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HumeLink

Revised Aboriginal Cultural Heritage Assessment Report
Technical Report 2

HumeLink
Technical Report 02

Revised Aboriginal Cultural Heritage Assessment Report

Rev 0

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Navin Officer

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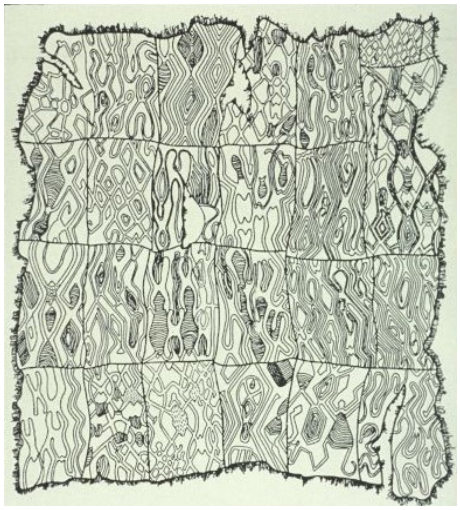

Navin Officer Heritage Consultants acknowledges Australia's Aboriginal and Torres Strait Islander people, their many diverse communities across our nation and their rich culture. We pay respect to their Elders past and present. We acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first peoples and as the Traditional Owners and custodians of the land and water across the Australian landscape and seascape. We recognise and value the ongoing contribution of Aboriginal people to Australian life and how their contribution continues to enrich our society. In our daily work we recognise, cherish, celebrate and defend the evidence of Aboriginal and Torres Strait Islander peoples rich and complex history and prehistory which extends back from the present day into a deep and distant past. We understand that this archaeological evidence has meaning to the descendants of those who created it. Through our research and conservation efforts we strive to unlock hidden meanings from these traces of the past and to make that knowledge available to current and future generations of Aboriginal and Torres Strait Islander people.

Cover photographs: NOHC field photos 2022

Above: Aboriginal possum skin rug collected 1839-1840 from the Hunter River region, eastern NSW (Smithsonian Inst. Washington D.C. Cat. no. E5803).

EXECUTIVE SUMMARY

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 365 kilometres (km) of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. This project is collectively referred to as HumeLink. The project would be located across six Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Yass Valley and Goulburn Mulwaree. HumeLink is a priority project for the Australian Energy Market Operator (AEMO) and the Commonwealth and NSW governments and has been declared as Critical State Significant Infrastructure (CSSI). The project would deliver a cheaper, more reliable and more sustainable grid by increasing the amount of renewable energy that can be delivered across the national electricity grid, helping to transition Australia to a low carbon future.

An Environmental Impact Statement (EIS) was prepared in accordance with the requirements of Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The EIS was placed on public exhibition by the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the NSW Department of Planning and Environment (DPE)) for a period of 42 days, between 30 August 2023 and 10 October 2023.

Transgrid has proposed amendments and refinements to the project as described in the EIS. The amendments provide functional improvements to the design and construction methodology of the project. The proposed amendments take into account submissions received during the public exhibition of the EIS and ongoing design and construction methodology development following the selection of the construction contractors. Project refinements have also been made as part of the ongoing design and construction methodology development since the EIS was exhibited. These amendments and refinements have been described and considered in relevant impact assessments.

The main purpose of this report is to assess the potential Aboriginal heritage impacts from construction and operation of the project to support the environmental assessment in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The project is being assessed as a Critical State Significant Infrastructure (CSSI) project in accordance with Division 5.2 of the EP&A Act (Application Number: SSI-36656827). The Planning Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 14 March 2022 identified Aboriginal heritage as a key issue that must be addressed by the EIS.

Amended project footprint

The amended project footprint is the area that has been assumed for the purposes of this Revised Aboriginal Cultural Heritage Assessment Report (ACHAR) to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. This Revised ACHAR supersedes *Technical Report 2 – Aboriginal Cultural Heritage Assessment Report* prepared for the EIS in full.

The study area for this report is defined as the amended project footprint.

Purpose of this report

This report forms a revised Technical Report 2 – Aboriginal Cultural Heritage Assessment Report prepared for the EIS. The purpose of this report is to support the HumeLink Amendment Report by assessing the potential impacts to Aboriginal heritage associated with the proposed amendments and refinements of the project.

AHIMS search area

On 18 October 2023 and again on 4 April 2024, an Aboriginal Heritage Information Management System (AHIMS) database search was undertaken of the amended project footprint to obtain data on

recorded sites in the amended project footprint. In accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment, Climate Change and Water (DECCW), 2010a), a wider area was searched to allow adequate landscape interpretation and large enough site numbers to allow adequate understanding of the distribution and nature of sites within the landscape.

Archaeological survey

Field survey was undertaken within the amended project footprint where property access had been secured. Therefore the 'survey area' is that part of the amended project footprint that was surveyed during the field investigation and excludes some parts of the amended project footprint that were not accessible, refer to Figure 1-4. In total 80.5 per cent of the amended project footprint has been directly assessed via survey. The field investigation also enabled Registered Aboriginal parties (RAPs) to visit the amended project footprint and to discuss the management of Aboriginal sites and cultural heritage values across the project footprint.

The archaeological survey and data collection were carried out in accordance with the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a). The purpose of the field investigation was to:

- verify the nature, location, and extent of any known Aboriginal sites within the amended project footprint
- identify and record any new Aboriginal sites or landforms with archaeological potential
- document the conditions encountered (survey units, landforms, general soil information, ground surface exposures, and vegetation) to assess the effectiveness of the survey.

Consultation

This project has followed the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010b). The aim of undertaking the consultation is to understand the cultural heritage values present in the amended project footprint, and the views and concerns of Aboriginal people about the project. There are 40 RAPs for this project. The amended project footprint did not change the area of interest for any RAP group.

AHIMS search results

A total of 170 sites are recorded on AHIMS in the amended project footprint. Of these, 39 of these were previously recorded by assessments not related to the HumeLink project and 131 sites were located as part of the assessment work completed for the HumeLink project. Of the 39 previously recorded Aboriginal sites within the amended project footprint, artefact sites (isolated finds and scatters) are the most common site type, with 31 of these sites recorded. Potential Archaeological Deposits (PADs) are the second most commonly occurring type, accounting for two of the total registered sites through the amended project footprint. It should be noted that while they are recorded as sites and treated as such until proven otherwise, PADs are really 'potential 'site locations ie not verified sites. There is one site recorded as a modified tree and a PAD recorded. Eight of the previously recorded sites are indicated as 'destroyed' on AHIMS and four sites are indicated as partially destroyed.

Survey results

A total of 128 new Aboriginal sites, including five modified trees, and (113) artefact occurrences including isolated finds or artefact scatters, and 10 PADs were identified in the amended project footprint during all HumeLink field surveys. All new Aboriginal sites identified during these field surveys have been added to AHIMS. The discrepancy in numbers is due to some lag time in adding sites to AHIMS between the end of assessment and them appearing on AHIMS and there also appears to be some double up in recordings on AHIMS there are AHIMS number for two recordings of the same site on the returned data. One area of charcoal staining was recorded but has determined to not be a site. Six additional trees were identified by the RAPs as being possible modified trees however the assessment found in each of these cases that the modification was due to natural causes. Nine additional unscarred trees were also identified by RAPs during field surveys as trees that they considered to have cultural significance. While the locations of these trees have been noted and

recorded through global position system (GPS) location and photograph (refer to Attachment 4), they are not Aboriginal objects as defined the *National Parks and Wildlife Act 1974* (NPW Act). An area of cultural significance was also identified by a RAP, again the area is not an Aboriginal object as defined the NPW Act. The RAPs that identified these locations, requested that impact to them be avoided. Recommendations have been made regarding the impact on areas of cultural value, including avoidance if possible and further consultation with RAPs.

Archaeological test excavation

The HumeLink test excavation program aimed to characterise the nature and occurrence of subsurface archaeological resources within PADs identified during the archaeological survey within the amended project footprint. The archaeological testing program also targeted specific areas identified as having low, moderate, and high archaeological potential. These areas were defined by the refined archaeological sensitivity model developed by Navin Officer Heritage Consultants (NOHC) in order to identify, characterise and assess any previously unidentified cultural material within the amended project footprint and to test the archaeological sensitivity model.

A total of 282 artefacts were recovered during the archaeological testing program. Archaeological material was not identified in all the areas investigated. Artefact density and distribution also varied across the different sites investigated. As a result of the testing program 11 subsurface artefact locations are now considered sites and have been added to AHIMS.

While the results were generally consistent with the predicted conditions of the areas investigated, the level of previous ground disturbance in test excavation areas could not be definitively determined prior to the test excavation program due to access and ground visibility. Ground disturbances significantly impact the identification of cultural material within the areas assessed and the condition and preservation of cultural material. Despite the limitations, the refined sensitivity model has been demonstrated to be a reliable tool to predict potential areas with cultural and archaeological material.

Archaeological sensitivity model

A key component of the methodology was the development of sensitivity modelling across the amended project footprint to assess the potential of the landscape to contain Aboriginal heritage. The outcomes of the modelling were used to inform potential field survey locations and predict potential sensitivity where the amended project footprint was not accessible and/ or in areas where ground surface visibility was limited. Reduced ground surface visibility was in part due to the extreme wet conditions associated with the La Niña weather pattern during the survey and test excavation program.

A preliminary Aboriginal archaeological sensitivity model was developed for the amended project footprint based on the review of previously recorded AHIMS sites, an assessment of topographic contours and slope, a consideration of hydrology and a review of previous archaeological investigations within and near the amended project footprint. Additionally, land disturbance and land use were analysed through aerial imagery to refine the sensitivity map. This type of modelling is a standard industry practice and Heritage NSW requirement.

Following the field survey, the model was refined using multiple datasets in order to achieve a weighted, multi-criteria analysis of the potential archaeological sensitivity of the amended project footprint. The model is built on the combination of several criteria including field survey results, slope, previously recorded AHIMS sites data, and large bodies of permanent water and waterways (referred to collectively as hydrology).

The archaeological sensitivity model has undergone a third stage of adjustment and review following the results of the subsurface test excavations. The location of archaeological test pits containing artefacts has been reviewed and this data incorporated into the model. Based on these results a separate subsurface archaeological sensitivity model was created in addition to the surface archaeological sensitivity model. The final versions of the models presented in this report aim to separately represent the likely surface and subsurface archaeological sensitivity across the amended project footprint.

Heritage significance of items recorded during survey

Archaeological sites recorded during the archaeological survey and previously recorded sites that were able to be identified have been placed into the following assessment categories:

- sites of low scientific significance
- sites of moderate (local) scientific significance, and
- sites where the scientific significance cannot be assessed without excavation

No sites have been assessed to have national or high (local) scientific significance.

Assessment of impacts

There are 178 Aboriginal sites including 12 PADs (including previously recorded sites and those sites that have been found during the current assessment) and one modified tree/PAD. identified within the amended project footprint that may be directly or indirectly impacted by the project. There is a noticeable increase in Aboriginal sites since the EIS, this increase is due to the inclusion of access tracks (including existing and upgraded tracks which already traverse Aboriginal sites), changes in the project footprint alignment and additional sites that were found during the post-EIS field survey. The sites include:

- 39 previously recorded site on AHIMS including three PADs (including the modified tree/PAD)
- 113 artefact locations
- 10 new PADs
- five modified trees
- 11 test locations with Aboriginal objects.

In addition, the following are non-Aboriginal objects:

- nine cultural trees
- one cultural site
- six modified trees of non-Aboriginal origin as defined under the NPW Act
- one charcoal occurrence.

The majority of the sites are stone artefact occurrences including artefact scatters and isolated finds. Most sites were assessed to have low or moderate significance and four sites were assessed as having high scientific significance at a local level.

Archaeological subsurface test excavation has been undertaken at five PAD sites potentially impacted by construction. Of the PADs tested subsurface artefacts were found at four PADs. All of the remaining eight PADs have been identified as having moderate to high archaeological potential. Two of the PADs previously recorded as part of the Snowy 2.0 Transmission Connection project, sites 56-6-0300 and 56-6-0262 have been subject to subsurface test excavation as part of that project.

Test excavation was undertaken at an additional 25 test areas. Of these, subsurface artefacts were found at 11 locations. These have all been determined to be sites and have been entered on AHIMS.

The Aboriginal sites within the amended project footprint are summarised in Table 10-1.

Of the 195 recordings that have now been documented:

- eight of the previously recorded sites are indicated as ‘destroyed’ on AHIMS
- four sites are indicated as partially destroyed
- five sites will not be impacted by the project but are near to access tracks

- six sites are not impacted but are located adjacent to the transmission line portion of the amended project footprint

The project may impact upon heritage items in the following ways:

- Total direct harm or disturbance to all surface and/or subsurface features could result at an item. This would generally result a total loss of heritage value at a site. An example of total direct impact for the project is the installation of a transmission line structure within a site that destroys the entire site.
- Partial direct harm or disturbance, where direct impacts would occur to only some of the surface and/or subsurface features. Partial direct harm generally results in partial loss of value at a site. An example of a partial direct harm would be where part of a site is impacted due to the installation of an access track or transmission line infrastructure.
- Potential direct harm or disturbance (total or partial), where direct impacts are occurring adjacent to sites, or where vegetation clearance/maintenance requires the use of heavy machinery to be active near sites. Such impacts would likely be inadvertent.
- Indirect impacts, including to the views to and from heritage items. Indirect impacts could include impacts from vegetation clearance and visual impacts to cultural values and views.

Of the 195 recordings (the following are not mutually exclusive):

- the majority (177) are within the transmission line portion of the amended project footprint (including one indicated as partially destroyed on AHIMS)
- eight sites are in the area of controlled blasting
- forty-six sites are on access tracks or intersection upgrades (one of these is recorded on AHIMS as ‘destroyed’ and one as ‘partially destroyed’)
- ten sites are near the future Maragle 500 kV substation compound (C05) (two of these are recorded on AHIMS as partially destroyed)
- seven sites are within the Crookwell accommodation facility and compound (AC06) access road (and recorded as destroyed on AHIMS)
- five sites are within the Crookwell accommodation Facility and compound (AC06)
- five sites are in or near the Amended Bannaby 500 kV substation compound (C12)
- two sites are in the Tarcutta accommodation facility and compound (AC03)
- one site is in the Gadara Road compound (C19)
- one site is within the Ardrossan Headquarters Road compound (C17).

The amended project footprint includes approximately 2,554 hectares identified as high archaeological sensitivity and 2,450 hectares identified as moderate sensitivity. However, not all the land within the amended project footprint would be used for construction and operation of the project as the final impacted area (for construction and operation) would be much smaller than the amended project footprint. Therefore, the amount of land impacted by the project within areas of high or moderate archaeological sensitivity is likely to be substantially less and will be confirmed during detailed design.

Management of impacts

The project aims to avoid heritage items as a first principle. As such, impacts to Aboriginal heritage have been considered during the corridor and route selection phases of the project. Avoidance of identified Aboriginal sites is being considered further during detailed design and construction planning. Mitigation measures aim to further manage impacts by undertaking salvage and recording prior to impacts occurring to sites, for example mitigation measures:

- AH5
- AH6
- AH7
- AH8

- AH9
- AH15

Aboriginal Heritage Management Plan

An Aboriginal Heritage Management Plan (AHMP) would be developed by the construction contractors. It would be prepared by a heritage specialist in consultation with the RAPs and consent authority to provide the post approval framework for managing Aboriginal heritage impacted by the project. The AHMP would address the processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the construction phase of the project. The AHMP would include the detail for the methods and processes to complete the required mitigation measures such as site fencing and further archaeological collection, testing and salvage. The AHMP would be communicated to all relevant construction workers prior to construction commencing in that area.

Summary of key mitigation measures:

A summary of the key mitigation measures for this assessment include:

- An AHMP would be developed by a heritage specialist in consultation with the RAPs and consent authority to provide the post approval framework for managing Aboriginal heritage impacted by the project.
- The structured Aboriginal community consultation process for this project will continue until completion of construction.
- The finalisation of the project design and construction methodology, and associated final disturbance areas, will be developed to avoid harm to features/items of Aboriginal heritage significance as far as practicable. The objective is to further reduce potential impacts through considered placement of transmission line structure locations and through further refinements of the design and construction methodology. Avoidance and minimisation of harm to features/items and PADs would be prioritised.
- Additional assessment would occur in accordance with the AHMP for areas where ground disturbing activities are required in locations outside of the previously assessed area. Where required, additional heritage surveys will be carried out with the RAPs prior to ground disturbing activities occurring in any such areas.
- An archaeological subsurface test excavation program will be carried out in parts of any PADs where project activities would have direct impact and a test excavation program has not already been completed in the area of impact. Direct impacts include activities that involve ground disturbance, such as grading of tracks and construction work sites, excavation for transmission line structure construction and removal of tree root balls.
- Where detailed design confirms there would be direct impacts in areas with high and moderate archaeological sensitivity that have not been previously subject to test excavations, a desktop assessment and site inspection will be completed to determine the level of previous impact from past ground disturbing activities and to determine if the area contains a PAD. If it is determined that the area contains a PAD and has undergone low previous impact, then an archaeological subsurface test excavation program will be carried out in the area of direct impact.
- At locations where new creek crossings are to be installed which coincide with areas assessed as having high and moderate archaeological sensitivity and a test excavation program has not already been completed in the area of impact, then a desktop assessment with site inspection will be completed to determine the level of previous impact from past ground disturbing activities and to determine if the area contains a PAD. Where a PAD is identified an archaeological subsurface test excavation program will be carried out in the area of direct impact.
- Surface artefact salvage will be completed in the locations of the installation of tracks and the upgrade of potentially existing tracks in areas assessed as having high and moderate archaeological sensitivity. Following the construction or upgrade of the track a walkover will be completed and any surface artefacts will be recorded and moved off the track.

- Surface artefact salvage will be completed in the locations of tree root ball removal in areas assessed as having high and moderate archaeological sensitivity.
- Harm to modified trees will be avoided where possible through design development and construction planning. If the removal of a modified tree cannot be avoided, the tree would be subject to 3D scanning. Prior to any impacts to modified or scarred trees, consultation will be undertaken with the RAPs on salvaging the scarred tree trunk.
- All portions of artefact scatters and isolated finds that would be directly impacted will require surface collection and salvage prior to construction commencement in those areas. Where test excavations identify archaeological deposits which cannot be avoided salvage excavations will occur.
- The locations of known Aboriginal heritage sites within and adjacent to the amended project footprint and the relevant protocols to avoid and manage any potential harm to the items will be communicated through the AHMP to all relevant construction personnel prior to construction commencing in that area.
- Cultural heritage awareness training will be carried out for all construction workers working on the project prior to the construction workers participating in construction activities. The training will cover features of heritage significance within and adjacent to project work sites and protocols that must be complied with to minimise and manage potential impacts to those features.
- If at any time during construction, any Aboriginal objects or human remains are discovered, they will be managed in accordance with an unexpected finds protocol that is aligned with the protocol in Attachment 6 of this Revised ACHAR.

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TABLE OF CONTENTS

Tables

Figures

GLOSSARY, ABBREVIATIONS AND DEFINITIONS

AANP	Australian Alps National Parks and Reserves
Aboriginal heritage impact permit (AHIP)	An AHIP is the statutory instrument issued by DPE under section 90 of the NPW Act to manage harm or potential harm to Aboriginal objects and places (OEH, 2017:1).
Aboriginal location/recording	An item recorded during the field survey that may or may not be an Aboriginal object/site as defined under the NSW *National Parks and Wildlife Act 1974*
Aboriginal object	Defined in the NPW Act as "any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains".
Aboriginal place	An area of land that is or was of special significance with respect to Aboriginal culture and is declared to be an Aboriginal place under section 84 of the NPW Act.
Aboriginal resource and gathering	An Aboriginal site feature related to everyday activities such as food gathering, hunting, or collection and manufacture of materials and goods for use or trade (OEH, 2012:8).
Aboriginal site	An Aboriginal object or Aboriginal place associated with past or contemporary Aboriginal occupation of NSW.
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIMS	Aboriginal Heritage Information Management System – a database of known Aboriginal site records in NSW and a repository of Aboriginal heritage survey, assessment and investigation reports.
AHIMS Search Area	The area of the AHIMS database search included the amended project footprint.
AHMP	Aboriginal Heritage Management Plan
AMBS	Australian Museum Business Services
Amended project (the)	The CSSI project "HumeLink", which is the subject of the Amendment Report and inclusive of the proposed amendments and project refinements to the project as described in the EIS. The project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
Amended project footprint (the)	The area that has been assumed for the purpose of the Amendment Report to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.

Amendment	A change in what the proponent is seeking approval for following the public exhibition of the EIS. It requires changes to the project description in the EIS and amendments to the associated infrastructure application.
Angular fragment / debitage	A piece of stone debris produced during stone tool making, exhibiting evidence of knapping but lacking key diagnostic traits (eg platform, termination, bulb of percussion)
Archaeological site	A place or location with material traces or evidence of Aboriginal land use. The boundaries of an archaeological site may be defined by the spatial extent of visible Aboriginal objects, or direct evidence of their location; obvious physical boundaries where present; or identification by the Aboriginal community based on cultural information (DECCW, 2010a:14).
Art (rock art)	Images made by Aboriginal people on rock surfaces in the past. Rock art can be found in shelters, caves, overhangs, rock platforms, and across rock formations. Techniques include painting, drawing, scratching, carving engraving, pitting, conjoining, abrading and the use of a range of binding agents and the use of natural pigments obtained from clays, charcoal and plants (DECCW, 2010a:30; OEH, 2012:8).
Artefact	Objects such as stone tools, and associated flaked material, spears, manuports, grindstones, discarded stone flakes, wooden implements, modified glass or shell demonstrating evidence of use of the area by Aboriginal people (OEH, 2012:8). Stone artefacts are the most common type of Aboriginal object and may be the only remains left at the locations where Aboriginal people lived in the past (DECCW, 2010a:28).
Artefact scatter	A formerly used site type consisting of two or more stone artefacts situated in proximity to each other. The use of the term 'scatter' was intended to be descriptive and did not infer the original human behaviour which formed the site. Now referred to as an 'artefact' site feature (see Artefact).
ASC	Australian Soil Classification
ATSIHP Act	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth)
Background discard/scatter	There is no single concept for background discard or 'scatter', and therefore no formal definition. Commonly agreed is that background discard of artefacts occurs in the absence of 'focused' activity involving the production and/or discard of stone artefacts in a particular location. An example of unfocused activity is occasional loss and /or discard of isolated artefacts during travel along a route or pathway. Examples of 'focused' activities are camping, knapping and heat-treating stone, cooking in a hearth, and processing food with stone tools. Definitions of background scatter comprising only qualitative criteria do not specify the numbers (quantity) or density (artefacts/m^2) of artefacts required to differentiate activity areas from background discard.

Backing	Abrupt retouch normally found on one lateral margin of a tool and opposite the working edge. Designed to increase the surface area of an artefacts for effective hafting.
Bladelet	A small (generally 8-12 mm in width) example of a blade; a cutting or scraping tool that is prepared through retouch of an initial flake (blade blank) at least twice as long as it is wide.
Burials	A traditional or contemporary (post-contact) burial of an Aboriginal person, which may occur outside designated cemeteries and may not be marked (OEH, 2012:8). Aboriginal ancestral remains are most frequently found in middens, sand dunes, lunettes, bordering dunes and other sandy or soft sedimentary soils (DECCW, 2010a:34).
Core	A nodule or block of siliceous rock from which sharp-edged flakes of stone are struck (generally with a hammerstone).
Cortex	The weathered outer layer of rock, differing in chemical and optical properties to the unweathered interior.
CSSI	Critical State Significant Infrastructure
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Environment and Conservation (former NSW department)
DECCW	Department of Environment, Climate Change and Water (former NSW department)
DEM	Digital Elevation Model
Distal flake	The termination end of a partial (broken) flake.
Dorsal surface	Outer surface of a flake (former surface of the core) characterised by cortex and/or negative concavities (flake scars) and ridges denoting prior removal of flakes.
DPE	NSW Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
EIS Project (the)	The CSSI project “HumeLink”, which is the subject of this Environmental Impact Statement. The project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.
EIS project footprint (the)	The area that was assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.
EP&A Act	*Environmental Planning and Assessment Act 1979*

EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESC	Effective survey coverage
ESD	Ecologically sustainable development
FGS	Fine grained silicious
Flake	A sliver of stone struck from a core exhibiting characteristic traits of force fracture.
Grinding grooves	Grooves in a rock surface resulting from manufacture of stone tools such as ground edge hatchets and spears, may also include rounded depressions resulting from grinding of seeds and grains (OEH, 2012:9).
GPS	Global positioning system
GSG	Great Soil Group
ha	Hectare
ILUA	Indigenous Land Use Agreement
IMT	Indurated mudstone tuff
Isolated find	A formerly used site type defined as a single stone artefact, not located within a rock shelter, which occurs without any associated evidence of Aboriginal occupation. Isolated finds may represent single discard events, be constituent components of background scatter, or be indicative of a larger obscured, remnant or disturbed site. Now referred to as an 'artefact' site feature (see Artefact).
Knapping	The process of fracturing flakes of stone from a core
KNC	Kelleher Nightingale Consulting
kV	Kilovolt
LALC	Local Aboriginal Land Councils
Lateral margin	Left and right edges of a flake (platform oriented upward when viewing the ventral surface and distal end oriented upward for the dorsal surface).
LCVIA	Landscape Character and Visual Impact Assessment
LEP	Local Environmental Plan
LGA	Local Government Area
Lithic assemblage	A collection of whole and fragmentary stone artefacts and manuports obtained from an Aboriginal site, either by collecting items scattered on the present ground surface (see Artefact scatter) or recovered during controlled archaeological excavation.

Medial Flake	Flakes defined by the absence of the proximal and distal margins with an identifiable ventral surface.
Minister, the	Commonwealth Minister for the Environment and Water
ML	Megalitres
mm	millimetres
MNES	Matters of national environmental significance
Modified tree	Trees which show the marks of modification as a result of cutting of bark from the trunk for use in the production of shields, canoes, boomerangs, burial shrouds, for medicinal purposes, foot holds etc, or alternately intentional carving of the heartwood of the tree to form a permanent marker to indicate ceremonial use/significance of a nearby area. These carvings may also act as territorial or burial markers (OEH, 2012:9).
NEM	National Electricity Market
NHL	National Heritage List
NOHC	Navin Officer Heritage Consultants
NP	National Parks
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NR	Nature Reserves
NSW	New South Wales
NVMP	Noise and Vibration Management Plan
OEH	NSW Office of Environment and Heritage, now Heritage NSW
OHEW	Overhead earth wire
Open camp site	A formerly used site type defined as a stone artefact scatter, not located within a rock shelter, containing two or more artefacts. The term 'open camp site' was based on ethnographic modelling suggesting that most artefact occurrences resulted from activities at camp sites. However, in order to separate the site description from the interpretation, both open camp sites and isolated finds are now referred to as 'artefact' sites (see Artefact).
OPGW	Optical Fibre Ground Wire
Platform	Planar surface marking the location from which the flake was struck from the core.
Potential archaeological deposit (PAD)	An area where Aboriginal objects may occur below the ground surface (OEH, 2012:9).

Primary flake	Initial flake struck from a weathered cobble with a dorsal surface covered in cortex and lacking prior flake scars.
Proponent	The entity seeking approval for the CSSI application, which for the HumeLink project is NSW Electricity Networks Operations Pty Ltd (referred to as Transgrid).
Proximal flake	The platform end of a partial (broken) flake.
RAPs	Registered Aboriginal Parties
Refinement	An aspect of the project that is more specific than what has been described in the EIS and fits within the limits set by the project description and does not change what is being sought for approval for or require an amendment to the infrastructure application for the project.
Retouch	Alteration of the cutting edges of a flake or tool to refine sharpness, shape, angle or strength.
Revised ACHAR	This report
REZ	Renewable Energy Zone
SEARs	Planning Secretary's Environmental Assessment Requirements
Shell	An accumulation or deposit of shellfish from beach, estuarine, lacustrine or riverine species resulting from Aboriginal gathering and consumption. Usually found in deposits previously referred to as shell middens. Must be found in association with other objects like stone tools, fish bones, charcoal, fireplaces/hearths, and burials. Will vary greatly in size and components (OEH, 2012:10).
SSD	State Significant Development
SSI	State Significant Infrastructure
Study area	The Aboriginal heritage study area is the same area as the amended project footprint. See amended project footprint
Survey area	The survey area is within the amended project footprint where access approval had been secured and surveyed. It excludes that part of the amended project footprint that was not accessible for survey.
Survey unit	The survey unit is a section of the survey area defined by landform or property access.
Termination	End of a flake opposite the platform denoting the place the force applied by the hammerstone exited the core.
Tertiary flake	Flake lacking dorsal or platform cortex indicating a high degree of prior reduction of the core from which it was knapped.
Tools	Artefacts that have been made or used for some specific tasks.
Transmission line easement	A legal right attached to a parcel of land that enables the non-exclusive use of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area

	where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 500 kV transmission lines would typically be 70 metres wide. However, a few select locations would require wider easements up to 130 metres wide for specific engineering or property reasons. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
Transmission line route	The location of the transmission line structures along the middle of the transmission line easement.
Transmission line structures	Proposed free standing structures to support the transmission lines
Transgrid	The project is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd (referred to as Transgrid). Transgrid is the operator and manager of the main high voltage transmission network in NSW and the ACT, and is the Authorised Network Operator for the purpose of an electricity transmission or distribution network under the provisions of the Electricity Network Assets (Authorised Transactions) Act 2015.
Unanticipated Aboriginal objects	An Aboriginal site/object in an area not identified as having high or moderate archaeological sensitivity consisting of more than: • an isolated find or • a single scarred tree or • a sparse scatter of more than 15 artefacts over 1 square metre on the surface, or • buried stratified archaeological deposits or • a surface site costing of a stone arrangement or • a carved tree.
Un-modified tree of cultural value	Several un-modified trees were identified by RAPs as being of cultural importance to them. These trees are not 'objects' as defined by the NPW Act.
Ventral surface	Inner surface of a flake originally attached to a core exhibiting one or more traits of conchoidal fracture including a bulb of percussion, bulbar scar and ripple marks.
Visual assessment	This term has been used to describe inspection of a particular part of the amended project footprint from afar eg outside a property fence line. This method was used to verify the likelihood of archaeological potential within areas that were inaccessible due to property access being denied.

1. INTRODUCTION

1.1 Background

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 365 kilometres (km) of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. This project is collectively referred to as HumeLink. The project would be located across six Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Yass Valley and Goulburn Mulwaree. HumeLink is a priority project for the Australian Energy Market Operator (AEMO) and the Commonwealth and NSW governments and has been declared as Critical State Significant Infrastructure (CSSI). The project would deliver a cheaper, more reliable and more sustainable grid by increasing the amount of renewable energy that can be delivered across the national electricity grid, helping to transition Australia to a low carbon future.

An EIS was prepared in accordance with the requirements of Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The EIS was placed on public exhibition by the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly the NSW Department of Planning and Environment (DPE)) for a period of 42 days, between 30 August 2023 and 10 October 2023.

Transgrid has proposed amendments and refinements to the project as described in the EIS. The amendments provide functional improvements to the design and construction methodology of the project. The proposed amendments take into account submissions received during the public exhibition of the EIS and ongoing design and construction methodology development following the selection of the construction contractors. Project refinements have also been made as part of the ongoing design and construction methodology development since the EIS was exhibited. These amendments and refinements have been described and considered in relevant impact assessments.

1.2 Key features of the project (as publicly exhibited)

The key components of the project as outlined and assessed in the EIS included:

- construction and operation of around 360 kilometres of new double circuit 500 kV transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle
- construction of a new 500/330 kV substation at Gregadoo (Gugaa 500 kV substation) approximately 11 kilometres south-east of the existing Wagga 330/132 kV substation (Wagga 330 kV substation)
- demolition and rebuild of a section of Line 51 (around two kilometres in length) as a double circuit 330 kV transmission line connecting into the Wagga 330 kV substation
- modification of the existing Wagga 330 kV substation and Bannaby 500/330 kV substation (Bannaby 500 kV substation) to accommodate the new transmission line connections
- connection of transmission lines to the future Maragle 500/330 kV substation (Maragle 500 kV substation, approved under the Snowy 2.0 Transmission Connection Project (SSI-9717))
- provision of one optical repeater telecommunications hut and associated connections to existing local electrical infrastructure
- establishment of new and/or upgraded temporary and permanent access tracks
- ancillary works required for construction of the project such as construction compounds, worker accommodation facilities, utility connections and/or relocations, brake and winch sites, and helipad/helicopter support facilities.

1.3 Overview of the proposed amendments

Since the public exhibition of the EIS, several amendments and refinements to the project have been proposed.

The proposed amendments to the project include:

- changes to the transmission line corridor, including the realignment of the route through Green Hills State Forest to the west of Batlow
- change to the number and location of construction ancillary facilities, including worker accommodation facilities and construction compounds
- nomination of access tracks to support the construction and operation of the project
- additional telecommunications connections to existing substations.

The proposed refinements to the project include:

- transmission line and substation design refinements at Gregadoo
- identification of areas where controlled blasting may be required
- use of approved water sources
- use of helicopters and drones.

Refer to Chapter 2 of this report for a detailed description of amendments and refinements relevant to this assessment.

Figure 1-1 shows the location of the amended project and Figure 1-2 shows the key components of the amended project.

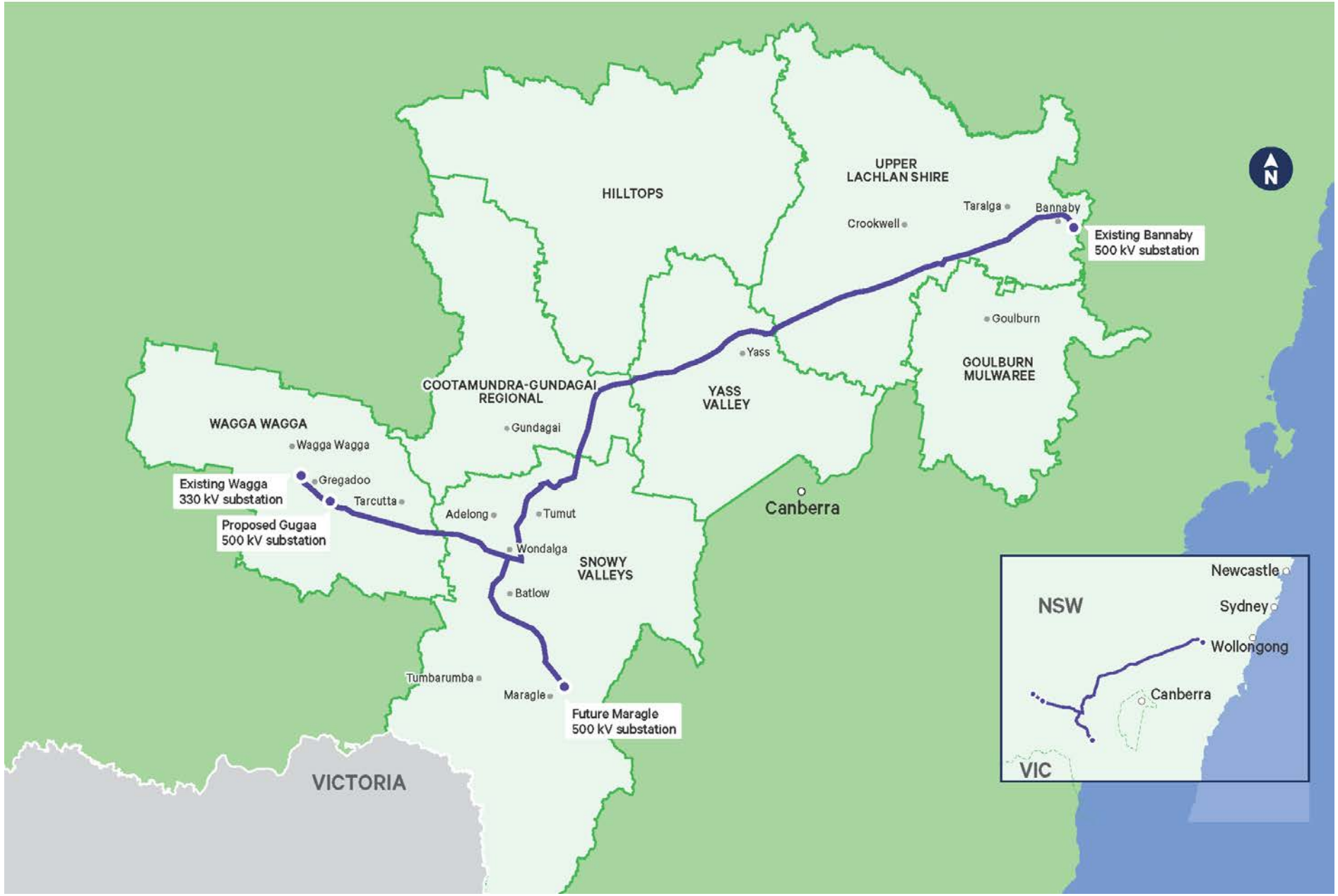
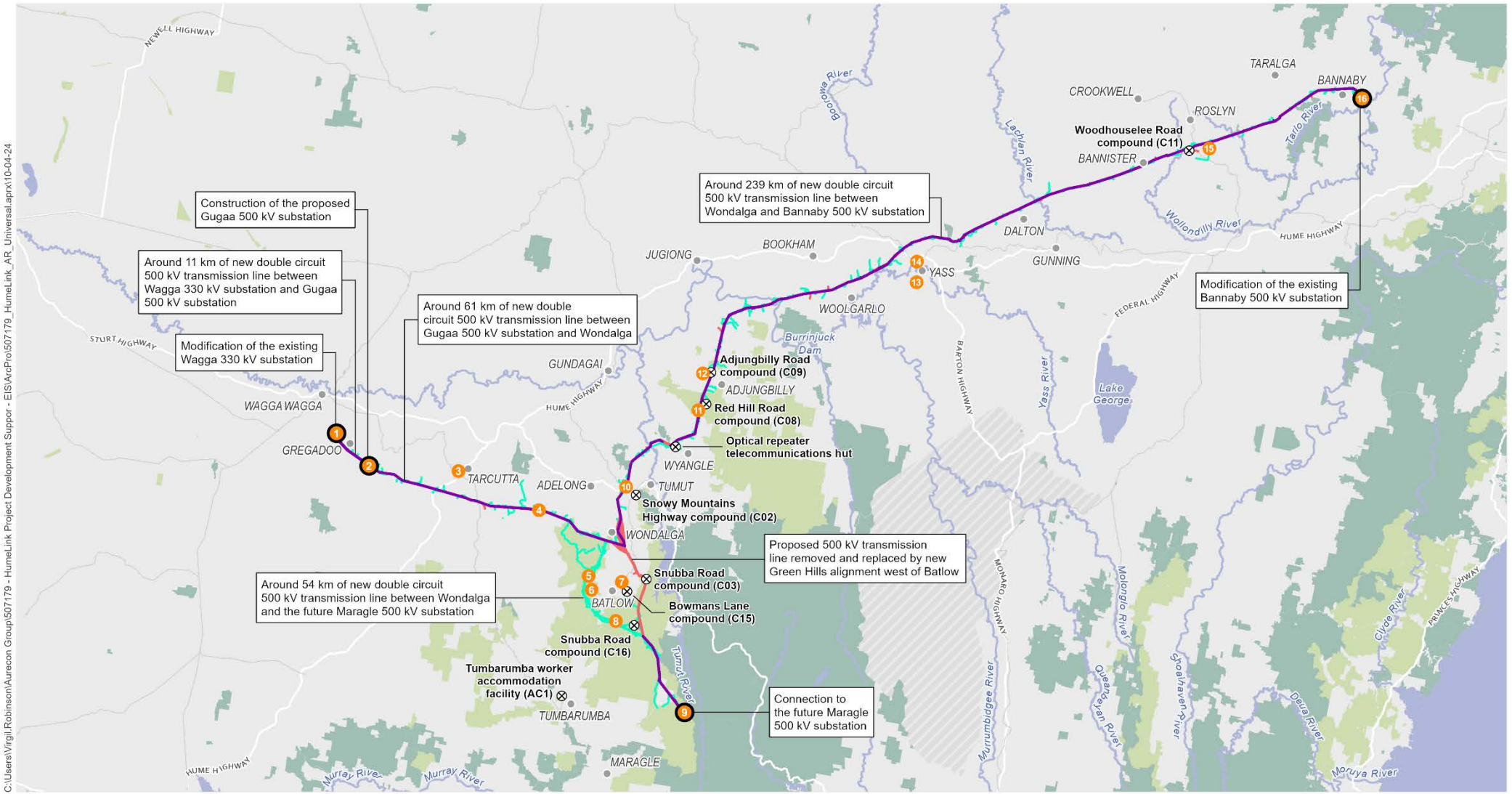


Figure 1-1 Overview of amended project location



EIS project footprint
Removed footprint
Amendments
Removed project facility
National park and reserve
State forest
Waterbody
Waterway
Major road
Railway

Construction ancillary facilities

1. Wagga 330 kV substation compound (C01)
2. Amended Gregadoo Road compound (C06)
3. Tarcutta accommodation facility and compound (AC03)
4. Ellerslie Road compound (C21)
5. Ardrossan Headquarters Road compound (C17)
6. Green Hills accommodation facility and compound (AC07)
7. Amended Memorial Avenue compound (C14)
8. Snubba Road compound (C18)
9. Maragle 500 kV substation compound (C05)
10. Gadara Road compound (C19)
11. Amended Honeysuckle Road compound (C07)
12. Adjungbilly accommodation facility and compound (AC04)
13. Yass substation compound (C10)
14. Yass accommodation facility and compound (AC05)
15. Crookwell accommodation facility and compound (AC06)
16. Amended Bannaby 500 kV substation compound (C12)

Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

1:925,000
0 20 40 km

Projection: GDA 1994 MGA Zone 55

C:\Users\Virgil.Robinson\Aurecon Group\507179 - HumeLink Project Development Suppor - EIS\ArcPro\507179_HumeLink_AR_Universal.aprx\10-04-24

HumeLink **Aboriginal Heritage**

Figure 1-2: Key components of the amended project

1.4 Purpose and structure of this report

This report forms a revised *Technical Report 2 – Aboriginal Cultural Heritage Assessment Report* prepared for the EIS. The purpose of this *Technical Report 2 – Revised Aboriginal Cultural Heritage Assessment Report* is to support the HumeLink Amendment Report by assessing the potential impacts to Aboriginal heritage associated with the proposed amendments and refinements of the project.

This structure and content of this report is as follows:

- provides a summary of proposed amendments and refinements to the project as described in the EIS (Chapter 2)
- provides a description of the project and construction methodology (Chapter 2)
- outlines the legislative and policy context relevant to the amended project footprint with regard to Aboriginal cultural heritage (Chapter 3)
- outlines the methodology used to compile this assessment (Chapter 4)
- outlines the Aboriginal community consultation carried out in order to identify and assess the cultural values of the amended project footprint, and document the consultation process for the project (Chapter 5)
- provides an environmental context for the amended project footprint (Chapter 6)
- discusses the data currently available on Aboriginal objects and places in the region, and the information this provides on past Aboriginal habitation and land use (Chapter 7)
- identifies the nature and extent of Aboriginal objects and places, and areas of archaeological potential, within the amended project footprint and AHIMS search area (Chapter 8)
- describes the cultural heritage values, assesses the significance of Aboriginal objects and places in the amended project footprint as well as identifies and provides results of the archaeological investigations (Chapter 9)
- assesses the impacts of the proposed development on Aboriginal cultural heritage values (Chapter 10)
- assesses cumulative impacts associated with the project (Chapter 11)
- provides management recommendations to avoid and minimise harm, and mitigate any heritage impacts, based on legislative requirements, the results of the archaeological investigation, and the views and recommendations of Registered Aboriginal Parties (RAPs) (Chapter 12).

1.5 Secretary's environmental assessment requirements

This report has been prepared in accordance with the Planning Secretary's Environmental Assessment Requirements (SEARs) for the project as well as relevant government assessment requirements, guidelines and policies, and in consultation with government agencies.

Table 1-1 Secretary's Environmental Assessment Requirements

Subject	Secretary's Environmental Assessment Requirements	Chapter
Heritage	An assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a) including results of archaeological test excavations (if required).	This technical report (Technical Report 2) The assessment of the impact to Aboriginal cultural heritage items is presented in Chapter 10. The results of the archaeological test excavations are presented in Chapter 8.

Subject	Secretary's Environmental Assessment Requirements	Chapter
	Evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010b).	Chapter 5
Supplementary SEARs		
19	The EIS must provide a detailed Heritage Impact Assessment conducted by an experienced and qualified heritage expert. The assessment must also include a visual impact assessment and detailed species assessment on potential impacts to the Bogong moth (which is a value of the heritage place). Whilst not an EPBC Act listed threatened species, the Bogong moth's assessment should follow the information requirements for EPBC listed species that is listed under paragraph 17.	This technical report (Technical Report 2) Biodiversity Development Assessment Report (Technical Report 1) Section 10.1.1 presents the findings of the bogong moth assessment.

1.6 Assessment approach and key terminology

Given that this assessment has been completed prior to detailed design, our approach has been to complete the desktop assessment and develop a sensitivity model to assess the archaeological potential of the amended project footprint. The field survey and associated test excavations have aimed to verify the accuracy of the predictive modelling and refine the Potential Archaeological Deposit (PAD) identification to aid in assessing the impact of the project on Aboriginal cultural heritage and to provide advice on mitigating that impact.

1.6.1 Amended project

The CSSI project "HumeLink", which is the subject of the Amendment Report and inclusive of the proposed amendments and project refinements to the project as described in the EIS. The project involves the construction and operation of high voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle.

1.6.2 Amended project footprint

The area that has been assumed for the purpose of the Amendment Report to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.

The study area for this report is defined as the amended project footprint, see Figure 1-3.

1.6.3 EIS project footprint

The area that was assumed for the purpose of the EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.

1.6.4 AHIMS search area

On 18 October 2023 an AHIMS database search was undertaken of the amended project footprint to obtain data on sites in the amended project footprint. Previous searches were undertaken prior to this search of a wider search area in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a). A larger area was searched to allow adequate landscape interpretation and to capture large enough site numbers to allow adequate understanding of the distribution and nature of sites within the landscape. The area of the AHIMS database search included the amended project footprint.

1.6.5 Sensitivity model

A key component of the desktop assessment was the development of a sensitivity model, which assessed the potential of the landscape traversed by the amended project footprint to contain Aboriginal sites. This model is described in Section 4.2.2.

1.6.6 Archaeological survey

The field survey was undertaken within the amended project footprint where access approval had been secured. Therefore the 'survey area' is that part of the amended project footprint that was surveyed during the field investigation and excludes some parts of the amended project footprint that were not accessible, see Figure 1-4 (this image provides a high level visual representation therefore access tracks are not included).

The archaeological survey and data collection were carried out in accordance with the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a). The purpose of the field investigation was to:

- verify the nature, location, and extent of any known Aboriginal sites within the amended project footprint
- identify and record new Aboriginal sites or landforms with archaeological potential
- document the conditions encountered (survey units, landforms, general soil information, ground surface exposures, and vegetation) to assess the effectiveness of the survey.

The field investigation also enabled RAPs to visit the amended project footprint and to discuss the management of Aboriginal sites and cultural heritage values across the amended project footprint.

