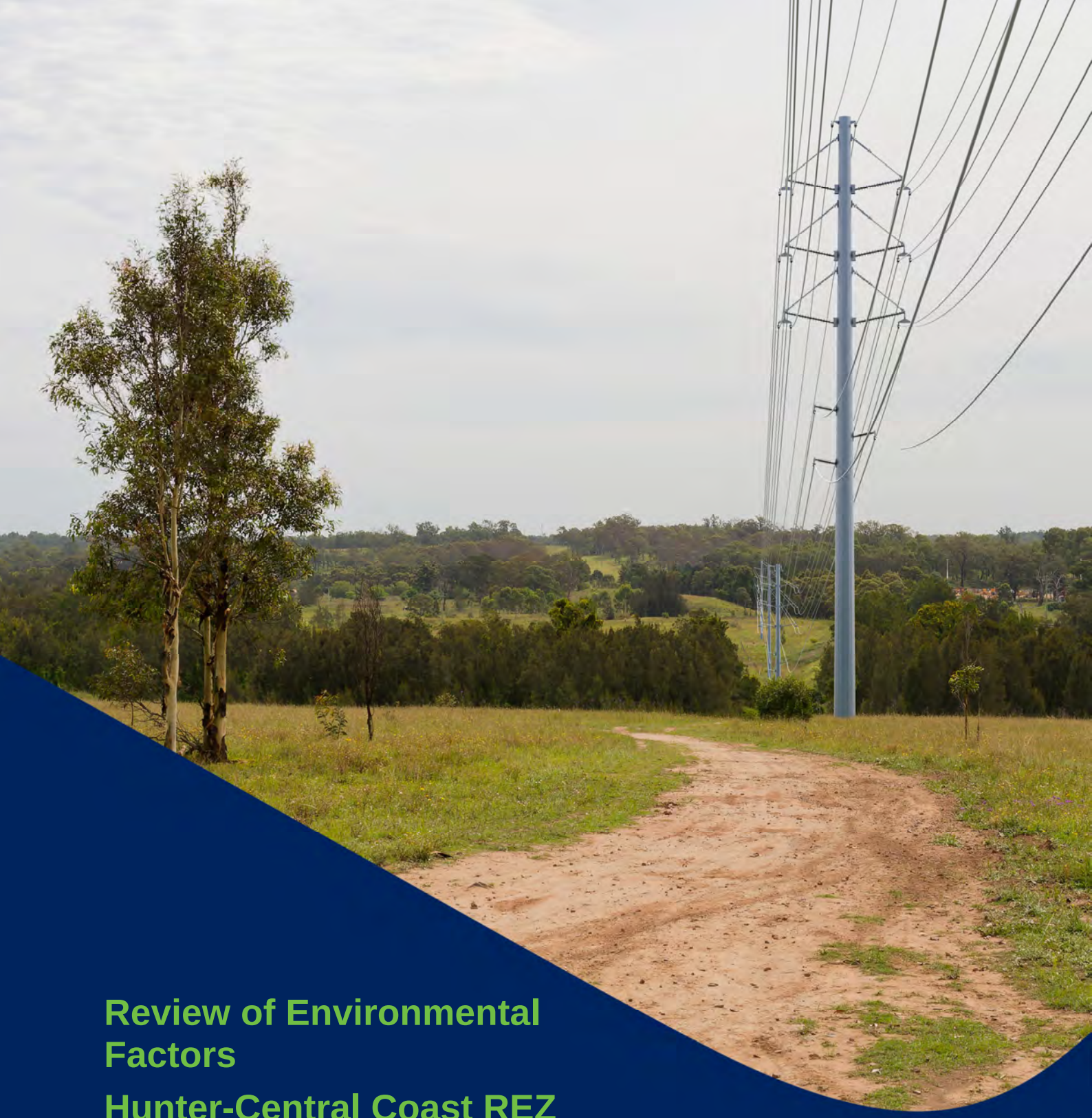


Review of Environmental Factors

Hunter-Central Coast REZ Network Infrastructure

Appendix K – Aboriginal Heritage

Wired for good.™

Ausgrid

HUNTER VALLEY RENEWABLE ENERGY ZONE (REZ), NSW

ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT

Report to Ausgrid

LGAs: Cessnock, Singleton, and Muswellbrook

February 2024

APEX ARCHAEOLOGY

PO Box 236, Nowra, NSW 2541 | heritage@apexarchaeology.com.au | www.apexarchaeology.com.au

ABN 56 625 618 993

EXECUTIVE SUMMARY

Apex Archaeology have been engaged to assist Ausgrid to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a proposed infrastructure project to modernise the electricity system within the Hunter Valley, NSW. The project includes areas within Cessnock, Singleton and Muswellbrook Local Government Areas (LGAs).

This ACHA has been prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (April 2011) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, April 2010) (the ACHCRs). A separate report detailing the results of the assessment prepared in line with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (September 2010) (the Code of Practice) is attached as an appendix to this report.

The proposed works for the project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.

This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible.

A total of 24 Aboriginal people and organisations registered an interest in being consulted for the project. The following list comprises the registered Aboriginal parties (RAPs) for the project:

- A1 Indigenous Services
- Amanada Hickey Cultural Services
- Aleira French Trading
- AGA Services
- Cacatua
- Corroboree Aboriginal Corporation
- DFTV Enterprises
- Didge Ngunawal Clan
- Gomeroy Consultants
- Gunjeewong

- Hunter Valley Aboriginal Corporation
- Kevin Duncan
- Konnango Aboriginal Cultural Heritage Services
- Long Gully Cultural Services
- Gomeroi People (Native Title Claim Group)
- Thomas Dahlstrom
- Ungooroo Aboriginal Corporation
- Wallangan
- Upper Hunter Wonnarua Council
- Wanaruah Nation Aboriginal Corporation
- Wanaruah Local Aboriginal Land Council
- Widescope
- Yarrawalk
- Yinarr Cultural Services

Consultation with the RAPs has been conducted in accordance with the ACHCRs.

The archaeological and cultural assessment for the project found the following:

- The Hunter Renewable Energy Zone (REZ) passes through a rich cultural landscape with many previously and newly recorded sites present.
- 84 previously recorded AHIMS sites are located within a 50m radius of the proposed transmission line route.
- 26 newly identified sites were located within a 50m radius of the proposed transmission line route.
- Nine zones of archaeological sensitivity were identified, associated with previously or newly identified sites.
- The proposed works have potential to avoid many of the identified sites, either through ensuring pole placement avoids known site locations, or the use of alternative construction methods which reduce or avoid impact.
- Final recommendations for management of the Aboriginal archaeological sites within the study area would rely on the final design of the REZ.

Therefore, the following recommendations have been made.

Recommendation 1: Finalisation of Design

On finalisation of the design for the Hunter REZ, an updated assessment of the potential impact of the works can be made and more concrete recommendations for the management of known Aboriginal sites can be presented. This report should be updated, or an addendum report prepared detailing the consideration of the detailed design in relation to Aboriginal archaeological requirements.

Recommendation 2: Further Assessment Required

This report comprises, essentially, an options and constraints assessment. Further consideration of Aboriginal cultural heritage is required prior to any on ground works proceeding. This would be informed by the detailed design for the Hunter REZ.

Recommendation 3: Avoid Known Sites

Known sites as identified in this report should be considered during detailed design for the Hunter REZ, with avoidance being of the highest priority wherever possible.

Recommendation 4: Application for AHIP Required

Aboriginal cultural material is present within the study area and thus an application for an Aboriginal Heritage Impact Permit (AHIP) will be required to permit harm to these items if avoidance is not possible. The requirement for an AHIP would be determined on finalisation of the detailed design for the Hunter REZ.

Recommendation 5: Maintain Aboriginal Community Consultation

Consultation with the RAPs in accordance with the ACHCRs regarding the project should continue, in order to keep the RAPs informed about the management of Aboriginal cultural heritage within the study area.

Recommendation 6: Development Boundaries

The proposed development works must be contained within the assessed boundaries for this project. If there is any alteration to the boundaries of the proposed development to include areas not assessed as part of this archaeological investigation, further investigation of those areas may be necessary to assist in appropriately managing Aboriginal objects and places which may be present.

Apex Archaeology acknowledges and pays respect to the past, present and future Traditional Custodians and Elders of this nation and in whose land this assessment took place, and to the continuation of cultural, spiritual and educational practices of Aboriginal and Torres Strait Islander peoples.

Document Control

The following register documents the development and issue of the document entitled 'Hunter Valley Renewable Energy Zone (REZ) NSW: Aboriginal Cultural Heritage Assessment Report', prepared by Apex Archaeology in accordance with its quality management system.

Revision	Prepared	Reviewed	Comment	Issue Date
1 – Draft	Rebecca Bryant & Leigh Bate	Jenni Bate	Client review	26 February 2024

GLOSSARY OF TERMS

Aboriginal Object	An object relating to the Aboriginal habitation of NSW (as defined in the NPW Act), which may comprise a deposit, object or material evidence, including Aboriginal human remains.
ACHA	Aboriginal Cultural Heritage Assessment
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHCRs	*Aboriginal cultural heritage consultation requirements for proponents 2010*
AHIMS	Aboriginal Heritage Information Management System maintained by Heritage NSW, detailing known and registered Aboriginal archaeological sites within NSW
AHIP	Aboriginal Heritage Impact Permit
ASIRF	Aboriginal Site Impact Recording Form
BP	Before Present, defined as before 1 January 1950.
Code of Practice	The DECCW September 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*
Consultation	Aboriginal community consultation in accordance with the DECCW April 2010 *Aboriginal cultural heritage consultation requirements for proponents 2010.*
DA	Development Application
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DECCW	The Department of Environment, Climate Change and Water (now Heritage NSW)
Disturbed Land	If land has been subject to previous human activity which has changed the land's surface and are clear and observable, then that land is considered to be disturbed
DPE	Department of Planning and Environment
Due Diligence	Taking reasonable and practical steps to determine the potential for an activity to harm Aboriginal objects under the *National Parks and Wildlife Act 1974* and whether an application for an AHIP is required prior to commencement of any site works, and determining the steps to be taken to avoid harm
Due Diligence Code of Practice	The DECCW Sept 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
GIS	Geographical Information Systems
GSV	Ground Surface Visibility
Harm	To destroy, deface or damage an Aboriginal object; to move an object from land on which it is situated, or to cause or permit an object to be harmed
Heritage NSW	Heritage NSW within the Department of Climate Change, Energy, the Environment, and Water; responsible for overseeing heritage matters within NSW
ka	Kiloannus, a unit of time equating to 1,000 years
LALC	Local Aboriginal Land Council
LGA	Local Government Area
NPW Act	NSW *National Parks and Wildlife Act* 1974
NPWS	National Parks and Wildlife Service
OEH	The Office of Environment and Heritage (now Heritage NSW)
PAD	Potential Archaeological Deposit
RAPs	Registered Aboriginal Parties

CONTENTS

APPENDICES

FIGURES

1.0 Introduction

Apex Archaeology have been engaged to assist Ausgrid to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a for a proposed infrastructure project to modernise the electricity system within the Hunter Valley, NSW (

Figure 1). The project includes areas within Cessnock, Singleton and Muswellbrook Local Government Areas (LGAs).

This ACHA has been prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (April 2011); the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, April 2010) (the ACHCRs). A separate report detailing the results of the assessment prepared in line with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (September 2010) (the Code of Practice) is attached as an appendix to this report.

1.1 Project Proponent

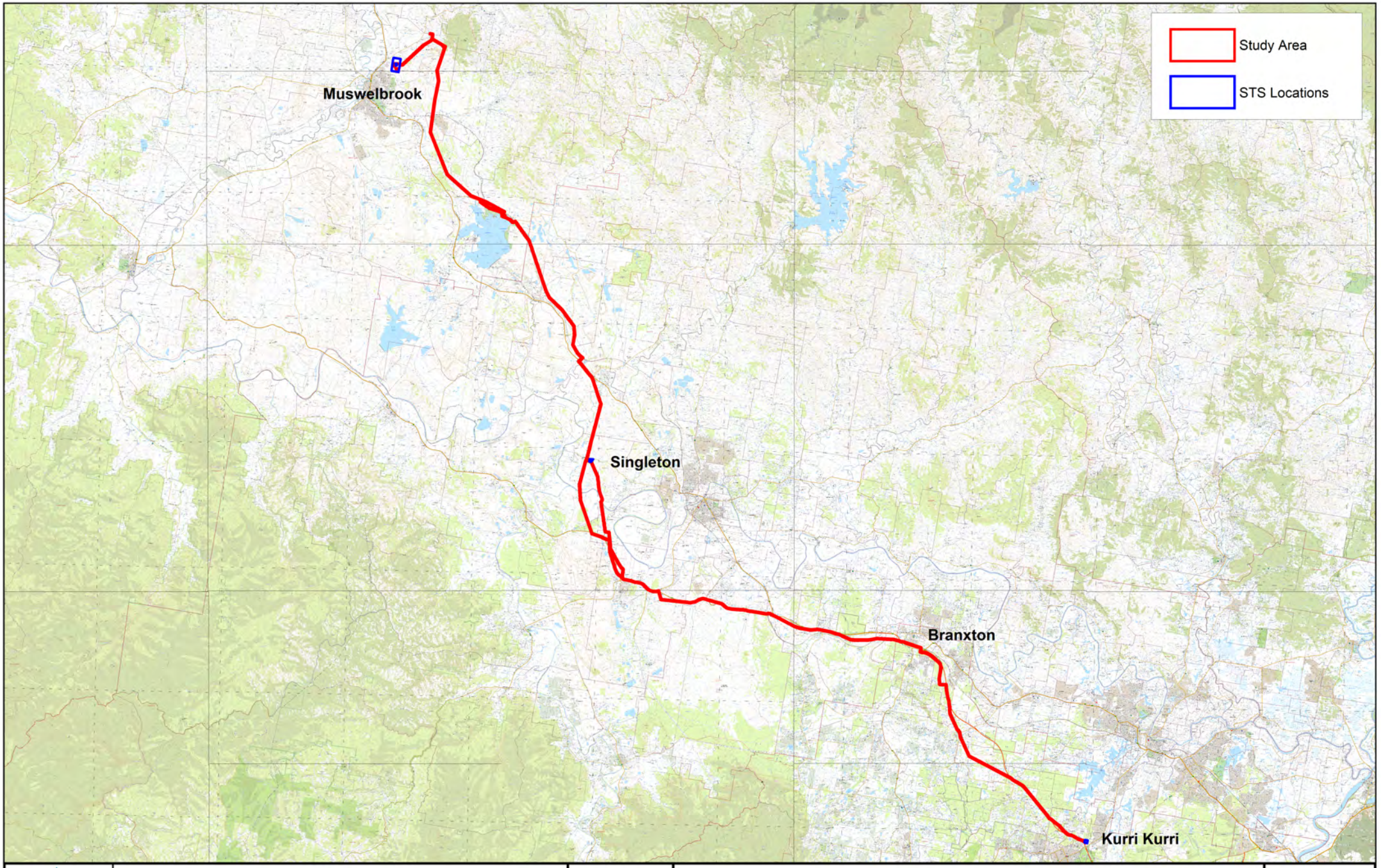
The proponent for the project is Ausgrid and their project manager is Richard Dunnicliff.

1.2 Study Area and Project Brief

The study area is within the central lowlands of the Hunter Valley and follows a meandering corridor that extends from Kurri Kurri, approximately 30 km northeast of the city of Newcastle on the coast, to Muswellbrook in the northwest. It is approximately 20m wide and covers a distance of approximately 105 km (Figure 1).

The proposed works for the project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.



PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 16 32

kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
NSW Topographic Maps
Spatial Services
Image Date: 2022
Final - Version 1

Figure 1: Study area within its regional context.

N

The entire study area is proposed to be investigated to determine whether cultural material is still located within the boundaries of the study area, and to identify the nature and extent of any such material present. This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible

1.3 Statutory Context

The proposed Hunter Renewable Energy Zone (REZ) project will deliver new renewable energy infrastructure to fulfill the increasing demand for affordable and sustainable electricity. This will include the construction of energy generators (e.g. solar and wind), storage facilities, and high-voltage transmission lines. The REZ aims to produce cheap, clean and reliable electricity that can be efficiently stored and transmitted across the National Electricity Market (Ausgrid 2022).

The determining authority in this instance is Ausgrid, who will determine a Review of Environmental Factors (REF) for the project under Part 5 of the Environmental Planning and Assessment Act.

The following section outlines the statutory context applicable to the project and the Aboriginal cultural heritage assessment.

1.3.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* provides protection for all Aboriginal objects and places within NSW. Aboriginal objects are defined as the material evidence of the Aboriginal occupation of NSW, while Aboriginal Places are defined as areas of cultural significance to the Aboriginal community. All Aboriginal objects are protected equally under the Act, regardless of their level of significance. Aboriginal Places are gazetted if the Minister is satisfied that the location was and/or is of special significance to Aboriginal people.

Following amendments to the NPW Act in 2010, approval to impact Aboriginal cultural heritage sites is only granted under a Section 90 AHIP, which is granted by the Heritage NSW in the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

1.3.2 NSW National Parks and Wildlife Regulation 2019

Part 5, Division 2 of the *National Parks and Wildlife Regulation 2019* addresses Aboriginal objects and places in relation to the NPW Act 1974, and outlines how compliance with relevant codes of practice can be met.

Clause 58(1) outlines the defence of low impact acts or omissions to the offence of harming Aboriginal objects, which includes maintenance works on existing roads and

fire trails, farming and land management work, grazing of animals, activities on land that has been disturbed that is exempt or complying development, mining exploration work, removal of vegetation (aside from Aboriginal culturally modified trees), seismic surveying or groundwater monitoring bores on disturbed ground, or environmental rehabilitation work (aside from erosion control or soil conservation works such as contour banks).

Clause 58(4) outlines the definition of 'disturbed land', as land that "has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable".

Clause 59 relates to the notification of Aboriginal objects and sites and Clause 60 relates to the requirements for the consultation process to support an AHIP application. The regulation sets out the requirements broadly in line with those outlined in the ACHCRs.

1.4 Objectives of the Aboriginal Cultural Heritage Assessment

The archaeological investigation was undertaken to meet the requirements of the Code of Practice and ACHCRs.

The purpose of the archaeological investigation is to understand and establish the potential harm the proposed development may have on Aboriginal cultural heritage within the study area, both tangible and intangible.

Aboriginal community consultation was undertaken for the project with the aim of:

- Identifying the Aboriginal community members who can speak for Country within which the study area is located;
- Involving the Aboriginal community in making decisions about the management of their cultural heritage;
- Identifying, assessing and recording Aboriginal heritage values within the study area;
- Preparing an assessment of the cultural heritage values in consultation with the Aboriginal community;
- Identifying the potential impact of the proposed development on the assessed cultural heritage values; and
- Developing conservation and mitigation strategies for these values, with the aim of minimising impacts to cultural heritage wherever possible.

In addition, this report provides a significance assessment of the identified Aboriginal heritage values, as defined by the registered Aboriginal stakeholders (RAPs) for the project. Aboriginal people are the primary determinants of the significance of their cultural heritage and therefore Apex Archaeology cannot make a determination on the cultural significance without the input of the RAPs.

Any development works which disturb the ground surface have the potential to impact Aboriginal archaeological deposits and therefore an assessment of whether the study area contains such deposits is required prior to the commencement of construction works. An assessment of whether the proposed development would impact these deposits (if present) is also necessary, and identification of to what extent the deposits would be impacted is also required. The degree of impact which may be allowable is determined, in part, with consideration of the level of cultural significance attributed to the cultural values of the study area, both tangible and intangible.

1.5 LIMITATIONS

This report relies in part on previously recorded archaeological and environmental information for the wider region. This includes information from AHIMS, which is acknowledged to be occasionally inaccurate, due to inaccuracies in recording methods. No independent verification of the results of external reports has been made as part of this report.

It should be noted that AHIMS results are a record only of the sites that have been previously registered with AHIMS and are not a definitive list of all Aboriginal sites within an area, as there is potential for sites to exist within areas that have not previously been subject to archaeological assessment.

A number of site cards note corresponding archaeological reports. However, a number of these reports are not available on AHIMS, or the internet. The heritage consultants or relevant organisation/s were contacted by email to request copies of these documents, however limited responses were received. As such, these documents were unable to be considered as part of this assessment. This is discussed further in Section 4 of the Apex Archaeological Technical Report attached as an appendix to this ACHAR.

Field investigations for this report included survey. The results are considered to be indicative of the nature and extent of Aboriginal archaeological remains within the study area, but it should be noted that further Aboriginal objects and sites which have not been identified as part of this assessment may be present within the wider area.

It is recognised that Aboriginal people are the primary determinants of the significance of their cultural heritage, and as such, Apex Archaeology have relied on the Aboriginal community to provide cultural knowledge regarding the site, where they are willing and able to share such knowledge. However, there may be occasions where RAPs are unwilling or unable to share cultural knowledge regarding the site and thus our assessment of significance relies on scientific assessment only.

2.0 Aboriginal Consultation Process

This section details the Aboriginal community consultation undertaken to assist in the heritage assessment of the study area. Aboriginal consultation in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* was undertaken by Apex Archaeology for this project.

Aboriginal community consultation is a requirement in order to make assessments of Aboriginal cultural values, as Aboriginal people are the primary determinants of the significance of their cultural heritage and therefore Apex Archaeology cannot make a determination on the cultural significance without the input of the RAPs. Aboriginal people often have a strong connection to their Country, and to their ancestors, both past and present.

Material evidence of past Aboriginal occupation of an area is a tangible link to the intangible traditions, lore, customs, beliefs and history. These intangible values provide a sense of belonging for Aboriginal people, and cultural heritage and cultural practices are kept alive through being incorporated into everyday life, which helps maintain a connection to the past and to the present. It is a vital part of the identity of Aboriginal people.

Therefore, it is important that Aboriginal people are afforded the opportunity to understand, comment on and have input into projects that may impact areas which may be culturally sensitive, or damage items of cultural significance. The process of Aboriginal community consultation provides this opportunity, and this ACHAR details the results of the consultation undertaken for this project.

2.1 The Consultation Process

The *Aboriginal cultural heritage consultation requirements for proponents 2010* provide the process for undertaking consultation with the Aboriginal community. This process includes identification, registration, engagement and consultation with those Aboriginal people who may have cultural knowledge which is relevant to determining the cultural significance of Aboriginal objects and places which may be within the study area.

The Consultation Guidelines detail a number of stages for consultation, as follows:

- Identification of those people who should be consulted for the project
- Inviting Aboriginal people to register their interest in being consulted for the project
- Providing information regarding the nature and scope of the project to the Aboriginal people who have registered an interest in being consulted – the registered Aboriginal parties (RAPs)
- Providing opportunities for RAPs to comment on the proposed methodology for cultural heritage consultation

- Presenting information about the potential impacts of the proposed development for the RAPs to comment on
- Providing opportunities for RAPs to comment on the cultural significance of the proposed development area
- Providing opportunities for RAPs to comment on the draft reports detailing the results of the archaeological and cultural assessments for the project

2.2 Stage 1 Consultation: Commencement

Stage 1 requires a list of Aboriginal people who may have cultural knowledge relevant to the area to be prepared from several sources of information. The first step requires enquiries to be made of certain statutory bodies regarding whether they are aware of Aboriginal people or organisations that may have an interest in the study area, and their contact details. Any Aboriginal people or organisations identified in this step must be contacted and invited to register an interest in the project. In addition, a notification must be placed in local print media requesting Aboriginal people or organisations to register their interested in the project. A list of those who register an interest must be compiled. A minimum of 14 days from the date of the letter or newspaper advertisement must be allowed for registrations of interest.

As a result of the Stage 1 activities, a list of Aboriginal people who wish to be consulted for the project is developed. These Aboriginal people become the registered Aboriginal parties – the RAPS – for the project.

Letters requesting the details of Aboriginal people who may hold cultural knowledge relevant to the study area and who may wish to be consulted for the project were sent to several statutory agencies on 06 September 2023. Copies of these letters and responses are attached in Appendix B. These Step 1 letters were sent to the following agencies:

- Cessnock City Council (CCC)
- Heritage NSW (HNSW)
- Hunter Local Land Services (HLLS)
- Mindaribba Local Aboriginal Land Council (MLALC)
- Muswellbrook Shire Council (MSC)
- Native Title Services Corp (NTSCorp)
- Office of the Registrar, *Aboriginal Land Rights Act 1983 (NSW)* (ORALRA)
- Singleton Council (SC)
- Wanaruah Local Aboriginal Land Council (WLALC)

Responses were received from Heritage NSW, CCS, SC, MSC, NTSCorp and ORALRA. Their responses are provided in Table 1 below and are available in Appendix B.

Table 1: Agencies contacted in Stage 1, and details of responses

Parties Contacted	Date of response	Details of Response
Cessnock City Council	12/09/2023	Email received from Jessica Elliott advising council did not have a list of Aboriginal individuals and/or groups who are registered with council and wish to be consulted on heritage matters. She did advise that there is a Community Directory that has information on local Aboriginal and Torres Strait Islander services. However, these are not related to heritage matters.
Heritage NSW	12/09/2023	Email letter received from Heritage NSW with Stakeholder Lists for Cessnock, Singleton and Muswellbrook LGAs.
Hunter Local Land Services	No response	N/A
Mindaribba Local Aboriginal Land Council	No response	N/A
Muswellbrook Shire Council (MSC)	13/09/2023	Email received advising to contact Wanaruah Local Aboriginal Land Council and Hunter Valley Aboriginal Corporation.
Native Title Services Corp (NTSCorp)	15/09/2023	Email received requesting registration of the Gomeroi People Native Title Claim Group.
Office of the Registrar, *Aboriginal Land Rights Act 1983 (NSW*	15/09/2023	Emailed letter received advising to contact Nadine Russell at Worimi Conservation Lands
Wanaruah Local Aboriginal Land Council	08/09/2023	Email letter received from CEO De-anne Douglas advising WLALC would like to be registered and that they have contacted the Hunter Valley Aboriginal Corporation to advise them of the project

An online search of the National Native Title Tribunal (NNTT) on 6th September 2023 did not identify any Native Title applications or determinations over the study area. The closest Native Title Claim applicant that has been accepted for registration is for the Gomeroi People (NC2011/006) and it is on the western side of the Hunter River. Although no portion of the land registered as part of the Native Title falls within the current study area, it is close to the boundary in the Muswellbrook portion of the study area. NTSCorp requested the Gomeroi People be registered for this project.

The Aboriginal people and organisations identified during this initial stage were contacted via letter (email if provided, or via post if no email address given) on 21 September 2023, inviting them to register an interest in the project. Registrations were accepted until 5 October 2023. This is Step 2 of Stage 1 of consultation. Copies of these letters are attached in Appendix C.

In addition, an advertisement was placed in the *Newcastle Herald* on 22 September 2023, inviting registrations of interest from people who may have cultural knowledge of the project area. A copy of the advertisement is attached in Appendix D.

A total of 24 Aboriginal people and organisations registered an interest in being consulted for the project. The following list comprises the registered Aboriginal parties (RAPs) for the project:

- A1 Indigenous Services
- Amanada Hickey Cultural Services
- Aleira French Trading
- AGA Services
- Cacatua
- Corroboree Aboriginal Corporation
- DFTV Enterprises
- Didge Ngunawal Clan
- Gomeroy Consultants
- Gunjeewong
- Hunter Valley Aboriginal Corporation
- Kevin Duncan
- Konnango Aboriginal Cultural Heritage Services
- Long Gully Cultural Services
- Gomeroi People (Native Title Claim Group)
- Thomas Dahlstrom
- Ungooroo Aboriginal Corporation
- Wallangang
- Upper Hunter Wonnarua Council
- Wanaruah Nation Aboriginal Corporation
- Wanaruah Local Aboriginal Land Council
- Widescope
- Yarra Walk
- Yinarr Cultural Services

2.3 Stage 2 & 3 Consultation: Presentation and Gathering of Information

During Stage 2, information about the proposed project is provided to the RAPs, including location, scale, proposed development plans, timeframes, methodologies and any other relevant details relating to the project. This information can be provided in writing or at a meeting (or both), and an opportunity for the RAPs to visit the site may also be provided.

During Stage 3, RAPs are invited to share information about the cultural significance of the study area, which can assist in the assessment of the cultural significance of the Aboriginal objects and/or places within the study area. The cultural heritage assessment informs and integrates with the scientific assessment of significance and therefore can assist in the development of mitigation and management measures for the project. A methodology detailing how this information will be gathered must be provided to the RAPs for comment and a minimum of 28 days must be allowed for responses to be received. Any feedback must be considered and implemented as appropriate into the methodology.

Stage 2 and 3 can be undertaken concurrently. The information about the project and the methodology for seeking cultural knowledge can be provided in the same written documentation or at the same meeting.

Details of the proposed project and the proposed methodology for undertaking the cultural heritage and archaeological assessments for the project were provided to each of the RAPs on 6th October 2023. Comments were accepted until 3rd November 2023. Additionally, Kevin Duncan and Corroboree Aboriginal Corporation registered late and were forward the information and methodology document on the 9th and 16th of October respectively. Responses were received from:

- A1 Indigenous Services
- Amanda Hicky Cultural Services
- Konanggo Aboriginal Cultural Heritage Services
- Long Gully Cultural Services
- Wonnarua Nation Aboriginal Corporation

Wonnarua Nation Aboriginal Corporation thanked Apex Archaeology for the information and all the other responses expressed support of the methodology. No amendments were requested by any of the RAPs. The RAP responses are attached in Appendix E and are detailed in Table 2.

Table 2: RAP responses to Information and Methodology document

RAP	RAP Response	Apex Archaeology Response
Long Gully Cultural Services	"I read over everything and I'm happy with everything on here and if anyone of us raps were wanting to alter the methods I'm happy to do so."	Noted with thanks
A1 Indigenous Services	"I have reviewed the attachment and support the document detailing the project information and the assessment methodology. A1 would like to be involved in the upcoming fieldwork. Please feel free to publish my name, and response but not the email."	Noted with thanks Email not included in appendix
Amanda Hickey Cultural Services	"Thank you for the email AHCS supports and is happy with the methodology. AHCS would like to formally register an interest in all field works for this project."	Noted with thanks
Konanggo Aboriginal Cultural Heritage Services	"I have read the proposed methodology it is concise and informative, and I agree with the recommendations proposed."	Noted with thanks
Wonnarua Nation Aboriginal Corporation	"Thank you"	Noted with thanks

No cultural information pertaining to the study area was received from any of the RAPs for the project during this stage of consultation.

2.4 Stage 4: Review of Draft Report

Stage 4 sees the preparation of the draft ACHAR, which details the results of the cultural heritage assessment. The draft is provided to the RAPs for their review and comment. A minimum of 28 days to comment on the ACHAR must be allowed. All comments must be addressed in the final document and the proponent's response to RAP comments must be included. Copies of any submissions received from RAPs must be included in the final ACHAR.

This section will be updated on finalisation of the draft report.

Consultation with the Aboriginal community for this project has been conducted in accordance with the ACHCRs. A log of all correspondence is presented in Appendix A of this ACHAR. Copies of all correspondence are included in Appendix G.

3.0 Summary and Analysis of Background Information

This section presents information about both the physical and cultural landscape in which the study area is located, as well as previous archaeological and ethnohistorical studies, to provide context and background to the existing knowledge of Aboriginal culture in the area.

3.1 Description of the Study Area

The study area is within the central lowlands of the Hunter Valley and follows a meandering corridor that extends from Kurri Kurri, approximately 30 km northeast of the city of Newcastle on the coast, to Muswellbrook in the northwest. It is approximately 20m wide and covers a distance of approximately 105 km.

3.2 Existing Environment

The Hunter Valley is a large coastal catchment of approximately 22,000 km^2 that is situated at the northern end of the geological structure referred to as the Sydney Basin (CSIRO 2021). The Hunter Valley is bound on the west by the Great Dividing Range, which has two spurs that form mountain ranges that extend east and form the northern and southern boundaries of the Hunter Valley. The northern spur comprises the Liverpool Range, Mount Royal Range and Barrington Tops, and the south is the dissected sandstone plateaux of the Southern Mountains. The study area is located between these two areas and is referred to as the Central Lowlands (Hughes 2014).

The major river systems in the Hunter Valley are the Hunter, Goulburn, Page, Williams and Patterson Rivers, with the main river flowing through the Central Lowlands comprising the Hunter River. It rises to the east of Murrurundi in the Liverpool Range and flows in a southerly direction, then east through Raymond Terrace to empty into the Pacific Ocean at Newcastle.

The whole study area has been subjected to historical disturbances to some degree. This includes the initial clearing of vegetation and the construction of transportation infrastructure through the study corridor including the Main Northern Railway, Golden Highway, and Hunter Expressway. There are a number of coal mines that are in close proximity or within sections of the study area. These include the Mount Thorley Mine, Warkworth Mine, Ashton Coal, Ravensworth Mine Complex, Liddell Coal Mine, Glendell Mine and Muswellbrook Coal Mine. Numerous types of below-ground services including water pipes, gas lines, and electrical transmission lines also run throughout the study area.

The study area falls within the Sydney Basin, which is roughly bounded by the Great Dividing Range to the west, the coast to the east, Newcastle to the north, and Durras, near Batemans Bay to the south. The current study area is located on the margin of the Cumberland Plain which is situated primarily on Wianamatta shale. This shale overlies the Hawkesbury sandstone which extend throughout the Sydney Basin and can be seen in exposed areas around the rivers and as rockshelters and overhangs

further away from the current study area (Branagan and Packham 2000). The study area has been subjected to historical disturbances including land clearing and subservices excavations for the construction of residences, buildings, roads, swimming pools and services, such as water and telecommunications.

Consideration of these features assists in determining the resources that may have been available at a location prior to colonisation and thus available for the use of Aboriginal people. Environmental features determine the types of stone available for creating tools; the types of plants and animals determine food sources, and the availability of fresh water determines how attractive an area may have been for habitation.

Additional information can be found in the Apex Archaeology Archaeological Report, which is appended to this ACHA.

Flora and Fauna

The original native vegetation before the large-scale land disturbance would have comprised woodland species including many different species of Eucalyptus trees such as: *E. moluccana* (grey box), *E.tereticornis* (forest red gum), *E. dawsonii* (slaty gum), E.punctata (grey gum), E. Nubila (blue-leaved iron bark), *E. Crebra* (red ironbark), *Angophora floribunda* (rough-baked apple), Angophra. Coasta (smooth-barked apple), and *Brachychiton populneus* (kurrajong). An understorey of vegetation comprising *Xanthorrhoea*, (grass tree) *Banksia, Acacia* (wattle), and *Macrozamia comminuis* (Burrawang) would also be present. Around the drainage lines and waterways there would have been wet shrubland species such as the *Melaleuca* (paper bark) and *Leptospermum* (tea tree), *Casuarina glauca* (swamp she-oak) and *Poa labillardierei* (tussock grass) would also have been present (Howell and Benson 2000: Terry 2003).

Early settlers commented on the well-grassed areas and the park-like appearance of the valley, so in general the Hunter Region would have provided excellent hunting grounds with plenty of kangaroos, possums, birds, lizards, snakes on the ground, and fish and shellfish in the rivers, estuaries and rock platforms of the coast (Moore 1970). However, as mentioned in the previous section, the vast majority of original vegetation within the study area would have been historically cleared for agricultural and development purposes, commencing around the early 1800s. This is perhaps most apparent along the riverbanks that are now dominated by introduced willow trees, pasture land and mono culture such as grapevines (Hughes et al 2014:35).

Many of these plants, trees and animals have been documented as resources used by Aboriginal people to fulfill dietary needs, supply raw material for tools and implements, and used for medicinal and ceremonial purposes. For example, the various Eucalypts provided wood for shields, canoes and coolamons, while the soft stringy park from the Melaleuca trees was used for bedding, and to wrap the deceased in burial practices. The gum from the wattle and grass trees was collected and mixed with ash to make a strong resin to attach stone tools to wooden handles

for spears and axes. The fur from possums was sewn together using a needle made from animal bones and thread made from the sinew of animal's muscles. The highly poisonous nuts from the *Macrozamia* plant were collected and leeched of their poison through burning and water before being ground on a stone anvil to make flour (Attenbrow 2010; Brayshaw 1986; Threlkeld in Gunson 1974).

The plants, animals and natural landscape played an important part of Aboriginal cultural life as is seen in clan totems, artwork, and Dreaming stories. The natural environment continues to offer a way of connecting to Country.

HYDROLOGY

As mentioned above, the Hunter River is the main river that flows through the central lowlands. It is the closest major river to the study area and crosses through it within the suburb of Masion Dieu. The Hunter River is fed by many large and small creeks and drainage systems that criss-cross through the study area. The main creeks in the southern portion of the study area include Swamp Creek, Black Waterholes Creek, Sawyers Gully, and Bishops Creek. The central portion near Braxton includes Anvil Creek and Black Creek. A bit further north near the Singleton military area is Mudies Creek, and Glennies Creek and Bowmans Creek flow between Camberwell and Ravensworth. The northern most portion of the study area near Muswellbrook includes Muscle Creek. There are also some sections, such as those near the Kurri Kurri area, that support a swamp/wetland environment.

All these main creeks and the Hunter River would have provided access to fresh water. The stream order is determined according to the Strahler system as used by the NSW Department of Planning and Infrastructure (Figure 2). Watercourse classification ranges from first order through to fourth order (and above) with first order being the lowest, ie a minor creek or ephemeral watercourse.

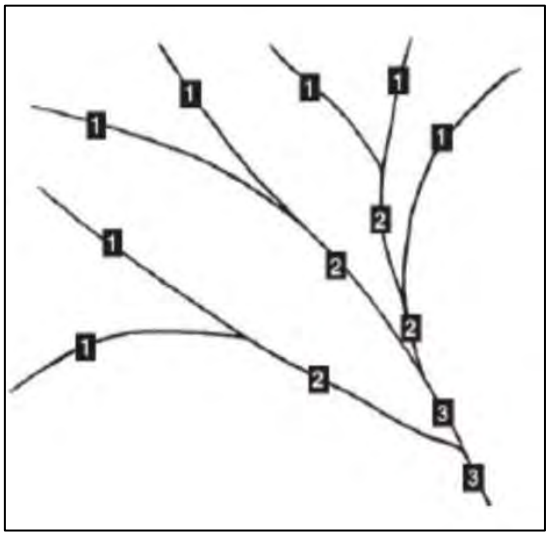


Figure 2: The Strahler system (Source: Department of Planning and Environment 2016).

3.3 Material Evidence of Aboriginal Land Use

3.3.1 AHIMS

A series of extensive searches of the Aboriginal Heritage Information and Management System (AHIMS) database was undertaken on the 24th of October 2023. The searches centred along the middle and both sides of the study corridor from Kurri Kurri to Muswellbrook. The searches covered a distance of approximately 95 km and crossed through the Cessnock, Singleton and Muswellbrook LGAs. A total of 1,167 registered AHIMS sites were identified. All of these except for four are listed as 'open sites', meaning they are in areas that are in open and exposed areas. Four are listed as 'closed sites', meaning they are in rock shelters.

For the site status of these registered AHIMS sites, 146 are listed as 'destroyed', 22 are listed as 'partially destroyed', and four are listed as 'not a site'. The remaining 994 are considered valid. However, as discussed below, some of the 'valid' sites have been destroyed through archaeological salvage excavations but their status has not been updated on the AHIMS register. There are also three sites that are listed as restricted.

Sites are recorded with one or more of a set of twenty-two site features specified by AHIMS. For the 1,167 sites in the search area, a total of 1,353 instances of nine separate site features have been recorded (Table 3), with a number of sites recorded with multiple features. The site feature most recorded is 'artefact'. There are 1,120 instances of 'artefact', which could be either an isolated stone artefact, or a stone artefact scatter. The second most common site is potential archaeological deposit (PAD), of which there are 211. There are also recordings of rarer sites including seven instances of 'grinding grooves', four instances of 'Aboriginal resource and gathering', and four 'Art (pigment or engraving)', three 'modified trees (carved or scarred)', two 'Aboriginal and dreaming', one 'conflict site', and one 'quarry' site

Table 3: Recorded site features within the AHIMS Register search area

Site Feature	No. of instances	% of total
Artefact	1120	83
Potential Archaeological Deposit (PAD)	211	16
Grinding Grooves	7	<1
Aboriginal Resource and Gathering	4	<1
Art (pigment or engraving)	4	<1
Modified Tree (carved or scarred)	3	<1
Aboriginal Ceremony and Dreaming	2	<1
Quarry	1	<1
Total	**1353**	**100**

There are 140 AHIMS sites registered as being within approximately 50m of the proposed transmission line route/fibre optic cable upgrade route. As with the results for the wider search area, the majority of these sites (134) were listed in the

extensive reports as 'artefact'. Twelve of the artefact sites also included areas of PAD, and there was one individual PAD site. There were also two recorded 'grinding groove' sites, and one recorded 'art' site. The site cards were obtained for all 140 sites and their respective archaeological reports were obtained (where possible) to confirm their site status, mapped location and any other relevant details prior to field work.

Of the 140 sites, a total of five have their site status listed as 'destroyed', and two are listed as 'deleted' (Table 4). Upon further investigations of the reports associated with these sites, an additional 28 of the sites currently registered as 'valid' have been destroyed. Twenty-five of these were detailed in Umwelt (2005, 2019) as being destroyed through archaeological salvage excavations, and one was in conjunction with Kuskie and O'Driscoll (2013). See Table 5.

Table 4: Previously destroyed or deleted sites as per AHIMS

Site ID	Site Name	AHIMS status
37-6-0614	Bowmans Creek 2	Destroyed
37-6-1151	LID 35	Destroyed
37-6-1160	LIDEE - IF1 duplicate of 37-3-1163 and 37-3-1164	Destroyed
37-6-1162	LIDEE - OS1 duplicate of 37-3-1165 and 37-3-1159	Deleted
37-6-1164	LIDEE IF 1 duplicate of 37-3-1160 and 37-3-1163	Deleted
37-6-0454	LID1	Destroyed
37-6-0456	SP2	Destroyed
37-6-2156	Branxton Rail 8	Destroyed
37-6-2160	Branxton Rail 12	Destroyed

Table 5: Sites currently listed as valid on AHIMS within close proximity to the proposed works and likely actual status.

Site ID	Site Name	Likely actual status	Report details
37-6-1341	Black Waterholes Creek RTA 1 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1342	Black Waterholes Creek RTA 2 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1343	Black Waterholes Creek RTA 3 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1344	Black Waterholes Creek RTA 4 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1355	Swamp Creek RTA 3	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1358	Swamp Creek RTA 6 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1360	Swamp Creek RTA 8 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4

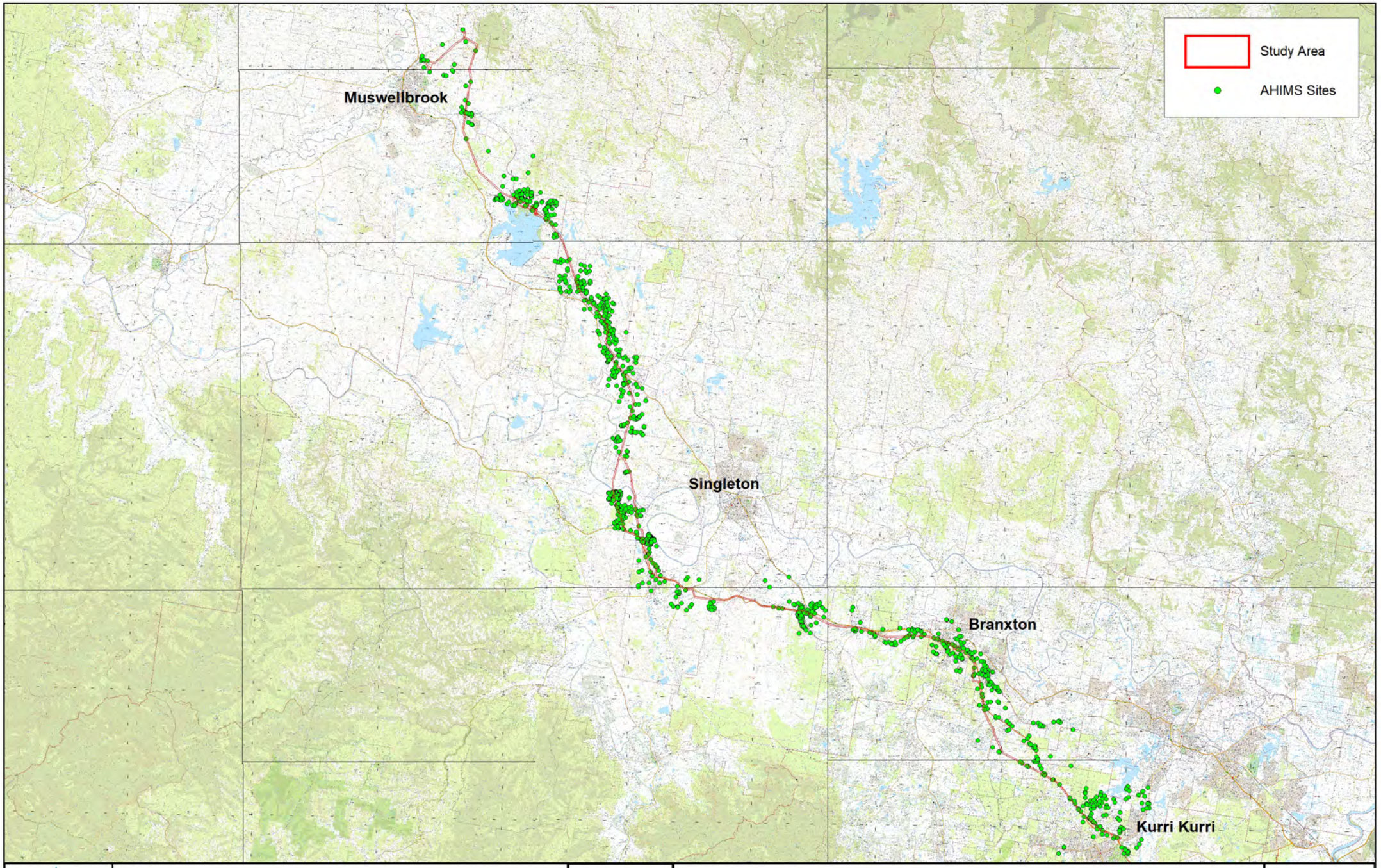
Site ID	Site Name	Likely actual status	Report details
37-6-1363	PAD11 Black Waterholes Creek	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1364	Sawyers Gully RTA 11 (formerly PAD12 Sawyers Gully)	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1346	Sawyers Gully RTA 2 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1308	Anvil Creek RTA 6	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1309	Anvil Creek RTA 7	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1316	Anvil Creek RTA 14IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1317	Anvil Creek RTA 15	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1319	Anvil Creek RTA 17	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1320	Anvil Creek RTA 18 IF	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1321	Anvil Creek RTA 19	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1328	Anvil Creek RTA 25	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1329	Anvil Creek RTA 26	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1312	Anvil Creek RTA 10	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1313	Anvil Creek RTA 11 IF	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1315	Anvil Creek RTA 13IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1322	Anvil Creek RTA 20 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1323	Anvil Creek RTA 21	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1324	Anvil Creek RTA 22	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'

Site ID	Site Name	Likely actual status	Report details
37-6-2151	Branxton Rail 3	Destroyed (Already Salvaged)	Kuskie and O'Driscoll 2013 Maitland to Minimbah AHIP. As per p.37 of report.
37-6-2159	Branxton Rail 11	Destroyed	Destroyed as per 2010 Aboriginal Site Impact Recording Form completed by Peter Kuskie from SE Archaeology attached to site card.
37-6-2269	Maitland to Minimbah X3	Destroyed	Already salvaged according to site card that state in the comments it was recorded and salvaged on /11/2009 by Caroline Ingram from SE Archaeology.

