retouched flakes, flaked pieces and cores. Subsurface testing program for Stage 4 to 11 involved the manual excavation of 98 50 cm^2 test pits across a range of landform units. Total of seven artefacts recovered, with the highest number coming from test pits in the simple slope landform unit. High levels of historic disturbance inferred from excavated soil profiles.	Umwelt (2010a, 2010b)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				Subsequent to the completion of the Stage 1 to 3 and Stage 4 to 11 investigations described above, in March 2009, a program of archaeological monitoring was undertaken within the Stage 4 to 11 investigation area under AHIP #3077. AHIP#3077 was issued to cover proposed impacts to AHIMS registered Aboriginal site 38-4-1044 (GillMirv 1) identified during the Stage 4 to 11 subsurface testing program. Total of four artefacts - two mudstone flakes, one broken mudstone flake and one broken quartz flake - recovered from monitoring area. Results deemed consistent with earlier subsurface investigations results (see above) and supportive of the hypothesis that the Stage 4 to 11 area was "subject to less activity by Aboriginal people that resulted in the discard of artefactual material than within the Stage 1 to 3 area".	
Eureka Heritage	2011	Darcy's Peak residential development, Gillieston Heights	Monitoring of ground disturbance works	Aboriginal archaeological monitoring program carried out for GH PAD 1 (AHIMS ID #38-4-1039) (see Mary Dallas Archaeological Consultants 2007, 2008 above) under AHIP#1097239. Monitoring completed alongside historical archaeological investigation owing to overlap between proposed historic excavation areas and registered PAD area. Thirty-four historic excavation squares - each measuring 20 x 20 m - inspected for Aboriginal archaeological materials. One half square (10 x 20) also inspected. Total of 279 flaked stone artefacts recovered from fourteen (41.2%) of the 34 full squares. Most (n = 9, 64.3%) artefact-bearing squares also contained historic (i.e., non-Aboriginal structural remains and/or artefacts) leading the excavators to suggest that "areas suitable for Aboriginal occupation and use, were also considered suitable for occupation and use by the colonists" (Eureka Heritage, 2011:17). Silcrete dominant raw material (n = 221, 79.2%) followed by silicified tuff (n = 51, 18.3%) and chert (n = 4, 2.5%). Formed objects limited to nine backed/retouched artefacts and eighteen cores. Cortex rare suggesting importation of largely to fully decorticated blanks. Mid-Holocene antiquity proposed on typological grounds. Technological and typological character of monitoring assemblage deemed consistent with that recovered by Mary Dallas Archaeological Consultants (2008).	Eureka Heritage (2011)
AECOM	2014	Rezoning of Hydro Aluminium Smelter Site & Buffer Land	Survey	Aboriginal heritage assessment of *c*.1964 ha study area incorporating the current Project Area. Archaeological survey of study area undertaken over an eight day period by a combined field team of two AECOM archaeologists and up to six rostered Registered Aboriginal Party (RAP) field representatives per day. Survey focussed on higher areas of GSV within the western half of the study area. However, several transects were also completed in the eastern half of the site. In the northeastern and north-central portions of the study area, particular attention was paid to areas of higher GSV along the margins of Wentworth Swamp, namely cattle tread and fluvial erosion exposures. All survey was conducted on foot, with a total of 51 transects completed over the course of the survey. Recorded transect data indicate that a total survey coverage of 137.5 ha, representing around 7% of the study area, was achieved.	AECOM (2014)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				Total of 482 individual Aboriginal cultural lithic items identified during survey, 475 or 98.5% of which were located within the study area. Employing a 50 m distance convention for site definition, consideration of the location of these items against the mapped and/or described boundaries of valid AHIMS registered sites within the study area (n = 23) provided a total of 65 new Aboriginal archaeological sites and 20 pre-existing sites (85 sites in total). Newly identified surface sites within the study area included 31 artefact scatters and 34 isolated artefacts while pre-existing sites consisted of 11 artefact scatters and nine isolated artefacts. Of the 20 previously recorded open artefact sites within the study area, nine were relocated during the survey undertaken. Majority (69.9%, n = 337) of identified artefacts consisted of flake debitage items (i.e., complete/proximal flakes and flake shatter pieces), with non-flake debitage items (i.e., flaked pieces, 7.5%, n = 36), heat shatters7 (14.3%, n = 69) and formed objects (i.e., cores and retouched implements) (1.7%, n = 8) comparatively poorly represented. A single broken sandstone grindstone, previously recorded by AMBS (2009a) as site KK15 (37-6-1963) and located outside of the Project Area, was also identified during survey. Silcrete was the dominant raw material overall, accounting for 56.8% (n = 274) of the total recorded assemblage. However, silicified tuff was also well represented (35.1%, n = 169). Other, less common raw materials included unidentified Fine Grained Siliceous (FGS) (n = 17, 3.5%), quartz (n = 12, 2.5%), quartzite (n = 5, 1%), volcanic (n = 3, 0.6%), chalcedony (n = 1, 0.2%) and sandstone (n = 1, 0.2%). In addition to identified sites, an assessment of the archaeological sensitivity of land within the study area was also undertaken, with three levels of sensitivity - Nil, Low and High - recognised on the basis of observed archaeology (i.e., its distribution and character), the results of previous Aboriginal heritage investigations within and surrounding the study area, levels of past land disturbance and the predicted complexity of deposits within each category. Identified areas of high archaeological sensitivity within the study area included elevated low gradient landform elements adjacent to Wentworth Swamp and higher order watercourses (e.g., Black Waterholes Creek, Swamp Creek).	

[7] All heat shatters identified during the survey comprised thermally-fractured pieces of stones used locally for stone artefact manufacture. A proportion also exhibited remnant flaked surfaces indicative of post-flaking burning.

5.2.4 Synthesis

In common with other regions of the Hunter Valley, previous archaeological surveys and subsurface investigation programs in the greater Kurri Kurri area have identified surface and subsurface deposits of stone artefacts, variously referred to as open artefact sites, artefact scatters, isolated artefacts and open camp sites, as the most common form of evidence of past Aboriginal occupation. Other archaeological site types, including scarred trees and grinding groove sites, have also been identified but are comparatively rare.

Previously identified open artefact sites in the greater Kurri Kurri area vary significantly in size and content and have identified in variety of a landform contexts. Although widely distributed, existing survey and excavation data indicate a strong trend for the presence of such sites near water sources, namely wetlands and creeks. At the same time, artefact distribution has been shown to vary significantly in relation to landform and the permanency of water sources, with the largest and most complex sites/deposits identified on elevated, low gradient landform elements adjacent to wetlands and higher order watercourses.

Dominant lithic raw materials for flaked stone artefact production in the area include silcrete and silicified tuff (also known as mudstone), both of which are available in locally occurring alluvial and colluvial gravel deposits. Other, less commonly exploited materials such as quartz, chert, quartzite and petrified wood are likewise available in these deposits. Local flaked stone assemblages have tended to be dominated by items of flake debitage (i.e., complete and broken flakes and flake shatter fragments), with formed objects (i.e., cores and retouched tools) and non-flake debitage items less common.

No Aboriginal archaeological sites have been previously identified within the Project Area. However, six sites have been identified within 50 metres. Previously identified sites consist exclusively of open artefact sites.

5.3 Archaeological Predictions

Key archaeological predictions for the Aboriginal archaeological record of the Project Area as follows:

- Material evidence of past Aboriginal activity within the Project Area, if present, is likely to be restricted to flaked stone artefacts in surface and subsurface contexts. However, there remains some, albeit limited, potential for the presence of grinding groove sites, stone quarries and scarred trees;
- Most, if not all, of the Aboriginal archaeological materials present within the Project Area will be of mid-to-late Holocene antiquity;
- Grinding groove sites, if present, will occur in direct association with the 2nd order stream that bisects the Project Area;
- The dominant raw material for flaked stone artefact production within the Project Area will be silcrete, with silicified tuff the second most common material;
- Flaked stone assemblages will be dominated by flake debitage (*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 surface and excavated assemblages;
- Tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts; and
- Surface artefact distribution within the Project Area will vary significantly in relation to landform, distance to water and stream order.

6.0 Ethnohistoric Context

6.1 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 5.0** has summarised the Aboriginal archaeological context of the Project Area on both a regional and local scale. This section builds on this foundation by summarising relevant ethnohistoric information for the Project Area and environs. As in other parts of New South Wales and Australia more broadly, non-Aboriginal people occupying the Lower Hunter Valley began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

Key sources, both primary and secondary, for the post-contact languages and lifeways of the Aboriginal people occupying the Lower Hunter Valley at 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.

6.2 Language Groups and Boundaries

As highlighted by Brayshaw (1987) and a number of other researchers (e.g., ERM, 2004; Kuskie 2012), 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 Project Area is located at the western extremity of Awabakal territory, very close to the Awabakal’s boundary with the Wonnarua (**Figure 19**). Tindale (1974 describes the territory of the Awabakal as an 1,800 km^2 area centred on Lake Macquarie, south of Newcastle, while that of the Wonnarua is described 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 and west of the Awabakal, Tindale (1974) places the Darkinjung, whose tribal territory is described as a 4,700 km^2 area extending south of watershed of Hunter River, from “well south” of Jerry's Plains, east toward Wollombi and Cessnock, south to Wisemans Ferry on the Hawkesbury River, and west to the divide east of Rylstone. To the north of the Awabakal were the Worimi who, 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. Finally, to the north on 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 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[8] (the ‘Bahtahbah’ mission) and is widely regarded as one of the pioneers of Aboriginal studies in New South Wales owing to his detailed recordings, with the assistance of influential Awabakal leader Biraban (aka John McGill), of the language and lifeways of the Aboriginal people occupying the Hunter River Estuary. Writing in 1828, for example, Threlkeld described the territory of the Awabakal as consisting of:

> “The land bounded (to the South) by Reid’s Mistake the entrance to Lake Macquarie, (to the North) by Newcastle & Hunter’s River, (to the West) by five islands on the head of Lake Macquarie 10 miles

[8] Subsequently relocated to Toronto in 1831and named ‘Ebenezer’ mission

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 20**)

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 19 Excerpt from Tindale's (1974) tribal map (from Kuskie, 2012: 38, Fig. 7, after Tindale, 1974)

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) 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 (Threlkeld, 1825 in Ford, 2010: 328).