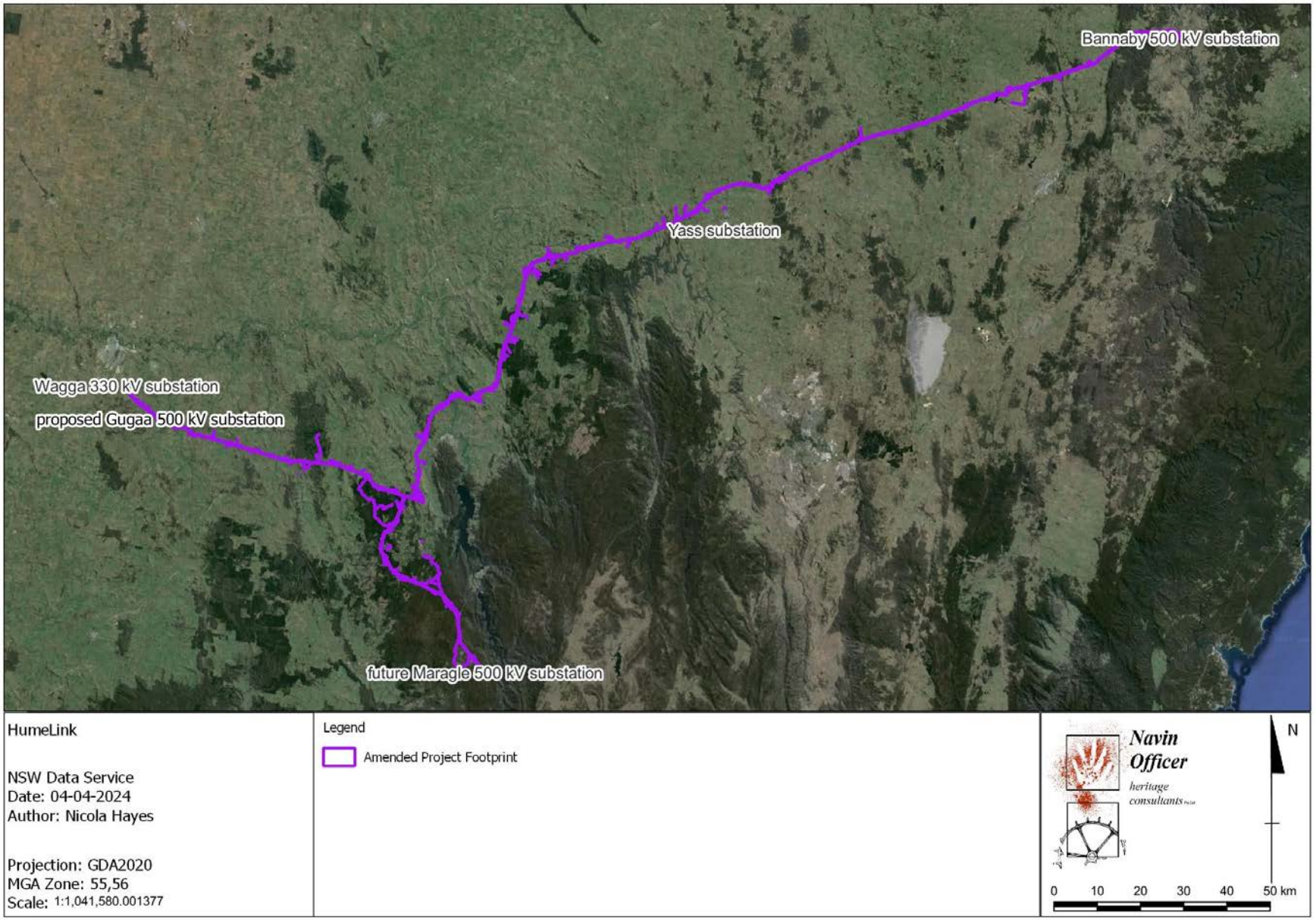


Figure 1-3 Amended project footprint (study area)

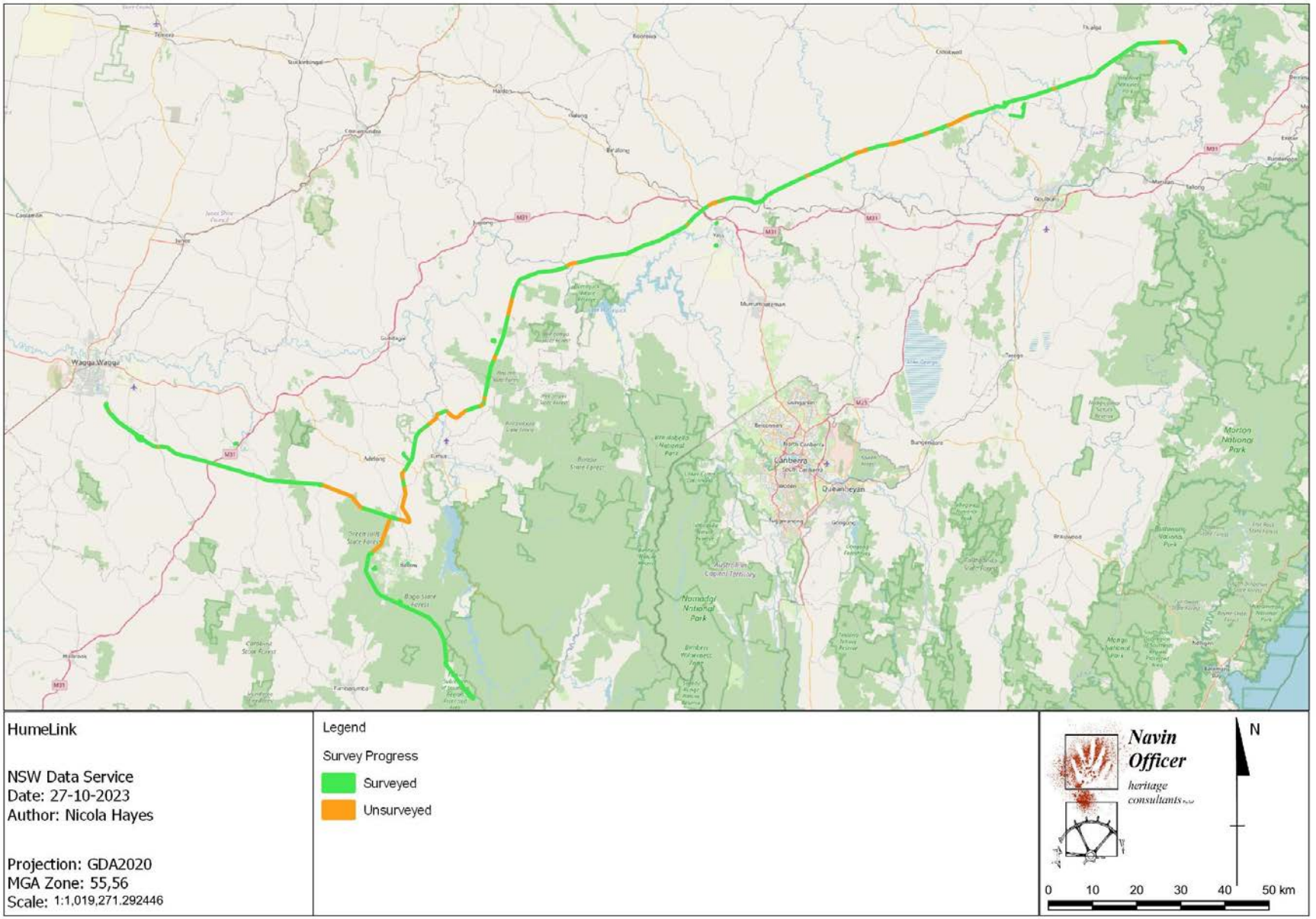


Figure 1-4 Survey completion showing the survey area in green

2. UPDATED PROJECT DESCRIPTION

The project description in this chapter is based on a preliminary detailed design and indicative construction methodology for the project. The design and construction methodology would continue to be refined and confirmed during further detailed design and construction planning by the construction contractors. Further details on the project are provided in Chapters 3 and Appendix A of the Amendment Report.

2.1 Summary of key components of the project

Key components of the project are summarised in Table 2-1.

Table 2-1 Summary of key components of the project

Component	Description
Transmission lines and supporting infrastructure	
Transmission lines and structures	The project includes the construction of new 500 kV transmission line sections between: • Wagga 330 kV substation and proposed Gugaa 500 kV substation (approximately 11 km) • Proposed Gugaa 500 kV substation and Wondalga (approximately 61 km) • Wondalga and future Maragle 500 kV substation (approximately 54 km) • Wondalga and Bannaby 500 kV substation (approximately 239 km). The transmission line section between the Wagga 330 kV substation and proposed Gugaa 500 kV substation would initially operate at 330 kV under HumeLink prior to commissioning of VNI West. The project also includes the rebuild of approximately 2 km of Line 51 as a new 330 kV transmission line between the Wagga 330 kV substation and around Ivydale Road, Gregadoo. This would be adjacent to the new transmission line between the existing Wagga 330 kV and proposed Gugaa 500 kV substations. The 500 kV transmission lines would be supported on a series of free-standing steel lattice structures that would range between 50 m and 76 m with an average height of 60 m. In some locations, the height of the transmission line structures may increase above 76 metres to minimise biodiversity, heritage or property impacts, or improve overall safety outcomes by providing the opportunity to increase the spanning distance between transmission line structures. These locations will be reviewed during further detailed design. The structures would generally be spaced between 300 to 600 m apart. Ongoing design development and changes to the transmission line corridor have refined transposition[1] locations, which may result in more transmission line structures in a location. Earth wire and communications cables would be co-located on the transmission line structures. The 330 kV structures for the rebuild of Line 51 would range between 24 m and 50 m in height and have a typical height of 40 m. Indicative configurations of transmission line structures that may be used as part of the project are shown in Figure 2-1. The type and arrangement of the structures would be refined during detailed design. The footings of each structure would require an area of approximately 300 to 450 m^2, depending on ground conditions and the proposed structure type. Additional disturbance at each structure site may be required to facilitate structure assembly and stringing.

[1] Transposition is the periodic swapping of positions of the conductors of a transmission line in order to improve transmission reliability.

Component	Description
Transmission line easements	The easement for the new 500 kV transmission lines would typically be 70 m wide. However, a few locations (such as transposition locations) may require easements up to 110 metres wide and up to 130 metres wide where the new 500 kV transmission line would parallel the relocated section of Line 51. Transgrid is working with landowners to finalise the location of and acquire the new transmission line easement for the project. The easement provides a right of access to construct, maintain and operate the transmission line and other operational assets. The easement also generally identifies the zone of initial vegetation clearance and ongoing vegetation management to ensure safe electrical clearances during the operation of the lines. Vegetation management beyond the easement may also occur where nearby trees have the potential to fall and breach safety clearances.
Substation activities	
Construction of the proposed Gugaa 500 kV substation	A new 500/330 kV substation would be constructed at Gregadoo, about 11 km south-east of the Wagga 330 kV substation. The substation would include ten new 500/330 kV transformers and four 500 kV reactors. The proposed Gugaa 500 kV substation is expected to occupy an area of approximately 34 hectares.
Modification of the existing Bannaby 500 kV substation	The existing Bannaby 500 kV substation on Hanworth Road, Bannaby would be expanded to accommodate connections for new 500 kV transmission line circuits. The modification would include changes to the busbars, line bays, bench and associated earthworks, steelwork, drainage, external fence, internal/external substation roads, secondary containment dams, sediment containment dams, cabling, and secondary systems. All of the work would be restricted to the existing substation property.
Modification of the existing Wagga 330 kV substation	The existing Wagga 330 kV substation on Ashfords Road, Gregadoo would be reconfigured to accommodate new bays for two new 500 kV transmission line circuits within the existing substation property. This would include modifications to the busbars, line bays, existing line connections, bench and associated earthworks, relocation of existing high voltage equipment, drainage, external fence, internal substation roads, steelwork, cabling, and secondary systems.
Connection to the future Maragle 500 kV substation	The project would connect to the future Maragle 500 kV substation approved under the Snowy 2.0 Transmission Connection Project (SS1-9717). Construction of the Maragle substation is proposed to be undertaken between 2023 and 2026. Further detail on the Snowy 2.0 Transmission Connection project is available at the Department of Planning and Environment's Major Projects website: www.planningportal.nsw.gov.au/major-projects/project/10591.
Ancillary facilities	
Nomination of access tracks	New access tracks or upgrades to existing access tracks are proposed to connect construction areas and the transmission line easement to the existing road network. Existing unsealed local roads, forest roads, and tracks proposed for use as part of the access arrangements may also require minor improvement work, such as grading or resurfacing, or drainage work.
Construction compounds	Construction compounds, that would include demountable site offices and amenities, would be required during construction to support storage and equipment laydown, crushing and screening, concrete batching plants, sediment basins, helipad/helicopter facilities, temporary storage of materials, plant and equipment storage, generators and worker parking required to construct the various elements of the amended project. Eleven potential construction compound locations have been identified. The proposed use of the construction compounds and their proposed boundaries/layout would be refined as design develops in consultation with relevant stakeholders and the construction contractors.

Component	Description
Worker accommodation facilities and compounds	The amended project includes the following new combined worker accommodation facilities and compounds: • Tarcutta accommodation facility and compound (AC03) – located about 1.5 km south-west of Tarcutta • Adjungbilly accommodation facility and compound (AC04) – located about 21.7 km east of Gundagai • Yass accommodation facility and compound (AC05) – located on the north-western outskirts of the Yass township • Crookwell accommodation facility and compound (AC06) – located off Graywood Siding Road, about 18.1 km north of Goulburn • Green Hills accommodation facility and compound (AC07) – located about 6.5 km west of Batlow.
Helipad/helicopter facilities	To facilitate construction of the project, helicopters may be used to deliver materials/equipment and transfer personnel to construction areas particularly within high alpine regions. To enable helicopters to operate safely and allow easy access to the site, a helicopter landing pad would be required. The helipad is expected to occupy an area of around 30 m by 30 m and would be remediated after construction. These areas would typically be located on existing disturbed land not subject to inundation and a reasonable distance from waterways, sensitive receivers and drainage lines. Several construction compounds have been identified and assessed as helipad locations. The exact locations to be used would be confirmed as detailed design is finalised by the construction contractors. In addition to this, the existing facilities at the Wagga Wagga Airport, and Tumut Airport may be used.
Utility connections, adjustments and protection	The project would require utility connections, adjustments and protection. Such work includes interfaces with other transmission lines and connections to existing services for temporary facilities. Potential impacts to existing services and utilities would be confirmed during detailed design and any proposed relocation and/or protection work would be determined in consultation with the relevant asset owners.

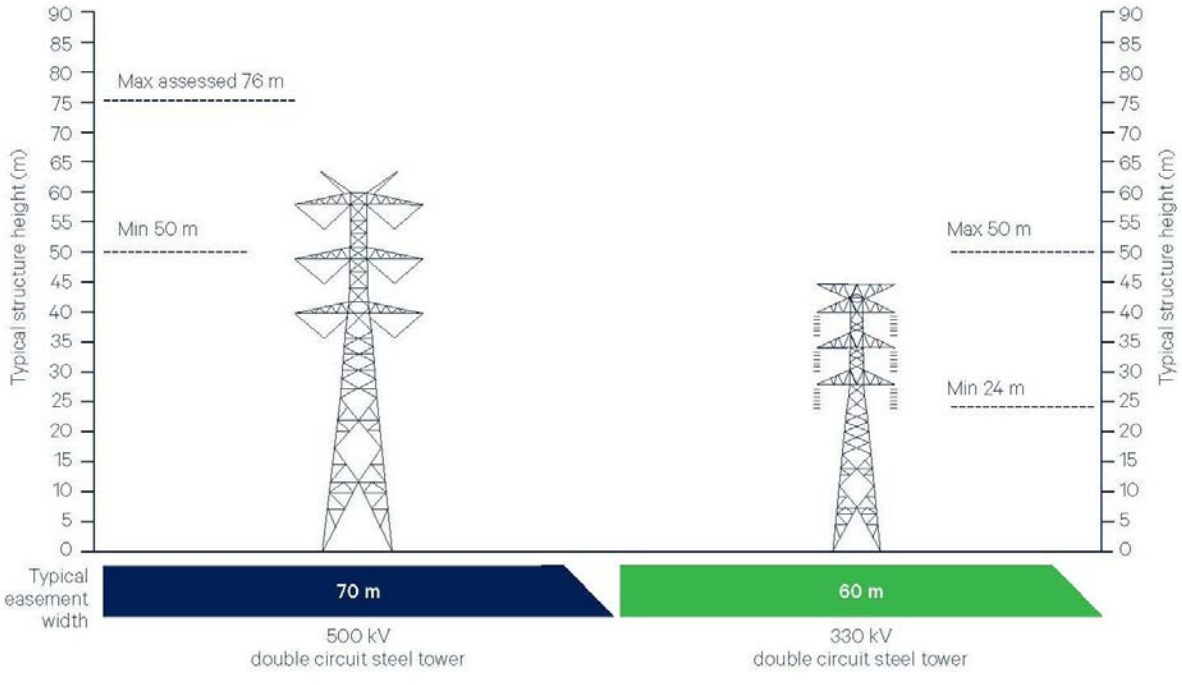


Figure not to scale.

Transmission line structures have been assessed to a height of 76 metres. Any structures that exceed 76 metres, would be managed in accordance with the change management process described in section 26.4 (Managing project changes) of the EIS, in consultation with affected landowners.

Figure 2-1 Indicative transmission line structures

2.2 Construction of the project

2.2.1 Construction activities

Key construction activities would generally include (but are not limited to):

- site establishment work, such as:
    - clearing of vegetation and topsoil
    - establishment of construction compounds, helipad/helicopter facilities and worker accommodation facilities
    - utility relocations and/or adjustments
    - construction of new access tracks and waterway crossings and/or upgrade of existing access tracks to transmission line structures
    - road improvement work where required
    - establishment of environmental management measures, traffic control measures and security fencing
    - construction of temporary worker accommodation facilities
    - establishing vehicle access and egress points including adjustment of roads to ensure safe vehicle movements as required
    - establishing hardstand areas for storage, laydown and car parking
    - carrying out geotechnical and contamination investigations
    - carrying out property adjustment and demolition work including adjustments to property fencing, barricades, gates and access, and demolition and relocation of existing dwellings and structures as required.
- construction of the transmission lines, including:
    - earthworks and establishment of construction benches and brake and winch sites as required for the stringing of the transmission line conductors
    - construction of footings and foundation work for the new transmission line structures including boring and/or excavation, steel fabrication work and concrete pours
    - erection of the new transmission line structures
    - stringing of conductors, overhead earth wires and OPGW
    - installation of earthing conductors
- relocation of a section of Line 51, including:
    - disconnection and removal of the existing section of Line 51
    - dismantling of transmission line structures and removal from site
    - construction of foundations and erection of new transmission line structures for the rebuild of Line 51 in a new location
    - stringing of conductors, overhead earth wires and OPGW
    - installation of associated transmission line structure fittings inclusive of all earthing below ground level
- construction of the proposed Gugaa 500 kV substation, including:
    - bulk earthworks to form the substation bench, access roads, drainage and oil containment structures
    - excavation and installation of concrete foundations, bund walls, fire walls, noise walls and kerbs including excavation

- installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
- excavation and installation of electrical conduits, electrical trenches, site stormwater drainage, oil containment work and associated concrete pits, pipes and tanks including excavation
- installation of new ancillary and equipment control buildings
- erection of galvanised steel structures to support electrical equipment
- installation of electrical equipment on foundations and/or steel support structures
- installation of conductors, cabling, wiring, electrical panels and electrical equipment
- erection of the substation site boundary security fencing, including site access gates
- connection of the proposed transmission lines to the substation

- modification of the existing Wagga 330 kV substation to enable the proposed connection and operation of the new transmission lines, including:
  - demolition and removal of redundant electrical equipment, fencing and cabling
  - bulk earthworks to form the extended substation bench and modified drainage structures
  - installation of concrete foundations and kerbs including excavation
  - installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
  - erection of galvanised steel structures to support electrical equipment
  - installation of electrical equipment on foundations and/or steel support structures
  - installation of electrical conduits, electrical trenches, and modified site stormwater drainage including excavation
  - installation of conductors, cabling, wiring, electrical panels and electrical equipment
  - installation of fencing, lighting and other security features
  - connection of the proposed transmission lines to the substation
- modification of the existing Bannaby 500 kV substation to enable the proposed connection and operation of the new transmission lines, including:
  - bulk earthworks to form the extended substation bench, new access road, modified stormwater drainage, modified oil containment and modified sediment control structures
  - installation of concrete foundations, retaining walls, bund walls, fire walls and kerbs including excavation
  - installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
  - erection of galvanised steel structures to support electrical equipment
  - installation of electrical equipment on foundations and/or steel support structures
  - installation of electrical conduits, electrical trenches, site stormwater drainage, oil containment work and associated concrete pits, pipes and tanks including excavation
  - installation of conductors, cabling, wiring, electrical panels and electrical equipment
  - installation of fencing, lighting and other security features
  - demolish redundant fencing including footings and kerbs
  - connection of the proposed transmission lines to the substation

- connection of the proposed transmission lines to the future Maragle 500 kV substation, including:
    - stringing conductors between transmission line structures and the future Maragle 500 kV substation gantry (including overhead earth wire (OHEW) and OPGW)
    - installing droppers from the future substation gantry to the switchgear
- construction of the telecommunications connections, including:
    - excavation of trenches between around 0.8 and 3 metres in depth and up to 450 mm in width
    - installation of the fibre optic cables (either direct buried or in conduit) and installation of marker tape
    - backfilling of the trenches
    - installation of cable pits and marker posts at surface level in specific locations
    - installation of a layer of sand/ cement mix over fibre cable/ conduit for mechanical protection in some locations.
- testing and commissioning of new electrical infrastructure
- demobilisation and rehabilitation of areas disturbed by construction activities.

A number of activities are expected to commence in accordance with the project conditions of approval before the key construction activities outlined above. These activities are considered pre-construction minor work and would comprise low impact activities that would begin after planning approval but prior to approval of the Construction Environmental Management Plan by the Department of Planning, Housing and Infrastructure (DPHI) (formerly the Department of Planning and Environment (DPE)). Pre-construction work would be managed in accordance with an Enabling Works Management Plan or Environmental Work Method Statements or similar environmental management documents.

2.2.2 Construction program

Construction of the project is targeted to commence in 2024 and is estimated to take about 2.5 years to complete. The project is expected to be fully operational by the end of 2026 (refer to Figure 2-2).

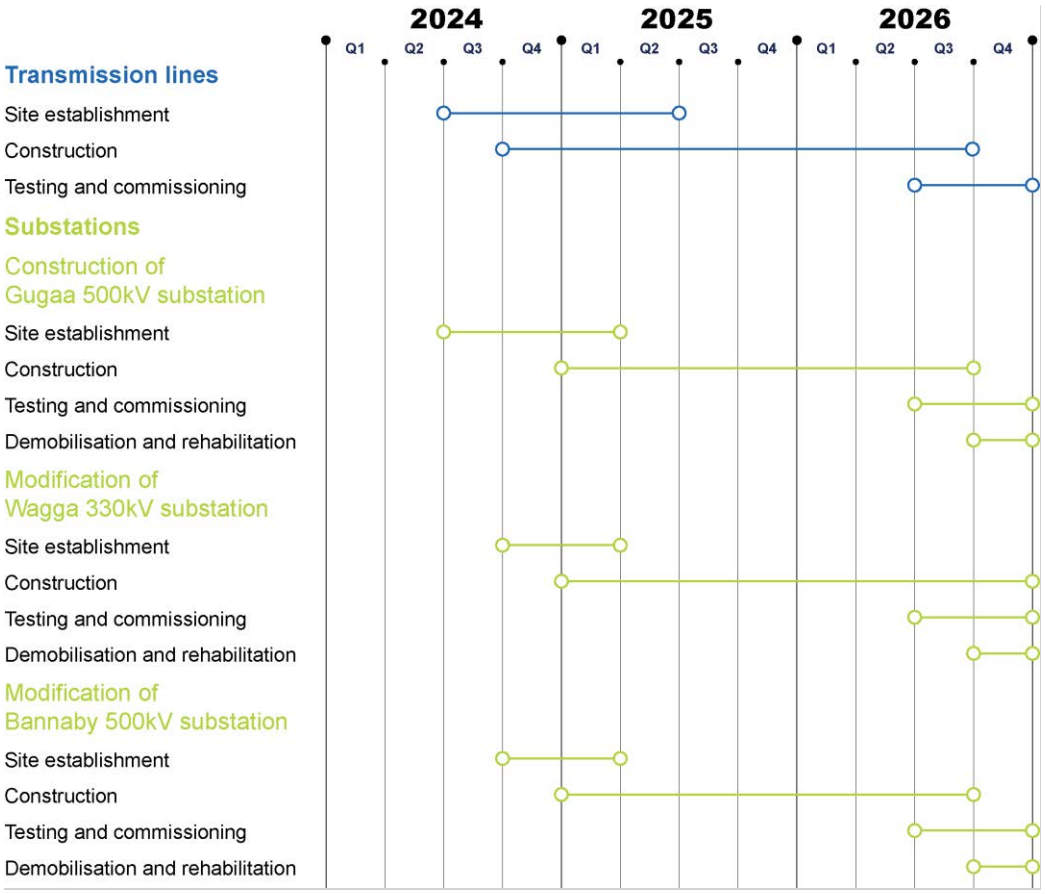


Figure 2-2 HumeLink indicative construction program

2.2.3 Indicative duration of construction activities

Construction at each transmission line structure would be transient and intermittent and construction activities would not occur at each structure location for the full duration for each phase of construction. However, following construction of the foundation, each transmission line structure would typically take one to three weeks to erect. The duration of any construction activity associated with an individual transmission line structure, and inactive/respite periods, may vary for a number of reasons including (but not limited to):

- multiple work fronts
- resource and engineering constraints
- environmental constraints
- work sequencing and location.

Figure 2-3 presents an indicative duration of construction activities associated with an individual transmission line structure.

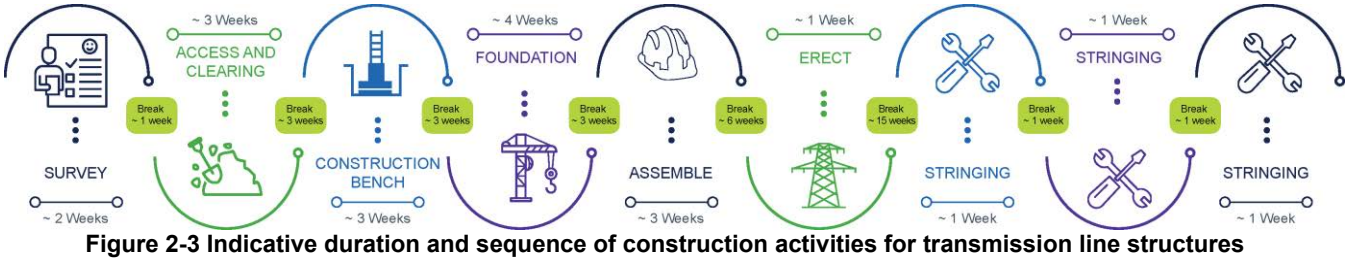


Figure 2-3 Indicative duration and sequence of construction activities for transmission line structures

Construction of the new Gugaa 500 kV substation could take up to 2.5 years.

2.2.4 Construction hours

It is expected that construction activities would largely be undertaken during standard construction hours. However, there would be times when working outside of standard construction hours would be required (as defined by the *Interim Construction Noise Guideline* (DECC, 2009)), subject to approval. As the details of construction methodology and project needs are developed, these hours will be refined for certain activities.

Where extended hours are proposed for activities in proximity to sensitive receivers, additional measures would be implemented and the work would be managed through an out-of-hours work protocol.

A series of work outside the standard construction hours is anticipated to include (but is not limited to) the following:

- transmission line construction at crossings of a main road or railway as these locations are expected to have restricted construction hours requiring some night work for activities such as conductor stringing over the crossing(s)
- work where a road occupancy licence (or similar) is required, depending on licence conditions
- transmission line cutover and commissioning
- the delivery of equipment or materials outside standard hours requested by police or other authorities for safety reasons (such as the delivery of transformer units)
- limited substation assembly work (eg oil filling of the transformers)
- connection of the new assets to existing assets under outage conditions (eg modification and/or connection work at Bannaby 500 kV substation, Wagga 330 kV substation and Maragle 500 kV substation), which is likely to require longer working hours
- operation of the temporary worker accommodation facilities
- emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm
- work timed to correlate with system planning outages
- situations where agreement is reached with affected sensitive receivers
- activities that do not generate noise in excess of the applicable noise management level at any sensitive receiver.

2.2.5 Construction plant and equipment

An indicative list of construction plant and equipment likely to be required during construction is provided below.

- air compressor
- backhoe
- bobcat
- bulldozers
- concrete agitator
- concrete pump
- cranes (various sizes up to 400 tonnes)
- crawler crane with grab attachments
- drill and blast units and associated support plant/equipment
- drones
- dumper trucks
- elevated working platforms
- excavators (various sizes)
- flatbed hiab trucks
- front end loader
- fuel trucks
- generators
- graders
- helicopters and associated support plant/equipment
- mobile cone/ jaw crusher
- mobile screener
- mulchers
- piling rig
- pneumatic jackhammers
- rigid tippers
- rollers (10 to 15 and 12-15 tonnes)
- semi-trailers
- tilt tray trucks
- trenchers
- transport trucks
- truck and dog
- watercarts
- winches.

2.2.6 Construction traffic

Construction vehicle movements would comprise vehicles transporting equipment, waste, materials and spoil, as well as workers' vehicles. A larger number of HVs would be required during the main construction work associated with the substations and transmission lines. Non-standard or oversized loads would also be required for the substation work (eg for transformer transport) and transportation of transmission line structure materials and conductors.

Hume Highway, Sturt Highway, Snowy Mountains Highway, Batlow Road, Barton Highway, Crookwell-Goulburn Road, Burley Griffin Way and Gocup Road are the main national and state roads proposed to provide access routes to the amended project footprint. These roads would be supported by regional and local roads throughout the LGAs of Wagga Wagga City, Snowy Valleys, Yass Valley, Cootamundra-Gundagai Regional, Goulburn Mulwaree and Upper Lachlan Shire that provide access routes to the amended project footprint.

2.2.7 Construction workers

The construction worker numbers would vary depending on the stage of construction and associated activities. During peak construction activities, the project could employ up to 1,600 full-time equivalent construction workers across multiple work fronts. It is expected that the maximum number of construction workers at any one location would not exceed 200.

2.2.8 Testing and commissioning

Prior to energisation of the infrastructure, a series of pre-commissioning activities would be conducted. This would include testing the new transmission lines and substation earthing, primary and secondary equipment.

2.2.9 Demobilisation and rehabilitation

Demobilisation and site restoration/ rehabilitation would be undertaken progressively throughout the amended project footprint during the construction program and would include the following typical activities:

- demobilisation of construction compounds and worker accommodation facilities
- removal of materials, waste and redundant structures not required during operation of the amended project
- removal of temporary fencing and environmental controls.

2.3 Operation phase

The design life of the project is 50 years, which can be extended to more than 70 years for some assets.

The substations and transmission lines would be inspected by field staff and contractors on a regular basis, with other operational activities occurring in the event of an emergency (as required). The project would require about five workers (in addition to Transgrid's existing maintenance workers) during operation for ongoing maintenance activities. Likely maintenance activities would include:

- regular inspection (ground and aerial) and maintenance of electrical equipment
- general building, asset protection zone and access road/track
- vegetation clearing/trimming within the easement
- fire detection system inspection and maintenance
- stormwater drainage systems maintenance.

It is expected that these activities would only require LVs and/or small to medium plant (depending on the work required).

3. LEGISLATIVE AND POLICY CONTEXT

Aboriginal cultural heritage in NSW is protected by Commonwealth and State legislation, and associated regulations and guidelines. The following are relevant to the project:

- State:
    - *National Parks and Wildlife Act 1974* (NPW Act)
    - *Environmental Planning and Assessment Act 1979* (EP&A Act)
    - *Aboriginal Land Rights Act 1983*
- Commonwealth:
    - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
    - *Native Title Act 1993*
    - *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (*ATSIHP Act).

3.1 National Parks and Wildlife Act 1974

Part 6 of the NPW Act provides protection for Aboriginal cultural heritage in NSW, including Aboriginal objects and declared Aboriginal Places.

An **Aboriginal object** is defined as:

> *"[…] any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains."*

An **Aboriginal place** is any area of land in NSW declared by the Minister for Environment and Heritage to be of special significance to Aboriginal culture.

It is an offence under s.86(4) of the NPW Act to harm (destroy, deface, or damage) or desecrate an Aboriginal object or place. The definition of harm includes moving an Aboriginal object from the land on which it is situated. Where harm cannot be avoided, an Aboriginal heritage impact permit (AHIP) issued by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (formerly the NSW Department of Planning and Environment (DPE)) under s.90 of the NPW Act would be required.

As the project has been declared CSSI no AHIP will be required (refer to Section 3.2) and the requirement for assessment of cultural heritage values are managed under the EP&A Act.

The Aboriginal Heritage Information Management System (AHIMS) collates information on known Aboriginal objects, sites and places. The AHIMS is a database maintained by NSW DCCEEW, which contains information about Aboriginal objects and places in NSW, including site records and cultural heritage assessment reports. If an Aboriginal object is found that is not already recorded on the AHIMS database, it is a requirement under s.89A of the NPW Act to notify NSW DCCEEW of the object's location.

3.2 Environmental Planning and Assessment Act 1979

The EP&A Act requires that environmental impacts are considered in land-use planning and development approval processes. One of the objectives of the Act is to promote the sustainable management of built and cultural heritage.

The EP&A Act contains provisions enabling the making of environmental planning instruments. These include State environmental planning policies, which deal with matters of State or regional

environmental planning significance within NSW; and Local Environmental Plans (LEPs), which guide planning decisions for local governments.

Planning approval pathways have been created in the EP&A Act to assess projects classed as State Significant Development (SSD) and State Significant Infrastructure (SSI). A range of development types can be declared to be SSD or SSI due to their size, economic value, or if they are in a sensitive environmental area. SSI projects may also be declared to be CSSI if they are of a high priority that 'is essential for the State for economic, environmental or social reasons.'

The project has been identified as CSSI under the State Environmental Planning Policy (Planning Systems) 2021. As the identification, assessment and mitigation of potential heritage impacts is managed by the environmental impact assessment process, the heritage provisions of environmental planning instruments do not apply, and the project does not require an approval or an excavation permit under the NPW Act. Key issues, which require detailed assessment are specified in the SEARs, and in the conditions of consent that are set when a project is approved.

3.2.1 Local Environmental Plans

Standard provisions for local environmental plans are set out in the Standard Instrument—Principal Local Environmental Plan (2006 EPI 155a). Section 5.10 provides for the conservation and management of environmental heritage, which can include buildings, works, places, relics, trees, objects or archaeological sites. Heritage items and heritage conservation areas on the land to which the LEP applies are identified and described in Schedule 5 environmental heritage.

There are a number of LEPs applicable to the amended project footprint as the project traverses through several LGAs. The environmental heritage schedules from relevant LEPs include:

- Wagga Wagga Local Environmental Plan 2010
- Yass Valley Local Environmental Plan 2013
- Tumbarumba LEP 2010 and Tumut LEP 2012 (for Snowy Valleys Council)
- Cootamundra LEP 2013 and Gundagai LEP 2011 (for Cootamundra-Gundagai Regional Council)
- Upper Lachlan Shire Local Environmental Plan 2013.

No Aboriginal sites listed on the LEPs above were identified within the amended project footprint.

3.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* establishes Local Aboriginal Land Councils (LALCs) at State and local levels and these bodies have a statutory obligation under the Act to:

- take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law
- promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area.

These requirements recognise and acknowledge the statutory role and responsibilities of NSWALC and LALCs.

The amended project footprint extends across the boundaries of Wagga Wagga, Brungle/Tumut, Onerwal and Pejar LALCs.

3.4 Environment Protection and Biodiversity Conservation Act 1999

The objectives of the Commonwealth EPBC Act include: the protection of the environment, especially those aspects of national significance; to promote the conservation of biodiversity and ecologically sustainable development; and to recognise the role of indigenous people and their knowledge in realising these aims.

A person must not take an action that has, will have or is likely to have a significant impact on any of the matters of environmental significance without approval from the Commonwealth Minister for the Environment and Water (the Minister).

Matters of national environmental significance (MNES) including:

- world heritage properties
- national heritage places
- wetlands of international importance
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines).

Other matters:

- the environment, where actions proposed are on, or will affect Commonwealth land
- the environment, where Commonwealth agencies are proposing to take an action.

To this end, it establishes:

- the National Heritage List (NHL) – a list of Indigenous, historic and natural places of outstanding significance to the nation, and
- the Commonwealth Heritage List (CHL) – a list of Indigenous, historic and natural heritage places owned or controlled by the Commonwealth Government.

The EPBC Act makes it a criminal offence to undertake actions having a ***significant*** impact on any matter of MNES or on Commonwealth land without the approval of the Minister. There are significant penalties, including fines and imprisonment, for taking such an action without approval. If it is to take an action that is likely to have a significant impact on a matter protected by the EPBC Act, it is important to make a referral to Commonwealth Department of Climate Change, Energy, the Environment and Water as early as possible in the planning and development stages.

A ***significant*** impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. All of these factors should be considered when determining whether an action is likely to have a significant impact on the environment. There are published guidelines on assessing if an impact is ***significant***.

The EPBC Act adopts a broad definition of the environment that is inclusive of cultural heritage values. In particular, the 'environment' is defined to include the social, economic and cultural aspects of ecosystems, natural and physical resources, and the qualities and characteristics of locations; places and areas (s528).

The EPBC Act allows for several means by which a controlled action can be assessed, including an accredited assessment process, a public environment report, an environmental impact statement, and a public inquiry (Part 8).

Section 68 imposes an obligation on a proponent proposing to take an action that it considers to be a controlled action, to refer it to the Minister for approval.

World heritage values are defined to be inclusive of natural and cultural heritage (s12(3)), and a declared World Heritage Property is one included on the World Heritage List or is declared to be such by the Minister (s13 and s14). The EPBC Act defines various procedures, objectives and

Commonwealth obligations relating to the nomination and management of World Heritage Properties (Part 15, division 1).

There are two places on the NHL close by, but not within the amended project footprint. They are the Australian Alps National Parks and Reserves and the Snowy Mountains Scheme. The Australian Alps National Parks[2] and Reserves has been listed for both natural and cultural values including Aboriginal gatherings to feast on Bogong moths. The Snowy Mountains Scheme has been listed for its European cultural values associated with engineering values and is addressed in *Technical Report 3 – Historic Heritage Impact Assessment* (Navin Officer Heritage Consultants (NOHC), 2023)[3].

3.5 Native Title Act

The Commonwealth *Native Title Act 1993* (Cth) provides the legislative framework to:

- recognise and protect native title
- establish ways in which future dealings affecting native title may proceed and to set standards for those dealings, including providing certain procedural rights for registered native title claimants and native title holders in relation to acts which affect native title
- establish a mechanism for determining claims to native title
- provide for, or permit, the validation of past acts invalidated because of the existence of native title.

The NSW *Native Title Act 1994* was introduced to make sure the laws of NSW are consistent with the Commonwealth's *Native Title Act 1993* on future dealings. It validates past and intermediate acts that may have been invalidated because of the existence of native title.

The National Native Title Tribunal has a number of functions under the *Native Title Act 1993*, including maintaining the Register of Native Title Claims, the National Native Title Register and the Register of Indigenous Land Use Agreements and mediating native title claims.

No Native Title claims have been registered within the amended project footprint.

3.5.1 Gundungurra Indigenous Land Use Agreement

The Gundungurra Indigenous Land Use Agreement 2014 (ILUA) is an agreement between the Gundungurra people, the Gundungurra Tribal Council Aboriginal Corporation, Gundungurra Aboriginal Heritage Association and the NSW Government. The ILUA covers an area of 694,200 hectares including 20 parks and reserves. The ILUA does not extinguish any native title rights and interests over the area, however it also does not constitute an admission or recognition of native title over these lands with the Gundungurra people agreeing to withdraw their native title claim (for at least five years) on registration of the agreement. The agreement does not preclude lodgement of a claim in the future should sufficient additional information to support such a claim be provided.

The ILUA provides the Gundungurra people an opportunity to be consulted with respect to management of national parks, state conservation areas and Forestry Corporation of NSW lands. Tarlo River National Park and Back Arm Nature Reserve are locations within the ILUA area and are (in part) located immediately adjacent to the amended project footprint. While the wider ILUA area does overlap with the amended project footprint, the actual lands subject to the ILUA (national parks, state conservation areas and Forestry Corporation of NSW lands) do not overlap with the amended project footprint.

[2] The Commonwealth gazettal notice listing the significant heritage values can be found here https://www.dcceew.gov.au/sites/default/files/env/pages/5049d4dd-060e-40fb-8dbf-eaa5496cd18d/files/10589104.pdf

[3] The Commonwealth gazettal notice detailing heritage criteria can be found at https://www.legislation.gov.au/Details/C2016G01361

In accordance with the Gundungurra Indigenous Land Use Agreement 2014 (refer to Section 5.1), letters were sent to Gundungurra Aboriginal Heritage Association Inc inviting them to register for the project, however no response was received.

3.5.2 Tumut Brungle Indigenous Land Use Agreement

The Tumut Brungle Indigenous Land Use Agreement (1999) is a legally binding agreement between Wiradjuri and Walgalu people and the Adelong Consolidated Gold Mine NL. The NSW State government is not a signatory. The agreement covers an area of approximately 8500 square km. The agreement was due to expire 20 years from the 26 August 1998 or earlier termination of the last mining tenement to be granted to ACG in relation to the Deed Area or, whichever is the later. The project traverses this agreement area however this agreement is no longer current.

3.6 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Commonwealth ATSIHP Act provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the "preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginal peoples in accordance with Aboriginal tradition."

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

No declarations relevant to the amended project footprint have been made under the ATSIHP Act.

4. METHODOLOGY

4.1 Overview of approach

This report has been developed in accordance with the following guidelines:

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010b)
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment and Heritage (OEH), 2011).

As such, the key requirements of this report are:

- to conduct a search of the AHIMS database
- to review the landscape context of the amended project footprint, with specific consideration to its implications for past Aboriginal land use
- to review relevant archaeological and ethnohistoric information for the amended project footprint
- to prepare a predictive model for the Aboriginal archaeological record of the amended project footprint
- to undertake an archaeological field investigation including detailed survey
- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the amended project footprint
- to provide RAPs with information about the scope of the proposed work and Aboriginal heritage assessment process
- to facilitate the process where registered RAPs can:
    - contribute culturally appropriate information to the proposed assessment methodology
    - provide information that will enable the cultural significance of Aboriginal objects and/or places within the amended project footprint to be determined
    - have input into the development of cultural heritage management options
- to prepare an ACHAR with input from registered RAPs.

4.2 Key tasks

4.2.1 Literature and database review

A range of historical and archaeological data was reviewed for the AHIMS search area (search undertaken on 2 February 2023 and updated on 18 October 2023). This literature and data review was used to determine if known sites are located within the amended project footprint, to facilitate site prediction on the basis of known regional and local site patterns, and to place the area within an archaeological and heritage management context. The review of documentary sources included heritage registers and schedules, local histories, and archaeological reports.

Aboriginal literature sources included the AHIMS maintained by DPHI and associated files and the catalogue of archaeological reports. Sources of historical information included regional and local histories, heritage studies and theses, parish maps, and where available, other maps, such as portion plans.

4.2.2 Preliminary archaeological sensitivity model applied to the field survey

A preliminary Aboriginal archaeological sensitivity model was developed for the EIS project footprint based on the review of previously recorded AHIMS sites, an assessment of topographic contours and slope, a review of previous archaeological investigations within and near the EIS project footprint and the hydrology along the EIS project footprint. Additionally, land disturbance and land use were also

analysed through aerial imagery to redefine the sensitivity map. This type of modelling is a standard industry practice and Heritage NSW requirement.

The archaeological sensitivity model was put together by combining several criteria (refer to Section 4.2.4). Each criterion was treated equally in respect to the overall impact on determining landform sensitivity. The model uses three broad categories that can be defined as:

- Low sensitivity (Green): Areas that are low sensitivity are generally categorised as high gradient, difficult to access landforms that are distant to the closest water source. There is a low chance of finding dense archaeological material in this zone.
- Moderate sensitivity (Yellow): Areas that are moderate sensitivity are generally of low to moderate gradient, difficult to access with only few accessible points (particularly on ridgelines) that are close (less than 500 metres) to water sources. There is a moderate chance of finding dense archaeological material in this zone.
- High sensitivity (Red): Areas that are high sensitivity are generally flat to low gradient, easily accessible areas that are within 300 metres to perennial bodies of water. There is a high chance of finding dense archaeological material in this zone.

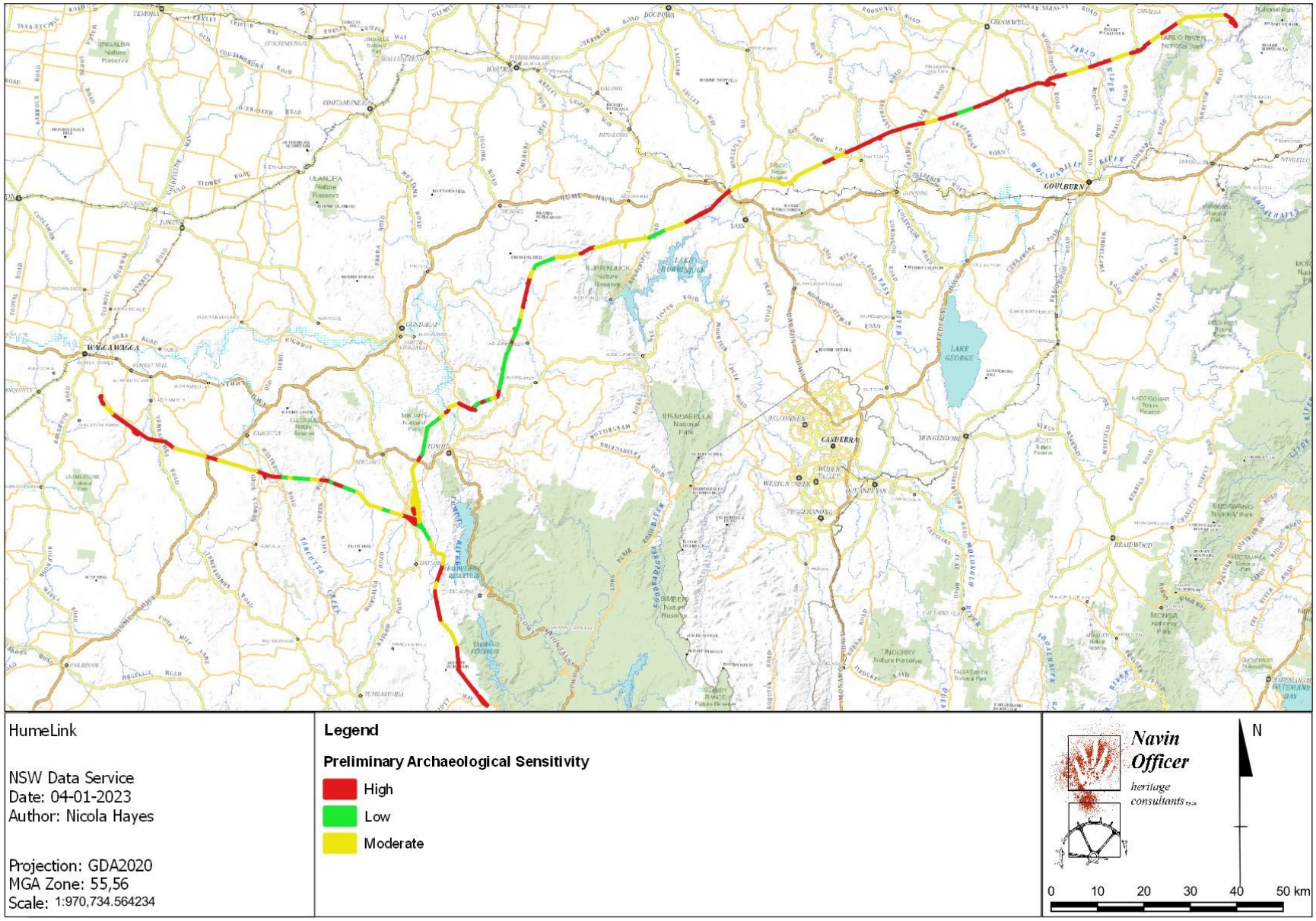


Figure 4-1 Preliminary archaeological sensitivity within the EIS project footprint (based on the EIS assessment)

4.2.3 Field survey

The field investigation involved physical pedestrian inspection of the survey area across all accessible properties. Access track surveys targeted proposed new tracks that extend outside of the transmission line corridor where access was available. The aims of the survey were to identify archaeological sites and areas of PAD not previously recorded, find, inspect, and assess the condition of known Aboriginal sites recorded on the AHIMS database and collect data to further refine the sensitivity model. Similar methodology has previously been used on other large linear projects. This methodology was presented to the RAPs and to Heritage NSW prior to fieldwork. Feedback was sought and no comments were received.

4.2.4 Sensitivity model following the field survey

A sensitivity model was developed in order to predict potential areas of surface artefact scatters. The preliminary version of the model was created based on the criteria mentioned above in Section 4.2.2 in order to inform survey decision-making and highlight areas in which more refined targeted investigation should occur. This model was presented to the RAPs for the project and to Heritage NSW through the presentation of the project methodology. Feedback was sought and no comments were received. Due to access restrictions, it was determined that survey of all accessible areas would be undertaken, rather than a sample survey. In this way the credibility of the sensitivity model could be tested, and the model refined as needed based on the results.

The landform archaeological sensitivity model was refined following the field survey using multiple datasets in order to achieve a weighted, multi-criteria analysis of the potential archaeological sensitivity of the landforms traversed by the amended project footprint. The model is built on the combination of several criteria including field survey results, slope, previously recorded AHIMS sites data, and large bodies of permanent water and waterways (referred further as hydrology) and disturbance (refer to Section 4.2.5).

The aims of the model are to use landscape criteria to identify areas of high and moderate sensitivity that contain the highest number of archaeological sites within the smallest footprint and identify areas of low sensitivity that contain the lowest number of archaeological sites with the largest footprint.

As new sites were recorded, their landscape criteria were incorporated into the archaeological site catalogue and new iterations of the model were run with varying parameters for the landscape criteria.

Figure 4-2 shows an example of the sensitivity model using the refined parameters.

4.2.4.1 Slope

The slope model was partly produced through using the Digital Elevation Model (DEM) 5 metre grid of Australia obtained from Geoscience Australia, who have collaborated between the Cooperative Research Centre for Spatial Information and DPHI to obtain Light Detection and Ranging imagery of the coastal areas and major population areas of NSW.

Using QGIS, it was possible to use the DEM to derive slope angles between different points of elevation. From this information it is possible to identify areas of high gradient terrain that would be difficult to traverse and/or any areas of gradual sloping to flat ground that would be more likely to be used by humans in the past. To highlight these more habitable and traversable areas, the slope data for each known and discovered archaeological site were compiled and slope ranges were categorised as good, moderate, and poor based on the presence or absence or archaeological sites.

For the areas that were outside the DEM dataset, contour data was collated from the Digital Topographic Database of the NSW Spatial Data Infrastructure. Contour data was collected from the Cootamundra-Gundagai Regional, Wagga Wagga City, Snowy Valley, Yass Valley and Upper Lachlan Shire LGAs and stitched together to cover the amended project footprint.

For this updated sensitivity model, slope has been classified as:

- good being zero to six degrees
- moderate as 6.01 to 11 degrees
- high as 11.01 degrees and greater.

Of the 157 surface site locations within the amended project footprint (being the 113 artefact sites identified in the current survey, the 11 test locations, and the previously recorded AHMS sites (39) and including two PADs and one modified tree/PAD and sites identified by RAPs), 150 were located on a slope of less than 11 degrees, 106 sites were located on a slope of less than six degrees.

4.2.4.2 AHIMS

There have been numerous previous surveys around the Wagga Wagga area at the northern and western extents of the amended project footprint. Beyond this area, previous archaeological survey coverage is sparser and more scattered. AHIMS site data that record the results of these previous surveys was obtained for the AHIMS search area. In total, there were 115 recorded AHIMS sites located within the AHIMS search area for the amended project footprint, ranging from stone arrangements, PADs, artefact scatters, modified carved trees / modified trees, open camp sites, and stone quarries.

For the purposes of this assessment, all site types have been valued equally in the model and a buffer of 100 metres was placed around each site to allow for any errors in original recordings and indicate an area of higher archaeological potential. In addition, sites recorded as part of the project surveys to date have also been used to test the model and refine it further. The final model incorporates the 184 sites that are located within the project area. Some sites outside the project footprint were used in the development of the model.