There are only two registered grinding groove sites recorded as being close to the area of proposed works. Grinding groove sites are considered to be rare and have been discussed previously in Section 4. They are described as follows on the site cards:

- AHIMS #37-3-0809 contains three sites (SA8/10, SA8/12, SA8/14). SA8/10 comprises two (potential) grinding grooves were located in a small exposure of sandstone on the slopes above the Glennies Creek terrace. Surface visibility was restricted by a heavy grass cover. The grooves measured 120 mm x 15 mm which suggest that they were not utilised for grinding the larger axe pre-forms such as those recorded during this survey. The sandstone outcrop was a small floater exposed within a cleared pasture area. The exposure is located approximately 2 m from an unformed vehicle track. The grooves are not deep and may have resulted from a single event. SA8/12 is described as an artefact scatter comprising 8 mudstone, 2 silcrete, 1 quartz with moderate potential for sub-surface deposit. SA8/14 was described as a stone artefact scatter comprising 1 mudstone and 2 silcrete.
- AHIMS #37-6-2015 comprises a slab of sandstone was observed with a slight uniform depression suggesting it may have been used as a grinding slab. The dimensions of the depression are 38 x 28 cm and had a depth of 4.5 cm. It is unclear whether this slab was portable, as it is embedded in the surrounding soil profile. Artefacts were concentrated at more than 1 artefact per $1m^2$. The artefacts comprised five pink and grey silcrete flakes, four quartz flakes, and two chert flakes.

All known sites are discussed in greater detail in the attached AR.



PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 16 32
kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Topographic Maps
Spatial Srvices
Image Date: 2022
Final - Version 1

Figure 3: AHIMS sites across the study area.

N

3.3.2 Previous Archaeological Assessment

A number of previous archaeological assessments have been undertaken within the study area and surrounds. These investigations were initially undertaken for research projects in the 1940s and the 1970s, then from this time on, in response to development of the area. This included the creation or extension of current mining operations, railway and highway transportation corridors, subsurface excavations for services including water, sewage, communication and electricity, and to a lesser degree, residential development.

In general, the investigations found that high densities of artefacts have been primarily found on lower slopes, alluvial floodplains and on middle to upper ridges. These areas have also been close to major rivers, such as the Hunter River, or higher-order creeks, as well as wetland and swamp environments. Although there are some sites that have been shown to contain evidence of occupation into the Pleistocene period (>10,000 ya), the majority of sites that have been confidently dated are around 5,000 years old. A vast array of artefactual tool types has been recovered from these sites that reflect the diversity of activities that had once taken place. These implements/tools were made from a variety of high-quality stone material with a preference for fine-grained tuff. The stone was mainly sourced from locally available cobble sources, but some also came bedrock and cobble sources from further afield through direct acquisition or trade and exchange as noted by Watt (2023).

These previous investigations are summarised in Table 6 below and discussed in detail in the Apex Archaeology ATR for this assessment.

Table 6: Previous heritage assessments undertaken by archaeological consultants in the region

Consultant	Date	Sites Identified	Region
McCarthy	1941	Numerous sites (2,451 stone artefacts including vast array of tool types, as well as glass artefacts)	Gowrie, Singleton
Moore	1970	Three rockshelter sites excavated (thousands of artefacts including stone tools and implements made from bone. As well as faunal remains)	Sandy Hollow, Milbrodale and Bobadeen
Dyall	1979	15 sites identified (stone artefacts and tool types including a Bulga knife, and grinding grooves)	Warkworth
Byrne	1985	None	Muswellbrook
Davis	1991	Six sites identified (all with stone flakes, no tools/implements were found)	Cessnock to Scone
HLA	1994	Two sites (isolated stone artefact and stone artefact scatters)	Warkworth Jerry Plains
Robyn Mills	1999	Two Sites (stone artefacts)	Kurri Kurrri

Consultant	Date	Sites Identified	Region
Kuskie and Kamminga	2000	Two sites excavated and thousands of artefacts retrieved including numerous tool types)	Black Hill/Woods Gully
Brayshaw	2003	Two previously identified sites (Bora Ground and Scarred tree) were attempted to be relocated	Wollombi Brook near Wombo mine.
Umwelt	2005	Identified ten previously recorded sites (artefact scatters and isolated finds). Ten PADs were also found.	Branxton
Umwelt	2006	Nine (six artefact scattered and two isolated stone artefacts)	
Worth	2007	Four stone artefact sites identified	Masion Dieu
Umwelt 2008	2008	38 sites (stone artefact and stone artefact scatters)	
Insite Heritage	2009	Identified seven previously recorded sites (isolated stone artefacts and stone artefact scatters)	Bowmans Creek
AMBS	2009	65 sites identified including two previously recorded (stone artefacts, including tools, ground - edge hatchet, and one sandstone grinding slab).	Kurri to Redbank Power Station
Kuskie	2010	One site (isolated stone artefact)	Branxton
Umwelt	2010	Management plan of numerous previously identified sies.	Branxton
McCardle Cultural Heritage	2010	Excavations of two PADs (over a hundred artefacts recovered of mainly stone flakes but also a few backed blades).	Sawyers Creek, North Rothbury
OzArk	2012	Excavations of two registered sites (133 test pits and 10 stone artefacts recovered)	Lake Liddell
Peter Kuskie and Corey O'Driscoll (South East Archaeology)	2013	Relocated 43 previously identified sites. These were salvaged or relocated and thousands of artefacts including specific tool types were recovered.	Maitland to Minimbah
Central Queensland Cultural Heritage Management	2014	Summarised previous archaeological investigations that had identified over 100 sites for an ACHA	Mount Thorley, Warkworth
Hughes.P., Spooner, N. and Questiaux	2014	Investigation of the geomorphology to better understand Pleistocene sites.	Sandy Hollow Creek at Warkworth West and sand sheet between Singleton and Muswellbrook
Umwelt	2014	150 previously unidentified sites (isolated stone artefacts and stone artefact scatters)	Ravensworth mine complex between Singleton and Muswellbrook

Consultant	Date	Sites Identified	Region
AMBS	2015	36 previously identified sites (relocated stone artefact flakes)	Kurri Kurri, Greta, Branxton, Singleton and Mount Thorley
WLALC	2016	One site identified (stone artefact scatter)	Intersection of New England Highway and Golden Highway
Kelleher Nightingale Consulting	2017	Five sites identified (isolated stone artefact and artefact scatters)	Section of New England Highway between Belford and the Golden Highway.
Arrow Heritage	2019	Inspection of 58 Sites and management recommendations.	Mount Thorley and Warkworth mining complex
AMBS	2019	One (stone artefact scatter, glass artefact and PAD).	Muddies Creek along the Golden Highway
Jacobs	2021	No sites identified	Kurri Kurri
OzArk	2021	16 sites identified (isolated stone artefacts and stone artefact scatters including backed blades and cores)	Bowmans Creek
Peter Kuskie	2022	38 sites identified (stone artefact scatters inc microlith, cores and retouched flake)	Wambo Coal Mine
Umwelt	2022	13 previously identified sites and nine new sites were recorded (isolated stone artefacts, artefact scatters and PADs were identified)	Kurri Kurri
Hugh Watt	2023	Spatial analysis of raw material sources and ground-edged artefacts (GEAs) in Hunter Valley. Identified 65 GEAS to 31 geological sources	Hunter Valley region

3.4 ETHNOHISTORY

Ethnohistorical evidence is based on the reports of colonisers and does not tend to include the Aboriginal perspective, leading to a Eurocentric view of Aboriginality. Additionally, historical records can be contradictory and incomplete regarding the exact tribal boundaries and locations of ceremonial or domiciliary activities of Aboriginal people before contact.

> *The problem associated with ethnohistoric documents include their tendency to record unusual, rather than everyday events, and their focus on religious behaviour to the exclusion of woman and children (Attenbrow 1976:34; Sullivan 1983:12.4).*

The opinions of the early explorers, anthropologists, settlers and contemporary academics regarding the geographic location of the major language groups within the Hunter Valley at the time of British contact with the Aboriginal people vary. However, an extract from a map created by David Horton (1996) for the Australian

Institute of Aboriginal and Torres Strait Islander Studies appears to be the current general consensus of the geographic location of the main Aboriginal language groups in the Hunter Valley Watt (2023:40). The current study area falls within the Wonnarua language group (Figure 4), which is similar to what was also suggested by Tindale (1974). The bordering language groups included the Geawegal to the north, the Darkinung to the south, the Worimi and Awabakal to the east, and the Wiradjuri to the west. The Kamilaroi was just to the north and shared a common border with the Wiradjuri and Geawegal.

Figure 4: Excerpt of AIATSIS Map of Aboriginal language groups (Source: Horton 1996)

Watt (2023: 42) also remarked that observations from around the contact period noted relationships between the language groups fluctuated between periods of combat and harmony. Most disputes, whether within or between languages groups, were settled by previously agreed formats. However, one common thread of conflict appears to be the forceful attitude of the Kamilaroi and their desire to expand their area of influence. For example, Robert Miller (1886:354), an Elder of the Wonnarua Language Group, noted that "wars were generally fought over the abduction of women by the Kamilaroi together with their habit of trespassing on the country of neighbouring tribes". Furthermore, Enright (1937) believed the Kamilaroi had plans to extend their territory further into the Hunter Valley. However, according to Horton (1994), this never came to fruition due to the continued expansion of settlers to the north and northwest.

Early recorded accounts of European settlers identify some aspects of the traditional lifestyles of Aboriginal people. As noted by Peterson (1976) Aboriginal society in general was constructed of a hierarchy of social levels and groups, with fluid boundaries with the smallest group comprising a family of a man and his wife/wives, children and some grandparents, referred to as a 'clan'. The next level consists of bands, which were small groups of several families who worked together for hunting and gathering purposes (Attenbrow 2010). The third level comprised regional networks with a number of bands, and these bands generally shared a common language dialect and/or had a belief in a common ancestor. Networks would come together for specific ceremonial purposes. The highest level is described as a tribe, which is usually described as a linguistic unit with flexible territorial boundaries (Peterson 1976); although Attenbrow (2010) argues that "these groups were not tribes in the current anthropological sense of the word".

The traditional lifestyles of Aboriginal groups were not only shaped by complex kinship ties, obligations and social links, but also to a large extent by the environment in which they lived. Whilst coastal groups utilised marine and estuarine resources, hinterland groups relied on freshwater and terrestrial animals and plants. The central lowlands of the Hunter Valley fall within the hinterland region. Although early settlers generally described the Hunter Valley as lightly wooded, they did mention a rich abundance of plants including ones that produced nectar, seeds, and edible fruit such as berries, and one that resembled custard apple (Brayshaw 1986). Within these woods, open plains, and clustered plants along the water ways, animals such as wallabies, kangaroos, possums, birds, fresh water fish, water birds and birds such as bush turkeys were noted to have lived. These formed an integral part of the Aboriginal people's diet, as well as their social lives and belief systems.

Early observations within the Hunter Valley mention Aboriginal people setting fire to patches of land to encourage grass revegetation that the kangaroos would feed on. Setting fire was also noted as being used in preparation for ceremonial and communication signalling (Brayshaw 1986). The excavations undertaken by Moore on rockshelters at Sandy Hollow, Milbrodale and Bobadeen with the Hunter Valley in the 1970s and 1980s recovered a variety of faunal bones along with the shells of freshwater mussels which confirm the diverse range of food that was used. The animal bones found in association with stone artefacts included Grey Kangaroo (*Macropus major*), Wallaby (*Wallabia spp.*) and Brush-tailed Possum (*Trichosurus vulpecula*), Ringtail Possum (*Pseudocherius*) and fragments of emu eggshells were also found.

Threlkeld (cited in Gunson 1974:42) observed that "Communications between distant tribes, although, perhaps hundreds of miles away, may intervene and are much more frequent than is commonly imagined by Europeans". The grasstrees (*Xanthorrhoea* sp.) for example, which provided woody material to make spears, were sent into the interior of the continent; receiving in return hanks of line, spun by hand from the fur of animals of the opossum tribe. Threlkeld also noted that groups from Lake

Macquarie, on the coast went 'to the mountains with upwards of 60 spears to exchange for opossum cord made of the fur' (Threlkeld cited in Gunson1974:206). Another observation by Dawson (1830:135-136) noted that:

> *Exchanges of articles sometimes took place between the coast natives and those residing in the interior. Iron Tomahawks, sea-shells, with which they scrape and sharpen their spears, and pieces of glass, which they use for that purpose whenever they can get them, where this frequently exchanged for opossum skins, and sometimes for the belts of yarn ready manufactured, as well as a small opossum band of net-work, which they wear on their forehead when in full dress.*

Recent provenancing studies of ground-edged artefacts found in the Hunter Valley reinforce early observations of long-distance exchange systems. These items, mainly ground-edged axes, were included in trade/exchange systems that operated locally, and over enormous distances. For example, axe-making material excavated from a rock shelter in Milbrodale was dated to between 900 to 1830 BP and sourced to a basalt outcrop at Merriwa within the Hunter Valley. Other axes were sourced a little further to the south to a basalt outcrop within Peats Ridge and Popron Creek within Darkinjung Country in the Central Coast region. Axes were also matched to cobble sources found along the banks of the Nepean River; while two axes found in the Hunter Valley have been tentatively matched to geological sources in Mount William in Victoria and Mount Isa in Queensland, distances that cover over one thousand and two thousand kms respectively (Watt 2023).

4.0 Aboriginal Cultural Heritage Significance Assessment

4.1 Introduction

Cultural or social significance can be defined as relating to the spiritual, traditional, historical and/or contemporary associations and values attached to a place or objects by Aboriginal people. Further, the tangible and intangible evidence of their cultural heritage is valued by Aboriginal people as it forms an essential part of their cultural identity and their connection to Country (DECCW 2010a).

The *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010a) acknowledge that:

- Aboriginal people have the right to maintain their culture, language, knowledge and identity
- Aboriginal people have the right to directly participate in matters that may affect their heritage
- Aboriginal people are the primary determinants of the cultural significance of their heritage

Undertaking consultation with Aboriginal people ensures that potential harm to Aboriginal objects and places from proposed developments is identified and mitigation measures developed early in the planning process.

4.2 Criteria

The Burra Charter is considered an appropriate framework for the assessment of cultural heritage, which can be made based on the following assessment criteria:

- **Social value:** Also referred to as cultural value, this criterion considers the spiritual, traditional, historical or contemporary associations an area or place has for Aboriginal people
- **Historic value:** the relationship between a place and people, events, phases or activities of importance to the Aboriginal community
- **Scientific value:** assessment under this criterion considered the ability of a landscape, place, area or object to inform scientific research and/or analysis and to assist in answering research questions
- **Aesthetic value:** the ability of a place, area, landscape or object to demonstrate aesthetic characteristics, or possess creative or technical values

These should be graded so as to allow the significance to be described and compared as high, moderate or low.

4.3 Significance Assessment

Social value

The Aboriginal community are best placed to make a determination of the social or cultural value of the study areas. No specific comments regarding the social value of the areas to Aboriginal people have been received from the RAPs to date,

although it is noted that all areas with evidence of Aboriginal occupation hold significance to Aboriginal people, and can be considered cultural landscapes. The study area is located within a rich cultural landscape and as such is likely to have high social value.

This criterion would be updated on receipt of further comment from the Aboriginal community.

HISTORIC VALUE

The background research and consultation with the RAPs for this project has not identified any historical associations with Aboriginal use or occupation of the study area relating to specific historical events or people. At this stage, the study area does not meet this criterion.

This criterion would be updated on receipt of further comment from the Aboriginal community.

SCIENTIFIC VALUE

The transmission line route for the proposed Hunter Renewable Energy Zone traverses an area rich in Aboriginal cultural heritage. There are areas of high disturbance with little to no archaeological significance, and other areas of moderate to high archaeological significance.

AESTHETIC VALUE

Generally, aesthetic value is determined by the response evoked by a setting. The study area is generally not considered to hold aesthetic significance with regards to Aboriginal heritage, based on its disturbed context and limited view lines.

4.4 CULTURAL SIGNIFICANCE ASSESSMENT

Generally, all Aboriginal sites are of high significance and importance to the Aboriginal community, both locally and more broadly. The Aboriginal social or cultural value of the study area can only be determined by the Aboriginal community and to date, no comments have been received regarding the specific social significance of the study area.

It is acknowledged that the overall significance of a site is determined by both the cultural and scientific values of the area; with cultural values potentially extending beyond a specific study area and incorporating cultural landscapes in many cases. The cultural significance of an area can only be determined by the Traditional Owners of that area. Generally, all sites with evidence of Aboriginal occupation are considered significant to Aboriginal people as part of a larger cultural landscape.

Given the range and number of sites known to exist within and around the study area, it is understood that the region would hold moderate to high cultural significance to Aboriginal people.

5.0 Proposed Activity

The proposed works for the Hunter Renewable Energy Zone (REZ) project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.

This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible.

As such, a range of mitigation measures are suggested which can be further refined on completion of the detailed design.

5.1 Potential Impact

There are a total of 110 previously recorded and newly identified Aboriginal sites within the study area, with 84 previously recorded, and 26 newly identified. The proposed works have the potential to impact on these sites, but at this stage of the project, detailed design has not yet been completed. As such, potential impacts cannot yet be determined until the detailed design is finalised.

This assessment will inform the detailed design so that known sites and areas of archaeological potential can be avoided wherever possible.

This report would be updated on completion of the detailed design to determine the potential impact of the works on Aboriginal cultural heritage, and to provide recommendations for management and mitigation.

6.0 Avoiding and Minimising Harm

6.1 Consideration of Alternatives

This report has been prepared to inform the detailed design for the proposed works so that Aboriginal cultural heritage is avoided as far as possible during works.

Further consideration regarding avoidance and minimisation of harm can be completed when the detailed design is finalised, but a number of recommendations for mitigation have been proposed for instances where avoidance is not possible.

6.1.1 Surface Collection

Areas with surface expression of artefacts but without subsurface potential for archaeological deposits may require surface collection of these objects prior to impact occurring. This would require an approved AHIP to permit the collection to occur.

In some instances, surface collection may be proposed and permitted under an approved AHIP, but the artefacts associated with the site may no longer be present at the site due to taphonomic processes over the site in the years since its recording and the attempt to collect the item. In instances where an attempt for collection has been made, and the item cannot be recovered despite best efforts, no further archaeological mitigation would be required for the site and works that would impact the site may proceed.

6.1.2 Test Excavation

In areas where potential archaeological deposits (PADs) are located and impact cannot be avoided, test excavation would be necessary to determine the nature and extent of these deposits and to formulate appropriate mitigation measures. These may include unmitigated impact, salvage excavations, or avoidance of specific areas in favour of alternative areas.

Test excavations would require the excavation of 50cm x 50cm test excavation units within the proposed impact area. These may be combined if necessary to form a 1m^2 test pit. The number of excavation units required would depend on the extent of the proposed works within a specific area and would be refined following development of the final design.

6.1.3 Management Plan

A management plan for sites within the transmission line route should be prepared to provide guidance on future management of these sites. This would be informed by the detailed design of the infrastructure, but also provide guidance for unexpected finds within the area. This would include guidance for on-going, periodic monitoring of fencing, ideally prior to vegetation management occurring.

6.1.4 Zones of Archaeological Sensitivity

Many of the areas identified as archaeologically sensitive zones have been subject to previous test excavation, often at the location of existing poles. These test excavations have confirmed the presence of subsurface archaeological deposits, along with the presence of surface artefacts. As such, location of ground disturbing works outside of existing pole locations or ground disturbance (such as trenches) would require archaeological test excavation prior to the commencement of works. This testing would relate to the proposed impacts and would be determined once potential impacts are understood.

6.1.5 Fencing

In some instances, avoidance will be possible. Wherever surface artefact concentrations can be avoided by the proposed works, including vegetation management works, the extent of the concentration should be fenced to prevent unintentional impact. Ideally fencing would be robust, visible, and signed to ensure no impact occurs to these sites.

Existing fencing for known sites should be reviewed and updated as necessary to provide appropriate protection to the site.

Further information regarding potential mitigation measures can be found in the attached AR.

6.2 Ecologically Sustainable Development

It is a requirement of Section 2A(2) of the NPW Act to apply the principles of Ecologically Sustainable Development (ESD) when considering any impact to Aboriginal objects and places. ESD integrates economic and environmental considerations, which includes cultural heritage, into decision-making processes. In general, ESD can be achieved through consideration and implementation of two key principles, being intergenerational equity and the precautionary principle.

Intergenerational equity refers to the present generation having consideration for the health, diversity and productivity of the environment for those generations to come. In terms of Aboriginal cultural heritage, this relates to cumulative impacts to Aboriginal objects and places within a region. Intergenerational equity therefore relies on the understanding that a reduction in the number of Aboriginal objects and places within a region results in fewer opportunities for Aboriginal people to access their cultural heritage in the future. Thus, it is essential to understand what comprises the Aboriginal heritage resource, both known and potential, when assessing intergenerational equity within a region.

The precautionary principle relates to threats of serious or irreversible environmental damage, and that lack of scientific certainty regarding the degree of potential damage should not be a reason to postpone adequate reasonable measures to prevent harm to the environment. Regarding Aboriginal cultural heritage, the precautionary principle relates to where a proposed development may seriously or irreversibly impact Aboriginal objects or places, or their significance; and where

there may be uncertainty relating to the integrity, rarity or representativeness of Aboriginal cultural values. The Code of Practice outlines that a precautionary approach should be taken to avoid or reduce damage to Aboriginal objects or places, with cost-effective measures implemented wherever possible. Additionally, a cumulative impact assessment should be completed to determine how the proposed development would impact the cultural resource in the wider region.

Consideration should be given to the significance of the sites present within an area, and whether they are able to transmit cultural information to future generations, or to act as teaching aids.

The study area is considered to have moderate to high cultural and archaeological significance, at least in some parts, and thus avoidance of impact is essential wherever possible.

6.2.1 Intergenerational Equity

Avoidance of impact would assist with regards to the ongoing transmission of cultural knowledge to future generations, with sites retained in situ wherever possible. Further consideration of intergenerational equity will be completed when the detailed design is completed and potential impacts to sites are better understood.

6.2.2 Cumulative Impacts

The cumulative impact of the project on the Aboriginal cultural resource must be considered as part of an assessment, and managed appropriately and sensitively. Avoidance of impact is the best practice approach wherever possible, particularly for sites that are intact, contain high numbers of artefacts, or are considered significant to the community.

It will be necessary to understand the likely impact of the works following completion of the detailed design to have a clearer understanding of the cumulative impacts of the proposed works.

6.3 Aboriginal Community Input

The RAPs have been consulted as part of this project, and their input, where received, has been incorporated into the report and recommendations.

7.0 RECOMMENDATIONS

The following recommendations are made on the basis of:

- The statutory requirements of the NP&W Act 1974;
- The requirements of Heritage NSW;
- The results of the cultural and archaeological assessment;
- An assessment of the likely impacts of the proposed development; and
- The interests of the registered Aboriginal stakeholders and the cultural heritage record.

It was found that:

- The Hunter Renewable Energy Zone (REZ) passes through a rich cultural landscape with many previously and newly recorded sites present.
- 84 previously recorded AHIMS sites are located within a 50m radius of the proposed transmission line route.
- 26 newly identified sites were located within a 50m radius of the proposed transmission line route.
- Nine zones of archaeological sensitivity were identified, associated with previously or newly identified sites.
- The proposed works have potential to avoid many of the identified sites, either through ensuring pole placement avoids known site locations, or the use of alternative construction methods which reduce or avoid impact.
- Final recommendations for management of the Aboriginal archaeological sites within the study area would rely on the final design of the REZ.

Therefore, the following recommendations have been made.

RECOMMENDATION 1: FINALISATION OF DESIGN

On finalisation of the design for the Hunter REZ, an updated assessment of the potential impact of the works can be made and more concrete recommendations for the management of known Aboriginal sites can be presented. This report should be updated, or an addendum report prepared detailing the consideration of the detailed design in relation to Aboriginal archaeological requirements.

RECOMMENDATION 2: FURTHER ASSESSMENT REQUIRED

This report comprises, essentially, an options and constraints assessment. Further consideration of Aboriginal cultural heritage is required prior to any on ground works proceeding. This would be informed by the detailed design for the Hunter REZ.

RECOMMENDATION 3: AVOID KNOWN SITES

Known sites as identified in this report should be considered during detailed design for the Hunter REZ, with avoidance being of the highest priority wherever possible.

Recommendation 4: Application for AHIP Required

Aboriginal cultural material is present within the study area and thus an application for an Aboriginal Heritage Impact Permit (AHIP) will be required to permit harm to these items if avoidance is not possible. The requirement for an AHIP would be determined on finalisation of the detailed design for the Hunter REZ.

Recommendation 5: Maintain Aboriginal Community Consultation

Consultation with the RAPs in accordance with the ACHCRs regarding the project should continue, in order to keep the RAPs informed about the management of Aboriginal cultural heritage within the study area.

Recommendation 6: Development Boundaries

The proposed development works must be contained within the assessed boundaries for this project. If there is any alteration to the boundaries of the proposed development to include areas not assessed as part of this archaeological investigation, further investigation of those areas may be necessary to assist in appropriately managing Aboriginal objects and places which may be present.

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Appendix A: Correspondence Log

Appendix B: Step 1 Letters and Responses

Responses not included in public report

Appendix C: Step 2 Letters and Responses

Not included in public report

Appendix D: Advertisement

Appendix E: Methodology, Cover Letters and Responses

Letters and responses not included in public report

Appendix F: Draft Report Emails and Responses

Not included in public report

HUNTER VALLEY RENEWABLE ENERGY ZONE (REZ), NSW

ARCHAEOLOGICAL REPORT

Report to Ausgrid

LGAs: Cessnock, Singleton, and Muswellbrook

February 2024

APEX ARCHAEOLOGY

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ABN 56 625 618 993

EXECUTIVE SUMMARY

Apex Archaeology have been engaged to assist Ausgrid to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a proposed infrastructure project to modernise the electricity system within the Hunter Valley, NSW. The project includes areas within Cessnock, Singleton and Muswellbrook Local Government Areas (LGAs). This report details the results of the archaeological assessment of the site, prepared in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (September 2010) (the Code of Practice). This report forms an appendix to the ACHA report prepared for the project.

The proposed works for the project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.

This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible.

The results of this archaeological assessment can be summarised as follows:

- The Hunter Renewable Energy Zone (REZ) passes through a rich cultural landscape with many previously and newly recorded sites present.
- 84 previously recorded AHIMS sites are located within a 50m radius of the proposed transmission line route.
- 26 newly identified sites were located within a 50m radius of the proposed transmission line route.
- Nine zones of archaeological sensitivity were identified, associated with previously or newly identified sites.

- The proposed works have potential to avoid many of the identified sites, either through ensuring pole placement avoids known site locations, or the use of alternative construction methods which reduce or avoid impact.
- Final recommendations for management of the Aboriginal archaeological sites within the study area would rely on the final design of the REZ.

Therefore, the following recommendations have been made.

RECOMMENDATION 1: FINALISATION OF DESIGN

On finalisation of the design for the Hunter REZ, an updated assessment of the potential impact of the works can be made and more concrete recommendations for the management of known Aboriginal sites can be presented. This report should be updated, or an addendum report prepared detailing the consideration of the detailed design in relation to Aboriginal archaeological requirements.

RECOMMENDATION 2: FURTHER ASSESSMENT REQUIRED

This report comprises, essentially, an options and constraints assessment. Further consideration of Aboriginal cultural heritage is required prior to any on ground works proceeding. This would be informed by the detailed design for the Hunter REZ.

RECOMMENDATION 3: AVOID KNOWN SITES

Known sites as identified in this report should be considered during detailed design for the Hunter REZ, with avoidance being of the highest priority wherever possible.

RECOMMENDATION 4: APPLICATION FOR AHIP LIKELY

Aboriginal cultural material is present within the study area and thus an application for an Aboriginal Heritage Impact Permit (AHIP) will be required to permit harm to these items if avoidance is not possible. The requirement for an AHIP would be determined on finalisation of the detailed design for the Hunter REZ.

RECOMMENDATION 5: MAINTAIN ABORIGINAL COMMUNITY CONSULTATION

Consultation with the RAPs in accordance with the ACHCRs regarding the project should continue, in order to keep the RAPs informed about the management of Aboriginal cultural heritage within the study area.

RECOMMENDATION 6: DEVELOPMENT BOUNDARIES

The proposed development works must be contained within the assessed boundaries for this project. If there is any alteration to the boundaries of the proposed development to include areas not assessed as part of this archaeological investigation, further investigation of those areas may be necessary to assist in appropriately managing Aboriginal objects and places which may be present.

Apex Archaeology acknowledges and pays respect to the past, present and future Traditional Custodians and Elders of this nation and in whose land this assessment took place, and to the continuation of cultural, spiritual and educational practices of Aboriginal and Torres Strait Islander peoples.

Document Control

The following register documents the development and issue of the document entitled 'Hunter Valley Renewable Energy Zone (REZ) NSW: Archaeological Report', prepared by Apex Archaeology in accordance with its quality management system.

Revision	Prepared	Reviewed	Comment	Issue Date
1 – Draft	Rebecca Bryant & Leigh Bate	Jenni Bate	Client review	16 February 2024
2 – Final	Jenni Bate			

GLOSSARY OF TERMS

Aboriginal Object	An object relating to the Aboriginal habitation of NSW (as defined in the NPW Act), which may comprise a deposit, object or material evidence, including Aboriginal human remains.
ACHA	Aboriginal Cultural Heritage Assessment
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHCRs	*Aboriginal cultural heritage consultation requirements for proponents 2010*
AHIMS	Aboriginal Heritage Information Management System maintained by Heritage NSW, detailing known and registered Aboriginal archaeological sites within NSW
AHIP	Aboriginal Heritage Impact Permit
AR	Archaeological report
ASIRF	Aboriginal Site Impact Recording Form
BP	Before Present, defined as before 1 January 1950.
Code of Practice	The DECCW September 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*
Consultation	Aboriginal community consultation in accordance with the DECCW April 2010 *Aboriginal cultural heritage consultation requirements for proponents 2010.*
DA	Development Application
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbed Land	If land has been subject to previous human activity which has changed the land's surface and are clear and observable, then that land is considered to be disturbed
DPIE	Department of Planning, Industry and Environment
Due Diligence	Taking reasonable and practical steps to determine the potential for an activity to harm Aboriginal objects under the *National Parks and Wildlife Act 1974* and whether an application for an AHIP is required prior to commencement of any site works, and determining the steps to be taken to avoid harm
Due Diligence Code of Practice	The DECCW Sept 2010 *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
GIS	Geographical Information Systems
GSV	Ground Surface Visibility
Harm	To destroy, deface or damage an Aboriginal object; to move an object from land on which it is situated, or to cause or permit an object to be harmed
Heritage NSW	Heritage NSW in the Department of Climate Change, Energy, the Environment and Water – responsible for heritage matters in NSW
ka	Kiloannus, a unit of time equating to 1,000 years
LALC	Local Aboriginal Land Council
LGA	Local Government Area
NPW Act	NSW *National Parks and Wildlife Act* 1974
NPWS	National Parks and Wildlife Service
OEH	The Office of Environment and Heritage (now Heritage NSW)
PAD	Potential Archaeological Deposit
RAPs	Registered Aboriginal Parties

CONTENTS

FIGURES

1.0 Introduction

Apex Archaeology have been engaged to assist Ausgrid to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for a proposed infrastructure project to modernise the electricity system within the Hunter Valley, NSW (Figure 1). The project includes areas within Cessnock, Singleton and Muswellbrook Local Government Areas (LGAs). This report details the results of the archaeological assessment of the site, prepared in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (September 2010) (the Code of Practice). This report forms an appendix to the ACHA report prepared for the project.

The proposed works for the project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.

1.1 Project Proponent

The proponent for the project is Ausgrid and their project manager is Richard Dunnicliff.

1.2 Objectives of the Archaeological Assessment

The archaeological investigation was undertaken to meet the requirements of the Code of Practice.

The purpose of the archaeological investigation is to understand and establish the potential harm the proposed development may have on Aboriginal cultural heritage within the study area, both tangible and intangible.

Any development works which disturb the ground surface have the potential to impact Aboriginal archaeological deposits and therefore an assessment of whether the study area contains such deposits is required prior to the commencement of construction works. An assessment of whether the proposed development would impact these deposits (if present) is also necessary, and identification of to what

extent the deposits would be impacted is also required. The degree of impact which may be allowable is determined, in part, with consideration of the level of cultural significance attributed to the cultural values of the study area, both tangible and intangible.

As such, the objectives of the assessment are to determine whether Aboriginal cultural values exist within the study area, and whether the proposed project can avoid impact to these values, or if mitigation measures may be necessary.

1.3 Study Area and Project Brief

The study area is within the central lowlands of the Hunter Valley and follows a meandering corridor that extends from Kurri Kurri, approximately 30 km northeast of the city of Newcastle on the coast, to Muswellbrook in the northwest. It is approximately 20m wide and covers a distance of approximately 105 km (Figure 1).

The proposed works for the project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

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The entire study area is proposed to be investigated to determine whether cultural material is still located within the boundaries of the study area, and to identify the nature and extent of any such material present. This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible.

1.4 Project Framework

The proposed Hunter Renewable Energy Zone (REZ) project will deliver new renewable energy infrastructure to fulfill the increasing demand for affordable and sustainable electricity. This will include the construction of energy generators (e.g.

solar and wind), storage facilities, and high-voltage transmission lines. The REZ aims to produce cheap, clean and reliable electricity that can be efficiently stored and transmitted across the National Electricity Market (Ausgrid 2022).

The determining authority in this instance is Ausgrid, who will determine a Review of Environmental Factors (REF) for the project under Part 5 of the Environmental Planning and Assessment Act.

1.5 Investigators and Contributors

This archaeological assessment was commissioned by Ausgrid. Apex Archaeology thanks Ausgrid's Project Manager, Richard Dunnicliff, for his assistance with the project. Thanks are also extended to the registered Aboriginal groups for their participation and assistance with the project, with particular thanks and appreciation to Kevin Sampson, Cacatua Culture Consultants, Les Atkinson, Wonaruah Local Aboriginal Land Council and Shai-lee Braneley, Wonnarua Nation Aboriginal Corporation for their assistance with the fieldwork.

This report has been prepared by Rebecca Bryant, Archaeologist with Apex Archaeology, Leigh Bate, Director and Archaeologist with Apex Archaeology and Jenni Bate, Director and Archaeologist with Apex Archaeology. The report was reviewed by Jenni Bate, Director and Archaeologist with Apex Archaeology. Both Jenni and Leigh have over sixteen years of archaeological consulting experience within NSW, and Rebecca has 12 years experience in archaeological research projects (inc five years in consultancy). Project team roles and qualifications are shown in Table 1.

Table 1: Project team roles and qualifications

Name	Role	Qualifications
Jenni Bate	Project Manager; Report Author; Review	B.Archaeology; Grad. Dip. CHM
Leigh Bate	Field inspection, Report Author; Review; GIS	B.Archaeology; Grad. Dip. Arch; Dip. GIS
Rebecca Bryant	Report Author	B.Science (Arch/Paleo); Mphil (Lithics)
David O'Brien	Field Inspection	B/Arch Prac; Masters of Arch Sci

1.6 Limitations

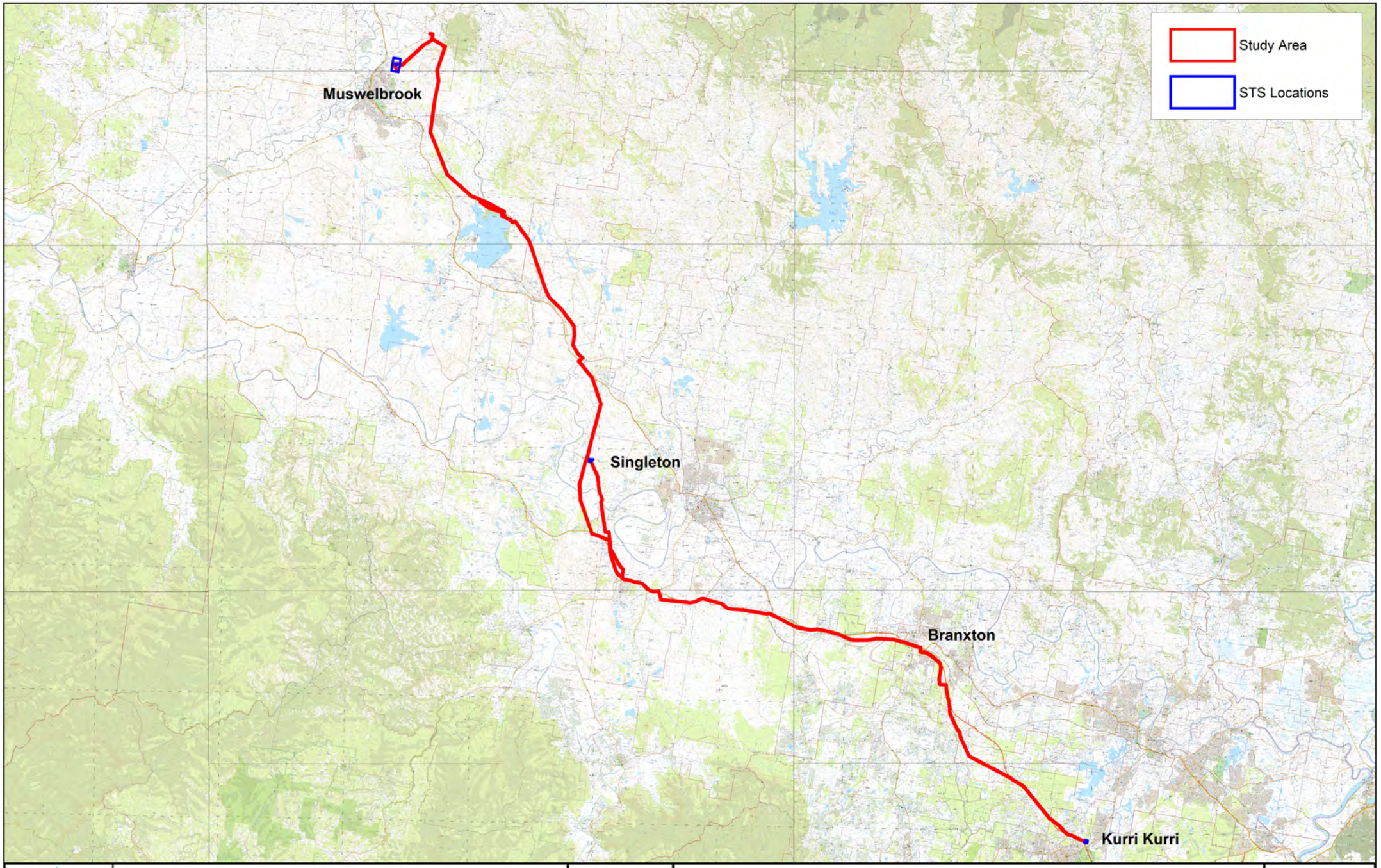
This report relies in part on previously recorded archaeological and environmental information for the wider region. This includes information from AHIMS, which is acknowledged to be occasionally inaccurate, due to inaccuracies in recording methods. No independent verification of the results of external reports has been made as part of this report.

It should be noted that AHIMS results are a record only of the sites that have been previously registered with AHIMS and are not a definitive list of all Aboriginal sites

within an area, as there is potential for sites to exist within areas that have not previously been subject to archaeological assessment.

A number of site cards note corresponding archaeological reports. However, a number of these reports are not available on AHIMS, or the internet. The heritage consultants or relevant organisation/s were contacted by email to request copies of these documents, however limited responses were received. As such, these documents were unable to be considered as part of this assessment. This is discussed further in Section 4.

Field investigations for this report included survey. The results are considered to be indicative of the nature and extent of Aboriginal archaeological remains within the study area, but it should be noted that further Aboriginal objects and sites which have not been identified as part of this assessment may be present within the wider area.



PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 16 32

kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
NSW Topographic Maps
Spatial Services
Image Date: 2022
Final - Version 1

Figure 1: Study area within its regional context.

N

2.0 Statutory Context

Heritage in Australia, including both Aboriginal and non-Aboriginal heritage, is protected and managed under several different Acts. The following section presents a summary of the applicable Acts which provide protection to cultural heritage within NSW.

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

This Act provides for the preservation and protection of injury and/or desecration of areas and objects in Australia and its waters that are of significance to Aboriginal people, in accordance with Aboriginal tradition.

Under this Act, the responsible Minister has provision to make both temporary and/or long-term declarations, in order to provide protection to areas and objects which are at threat of injury or desecration. In some instances, this Act can override State or Territory provisions, or be invoked if State or Territory provisions are not enforced. An Aboriginal or Torres Strait Islander individual or organisation must invoke the Act.

No items within the study area are listed or protected under this Act.

2.1.2 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides protection to environmental sites of national significance, including places with cultural heritage values that contribute to Australia's national identity. The Act aims to respect the role of Indigenous peoples in the conservation and ecologically sustainable use of Australia's biodiversity, and to enhance the protection and management of important natural and cultural places. Additionally, the Act is designed to promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

The National Heritage List (NHL) provides a listing of natural, historic and Indigenous places of outstanding significance to the nation, while the Commonwealth Heritage List (CHL) details the Indigenous, historic and natural places owned or controlled by the Australian Government.

Under the EPBC Act, approvals are required if any action is proposed that will have (or is likely to have) a significant impact on the National Heritage values of a National Heritage place. Therefore, actions must be referred to the Australian Government Minister for the Environment and Heritage. A decision will be made as to whether the proposed action will have a significant impact on any matters of national significance.

The Register of the National Estate (RNE) is a former statutory register that is no longer in force; however listings can still be searched. The listings on the RNE did not automatically transfer to the NHL.

A search of the Australian Heritage Database which incorporates the NHL and the CHL did not identify any Aboriginal heritage items within the study area.

2.1.3 Native Title Act 1993

The *Native Title Act 1993*, as amended, provides protection and recognition for Native title. Native title is recognised where the rights and interests of over land or waters where Aboriginal and Torres Strait Islander practiced traditional laws and customs prior to the arrival of European settlers, and where these traditional laws and customs have continued to be practiced.

The National Native Title Tribunal (NNTT) was established to mediate native title claims made under this Act. Three registers are maintained by the NNTT, as follows:

- National Native Title Register
- Register of Native Title Claims
- Register of Indigenous Land Use Agreements.

Searching the NNTT registers allows identification of potential Aboriginal stakeholders who may wish to participate in consultation.

A search of all three registers on 11 November 2023 did not identify any registered Native Title claims or Native Title determinations over the study area. The closest native title claim that has been accepted for registration is the application from the Gomeroi People (NC2011/006, NSD37/2019). The eastern boundary of the native title claim is on the western side of the Hunter River and falls outside the Muswellbrook boundary of the current study area.

2.2 New South Wales Legislation

2.2.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* provides protection for all Aboriginal objects and places within NSW. Aboriginal objects are defined as the material evidence of the Aboriginal occupation of NSW, while Aboriginal Places are defined as areas of cultural significance to the Aboriginal community. All Aboriginal objects are protected equally under the Act, regardless of their level of significance. Aboriginal Places are gazetted if the Minister is satisfied that the location was and/or is of special significance to Aboriginal people.

Following amendments to the NPW Act in 2010, approval to impact Aboriginal cultural heritage sites is granted under a Section 90 AHIP, which is determined by Heritage NSW in the Department of Climate Change, Energy, the Environment and Water (DECCW)

2.2.2 Environmental Planning & Assessment Act 1979

Under the EP&A Act, it is necessary to consider environmental impacts, including impact to cultural heritage, as part of the land use process. Local Environmental Plans (LEPs) and Development Control Plans (DCPs) are also required to be prepared by Local Government Areas (LGAs) in order to provide guidance on the applicable level of environmental assessment. LGAs are required to maintain a list of locally significant heritage items as part of their LEP.