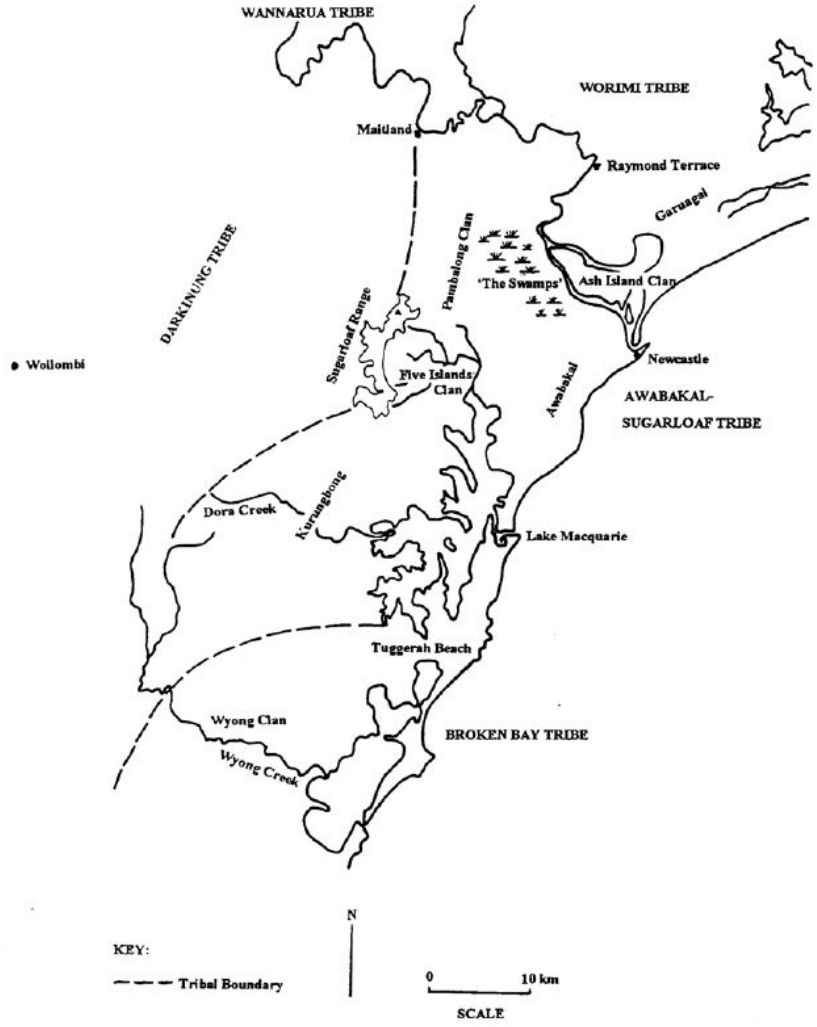

Figure 20 Gunson's (1974) tribal map for the lower Hunter Valley, based on the observations of Reverend Lancelot Threlkeld (from Kuskie, 2012: 39, Fig. 8, after Gunson, 1974).

Threlkeld's observations are clearly of particular relevance to the current assessment and 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 Mid 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 and is also worthy of mention here. Based on his own detailed review of available historical records, Ford (2010) has convincingly argued that, contrary to popular beliefs, 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[9]. 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 it is Miller's (1887) misapplication of the term *Wannerawa*, *as* 'Wonnarua', to the Mid and Upper Hunter Valley, 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 Mid 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 his 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.

6.3 Social Organisation

In common with other regions of New South Wales (e.g., Attenbrow, 2010) and Australia more broadly (Peterson, 1976), available historical records suggest that the primary units of social organisation amongst the Aboriginal language groups present in the lower Hunter 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[10], 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 lower Hunter 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, 1877; 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).

For the coastal Worimi, Elkin (1932) and Enright (1932) report the existence of four 'named local groups', two of which - the Garugal and Maiangal - were 'salt-water' groups and two - the Gamipingal and Buraigal - 'inland' groups. Although unspecified by either author, these groups were likely bands (*sensu* Attenbrow, 2010). Social organisation amongst the Worimi, Elkin (1932) notes, was based on exogamous patrilineal totemic clan membership, with at least twelve clans, known as *tambual*, recognised. Sex totemism was reportedly also practised, with *kulangulan*, the bat, comprising the men's totem and *dilmun*, the wood-pecker, the women's (Elkin, 1932: 361).

As with the Worimi, a total of four named local groups have been reported for the Awabakal (Gunson, 1974), each associated with a particular tract of land within the broader territory of the Awabakal 'tribe' (see **Figure 20**) and led by its own 'chief':

[9] From north to south: the Sugarloaf Range, the Watagan Rage and Peats Ridge.
[10] Some individuals may have been related through marriage.

- The Awabakal-Sugarloaf Tribe, led by Biraban;
- The Pambalong Clan, led by Gorman/Coleman;
- The Ash Island Clan, led by Wallungull; and
- The Kurungbong, led by King Ben.

6.4 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 Lower 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).

Along the coast, the accounts of early observers such as Dawson (1830), Scott (1929) and Threlkeld (in Gunson, 1974) are suggestive of a diet based principally on fish and shellfish, with crustacea (i.e., crabs and crayfish) and marine mammals, namely whales and dolphins also consumed, the latter opportunistically (e.g., Threlkeld in Gunson, 1974: 55). Fish, a dietary staple, were caught in a variety of ways including angling (i.e., hook and line fishing), spearing, hand netting and trapping, and were cooked in fires, sometimes in canoes while still on the water (Threlkeld in Gunson, 1974: 190; Scott, 1929: 17-18). Angling was undertaken by women and spearing by men (Dawson, 1830: 314; Scott, 1929: 18; Threlkeld in Gunson, 1974: 54). Crayfish were obtained by diving amongst the rocks, an activity that was undertaken both sexes (cf. Scott, 1929: 19 & Threlkeld in Gunson, 1974: 55). Haslam et al. (1984: 22) report that shellfish were collected by women and children. However, Brayshaw (1987: 76) notes that there is no direct evidence as to who traditionally undertook this task.

The role of marine foods in the diets of Aboriginal groups occupying the lower Hunter at contact was complimented, or supplanted further inland, by 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, 1827: 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 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.

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 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” (Anon, 1877e). 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 limited are 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”.

6.5 Material Culture

Aboriginal material culture is explicitly linked to the natural environment and resource availability. For the lower 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 2** and **Plate 3**). 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 lower 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 2 **Joseph Lycett's '*Aborigines resting by camp fire, near the mouth of the Hunter River*', *ca*.1820 (Source: National Library of Australia)**

Plate 3 **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 2m long and *c*.4cm 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, 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.

Although particularly well represented in the archaeological record of the lower Hunter Valley, 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)[11]. However, she also acknowledges that their use may simply have escaped the notice or interest of early observers.

6.6 Ceremony and Ritual

Evidence for ceremonial or ritual behaviour amongst the Aboriginal groups occupying the lower Hunter Valley at contact can be found in the accounts of a number 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[12] 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 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).

Available historical records suggest that burial in the earth was the most common form of burial practised by Aboriginal groups occupying the Lower Hunter Valley at contact, with tea tree bark widely used as a burial shroud (Fawcett, 1898b: 180; McKiernan, 1911: 889; Miller, 1877: 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. (1981) have noted of the Hunter Valley as a whole that, although skirmishes were common, major clashes were infrequent. Ritual combat appears to have linked principally to unsanctioned territorial incursions and the abduction of women (Fawcett, 1898b).

[11] 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.
[12] Where two circles were used, these were separated by a distance of up to 400 m.

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[13], for example, whose supreme spiritual entity was known as *Koun* (pronounced cone), the inland Wonnarua and Kamilaroi are understood to have venerated the prominent sky cult hero *Biame*. Threlkeld (1834 in Keary 2009) reports that Koun was known by three names - *Ko-in*, *Tip-pa-kál*, and *Pór-ráng* - and describes him as follows:

> "in appearance like a black; he resides in the thick brushes or jungles; he appears occasionally by day, but mostly at night. In general he precedes the coming of the natives from distant parts, when they assemble to celebrate certain mysteries, as knocking out the tooth in the mystic rite, or when performing some dance. He appears painted with pipe clay, and carries a fire-stick in his hand; but, generally, it is the doctors, a kind of Magicians, who alone perceive him, and to whom he says, 'Fear not, come and talk.' At other times he comes when the blacks are asleep, takes them up as an eagle does his prey, and carries them away. The shout of the surrounding party often occasion him to drop his burthen; otherwise, he conveys them to his fireplace in the bush, where close to the fire he carefully deposits his load. The person carried tries to cry out, but cannot feeling almost choked: at daylight, Ko-in disappears, and the black finds himself conveyed safely to his own fire-side!"

Available historical accounts indicate that that eagle-hawk (sea eagle) was a totem of particular importance to the Awabakal owing to its strong relationship with Koun, who resembled an eagle-hawk when in flight (Gunson, 1974: 3; Keary, 2009). Circular stone structures observed by Threlkeld on the Sugarloaf Range to the west of Lake Macquarie were explained by Threlkeld's primary informant Biraban as having been placed and assembled by eaglehawks (Keary, 2009).

Another important spiritual entity for the coastal Awabakal was *Puttikan*, a feared supernatural spirit who inhabited the Sugarloaf Range. Threlkeld (in Gunson, 1974: 61) describes *Puttikan* as follows:

> "resembling a man but taller in stature; with arms, legs, face, and hair, very long on the head, but the feet are placed contrarily to the face being behind; and the body hairy, like an animal. The flesh is so hard in all parts of the body that it is imprenentrable [sic], except just between the legs, where a spear may penetrate, but at no other part. He is fierce, devouring men, and often pursuing the Aborigines in the mountains".

6.7 Post Contact History

As in other parts of NSW and Australia more generally, the early post-contact history of the Aboriginal people of the lower Hunter 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.

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

[13] 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.*

7.0 Archaeological Survey

7.1 Aims and Objectives

The overarching aim of the archaeological survey undertaken for this assessment was to identify and record any existing surface evidence of past Aboriginal occupation within the Project Area. Nested-objectives were as follows:

- To “ground-truth” historical land use impacts across the Project Area;
- To identify areas that, irrespective of the presence or absence of surface artefacts, are likely to contain subsurface archaeological deposit; and
- To provide sufficient data to facilitate the development of appropriate management recommendations for the known and potential Aboriginal archaeological resource of the Project Area.

7.2 Methodology

Archaeological survey of the Project Area was undertaken on Friday 10 April 2015 by a combined field team of two AECOM archaeologists and two RAP field representatives (for a list of RAP field representatives refer to **Table 5** in **Section 3.3.2**). In accordance with the draft survey methodology presented to RAPs, the survey focused on areas of minimally to moderately disturbed terrain, specifically, the vegetated peripheries of the Clay Borrow Pit to the west of the Smelter, patches of regenerating native vegetation between the Smelter and North Dams[14] and the cleared electricity easement to the east of the Clay Borrow Pit. These areas offered the highest potential for archaeological site identification.

All survey was conducted on foot, with a total of four transects completed over the course of the survey. The location of each transect completed during survey, including start and end points, was recorded using one of two handheld differential GPS units, with associated transect data (e.g., levels of visibility and exposure) entered directly into the same unit upon the completion of each transect.

All Aboriginal archaeological materials identified during survey were recorded to a standard comparable to that required by the Code of Practice (Requirement 7), with individual artefact locations captured by differential GPS. As with that recorded for individual survey transects, attribute data for all identified Aboriginal artefacts within the Project Area were entered directly into a GPS unit using AECOM’s standard digital open site recording form.

7.2.1 Site Definition

The definition, in spatial terms, of Aboriginal archaeological sites is a topic of considerable importance to modern cultural heritage management and one that has generated significant discussion in Australian archaeology (e.g., Doleman 2008; Holdaway, 1993; Holdaway et al. 1998, 2000; MacDonald & Davidson 1998; McNiven 1992; Robins 1997; Shiner 2008). Aboriginal archaeological sites can be broadly defined as places in the landscape that retain physical evidence of past Aboriginal activity. Such evidence, of course, can assume a range of forms, depending on the nature of the activity or activities that produced it, and can vary dramatically in quantity and extent. Some Aboriginal archaeological sites are, by their very nature, easy to define in spatial terms. Scarred trees and rockshelters, for example, can be readily delineated from their surrounding landscapes. Difficulties arise, however, for sites whose present-day physical extent is, more often than not, a product of geomorphic processes, as opposed to the actions of Aboriginal people in the past.