4.2.4.3 Hydrology

Sites are likely to occur near major perennial waterways and large bodies of water. Several significant rivers, creeks and streams are encompassed within the amended project footprint (eg Murrumbidgee River, Tumut River). In initially formulating the model, hydrology data classified using the Classical Stream Order Model was utilized but this data necessitated the inclusion of minor streams to accurately model the archaeological sensitivity. New hydrology data to inform this assessment was obtained from the NSW government which was classified using the Strahler stream order system. Using this system improves classification of streams higher in the water shed and allows for better differentiation between consequential and inconsequential streams.

The Strahler system organises streams by joining streams of the same order to create a higher order stream. A first order stream has no other streams flowing into it. A second order stream is created by the combining of two first order streams. When two streams of different orders combine the result is a stream the same as the highest order stream. When two streams of the same order combine the result is a stream one order higher than those that combined.

Strahler stream order levels 2 and higher were used. Level 1 streams were eliminated as they are all small inconsequential streams high in the watershed such as drainage lines leading to farm dams. The model testing has shown that of the 184 surface sites within the amended project footprint, 128 are within 350 metres of order 2 or higher streams and 145 are within 500 metres.

4.2.5 Final model for archaeological sensitivity – surface sites

The landscape parameters for the final model for predicting archaeological sensitivity were refined through numerous model iterations using the continuously updated archaeological data. To determine the most efficient landscape parameters, separate “blind” models were run that did not use proximity to archaeological sites as a model criterion (Table 4-1). This ensures that the model can be as accurate as possible in areas with extremely poor visibility and or no previous archaeological investigation has occurred.

Efficiency is measured as the percentage of sites identified in a level of sensitivity divided by the percentage of land area for that level of sensitivity. The final model reincorporates proximity to existing archaeological sites (Table 4-2). This allows for recorded sites to identify increased sensitivity in areas where poor visibility across the project area hampered surface investigation. Additionally, areas of disturbance were incorporated into the model using available data including roads, railway lines, dams, waterways, and farm dams. Forestry NSW have provided the road and track data for forests within the amended project footprint. The data included roads and tracks that were categorised as sealed, gravelled, natural (graded) and 4WD tracks. We have interpreted these layers and have classified the sealed and gravelled tracks as disturbed in the model. The unsealed and un-gravelled (natural and 4WD) tracks were found to contain Aboriginal object s during field survey so have not been classified as disturbed.

The archaeological surface sensitivity parameters are as follows:

- High Sensitivity:
    - Areas of good slope (0-6 degrees) within 350 metres of an order 2 stream or higher.
    - Areas of good slope within 100 metres of an archaeological site.
- Moderate Sensitivity:
    - Areas of moderate slope (6.01-11 degrees) within 350 metres of an order 2 stream or higher.
    - Areas of good slope (0-6 degrees) between 350 and 500 metres of an order 2 stream or higher.
    - Areas of moderate slope within 100 metres of an archaeological site.
- Low Sensitivity:
    - All other areas.

Table 4-1 ”Blind” surface model without AHIMS

Sensitivity	Surface Sites	Percentage	Area m^2	Percentage	Efficiency
High	76	48.1	25240343	27.9	1.73
Moderate	44	27.8	24374971	26.9	1.04
Low	27	17.1	38187647	42.1	0.41
Disturbance	11	7.0	2819886	3.1	
Total	158	100	90622847		

Table 4-2 Final model for predicting surface artefact scatters

Sensitivity	Surface Sites	Percentage	Area	Percentage	Efficiency
High	96	60.8	25548197	28.1	2.16
Moderate	40	25.3	24508700	27.0	0.94
Low	11	7.0	37893685	41.7	0.17
Disturbance	11	7.0	2819886	3.1	
Total	158	100	90770468		

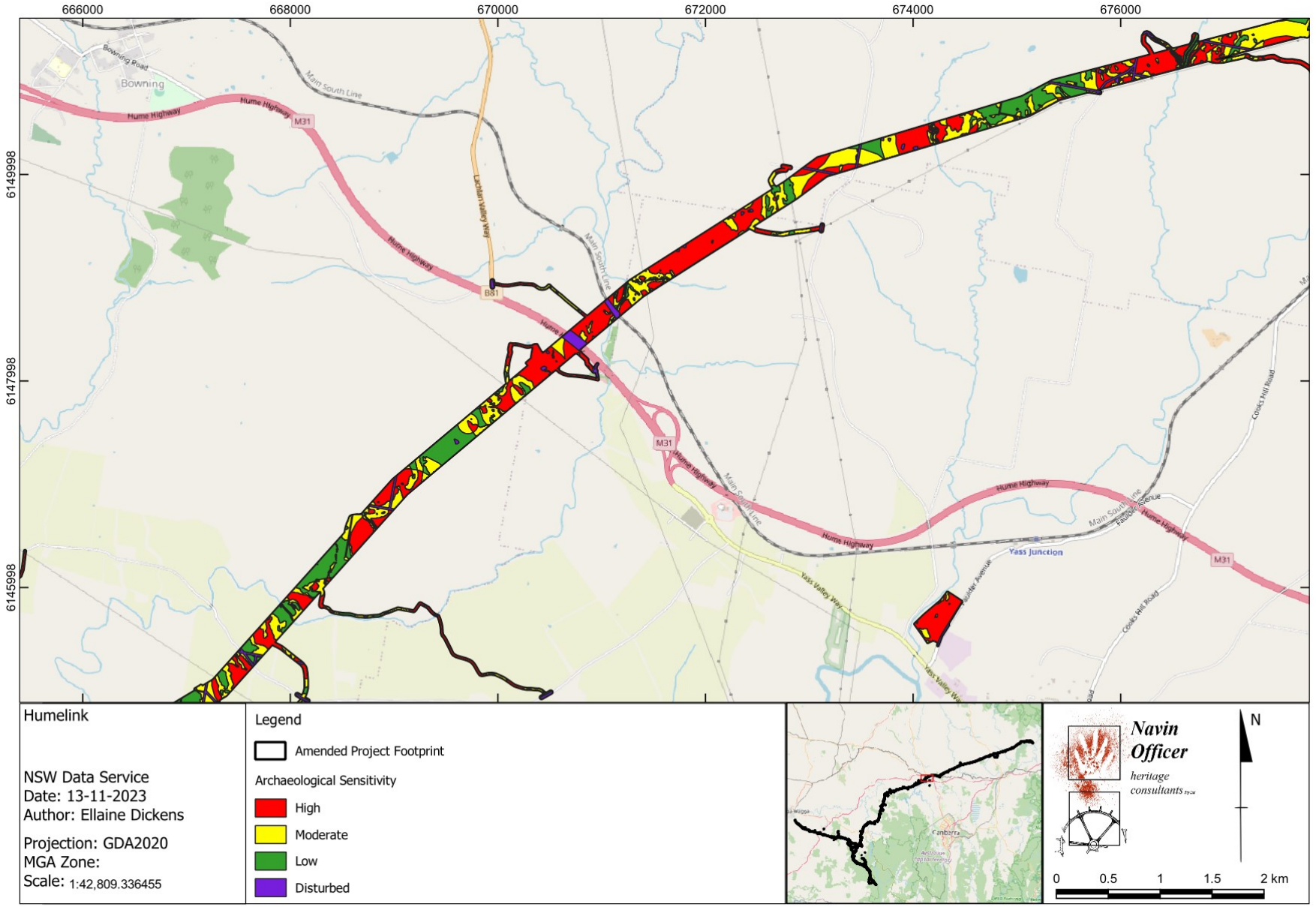


Figure 4-2 Example of landform archaeological sensitivity model following the field survey

4.2.6 Test excavation

4.2.6.1 Aims

The archaeological test excavation program aimed to characterise the nature and occurrence of subsurface archaeological resources within areas identified to contain PADs during the archaeological survey within the amended project footprint.

The subsurface testing program also aimed to target specific areas of low, moderate, and high archaeological potential defined by the refined archaeological sensitivity model. Testing surveyed areas with poor Ground Surface Visibility based on the archaeological sensitivity model aimed to identify, characterise and assess any previously unidentified cultural material within the amended project footprint and to test the robustness of the archaeological sensitivity model. The methodology does not conclusively prove or disprove that Aboriginal heritage objects are present or absent from the project footprint but aimed to test the archaeological sensitivity model to allow for greater certainty in the assessment of impacts to areas of identified low, moderate, and high archaeological sensitivity. The test excavation program also aimed to identify any prior land-use disturbance, characterise soil profiles as well as identify cultural material density and distribution at test locations.

The following archaeological test excavation methodology has been developed in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010a).

4.2.6.2 Test excavation locations

Test excavation was undertaken in six of the 10 new PADs identified in the amended project footprint during the survey program. The remaining four new PADs were not tested as either the project has committed to not impacting the areas or the area is only being impacted by the use of existing tracks. Test excavation will occur at these PADs if, following detailed design, they are to be directly impacted by the project. Transects were placed within the boundaries of the amended project footprint and specifically in areas considered to contain higher potential for subsurface deposits within the PAD following the parameters of the sensitivity model.

Additional areas for testing were defined from the sensitivity model targeting areas of low, moderate and high archaeological sensitivity. Five test transects were undertaken within each of the LGAs that the project crosses (Wagga Wagga City, Snowy Valleys, Upper Lachlan Shire, Cootamundra–Gundagai Regional and Yass Valley). Each transect aimed to test more than one grade of archaeological sensitivity namely areas of high and/or moderate and/or low sensitivity and a sample of each sensitivity type was tested. Fewer areas of low sensitivity were tested as indicated by the model, these are generally areas of steeper slope and were generally less accessible compared to area of moderate or high archaeological sensitivity. Figure 4-3 shows all the test excavation locations targeted for testing and Table 4-3 summarises the sensitivity, bioregion, LGA and LALC for east test area. Testing within these areas consisted of a linear transect placed within the boundaries of the amended project footprint. Transect length varied based on landscape conditions to avoid trees, highly disturbed areas, wet/boggy areas and surface bedrock.

The results of the test excavation program have been included in the final predictive archaeological sensitivity model to further refine the model and allow for the characterisation of subsurface archaeological deposits within identified areas of high, moderate and low sensitivity.

Table 4-3 Test areas including sensitivity, landform, bioregion, LGA and LALC

Test area	Archaeological Sensitivity	Landform	Bioregion	LGA	LALC
HL-PAD-01	High	Lower slope floodplain	South West Slopes	Wagga Wagga	Wagga Wagga
HL-PAD-02	High, moderate and low	Lower slope and floodplain	South West Slopes	Wagga Wagga	Brungle/Tumut
HL-PAD-05	High and moderate	Gentle slope	South Eastern Highlands	Yass Valley	Onerwal
HL-PAD-06	Moderate	Gentle slope	South Eastern Highlands	Yass Valley	Onerwal
HL-PAD-07	High	Gentle slope/ floodplain	South Eastern Highlands	Upper Lachlan	Onerwal
HL-PAD-10	High and moderate	Lower slope	South Eastern Highlands	Upper Lachlan	Pejar
WAS01	High and moderate	Moderate slope/ floodplain	South Western Slopes	Wagga Wagga	Wagga Wagga
WAS02	High and moderate	Floodplain	South Western Slopes	Wagga Wagga	Wagga Wagga
WAS02-1	High, moderate and low	Mid-slope	South Western Slopes	Wagga Wagga	Wagga Wagga
WAS03	High and moderate	Floodplain	South Western Slopes	Wagga Wagga	Wagga Wagga
WAS03-1	Moderate and low	Gentle slope	South Western Slopes	Wagga Wagga	Wagga Wagga
WAS04	High and moderate	Mid-slope	South Western Slopes	Wagga Wagga	Brungle/Tumut
SVAS01	High, moderate and low	Moderate slope	Australian Alps	Snowy Valleys	Brungle/Tumut
SVAS02	High and moderate	Gentle to moderate slope	South Western Slopes	Snowy Valleys	Brungle/Tumut
SVAS03	High and moderate	Moderate slope	South Western Slopes	Snowy Valleys	Brungle/Tumut
SVAS04	Moderate and low	Lower slope	South Eastern Highlands	Cootamundra-Gundagai	Brungle/Tumut
SVAS05	High and moderate	Gentle to moderate slope	South Western Slopes	Snowy Valleys	Brungle/Tumut
CGAS01	High and moderate	Moderate slope	South Western Slopes	Cootamundra-Gundagai	Brungle/Tumut
CGAS02	High and moderate	Moderate slope	South Western Slopes	Cootamundra-Gundagai	Brungle/Tumut
CGAS03	High and moderate	Gentle slope	South Western Slopes	Cootamundra-Gundagai	Brungle/Tumut
CGAS04	High and moderate	Gentle slope	South Western Slopes	Cootamundra-Gundagai	Brungle/Tumut
YAS01	High, moderate and low	Moderate slope	South Western Slopes	Yass Valley	Onerwal
YAS02	High and moderate	Gentle slope	South Eastern Highlands	Yass Valley	Onerwal
YAS03	High and moderate	Gentle slope	South Eastern Highlands	Yass Valley	Onerwal

Test area	Archaeological Sensitivity	Landform	Bioregion	LGA	LALC
YAS04	High and moderate	Gentle slope	South Eastern Highlands	Yass Valley	Onerwal
YAS05	High	Lower slope/ floodplain	South Western Slopes	Yass Valley	Onerwal
ULAS01	High	Floodplain	South Eastern Highlands	Upper Lachlan	Onerwal
ULAS02	High and moderate	Moderate slope	South Eastern Highlands	Upper Lachlan	Onerwal
ULAS03	High and moderate	Moderate slope	South Eastern Highlands	Upper Lachlan	Onerwal
ULAS04	High and moderate	Floodplain	South Eastern Highlands	Upper Lachlan	Onerwal
ULAS05	High and moderate	Moderate slope	South Eastern Highlands	Upper Lachlan	Pejar

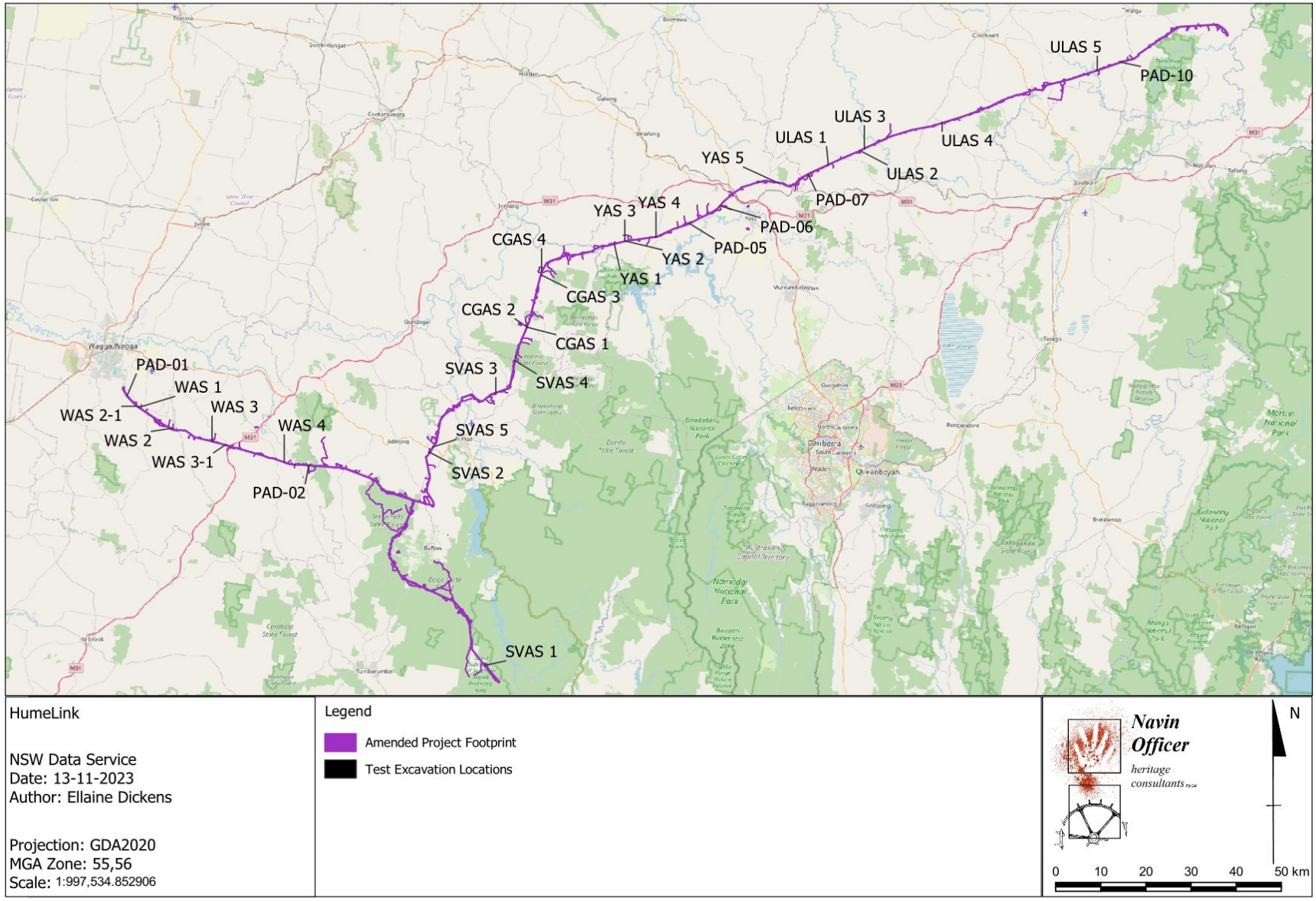


Figure 4-3 Test excavation locations

4.2.6.3 Test excavation methodology and sampling strategy

The test excavation program was undertaken in accordance with Requirements 14 to 20 and 23 to 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) and specifically, Requirement 15b which stipulates that a sampling strategy must be developed.

PAD testing:

- Test pits were placed within a systematic transect established across the extension of the PAD within the boundaries of the amended project footprint. Test pits were placed at intervals of five to 10 metres within transects measuring less than 100 metres in length. For transects measuring over 100 metres in length, test pits were placed at intervals of 10 to 20 metres.
- The number of test pits and distance within each test pit within an established transect varied to avoid hazards and obstructions that may be encountered when placing the pits.

Additional sites:

- Ten test pits were placed at intervals of 10 metres within each systematic transect established within the amended project footprint. The additional area locations were selected following consultation on the project methodology and were dependant on site access conditions. Test pit interval location varied if required to avoid hazards and obstructions that may be encountered when placing the pits.

Test pit excavations were carried out following Requirement 16a of the Code of Practice using hand tools such as mattocks, shovels, and trowels applying standard by-hand archaeological methodologies including vertical and horizontal recording of spit levels and sedimentary, cultural and stratigraphic features.

Each test pit measured 500 millimetres squared with the first test pit on each transect excavated in 50 millimetre spits. A spit is an excavation unit with an arbitrarily assigned measurement of depth. Depending upon the results of the first excavation unit, subsequent spit intervals were excavated in 100 millimetre spits except in circumstances where the excavation of cultural features or stratigraphic units necessitates a smaller interval. Test pits containing diagnostic artefactual material were expanded into one square metre test pits and recorded in quadrant sample units measuring 500 millimetres squared.

Test excavation of each pit ceased when the natural B Horizon deposit was reached or to the base of an Aboriginal object bearing units or until deposits are sterile. An additional spit was excavated on the first pit on each transect excavated in 500 millimetre spits to confirm that soils are culturally sterile. B horizon soils consist of one or more mineral soil layers characterised by a concentration of silicate clay, iron, aluminium, and organic material below A horizons (National Committee on Soil and Terrain, 2009: 150). This layer is generally compacted and considered to be undisturbed and not associated with cultural activity.

4.2.6.4 Sieving

All excavated material was sieved through at least a 5 millimetre mesh, with use of a top larger mesh (10 millimetres by 10 millimetres) where appropriate. All identified or suspected cultural material recovered from sieving was retained, bagged and labelled according to the test pit provenance.

4.2.6.5 Recording

Detailed recording of each excavated test pit was carried out during the test excavation program. This consisted of an excavation recording form with detailed descriptions of the landscape and landform character, soil profile, any evidence of disturbance and/or features, as well as depth of excavation and the number of artefacts and inclusions present. Photographic recording was carried out before and after the completion of each test pit. A scaled section drawing was undertaken for at least one wall section of each excavated test pit.

4.2.6.6 Lithic (stone) analysis

All lithic items were examined in detail by a lithic specialist using a low-power binocular microscope and incident illumination and/or hand lens. Descriptive recording of collected material was to a level concomitant with the stated testing and salvage aims of the investigation, and the number of artefacts/type of material recovered.

Attributes for each artefact in the assemblage were entered into a relational database and digital photographs were taken of selected artefacts, where appropriate. Information for each specimen recorded in the analysis are provided in Attachment 7. The analysis specifically addressed the following:

- Source information. What raw material resources were used; where did they come from; and what does this tell us about Aboriginal use of the region in the past?
- Stone reduction technology. How was the stone worked and used? Does this change over time? Can the function of the site be inferred from the artefact assemblage? What does this tell us about Aboriginal occupation, use, settlement and activities undertaken through time in this region?
- Post-depositional influences. What post-depositional influences have impacted the assemblage, and what does this tell us about the integrity and significance of the site?
- Site chronology. When was the site occupied? Was the assemblage the product of repeated occupations or a single event? Is there spatial patterning in the assemblage, and what does this tell us about repeated use, activities and/or occupation of the region through time?

The primary aim of the analysis of the lithic items retrieved from the test locations is to assist in the assessment of the significance of the sites/deposits and to identify appropriate management strategies.

The analysis was consistent with standards and guidelines defined by Heritage NSW.

The terminology used in the analysis is defined in Table 4-4.

Table 4-4 Analysis terminology

Analytical Terms	Definition
Angular fragment / Debitage	A piece of debris exhibiting evidence of knapping but lacking key diagnostic traits (eg platform, termination, bulb of percussion)
Backing	Abrupt retouch normally found on one lateral margin of a tool and opposite the working edge.
Bladelet	A small (generally 8-12 mm in width) example of a blade; a cutting or scraping tool that is prepared through retouch of an initial flake (blade blank) at least twice as long as it is wide.
Core	A nodule or block of siliceous rock from which sharp-edged slivers of stone are struck (generally with a hammerstone).
Cortex	The weathered outer layer of rock, differing in chemical and optical properties to the unweathered interior.
Distal flake	The termination end of a partial (broken) flake.
Dorsal surface	Outer surface of a flake (former surface of the core) characterised by cortex and/or negative concavities (flake scars) and ridges denoting prior removal of flakes.
Flake	A sliver of stone struck from a core exhibiting characteristic traits of force fracture.
Knapping	The process of fracturing flakes of stone from a core
Medial Flake	Flakes defined by the absence of the proximal and distal margins with an identifiable ventral surface.
Lateral margin	Left and right edges of a flake (platform oriented upward when viewing the ventral surface and distal end oriented upward for the dorsal surface).
Platform	Planar surface marking the location from which the flake was struck from the core.

Analytical Terms	Definition
Primary flake	Initial flake struck from a weathered cobble with a dorsal surface covered in cortex and lacking prior flake scars.
Proximal flake	The platform end of a partial (broken) flake.
Retouch	Alteration of the cutting edges of a flake or tool to refine sharpness, shape, angle or strength.
Termination	End of a flake opposite the platform denoting the place the force applied by the hammerstone exited the core.
Tertiary flake	Flake lacking dorsal or platform cortex indicating a high degree of prior reduction of the core from which it was knapped.
Tools	Artefacts that have been made or used for some specific tasks.
Ventral surface	Inner surface of a flake originally attached to a core exhibiting one or more traits of conchoidal fracture including a bulb of percussion, bulbar scar and ripple marks.

4.2.7 Post subsurface test excavation subsurface archaeological sensitivity model adjustments and reviews

When post excavation subsurface data was reviewed it was determined that a separate model with different landscape parameters should be made specific to predict subsurface archaeological sensitivity. The final model for predicting surface artefacts scatters (Section 5.2.5 above) was compared with test pits that contained artefacts. Of the 39 test pits containing artefacts, 27 were in areas of high sensitivity, nine in moderate and three in low.

When the slope and distance to water of the test pits were investigated it was discovered that no test pit containing artefacts was found above 8.7 degrees and that the location of test pits containing artefacts was more weighted towards proximity to higher order streams such as 3 and 4 or above. Therefore, the slope parameters were refined to “good” slope being 0 to 5 degrees, moderate slope 5.01-8.7 degrees and “poor” slope being above 8.7 degrees. The subsurface archaeological sensitivity model parameters are as follows:

- High sensitivity:
    - Areas of “good” slope within 200 metres of an order 3 stream or higher.
    - Areas of “good” slope within 400 metres of an order 4 stream or higher.
- Moderate sensitivity:
    - Areas of “good” slope within 650 metres of an order 3 stream or higher.
    - Areas of “moderate” slope within 200 metres of an order 3 stream or higher.
    - Areas of “good” slope within 450 metres of an order 4 stream or higher.
- Low sensitivity:
    - All other areas.

4.2.7.1 Final model for predicting subsurface archaeological sensitivity

The final surface (Section 4.2.5 above) and the model for predicting subsurface archaeological sensitivity both achieve the model aims of identifying the locations of the most archaeological sites in the smallest footprint for high and moderately sensitive areas while placing the fewest archaeological sites in areas of low sensitivity (Table 4-5). The final subsurface sensitivity model is more efficient than the surface model due to narrower landscape criteria weighted towards larger streams and gentler slopes. The surface model requires broader landscape criteria because Aboriginal activity can result in ephemeral surface scatters of material from low density activity and occupation. These sites can be found in a range of landscapes, not all of those landscapes have potential for archaeological deposits to accumulate. Archaeological deposits typically accumulate in areas where people repeatedly occupy. These areas are more dependent on perennial water sources and level to gentler slopes.

Table 4-5 Final Model relevant statistics

Subsurface Model Sensitivity	Test Pits with Artefacts	Percentage Sites	Surface Sites	Percentage	Area m^2	Percentage Area	Efficiency
High	22	56.4	37	23.4	12002624	13.6	4.15
Moderate	17	43.6	51	32.3	17151262	19.4	2.25
Low	0	0.0	55	34.8	54252099	61.4	
Disturbed	0	0.0	15	9.4	4957978	5.6	
Total	39	100	158		88363963		
Surface Model Sensitivity	**Test Pits with Artefacts**	**Percentage Sites**	**Surface Sites**	**Percentage**	**Area m^2**	**Percentage Area**	**Efficiency**
High	27	69.2	**82**	**51.9**	24134657	27.3	2.53
Moderate	9	23.1	**48**	**30.4**	23529913	26.6	0.87
Low	3	7.7	**13**	**8.2**	35884566	40.5	0.19
Disturbed	0	0.0	**15**	**9.5**	4957978	5.6	
Total	39		**158**		88507114		

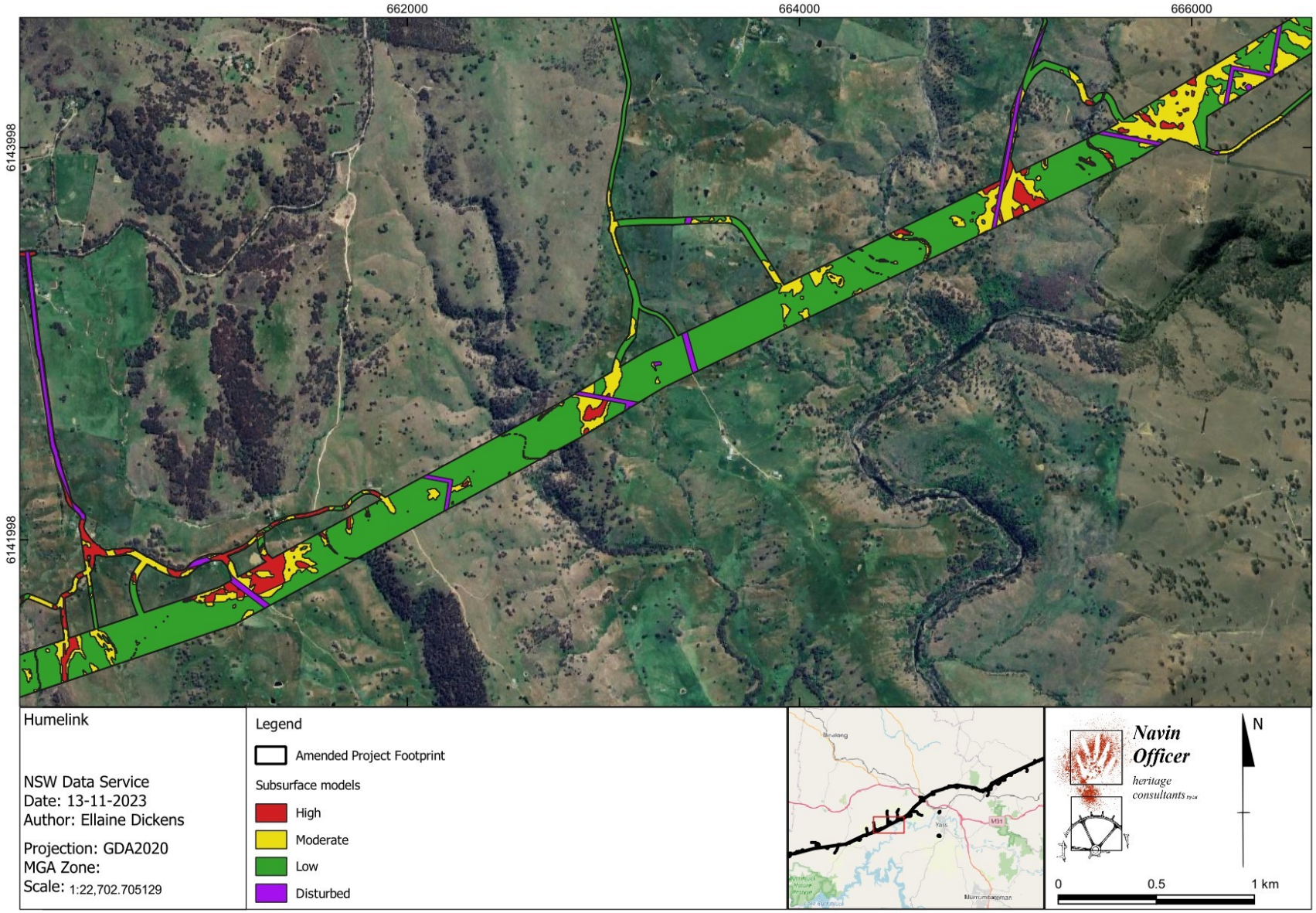


Figure 4-4 Example of the final subsurface archaeological sensitivity model

4.3 Personnel

Aboriginal organisations represented in the field included:

- Wagga Wagga Local Aboriginal Land Council
- Tumut/Brungle Local Aboriginal Land Council
- Pejar Local Aboriginal Land Council
- Onerwal Local Aboriginal Land Council
- Murra Bidgee Mullangari.

Contributors to the collection of information for this report from NOHC are:

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- Ben Sybert
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- Chantelle Laucht
- Christian Keyes
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- Ellie Dickins
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- Jasmine Fenyvesi
- Joel Mason
- Kate Dale
- Kiara Jodlowski-Tan
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- Nicola Hayes
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- Ricardo Servin
- Robert (Jack) Bogdanek
- Roxanne Tsang
- Sophie Brettell
- Tealeah Prior
- Tessa Bryant
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This report was prepared by Ricardo Servin with assistance from Nicola Hayes, Jasmine Fenyvesi, Ben Sybert, Meg Walker, Ellaine Dickens, Lachlan Sharp and Miles Robson.

Ricardo has a Bachelor of Arts majoring in Archaeology from the University of Sydney. Nicola has a Bachelor of Arts and Science (BA/Sc), as well as a Graduate Diploma in Archaeology from the Australian National University (ANU). Jasmine has a Bachelor of Archaeological Practice (BAP) from ANU. Ben has a Bachelor of Arts (BA) from the University of Illinois (USA) and Master of Archaeological Science (MASc) from ANU including an advanced remote sensing and GIS specialisation. Meg has a Bachelor Arts and Commerce (BA/BComm) and Master of Archaeological and Evolutionary Science (MAESc) (Advanced) from ANU specialising in bioarchaeology and environmental archaeology.

4.4 Limitations and uncertainty

4.4.1 Land access restrictions

Some sections of the amended project footprint could not be accessed due to a lack of landowner consent to enter, therefore approximately 80.5 per cent of the amended project footprint has been directly assessed via survey, while the remainder has been indirectly assessed through the use of a sensitivity model. Vegetation and weather have also restricted access to some areas of the amended project footprint. Some areas of the amended project footprint are extremely steep and inaccessible. Some sections of the amended project footprint are heavily vegetated with native forest and planted

pine forest. The wet weather experienced in 2022 also made access difficult due to flooding and boggy ground conditions.

4.4.2 Restricted information

Information in this report relating to the exact location of Aboriginal sites should not be published or promoted in the public domain.

One site identified by Aboriginal stakeholders in this report has been specifically identified as requiring access restrictions due to its cultural sensitivity.

4.4.3 Confidentiality

No information in this report has been classified as confidential.

5. CONSULTATION PROCESS

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010b) establish the requirements for consultation with Aboriginal people as part of the heritage assessment process in cases where AHIPs are required. As the project has been declared CSSI no AHIP will be required; however, the SEARs for this project (refer to Section 1.3) specify that this guideline will apply to the project. The aim of undertaking the consultation is to understand the cultural heritage values present in the amended project footprint, and the views and concerns of Aboriginal people about the project.

The requirements specify four stages of consultation:

- stage 1 – notification of project proposal and registration of interest
- stage 2 – presentation of information about the proposed project
- stage 3 – gathering information about cultural significance
- stage 4 – review of draft cultural heritage assessment report.

The actions for each stage of consultation are summarised below with **ATTACHMENT 1** containing the full consultation log.

5.1 Gundungurra Indigenous Land Use Agreement

In accordance with the Gundungurra Indigenous Land Use Agreement 2014 (refer to Section 3.5.1), letters were sent to Gundungurra Aboriginal Heritage Association Inc inviting them to register for the project, however no response was received.

The amended project footprint does not directly enter any of the lands associated with the agreement and the ILUA is specific to the lands mentioned. The ILUA outlines that consultation should be consistent with the managing principles and strategies for the National Park Lands, Sydney Catchment Authority Lands, the Forestry Corporation of New South Wales Lands and Blue Mountains City Council Lands as provided for under the NPW Act the *Sydney Water Catchment Management Act 1998*. the *Forestry Act 2012* and the *Crown Lands Act 1989* and *Local Government Act 1993* respectively.

5.2 Stage 1

Relevant organisations were contacted with a request to provide information about potential Aboriginal stakeholders who may have an interest in the amended project footprint and hold knowledge relevant to determining the cultural significance of Aboriginal objects and places. A public notice containing a brief project overview and inviting expressions of interest from the Aboriginal community was also placed in local newspapers.

Aboriginal people on the list of potential stakeholders were notified of the project and invited to register an interest in being involved in consultation.

The following outlines who were notified of the project and how people were engaged to register their interest. In addition to the below, a search was also made of the National Native Title Tribunal registers.

Public notices were placed in the following newspapers in April 2021:

- Tumut-Adelong Times
- Goulburn Post
- Yass Tribune
- Koori Mail
- Cootamundra Herald
- Crookwell Gazette

- Southern Weekly: no longer exists
- Wagga Daily Advertiser.

Letters were sent to:

- Office of the Registrar *Aboriginal Land Rights Act 1983* (NSW)
- Native Title Services Corporation Limited
- Riverina Local Land Services
- Murray Local Land Services
- South East Local Land Services
- Heritage NSW
- Wagga Wagga Local Aboriginal Land Council
- Brungle Tumut Local Aboriginal Land Council
- Wagonga Local Aboriginal Land Council
- Onerwal Local Aboriginal Land Council
- Pejar Local Aboriginal Land Council
- Young Local Aboriginal Land Council
- Wagga Wagga City Council
- Snowy Valleys Council
- Cootamundra-Gundagai Regional Council
- Yass Valley Council
- Upper Lachlan Shire Council.

Following advice received from the above organisations, letters were sent to the organisations and individuals identified by them.

The closing date for expressions of interest was 28 April 2021. Registrations of interest were received from the following groups and individuals (and are the RAPs for this project) (refer to Table 5-1).

Table 5-1 Registered Aboriginal Parties

Individual Name	Organisation
Alona Apps	individual
Arnold Williams	Ngunnawal Elders Corporation
Braiden Ede	individual
Cherie Carroll Turrise	Gunjeewong Cultural Heritage Aboriginal Corporation
Clive Freeman	individual
Dean Bell	Yurwang Gundana Cultural Heritage Services
Dean Delponte	Ngunawal Heritage Aboriginal Corporation
Darleen Johnson	Murra Bidgee Mullangari
Enid Clarke (Elder)	individual
Glen Freeman	Gulgunya Ngunawal Heritage Aboriginal Consultancy
Jahnayah Freeman	individual
James Ingram	Bidya Marra Consultancy
Jesse Johnson	Muragadi Heritage Indigenous Corporation
Jirrah Freeman	individual
Keith Freeman (Elder)	individual

Individual Name	Organisation
Kevin Atkinson	Bangerang Aboriginal Corporation
Krystal Ingram	individual
Lawrence Marlowe	individual
Lily Carroll	Didge Ngunawal clan
Mark Saddler	Bundyi Aboriginal Cultural Knowledge
Marnie Freeman	individual
Martin Riley (Elder)	individual
Matthew Marlowe	individual
Norma Freeman (Elder)	individual
Priscilla Marlowe	individual
Rob Clegg and Peter Clegg	individual
Robert Monaghan	Ngurambang
Robert Young	Konanggo Aboriginal Cultural Heritage Services
Rodney Penrith	individual
Rolly Williams	individual
Shirley Marlowe	individual
Steve Johnson (Director)	Corroboree Aboriginal Corporation
Tammy Muscat	PD Ngunawal Consultancy
The Secretary	Wagga Wagga Local Aboriginal Land Council
The Secretary	Brungle Tumut Local Aboriginal Land Council
The Secretary	Wagonga Local Aboriginal Land Council
The Secretary	Onerwal Local Aboriginal Land Council
The Secretary	Pejar Local Aboriginal Land Council
Tyronne Bell	Thunderstone Cultural & Land Management Services Aboriginal Corporation
Wally Bell	Buru Ngunawal Aboriginal Corporation
Yalmambirra	individual

5.3 Stages 2 and 3

Information about the scope of the project and the cultural heritage assessment methodology, including the predictive model developed for the project, was presented to the RAPs. This was provided through written correspondence and was discussed with stakeholders during a visit to the amended project footprint.

All RAPs were invited to provide cultural information concerning Aboriginal objects and places within the amended project footprint, to contribute to the assessment of Aboriginal cultural heritage significance and development of management recommendations. These may include identification of options for avoidance, minimisation and mitigation of impacts on cultural heritage, and priorities for conservation and protection. RAPs were also invited to provide feedback on the cultural heritage assessment methodology and the predictive model developed for the project.

5.4 Field participation

The Aboriginal organisations represented in the field during the various field survey and subsurface test excavation events were:

- Wagga Wagga Local Aboriginal Land Council

- Tumut/Brungle Local Aboriginal Land Council
- Pejar Local Aboriginal Land Council
- Onerwal Local Aboriginal Land Council.
- Murra Bidgee Mullangari.

At least two field representatives were present on each field team operating within their relevant LALC area.

5.5 Stage 4 – review of draft cultural heritage assessment report

The draft cultural heritage assessment report was made available for the RAPs to review and provide comments. The report was finalised after the proponent's responses to each submission were provided and documented.

A draft copy of the ACHAR was provided to RAPs for comment on 9 March 2023.

5.6 Stage 4 – review of amended ACHAR

A draft version of this amended ACHAR will be made available for the RAPs to review and provide comments.

5.7 Summary of Aboriginal community consultation

A consultation log, copies of correspondence, and feedback on the draft report from RAPs are attached in **ATTACHMENT 1** and summarised in Table 5-2.

Table 5-2 Summary of Aboriginal cultural heritage consultation

Stage	Action	Date	Details
1	Notification of project was sent	20/04/2021	46 Aboriginal people and organisations were identified as potential stakeholders.
	Newspaper advertisements were placed	April 2021	
	NNTT Register Search	April 2021 and April 2024	No registered native title claimants, native title holders, or current Indigenous land use agreements (ILUAs) were identified within the amended project footprint (Section 3.5.1). Noting that while the wider Gundungurra ILUA area does overlap with the amended project footprint, the actual lands subject to the ILUA (national parks, state conservation areas and Forestry Corporation of NSW lands) do not overlap with the amended project footprint.
	Registration of interest of Aboriginal stakeholders	20/04/2021-28/04/2021	Registrations of interest in the project were received from 40 Aboriginal people and organisations
2	Presentation of information about the proposed project to RAPs	28/09/2021-26/10/2021	The assessment methodology and request for information about cultural significance was sent to RAPs.
3	Gathering information about cultural significance		

Stage	Action	Date	Details
4	Field investigation – field survey	November 2021 to December 2022	Archaeological survey undertaken by NOHC and representatives of: (a) Wagga Wagga Local Aboriginal Land Council (b) Tumut/Brungle Local Aboriginal Land Council (c) Pejar Local Aboriginal Land Council (d) Onerwal Local Aboriginal Land Council.
5	Review of subsurface test excavation methodology	10/08/2022-7/09/2022	The subsurface test excavation methodology was sent to all RAPs for the project.
6	Field investigation – subsurface testing	October 2022 to December 2022	Subsurface test excavations by NOHC and representatives of: (a) Wagga Wagga Local Aboriginal Land Council (b) Tumut/Brungle Local Aboriginal Land Council (c) Pejar Local Aboriginal Land Council (d) Onerwal Local Aboriginal Land Council. **(e)** Murrabidgee Mullangari.
7	Review of draft cultural heritage assessment report by RAPs	9/03/2023	The draft report, accompanied by an invitation to provide comments within 28 days, was provided to each of the RAPs.
8	Field investigation – survey and subsurface testing	11/09/23 to 16/10/23	Field survey of additional areas in the amended project footprint and subsurface test excavation of PAD 02 and PAD 10 by NOHC and representatives of: (a) Wagga Wagga Local Aboriginal Land Council (b) Tumut/Brungle Local Aboriginal Land Council (c) Pejar Local Aboriginal Land Council (d) Onerwal Local Aboriginal Land Council.
8	Review of draft amendment report	7/2/24	The draft report, accompanied by an invitation to provide comments within 28 days, was provided to each of the RAPs. Transgrid contacted each RAP by phone to follow-up to discuss the response process. The general feedback that we got was that they didn't have time to read 400+ pages without being compensated for the time spent. One comment was received (refer to Table 5-3).

5.8 Submissions from Registered Aboriginal Parties

As noted in the sections above, comments were received from RAPs at various stages of the project, most notably at the draft research methodology stage when respondents were invited to provide feedback. Questions raised by RAPs and discussed at this stage included questions around testing, and access to properties and specific questions regarding project impacts to PADs. One response pointed out the cultural importance of natural springs, creeks and rivers. Table 5-3 outlines the RAPs responses and the project response to these.

No responses to the draft report for the EIS were received following the close of the review period. Those RAPs involved in field work generally expressed satisfaction with the work being undertaken. Representatives from Wagga Wagga LALC additionally commented that they were generally supportive of the HumeLink project as it was aligned with the development and integration of renewable energy into the grid which they felt was a positive step in caring for Country.

Table 5-3 Responses from RAPs

RAP Name	Comment	Response
Methodology and project information		
Robert Monaghan	Received method, asked about participation, he is a member of the LALC	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Yalmambirra	Method looks good asked if he had been selected to be involved	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Yurwang Gundana CHS	Question regarding LALC involvement	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Yurwang Gundana CHS	Method response, questions again field involvement	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Clive Freeman	Is ok with approach apart from engagement of land councils only in the field, feels they do not represent the traditional owners, will provide a written response	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Clive Freeman	concerned about RAP involvement and wanting not just LALCs involved in the field survey	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Muragadi Heritage Indigenous Corporation	agree with the recommendations made	noted
Luke Penrith	grateful to work again with NOHC on this important project	noted
Thunderstone Cultural & Land Management Services Aboriginal Corporation	nothing to add to the methodology	noted
Didge Ngunnawal	can't wait to work with you again on this survey	noted
Bundyi Cultural Tours	concerned that he only received the method on the 14/10 and replied with a letter outlining concerns regarding involvement of RAPs in the walkovers	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Ngunnawal Elders Council	question regarding RAP involvement, otherwise had no other comments	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Test excavation methodology		
Robert Clegg	Well received, thanks. You have covered all proponents for the methodology and done it well, I have no problems with this methodology	Noted
Yalmambirra	I have read the methodology and am satisfied that it covers the issues well.	Noted
Muragadi Heritage Indigenous Corporation	I have read the methodology and am satisfied that it covers the issues well.	Noted

RAP Name	Comment	Response
Gunjeewong	Gunjeewong is happy with methods provided	Noted
Roley Williams	Thanks for your request to provide a response to your excavation fieldwork report which I will not read as I was not invited to participate in as a registered RAP. I am very disappointed in the community consultation process that your organisation has undertaken during the Cultural Heritage Assessments. I will not make comments on your report as I do not have any personal knowledge of how, what and why the selected areas for the test excavations were selected. I would appreciate a reasonable reply from you as to why I was not included to take part in the Cultural Heritage Assessments which I registered for in August 2020.	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork. NOHC have completed the consultation guidelines as required. Transgrid have undertaken additional consultation with RAPs and a Cultural Values Assessment has been prepared
Yurwang Gundana CHS	Yurwang Gundana agrees with the methodology and doesn't see any issue with it, we do wish to be a part of the test excavations, is there a time frame for the fieldwork?	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Ngunawal Heritage Aboriginal Corporation (now Mundawari Heritage Consultants Pty Ltd)	We have reviewed the proposed methodology and are supportive, however there are some questions below: 1. Are there any properties that are still inaccessible, therefore have not been culturally assessed? 2. What is the extent of impact through construction and ongoing maintenance works will there be at the 6 identified PAD locations? 3. Are there any natural springs, rivers or creeks that are going to be impacted by the construction works? We would also like to be involved in the test excavation program. Can you please advise on what you require from us for our involvement.	Yes there are properties still inaccessible This report outlines the impacts to sites and PADs Rivers and creeks will be crossed by the project and may have some works associated with track construction or upgrades. Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Report for the EIS		
Roley Williams	G'day Nicola, as I have stated before, I will not comment on any ACHA Reports, when I was not involved in any of the survey/fieldwork for any part of the whole project	Transgrid have determined the groups to be involved in the fieldwork namely that LALCs were to be involved in most of the fieldwork
Revised ACHAR		
Robert Clegg	Many thanks for this	Noted

Transgrid have also undertaken engagement with RAPs and LALCs following EIS public exhibition (11 October 2023 to end March 2024). Detailed information on the feedback received, themes and topics, is outlined in the table below:

Table 5-4 Transgrid engagement

LALC or RAP	Feedback and topics raised
Brungle Tumut LALC	Cultural sensitivity - Protection of sacred sites: Stakeholders expressed concerns about potential impacts on culturally significant sites, artefacts, or landscapes. - Demonstrating respect to Aboriginal and Torres Strait Islander people by observing cultural protocols, customs and significant artefacts. - Traditional land use and access of areas of hunting, gathering, ceremonies, or other cultural practices. - Effective and inclusive consultation process and the extent to which their feedback is considered in project planning. - Engagement has improved. - Cultural awareness and increased value and recognition of Aboriginal and Torres Strait Islander culture, history and knowledge. Environmental impacts - Land and habitat disruption to ecosystems along the project footprint and environmental mitigation measures such as habitat restoration, wildlife corridors and sustainable land management practices. - Water resources: quality impacts. Project effectiveness: - Route refinement and inclusion of alternative route options feedback to minimise Aboriginal heritage impacts. - Long-term project impacts and sustainability in project planning and decision making. Community opportunities and challenges: - Economic opportunities through project-related employment, training, and business opportunities for Indigenous stakeholders. - Social impacts of predicted influx of construction workers and transient populations in local areas, impacting local resources and infrastructure, and potentially disrupting community dynamics and increasing social tensions.
Pejar LALC	Cultural sensitivity - Demonstrating respect to Aboriginal and Torres Strait Islander people by observing cultural protocols, customs and significant artefacts. - Effective and inclusive consultation process and the extent to which their feedback is considered in project planning. - Engagement has improved. - Cultural awareness and increased value and recognition of Aboriginal and Torres Strait Islander culture, history and knowledge. Project effectiveness: - Long-term project impacts and sustainability in project planning and decision making. Community opportunities and challenges: - Economic opportunities through project-related employment, training, and business opportunities for Indigenous stakeholders.
Wagga LALC	Community opportunities and challenges: - Economic opportunities through project-related employment, training, and business opportunities for Indigenous stakeholders. - Social impacts of predicted influx of construction workers and transient populations in local areas, impacting local resources and infrastructure, and potentially disrupting community dynamics and increasing social tensions.

6. ENVIRONMENTAL CONTEXT

A review of the landscape can assist in predicting the ways in which Aboriginal people have used the amended project footprint in the past. It establishes a context for the distribution of material traces of past Aboriginal occupation by identifying natural resources and landscape features that may have been focal points for activities and settlement. In addition, identification of site formation and post-depositional processes can assist in determining if Aboriginal objects are likely to be preserved below the ground surface, and if PADs are likely to be relatively intact or disturbed. The environmental context of the amended project footprint is largely the same as the publicly exhibited project and is summarised below.

6.1 Bioregions

Australia's landscapes have been classified into bioregions as part of a national and regional framework for conservation, planning, and assessment. The classification system is based on physical environmental attributes including climate, lithology, geology, landforms and vegetation (Thackway and Cresswell, 1995). These large, geographically distinct areas of land have been further refined into more localised and homogenous geomorphological units known as subregions (Department of Agriculture, Water and the Environment, n.d., in Thackway and Cresswell 1995).

The amended project footprint extends through different bioregions, from the NSW South Western Slopes through the Australian Alps and the South Eastern Highlands bioregions (Figure 6-1).