Under the EP&A Act, Part 3 describes the planning instruments at both local and regional levels; Part 4 relates to development assessment and consent processes, and Part 5 refers to infrastructure and environmental impact assessment.

The current project will be determined under Part 5 of the EP&A Act, and Ausgrid are the determining authority. A Review of Environmental Factors (REF) will be prepared to inform the assessment process, with this report providing guidance to the REF development.

2.2.3 Cessnock LEP 2011, Singleton LEP 2013 and Muswellbrook LEP 2009

The Cessnock Local Environmental Plan (LEP) 2011, Singleton LEP 2013, and Muswellbrook LEP 2009 are the overarching planning instruments applicable to their respective LGAs under the same name. The study area is covered by the following provisions listed in the Clauses below. As these provisions are the same for all three LEPs they will not be repeated individually.

Clause 5.10 (1) (d) states that the objective of this clause is to conserve Aboriginal objects and Aboriginal places of heritage significance.

Clause 5.10(2) (e) identifies that no buildings may be erected on land within a heritage conservation area, or which contains an Aboriginal object, without first obtaining development consent. Further, Clause 5.10(2) (c) states that archaeological sites may not be disturbed or excavated without development consent. Clause 5.10(2) (d) states that an Aboriginal place of heritage significance may not be disturbed or excavated without development consent. Exceptions to the requirement for development consent are detailed by -

Clause 5.10(3) (a) and include work that is minor in nature or is for the maintenance of a heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, and would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, or (b) the development is in a cemetery or burial ground and the proposed development would not cause disturbance to human remains, relics, Aboriginal objects in the form of grave goods, or to an Aboriginal place of heritage significance.

Clause 5.10(8) (a & b) requires that the effect of any development on an Aboriginal place of heritage significance must be considered, and the Aboriginal community must be notified of any proposed developments and take into consideration any responses received within 28 days after the notice was sent. This document details the notification to the registered Aboriginal community regarding the intention to develop the study area and the consultation undertaken regarding the proposed development's potential impact on Aboriginal cultural heritage in the area.

Clause 5.10(10) (d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance.

There are no known items of Aboriginal heritage significance identified within the LEPs that fall within the current study area. There are items of general heritage and archaeological, however none of these contain references to Aboriginal objects. Assessment of these items is outside the scope of this assessment and therefore they are not considered further in this report.

3.0 Aboriginal Cultural Heritage

This section presents information about both the physical and cultural landscape in which the study area is located, as well as previous archaeological and ethnohistorical studies, to provide context and background to the existing knowledge of Aboriginal culture in the area.

3.1 Existing Environment

The Hunter Valley is a large coastal catchment of approximately 22,000 km^2 that is situated at the northern end of the geological structure referred to as the Sydney Basin (CSIRO 2021). The Hunter Valley is bound on the west by the Great Dividing Range, which has two spurs that form mountain ranges that extend east and form the northern and southern boundaries of the Hunter Valley. The northern spur comprises the Liverpool Range, Mount Royal Range and Barrington Tops, and the south is the dissected sandstone plateaux of the Southern Mountains. The study area is located between these two areas and is referred to as the Central Lowlands (Hughes 2014).

The major river systems in the Hunter Valley are the Hunter, Goulburn, Page, Williams and Patterson Rivers, with the main river flowing through the Central Lowlands comprising the Hunter River. It rises to the east of Murrurundi in the Liverpool Range and flows in a southerly direction, then east through Raymond Terrace to empty into the Pacific Ocean at Newcastle.

The whole study area has been subjected to historical disturbances to some degree. This includes the initial clearing of vegetation and the construction of transportation infrastructure through the study corridor including the Main Northern Railway, Golden Highway, and Hunter Expressway. There are a number of coal mines that are in close proximity or within sections of the study area. These include the Mount Thorley Mine, Warkworth Mine, Ashton Coal, Ravensworth Mine Complex, Liddell Coal Mine, Glendell Mine and Muswellbrook Coal Mine. Numerous types of below-ground services including water pipes, gas lines, and electrical transmission lines also run throughout the study area.

Geology

The underlying geology was formed during the Permian period which began around 299 million years ago (mya) and concluded around 252 mya. In the section of the study area closer to the coast, around Kurri Kurri and Greta, lies the Tomago Coal Measures and Dalewood group that comprise coal, tuff, conglomerate, mudstone and sandstone. Moving further northwest along the study area corridor, the area from Branxton to Muswellbrook is dominated by the Singleton Coal Measures that include coal, shale, sandstone, conglomerate, tuff, chert, and torbanite seams. There are also patches from the Maitland Group that comprise sandstone, conglomerate, and siltstone. Although the main area of previous volcanic activity within the Hunter Valley is centred around Merriwa to the north of the study area, there are a few small basalt outcrops that are mapped as being in close proximity

to the study area; for example, in the area around Jerry's Plains (New South Wales Department of Mines 1969: Branagan & Packham 2000).

Soils and Topography

The underlying geology of the study area has contributed to the varied topography and formation of numerous soil landscapes. In general, the present-day study area comprises low undulating and rolling hills that fringe the flattish flood plain areas and narrow-to-wide terraces that border the meandering Hunter River and its tributaries. All of the soils mapped within the study area have quite a high sand content and are discussed individually in more detail in the paragraphs below.

From the southern section of the study area at Kurri Kurri to Branxton, the soil landscape maps as Neath, then from just north of Black Waterholes Creek it is dominated by the Branxton Soil landscape. Around Dillions Scrub and where the Golden Highway intercepts at the New England Highway and at the Putty Road, there are sections that fall within the Rothbury Soil landscape. The Hunter Soil landscape is at Muddies, Glennies, Ravensworth Creek and Doctors Creek, and along Bowmans Creek, Jerry's Plains near the boundary of Maison Dieu and Warkworth, and Muswellbrook. Roxburgh and Bayswater soil landscapes are also at Muswellbrook and Camberwell, and the Liddell soil landscape is mapped as being around Liddell.

Neath Soil Landscape comprises gently undulating rises and swamps. The topsoil comprising the A1 horizon is a dull brown loamy sand that may have orange and grey mottling. It can be up to 35 cm deep and overlies a clear change to an olive grey sandy clay. It is poorly drained and subject to severe sheet and rill erosion in cleared areas.

Branxton Soil Landscape covers undulating hills and rises with many small creek flats. There are numerous drainage lines that are spaced at 400 – 1,500 m intervals. The top A1 soil horizon that can be up to 20 cm deep and is a brown or dark reddish brown sandy loam that may have a sharp change to bleached dull yellow loamy sand. This overlies a bright brown light medium clay that can have yellow, or grey and orange mottling. These soils have a moderate to low water-holding capacity and range from low to high erodibility.

Rothbury Soil Landscape comprises undulating and rolling hills There are four soil profiles within this soil landscape depending on the slope and drainage lines. However, overall, the A1 horizon tends to be dark brown to dull yellowish brown sandy loam soils that can be up to 30 cm deep, except on the flatter areas where they can be up to 70 cm deep. They overlay clay that can be yellowish or brown, and may have yellow mottling. The soils are subject to minor sheet erosion on the lower slopes and can be moderately well-drained.

Hunter Soil Landscape covers the floodplains of the Hunter River and its tributaries. The main soils are all formed in alluvium and the A1 horizon can be up to 50 cm deep in prior stream channels and on tributary flats. These include brown clays and black

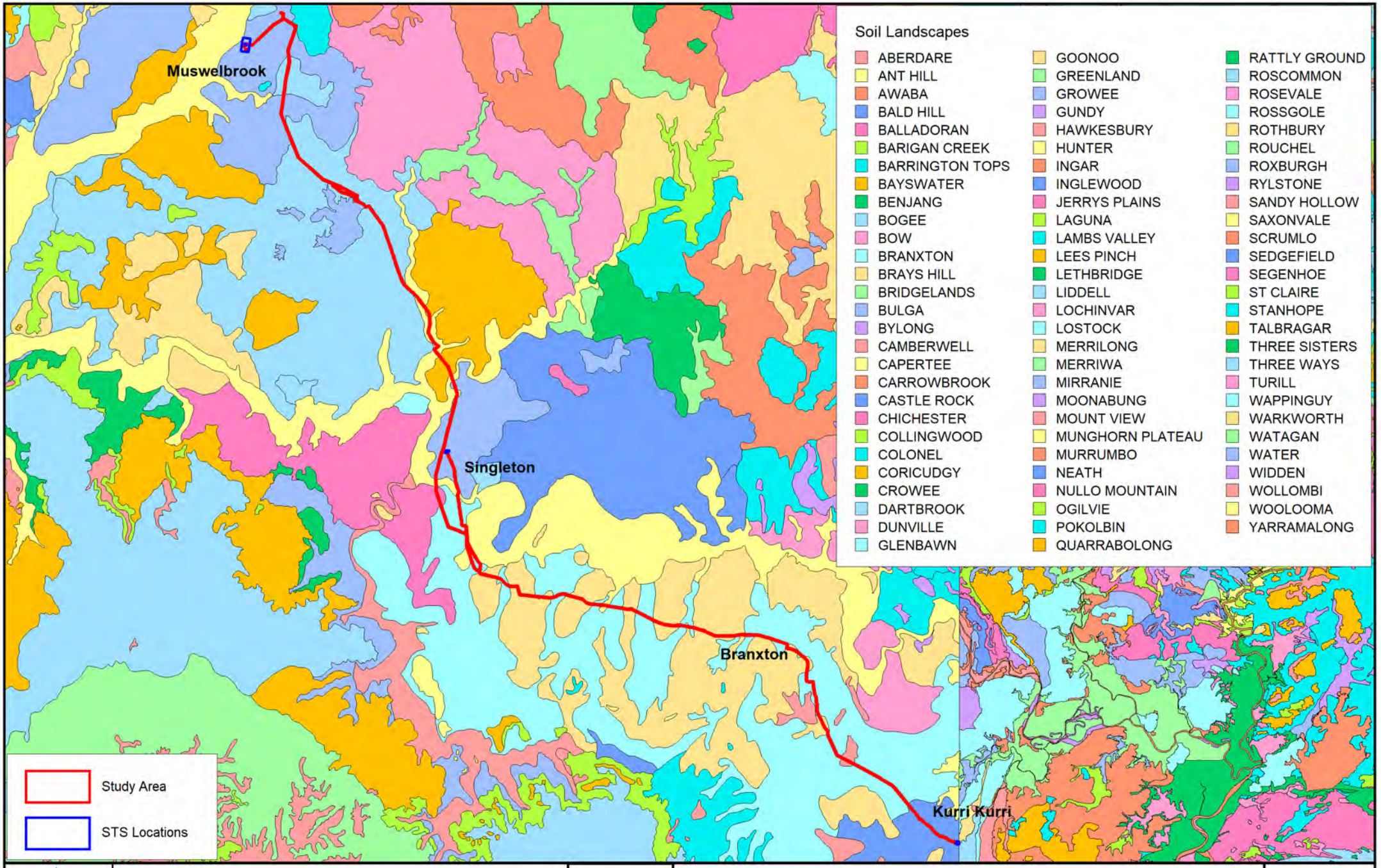
silty clay soils that overlay clay. The sandy alluvial sands and soils that occur on levees and flats adjacent to the present river channel are generally loose and fine, and are a brownish black colour that grade to a dark brown clay sand with rounded stones. These soils can be over 300 cm deep. The Hunter soil landscape is prone to minor stream bank erosion on the present water course with minor sheet and gully erosion. It is an aggrading landscape that has formed by sediment that has built up over time.

Bayswater Soil Landscape consists of undulating low hills and drainage lines. The A1 soils on the slopes are yellow, red/yellow and brown. They are mainly loam to clay loam and can be up to 65 cm deep that overlay clay. The alluvial soils are in the drainage lines and are brown loamy sand to sandy clay and can be over 80 cm deep over the underlying bedrock. The soils are prone to moderate sheet and gully erosion on the slopes.

The Liddell Soil Landscape comprises low hills and undulating hills. The A1 horizon soil profile is a loamy sand to a sandy loam and varies in colour from brown to dark brown. They are up to 20 cm deep on the upper and lower slopes, and overlie brown/orange clay. The A1 soil profile in the mid-slope areas tends to be deeper, up to 40 cm, and has a higher sand content which overlies a gradual change to dull yellowish, bright brown loam sand. Minor to severe sheet erosion is common, with some minor rill erosion, and moderate erosion in gullies and drainage lines.

An investigation of the archaeological potential of the soil profiles within the Central Lowlands conducted by Hughes (2014) found that in general the A1 horizon are likely to contain archaeological material from the Holocene period (< 10,000 years ago (ya)). It is noted that a few sand sheets, such as within the Warkworth Sand Sheet, have been found to contain older Pleistocene deposits > 23,000 to possibly ~50,000 ya. However, these sands sheets have been inaccurately mapped which makes them difficult to locate and may only be found during field work excavations.

In summary, the soil landscapes within the study area have been impacted by natural erosion that would have been compounded by the initial loss of vegetation cover through historical and ongoing land-clearing practices. Subsequent excavation for services, transportation routes, and coal mines, would have further affected the soil profiles and resulted in the partial, or complete loss of the original topsoil within the majority of the current study area. Additionally, the Hunter River and its tributaries have a long history of flooding. Although the 1949 flood was one of the largest recorded since European settlement, there is also evidence of paleo floods that have exceeded this level of flooding during the past 4,300 years (Hughes et al 2014:35). All these man-made and natural impacts would have affected the original position of any existing archaeological material on the surface or below ground to some degree. However, there may still be intact archaeological deposits in discreet areas that have not been subjected to these impacts.



PO Box 236
NOWRA
NEW SOUTH WALES 2541

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Singleton -
Soil Landscape Data
Spatial Services
Final - Version 1

Figure 2: Soil landscapes across the study area.

Flora and Fauna

The original native vegetation before the large-scale land disturbance would have comprised woodland species including many different species of Eucalyptus trees such as: *E. moluccana* (grey box), *E.tereticornis* (forest red gum), *E. dawsonii* (slaty gum), E.punctata (grey gum), E. Nubila (blue-leaved iron bark), *E. Crebra* (red ironbark), *Angophora floribunda* (rough-baked apple), Angophra. Coasta (smooth-barked apple), and *Brachychiton populneus* (kurrajong). An understorey of vegetation comprising *Xanthorrhoea*, (grass tree) *Banksia, Acacia* (wattle), and *Macrozamia comminuis* (Burrawang) would also be present. Around the drainage lines and waterways there would have been wet shrubland species such as the *Melaleuca* (paper bark) and *Leptospermum* (tea tree), *Casuarina glauca* (swamp she-oak) and *Poa labillardierei* (tussock grass) would also have been present (Howell and Benson 2000: Terry 2003).

Early settlers commented on the well-grassed areas and the park-like appearance of the valley, so in general the Hunter Region would have provided excellent hunting grounds with plenty of kangaroos, possums, birds, lizards, snakes on the ground, and fish and shellfish in the rivers, estuaries and rock platforms of the coast (Moore 1970). However, as mentioned in the previous section, the vast majority of original vegetation within the study area would have been historically cleared for agricultural and development purposes, commencing around the early 1800s. This is perhaps most apparent along the riverbanks that are now dominated by introduced willow trees, pasture land and mono culture such as grapevines (Hughes et al 2014:35).

Many of these plants, trees and animals have been documented as resources used by Aboriginal people to fulfill dietary needs, supply raw material for tools and implements, and used for medicinal and ceremonial purposes. For example, the various Eucalypts provided wood for shields, canoes and coolamons, while the soft stringy park from the Melaleuca trees was used for bedding, and to wrap the deceased in burial practices. The gum from the wattle and grass trees was collected and mixed with ash to make a strong resin to attach stone tools to wooden handles for spears and axes. The fur from possums was sewn together using a needle made from animal bones and thread made from the sinew of animal's muscles. The highly poisonous nuts from the *Macrozamia* plant were collected and leeched of their poison through burning and water before being ground on a stone anvil to make flour (Attenbrow 2010; Brayshaw 1986; Threlkeld in Gunson 1974).

Hydrology

As mentioned above, the Hunter River is the main river that flows through the central lowlands. It is the closest major river to the study area and crosses through it within the suburb of Masion Dieu. The Hunter River is fed by many large and small creeks and drainage systems that criss-cross through the study area. The main creeks in the southern portion of the study area include Swamp Creek, Black Waterholes Creek, Sawyers Gully, and Bishops Creek. The central portion near Braxton includes Anvil Creek and Black Creek. A bit further north near the Singleton military area is Mudies

Creek, and Glennies Creek and Bowmans Creek flow between Camberwell and Ravensworth. The northern most portion of the study area near Muswellbrook includes Muscle Creek. There are also some sections, such as those near the Kurri Kurri area, that support a swamp/wetland environment.

All these main creeks and the Hunter River would have provided access to fresh water. The stream order is determined according to the Strahler system as used by the NSW Department of Planning and Infrastructure (Figure 3). Watercourse classification ranges from first order through to fourth order (and above) with first order being the lowest, ie a minor creek or ephemeral watercourse.

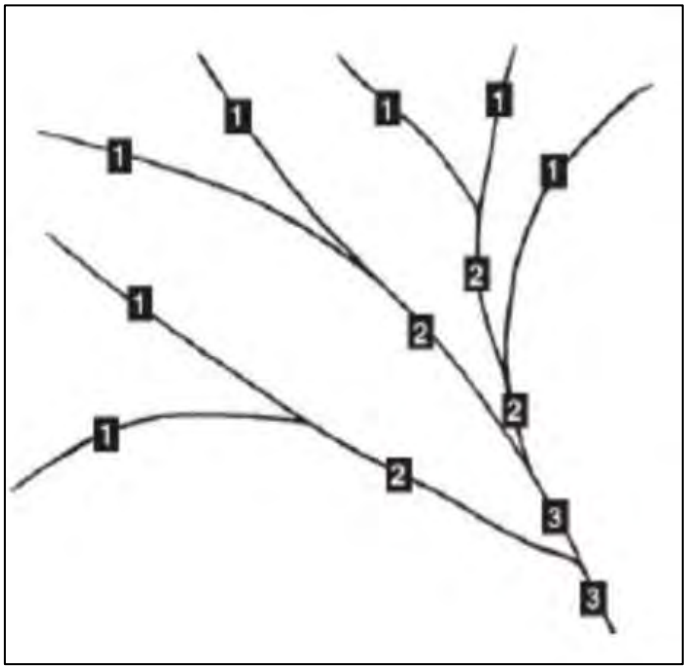


Figure 3: The Strahler system (Source: Department of Planning and Environment 2016).

3.1.1 Raw Materials

A wide range of raw materials were selected by Aboriginal people for flaking to create stone implements. Material types ranged from high quality to poor quality for flaking purposes, depending on the geology of the area and readily available material types. The following is a description of a range of raw material types known to have been utilised by Aboriginal people for the creation of stone artefacts. Not all occur naturally within all environments, although different resources can be identified within different regions due to trade or resource carrying (ie 'manuport' stone). A number of sources for the procurement of stone material within the Hunter Valley have been identified in previous research and consultancy reports. These are included in the following section 3.1.2.

Breccia

Breccias are coarse, angular volcanic fragments cemented together by a finer grained tuffaceous matrix.

Chalcedony

Chalcedony is a microcrystalline, siliceous rock which is very smooth and can be glossy. Introduction of impurities can produce different coloured versions of chalcedony, including yellow/brown (referred to as carnelian), brown (sard), jasper (red/burgundy) and multicoloured agate. It flakes with a sharp edge and was a prized material type for the creation of stone artefacts in parts of Australia (Kuskie & Kamminga 2000: 186).

Chert

Chert is a highly siliceous sedimentary rock, formed in marine sediments and also found within nodules of limestone. Accumulation of substances such as iron oxide during the formation process often results in banded materials with strong colours. 'Mereweather Chert' is noted to be found at Nobbys Head on the Newcastle coastline. However, this reference most probably refers to a layer of volcanic ash also called Nobbys tuff that has been chemically (see tuff section below). Chert would also have been found as pebbles and colluvial gravels in creeks and rivers within the Hunter Valley. It flakes with durable, sharp edges and can range in colour from cream to red to brown and grey.

Petrified Wood

Petrified wood is formed following burial of dead wood by sediment and the original wood being replaced by silica. Petrified wood is a type of chert and is a brown and grey banded rock and fractures irregularly along the original grain.

Quartz

Pure quartz is formed of silicon dioxide, and has a glossy texture and is translucent. Introduction of traces of minerals can lead to colouration of the quartz, such as pink, grey or yellow. The crystalline nature of quartz allows for minute vacuoles to fill with gas or liquid, giving the material a milky appearance.

Often quartz exhibits internal flaws which can affect the flaking quality of the material, meaning that in general it is a low-quality flaking material (Kuskie & Kamminga 2000: 186). However, quartz is an abundant and widely available material type and therefore is one of the most common raw materials used for artefact manufacture in Australia. Flaking of quartz can produce small, very sharp flakes which can be used for activities such as cutting plant materials, butchering and skinning.

Quartzite

Formed from sandstone, quartzite is a metamorphic stone high in silica that has been heated or had silica infiltrate the voids found between the sand grains. Quartzite ranges in colour from grey to yellow and brown.

Silcrete

Silcrete is a siliceous material formed by the cementing of quartz clasts with a matrix. These clasts may be very fine grained to quite large. It ranges in colour from grey to white, brown, red or yellow. Silcrete flakes with sharp edges and is quite

durable, making silcrete suitable for use in heavy duty woodworking activities and also for spear barbs (Kuskie & Kamminga 2000:184).

TUFF/INDURATED MUDSTONE

There is some disagreement relating to the identification of lithic materials as tuff or indurated mudstone. The material is a finely textured, very hard yellow/orange/reddish-brown or grey rock. Kuskie and Kamminga (2000: 6, 180) describe that identification of lithic materials followed the classification developed by Hughes (1984), with indurated mudstone described as a common stone material in the area. However, Kuskie and Kamminga's analysis, which included x-ray diffraction, identified that lithics identified as 'indurated mudstone' was actually rhyolitic tuff, with significant differences in mineral composition and fracture mechanics between the stone types. They define mudstone as rocks formed from more than 50% clay and silt with very fine grain sizes and then hardened.

The lithification of these mudstones results in shale (Kuskie & Kamminga 2000: 181) and thus 'indurated mudstone', in the opinion of Kuskie and Kamminga, do not produce stones with the properties required for lithic manufacture.

In 2011, Hughes, Hiscock and Watchman undertook an assessment of the different types of stones to determine whether tuff or indurated mudstone is the most appropriate terminology for describing this lithic material. The authors undertook thin section studies of a number of rocks and determined that the term 'indurated mudstone' is appropriate, with an acknowledgment that some of this material may have been volcanic in origin. They also acknowledge that precise interpretation of the differences between material types is difficult without detailed petrological examination, and suggest that artefacts produced on this material are labelled as 'IMT' or 'indurated mudstone/tuff'.

The most notable source of tuff is to be found along the coastal headland at Nobby's Head in Newcastle. It is known as Nobby's tuff and is generally a light grey/whitish/ yellowish colour. However, some literature also refers to it as Mereweather chert. Aboriginal stone artefacts have been found and recorded as having a bright red oxidised iron coating that has been chemically altered and the stone material has been referred to as "Mereweather Chert"(Meredith 2017)

VOLCANIC

Both volcanic and acid volcanic stones are a used raw material type within the Sydney Basin. Without detailed petrological analysis it can be sometimes difficult to identify the specific raw material. However, probably one of the most common and recognisable types of volcanic stone is basalt, which is commonly referred to as 'blue metal'. It is solidified lava that was produced by now extinct volcanoes and diatremes that are spread-out within the Sydney Basin. If the lava cools quickly it results in fine-grained basalt that is easily flaked or ground to make tools, implements or weapons. Tuff forms from the tiny ash particles that are also released

during volcanic explosions. When it cools it hardens into a fine-grained rock called 'tuff', as discussed above.

Basalt would have been either collected from the primary deposits formed during the eruption, which would require pieces to be broken off (quarried) or it was collected in cobble-form from a creek bed or shoreline. Cobbles are referred to as secondary sources as they are formed from pieces of rock that have been dislodged from their primary source and end up in creeks and/or river systems (Petrequin 2016; Attenbrow et al. 2017). The flow of water moves them around and smooths them into water-rolled cobbles that can be transported considerable distance from the original source. Basalt was often used to make axes which were either flaked into the desired shape from quarried stone, or from cobbles which quite often only required only one end to be ground into a sharp working edge.

Basalt can be found in cobble form along the banks of rivers, and in bedrock quarries within the Sydney Basin region. Recent research undertaken by the Australian Museum and University of New England using portable XRF technology demonstrated that a number of stone axes that have been provenanced to the Hunter Valley and held at the Australian Museum have been traced to these sources, including cobbles found on the banks of the Nepean River in Sydney, basalt bedrock in Merriwa and Peats Ridge in Popron Creek in the Central Coast (Attenbrow et al. 2017: Hughes 2023).

3.1.2 PROCUREMENT

Assemblage characteristics are related to and dependent on the distance of the knapping site from raw materials for artefact manufacture, and different material types were better suited for certain tasks than other material types. Considerations such as social or territorial limitations or restrictions on access to raw material sources, movement of groups across the landscape and knowledge of source locations can influence the procurement behaviour of Aboriginal people. Raw materials may also have been used for trade or special exchange between different tribes. Nearly all of the above-mentioned stone material would have been available in the cobble/pebble form from gravels along the banks of the Hunter River and some of its tributaries. A number of previous research projects and archaeological investigations have noted possible sources (Table 2).

Table 2: Some potential stone material sources in Hunter Valley

Material	Potential location	Reference
Tuff	Black Hill, Long Gully, George Booth Drive, Buttai, Minmi Creek, Wallsend. Cobble beds along the Hunter River	Little cited in Kuskie and Kamminga 2000:358-359
Hornfels	Hunter River (Lemington Road Crossing), cobles in Bowmans Creek, 16 km northwest from Singleton	Attenbrow et al 2017: Umwelt 2004
Basalt	Hunter River at Bowmans Crossing, Lemington Road Crossing, Merriwa Munmurra River near Merriwa.	Attenbrow et al 2017: Watt 2023
Dolerite	Nobbys Head, Newcastle	Attenbrow et al 2017

Silcrete	Gravel beds along local creeks and rivers. Thorton	Kamminga and Kuskie 2000:359, 537
Quartz	Gravel beds along local creeks and rivers	Kamminga and Kuskie 2000:359
Chalcedony	Gravel beds along local creeks and rivers	Kamminga and Kuskie 2000:359
Quartzite	Gravel beds along local creeks and rivers	Kamminga and Kuskie 2000:359
Petrified wood	Gravel Beds along Black Creek/Swamp Creek near Singleton	Umwelt 2004
Sandstone scree (suitable for grindstone)	Bowmans Creek 16 km northwest of Singleton	Umwelt 2004

3.1.3 MANUFACTURE

A range of methodologies were used in the manufacture of stone artefacts and tools, through the reduction of a stone source. Stone may have been sourced from river gravels, rock outcrops, or opportunistic cobble selection. Hiscock (1988:36-40) suggests artefact manufacture comprises six stages, as follows:

1. The initial reduction of a selected stone material may have occurred at the initial source location, or once the stone had been transported to the site.
2. The initial reduction phase produced large flakes which were relatively thick and contained high percentages of cortex. Generally, the blows were struck by direct percussion and would often take advantage of prominent natural ridges in the source material.
3. Some of these initial flakes would be selected for further reduction. Generally only larger flakes with a weight greater than 13-15 grams would be selected for further flaking activities.
4. Beginning of 'tranchet reduction', whereby the ventral surface of a larger flake was struck to remove smaller flakes from the dorsal surface, with this retouch applied to the lateral margins to create potential platforms, and to the distal and proximal ends to create ridges and remove any unwanted mass. These steps were alternated during further reduction of the flake.
5. Flakes were selected for further working in the form of backing.
6. Suitable flakes such as microblades were retouched along a thick margin opposite the chord to create a backed blade.

Hiscock (1986) proposed that working of stone materials followed a production line style of working, with initial reduction of cores to produce large flakes, followed by heat treatment of suitable flakes before the commencement of tranchet reduction. These steps did not necessarily have to occur at the same physical location, but instead may have been undertaken as the opportunity presented.

Although probably less common than the process of flaking stone to modify it, the grinding technique was used within the Sydney Basin. This has been documented by early settlers particularly in the manufacture of axe heads where the end of a cobble was ground to achieve a working edge (Corkill 2005), and also along the lateral

margin of Bulga knives used to scrap and prepare skins, amongst other uses (McCarthy 1946: Kononenko 2022).

3.2 Land Use History

Indigenous Occupation

When Aboriginal occupation of Australia is likely to have first commenced, around 60,000 years ago (Mulvaney and Kamminga 1999; Bowdler *et al* 2003; Attenbrow 2010), sea levels were around 30-35m lower than present levels, and this further decreased to up to 130m lower than present sea levels (Attenbrow 2010). Sea levels stabilised around 7-6,500 years ago, and as a result many older coastal sites would have been inundated with increasing sea levels. It is possible that areas that are now considered "coastal" would once have limited resources available to Aboriginal people, and as such would have been less likely to have been occupied or used for repeated habitation sites.

Archaeological work at the Madjedbebe site in Arnhem Land in the Northern Territory confidently dated cultural material evidence of occupation to the Pleistocene period, around 45-46 kiloannum (ka – thousand years ago), and possibly up to 50-55 ka (Clarkson et al 2015). In NSW, there is also strong evidence available to support Aboriginal occupation of the Cumberland Plain region in the Pleistocene period (approximately 40 ka) and possibly earlier. Work in Cranebrook Terrace was dated to 41,700 years ago by Stockton and Holland (1974), and a site in Parramatta within deep sandy deposits was dated to 25-30 ka (JMcDCHM 2005). Kohen's 1984 assessment of Shaws Creek in the Blue Mountain foothills yielded ages of 13 ka, while deeply stratified occupation deposits in sand bodies at Pitt Town near the Nepean River were dated to 39 ka by optically stimulated luminescence dating (Apex Archaeology 2018). Further north in the Central Coast region, Attenbrow (1987) dated Loggers rock shelter at Mangrove Creek to 11 ka by Attenbrow (1987).

Although the Hunter Valley does not appear to contain the deep stratified sand-body units like those along the Nepean River, a number of sites in the Hunter Valley have been dated to the Pleistocene period. Koettig (1987, as cited in Williams et al., 2014) recovered 49 artefacts associated with a hearth (Aboriginal fire place) dated to 40–37 ka adjacent to a tributary of the Hunter River. Baker (1994) dated the basal cultural level of a site on Moffats Swamp Dune on the Tomago Coastal Plain, near Raymond Terrace, to approximately 15,000 years. A rock shelter in Bobadeen on the Goulburn River was excavated by Moore (1970:48) and was found to have evidence of occupation dating to approximately 5,000 years ago. However, the majority of dated Aboriginal archaeological sites in the Hunter Valley tend to be less than 10,000 years of age, and more in the range of less than 5,000 years. Kuskie and Kamminga (2000:15) have suggested that this paucity of Pleistocene sites in the Hunter and Lower Hunter may be due to several factors including that burial of older deposits have not been detected, the impact of post-depositional processes confusing or

damaging evidence, and/or the removal of deposits during periods of severe erosion.

As discussed in the previous two sections, at the time of contact the traditional owners of the Hunter Valley would have had access to a wide-range of natural resources that they had used for thousands of years. These resources combined with environmental factors would have influenced the way Aboriginal people moved around the landscape, where they camped, where they hunted, where they collected food, and where they conducted ceremonial gatherings. This changed dramatically at the onset of European intrusion and settlement in the Hunter Valley. As noted by Dungog magistrate, E.M. McKinlay in 1845:

> *Ordinary means of subsistence had diminished on account of the brushes having been cleared,* [in] *which animals and vegetables formerly abounded, and were easily obtained* (McKinlay 1845:969).

Observations made by David Dunlop, another magistrate, in Wollombi, also noted that:

> *The kangaroo has entirely disappeared; the wallaby, black swan, wild duck, wonga-wonga* [type of pigeon], *bronze pigeon and pheasant are daily decreasing* (Dunlop 1845:972).

As pointed out by Watt (2023:25) this scarcity of resources most probably would have forced Aboriginal people to new locations in search of food, possibly encroaching on the country of other Language Groups and disrupting exchange patterns and social networks.

POST CONTACT OCCUPATION

In 1791, three years after the establishment of the first European settlement at Sydney Cove, nine convicts and two children escaped by fishing boat from the Sydney Colony. The escape had been organised by convict William Bryant and was diarised by one of the escapees, James Martin. According to Martin, the party left Sydney around the 28th March and within two days reached a small inlet approximately 222 km north of Sydney and just south of Newcastle. There they found a "Quantity of fine Burn Coal…they apperanance of they land appears more better here than at Sidney Cove here we got averse Quantity of fish which were of a great Refresment to us + we call it fortunate Creek" (Causer 2017 – presented verbatim). They also had their first encounter with the Aboriginal people of the area to whom they gave some "Cloaths [sic] & other articles and they went away very much satisfied" (Causer 2017). The party eventually made it to Timor, and Vice-Admiral William Bligh, who was in Timor in 1792, learned of their journey. Bligh reproduced the following quote by Bryant in Bligh's own journal:

> *Walking along shore towards the entrance of the Creek we found several large pieces of Coal – seeing so many pieces we thought it was not unlikely to find a Mine, and searching about a little, we found a place where we*

> *picked up with an Axe as good Coals as any in England— took some to the fire and they burned exceedingly well* (Causer 2017:25).

According to Collins (1802), Lieutenant Shortland pursued another group of escaped convicts up the coast six years later in 1797. During Shortland's expedition he discovered coal at the mouth of a large river, which he named the Hunter River. In 1801 the Hunter Valley was reserved in the public interest for the control of the coal and timber resources. At the same time a penal settlement was established on the Hunter River at Newcastle, and for the next twenty years the penal colony was at the forefront of the European expansion throughout the Hunter Valley. According to the University of Newcastle (2024), with the exception of a few officials, soldiers and their families, the local population was predominately male convicts. They worked in coal mining, lime-burning, timber-cutting and public works programs.

In 1821 Lachlan Macquarie in his last year as Governor of NSW noted the "Extensive plains of rich and fertile lands being found at no great distance along the three principal sources of the River Hunter", and strongly recommended the area be opened up to free settlers. In 1823 Governor Thomas Brisbane abandoned the penal settlement at Newcastle and moved the convicts to Port Macquarie. The land was opened up to free settlement and the largest land grant, except under special order, was not to exceed 9,600 acres. As the Hunter River was the main channel for communication and transportation the lands bordering it were occupied first (Nadew 1933:3).

In 1824 the Australian Agricultural Company was formed, and in 1828 the company was given the monopoly on coal mining in NSW. The company operated mines from Newcastle on the coast and westwards through the Hunter Valley. Before the monopoly agreement was terminated in 1847, a number of other individuals commenced operating mines, including Reverend Lancelot Threlkeld (Sir Edgeworth David Memorial Museum 2023). Threlkeld was interested in the welfare of Aboriginal people and also published important landmark studies of their language (Gunson 2023). Today the Hunter comprises 41 coal mines owned by 11 producers that are spread over more than 450 km (Australian Mining Review 2023). The main areas where coal mines are close to, or within the current study area, are around Ravensworth, and the Mount Thorley mine between Jerry Plains and Putty Road.

The coal mining industry was also the catalyst for the development of rail transportation and the establishment of towns and their associated infrastructure such as electricity lines. In 1857 the 'Main North Railway' line was constructed through the Hunter, including sections within the current study area at Branxton and south of Singleton. Electricity and fibre optic lines have also been constructed along the entire length of the study area from Kurri Kurri to Muswellbrook.

Over the following years, numerous roads were constructed and linked to create modern-day highways. In 1928 the 'Golden Highway' connecting Dubbo to Newcastle was gazetted, and in 1933 a series of roads known as the 'Great Northern Highway'

was renamed the ‘New England Highway’. Both these highways impact the current study area just south of Singleton, and the New England Highway impacts the study area around Ravensworth. However, the main transport construction that has impacted a large portion of the current study area is the Hunter Expressway, that was previously known as the ‘F3 to Branxton link’ or ‘Kurri Kurri Corridor’. It was completed in 2014 and mostly runs parallel to the current study corridor from Kurri Kurri to just north of Branxton where it merges into the New England Highway.

In summary, the post contact occupation of the Hunter Valley occurred relatively rapidly after the initial colonisation of Sydney in 1788. The establishment of a penal colony and coal industry in the early 1800s, followed by clearing of nearly all the original vegetation for agricultural and wood procurement, significantly impacted the land and some of the original waterways within the Hunter Valley. The subsequent construction of transportation infrastructure and subsurface services for water, electricity, fibre optic communication lines, and larger mines would have required moderate to very deep excavations that have significantly modified the natural landscape.

4.0 Literature Review

A review of previous archaeological work within the surrounding region of the study area was undertaken. A number of reports were identified from background research and the AHIMS database and are summarised below, with detailed summaries presented in Section 4.1.

Table 3: Previous heritage assessments undertaken by archaeological consultants in the region

Consultant	Date	Sites Identified	Region
McCarthy	1941	Numerous sites (2,451 stone artefacts including vast array of tool types, as well as glass artefacts)	Gowrie, Singleton
Moore	1970	Three rockshelter sites excavated (thousands of artefacts including stone tools and implements made from bone. As well as faunal remains)	Sandy Hollow, Milbrodale and Bobadeen
Dyall	1979	15 sites identified (stone artefacts and tool types including a Bulga knife, and grinding grooves)	Warkworth
Byrne	1985	None	Muswellbrook
Davis	1991	Six sites identified (all with stone flakes, no tools/implements were found)	Cessnock to Scone
HLA	1994	Two sites (isolated stone artefact and stone artefact scatters)	Warkworth Jerry Plains
Robyn Mills	1999	Two Sites (stone artefacts)	Kurri Kurrri
Kuskie and Kamminga	2000	Two sites excavated and thousands of artefacts retrieved including numerous tool types)	Black Hill/Woods Gully
Brayshaw	2003	Two previously identified sites (Bora Ground and Scarred tree) were attempted to be relocated	Wollombi Brook near Wombi mine.
Umwelt	2005	Identified ten previously recorded sites (artefact scatters and isolated finds). Ten PADs were also found.	Branxton
Umwelt	2006	Nine (six artefact scattered and two isolated stone artefacts)	
Worth	2007	Four stone artefact sites identified	Masion Dieu
Umwelt 2008	2008	38 sites (stone artefact and stone artefact scatters)	
Insite Heritage	2009	Identified seven previously recorded sites (isolated stone artefacts and stone artefact scatters)	Bowmans Creek
AMBS	2009	65 sites identified including two previously recorded (stone artefacts, including tools, ground - edge hatchet, and one sandstone grinding slab).	Kurri to Redbank Power Station
Kuskie	2010	One site (isolated stone artefact)	Branxton

Consultant	Date	Sites Identified	Region
Umwelt	2010	Management plan of numerous previously identified sies.	Branxton
McCardle Cultural Heritage	2010	Excavations of two PADs (over a hundred artefacts recovered of mainly stone flakes but also a few backed blades).	Sawyers Creek, North Rothbury
OzArk	2012	Excavations of two registered sites (133 test pits and 10 stone artefacts recovered)	Lake Liddell
Peter Kuskie and Corey O'Driscoll (South East Archaeology)	2013	Relocated 43 previously identified sites. These were salvaged or relocated and thousands of artefacts including specific tool types were recovered.	Maitland to Minimbah
Central Queensland Cultural Heritage Management	2014	Summarised previous archaeological investigations that had identified over 100 sites for an ACHA	Mount Thorley, Warkworth
Hughes.P., Spooner, N. and Questiaux	2014	Investigation of the geomorphology to better understand Pleistocene sites.	Sandy Hollow Creek at Warkworth West and sand sheet between Singleton and Muswellbrook
Umwelt	2014	150 previously unidentified sites (isolated stone artefacts and stone artefact scatters)	Ravensworth mine complex between Singleton and Muswellbrook
AMBS	2015	36 previously identified sites (relocated stone artefact flakes)	Kurri Kurri, Greta, Branxton, Singleton and Mount Thorley
WLALC	2016	One site identified (stone artefact scatter)	Intersection of New England Highway and Golden Highway
Kelleher Nightingale Consulting	2017	Five sites identified (isolated stone artefact and artefact scatters)	Section of New England Highway between Belford and the Golden Highway.
Arrow Heritage	2019	Inspection of 58 Sites and management recommendations.	Mount Thorley and Warkworth mining complex
AMBS	2019	One (stone artefact scatter, glass artefact and PAD).	Muddies Creek along the Golden Highway
Jacobs	2021	No sites identified	Kurri Kurri
OzArk	2021	16 sites identified (isolated stone artefacts and stone artefact scatters including backed blades and cores)	Bowmans Creek
Peter Kuskie	2022	38 sites identified (stone artefact scatters inc microlith, cores and retouched flake)	Wambo Coal Mine
Umwelt	2022	13 previously identified sites and nine new sites were recorded	Kurri Kurri

Consultant	Date	Sites Identified	Region
		(isolated stone artefacts, artefact scatters and PADs were identified)	
Hugh Watt	2023	Spatial analysis of raw material sources and ground-edged artefacts (GEAs) in Hunter Valley. Identified 65 GEAS to 31 geological sources	Hunter Valley region

4.1 Previous Archaeological Work

An analysis of previous archaeological work within the study area and surrounds assists in the preparation of predictive models for the area, through understanding what has been found previously. By compiling, analysing and synthesising the previous archaeological work, an indication of the nature and range of the material traces of previous Aboriginal land use is developed. Land use did not occur within a vacuum, but within a wider cultural landscape, and this must be considered during any archaeological assessment in order to develop appropriate mitigation and management recommendations.

A number of previous archaeological assessments have been undertaken within the study area and surrounds. These investigations were initially undertaken for research projects in the 1940s and the 1970s, then from this time on, in response to development of the area. This included the creation or extension of current mining operations, railway and highway transportation corridors, subsurface excavations for services including water, sewage, communication and electricity, and to a lesser degree, residential development. These are listed in Table 3 and summarised in the following two sections.

As mentioned in Section 1.6, reports that were referred to in the site cards for registered Aboriginal sites concentrated within the suburbs of Gouldsville and Warkworth and fall within the current study area were recorded by Scarp Archaeology and Arrow Heritage Solutions. Scarp and Arrow were both contacted by email on the 3rd November 2023 to request copies of relevant reports, as the reports were not available from AHIMS or online. Michael Slack from Scarp replied the following day to advise that the primary report is copyrighted and rights held with Coal Australia[1] and the various Local Aboriginal Land Councils. The Wanaruah LALC responsible for that area was subsequently contacted on the 21st November 2023 and to date, no response has been received. Joel Deacon from Arrow Heritage responded on the 13th November and advised that Scarp Archaeology never furnished HVO/Coal & Allied with a report for the surveys they conducted. Joel added that Arrow Heritage was asked to register the sites with AHIMS on behalf of HVO/Coal

[1] It is unclear who 'Coal Australia' is, as HVO Coal & Allied Australia was owned by Rio Tinto and sold to Yancoal in 2017. Yancoal was contacted by phone and advised they had not heard of Coal Australia.

& Allied, who are now owned by Yancoal. As such, these reports have not been considered as part of this assessment.

The report for the Kelleher Nightingale Consultancy's archaeological excavation in relation to the upgrading of the New England Highway between Belford and the Golden Highway was also requested from Transport NSW. Although a number of heritage reports were provided for this area, the Kelleher Nightingale one is still pending.

4.1.1 Relevant Heritage Assessments

McCarthy 1943

In 1941 Fred McCarthy from the Australian Museum investigated a workshop and camp-site at Gowrie that had been discovered by F.A Davison. The two men spent a week collecting artefacts which totalled 2,451 specimens. These were all found on a terrace, approximately 61 m above the Hunter River and adjacent alluvial flats. They were embedded in the top 15 cm of fine silt that overlayed coarse gritty clay. At the base of the terrace was a thick layer of water-worn pebbles. The implements were noted to be particularly abundant on a tongue of land enclosed by a bend in the river at Gowrie and their occurrence was traced for about 16 km and was considered to be probably longer.

A vast array of tools/implements were found including scraper, burins, geometric microliths, and backed blades – particularly Bondi points. There were also a large variety of cores. The predominant material that was used to make these were chert of all shades of colour from cream to red, grey being scarce. Other materials commonly used were jasper, quartzite, porphyry, and conglomerate. Igneous rocks were found to occur among the river gravels at the base of the terrace.

A number of glass artefacts were also found that varied in size from .05 cm to 1cm in thickness and up to 10 cm long. They comprised green, brown, blue, amber, and white shades of colour. Patches of broken bottles were found in isolated localities, especially beside the railway line, river bank and the branch road through Gowrie near tree stumps and along the margin of the terrace. The assemblage of glass artefacts comprised concave and nosed tool, piercers, and side scrapers. Additionally, a number of fragments of crockery and insulators appear to have been used as scrapers, and were 2.5 – 3 cm long. A piece of grey roof slate that was 10 cm long, and an irregular-trapezoid shape, had its longest margin serrated for 7 cm. No glass Bondi Points or geometric microliths were found.

Additionally, no axes or mortars were found in Singleton, and it was hypothesised that the lack of seed and nuts at Singleton was due to absence of particular types of flora. For example, in Bulga mortars were found in association with Kurrajong trees and *Macrozamia* palm. With regards to the lack of axes it was proposed that terrace implements form a pre-axe industry at Singleton which has survived minus the geometric microliths. It was proposed that this indicates that the Singleton

terrace implements could be the oldest in the Hunter Valley. However, additional dating information was required to confirm this.

Moore 1970

David Moore, curator of Anthropology at The Australian Museum undertook an archaeological survey within the Hunter Valley in the late 1960s to the early 1970s. He excavated rock shelters at Sandy Hollow, Milbrodale and Bobadeen that contained occupation deposit with specific types of tools, including Bondi points, Eloueras, geometric microliths, and side and end scrappers. Moore also excavated a terrace along the Hunter Valley to determine if artefacts found eroding from the surface reflected deeper stratified deposits.