Although relevant to a variety of site types, geomorphic processes such as soil erosion and deposition, are of particular relevance to identification and definition of surface scatters of stone artefacts, commonly referred to as ‘open camp sites’ or ‘artefact scatters’. It is, for example, now widely accepted that the visibility and preservation of such sites are, to a significant extent, products of such processes, both contemporary and historic (Dean-Jones & Mitchell 1993; Fanning et al. 2008, 2009; Shiner 2008). As demonstrated by countless large-scale excavations projects in south-eastern Australia, including the lower Hunter Valley, surface artefacts almost invariably represent only a fraction of the total number of artefacts present within these 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 to form part of more-or-less continuous

[14] Note that, while initially included within the Project Area for this assessment, sections of regenerating native vegetation between the Smelter and North Dams were excluded from Project Area post-survey.

subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as stream order and landform.

Such evidence poses a significant analytical and interpretive dilemma. Defining sites on the basis of surface artefacts alone is clearly problematic, with modern site boundaries invariably reflecting the size and distribution of surface exposures as opposed to the actions of Aboriginal people in the past. Nonetheless, for pragmatic reasons, this is the most commonly used approach, with 'distance' and 'density-based' definitions dominating. In NSW, 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*'. Neither definition is derived from a particular theoretical approach or body of empirical research - they are simply pragmatic devices for site definition. Definitions based on artefact density also vary in their particulars. However, one of most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 m², higher density clusters that are subsequently defined as 'sites'.

Non-site or distributional archaeology offers an alternative approach to distance and density-based site definitions (Ebert 1992; Foley 1981), with individual artefacts, not sites, treated as the basic units of analysis (for published Australian examples see Doelman 2008; Holdaway et al. 2000; McNiven 1992; Robins 1997; Shiner 2008). While recognising the interpretive potential of non-site approaches with respect to data analysis and discussion, their implementation in the context of cultural heritage management studies is difficult. Here, the identification of 'sites' is required for reasons of recording (i.e., their entry into site databases such as AHIMS) as well as ease of relocation, protection, and ongoing management. The identification of spatially-discrete 'sites', therefore, offers the most pragmatic approach to Aboriginal heritage management in impact assessment contexts (but see McDonald (1996) for a different view).

Site definition for the current assessment has been based on the 50 m distance convention cited above. Subsurface archaeological potential, meanwhile, is addressed by the concept of 'archaeological sensitivity', with three levels of sensitivity recognised: nil, low and high (**Table 15**). Akin to the concept of PAD, archaeologically sensitive areas can be broadly defined as those that retain potential for subsurface archaeological deposit. For the current investigation, levels of archaeologically sensitivity across the Project Area have been assessed on the basis of observed archaeology (i.e., its distribution and character), the results of previous Aboriginal heritage investigations within and surrounding the Project are, levels of past land disturbance and the predicted complexity of deposits within each category.

Table 15 Archaeological sensitivity rating scheme

Rating	Definition
Nil	Land with no potential for subsurface archaeological deposit(s) due to past ground disturbance(s).
Low	Subsurface archaeological deposit(s) may be present. Relative to areas of high sensitivity, lower artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances.
High	Subsurface archaeological deposit(s) likely to be present. Relative to areas of low sensitivity, higher artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances.

7.3 Survey Results

7.3.1 Survey Coverage and Effective Coverage

As indicated in **Section 7.2** and shown on **Figure 21**, a total of four pedestrian transects were completed over the course of the survey. Recorded transect data indicate that a total survey coverage of approximately 2.2 ha was achieved. Excluding those portions of transects falling outside of the Project Area provides a revised *total survey coverage* of *c*.1.5 ha, representing around 2**%** of the entire Project Area and 53.7% of minimally to moderately disturbed terrain therein. A breakdown of survey coverage by landform is provided in **Table 16**.

Effective coverage is an estimate of the area in which archaeological materials are 'detectable'. Calculation of the *total effective coverage* obtained for the current survey indicates that approximately 0.075 ha of land within the Project Area was effectively surveyed for Aboriginal archaeological materials (**Table 17**). This equates to around 0.1% of the total Project Area and 4.9% of the total area surveyed (1.5 ha).

Tabulated estimates of the effective coverage achieved for each of the four pedestrian transects completed during survey are provided in **Table 18**. As indicated, effective coverage within Transect 1 was relatively high (45%) owing to the presence of multiple exposures[15] characterised by very good to excellent Ground Surface Visibility (GSV) (**Plate 4** and **Plate 5**). Levels of effective coverage for Transects 2, 3 and 4, in contrast, were significantly lower due to limited exposure and generally poor GSV conditions. Unsurprisingly, consideration of levels of effective survey coverage by landform (**Table 16**) shows that effective coverage was highest within the disturbed landform unit (0.053 ha), with the remaining landform units characterised by significantly lower values. The single stone artefact recorded during survey was identified within the disturbed landform unit. No cultural lithics were identified within the simple slope and crest flat landform units.

Table 16 Survey coverage by landform

Landform unit	Area (ha)	%
Disturbed	0.8	52.6
Simple slope	0.6	39.2
Crest	0.1	8.1
Total	**1.5**	**100**

Table 17 Effective coverage by landform with surface artefact counts

Landform unit	Effective coverage (ha)	% of total effective coverage	Number of surface artefacts	% of total artefacts
Disturbed	0.053	71	1	100
Simple slope	0.018	24	-	-
Crest	0.004	5	-	-
Total	**0.075**	**100**	**-**	**100**

Table 18 Effective coverage for individual survey transects

Transect Id	Landform unit(s)	Length (m)	Survey unit area (m²)	Visibility (%)	Exposure (%)	Effective coverage area (m²)	Effective coverage (%)
01	Disturbed & Elevated flat	283	2297.4	90	50	1033.8	45
02	Disturbed	202	1663.1	80	30	399.1	24
03	Disturbed	307	3144.4	60	20	377.3	12
04	Simple slope, Crest & Disturbed	1,453	14,601.2	30	10	438	3

[15] Note that observed exposures along Transect #1 and #2 were, for the most part, 'artificial' in the sense that they comprised eroding sections of dam bank.

Transect 4
Transect 1
Transect 2
Transect 3
Bishops Bridge Road
Hart Road
Hart Road
M15
HUNTER EXPRESSWAY
Dickson Road
Kurri Kurri/
Loxford Park
Speedway
Swamp Creek
20
10
10
10
20

KEY

- Project area
- Road
- Survey transects
- Watercourse

0 100 200m

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SURVEY TRANSECTS

Aboriginal Cultural Heritage Assessment
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FIGURE 21

Plate 4 **Example of 'dam bank exposure' in Transect #1. Note excellent GSV.**

Plate 5 **View across part of Transect #2. Note enhanced GSV conditions in foreground.**

Plate 6 **View across part of Transect #4. Note very poor GSV conditions due to grass cover.**

Plate 7 **View across part of Transect #4. Note very poor GSV conditions outside of disturbed areas.**

7.3.2 Ground Disturbance

Levels of Ground Integrity (GI) across the surveyed portions of the Project Area ranged from low to moderate, with the majority of surveyed land comprising grossly disturbed terrain. Recent and historical ground surface disturbance activities noted during survey included dam and drainage channel construction/modification, pipeline and powerline installation, native vegetation clearance, sediment fence installation, vehicle track construction/use and remediation earthworks.

Sections of regenerating native vegetation adjacent to Transects 1, 2 and 3 were not, for the most part, physically surveyed owing to uniformly poor survey and GSV conditions. However, these areas were assessed in the field as retaining a moderate GI, an assessment consistent with available historical aerial photographs for the Project Area. Strips of regenerating native vegetation on the peripheries of the former clay borrow pit area to the west of the main smelter complex were likewise assessed as retaining moderate GI, as was cleared land to the immediate north and west of the 'Cleared Area West of Line 3'.

7.3.3 Identified Sites

One previously unrecorded Aboriginal archaeological site was identified during survey. The site, which consists of an isolated stone artefact in a disturbed surface context, in described in **Section 7.3.3.1**. The location of the site, meanwhile, is shown on **Figure 22**.

7.3.3.1 Hydro-IA35-15

Hydro-IA35-15 comprises an isolated silicified tuff flake on the eastern edge of unsealed N-S trending vehicle track on Lot 319 of DP755231. The flake has been exposed by the installation of a sediment fence along part of the track in question and is currently resting on a deflated spoil pile to the immediate west of this fence. The flake, which is complete and measures 23.6 (L) x 22.9 (W) x 8 (T) mm, exhibits a multiple scar platform and retains 1-50% water-rolled dorsal cortex. The landscape context of the site is that of gently inclined (3-10%) simple slope approximately 250 m west of the unnamed second order stream that bisects the Project Area. Overall site condition can be characterised as poor. Relevant disturbance factors include construction of the sediment fence, native vegetation clearance, vehicle track construction/use and erosion.

7.3.4 Archaeological Sensitivity

Figure 23 presents AECOM's assessment of the archaeological sensitivity of land within the Project Area. As indicated in Section **7.2.1**, three levels of archaeological sensitivity are recognised on the basis of the results of previous Aboriginal heritage investigations within and surrounding the Project Area, levels of past land disturbance and the predicted complexity of deposits within each category: Nil, Low and High.

As shown on **Figure 23**, the majority of land within the Project Area has been assessed as being of 'Nil' archaeological sensitivity owing to intensive landscape modification associated with the construction/expansion of Hydro smelter and affiliated ground disturbance activities. Identified areas of low archaeological sensitivity within the Project Area include the vegetated peripheries of the Clay Borrow Pit to the west of the Smelter and the cleared electricity easement to the east of the Clay Borrow Pit. These areas do not, on the basis of field observations and historical aerial photographs, appear to have been heavily disturbed but are located more than 100 m from a mapped higher order watercourse.

One area of high archaeological sensitivity, comprising a cleared section of elevated low gradient terrain (see **Plate 11**) overlooking the unnamed 2nd order stream that bisects the Project Area, is recognised. Field observations and historical aerial photographs suggest that this area retains moderate GI.

Relative to areas of low sensitivity, it is predicted that any subsurface archaeological deposits present within areas of high sensitivity will exhibit higher mean artefact counts, densities and assemblage richness values (i.e., with respect to the representation of technological types and raw materials). Archaeological features such as knapping floors and hearths are also more likely to occur in these areas.

Plate 8 **Hydro-IA35-15: complete silicified tuff flake**

Plate 9 **View across Hydro-IA35-15, looking south. White pin-marker in foreground marks location of artefact.**

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HYDRO-IA35-15

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Kurri Kurri, New South Wales

FIGURE 22

Bishops Bridge Road

Hart Road

Hart Road

Dickson Road

Kurri Kurri/
Loxford Park
Speedway

Swamp Creek

M15

HUNTER EXPRESSWAY

20

10

10

20

10

KEY

Project area
Road
Watercourse
Aboriginal Heritage Sensitivity
High
Low
Nil

0 100 200m

G:\ENV\GIS\Projects\60360312210 Hydro Aboriginal\FIGURES\Remediation EIS\60312210 F23 Archaeological Sensitivity 25 09 2015 TO Rev B

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ARCHAEOLOGICAL SENSITIVITY

Aboriginal Cultural Heritage Assessment
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FIGURE 23

Plate 10 **View across section of regenerating native vegetation at western end of Transect #1**

Plate 11 **View across northernmost portion of 'Cleared Area West of Line 3', assessed in the field as retaining moderate ground integrity. Note that area of moderate GI excludes spoil mound at right.**

7.3.5 Assessment of Archaeological Predictions

In **Section 5.3**, a series of predictions regarding the Aboriginal archaeological record of the Project Area were made. **Table 19** compares the predictions made with the results of the archaeological survey undertaken as basis for informing future archaeological investigations within and around the Project Area.