Within the South Western Slopes bioregion, the amended project footprint extends through Wagga Wagga City, Cootamundra-Gundagai Regional, Yass Valley LGAs and partly to the south within the Snowy Valleys LGA. This bioregion consists of foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range and is dominated by a subhumid climate. Geology, soils and vegetation are complex and diverse but typified by granites and meta-sediments, texture contrast soils and a variety of eucalypt woodland.

To the east and south, the amended project footprint extends across the Yass Valley, Upper Lachlan Shire, Goulburn Mulwaree and Snowy Valleys LGAs that are located within the South Eastern Highlands bioregion. This bioregion covers the dissected ranges and plateau of the Great Dividing Range that are topographically lower than the Australian Alps, which lie to the south-west. It extends to the Great Escarpment in the east and to the western slopes of the inland drainage basins. Native grasslands are found on heavy textured soils in valleys, lower slopes and broader plains between 560 and 1,200 metres in altitude and are extensive on the dry plains of the Monaro Tablelands.

Further to the south within the Snowy Valleys LGA, the amended project footprint extends across the Australian Alps bioregion. This small bioregion is dominated by a montane climate, with no dry season and a mild summer and contains a patch of alpine climate characterised by no dry season and a cool summer. This bioregion constitutes the highest section of the Great Dividing Range and the landscape is characterised by peaked ranges and broad forested valleys (National Parks and Wildlife Service (NPWS) NSW 2003:217-221).

6.1.1 South Western Slopes

The South Western Slopes Bioregion is a large area of foothills and ranges comprising the western fall of the Great Dividing Range to the edge of the Riverina Bioregion (NPWS NSW, 2003:119-122). A very wide range of rock types is found across the bioregion, which is also affected by topographic and rainfall gradients that decrease toward the west. These physical differences have an impact on the nature of the soils and vegetation found across the bioregion. Inland streams pass across the slopes in confined valleys with terraces and local areas of sedimentation. Geology, soils and vegetation are complex and diverse but typified by granites and meta-sediments, texture contrast soils and a variety of eucalypt woodlands (NPWS NSW 2003:119-122).

The bioregion lies wholly in the eastern part of the Lachlan Fold Belt which consists of a complex series of north to north-westerly trending folded bodies of Cambrian to Early Carboniferous sedimentary and volcanic rocks. Granites are common and mostly located in large scale upfolded bodies of rock. Granite landscapes occur either as central basins surrounded by steep hills formed on contact metamorphic

rocks, or as high blocky plateau features with rock outcrops and tors. Hilly landscapes developed on the sedimentary and volcanic rocks are controlled by structural features (bedding and faults) and typically form lines of hills extended along the strike of more resistant rocks such as quartzite. The valleys between ranges are either in granite or generally softer rocks such as shale, phyllite or slate (NPWS NSW, 2003:119-122).

The overall pattern of soils in these landscapes is one where shallow, stony soils are found on the tops of ridges and hills. Moving downslope, texture contrast soils are the norm with subsoils derived from the underlying weathered rock and the topsoils being a homogenised surface mantle of coarser material derived from all parts of the slope. On valley floors subsoils have drabber colours indicative of poor drainage and they may accumulate soluble salts. Dryland salinity is widespread. Alluvial sands and loams are more common than clays in most parts of the landscape but alluvial clays become more important nearer to the Riverine Plain. Over the Quaternary, soils in these landscapes have accumulated a considerable quantity of windblown silt and clay from western NSW (NPWS NSW 2003:119-122).

6.1.2 South Eastern Highlands

The South Eastern Highlands extend through the dissected ranges and plateau of the Great Dividing Range, bounded by the Australian Alps and South Western Slopes bioregions to the south and west and through the Great Escarpment in the east and to the western slopes of the inland drainage basins. Climate is characterised by warm summers and no dry seasons. Large areas in the north and south of the bioregion are at higher elevations in a montane climate zone, where summers are much milder (NPWS NSW, 2003:203-206).

The highlands are part of the Lachlan fold belt that runs through the eastern states as a complex series of metamorphosed Ordovician to Devonian sandstones, shales and volcanic rocks intruded by numerous granite bodies and deformed by four episodes of folding, faulting and uplift (NPWS NSW, 2003:203-206).

Topographically, the dominant features of the bioregion are plateau remnants, granite basins with prominent ridges formed on contact metamorphic rocks and the western ramp grading to the South Western Slopes. Streams cutting through the bioregion are deeply entrenched with only a few terrace features. Valleys are narrow and there is little Quaternary sediment except in the numerous lake basins of the Monaro province (NPWS NSW, 2003:203-206).

Soils vary across the bioregion in relation to altitude, temperature and rainfall. On the Palaeozoic slates, sandstones and volcanics, mottled red and yellow texture contrast soils, with red earths are found. On the granites, shallow red earths occur on ridges, yellow texture contrast soils on all slopes and deep coarse sands in alluvium. On Tertiary basalts, shallow red-brown to black stony loams exist, with alluvial loams and black clays in swampy valley floors. Limited areas of shallow organic loams are present at high altitude on Canobolas. Some of the tertiary sands in the mid-Shoalhaven deep have been worked into low dunes under a past climate and now have deep siliceous sand or yellow earth profiles (NPWS NSW, 2003:203-206).

Vegetation also varies across the bioregion in relation to altitude, temperature and rainfall. Temperature affects the vertical distribution of species and can be observed in inverted sequences in frost hollows (NPWS NSW 2003:203-206).

6.1.3 Australian Alps

The Australian Alps bioregion contains Mount Kosciuszko, the highest mountain in Australia. It is dominated by a montane climate, with no dry season and a mild summer (Stern *et al*., 2000). The south-west of the bioregion presents the only example of alpine and sub-alpine climate in NSW, characterised by no dry season and a cool summer (NPWS NSW, 2003:217-221).

The extreme climatic gradient across the alpine ranges is reflected in the soil and vegetation that pass from lowland eucalypt forest on texture contrast soils to alpine herb field on organic uniform soils at the highest elevations. Above 1,400 metres, snow may persist for four to six months and frost can occur throughout the year. The north-eastern tip of the bioregion is representative of the temperate zone, which prevails in the New England Tableland, South Eastern Highlands and Sydney Basin bioregions where there is a warm summer and no dry season (NPWS NSW 2003:217-221; Stern *et al*., 2000).

Topographically the Australian Alps constitutes the highest section of the Great Dividing Range, and the landscape is characterised by peaked ranges, and broad, forested valleys (NPWS NSW 2003:217-221).

The alpine area comprises granites that have formed faulted, stepped ranges at the point where the South Eastern Highlands in NSW turn west into Victoria. More recent volcanic activity produced basalts and, in the Pleistocene, the cold climate superimposed glacial features on the landscape (NPWS NSW 2003:217-221).

The Australian Alps is the only part of the mainland to have been affected by Pleistocene glaciation and contains a variety of unique glacial and periglacial landforms above 1,100 metres altitude (NPWS NSW 2003:217-221).

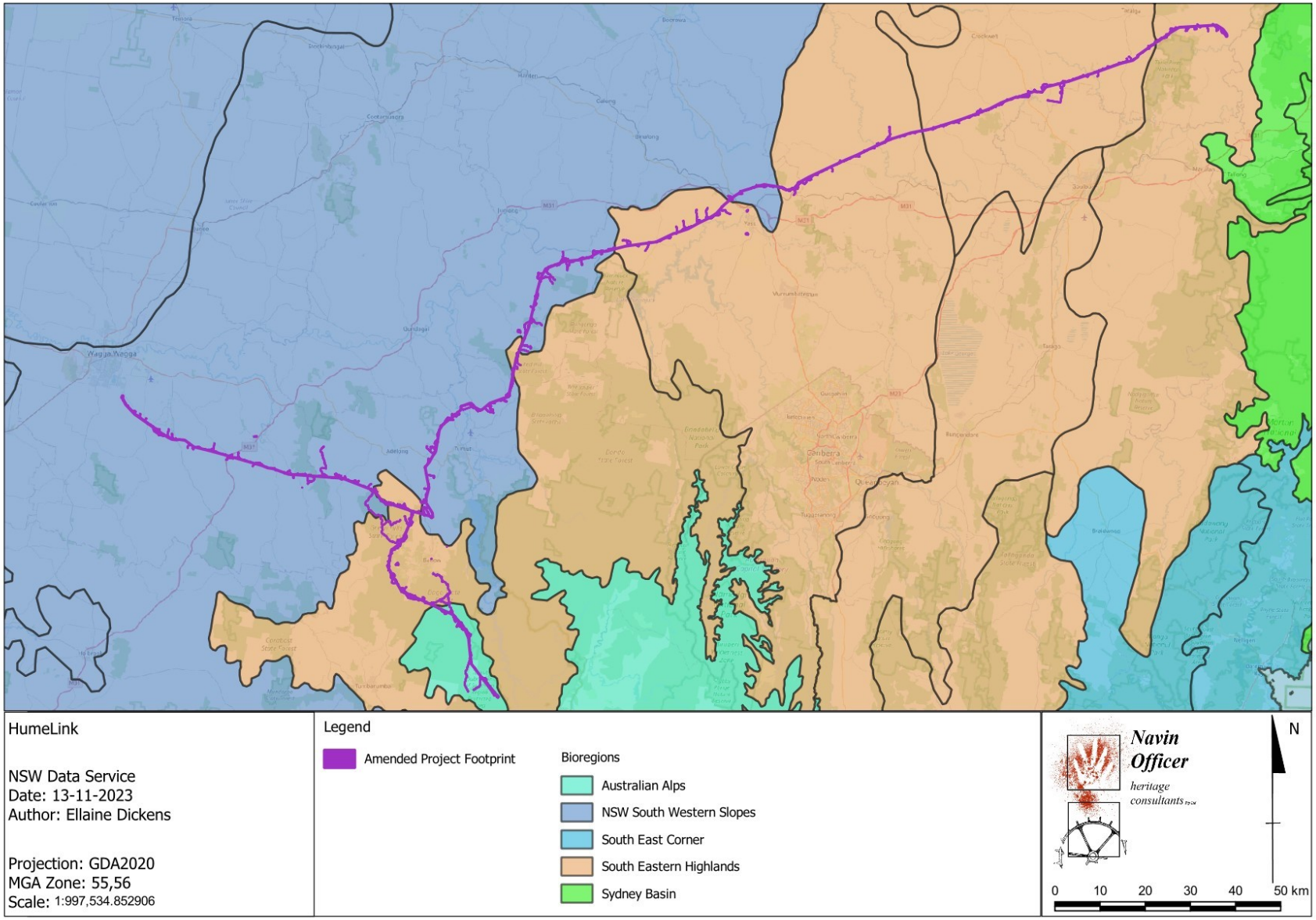


Figure 6-1 Amended project footprint and bioregions

6.2 Geology and soils

6.2.1 Geology

The project extends across different geological formations. Figure 6-1 outlines the different underlying geological units that occur within the amended project footprint.

Table 6-1 Geological formations within the amended project footprint

Geological Unit	NSW code	Description	Province
Kialla Quartz Diorite	**D__k**	A Pragian to Emsian Shallow crustal continental I-type formation of mid green grey, fine to medium grained, equigranular, massive quartz diorite and dark grey, coarse-grained, micropoikilitic, massive quartz gabbro. Rare dark grey, massive tonalite near the western margin.	Lachlan Orogen
Gocup Granite	**Db_o**	A Lochkovian to Emsian shallow crustal - continental S-type formation of fine to coarse grained biotite granite. Minor coarse grained muscovite biotite granite. Very minor aplite dykes, quartz veins. Rare pegmatite dykes.	Lachlan Orogen
Barrallier Ignimbrite	**Dbib**	A Eognathodus kindlei to Polygnathus pireneae terrestrial extrusive volcanic I-type formation of pyroclastic rock. It comprises of dark blue grey, massive, welded, crystal-rich, compositionally uniform dacitic ignimbrite. Whole and fractured phenocrysts are set in a cryptocrystalline to recrystallised matrix.	Lachlan Orogen
Killimicat Granite	**Dbok**	An Early Devonian shallow crustal continental I-type formation of fine to medium grained biotite granite. Minor aplite dykes, quartz veins.	Lachlan Orogen
Mountain Creek Volcanics	**Dbrm**	A Pridoli terrestrial volcaniclastic I type formation of pyroclastic rock. It consists of a dark grey or black, fine grained, feldspar phyric, rhyolitic to dacitic, welded ignimbrite and flow banded lava. Lenses of volcaniclastic sandstone, siltstone and volcanic breccia. Minor basal, polymictic, conglomerate and pebbly sandstone.	Lachlan Orogen
Mountain Creek Volcanics - sandstone	**Dbrm_s**	A Pridoli terrestrial volcaniclastic fine to coarse grained, thin to medium bedded, volcaniclastic sandstone and tuffaceous siltstone. Massive volcaniclastic dacitic breccia and conglomerate. Minor accretionary lapilli tuff.	Lachlan Orogen
Pilleuil Andesite	**Dbrp**	A Lochkovian terrestrial extrusive volcanic I-type formation of blue grey, fine-grained, massive, feldspar and pyroxene phyric andesite. Rare thin lenses of grey, fine grained, massive, volcaniclastic sandstone.	Lachlan Orogen
Sharpeningstone Conglomerate	**Dbrs**	An Ancyrodelloides delta to Pedavis pesavis terrestrial alluvial fan formation of grey to maroon, medium to very thick bedded, poorly sorted, polymictic, pebble to cobble conglomerate to pebbly sandstone, interbedded with subordinate mudstone and fine grained, lithic sandstone, especially towards the top of the sequence.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Kirawin Formation	**Dbrk**	An Eognathodus sulcatus deep marine volcaniclastic formation of black or dark green, massive to well laminated mudstone or shale, thin interbeds of fine-grained, silty, volcaniclastic sandstone, minor lenses of volcaniclastic, pebble to granule conglomerate and pebbly sandstone, rare lenses of silty limestone.	Lachlan Orogen
Tarlo Formation	**Dlaa**	A Famennian to Tournaisian terrestrial fluvial formation of purple red to fawn or white, generally thin to medium bedded and sporadically thick bedded, fine to medium grained, lithic quartz sandstone interbedded with purple, red or green, massive- or thin bedded siltstone.	Lachlan Orogen
Cowpers Creek Conglomerate - conglomerate	**Dlac_c**	A Famennian terrestrial alluvial fan formation of buff to red to purple, pebble to boulder, poorly sorted, mostly thick bedded, matrix and clast supported, polymictic conglomerate. Large scale planar and trough cross bedding is common.	Lachlan Orogen
Strathaird Formation	**Dlar**	A Frasnian terrestrial alluvial fan formation of Arenite, shale, breccia, conglomerate, arkose. Phyllitic slate near faults.	Lachlan Orogen
Wologorong Granite	**Dpaw**	A Ludlow Shallow crustal continental S-type formation of cream, pale grey and pink, leucocratic, medium to coarse grained, equigranular to sparsely porphyritic, muscovite biotite granite. Metasedimentary xenoliths in places. Low to high K, low Th and low to medium U radioelement response.	Lachlan Orogen
Wologorong Granite - biotite phase	**Dpaw_b**	A Ludlow shallow crustal continental S-type formation of cream, leucocratic, coarse grained, porphyritic, biotite granite and fine-grained, massive and equigranular, cordierite biotite granodiorite. Medium K and high Th radioelement response.	Lachlan Orogen
Forest Lodge Quartz Monzodiorite	**Dtlf**	A Eognathodus kindlei to Polygnathus pireneae shallow crustal continental I-type formation of dark green grey, quartz monzodiorite. Equigranular to porphyritic in plagioclase, augite orthopyroxene, hornblende and rare biotite in a micrographic and granophyric groundmass. Salmon-coloured K-feldspar and green sericitised plagioclase crystals.	Lachlan Orogen
Unassigned Devonian intrusions - aplite	**Dui_a**	A Pridoli to Early Devonian I-type formation of igneous aplite, aplitic granite. Equigranular and porphyritic aplite in places.	Lachlan Orogen
Crookwell Basalt	**GEckc**	A Ypresian to Bartonian terrestrial extrusive volcanic formation of dark grey to black, mostly fine grained, alkali olivine basalt and dolerite with minor trachyte and lithic welded ignimbrite.	Cenozoic Igneous Province
Alluvial sediments	**GN_aa**	A Paleogene to Pleistocene formation of clastic alluvial deposits, dominantly sand and gravel, friable to unconsolidated, or cemented to sandstone or conglomerate. Massive to bedded, ranging from thin to very thick; horizontal to cross bedded. Includes some lacustrine deposits and sub-basaltic sediments.	Cenozoic Sedimentary Province

Geological Unit	NSW code	Description	Province
Wheeo Basalt	**NM__w**	A Chattian to Langhian terrestrial extrusive volcanic black, alkali olivine phyric basalt to basanite, doleritic in part, with local concentrations of ultramafic xenoliths and xenocrysts.	Cenozoic Igneous Province
Snowy Mountains Volcanics - dolerite	**NMsms_d**	A Chattian to Burdigalian terrestrial extrusive volcanic formation of alkaline dolerite.	Cenozoic Igneous Province
Tumbarumba Basalt	**NMsmt**	A Chattian to Burdigalian terrestrial extrusive volcanic formation of primitive undersaturated sapphire and ruby bearing basanite to alkali basalts and minor olivine basalts.	Cenozoic Igneous Province.
Abercrombie Formation	**Oada**	A La2b (Lancefieldian) to Da4 (Darriwilian) formation of brown and buff to grey, thin- to thick-bedded, fine- to coarse-grained mica-quartz sandstone, interbedded with laminated siltstone and mudstone and containing sporadic chert-rich units.	Lachlan Orogen
Nattery Chert Member	**Oadan**	A Da3 (Darriwilian) to Da4 (Darriwilian) deep marine siliciclastic and biochemical formation of honey coloured, brown to grey, medium bedded to laminated chert, interbedded with cherty siltstone, mudstone and minor graded and cross-laminated fine grained quartzose sandstone.	Lachlan Orogen
Willigam Sandstone Member	**Oadaw**	A La2b (Lancefieldian) to Be1 (Bendigonian) deep marine siliciclastic and biochemical formation of grey, poorly sorted, feldspar lithic quartz sandstone and wacke, interbedded with siltstone, mudstone and shale. Graded bedding and ripple cross lamination are common in sandstone beds.	Lachlan Orogen
Adaminaby Group - knotted schist	**Oad_k**	A Warendan to Da4 (Darriwilian) Deep Marine siliciclastic formation of Metamorphic rock with medium to coarse grained porphyroblasts (typically cordierite or andalusite) enveloped by a secondary, commonly micaceous, schistosity to produce a 'knotted' texture.	Lachlan Orogen
Bumballa Formation	**Obeb**	A Da4 (Darriwilian) to Gi2 (Gisbornian) deep marine siliciclastic and biochemical formation of olive to grey, buff and cream, ripple cross laminated to graded fine grained sandstone, interbedded with grey to black laminated siltstone and mudstone with very minor chert. Sporadic intervals of fine to coarse grained quartzose sandstone.	Lachlan Orogen
Warbisco Shale	**Obew**	An Ea1 (Eastonian) to Bo3 (Bolindian) deep marine siliciclastic and biochemical formation of black, laminated to medium bedded pyritic carbonaceous shale, commonly strongly foliated and folded. Minor quartzose sandstone.	Lachlan Orogen
Mundoonen Sandstone - massive to laminated	**Omam_l**	A Hirnantian to Rhuddanian deep marine siliciclastic formation of brown to yellow-brown, thin bedded, massive and laminated, fine- to medium grained, lithic quartz to quartzose sandstone interbedded with ripple cross laminated siltstone.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Mundoonen Sandstone - massive to graded	**Omam_s**	A Hirnantian to Rhuddanian deep marine siliciclastic formation of brown to yellow brown (buff and cream in places), weathered to red, medium to thick bedded, massive to graded, medium grained to granule, lithic quartz to quartzose sandstone, bimodally sorted in places. Minor interbedded siltstone.	Lachlan Orogen
Unassigned Palaeozoic intrusions - mafic intrusions	**PZui__m**	A Cambrian to Permian Shallow crustal formation of undifferentiated mafic igneous intrusions and possible diatremes.	Statewide
Quartz vein	**q**	A Palaeozoic formation of a thin, extensive curvi planar body of intrusive milky white to translucent quartz, texturally massive to internally zoned, staged crystal growth or laminar quartz; usually occupying a fracture. Country rock fragments or mineralisation present.	Statewide
Alluvial channel deposits - meander-plain facies	**Q_acm**	A clastic formation of Quaternary terrestrial fluvial unconsolidated grey humic, clayey very fine-grained sand, typically overlying light brown clayey silt.	Cenozoic Sedimentary Province
Alluvial channel deposits - subaqueous	**Q_acw**	A Quaternary formation of clastic terrestrial fluvial sediment. It consists of fluvially deposited sand, gravel, silt and clay.	Cenozoic Sedimentary Province
Alluvium	**Q_a**	A Quaternary clastic sedimentary formation of unconsolidated grey to brown to beige humic micaceous silty clay, quartz lithic silt, fine- to medium-grained quartz-rich to quartz-lithic sand, polymictic pebble to cobble gravel (as sporadic lenses); sporadic paleosol horizons.	Cenozoic Sedimentary Province
Colluvium	**Q_c**	A Quaternary formation of clastic Colluvium that consist of poorly sorted, weakly cemented to unconsolidated colluvial lenses of polymictic conglomerate with medium- to very coarse-grained sand matrix; interspersed with unconsolidated clayey and silty red-brown (aeolian) sand layers, modified by pedogenesis.	Cenozoic Sedimentary Province
Residual deposits	**Q_r**	A Quaternary formation of residual deposits of weakly-consolidated regolithic residuum such as soil or saprolite mostly developed in-situ as a result of advanced weathering and/or pedogenesis	Cenozoic Sedimentary Province
Mixed colluvial, alluvial and aeolian deposits	**Q_ca**	A Quaternary formation of mixed clastic colluvial, alluvial and aeolian deposits.	Cenozoic Sedimentary Province
Young Granodiorite	**Syoy**	A Kockelella amsdeni to Polygnathoides siluricus formation of shallow crustal continental S-type cream to grey, medium- to coarse-grained, massive, equigranular, muscovite cordierite biotite granite and granodiorite; locally with abundant biotite-rich microgranitic enclaves and quartz xenoliths; minor porphyritic, biotite microgranite.	Lachlan Orogen
Gatelee Ignimbrite	**Sbpg**	An Early Devonian shallow marine volcaniclastic formation of purple to blue-grey and pale to dark green, porphyritic rhyolitic flow banded ignimbrite; cobble to boulder polymictic conglomerate with clasts of shale/slate, minor sandstone, chert and dacite in a matrix of dacitic and lithic fragments.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Gatelee Ignimbrite - conglomerate	**Sbpg_c**	An Early Devonian shallow marine volcaniclastic formation of polymictic conglomerate.	Lachlan Orogen
Hawkins Volcanics	**Sdoh**	A Pterospathodus amorphognathoides to Kockelella amsdeni Transitional marine to terrestrial S-type formation of blue-grey, massive, welded, porphyritic biotite-cordierite garnet rhyolitic to dacitic ignimbrite; sporadic quartz dioritic xenoliths. Flow-banded, vesicular rhyodacitic-dacite; volcanic sandstone, minor rhyodacitic agglomerate and rhyolitic lapilli tuff.	Lachlan Orogen
Bango Limestone Member	**Sdohb**	A Sheinwoodian to Cyrtograptus lundgreni-Testograptus testis shallow marine carbonate formation of grey or white, massive, recrystallised, fossiliferous limestone.	Lachlan Orogen
Goobarragandra Volcanics	**Sdoo**	A Kockelella amsdeni to Homerian terrestrial volcaniclastic S-type formation of pyroclastic rock. It consists of grey/blue, massive, medium to coarse grained, crystal rich, densely welded, dacitic ignimbrite. Minor lithologies: pebbly, volcanic sandstone and mudstone; crystal-rich tuffaceous sandstone; limestone; quartzose to quartz-lithic sandstone.	Lachlan Orogen
O'Briens Creek Sandstone Member	**Sdoso**	A Kockelella amsdeni transitional marine to terrestrial formation of brown-beige to off-white, very coarse- to medium-grained quartzo-feldspathic sandstone, poorly sorted, sub-rounded to angular grains. Sparsely fossiliferous (brachiopods, gastropods, crinoid stems), rare laminar siltstone near the base.	Lachlan Orogen
Goobarragandra Volcanics - limestone	**Sdoo_l**	A Kockelella amsdeni to Homerian shallow marine carbonate formation of limestone.	Lachlan Orogen
Cliftonwood Limestone Member	**Sdosc**	A Kockelella amsdeni shallow marine carbonate formation of grey limestone in mudstone breccia, clast supported, pebbles of crystalline fossiliferous limestone within a dark grey limey fossiliferous mudstone (fossils include spiriferids, gastropods, corals).	Lachlan Orogen
Euralie Limestone Member	**Sdoye**	A Monograptus ludensis to Homerian shallow marine carbonate limestone (including micrite, biomicrite, and nodular limestone), fossiliferous tuffaceous sandstone and calcareous mudstone.	Lachlan Orogen
Laidlaw Volcanics	**Sdol**	A Pterospathodus amorphognathoides to Ancoradella ploeckensis marine to terrestrial transitional formation of S-type dark to light grey, very coarse-grained, porphyritic, rhyodacitic ignimbrite. Sporadically grades to a coarse-grained equigranular ignimbrite. Rare columnar structure.	Lachlan Orogen
Tullerah Sandstone Member	**Sdoyt**	A Monograptus ludensis to Ancoradella ploeckensis marine to terrestrial transitional formation of tuff and lapilli tuff. It consist of white grey, thin to medium bedded, massive, medium to very fine grained, arkosic to volcaniclastic sandstone.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Gums Road Limestone Member	**Sdoyg**	A Monograptus ludensis to Ancoradella ploeckensis shallow marine carbonate formation of fossiliferous massive to bedded limestone (biomicrite, intrasparrudite, pelsparrudite, biomicrudite), quartzose biomicrite, clayey biomicrite, shale partings, conglomerate.	Lachlan Orogen
Excursion Creek Sandstone Member	**Sdoyx**	A Monograptus ludensis to Ancoradella ploeckensis shallow marine shelf formation of medium to very fine-grained, thin to medium-bedded, massive, volcanic sandstone with lesser siltstone and mudstone.	Lachlan Orogen
Gunning Granite	**Sgug**	An Aeronian shallow crustal continental I-type formation of grey to cream, medium to coarse grained, equigranular to porphyritic, hornblende biotite granite, granodiorite and lesser tonalite; dark grey ovoid microdioritic enclaves and clots; granite is strongly schistose along the eastern margin.	Lachlan Orogen
Gunning Granite - leucocratic biotite phase	**Sgug_b**	An Aeronian shallow crustal continental I-type formation of grey, medium grained, equigranular to porphyritic, leucocratic, biotite granite with miarolitic cavities. High K and Th, and medium to high U radioelement response.	Lachlan Orogen
Black Bog Shale - shale	**Shab_l**	A Saetograptus leintwardinensis to Bohemograptus shallow marine shelf formation of black to dark grey, massive to rarely laminated shale with minor thin bedded, sandy siltstone interbeds (upper shale unit).	Lachlan Orogen
Black Bog Shale - mudstone	**Shab_m**	A Saetograptus leintwardinensis to Bohemograptus shallow marine shelf formation of grey, massive or finely laminated mudstone (lower shale unit).	Lachlan Orogen
Yarwood Siltstone Member	**Shaby**	A Bohemograptus shallow marine carbonate formation of fossiliferous calcareous mudstone or siltstone.	Lachlan Orogen
Cowridge Siltstone	**Shac**	A Monograptus parultimus to Monograptus perneri shallow marine shelf formation of grey, thin to medium bedded, graded siltstone to very fine-grained sandstone interbedded with grey mudstone.	Lachlan Orogen
Cowridge Siltstone - upper mudstone	**Shac_u**	A Monograptus parultimus to Monograptus perneri shallow marine shelf formation of grey, olive or brown, massive to finely laminated mudstone with minor graded siltstone or fine-grained sandstone interbeds (upper mudstone unit).	Lachlan Orogen
Cowridge Siltstone - lower mudstone	**Shac_l**	A Monograptus parultimus to Monograptus perneri shallow marine shelf formation of grey, olive or brown, massive to finely laminated mudstone with minor graded siltstone or fine-grained sandstone interbeds (lower mudstone unit).	Lachlan Orogen
Elmside Formation	**Shae**	A Monograptus transgrediens to Monograptus uniformis shallow marine shelf formation of fine to coarse grained, graded, lithic sandstone and grey, laminated mudstone with rare, thin beds of graded, lithic sandstone; minor massive, algal limestone.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Elmside Formation - limestone	**Shae_l**	A Monograptus transgrediens to Monograptus uniformis shallow marine carbonate formation of Algal limestone.	Lachlan Orogen
Rosebank Shale	**Shar**	A Monograptus parultimus to Monograptus perneri Shallow marine shelf formation of grey, green/grey and black, massive to laminated shale and mudstone with thin to very thin beds of siltstone.	Lachlan Orogen
Rainbow Hill Member	**Sharr**	A Bohemograptus shallow marine carbonate formation of strongly bioturbated, highly fossiliferous siltstone, mudstone and shale, minor calcareous siltstone and limestone.	Lachlan Orogen
Hume Limestone Member	**Shash**	An Ancoradella ploeckensis to Polygnathoides siluricus shallow marine carbonate limestone formation of coralline and crinoidal biomicrite and biosparite interbedded with shaly mudstone.	Lachlan Orogen
Barrandella Shale Member	**Shasb**	An Ancoradella ploeckensis shallow marine shelf formation of green to grey, fossiliferous, shaly mudstone with thin beds of siltstone, calcareous siltstone and shale; minor, thin, interbedded crinoidal limestone.	Lachlan Orogen
Bowspring Limestone Member	**Shaso**	An Ancoradella ploeckensis shallow marine carbonate mudstone formation of bedded, semi nodular, fossiliferous, biosparite, biomicrite and micritic limestone with interbeds of shale; shale with nodular limestone interbeds.	Lachlan Orogen
Green Hills Granodiorite	**Stgh**	A Homerian to Gorstian S-type formation of light grey to grey, medium- to coarse-grained, biotite granodiorite; fine- to medium-grained, porphyritic biotite-muscovite granodiorite varying to granite; quartz-rich fine-grained metasedimentary xenoliths, biotite-rich enclaves.	Lachlan Orogen
Coolac Serpentinite	**Sccc**	An Upper Mantle Llandovery formation of schistose serpentinite with sporadic massive serpentinite, partly serpentinised grey green harzburgite and dunite, wehrlite and clinopyroxene-rich lherzolite, chromitite (as podiform masses), tectonic inclusions and sporadic rodingite dykes.	Lachlan Orogen
Cuddyong Formation	**Scac**	A Gorstian deep marine siliciclastic formation of interbedded fine to coarse grained, grey to cream quartzose sandstone and siltstone; rhyolite, dacite, grey to black siltstone, shale and mudstone, pyritic siltstone, sporadic limestone; volcaniclastic clasts and allochthonous limestone blocks.	Lachlan Orogen
Cuddyong Formation - siltstone	**Scac_s**	A Gorstian deep marine siliciclastic formation of dark grey to black, siliceous, carbonaceous, and pyritic siltstone, shale and mudstone with minor, interbedded, quartzose or volcaniclastic sandstone.	Lachlan Orogen
Argyle Formation	**Smfa**	A Polygnathoides siluricus to Ozarkodina eosteinhornensis deep marine formation of sandstone, greywacke, shale in turbiditic sequence.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
De Drack Formation	**Smfd**	A Pterospathodus amorphognathoides to Ancoradella ploeckensis deep marine formation of volcaniclastic sandstone, laminated tuffaceous and cherty siltstone and shale, limestone, barite, calcareous siltstone and mudstone. Rare vitric tuff and volcanic sandstone.	Lachlan Orogen
Kerrawary Siltstone	**Smfe**	A Monograptus ludensis to Ozarkodina crispa shallow marine shelf formation of grey, thick to very thick bedded, laminated, siltstone with minor massive thin to medium bedded, massive, fine to medium grained quartzose sandstone.	Lachlan Orogen
Rhyanna Formation	**Smfr**	A Caudicriodus woschmidti to Ozarkodina eurekaensis deep marine formation of green grey, thin to medium bedded, siltstone grading up from fine grained sandstone at bed bases, interbedded with silicified vitric and fine-grained felsic tuff; rare olistostrome deposits.	Lachlan Orogen
Rhyanna Formation - mudstone	**Smfr_m**	A Caudicriodus woschmidti to Ozarkodina eurekaensis deep marine siliciclastic formation of blue grey to off-white, generally massive but sometimes faintly planar laminated, thick bedded, silicified, volcanic mudstone.	Lachlan Orogen
Rhyanna Formation - sandstone	**Smfr_s**	A Caudicriodus woschmidti to Ozarkodina eurekaensis deep marine siliciclastic formation of Olistostrome containing megaclasts of quartzose to lithic-quartz sandstone, siltstone, limestone, and mafic igneous rock, set in a grey to olive-brown muddy matrix.	Lachlan Orogen
Nacka Metabasic Igneous Complex	**Suca**	A Rhuddanian to Telychian Shallow crustal continental I-type formation of predominantly mid to dark grey, fine to medium grained, equigranular to porphyritic, hornblende metagabbro/diorite with local pegmatite patches and dykes; local mingling structures at eastern contact amphibolite.	Lachlan Orogen
Snubba Range Gabbro Member	**Sucas**	A Rhuddanian to Telychian Shallow crustal continental I-type formation of predominantly mid to dark grey, fine- to medium-grained, equigranular to porphyritic, hornblende metagabbro/diorite with local pegmatite patches and dykes; local mingling structures at eastern contact; amphibolite.	Lachlan Orogen
Wyangle Formation	**Sufg**	A Llandovery to Silurian shallow marine shelf formation of tuff and coherent andesitic volcanic rocks, quartz-poor lithic sandstone, conglomerate and cherty siltstone.	Lachlan Orogen
Honeysuckle beds	**Sufh**	A Pridoli shallow marine volcaniclastic formation of metabasalt, minor metadolerite, meta-andesite, siltstone, shale, quartzite; dolerite, amphibolite, ultramafic rocks, gabbro, intermediate volcanic rocks and lithic tuff.	Lachlan Orogen
Honeysuckle Beds - gabbro	**Sufh_g**	A Pridoli deep crustal oceanic formation of Gabbro, minor diorite and plagiogranite.	Lachlan Orogen
Jackalass Slate - porphyry	**Sufj_q**	A Pridoli deep marine extrusive volcanic formation of quartz-feldspar porphyry and feldspar porphyry volcanic rocks/dykes.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
Jackalass Slate	**Sufj**	A Pridoli deep marine siliciclastic formation of Cleaved (commonly pyritic) slates and siltstones with minor volcaniclastic slate, siltstone and quartzofeldspathic sandstone; minor polymictic conglomerate; rare marble, chert/jasper, andesite and feldspar with quartz porphyry.	Lachlan Orogen
Brungle Creek Metabasalt	**Sufr**	A Llandovery deep marine volcaniclastic I-type formation of basalt, basaltic hyaloclastite, chert and polymictic conglomerate.	Lachlan Orogen
Bumbolee Creek Formation	**Sufu**	A Llandovery deep marine formation of quartz-rich shale/slate, siltstone and interbedded fine-grained sandstone; medium to coarse grained quartz-rich sandstone; rare volcanolithic and quartz pebble conglomerate and laminated black/grey chert.	Lachlan Orogen
Blowering Formation - siltstone	**Sufo_s**	A Gorstian deep marine formation of siltstones to slates, light to dark grey with moderate to strong cleavage. Black manganese staining on cleavage surfaces. Clastic grains (0.01-0.15 mm) consist of angular fragments of quartz and plagioclase which occur in a matrix of carbonate, sericite and chlorite.	Lachlan Orogen
Blowering Formation - tuff	**Sufo_t**	A Gorstian shallow marine volcaniclastic formation of porphyritic dacite crystal-(lithic) ash fall tuff; minor fine to medium grained dacite crystal (lithic) ash fall tuff.	Lachlan Orogen
Ellerslie Granodiorite	**Sume**	A Sheinwoodian to Homerian I-type formation of predominantly foliated, medium to coarse grained, biotite granodiorite to granite. Minor mid grey, medium grained, porphyritic hornblende–biotite granodiorite and leucocratic, medium to coarse grained, biotite granite. Rare aplite dykes, quartz veins.	Lachlan Orogen
Wondalga Granodiorite	**Sumw**	A Telychian to Homerian Shallow crustal continental I-type formation of commonly sheared, medium- to coarse grained, inequigranular, biotite hornblende granodiorite tonalite; fine to medium grained, weakly porphyritic, biotite granodiorite; minor aplite and basic dykes; quartz veins; rare pegmatite dykes	Lachlan Orogen
Mount Flakney Granite	**Suxm**	A Telychian to Gorstian formation of unassigned Central Lachlan Silurian granites and Mount Flakney granite comprising felsic medium- to coarse-grained, subequigranular, biotite-muscovite-granite with rare coarse-grained feldspar phenocrysts. Rare mafic microgranular enclaves; biotite-rich xenoliths are common, particularly towards the north-west pluton margin.	Lachlan Orogen

6.2.2 Soils

Soil types have distinct morphological and topological characteristics that result in specific archaeological potential. Because they are defined by a combination of soils, topography, vegetation and weathering conditions, soils are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

The amended project footprint extends across different soil types defined within the Great Soil Group (GSG) Soil Type Map of NSW (Department of Planning, Industry and Environment, 2021) and classified within the Australian Soil Classification class (ASC) (Isbell, 2020) (refer to Table 6-2).

6.2.2.1 GSG

The GSG (Department of Planning, Industry and Environment, 2021) describes soil types in terms of morphology, genesis and land use. Table 6-2 outlines the soil types that occur within the extension of the amended project footprint based on the GSG with an equivalent to the ASC.

6.2.2.2 ASC

A multi-category scheme with classes defined by diagnostic horizons or materials and their arrangement in vertical sequence as seen in an exposed soil profile. The scheme is hierarchically classified by Order, Suborder, Great Group, Subgroup, family (Table 6-2).

The ASC orders associated with the GSG soil types identified within the amended project footprint are the following:

Chromosols (**CH**): This order consists of soils with strong texture and clearly defined horizon boundaries. Soils of this order are among the most widespread soils used for agriculture in Australia, particularly those with red subsoils. They do not have high levels of sodium and are not strongly acidic in the subsoil (Isbell, 2020:36).

Dermosols (**DE**): This order consists of soils with structured B2 horizons and lacking strong texture-contrast between A and B. Soils in this order can vary from stony hard setting soils to friable deeper profiles (Isbell, 2020:42).

Ferrosols (**FE**): This order consists of soils lacking a strong texture contrast between A and B horizons. Their B2 horizon has a high iron free oxide. Ferrosols are generally found in well drained areas are almost entirely formed on either mafic or ultramafic igneous rocks, their metamorphic equivalents, or alluvium derived therefrom.

Kandosols (**KA**): This order consists of those soils that lack strong texture contrast, have massive or only weakly structured B horizons, and are not calcareous throughout. They are mostly well drained, permeable soils, although some yellow and most grey forms have impeded subsoil drainage (Isbell 2020, 66).

Kurosols (**KU**): This order consists of soils with strong texture contrast between A horizons and strongly acid B horizons. These soils may present some unusual subsoil chemical features such as high magnesium, sodium and aluminium (Isbell, 2020:72).

Rudosols (**RU**): This order generally consists of young soils that have had little time to pedologically modify parent rocks or sediments, therefore containing negligible pedologic organisation. The soils are apedal or only weakly structured in the A1 horizon and show no pedological colour changes apart from the darkening of an A1 horizon. There is little or no texture or colour change with depth unless stratified or buried soils are present (Isbell, 2020:85).

Sodosols (**SO**): This soil order consists of soils with strong texture contrast between A horizons and sodic B horizons that are not strongly acid. These soils generally have an abrupt clay increase down the profile and high sodium content, which may lead to clay dispersion and instability (Isbell, 2020: 91).

Vertosols (**VE**): This order consists of clay soils with shrink-swell properties that exhibit strong cracking when dry and at depth have slickensides and/or lenticular peds. Problems of water entry are usually related to tillage practices and adverse soil physical conditions at least partly induced by high sodium in the upper part of many profiles (Isbell, 2020:109).

Table 6-2 Soil type occurrence within the amended project footprint

GSG Soil Type	Soil Description	ASC
Alluvial Soils – medium to heavy textured (Loams clay loams) (Amh)	Soils developed from recently deposited alluvium, normally characterise little or no modification of the deposited material by soil forming processes, particularly with respect to soil horizon development (OEH, 2017).	Dermosols (DE)
Chernozems (CH)	Like Black Earths, but of lower clay content and more friable, having porous structural units. The profile shows weak horizon differentiation with gradual boundaries. Soil reaction is neutral to alkaline (OEH, 2017).	Dermosols (DE)
Chocolate Soils (C)	This classification consists of brownish, acid, friable, moderately pedal to fine blocky structured, clay loam soils with weak to moderate horizon differentiation.	Dermosols (DE) / Ferrosols (FE)
Euchrozem (E)	This classification consists of Red, strongly structured clay soils with a somewhat lower clay content near the surface. They resemble Krasnozems but are more alkaline.	Ferrosols (FE)
Red Brown Earths (RBE)	The characteristic features of these soils are grey-brown to red-brown loamy A horizons, weakly structured to massive, an abrupt to clear boundary between A and B horizons, and brighter brown to red clay B horizons with well-developed medium prismatic to blocky structure (OEH, 2017).	Chromosols (CH)
Grey, Brown and Red Clays (GC_BC_RC)	A broad group of soils whose common properties are determined by their rich clay contents. These soils are found in imperfectly drained sites (OEH, 2017; Isbell 2020).	Vertosols (VE)
Krasnozems (K)	This soil type consists of deep, red strongly-structured clay soils with clay content gradually increasing with depth and weak horizon differentiation.	Ferrosols (FE)
Red Podzolic Soils - less fertile (granites and metasediments) (RPl)	A soil profile formed at an advanced stage of weathering and leaching by the process of podzolization. These soils have a strong textural difference: the A horizon (topsoil) is usually loamy, and the A2 horizon (lower topsoil) is sporadically bleached (or randomly pale). The A horizon has a medium to coarse particle size overlaying a predominantly red B horizon (subsoil), which has a higher clay content. The soils are often more acidic in the surface than at depth. The boundaries between the soil layers are gradual to clear. These soils are inherently infertile and commonly deficient in phosphorus, nitrogen, and molybdenum. They commonly occur on the upper slopes of hills grading into shallow soils (lithosols) on hill tops (Department of Primary Industries, 2001).	Kurosols (KU)
Red Podzolic Soils – more fertile (volcanics, granodiorites) (RPm)	A soil profile formed at an advanced stage of weathering and leaching by the process of podzolization. These soils have a strong textural difference: the A horizon (topsoil) is usually loamy, and the A2 horizon (lower topsoil) is sporadically bleached (or randomly pale). The A horizon has a medium to coarse particle size overlaying a predominantly red B horizon (subsoil), which has a higher clay content. The soils are often more acidic in the surface than at depth. The boundaries between the soil layers are gradual to clear. They commonly occur on the upper slopes of hills grading into shallow soils (lithosols) on hill tops (Department of Primary Industries, 2001)	Dermosols (DE)
Red Earths – more fertile (volcanics, granodiorites) (REm)	This soil type is characterised by Massive, reddish sandy profiles with a gradual increase in clay content with depth over a diffuse to gradual boundary.	Dermosols (DE)

GSG Soil Type	Soil Description	ASC
Red Earths - less fertile (granites and metasediments) (REI)	This soil type is associated with old land surfaces. Red earths generally consist of a diffuse to gradual profile with an increase in clay content with depth. These soils are fairly well structured but still prone to hard setting and surface crusting. They are considered fertile in the region (Department of Primary Industries, 2001).	Kandosols (KA)
Yellow Earths (YE)	This soil type is associated with old land surfaces and are similar to red earths except that these are predominantly yellow. They are not as well drained as the red earths and are weekly structured (Department of Primary Industries, 2001).	Kandosols (KA)
Solodic Soils (SC)	Solodic soils occur on residual hills to low ridges and slopes. They occur on various types of sedimentary and metamorphic material, often presenting the appearance of layering within the soil itself. They generally present a well-structured profile with clear to abrupt boundaries (Department of Primary Industries, 2001).	Sodosols (SO)
Non-Calcic Brown Soils (NKB)	Similar to Red-brown Earths but without an A2 horizon. They have a carbonate-free solum and a neutral to slightly alkaline (with lower base saturation) B horizon. They are also generally thinner soils, 40–80 cm deep (OEH, 2017).	Chromosols (CH)
Soloths (SH)	Acid soils with strong texture contrast between pale topsoil and clay subsoil with coarse blocky or columnar structure (OEH, 2017).	Kurosols (KU) - Kurosols (natric) (KUn)
Lithosols (L)	This soil type consists of weathering rock and rock fragments lacking horizon development. They have shallow sandy to sandy loam topsoil, and a clayey sand subsoil formed in situ or formed from colluvial material. They occur mostly in the north-east of the Murrumbidgee catchment on ridges and close to drainage lines (OEH, 2017; Department of Primary Industries, 2001).	Rudosols (RU)
Weisenboden (W)	Dark clay to clay loam soils with uniform to gradational texture profiles and varying development of gley features in the deeper subsoil due to intermittent partial saturation associated with seasonal seepage and perched water. Perched water is a saturated layer of soil which is separated from any underlying saturated layers by an unsaturated layer (OEH, 2017).	Vertosols (VE)
Yellow Podzolic Soils – less fertile (granites and metasediments) (YPI)	This type consists of predominantly acidic soils occurring in poorly drained areas such as foot slopes (lower slopes) and depressions. They are usually deep and are dispersible and highly erodible. The soil is highly erodible and is more acidic on the surface than in the subsurface.	Kurosols (KU)

6.3 Hydrology

Water availability is a major influence on the range of resources available, and the suitability of an area for Aboriginal occupation. Water resources are key for the identification and interpretation of areas of occupation, environment, archaeological potential, and depositional formation.

The amended project footprint extends along and across major rivers, perennial and non-perennial waterways and in proximity to ephemeral lakes. The project is situated within the transitional zones between the foothills and ranges of the South Western Slopes Bioregion, the dissected ranges and plateau of the Great Dividing Range, the Great Escarpment and the western slopes of the inland drainage basins within the South Eastern Highlands Bioregion and the alpine ranges of Australian Alps Bioregion. Hydrological features located within these bioregions have been segmented by LGAs and summarised below.

6.3.1 NSW South Western Slopes

Wagga Wagga City LGA

Within the NSW South Western Slopes bioregion, the amended project footprint extends from the Wagga 330 kV substation within the Wagga Wagga City LGA. The amended project footprint extends along and across perennial and non-perennial watercourses and in proximity to natural and artificial waterbodies and gullies.

From the western end of the project to the east within the Wagga Wagga City LGA, the amended project footprint extends across major perennial creeks such as O'Brien's Creek, Kyeamba Creek, Keajura Creek, College Creek, Umbango Creek and Tarcutta Creek. It also extends across high order seasonal nonperennial creeks, gullies and tributaries such as Coxs Creek, tributaries of Boiling Down Creek, Tywong Creek, Foleys Gully, Gregadoo Creek, Big Spring Creek, and Comatwa Creek.

Snowy Valleys LGA

The extension of the project within the Snowy Valleys LGA and within the NSW South Western Slopes extends across and along rivers and major perennial creeks, low order non-perennial creeks and tributaries as well as natural and artificial waterbodies and gullies.

From the eastern boundary to the south and north-eastern boundary of the Snowy Valleys LGA, the amended project footprint extends across rivers and perennial creeks such as Turners Creek, Yaven Yaven Creek, Darlows Creek, Mudhole Creek, Gilmore Creek, Tumut River, Goobarragandra River, Bombowlee Creek, Killimicat Creek, Brungle Creek, perennial tributaries from Brungle Creek, Gocup Creek, Tumut River and Sawpit Gully. The amended project footprint also runs across high order non-perennial creeks and gullies such as Sud Hot Creek, Right Arm Creek, Wilsons Creek, Cockatoo Creek, Stony Creek, Leech Gully, Pipers Creek, Terrys Creek, and high order tributaries of perennial creeks and rivers. The amended project footprint also extends across a large number of low order non-perennial waterways.

Cootamundra-Gundagai Regional LGA

Within this LGA and within the NSW South Western Slopes Bioregion, the amended project footprint extends across and along major perennial creeks, low order non-perennial creeks and tributaries as well as natural and artificial waterbodies and gullies.

From the south-western border to the north-eastern border of the LGA, the amended project footprint extends across rivers and perennial creeks such as Adjungbilly Creek, O'Brien's Creek, Cart Road Creek, Oak Creek, Murrumbidgee River. The amended project footprint also extends across high order non-perennial creeks and gullies such as Yellow Clay Creek, Dicks Gully and Rocky Creek as well as tributaries and low order perennial waterways.

Yass Valley LGA

The NSW South Western Slopes bioregion partially occurs on the northern portion of the Yass Valley LGA. From the north-western boundary to the north-eastern boundary, the amended project footprint runs across rivers and major perennial creeks such as Murrumbidgee River and Derringullen Creek as well as high order non-perennial creeks and gullies such as Oak Creek, Excursion Gully, Fairy Hole Creek, Cooks Creek and Bango Creek. The amended project footprint also runs across tributaries and low order perennial waterways within this region.

6.3.2 South Eastern Highlands

Snowy Valleys LGA

The Southern Highlands bioregion occurs on a large portion of the Snowy Valleys LGA, however, the extension of the amended project footprint in this area only traverses the west, the centre, and the north-eastern border of the Snowy Valleys LGA. From the western occurrence of the South Eastern Highlands bioregion to the centre south and western corner within the Snowy Valleys LGA, the amended project footprint extends across two perennial creeks, Adelong Creek and Gilmore Creek as well as through high order nonperennial creeks such as Nacki Nacki Creek, Sharps Creek, Snubba

Creek and Kiley Creek. The amended project footprint also runs across tributaries and low order perennial waterways within this region.