The Sandy Hollow rock shelter was positioned at the foot of an escarpment that accessed Cassilis Gap. This was the entry way from west of the Great Divide into the Hunter Valley and was thought to be where the Kamilaroi would enter Wanaruah Country for trade or warfare. A total of 4,190 stone artefacts were recovered including 66 Bondi Points, 22 miscellaneous backed blades and nine Eloueras, and a few scrapers. A variety of animal bones including grey kangaroo, wallaby and brush-tailed possums were found. There were also shells from a variety of fresh-water mussels. Carbon dates at the lowest levels were approximately 1,300 years.

One of the two Milbrodale rock shelters excavated was positioned above Bulga Creek and contained hundreds of flakes and 152 cores. The tool types included Bondi, Eloueras, microliths, side scrapers (side and end), an adze flake, fabricators, cores, and a ground-edge axe. The lowest level was found to date to approximately 1,400 years BP.

The area along a 200-foot (approx. 61 m) contour between Wollombi Brook junction and Singleton that had previously been noted by McCarthy and Davinson in 1943 as containing a large number of artefacts eroding in sections was also investigated through a series of test trenches. None of the trial excavations produced any conclusive evidence but did establish that the artefacts eroding out were within the sparse (15 to 30 cm of topsoil) overlying the heavy clay. Moore also found other artefacts were found sticking out of the clay on the surface, and proposed that this because when water erosion occurs the artefacts can further accumulate by sticking in the clay at erosion points. So, it cannot be inferred that an extraordinarily intensive implement-making industry occurred in these areas of the terrace simply due to clustering of artefacts.

The Bobadeen rock shelter that was excavated in 1967 was located beside Queen Creek. It was noted that it was about 1.6 km from a ‘magnificent painted shelter’ containing a panel of red hand stencils about 91 m long. The small shelter was about 4 m long and 3 m deep and produced a large quantity of implements, including Bondi Points, scrapers, adze flakes, fabricators, a core, a pebble hammerstone, a small pebble muller and a complete axe head. A high proportion of the tools were made from milky quartz, and rock crystal, and fine-grained chert. There were also

69 probable bone implements including ones that seemed to be a specialised type of burin. It was suggested that they were used to inscribe the patterns on animal skins, such as marsupial cloaks. Moore also noted the following regarding the quartz tools:

> *The extraordinary quality of the quartz-working at this site surprised all those excavating. Quartz Bondi Points ranged from perfect specimens to rough stubby blades, but some of the quartz crystal geometric microliths, many less than a centimetre in length, could scarcely be believed to be man-made, until they were placed under a medium-powered microscope, when it could be seen that there was unquestionable secondary working along their backs*.

The shelter also contained animals including ringtail possum, brushtail possum, bandicoot, wallaby, rat kangaroo, and freshwater shell. The lower levels of shelter were dated to approximately 7,750 years. However, it was believed that as this date was associated with a Bondi Point, it seemed too early, a further sample taken from another area within the same level yielded a day of approx. 5,150 BP. which was believed to be more reliable.

DYALL 1979

This report is incomplete and disjointed. From the information provided by AHIMS it appears that in 1979 Len Dyall undertook an archaeological survey for the development of Warkworth Mine. The survey covered all the creek systems and ridges. Dyall identified 15 Aboriginal sites that comprised stone artefact scatters and isolated finds, included a "Bulga Knife" made of limestone that was in the possession of the mining manager. Approximately 73 grinding grooves were located in a creek bed and a number of microlithic baked blades were also found and one site had 'at least 500 waste flakes and flaking cores'. The report mentions that the stone raw material used was chert and rhyolite.

It was recommended that the axe-grinding grooves be documented as the rock was breaking up from natural causes. The other sites were considered minor and there were no recommendations to investigate them further. Unfortunately, it appears no potential for subsurface archaeology seems to have been considered even though from the paucity of information in the report there was interesting archaeology in the area and numerous camping and activity areas present.

DENIS BYRNE 1985

Denis Byrne was engaged to undertake an archaeological survey at Grasstree Ridge near Muswellbrook, approximately 1 km south of the current study area. The project was for the extension of a gravel quarrying operation that was situated on low hilly terrain and comprised silty sandstone, and siltstone, shale, and mudstone.

The study area was noted to have a history of ground disturbance stretching back some 30 years, and the ground surface of the study area had been extensively impacted. No archaeological material was located during the survey and the

chances of locating artefactual material was considered to be negligible. No further archaeological investigations were considered warranted.

DAVIES 1991

S.J. Davies from the University of Queensland undertook an archaeological assessment of the proposed 120 km optic fibre cable route between Cessnock and Scone, New South Wales. A survey was undertaken with representatives from the Wanaruah and Mindaribba Land Councils within a 6-metre-wide corridor that was generally located on the north to east side of the New England Highway. The survey was divided into sections of which two are within close proximity to the current study area. They were the Muswellbrook to Singleton Section (2) that was 45 km in length, and the Singleton to Branxton Section (3) that was 27 km in length. Six sites were identified during the survey, five of which were within the Muswellbrook to Singleton section. The other site was in the Singleton to Branxton section.

Four of the six sites identified were stone artefact scatters comprising between 10 and 50 stone artefacts. The other two sites were isolated stone artefacts. The stone artefacts were mainly flakes and flake pieces with only one core and one flake with retouch noted. No implements such as backed blades were observed and the raw materials used were mudstone, chert, and silcrete. Three of the sites are within the current study area and are described as follow:

- AHIMS #37-2-0543 (Telecom Site 3) Isolated stone artefact. It was identified as an unmodified mudstone flake. The artefact was located on the side of an actively eroding gully on the slope of a low hill.
- AHIMS #37-3-0192 (Telecom Site 4) and duplicate of AHIMS #37-3-0462 (Davies Site 5). Isolated stone artefact. It was identified as an unmodified mudstone flake. Site Condition: The artefact was located on the surface of a shallow depression of erosion. An immediate threat to this site from erosion is unlikely.
- AHIMS #37-3-0193 (Telecom Site 5) Stone Artefact scatter. Approximately 20 stone artefacts were located on the surface of a high creek terrace. The site is approximately 20 m^2 in area. Artefacts were not observed along the erosion face of this terrace although they were eroding from the side of a creek terrace to the west of this site. Site depth could not be determined.

It was believed that the visible artefacts were only segments of more extensive (though possibly discontinuous) scatters of stone artefacts. The maximum density of artefacts at the sites ranged between 4/m^2 to 12/m^2 and they were all located in cleared grazing paddocks with artefacts only being visible in the eroded segments of banks or low-level spurs adjacent to creeks/gullies. Disturbance at these sites appeared to be minimal.

The sites were considered typical of sites in the Central Lowlands subregion in terms of location, range of raw material types, and the general lack of unmodified artefacts. However, in consultation with the Wanaruah LALC, one of the sites (AHIMS

#37-6-480) that contained 50 artefacts was considered to offer further research potential due to the minimal signs of disturbance. It was recommended that the sites be avoided but if this was not possible then archaeological test excavation should be undertaken at the site under threat to assess its extent and research potential.

HLA 1994

Ian Stuart from HLA Envirosciences Pty Ltd undertook an archaeological survey along the easement of a relocated powerline proposed between Mount Thorley along Jerrys Plains Road in 1994. Although the dense vegetation restricted the effective survey coverage two sites were identified. Both sites are within the current study area and are considered 'valid'. These are:

- AHIMS #37-6-0677 (Wark-1) is and extensive stone artefact scatter on the western side of Doctors Creek. It comprised 'a variety of silcretes' but no formal tool-types.
- AHIMS #37-6-0682 (Wark-2) is an isolated silcrete stone artefact with retouch and evidence of usewear. The artefact was located in a very shallow stream bed.

It was recommended that as site AHIMS #37-6-0677 was considered to be of high significance and if it could not be avoided then a controlled archaeological excavation of the hole for the electricity pole be undertaken.

Robynne Mills 1999

Robynne Mills undertook a heritage assessment for a proposed New Wastewater Treatment Plant at Kurri Kurri. A survey was conducted with representatives from the Wonnarua Tribal Council that identified two isolated artefacts that were recorded as AHIMS #37-6-0866 (KK-IF-1) and AHIMS #37-6-0865 (KK-IF-2). A PAD was also recorded during the survey.

AHIMS site #37-6-0866 (KK-IF-1) is within the current study area and was described as being located on an ant's nest on the edge of a cleared area approximately 5 m x 8 m. The artefact was a yellow/red chert flake 1.8 x 1.5 x 0.4cm with 40% water worn cortex. The study area was considered to be highly disturbed and the site was considered to be of low significance. The area of PAD located on the north-eastern boundary of their study area was described as covering an area of 30m x 20m. however, the site card for #37-6-0866 noted "no other areas of PAD were identified" and so the site is not registered as an artefact site with associated PAD.

It was recommended that if the registered sites could not be avoided then a 'consent to destroy' permit be applied for and no further archaeological investigation was considered warranted. It was recommended that the PAD also be avoided but if this was not possible then the area should be pegged out and further assessed by an archaeologist and representative of the Aboriginal community.

While this site is located within the study area, it has been impacted by construction of the Hunter Expressway and no further consideration of this site is included in this report.

KUSKIE AND KAMMINGA (SOUTHEAST ARCHAEOLOGY) 2000

Kuskie and Kamminga undertook an archaeological salvage excavation of two Aboriginal sites along the route of the proposed Freeway at Black Hill near Newcastle. The area was approximately 11 km to the east of the current study area and was within the Central Lowlands. The sites Black Hill and Woods Gully were 700 m apart and the landform comprised undulating hills and rises within a silt to sandy clay loam soil profile. They were also in close proximity to Hexham Wetlands, a large freshwater swamp.

The report discussed previous test excavations undertaken by Baker in 1996 that included a sample of 66 one square metre units and two open areas (4.25 m^2 at Woods Gully and 9 m^2 at Black Hill) to the B horizon. High numbers of artefacts were found on a large spur crest with an easterly aspect over the watercourse and Hexham Wetlands, and also on a north-facing mid-slope area. Additionally, one square meter excavated at Woods Valley contained 1,854 artefacts, which was the highest artefact density in the Hunter Valley at that time. The dominant stone material was silcrete which was noted to be available in cobble form at Beresfield and Holmwood estate. Nobby's tuff was also identified, and Baker found backed blade manufacturing was present and evidence of bipolar reduction also occurred but not as common.

Following on from Baker's results, Kamminga and Kuskie aimed to investigate the relationship between artefact densities across mid-slope, crests, and low spurs bordering water courses by targeting areas that Baker had not tested. The excavation also aimed to provide a detailed analysis and characterisation of the artefact assemblages including technological strategies associated with the production of microblades; other stone tool technologies, stone procurement strategies, tool functions and how these technological strategies relate to subsistence strategies.

At the Black Hill site, 364 test pits were excavated on the ridge crest and south and north slopes, and an additional 71 m^2 area was excavated through broad and hand-excavation. A total of 13,790 artefacts and 9,226 lithic fragments were recovered (59.9% recognised artefacts and 40.1% of lithic fragments). The broad area on the near-level ridge crest was noted to have had excellent views in all directions and was approximately 200 m from the wetlands. Rhyolitic tuff was the dominant material (72.4%), followed by silcrete (26.6%) with a very low frequency of other materials (1%). Flakes were the dominant artefact type (37%), followed by flake fragments (33.1%), microblades (6.3%) and microblade portions (9.2%) are also relatively common There were also low frequencies of recognised tools/ implements

including Bondi points, flake scrapers thumbnail scrapers, eloueras, retouched flakes, utilised flakes, flake scraper, and a grindstone.

At the Woods Gully site, 248 test pits were excavated, one broad area measuring 48 m^2, and the monitoring of two surface scrapes measuring 9,332m^2. A total of 8,915 artefacts, mainly from hand excavations, were retrieved. Stone materials in the combined artefact assemblage were dominated by rhyolitic tuff (75%), followed by silcrete (20.9%), with a very low frequency of other materials (4.1%). Artefact types comprised flakes (37.4%), flake fragments and portions (36.3%), microblades (6.8%) and microblade portions (6.9%). Low frequencies of recognised tool types included, Bondi points, eloueras, and retouched flakes.

Quartz was found in low numbers < 5% but also had evidence of in-situ knapping of microblades and bipolar flaking. Chalcedony was rare with only 1.5% of the assemblage. Chert artefacts were also found with only 11 items identified. A few pieces of dacite, a volcanic, and five sandstone pieces were found including one anvil. Two pieces of hard red ochre were also recovered. It was proposed that the tuff derived from thin seams that occurred in the hills immediately behind the sites. Tuff could have also have been acquired from Nobby's Head in Newcastle.

The Mindaribba Local Aboriginal Land Council were heavily involved in all aspects of the investigation and the results of the study were presented to the Aboriginal community and general public through a poster, a documentary, a permanent display of artefacts, a cultural landscape replicative model of the Woods Gully locality (displaying Aboriginal people engaged in traditional activities) and an illustrated non-technical report.

A total of forty-four categories of stone artefacts were identified in the Black Hill 2 and Woods Gully assemblages. Six categories of activities were identified through the artefactual evidence at the sites: non-specific stone flaking, bipolar flaking, microblade production, backing retouch of microblades, loss or intentional discard of microliths and loss or intentional discard of non-microlith tools. However, many of the artefact categories represent debris from stone knapping, with production of microblades the most common specific activity. Some of the microblades (and probably other flake types) were further knapped to make microliths, particularly Bondi points. Artefact assemblages containing microblades and microlith knapping debitage were considered typical of prehistoric occupation sites in the lower Hunter Valley and south-eastern Australia generally.

Microscopic inspection of specimens, thin-section analysis and x-ray diffraction analysis were used to identify stone materials and establish that the stone type commonly referred to by archaeologists as 'indurated mudstone' is in fact indurated rhyolitic tuff. It was proposed that much or nearly all of the stone used for knapping was probably derived from local sources within a day's foraging range of campsites. The relationship of artefact distribution to environmental variables such as slope, aspect and distance to water was examined. The results indicate that human activity

was focused on the level crest and gently inclined north-facing upper-slope at the Black Hill 2 site. At the Woods Gully site, occupation was focused in several areas with contrasting environmental conditions.

An episode of occupation associated with a stone-lined fireplace at Woods Gully was radiocarbon dated to 2,130±70 years BP. The predominant type of stone tool manufacturing that had taken place at these two sites was considered to be micro blade and microlith technology, which was proposed could be as old as approximately 4,000 years BP. Microscopic examination and consideration of the design technology of the Eloueras stone implements were suggested by Kuskie and Kamminga to be tools that were used in the processing of plants such as rhizomes in ferns (2000:400-401). Usewear on the flakes from Wormi cleavers were smoothed indicting they were used on soft material such as plants, and they were recycled as cores to make smaller artefacts. Twelve grindstones were identified that would have been used to produce a variety of plant foods. A number of artefacts also have multiple hertzian cones which were considered diagnostic elements of microblade and microlith knapping debitage.

Kuskie and Kamminga (2000) deduced from the stone tool/implements that the site was used over multiple episodes of occupation. They concluded that the production of Bondi points took place on site, which included hafting with resin. Ochre was also probably obtained from a regional source, for example north of Lake Macquarie. Plant foods were most likely processed and consumed on site using Worimi cleavers and eloueras were fixed to a wooden handle or to the end of a digging stick to procure plant foods with strongly fibrous or woody tissue. Animal foods were processed and consumed on-site.

HELEN BRAYSHAW 2003

Helen Brayshaw undertook an investigation to relocate a Bora Ground that had been mentioned in heritage reports and local history publications. The investigation was considered urgent as the Aboriginal community were concerned it may be impacted by the proposed expansion of Wambo Mine. The purpose of the investigation was to use the available information to locate two sites, AHIMS # 37-6-055, a scarred tree, and AHIMS #37-6-56, a Ceremonial Ground, as accurately as possible, even though it was understood that no physical evidence remained.

Discussion with two local non-Aboriginal people (David and Jim Eather) concluded that the scarred tree and ceremonial site were at the same location and it was approximately 300 m from Wollombi Brook on the eastern side of a stock route and about 1.4 km north of the current NPWS position for the site. The men's uncle (Alex Eather) had taken a museum party to the site before he died in 1956 and photographs were taken and the below description appeared in the *Singleton Times Newsletter* in 1993:

> *Here also is to be seen the remains of an ancient Bora ground with its sacred circles still defined by small mounds of earth and a ring of carved trees still*

bearing the curious emblematical devices which marked· this strange and mystical ceremony of initiation of the young men of the tribe to tribal rites. This Bora ceremony was held in the year 1852, and on reliable authority of residents of the locality was attended by between 500 and 600 Aborigines from various tribes from as far as Mudgee and Goulburn.

Additional discussions with the Australian Museum found a paper that indicated that Alex Eather had had discussions with the museum in 1918 and had brought in some siliceous stone flakes and mentioned the location of the carved tress, clearing and mound as still intact. The Museum proposed an expedition to record the site on 13th May 1918. In a response letter to the Museum Alex Eather also replied that there were about a dozen marked trees. Thorpe reported to Ethridge in May 1918 (Curator at the Australian) the following:

The party was duly conducted to the Bora Ground, the position of which will be fixed later, as the site [is] possibly in another Parish other than that of the map provided. Observations and measurements were made, showing the position of each tree. This will be diagrammatically portrayed by Dr Anderson.

The trees, [Red Gum & Apple], were carved in the bark, with a short bladed tomahawk sixty years ago, and the bark being absent it was necessary to reconstruct the different patterns of the carvings in chalk, from well-defined scars made on the sapwood. None of the trees are worthy of removal.

Associated with the trees and intercalated more or less regularly with the same, are a number of mounds of heaped earth. These will also be shown on the plan. There is also, in the north-eastern corner of the Bora Ground, a crescentic mound 2 feet high by 15 feet greatest length. Two of the smaller variety and the crescentic mound were cut through and bottomed on sandstone at a depth of about four feet. They contained nothing of an Aboriginal character. The site is in open forest country on a slight eminence or plateau. Four of the trees were photographed; those carved all around were taken from different views. The ground is exceptionally level and sandy.

Or Thursday, Dr Anderson and Glutton proceeded in another direction to photograph some rock paintings, which I believe are exceptionally fine. I spent the day collecting flakes and other Implements at the camp site in the Bora Ground vicinity.

Although the Ethridge noted that a 'full report' would be provided, it has not been found.

UMWELT 2005

Umwelt outlined the history of previous Aboriginal cultural heritage assessments that had been undertaken for the F3 to Branxton project in order to review constraints and provide management recommendations. The report concentrated on issues relating to the modified route for the Branxton interchange. It provided detail of the potential impacts of the construction of the Branxton interchange on Aboriginal sites

and PADs within the area. It also noted that some of the sites had been subjected to archaeological salvage and some of the PADs had been tested.

Umwelt noted that the initial assessment of the pipeline route alignment had been undertaken in 1994 by Brayshaw and MacDonald in consultation with Mindaribba Local Aboriginal Land Council. The survey had located 10 Aboriginal sites (including five artefact scatters, five isolated finds) as well as 10 PADs along the entire length of the route alignment. However, the NPWS subsequently requested more information including wider consultation with Aboriginal groups, mapping of the geology and topographic units, reviews of previous archaeological work, and a predictive model. Brayshaw's 2001 report to NPWS was approved providing that more Aboriginal groups were consulted, test excavations were undertaken, and a Cultural Heritage Plan of Management was drawn up.

In 2002 Umwelt undertook the additional Aboriginal heritage assessment requirement over a 12-month period. This included the inspection of the entire route alignment and a corridor five km either side in consultation with representatives of five Aboriginal groups. Consideration was also given to the distribution of natural resources that would have been used by Aboriginal people. The assessment located 29 isolated stone artefacts, 50 artefact scatters, eight sets of grinding grooves, 22 PADs, three stone arrangements, two areas of cultural heritage and seven European heritage items. This data and consideration of access to natural resources was used to design a methodology for salvage of sites and investigations of PADs.

The Umwelt (2005:5) report includes seven stone artefact/s sites around Anvil Creek (Table 4) that are mapped as being within the current study area. However, the report noted these had been collected under Section 90 consent #2102 and no further salvage was not required. No details on the stone artefacts were provided. However, the soils in the area were noted to be very sandy loams over a pebbly conglomerate.

It was proposed that a light background scatter of artefacts could be expected in a subsurface context across the whole of the survey area and its environs. Although the larger concentrations were considered likely to occur on the northern side of Anvil Creek with the area at the confluence of Anvil Creek and Redhouse Creek.

Table 4: AHIMS sites within the current study area that are currently registered as 'valid' but have already been salvaged.

AHIMS no.	Site Name	Site Type	Recorder
37-6-1312	Anvil Creek RTA 10	Artefact Scatter	Umwelt
37-6-1313	Anvil Creek RTA 11IF	Isolated find	Umwelt
37-6-1320	Anvil Creek RTA 18IF	Isolated find	Umwelt
37-6-1321	Anvil Creek RTA 19	Artefact Scatter	Umwelt
37-6-1322	Anvil Creek RTA 20IF	Isolated find	Umwelt
37-6-1323	Anvil Creek RTA 21	Artefact Scatter	Umwelt
37-6-1324	Anvil Creek RTA 22	Artefact Scatter	Umwelt

It was recommended that a stone artefact scatter on Redhouse Creek be conserved due to its high Aboriginal significance and teaching potential. Another site on Anvil Creek was recommended to be salvaged under a Section 90 permit.

WORTH 2007

Worth undertook an Aboriginal Cultural Heritage Impact Assessment at 109 Knodlers Lane, Maison Dieu. Worth's study area included a portion of the current study area. The study area covered approx. 3.5 ha of land and the assessment included a review of previous archaeological investigations and an updated survey to relocate previously recorded Aboriginal sites and identify new ones.

The report states that a total of 202 artefacts, comprising 185 flakes and 17 cores were found, along with 299 debitage/broken flaked pieces, or raw stone material. However, it was not clear how much of the 'raw stone material' was included in the 299 pieces.

Four sites were identified, including one within the current study area:

AHIMS #37-6-1802 (MU2 B) was in 90 m x 40 m area of gently sloping land approximately 40 m west of the M2U site, and within 50m of a drainage line. It contained 124 stone artefacts which comprised mainly mudstone (71%) followed by silcrete (14%) and small amounts of chalcedony, chert and quartz.

It was recommended that a research permit and impact permit be submitted to undertake a salvage exercise to collect the artefacts.

UMWELT 2004

Umwelt undertook an Aboriginal archaeological assessment within the Glendell Mine Lease, approximately 16 km northwest of Singleton and just west of the current project area. A total of 37 sites were identified during the field survey along Bowmans Creek /Swamplands, Swamp Creek and Betty's Creek. They comprised 29 stone artefact scatters, seven isolated stone artefacts, one quarry with associated artefact scatter, and one buried soil profile. The artefacts were mainly made from mudstone and silcrete and not the locally-available material of quartz and quartzite. Although there were a couple of quartz bipolar flakes.

It was concluded that the entire Glendell mine site would have provided adequate resources for small groups of Aboriginal people. However, Bowmans Creek would have formed the focus of camping activities for longer durations. Occupation sites would be expected to be found on the lower slopes, terraces and floodplains along Bowmans Creek/Swamp Creek floodplain.

It was recommended that sites that will not be subjected to immediate impact should be managed in situ, and that the ones that would be impacted by proposed mining works be subject to a surface collection and under a Section 90 consent.

UMWELT 2006

Umwelt Environmental Consultants undertook an Aboriginal archaeological survey and assessment in consultation with Aboriginal groups for the proposed 132 kV transmission line at Antienne, near Lake Liddel, and close to the portion of the current study area that is on the eastern side of Lake Liddell. A total of nine Aboriginal archaeological sites were identified. Six of these were artefact scatters and two were isolated stone artefacts. The 72 artefacts comprised mainly flakes and flaked pieces but there was also one blade, three retouched flakes and seven cores. The artefacts were made predominantly from silcrete and mudstone, with a small amount manufactured from porcelanite, hornfels, quartz and chalcedony.

The majority of sites were found to be located within riparian corridors (drainage lines and banks of drainage lines) and no sites were found to have any areas of PAD. It was recommended that three sites be conserved and managed in situ and the others be subjected to a salvage collection.

Five sites were salvaged through surface collection in December 2006, including AHIMS #37-3-0454 (Lid1) that is within the current study area. The site was an artefact scatter that comprised three mudstone flakes in a 30 m x 20 m area that had been impacted by minor sheet erosion.

UMWELT 2008

Umwelt Environmental Consultants provided an Aboriginal Cultural Heritage Management Plan for the Glendell Mine, just east of the current study area. It detailed previous archaeological investigations that identified 38 sites comprising isolated stone artefacts and stone artefacts scatters. It also discussed the sites that had been subjected to salvage surface collections and excavation.

The management plan was primarily to protect the remaining five sites and areas around the previously salvaged sites, as well as a conservation area to protect any potential new sites. The management plan included recommendation for the establishment of a management committee to oversee the management plan. The committee would include two members of the mine managements, three representatives of the registered Aboriginal stakeholder groups, and a qualified archaeologist on call if required. The plan would include cultural awareness training for mine personnel, the monitoring of sites by an archaeologist and Aboriginal stakeholder representative, access to sites for teaching and research purposes with permission form the Management Committee, and removal of stock from the sites.

INSITE HERITAGE 2009

Insite heritage was engaged by Ashton Coal Operations (ACOL) to undertake an Aboriginal archaeological heritage assessment of an area subject to two proposed realignments of Bowman Creek. Previous projects had been undertaken by Insite Heritage for ACOL that had identified seven archaeological sites (artefacts and isolated finds) on the western side of Bowmans Creek. These comprised artefact scatters and isolated finds. One site and a PAD was proposed to be impacted by the

creek alignment. It was recommended that the area be subjected to an archaeological salvage.

The report discussed the investigations that had previously been undertaken within the mining lease area including HLA EnviroSciences (2001), Witter (2002) and Mitchell (2002). The survey by HLA (2001) had identified 24 archaeological sites. These were mainly isolated stone artefacts and stone artefact scatters. The majority of artefact types were noted to have been flakes, flake pieces, some cores and tools. The dominant raw material was recorded as 'mudstone' and 'silcrete'. Witter undertook a more comprehensive survey of the same area and identified an additional 18 sites including six sets of grinding grooves. At three of the sites 'Waterhole', 'Oxbow', and 'Gennies Creek' over 200 artefacts were identified and it was proposed that there was a low component of microblade technology. Wittner (2002:75, cited in Insite 2009) also commented that site may have been related to fishtraps. These sites were all on high ground and adjacent to a deep section of a permanent creek.

Wittner (2002, cited in Insite 2009) identified the Waterhole site, which is with the current study area. It is described as follows:

(AHIMS # 37-3-0500/ AHIMS #37-3-0006). The site was recorded as being 250 x 100 m and contained 256 artefacts and three sets of grinding grooves. Along with flakes and debitage there were also implements that included mudstone blades, retouched scrapers, a chopper core, and a stone axe. There were also signs of heat treat treatment on the stone artefacts within the scatter. Although the area was considered to be heavily eroded, a possible intact area of 50 m x 50 m was found.

The report also noted that a geomorphological study had also been undertaken into Wittner's survey area and this included a pit dug into a terrace with the Ashton Glennies Creek site. An artefact was found 55 cm below the ground surface with a buried soil profile and it was suggested it may have been of early Holocene or possibly late Pleistocene age.

AMBS 2009

AMBS was engaged to undertake an Aboriginal Heritage Assessment for Energy Australia (EA). The proposed project was for an upgrade to the 132kV 'Kurri - Redbank Feeder'. The upgrade comprised the installation of approximately 115 concrete poles at 55 locations along a 54 km easement between Kurri Kurri in the south and Redbank, just north of Mount Thorley.

The assessment included a review of previous archaeological investigations, consideration of the environmental context, and a pedestrian survey with representatives of the Aboriginal community to relocate or identify new archaeological sites. The assessment also provided an Aboriginal heritage site predictive model.

A total of 65 sites were identified, of which two had been previously recorded. These site types were mainly stone artefact scatters (41), followed by isolated finds (19), then artefact scatter with PAD (4). A total of 321 flaked stone artefacts, one ground stone hatchet, and one sandstone grinding slab were found. The stone artefacts were mainly made from silcrete (90), indurated mudstone (73), silicified tuff (23), then quartz, quartzite and chalcedony in small proportions

Forty-six sites were assessed as having low significance. They were isolated stone artefacts and stone artefact scatters with less than 10 artefacts. Fifteen sites were assessed as being of 'moderate' significance with research potential. These generally had over 10 stone artefacts and/or had tools present. The tools within these sites included backed artefacts, flake scrapers and a ground-edge hatchet. Four sites were identified as having 'high' significance. Three were artefact scatters with associated PAD, and one was a grinding slab which was considered to be a rare find.

It was predicated that areas on crests adjacent to the confluence of creeks, or on creek flats near perennial water course have 'high' archaeological sensitivity if there is a low-level of disturbance. Areas of 'moderate' sensitivity are typically in close proximity to creeks and have low-levels of disturbance. Area of 'low' archaeological sensitivity were areas over 150 m from water courses with a high level of disturbance.

It was recommended that areas with 'moderate' and 'high' archaeological sensitivity that could not be avoided be subjected to further investigation and the PADs undergo test excavations. It was recommended that an AHIP be sought that would permit the test excavations and also allow the artefacts to be moved out of areas that maybe impacted, such as vehicle tracks.

KUSKIE 2010

Kuskie (South East Archaeology) was engaged to undertake an Aboriginal heritage impact assessment for the proposed Stage 3 upgrade of the Branxton Waste Water Treatment Works (WWTW). The investigation area was located at Branxton, in the Hunter Valley of NSW

A field survey undertaken with the assistance of representatives of the registered Aboriginal stakeholders. It involved comprehensive coverage (approximately 40% direct sample) of the 4.5 hectares. Portions of the study area have been substantially impacted by previous land which had greatly reduced the potential for *in situ* archaeological evidence to occur in a sub-surface context in these areas.

One site was identified during the survey ('BWWTW 2/A', an isolated artefact) and it was considered of low scientific significance within a local context. However, the presence of sub-surface artefacts that have been dislocated from their original contexts and are of negligible significance cannot be discounted. It was recommended that an AHIP be sought to investigate potential sub-surface artefacts.

UMWELT 2010

Umwelt was engaged to prepare an Aboriginal Cultural Heritage Plan of Management (ACHPM) for the F3 to Branxton Link (Hunter Expressway) prior to the construction phase. It was also to provide management strategies, methods and outcomes for the known Aboriginal sites and values identified and remaining within the Hunter Expressway road corridor.

The ACHMP was prepared in consultation within the relevant Aboriginal stakeholder groups, and the study area was divided into 'Zones of Management' which Identified carrying levels of Aboriginal cultural heritage and archaeological sensitivity. The zones that contained existing registered sites that had specific management requirements, such as grinding grooves, were detailed individually. A number of sites within Appendix 4 of the ACHMP report had also already been salvaged, or had been subjected archaeological subsurface testing prior in 2005. Some of these sites are/were within the current study and have been summarised under 'Umwelt 2005'.

MCCARDLE CULTURAL HERITAGE 2010

McCardle Cultural Heritage (MCC) was engaged to conduct test excavations on two areas of PAD after a previous investigation had identified 151 stone artefacts across the surface. PAD1 (AHIMS #37-6-2165) was located on the southern banks of Sawyers Creek, and PAD 2 (AHIMS #37-6-2164) was located on the northern bank.

A total of 41 test pits measuring 50 cm x 50 cm were excavated by hand and a total of 115 artefacts were identified. The highest numbers came from PAD 1 that was positioned within a raised alluvial land near the creek. It contained 114 artefacts and 108 came from two pits. The artefacts were noted to be made from mudstone (83) and silcrete (32). The entire assemblage comprised mainly flake pieces and complete flakes. These were recovered from within the top 10 to 20 cm soil profile. However, there were also three backed artefacts.

It was noted that there were a considerable number of flakes that had been longitudinally split, which would have occurred through in situ knapping. There was also a large number of small pieces (debitage). It was proposed that this evidence, coupled with a relatively undisturbed soil profile, suggests that in situ tool making/maintenance had occurred at the site.

It was recommended that PAD1 (AHIMS #37-6-2165) be subjected to further investigation by archaeological salvage.

OZARK 2012

OzArk undertook archaeological test excavations of two previously registered sites AHIMS #37-3-0452 (LID 3), and AHIMS #37-3-1150 (LID 34) for an extension of an open cut mine on the eastern side of Lake Liddell. The project was in close proximity to the current study area. It was noted in the OzArk (2012) report that the area had already been subjected to extensive archaeological investigations since mining was initiated there with surveys undertaken from 1982 to 2011 by Haglund (1982),

Brayshaw (1981 & 1983) and Umwelt (2011, 2008, 2009, 2010 & 2011). These investigations were predominantly surveys but also included an excavation undertaken by Brayshaw in 1983 approximately 3 km to the west. Two 1 m x 1m pits were excavated to basal clay at 15 cm. A total of 822 stone artefacts were recovered from the surface and subsurface comprising silcrete and mudstone.

The OzArk test excavations were conducted conjunction with representatives from nine RAPs. A total of 133 test pits measuring 50 cm x 50 cm were excavated to culturally sterile soil or clay layers, 100 at AHIMS #37-3-0452 (LID 3). and 33 at AHIMS #37-3-1150 (LID 34). Ten artefacts were found within the top 15 cm of the soil profile that was considered undisturbed (eight at LID 3 and two at LID 34). Except for one flaked piece, all the artefacts were flakes and comprised mainly mudstone but also included two pieces of quartz and one piece of quartzite.

It was recommended that no further archaeological investigations were required; however, the Aboriginal community should be given an opportunity to collect any surface artefacts that may be within the areas of impact around the two registered sites.

SOUTH EAST ARCHAEOLOGY 2013

Kuskie and O'Driscoll undertook an Aboriginal heritage impact assessment for the Maitland to Minimbah Third Track Project. Apart from the area around Rutherford, the remainder of the rail corridor had sections that fell within the current study area. Kuskie had been involved in many previous investigations of the study area that are covered in reports written from 2009 to 2012.

The field work was initially conducted over a 55-day period in conjunction with Aboriginal stakeholders. It included surface collection and archaeological salvage excavations. The project was proposed to impact 57 previously identified sites. Of these sites, 43 were successfully relocated and salvaged, the remaining, that were mostly isolated artefacts and small artefact sites could not be found.

The archaeological salvage work was completed under a combination of an approved Aboriginal Heritage Management Plan and an AHIP. The salvage included 16 surface scrapes which covered an area of 23,000m^2 and resulted in the recovery of 1,048 stone artefacts. Six of these areas that measured a total of 14 m^2 were excavated by hand and 449 stone artefacts were found. An additional 23 m^2 in a broader area was also hand excavated and a further 997 stone artefacts were retrieved. There were also 350 stone artefacts retrieved during surface collection. This resulted in a total 2,824 stone artefacts being retrieved over the course of the salvage.

Analysis of the stone artefacts found that ten different categories of stone material were identified. The assemblage was comprised mainly silcrete (71.6%), followed by tuff (26.5%) and much smaller amounts (less than 1%) of chert, quartz, quartzite, volcanic, basalt, acidic volcanic, sandstone and volcanic breccia. It was suggested

that the silcrete would have been available in colluvial and /or alluvial deposits. The assemblage was dominated by flakes (30.5%), then flake portions (24.3%), followed by fragments of flakes (23.5 %) and cores (8.8%). There were also retouched flakes (2.9%), backed artefacts (2.8%), blades (1.5%) and less than one percent of hammerstones, bipolar flake, axe, ground-edge hatchet, Bondi point, utilised Bondi point, utilised backed artefact and utilised blade.

Kuskie and O'Driscoll proposed that the stone tools and fragments suggests that the study area may relate to the production of microblades and microliths, perhaps to arm spears. However, given that most of the stone artefacts are remnants of tool-making (debitage), other types of tool-making activity cannot be specified. Additionally, the spatial distribution of artefacts in the areas examined from Maitland to Minimbah salvage showed there was a low-density distribution of artefacts consistent with background discard. However, there were low number of discrete activity areas that were more prevalent in flat areas, followed by similar densities between slopes, drainage depressions and spur crests.

Kuskie and O'Driscoll also proposed that portions of their investigation area are places that would be considered to be secondary resource zones. In particular, those close to higher-order watercourses such as Stony Creek, Anvil Creek, Sawyers Creek, Black Creek, Sweetwater Creek and Jump-up Creek, along with areas at the eastern end close to Wentworth Swamps, were considered to provide resources for Aboriginal people. Occupation of these areas would probably have involved hunting and gathering activities by small parties of men and/or woman and children. There also would have been seasonal encampments of small hunter-gather groups, and nuclear/extended family groups.

Central Queensland Cultural heritage Management Pty Ltd 2014

Central Queensland Cultural Heritage Management Pty Ltd (CQCHM) was engaged to undertake an Aboriginal Cultural Heritage Assessment Report within the Mount Thorley Warkworth (MTW) mining leases for the 'Warkworth Continuation 2014 Proposal' and the 'Mount Thorley Operations 2014 Proposal Environmental Impact Statements' for Coal & Allied. The area had already been subjected to comprehensive Aboriginal heritage surveys and research between 2002 and 2008 which provided the basis for the company's Aboriginal cultural heritage management strategy to minimise the company's impact on Aboriginal heritage. This strategy had been involved heavy involvement of the Upper Hunter Valley Aboriginal Heritage Working Group (CHWG).

CQCHM's current report aimed to outline current management practices at MTW, review the research that had been conducted for the new 'proposals', and ensure that potential impacts and the view of the Aboriginal community and cultural management commitments were considered. The report also outlined the Aboriginal Cultural Heritage strategies for other lands owned by Coal & Allied be reserved as conservation areas.

Summaries of the more pertinent previous investigations that had been undertaken within the CQCHM study area helped guide the management plans. These are listed below as they appeared in CQCHM's 2014 report.

AMBS 2002 investigated the far two thirds of the eastern section and identified 68 stone artefact scatters, 50 isolated stone artefacts and two grinding grooves. These were noted to mainly be located on drainage lines. One of the grinding grooves had been salvaged and relocated in 2010. These had previously been identified by Len Dyall in 1979 who found 73 grooves in a cluster. Laila Haglund identified a further nine grinding grooves 250 m upstream in 1999. The Aboriginal community were particularly concerned about the remaining grinding grooves.

AECOM 2009 identified 112 sites including 61 isolated stone artefacts, 46 stone artefact scatters, four scarred trees, and one scarred tree with stone artefact scatter in the western most section of the study area. Most of the stone artefacts were flakes and broken flakes but there were also points, blades, cores and hammerstones. There was also a piece of dark bottle glass that had been flaked. The bottle glass and the scarred trees were considered to be of high scientific evidence.

Scarp Archaeology 2009 undertook a study of the Warkworth sandsheet in the western section of the study area up to Woollombi Brook. Seven trenches approximately 5 m in length and .9 cm wide were excavated by machine. Samples were taken for OSL dating and carbon from wood was collected for C14 dating. Twenty-one stone artefacts were retrieved. The sample results varied wildly from 6,600 to 105,000 years old. The carbon samples provided dates of 300 years and 43,500 years, and the results indicated extensive mixing of the both the Aboriginal and European cultural material. This was concluded to be from bioturbation that included a large tree growth, termite mounds, and wombat burrows.

Thes previous investigations and concerns of the Aboriginal community were taken into consideration and it was proposed that lands along the western boundary, along Wollombi Brook and Loder Creek be set aside as Aboriginal Cultural Heritage Conservation Area. These would be managed by an integrated and co-management arrangement with the Aboriginal community. The community also emphasised the need to achieve long-term and secure management of a range of significant places and areas, including the Bulga Bora ground just west of the Warkworth area. They also wanted to investigate the possibility of acquiring the lands where Baiame Cave is located (approx. 7 km to the southwest).

Hughes, P., Spooner, N. and Questiaux, D. 2014

Hughes et al. investigated the geomorphology and three previous archaeological investigation areas within the central lowlands of the Hunter Valley to help understand why Pleistocene sites (>10,000 years old) are difficult to find in the archaeologically-rich landscape. Their paper considered three archaeological sites that contained artefact-bearing deposits that had been dated to the present period by Optical Stimulated Luminescence Dating (OSL) and/or carbon dating. These were

at Chestnut Dune, immediately adjacent to the southern bank of the Hunter River, the western side of Sand Hollow Creek at Warkworth West, and the sand sheet on the north side of the Hunter River about halfway between Singleton and Muswellbrook.

Hughes found that, given the geomorphic and soil formation processes that have operated over the long period of Aboriginal occupation of the central lowlands in the Hunter Valley, it is likely that most archaeological materials older than approximately 10,000 years have either been completely removed or have been widely dispersed across the landscape and are no longer recognisable as discrete Pleistocene-aged assemblages. Even if there are older artefacts within A-horizons of the duplex soils that occur along the tributary creek valleys, it will be very difficult to distinguish from the associated younger artefacts. This is due to the geomorphic and soil formation processes that have operated over the long period of Aboriginal occupation in this area of the Hunter Valley. It is likely that most archaeological materials older than approximately 10,000 years have either been completely removed, or have been widely dispersed across the landscape and are no longer recognisable as discrete Pleistocene-aged assemblages.

It was proposed that up until about 40,000 years ago the Hunter River would have been a very powerful river, unlike the relatively inactive one that flows today. However, the investigation noted that two geomorphic contexts have been shown to have the potential to contain recognisable older archaeological materials: late Pleistocene windblown sand dunes/sheets (e.g. at Warkworth West) and late Pleistocene/early Holocene colluvial deposits (e.g. at Carrington pit mining site). Furthermore, sand dunes/sheets have the highest potential because they cover relatively large areas compared with prospective colluvial or alluvial fan deposits. They are also easily recognisable in the landscape. The distribution of windblown sand bodies is limited to areas adjacent to the Hunter River and Wollombi Brook, particularly near the junction of these two rivers.

The paper noted that although these sand bodies are present, they have limited distribution and are disappearing fast as a result of development, particularly coal mining. It will also be a difficult task to identify areas that have archaeological materials that confidently can be shown to be Pleistocene in age. The investigation found that where archaeological sites potentially of Pleistocene age are found, they are sparse, contain only stone artefacts and have been disturbed to varying degrees by bioturbation. This makes them difficult to date with confidence. However, despite these difficulties, the Warkworth Sands site has been shown to contain a lower assemblage of late Pleistocene age which began accumulating more than ~23,000 BP and possibly as early as ~50,000 BP.

UMWELT 2014

Umwelt was engaged to undertake an Aboriginal Heritage study for the Ravensworth Mine Complex located between Singleton and Muswellbrook and provided an interim report on their Aboriginal cultural heritage works at the Ravensworth Operations.

A total of 373 Aboriginal site were found to exist within and near the subject area. This included 150 previously unknown sites that included 149 artefact scatter/isolated find sites, and one scarred tree. Forty-six of the newly-identified sites were managed *in situ;* 31 had interim fencing protection erected; 63 underwent surface collection; three sites had partial surface collection and partial in situ management; one site underwent surface collection and cultural salvage. A total of 225 sites had permanent fencing erected them, and 77 sites had temporary fencing erected around them.

Subsurface test excavations were undertaken at 11 of the sites with 29,173 stone artefacts retrieved. Subsequent salvage excavations at 26 locations recovered a total of 25,186 artefacts. Although there was no lithic report attached to the interim report, it appears form the included tables that the stone artefacts included backed blades, geometric microliths, cores. The raw materials included mudstone, silcrete, quartz, hornfels, porcelanite, petrified wood, chert, chalcedony.

AMBS 2015

Following on from the AMBS 2009 Kurri Kurri to Redbank archaeological investigation discussed above, AMBS relocated stone artefacts on the surface from areas of impact within 36 sites. They also undertook test excavations in areas that were considered to have 'high' or 'moderate' archaeological sensitivity. These areas were in three archaeological (Zone 1, Zone 2 and Zone 3). Zone 1 was to the south between Kurri Kurri and Greta, Zone 2 was between Branxton and Singleton, and Zone 3 was between Singleton and Mount Thorley.

A total of 31 test pits were excavated across these zones and along the transmission line in places where the poles were to be replaced. The pits measured 1.5 m x 1.5 m and the majority were excavated in 10 cm spits. The minimum depth was 4 cm and the maximum depth of 55 cm. At total of 163 artefacts were recovered from Zone 1. They were comprised predominantly of chalcedony (130), silcrete (25) and silicified tuff (8). The assemblage comprised mainly flakes and debitage. The angular chalcedony pieces were of fairly poor flaking quality that retained limited diagnostics, some with only partial conchoidal fractures. Although no formal tool types were recognised usewear analysis identified that the tips of the crystal-bearing chalcedony had evidenced of being used for piercing soft material such as animal hide, and another piece had evidence as being used on woodwork. It was noted that the use of crystals as tools has not often been documented. These artefacts were found in five of the seven pits excavated in hillslope and ridge locations in the Sawyer Gully area.

A total of 41 artefacts were retrieved from Zone 2 and comprised silcrete (33), silicified tuff (3), quartzite (3) and porphyry (2). The silcrete artefacts in this area had less cortex present and there were a low number of cores. It was suggested that this indicates that this could have been a campsite where the early stage of reduction in the tool-making process took place. A large quartzite cobble was found on the surface and had microscopic evidence of abrading that indicated it was probably used on bone or soft wood. The Zone 2 area is at Jump-up Creek flat within a sand deposit. However, the sand body was not considered to be of Pleistocene age.

It was recommended that no further archaeological investigation was required prior to the commencement of the proposed works. However, if further impacts are planned near Zone 1 and Zone 2 further archaeological investigation may be necessary.