Table 19 Evaluation of archaeological predictions

Prediction	Assessment
Material evidence of past Aboriginal activity within the Project Area, if present, is likely to be restricted to flaked stone artefacts in surface and subsurface contexts. However, there remains some, albeit limited, potential for the presence of grinding groove sites, stone quarries and scarred trees	The results of the current survey support this prediction. Only one Aboriginal archaeological site, consisting of an isolated stone artefact - was identified during survey. No scarred trees, stone quarries or grinding groove sites were identified during survey.
Most, if not all, of the Aboriginal archaeological materials present within the Project Area will be of mid-to-late Holocene antiquity	The single stone artefact identified during survey is chronologically undiagnostic.
Grinding groove sites, if present, will occur in direct association with the 2nd order stream that bisects the Project Area	No grinding groove sites or exposures of sandstone bedrock were identified during survey.
The dominant raw material for flaked stone artefact production within the Project Area will be silcrete, with silicified tuff the second most common material	The validity of this prediction cannot be adequately assessed on the basis of the current survey results.
Flaked stone assemblages will be dominated by flake debitage (sensu Andrefsky 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented	The validity of this prediction cannot be adequately assessed on the basis of the current survey results.
The majority of silcrete artefacts will exhibit evidence of thermal alteration;	No silcrete artefacts were identified during survey
Knapping floors, if present, will exhibit evidence indicative of systematic backed artefact manufacture;	No knapping floors were identified during survey
Complete and/or fragmentary backed artefacts will dominate the retouched components of surface and excavated assemblages; and	No backed artefacts were identified during survey
Tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts.	No tool types of demonstrated temporal significance were identified during survey
Surface artefact distribution within the Project Area will vary significantly in relation to landform, distance to water and stream order.	The validity of this prediction cannot be adequately assessed on the basis of the current survey results.

8.0 Significance Assessment

8.1 Principles of Assessment

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

In Australia, the primary guide to the assessment of cultural significance is the *Australian ICOMOS Charter for Places of Cultural Significance* (1999), 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 1999: 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 20**). 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) (ICOMOS 1999: 12). 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 1999: 11).

With respect to Aboriginal sites and places, 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. These values are discussed in **Sections 8.2** and **8.4**.

Table 20 Values relevant to determining cultural significance, as defined by The Burra Charter (1999).

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 1999: 12).
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 1999: 12).
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 1999:12).
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 1999: 12).

8.2 Scientific (Archaeological) Significance

The scientific (or archaeological) significance of Aboriginal archaeological sites relates primarily to their potential for providing information about past Aboriginal culture and is commonly assessed on the basis of their *research potential, representativeness* and *rarity*. Other criteria, such as aesthetic value and education potential, may also be relevant.

8.2.1 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, Bowdler and Bickford

(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 (NPWS 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.

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.

8.2.2 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[16]. 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

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

a major constraint in assessments of representativeness and rarity. As stressed by Bowdler (1981) some 30 years ago, detailed regional-scale assessments of the Aboriginal archaeological record of Australia are required to address this issue.

8.3 Assessment of Scientific Significance

An assessment of the scientific significance of newly identified isolated artefact Hydro-IA35-15 is presented in **Table 21** below. This assessment finds that the site is of low scientific significance.

Table 21 Significance assessment for identified Aboriginal archaeological site Hydro-IA35-15

Site	Significance ranking	Justification
Hydro-IA35-15	Low	***Complexity*** • Isolated artefact in disturbed surface context • Chronologically undiagnostic waste flake • Locally and regionally common raw material (silicified tuff) ***Integrity*** • Overall site condition is poor. Relevant disturbance factors include sediment fence installation, native vegetation clearance, vehicle track construction/use and erosion. ***Potential for deposit*** • Field observations suggest low potential for subsurface archaeological deposit within the boundaries of this site ***Rarity and representativeness*** • Open artefact sites are a locally and regionally common site type. • Hydro-IA35-15 is a poor example of its type. Numerous open artefact sites of higher research potential are known on a local and regional scale.

8.4 Social/Cultural Values

Social or cultural values refer to the spiritual, traditional, historical and contemporary associations and attachments a place or area has for Aboriginal people. As such, these values and their social significance can only be identified through consultation with Aboriginal people. Accordingly, throughout the assessment process, AECOM have actively sought the opinions of RAPs on this matter, both verbally and in writing. Opportunities for the provision of cultural information have been provided at all stages of the assessment process. Social or cultural values are applicable to sites, items and landscapes.

Throughout the assessment process, RAPs have identified the following social or cultural values for the Project Area and its associated Aboriginal archaeological record:

- The Project Area is significant to local Aboriginal people because it contains watercourses and food resources.

9.0 Impact Assessment

9.1 Summary of Proposed Impacts

As detailed in **Section 1.3**, Hydro proposes to carry out demolition, remediation and waste management activities within the Project Area to render it suitable for future use. The key elements of the Project, which will be undertaken in six phases, are:

- The demolition of the smelter buildings and structures within the Project Area. This would include safe removal of hazardous materials prior to and during remediation;
- The remediation of contaminated soils located within the Project Area, including materials within the capped waste stockpile (containing mixed smelter wastes) and accessible contaminated soils around and below smelter structures;
- The design and construction of a waste management facility, comprising a state of the art, modern and purpose built containment cell that would encapsulate materials including:
    - Non-recyclable demolition waste from the existing smelter buildings and structures;
    - Contaminated soils from the smelter;
    - Materials within the existing capped waste stockpile located at the smelter site;
    - Stored residual smelting process materials; and
    - Soils and materials derived from remediation elsewhere within Hydro-owned land.
- Validation of the remediated areas of the smelter site and Hydro-owned land as suitable for future employment land uses; and
- The treatment of leachate and leachate impacted groundwater from the capped waste stockpile.

Following completion of the demolition, site remediation and construction of the containment cell, the following activities would be undertaken:

- Establishment and implementation of a containment cell monitoring program; and
- Long term management of the containment cell through an Environmental Management Plan.

An assessment of the potential impacts of the Project on the identified Aboriginal heritage values of the Project Area is provided below.

9.2 Impacts to Aboriginal Heritage

9.2.1 Hydro-IA35-15

The location of newly identified site Hydro-IA35-15 in relation to the project layout (**Figure 24**) indicates that the site will be directly impacted by the construction of the containment cell to the west of the smelter site. In the absence of appropriate mitigation measures, complete destruction is anticipated.

9.2.2 Area of High Archaeological Sensitivity

As shown on **Figure 24**, the area of high archaeological sensitivity identified in the northernmost portion of the ‘Cleared Area West of Line 3’ falls within the area earmarked for the ENM stockpile. Physical impacts to the integrity of natural soil profiles within this area may occur as a result of temporary soil and material stockpiling and removal activities (including associated heavy vehicle movements).

9.2.3 Areas of Lows Archaeological Sensitivity

Reference to **Figure 24** indicates that identified areas of low archaeological sensitivity in the northwestern portion of the Project Area will be impacted by the construction of the containment cell and ENM stockpiling. Any Aboriginal archaeological materials present within these areas are expected to be severely disturbed or destroyed as a result of these activities.

9.3 Cumulative Impact Assessment

9.3.1 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 regards 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 OEH'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, OEH 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 development will have 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 are robust regional and national data sets 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 OEH guidelines necessitate that a cumulative impact assessment be undertaken as part of any Aboriginal cultural heritage assessment in NSW.

9.3.2 Intergenerational Equity - Cumulative Impact Assessment

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

1) A comparison, using the results of AHIMS searches, of the identified Aboriginal archaeological resource of the Project Area with that of the surrounding region, defined here as an arbitrary 10 x 10 km area centred on the Project 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.

9.3.2.1 Known Resource

Alongside those identified within the Project 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 Project on this joint resource.

As indicated in **Section 9.2.1**, newly identified isolated artefact Hydro-IA35-15 is expected to be directly impacted by the Project. AHIMS data indicate that this site represents 0.7% of the existing open artefact resource of the

study region, with searches of the AHIMS database on 16 February 2015 returning 141 'Valid' open artefact site entries, four 'Partially Destroyed' open artefact site entries and nine 'Destroyed' open artefact site entries for this area.

While acknowledging the limitations of the AHIMS database with respect to the validity of listed site statuses, on the basis of current AHIMS data, it seems reasonable to conclude that the loss of Hydro-IA35-15 within the Project Area would not constitute a significant adverse impact to the existing open artefact resource of the study region. Consideration of the character of this site, which comprises an isolated flake in a disturbed surface context, provides further support this suggestion as does the observation that, while a large number of Aboriginal archaeological investigations incorporating survey and/or excavation have been undertaken within the study region, the majority of land within this area has not been physically inspected for Aboriginal sites.

9.3.2.2 Potential Resource

Based as they are on the results of archaeological investigations covering only a fraction of the total study region, the AHIMS-derived figures cited in **Section 9.3.2.1** provide an insufficient picture of the cumulative impact of the Project on the open artefact resource of the study region. Accordingly, an assessment of the potential open artefact resource of this area is also required. For the present analysis, digital land use data and relevant topographic maps have been used to prepare a provisional assessment of this resource.

As a starting point, it is necessary to quantify the amount of land within the study region that has the potential to retain to open artefact sites similar to that identified within the Project Area. A basic assumption here is that 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 (**Table 22**) indicates that grossly modified or disturbed terrain accounts for around 19% of land within the region. Outside of grossly disturbed areas (e.g., urban and industrial areas, transport corridors), grazing land is particularly well represented, accounting for 42.9% of land within the study region. Areas specifically reserved for conservation, meanwhile, make up 0.6% of land within the region, with a further 28.3% comprising intact or regenerating native forest. Land utilised for horticulture is poorly represented at 0.3%. Natural landscape features (i.e., rivers, creeks and wetlands) make up the remaining 8.5%.

Viewed from an Aboriginal archaeological perspective, the land use data presented in (**Table 22**) suggest that approximately 81% of the land within the study region can be considered to comprise a potential open artefact site resource. As indicated, land upon which open artefact sites are unlikely to survive accounts for around 19% of the total resource area. This figure increases to around 62% if grazing land is included. However, as indicated by the results of numerous Aboriginal archaeological investigations, both within and outside of the study region, grazed areas can and frequently do retain significant surface and subsurface stone artefact records. It can, therefore, be concluded that around 81% of land within the study region has the potential to retain open artefact sites in surface and subsurface contexts. While acknowledging the fact that the character and distribution of such sites will vary markedly in relation to a range of environmental variables, 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 from which assess the cumulative impact of the Project on this resource.

Assuming, for the purposes of this analysis, that all non-grossly disturbed portions of the Project Area comprise a potential open artefact site resource and that the Project will result in the total destruction of these areas, it can be stated that the Project would result in a *c.*0.04% decrease in the region's potential open artefact resource. On this basis, it can be concluded that the impact of the Project on the potential Aboriginal archaeological resource of the study region will be very low.

With regards to the existence, outside of the Project area, of environmental contexts that have the potential to contain sites comparable to those identified within it, examination of relevant topographic maps for the study region indicates that many such contexts exist. As demonstrated by the results of the AECOM's (2014) assessment and those of previous archaeological investigations within the study region, although open artefact sites/deposits can occur in *any landform context,* they are most commonly found in contexts within 100 m of watercourses and other aquatic features (e.g., creek/river banks and terraces, proximal flood/drainage plains, bordering lower slopes, wetland margins). On the basis of this evidence alone, it can be confidently concluded that land outside of the current Project Area but within the study region contains a significant, as yet unidentified, open artefact site resource. Elevated, low gradient landform elements within 100 m of higher order creeks and wetlands, in particular, retain significant potential for the identification of open artefact sites/deposits.