Cootamundra-Gundagai Regional LGA

The extension of the amended project footprint in this bioregion only transverses a small portion of the south-eastern section of the Cootamundra-Gundagai Regional LGA. From the southern border, the project extends across Saw Mill Creek, a perennial creek, and its tributaries.

Yass Valley LGA

The South Eastern Highlands bioregion covers a large portion of Yass Valley LGA. From the western boundary of this bioregion within the Yass Valley LGA, the amended project footprint extends across major perennial creeks such as Washpen Creek, Bowning Creek and Derringullen Creek as well as high order non-perennial creeks such as Jugiong Creek, Cart Road Creek, Black Range Creek, Bogolong Creek, and Woolgarlo Creek. The amended project footprint also extends across low order non-perennial creeks, tributaries and waterways.

Upper Lachlan Shire LGA

The South Eastern Highlands bioregion covers most of the Upper Lachlan Shire LGA. From the western border of the LGA to the east the amended project footprint runs across rivers and high order perennial creeks and tributaries such as Flacknell Creek, Jerrawa Creek, Oolong Creek, Lachlan River, Merrill Creek, Humes Creek, Kialla Creek, Middle Creek, First Creek, Pejar Creek, Wollondilly River, Steeves Creek, Melamalong Creek, Tarlo River, Turrallo Creek, Cowpers Creek, Myrtle Creek, Kerrawary Creek and Bannaby Creek. The amended project footprint also traverses through high order non-perennial creeks and gullies such as Catherines Creek, tributaries of Bunton Creek, Felled Timber Creek, Dowlings Creek, Sams Creek, Middle Creek, Heffernans Creek, Gurrundah Creek, Ryans Creek, Sawpit Creek, Back Creek, tributaries of Wollondilly River, tributaries of Pejar Creek, Sawpit Gully, tributaries of Tarlo River, tributaries of Kings Creek, Dawsons Flat Creek, Cow Horn Creek, Forest Creek, tributaries of Kerrawary Creek, Bannaby Creek, Connors Creek, Wills Gully as well as low order non-perennial waterways and tributaries.

Goulburn Mulwaree LGA

The South Eastern Highlands bioregion covers most of the Goulburn Mulwaree LGA. The amended project footprint does not interact with any named creek or rivers that are within the Goulburn Mulwaree LGA. There are several higher order unnamed drainageways along the length of the Crookwell accommodation facility and compound (AC06) access road.

6.3.3 Australian Alps

Snowy Valleys LGA

The Australian Alps bioregion occurs partially along the south and the south-eastern portion of the Snowy Valleys LGA. From the northern boundary of this bioregion within the Snowy Valleys LGA the amended project footprint traverses perennial creeks such as Yellowin Creek, Buddong Creek, Stockmans Creek, Honey Suckle Creek, Long Creek, Plain Creek and Yorkers Creek as well as high order non-perennial creeks and gullies such as Sandy Creek, Sheepyard Creek, Mettys Gully, McGregors Gully, Tomneys Plain Creek and Logbridge Creek. The amended project footprint also runs across low order non-perennial creeks, waterways and tributaries.

6.4 Land-use history

The amended project footprint has been subject to varying degrees of disturbance by historical activities such as clearing and farming. The native vegetation was variably cleared in the historic period and is now a mixture of open pasture, and open forest.

7. ABORIGINAL HERITAGE CONTEXT

7.1 Introduction

This section summarises the Aboriginal heritage context of the amended project footprint. A review of historical and ethnohistorical records, and the findings of previous archaeological investigations, has been undertaken to place Aboriginal occupation of the landscape in a local and regional context. A predictive model has been developed to assist in determining the potential for Aboriginal sites to be present, and their likely nature and distribution.

7.2 Aboriginal history

7.2.1 NSW South Western Slopes

In the eastern end of the amended project footprint, the Murrumbidgee River would have been a focus of occupation in the region, with the river supporting woodland and forest habitats housing a wide range of resources for the Aboriginal population to support themselves. The frequent floods of the Murrumbidgee River provided Aboriginal people with abundant resources, as pools left by the receding floodwaters would be filled with freshwater mussels, fish, yabbies, and aquatic plants (Kabaila, 1998).

The NSW South Western Slopes are home to the Wiradjuri people. The Wiradjuri is the largest Aboriginal group in NSW, known as “the people of three rivers’, for the Wambool (the Macquarie River), the Kalari (the Lachlan River) and the Murrumbidjeri (the Murrumbidgee River) bordering their country. In the south of Wiradjuri country three local groups are known, the Murringbulla at Murrumburrah, the Kutamundra at Cootamundra, and the Narrungdera at Narrandera. The amended project footprint sits within Narrungdera country. Narrungdera boundaries ran approximately from Ganmain to Ardlethan, west to Mirrool Creek and along the Murrumbidgee River to Darlington Point (Howitt, 1884; Wood, 1992).

Recorded burials and ceremonial sites are rare in the region around Wagga Wagga, though there are a number of historical accounts of such sites. An 1861 article in *The Argus* reported on the burial of Wiradjuri man “Old Billy” near the racecourse camp at Wagga Wagga. He had died under suspicious circumstances and the chief constable of the Wagga Wagga police had visited the camp to investigate, finding that the body had already been prepared for burial with a grave dug ‘a short distance from the camp’ (The Argus, 20 November 1861). A local history of Wagga Wagga by J Baylis notes that the sandhills of Wagga Wagga were known burial grounds for Wiradjuri people (Baylis, 1927).

Historical records of cultural practises in the Wagga Wagga region from the 1870s to the 1940s focus mainly on the ‘burbong’ or male initiation ceremonies and other ‘men’s business’ (Green, 2002). It should not be assumed that women did not also have a ceremonial life with important places associated with this as well as places associated with other day to day activities. The male-centric focus of the historical record stems from the European recorders being men who would not have been privy to any ‘women’s business’ and often overlooked domestic or mundane tasks as being unimportant. Though the recorders were given some knowledge of these practises, the level of information given was similar to that given to children who had not yet been initiated as much of the knowledge was protected for only initiated men. The practise of ceremony declined quickly following European settlement in the region and by 1900 was no longer seen to happen, there is evidence that some of these ceremonial practises continued in secret till the 1930s and potentially beyond (Green, 2002)

The first Europeans to visit the Wagga Wagga region were Sturt and his exploration party in 1829 during their travels on the Murrumbidgee. Diseases such as smallpox were introduced to Australia by colonists and had spread between Aboriginal populations ahead of European settlement so that by the early 1830s Aboriginal groups had already suffered dramatic population loss. This implies that early records of population numbers recorded by explorers are not an accurate measure of how many Aboriginal people would have lived in the region prior to the arrival of Europeans in Australia. In 1836 Thomas Mitchell traversed the country to the southeast of Wagga Wagga and reported that Europeans had settled the banks of the Murrumbidgee (Swan, 1970). European settlement of the riverine plains and saltbush plains was swift and further dispossessed and decimated the remaining Aboriginal

population. By the mid-1830s it was estimated that, of a possible population of 3,000, only 1,000 Aboriginal people survived (Garland, 1984). The loss of fishing grounds and significant sites, as well as the murder of Aboriginal people, was retaliated through attacks with spears on cattle and stockmen. Clashes between European settlers and Aboriginal people were very violent, with the period from 1838 to 1841 being termed the 'Wiradjuri Wars'.

Aboriginal people are noted camping on the outskirts of Wagga Wagga throughout the mid-1800s, two noted sites are Hampden Bridge and at the racecourse situated next to the Murrumbidgee River (Garland, 1984; Green, 2002). Following the establishment of Warangesda Mission at Darlington Point and Brungle Mission near Tumut in the 1880s remaining Aboriginal people in the Wagga Wagga region would have been encouraged, often through force, to relocate to these missions. Only six Aboriginal people were counted in Wagga Wagga in the 1901 census (Green, 2002: 115) though this is likely a misrepresentation of the number of Aboriginal people in the region as the Commonwealth Constitution, which came into effect on 1 January 1901, stated, “in reckoning the numbers of people, Aboriginal natives shall not be counted”. Aboriginal people were instead recognised under the *Flora and Fauna Act* (Green, 2002:115).

7.2.2 South Eastern Highlands

The bioregion includes the towns of Orange, Bathurst and Lithgow in the north, Goulburn, Queanbeyan and Yass in the centre and Cooma, Jindabyne and Bombala in the south.

The Lachlan, Macquarie, Murray, Murrumbidgee, Shoalhaven and Snowy Rivers all flow across the bioregion.

Within the South Eastern Highlands region there are four major language groups, the Wiradjuri (as discussed above) to the west and north-west, the Ngun(n)awal to the centre, the Ngario to the south, and the Gandangara (Gundungurra) to the north-east. Tribal boundaries are based largely on linguistic evidence. It is probable that tribal boundaries, clan estates and band ranges were fluid, varying over time. Consequently, tribal boundaries as delineated today must be regarded as approximations only, and relative to the period of, or immediately before, European contact. European settlement in the South Eastern Highlands began very soon after invasion of the continent, and increased heavily after the 1820s. As a result, recorded information regarding traditional Aboriginal culture is highly fragmentary as much of the local Aboriginal language and lifestyle had changed before it could be recorded.

The Yass region was occupied by the Wiradjuri and Ngunawal Aboriginal language groups, with Robinson (in Mackaness 1941) noting that the people of Yass were referred to as Onerwal [Ngunawal]. Jackson-Nakano (2002) notes that the Wallabalooa tribe occupied the Yass and Boorowa districts in the early years of European settlement and, according to Bayley (in Jackson-Nakano 2002), *Warrambalulah* was the Aboriginal name for the area on which the Yass township was settled. Prior to European usurption of their traditional lands Aboriginal society was an autonomous society with established seasonal economic practices. As European settlement rapidly absorbed Aboriginal territory, imposed boundaries and forced many Aboriginal people onto government reserves. Increasingly people became economically dependent on the missions and government due to the inability to access traditional lands or carry out traditional subsistence activities.

Relationships with early European settlers varied. In some cases, such as the Humes, Broughtons, Kennedys, Walkers and Howells, relationships with members of the Wallabalooa group were noted to be positive (Jackson-Nakano, 2002); although these may be considered the exception rather than the norm. Although reserves of land in the Yass region were set aside for Aboriginal people from 1851, these parcels went largely unused with people preferring to live on the outskirts of towns and on stations located in their own country. Reports from the Yass Courier in 1857 and 1858 refer to a ‘Blacks Camp’, which is thought to be the Yass River Camp used by Aboriginal people throughout the 19th and 20th centuries (White and Cane 1986).

The passing of the *Robertson Land Acts* in 1861 disenfranchised many Aboriginal people across NSW, including the South Eastern Highlands, pushing people out of their country and reducing access to traditional resource gathering areas. However, within the Yass region a number of properties were

either purchased or were gazetted by Aboriginal families. Some properties of note in the Yass region include Brickey's Creek, Blakeney Creek and Flakeney Creek (Kaibala 1998).

Towards the end of the 19th century, the European community of Yass demanded that the Aboriginal community be 'controlled', resulting in the reservation of a parcel of land at Oak Hill. It was reported that 13 houses were built at the site in 1888, and by 1890 it was recorded that 78 people were living at the site across 12 houses and four bark huts (White and Cane, 1986). The occupation of the Oak Hill site was short lived with pressure from the Yass community in 1899 to remove Aboriginal people from the town entirely. Attempts to encourage people to move to other reserves were unsuccessful and so the Edgerton reserve was set up 20 kilometres from Yass in 1909. Many Aboriginal people refused to move to the Edgerton site petitioning to stay at Oak Hill, this resulted in the Oak Hill site being revoked. While some people initially moved to the Edgerton site it was abandoned by 1916, with people either moving into the Yass township or back to Oak Hill to a camp at the bottom of the hill along the Yass River (White and Cane, 1986). This was a period of great difficulty for Aboriginal people as it was during this time that children were removed from their families. Between 1900 and 1915, 15 children were recorded as being removed from Aboriginal families in Yass. A further reserve, named Hollywood, was set up in the south of Yass near the cemetery in 1834 to an attempt to remove people from the Oak Hill site, however, the Hollywood reserve was a failure with many refusing to move or very quickly abandoning the site due to poor conditions. Following this period Aboriginal people were either resettled in Yass, including occupation of Oak Hill, or were moved to reserves further away from Yass.

Tindale (1974) determined that the Goulburn region was situated at the boundary of two tribes – the Gandangara to the north and the Ngunawal to the south. Early settlers describe large numbers of Aboriginal people (over 3,000) attending ceremonies in the Goulburn district (in Wyatt, 1941:112). Large groups such as this would have collected from a number of neighbouring 'tribes' and the fact that Goulburn was the scene of the gathering suggests that it may have been centrally located between these tribes. However, early commentators often confused hordes or clan divisions, which were, in fact, more relevant to everyday life, with broad tribal groupings. Early ethnographers tended to describe any large groups of Aboriginal people as 'tribes'.

It has been observed that the word lists recorded from both the Ngunawal and Gandangara languages were virtually identical (Eades, 1976:6). 'This may indicate that the tribal division was inaccurately recorded by Mathews (1904 1908), or that Aboriginal people to the north and south of Goulburn were linguistically related and had close social, and maternal kinship ties' (Koettig and Lance, 1986:13).

Estimates of the pre-European size of the Aboriginal population in the Goulburn region cannot be confidently based on the inadequate ethno-historical sources for the area. By extrapolating Radcliffe-Brown's (1930:696) population estimate for the whole of Australia, and Tindale's (1940) tribe numbers, Flood estimated that the population density for the Southern Tablelands was about 1:36 square kilometres. She admits, however, that 'It is of course impossible to estimate the population of any one particular area from this crude index of population density for the tribal population as a whole, but such an index can be useful in making comparisons with other tribal territories containing similarly unequal resource zones' (Flood, 1980:43).

Many early explorers to the Goulburn area noted the absence of a visible Aboriginal population. This could be due to a number of reasons including efforts by the local population to remain undetected but was also likely due to the population already being affected by the introduction of introduced diseases. A smallpox epidemic reported in Sydney in 1789 had likely spread to the Goulburn region prior to European movement through the area (Koettig and Lance, 1986).

From records of the earliest European journey through Argyle County in 1798 it is recorded that a young Aboriginal girl was caught by the exploring parties, whose language was so different from their indigenous guide, that she was released the following day with a gift of a tomahawk and sent back to 'the rest of the natives, which were covered in large skins, which reached down to their heels' (in Eddy, 1985:5). In the 1830s George Bennett recorded people on the Goulburn Plains making and wearing possum skin cloaks. He also recorded the construction of bark huts made out of tree branches with bark sheets (Bennett, 1834).

During a visit to the Goulburn area in 1836, James Backhouse recorded an Aboriginal woman eating 'sow-thistle'. This is believed to be a variety of the Asteraceae family (also including the yam daisy)

(Koettig and Lance, 1986). Other plant resources local to the area included flowers, nectar and fruits from edible plants, such as Melaleuca, Grevillia, Hakea and Banksia. Bennett observed Aboriginal peoples roasting echidnas and hunting platypus on the Wollondilly River, as well as individuals eating Banksia nectar (Bennett, 1834). Possum, kangaroo and wallaby as well as fish and birds have also been recorded in observations of the traditional Aboriginal diet within the amended project footprint (Flood, 1980).

A second smallpox epidemic in 1846-1847 had devastating effects on the remaining Aboriginal population of Goulburn, with the Bench of Magistrates estimating a population of only 25 remaining in Goulburn (Steele, 2003). This does not, however, consider the people who may have moved to other parts of the region.

7.2.3 Australian Alps

The Jindabyne region, largely to the south of the amended project footprint, was located within the territory of the Ngarigo. The territory extended approximately 200 kilometres from north to south and was approximately 120 kilometres at its widest point and covered over 15,000 square kilometres (Tindale, 1974). The territory included the tableland tract between the western slopes of the coastal ranges and the eastern fall of the Kosciusko Plateau and apparently included the peaks of the Snowy and Kosciusko Ranges. The drainage basin of the Snowy River was prominent within the territory (Chapman, 1977:18).

It is generally agreed that Aboriginal groups in the alps chose to spend winter in the Montane valleys where it would be warmer (Sheppard, 2005:12). The recollections of Felix Mitchell document this, mentioning;

> *The Monaro blacks, it is said, departed from the highlands during the winter. In the warmer weather they returned, and a great number travelled out to the Bogong Mountains, there to feast upon the Bogong moth, of which they were extremely fond.* (Mitchell, 1926:18-19).

The movement pattern of Aboriginal people was facilitated by the interconnecting valleys and contours of the country that are a prominent feature of the highland areas (Sheppard, 2005:12). It is suggested that numerous Aboriginal communication, ceremonial and trade routes existed within the alps region. These routes were largely followed by early European settlers as stock routes as they provided the easiest terrain to navigate and incorporated water resources (Sheppard, 2005:14).

Bogong moth hunting is viewed as a staple of alpine life, despite fragmentary historic records and a frequent overstatement of its importance (Flood, 1992:84). Moth hunting occurred through the alps from near Canberra to the western Victorian Alps (Flood, 1992:84). Access to different moth aestivation areas was largely dependent on ancestral rights, although organised feasting and large ceremonies involving Aboriginal people from outside the region still occurred (Kamminga, 1992:106-108). It is generally believed that the moth was a ceremonial food rather than a dietary staple like the Daisy Yam (Sheppard, 2005:17).

Recorded burials are rare, it is believed that the preference was to bury the dead inside hollow trees, or in a sitting position facing east and covered by approximately one metre high earth mounds with stones overlying. The exception to this was for members of importance who were buried in caves, examples of this are recorded in the caves at Blue Waterholes (Cooke, 1988; Boot, 2004).

The first (recorded) European explorer to cross Ngarigo territory was Captain Currie R.N., who reached the Bredbo River from the north in 1823 (Hancock, 1972). The following years saw a rapid settlement of the area by graziers and squatters. It has been estimated that at the time of European contact, the Ngarigo people numbered around 500 to 600 (Flood, 1976:38; Hancock, 1972:67; Helms, 1895:388).

The significance of Aboriginal guides in early European exploration has long been understated. Most of the early European explorers in the alps were aided by Aboriginal guides for their wealth of knowledge of the area (Sheppard, 2005:22). Gardner noted that ‘every explorer and squatter of note in the alpine district was assisted by at least one Aboriginal guide’ (Gardner, 1992:96).

The encroachment of white settlers into tribal lands had a profound impact on the Aboriginal population. The population was drastically reduced through contact with European diseases, loss of traditional food resources, and by skirmishes with the white settlers. By the 1870s and 1880s the Ngarigo of the Monaro were reduced to a few survivors who wandered between Cooma, the Alps and the Lake Tyre Mission Settlement (Chapman, 1977:22).

7.3 Material evidence of Aboriginal land use

A number of Aboriginal archaeological studies have been undertaken in the vicinity of the amended project footprint. These studies provide context for the current assessment and inform the predictive model as to the site types likely to be encountered by the project as well as the significance of the survey and subsurface testing results. Summaries of these studies are presented below and their location in relation to the amended project footprint is shown in Figure 7-1.

7.3.1 NSW South Western Slopes

In 1998, NOHC conducted a cultural heritage assessment for the Visy Pulp and Paper Mill at Gadara Plains, located 1.8 kilometres west of the current amended project footprint, eight kilometres south-west of Tumut, NSW. The 1998 study area covered around 10 square kilometres, comprising of the paper mill site (800 metres by 400 metres approximately) as well as adjacent areas under investigation as water storage and wastewater irrigation areas, intersecting with a 1.5 kilometre portion of the current amended project footprint south of the Snowy Mountains Highway. The assessment identified both Aboriginal and European heritage sites within this study area. The Aboriginal heritage sites included two artefact scatters, two possible modified trees, and eight isolated finds. Five areas of potential archaeological deposit were identified within the paper mill site area. Thirteen European sites and features were identified, ranging from negligible significance to low-to-moderate regional significance. Subsurface testing was conducted within the boundaries of the proposed mill site. Twenty-two test pits were excavated with nine artefacts recovered from three test pits.

Following the 1998 assessment of the Visy Pulp and Paper Mill Tumut (NOHC, 1998) further work was required to assess the impact of a proposed extension of the area of mill irrigation on an area of land on which one of the three possible Aboriginal modified trees (A5) was located (NOHC 2006). As part of this extension Visy proposed to remove the possible Aboriginal modified tree (A5), located approximately 500 metres south of the current amended project footprint, before this could occur the NSW Department of Environment and Conservation (DEC) requested a reassessment of that modified tree against their publication ‘Aboriginal Scarred Trees in NSW: A Field Manual’ (Long, 2005). As a result of the comparison of the scar characteristics at site A5 against the criteria outlined in the DEC publication, it was concluded that the scar had a high likelihood of a natural origin (storm damage – branch tear) rather than being the result of past human activity. It was recommended that the designation of ‘Aboriginal Object’ (which currently applies to modified tree A5) be removed.

In 2002, the NSW NPWS commissioned a preliminary Aboriginal Heritage Survey (Dearling and Grinbergs, 2002) as part of preparations for a plan of management for several Nature Reserves (NR) and National Parks (NP) in the South West Slopes region. Surveys were undertaken at Benambra NP, Ellerslie NR, Livingstone NP and reserve, Minjary NP, Ulandra NR, and Queanbeyan Management Area NR. Six artefact scatters and five isolated finds were located at Minjary NP, which borders an approximately two-kilometre section of the current amended project footprint. The park was considered to have low potential to contain more sites. Minjary Mountain within the north-west of the park, approximately five kilometres from the current amended project footprint, was considered to be significant as a viewing point to other surrounding areas and was noted to potentially be associated with a men’s initiation site (Freeman, D. pers. comm. in Dearling and Grinbergs, 2002).

In 2007, OzArk Environmental and Heritage Management conducted an assessment for the Wagga Wagga to Yass 132 kV Transmission Line for transmission line structure replacement works along the existing easement. As a result of the survey, four Aboriginal sites and one historic heritage feature were recorded. The Aboriginal sites consisted of four artefact scatters, two of which had associated PAD. Three of these sites fall within one kilometre from the current amended project footprint, with one site 50 metres north of amended project footprint. The historic site consisted of a ruined stone shepherd’s hut. No Aboriginal or historic sites were to be impacted by the project.

New South Wales Archaeology Pty Ltd (NSW Archaeology, 2012) was commissioned to undertake an Aboriginal cultural heritage assessment for the Rye Park Wind Farm between Yass and Boorowra, NSW, intersecting with a three-kilometre section of the current amended project footprint at Days Road. Sixteen Aboriginal sites were identified during the assessment including three artefact scatters, 10 isolated finds, and three possible quartz quarrying sites which may have been used as stone procurement areas, 10 of these sites fall within one kilometre from the current amended project footprint. Based on the predictive modelling it was concluded that no subsurface testing was warranted within the areas to be impacted. Three European heritage items were recorded by the survey and were recommended to be avoided by the project but were not deemed significant enough to warrant heritage listing.

Kelleher Nightingale Consulting Pty Ltd (KNC, 2015) undertook an Archaeological and Heritage Management Report for upgrade works for a section of the Gocup Road which links Tumut and Gundagai and intersects the current amended project footprint. The upgrade works were required to address vehicle safety requirements and to accommodate the demands of modern freight services. This report incorporated results from previous surveys undertaken by KNC in 2012 in which 10 sites were identified including eight artefact scatters, an isolated artefact, and a potential archaeological deposit. KNC's 2015 study also incorporated a further six Aboriginal cultural sites which had been recorded by Waters Consultancy Pty Ltd as part of an Aboriginal cultural assessment (2015). These cultural sites included two ceremonial pathways, one seasonal pathway, one meeting place and camping area, one pathway associated with specific resource use and one remnant wetland that constituted a resource gathering area. Six of the previously recorded archaeological sites from KNC's 2012 survey were noted to overlap the identified Aboriginal cultural sites previously recorded by Waters Consultancy Pty Ltd.

The artefacts recorded within the assemblage were made up of predominately quartz with some tuff, dark volcanic and fined grained siliceous materials noted and were determined as being sourced from the local region. Sites were located on low gradient slopes, floodplains, ridge lines and spurs, and were generally within 200 metres of a water source. The majority of sites had medium to high level disturbance from the construction and maintenance of infrastructure and services, housing construction and erosion (KNC, 2015).

7.3.2 South Eastern Highlands

Koettig (1986a) surveyed a proposed water pipeline route between Bowning and Yass during which two small artefact scatters and two Aboriginal modified trees were recorded near Derringullen Creek, three of these sites were located within one kilometre of the current amended project footprint. The artefact scatters were both small in size consisting of three artefacts each. Following the survey, subsurface testing was carried out near Derringullen Creek at an area identified as having high potential for subsurface deposit. Testing revealed consistent distribution of artefacts in low densities over a 700 metre stretch adjacent to the creek (Koettig, 1986b).

In 1986, Koettig and Lance conducted an Aboriginal Resources Planning Study for the City of Goulburn. As part of this study, they developed a topographic Aboriginal site location model for the area to assess the archaeological sensitivity of four separate landscape zones, major watercourses, undulating hills and plains, hills, and residential areas. The majority of the sites identified by the study were located on basal slopes close to major waterways and within the undulating hills and plains zone stone artefact scatters were the dominant site type.

Brayshaw and Dallas (1993) surveyed an extended corridor of land for the proposed 500 kV transmission line between Mount Piper and Marulan, intersecting the current amended project footprint. Twenty-six previously unrecorded sites were located during the route survey. Two of these were located within 500 metres of the current amended project footprint. NPWS 45-1-239 was an open artefact scatter situated 300 metres west of the confluence of Pipers and Irondale Creeks. The second site, NPWS 45-1-23, comprised a shelter with archaeological deposit and art and axe grinding grooves located on a hillslope adjacent to a tributary of Pipers Creek. Sandstone scarps and prominent ridgelines were considered to have the highest sensitivity for archaeological sites; creek and river flats and adjacent high ridgetops, the Wollondilly River flats, and adjacent hillslopes were identified as having high sensitivity; and gently undulating land, containing creeks and adjacent ridgelines that

extend between Bannaby and Marulan were identified as having moderate sensitivity for archaeological sites.

One of the pylon sites, no. 349, associated with the Mount Piper to Marulan 500 kV transmission line was proposed to impact site 45-1-239, also known as Bannaby 1, located within the current amended project footprint. A permit to carry out preliminary research and undertake investigation at site 45-1-239 was obtained from NPWS NSW to be carried out by Haglund and Associates (1991). Surface collection was undertaken along the track to be used for access to pylon 349 as well as the area to be impacted by construction however the number of artefacts recovered was not noted in the report. Four test pits, 1 metre by 0.5 metres, were excavated within the pylon site, with each test pit placed across the approximate locations of the four pylon legs. A further seven test pits were excavated across the ridge crest, with pit sizes ranging from 0.5 metres by 0.25 metres to one metre by 0.25 metres. A total of 214 lithic artefacts were recovered from excavations with 105 of these coming from the four tests pits at the pylon location. The site was characterised as having several small intensively used areas separated by areas of sparse but widespread archaeological material.

Following the excavations, it was concluded that construction of pylon 349 could go ahead with precautions in place to minimise impact to the archaeological deposit (Electricity Commission of NSW, 1991) which included monitoring of the works by archaeologists and minimising the impact area.

OzArk was commissioned to undertake the initial assessment for the Taralga Windfarm, east of Taralga NSW (OzArk, 2004). The works included the construction of 87 turbines as well as all associated infrastructure including access roads. As a result of the survey seven Aboriginal archaeological sites were identified including six artefact scatters, including one with PAD, and a modified tree. One of these sites is located 700 metres north-west of the current amended project footprint. Two non-Indigenous sites were identified consisting of the remains of a stone cottage and a stone hearth, both were considered to be of low significance. It was recommended that a number of the works be relocated to avoid impacts which were able to be incorporated in the project, resulting in no sites being impacted.

A number of wind farms have been constructed around Crookwell, with the Crookwell 1 and Crookwell 2 Wind Farms already constructed and the proposed Crookwell 3 Wind Farm in development. The Crookwell wind farms span across an almost 12-kilometre section of the current amended project footprint, intersecting at various points. There have been a number of archaeological assessments associated with the wind farms, leading to a robust characterisation of the archaeological resource in the area.

The original wind farm underwent three phases of investigation prior to construction. The site was first subject to detailed archaeological surface survey (Bell and White, 1996) recording one Aboriginal site, an artefact scatter of 20 quartz flakes. Poor visibility across this study area led Bell and White to conclude that in order to properly assess the archaeological potential of this study area subsurface testing would be required. McDonald and Garling undertook the subsurface testing component in 1997 which involved the excavation of three one metre by one metre test pits at each of the eight turbine locations, totalling 24 test pits. Artefacts were recovered from nine of the test pits, with the assemblage totalling 54 lithic artefacts. One of the test pits contained a high density of artefacts, 32 in total (site CWF1), one pit contained seven artefacts while all other pits containing cultural material contained three or less artefacts (McDonald and Garling, 1997). Site CWF1 is located 270 metres from the current amended project footprint. During these investigations a new classification of stone tool was identified, a small, backed tool later named ‘Pejar Point’, this was the first recorded find of this type of stone implement (McDonald and Garling, 1998). Due to the high concentration of artefacts and the previously undescribed stone tool it was recommended that further excavation and analysis be undertaken at site CWF1.

Broad area excavation at site CWF1 was undertaken by McDonald and Garling in 1998, with an area of 25 square metres excavated to average depths of 30 centimetres. A total of 2,154 lithic artefacts were recovered from the excavations with evidence of on-site manufacture of backed artefacts including the ‘Pejar Points’ located in the testing phase and another previously undescribed artefact, ‘rectangulars’, identified by McDonald and Garling (1998). The artefacts were predominantly recovered from the top 20 centimetres of deposit. The raw material makeup of the assemblage was fairly limited, made up of quartz, silcrete and chalcedony. The site was interpreted as a single occupation event involving artefact manufacture and other utilitarian activities (McDonald and Garling, 1998).

Assessment of the Crookwell 2 Wind Farm began in 2004, with a field survey of the proposed study area (Hardy and Thomson). As a result of the survey 25 previously unrecorded sites were identified, consisting of 22 artefact scatters and three modified trees. The combined assemblage of the artefact scatters totalled 105 artefacts, with the highest numbers of artefacts recorded at a site at 25, another two sites contained 11 artefacts while all other sites contained less than ten. The site distribution seems to be consistent with a model of low-density background scatter with occasional larger sites (Hardy and Thomson 2004). This observation is line with the results of the analysis by McDonald and Garling at the Crookwell 1 site. Based on the distribution of sites across this study area Hardy and Thomson concluded that archaeological material was likely to be located along creek lines, the confluence of drainage lines, and along ridgelines and sloping areas. Based on this model they determined that five of the recorded sites had potential for subsurface deposit. They also recommended subsurface testing where recorded sites overlapped with proposed impacts, that subsurface testing be considered for all proposed turbine sites, and that testing of areas to be impacted by road construction be considered (Hardy and Thomson, 2004).

Biosis undertook the subsurface testing component of the Crookwell 2 Wind Farm (2005) with a focus on proposed impact areas including undertaking probe transects for proposed tracks/roads, known archaeological sites, and transmission cable trenches, as well as test pitting at the substation area and the turbine locations. A total of 882 test pits and probes were excavated, 422 test pits and 460 test probes, covered an excavate area of approximately 217 square metres. Artefacts were recovered from 135 of the test pit and spade probes excavated, with a total assemblage of 784 lithic artefacts. Forty per cent of the assemblage came from a single test pit which was interpreted as a single flaking event. The majority of the artefacts recovered we located between 10-15 centimetres below the ground surface. The average depth of the test pits were 15 centimetres and the average depth of the test probes were 22 centimetres. The majority of the artefacts were recovered on landforms identified as being archaeologically sensitive by Hardy and Thomson (2004) with high densities of artefacts located on flats, crests, and upper slopes. The majority of the artefacts were produced from quartz and silcrete with smaller numbers of artefacts made up from a diverse range of materials including volcanics, chalcedony, rhyolite and tuff. While five backed points were recovered from excavations, with one displaying similar properties to the Pejar Point identified at Crookwell 1 Wind Farm, there was not enough detailed evidence to provide further information as to the nature of Pejar Points.

Assessment of the Crookwell 3 Wind Farm began in 2010, with the indigenous and non-indigenous cultural heritage assessment undertaken by Anderson Environmental Consultants (Anderson, 2010). Construction impacts for the wind farm included 30 new wind turbines along with associated infrastructure such as access roads and power line connections. As a result of the investigations 10 sites of Aboriginal heritage were recorded. No sites of non-indigenous heritage were identified. Sites included six artefact scatters, and four isolated finds. The assemblage was predominantly silcrete with lesser quantities of quartz. Further investigation, including subsurface testing, was recommended at Sites 2 and 8 if impacts to sites were to occur.

In 2016, Bowen Heritage Management was commissioned to undertake an ACHAR to remove 14 of the 46 turbine locations and to realign sections of the road and electrical cabling as part of works for the Crookwell 2 Wind Farm (Bowen Heritage Management, 2017). Twenty-two previously recorded sites stood to be impacted by these works.

As part of ongoing work for the Crookwell 2 Wind Farm Past Traces conducted an Aboriginal heritage assessment for the construction of an access road along Woodhouselee Road. Three Aboriginal sites were located during the survey program, including two small artefact scatters and a large artefact scatter with associated PAD. As an access road was proposed to cross this PAD (PJ56) subsurface testing was required to determine the nature of the site. Twelve test pits were excavated as part this testing resulting in the recovery of one artefact. Testing was also required for the construction of a temporary access track due to its proximity to site PJ56. Eight test pits were excavated along the proposed road alignment at 10 metre intervals. Only one artefact was recovered as part of this testing. The test pit containing the artefact was located along a fence line making diversion of the track to avoid this alignment impossible. Due to the results of the testing the proposed temporary access track was not constructed.

NOHC (2007) undertook an Aboriginal cultural heritage assessment for the development of the Bannaby 500/330 kV substation on Lot 2, DP 1096390, at the eastern end of the current amended

project footprint. The works for substation included the construction of the new substation as well as all associated infrastructure, realignment of a number of powerlines, and upgrades to an existing council road for site access. The study identified 11 sites comprising seven artefact scatters and four isolated finds. One area of PAD was identified in the area of one of the artefact scatters. Following this assessment, it was recommended that if the sites were to be impacted by the project, a program of surface salvage be undertaken to avoid impact to the associated artefacts and if the existing road alignment was to be widened substantially then a program of archaeological subsurface testing should be undertaken in the locality of the PAD to determine the extent and nature of the deposits to be disturbed by construction, and to provide appropriate management recommendations.

The study determined that the proposed substation development would impact nine of the recorded 11 Aboriginal cultural heritage sites, including the PAD and so an AHIP was procured to salvage artefacts from eight of the sites and to undertake an archaeological excavation program at the PAD. This was undertaken by NOHC in 2008.

Four hundred and forty-nine (449) stone artefacts were recovered from the Bannaby 500 kV substation subsurface testing and collection programs, 220 lithic artefacts were collected from the surface assemblages and 229 lithic artefacts were recovered from the excavated pits (NOHC, 2008). Thirty-eight (38) different assemblage elements were represented in the assemblage, indicating a wide range of manufacturing, retouching and most likely use related tasks took place in the area. Flakes made up the greatest proportion of the assemblage, followed by flaked pieces and broken retouched flakes. A small number of cores and bipolar artefacts were located as well as a small grindstone top-stone (muller). Retouched artefacts made up a larger than average percentage of the assemblage, at 8.3 per cent. Various kinds of notched and unnotched scrapers made up the bulk of the retouched assemblage (72 per cent of retouched artefacts). The site was determined to be of medium local significance.

In 2012, Australian Museum Business Services (AMBS) undertook an Aboriginal Heritage Study for the entire Goulburn Mulwaree LGA for the Goulburn Mulwaree Council to inform future management of Aboriginal cultural heritage within the LGA. This study followed on from earlier work from Lance and Koettig (1986) and Fuller (1989) in relation to landform sensitivity for archaeological potential and assessing the importance of different landforms to the Aboriginal community. Within the review of previous archaeological work, it was found that the predictive model developed by Koettig and Lance (1986) and Fuller (1989) remained consistent with patterns in site recording for the Goulburn region. These AMBS findings were used as the basis for classification of landform potential for predictive archaeological sensitivity mapping within the boundaries of the LGA under this study.

In 2018, Barker Ryan Stewart Pty Ltd and Sue Rosen and Associates reviewed and updated the 2012 Goulburn Mulwaree LGA Aboriginal Heritage Study and produced a thematic history of the Goulburn Mulwaree LGA incorporating both the Aboriginal and non-Aboriginal history of the region. This included a number of updates to the Goulburn Mulwaree LEP including a number of items recommended for new listings, updates to a number of listings, and the removal of a number of listings which had either been demolished or no longer met the criteria for heritage significance. A lack of listings relating to local Aboriginal sites or places was noted by the review.

Following the approval of AHIP C00043 associated with the Gullen Solar Farm, located between Crookwell and Goulburn intersecting with the current amended project footprint, NSW Archaeology Pty Ltd was commissioned to undertake management actions associated with the AHIP (Dibden, 2018). A cultural heritage and archaeological survey for Aboriginal areas, objects and places had been conducted in September 2015 by NSW Archaeology Pty Ltd. During the 2015 survey, 21 Aboriginal sites were located, including 11 artefact scatters, eight isolated finds, one sensitive archaeological landform, and two stone procurement areas (Dibden, 2015). Eight sites were protected from impact by no-go zones, one site was partially impacted, and 10 sites were impacted by the project.

New South Wales Archaeology completed an Aboriginal Cultural Heritage Assessment for the Snowy 2.0 main works project in 2019, approximately three kilometres east of the current amended project footprint near the Talbingo Reservoir. Some 29 previously recorded Aboriginal object sites were known to be present in Snowy 2.0 survey area. A total of 306 additional sites were recorded during the field survey. An extensive program of subsurface test excavation has been undertaken. A total of 654 test squares has been excavated and 3,394 stone artefacts have been retrieved.

7.3.3 Australian Alps

A number of archaeological investigations have taken place in the wider Australian Alps region, typically related to ski resort development in the south, and transmission line upgrades.

Flood in 1973 noted sites in the Kiandra, Mt Tantangara and Boggy Plain area. In 1980 Flood recorded a large artefact scatter (<100 artefacts) in the saddle at Connors Hill. This scatter included backed blades, manuports, and a backed glass scraper.

In 1989 Navin undertook a survey on the Mt Tantangara summit for a proposed mobile repeater and communications facility and recorded an artefact scatter on the mountain slopes between Mt Tantangara and Sawyers Hill. Artefact raw materials included quartz, mudstone, and silcrete and the site was concluded to be associated with a nearby small spring.

A low-density open artefact scatter was recorded on the Four Mile Hill Fire Trail in the Kosciusko National Park Baseline Heritage Study (Johnson, 1992) and is listed in AHIMS as #57-4-95. As part of this study numerous sites were recorded at Lobs Hole with artefacts comprising of sharp edge flakes, retouched tools, debitage, cores, a grinding stone and a hammerstone. The area was concluded to have been used opportunistically as a refuge from inclement weather in the higher country (Johnson, 1992).

Navin and Officer (1992) analysed the distribution of site locations recorded during previous surveys. The site distribution pattern suggests that the wider river valleys and major ridgelines served as access routes through the ranges (Navin and Officer, 1992:8). Sites are located almost exclusively on level, well-drained ground and generally consist of low density, small (up to 20 artefacts) to medium (21-50 artefacts) surface scatters (Navin and Officer, 1992:8). Johnson and Jones (1991:33) also observe that sites are found ‘mainly on level or gently sloping ground rather than on steeper slopes’.

In 2000(c) NOHC used subsurface testing to test potential landform-based variables relating to archaeological sensitivity within the Perisher Range Resorts area. They found that in broad terms, sites were more likely to be found in woodland environments of spur and ridge crests. The results of the investigation concluded that the strongest site determinants were relatively level, well drained ground, shelter from prevailing weather patterns (mainly from the west and north-west), avoidance of cold air drainage contexts, preference for terrain facilitating pedestrian access through travel, proximity to exploitable resources such as open woodland, grassland and herb fields and Bogong moth aestivation sites (NOHC, 2000c:41).

New South Wales National Parks and Wildlife Services (Sale, 2004) produced an internal report for a Kosciuszko National Park Aboriginal Heritage Study in an area bordering the southern section of the current study area. Historic research conducted by this study concluded that targeted archaeological survey work was necessary for areas with minimal previous archaeological investigation in order to address information gaps (Sale, 2004:27).

In 2006 Mills Archaeological and Heritage Services undertook an archaeological assessment within Bago State Forest in the Brandy Marys Leases area, in the southernmost section of the current study area. They determined that the area remained virtually unchanged since European settlement, apart from the installation of powerline easement, fence lines, and vehicle tracks. The number and variety of identified sites indicated the area was of ‘high usage’ by Aboriginal people (Mills Archaeological and Heritage Services, 2006: 48). It was recommended that the Brandy Marys Leases area be protected and conserved due to the high scientific, educational, and Aboriginal cultural significance of the present sites.

In 2007, Feary and Vincent undertook a desktop assessment of the Aboriginal Heritage of Kiandra, for the new Precinct Plan. The area was assessed to have low potential to have been occupied by Aboriginal people due to lack of resources and generally being barren and cold (Feary and Vincent 2007; NSW Archaeology, 2018:69). Feary and Vincent hypothesised that the Kiandra area was predominantly used as a movement corridor for Bogong moth exploitation and ceremony in the high country, and as a potential source of ‘knife’ making stone (Feary and Vincent, 2007: 12).

During a later assessment of the Kiandra precinct, Knight (2010) recorded 17 Aboriginal sites, including a cultural stone alignment. Wallace's Creek Fire trail demonstrated the highest level of site complexity, with four different types of raw material present.

Jacobs completed an Aboriginal Cultural Heritage Assessment for the Snowy 2.0 – Transmission Connection project in 2020. The initial desktop assessment identified five previously recorded Aboriginal sites, which were registered on AHIMS. All these sites are surface scatters of stone artefacts. The archaeological survey identified an additional four PADs. Archaeological test excavation was conducted at two of the four PADs (ST PAD 03 and Substation PAD). It was found that Substation PAD is not a site and ST PAD 03 is a sparse artefact scatter.

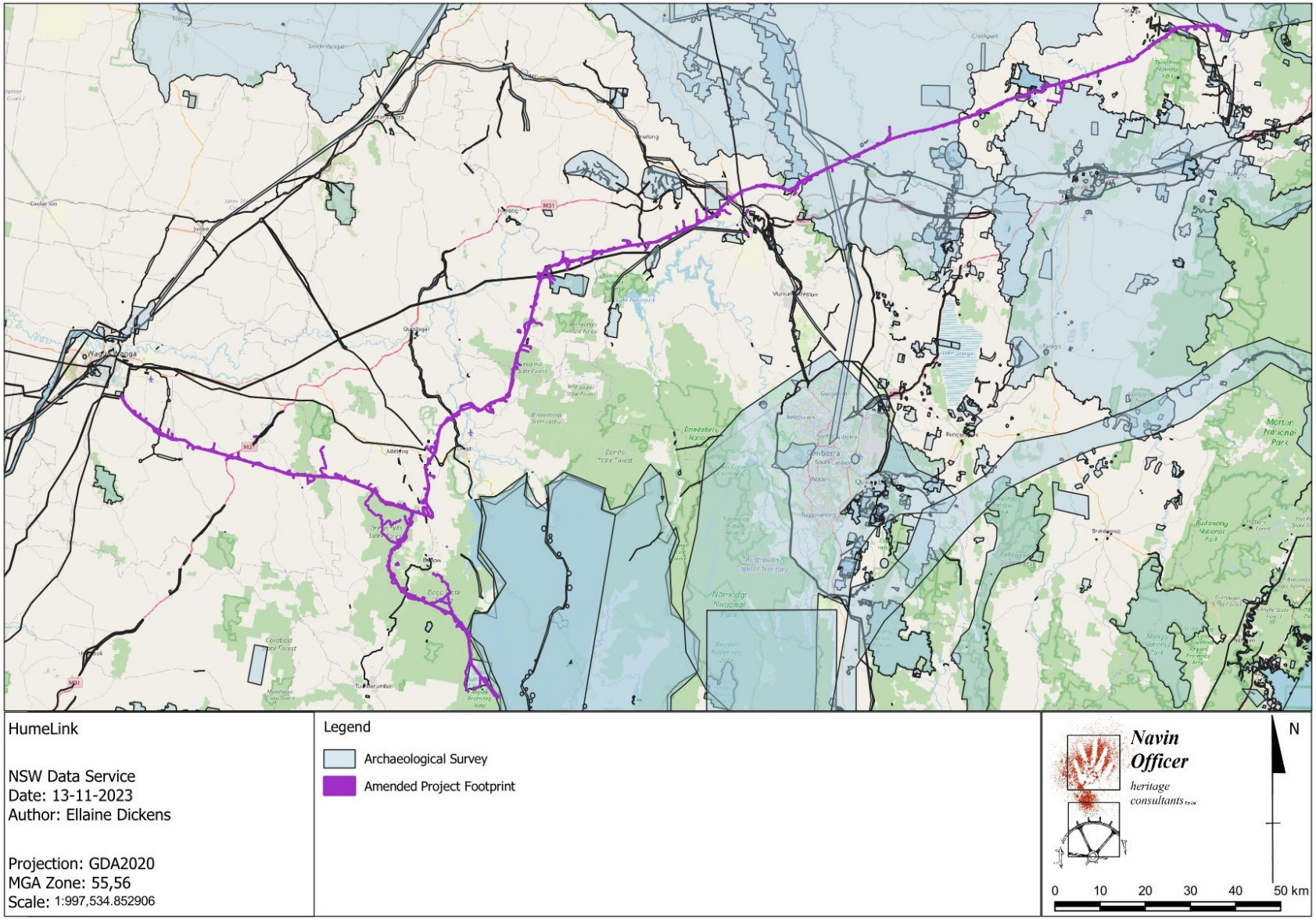


Figure 7-1 Aboriginal archaeological studies and the amended project footprint

7.4 Aboriginal heritage recordings

An AHIMS search was conducted of the amended project footprint on 18 October 2023 and again on 4 April 2024, 170 sites were recorded. Of the 170 recorded sites, 39 of these were previously recorded by assessments not related to the HumeLink project, the remaining 131 sites were located as part of the survey work completed for the HumeLink project. Of the 39 previously recorded Aboriginal heritage items/recordings within the amended project footprint artefact sites (isolated finds and scatters) are the most common site type with 36 sites recorded. PADs are the second most commonly occurring type, accounting for two of the total registered sites through the amended project footprint. There is one modified tree/PAD. Eight of the previously recorded sites are indicated as 'destroyed' and four sites are indicated as partially destroyed. Table 7-1 outlines site types and features identified within the AHIMS database within the amended project footprint.

Table 7-1 Summary of previously recorded registered Aboriginal sites within the amended project footprint

Site feature(s)	Number of sites	Per cent of total (%)
Artefact	36	92.3
Potential Archaeological Deposit (PAD)	2	5.1
Modified tree/PAD	1	2.6
Total	**39**	**100.00**

7.5 National Heritage List: Australian Alps National Parks and Reserves

There are two places on the NHL located partly within the AHIMS search area, but not within the amended project footprint. They are the Australian Alps National Parks and Reserves (AANP) and the Snowy Mountains Scheme. The Snowy Mountains Scheme is listed for its European cultural values and is addressed in *Technical Report 3 – Historic Heritage Impact Assessment* (NOHC, 2023) and not addressed further here. The Australian Alps National Parks and Reserves has been listed for both natural and cultural values.

The following is an extract from the Australian Heritage Database entry for this site:

The AANP are part of a unique Australian mountainous bioregion extending over New South Wales, the Australian Capital Territory and Victoria. The AANP displays a mosaic of interactions between its natural and cultural environments. The natural landscapes of the AANP contain extremely restricted alpine and sub-alpine environments and flora and fauna species, with the alpine zone occupying a very small area (approximately 25,000 hectares). The AANP contains glacial lakes and includes the plateaus and peaks that are prominent and unparalleled in the Australian continent with an average elevation of only 330 metres above sea level. The AANP includes most of continental Australia's peaks over 1,700 metres and all of those over 1,900 metres and experiences extensive snow coverage on a seasonal basis. The AANP provides a vital refuge for alpine and sub-alpine flora and fauna species, with a high level of richness and endemism across a wide range of taxa.

The AANP contains the Indigenous history of moth feasting which involved the use of an adult insect – the moth – as the basis for large-scale annual gatherings of different Aboriginal groups for ceremonies sets the gatherings in the AANP apart from other Aboriginal ceremonial gatherings and has captured the Australian imagination, making it exceptional in Australia.

7.6 Predictive model

7.6.1 Regional data

The occurrence and survival of archaeological sites is dependent on many factors including micro-topography and the degree of land surface disturbance. It should also be noted that for practical reasons, archaeological surveys tend to focus on environments identified as archaeologically sensitive

based on previous research and aided by effective ground visibility. As a result, predictive site location models can tend to reflect previous survey bias and can become self-perpetuating.

Archaeological investigations within the South Western Slopes and South East Highlands have been carried out since the late 1970s. Broad scale regional studies and research include Witter's (1980) work on site prediction in Australia and Flood's (1980) early synthesis of the archaeology of the highlands of south-eastern NSW.

Witter (1980) constructed one of the earliest models for Aboriginal site distribution in the region for the area situated between Canberra and Dalton. He suggested that occupation of the area was largely focused around tributary and major stream valleys in the mid to late Holocene arguing that large lowland camps were found almost exclusively in river valleys or gently sloping land, while medium sized lowland camps were found mainly on escarpments and saddles. He argued that seasonal movement entailed occupation of the tributary valleys and lower slopes during winter in order to be above cold air drainage but below cooler elevations and that these locations would have provided reliable water and the exploitation of a diversity of resource zones, while in summer the larger valley bottoms and higher elevated zones would have been used preferentially. Witter (1980) constructed two models of Holocene adaptation for the region, Riverine Oriented and Plateau Oriented. The Riverine model is relevant to the amended project footprint and was defined as a subsistence regime based on the semi-arid plains which was focused on the exploitation of aquatic plants such as Typha and Trig lochia and animals such as fish and crustacea. This economy was focused on the plain's woodlands close to major rivers with seasonal usage of semi-arid and dry temperate uplands. Subsistence within the Plateau region was considered to revolve around Acacia as a vegetable staple with an economy focused on ridges, slopes, and flats, with camp sites focused on permanent water.