WLALC 2016

Wanaruah Local Aboriginal Land Council (WLALC), 2016 undertook a site survey for a due diligence at the intersection of the New England Highway and Golden Highway A stone artefact scatter containing >50 artefacts comprising mostly mudstone with some quartz, was identified in a long and eroded contour/drainage line to the north of an existing dam. It was suggested the newly recorded site was and extension of two previously identified sites. As the sites were to be impacted by the upcoming works, it was recommended that the sites be salvaged under an AHIP.

Kelleher Nightingale Consulting 2017

Kelleher Nightingale Consulting (KNC) undertook an Aboriginal Cultural Heritage Assessment for a proposed upgrade to a section of the New England Highway between Belford and the Golden Highway. The assessment included an archaeological survey and a desktop review of previous archaeological investigations, along with consideration of the overall environment.

The assessment identified five sites that comprised two low-density artefact scatters, one isolated artefact and two moderate-density artefact scatters. One of the sites, discussed below (AHIMS 37-6-0818 (WP 6 Bulga), also includes the duplicates of AHIMS #37-6-0818, AHIMS #37-61594 and AHIMS #37-6-1596.

KNC undertook a test excavation on sites AHMIS #37-6-1600 (USR 39), AHIMS #37-6-0818 (WP 6 Bulga) and AHIMS #37-6-3691 (NEH AFT 2). The first two sites were located across terrace, slope and crest landforms adjacent to an unnamed third-order creek (Test Area 1). A total of 20 test squares measuring 50 cm x 50 cm were excavated. Eight of the squares that had been positioned on terrace landforms and raised areas contained artefacts. At least 20 stone artefacts were recovered but the actual number is not stated in the report. The artefacts were noted to comprise mainly silcrete with smaller quantities of mudstone and quartz. They were mainly flakes and flaked pieces but one multi-directional core was also found. It was suggested that this area was primarily used to maintain and utilise artefacts.

Ten test squares were excavated at AHIMS #37-6-3691 and the soil profile was found to have been heavily disturbed. No artefacts were found.

It was recommended that an application for an AHIP application be submitted to permit collection of surface artefacts across four of the sites. It was further recommended that AHIMS 37-6-0818 (WP 6 (Bulga)) be subjected to further archaeological investigation through a salvage excavation.

ARROW 2019

Arrow Heritage Solutions undertook a compliance inspection of Aboriginal sites within the Mount Thorley and Warkworth mining complex located approximately 8 km southwest of Singleton and within close proximity to the current study area. The compliance inspection was undertaken to fulfill the requirements of the Aboriginal Heritage Management Plan for the mine. The inspection was undertaken with representatives of the Wattaka Cultural Consultants and Wallangan Cultural Services.

A total of 58 Aboriginal heritage sites were inspected across the Warkworth and Mount Thorley mining sites. The report does not specify details of all the individual sites, with only a few mentioning 'artefact' in the description. It is assumed by the description of the sites' condition that these comprised stone artefact scatters although it is noted there were photographs of four scarred trees. The inspection included noting the condition of the sites and the state of the barricading around the site extents. It was recommended that some of the barricading be updated and ten of the sites be salvaged as they were close to areas for future proposed works.

AMBS 2019

AMBS was engaged by the Roads and Maritime Service to undertake an ACHA to assess potential impacts associated with the clearance of unexploded ordinances (UXO) in an area for a proposed new road crossing. The new road crossing was proposed to be at Muddies Creek along the Golden Highway. One identified site AHIMS #37-6-3835 had previously been identified in the area and comprised four stone artefacts and one glass artefact on an elevated terrace with associated PAD.

The pedestrian survey relocated AHIMS #37-6-3835 and an additional five artefacts were found. The 11 artefacts comprised three silcrete flakes, one silcrete core, two orange chert cores, one quartz flake, and one glass flake. An additional PAD had also identified to the east of the registered site as it was in an area that is close to a fresh water source and may have only been subjected to minimal land disturbance. Although the report does not label it with a site name it appears to be AHIMS #37-6-3966.

As the registered site AHIMS #37-6-3835, its associated PAD, and the additional PAD, are in areas that were proposed for UXO clearance, the methodology for further archaeological investigation would have to comply with the Department of Defence's (DoD) strict protocol. It was recommended that the DoD personal involved

in the excavation undergo an Aboriginal heritage induction training by a qualified archaeologist and a representative from the Aboriginal community. It was also recommended that a qualified archaeologist and representative of the Aboriginal community participate in the identification and recording of any suspected Aboriginal heritage objects.

JACOBS 2021

Jacobs undertook an Aboriginal Cultural Heritage Assessment report for a proposed gas-fired power station near Kurri Kurri. The assessment included a review of previous archaeological investigations, consideration of the natural environment in relation to availability of natural resources and underlying geology/soils, and a pedestrian survey.

Although it was noted that there were 78 previously recorded Aboriginal sites within 2.5 km of the study area, none had been recorded as being within the area of proposed works. A subsequent survey undertaken with registered Aboriginal parties of the study area found it had been heavily disturbed by past development including the construction of an aluminium smelter. No artefacts were identified during the survey. However, the assessment noted that areas of bulk excavation that would extend into the underlying alluvial deposits and which may be undisturbed could contain Aboriginal objects. It was therefore recommended that bulk excavation be monitored for any potential cultural material.

OZARK 2021

OzArk undertook an Aboriginal Cultural Heritage Assessment for a proposed wind farm at Bowmans Creek, approximately 3 km to the northeast of the current study area. The assessment reviewed previous archaeological investigations, considered the natural environment, and undertook a pedestrian survey in conjunction with some of the Aboriginal parties that had registered for the project.

A total of 16 sites were considered during the investigation. Three of them had been previously recorded and thirteen were identified during the survey. The new ones comprised eight artefact scatters with a low–moderate artefact density, and five isolated artefacts. Six of the sites were within the survey boundary and would have been potentially harmed by the project. The seven sites outside the survey boundary were either near the survey boundary or were recorded as a result of survey for project components that are no longer part of the project.

All sites were recorded as being in lowland landforms in areas along Albano Road within the broad Bowmans Creek Valley. All the new sites were associated with the electricity line to the Liddell Power Station. A total of 154 stone artefacts were located, as well as one site with grinding grooves, a previously recorded ‘ceremonial ring with artefact scatter, a previously identified PAD, a scarred tree, and a rock shelter with an isolated stone artefact. The stone artefacts comprised mainly flakes and flake pieces but also included 3 backed blades, and four cores.

It was recommended that as many sites as is possible should be avoided in the final design for the proposed works and if sites cannot be avoided, they should be protected by temporary fencing. If the sites will be impacted, then they will have to be salvaged, either through a collection of surface artefacts or limited sub surface archaeological investigation.

AMBS 2022

AMBS Ecology and Heritage (AMBS) undertook archaeological test excavations for the proposed Mudies Creek Flood Mitigation project on the Golden Highway. A total of 106 50 cm x 50 cm test pits were excavated over 19 days across the project area that included two previously registered AHIMS sites (# 37-6-3966 PAD, and #37-6-3835 surface artefact scatter). The excavations recovered 57 stone artefacts. An additional 18 artefacts were found on the surface which brought the assemblage to 75 stone artefacts.

The assemblage comprised indurated mudstone, tuff, and chert with a small number of glass artefacts, quartz and quartzite. These artefacts were predominately flakes with small numbers of complete flakes, cores, a possible piece of a hammerstone and heart-shattered fragments. Possible heat treatment was also noted on five of the flakes. A number of historic objects including ceramic and building material were found within the units. it was proposed that this indicated a high level of disturbance and the stone artefacts were not in siu

The site was considered to be of moderate cultural significance to the local Aboriginal community due to its association with the cultural landscape around the Golden Highway and the presence of Mudies Creek. It also had potential evidence of post-contact use of the site by Aboriginal people. It was recommended that no further archaeological test excavation salvage excavations were warranted but an AHIP for the proposed development.

KUSKIE 2022

Peter Kuskie (South East Archaeology) was engaged to prepare an ACHA for the proposed modification to the existing Wambo Coal Mine. The area of investigation measured approximately 238 ha in size. The southern portion of the area had previously been surveyed for Aboriginal sites and was covered under existing AHIPS. Therefore the pedestrian investigation concentrated on the northern and middle section. This area measured approximately 154 ha.

The aim of the investigation was to identity and record any Aboriginal heritage evidence or cultural values within the investigation area and formulate recommendation for the conservation and management of this evidence in consultation with the local Aboriginal community. Previous investigations had identified 24 Aboriginal sites comprising isolated stone artefacts and stone artefact scatters, and the current survey identified another 14 sites. A total of 64 stone artefacts were recorded during the survey. They comprised mainly of flakes and

flake portions but also included a geometric microlith, six cores and a retouched flake.

The main material used to make stone tools was tuff which comprised over 50% of the assemblage, followed by silcrete which represented about a quarter of the artefacts found. There were also a couple of pieces of petrified wood, and an artefact made from volcanic material. It was suggested that the tuff was probably procured from a relatively local source such as a colluvial or alluvial source such as the Hunter River and associated terrace deposits.

The results of the survey suggested that the potential for sub-surface deposits of artefacts that may be of high research value to occur was considered low, apart from an area comprising low gradient ground within close proximity to Wambo Creek. It was recommended that an application for an AHIP be submitted to include the northern and central portions of the study area.

UMWELT 2022

Umwelt undertook an Aboriginal Cultural Heritage Assessment as part of the Environmental Impact Statement (EIS) for the Kurri Kurri Lateral Pipeline that will provide a gas supply to the Hunter Power Project. The investigation included a review of previous archaeological investigations, consideration of the underlying geology, soil and landform, and pedestrian surveys undertaken in conjunction with representatives from the Aboriginal community.

A total of 162 Aboriginal sites were identified on AHIMS as being within the project footprint. The majority were associated with stone artefacts (87%) including individual artefacts, stone artefact scatters, PADs and grinding grooves. PADs without any association with surface artefacts were also identified (8.6%).

It was noted that previous archaeological excavations and oral history records had found that Hexham Swamp, the Wallis Creek floodplain, and Wentworth Swamp were key areas by which Aboriginal people camped repeatedly and/or for longer duration. It was predicted that sites are most likely to occur in close proximity to main water courses and will most likely be on elevated landforms and/or near-level lower slopes with direct access to these water courses. It was also suggested that stone artefacts would most likely to have been made from silcrete, mudstone or tuff, with tuff expected to be most common for sites associated with Hexham Swamp and Wallis Creek. Artefact assemblages in sites bordering swamps/wetlands would be likely places that could include evidence of manufacture and/or discard of backed artefacts.

A pedestrian survey was carried out during the investigation to identify new sites and relocate new ones that were mapped as being within in close proximity to the study area. A total of 13 previously identified sites were identified as being with in the study area, and nine new sites were identified. The sites comprised isolated stone

artefacts and stone artefact scatters from a variety of materials, including silcrete, mudstone and quartz. Areas of PADs were also identified.

It was recommended that an Aboriginal cultural heritage management plan be developed in consultation with the RAPs. This would include the protection of three of the sites by fencing during works, and that the sites that would be directly impacted be subject to collection and/or excavation.

WATT 2023

Hugh Watt undertook a spatial analysis of raw material sources and ground-edge artefacts (GEAs) in the Hunter Valley also which considered the transition Aboriginal people made from stone to metal hatchets. The investigation was for his Masters thesis and he examined 140 GEAs found throughout the Hunter Valley that included 129 ground-edged hatchets, six Bulga knives, four hammer/pounders, and an unusual Polynesian style axe from Singleton. The GEAs had been analysed as part of wider joint research project led by Val Attenbrow from the Australian Museum and Peter Grave from the University of New England. The project had used non-destructive portable X-Ray Fluorescence (pXRF) to chemically analyse GEAs and compare them to over 300 geological samples from within Australia, but primarily within the Sydney Basin.

Watt outlined that the pXRF analysis provided matches for 65 GEAs from 25 find-spots to 31 geological sources. Fifty-two (80%) of the 65 GEAs were matched to non-local sources. Sources within the Hunter Valley matched rock at Merriwa and Glen Creek including basalts, dolerites and ignimbrite/welded tuff. The non-local sources were from the Central Coast region, Nepean River in the Sydney region, and Belmont Park, Kiama, and Five Islands in the South Coast region. These included a wider range of rock types than the local sources, such as basalts, meta-basalts, dolerite, latite, hornfels, quartzites, ignimbrites (rhyodacite), porphyritic volcanics and fine-grained volcanics. Two GEAs were also tentatively matched much further away, one to Mt Isa over 2,000 km to the north, and one to Mt William over 1,000 km to the south. The results demonstrated a vast trade/exchange network, especially between the Aboriginal people from the Hunter Valley and the Darkinjung language group on the Central Coast, and the Dharug language group in the Sydney area.

Watt noted that metal axes were initially introduced by the Macassans, from Sulawesi in Indonesia to Aboriginal people living in the far north of Australia at least from the 1500s. In 1788 hundreds more were brought over by members of the First Fleet to be used as a trading currency. These axes made their way into the Hunter Valley by 1802 and some were also noted to have been traded into the area by coastal people in exchange for possum skins. As Aboriginal people became aware of the value of metal hatchets over their existing ground-edge stone hatchets, both as a tool and as an item of exchange between tribes, they began to manufacture their own variations. For example, they used their own hafting material such as resin

from grass plants or Eucalyptus trees and wood from available plants 'great amount of ingenuity, resource and skill'.

Summary of previous Archaeological work

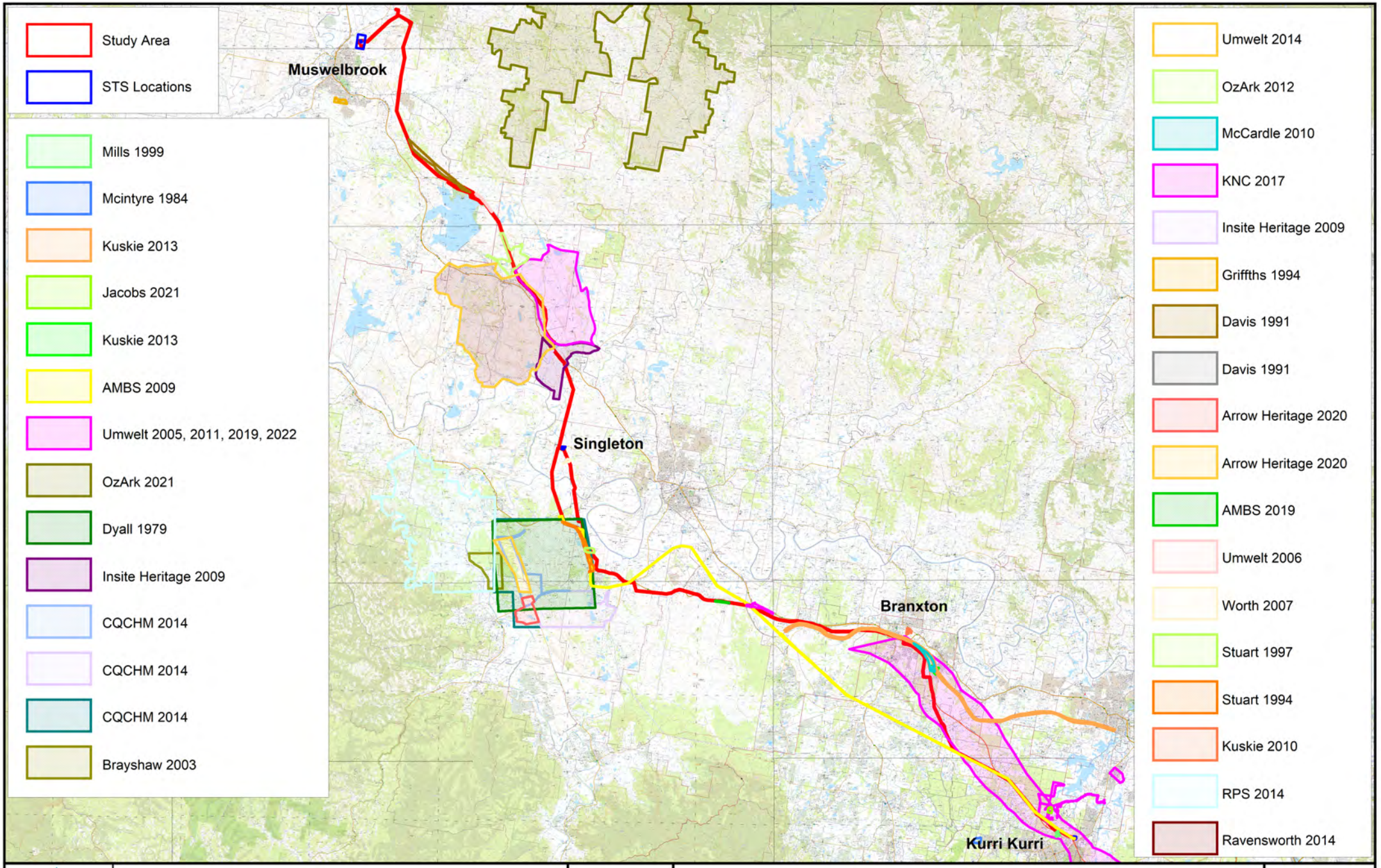
There have been many archaeological investigations for research and consulting projects undertaken within the Hunter Valley region, including large sections within the current study area. In general, the investigations have found that high densities of artefacts have been primarily found on lower slopes, alluvial floodplains and on middle to upper ridges. These areas have also been close to major rivers, such as the Hunter River, or higher-order creeks, as well as wetland and swamp environments. Although there are some sites that have been shown to contain evidence of occupation into the Pleistocene period (>10,000 ya), the majority of sites that have been confidently dated are around 5,000 years old. A vast array of artefactual tool types has been recovered from these sites that reflect the diversity of activities that had once taken place. These implements/tools were made from a variety of high-quality stone material with a preference for fine-grained tuff. The stone was mainly sourced from locally available cobble sources, but some also came bedrock and cobble sources from further afield through direct acquisition or trade and exchange as noted by Watt (2023).

Pioneering archaeological investigations undertaken by Fred McCarthy around Singleton in the early 1940s retrieved thousands of artefacts eroding from the terrace above the Hunter River in Singleton that included scrapers, burins, microliths and backed blades – particularly Bondi points. These were mainly made from chert (probably tuff) but also included jasper, quartzite, porphyry and igneous rocks. A number of artefacts made from European glass into scrapers and pierces, showed the site was still being used at the onset of European intrusion into the area. Some twenty years later David Moore undertook a series of excavations in rockshelters at Milbrodale, Sandy Hollow and Bobadeen. Thousands of artefacts including complete tools such as those found by McCarthy were unearthed, along with tools made from animal bones. Carbon dates taken from the lowest occupation level at Bobadeen dated it to approximately 5,000 ya.

Investigations over the last twenty-five years have mainly been carried out in response to mining and infrastructure projects. The archaeological materiald retrieved from sites have mostly been isolated stone artefacts or stone artefact scatters on the surface, sometimes with associated areas of PAD. The sites are often in highly disturbed areas with limited subsurface potential. However some less disturbed areas on elevated terraces close to waterways have resulted in the identification of sites with a high concentration of artefacts. This is particularly evident in the comprehensive archaeological excavations and lithic analysis work that were undertaken by Kuskie and Kamminga (2000) following on from Baker's (1996) initial investigations at Black Hill and Wood Gully within the central lowlands. Kuskie and Kamminga recovered over 20,000 stone artefacts including backed blades, eloueras, Worimi cleavers, backed blades and grindstones. The study area

was in close proximity to Hexham Wetlands and was on a landform comprised of undulating hills and rises. They also identified that the area had a concentration of microblade production. Use wear and residue analysis showed that some of the stone tools were used to process plant material.

As also pointed out by Kuskie (2010) the focus areas for previous Aboriginal occupation may have largely been confined to elevated areas fringing the watercourses and resource zones (eg. on elevated, well-drained flats/terraces, low gradient simple slopes and low gradient spur crests) which perhaps varied over time in terms of their suitability for occupation. However, occupation may have also occurred periodically on low-elevation flats.



PO Box 236
NOWRA
NEW SOUTH WALES 2541

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kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
NSW Topographic Maps
Spatial Services
Image Date: 2022
Final - Version 1

Figure 4: Map of relevant previous assessments in proximity to the study area.

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4.2 AHIMS Results

A series of extensive searches of the Aboriginal Heritage Information and Management System (AHIMS) database was undertaken on the 24th of October 2023. The searches centred along the middle and both sides of the study corridor from Kurri Kurri to Muswellbrook. The searches covered a distance of approximately 95 km and crossed through the Cessnock, Singleton and Muswellbrook LGAs. A total of 1,167 registered AHIMS sites were identified. All of these except for four are listed as 'open sites', meaning they are in areas that are in open and exposed areas. Four are listed as 'closed sites', meaning they are in rock shelters. These sites are shown on Figure 5, which demonstrates the rich nature of archaeological evidence present within and around the transmission line route. Further mapping below depicts the sites and their names in relation to the study area.

For the site status of these registered AHIMS sites, 146 are listed as 'destroyed', 22 are listed as 'partially destroyed', and four are listed as 'not a site'. The remaining 994 are considered valid. However, as discussed below, some of the 'valid' sites have been destroyed through archaeological salvage excavations but their status has not been updated on the AHIMS register. There are also three sites that are listed as restricted.

Sites are recorded with one or more of a set of twenty-two site features specified by AHIMS. For the 1,167 sites in the search area, a total of 1,353 instances of nine separate site features have been recorded (Table 5), with a number of sites recorded with multiple features. The site feature most recorded is 'artefact'. There are 1,120 instances of 'artefact', which could be either an isolated stone artefact, or a stone artefact scatter. The second most common site is potential archaeological deposit (PAD), of which there are 211. There are also recordings of rarer sites including seven instances of 'grinding grooves', four instances of 'Aboriginal resource and gathering', and four 'Art (pigment or engraving)', three 'modified trees (carved or scarred)', two 'Aboriginal and dreaming', one 'conflict site', and one 'quarry' site.

Table 5. Site features recorded for the 1167 registered sites within the AHIMS search for the study area

Site Feature	No. of instances	% of total
Artefact	1120	83
Potential Archaeological Deposit (PAD)	211	16
Grinding Grooves	7	<1
Aboriginal Resource and Gathering	4	<1
Art (pigment or engraving)	4	<1
Modified Tree (carved or scarred)	3	<1
Aboriginal Ceremony and Dreaming	2	<1
Quarry	1	<1
Total	**1353**	**100**

There are 140 AHIMS sites registered as being within approximately 50m of the proposed transmission line route/fibre optic cable upgrade route. If the relevant archaeological reports were able to be obtained, they were discussed in more detail in Section 4. As with the results for the wider search area, the majority of these sites (134) were listed in the extensive reports as 'artefact'. Twelve of the artefact sites also included areas of PAD, and there was one individual PAD site. There were also two recorded 'grinding groove' sites, and one recorded 'art' site. The site cards were obtained for all 140 sites and their respective archaeological reports were obtained (where possible) to confirm their site status, mapped location and any other relevant details prior to field work.

Of the 140 sites, a total of five have their site status listed as 'destroyed', and two are listed as 'deleted' (Table 6). Upon further investigations of the reports associated with these sites, an additional 28 of the sites currently registered as 'valid' have been destroyed. Twenty-five of these were detailed in Umwelt (2005, 2019) as being destroyed through archaeological salvage excavations, and one was in conjunction with Kuskie and O'Driscoll (2013). See Table 7.

Table 6: Previously destroyed or deleted sites as per AHIMS

Site ID	Site Name	AHIMS status
37-6-0614	Bowmans Creek 2	Destroyed
37-6-1151	LID 35	Destroyed
37-6-1160	LIDEE - IF1 duplicate of 37-3-1163 and 37-3-1164	Destroyed
37-6-1162	LIDEE - OS1 duplicate of 37-3-1165 and 37-3-1159	Deleted
37-6-1164	LIDEE IF 1 duplicate of 37-3-1160 and 37-3-1163	Deleted
37-6-0454	LID1	Destroyed
37-6-0456	SP2	Destroyed
37-6-2156	Branxton Rail 8	Destroyed
37-6-2160	Branxton Rail 12	Destroyed

Table 7. Sites currently listed as valid on AHIMS within close proximity to the proposed works and likely actual status

Site ID	Site Name	Likely actual status	Report details
37-6-1341	Black Waterholes Creek RTA 1 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1342	Black Waterholes Creek RTA 2 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1343	Black Waterholes Creek RTA 3 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1344	Black Waterholes Creek RTA 4 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1355	Swamp Creek RTA 3	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1358	Swamp Creek RTA 6 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1360	Swamp Creek RTA 8 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4

Site ID	Site Name	Likely actual status	Report details
37-6-1363	PAD11 Black Waterholes Creek	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1364	Sawyers Gully RTA 11 (formerly PAD12 Sawyers Gully)	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1346	Sawyers Gully RTA 2 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1308	Anvil Creek RTA 6	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1309	Anvil Creek RTA 7	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1316	Anvil Creek RTA 14IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1317	Anvil Creek RTA 15	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1319	Anvil Creek RTA 17	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1320	Anvil Creek RTA 18 IF	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1321	Anvil Creek RTA 19	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1328	Anvil Creek RTA 25	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1329	Anvil Creek RTA 26	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1312	Anvil Creek RTA 10	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1313	Anvil Creek RTA 11 IF	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1315	Anvil Creek RTA 13IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1322	Anvil Creek RTA 20 IF	Destroyed (Already Salvaged)	Umwelt 2010 ACHPM for Hunter Expressway Appendix 4
37-6-1323	Anvil Creek RTA 21	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-1324	Anvil Creek RTA 22	Destroyed (Already Salvaged)	Umwelt 2005 review of constraints report state site has been salvaged 'No further Salvage required'
37-6-2151	Branxton Rail 3	Destroyed (Already Salvaged)	Kuskie and O'Driscoll 2013 Maitland to Minimbah AHIP. As per p.37 of report.

Site ID	Site Name	Likely actual status	Report details
37-6-2159	Branxton Rail 11	Destroyed	Destroyed as per 2010 Aboriginal Site Impact Recording Form completed by Peter Kuskie from SE Archaeology attached to site card.
37-6-2269	Maitland to Minimbah X3	Destroyed	Already salvaged according to site card that state in the comments it was recorded and salvaged on /11/2009 by Caroline Ingram from SE Archaeology.

There are only two registered grinding groove sites recorded as being close to the area of proposed works. Grinding groove sites are considered to be rare and have been discussed previously in Section 4. They are described as follows on the site cards:

- AHIMS #37-3-0809 contains three sites (SA8/10, SA8/12, SA8/14). SA8/10 comprises two (potential) grinding grooves located in a small exposure of sandstone on the slopes above the Glennies Creek terrace. Surface visibility was restricted by heavy grass cover. The grooves measured 120 mm x 15 mm which suggest that they were not utilised for grinding the larger axe pre-forms such as those recorded during this survey. The sandstone outcrop was a small floater exposed within a cleared pasture area. The exposure was located approximately 2 m from an unformed vehicle track. The grooves were not deep and may have resulted from a single event. SA8/12 was described as an artefact scatter comprising 8 mudstone, 2 silcrete, 1 quartz with moderate potential for sub-surface deposit. SA8/14 was described as a stone artefact scatter comprising 1 mudstone and 2 silcrete.
- AHIMS #37-6-2015 comprises a slab of sandstone with a slight uniform depression, suggesting it may have been used as a grinding slab. The dimensions of the depression were 38 x 28 cm and had a depth of 4.5 cm. It is unclear whether this slab was portable, as it is embedded in the surrounding soil profile. Artefacts were concentrated at more than 1 artefact per $1m^2$. The artefacts comprised five pink and grey silcrete flakes, four quartz flakes, and two chert flakes.

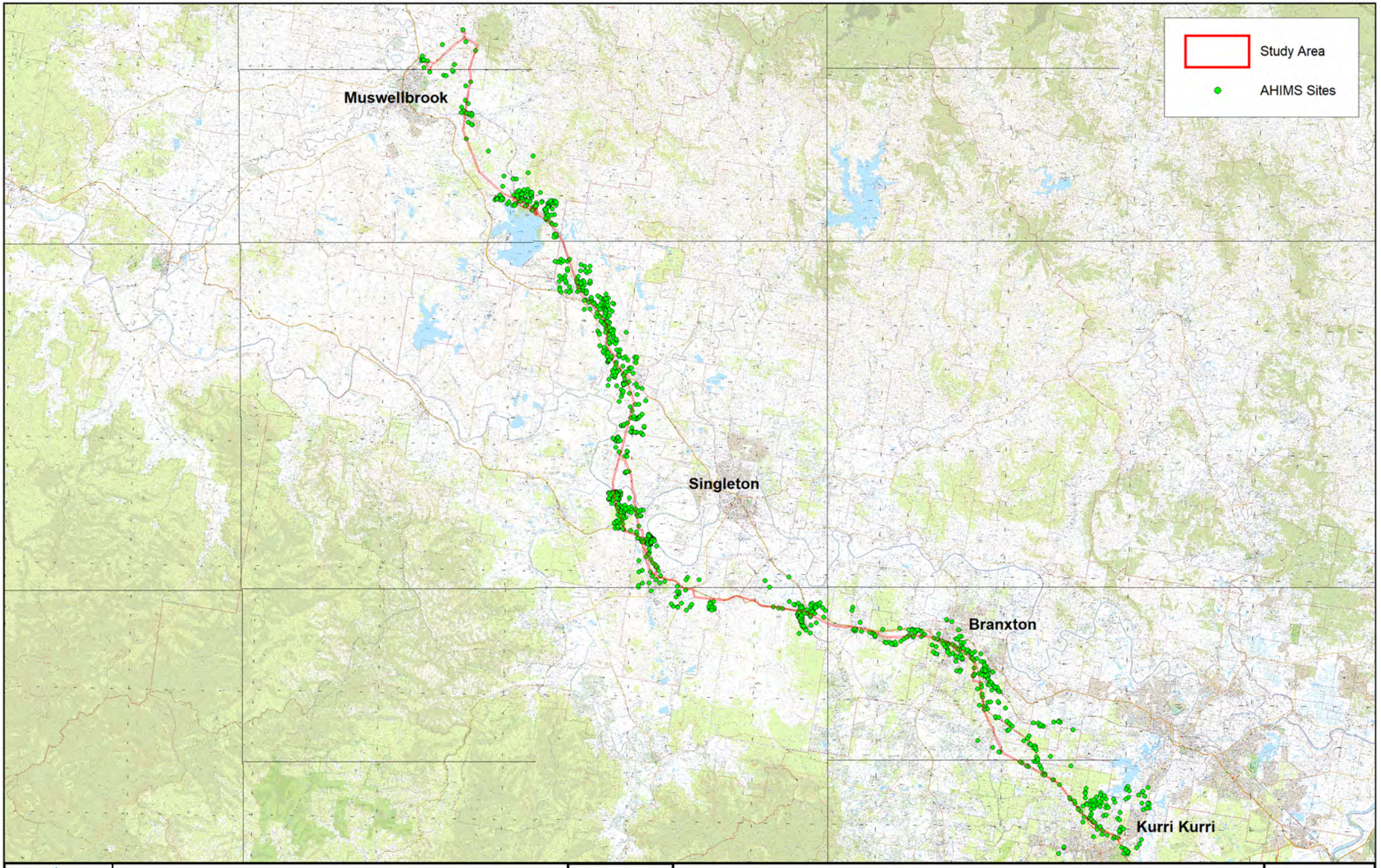

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Figure 5: AHIMS sites accross the study area.

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4.3 Predictive Model

Based on the results of previous archaeological investigations within the wider region, a number of predictions regarding Aboriginal use of the area can be made. These predictions focus on the nature, extent and integrity of the remaining evidence.

The landscape characteristics of the area influence the prediction of the nature of potential sites within the landscape itself. Disturbance is the predominant factor determining whether or not artefacts are likely to be identified within a landscape.

Surface sites are likely to have been impacted by pedestrian activity, vegetation clearance, the construction of water drainage and structures within the area over the historic period. Natural actions such as erosion and bioturbation are likely to have also impacted not only the surface, but also at least the upper levels of subsurface archaeological deposits. Whilst these actions may impact the integrity of stratigraphy within the deposit, this does not necessarily mean associated archaeological objects will also be disturbed.

In general, Aboriginal use of an area is based on a number of factors, such as:

- Proximity to permanent water sources – generally permanent or areas of repeat habitation are located within approximately 200m of permanent water;
- Proximity to ephemeral water sources – generally sites near ephemeral water sources were utilised for one-off occupation;
- Ease of travel – ridgelines were often utilised for travel during subsistence activities; and
- The local relief – flatter, more level areas were more likely to be utilised for long term or repeat habitation sites than areas of greater relief, especially if the slopes are at a distance from water.

Stone Artefacts

Stone artefacts can be identified on the ground surface or within subsurface deposits. Generally, artefact concentrations are representative of debris from knapping activities, which includes flakes, flake fragments, cores, and pieces likely to have been knapped but with no or inconclusive diagnostic features, referred to as flaked pieces. Modified artefacts can also be identified, including backed artefacts, scrapers, or edge ground axes, although these are generally a smaller proportion of the artefact assemblage. During excavation, very small debris (~3-5mm) can be identified within sieved material, and is referred to as debitage. This is indicative of *in situ* knapping activities.

As the detection of stone artefacts relies on surface visibility, factors such as vegetation cover can prevent their identification. Conversely, areas of exposure can assist in their identification. Stone artefacts have been identified throughout the study area during previous academic research and consultancy projects. It is highly

probable that more stone artefacts, either in isolation or in concentrations, may be identified within the study area during this current assessment; although they will likely be found in a disturbed context.

Quarry and Procurement

Exposures of stone which can be exploited for the production of lithics are referred to as quarries or procurement sites. Quarries generally have evidence of extraction visible, while procurement sites can be inferred through the presence of artefactual material made from raw material sources present within the area.

It is possible that areas of exposures containing gravels and cobbles may have been exploited in the past Aboriginal people. However no specific quarries have been identified and/or registered as a site during previous investigations the study area and immediate surrounds.

Middens

Middens are concentrations of shell, and may also contain stone artefacts, bone and sometimes human burials. These sites are generally recorded along coastal areas. Middens are formed through the exploitation of locally available species by humans for resources, and accumulation of the shell material within a specific location. Middens can range in size from small, discrete deposits, to deposits covering a large area.

Generally, middens reflect the species available in the local area. In estuarine regions, estuarine species will dominate the composition of the midden, while around headlands, rock platform species tend to dominate. No shell middens have been registered within the study area. Given the distance of the study area from the coast, middens containing saltwater species are considered unlikely to occur within the area. However, it has been noted by Wood (1972:44) that 'Aborigines left heaps of mussel shells on the banks of Muscle Brook, hence its name and that of the town Muswellbrook'. So, although unlikely, there may be remnants of freshwater species in proximity to watercourses.

Burials

Aboriginal people across Australia utilised a range of burial forms, which depended on the customs of the individual tribes. Common burial practices included inhumation, cremation, desiccation and exposure. Burials are known to occur within sandy contexts in the wider region. These are generally found within coastal Holocene sand bodies, and generally are not identified during field survey as there is usually minimal surface expression of this type of site.

To date, there are no records of burials being identified within the specific study area, but this does not preclude burials from occurring. There are alluvial soils within sections of the study area that may be quite deep with a high sand content. However, given the extensive land disturbance and alternative areas which may have been more attractive for locating burials, it is considered unlikely that evidence of subsurface burials may still remain, but it is a possibility.

Rock Shelters

Rock shelters are formed by rock overhangs which would have provided shelter to Aboriginal people in the past. Often, evidence of this occupation can be found in the form of art and/or artefacts. Shell, midden material, grinding grooves, pictographs (rock engravings), artworks including stencils and paintings, and potential archaeological deposits (PAD) are common features of rock shelter sites.

Previous investigations within portions of the study area and surrounds did not identify rock shelters and it is unlikely this site type will occur in the study area.

Grinding Grooves

Grinding grooves are formed on sandstone exposures through the creation and maintenance of ground edge tools, such as axes and spears. Usually, stone was ground to form a sharp edge, although bone and shell were also ground to create sharp points.

Generally, fine grained sandstone was favoured for these maintenance activities, and the presence of a water source nearby or overflowing the sandstone was also favoured. Grinding grooves range from individual examples through to hundreds of grooves within an area, sometimes arranged in a specific pattern. Horizontal sandstone was generally preferred, although there are examples of vertical grooves.

Previous investigations within portions of the study area have identified two grinding groove sites. It is possible that this site type may occur in the study area.

Scarred and Carved Trees

Scarred and carved trees are created during the removal of bark from a tree for a range of reasons, both domestic and ceremonial. This type of site can be identified within areas containing trees of the correct species and appropriate age. Deliberately scarred trees can be difficult to differentiate from naturally occurring damage to trees, and specific criteria must be considered when assessing a scar for a cultural origin.

Previous investigations within portions of the study area and surrounds did not identify culturally modified trees. It is unlikely this site type is present within the study area given the extensive vegetation clearance and land use history.

Ceremonial Sites

Specific places were used for ritual and ceremonial purposes, including initiation and burial practices. Secret rituals were also undertaken at specific places by specific individuals, such as at water holes and by clever men.

The landscape itself was also considered to hold significance to Aboriginal people, and the understanding of this is referred to as a sacred geography. This includes natural features which were associated with spirits or creation beings. The meaning attributed to the landscape provided Aboriginal people with legitimacy regarding their role as guardians of the places which had been created by the spiritual ancestors (Boot 2002).

Many areas within the Hunter Valley region in NSW are considered to be sacred to the original inhabitants. However, there are no known recorded areas within the study area, although this does not preclude these values from existing within this location.

Contact Sites

Contact sites contain evidence of Aboriginal occupation concurrent with initial colonisers in an area. This could include evidence such as flaked artefacts formed on glass, or burials containing non-Aboriginal grave goods. Often Aboriginal camps would form around newly built towns, allowing for employment (or exploitation) of the Aboriginal people by the colonists, and also for trade to exist between the two communities. Contact sites can also occur around Aboriginal mission sites, where Aboriginal children were taken from their families to raise in the European manner. Families often camped around the mission boundaries to try to catch a glimpse of their children.

At least one contact site was recorded within the study area, with glass flakes associated with an artefact scatter (37-6-3835). It is possible that additional contact sites may be present within the study area.

5.0 Field Work

5.1 Sampling Strategy

A sampling strategy was developed and provided to the Registered Aboriginal Parties (RAPs) as part of the consultation process completed for the ACHA. The strategy included assessment of all landforms within the study area that have the potential to be impacted by the proposed development. Areas considered likely to have archaeological potential were closely scrutinised, although the entire study area was considered.

The sampling strategy included assessment of the entirety of the study area due to the nature of the development proposal, in order to provide an accurate assessment of the study area in relation to the proposed impacts.

5.2 Site Inspection

A site survey was undertaken over two weeks from 13 November 2023 to the 24 November 2023 by Apex Archaeology in conjunction with the RAPs for the study area as part of the assessment under the Code of Practice and ACHCRs.

Participants in the survey included:

- Leigh Bate, Apex Archaeology
- David O'Brien, Apex Archaeology
- Kevin Sampson, Cacatua Culture Consultants
- Les Atkinson, Wonaruah Local Aboriginal Land Council
- Shai-lee Braneley, Wonnarua Nation Aboriginal Corporation

5.3 Survey Coverage

The survey was conducted on foot for the purposes of discovering Aboriginal objects within the study area, including areas considered to have potential for subsurface objects to be present. The survey was undertaken in accordance with the sampling strategy prepared for the project.

The study area was surveyed in one linear transect along the entirety of the proposed route from the southern end (Kurri Kurri STS) to the northern end (Muswellbrook STS). Areas of extreme disturbance (ie road verge location along the Hunter Expressway, New England Highway and Mitchell Line of Road) were not surveyed by pedestrian transect but rather driven as vehicular reconnaissance. This was agreed with all members of the survey team for each of these sections.

Further, areas of severe vegetation growth or swampy areas were not traversed due to inaccessibility. Landform elements have been described; however significant disturbance relating to the original transmission line easement construction, subsequent ongoing easement maintenance and vegetation clearance/control, along with mining related impacts, viticulture and agriculture have modified the original land surface.

Each participant was responsible for inspecting a 2m wide portion of the transect walked. This meant that on each pass an area covering 8m would be observed for archaeological material by the survey team.

Due to the linear nature and high level of disturbance within much of the study area, survey units were based on an arbitrary assessment of the survey transect within the study area. Survey units are discussed following and depicted in related mapping.

<table>
<tr><td colspan="2">Survey Unit:</td><td>1</td><td rowspan="2">Survey Area:</td><td rowspan="2">Kurri Kurri STS</td></tr>
<tr><td colspan="2">Number of Survey Participants:</td><td>4</td></tr>
<tr><td>Landform Element:</td><td colspan="2">Flat/Modified/Disturbed</td><td>Distance to Watercourse:</td><td>1.5km (Swamp Creek)</td></tr>
<tr><td>Slope:</td><td colspan="2">Level-very gentle (<1.45°)</td><td>Vegetation:</td><td>Cleared, Grass</td></tr>
<tr><td>Detection Limiting Factors:</td><td colspan="2">Grass, Gravels, Leaf Litter</td><td>Ground Disturbance:</td><td>High</td></tr>
<tr><td>Survey Unit Length:</td><td colspan="2">560m</td><td>Ground Surface Visibility:</td><td>35%</td></tr>
<tr><td>Total Area surveyed</td><td colspan="2">4480m²</td><td>Archaeological Visibility:</td><td><1%</td></tr>
<tr><td colspan="3">  </td><td colspan="2">  </td></tr>
<tr><td colspan="3">Plate 1: Looking north over upgrade area option A (Kurri Kurri STS).</td><td colspan="2">Plate 2: Looking east over upgrade area option A (Kurri Kurri STS).</td></tr>
<tr><td colspan="3">  </td><td colspan="2">  </td></tr>
<tr><td colspan="3">Plate 3: Looking south over upgrade area option B (Kurri Kurri STS).</td><td colspan="2">Plate 4: Looking south west at the southern end of the TL route (Kurri Kurri STS).</td></tr>
<tr><td colspan="3">AHIMS Sites within TL Study Area:</td><td colspan="2">37-6-1358</td></tr>
<tr><td colspan="3">Newly Recorded Sites:</td><td colspan="2">None</td></tr>
</table>

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Figure 6: Survey transect and AHIMS sites (Kurri Kurri STS).

N

Survey Unit:	2	**Survey Area:**	Mcleod Road, Loxford
Number of Survey Participants:	4		
Landform Element:	Flat/Modified/Disturbed	**Distance to Watercourse:**	1.2km (Swamp Creek)
Slope:	Level-very gentle (<1.45°)	**Vegetation:**	Cleared, Shrubs
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	896m	**Ground Surface Visibility:**	45%
Total Area surveyed	7168m²	**Archaeological Visibility:**	<1%

Plate 5: Looking east over highly modified landscape adjacent the Hunter Expressway within TL route (sed pond/storm water swale.

Plate 6: Looking north west along access track within TL easement.

Plate 7: Looking north west along TL easement and access track.

Plate 8: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	37-6-1355
Newly Recorded Sites:	None

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Figure 7: Survey transect and AHIMS sites.

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Survey Unit:	3	**Survey Area:**	Scales Road, Loxford
Number of Survey Participants:	4		
Landform Element:	Gentle Simple Slope	**Distance to Watercourse:**	86m (Swamp Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass, Regrowth
Detection Limiting Factors:	Bitumen, Gravel, Shrubs, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	1467m	**Ground Surface Visibility:**	25%
Total Area surveyed	11,736m²	**Archaeological Visibility:**	<5%

Plate 9: Looking north west upslope along Scales Road within the TL easement.

Plate 10: Looking south east along Scales Road within the TL easement.

Plate 11: Looking north west along TL route within existing easement.

Plate 12: Looking north west along TL route within existing easement.

AHIMS Sites within TL Study Area:	37-6-1645, 37-6-1360, 37-6-2007 & 37-6-1644,
Newly Recorded Sites:	None

Survey Unit:	4	**Survey Area:**	Back Waterholes Creek
Number of Survey Participants:	4		
Landform Element:	Flat/Modified/Disturbed	**Distance to Watercourse:**	4m
Slope:	Level-very gentle (<1.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Imported Stone, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	626m	**Ground Surface Visibility:**	20%
Total Area surveyed	5008m²	**Archaeological Visibility:**	<5%

Plate 13: Looking north west along TL easement.

Plate 14: Looking north west across Black Waterholes Creek (Highly Modified/Armoured banks).

Plate 15: Looking south east along TL easement.

Plate 16: Coordinate location of AHIMS site 37-6-2009 (Pink Flag).