Table 22 Land use analysis

Land Use	Ha	%
Conservation Area	64	0.6
Grazing	4285	42.9
Horticulture	25	0.3
Intensive Animal Production	22	0.2
Mining & Quarrying	21	0.2
Power Generation	81	0.8
River & Drainage System	224	2.2
Transport & Other Corridors	173	1.7
Tree & Shrub Cover	2830	28.3
Urban	1645	16.5
Wetland	629	6.3
Total	**10,000**	**100**

Source: NSW Landuse data, OEH Spatial Data Online

9.3.3 The Precautionary Principle

As indicated in **Section 9.3.1**, 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 investigation, 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 Project area and that this approach is reflected in our proposed management strategy.

Hart Road

Dickson Road

KEY

Project area
Road
Watercourse

Sensitivity
High
Low
Nil

Project component
Water treatment plants
Potential ancillary facilities
Stage 1 demolition
Stage 2 demolition
Main haul road and hart road (extended)
Main demolition compound
Containment cell
ENM/temporary capping storage
Materials stockpile/storage area
Crushing plants
Stacks/tank for stage 2 demolition
Hydro-IA35-15
Vegetation clearance for dam access
Contractors compound
Miscellaneous earthworks/smelter wastes removal
Capped waste stockpile
Contaminated soil remediation
Capped waste stockpile storage areas
Material stockpile area/storage areas

0 200 400m

G:\ENVGIS\Projects\60\60312210 Hydro Aboriginal\FIGURES\Remediation EIS\60312210 F24 Impact Assessment 25 09 2015 TO Rev B

AECOM

IMPACT ASSESSMENT

Aboriginal Cultural Heritage Assessment
Kurri Kurri, New South Wales

FIGURE 24

10.0 Management Strategy

10.1 Management Strategy

A management strategy to address the potential impacts of the Project on the identified Aboriginal heritage values of the Project Area is provided in the following sections. It is proposed that this strategy will guide the management of Aboriginal cultural heritage within the Project Area for the life of the Project.

10.1.1 Surface Collection and Precautionary Fencing of Hydro-IA35-15

As impacts to newly identified Aboriginal archaeological site Hydro-IA35-15 are unavoidable, the site should be surface collected prior to any Project-related ground disturbance works in its vicinity. Surface collection should be undertaken by a qualified archaeologist and/or RAP field representative. Subject to RAP endorsement, the stone artefact salvaged from this site should be relocated to an existing open artefact site within Hydro-owned land. Applicable site cards should be updated to reflect this move.

In order to avoid any inadvertent impacts to Hydro-IA35-15 prior to surface collection, it is recommended that the site be protected via permanent stock-proof fencing and appropriate signage. Fencing should comprise star pickets and high visibility construction fencing (or similar suitable materials). An archaeologist and/or RAP field representative should be engaged to supervise the fencing works and ensure that the site is accurately fenced.

10.1.2 Geo-Matting of Area of High Archaeological Sensitivity

In the event that the area of high archaeological sensitivity identified at the northern end of the Cleared Area West of Line 3 is to be used for stockpiling, care should be taken should be taken to avoid physical impacts to natural soil profiles in this area. If stockpiling is to occur, as a precautionary measure, a suitably qualified contractor should be engaged to lay geo-matting across this area, with consideration also given to additional mitigation measures (e.g., fencing, avoidance) as required. Upon completion of the Project, appropriate removal methods should be implemented so that natural soils are not disturbed.

10.1.3 Areas of Low Archaeological Sensitivity

No further mitigation or management actions are warranted for identified areas of low archaeological sensitivity within the Project Area. Nonetheless, should a previously unidentified Aboriginal site be identified in any of these areas throughout the life of the Project, the management procedure outlined in **Section 10.1.4** should be followed.

10.1.4 Management of Previously Unrecorded Aboriginal Objects

Should a previously unidentified Aboriginal site be identified at any point throughout the life of the Project, the following standard procedure should be adopted:

1) All works must cease immediately in the area to prevent any further impacts to the site;

2) Notify Hydro's Environment Officer;

3) Engage a suitably qualified archaeologist and RAP representative to determine the nature, extent and significance of the site and provide appropriate management advice. Management action(s) will vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts; and

4) Prepare and submit an AHIMS site card for the site.

10.1.5 Human Skeletal Remains

In the event that potential human skeletal remains are identified within the Project Area at any point during the life of the Project, the following standard procedure should be followed.

1) All work in the vicinity of the remains should cease immediately;

2) The location should be cordoned off;

3) 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):

- If the remains are identified as modern and human, the area will become a crime scene under the jurisdiction of the NSW Police;
- If the remains are identified as pre-contact or historic Aboriginal, the site will be secured and OEH and all RAPs notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided, remains will be retrieved via controlled archaeological excavation and reburied outside of the Disturbance Boundary in a manner and location determined by OEH and the RAPs;
- If the remains are identified as historic non-Aboriginal, the site is to be secured and the NSW Heritage Division contacted; and
- If the remains are identified as non-human, work can recommence immediately.

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Appendix A

Aboriginal Community Consultation Log

Date	To/From AECOM	Organisation	Contact person(s)	Method of contact	AECOM representative	Summary
14.01.15	From AECOM	OEH	-	Letter	A.McLaren	Letter to request information regarding Aboriginal individuals and/or organisations who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects/places in the area of the project.
14.01.15	From AECOM	Mindaribba LALC	-	Letter	A.McLaren	As above
14.01.15	From AECOM	Office of the Registrar	-	Letter	A.McLaren	As above
14.01.15	From AECOM	NTSCORP Limited	-	Letter	A.McLaren	As above
14.01.15	From AECOM	Cessnock Shire Council	-	Letter	A.McLaren	As above
14.01.15	From AECOM	Hunter Local Land Services	-	Letter	A.McLaren	As above
14.01.15	From AECOM	National Native Title Tribunal	-	Email with letter attachment	A.McLaren	As above
20.01.15	To AECOM	OEH	Nicole Davis	Email with letter attachment	A.McLaren	Response to AECOM's information request
21.01.15	To AECOM	NTSCORP Limited	George Tonna	Letter	A.McLaren	Response to AECOM's information request
23.01.15	To AECOM	Office of the Registrar	Bianca Ceissman	Letter	A.McLaren	Response to AECOM's information request
27.01.15	To AECOM	-	Stephen Talbott	Email	A.McLaren	Registration of interest for the Project
27.01.15	To AECOM	-	Amanda Heard	Email	A.McLaren	Registration of interest for the Project
30.01.15	To AECOM	National Native Title Tribunal	Melissa O'Malley	Email with letter attachment	A.McLaren	Response to AECOM's information request
30.01.15	From AECOM	Various Aboriginal organisations & individuals (n = 82)	Various	Letter & Email	A.McLaren	Expression of Interest (EOI) letter for Project
30.01.15	To AECOM	Wurrumay Consultant	Kerrie Slater	Email	A.McLaren	Confirmation of postal address
03.02.15	To AECOM	Wurrumay Consultant	Kerrie Slater	Email with letter attachment	A.McLaren	Registration of interest for the Project

03.02.15	To AECOM	Tocomwall Pty Ltd	Danny Franks	Email with letter attachment	A.McLaren	Registration of interest for the Project
04.02.15	To AECOM	Wallangan Cultural Services	Maree Waugh	Email	A.McLaren	Registration of interest for the Project
04.02.15	To AECOM	Yinnar Cultural Services	Kathie Kinchela	Phone	A.McLaren	Registration of interest for the Project
05.02.15	To AECOM	Wanaruah Local Aboriginal Land Council	Noel Downs	Email with letter attachment	A.McLaren	Registrations of interest for the Project for Hunter Valley Cultural Consultants, Upper Hunter Heritage Consultants, Giwiirr Consultants and Aboriginal Native Title Consultants
05.02.14	To AECOM	Gidawaa Walang Cultural Heritage Consultancy	Ann Hickey	Fax	A.McLaren	Registration of interest for the Project
05.02.15	To AECOM	Kawul Cultural Services	Vicky Slater	Phone	A.McLaren	Message asking for return phone call re assessment
06.02.15	To AECOM	Wonn1 (Kauwul Pty Ltd)	Suzie Worth (on behalf of Arthur Fletcher)	Email with letter attachment	A.McLaren	Registration of interest for the Project
06.02.15	To AECOM	Wanaruah Local Aboriginal Land Council	Suzie Worth	Email with letter attachment	A.McLaren	Registration of interest for the Project
06.02.15	To AECOM	Upper Hunter Wonnarua Council Inc	Rhoda Perry	Phone	A.McLaren	Does not wish to register at this point in time owing to number of organisations/individuals involved
06.02.15	From AECOM	Kawul Cultural Services	Vicky Slater	Phone	A.McLaren	Return call phone. No answer. Message left.
06.02.15	From AECOM	Wonnarua Culture Heritage	Shannon Griffiths	Phone	A.McLaren	Return phone call. Registration of interest for the Project
07.02.15	To AECOM	Lower Hunter Wonnarua Cultural Services	Tom Miller	Email with letter attachment	A.McLaren	Registration of interest for the Project
08.02.15	To AECOM	Culturally Aware	Tracey Skene	Email	A.McLaren	Registration of interest for the Project
10.02.15	To AECOM	Smith Dhagaans Cultural Group	Timothy Smith	Email with letter attachment	A.McLaren	Registration of interest for the Project
10.02.15	To AECOM	Wattaka Wonnarua Cultural Consultancy Services	Des Hickey	Email with letter attachment	A.McLaren	Registration of interest for the Project
11.02.15	To AECOM	Widescope Group	Steven Hickey	Email	A.McLaren	Registration of interest for the Project
11.02.15	To AECOM	A1 Indigenous	Carolyn	Email	A.McLaren	Registration of interest for the

		Services	Hickey			Project
11.02.15	To AECOM	Amanda Hickey Cultural Services	Amanda Hickey	Email	A.McLaren	Registration of interest for the Project
12.02.15	To AECOM	Kawul Cultural Services	Vicky Slater	Email	A.McLaren	Registration of interest for the Project
12.02.15	To AECOM	Kawul Cultural Services on behalf of HTO Environmental Management Services	Vicky Slater	Email	A.McLaren	Registration of interest for HTO Environmental Management Services
12.02.15	To AECOM	Murrawan Cultural Consultants	Robert Smith	Phone	A.McLaren	Registration of interest for the Project
13.02.15	To AECOM	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Email with letter attachment	A.McLaren	Registration of interest for the Project
13.02.15	To AECOM	Lower Hunter Aboriginal Incorporated	David Ahoy	Email	A.McLaren	Registration of interest for the Project
14.02.15	To AECOM	Cacatua General Services / AGA Services	Donna Sampson	Email with letter attachment	A.McLaren	Registration of interest for the Project
15.02.15	To AECOM	Jarban and Mugrebea	Les Atkinson	Email with letter attachment	A.McLaren	Registration of interest for the Project
16.02.15	To AECOM	Awabakal Descendants Traditional Owners Aboriginal Corporation	Peter Leven	Phone	A.McLaren	Registration of interest for the Project
16.02.15	To AECOM	Mindaribba LALC	Lea-Anne Ball	Email	A.McLaren	Registration of interest for the Project
16.02.15	To AECOM	Guringai Traditional Owners	Todd Heard	Email	A.McLaren	Registration of interest for the Project
17.02.15	To AECOM	Crimson Rosie	Jeff Matthews	Letter	A.McLaren	Registration of interest for the Project
20.02.15	From AECOM	All RAPS	Various	Email and letters	A.McLaren	Draft assessment methodology
25.02.15	To AECOM	Wurrumay Consultant	Kerrie Slater	Email with letter attachment	A.McLaren	Response to draft methodology. See **Section 3.3.1** for summary of response.
10.03.15	To AECOM	Gidawaa Walang Cultural Heritage Consultancy	Annie Hickey	Email	A.McLaren	Response to draft methodology. See **Section 3.3.1**for summary of response.
23.03.15	To AECOM	Awabakal Traditional Owners Aboriginal	Kerrie Brauer	Email	A.McLaren	Response to draft methodology. See **Section 3.3.1**for summary of response.