In 1992, Witter carried out research for his PhD in the Boorowa and Upper Lachlan River region, analysing the archaeology of an area approximately 75 kilometres by 25 kilometres in size. Twenty-one sites were recorded in the Boorowa survey area, all sites were open artefact scatters. Microblade sites were common throughout all sections of the area, hearths were rare, and workshops (flaking events) were common. The basin sites were located adjacent to streams in valley bottoms. Quartz dominated the assemblages at all basin sites although silcrete was present at most, felsite and other materials were common and fine-grained volcanic material was often present (Witter, 1992:240). Within the ranges most sites were located in gullying scalds near water courses or seepages although some were found on ridge lines. Again, quartz was dominant although felsite and silcrete were also common (1992:241). Backed blades were recovered predominantly in sites located on foot slopes below the range country (Witter, 1992:214).

Witter's basic premise was that sites and their contents reflect Aboriginal decision making relative to cultural strategies and the local environment. Witter argues for the possibility that sites in the elevated country were probably occupied during winter, in association with active springs and that the valley was mostly occupied in summer or during drought. Witter acknowledges that variation in ground surface visibility may well be biasing the results as conditions allowing the detection of sites in the valley systems were very poor.

Across the Southern Tablelands region, it has been found that sites are rarely present on elevated topographies (Packard and Hughes, 1983; Past Traces, 2017) and that sites are generally located in flat areas close to water (Witter, 1980). In the Crookwell area, Biosis (2004:42) concluded that archaeological material was most likely to be located along creek lines, in the vicinity of the confluence of drainage lines, on broad, flat ridgelines and gently sloping areas. They concluded that the dominant character of the area consisted of 'background scatter' with higher density sites, which were the focus of knapping events.

Based on the results and analytical conclusions of previous archaeological records and surveys in similar landscape contexts it is possible to predict the types and topographic contexts of sites which may occur within the amended project footprint. From this existing body of work, the following set of broad site location criteria have been summarised for the amended project footprint.

7.6.1.1 Artefact scatters

Open artefact scatters are likely to be the most common site type encountered. They may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting or gathering activities, domestic camps, or the manufacture and maintenance of stone tools. The spatial extent and density of artefacts represented in these scatters can vary dramatically. Within the amended project footprint, artefact scatters tend to be dominated by assemblages of quartz, although silcrete and chert are also common, with low quantities of and other rock types.

Across the Southern Tablelands region, it has been found that sites are rarely present on elevated topographies (Packard and Hughes, 1983; Past Traces, 2017). Previous survey results suggest that artefact scatters are most likely to occur in well drained elevated contexts within riparian zones, flood plains and adjacent to water sources. Level or gently sloping surfaces are typical site locations, with few sites recorded from moderate to high gradient contexts. Within the amended project footprint, potential site locations include elevated banks, terraces, flood channels, paleochannels, water holes, lagoons and wetland basins. Larger and denser sites are more likely to occur in association with stable sedimentary contexts adjacent to (past or present) permanent water sources, and major tributaries.

7.6.1.2 Isolated finds

Isolated finds are artefacts which occur without any associated evidence for prehistoric activity or occupation. They are defined as single artefacts located more than 60 metres from any other artefact. Isolated finds can occur anywhere in the landscape and may represent the random loss or deliberate discard of artefacts, or the remains of dispersed artefact scatters.

7.6.1.3 Burials

Burials are generally found in soft sediments such as sand or alluvial silts, but may also occur in middens, rock shelters or hollow trees. Burials are generally only visible where there has been some disturbance of subsurface sediments or where some erosional process has exposed them.

Historical records for the Goulburn area indicate that the main methods employed for disposal of the dead in the district were ‘placement in hollow trees, interment (sic) in soft soil or sand with a mound built over the grave, or burial in rocky ground on hill tops' (Koettig and Lance, 1986:20).

It is unlikely that burials on rocky hilltops would have survived to the present day. The shallow soils typical of hilltops would not allow for deep burial, consequently the likelihood of disturbance from soil erosion, animal activities and land clearance would be high. These factors would adversely affect burials even if protective stone cairns were placed over them.

7.6.1.4 Modified trees

These sites may occur almost anywhere mature native trees have been retained, including fluvial corridors, larger stands of vegetation in greenfield sections, and isolated shade trees on grazing land. The identification of scars as Aboriginal in origin can often remain problematic. Much of the transmission line easement has been cleared of native vegetation, however pockets of mature native trees still remain. The potential for modified trees to survive within the amended project footprint is moderate to high.

Modified trees result when bark has been removed from a tree for some particular purpose such as for the manufacture of a shield, canoe or coolamon. Scars may also be the result of making footholds in a tree to collect foodstuffs or to facilitate the removal of bark.

Modified trees also include ring trees. Ring trees are identified as trees where the branches have been purposely joined together to form a ring. The rings are typically seen to be a maker or way-finder to an important location.

Carved Trees are a much rarer site type than modified trees and are sometimes found in association with ceremonial or burial grounds. They characteristically include carved figurative and non-figurative motifs on the exposed wood created within a scar produced by bark removal. Etheridge (1918)

recorded a number of carved trees that had been located in the Goulburn district. One tree (NPWS #51-5-0001) was located on the site of the now abandoned Yarra Railway Station, approximately six kilometres southeast of Goulburn and one kilometre from the amended project footprint. Two others were at Mount Wayo, 16 kilometres north of Goulburn and were located near an Aboriginal grave (Koettig and Lance, 1986:20). Paton and Hughes (1985) note that Bell (1979, 1980, 1982) documented at least 12 Aboriginal carved trees which had been recorded within a 50 kilometre radius of the Ulandra Reserve. Some of these trees were recorded in the early literature but had since been destroyed. At least five of the trees were thought to have been associated with burials.

7.6.1.5 Quarries

Either extraction or procurement, these sites are typically exposures of a geological raw material where evidence for human extraction and or preliminary processing has survived. Typically, these involve the extraction of siliceous rock types for the manufacture of artefacts or the removal of ochre. To date only one Aboriginal quarry site, a chert quarry, has been located in the Goulburn district (Paton, 1990).

7.6.1.6 'Bora' Grounds

'Bora' Grounds functioned as a prepared stage for initiation and other ceremonial activities which held a key role in the teaching and maintenance of the complex social and religious framework within Aboriginal society. Cited frequently in early records, the Gamilaraay word 'Bora' has been used as a generic term for ceremonial sites across much of NSW. In the Goulburn area these sites were more likely known as 'Burbung' or 'Boonan' grounds in line with the Wiradjuri or Yuin/Ngunnawal languages (Knight 2001). They consist mostly of one or more circular rings defined by mounded earth, sand and/or rocks. There may also be an associated depression within the ring. A pathway generally connected two rings and was often many hundreds of metres long. Typically, one circle was associated with more public ceremonies and the second with restricted and sacred information.

Several of these grounds are known to have existed in the Goulburn area. Macalister (1907:85) notes that a 'bora' ground site was located on a small hill near the existing Kenmore hospital. Others were located at Eastgrove and in the vicinity of the Goulburn Railway Station, the bridge/showground area, Rocky Hill, the All-Saints Church area, Mulwaree Flats near the Brewery, the Railway Quarry site, Corroboree Hill and Saint Patrick's College Hill (Koettig and Lance, 1986:20; Smith, 1992:11, 43).

Bora' grounds can only be recognised or located either through detailed oral accounts or identifying surviving ground surface features. Unfortunately, most physical evidence of these sites is fragile and easily destroyed by minimal agricultural activities. Based on the cleared status of most of the transmission line easement, and the likely agricultural practices which have occurred since white settlement (ploughing and levelling, trampling by stock, crop cultivation, construction of drainage canals, fences, roads and access tracks), the potential for these more fragile/rare sites to have survived in the amended project footprint to the present day is considered low.

7.6.2 Regional site location model

Based on the results of the AHIMS search and previous archaeological investigations undertaken relevant to the amended project footprint, it is possible to provide a predictive model for the types and topographic context in which sites may occur across the different Bioregions covered by the amended project footprint. Due to the amount of available data, the data for each bioregion has then been divided into the relevant LGA (Figure 7-2). These models have been taken into consideration during the formulation of the assessment methodology for this project and was subsequently tested and refined by the field survey and test excavation investigations (refer to Section 8.7).

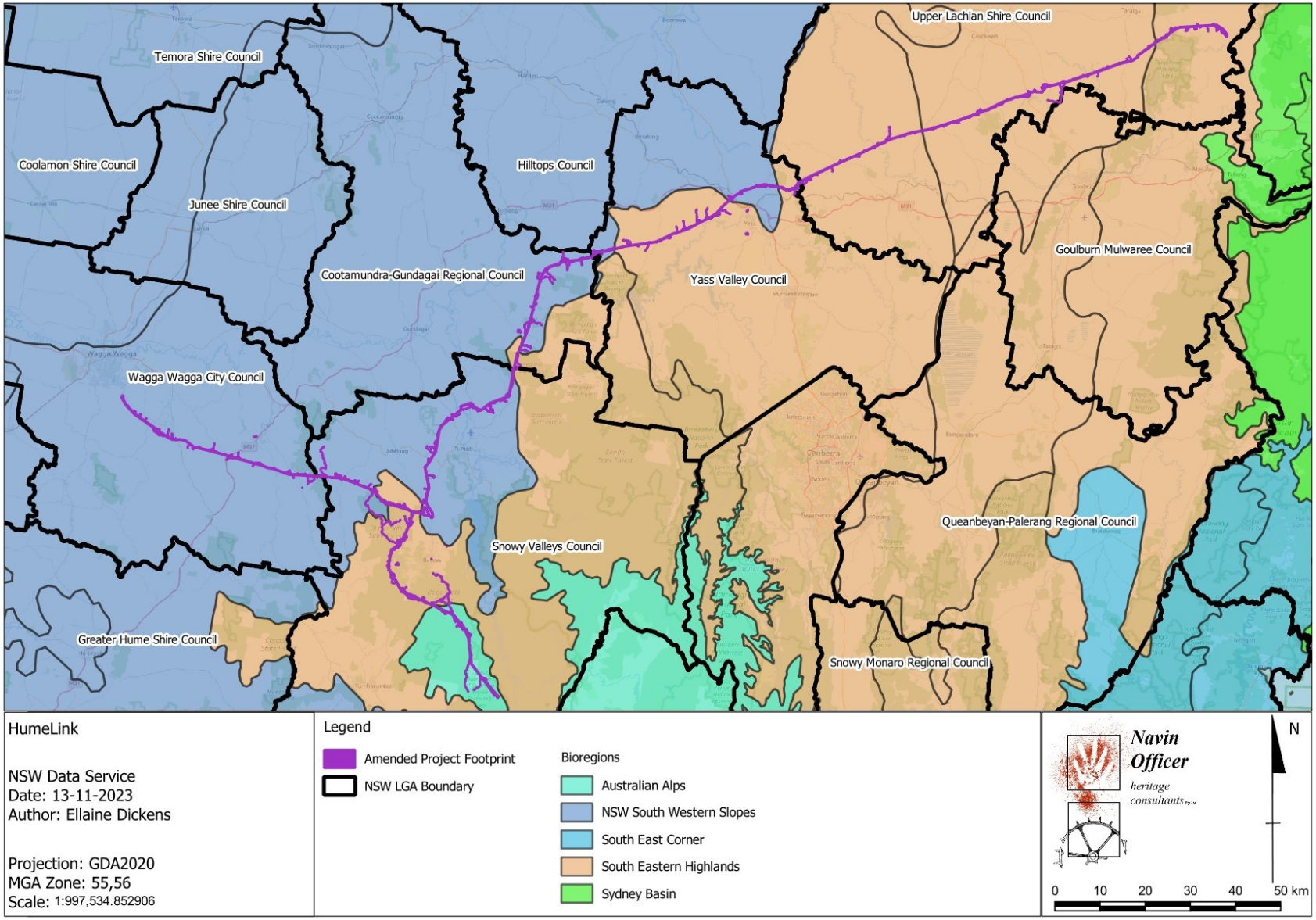


Figure 7-2 Bioregions and Local government areas

7.6.2.1 South Western Slopes bioregion

7.6.2.1.1 Wagga Wagga City

For the Wagga Wagga City LGA located within the South Western Slopes bioregion, Kelleher and Nightingale (KNC, 2008) argued that archaeological material is more likely to occur in locations with access to lithic raw material, diverse and consistently available subsistence resources, particularly water sources and landforms associated with these features. Table 7-2 outlines the predicted site types that may occur within the Wagga Wagga City LGA.

Table 7-2 Predicted site types – Wagga Wagga City LGA

Site type	Predicted occurrence
Artefact scatters	Artefact scatters are likely to be the most common site type to be encountered in the amended project footprint. The Murrumbidgee River floodplain and major valleys would have been an important source of water and subsistence resources. Elevated, well drained areas associated with these floodplains will potentially demonstrate longer-term and more frequent occupation. Smaller tributaries are likely to represent smaller, more focused occupation events. Spurs and ridgelines are likely to contain low density scatters demonstrating infrequent occupation events possibly associated with the use of these landforms to move across the landscape.
Isolated artefacts	Isolated artefacts can occur anywhere in the landscape. These may represent areas where further archaeological material remains buried or the evidence of random loss or deliberate discard of artefacts.
Modified trees	Modified trees are likely to occur anywhere across the landscape. While areas across the landscape have been cleared, mature trees are likely to be concentrated along major watercourses. However, identification of scars as Aboriginal in origin can often remain problematical as bark was also removed by Aboriginal people during the historic period for their own purposes and for roofing on early European houses making the distinction between European and Aboriginal cultural trees blurred.

7.6.2.1.2 Cootamundra-Gundagai Regional

The Cootamundra-Gundagai Regional LGA is located within the South Western Slopes Bioregion. The following model has been developed based on the environmental context, recent archaeological investigations in the Cootamundra-Gundagai Regional LGA (KNC, 2015; OzArk Environment & Heritage, 2019), and the results of the AHIMS search discussed in Chapter 6. Table 7-3 outlines the predicted sites that may occur within the Cootamundra-Gundagai Regional LGA.

Table 7-3 Predicted sites – Cootamundra-Gundagai Regional LGA

Site type	Predicted occurrence
Artefact scatters	Artefact scatters are likely to occur anywhere in the landscape, particularly in proximity to permanent and ephemeral water sources. The Murrumbidgee and the Tumut River would have been important sources of water and subsistence resources. These sites can also occur in elevated, well drained areas associated with these floodplains as well as in spurs and ridgelines.
Isolated artefacts	Isolated artefacts can occur anywhere in the landscape but are more likely to occur in topographies where open artefacts typically occur. Isolated artefacts can also occur within disturbed contexts. This site type can be indicative of random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter or an otherwise subsurface artefact scatter.
Modified trees	Modified trees are the most common site type encountered within the area. Modified trees may be present in areas where undisturbed mature native vegetation is present. Mature trees can also be concentrated along major watercourses. However, identification of scars as scars made by Aboriginal people can be problematic because some forms of natural trauma and European bark extraction create similar scars. Bark was also removed by Aboriginal people during the historic period for their own purposes and for roofing on early European houses making the distinction between European and Aboriginal cultural trees blurred.

7.6.2.2 South Eastern Highlands bioregion

7.6.2.2.1 Yass Valley

The Yass Valley LGA falls within the South Eastern Highlands bioregion and partially to the north within the South Western Slopes bioregion. The following site predictive model has been developed based on the results of previous archaeological investigations within the Yass Valley LGA (NOHC, 2000a, 2000b, 2001; Navin Officer Archaeological Resource Management, 1995; NSW Archaeology, 2015), the environmental context and the results of the AHIMS search discussed in Chapter 6. Table 7-4 outlines the predicted sites that may occur within the Yass Valley LGA.

Table 7-4 Predicted site types – Yass Valley LGA

Site type	Predicted occurrence
Artefact scatters	Artefact scatters are the most likely site type to occur in the amended project footprint within the Yass Valley LGA. Given the environmental context of the area, artefact scatters are predicted to be present in variable densities across the landscape. These are most likely to occur on flattened ridge tops, knolls, and flats adjacent to permanent drainage lines; on sand bodies adjacent to water; on smaller formations above the valley floor; and on terrain representing median altitude relative to the Valley floor and potential cold air drainage. Murrumbidgee River and Yass River would have been key sources of water and resources in the Yass Valley LGA.
Isolated artefacts	Isolated artefacts can occur anywhere in the landscape and may represent evidence of random loss or deliberate discard of artefacts, the remnant of a now dispersed and disturbed artefact scatter or an otherwise subsurface artefact scatter.
Modified trees	Modified trees are likely to occur in areas where undisturbed mature native vegetation is present. Mature trees can also be concentrated along major watercourses. However, identification of scars as Aboriginal cultural heritage can be problematic because some forms of natural trauma and European bark extraction create similar scars. Bark was also removed by Aboriginal people during the historic period for their own purposes and for roofing on early European houses making the distinction between European and Aboriginal cultural trees blurred.

Site type	Predicted occurrence
PADs	PADs have been recorded within the Yass Valley LGA and some have been located within the boundaries of the amended project footprint. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range. While PADs are not a common site type within the area they have been encountered and are likely to occur.

7.6.2.2.2 Upper Lachlan Shire

The Upper Lachlan Shire LGA falls almost entirely within the Southern Eastern Highlands bioregion. The following predictive site modelling has been developed based on the environmental context of the Upper Lachlan Shire LGA, previous archaeological investigations (ERM, 2014; NSW Archaeology, 2007) and the results of the AHIMS search and the sites identified along the amended project footprint within the Upper Lachlan Shire LGA. Table 7-5 outlines the predicted sites that may occur within the Upper Lachlan Shire LGA.

Table 7-5 Predicted site types – Upper Lachlan Shire LGA

Site type	Predicted occurrence
Artefact scatters	Artefact scatters containing low artefact numbers are the most likely site type to occur in the amended project footprint within the Upper Lachlan Shire LGA. This site type is expected to be widely spread across the landscape with variation in density in relation to different environmental factors. Given the environmental context of the area, artefact scatters are predicted to be present in variable densities across the landscape. These are most likely to occur on flat or gently sloping terrain in close proximity to water or within elevated landforms such as hilltops, crests, or upper flats. Lachlan River, Wollondilly River, Tarlo River and associated tributaries would have been key sources of water and resources in the Upper Lachlan Shire LGA.
Isolated artefacts	Isolated artefacts can occur anywhere in the landscape and may represent evidence of random loss or deliberate discard of artefacts, the remnant of a now dispersed and disturbed artefact scatter or an otherwise subsurface artefact scatter.
Modified trees	Modified trees are likely to occur in areas where undisturbed mature native vegetation is present. Mature trees can also be concentrated along major watercourses. However, identification of scars as Aboriginal cultural heritage can be problematic because some forms of natural trauma and European bark extraction create similar scars. Bark was also removed by Aboriginal people during the historic period for their own purposes and for roofing on early European houses making the distinction between European and Aboriginal cultural trees blurred.
PADs	PADs have been recorded within the Upper Lachlan Shire LGA and some have been located within the boundaries of the amended project footprint. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range. While PADs are not a common site type within the area they have been encountered and are likely to occur.

7.6.2.3 Australian Alps bioregion

7.6.2.3.1 Snowy Valleys

The section of the amended project footprint that extends within the Snowy Valleys LGA falls within the South Eastern Highlands bioregion and the Australian Alps bioregion. The following predictive site modelling has been developed based on the environmental context of the Snowy Valleys LGA, previous archaeological investigations (Feary and Niemoeller, 2017, 2019; NSW Archaeology, 2018) and the results of the AHIMS search and the sites identified along the amended project footprint within the Snowy Valleys LGA. Table 7-6 outlines the predicted sites that may occur within the Snowy Valleys LGA.

Table 7-6 Predicted site types – Snowy Valleys LGA

Site type	Predicted occurrence
Artefact scatters	Artefact scatters are the most likely site type to occur in the amended project footprint within the Snowy Valley LGA. This site type is expected to be widely spread across the landscape with variation in density in relation to different environmental factors. Given the environmental context of the area, artefact scatters are more likely to occur on flat, elevated sheltered ground close to water and along wide river valleys and ridgelines/spurs, and on saddles with some level of protection that could be associated with natural routes of movement.
Isolated artefacts	Isolated artefacts can occur anywhere in the landscape and may represent evidence of random loss or deliberate discard of artefacts, the remnant of a now dispersed and disturbed artefact scatter or an otherwise subsurface artefact scatter.
Modified trees	Modified trees are likely to occur in areas where undisturbed mature native vegetation is present. Mature trees can also be concentrated along major watercourses. However, identification of scars as Aboriginal cultural heritage can be problematic because some forms of natural trauma and European bark extraction create similar scars. Bark was also removed by Aboriginal people during the historic period for their own purposes and for roofing on early European houses making the distinction between European and Aboriginal cultural trees blurred.
PADs	PADs have been recorded within the Snowy Valleys LGA and some have been located within the boundaries of the amended project footprint. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range. While PADs are not a common site type within the area they have been encountered and are likely to occur.
Burial	There is a burial site (Green Hills SF_Old Bago Station Burial - # 56-6-0542) located on Green Hills between Lower Bago Road and Swap Road within the Snowy Valleys LGA approximately 100 metres east from the amended project footprint. Aboriginal burials are rarely encountered during field surveys. However, they have been recorded within the Snowy Valleys LGA and are likely to occur within the amended project footprint.
Stone quarry	A stone quarry site (C114-Q5-1 - # 56-6-0390) has been identified 5 kilometres west of the amended project footprint near Nurenmerenmong south of Ash Creek Road and west from Two Mile Creek Road within the Snowy Valleys LGA. The presence of these site types is dependent on the surface exposure of suitable stone and will commonly have evidence of exploitation including extraction and preliminary flaking preparation. Stone Quarries are rare in the region, however, there is low potential for quarries to be present within the amended project footprint.
Ceremonial site	Three ceremonial sites has been identified 500 to 800 metres outside of the amended project footprint. Two of these sites are registered as Aboriginal Ceremony and Dreaming sites (Illabo-Tumut pipeline site IT8 - # 56-3-0028 and Nurenmerenmong Boraground - # 56-6-0149) and one as a ceremonial ring (BM-BORA PAD-1 J118 - # 56-6-0230) Dreaming and ceremonial sites were used for ritual and ceremonial purposes. These sites are locations that have spiritual or ceremonial value to Aboriginal people. Ceremonial sites may consist of natural landforms where no physical evidence of previous use of the place may occur.
Stone arrangements	Stone arrangements generally consist of geometric arrangements of portable stone likely to occur on hilltops and ridge crests that contain stone outcrops or surface stone, where impact from recent land-use practices has been minimal. One stone arrangement site (BM/Bora-OS_J206 - # 56-6-0326) has been identified near Long Creek, east from East Bango Powerline Road in the Snowy Valleys area and within the boundaries of the amended project footprint. While stone arrangements are not common in the area these are likely to occur.

8. ARCHAEOLOGICAL INVESTIGATION

This section outlines the results of the field investigations including field survey and subsurface test excavation of the amended project footprint undertaken as part of this Revised ACHAR.

There are 170 sites recorded on AHIMS within the amended project footprint, of these, 131 were recorded as part of this assessment and 39 are previously recorded. Four sites were re- located during the field survey program. In addition, a total of 128 Aboriginal sites and including 10 PADs were identified in the amended project footprint during the field investigations.

The test excavation program aimed to characterise the nature and occurrence of subsurface archaeological resources within areas identified to contain PADs during the archaeological survey within the amended project footprint. The archaeological testing program also targeted specific areas of low, moderate, and high archaeological potential defined by the refined archaeological sensitivity model developed by NOHC aiming to identify, characterise and assess any previously unidentified cultural material within the amended project footprint and to test the archaeological sensitivity model.

8.1 AHIMS search results

There are 39 previously recorded sites on AHIMS within the amended project footprint. Four previously recorded sites located within the amended project footprint were revisited during field assessment. Gullen Solar Farm 13 (AHIMS #51-5-0254) site, previously recorded within the amended project footprint, was revisited but could not be located during the archaeological field survey program.

Table 8-1 Previously recorded sites on AHIMS within the amended project footprint

AHIMS ID	Site name	Site type	Validity
51-5-0201	DALTON 8	Artefact	
51-5-0253	Gullen Solar Farm 12	Artefact	
51-5-0254	Gullen Solar Farm 13	Artefact	Partially Destroyed
51-5-0330	RPWF IF 2	Artefact	
51-5-0335	RPWF AFT 1 + PAD	Artefact	
51-6-0714	Hillview Park	Artefact	Partially Destroyed
51-6-0718	Hillview Park 4	Artefact	
51-6-0720	HP7	Artefact	Destroyed
51-6-0811	PJ58	Artefact	
51-6-0871	CWF7	Artefact	Destroyed
51-6-0872	CWF6	Artefact	Destroyed
51-6-0879	Crookwell WF12	Artefact	
51-6-0880	CWF11	Artefact	Destroyed
51-6-0881	CWF10	Artefact	Destroyed
51-6-0888	CWF8	Artefact	Destroyed
51-6-0889	CWF9	Artefact	Destroyed
51-6-0899	Crookwell WF23	Artefact	
51-6-0902	CWF21	Artefact	Destroyed
52-1-0152	Bannaby 1	Artefact	
52-1-0272	BA1 (Bannaby Substation)	Artefact	
52-1-0273	BA2 (Bannaby Substation)	Artefact	
52-1-0277	BA6 (Bannaby Substation)	Artefact	

AHIMS ID	Site name	Site type	Validity
52-1-0279	BA8 (Bannaby Substation)	Artefact	
52-1-0280	BA9 (Bannaby Substation)	Artefact	
52-1-0281	BA10 (Bannaby Substation)	Artefact	
56-3-0235	Kylies Run Redhill	Artefact	
56-3-0288	Kylies Run/Roberts Rd	Artefact	
56-6-0143	BM-OS-1	Artefact	
56-6-0152	BSF-OS J68	Artefact	
56-6-0153	BSF-OS-2 J26	Artefact	
56-6-0177	Logbridge creek - 1F-1 - J43	Artefact	
56-6-0180	Logbridge Ck-1F-3 - J46	Artefact	
56-6-0181	BSF-OS-1	Artefact	
56-6-0262	BSF-05-46/PAD (J195)	Modified tree/PAD	
56-6-0263	BSF-05-46 (J193)	PAD	
56-6-0273	BSF-IF-34/PAD J174	Artefact	
56-6-0300	LBC-IF-11/PAD (J191)	PAD	Partially Destroyed
56-6-0301	LBC-IF-11 (J190)	Artefact	
56-6-0302	LBC-IF-10 (J189)	Artefact	Partially Destroyed

BSF-05-46/PAD (J195) (AHIMS #56-6-0262)

This site was originally recorded as a PAD associated with an open campsite (BSF-05-46) (Kelton, 2004). An additional modified tree was identified in association with this site (refer to Figure 8-1 and Figure 8-2), no artefact scatter was relocated. Tree height measures 230 centimetres with a 177 centimetres girth. The tree is in poor condition, currently dead, with a missing crown, major crown limbs are missing, insects have attacked the tree, and it is now hollow. The scar faces south-east and is in very poor condition as the scar surface is burnt and core wood is missing. Scar measurements are as follows:

- length excluding regrowth: 49 centimetres
- length including regrowth: 51 centimetres
- width excluding regrowth: 24 centimetres
- width including regrowth: 33 centimetres
- height of base of scar above ground: 73 centimetres
- height of base of outer scar (outside regrowth) above ground: 68 centimetres.

Figure 8-1 Scar

Figure 8-2 Modified tree

Gullen Solar Farm 12 (AHIMS #51-5-0253)

Site recorded as: Stone artefacts were recorded in bare earth exposures at a farm gate. The landform is a crest/plateau which is very gently undulating. Twelve artefacts were recorded most of which appear to be a part on an individual knapping event. Background gravels contain natural quartz. The exposure measures c. 10 x 5 metres, of which c. 5 per cent was ground exposure, possessing an estimated 80 per cent archaeological visibility. The geomorphological context is relatively stable. The soil is a silty loam with some background shatter. The site has some subsurface potential. The site is disturbed. The artefacts occur as an individual knapping event and are assessed to be part of the patchy artefact distribution across the wider landform. (AHIMS site card).

During the current assessment four quartz flakes and flaked pieces were located at this site.

Gullen Solar Farm 13 (AHIMS #51-5-0254)

Site recorded as:

One stone artefact was recorded in a recently cultivated paddock. The landform is a very gently undulating broad plateau/crest. The artefact is a milky quartz flake fragment. Ground exposure is c. 2 per cent of which an estimated 40 per cent is archaeological visibility. The geomorphological context is relatively stable. Accordingly, the site has subsurface potential. The site is disturbed. Artefacts are present in very low density and artefacts are assessed to be part of the distribution across the wider landform rather than a discrete 'site' occurrence. (AHIMS site card). This site could not be relocated during the field survey.

Dalton 7 (AHIMS #51-5-0202)

This site was originally recorded by NOHC (2009) as a scatter of at least 10 and up to 50 artefacts located on vehicle tracks leading to a dam. The site was located on basal slopes. The artefacts were visible in an area approximately 60 by 30 metres. The incidence of ground exposures in the area of the site was 20 per cent with 40 per cent visibility in the exposures. Ground surface visibility was limited by gravel and grass cover.

Artefacts:

- dark grey fine grained volcanic flake, 15 x 15 x 4 millimetres
- grey fine grained volcanic flake, 41 x 21 x 8 millimetres
- grey fine grained volcanic core, 36 x 27 x 20 millimetres
- dark grey fine grained volcanic flake, 12 x 10 x 3 millimetres
- grey silcrete flaked piece, 22 x 17 x 14 millimetres
- grey silcrete flaked piece, 34 x 25 x 15 millimetres
- white quartz flake 25 x 20 x 7 millimetres
- black chert flake 19 x 20 x 8 millimetres
- brown silcrete flake, 27 x 20 x 8 millimetres
- pink and grey silcrete flake 38 x 17 x 9 millimetres.

This site was revisited and found to extend into the amended project footprint and recorded as HL-046 (refer to Attachment 3).

8.2 New sites and PADs

A total of 118 previously unrecorded Aboriginal sites (including artefact occurrences (113) and modified trees (5)) and 10 PADs, plus one area of charcoal staining that is determined to not be a site, were identified during the post-EIS field survey program in the amended project footprint. New site descriptions are summarised in Table 8-2 and depicted in Attachment 3. Refer to Section 8.2.1 and Table 8-3 for the summary of PADs.

Table 8-2 Summary of sites

Site name	Site features	[redacted]	Associated PAD
HL-01	Artefact scatter (10)	[redacted]	HL-PAD-01
HL-02	Artefact scatter (3)	[redacted]	
HL-03	Isolated find	[redacted]	
HL-04	Isolated find	[redacted]	
HL-05	Isolated find	[redacted]	
HL-07	Modified tree	[redacted]	
HL-08	Isolated find	[redacted]	
HL-09	Isolated find	[redacted]	
HL-14	Modified tree	[redacted]	
HL-15	Modified tree	[redacted]	
HL-18	Artefact scatter (6)	[redacted]	
HL-19	Artefact scatter (3)	[redacted]	
HL-20	Artefact scatter (100+)	[redacted]	HL-PAD-03
HL-21	Isolated find	[redacted]	
HL-22	Isolated find	[redacted]	
HL-23	Isolated find	[redacted]	
HL-25	Isolated find	[redacted]	
HL-26	Isolated find	[redacted]	
HL-27	Isolated find	[redacted]	
HL-28	Isolated find	[redacted]	

Site name	Site features	[redacted]	Associated PAD
HL-29	Artefact scatter (9)	[redacted]	HL-PAD-05
HL-30	Isolated find	[redacted]	
HL-31	Isolated find	[redacted]	
HL-32	Isolated find	[redacted]	
HL-33	Artefact scatter (3)	[redacted]	
HL-34	Isolated find	[redacted]	
HL-35	Isolated find	[redacted]	
HL-36	Isolated find	[redacted]	
HL-37	Artefact scatter (4)	[redacted]	
HL-38	Artefact scatter (3)	[redacted]	HL-PAD-07
HL-39	Isolated find	[redacted]	
HL-40	Isolated find	[redacted]	
HL-41	Isolated find	[redacted]	
HL-43	Artefact scatter (2)	[redacted]	
HL-44	Artefact scatter (4)	[redacted]	HL-PAD-08
HL-45	Isolated find	[redacted]	
HL-46	Artefact scatter (11)	[redacted]	
HL-47	Isolated find	[redacted]	
HL-48	Isolated find	[redacted]	
HL-49	Isolated find	[redacted]	
HL-50	Isolated find	[redacted]	
HL-51	Artefact scatter (30+)	[redacted]	HL-PAD-08
HL-53	Isolated find	[redacted]	
HL-55	Isolated find	[redacted]	
HL-56	Artefact scatter (3)	[redacted]	
HL-59	Artefact scatter (2)	[redacted]	
HL-60	Artefact scatter (50+)	[redacted]	HL-PAD-09
HL-61	Isolated find	[redacted]	
HL-62	Artefact scatter (30+)	[redacted]	HL-PAD-10
HL-63	Artefact scatter (32)	[redacted]	
HL-64	Isolated find	[redacted]	
HL-65	Modified tree	[redacted]	
HL-66	Artefact scatter (3)	[redacted]	
HL-67	Isolated find	[redacted]	
HL-68	Isolated find	[redacted]	
HL-70	Isolated find	[redacted]	
HL-71	Isolated find	[redacted]	
HL-72	Artefact scatter (5)	[redacted]	
HL-73	Artefact scatter (8)	[redacted]	

Site name	Site features	[redacted]	Associated PAD
HL-87	Isolated find		
HL-89	Isolated find		
HL-90	Artefact scatter (2)		
HL-91	Artefact scatter (2)		
HL-92	Artefact scatter (3)		
HL-93	Artefact scatter (3)		
HL-94	Isolated find		
HL-95	Isolated find		
HL-96	Artefact scatter (4)		
HL-97	Artefact scatter (2)		Near HL-PAD-07
HL-98	Isolated find		
HL-99	Artefact scatter (15+)		
HL-100	Artefact scatter (2)		
HL-101	Isolated find		
HL-102	Artefact scatter (2)		
HL-104	Artefact scatter (20+)		
HL-106	Modified Tree		
HL-107	Artefact scatter (3)		
HL-108	Artefact scatter (8)		
HL-111	Artefact scatter (3)		
HL-112	Artefact scatter (5)		
HL-113	Artefact scatter (2)		
HL-114	Artefact scatter (3)		
HL-115	Artefact scatter (2)		
HL-116	Artefact scatter (2)		
HL-117	Artefact scatter (9)		
HL-118	Artefact scatter (7)		
HL-119	Artefact scatter (6)		
HL-120	Artefact scatter (6)		
HL-121	Artefact scatter (4)		
HL-122	Artefact scatter (4)		
HL-123	Artefact scatter (2)		
HL-124	Artefact scatter (9)		
HL-125	Artefact scatter (7)		HL-PAD-10
HL-126	Isolated find		
HL-127	Isolated find		
HL-128	Isolated find		
HL-129	Isolated find		
HL-130	Isolated find		
HL-131	Isolated find		
HL-132	Isolated find		

Site name	Site features	[redacted]	Associated PAD
HL-133	Isolated find	[redacted]	
HL-134	Isolated find	[redacted]	
HL-136	Isolated find	[redacted]	
HL-137	Isolated find	[redacted]	
HL-138	Isolated find	[redacted]	
HL-139	Isolated find	[redacted]	
HL-140	Isolated find	[redacted]	
HL-141	Isolated find	[redacted]	
HL-143	Isolated Find and Charcoal Stain	[redacted]	
HL-144	Areas of Charcoal Staining	[redacted]	
HL-145	Isolated find	[redacted]	
HL-146	Isolated find	[redacted]	
HL-147	Isolated find	[redacted]	HL-PAD-10
HL-150	Artefact scatter (2)	[redacted]	
HL-151	Artefact scatter (2)	[redacted]	
HL-152	Isolated find	[redacted]	
HL-153	Isolated find	[redacted]	
HL-154	Isolated find	[redacted]	
HL-155	Isolated find	[redacted]	HL-PAD-11

*GPS locations have been redacted

8.2.1 Potential archaeological deposits

The potential for subsurface material to be present is assessed using criteria developed from the results of previous surveys and excavations relevant to the region (refer to Section 7.5). A consideration is made of the suitability of the location to have been a place where Aboriginal people would have carried out activities that leave behind physical evidence. In addition, the landform characteristics should have the potential to retain and potentially cover that evidence through subsequent deposition of soil, so as to preserve the archaeological evidence sub-surface. PADs are generally defined by the extent of particular micro-land formations known to have high correlations with archaeological material.

A PAD may or may not be associated with surface artefacts. In the absence of artefacts, a location with potential has been recorded as a PAD. Where one or more surface artefacts occur on a sedimentary deposit, a PAD may also be identified where there is insufficient evidence to assess the nature and content of the underlying deposit and it is considered that the artefacts bearing deposit may extend beyond the visible distribution of surface artefacts. This situation is due mostly to poor ground surface visibility.

A total of 10 PADs have been identified in the amended project footprint during the HumeLink fieldwork (Table 8-3). Of these, eight PADs have been identified as having one or more Aboriginal sites associated with them within the amended project footprint (associated sites in the table below). The EIS project footprint contained six PADs. PADs 03, 08, 09 and 11 are in the amended project footprint but were not in the EIS project footprint.

Table 8-3 PADs Summary

Site name	Area m²	[redacted]	[redacted]	Associated Site
HL-PAD-01	1016.085	[redacted]	[redacted]	HL-01
HL-PAD-02	216995.711	[redacted]	[redacted]	
HL-PAD-03	13278.296	[redacted]	[redacted]	HL-20, 56-3-0288
HL-PAD-05	10159.722	[redacted]	[redacted]	HL-29
HL-PAD-06	7165.051	[redacted]	[redacted]	
HL-PAD-07	10610.070	[redacted]	[redacted]	HL-38
HL-PAD-08	14127.833	[redacted]	[redacted]	HL-51
HL-PAD-09	3246.310	[redacted]	[redacted]	HL-60
HL-PAD-10	59529.792	[redacted]	[redacted]	HL-62, HL-125, HL-147
HL-PAD-11	18558	[redacted]	[redacted]	HL-155

*GPS locations have been redacted

8.2.2 Additional trees identified by RAPs

In addition to the verified Aboriginal modified (scarred) trees, six additional trees with scars were identified by the RAPs as 'possible' Aboriginal modified trees. These were assessed by the archaeologists undertaking the survey and the scars found to be due to natural causes (refer to criteria set out in Attachment 4). These trees are not Aboriginal modified trees and therefore are not Aboriginal objects under the NPW Act (refer to *National Parks and Wildlife Act 1974* s5*).* A global positioning system (GPS) location and photograph were recorded for each of these trees.

Nine unscarred trees were also identified by RAPs during field surveys and reported as trees that they considered to have cultural significance. These nine trees were not modified and there was no physical evidence of Aboriginal use. A GPS location and photograph were recorded for each of these trees (Attachment 4); however, they are not Aboriginal objects as defined by the NPW Act.

8.3 Survey coverage

The effectiveness of archaeological field survey is to a large degree related to how conspicuous the Aboriginal site is in the landscape and the incidence and quality of ground surface visibility. Visibility was estimated for all areas surveyed. Two variables of ground surface visibility were estimated during the survey:

- A percentage estimate of the total area of ground inspected, which contained visible exposures of bare ground.

- A percentage estimate of the average levels of ground surface visibility within those exposures. This is a net estimate and accounts for all impacting visual and physical variables including the type of sediment or rock exposed.

These estimates provide a measure with which to gauge the effectiveness of the survey and level of sampling conducted. They can also be used to gauge the number and type of sites that may not have been detected by the survey.

Ground surface visibility is a measure of the bare ground visible to the archaeologist during the survey. There are two main variables used to assess ground surface visibility, the frequency of exposure encountered by the surveyor and the quality of visibility within those exposures. The predominant factors affecting the quality of ground surface visibility within an exposure are the extent of vegetation and ground litter, the origin of exposure, the extent of recent sedimentary deposition, and the level of visual interference from surface gravels.

The prominence or how conspicuous a site type is in the landscape is also a crucial factor in assessing the impact of visibility levels. Sites based on rock exposures, such as rock shelters, open engravings

and grinding grooves are more likely to be easily visible than sites with no surface relief located on, or within, sedimentary matrices.

Artefacts made from locally occurring rock such as quartz may be more difficult to detect under usual field survey conditions than rock types that are foreign to the area. The impact of natural gravels on artefact detection was taken into account in the visibility variables estimates outlined above.

Table 8-4 summarises estimates for the degree to which separate landforms within the survey area were examined and also indicates the ground surface exposure incidence and average ground visibility present in each case. Figure 8-3 depicts the survey units recorded for the field survey. A total of 80.5 per cent of the amended project footprint was inspected during the survey, with 10 per cent providing useable archaeological exposures.

Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was three per cent of the total surveyed area. The ESC attempts to provide an estimate of the proportion of the amended project footprint that provides a net 100 per cent level of ground surface visibility to archaeological surveyors. This low overall ESC is not unusual nor unexpected due to the high vegetation cover at the time of survey. This low ESC will be managed through the mitigation measures of further assessment and survey (refer to Table 12-1).

Table 8-4 Survey coverage

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
W-SU01	Completed	Plain	624948	0	0	0	0	
W-SU02	Completed	Gentle slopes	703401	30	5	105510.15	15%	HL-01 HL-02
W-SU03	Completed	Plain	644849	90	80	464291.28	72%	
W-SU04	Partially completed	Plain & streambank	2881178	5	5	72029.45	2.5%	HL-03
W-SU05	Completed	Moderate slopes	459114	30	10	13773.42	3%	
W-SU06	Completed	Gentle slopes	941880	10	5	4709.4	0.5%	HL-04 HL-05 HL-111 HL-112 HL-113
W-SU07	Completed	Plain & streambank	578719	40	20	46297.52	8%	
W-SU08	Completed	Gentle slopes	639514	70	20	89531.96	14%	
W-SU09	Completed	Moderate slopes	531774	20	10	10635.48	2%	
W-SU10	Completed	Gentle slopes	568545	5	5	14213.625	2.5%	HL-71
W-SU11	Completed	Plain & streambank	1149778	5	0	0	0	HL-07 HL-08 HL-95
W-SU12	Completed	Streambank	223715	80	70	125280.4	56%	HL-09
W-SU13	Completed	Steep slopes	754686	0	0	0	0	
W-SU14	Completed	Steep slopes	267192	5	5	667.98	0.25%	
W-SU15	Completed	Plain	133666	75	20	20049.9	15%	HL-122 HL-123
W-SU16	Completed	Steep slopes	754714	5	5	18867.85	2.5%	
SV-SU01	Completed	Crest	418701	20	50	41870.1	10%	HL-107 HL-126 HL-127

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
SV-SU02	Partially completed	Moderate slopes	363379	50	2	3633.79	1%	
SV-SU03	Not completed	Moderate slopes	450298	70	70	220646.02	49%	
SV-SU04	Partially Completed	Moderate slopes	1334886	20	10	26697.72	2%	HL-139
SV-SU05	Completed	Moderate slopes	430546	20	10	8610.92	2%	HL-90
SV-SU06	Partially completed	Crest	599339	5	5	14983.475	2.5%	HL-100
SV-SU07	Not completed	Steep slopes	1186912	-	-	-	-	
SV-SU08	Partially Completed	Steep slopes	1100511	-	-	-	-	HL-138
SV-SU09	Completed	Crest	714743	50	30	107211.45	15%	HL-132
SV-SU10	Completed	Steep slopes	1265245	20	5	12652.45	1%	HL-130 HL-131
SV-SU11	Completed	Moderate slopes	1582824	10	5	7914.12	0.5%	HL-108 HL-128 HL-129
SV-SU12	Completed	Moderate slopes	838259	0	0	0	0	
SV-SU13	Completed	Moderate slopes	1378981	20	10	27579.62	2%	HL-97 HL-99 HL-104
SV-SU14	Completed	Gentle slopes	1204344	0	0	0	0	
SV-SU15	Completed	Gentle slopes	1991127	5	5	4977.8175	0.25%	HL-14 HL-15 HL-145
SV-SU16	Completed	Crest	541560	5	5	1353.9	0.25%	
SV-SU17	Not completed	Moderate slopes	1053850	-	-	-	-	
SV-SU18	Partially completed	Steep slopes	248058	50	2	2480.58	1%	
SV-SU19	Not completed	Gentle slopes	603150	-	-	-	-	
SV-SU20	Not completed	Steep slopes	657410	-	-	-	-	
SV-SU21	Completed	Gentle slopes	159822	20	5	1598.22	1%	

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
SV-SU22	Completed	Crest	252020	50	10	12601	5%	
SV-SU23	Disturbed	Gentle slopes	20307	0	0	0	0	
SV-SU24	Completed	Moderate slopes	73272	50	2	1831.8	2.5%	
SV-SU30	Partially completed	Moderate slopes	492229	60	5	14766.87	3%	HL-68
SV-SU32	Partially completed	Moderate slopes	700361	50	2	7003.61	1%	
SV-SU33	Partially completed	Gentle slopes	405168	40	10	16206.72	4%	
SV-SU34	Completed	Valley flat	308957	10	5	1544.785	0.5%	HL-70 HL-133
SV-SU35	Completed	Crest & moderate slopes	1859212	5	5	4648.03	0.25%	
SV-SU36	Partially completed	Moderate slopes	362238	0	0	0	0	
SV-SU37	Completed	Valley flat	264067	0	0	0	0	
SV-SU39	Not completed	Valley flat	299159	-	-	-	-	
SV-SU40	Not completed	Streambank	245186	-	-	-	-	
SV-SU41	Partially completed	Crest	434097	40	15	26045.82	6%	
SV-SU42	Not completed	Crest	521239	-	-	-	-	
SV-SU43	Partially completed	Streambank	218197	0	0	0	0	
SV-SU44	Completed	Streambank	262517	0	0	0	0	
SV-SU45	Partially completed	Valley flat	225099	0	0	0	0	
CG-SU01	Partially completed	Streambank	231016	60	30	41582.88	18%	
CG-SU02	Completed	Moderate slopes & streambank	456994	30	5	6854.91	1.5%	
CG-SU03	Partially completed	Gentle slopes	834250	30	5	12513.75	1.5%	
CG-SU04	Partially completed	Crest	496571	70	10	34759.97	7%	HL-22
CG-SU05	Completed	Gentle slopes	420614	90	20	75710.52	18%	HL-91 HL-93

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
CG-SU06	Completed	Saddle & crest	1077689	50	10	53884.45	5%	
CG-SU07	Partially completed	Streambank & crest	715472	80	30	171713.28	24%	HL-150 HL-151 HL-152 HL-153 HL-154 HL-155
CG-SU08	Completed	Moderate slopes	844238	50	10	42211.9	5%	HL-23
CG-SU12	Completed	Moderate slopes	441929	50	10	22096.45	5%	
CG-SU13	Completed	Crest	447659	50	10	22382.95	5%	
CG-SU14	Partially completed	Steep slopes	575237	50	10	28761.85	5%	
CG-SU15	Partially completed	Steep slopes & crest	430052	0	0	0	0	HL-21
CG-SU16	Not completed	Moderate slopes	156162	-	-	-	-	
CG-SU17	Completed	Gentle slopes	325515	5	5	813.7875	0.25%	
CG-SU18	Completed	Moderate slopes	458912	10	5	2294.56	0.5%	
CG-SU19	Completed	Moderate slopes	222573	50	5	5564.325	2.5%	
CG-SU20	Completed	Gentle slopes	251547	0	0	0	0	
CG-SU21	Completed	Streambank	328979			0	0	
YV-SU01	Partially completed	Ridge	704540	0	0	0	0	HL-67
YV-SU02	Completed	Gentle slopes	1688461	30	5	25326.915	1.5%	HL-94
YV-SU03	Completed	Gentle slopes & crest	927265	50	10	46363.25	5%	HI-26 HL-27 HL-28 HL-29
YV-SU04	Completed	Moderate slopes & crest	1086697	0	0	0	0	HL-31
YV-SU05	Partially completed	Crest	622208	20	10	12444.16	2%	
YV-SU06	Completed	Gentle slopes	778993	0	0	0	0	HL-33 HL-34

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
YV-SU07	Partially completed	Crest	839968	0	0	0	0	
YV-SU08	Partially completed	Moderate slopes & streambank	1311252	0	0	0	0	HL-35
YV-SU09	Completed	Plain & gentle slopes	1297563	70	30	272488.23	21%	HL-37
YG-SU10	Completed	Gentle slopes	822102	50	10	41105.1	5%	HL-25
YG-SU11	Completed	Moderate slopes	110910	60	10	6654.6	6%	
YG-SU12	Disturbed	Moderate slopes	214412	0	0	0	0	
ULS-SU01	Completed	Gentle slopes & ridge	1046895	10	10	10468.95	1%	HL-38 HL-39 HL-40
ULS-SU02	Completed	Plain	548708	0	0	0	0	
ULS-SU03	Partially completed	Plain	513676	30	10	15410.28	3%	HL-41
ULS-SU04	Partially completed	Gentle slopes & streambank	2492747	10	10	24927.47	1%	HL-43 HL-44 HL-45 HL-46 HL-47 HL-48 HL-49 HL-50 HL-51
ULS-SU05	Partially completed	Gentle slopes	1229367	0	0	0	0	
ULS-SU06	Not completed	Moderate slopes	590520	-	-	-	-	
ULS-SU07	Partially completed	Gentle slopes	864714	0	0	0	0	HL-87 HL-89 HL-92 HL-96 HL-101 HL-102

Survey Unit	Completed	Landform	Survey unit area (square metre)	Visibility per cent	Exposure per cent	Effective coverage area (square metre) survey unit area x visibility per cent x exposure per cent)	Effective coverage per cent (effective coverage area / survey unit area x 100)	Aboriginal sites
ULS-SU08	Partially completed	Crest & gentle slopes	2912405	40	50	582481	20%	HL-55 HL-66 HL-72 HL-144
ULS-SU09	Completed	Crest & moderate slopes	1393706	30	5	20905.59	1.5%	HL-59 HL-116
ULS-SU10	Completed	Streambank & moderate slopes	997456	20	10	19949.12	2%	
ULS-SU11	Partially completed	Streambank & steep slopes	1048625	50	50	262156.25	25%	HL-61 HL-124
ULS-SU12	Completed	Streambank & gentle slopes	857165	10	5	4285.825	0.5%	HL-62 HL-125 HL-147
ULS-SU13	Completed	Streambank & gentle slopes	1092646	0	0	0	0	
ULS-SU14	Completed	Gentle slopes	560375	0	0	0	0	
ULS-SU15	Completed	Moderate slopes	651949	40	5	13038.98	2%	HL-141
ULS-SU16	Completed	Streambank & moderate slopes	210323	20	5	2103.23	1%	
ULS-SU17	Completed	Crest & steep slopes	420282	10	2	840.564	0.2%	
ULS-SU18	Partially completed	Streambank & steep slopes	1677036	20	10	33540.72	2%	HL-64
ULS-SU19	Partially completed	Moderate slopes & crest	1000406	30	10	30012.18	3%	HL-65
ULS-SU20	Partially completed	Crest	737400	20	10	14748	2%	
ULS-SU21	Completed	Gentle slopes	43873	0	0	0	0	
ULS-SU22	Disturbed	Crest	36916	0	0	0	0	
ULS-SU23	Completed	Gentle slopes	301986	40	10	12079.44	4%	HL-114 HL-115
Total			77,273,899	28%	10%	2163669.172	3%	

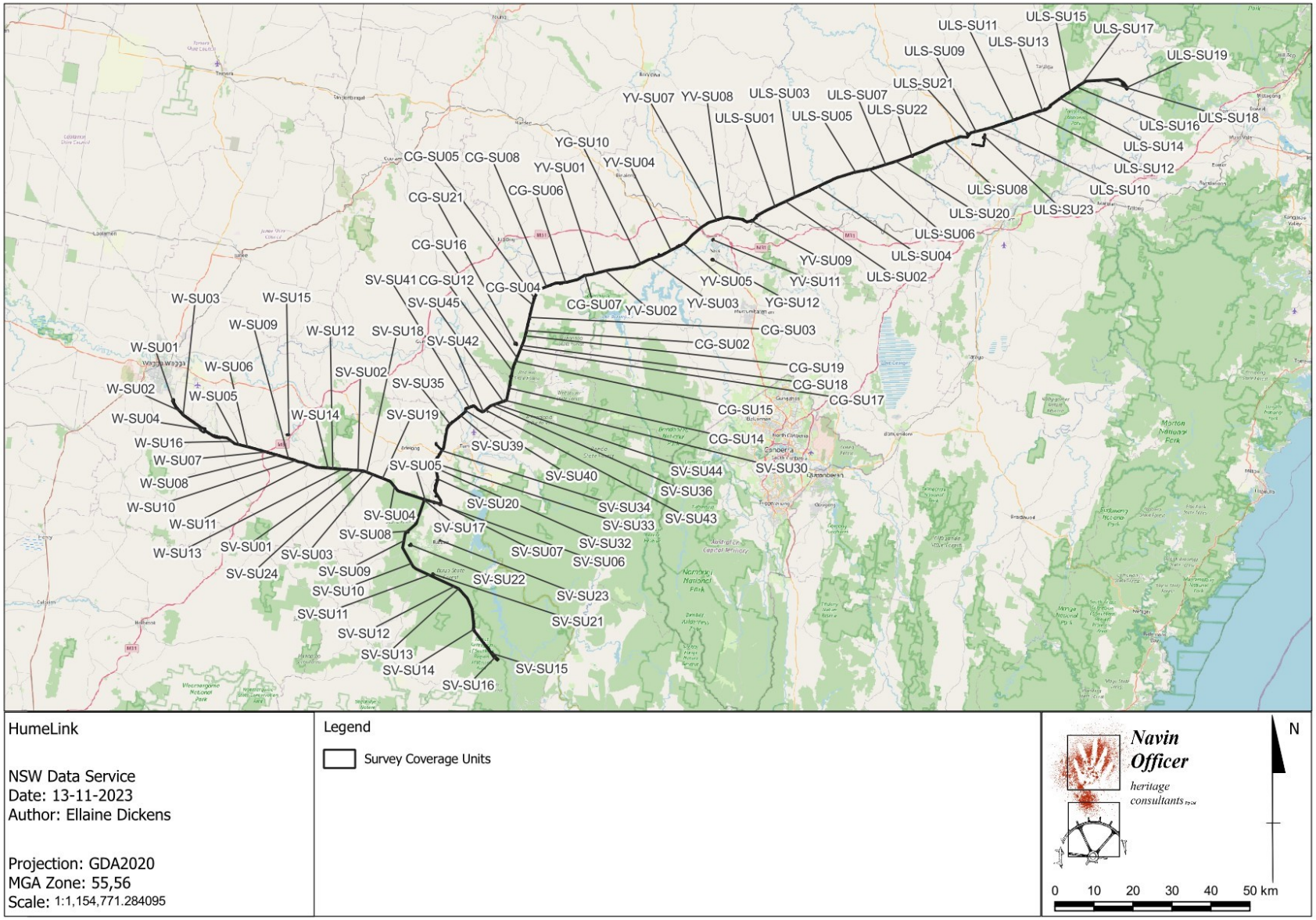


Figure 8-3 Survey Units

8.4 Analysis of Aboriginal archaeological survey and discussion

There are 39 previously recorded Aboriginal heritage items located within the amended project footprint. A total of 118 previously unrecorded Aboriginal sites plus 10 PADs have been identified during the field survey program within the amended project footprint. The majority of sites are artefact occurrences, with 36 previously recorded sites and 113 of the 128 newly recorded sites being either artefact scatters or isolated finds. Five of the remaining newly recorded sites and one AHIMS site were Aboriginal modified trees. Based on the above information, two of the previously recorded sites are recorded as PADs and one as a modified tree and PAD.