AHIMS Sites within TL Study Area:	37-6-1343, 37-6-2009 & 37-6-1363
Newly Recorded Sites:	None

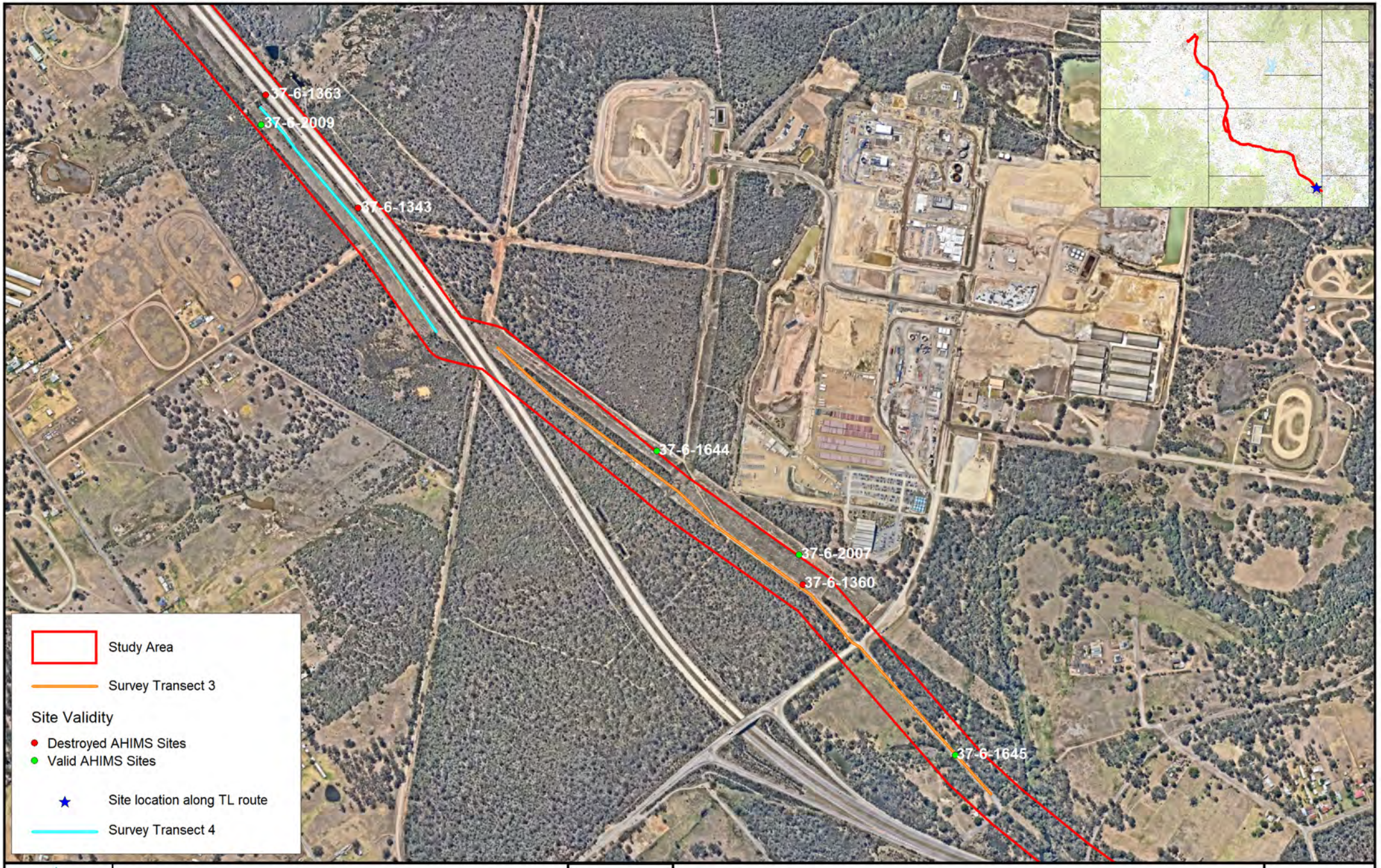

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Figure 8: Survey transects and AHIMS sites.

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Survey Unit:	5	**Survey Area:**	Keinbah
Number of Survey Participants:	4		
Landform Element:	Gentle Simple Slope, Rolling Hills, Creek Bank	**Distance to Watercourse:**	Intersect TL easement (Sawyers Gully)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	Low to Moderate
Survey Unit Length:	3677m	**Ground Surface Visibility:**	25%
Total Area surveyed	29,416m²	**Archaeological Visibility:**	20%

Plate 17: Looking north west along TL easement from Sawyers Gully creek.

Plate 18: Looking north west over AHIMS site 37-6-2012 (pink flag).

Plate 19: Looking north west along TL easement within moderate zone of archaeological sub-surface potential.

Plate 20: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	37-6-1346, 37-6-2010, 37-6-2011, 37-6-2012, 37-6-2935, 37-6-2013, 37-6-2014, 37-6-2015, 37-6-2016 & 37-6-2017
Newly Recorded Sites:	None

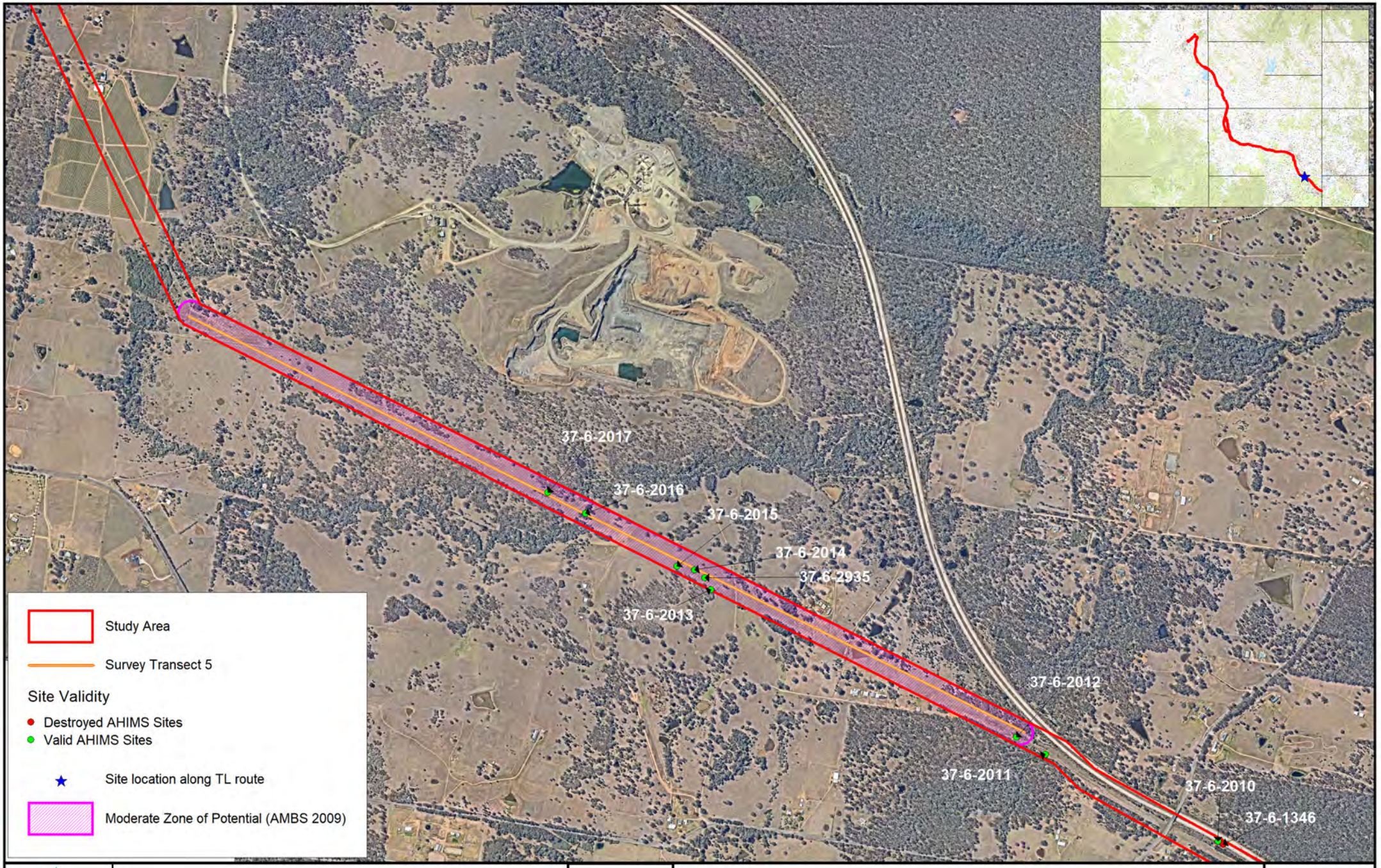

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Figure 9: Survey transect and AHIMS sites.

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Survey Unit:	6	**Survey Area:**	Keinbah
Number of Survey Participants:	4		
Landform Element:	Gentle Simple Slope Modified/Disturbed	**Distance to Watercourse:**	1.8km (Anvil Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Vineyard
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	Moderate to High
Survey Unit Length:	2022m	**Ground Surface Visibility:**	20%
Total Area surveyed	16,176m²	**Archaeological Visibility:**	5%

Plate 21: Looking south east along TL easement.

Plate 22: Looking north west through De Luliis Vineyard.

Plate 23: Looking north west along TL easement.

Plate 24: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	None
Newly Recorded Sites:	None

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Projection:
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Figure 10: Survey transect.

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Survey Unit:	7	**Survey Area:**	Camp Road, Rothbury
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	480m (Sawyers Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf litter	**Ground Disturbance:**	High
Survey Unit Length:	1491m	**Ground Surface Visibility:**	30%
Total Area surveyed	11,928m²	**Archaeological Visibility:**	10%

Plate 25: Looking north west along TL easement.

Plate 26: Looking north west along TL easement.

Plate 27: Looking north west along TL easement.

Plate 28: Looking north across Camp Road crossing point of TL.

AHIMS Sites within TL Study Area:	37-6-1328 & 37-6-1329
Newly Recorded Sites:	CR-AS-01, CR-AS-02 & CR-IF-01

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Figure 11: Survey transect, Newly Identified Aboriginal Sites and AHIMS sites.

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Survey Unit:	8	**Survey Area:**	Greta
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified, Disturbed	**Distance to Watercourse:**	1km (Sawyers Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	2207m	**Ground Surface Visibility:**	35%
Total Area surveyed	17,656m²	**Archaeological Visibility:**	15%

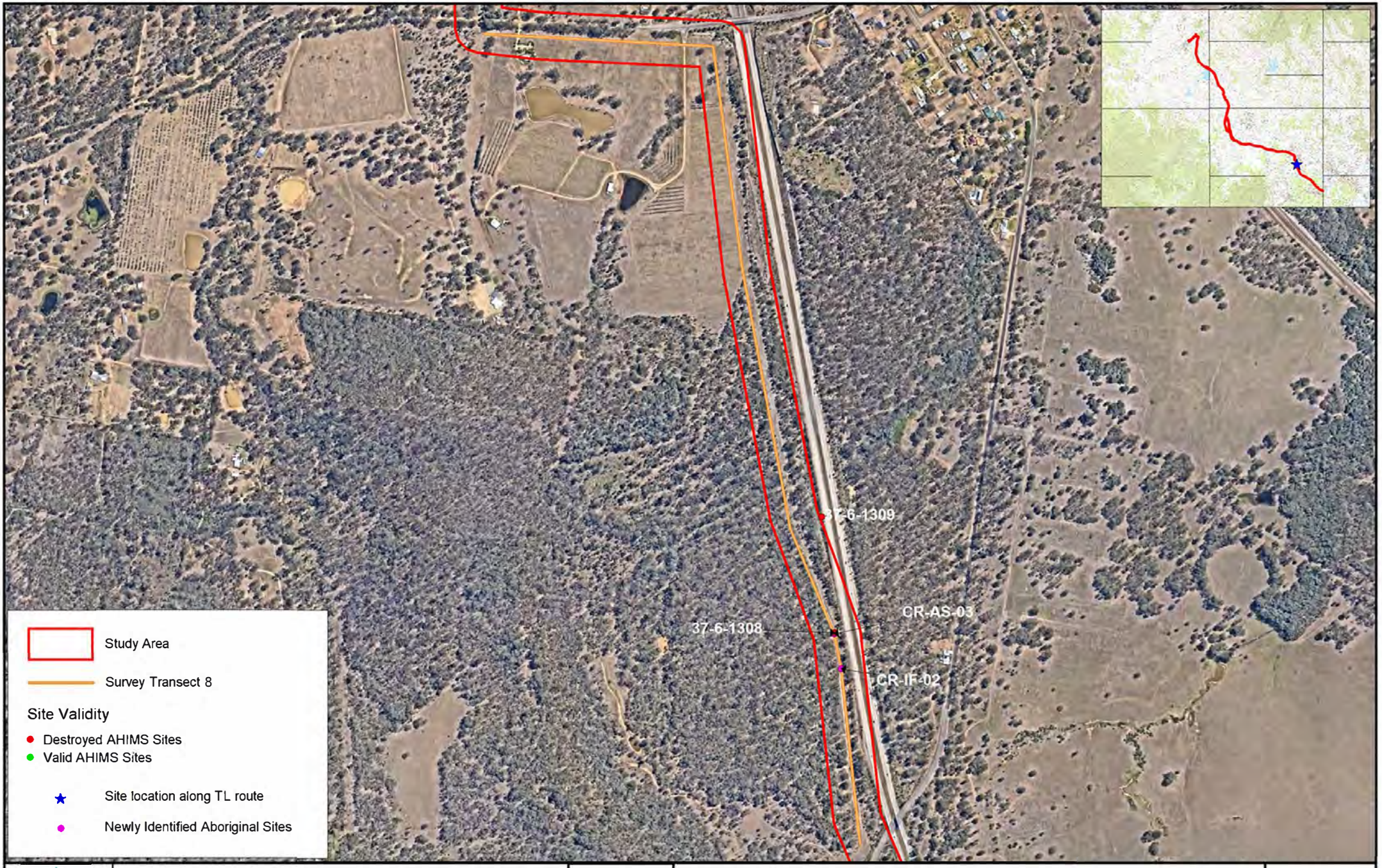
Plate 29: Looking north along TL easement. Exposed telecommunications access point.

Plate 30: Looking north along TL easement.

Plate 31: Looking north along TL easement.

Plate 32: Looking north along TL easement towards Tuckers Lane.

AHIMS Sites within TL Study Area:	37-6-1308 & 37-6-1309
Newly Recorded Sites:	CR-IF-02 & CR-AS-03



PO Box 238
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NEW SOUTH WALES 2541

0 420 840
kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Near Maps 2024
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Figure 12: Survey transect, Newly Identified Aboriginal Sites and AHIMS sites.

N

Survey Unit:	9	**Survey Area:**	Greta
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed, Creek Bank	**Distance to Watercourse:**	Intersects TL easement (Sawyers Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	3224m	**Ground Surface Visibility:**	40%
Total Area surveyed	25,792m²	**Archaeological Visibility:**	10%

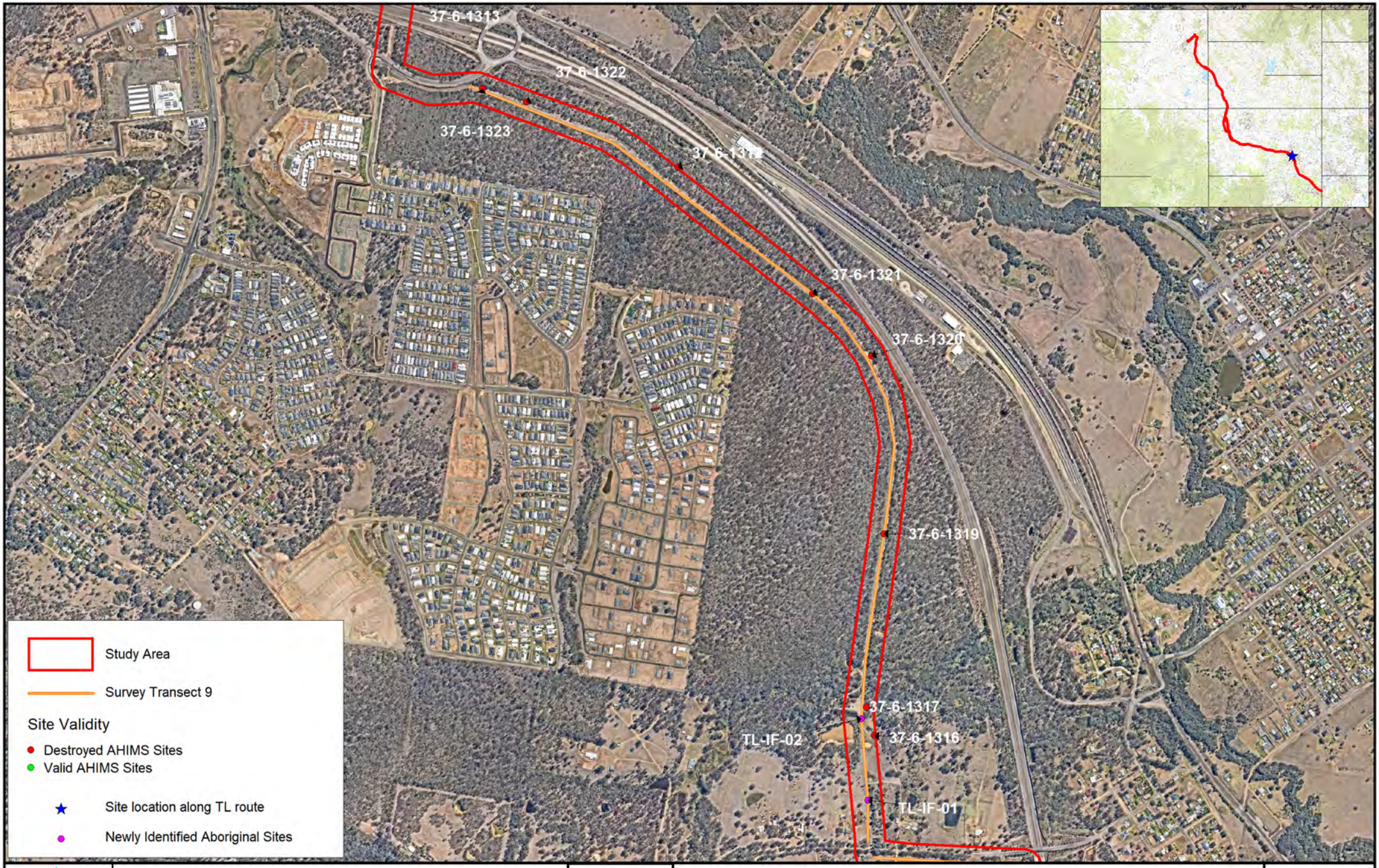
Plate 33: Looking north along TL easement.

Plate 34: Looking north along TL easement Sawyers Creek crossing point.

Plate 35: Looking south along TL easement showing highly eroded section.

Plate 36: Looking at TL crossing point over the Hunter Expressway.

AHIMS Sites within TL Study Area:	37-6-1316, 37-6-1316, 7-6-1317, 37-6-1319,37-6-1321, 37-6-1312, 37-6-1322 & 37-6-1323
Newly Recorded Sites:	TL-IF-01 & TL-IF-02



PO Box 236
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NEW SOUTH WALES 2541

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kilometres

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Figure 13: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	10	**Survey Area:**	Branxton
Number of Survey Participants:	4		
Landform Element:	Flat, Modified/Disturbed	**Distance to Watercourse:**	460m (Anvil Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter, Ballast	**Ground Disturbance:**	High
Survey Unit Length:	1525m	**Ground Surface Visibility:**	25%
Total Area surveyed	12,200m²	**Archaeological Visibility:**	5%

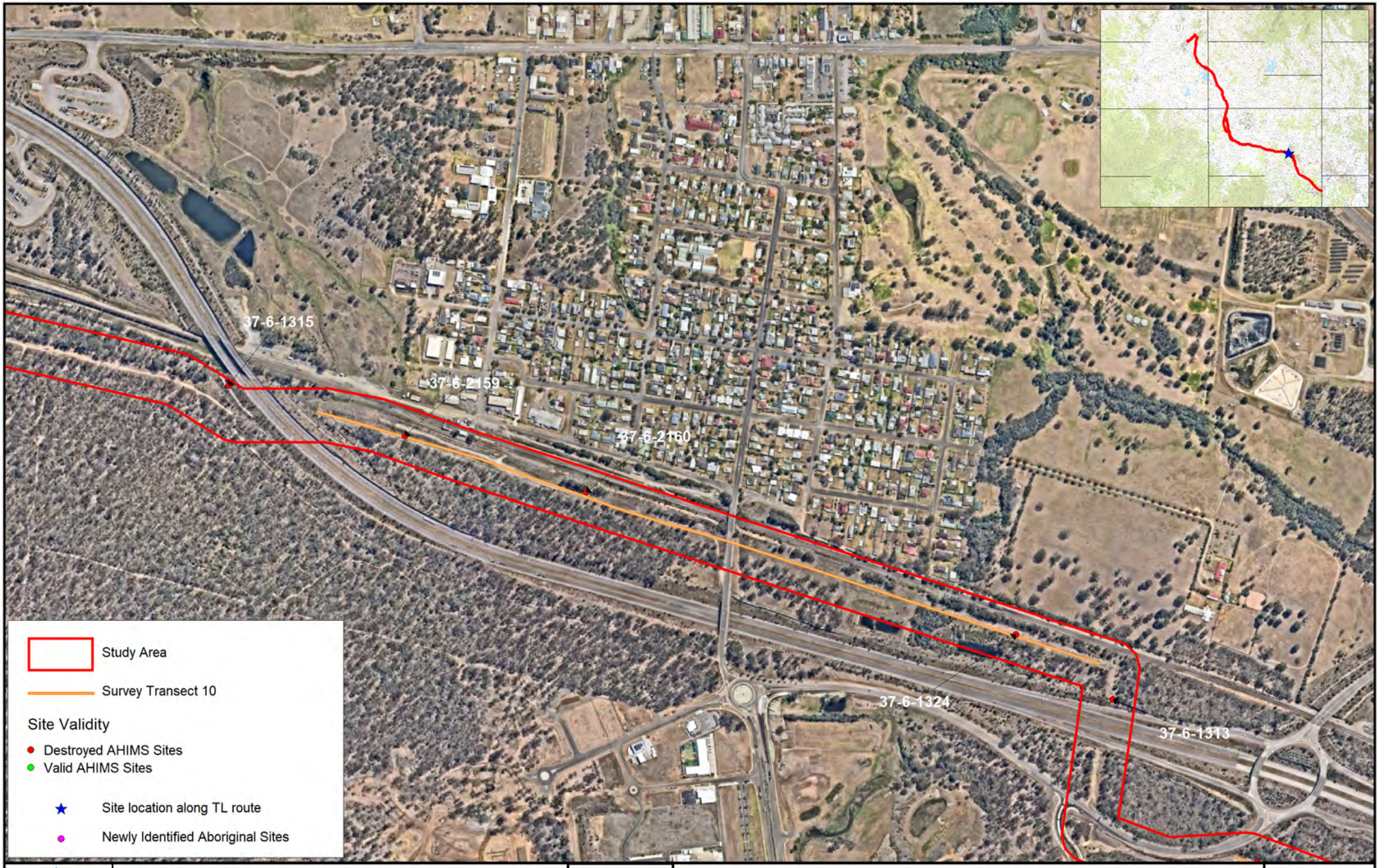
Plate 37: Looking north along the TL easement.

Plate 38: Looking north along the TL easement (area severely modified).

Plate 39:Looking north along access track within TL easement.

Plate 40: Looking north towards TL crossing point over the Main Northern Railway corridor.

AHIMS Sites within TL Study Area:	37-6-1313, 37-6-1324, 37-6-2160, 37-6-2159 & 37-6-1315
Newly Recorded Sites:	None



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metres

Projection:
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Figure 14: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	11	**Survey Area:**	Black Creek
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed, Creek Bank	**Distance to Watercourse:**	Intersects TL easement (Black Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	1088m	**Ground Surface Visibility:**	40%
Total Area surveyed	8704m²	**Archaeological Visibility:**	20%

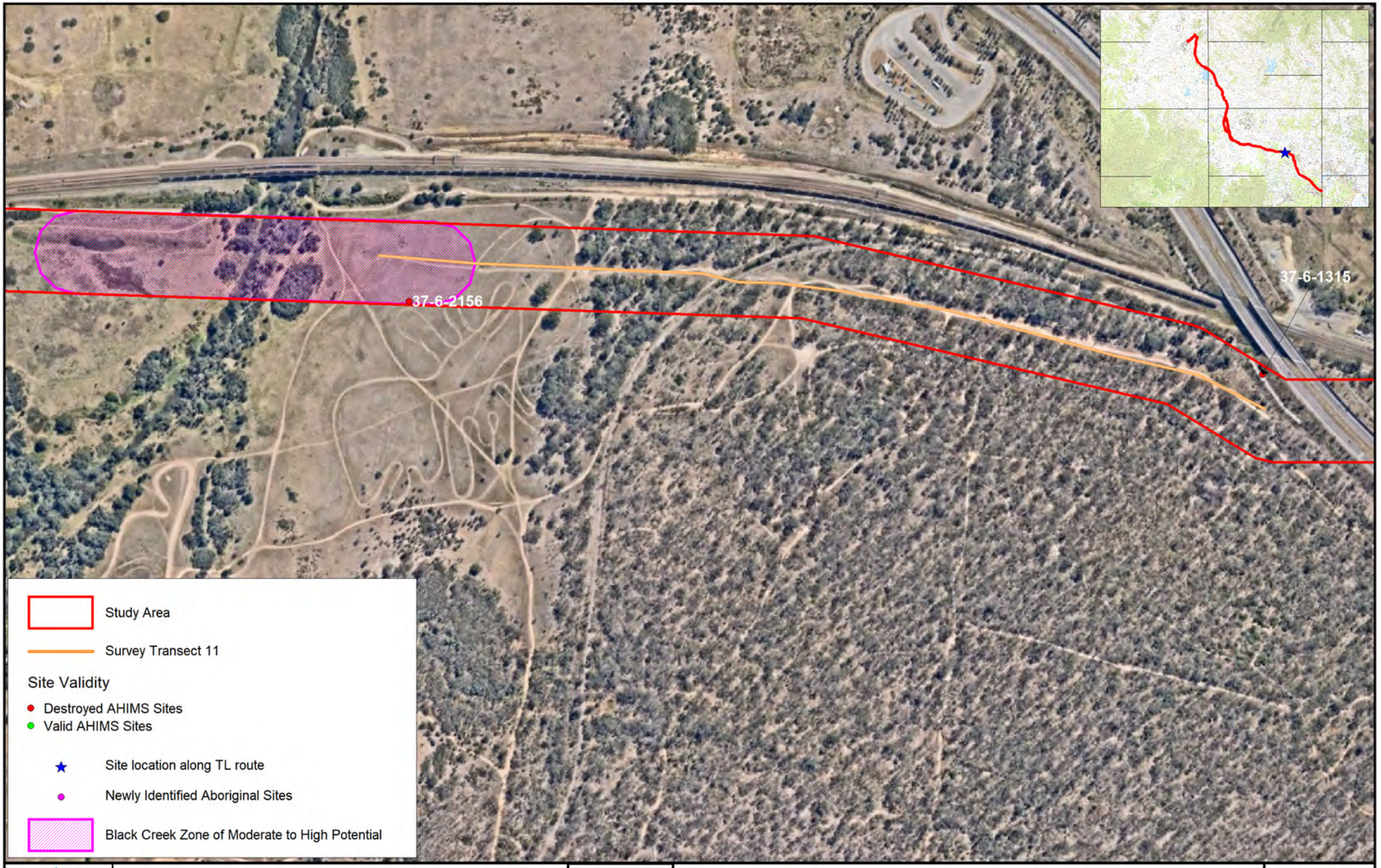
Plate 41: Looking west along TL easement.

Plate 42: Looking west along TL easement crossing point of railway siding.

Plate 43: Looking west along TL easement

Plate 44: Looking downslope towards TL easement crossing point of Black Creek.

AHIMS Sites within TL Study Area:	37-6-2156
Newly Recorded Sites:	None



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metres

Projection:
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Figure 15: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	12	**Survey Area:**	Belford
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	790m (Black Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	Moderate
Survey Unit Length:	3989m	**Ground Surface Visibility:**	30%
Total Area surveyed	31,912m²	**Archaeological Visibility:**	10%

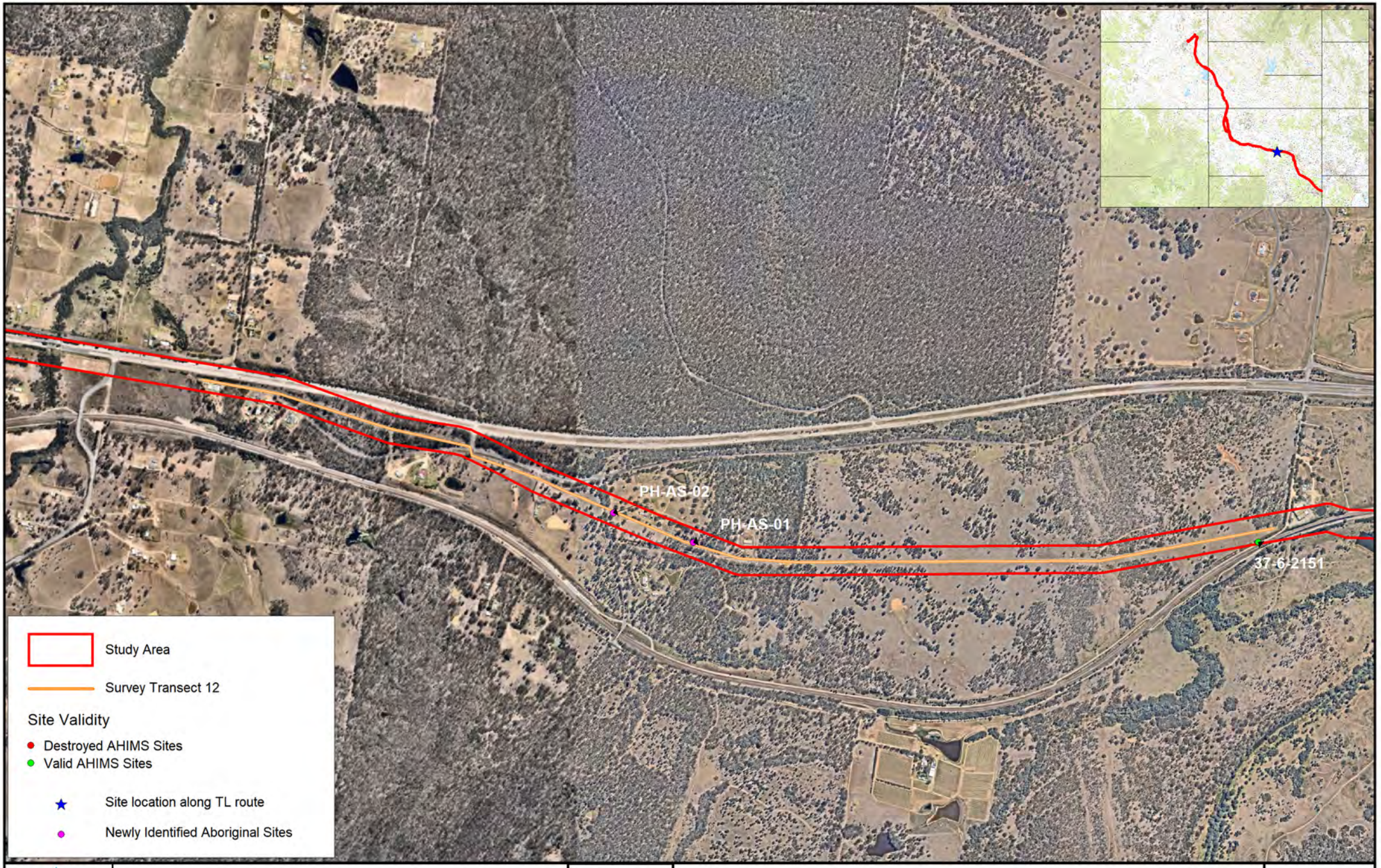
Plate 45: Looking west along TL easement.

Plate 46: Looking west along TL easement.

Plate 47: Looking west along TL easement

Plate 48: Looking west along TL easement towards section running parallel to the New England Highway

AHIMS Sites within TL Study Area:	37-6-2151
Newly Recorded Sites:	PH-AS-01 & PH-AS-02



PO Box 236
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kilometres

Projection:
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Figure 16: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	13	**Survey Area:**	Belford/Whittingham
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	1km (Emigrant Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	Moderate to High
Survey Unit Length:	3489m	**Ground Surface Visibility:**	20%
Total Area surveyed	27,912m²	**Archaeological Visibility:**	15%

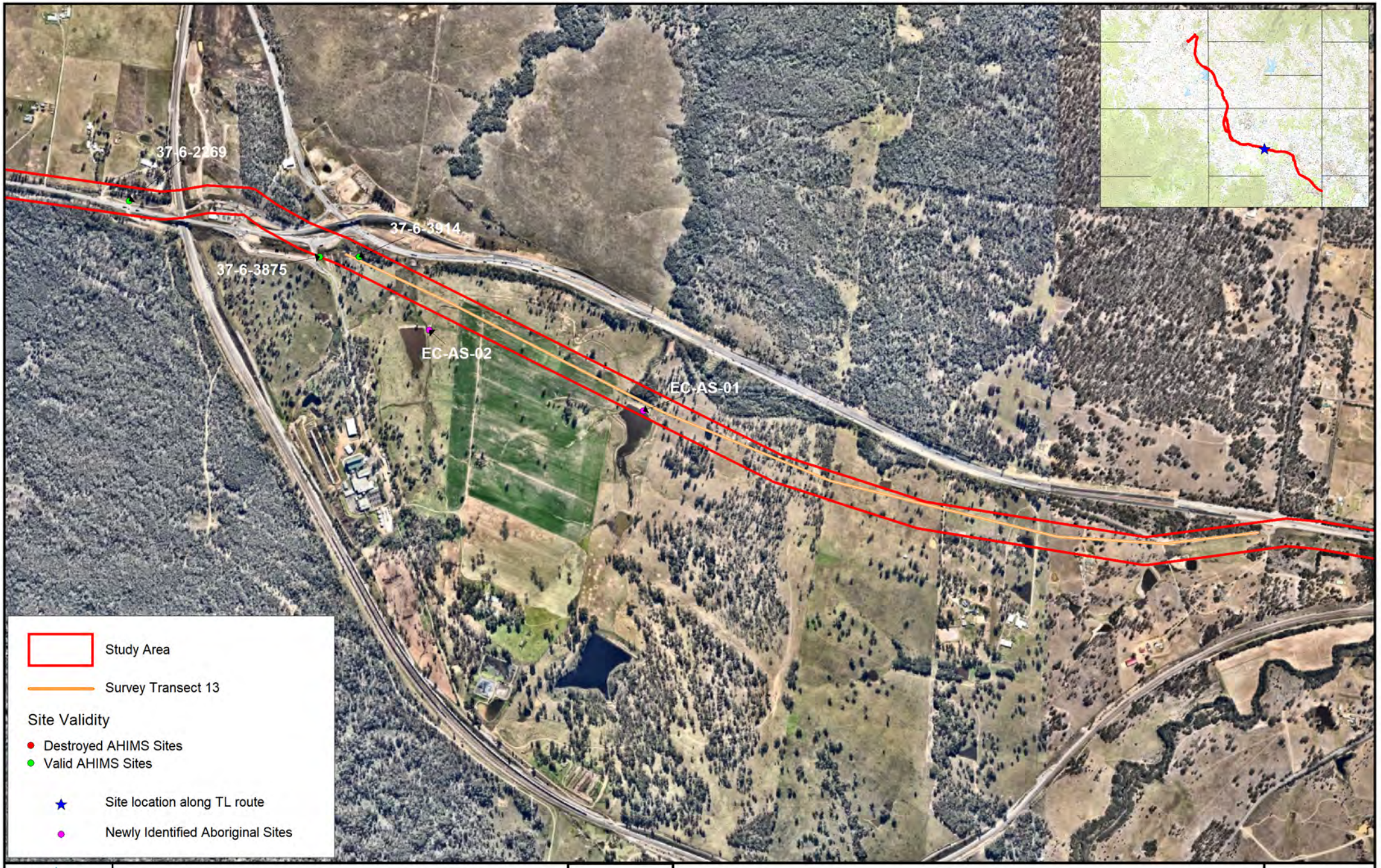
Plate 49: Looking west along TL easement.

Plate 50: Looking west along TL easement.

Plate 51: Looking west along TL easement.

Plate 52: Looking west along TL easement towards New England Highway/Mitchell Line of Road intersection.

AHIMS Sites within TL Study Area:	37-6-3914, 37-6-3875 & 37-6-2269
Newly Recorded Sites:	EC-AS-01 & EC-AS-02



PO Box 236
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0 0.7 1.4
kilometres

Projection:
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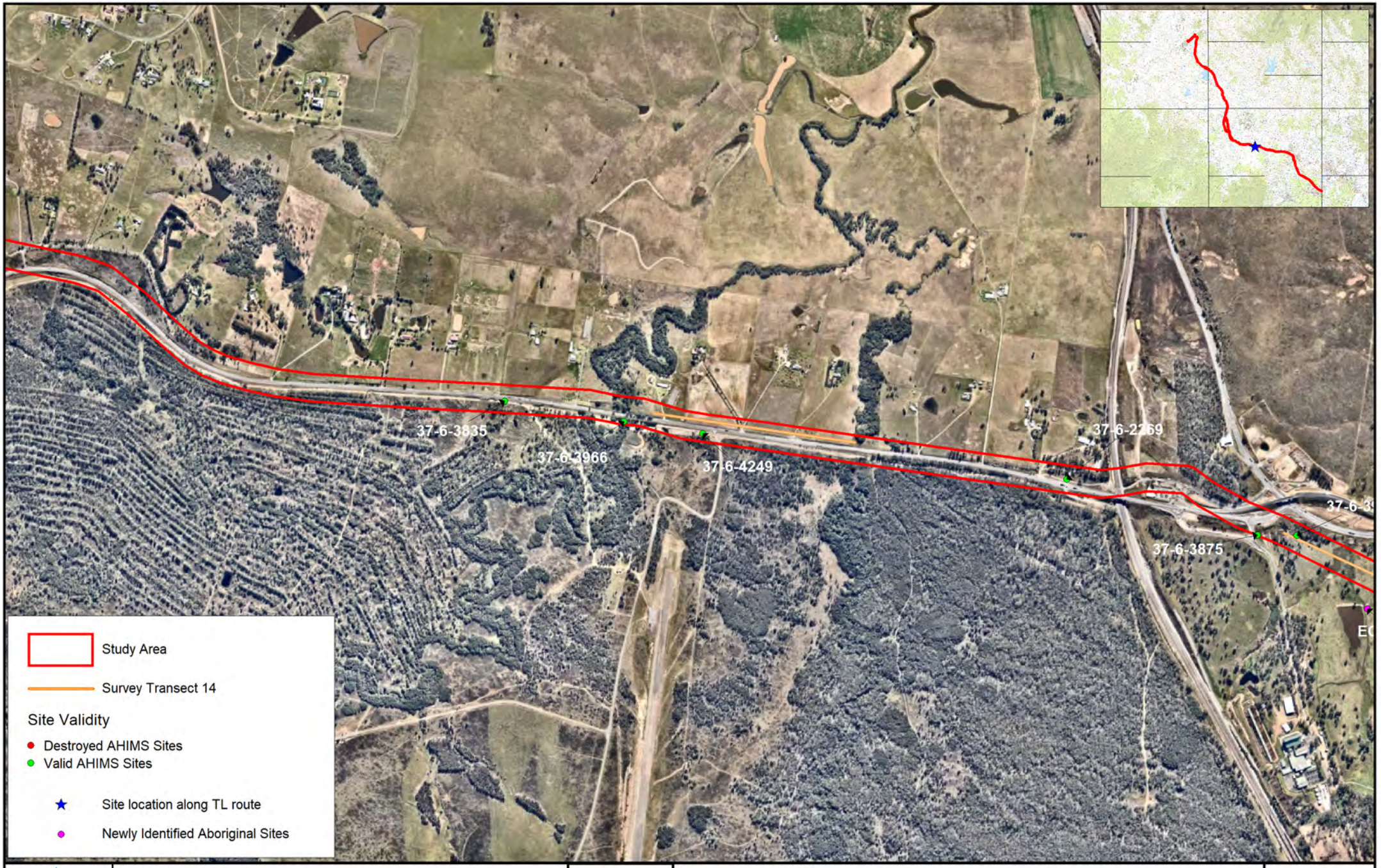
Figure 17: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	14	**Survey Area:**	Whittingham
Number of Survey Participants:	4		
Landform Element:	Flat, Modified/Disturbed, Creek Bank	**Distance to Watercourse:**	316m (Muddies Creek)
Slope:	Level-very gentle (<1.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	731m	**Ground Surface Visibility:**	15%
Total Area surveyed	5848m²	**Archaeological Visibility:**	<1%
			
Plate 53: Looking west along Mitchell Line of Road within TL easement/road verge.			
AHIMS Sites within TL Study Area:		37-6-2369, 37-6-4249, 37-6-3966 & 37-6-3835	
Newly Recorded Sites:		None	



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kilometres

Projection:
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Figure 18: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	15	**Survey Area:**	Whittingham
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	950m (Doughboy Hollow Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	799m	**Ground Surface Visibility:**	30%
Total Area surveyed	6392m²	**Archaeological Visibility:**	5%

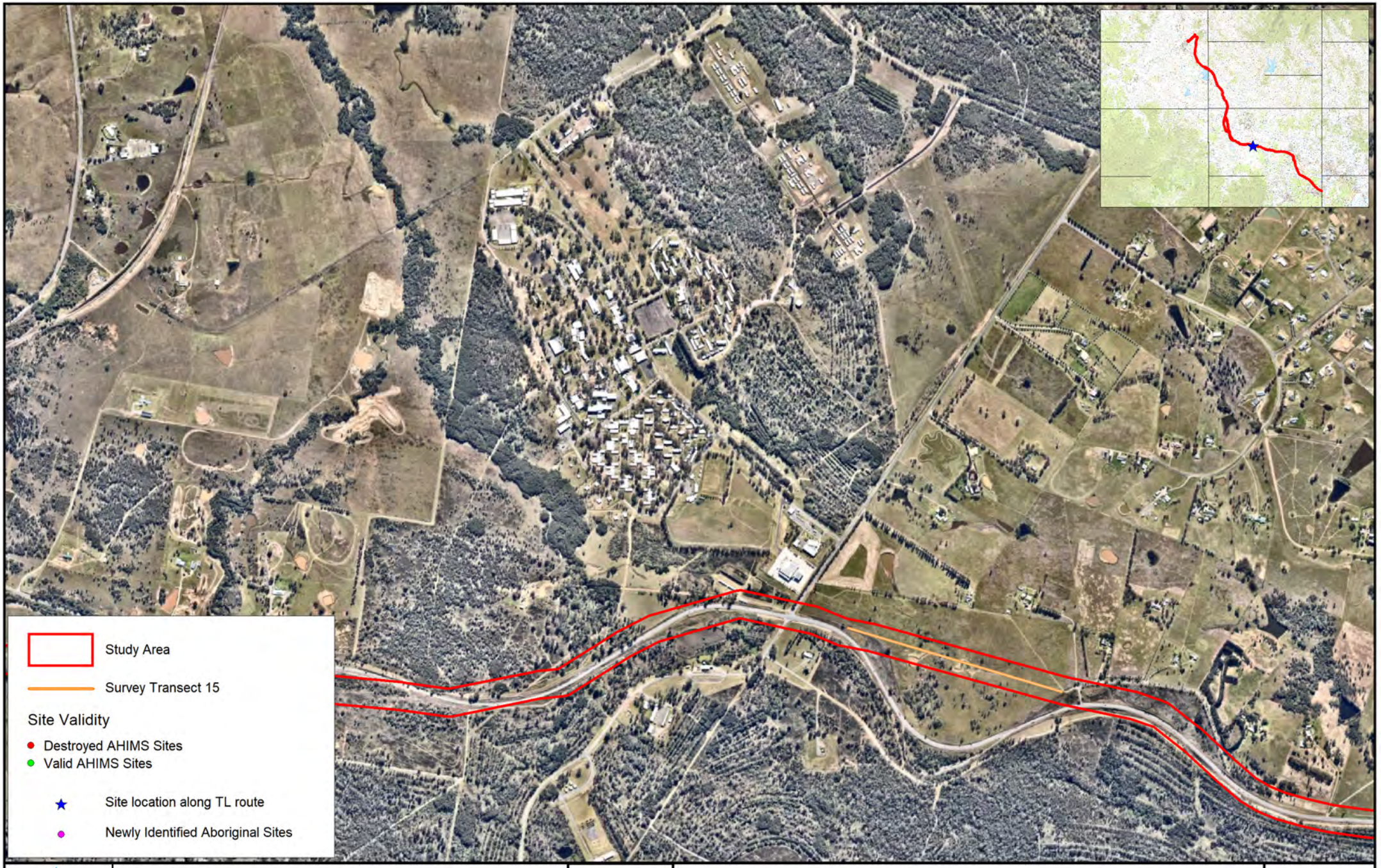
Plate 54: Looking north over upgrade area option A (Kurri Kurri STS)

Plate 55: Looking east over upgrade area option A (Kurri Kurri STS)

Plate 56: Looking south over upgrade area option B (Kurri Kurri STS)

Plate 57: Looking south west at the southern end of the TL route (Kurri Kurri STS)

AHIMS Sites within TL Study Area:	None
Newly Recorded Sites:	None



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kilometres

Projection:
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Base Map:
Near Maps 2024
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Figure 19: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	16	**Survey Area:**	Singleton Army Base
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	4.4km (Muddies Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	2843m	**Ground Surface Visibility:**	15%
Total Area surveyed	22,744m²	**Archaeological Visibility:**	5%

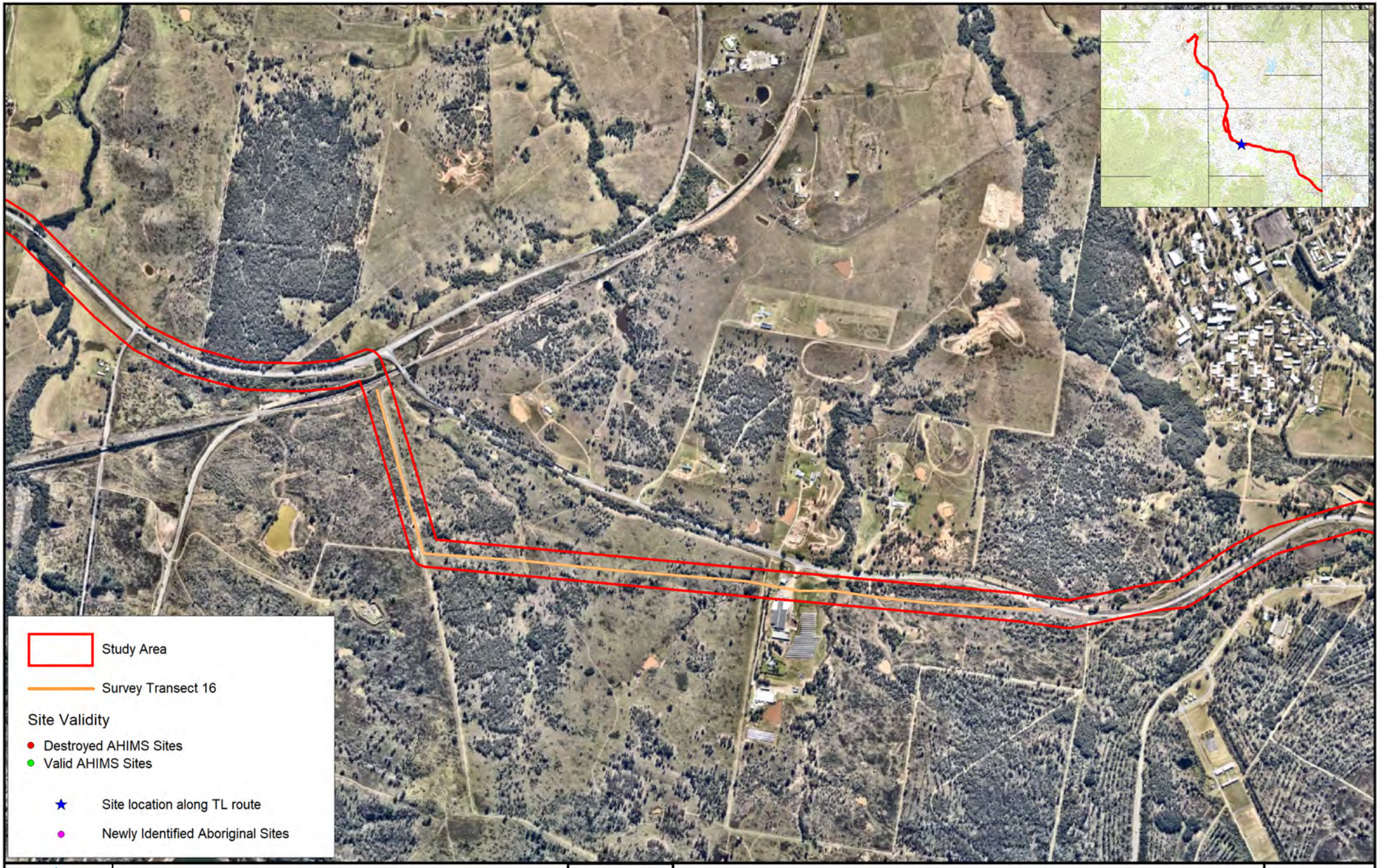
Plate 58: Looking west along the TL easement.