		Corporation				
30.03.15	From AECOM	All RAPS	Various	Email	A.McLaren	Fieldwork notification letter
31.03.15	To AECOM	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Email	A.McLaren	Response to fieldwork notification.
03.07.15	From AECOM	All RAPS	Various	Email & mail	A.McLaren	Draft report for RAP review
26.07.15	To AECOM	Culturally Aware	Tracey Skene	Email	A.McLaren	Response to draft report. See **Table 6** in **Section 3.0**.
28.07.15	To AECOM	Wallangan Cultural Services	Maree Waugh	Email	A.McLaren	Response to draft report. See **Table 6** in **Section 3.0**.
03.08.15	To AECOM	Tocomwall	Jakub Czastka	Email with letter attachment	A.McLaren	Response to draft report. See **Table 6** in **Section 3.0**.

Appendix B

Agency Responses

OFFICE OF THE REGISTRAR
ABORIGINAL LAND RIGHTS ACT 1983 (NSW)

11-13 Mansfield Street
Glebe NSW 2037
PO Box 112, Glebe NSW 2037
P 02 9562 6327 F 02 9562 6350

Dr Andrew McLaren
AECOM
Level 21, 420 George Street
Sydney NSW 2000

Dear Dr McLaren

Re: Request - Search for Registered Aboriginal Owners

I refer to your letter dated 14 January 2015 regarding Aboriginal Cultural Heritage Assessment within the area of Kurri Kurri NSW.

I have searched the Register of Aboriginal Owners and the project area described *does not appear* to have Registered Aboriginal Owners pursuant to Division 3 of the *Aboriginal Land Rights Act* 1983 (NSW).

I suggest that you contact the Mindaribba Local Aboriginal Land Council. They will be able to assist you in identifying other Aboriginal stakeholders for this project.

Yours sincerely

Bianca Ceissman
Administration Officer
Office of the Registrar, *Aboriginal Land Rights Act* (1983)
19 January 2015

Attachment A: ABORIGINAL PARTIES IN THE AREA OF INTEREST (OTHER THAN LOCAL ABORIGINAL LAND COUNCILS)

1. Aboriginal Native Title Elders Consultants
Margaret Matthews
16a Mahogany Street
MUSWELLBROOK NSW 2333
Mob: 0417 725 956

2. Aliera French Trading
12 Haydon Street
MUSWELLBROOK NSW 2333
Ph: 02 6541 2756
Mob: 0421 299 963
Aliera.french.trading@hotmail.com

3 Alison Sampson
36 Hill Street
CAROONA NSW 2343
Mob: 0401 151 124 or 0434 642 004
Alliekat29@hotmail.com

4. Black Creek Aboriginal Corporation
Tracey White
PO Box 168
KURRI KURRI NSW 2327
Ph: 02 4990 6747
blackcreek@idl.net.au

5. Bullen Bullen
Lloyd Mathews
16B Mahogany Avenue
MUSWELLBROOK NSW 2333
Mob: 0417 725 956

6. Cacatua Culture Consultants
Donna & George Sampson
Unit 1B 11 Glenwood Drive
THORNTON NSW 2322
Ph: 02 4028 6942
Fax: 02 4028 6943
Mob: 0403 765 019 or 0434 877 016
cacatua@resetdsl.net.au

7. Carrawonga Consultants
Cheryl Moodie & Justin Matthews
11 Coolibah Close
MUSWELLBROOK NSW 2333
Mob: 0411 958 511 or 0401 154 328

8. Culturally Aware
Tracey Skene
7 Crawford Place
MILFIELD NSW 2325

9. D F T V Enterprises
Derrick Vale Snr
5 Mountbatten Close
RUTHERFORD NSW 2320
Mob: 0438 812 197
deckavale@hotmail.com

10. Deslee Talbott Consultants
Deslee Matthews
Unit 2 / 19 South Street
GUNNEDAH NSW 2380
Mob: 0431 205 336

11. Devine Diggers Aboriginal Cultural Consultants
Deidre Perkins
6 Ashleigh Street
HEDDON GRETA NSW 2321
Ph: 02 4937 4573
Mob: 0425 654 290
divinediggers@bigpond.com

12. DRM Cultural Management
Helen Faulkner
81 Wansbeck Valley Road
CARDIFF NSW 2285
Mob: 0412 369 661

13. Esther Tighe
1/86 Edward Street
GUNNEDAH NSW 2380
Ph: 02 6742 7105
Fx: 02 6742 2125
Mob: 0422 648 350

14. Gidawaa Walang & Barkuma Neighbourhood Centre Inc.
Debbie Dacey-Sullivan
76 Lang Street
KURRI KURRI NSW 2327
Ph: 02 4937 1094
Mob: 0411 196 991
barkuma@hotmail.com

15. Giwiirr Consultants
Michele Stair
8 Fitzgerald Avenue
MUSWELLBROOK NSW 2333
Ph: 02 6541 0506
Mob: 0432 214 402

16. Griffiths Group
Priscilla Priestley
7 Yeoman Avenue
METFORD NSW 2333
Mob: 0422 651 752

17. HECMO Consultants
Kerren Boyd
Lot 136 Main Street
BREEZA NSW 2381
Mob: 0402 865 400
Chook7262@hotmail.com

18. Hielamon Cultural Consultants
Clifford Johnson
16B Mahogany Drive
MUSWELLBROOK NSW 2333
Mob: 0478 828 745

19. HSB Heritage Consultants
Patricia Hampton
35 Larool Street
STH TAMWORTH NSW 2340
Mob: 0424 142 216
pamelaann@live.com.au

20. Hunter Traditional Owner
Paulette Ryan
14 Barton Avenue
SINGLETON HEIGHTS
Ph: 02 6574 4906
Mob: 0432 672 273

21. Hunter Valley Aboriginal Corporation
Rhonda Griffith
PO Box 579
MUSWELLBROOK NSW 2333

22. Hunter Valley Cultural Consultants
Christine Matthews
40 Humphries Street
MUSWELLBROOK NSW 2333
Ph: 02 6543 4521
Mob: 0438 390 882

23. Hunter Valley Cultural Surveying
Luke Hickey
165 Susan Street
SCONE NSW 2337
Ph: 02 6541 0525
Mob: 0402 446 223 or 0423 960 690
hvcs@bigpond.com

24. Hunter Valley Natural & Cultural Resources
David French
Flat 1 / 72-11 Tindale Street
MUSWELLBROOK NSW 2333
Mob: 0413 242 613

25. Hunters & Collectors
Tania Matthews
2/23 Reid Street
NARRABRI NSW 2390
Ph: 02 6779 24038
Tamatthews10@hotmail.com

26. I & E Aboriginal Culture and Heritage
Ivy Jaeger
1/162 Myall Road
CARDIFF NSW 2285
Mob: 0402 943 540
Ie.aboriginalcultureandheritage@hotmail.com

27. Jarban & Mugrebea
Les Atkinson
11 Nelson Street
CESSNOCK NSW 2325
Mob; 0402 353 317
Les.atkinson@hotmail.com

28. Jeff Matthews
6 Eucalypt Avenue
MUSWELLBROOK NSW 2333
Ph: 02 6543 4791

29. JLC Cultural Services
Jenny Lee Chambers
39 Goulburn Drive
SANDY HOLLOW NSW 2333
Mob: 0432 087 829

30. Jumbunna Traffic Management Group Pty Ltd
Norm Archibald
27 Margaret Street
TERALBA NSW 2284
Ph: 02 4965 8105
jtmanagement@live.com.au

31. Kauma Pondee Inc.
Jill green
Unit 6 / 1 Central Street
NEW LAMBTON NSW 2305
Mob: 0434 210 190
greenie@live.com

323 Kawul Cultural Services
Vicky Slater
PO Box 817
SINGLETON NSW 2330
Mob: 0431 720 887
Kawul–Culturalservices@hotmail.com

33. KL KG Saunders Trading services
Krystal & Kylie Saunders
6 Bowfield Place
MUSWELLBROOK NSW 2333
Mob: 0412 693 952 or 0434 553 307

34. Lorraine Towney
32 Dewhurst Street
QUIRINDI NSW 2343
Mob: 0403 427 894

35. Lower Hunter Aboriginal Incorporated
Les Ahoy
74 Hayden Brook Road
BOORAGUL NSW 2284
Mob: 0411 095 249
Lowerhunterai@gmail.com

36. Lower Hunter Wonnarua Council Inc.
Lea-Anne Ball Uncle Tommy Miller
51 Bowden Street
HEDDON GRETA NSW 2321
Ph: 02 4937 2694
Mob: 0447 26 590 (LM) or 0402 636 521 (Uncle)
tn.miller@southernphone.com.au or lea-anne.ball@bigpond.com

37. Lower Wonnaruah Tribal Consultancy Pty Ltd
Barry Anderson
156 The Inlet Road
BULGA NSW 2330
Mob: 0417 403 153
Barry156@bigpond.com

38. Michelle Saunders
24 Walhallow Village
WALHALLOW NSW 2343
Mob: 0458 516 775
michellesaunders@y7mail.com

39. Mindaribba Local Aboriginal land Council
PO Box 401
EAST MAITLAND NSW 2323
Ph: 02 4934 8511
Fx: 02 4934 8544
Mob: 0402 927 449

40. Mingga Consultants
Clifford Matthews
11 Coolibah Close
MUSWELLBROOK NSW 2333
Ph: 6541 0751
Mob: 0421 942 902

41. Mooki Plains Management
Stephen Matthews
28 Herbert Street
GUNNEDAH NSW 2380
Ph: 02 6742 5563

42. Mooki Plains Management
Les Field
4 Hinton Drive
GUNNEDAH NSW 2380
Ph: 02 6742 5563

43. Murrawan Cultural Consultants Pty Ltd
Robert Smith
33 Clift Street
HEDDON GRETA NSW 2321
Mob: 0402 679 809
murrawancc@gmail.com

44. Moreeites
Susan Cutmore
Unit 11 / 97 Brook Street
MUSWELLBROOK NSW 2333
Mob: 0411 570 568
Suewong58@hotmail.com

45. Muswellbrook Cultural Consultants
Brian & Gay Horton
10 Scott Street
MUSWELLBROOK NSW 2333

46. Myland Cultural & Heritage Group
Warren Schillings
30 Taurus Street
ELERMORE VALE NSW 2287
Mob: 0431 392 554
warren@yamuloong.com

47. Rebecca Lester
297 Pioneer Road
SINGLETON NSW 2330
Mob: 0423 044 586
Sandra_rebecca@y7mail.com

48. Ngarramang-Kuri Aboriginal Culture & Heritage Group
Abie Wright
21 Bancroft Street
GLENDALE NSW 2285
Mob: 0466 589 238
abie@yarnteen.com.au