Six additional trees were identified by the RAPs as being possible modified trees. They were assessed by the archaeologists undertaking the survey who noted that the scars were due to natural causes. These trees are therefore not Aboriginal modified trees. They are not Aboriginal objects as defined the NPW Act. and they are not included in the total count for newly recorded sites.

Nine unscarred trees were also identified by RAPs during field surveys as trees of cultural significance. However, these nine trees were not modified and there was no physical evidence of Aboriginal use. A GPS location and photograph were recorded for each of these trees. They are not Aboriginal objects as defined by the NPW Act. They are not included in the total count for newly recorded sites.

As discussed in Section 7.5, open artefact scatters are the most common site type and may occur anywhere that Aboriginal people have travelled, hunted or camped. The survey did not find any burials, quarries, or ceremonial sites.

Prior to the current field assessment two PADs and one modified tree/PAD had been identified in the amended project footprint, the current assessment has identified a further 10 PADs. PADs are discussed further in Section 9.7.

Visibility across the amended project footprint was low leading to very low effective survey coverage, the survey's effective coverage data across the project landforms are:

- Crest 12%
- Crest & gentle slopes 2%
- Crest & moderate slopes 4%
- Crest & steep slopes 2%
- Gentle slopes 21%
- Gentle slopes & ridge 1%
- Moderate slopes 21%
- Plain 5%
- Plain & gentle slopes 1%
- Plain & streambank 3%
- Ridge 1%
- Saddle & crest 1%
- Steep slopes 8%
- Streambank 6%
- Streambank & crest 1%
- Streambank & gentle slopes 3%
- Streambank & moderate slopes 4%
- Streambank & steep slopes 2%
- Valley flat 4%

A majority of sites recorded during the field surveys were located in survey units containing gentle slopes (49), followed by streambank (27), crest (25), moderate slopes (16), plain (8), steep slopes (7), ridge (4) and valley flat (2) (refer to Figure 8-4 and Figure 8-5).

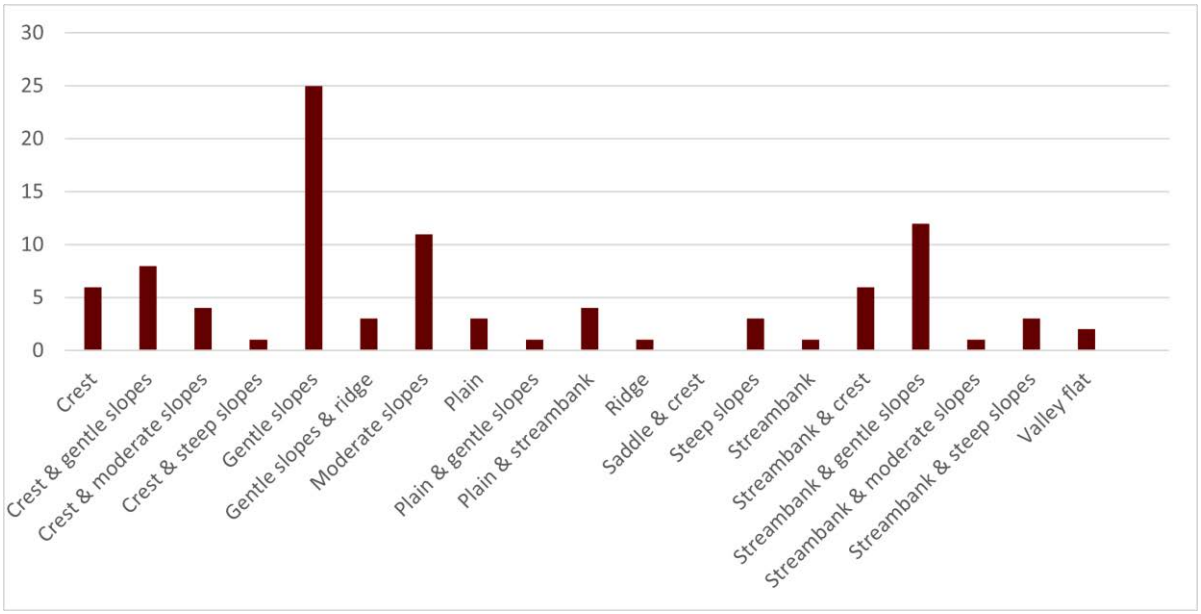


Figure 8-4 Site distributions across landforms

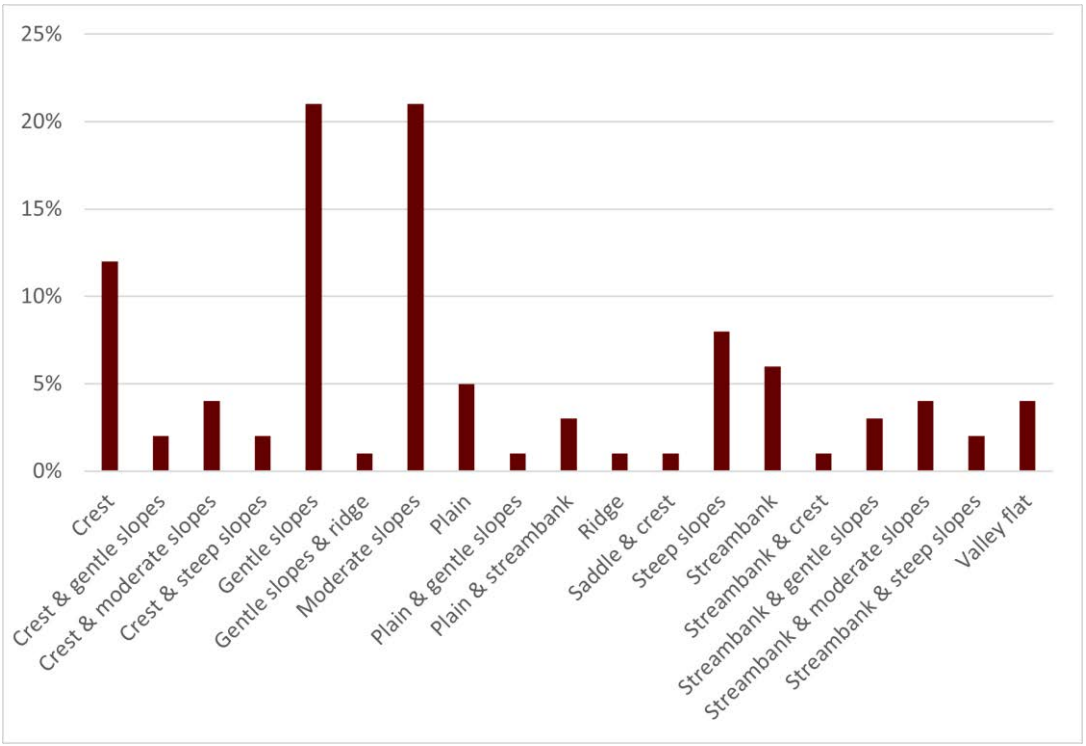


Figure 8-5 Landform percentage across the amended project footprint

8.5 Test excavation results

The following section outlines the results of the archaeological test investigations conducted for the project. Based upon the results of the archaeological survey program undertaken by NOHC, the test excavation program aimed to characterise the nature and occurrence of subsurface archaeological resources within areas identified to contain PADs during the archaeological survey within the amended project footprint.

The archaeological testing program also targeted specific areas of low, moderate, and high archaeological sensitivity defined by the refined archaeological sensitivity model developed by NOHC aiming to identify, characterise and assess any previously unidentified cultural material within the amended project footprint and to test the archaeological sensitivity model.

The artefacts recovered during the test excavation program within the amended project footprint underwent a detailed lithic analysis by Ricardo Servin (Senior Archaeologist, NOHC) and Lachlan Sharp (Archaeologist, NOHC). Analysis of the stone material recovered during the test excavation program aims to provide a detailed examination using standard terminology for artefact analysis from Holdaway and Stern (2013) and McCarthy (1976). Detailed artefact analysis entailed recording several attributes of each artefact. Stone artefact raw materials were examined through a hand lens (x 10 magnification). Each artefact was recorded in database form, suitable for comparative analysis on a local and regional basis.

A total of 282 artefacts were recovered during the archaeological testing program (Table 8-5). Archaeological material was not identified in all the areas investigated. Artefact density and distribution also varied across the different sites investigated.

Table 8-5 Artefact numbers and percentage per test location

Site	Number of artefacts	Per cent (%)
PAD01	23	8.16
PAD02	0	0
PAD05	4	1.41
PAD07	8	2.83
PAD10	79	28.01
CGAS01/02	0	0
CGAS03	0	0
CGAS04	7	2.48
SVAS01	0	0
SVAS02	0	0
SVAS03	5	1.77
SVAS04	0	0
SVAS05	0	0
ULAS01	0	0
ULAS02	32	11.34
ULAS03	11	3.9
ULAS04	12	4.26
ULAS05	16	5.67
WAS1	0	0
WAS2	0	0
WAS2-1	23	8.16
WAS03	1	0.35
WAS3-1	0	0

Site	Number of artefacts	Per cent (%)
WAS4	0	0
YAS01	19	6.74
YAS02	37	13.12
YAS03	0	0
YAS04	5	1.77
YAS05	0	0
Total	**282**	100

8.5.1 HL-PAD-01

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within this PAD consisted of a transect established on a north-west to south-east alignment within the boundaries of the PAD (Figure 8-6). A total of five test pits were placed within the transect with intervals of five metres between each test pit.

Figure 8-6 HL-PAD-01 test pit locations

8.5.1.1 Landform

PAD01 is located on a lower slope floodplain 15 metres to the west of a non-perennial waterway.

8.5.1.2 Soils, disturbance and features

While the PAD is located within one landform unit, soils across the test pits excavated varied across the transect. This is mainly associated with different stages of ground disturbance identified during the test excavation program.

To the east of the transect, there is an existing fence line placed on a north-south alignment. Parallel to the fence line, and only 15 metres to the east of the PAD, Ivydale Road runs perpendicular to the transect. There is evidence of a swale between the fence line and Ivydale Road.

Ground surface across the PAD displays evidence of land clearance. The area has been subject to different stages of land clearance, including tree removal, and has historically been used for grazing and cropping. The area is currently used for grazing purposes.

Figure 8-7 Landscape view showing the landform unit and vegetation within HL-PAD-01

Soils across the area also display evidence of extensive ground erosion, which is evident along the ground surface as well as within the subsurface soils.

The stratigraphic profile within test pits 1 and 2, located to the east of the transect and closer to the fence line and the road, consists of potentially redeposited soils likely associated with the construction of Ivydale Road, the swale and the fence line. The stratigraphic profile within test pit 1 lacks a topsoil formation. There is no evidence of organic material within the identified layers, with the exception of very few scattered (one per cent) young grass roots. The absence of extensive evidence of erosion within the stratigraphic profile also suggests soil redeposition. A base of compacted silty clay was reached at a depth of 250 millimetres.

The stratigraphic profile within test pit 2 is likely to contain redeposited material to a depth of 100 millimetres. The profile contains a potential topsoil with young grass root (less than five per cent) overlaying a thin deposit of pale silty clay, which represents the same deposit identified within test pit 1. Below, a soil deposit with a clear horizontal boundary of moderately compacted silty clay with evidence of organic material and grass root is present.

The soil profile across test pits 3 to 5 was consistent with the landform unit and has not been redeposited. Generally, the stratigraphic profile consisted of a sandy loam topsoil (A1) with an average of 10 per cent of young grass bioturbation, which transitioned into a sandy clay loam (A2) with less than two per cent of grass bioturbation and an abrupt horizon boundary to a B-horizon that consisted of moderately moist firm clay.

A very high concentration of charcoal within test pit 5 was identified from the base of spit 1 (zero to 100 millimetres) to the base of the test pit at a depth of 300 millimetres. The charcoal concentration covered a width of approximately 800 millimetres, predominantly located in the northern section of the test pit. Lithic material was recovered within the test pit; however, no inclusions were identified within the charcoal feature and it was concluded to be associated with burnt tree roots.

Figure 8-8 P HL-PAD-01 Test Pit 1

Figure 8-9 HL-PAD-01 Test Pit 4 Expansion

Table 8-6 HL-PAD-01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-120 mm Munsell: 5YR3/2 Description: Sandy clay loam. 5%-10% grass roots bioturbation. A clear horizon boundary.
A2 Horizon	Depth: 50-250 mm Munsell: 5YR4/2 Description: Sandy clay loam. 5% grass roots bioturbation. A clear horizon boundary.

Soil horizon	Description
B- Horizon	Depth: 220-300 mm Munsell: 5YR4/4 Description: Clay.

8.5.1.3 Artefact analysis

Cultural material was only identified within test pits 1, 3, 4 and 5 of this PAD. A total of 23 artefacts were recovered during the archaeological test excavation. Artefact distribution was characterised by a low-density deposit distributed across the extension of the transect investigated.

Table 8-7 HL-PAD-01 artefact numbers per test pit

Test Pit	Artefacts	Percentage of the total site assemblage
1	5	21.7%
3	6	26.08%
4	7	30.43%
5	5	21.7%

Of the 23 artefacts recovered three (13.04 per cent) were identified as tool types consisting of backed artefacts, six (26.08 per cent) were identified as complete flakes and there were a total of six (26.08 per cent fragmented artefacts. The remaining consisted of eight (34.78 per cent) angular flakes.

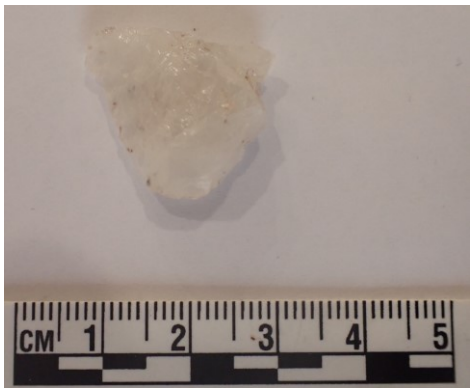


Figure 8-10 Ventral surface of a quartz backed tool (PAD01 TP3 Spit 1 [2])

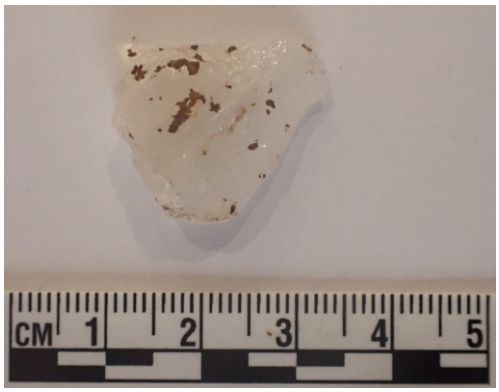


Figure 8-11 Dorsal Ventral surface of a quartz backed tool (PAD01 TP3 Spit 1 [2])

Figure 8-12. Ventral surface of a quartz medial flake (PAD01 TP3 Spit 1 [4])

Figure 8-13. Dorsal surface of a quartz medial flake (PAD01 TP3 Spit 1 [4])

All of the artefacts recovered within the site were made out of quartz. Artefacts were mostly recovered from spit 1 with a total of 15 (65.21 per cent) artefacts recovered within this spit with a ranging depth of zero to 100 millimetres and the rest recovered to a maximum depth of 200 millimetres.

Artefact density and distribution were generally consistent across the investigated area. While artefacts identified within test pit 1 were likely recovered within redeposited soil, the artefacts recovered from the rest of the test pits displayed low levels of ground disturbance on the western side of the site and the presence of undisturbed archaeological deposits in the area. Based on the density and distribution of artefacts recovered the assemblage is representative of a background scatter.

8.5.2 HL-PAD-02

***Bioregion**: South West Slopes* ***LGA**: Wagga Wagga* ***LALC**:* Brungle/Tumut

Testing within PAD-02 consisted of test pits placed in areas targeting a proposed creek crossing track. A total of four test pits were placed within the PAD in a general east-west direction covering a line of approximately 135 metres.

Figure 8-14 PAD-02 test pit locations

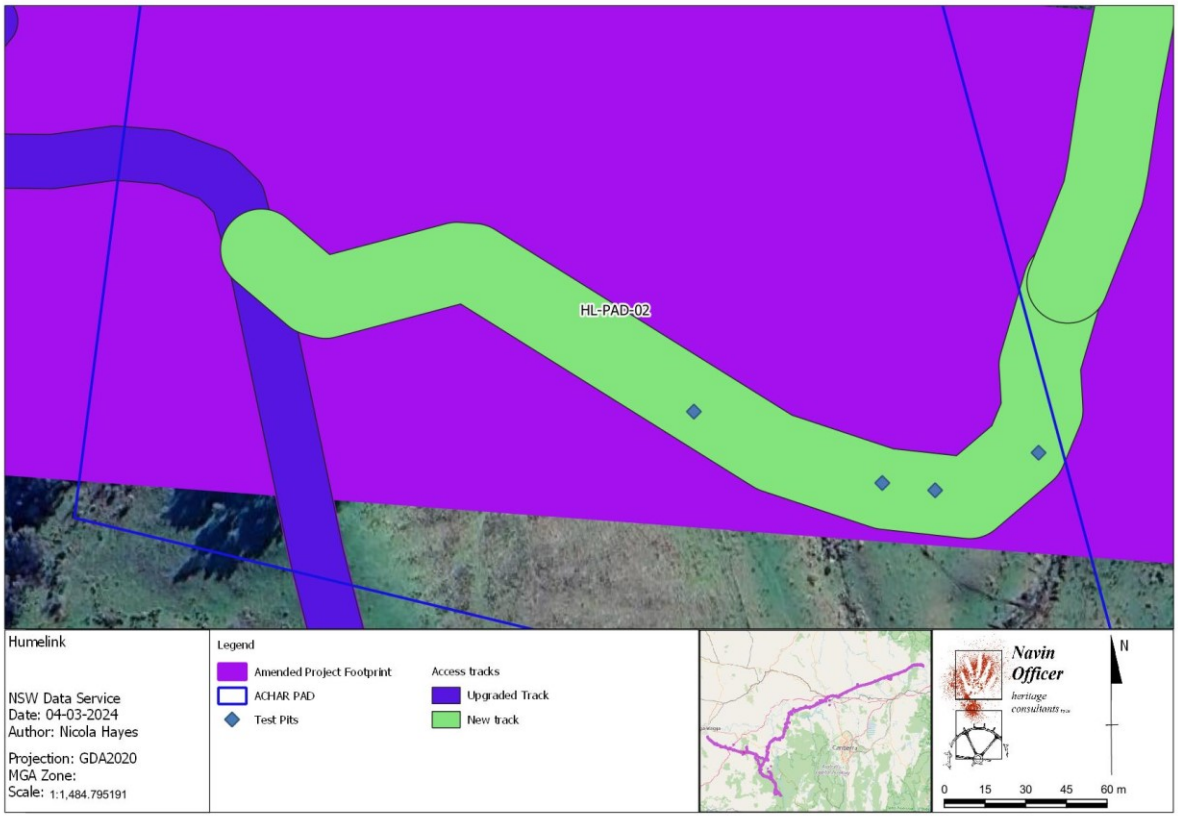


Figure 8-15 PAD-02 test pit locations with track

8.5.2.1 Landform

PAD-02 is located on a lower slope and floodplain surrounding an unnamed non-perennial creek that joins Galvins Creek to the south.

8.5.2.2 Soils, disturbance, and features

Soils across the test pits excavated varied across the transect. This is mainly due to ground disturbance and the different landforms identified during the test excavation program. Ground surface across the PAD displays evidence of land clearance. The area has been subject to associated with grazing and tree removal. To the west of the transect, there is an existing fence line on a north-south alignment. The creek running through the transect is greatly eroded to a depth of approximately 2 metres below ground level.

The soil profile generally consisted of a silty loam topsoil (A1) with frequent fine grass root bioturbation with a transition to orange-brown silt (A2) and a clear transition to orange-brown clay (B-horizon), with very few to no gravels throughout. However, pit 2 located within the level floodplain consisted alluvial deposits of dark brown silty loam topsoil with frequent fine grass root bioturbation (A1) before a clear transition to silt (A2) gradually transitioning to clayey silt (A3) with no clay base reached due to depth constraints. A high concentration of charcoal was identified within pit 1 throughout the northern half of the pit which was concluded to be associated with burnt tree roots. Pit 1 also contained extremely compacted degraded sandstone. Pit 3 was located on a slight rise and contained some gravels throughout.

Figure 8-16 Landscape view showing the landform unit and vegetation within PAD-02

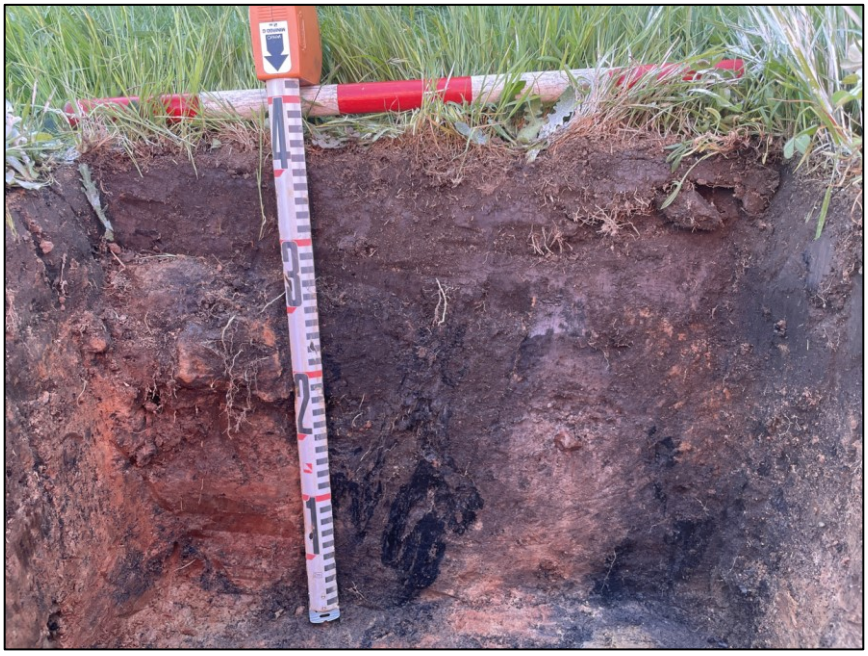


Figure 8-17 PAD-02 Test Pit 1

Figure 8-18 PAD-02 Test Pit 2

Table 8-8 PAD-02 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-110 mm Munsell: 2.5YR 4/1 Description: Silty loam with 10%-20% grass roots bioturbation. A clear horizon boundary.
A2 Horizon	Depth: 100-500 mm Munsell: 5YR 5/2 Description: Clayey silt with <5% grass roots bioturbation.
B- Horizon	Depth: 300-800mm Munsell: 5YR 4/3 Description: Clay.

8.5.2.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.3 HL-PAD-05

***Bioregion**: South Eastern Highlands* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within this PAD consisted of a transect established on a north-east to south-west alignment within the boundaries of the PAD. A total of eight test pits were placed within the transect with intervals of 10 metres between each test pit.

Figure 8-19 HL-PAD-05 test pit locations

8.5.3.1 Landform

PAD-05 is located within a gentle slope on a basin surrounded by catchments to the east and to the west. McCullums Creek, a nonperennial creek, runs approximately 400 metres to the north of the transect placed within PAD-05.

8.5.3.2 Soils, disturbance and features

General disturbances identified across the site are associated with different stages of land clearance and soil erosion. The site is currently used for grazing. A constructed dam is located 55 metres north of the northern boundary of the PAD and approximately 105 metres north of the transect.

In general, the stratigraphic profile across the investigated area consisted of a silty clay loam topsoil (A1) with more than 20 per cent of grass root bioturbation and common inclusions (more than 10 per cent) of sandstone and ironstone. The topsoil deposit overlays a silty clay deposit (A2) with less than five per cent grass root bioturbation and common inclusions (20 per cent) of ironstone and sandstone gravels. Charcoal was also identified in test pits, which was determined to be associated with burnt tree roots. Below this deposit, the B-horizon was generally reached, and it consisted of hard compacted clay with ironstone and sandstone inclusions.

Figure 8-20 Overview view of HL-PAD-05 Pit 3 showing the gradient of the gentle slope in the background

Figure 8-21 HL-PAD-05 Test Pit 3

Figure 8-22 HL-PAD-05 Test Pit 5

Table 8-9 HL-PAD-05 summary of soil character

Soil horizon	Description
A1 Horizon	Depth: 0-120 mm Munsell: 5YR4/4 Description: Sandy clay loam. 5%-10% grass roots bioturbation and >20% ironstone and sandstone inclusions. A clear horizon boundary.
A2 Horizon	Depth: 60-350 mm Munsell: 5YR5/4 Description: Silty clay with >5% grass roots bioturbation and >10 ironstone and sandstone inclusions. A clear horizon boundary.
B- Horizon	Depth: 200-500 mm Munsell: 5YR6/4 Description: Hard compacted clay with >5% sandstone and ironstone inclusions.

8.5.3.3 Artefact analysis

Cultural material was only identified within test pit 6 with a total of four artefacts recovered during the archaeological test excavation. All of the artefacts recovered were made out of silicified mudstone and mostly recovered within spit 1 (zero to 10 centimetres depth) with only one artefact recovered within spit 2 (10 to 20 centimetres depth).

Of the four artefacts recovered three were identified as complete flakes and one as an angular flake.

The very low density and distribution of artefacts within this PAD indicate that the area has been subjected to deep levels of ground disturbance which may have resulted in previously intact archaeological deposits being impacted.

8.5.4 HL-PAD-07

***Bioregion**: South Eastern Highlands* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within PAD07 consisted of one transect established on a north-east-south-west alignment with 10 test pits placed within the transect with intervals of 10 metres between each test pit.

Figure 8-23 HL-PAD-07 test pit locations

8.5.4.1 Landform

PAD07 is located on a gently inclined slope within a floodplain area. The transect is located 70 metres south of a 1st order tributary associated with Catherines Creek and is also located 160 metres west of a 3rd order tributary of Catherines Creek.

8.5.4.2 Soils, disturbance and features

The ground surface across PAD07 demonstrated low levels of disturbance, however, it was evident that the surrounding area had been subject to land clearance as well as agricultural activity including grazing. Overall, as consistent with the landform and low levels of disturbance, the soil profiles across the transect were relatively uniform. The test pits consisted of a moist silty loam topsoil (A1) with abundant (25 to 30 per cent) grass root bioturbation and few (two to 10 per cent) angular coarse quartz gravel inclusions. This transitioned with a clear horizon boundary to a weakly compacted silty clay loam (A2) with few (one to 10 per cent) fine grass roots, common (10 to 20 per cent) sandstone cobble inclusions and fine quartz gravel inclusions. The water content also increased significantly with depth, and the water table was hit at the base of the A2 Horizon in many of the test pits. This deposit overlaid the B-Horizon, which consisted of a compact clay deposit with common (10 to 20 per cent) sandstone and quartz gravels and sandstone cobble inclusions. Many of the test pits contained few (two to five per cent) small charcoal fragments within the B-Horizon deposit, which were associated with burnt tree roots.

Figure 8-24 HL-PAD-07 Test Pit 3

Figure 8-25 HL-PAD-07 Test Pit 4

Table 8-10 HL-PAD-07 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-170 mm Munsell: 2.5Y6/6 Description: Silty loam. 25-30% grass roots bioturbation and 2-10% quartz gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 60-270 mm Munsell: 2.5Y9/6 Description: Silty clay loam with 1-10% grass roots bioturbation and 10-20% sandstone cobble inclusions. Clear horizon boundary.
B- Horizon	Depth: 160-300 mm Munsell: 5Y7/8 Description: Compact clay.

8.5.4.3 Artefact Analysis

Cultural material was identified within test pits 6 and 8 with a total of eight artefacts recovered during the archaeological test excavation. Of these, five artefacts were recovered from test pit 6 and three from test pit 8. Artefacts were proportionately found within spit 1 (zero to 100 millimetres depth) and spit 2 (10 to 200 depth).

The assemblage consisted of three (37.5 per cent) complete flakes, one (12.5 per cent) proximal flake, one (12.5 per cent) medial flake and three (37.5 per cent) angular flakes. Artefacts were made out of different raw materials such as silcrete, quartz, indurated mudstone and granite. There were two artefacts of silcrete, two artefacts of quartz, two artefacts of indurated mudstone and two artefacts of granite.

Four of the artefacts recovered from test pit 6 contained cortex. Three of these artefacts were identified as complete flakes and one as a proximal flake. Cortex presence varied from 10 per cent to 40 per cent suggesting that the discarding of these occurred during the early stages of the reduction process. The low density and distribution of artefacts within the area suggest a sparse use of the landscape and discarding through routes of transportation to and from water sources.

The assemblage recovered is considered a low-density background scatter.

8.5.5 HL-PAD-10

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within PAD-10 consisted of test pits placed in a north-east-south-west alignment. A total of seven test pits were placed within the transect at intervals of 10 metres between each test pit.

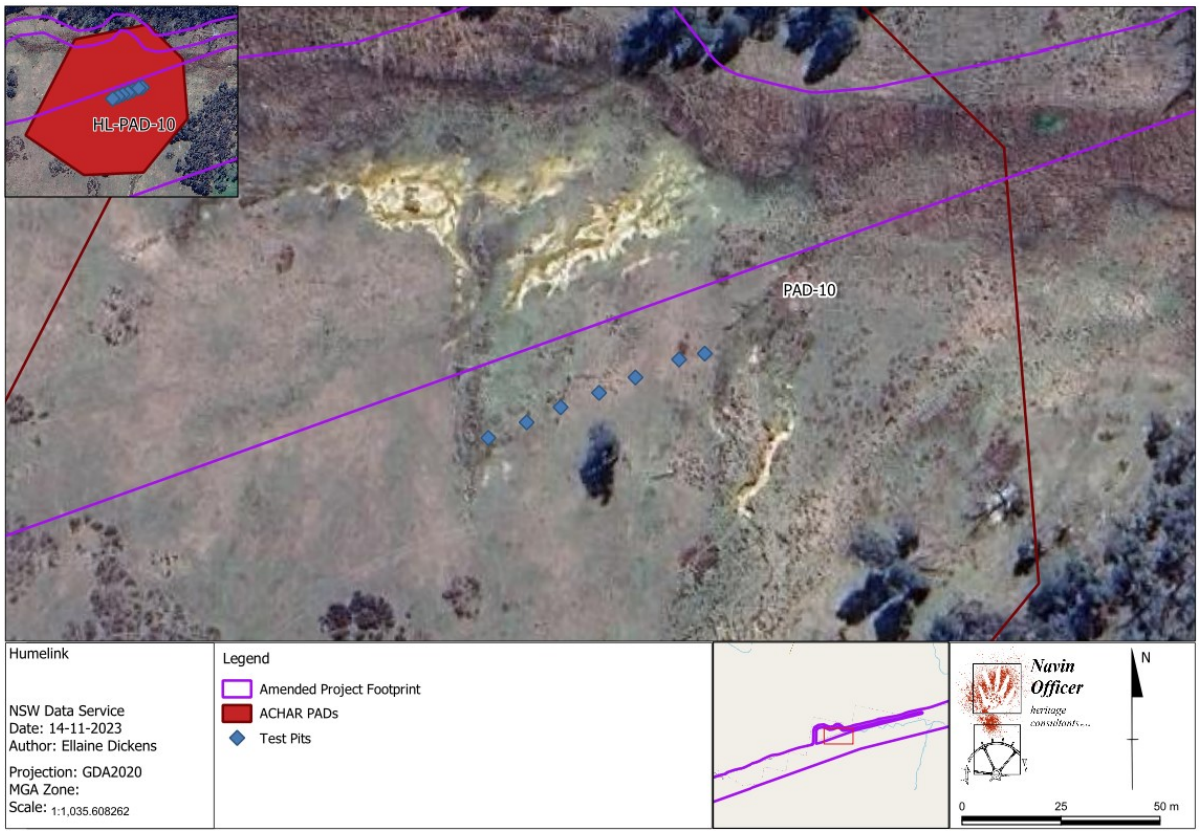


Figure 8-26 PAD-10 test pit locations

8.5.5.1 Landform

PAD-10 is located on the lower slope of a gently inclined rolling hills landscape. The transect is located approximately 25 metres west of an unnamed non-perennial tributary of Cowpers Creek and is 25 metres south of an existing transmission line.

8.5.5.2 Soils, disturbance, and features

The site displays evidence of ground surface disturbance associated with soil erosion, grazing, and land clearance, though some remnant trees have been retained. Large erosion scalds are present within the PAD to the north and south-east of the transect. The creek line has been eroded to a depth of approximately 1.2 metres at its deepest point.

The soil profiles were relatively consistent across the investigated area, however differed in depths and abundance of gravel and stone inclusions. Generally, the soil profile consisted of a silty loam topsoil (A1) with approximately 20 per cent grass roots bioturbation transitioning to an orange-brown clayed silt deposit (A2) with less than 5 per cent grass roots bioturbation and approximately 5 per cent fine gravels. This was underlain by a yellow-brown clay (B-Horizon) with 10 to 20 per cent coarse gravels present. Test pits 4, 5, and 6 contained frequent ironstone fragments within the B-Horizon deposit. Pit 3 was noted to have no gravel or stone inclusions present. The water table was reached in pit 7 at 300 millimetres depth due to recent rains.

PAD-10 includes three recorded Aboriginal sites; HL-147 isolated find (AHIMS #51-6-0973), HL-125 artefact scatter (AHIMS #51-6-0976), and HL-62 artefact scatter (AHIMS #51-6-0949).

Figure 8-27 Landscape view showing the landform unit and vegetation within PAD-10

Figure 8-28 PAD-10 Test Pit 3 post expansion

Figure 8-29 PAD-10 Test Pit 7 showing evidence of water seepage from the water table

Table 8-11 PAD-10 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-170 mm Munsell: 7.5YR 3/2 Description: Silty loam, 15-20% grass roots bioturbation. A gradual horizon boundary.
A2 Horizon	Depth: 110-500 mm Munsell: 7.5YR 6/6 Description: Clayed silt, <5% grass roots bioturbation, ~5% fine gravels. A clear horizon boundary.
B- Horizon	Depth: 400-600 mm Munsell: 7.5YR 5/6 Description: Yellow brown clay with 10-20% coarse gravels and ironstone fragments.

8.5.5.3 Artefact analysis

Of the seven test pits excavated at PAD-10, four contained cultural material (pits 1 to 4). At the completion of excavations 79 artefacts were unearthed at the site (refer to Table 8.6 below). The artefacts unearthed during excavations were predominantly (64.56 per cent) recovered from spit 2 (100 to 200 millimetres depth) and spit 4 (300 to 400 millimetres). A sample of the lithic artefact assemblage from the PAD-10 excavations are shown below (Figure 8-30 to Figure 8-33).

Table 8-12 PAD-10 Artefact numbers per test pit.

Test Pit	Artefacts	Percentage of the total site assemblage
1	9	11.39%
2	24	30.38%
3	14	17.72%
4	32	40.51%

Figure 8-30 Dorsal surface of pink silcrete artefacts including refit blade (PAD-10 TP 4 Spit 4[71-79)

Figure 8-31 Ventral surface of pink silcrete artefacts including refit blade (PAD-10 TP 4 Spit 4[71-79)

Figure 8-32 Dorsal surface of a IMT comp split flake and quartz artefacts (PAD-10 TP4 Spit 2 [53-58]).

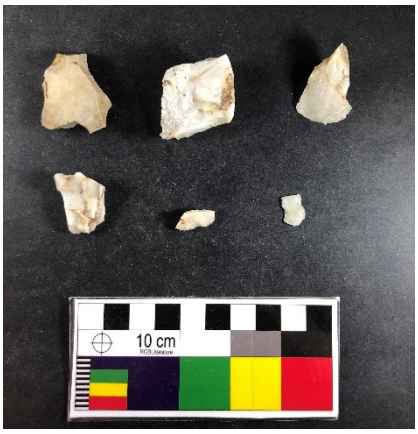


Figure 8-33 Ventral surface of a IMT comp split flake and quartz artefacts (PAD-10 TP4 Spit 2 [53-58]).

A wide variety of artefact types comprise the PAD-10 assemblage (Figure 8-34) Of the 79 artefacts, 17 (21.52 per cent) were complete flakes, 12 (15.19 per cent) were distal flakes and nine (11.39 per cent) were proximal flakes. Moreover, five artefacts (6.33 per cent) were medial flakes, and two (2.53 per cent) artefacts were longitudinally split flakes. There were four (5.06 per cent) cores, and five (6.33 per cent) core fragments present within the assemblage. One (1.27 per cent) complete split tool was also identified with the PAD-10 artefacts. The remaining 24 artefacts (30.38 per cent) of the assemblage were angular fragments.

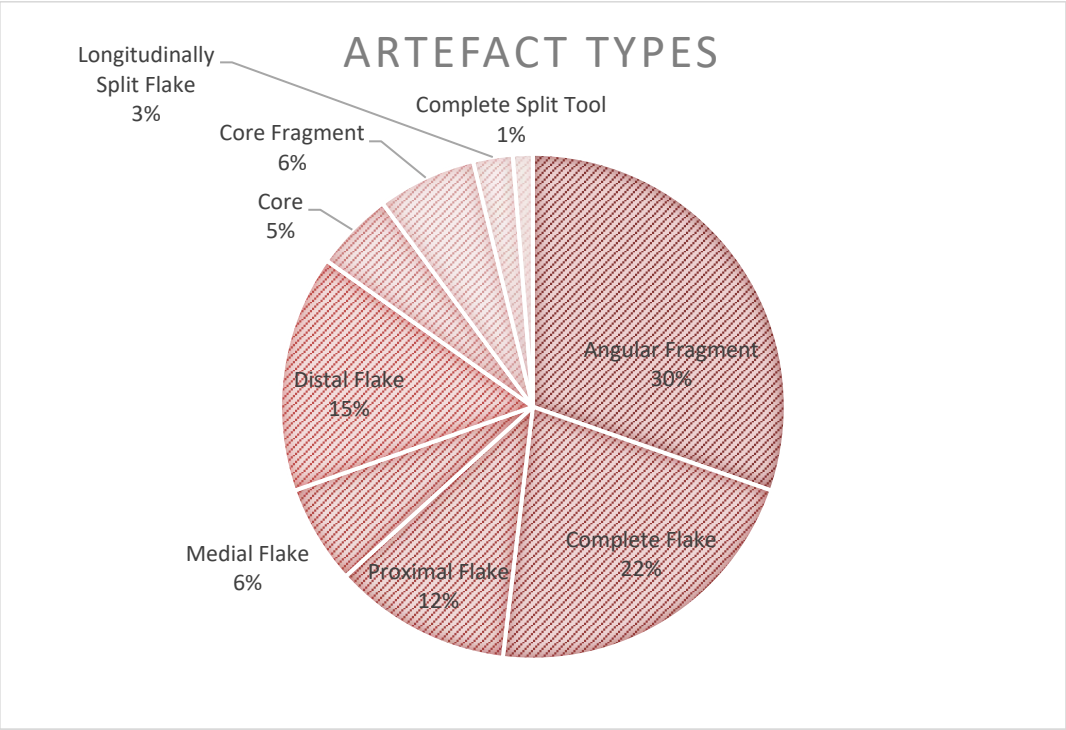


Figure 8-34 Pie chart of HL-PAD-10 artefact types

The wide array of artefact types located at HL-PAD-10 and associated Aboriginal sites HL-147 (AHIMS #51-6-0973 - isolated find), HL-125 (AHIMS #51-6-0976 - artefact scatter), and HL-62 (AHIMS #51-6-0949 - artefact scatter); suggests that the area was utilised for lithic production. The cultural material recovered from the PAD-10 demonstrates the full lithic reduction sequence with core/core fragments and complete and partial flakes present in the assemblage. The byproducts of artefact production known as angular fragments were recovered in large quantity (30.38 per cent) which further demonstrates on site lithic reduction. The occurrence of artefacts from the surface sites HL-147, HL-125 and HL-62 through to a depth of 400 millimetres in the excavated pits suggests is considered to represent a focused used of the landscape and has potential to demonstrate either the accumulation of short-term visits or long-term occupation of the area.

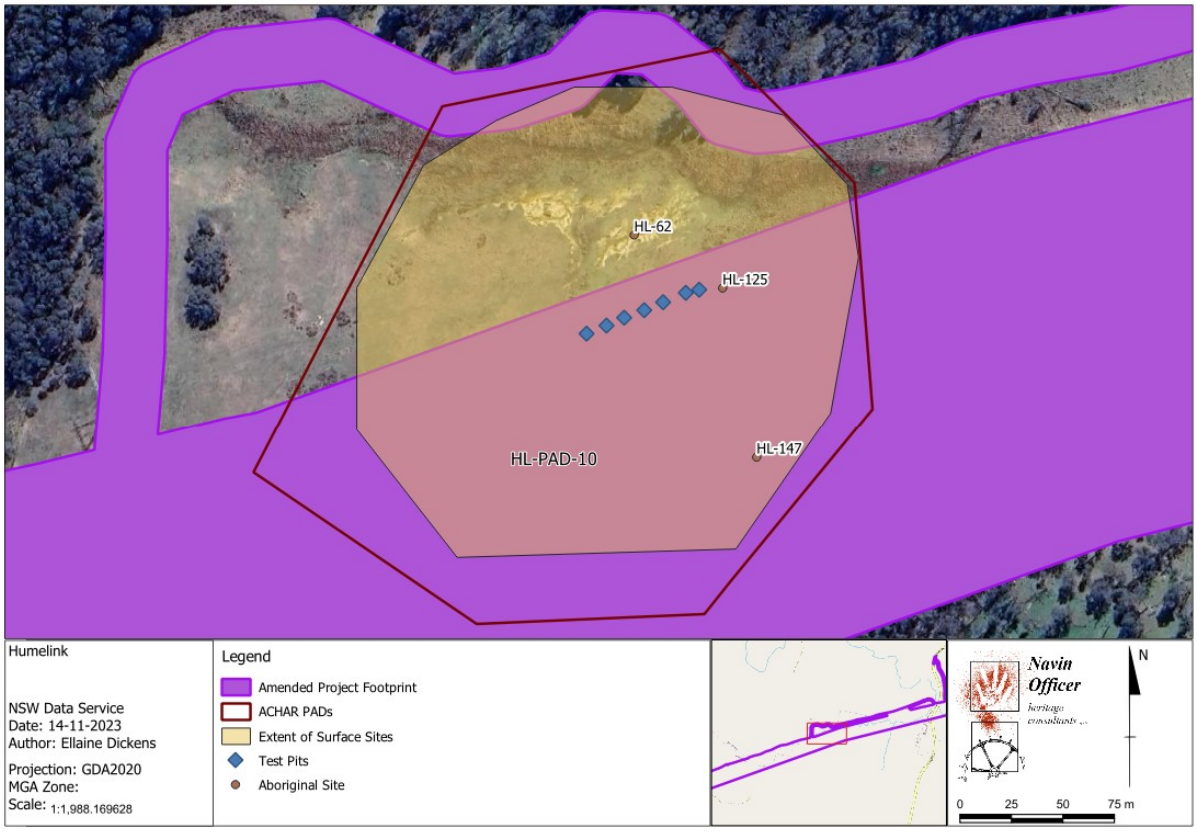


Figure 8-35 PAD-10 with previously identified sites

The artefacts from PAD-10 are comprised of a wide variety of base materials (refer to Table 8-13 below). The most prominent raw material was fine grained silcrete, from which 43 (54.43 per cent) artefacts were produced. The second was milky quartz with 24 (30.38 per cent) artefacts produced. Indurated Mudstone/Tuff (IMT) was the third most common material used with six (7.59 per cent) artefacts made from it. There were also three (3.8 per cent) medium grained silcrete artefacts, two (2.53 per cent) quartzite artefacts and a single (1.27 per cent) chert artefact.

Table 8-13 PAD-10 artefact raw material types.

Raw Material	Count	Percentage of the total site assemblage
Fine Silcrete	43	54.43%
Milky Quartz	24	30.38%
Indurated Mudstone/Tuff (IMT)	6	7.59
Medium Silcrete	3	3.8
Quartzite	2	2.53
Chert	1	1.27%

Some artefacts with the PAD-10 assemblage demonstrate modification to the raw material such as heat treatment. Of the 79 artefacts, 20 (25.32 per cent) have been produced from heat treated materials (refer to Figure 8-36 and Figure 8-37).