Plate 59: Looking west along the TL easement.

Plate 60: Looking west along the TL easement.

Plate 61: Looking north along the TL easement towards Mitchell Line of Road.

AHIMS Sites within TL Study Area:	None
Newly Recorded Sites:	None



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kilometres

Projection:
MGA Zone 56 (GDA 94)
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Figure 20: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	17	**Survey Area:**	Mount Thorley/Warkworth
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed, Terrace	**Distance to Watercourse:**	Intersects TL easement (Hunter River)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	5971m	**Ground Surface Visibility:**	35%
Total Area surveyed	47,768m²	**Archaeological Visibility:**	20%

Plate 62: Looking north west along TL easement (eastern corridor).

Plate 63: Looking north west along TL easement (eastern corridor).

Plate 64: Looking north west along TL easement (eastern corridor).

Plate 65: Looking north west along TL easement (eastern corridor).

AHIMS Sites within TL Study Area:	37-6-0020, 37-6-3077, 37-6-3078, 37-6-1439, 37-6-0677, 37-6-3081, 37-6-3157, 37-6-3156, 37-6-3100, 37-6-0154, 37-6-4042, 37-6-4040 & 37-6-4051
Newly Recorded Site Complexes:	Jerry's Plains Zone of Subsurface Archaeological Potential & Gouldsville – Eastern Corridor – Archaeologically Sensitive Zone.

Survey Unit:	18	**Survey Area:**	Warkworth
Number of Survey Participants:	4		
Landform Element:	Flat, Modified/Disturbed	**Distance to Watercourse:**	1.4km (Hunter River)
Slope:	Level-very gentle (<1.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	243m	**Ground Surface Visibility:**	10%
Total Area surveyed	1944m²	**Archaeological Visibility:**	5%

Plate 66: Looking north west along TL easement.

Plate 67: Looking north east along easement (pink flag indicates AHIMS site 37-6-0682).

AHIMS Sites within TL Study Area:	37-6-0682
Newly Recorded Sites:	None

Survey Unit:	19	**Survey Area:**	Kurri Kurri STS
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed, Terrace	**Distance to Watercourse:**	Intersects TL easement (Hunter River)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	3072m	**Ground Surface Visibility:**	35%
Total Area surveyed	24,576m²	**Archaeological Visibility:**	20%

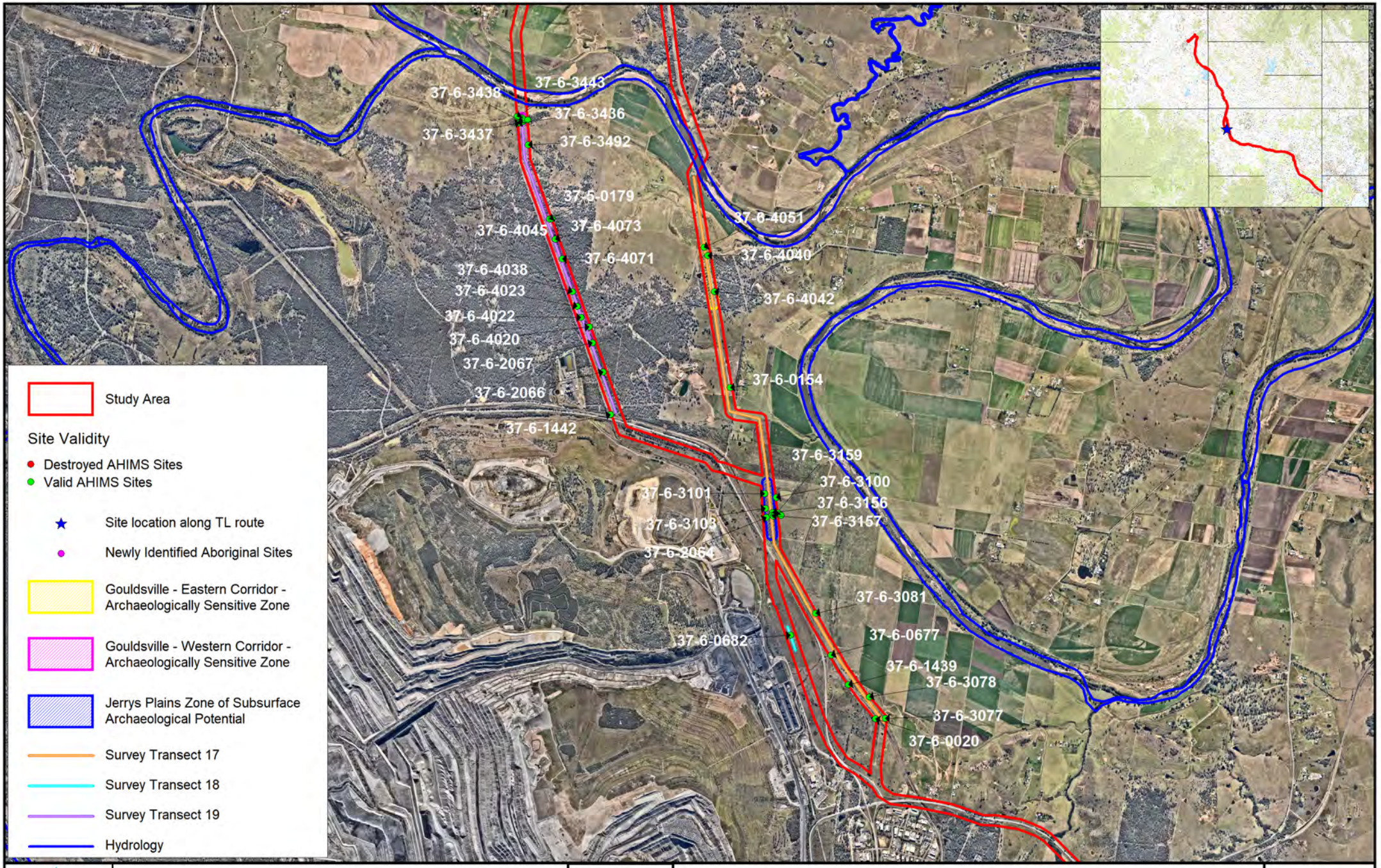
Plate 68: Looking south east along TL easement crossing rail corridor (western corridor).

Plate 69: Looking north west along the TL easement (western corridor).

Plate 70: Looking north west along TL easement (western corridor).

Plate 71: Looking north across crossing TL easement point of the Hunter River (western corridor).

AHIMS Sites within TL Study Area:	37-6-1442, 37-6-2066, 37-6-2067, 37-6-4020, 37-6-4022, 37-6-4023, 37-6-4038, 37-6-4045, 37-6-4071, 37-6-4073, 37-5-0179, 37-6-3492, 37-6-3436, 37-6-3437, 37-6-3438 & 37-6-3443
Newly Recorded Site Complex:	Gouldsville – Western Corridor – Archaeologically Sensitive Zone



PO Box 236
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kilometres

Projection:
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Figure 21: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	20	**Survey Area:**	Maison Dieu
Number of Survey Participants:	4		
Landform Element:	Flat/Modified/Disturbed	**Distance to Watercourse:**	Intersects TL easement (Hunter River)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	Moderate
Survey Unit Length:	2819m	**Ground Surface Visibility:**	35%
Total Area surveyed	22,552m²	**Archaeological Visibility:**	10%

Plate 72: Looking north east along TL easement (Western Corridor).

Plate 73: Looking north east along TL easement (Western Corridor).

Plate 74: Looking east across Singleton STS along TL easement.

Plate 75: Looking south east along TL easement (Eastern Corridor).

AHIMS Sites within TL Study Area:	37-6-1802
Newly Recorded Sites:	KL-IF-01, KL-IF-02, KL-AS-02, KL-AS-03, SSTS-AS-01, SSTS-AS-02, SSTS-AS-03, SSTS-AS-04 & SSTS-AS-05

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kilometres

Projection:
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Near Maps 2024
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Figure 22: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	21	**Survey Area:**	Maison Dieu
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Creek Bank, Modified/Disturbed	**Distance to Watercourse:**	710m (Hunter River) TL Intersects Fal Brook
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	5626m	**Ground Surface Visibility:**	35%
Total Area surveyed	45,008m²	**Archaeological Visibility:**	20%

Plate 76: Looking north east along TL easement.

Plate 77: Looking north east along TL easement.

Plate 78: Looking north west along TL easement.

Plate 79: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	37-6-4305, 37-3-0809 and 37-3-0810
Newly Recorded Sites:	MD-AS-01, MD-IF-01, MD-AS-02, MD-IF-02 & MD-AS-03/PAD (Camberwell Zone of High Potential).

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0 1.4 2.8
kilometres

Projection:
MGA Zone 56 (GDA 94)
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Figure 23: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	22	**Survey Area:**	Camberwell
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Creek Bank, Modified/Disturbed	**Distance to Watercourse:**	Intersects TL easement (Glennies Creek & Bowmans Creek).
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	2127m	**Ground Surface Visibility:**	25%
Total Area surveyed	17,016m²	**Archaeological Visibility:**	15%

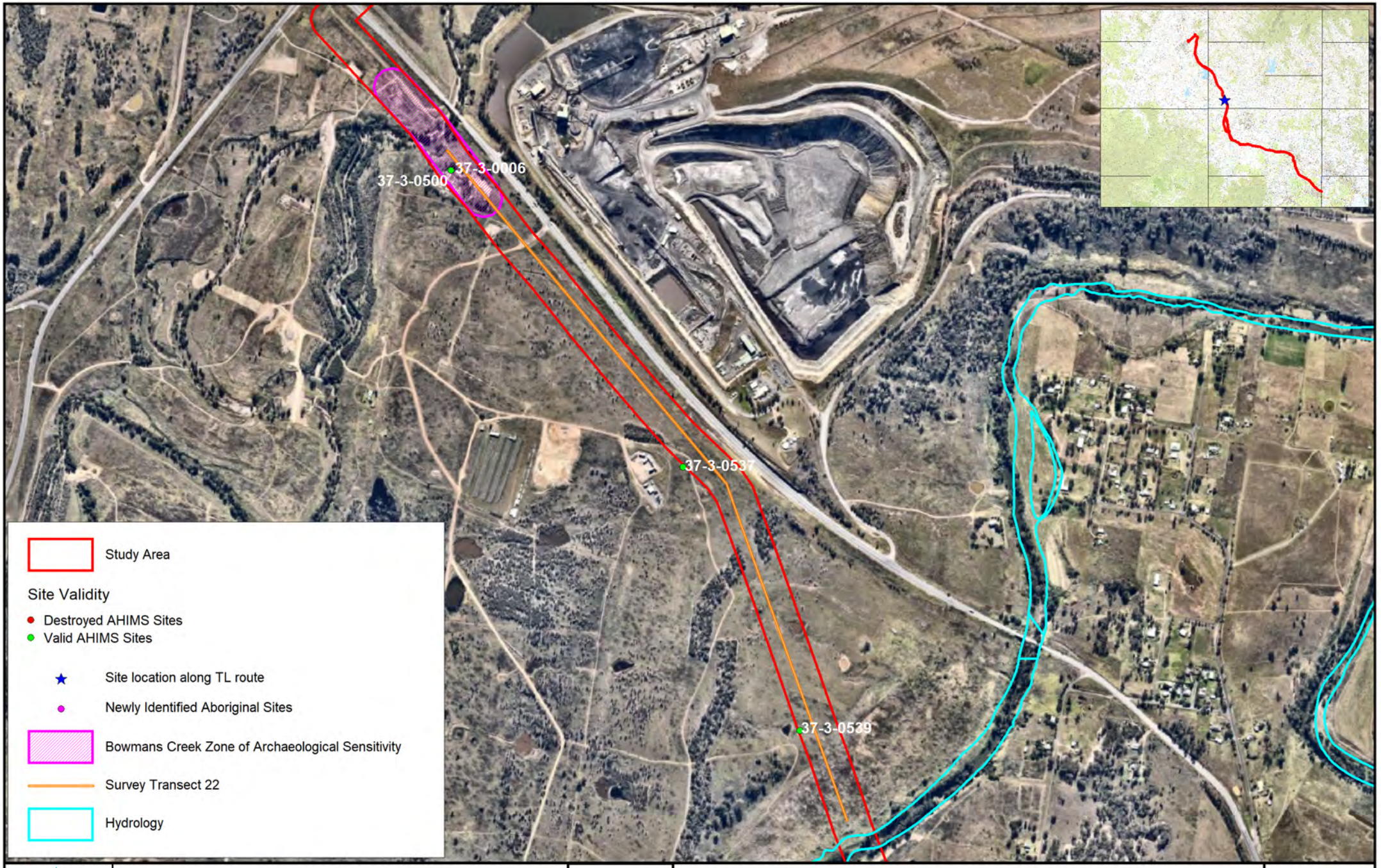
Plate 80: Looking north west along TL easement.

Plate 81: Looking north west along TL easement.

Plate 82: Looking north west along TL easement.

Plate 83: Looking north west along TL easement towards crossing point over Bowmans Creek.

AHIMS Sites within TL Study Area:	37-3-0539, 37-3-0537, 37-3-0500 & 37-3-0006
Site Complex:	Bowmans Creek Zone of Archaeological Sensitivity



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kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
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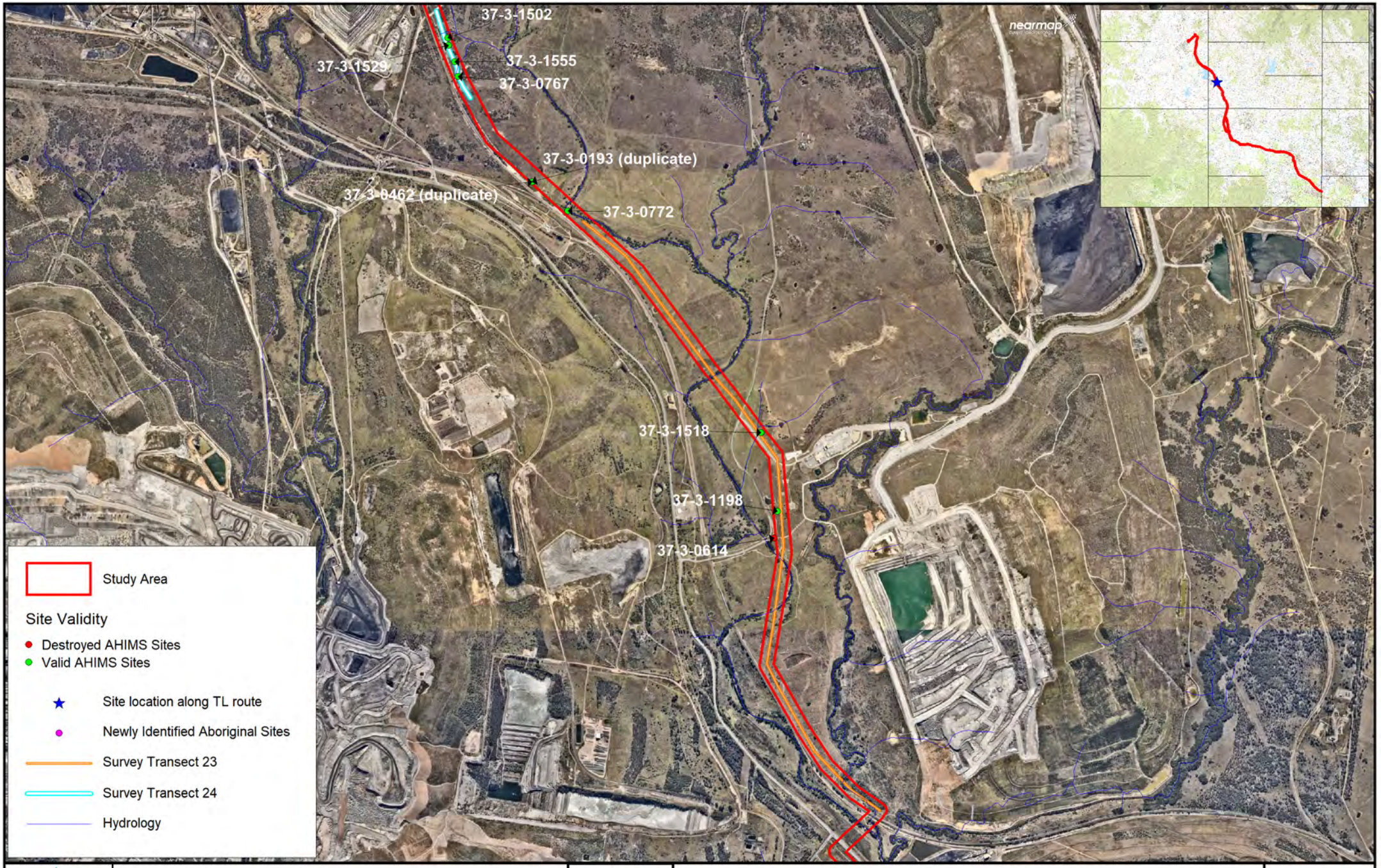
Figure 24: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	23	**Survey Area:**	Ravensworth
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	Intersect TL easement (Bowmans Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	1469m	**Ground Surface Visibility:**	40%
Total Area surveyed	11,752m²	**Archaeological Visibility:**	10%
			
Plate 84: Looking north west along TL easement.		Plate 85: Looking north west along TL easement.	
AHIMS Sites within TL Study Area:		37-3-0614, 37-3-1198, 37-3-1518, 37-3-0772, 37-3-0462 (duplicate) & 37-3-0193 (duplicate)	
Newly Recorded Sites:		None	

Survey Unit:	24	**Survey Area:**	Ravensworth
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	Intersect TL easement (Bowmans Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	673m	**Ground Surface Visibility:**	35%
Total Area surveyed	5384m²	**Archaeological Visibility:**	10%
			
Plate 86: Looking north west along TL easement.		Plate 87: Looking north west along TL easement.	
AHIMS Sites within TL Study Area:		37-3-0767, 37-3-1555, 37-3-1529 & 37-3-1502	
Newly Recorded Sites:		None	



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kilometres

Projection:
MGA Zone 56 (GDA 94)
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Near Maps 2024
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Figure 25: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	25	**Survey Area:**	Kurri Kurri STS
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	1.9km (Bowmans Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	1357m	**Ground Surface Visibility:**	20%
Total Area surveyed	10,856m²	**Archaeological Visibility:**	<1%
			
Plate 88: Looking north west along TL easement.		Plate 89: Looking north west along TL easement.	
AHIMS Sites within TL Study Area:		37-3-1162, 37-3-1160, 37-3-1151, 37-3-0454, 37-3-0711 & 37-3-0192	
Newly Recorded Sites:		None	

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0 1.25 2.5
kilometres

Projection:
MGA Zone 56 (GDA 94)
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Figure 26: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	26	**Survey Area:**	Hebden
Number of Survey Participants:	4		
Landform Element:	Flat/Modified/Disturbed	**Distance to Watercourse:**	2.9km (Bowmans Creek)
Slope:	Level-very gentle (<1.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels	**Ground Disturbance:**	High
Survey Unit Length:	3024m	**Ground Surface Visibility:**	35%
Total Area surveyed	24,192m²	**Archaeological Visibility:**	10%

Plate 90: Looking north west along TL easement.

Plate 91: Looking north west along TL easement.

Plate 92: Looking south east along TL easement.

Plate 93: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	37-2-2213, 37-2-2214, 37-2-2215, 37-2-2216, 37-2-2217 & 37-2-2218
Newly Recorded Sites:	None

PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 0.8 1.6

kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Near Maps 2024
Image Date: 23/10/2023
Final - Version 1

Figure 27: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	27	**Survey Area:**	Muswellbrook
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	Intersect TL easement (Muscle Creek)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	5006m	**Ground Surface Visibility:**	35%
Total Area surveyed	40,048m²	**Archaeological Visibility:**	5%

Plate 94: Looking south east over Wild Quarries site within TL easement.

Plate 95: Looking north west along TL easement.

Plate 96: Looking north east along TL easement.

Plate 97: Looking north west along TL easement.

AHIMS Sites within TL Study Area:	37-2-0098 & 37-2-1455
Newly Recorded Sites:	WR-IF-01

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NOWRA
NEW SOUTH WALES 2541

0 1.6 3.2
kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Near Maps 2024
Image Date: 23/10/2023
Final - Version 1

Figure 28: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Survey Unit:	28	**Survey Area:**	Muswellbrook
Number of Survey Participants:	4		
Landform Element:	Flat, Gentle Simple Slope, Modified/Disturbed	**Distance to Watercourse:**	1.7km (Hunter River)
Slope:	Gentle (>1.45°-5.45°)	**Vegetation:**	Cleared, Grass
Detection Limiting Factors:	Grass, Gravels, Leaf Litter	**Ground Disturbance:**	High
Survey Unit Length:	12,439m	**Ground Surface Visibility:**	35%
Total Area surveyed	99,512m²	**Archaeological Visibility:**	<1%

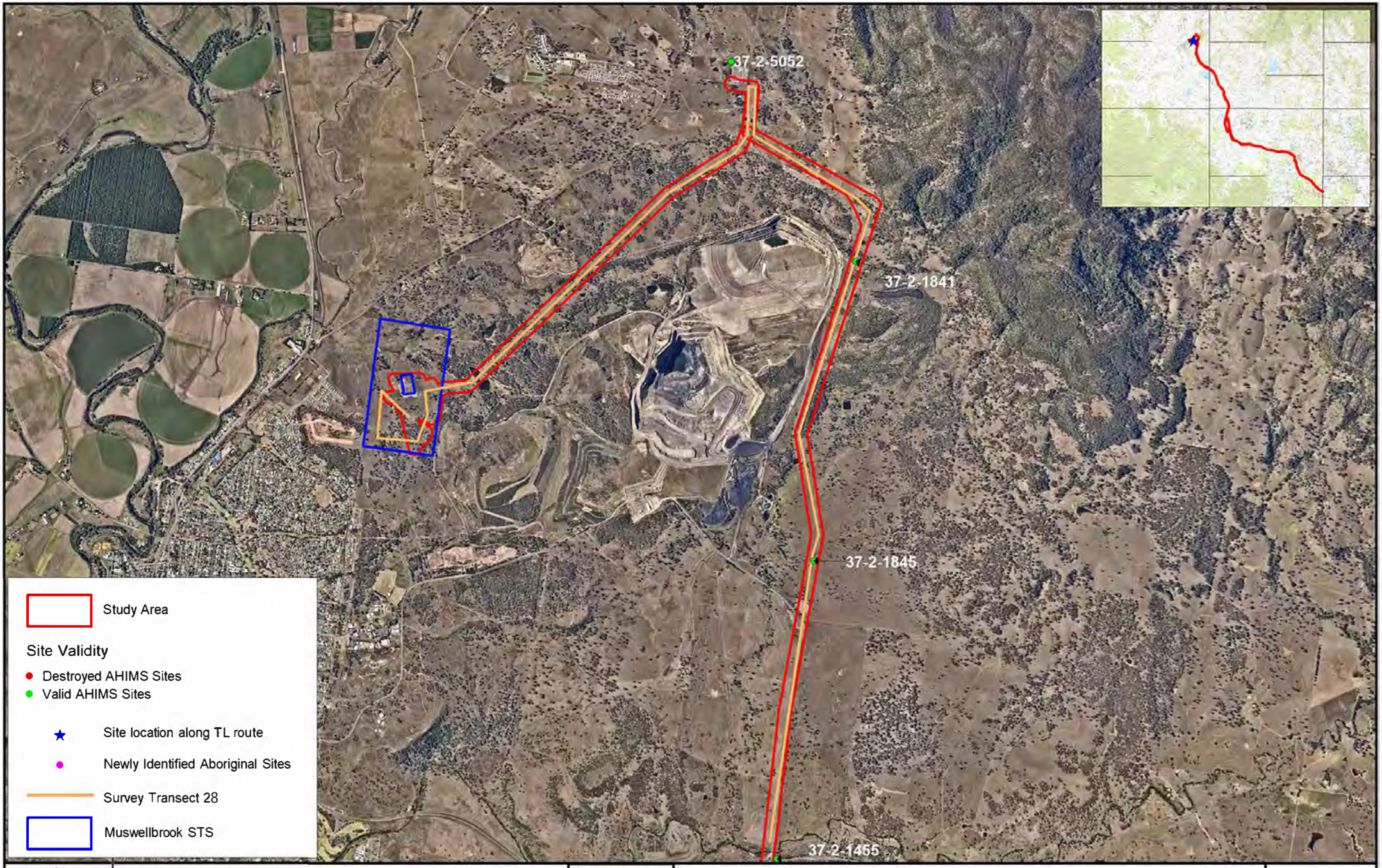
Plate 98:Looking north along TL easement.

Plate 99: Looking north east along TL easement.

Plate 100: Looking north east along TL easement

Plate 101: Looking south west towards Muswellbrook STS along TL easement.

AHIMS Sites within TL Study Area:	37-2-1845 & 37-2-1841
Newly Recorded Sites:	None



PO Box 236
NOWRA
NEW SOUTH WALES 2541

0 1.7 3.4
kilometres

Projection:
MGA Zone 56 (GDA 94)
Base Map:
Near Maps 2024
Image Date: 23/10/2023
Final - Version 1

Figure 29: Survey transect, AHIMS sites and newly identified Aboriginal sites.

N

Table 8: Survey units

Unit name	Landform Element	Number of participants	Total Length
Survey Unit 1	Flat/Modified/Disturbed	4	560m
Survey Unit 2	Flat/Modified/Disturbed	4	896m
Survey Unit 3	Gentle simple slope	4	1467m
Survey Unit 4	Flat/Modified/Disturbed	4	626m
Survey Unit 5	Gentle simple slope/ rolling hills/ creek bank	4	3677m
Survey Unit 6	Gentle simple slope/ Flat/Modified/Disturbed	4	2022m
Survey Unit 7	Flat/Gentle simple slope/Modified/ Disturbed	4	1491m
Survey Unit 8	Flat/Gentle simple slope/Modified/ Disturbed	4	2207m
Survey Unit 9	Flat/Gentle simple slope/Modified/ Disturbed/Creek bank	4	3224m
Survey Unit 10	Flat/Modified/Disturbed	4	1525m
Survey Unit 11	Flat/Gentle simple slope/Modified/ Disturbed/Creek bank	4	1088m
Survey Unit 12	Flat/Gentle simple slope/Modified/ Disturbed	4	3989m
Survey Unit 13	Flat/Gentle simple slope/Modified/ Disturbed	4	3489m
Survey Unit 14	Flat/ Modified/ Disturbed/Creek Bank	4	731m
Survey Unit 15	Flat/Gentle simple slope/Modified/ Disturbed	4	799m
Survey Unit 16	Flat/Gentle simple slope/Modified/ Disturbed	4	2843m
Survey Unit 17	Flat/Gentle simple slope/Modified/ Disturbed	4	5971m
Survey Unit 18	Flat/Modified/ Disturbed	4	243m
Survey Unit 19	Flat/Gentle simple slope/Modified/ Disturbed/Terrace	4	3072m
Survey Unit 20	Flat/Modified/ Disturbed	4	2819m
Survey Unit 21	Flat/Gentle simple slope/Creek Bank/ Modified/ Disturbed	4	5626m
Survey Unit 22	Flat/Gentle simple slope/Creek Bank/ Modified/ Disturbed	4	2127m
Survey Unit 23	Flat/Gentle simple slope/Modified/ Disturbed	4	1469m
Survey Unit 24	Flat/Gentle simple slope/Modified/ Disturbed	4	673m
Survey Unit 25	Flat/gentle simple slope/Modified/ Disturbed	4	1357m
Survey Unit 26	Flat/Modified/Disturbed	4	3024m
Survey Unit 27	Flat/Gentle simple slope/Modified/ Disturbed	4	5006m
Survey Unit 28	Flat/Gentle simple slope/Modified/ Disturbed	4	12439m

During the survey completed by Apex Archaeology the study area was inspected for Aboriginal archaeological evidence. An assessment of landform element and slope was made for the study area, with the results presented in

Table 9.

The total survey coverage (meaning the areas physically inspected for archaeological evidence) was approximately 595,680m^2. A range of factors were considered and recorded during the survey, including the surface visibility (percentage of bare ground within a survey unit); archaeological visibility (amount of bare ground within an area in which artefacts could be expected to be identified if present); exposure type (A or B soil horizon) and calculations of how effective the survey coverage was. The results of the survey coverage are presented in

Table 9.

Table 9: Survey coverage results

Survey Area #	Total Area Surveyed (m²)	Surface Visibility (%)	Arch Vis (%)	Exposure Type (A/B)	Effective Coverage (m²)	% Total Effective Survey Coverage of Context
SU 1	4480	35	1	A and B	15.68	0.35
SU 2	7168	45	1	A and B	32.25	0.44
SU 3	11,736	25	5	A and B	146.7	1.25
Su 4	5008	20	5	A and B	50.08	1
SU 5	29,416	25	20	A and B	1470.8	5
SU 6	16,176	20	5	A and B	485.28	3
SU 7	11,928	30	10	A and B	357.84	3
SU 8	17,656	35	15	A and B	926.94	5.25
SU 9	25,792	40	10	A and B	1031.68	4
SU 10	12,200	25	5	A and B	152.5	1.25
SU 11	8704	40	20	A and B	696.32	7.9
SU 12	31,912	30	10	A and B	957.36	3
SU 13	27,912	20	15	A and B	837.36	3
SU 14	5848	15	1	A and B	8.77	0.1
SU 15	6392	30	5	A and B	95.88	1.5
SU 16	22,744	15	5	A and B	170.58	0.75
SU 17	47,768	35	20	A and B	3343.76	7
SU 18	1944	10	5	A and B	9.72	0.5
SU 19	24,576	35	20	A and B	1720.32	7
SU 20	22,552	35	10	A and B	1578.64	7
SU 21	45,008	35	20	A and B	3150.56	7
SU 22	17,016	25	15	A and B	638.1	3.75
SU 23	11,752	40	10	A and B	470.08	4
SU 24	5384	35	10	A and B	188.44	3.5
SU 25	10,856	20	1	A and B	379.96	3.5
SU 26	24,192	35	10	A and B	846.72	3.5
SU 27	40,048	35	5	A and B	700.84	1.75
SU 28	99,512	35	1	A and B	348.29	0.3

Surface visibility across the study areas was limited due to surface vegetation such as exotic grasses, leaf litter, gravels and weeds.

5.4 Survey Results

The area has clearly been disturbed by previous transmission line construction and vegetation maintenance, mining related activities, rail infrastructure, road construction and upgrades along with sub surface telecommunication cabling (Telstra copper cable & fibre optic cable) and farming/agricultural activities. More noticeable disturbance was evident within the southern and northern portions of the transmission line route; however there was still a moderate level of disturbance within the central portion of the transmission line route. Given the entirety of the

study area is within previously constructed transmission line easement, the levels of disturbance were assessed as being overall quite high.

Ground surface visibility (GSV) was moderate throughout the study area. GSV was rated from a range of 10 to 45% overall. Raw material sources (silcrete cobbles and IMST cobbles) were identified within areas of archaeological sensitivity around the Hunter River within the raised terrace areas of Gouldsville and Glennies Creek.

Table 10: Previously recorded AHIMS sites that were relocated during the site survey work.

Site ID	Site Name	Site Type	Relocated	Comment
37-3-0192	Telecom site 4;	Isolated find	No	Site relocated but artefact not identified site likely impacted by rail corridor works.
37-3-0193/ 37-3-0462	Telecom site 5; Davies Site 5	Artefact scatter	No	Valid Site
37-3-0537	Ashton High Ridge Workshop site (EWA 86)	Artefact scatter/PAD	No	Valid Site
37-3-0539	Ashton Glennies Flats site 1	Artefact scatter	No	Valid Site
37-3-0711	SP2 (Liddell Mine)	Artefact scatter	No	Valid Site
37-5-0179	NW 1;	Artefact scatter	No	Valid Site
37-6-0020	Mt Thorley;	Artefact scatter	Yes	Valid Site
37-6-0154	Mt Thorley; Mt Thorley D;	Artefact scatter	No	Valid Site
37-6-0677	Wark-1	Artefact scatter/PAD	Yes	Valid Site
37-6-0682	Wark-2	Isolated find	Yes	Site relocated within mine site. Artefacts no relocated
37-6-1439	JP 12	Artefact scatter/PAD	Yes	Valid Site
37-6-1442	JP 21	Artefact scatter	No	Valid Site
37-6-1644	Swamp Creek Catchment 5	Artefact scatter/PAD	Yes	Site highly disturbed – no artefacts identified -Site card update required
37-6-1645	Swamp Creek Catchment 4	Artefact scatter/PAD	Yes	Site likely destroyed – Site card update required
37-3-0006	Camberwell Bowman's Creek	Artefact scatter	Yes	Site complex should be avoided and conserved.
37-3-0500	ASH4 Waterhole Site same as 37-3-0006	Artefact scatter/Grinding grooves	Yes	Site complex should be avoided and conserved.

Site ID	Site Name	Site Type	Relocated	Comment
37-3-0767	Bowmans Ck 12	Artefact scatter	Yes	Valid Site
37-3-0772	Bowmans Ck 16	Rock engraving	No	Valid Site (Conserve and avoid)
37-3-0809	SA8/10, SA8/12, SA8/14	Artefact scatter/ Grinding grooves	No	Valid site (potential grinding groove not relocated).
37-3-0810	SA1/8-SA1/11, SA4/2, SA11/1-SA11/6	Artefact scatter/PAD	No	Outside easement
37-3-1198	MOCO OS-10	Artefact scatter	Yes	Site fenced and conserved
37-3-1502	Bowmans Creek 6	Artefact scatter	Yes	Valid Site
37-3-1518	Glendell North IF18	Isolated find/PAD	Yes	Site fenced and conserved
37-3-1529	Glendell North IF7	Isolated find	Yes	Valid Site
37-3-1555	Glendell North OS10	Artefact scatter	Yes	Valid Site
37-6-0866	KK-IF-1	Isolated find	No	Site likely destroyed by Hunter Expressway development
37-6-1802	MU2B	Artefact scatter	No	Valid Site
37-6-2007	KR04	Isolated find	No	Valid Site
37-6-2009	KR06	Artefact scatter	Yes	Site highly impacted and likely destroyed – site card update required
37-6-2010	KR07	Artefact scatter	Yes	Surface collection has occurred
37-6-2011	KR08	Artefact scatter	Yes	Surface collection has occurred
37-6-2012	KR08a	Artefact scatter	Yes	Surface collection has occurred
37-6-2013	KR09	Artefact scatter	Yes	Surface collection has occurred
37-6-2014	KR10	Artefact scatter/PAD	Yes	Surface collection has occurred
37-6-2015	KR11	Grinding groove	Yes	Not a site – site card update required
37-6-2016	KR12	Artefact scatter/PAD	Yes	Surface collection and test excavation has occurred
37-6-2017	KR13	Artefact scatter/PAD	Yes	Surface collection and test excavation has occurred
37-6-2064	KR59	Artefact scatter	Yes	Valid Site
37-6-2066	KR61	Artefact scatter	Yes	Valid Site
37-6-2067	KR62	Artefact scatter	Yes	Valid Site

Site ID	Site Name	Site Type	Relocated	Comment
37-6-2151	Branxton Rail 3	Artefact scatter	Yes	Site destroyed ASIRF submitted – incorrect validity on AHIMS
37-6-2154	Branxton Rail 6	Isolated find	No	Valid – Not relocated
37-6-2159	Branxton Rail 11	Isolated find	No	Site destroyed – ASRIF submitted AHIMS needs to update validity
37-6-2160	Branxton Rail 12	Isolated find	No	Site destroyed – ASRIF submitted AHIMS needs to update validity
37-2-0543	Telecom site 3	Isolated find	No	Valid Site
37-2-2213	AN3	Artefact Scatter	No	Valid Site
37-2-2214	AN4	Artefact Scatter	No	Valid Site
37-2-2215	AN5	Artefact Scatter	No	Valid Site
37-2-2216	AN6	Artefact Scatter	No	Valid Site
37-2-2217	AN7	Artefact Scatter	Yes	Valid Site
37-2-2218	AN8	Artefact Scatter	Yes	Valid Site
37-2-0098	Black Hill Muscle Creek	Artefact Scatter	No	Valid Site
37-2-1455	NH2	Artefact Scatter	No	Valid Site
37-2-1845	MW-IF-1	Isolated Find	No	Valid Site
37-2-1841	MWOS3	Artefact Scatter	No	Valid Site
37-6-2269	Maitland to Minimbah X3	Artefact scatter	no	Site highly impacted/disturbed and likely destroyed - site card update required
37-6-2935	KR63	Artefact scatter	Yes	Results are from test excavation area identified – sub surface potential confirmed
37-6-3077	MTW-503	Isolated find	Yes	Valid Site
37-6-3078	MTW-502	Isolated find	Yes	Valid Site
37-6-3081	MTW-499	Isolated find	Yes	Valid Site
37-6-3100	MTW-470	Isolated find	Yes	Valid Site
37-6-3101	MTW-469	Isolated find	Yes	Valid Site
37-6-3103	MTW-467	Artefact scatter	Yes	Valid Site
37-6-3156	MTW-481	Isolated find	Yes	Valid Site
37-6-3157	MTW-480	Isolated find	Yes	Valid Site
37-6-3158	MTW-479	Isolated find	Yes	Valid Site
37-6-3159	MTW-478	Isolated find	Yes	Valid Site
37-6-3161	MTW-476	Isolated find	Yes	Valid Site
37-6-3162	MTW-475	Isolated find	Yes	Valid Site
37-6-3163	MTW-474	Artefact scatter	Yes	Valid Site
37-6-3436	HVO-1293	Artefact scatter	Yes	Valid Site
37-6-3437	HVO-1294	Isolated find	Yes	Valid Site

Site ID	Site Name	Site Type	Relocated	Comment
37-6-3438	HVO-1295	Isolated find	Yes	Valid Site
37-6-3439	HVO-1296	Artefact scatter/PAD	Yes	Valid Site
37-6-3440	HVO-1297	Artefact scatter	Yes	Valid Site
37-6-3441	HVO-1298	Artefact scatter	Yes	Valid Site
37-6-3443	HVO-1300	Artefact scatter	Yes	Valid Site
37-6-3453	HVO-1310	Isolated find	Yes	Valid Site
37-6-3492	HVO-1350	Isolated find (axe)	No	Valid Site
37-6-3835	Mudies Creek Artefact 01	Artefact scatter/ contact site	No	Southern side of Mitchell Line of Road will not be impacted
37-6-3875	NEH IF 01	Isolated find	Yes	Site highly impacted and likely destroyed – no artefacts identified – site card update required
37-6-3914	NBR/NEH/GH/1	Artefact scatter	Yes	Site highly impacted and likely destroyed – no artefacts identified – site card update required
37-6-3966	Mudies Creek Potential Archaeological Deposit	Artefact scatter/PAD	No	Southern side of Mitchell Line of Road will not be impacted
37-6-4020	2010-HVOSE-12	Artefact scatter	Yes	Site Valid
37-6-4022	2010-HVOSE-14	Artefact scatter	Yes	Site Valid
37-6-4023	2010-HVOSE-15	Artefact scatter	Yes	Site Valid
37-6-4038	2010-HVOSE-16	Artefact scatter	Yes	Site Valid
37-6-4040	2010-HVOSE-05	Artefact scatter	Yes	Site Valid
37-6-4042	2010-HVOSE-07	Artefact scatter	Yes	Site Valid
37-6-4045	HVO-1421	Isolated find	Yes	Site Valid
37-6-4051	HVO-1689	Isolated find	Yes	Site Valid
37-6-4071	HVO-1425	Isolated find	Yes	Site Valid
37-6-4073	HVO-1422	Artefact scatter	Yes	Site Valid
37-6-4249	Mudies Creek Artefact 02	Artefact scatter	No	Southern side of Mitchell Line of Road will not be impacted
37-6-4305	MD028	Isolated find	No	Valid site

5.5 New Sites

Twenty six additional new sites were identified during the survey (Table 11). These comprised sixteen artefact scatters, nine isolated finds and one artefact scatter with PAD.

Table 11: Newly identified Aboriginal sites located within the study area.

Site ID	Site Name	Site Type	Context
Pending	CR-AS-01	Artefact Scatter	Open Site
Pending	CR-IF-01	Isolated Find	Open Site
Pending	CR-AS-02	Artefact Scatter	Open Site
Pending	CR-IF-02	Isolated Find	Open Site
Pending	CR-AS-03	Artefact Scatter	Open Site
Pending	TL-IF-01	Isolated Find	Open Site
Pending	TL-IF-02	Isolated Find	Open Site
Pending	PH-AS-01	Artefact Scatter	Open Site
Pending	PH-AS-02	Artefact Scatter	Open Site
Pending	EC-AS-01	Artefact Scatter	Open Site
Pending	EC-AS-02	Artefact Scatter	Open Site
Pending	SSTS-AS-01	Artefact Scatter	Open Site
Pending	KL-IF-01	Isolated Find	Open Site
Pending	KL-AS-02	Artefact Scatter	Open Site
Pending	KL-IF-02	Isolated Find	Open Site
Pending	KL-AS-03	Artefact Scatter	Open Site
Pending	SSTS-AS-02	Artefact Scatter	Open Site
Pending	SSTS-AS-03	Artefact Scatter	Open Site
Pending	SSTS-AS-04	Artefact Scatter	Open Site
Pending	SSTS-AS-05	Artefact Scatter	Open Site
Pending	MD-AS-01	Artefact Scatter	Open Site
Pending	MD-IF-01	Isolated Find	Open Site
Pending	MD-AS-02	Artefact Scatter	Open Site
Pending	MD-IF-02	Isolated Find	Open Site
Pending	MD-AS-03	Artefact Scatter/PAD	Open Site
Pending	WR-IF-01	Isolated Find	Open Site

CR-AS-01 (AHIMS # PENDING)

Artefact scatter located within the transmission line easement approximately 750m north of Lovedale Road and approximately 134m south west of Camp Road. Two artefacts identified.

Plate 102: Context shot of CR-AS-01 looking north along TL easement.

Plate 103: Silcrete core and flake associated with CR-AS-01.

CR-IF-01 (AHIMS # PENDING)

Isolated find located 1.2km north west of Lovedale Road within the transmission line easement and approximately 56m south west of Camp Road.

Plate 104: Context shot of CR-IF-01 looking north within TL easement.

Plate 105: Silcrete flake associated with CR-IF-01

CR-AS-02 (AHIMS # PENDING)

Artefact scatter located approximately 1.4km north west of Lovedale Road and 40m from Camp Road along the transmission line easement. Three artefacts identified.

Plate 106: Looking north along the TL easement across location of CR-AS-02.

Plate 107: IMSCT flake and Silcrete flakes associated with CR-AS-02

CR-IF-02 (AHIMS # PENDING)

Isolated find 420m north of Camp Road and 24m west of the Hunter Express Way within the TL easement.

Plate 108: Context shot location of CR-IF-02 within the TL easement looking south.

Plate 109: Silcrete flake (ventral & dorsal surface) associated with CR-IF-02

CR-AS-03 (AHIMS 37-6-1308)

Artefact scatter located at AHIMS site 37-6-1308. Site location was salvaged in 2010 by Umwelt as a part of the Hunter Expressway works; however was not updated on AHIMS as destroyed. Artefacts identified during the current assessment are located within the same location as AHIMS site 37-6-1308 and as such a new site recording will not be made. Site is located 1.3km south of Tuckers Lane and approximately 30m west of the Hunter Expressway. Two artefacts identified.