49. Roger Noel Matthews Consultancy
Roger Noel
15 Parkinson Avenue
MUSWELLBROOK NSW 2333
Mob: 0419 676 580

50. Ron Smith
Flat 8
6 Hastings River Drive
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scottosmith@live.com.au

51. Rosyln Sampson
Unit 4 122 Upper Street
TAMWORTH NSW 2340
Mob: 0403 139 411
Laurarose2010@live.com.au

52. Scott Smith
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53. Smith Dhagaans Cultural Group
Tim Smith
46 Springvale Cct
CAMERON PARK NSW 2285
Mob: 0401 100 708
Smith.Dhagaans@hotmail.com

54. St Clair Singleton Aboriginal Corporation
Cultural Heritage Officer
PO Box 710
SINGLETON NSW 2330

55. Steven Saunders
35 Walhallow Village
CAROONA NSW 2343
Mob: 0487 192 468

56. T & G Culture Consultants
19 O'Donnell Cres
METFORD NSW 2323
Mob: 0428 147 417

57. Thawan Heritage Consultant
Jennifer Hampton
35 Larool Street
TAMWORTH NSW 2340
Mob: 0428 540 646
thawanheritageconsultant@hotmail.com

58. Trevor Robinson
PO Box 73
PEAK HILL NS 2869

59. Ungooroo Aboriginal Corporation
Alan Paget & Sarah Hall
PO Box 3095
SINGLETON NSW 2330
Ph: (02) 6571 5111
admin@ungooroo.com.au

60. Ungooroo Cultural & Community Services
Rhonda Ward
8 Blaxland Avenue
SINGLETON NSW 2330
Mob: 0450 754 199
Ungooroo59@hotmail.com

61. Upper Hunter Heritage Consultants
Melissa & Darrel Matthews
14 Edinglassie Avenue
MUSWELLBROOK NSW 2333
Ph: 02 6541 3532
Mob: 0439 556 641

62. Upper Hunter Wonnarua Council Inc.
Rhoda Perry & Georgina
17/174 John Street
SINGLETON NSW 2330

63. Valley Culture
Larry Van Vliet
140 Sydney Street
MUSWELLBROOK NSW 2333
Mob: 0417 725 956

64. Waabi Gabinya Cultural Consultancy
Elizabeth Howard
19 Foley Street
MUSWELLBROOK NSW 2333
Mob: 0439 653 928
waabigabinyacc@hotmail.com

65. Wallagan Cultural Services
Maree Waugh
PO Box 40
CESSNOCK NSW 2325
Mob: 0439 813 078
Mareewaugh30@hotmail.com

66. Wanaruah Custodians
David Foot
35 Acacia Circuit
SINGLETON NSW 2330
Ph: 02 6573 1712
Mob: 0457 429 136

67. Wanaruah Local Aboriginal Land Council
PO Box 127
MUSWELLBROOK NSW 2333
Ph: 02 6543 1288
Wanaruah@hunterlink.net.au

68. Warrigal Cultural Services
Aaron Slater
PO Box 1095
SINGLETON NSW 2330
Mob: 0478 844 530
Warragil_c.s@hotmail.com

69. Wattaka Wonnarua CC Service
Des Hickey
4 Kennedy Street
SINGLETON NSW 2330
Ph: 6573 3786
Fx: 6571 2609
Mob: 0432 977 178
deshickey@bigpond.com

70. Widescope Indigenous Group Pty Ltd
Steve Hickey
73 Russell Street
EMU PLAINS NSW 2750
Mob: 0425 232 056 or 0425 230 693
Widescope.group@live.com

71. Wonn1 Contracting
Arthur Fletcher
619 Main Road
GLENDALE NSW 2285
Ph: 02 4954 7751
Mob: 0402 146 193
Wonn1sites@gmail.com

72. Wonnarua Culture Heritage
Gordon Griffiths
19 O'Donnell Crescent
METFORD NSW 2323
Ph 02 4934 6437
Mob: 0401 028 807

73. Wonnarua Nation Aboriginal Corporation
Laurie Perry
PO Box 3066
SINGLETON NSW 2330
Ph: 02 6571 5419
Mob: 0412 593 020

74. Wonnaruah Elders Council
Uncle Tommy Miller
PO Box 184
SINGLETON NSW 2330

75. Wurrumay Consultants
Kerrie Slater
PO Box 817
SINGLETON NSW 2330
Mob: 0423 935 556
wurrumay@hotmail.com

76. Yarrawalk (A division of Tocomwall Pty Ltd)
Scott Franks
PO Box 76
CARRINGBAH NSW 1495
Mob; 0404 171 544
scott@tocomwall.com.au

77. Yinarr Cultural Services
Kathleen Steward
111 Westwood Road
GUNGAL NSW 2333
Ph: 02 6547 6077
0432 720 623
yinarculturalservices@bigpond.com

78 J & A Leonardi
69 Nelson Street
BARNSLEY NSW 2278
Ph: 02 49552136

21 January 2015 ref: OE&H : 21-1-2015/1

AECOM
PO BOX Q410
QVB Post Office NSW 1230

Dear Sir or Madam

Aboriginal Cultural Heritage Assessment

Hydro Smelter site, Kurri Kurri

I refer to your letter of 14 January 2015 regarding the above matter.

We acknowledge that section 4.1.2 of the Office of Environment & Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* require you to contact us in order to compile a list of Aboriginal people who may have an interest in the proposed project area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places.

However, we advise that NTSCORP's privacy guidelines restrict us from providing proponents with contact details of traditional owners who may have such an interest or hold such knowledge.

Please be advised that, in response to your notification, we will forward your correspondence to any individuals, groups and organisations whom NTSCORP is aware assert traditional interests within or hold cultural knowledge about the relevant area. Recipients of our correspondence will be invited to register their interest in the project directly with you ASAP.

Please be aware that NTSCORP cannot make a guarantee or undertaking that the recipients of our correspondence represent the entirety of traditional owners for the relevant area.

Yours faithfully,

George Tonna
Land & Notifications Officer
NTSCORP Limited

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+61 2 9310 4177
71 098 971 209
www.ntscorp.com.au

National Native Title Tribunal

Operations East, Sydney Office
Level 16, Law Courts Building,
Queens Square
Sydney NSW 2000
GPO Box 9973
Sydney NSW 2000
Telephone (02) 9227 4000
Facsimile (02) 9227 4030

30 January 2015

Geordie Oakes
Archaeologist
AECOM Australia Pty Ltd
PO Box Q410
QVB PO Sydney NSW 2000

Our Reference: 0365/15MO
Your Reference: Hydro2

Dear Sir/Madam

Native Title Search Results for Lot 2 DP456769, Lot 1 DP456769, Lot 769 DP755231 within Cessnock Local Government Area

Thank you for your search request of 22 January 2015 in relation to the above area.

Search Results
The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

Register Type	NNTT Reference Numbers
Schedule of Applications (unregistered claimant applications)	Nil.
Register of Native Title Claims	NC2013/002, NC2013/006
National Native Title Register	Nil.
Register of Indigenous Land Use Agreements	Nil.
Notified Indigenous Land Use Agreements	Nil.

Please note that there may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed in the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you

need to refer to "Area covered by claim" section of the relevant Register Extract or Application Summary and any maps attached.

Search results and the existence of native title
Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

Tribunal accepts no liability for reliance placed on enclosed information
The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representative, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please contact me on 1800 640 501.

Yours sincerely

Melissa O'Malley | RECEPTIONIST/CLIENT SERVICES OFFICER
National Native Title Tribunal | Sydney Office
Level 16, Federal Law Courts Building, Queens Square, Sydney, New South Wales 2000
Telephone (02) 9227 4000 | Facsimile (02) 9227 4030 | Email melissa.o'malley@nntt.gov.au
Freecall 1800 640 501 | www.nntt.gov.au
Shared country, shared future.

Searching the NNTT Registers in New South Wales

Search service
On request the National Native Title Tribunal may search its public registers for you. A search may assist you in finding out whether any native title applications (claims), determinations or agreements exist over a particular area of land or water.

In New South Wales native title cannot exist on privately owned land including family homes or farms.

What information can a search provide?
A search can confirm whether any applications, agreements or determinations are registered in a local government area. Relevant information, including register extracts and application summaries, will be provided.

In NSW because we cannot search the registers in relation to individual parcels of land we search by local government area.

Most native title applications do not identify each parcel of land claimed. They have an external boundary and then identify the areas not claimed within the boundary by reference to types of land tenure e.g., freehold, agricultural leasehold, public works.

What if the search shows no current applications?
If there is no application covering the local government area this only indicates that at the time of the search either the Federal Court had not received any claims in relation to the local government area or the Tribunal had not yet been notified of any new native title claims.

It does not mean that native title does not exist in the area.

Native title may exist over an area of land or waters whether or not a claim for native title has been made.

Where the information is found
The information you are seeking is held in three registers and on an applications database.

National Native Title Register
The National Native Title Register contains determinations of native title by the High Court, Federal Court and other courts.

Register of Native Title Claims
The Register of Native Title Claims contains applications for native title that have passed a registration test.

Registered claims attract rights, including the right to negotiate about some types of proposed developments.

Register of Indigenous Land Use Agreements
The Register of Indigenous Land Use Agreements contains agreements made with people who hold or assert native title in an area.

The register identifies development activities that have been agreed by the parties.

Schedule of Native Title Applications
The Schedule of Native Title Applications contains a description of the location, content and status of a native title claim.

This information may be different to the information on the Register of Native Title Claims, e.g., because an amendment has not yet been tested.

How do I request a native title search?
Download the Search Request Form from the Tribunal's website at - http://www.nntt.gov.au/assistance/Pages/Searches-and-providing-Register-information.aspx

Email to: NSWEnquiries@nntt.gov.au
Post to: GPO Box 9973 Sydney NSW 2001
For additional enquiries: 02 9227 4000

McLaren, Andrew

From: Lea-Anne Ball <ceo@mindaribbalalc.org>
Sent: Monday, 16 February 2015 2:02 PM
To: McLaren, Andrew
Subject: Register as Aboriginal Party Hydro Aluminium Smelter Kurri Kurri

Hi Andrew,

Mindaribba LALC would like to lodge an expression of Interest and Register as an Aboriginal Party for the Above mentioned Investigation.

Regards

Lea-Anne Ball
Chief Executive Officer
Mindaribba LALC

Ph. 02 4015 7000
Fax. 02 4934 8544

Mobile. 0439 770 789

MINDARIBBA
LOCAL ABORIGINAL LAND COUNCIL

CESSNOCK
CITY COUNCIL

16 February 2015

Dr Andrew P McLaren
AECOM Australia Pty Ltd
PO Box Q410
QVB Post Officer NSW 1230

Contact: Miss Hannah McCauley
Our Ref: -
Your Ref: -

Dear Andrew McLaren

Re: Information Request Regarding Relevant Aboriginal Persons & Organisations, Kurri Kurri NSW

I refer to your letter dated 14 January 2015 enquiring the as to the "...Aboriginal individuals and/or organisations whom you consider may hold current cultural knowledge relevant to determining the cultural significance of Aboriginal objects/places in the area of the proposed project..."

Please be advised that subject site is located within the Mindaribba Local Aboriginal land Council. To contact the Mindaribba Land Council you can use either of the following website:

- http://www.alc.org.au/home.aspx; or
- http://www.mindaribbalalc.org/

If you require any further information, please do not hesitate to contact me on telephone 02 4993 4183 or via email hannah.mccauley@cessnock.nsw.gov.au.