Plate 110: Looking south over CR-AS-03 (AHIMS site 37-6-1308).

Plate 111: Silcrete flake and IMSTC proximal flake associated with CR-AS-03 (AHIMS site 37-6-1308).

TL-IF-01 (AHIMS # PENDING)

Isolated find located along the TL easement approximately 150m north of Tuckers Lane and 500m west of the Hunter Expressway.

Plate 112: Looking north over context location of TL-IF-01.

Plate 113: Silcrete flake associated with TL-IF-01

TL-IF-02 (AHIMS # PENDING)

Isolated find located approximately 430m north of Tuckers Lane and 480m west of the Hunter Express Way. Site is situated on the southern terrace of Sawyers Creek within the TL easement.

Plate 114: Looking north over TL-IF-02.

Plate 115: IMSTC flake associated with TL-IF-02

PH-AS-01 (AHIMS # PENDING)

Artefact scatter located 340m east of Pothana Road and 350m south of the New England Highway within the TL easement. Two artefacts identified.

Plate 116: Looking west over PH-AS-01 within TL easement.

Plate 117: Silcrete flakes associated with PH-AS-01

PH-AS-02 (AHIMS # PENDING)

Artefact Scatter located 20m east of Pothana Road and approximately 235m south of the New England Highway. Two items forming a conjoin artefact identified.

Plate 118: Looking west over PH-AS-01 within TL easement.

Plate 119: Silcrete flake (conjoin) associated with PH-AS-01

EC-AS-01 (AHIMS # PENDING)

Artefact scatter located approximately 300m south west of the New England Highway and 1.3km east of the Main Northern Railway. Five artefacts identified.

Plate 120: Looking north west over EC-AS-01 along dam wall within TL easement.

Plate 121: Silcrete core, IMSTC core and silcrete flakes associated with EC-AS-01

EC-AS-02 (AHIMS # PENDING)

Artefact scatter located slightly outside of the TL easement approximately 262m south of the New England Highway and 730 east of the Main Northern Railway. Two artefacts identified.

Plate 122: Looking north over EC-AS-02.

Plate 123: Silcrete flakes associated with EC-AS-02.

SSTS-AS-01 (AHIMS # PENDING)

Artefact scatter located directly east of the Singleton STS site within the TL easement. Nine artefacts identified.

Plate 124: Looking north west over SSTS-AS-01 with the TL easement.

Plate 125: IMSTC flakes associated with SSTS-AS-01

KL-IF-01 (AHIMS # PENDING)

Isolated find located within farm paddock (109 Knodlers Lane) approximately 70m east of Knodlers Lane and 30m west of the TL easement.

Plate 126: Silcrete flake associated with KL-IF-01 (dorsal).

Plate 127: Silcrete flake associated with KL-IF-01 (ventral).

KL-AS-02 (AHIMS # PENDING)

Artefact scatter located within the TL easement 156m east of Knodlers Lane within 109 Knodlers Lane. Five artefacts identified.

Plate 128: Close up of artefacts from KL-AS-02

Plate 129: Silcrete flakes and IMSTC core associated with KL-AS-02

KL-IF-02 (AHIMS # PENDING)

Isolated find located within 109 Knodlers Lane. Site located approximately 190m east of Knodlers Lane.

Plate 130: Looking north over KL-IF-01 within TL easement.

Plate 131: IMSTC Core associated with KL-IF-02

KL-AS-03 (AHIMS # PENDING)

Artefact scatter approximately 270m east of Knodlers Lane either side of an unnamed drainage line within areas of exposure and on ant nests. Site consists of 25 artefacts (17 of silcrete and IMSTC – nine post contact glass).

Plate 132: Looking north over KL-AS-03.

Plate 133: Looking north over KL-AS-03..

Plate 134: IMSTC flake and glass flakes associated with KL-AS-03.

SSTS-AS-02 (AHIMS # PENDING)

Artefact scatter located 280m south east of the Singleton STS and 410m south of Maison Dieu Road. Site consists two items forming a conjoin IMSTC flake.

Plate 135: Context shot of IMSTC conjoin (SSTS-AS-01)

Plate 136: IMSCT conjoin flake associated with STS-AS-02

SSTS-AS-03 (AHIMS # PENDING)

Artefact scatter located on erosional scour within the TL easement. Site located approximately 870m south east of Singleton STS and 944m south of Maison Dieu Road. Fourteen artefacts identified.

Plate 137: Looking south over SSTS-AS-03 and close up context shot of IMSTC items.

Plate 138: IMSTC flakes associated with SSTS-AS-03

SSTS-AS-04 (AHIMS # PENDING)

Artefact scatter located on erosion scour within the easement. Site is located approximately 1km south east of the Singleton STS and 987m south of Maison Dieu Road. Nine artefacts identified. Artefacts located on the surface of erosion scours and area is not considered to have potential for subsurface deposits to be present.

Plate 139: Looking south over SSTS-AS-04 within TL easement

Plate 140: IMSTC flakes and core associated with SSTS-AS-04.

SSTS-AS-05 (AHIMS # PENDING)

Artefact scatter located along TL easement within area of severe erosion. Site located approximately 1.5km south east of Singleton STST and 1.4km south of Maison Dieu Road. Five artefacts identified. Artefacts located on the surface of erosion scours and area is not considered to have potential for subsurface deposits to be present.

Plate 141: SSTS-AS-05 close up and looking over severe erosional scour where items were identified.

Plate 142: IMSTC core, flake and Silcrete flake associated with SSTS-AS-05.

MD-AS-01 (AHIMS # PENDING)

Artefacts scatter located 1.7km north of Singleton STS within the TL easement. Two artefacts identified.

Plate 143: Close up of MD-AS-01.

Plate 144: Silcrete core and flake associated with MD-AS-01

MD-IF-01 (AHIMS # PENDING)

Isolated find located approximately 2.7km north of the singleton STS within the TL easement.

Plate 145: Looking north over MD-IF-01 within TL easement.

Plate 146: Silcrete core associated with MD-IF-01

MD-AS-02 (AHIMS # Pending)

Artefact scatter located along TL easement approximately 3.3km north of Singleton STS. Three artefacts identified.

Plate 147: Looking north over MD-AS-02 within TL easement.

Plate 148: IMSTC core, flake and mudstone flake associated with MD-AS-02

MD-IF-02 (AHIMS # PENDING)

Isolated find located approximately 3.9km north of the Singleton STS within the TL easement.

Plate 149: Silcrete core (MD-IF-02).

Plate 150: Silcrete core (MD-IF-02).

MD-AS-03 (AHIMS # PENDING)

Artefact scatter and area of PAD (Camberwell Zone of Archaeological Potential) located either side of unnamed drainage line associated with Glennies Creek. More than 100 artefacts identified. Site is located 1.1km south west of the New England Highway

Plate 151: Looking west over MD-AS-03.

Plate 152: Silcrete and IMSTC flakes associated with MD-AS-03

WR-IF-01 (AHIMS # PENDING)

Isolated find located approximately 85m south of Woodland Ridge Road within the TL easement.

Plate 153: Silcrete core (WR-IF-01).

Plate 154: Silcrete core (WR-IF-01).

5.5.1 ZONES OF ARCHAEOLOGICAL POTENTIAL/SENSITIVITY

As a result of the assessment and survey, a number of zones of archaeological potential or sensitivity were identified. This was generally based on the number of previously registered sites in close proximity and consideration of current archaeological evidence in association with assessment of the landform. These zones are discussed below.

MODERATE ZONE OF POTENTIAL (AMBS 2009)

This Moderate Zone of Archaeological potential was identified by AMBS (2009). The area is located from the Hunter Expressway and runs approximately 3.6km north west. The area has been previously archaeologically tested prior to pole

replacement/upgrades and this confirmed the area contained moderate artefact bearing deposits in some locations.

Black Creek

The Black Creek Zone is located around AHIMS site 37-6-2156 which is listed as destroyed but a high level of archaeological potential remains around Black Creek. This area likely represents an important place to the local Aboriginal community, based on feedback received during the site inspection and many previous assessments undertaken in the vicinity over the last 15 years.

Jerrys Plains Zone of Subsurface archaeological potential

This zone comprises a site complex of a number of individual and concentrations of artefact recordings undertaken by Scarp Archaeology in 2011. No report regarding these sites could be identified; however the area compromises a prolific archaeological resource spread over a large area with sub surface potential.

Gouldsville – Western Corridor – Archaeologically Sensitive Zone

This zone is approximately 2.4km long and consists of 17 previously recorded artefact scatter locations within a raised terrace on the southern side of the Hunter River. This area had been disturbed by prior land clearing activities and earthworks and access track construction associated with the existing transmission line route running through the area; however the archaeological resource is eroding from the ground and washing in from the sides in numerous areas. This area has seen some previous attempts to fence and delineate areas of sensitivity however the majority of the fencing is in a dilapidated state and further erosion and sheet wash within the area is causing severe site disturbance.

Gouldsville – Eastern Corridor – Archaeologically Sensitive Zone

This zone is approximately 640m long and consists of three previously recorded artefact scatter locations within a raised terrace on the southern side of the Hunter River. This area had been disturbed by prior land clearing activities and earthworks and access track construction associated with the existing transmission line route running through the area; however the archaeological resource is eroding from the ground and washing in from the sides in this area as well. Raw material resources are prolific along with artefact occurrences.

Knodlers Lane Zone of Moderate Potential 1

This zone is located within the property located at 109 Knodlers Lane. Three artefact sites were identified along with an area of moderate sub surface archaeological potential. Site is located along a raised area within the Transmission Line easement.

Knodlers Lane Zone of Moderate Potential 2

This zone is located on either side of an unnamed drainage line associated with the Hunter River within the property located at 863 Maison Dieu Road. This site has moderate potential for subsurface deposits, along with the fact it is a post contact site due to the presence of glass artefacts interspersed with stone objects.

CAMBERWELL ZONE OF HIGH POTENTIAL

This zone is located either side of an unnamed drainage line associated with Glennies Creek. Artefacts were eroding out of the edges of a scour. Deposit was prolific with more than 100 artefacts observed within a small area with the potential for high density subsurface deposits to occur within this area.

BOWMANS CREEK ZONE OF ARCHAEOLOGICAL SENSITIVITY

This zone has previously been identified as AHIMS sites 37-3-0500 & 37-3-0006. This area is an archaeological complex consisting of a prolific artefact scatter and grinding groove complex on the southern bank of Bowmans Creek. It was subject to a surface collection in 1979; however artefacts still remain on the ground surface. The area has been recommended for conservation and avoidance; however no management plan has been identified for this site. The grinding groves in this location are within fine grained sandstone and conglomerate sandstone which is very friable and cracking apart (Plate 155).

Plate 155: Grinding grooves within friable sandstone (AHIMS site 37-3-0500 & 37-3-0006).

5.6 DISCUSSION

A total of 26 new artefact sites were recorded during this assessment. These consisted of nine isolated finds and 15 artefact scatters and one artefact scatter (post contact site) with associated PAD and one prolific artefact scatter site with associated PAD. A further nine zones of archaeological potential/sensitivity were identified within the transmission line corridor.

5.6.1 KL-AS-03 (AHIMS # Pending)

This site was located within the newly identified Knodlers Lane Zone of Moderate Potential 2, with a number of stone artefacts interspersed with flaked glass items.

The assessment of glass pieces as Aboriginal glass artefacts is not straightforward for several reasons (Goward 2011; Munt 2022; Richardson 2004; White 2018):

- European materials used by Aboriginal people in the early historic phase are of the same types of materials used by Europeans and found in historical contexts (i.e. glass, ceramics);
- Glass and ceramics can fragment accidentally, resulting in flaking or damage with some traits similar to those of deliberate flaking or tool use;
- Randomly smashing a bottle can result in edges suitable for use as tools; it was not necessary to flake glass bottles to obtain useable pieces;
- Microscopic usewear and/or residues may identify glass or other fragments used as tools, but microscopic analysis will not identify materials which were by-products of flaking/breakage;
- Materials or objects used and discarded by Aboriginal people probably formed low density scatters which accumulated over a relatively short time span, of less than c.100 years. Focused knapping/breakage activities would have resulted in larger numbers of objects but would probably be of limited spatial extent. High density Contact/Historic Phase sites may be rare.

Criteria for identifying glass artefacts have been proposed and/or reviewed by several workers (Goward 2011; Harrison 2000; Munt 2022; Munt and Owen 2022; Richardson 2004; White 2018). Criteria include (not in order of importance):

- Available historical evidence – oral histories, historical documents – which support the presence of Aboriginal people at the location;
- The presence of associated contemporary materials – shell midden, fish hook technology, Contact phase rock art, scarred trees, stone artefacts, burials;
- Glass dateable to the late 18th and early 19th centuries, based on method of manufacture, makers' mark, colour, imperfections (e.g. bubbles);
- Presence of usewear and/or residues confirming use of glass as tools;
- Presence of technological attributes similar to those used to identify stone artefacts;
- Evidence of a reduction sequence – cores and flakes, worked and unworked fragments from the same bottle, refitting fragments, preference for thicker glass (bottle base or shoulder), evidence of systematic reduction;
- Presence of convincing retouch – continuous retouch, regular scar size, scar location on functional edges, regular orientation and initiation of scars, relative age of scars (e.g. scars as weathered as original glass surfaces);
- Absence of attributes related to unintentional damage – intermittent scars, large isolated scars, scars of irregular size, steep scars, crushing on high

points/parts of the object, scars less weathered than the original surface of the bottle;
- Context, including the absence of taphonomic processes related to incidental flaking – these may include animal trampling, vehicle traffic, agricultural activity, construction work, 19th century rubbish dumping.

In addition, the probability of an item being an Aboriginal glass artefact could be assessed, taking into account various information (Richardson 2004; White 2018). Glass items have:

- No or extremely low probability of being Aboriginal artefacts if they are of glass which was manufactured too recently, no flaking or modification is present, scars are newer (less weathered) than the original glass surfaces, or if all scarred edges are non-functional (located on the item in positions which would not have been practical for tool use or for flake production);
- Low probability if edge scars are irregular or in isolated locations, if any edges are in non-functional locations, or if found amongst numerous other varied historic/modern items;
- Moderate probability if glass is sufficiently old, and flaking resembles Aboriginal stone artefacts (cores, tools, debitage) with convincing retouch;
- High probability if glass dates to the late 18th or early 19th century, usewear and/or tool use residues are present, flaking resembles Aboriginal stone artefacts (cores, tools, debitage) with convincing retouch, evidence of a reduction sequence is present, and the items do not occur amongst European fill or rubbish.

With regard to the glass items identified at KL-AS-03 (AHIMS # pending), given the nature of the current assessment and the fact that items could not be removed from site for detailed microscopic and other analysis, it is difficult to definitively state that the glass items identified were culturally modified by Aboriginal people. However, given the context in which they were located, in association with other stone artefacts and away from rubbish or fill; and in an abundance of caution, the glass items have been recorded as Aboriginal contact artefacts.

6.0 Scientific Values and Significance Assessment

6.1 Introduction

The *Aboriginal cultural heritage consultation requirements for proponents 2010* acknowledge that:

- Aboriginal people have the right to maintain their culture, language, knowledge and identity
- Aboriginal people have the right to directly participate in matters that may affect their heritage
- Aboriginal people are the primary determinants of the cultural significance of their heritage

Undertaking consultation with Aboriginal people ensures that potential harm to Aboriginal objects and places from proposed developments is identified and mitigation measures developed early in the planning process.

6.1 Archaeological Significance

Archaeological or scientific significance relates to the value of archaeological objects or sites as they are able to inform research questions considered important to the archaeological community, which includes Aboriginal people, heritage consultants and academic researchers. The value of this type of significance is determined on how the objects and sites can provide information regarding how people in the past lived their lives. The criteria for archaeological significance assessment generally reflect the criteria of the ICOMOS Burra Charter.

6.2 Criteria

Archaeological significance is assessed based on the archaeological or scientific values of an area. These values can be defined as the importance of the area relating to several criteria. Criteria used for determining the archaeological significance of an area are as follows:

- **Research potential:** Can the site contribute to an understanding of the area/region and/or the state's natural and cultural history? Is the site able to provide information that no other site or resource is able to do?
- **Representativeness:** is the site representative of this type of site? Is there variability both inside and outside the study area? Are similar site types conserved?
- **Rarity:** is the subject area a rare site type? Does it contain rare archaeological material or demonstrate cultural activities that no other site can demonstrate? Is this type of site in danger of being lost?
- **Integrity/Intactness:** Has the site been subject to significant disturbance? Is the site likely to contain deposits which may possess intact stratigraphy?

Further, an assessment of the grade of significance is made, based on how well the item fulfils the assessment criteria. The Heritage Branch of the Department of Planning (now Heritage NSW) 2009 guideline *Assessing Significance for Historical Archaeological Sites and 'Relics'* defines the grading of significance as follows:

Table 12: Grading of significance, from Heritage Branch 2009

Grading	Justification
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness. Item can be interpreted relatively easily.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.
Moderate	Altered or modified elements. Elements with little heritage value but which contribute to the overall significance of the item.
Little/Low	Alterations detract from significance. Difficult to interpret.
Intrusive	Damaging to the item's heritage significance.

Whilst this was developed for the assessment of significance of historical items, the criteria are applicable to archaeological significance assessments as well. It is important to note that the below assessment is specific to Aboriginal cultural heritage and does not consider the non-Aboriginal significance of the site.

6.3 Significance Assessment

The significance of each site within the study area has been assessed and is presented in Table 13.

The assessment of significance is based on answering the questions outlined in Section 6.2 above.

Table 13: Summary of significance assessment for all sites within study area

Site ID	Research	Representativeness	Rarity	Integrity	Overall
37-3-0192	Low	Low	Low	Low	Low
37-3-0193/ 37-3-0462	Low	Low	Low	Low	Low
37-3-0537	Moderate	Low	Low	Low	Low
37-3-0539	Low	Low	Low	Low	Low
37-3-0711	Low	Low	Low	Low	Low
37-5-0179	Low	Low	Low	Low	Low
37-6-0020	Low	Low	Low	Low	Low
37-6-0154	Low	Low	Low	Low	Low
37-6-0677	Low	Low	Low	Low	Low
37-6-0682	Low	Low	Low	Low	Low
37-6-1439	Low	Low	Low	Low	Low
37-6-1442	Low	Low	Low	Low	Low
37-6-1644	Low	Low	Low	Low	Low
37-6-1645	Low	Low	Low	Low	Low
37-3-0006	Moderate	Moderate	High	Moderate	Moderate
37-3-0500	Moderate	Moderate	High	Moderate	Moderate
37-3-0767	Low	Low	Low	Moderate	Low
37-3-0772	High	High	High	Moderate	High

Site ID	Research	Representativeness	Rarity	Integrity	Overall
37-3-0809	Moderate	Moderate	Moderate	Moderate	Moderate
37-3-0810	Moderate	Moderate	Moderate	Moderate	Moderate
37-3-1198	Moderate	Moderate	Moderate	Moderate	Moderate
37-3-1502	Low	Low	Low	Low	Low
37-3-1518	Low	Low	Low	Low	Low
37-3-1529	Low	Low	Low	Low	Low
37-3-1555	Low	Low	Low	Low	Low
37-6-0866	Low	Low	Low	Low	Low
37-6-1802	Low	Low	Low	Low	Low
37-6-2007	Low	Low	Low	Low	Low
37-6-2009	Low	Low	Low	Low	Low
37-6-2010	Low	Low	Low	Low	Low
37-6-2011	Low	Low	Low	Low	Low
37-6-2012	Low	Low	Low	Low	Low
37-6-2013	Low	Low	Low	Low	Low
37-6-2014	Low	Low	Low	Low	Low
37-6-2015	Low	Low	Low	Low	Low
37-6-2016	Low	Low	Low	Low	Low
37-6-2017	Low	Low	Low	Low	Low
37-6-2064	Low	Low	Low	Low	Low
37-6-2066	Low	Low	Low	Low	Low
37-6-2067	Low	Low	Low	Low	Low
37-6-2151	Low	Low	Low	Low	Low
37-6-2154	Low	Low	Low	Low	Low
37-6-2159	Low	Low	Low	Low	Low
37-6-2160	Low	Low	Low	Low	Low
37-2-0543	Low	Low	Low	Low	Low
37-2-2213	Low	Low	Low	Low	Low
37-2-2214	Low	Low	Low	Low	Low
37-2-2215	Low	Low	Low	Low	Low
37-2-2216	Low	Low	Low	Low	Low
37-2-2217	Low	Low	Low	Low	Low
37-2-2218	Low	Low	Low	Low	Low
37-2-0098	Low	Low	Low	Low	Low
37-2-1455	Low	Low	Low	Low	Low
37-2-1845	Low	Low	Low	Low	Low
37-2-1841	Low	Low	Low	Low	Low
37-6-2269	Low	Low	Low	Low	Low
37-6-2935	Moderate	Moderate	Low	Moderate	Moderate
37-6-3077	Low	Low	Low	Low	Low
37-6-3078	Low	Low	Low	Low	Low
37-6-3081	Low	Low	Low	Low	Low
37-6-3100	Low	Low	Low	Low	Low
37-6-3101	Low	Low	Low	Low	Low
37-6-3103	Low	Low	Low	Low	Low
37-6-3156	Low	Low	Low	Low	Low
37-6-3157	Low	Low	Low	Low	Low
37-6-3158	Low	Low	Low	Low	Low
37-6-3159	Low	Low	Low	Low	Low
37-6-3161	Low	Low	Low	Low	Low
37-6-3162	Low	Low	Low	Low	Low
37-6-3163	Low	Low	Low	Low	Low

Site ID	Research	Representativeness	Rarity	Integrity	Overall
37-6-3436	Low	Low	Low	Low	Low
37-6-3437	Low	Low	Low	Low	Low
37-6-3438	Low	Low	Low	Low	Low
37-6-3439	Low	Low	Low	Low	Low
37-6-3440	Low	Low	Low	Low	Low
37-6-3441	Low	Low	Low	Low	Low
37-6-3443	Low	Low	Low	Low	Low
37-6-3453	Low	Low	Low	Low	Low
37-6-3492	Moderate	Moderate	High	Low	Moderate
37-6-3835	Moderate	Moderate	High	Moderate	Moderate
37-6-3875	Low	Low	Low	Low	Low
37-6-3914	Low	Low	Low	Low	Low
37-6-3966	Moderate	Moderate	Low	Moderate	Moderate
37-6-4020	Low	Low	Low	Low	Low
37-6-4022	Moderate	Low	Moderate	Low	Moderate
37-6-4023	Low	Low	Low	Low	Low
37-6-4038	Low	Low	Low	Low	Low
37-6-4040	Low	Low	Low	Low	Low
37-6-4042	Low	Low	Low	Low	Low
37-6-4045	Low	Low	Low	Low	Low
37-6-4051	Low	Low	Low	Low	Low
37-6-4071	Low	Low	Low	Low	Low
37-6-4073	Low	Low	Low	Low	Low
37-6-4249	Moderate	Moderate	Low	Moderate	Moderate
37-6-4305	Low	Low	Low	Low	Low
CR-AS-01	Low	Low	Low	Low	Low
CR-IF-01	Low	Low	Low	Low	Low
CR-AS-02	Low	Low	Low	Low	Low
CR-IF-02	Low	Low	Low	Low	Low
CR-AS-03	Low	Low	Low	Low	Low
TL-IF-01	Low	Low	Low	Low	Low
TL-IF-02	Low	Low	Low	Low	Low
PH-AS-01	Low	Low	Low	Low	Low
PH-AS-02	Low	Low	Low	Low	Low
EC-AS-01	Low	Low	Low	Low	Low
EC-AS-02	Low	Low	Low	Low	Low
SSTS-AS-01	Low	Low	Low	Low	Low
KL-IF-01	Moderate	Low	Low	Low	Low
KL-AS-02	Moderate	Low	Low	Low	Low
KL-IF-02	Moderate	Low	Low	Low	Low
KL-AS-03	Moderate	Moderate	High	Low	Moderate
SSTS-AS-02	Low	Low	Low	Low	Low
SSTS-AS-03	Low	Low	Low	Low	Low
SSTS-AS-04	Low	Low	Low	Low	Low
SSTS-AS-05	Low	Low	Low	Low	Low
MD-AS-01	Low	Low	Low	Low	Low
MD-IF-01	Low	Low	Low	Low	Low
MD-AS-02	Low	Low	Low	Low	Low
MD-IF-02	Low	Low	Low	Low	Low
MD-AS-03	Moderate	Moderate	Moderate	Moderate	Moderate
WR-IF-01	Low	Low	Low	Low	Low

Moderate zone of potential (AMBS 2009)

Although archaeological test excavation and surface collection has been completed within this zone, the surrounding area as mapped in this report (Figure 9) retains potential for additional archaeological material to be present. As such, the area is considered to have moderate research potential due to the presence of potential subsurface archaeological deposits, although any archaeological material recovered is considered to be of low representativeness and rarity. Integrity is low to moderate throughout the area, and overall this zone is considered to have moderate archaeological significance.

Black Creek

One previously recorded site is listed within this zone of archaeological sensitivity (Figure 15), but the site is listed as destroyed. However, the area is considered to have sensitivity due to the landform and potential for additional subsurface archaeological deposits to be present. Although any archaeological material recovered is likely to be of low representativeness and rarity, the area is considered to have moderate integrity and overall, the area is considered to have moderate archaeological significance.

Jerrys Plains Zone of Subsurface archaeological potential

Although individual sites within this zone may have been assessed as having overall low archaeological sensitivity, the wider zone is considered to have moderate research, representativeness, rarity and integrity and overall is considered to have moderate archaeological significance.

Gouldsville – Western Corridor – Archaeologically Sensitive Zone

This area contains a number of previously recorded sites which are generally individually assessed to be of low archaeological significance; however the wider zone is considered to have moderate potential for additional subsurface archaeological deposits to be present, which is assessed as having moderate research significance and representativeness, with low rarity and integrity. Overall, this zone is considered to have low-moderate archaeological significance.

Gouldsville – Eastern Corridor – Archaeologically Sensitive Zone

This area contains a number of previously recorded sites which are generally individually assessed to be of low archaeological significance; however the wider zone is considered to have moderate potential for additional subsurface archaeological deposits to be present, which is assessed as having moderate research significance and representativeness, with low rarity and integrity. Overall, this zone is considered to have low-moderate archaeological significance.

Knodlers Lane Zone of Moderate Potential 1

Several new sites were located within this area, which was considered to have moderate research potential. However, the site has low representativeness, rarity and integrity, and overall is considered to have low archaeological significance.

KNODLERS LANE ZONE OF MODERATE POTENTIAL 2

This site is considered to have moderate research potential, moderate representativeness, high rarity and moderate integrity. Sites with potential evidence of post-contact glass artefacts are rare within NSW. Overall the site is considered to have moderate archaeological significance.

CAMBERWELL ZONE OF HIGH POTENTIAL

This area was located around a newly identified site and is considered to have high potential for additional subsurface archaeological deposits to be present. As such, it is considered to have high research potential, moderate representativeness and rarity, and moderate integrity. Overall, this zone is considered to have moderate to high archaeological significance.

BOWMANS CREEK ZONE OF ARCHAEOLOGICAL SENSITIVITY

This zone of sensitivity is considered to have moderate research potential, high representativeness and rarity, and low integrity due to past archaeological work at the site. Overall, this zone of archaeological sensitivity is considered to have moderate archaeological significance.

6.4 STATEMENT OF ARCHAEOLOGICAL SIGNIFICANCE

The transmission line route for the proposed Hunter Renewable Energy Zone traverses an area rich in Aboriginal cultural heritage. There are areas of high disturbance with little to no archaeological significance, and other areas of moderate to high archaeological significance. Overall, it is acknowledged that a wealth of Aboriginal archaeological sites are present within the route itself and in the wider area, and this significant landscape should be protected wherever possible.

7.0 Impact Assessment & Mitigation Measures

7.1 Guiding Principles

Wherever possible and practicable, it is preferred to avoid impact to Aboriginal archaeological sites. In situations where conservation is not possible or practicable, mitigation measures must be implemented.

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013 (The Burra Charter) provides guidance for the management of culturally sensitive places. The Burra Charter is predominantly focussed on places of built heritage significance, but the principles are applicable to other places of significance as well.

The first guiding principle for management of culturally significant sites states that "places of cultural significance should be conserved" (Article 2.1). A cautious approach should be adopted, whereby only "as much as necessary but as little as possible" (Article 3.1) should be changed or impacted.

Mitigation measures depend on the significance assessment for the site. Cultural significance of sites should also be considered in consultation with the Aboriginal community during community consultation.

7.2 Proposed Development

The proposed works for the Hunter Renewable Energy Zone (REZ) project will be undertaken in two stages. The first stage will encompass a 132kV transmission line, pole replacements, access tracks, and upgrades of sub-transmission stations covering a distance of approximately 60 km from Singleton to Kurri. Two fibre-optic underground cables from Singleton to Muswellbrook will also be constructed within the existing overhead powerline easements.

The second stage of the proposed works will include the construction of a new Eastern Hub 132kV switching station comprising approximately 8 ha. This will connect with the Singleton to Kurri transmission line. Additional rearrangement of the existing Upper Hunter transmission network will also be necessary to connect between the new Eastern Hub and existing facilities in Muswellbrook. All these works will require pole replacements, access track works and vegetation clearing, as well as an upgrade to Muswellbrook sub-transmission substation with an extension to the existing yard.

This report includes, essentially, an options and constraints assessment, providing guidance regarding the known Aboriginal cultural heritage values within the study area. This will, in turn, guide the development of the detailed design of the overall project and inform the management and mitigation measures required to deliver the project appropriately. This ensures Aboriginal cultural heritage is considered at the earliest stages of the project, and allows avoidance wherever possible.

As such, a range of mitigation measures are suggested which can be further refined on completion of the detailed design.

7.3 Potential Mitigation Measures

Given the variety of sites identified within the transmission line corridor, and the potential for detailed design to be developed to avoid these or at least minimise impact, a range of mitigation measures are suggested below which may need to be enacted, depending on the proposed impact to the site. These would apply in instances where avoidance is not possible.

7.3.1 Surface Collection

Areas with surface expression of artefacts but without subsurface potential for archaeological deposits may require surface collection of these objects prior to impact occurring. This would require an approved AHIP to permit the collection to occur.

In some instances, surface collection may be proposed and permitted under an approved AHIP, but the artefacts associated with the site may no longer be present at the site due to taphonomic processes over the site in the years since its recording and the attempt to collect the item. In instances where an attempt for collection has been made, and the item cannot be recovered despite best efforts, no further archaeological mitigation would be required for the site and works that would impact the site may proceed.

7.3.2 Test Excavation

In areas where potential archaeological deposits (PADs) are located and impact cannot be avoided, test excavation would be necessary to determine the nature and extent of these deposits and to formulate appropriate mitigation measures. These may include unmitigated impact, salvage excavations, or avoidance of specific areas in favour of alternative areas.

Test excavations would require the excavation of 50cm x 50cm test excavation units within the proposed impact area. These may be combined if necessary to form a 1m^2 test pit. The number of excavation units required would depend on the extent of the proposed works within a specific area and would be refined following development of the final design.

7.3.3 Management Plan

A management plan for sites within the transmission line route should be prepared to provide guidance on future management of these sites. This would be informed by the detailed design of the infrastructure, but also provide guidance for unexpected finds within the area. This would include guidance for on-going, periodic monitoring of fencing, ideally prior to vegetation management occurring.

7.3.4 Zones of Archaeological Sensitivity

Many of the areas identified as archaeologically sensitive zones have been subject to previous test excavation, often at the location of existing poles. These test excavations have confirmed the presence of subsurface archaeological deposits, along with the presence of surface artefacts. As such, location of ground disturbing works outside of existing pole locations or ground disturbance (such as trenches) would require archaeological test excavation prior to the commencement of works. This testing would relate to the proposed impacts and would be determined once potential impacts are understood.

7.3.5 Fencing

In some instances, avoidance will be possible. Wherever surface artefact concentrations can be avoided by the proposed works, including vegetation management works, the extent of the concentration should be fenced to prevent unintentional impact. Ideally fencing would be robust, visible, and signed to ensure no impact occurs to these sites.

Existing fencing for known sites should be reviewed and updated as necessary to provide appropriate protection to the site.

7.4 Known Site Management

The following table outlines the known sites within the transmission line route and recommended management actions for each, if avoidance is not possible. This assumes that avoidance has been considered and is not feasible. Justification of why avoidance is not possible would be necessary.

Table 14: Valid sites within TL route

AHIMS #	Site Name	Features	Suggested Management
37-3-0192	Telecom site 4;	Isolated find	Surface collection; unmitigated impact
37-3-0193/ 37-3-0462	Telecom site 5; Davies Site 5	Artefact scatter	Surface collection; unmitigated impact
37-3-0537	Ashton High Ridge Workshop site (EWA 86)	Artefact scatter/PAD	Test excavation; surface collection
37-3-0539	Ashton Glennies Flats site 1	Artefact scatter	Surface collection; unmitigated impact
37-3-0711	SP2 (Liddell Mine)	Artefact scatter	Surface collection; unmitigated impact
Gouldsville Western Corridor Archaeological Sensitivity			
37-5-0179	NW 1;	Artefact scatter	Test excavation; surface collection
37-6-3436	HVO-1293	Artefact scatter	Test excavation; surface collection
37-6-3437	HVO-1294	Isolated find	Test excavation; surface collection
37-6-3438	HVO-1295	Isolated find	Test excavation; surface collection
37-6-3443	HVO-1300	Artefact scatter	Test excavation; surface collection
37-6-3492	HVO-1350	Isolated find	Test excavation; surface collection
37-6-4020	2010-HVOSE-12	Artefact scatter	Test excavation; surface collection
37-6-4022	2010-HVOSE-14	Artefact scatter	Test excavation; surface collection
37-6-4023	2010-HVOSE-15	Artefact scatter	Test excavation; surface collection
37-6-4038	2010-HVOSE-16	Artefact scatter	Test excavation; surface collection
37-6-4045	HVO-1421	Isolated find	Test excavation; surface collection
37-6-4071	HVO-1425	Isolated find	Test excavation; surface collection
37-6-4073	HVO-1422	Artefact scatter	Test excavation; surface collection
37-6-0020	Mt Thorley;	Artefact scatter	Surface collection; unmitigated impact
37-6-0154	Mt Thorley; Mt Thorley D;	Artefact scatter	Surface collection; unmitigated impact
37-6-0677	Wark-1	Artefact scatter/PAD	Test excavation; surface collection
37-6-0682	Wark-2	Isolated find	Surface collection; unmitigated impact

AHIMS #	Site Name	Features	Suggested Management
37-6-1439	JP 12	Artefact scatter/PAD	Test excavation; surface collection
37-6-1442	JP 21	Artefact scatter	Surface collection; unmitigated impact
37-6-1644	Swamp Creek Catchment 5	Artefact scatter/PAD	Test excavation; surface collection
37-6-1645	Swamp Creek Catchment 4	Artefact scatter/PAD	Test excavation; surface collection
Bowmans Creek Zone of Archaeological Sensitivity			
37-3-0006	Camberwell Bowman's Creek	Artefact scatter	Test excavation; surface collection
37-3-0500	ASH4 Waterhole	Artefact scatter/Grinding grooves	Surface collection; fence grinding grooves; test excavation
37-3-0767	Bowmans Ck 12	Artefact scatter	Surface collection; unmitigated impact
37-3-0772	Bowmans Ck 16	Rock engraving	Fence
37-3-0809	SA8/10, SA8/12, SA8/14	Artefact scatter/ Grinding grooves	Surface collection; fence grinding grooves
37-3-0810	SA1/8-SA1/11, SA4/2, SA11/1-SA11/6	Artefact scatter/PAD	Test excavation; surface collection
37-3-1198	MOCO OS-10	Artefact scatter	Surface collection; unmitigated impact
37-3-1502	Bowmans Creek 6	Artefact scatter	Surface collection; unmitigated impact
37-3-1518	Glendell North IF18	Isolated find/PAD	Test excavation; surface collection
37-3-1529	Glendell North IF7	Isolated find	Surface collection; unmitigated impact
37-3-1555	Glendell North OS10	Artefact scatter	Surface collection; unmitigated impact
37-6-0866	KK-IF-1	Isolated find	Surface collection; unmitigated impact
37-6-1802	MU2B	Artefact scatter	Surface collection; unmitigated impact
37-6-2007	KR04	Isolated find	Surface collection; unmitigated impact
37-6-2009	KR06	Artefact scatter	Surface collection; unmitigated impact
37-6-2010	KR07	Artefact scatter	Surface collection; unmitigated impact
37-6-2011	KR08	Artefact scatter	Surface collection; unmitigated impact
Moderate Zone of Archaeological Potential (AMBS 2009)			
37-6-2012	KR08a	Artefact scatter	Test excavation; surface collection
37-6-2013	KR09	Artefact scatter	Test excavation; surface collection
37-6-2014	KR10	Artefact scatter/PAD	Test excavation, surface collection
37-6-2015	KR11	Grinding groove	Fence site
37-6-2016	KR12	Artefact scatter/PAD	Test excavation, surface collection
37-6-2017	KR13	Artefact scatter/PAD	Test excavation, surface collection

AHIMS #	Site Name	Features	Suggested Management
37-6-2935	KR63	Artefact scatter	Test excavation; surface collection; salvage excavations
37-6-2066	KR61	Artefact scatter	Surface collection; unmitigated impact
37-6-2067	KR62	Artefact scatter	Surface collection; unmitigated impact
37-6-2151	Branxton Rail 3	Artefact scatter	Surface collection; unmitigated impact
37-6-2154	Branxton Rail 6	Isolated find	Surface collection; unmitigated impact
37-6-2159	Branxton Rail 11	Isolated find	Surface collection; unmitigated impact
37-6-2160	Branxton Rail 12	Isolated find	Surface collection; unmitigated impact
37-6-2269	Maitland to Minimbah X3	Artefact scatter	Surface collection; unmitigated impact
37-6-3077	MTW-503	Isolated find	Surface collection; unmitigated impact
37-6-3078	MTW-502	Isolated find	Surface collection; unmitigated impact
37-6-3081	MTW-499	Isolated find	Surface collection; unmitigated impact
Jerrys Plain Zone of Subsurface Archaeological Potential			
37-6-2064	KR59	Artefact scatter	Test excavation; surface collection
37-6-3100	MTW-470	Isolated find	Test excavation; surface collection
37-6-3101	MTW-469	Isolated find	Test excavation; surface collection
37-6-3103	MTW-467	Artefact scatter	Test excavation; surface collection
37-6-3156	MTW-481	Isolated find	Test excavation; surface collection
37-6-3157	MTW-480	Isolated find	Test excavation; surface collection
37-6-3159	MTW-478	Isolated find	Test excavation; surface collection
37-6-3158	MTW-479	Isolated find	Surface collection; unmitigated impact
37-6-3161	MTW-476	Isolated find	Surface collection; unmitigated impact
37-6-3162	MTW-475	Isolated find	Surface collection; unmitigated impact
37-6-3163	MTW-474	Artefact scatter	Surface collection; unmitigated impact
37-6-3439	HVO-1296	Artefact scatter/PAD	Test excavation, surface collection
37-6-3440	HVO-1297	Artefact scatter	Surface collection; unmitigated impact
37-6-3441	HVO-1298	Artefact scatter	Surface collection; unmitigated impact
37-6-3453	HVO-1310	Isolated find	Surface collection; unmitigated impact
37-6-3835	Mudies Creek Artefact 01	Artefact scatter/ contact site	Collected under AHIP C0004290; test excavation completed. No further archaeological work required
37-6-3875	NEH IF 01	Isolated find	Surface collection; unmitigated impact

AHIMS #	Site Name	Features	Suggested Management
37-6-3914	NBR/NEH/GH/1	Artefact scatter	Surface collection; unmitigated impact
37-6-3966	Mudies Creek Potential Archaeological Deposit	Artefact scatter/PAD	No further archaeological assessment recommended; site likely to have been destroyed by Mudies Creek flood mitigation works Site not considered to extend to northern side of Golden Highway (within current study area) Any work on southern side of highway would require test excavation and surface collection
Gouldsville Eastern Corridor Archaeological Sensitivity			
37-6-4040	2010-HVOSE-05	Artefact scatter	Test excavation; surface collection
37-6-4042	2010-HVOSE-07	Artefact scatter	Test excavation; surface collection
37-6-4051	HVO-1689	Isolated find	Test excavation; surface collection
37-6-4249	Mudies Creek Artefact 02	Artefact scatter	Surface collection; unmitigated impact
37-6-4305	MD028	Isolated find	Surface collection; unmitigated impact
Pending	CR-AS-01	Artefact Scatter	Surface collection; unmitigated impact
Pending	CR-IF-01	Isolated Find	Surface collection; unmitigated impact
Pending	CR-AS-02	Artefact Scatter	Surface collection; unmitigated impact
Pending	CR-IF-02	Isolated Find	Surface collection; unmitigated impact
Pending	CR-AS-03	Artefact Scatter	Surface collection; unmitigated impact
Pending	TL-IF-01	Isolated Find	Surface collection; unmitigated impact
Pending	TL-IF-02	Isolated Find	Surface collection; unmitigated impact
Pending	PH-AS-01	Artefact Scatter	Surface collection; unmitigated impact
Pending	PH-AS-02	Artefact Scatter	Surface collection; unmitigated impact
Pending	EC-AS-01	Artefact Scatter	Surface collection; unmitigated impact
Pending	EC-AS-02	Artefact Scatter	Surface collection; unmitigated impact
Pending	SSTS-AS-01	Artefact Scatter	Surface collection; unmitigated impact
Knodlers Lane Zone of Moderate Potential 1			
Pending	KL-IF-01	Isolated Find	Test excavation; surface collection
Pending	KL-AS-02	Artefact Scatter	Test excavation; surface collection
Pending	KL-IF-02	Isolated Find	Test excavation; surface collection
Knodlers Lane Zone of Moderate Potential 2			
Pending	KL-AS-03 (contact site)	Artefact Scatter/PAD	Test excavation; surface collection

AHIMS #	Site Name	Features	Suggested Management
Pending	SSTS-AS-02	Artefact Scatter	Surface collection; unmitigated impact
Pending	SSTS-AS-03	Artefact Scatter	Surface collection; unmitigated impact
Pending	SSTS-AS-04	Artefact Scatter	Surface collection; unmitigated impact
Pending	SSTS-AS-05	Artefact Scatter	Surface collection; unmitigated impact
Pending	MD-AS-01	Artefact Scatter	Surface collection; unmitigated impact
Pending	MD-IF-01	Isolated Find	Surface collection; unmitigated impact
Pending	MD-AS-02	Artefact Scatter	Surface collection; unmitigated impact
Pending	MD-IF-02	Isolated Find	Surface collection; unmitigated impact
Camberwell Zone of High Potential			
Pending	MD-AS-03	Artefact Scatter/PAD	Test excavation; surface collection
Pending	WR-IF-01	Isolated Find	Surface collection; unmitigated impact

7.5 Update of Suggested Management

The above management measures should be updated once the final design for the transmission line is known and understood, with avoidance of known and newly recorded sites to be of the highest priority in the design phase.

8.0 Recommendations

The following recommendations are made on the basis of:

- The statutory requirements of the NP&W Act 1974;
- The requirements of Heritage NSW;
- The results of the cultural and archaeological assessment;
- An assessment of the likely impacts of the proposed development; and
- The interests of the registered Aboriginal stakeholders and the cultural heritage record.

It was found that:

- The Hunter Renewable Energy Zone (REZ) passes through a rich cultural landscape with many previously and newly recorded sites present.
- 84 previously recorded AHIMS sites are located within a 50m radius of the proposed transmission line route.
- 26 newly identified sites were located within a 50m radius of the proposed transmission line route.
- Nine zones of archaeological sensitivity were identified, associated with previously or newly identified sites.
- The proposed works have potential to avoid many of the identified sites, either through ensuring pole placement avoids known site locations, or the use of alternative construction methods which reduce or avoid impact.
- Final recommendations for management of the Aboriginal archaeological sites within the study area would rely on the final design of the REZ.

Therefore, the following recommendations have been made.

Recommendation 1: Finalisation of Design

On finalisation of the design for the Hunter REZ, an updated assessment of the potential impact of the works can be made and more concrete recommendations for the management of known Aboriginal sites can be presented. This report should be updated, or an addendum report prepared detailing the consideration of the detailed design in relation to Aboriginal archaeological requirements.

Recommendation 2: Further Assessment Required

This report comprises, essentially, an options and constraints assessment. Further consideration of Aboriginal cultural heritage is required prior to any on ground works proceeding. This would be informed by the detailed design for the Hunter REZ.

Recommendation 3: Avoid Known Sites

Known sites as identified in this report should be considered during detailed design for the Hunter REZ, with avoidance being of the highest priority wherever possible.

RECOMMENDATION 4: APPLICATION FOR AHIP REQUIRED

Aboriginal cultural material is present within the study area and thus an application for an Aboriginal Heritage Impact Permit (AHIP) will be required to permit harm to these items if avoidance is not possible. The requirement for an AHIP would be determined on finalisation of the detailed design for the Hunter REZ.

RECOMMENDATION 5: MAINTAIN ABORIGINAL COMMUNITY CONSULTATION

Consultation with the RAPs in accordance with the ACHCRs regarding the project should continue, in order to keep the RAPs informed about the management of Aboriginal cultural heritage within the study area.

RECOMMENDATION 6: DEVELOPMENT BOUNDARIES

The proposed development works must be contained within the assessed boundaries for this project. If there is any alteration to the boundaries of the proposed development to include areas not assessed as part of this archaeological investigation, further investigation of those areas may be necessary to assist in appropriately managing Aboriginal objects and places which may be present.

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APPENDIX A: AHIMS SEARCHES

Not included in public report