Yours faithfully

Hannah McCauley
Acting Administrative Planning Assistant

Appendix C

Public Notice - Maitland Mercury

Call for Registrations

Aboriginal Cultural Heritage Assessment Hydro Aluminium Smelter Site, Kurri Kurri, NSW

AECOM Australia Pty Ltd (AECOM), on behalf of Hydro Aluminium Kurri Kurri Pty Ltd (Hydro), is seeking to identify Aboriginal persons or organisations who wish to be consulted in relation to an Aboriginal cultural heritage assessment being undertaken for land within the Hydro Aluminium smelter site at Kurri Kurri, NSW. Hydro proposes to undertake demolition, remediation and waste management activities at the Smelter. This Project is classified as a State Significant Development (SSD) for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The primary purpose of the assessment is to establish the potential impact that the Project may have on Aboriginal objects and places, and to assist the Director-General in his or her determination of the Project.

Interested Aboriginal persons andr organisations are invited to register their interest in writing to:

Dr Andrew McLaren
AECOM Australia Pty Ltd
PO Box Q410, QVB PO
Sydney NSW 1230

Phone: +61 2 8934 0547
Fax: +61 2 8934 0001

Email:andrew.mclaren@aecom.com

The closing date for registration is 3 February 2015.

Appendix D

RAP Responses to Draft Assessment Methodology

McLaren, Andrew

From: Barkuma <barkumanc@hotmail.com>
Sent: Tuesday, 10 March 2015 10:48 AM
To: McLaren, Andrew
Subject: RE: Hydro Aluminium Kurri Kurri Smelter Draft Methodology

Dear Andrew,

Gidawaa Walang Cultural Heritage Consultancy supports the Draft Methodology for the Hydro Aluminium Smelter.

Thank You
Annie

Barkuma Neighbourhood Centre Inc.
76 Lang Street, Kurri Kurri NSW 2327
Phone: (02) 4937 1094
Fax: (02) 4936 4449
www.barkuma.org.au

From: Andrew.McLaren@aecom.com
To: barkumanc@hotmail.com
Subject: Hydro Aluminium Kurri Kurri Smelter Draft Methodology
Date: Thu, 19 Feb 2015 22:42:18 +0000

Dear Annie

Please find attached to this email the draft methodology for the Hydro Aluminium Kurri Kurri Smelter project. I would greatly appreciate it if you could get back to me with any comments you have on the draft methodology.

The comment period for the draft methodology will close 28 days from the date of this email, which is 22nd March 2015. Do not hesitate to contact me if you require anything further with regards to this.

Thanks and all the very best

Andrew McLaren
Archaeologist
D +61 2 8934 0547
Andrew.McLaren@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
www.aecom.com

22 March 2015

Andrew McLaren
AECOM
PO Box Q410
QVB Post Office, Sydney NSW 1230

Dear Andrew,

Re: Review and Response Regarding the Draft Aboriginal Heritage Assessment Methodology for the Hydro Aluminium Kuri Kuri Smelter Site

With regard to the Draft Aboriginal Heritage Assessment Methodology for the Hydro Aluminium Kuri Kuri Smelter Site, we recognise the evaluation by AECOM to be comprehensive and herein provide our response regarding our comments.

We agree with the Proposed Assessment Approach outlined within Section 1.6 on page 14-15 of the Draft Aboriginal Heritage Assessment Methodology for the Hydro Aluminium Kuri Kuri Smelter Site.

Our representatives are experienced in providing information regarding our Cultural Heritage and also have the training and experience to identify cultural material. We are conscious of the time frames that are required to read and review Draft Reports and generate written comment.

Our Certificates of Currency and Terms of Engagement details, while readily available, will be forwarded separately as we consider this information to be personal and confidential information which should not be included within the correspondence for the draft report.

With regard to providing cultural appropriate information, we would be pleased to share verbally any relevant cultural knowledge pertaining to the study area while attending the field assessment, but we do reserve the right and reluctance to share our cultural heritage with others in respect to our lore and custom and aspects of the cultural significance that connects us to our country. It is believed by our people that those who shouldn't be privy to this cultural knowledge have no rights or entitlements to it.

The principle vision and aims of the Awabakal People is to protect the Cultural Heritage of our Ancestors. Therefore, any artefacts and/or residual evidence of our people are held in high regard and are considered a cultural reminder that unites us with our land and sea country, our past and spirituality.

If you require any further information please do not hesitate in contacting me.

Kind regards,
Kerrie Brauer
Director | Administration

Awabakal Traditional Owners Aboriginal Corporation
ABN: 90 203 408 390 | ICN: 4411
PO Box 253 Jesmond NSW 2299 Australia
T: 61 2 49 58 81 70 | E: info@awabakal.com.au | www.awabakal.com.au

McLaren, Andrew

From: kerrie slater <wurrumay@hotmail.com>
Sent: Wednesday, 25 February 2015 10:19 AM
To: McLaren, Andrew
Subject: RE: Hydro Aluminium Kurri Kurri Smelter Draft Methodology

Hi Andrew

I've have read the Draft for the project & agree with the Methodology.

Regards

Kerrie Slater - Manager

From: Andrew.McLaren@aecom.com
To: wurrumay@hotmail.com
Subject: Hydro Aluminium Kurri Kurri Smelter Draft Methodology
Date: Thu, 19 Feb 2015 22:29:38 +0000

Dear Kerrie

Please find attached to this email the draft methodology for the Hydro Aluminium Kurri Kurri Smelter project. I would greatly appreciate it if you could get back to me with any comments you have on the draft methodology.

The comment period for the draft methodology will close 28 days from the date of this email, which is 22nd March 2015. Do not hesitate to contact me if you require anything further with regards to this.

Thanks and all the very best

Andrew McLaren
Archaeologist
D +61 2 8934 0547
Andrew.McLaren@aecom.com

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Appendix E

RAP Responses to Draft Report

Tocomwall Pty Ltd
PO Box 76 Caringbah NSW 1495
Tel: 02 9542 7714 Fax: 02 9524 4146
Email: info@tocomwall.com.au www.tocomwall.com.au
ABN: 13 137 694 618

Dr A. P. McLaren

Archaeologist

AECOM

Via email: andrew.mclaren@aecom.com

3 August 2015

Dear Andrew,

Re: Review of ACHAR for Hydro Aluminium Smelter at Kurri Kurri, NSW

Tocomwall has reviewed the aforementioned report and has the following suggestions and recommendations to make in regards to the report.

The general location of the study area in close proximity to swamps and waterways would suggest that the location was a prime one for the exploitation of resources and the availability of water for Aboriginal people. However, it is hard to fully assess the AECOM conclusions (for example, levels of disturbance).

The final conclusions of the report regarding the depth, nature and degree of disturbance cannot be supported based on the current level of detail identified. For example, there are no records to indicate the depth of disturbance, particularly in relation to the depth of deposits. Aboriginal archaeological sites – for example in Sydney's CBD – have confirmed that Aboriginal archaeology can survive in what are initially conceived as very disturbed contexts. Classic examples include the KENS site in Sydney: this is one of the largest Aboriginal sites in the CBD, where most of the intact sites were located beneath historical features. Examples include artefact scatters located beneath basements and adjacent to a filled well, as well as other scatters located within the footings of historical buildings. In other words, the levels of disturbance – and particularly those based on only a surface appraisal of the data – cannot be qualified; rather, they should be quantified by looking at relevant subsurface data such as geological trenches or some form of borehole data. This conclusion is further supported by the fact that sections of the study area displayed poor ground visibility.

In conclusion, Tocomwall do not support the significance assessment or the proposed management strategy. This is largely due to the fact that AECOM has made no attempt to understand the potential of subsurface contexts through some form of subsurface program, e.g. geotechnical boreholes or better still, geoarchaeological ones.

Tocomwall would therefore like to see further studies of the area undertaken prior to the area – and any potential Aboriginal heritage resources – being destroyed. Tocomwall do not support the idea of geo-matting on the area of high sensitivity. This would cause serious damage to any potential archaeological resources through processes such as loading via the overburden.

In conclusion, Tocomwall would like to see a more scientific approach to assessing the potential archaeological deposits in areas of high, medium and low 'disturbance'. The archaeological report literature is full of examples of Aboriginal archaeology being identified both at depth and amongst

Tocomwall Pty Ltd
PO Box 76 Caringbah NSW 1495
Tel: 02 9542 7714 Fax: 02 9524 4146
Email: info@tocomwall.com.au www.tocomwall.com.au
ABN: 13 137 694 618

seemingly 'highly disturbed' areas. Tocomwall suggest a quantitative rather than a qualitative approach to the assessment of subsurface potential through using sound scientific principles rather than speculative conclusions.

Please feel free to call me should you have any questions.

Regards,

Jakub Czastka (Chaz)
Senior Archaeologist
Tocomwall Pty Ltd
m: 0418 738 521
p: 02 9542 7714
f: 02 9524 4146
e: jakub@tocomwall.com.au

McLaren, Andrew

From: Tracey Skene <tracey@marrung-pa.com.au>
Sent: Sunday, 26 July 2015 10:26 PM
To: McLaren, Andrew
Subject: Former Hydro Aluminum Smelter ACHA Draft Report

AECOM Australia Pty Ltd
Level 21, 420 George Street
Sydney NSW 2000

Regarding : Review of Draft Aboriginal Aboriginal Culture Heritage Assessment Report

Attention Dr Andrew P McLaren,

To Mr McLaren,

Culturally Aware have viewed and read you Draft Report for the Former Hydro Aluminium Smelter, I agree to the collection of the Isolated Find site A35-15,and I do hold some concerns for the other sensitive locations that are to be impacted upon by stockpile and machinery, I feel these areas are to have Aboriginal representatives on the ground when any impacts are to takes place in these locations.

I know the Cultural landscape well, as I grew up in the LGA area and surrounding areas , I'm quiet aware of the highly significance of the waterway in the surrounding landscape and within the boundaries of this smelter and also the mythological and Traditional Ecological systems around this site.

There also should be a management plan and Aboriginal Cultural values report done on this location, which would also take into account the surrounding Cultural landscape which is associated to this assessment area(these reports should be done by the Aboriginal community as it gives good reasoning to provide some form of protection and preservation of an area with known and important heritage values, as we know that Aboriginal heritage sites are often at risk impact through natural processes, such as erosion or from human action, Protecting a site requires some form of management if the site is to retain its cultural integrity and be preserved and documented for the future.

It's important to respect the wishes of Aboriginal people with cultural and/or historical connections when recommending any mitigation into identified sites, consultation and negotiation with relevant Aboriginal people is the best means of addressing Aboriginal heritage issues, as they are the primary source of information on the value of their heritage.

Kind Regards,

Tracey Skene
Culturally Aware
Mobile: 0474106537

McLaren, Andrew

From: maree waugh <mareewaugh30@hotmail.com>
Sent: Tuesday, 28 July 2015 11:41 PM
To: McLaren, Andrew
Subject: Former Hydro Aluminium Smelter

Hi Andrew

I have read the Draft Report for the fromer Hydro Aluminium Smelter, happy to collection of the A35-15 site and with impact areas of stockpile these areas should have Aboriginal field workers out on site when thay work in these areas.
if there is not a managment plan in place it should be done on this site, along with a Aboriginal Cultural Heritage report of the area done by Aboriginal Community on this location.

Please feel free to contact me if you would like to discuss this further.

Maree Waugh

Wallangan Cultural Services