Figure 8-36 Dorsal surface of a fine grained silcrete core which has been heat treated (PAD-10 TP3D Spit 1 [47]).

Figure 8-37 Ventral surface of a fine grained silcrete core which has been heat treated (PAD-10 TP3D Spit 1 [47]).

8.5.6 WAS01

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within WAS01 consisted of a transect established on a north-west-south-east alignment with 10 test pits placed within the transect with intervals of 10 metres between each test pit.

Figure 8-38 WAS01 test pit locations

8.5.6.1 Landform

WAS01 is located on a gently to moderately inclined slope within a floodplain area. The eastern end of the transect falls 20 metres north of a tributary and approximately 225 metres north of Tywong Creek.

8.5.6.2 Soils, disturbance and features

Ground surface across the area displays evidence of land clearance. The area is used for grazing. Trampling and erosion disturbances were also noted in the area.

The soil profiles across the assessed area were consistent throughout the test pits. In general, the stratigraphic profile consisted of a silty loam topsoil (A1) with 10 per cent to 20 per cent of grass roots bioturbation and five per cent of quartz gravel inclusions overlaying a clayed silt deposit (A2) generally containing an average five per cent grass roots bioturbation and less than five per cent inclusions of charcoal fragments. The B-horizon consisted of a moderately hard compacted silty clay to clay.

Figure 8-39 Pre-excavation photo of WAS01 Test Pit 1 showing the gradient of the slope

Figure 8-40 WAS01 Test Pit 3

Figure 8-41 WAS01 Test Pit 9

Table 8-14 WAS01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-140 mm Munsell: 7.5YR3/2 Description: Silty loam. 10%-20% grass roots bioturbation and 5% quartz gravel inclusions. Clear horizon boundary
A2 Horizon	Depth: 100-480 mm Munsell: 10YR5/4 Description: Clayed silt with >5% grass roots bioturbation and <5% charcoal fragments inclusions. clear horizon boundary.
B- Horizon	Depth: 320-500 mm Munsell: 10YR5/5 Description: Moderately compacted silty clay to clay

8.5.6.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.7 WAS02

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within WAS02 consisted of one transect established on an east-west alignment with 10 test pits placed at 10 metre intervals within the transect. Test pits were placed just outside of the amended project footprint at the request of the landowner on the placement of test pits.

Figure 8-42 WAS02 test pit locations

8.5.7.1 Landform

WAS02 is located on a floodplain approximately 200 metres west of Kyeamba Creek, a 4th order tributary that feeds into a Teatree Creek further south.

8.5.7.2 Soils, disturbance and features

The ground surface in the vicinity of the investigated area displays evidence of disturbance associated with the construction of a dirt vehicle track directly adjacent to the transect as well as property fence lines in close vicinity, while disturbance is also associated with land clearance and previous agricultural activity, including grading of the land.

In general, the soil profile across the transect consisted of a silty loam topsoil (A1) with common grass roots (more than 15 per cent) and few (two to 10 per cent) shale and quartz gravel inclusions. The A1 Horizon overlays a weakly compacted silty clay loam (A2) with few grass roots (less than five per cent), few (five to 10 per cent) coarse quartz and shale gravel inclusions, and very few charcoal fragments (less than per cent) associated with burnt tree roots. This deposit transitioned to a moist, compact clay (B-Horizon) with a clear horizon boundary, which consisted of few (two to 15 per cent) fine quartz gravel inclusions, few (five per cent) fine manganese flecks present and few (less than five per cent) charcoal fragments present.

Figure 8-43 View showing the access track in close proximity to the transect

Figure 8-44 WAS02 Test Pit 3

Figure 8-45 WAS02 Test Pit 9

Table 8-15 WAS02 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-180 mm Munsell: 5YR5/2 Description: Silty loam. 10%-20% grass roots bioturbation and 2-10% small quartz and shale gravel inclusions. Clear horizon boundary
A2 Horizon	Depth: 0-270 mm Munsell: 10YR7/3 Description: silty clay loam with <5% grass roots bioturbation and 5-10% coarse quartz and shale gravel inclusions. Clear horizon boundary.
B-Horizon	Depth: 150-300 mm Munsell: 10YR7/1 Description: Compact clay. Few (2-15%) quartz gravel inclusions.

8.5.7.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.8 WAS02-1

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within WAS02-1 consisted of one transect established on a north-west-south-east alignment with five test pits placed at 10 metre intervals within the transect.

Figure 8-46 WAS02-1 test pit locations

8.5.8.1 Landform

WAS02-1 is located on a moderately inclined mid-slope approximately 10 metres north of a granite outcrop exposure and 190 metres south of a tributary.

8.5.8.2 Soils, disturbance and features

Ground surface across the site displays evidence of disturbance associated with erosion, land clearance, trampling and grazing. Disturbance is also associated with the construction of the existing transmission line structure located approximately 25 metres east of the transect.

The soil profile across the site is consistent across the investigated area. In general, the stratigraphic profile consisted of a sandy loam topsoil (A1) with 10 per cent to 15 per cent grass root bioturbation with a clear horizon boundary overlaying a clayed sand deposit (A2) with less than 2 per cent of charcoal fragment inclusions and less than five per cent grass roots bioturbation. This deposit transitioned into a clayed sand deposit (A3) with less than two per cent charcoal fragments above a moderately compacted sandy clay deposit (B-horizon) with a clear horizon boundary.

Figure 8-47 Landscape view showing the gradient of the slope and the existing transmission line structure in the vicinity

Figure 8-48 WAS02-1 Test Pit 1 Expansion

Figure 8-49 WAS02-1 Test Pit 4

Table 8-16 WAS02-1 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-160 mm Munsell: 5YR3/3 Description: Silty loam. 10%-15% grass roots bioturbation. Clear horizon boundary.
A2 Horizon	Depth: 100-350 mm Munsell: 5YR5/4 Description: Clayed silt with >5% grass roots bioturbation and >2% charcoal fragments and 1% granite gravel inclusions. Diffuse horizon boundary.
A3 Horizon	Depth: 280-400 mm Munsell:5YR5/6 Description: Sandy clay deposit with <2% charcoal fragments
B-Horizon	Depth: 300-500 mm Munsell: 5YR4/6 Description: Moderately compacted sandy clay to clay.

8.5.8.3 Artefacts analysis

A total of 23 artefacts were recovered during the archaeological test excavation within this area. Cultural material was only identified within test pit 1 with six (26.08 per cent) artefacts recovered from spit 1 (zero to 100 millimetres depth) and 17 (73.91 per cent) artefacts recovered from spit 2 (100 to 200 millimetres depth).

Of the 23 artefacts nine (39.13 per cent) were identified as complete flakes, five (21.73 per cent) as longitudinal split flakes, six (26.08 per cent) angular flakes, one (4.34 per cent) distal flake, one (4.34 per cent) core and one (4.34 per cent) identified as a tool.

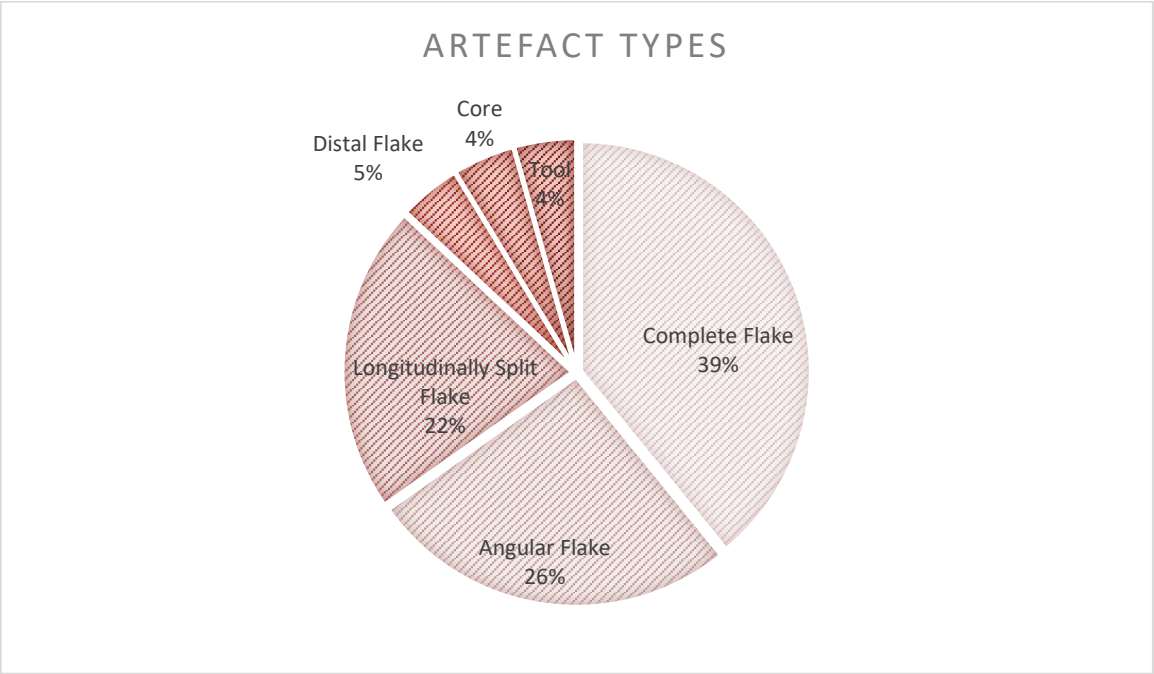


Figure 8-50 WAS02-1 artefact types

Figure 8-51 Multiplatform core made from granite (WAS2-1 TP1 Spit 2 [1])

Figure 8-52 Multiplatform core made from granite (WAS2-1 TP1 Spit 2 [1])

Granite was the predominant raw material used with 14 (60.86 per cent) artefacts of the total assemblage made from this material. The second material identified was quartz with nine artefacts made from this material. Both types of raw materials are regional.

As artefacts were only identified within one test pit of the area investigated it is considered that the assemblage demonstrates a sparse use of the landscape in the area and to be representative of a background scatter. However, the density and distribution of artefacts indicate the presence of intact archaeological deposits in the area.

8.5.9 WAS03

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within this area consisted of one transect established on a north-south alignment with 10 test pits placed at 10 metre intervals within the transect.

Figure 8-53 WAS03 test pit locations

8.5.9.1 Landform

WAS03 is located on a floodplain approximately 20 metres west of a 1st order tributary associated with Keajura Creek. The area is also located 100 metres east of another 1st order tributary of Keajura Creek.

8.5.9.2 Soils, disturbance and features

The ground surface across the excavation area (WAS03) displayed evidence of disturbance in the form of land clearance and previous agricultural activity, including ploughing. It is also clear that the area has been subject to soil erosion. An artificial dam is located 200 metres south of the transect, which is fed by the 1st order tributary located to the east of the transect.

It is very clear in the soil profile, which was relatively consistent across the transect, that the surrounding area has been subject to recent ground disturbance associated with agricultural activity. Many of the test pits lacked a topsoil (A1) formation as the upper unit of the soil profile did not contain any evidence of leaching, organic matter or inclusions. For those test pits that did contain a topsoil, this consisted of a newly-formed, thin layer of greyish-brown silty loam (A1) with abundant (greater than 20 per cent) grass roots and few (5 to 10 per cent) coarse quartz gravel inclusions present. This overlayed a moist, compact reddish-brown clay loam (A2) with few (less than10 per cent) young grass roots and very few (one to five per cent) fine quartz gravel inclusions. Few small charcoal fragments associated with burnt tree roots were also identified in the clay loam deposit. This deposit represented the upper unit of the soil profile for those test pits that lacked a topsoil formation. The B-Horizon lay

below the clay loam deposit, which consisted of a compact, reddish-brown clay with very few (less than 5 per cent) inclusions of coarse quartz gravel.

Figure 8-54 WAS03 Test Pit 3 Expansion

Figure 8-55 WAS03 Test Pit 7

Table 8-17 WAS03 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-80 mm Munsell: 5YR8/2 Description: Silty loam. >20 grass roots bioturbation and 5-10% quartz gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 60-280 mm Munsell: 7.5YR8/4 Description: clay loam with <10% grass roots bioturbation and 1-5% fine quartz gravel inclusions. Clear horizon boundary.
B-Horizon	Depth: 150-300 mm Munsell: 5YR9/2 Description: Compact clay. Very few (<5%) quartz gravel inclusions.

8.5.9.3 Artefact analysis

One artefact was recovered during the archaeological test excavation. It consisted of one proximal flake made of quartz recovered from test pit 3 spit 1. No other evidence of cultural material was identified in the area during the archaeological test excavation.

As the area investigated displays extensive evidence of ground disturbance, the presence of this artefact suggests that intact archaeological deposits were present in the area, but these have been removed by continuous reworking of the land.

8.5.10 WAS03-1

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Wagga Wagga*

Testing within WAS03-1 consisted of one transect established on a north-south alignment with five test pits placed at 10 metre intervals within the transect.

Figure 8-56 WAS03-1 test pit locations

8.5.10.1 Landform

WAS03-1 is located on a lower, gently inclined slope approximately 150 metres east of a 1st order tributary associated with Keajura Creek.

8.5.10.2 Soils, disturbance and features

The ground surface across the excavation area WAS03-1 displayed evidence of disturbance in the form of land clearance and agricultural activity. A dirt road is located directly adjacent to the transect, while outbuildings and structures related to farming are located 140 metres to the south. An artificial dam is also located 100 metres east of the transect.

The disturbances that are evident across the ground surface in the vicinity of the transect are demonstrated in the soil profiles across the area. For most of the test pits, the soil profile lacked an A2 Horizon and consisted of a very shallow topsoil (A1) that overlaid a compact clay deposit (B-Horizon). The topsoil (A1) deposit comprises of a moderately moist silty loam with abundant (20-25 per cent) grass root bioturbation and few (two to 10 per cent) coarse quartz gravel inclusions. Two of the test pits contained very few (less than two per cent) small charcoal fragments present. This deposit transitioned sharply to a compact, moist brownish-red clay (B-Horizon) with very few (less than two per cent) charcoal fragments and no other inclusions. Only test pit 4 contained an A2 Horizon below the topsoil, which consisted of a silty clay loam with very few (less than five per cent) fine quartz gravel inclusions.

Figure 8-57 View showing gradient of slope within WAS03-1

Figure 8-58 WAS03-1 Test Pit 1

Figure 8-59 WAS03-1 Test Pit 4

Table 8-18 WAS03-1 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-150 mm Munsell: 7.5YR8/2 Description: Silty loam. 20-25% grass roots bioturbation and 2-10% quartz gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 80-160 mm Munsell: 7.5YR4/8 Description: silty clay loam with <10% grass roots bioturbation and 1-5% fine quartz gravel inclusions. Clear horizon boundary.
B-Horizon	Depth: 100-300 mm Munsell: 7.5YR5/12 Description: Compact clay. Very few (<2%) charcoal fragments.

8.5.10.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.11 WAS04

***Bioregion**: NSW South Western Slopes* ***LGA**: Wagga Wagga City Council* ***LALC**: Brungle/Tumut*

Testing within this area consisted of two transects, both of which were established on a north-west-south-east alignment and placed 10 metres apart parallel to each other. Transect 1 (northern transect) consisted of seven test pits with 10 metre intervals between each test pit. Transect 2 (southern transect) consisted of three test pits with 10 metre intervals between each test pit. Transect 2 was added during the excavation due to the high level of disturbance and soil redeposition found on Transect 1.

Figure 8-60 WAS04 test pit locations

8.5.11.1 Landform

WAS04 is located on a moderately inclined mid-slope approximately 200 metres to the south of a tributary stream channel. The end of a tributary stream channel that feeds an artificial dam is located approximately 150 metres to the west of the site.

Figure 8-61 Landscape view showing the gradient of the slope within the transect

8.5.11.2 Soils, disturbance and features

The site is located approximately 15 metres south of a cattle yard. Test pits 1, 2 and 3 within transect 1 are the closest to the cattle yard. Test pit 1 within transect 1 is also located approximately 7 metres west of a fence line and an adjacent vehicle track.

Figure 8-62 Post-excavation view of WAS04 Test Pit 2

Ground surface across the site displays evidence of land clearance and the area is currently used for grazing. Soil erosion, trampling and vehicle disturbances were also identified in the area.

Soil profiles varied across the investigated area. This was identified to be the result of soil redeposition which indicated that the area has also been subjected to deep ground disturbance. Soil redeposition was identified in test pits 1, 3, 4, 5 and 6 within transect 1. Redeposited material was identified below a thin layer of topsoil and consisted of mottled silty clay with high inclusions of charcoal, gravel, scattered presence of broken glass and, as in the case with test pit 3 within transect 1, a piece of wire found within this deposit just above the boundary with the B-horizon deposit.

Figure 8-63 WAS04 Transect 1 Test Pit 5

While soil redeposition was not as evident in the other test pits, it is likely that the topsoil is associated to the redeposition event. Test pits displaying low levels of disturbance were shallow and have a similar stratigraphic profile. The stratigraphic profile identified within test pits with low evidence of ground disturbance consisted of a silty loam topsoil (A1) with 10 per cent to 20 per cent grass roots bioturbation and greater than 2 per cent small quartz gravel inclusions overlaying a clayed silt deposit (A2) with greater than 5 per cent grass root bioturbation and greater than 15 per cent of small quartz gravel inclusions including some quartz pebbles. The B horizon deposit was generally identified with a clear horizon boundary from the deposit above and it consisted of a compacted wet silty clay to clay.

Figure 8-64 WAS04 Transect 2 Test Pit 1

Table 8-19 WAS04 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-120 mm Munsell: 10YR2/1 Description: Silty loam. 10%-20% grass roots bioturbation and >2% small quartz gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 100-280 mm Munsell: 10YR4/4 Description: Clayed silt with >5% grass roots bioturbation and >15% small quartz gravel inclusions including some quartz pebbles. Clear horizon boundary.
B-Horizon	Depth: 240-300 mm Munsell: 5YR3/4 Description: Moderately compacted silty clay to clay

8.5.11.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.12 SVAS01

***Bioregion**: Australian Alps* ***LGA**: Snowy Valleys* ***LALC**: Brungle/Tumut*

Testing within this area consisted of a transect established on a north-west-south-east alignment with a total of 10 test pits placed at intervals of 10 metres within the transect. Pits were placed just outside of the amended project footprint due to thick vegetation cover within the amended project footprint at this location.

Figure 8-65 SVAS01 test pit locations

8.5.12.1 Landform

SVAS01 is located on a moderately inclined slope approximately 120 metres north of a tributary and approximately 550 metres north of Plain Creek.

8.5.12.2 Soils, disturbance and features

The site is located within an existing transmission line easement within Bago State Forest. The easement has been marked by land clearance of the area which required the removal of a large number of trees. As the easement is regularly maintained for access the area is subject to continuous stages of land clearance. The area also displays evidence of erosion and vehicle impacts. The stratigraphic profile across the area was consistent with the ground disturbance identified in the area and generally consisted of a silty loam topsoil (A1) with greater than 10 per cent grass root bioturbation and greater than 20 per cent granite gravel and cobbles inclusions overlying a silty clay loam deposit (A2) with 2 per cent grass roots and greater than 20 per cent granite cobbles inclusion transitioning into a layer of granite cobles and boulders. In some cases, the rocky deposit was reached below the topsoil deposit.

Figure 8-66 SVAS01 Test Pit 2

Figure 8-67 SVAS01 TP6

Table 8-20 SVAS01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-100 mm Munsell: 10YR3/3 Description: Silty loam topsoil with >10% grass root bioturbation and >20% granite gravel and cobbles inclusions. A clear horizon boundary.
A2 Horizon	Depth: 40-490 mm Munsell: 7.5YR4/6 Description: Silty clay loam deposit (A2) with 2% grass roots and >20% granite cobbles inclusion. A clear horizon boundary.
B-Horizon	Depth: 100-500 µmm Munsell: Description: Granite cobbles and boulders.

8.5.12.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.13 SVAS02

***Bioregion**:* South Western Slopes ***LGA**: Snowy Valleys* ***LALC**: Brungle/Tumut*

Testing within this area consisted of a transect established on a north-east-south-west alignment with a total of 10 test pits placed at intervals of 10 metres within the transect.

Figure 8-68 SVAS02 test pit locations

8.5.13.1 Landform

SVAS02 is located on a gently/moderately inclined slope with a south-western relief towards a floodplain area. A waterway runs approximately 48 metres south of the transect and a tributary is located approximately 180 metres north of the transect.

8.5.13.2 Soils, disturbance and features

Ground surface across the site displays evidence of ground disturbance associated with land clearance, grazing, trampling and potential flooding.

Soil profiles across the area investigated are consistent with the landform units of the area. In general, the stratigraphic profile consists of a silty loam topsoil (A1) with 10 per cent to 20 per cent grass root bioturbation and a common presence of ash within the soil matrix which is associated to bushfires and not identified to have cultural significance. This deposit silt above a silty clay loam deposit (A2) with a clear horizontal boundary with 2 per cent grass root bioturbation and an average of 15 per cent inclusions of small quartz gravel, transitioning into a silty clay deposit (A3) with greater than 2 per cent small quartz gravel inclusions. The B-Horizon had a clear horizon boundary and consisted of moderately compacted silty clay to clay.

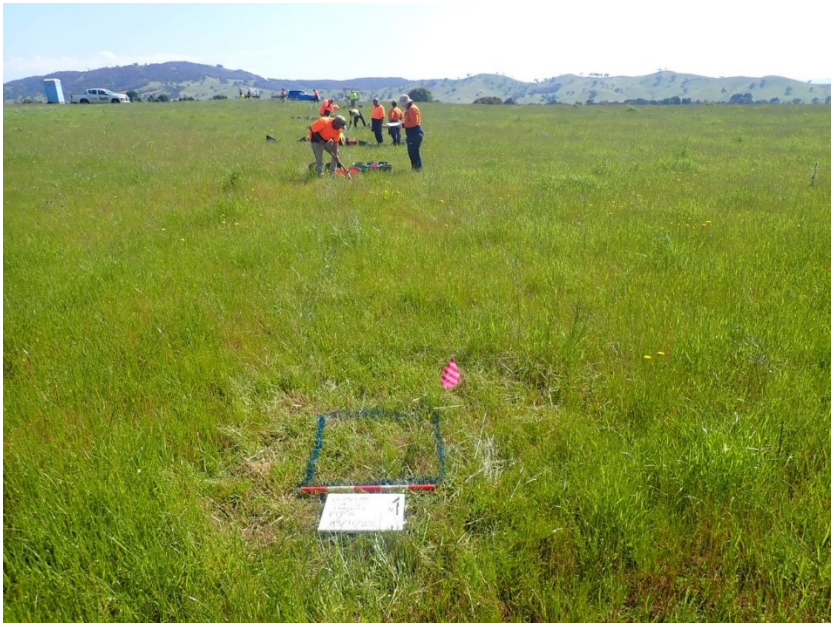


Figure 8-69 Landscape view of SVAS02 showing the gradient of the slope

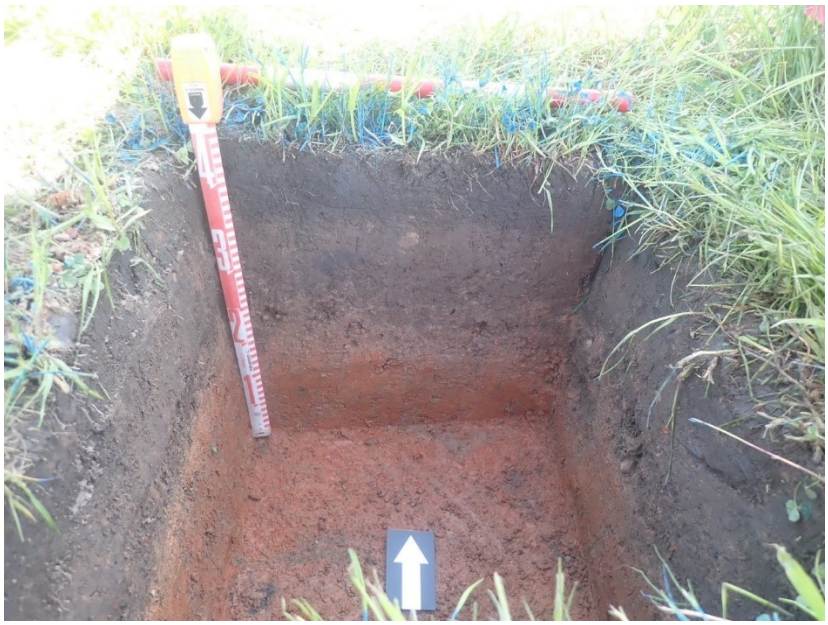


Figure 8-70 SVAS04 Test Pit 2

Figure 8-71 SVAS02 Test Pit 6

Table 8-21 SVAS02 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-120 mm Munsell: 10YR2/1 Description: Silty loam with 10%-20% of grass root bioturbation and a common presence of ash which is associated to bushfires and not identified to have cultural significance
A2 Horizon	Depth: 80-300 mm Munsell: 10YR5/3 Description: Silty clay loam with 2% grass root bioturbation and an average of 15% inclusions of small quartz gravel. A gradual/transitional horizon boundary.
A3 Horizon	Depth: 220-490mm Munsell: 10YR5/5 Description: Silty clay with >2% small quartz gravel inclusions. A clear horizon boundary
B-Horizon	Depth: 240-500 mm Munsell: 7.5YR5/8 Description: Clay.

8.5.13.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.14 SVAS03

***Bioregion**:* South Western Slopes ***LGA**: Snowy Valleys* ***LALC**: Brungle/Tumut*

Testing within this area consisted of a transect established on a north-west-south-east alignment with a total of 10 test pits placed 10 metres apart within the transect.

Figure 8-72 SVAS03 test pit locations

8.5.14.1 Landform

SVAS03 is located on a moderately inclined slope approximately 300 metres east of Sawpit Creek and 250 metres west of a waterway.

8.5.14.2 Soils, disturbance and features

Ground surface across the area displays evidence of land clearance and the area is currently used for grazing. Other disturbances identified in the area were associated with soil erosion, trampling and vehicle damage.

Soil profiles across the investigated area were generally similar, however, testing was undertaken during wet season and several test pits were excavated to a depth were a water-table was reached and the B-horizon could not be reached. The general stratigraphic soil profile consisted of a wet silty loam topsoil (A1) with greater than 20 per cent grass root bioturbation and greater than five per cent gravel inclusions with a clear horizontal boundary above a wet silty clay loam deposit (A2) with greater than two per cent grass root bioturbation and greater than 10 per cent gravel inclusions transitioning into a moderately compacted wet silty clay (B-horizon).

Figure 8-73 Base of SVAS03 Test Pit 4 showing the water table being hit

Figure 8-74 SVAS03 TP1

Table 8-22 SVAS03 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-300 mm Munsell: 10YR3/2 Description: Wet silty loam topsoil with >20% grass root bioturbation and >5% gravel inclusions with a clear horizontal boundary.
A2 Horizon	Depth: 100-400 mm Munsell: 10YR5/3 Description: clay loam deposit (A2) with >2%grass root bioturbation and >10% gravel inclusions with a diffuse boundary.
B-Horizon	Depth: 300-400 mm Description: Silty clay.

8.5.14.3 Artefact analysis

A total of five artefacts were recovered during the archaeological test investigation in this area. Cultural material was recovered from test pits 3, 5 and 6. Three of the artefacts were recovered from test pit 5 spit 3 (200 to 100 millimetres depth), one recovered from test pit 3 spit 1 (zero to 100 millimetres depth) and one recovered from test pit 6 spit 3 (200 to 100 millimetres depth). The assemblage consisted of one distal flake made of quartz, a complete flake made from indurated mudstone, an angular flake made from quartzite, a multiplatform core made of metamorphic material and a manuport made from silicified mudstone. The manuport has been recorded based on the stratigraphic context as no evidence of recent disturbance was identified at this depth and this material is unlikely to occur naturally at the location of the area investigated.

As noted, artefacts were made of a varied range of raw materials available in the region. Most of the artefacts were recovered from spit 3 (200 to 100 millimetres depth) suggesting that undisturbed subsurface deposits with potential archaeological material are present in the area. Based on the very low density and distribution of artefacts recovered in the investigated area it is determined that the assemblage recovered is representative of a low-density background scatter.

8.5.15 SVAS04

***Bioregion**: South Eastern Highlands* ***LGA**: Cootamundra-Gundagai* ***LALC**: Brungle/Tumut*

Testing within SVAS4 consisted of one transect established in a north-north-west to south-south-east alignment in order to sample the slope present in the vicinity. Test pit 1 was placed on the upper section of the slope and the transect continued down slope. A total of eight test pits were excavated within the transect with intervals of 10 metres between each test pit.

Figure 8-75 SVAS04 test pit locations

8.5.15.1 Landform

SVAS04 is located on a lower slope approximately seven metres to the east of a water catchment.

8.5.15.2 Soils disturbance and features

It was clear prior to the excavation of SVAS04 that the area has been subject to land clearance and has been used for grazing.

The soil profile across the transect showed relative consistency as the level of disturbance across the excavation area was similar. The topsoil (A1 Horizon) in many of the test pits has been removed due to grazing and redeposited sediment represents the upper unit of the soil profile within these test pits.

The stratigraphy of test pit 1 demonstrated strong evidence of disturbance as the original topsoil appears to have been removed and replaced with a sterile reddish-brown silty clay loam deposit, which contains no inclusions and no organic matter, with the exception of very few young grass roots. This therefore indicates that this silty clay loam deposit has been deposited very recently and as a result a topsoil (A1 Horizon) has not formed. The entire soil profile of test pit 1 consisted of a single unit of sterile, introduced sediment. No changes in the soil profile were identified, except for a gradual increase of soil compaction with depth until a layer of granite cobbles was reached at a depth of 400 millimetres.

Because of the hard compaction of the soil and the layer of granite cobbles, the B-Horizon layer could not be reached.

The upper unit of the soil profile present in test pit 1 was consistent with that evident in test pits 2 to 6 as the original topsoil has been removed and the upper units within these test pits consist of a sterile silty loam that contained very little organic matter, very few inclusions and young grass roots. The soil profiles in test pits 2 to 6 demonstrated a very diffuse horizon boundary, as a reddish-brown silty clay deposit lay below the upper unit from a depth of 200 to 250 millimetres. Inclusions of two to five per cent medium-sized gravels and very few (two per cent) charcoal fragments were present within this deposit. Other inclusions within this deposit included granite cobble ranging from 50 to 200 millimetres in length, increasing with quantity down-slope along the transect. The B-Horizon was only reached in test pit 3, which was identified at a depth of 450 millimetres and comprised of a compact, moist reddish-brown clay with inclusions of large granite cobbles.

The soil profile in test pits 7 to 10 demonstrated an increasing thinning of the topsoil as the upper unit comprised of a higher clay content and consisted of a silty clay loam that lacked organic matter with the exception of young grass roots and very few gravel inclusions (two to five per cent). The transition to the lower deposit, which comprised of a reddish-brown silty clay from a depth of 400 millimetres, was very diffuse across test pits 7 to 10. Large granite cobble inclusions ranging from 50 to 200 millimetres in length were present within this silty clay deposit. The B-Horizon was not reached in test pits 7 to 10 due to the evident ground disturbance present and the sterile composition of the soil profile.

Figure 8-76 Landscape view showing the landform unit along the transect

Figure 8-77 SVAS04 TP2

Figure 8-78 SVAS04 TP8

Table 8-23 SVAS04 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-200 mm Munsell: 2.5YR3/4 Description: silty clay loam. Very few gravel inclusions (2-5%). Young grass roots. Diffuse horizon boundary.
A2 Horizon	Depth: 150-600 mm Munsell: 2.5YR3/6 Description: Silty clay. Few gravel inclusions (2-10%), granite cobble inclusions (5%). Charcoal fragments present (2%). A diffuse horizon boundary.
B-Horizon	Depth: 400-500 mm Munsell: 2.5YR3/6 Description: Clay.

8.5.15.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.16 SVAS05

***Bioregion**:* South Western Slopes ***LGA**: Snowy Valleys* ***LALC**: Brungle/Tumut*

Testing within SVAS05 consisted of one transect established on a north-east-south-west alignment with a total of 8 test pits placed at intervals of 10 metres within the transect.

Figure 8-79 SVAS05 test pit locations

8.5.16.1 Landform

SVAS05 is located on a gently/moderately inclined slope within a valley. The transect is located approximately 400 metres south-west of Sandy Creek and 250 metres east of a low order creek.

8.5.16.2 Soils disturbance and features

Ground surface across the investigated area displayed evidence of disturbance associated with frequent land clearance. The area is potentially used seasonally for grazing and cropping. Approximately 10 metres north of the transect there is an underground service line running in an east west alignment with a pvc pipe sticking out every few metres. To the north of the transect between test pit 7 and 8 there is a fence line placed on an east-west alignment.

Soil profiles were consistent across the area investigated. Generally, the stratigraphic profile consisted of a silty clay loam topsoil (A1) with greater than 20 per cent grass root bioturbation and greater than 5 per cent small gravel inclusions with a clear horizon boundary overlying a silty clay loam deposit (A2) with negligible root bioturbation and greater than 20 per cent small quartz gravel inclusions. Below this deposit there is a layer of quartz gravel mixed with silty clay with an abrupt horizontal boundary overlying a silty clay deposit (B-horizon). The layer of quartz gravel decreased to the north of the transect, following the northern slope relief becoming as part of inclusions within test pit 8.

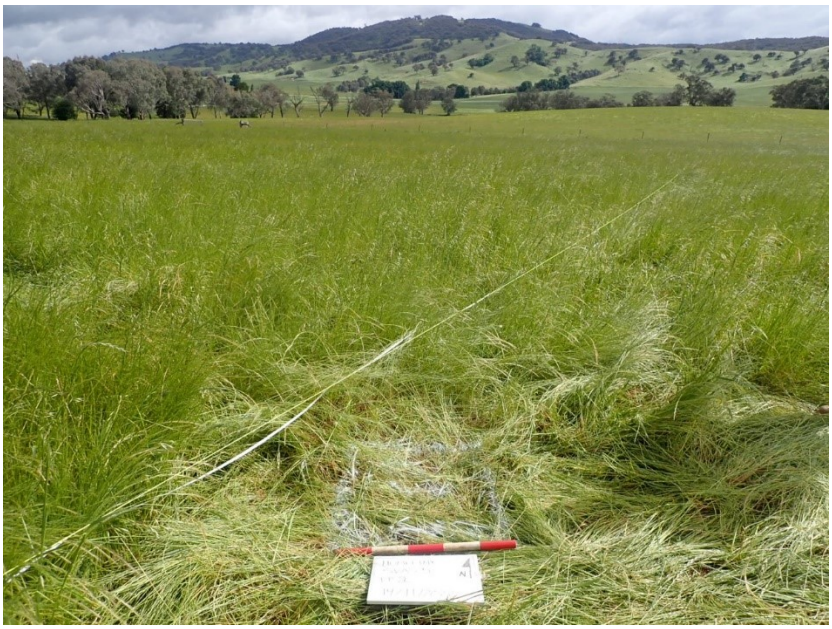


Figure 8-80 Landscape view showing the gradient of the slope along the transect

Figure 8-81 SVAS05 TP4

Figure 8-82 SVAS05 TP8

Table 8-24 SVAS05 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-100 mm Munsell: 5YR3/3 Description: Silty clay loam topsoil with >20% grass root bioturbation and >5% small gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 80-320 mm Munsell: 5YR4/3 Description: Silty clay. Few gravel inclusions (2-10%), granite cobble inclusions (5%). Charcoal fragments present (2%). A diffuse horizon boundary.
Lithologic layer	Depth: 240-350 mm Description: quartz cobbles (10-50mm diameter)
B-Horizon	Depth: 260-400 mm Munsell: 5YR5/6 Description: Silty clay.

8.5.16.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.17 CGAS01/02

***Bioregion**:* South Western Slopes ***LGA**: Cootamundra-Gundagai* ***LALC**: Brungle/Tumut*

Given access limitations, CGAS01 and CGAS02 were combined in one area. The site consisted of a transect established on a north-south alignment with a total of 17 test pits generally placed at intervals of 10 metres except for test pit 7 and 8 which were placed 15 metres apart and test pits 9 and 10 which were placed 25 metres apart to avoid boggy areas heavily disturbed by trampling.

Figure 8-83 CGAS01/02 test pit locations

8.5.17.1 Landform

CGAS01/02 is located on a moderately inclined mid slope with an eastern relief. The southern end of the transect intersects a tributary. A non-perennial creek line is located approximately 350 metres east of the investigated area. Adjungbilly Creek is located 1,850 metres south of the transect.

8.5.17.2 Soils, disturbance and features

Ground surface across the area displayed evidence of seasonal land clearance. Some areas were boggy and significantly disturbed by trampling were stock prints were sunk in the wet ground. The area is currently used for grazing. There is an artificial dam located 24 metres west of the transect which would have required deep ground disturbance around the area. There is also a fence line parallel to the established transect located approximately 10 metres west of the transect.

Soil profiles across the investigated area were generally consistent. In general, the stratigraphic profile consisted of a silty loam topsoil (A1) with greater than 20 per cent grass root bioturbation and a clear horizon boundary overlying a sandy clay loam deposit (A2) with less than 5 per cent grass root bioturbation and greater than 10 per cent quartz, ironstone and sandstone inclusions. Below this deposit a B-horizon was reached and consisted of moderately compacted wet silty clay to clay deposit.

Figure 8-84 CGAS01 Test Pit 4

Figure 8-85 CGAS01 TP7

Table 8-25 CGAS01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-160 mm Munsell: 10YR3/3 Description: Silty loam with >20% grass root bioturbation. Clear horizon boundary.
A2 Horizon	Depth: 100-480 mm Munsell: 10YR6/4 Description: Sandy clay loam deposit with <5% grass root bioturbation and >10% quartz, ironstone and sandstone inclusions. A diffuse horizon boundary.
B-Horizon	Depth: 280-500 mm Munsell: 10YR6/6 Description: Silty clay – clay.

8.5.17.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.18 CGAS03

***Bioregion**:* South Western Slopes ***LGA**: Cootamundra-Gundagai* ***LALC**: Brungle/Tumut*

Testing within CGAS03 consisted of one transect established in a north-south alignment. A total of 10 test pits were excavated within CGAS03 with intervals of 10 metres between each test pit.

Figure 8-86 CGAS03 test pit locations

8.5.18.1 Landform

CGAS03 is located on a gentle slope 80 metres north of a waterway and approximately 500 metres south of Yellow Clay Creek.

8.5.18.2 Soils disturbance and features

The soil profile across the transect showed variation, predominantly due to high levels of ground disturbance that was evident during the excavation process. It is clear from the soil profile of many test pits in this area that the topsoil (A1 Horizon) was introduced and that the area has been subject to modification in recent years. The evidence of disturbance within the test pits were indicated by the absence of a topsoil (A1 Horizon) in the soil profile.

Ground surface across CGAS03 has been subject to land clearance and has historically been used for various agricultural activity, including grazing and cropping.

The transect was located within two separate paddocks, with test pits 1 to 2 located north of a fence line that displayed strong evidence of disturbed soil. Test pits 3 to10 were excavated in a separate paddock south of the fence line, and which were also heavily disturbed and consisted of introduced soil present in the upper units of the soil profile.

The stratigraphic profile within test pits 1 and 2 consisted of a loosely compacted dark brown silty loam topsoil (A1 Horizon) with very few inclusions of charcoal (one per cent) and grass roots. A dark orange-

brown silty clay deposit was present below the A1 Horizon, and which consisted of few inclusions of charcoal (1 per cent) and gravel (two to five per cent). The water content within test pits 1 and 2 increased with depth, with few ironstone fragments present from a depth of 200 millimetres. The B-Horizon was reached in pit 1 at a depth of 500 millimetres, and which consisted of a dark orange-brown clay with few inclusions of ironstone fragments (2 per cent) present. The excavation in test pit 2 ceased prior to the B-Horizon being reached due to the disturbed and sterile composition of the soil profile.

The soil profile of test pits 3 to 10 south of the fence line displayed increasing levels of disturbance, predominantly caused by the redeposition of sediment in this section of the transect. The stratigraphy of many of the test pits south of the fence line (pits 3 to 10) lacked a topsoil formation, as indicated by the absence of leaching and any organic material. This redeposited soil in the upper unit of the soil profile consisted of a pale greyish-brown silty loam with no inclusions present. The redeposition of soil was evident predominantly in the upper 100 millimetres of the soil profile across test pits 3 to 10. This overlaid a pale brown silty clay loam deposit, which transitioned to a pale orange-brown silty clay from a depth of 300 to 400 millimetres. Quartz gravel inclusions within test pits 3 to 10 were present (five to 20 per cent), while charcoal fragments were also present (two per cent). Manganese flecks were also present in the lower soil profile, from a depth of 300 millimetres. The B-Horizon was not reached in test pits 3 to 9 due to the highly disturbed soil profile, however test pit 10 reached a compact, brownish-yellow clay B-Horizon at a depth of 400 millimetres.

Figure 8-87 CGAS03 TP1

Figure 8-88 CGAS03 Test Pit 6

Table 8-26 CGAS03 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-150 mm Munsell: 7.5YR4/3 Description: silty loam. 5% grass roots bioturbation. A clear horizon boundary.
A2 Horizon	Depth: 80-500 mm Munsell: 7.5YR4/6 Description: Silty clay. Charcoal fragments (2-5%), gravel (5-20%) and manganese (2%) present. A clear horizon boundary.
B-Horizon	Depth: 400-500 mm Munsell: 7.5YR5/8 Description: Clay.

8.5.18.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.19 CGAS04

***Bioregion**:* South Western Slopes ***LGA**: Cootamundra-Gundagai* ***LALC**: Brungle/Tumut*

Testing within CGAS04 consisted of a transect established on a north-east-south-west alignment with a total of 10 test pits placed at intervals of 10 metres within the transect.

Figure 8-89 CGAS04 test pit locations

8.5.19.1 Landform

CGAS04 is located on a gently inclined slope leading downslope towards Yellow Clay Creek, which is approximately 110 metres east of the transect.

8.5.19.2 Soils, disturbance and features

The site displays evidence of ground surface disturbance associated with land clearance and grazing. Other forms of disturbance include the construction of the vehicle access track 20 metres south-west of the transect and the installation of property fence lines directly adjacent to the western end of the transect.

Soil profiles were relatively consistent across the area investigated, however, differed in depths of deposits as the transect headed downslope. Generally, the soil profile consisted of a silty loam topsoil (A1) with greater than 20 per cent grass root bioturbation and common (five to 20 per cent) coarse quartz gravel inclusions. Bioturbation caused by insects and ant nests were also identified in many of the test pits within the A1 Horizon. This deposit overlaid a pale greyish-brown silty clay loam (A2) with less than 5 per cent grass root bioturbation and common (five to 25 per cent) fine quartz gravel inclusions as well as degraded ironstone fragments towards the base of the A2 Horizon. This transitioned to a reddish-brown, compact clay (B-Horizon) with common (five to 20 per cent) degraded ironstone fragments present. Manganese flecks were also identified in the B-Horizon deposit, increasing with quantity downslope towards Yellow Clay Creek.

Figure 8-90 Landscape view showing the gradient of the slope

Figure 8-91 CGAS04 Test Pit 4

Figure 8-92 CGAS04 Test Pit 10

Table 8-27 CGAS04 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-140 mm Munsell: 7.5YR3/4 Description: Silty loam. >20% grass root bioturbation and 5-20% coarse quartz gravel inclusions. A clear horizon boundary.
A2 Horizon	Depth: 110-500 mm Munsell: 7.5YR4/6 Description: Silty clay loam deposit (A2) with <5% grass roots and 5-25% quartz gravel inclusion and ironstone fragments. A clear horizon boundary.
B-Horizon	Depth: 180-600 mm Munsell: 7.5YR6/8 Description: Compact, dry clay. Common (5-20%) ironstone fragments and manganese flecks.

8.5.19.3 Artefact analysis

A total of seven artefacts were recovered during the archaeological test investigation within this site. Cultural material was only identified within test pit 9 and characterised by a low-density deposit. Three (42.85 per cent) artefacts were recovered from spit 1 (zero to 100 millimetres depth), two (28.57 per cent) artefacts were recovered from spit 2 (100 to 200 millimetres depth) and two (28.57 per cent) were recovered from spit 3 (200 to 300 millimetres depth).

The assemblage consisted of two (28.57 per cent) complete flakes, one (14.28 per cent) distal flake, two (28.57 per cent) longitudinally split flakes, one (14.28 per cent) proximal flake and one (14.28 per cent) backed tool. Of these, three (42.85 per cent) were made from silcrete, three (42.85 per cent) from silicified mudstone and one (14.28 per cent) from quartzite.

Figure 8-93. Ventral view of longitudinally split flake (CGAS04, TP9A, Spit 1)

Figure 8-94. Dorsal view of longitudinally split flake (CGAS04, TP9A, Spit 1)

The low density and distribution of artefacts indicate that the area has been subjected to ground disturbance in which potential archaeological deposits that were present in the area have been displaced. The assemblage recovered represents a low background scatter potentially associated to routes of transportation to and from water sources.

8.5.20 YAS01

***Bioregion**:* South Western Slopes ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within YAS01 consisted of one transect that was established on an east-west alignment. A total of nine test pits were excavated within the transect with intervals of 10 metres between each test pit.

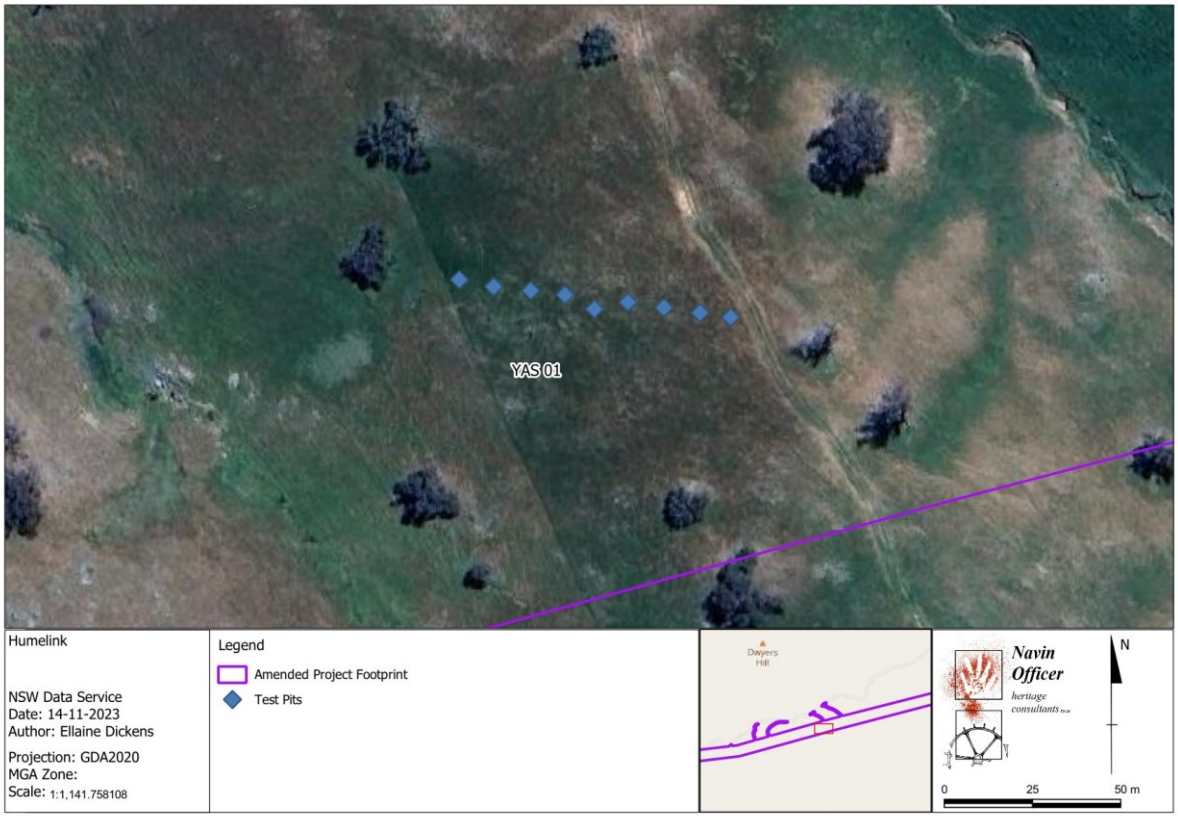


Figure 8-95 YAS01 test pit locations

8.5.20.1 Landform

YAS01 is located on a moderately inclined hillslope situated in between two 1st order tributaries associated with Oak Creek. One of the 1st order creek lines is located 30 metres west of the transect while the other is located 40 metres east of the transect.

8.5.20.2 Soils, disturbance and features

General disturbances identified across the site are associated with land clearance. However, with the exception of initial land clearance, there is minimal evidence of ground disturbance in the vicinity. The low level of disturbance present is consistent with the soil profile and the presence of artefacts within the test pits.

In general, the stratigraphic profile across the investigated area consisted of a sandy loam topsoil (A1) with more than 20 per cent of grass root bioturbation and common inclusions (five to 30 per cent) of sandstone gravel and cobbles. The topsoil deposit overlays a sandy clay loam deposit (A2) with less than 5 per cent grass root bioturbation and common to abundant inclusions (10 to 50 per cent) of sandstone cobbles and boulders. Very few (one to two per cent) charcoal fragments associated with burnt tree roots were also identified within the A2 Horizon. Below this deposit, the B-horizon was reached, and it consisted of weakly compacted clay with few (five to10 per cent) degraded ironstone fragments and very few (one to two per cent) fine charcoal fragments present.

Figure 8-96 Landscape view showing the landform units within the vicinity of the transect

Figure 8-97 YAS01 Test Pit 1 Expansion

Figure 8-98 YAS01 Test Pit 3

Table 8-28 YAS01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-170 mm Munsell: 7.5YR5/6 Description: sandy loam. Abundant grass roots bioturbation. Common (5-30%) sandstone gravel and cobble inclusions. A clear horizon boundary.
A2 Horizon	Depth: 50-500 mm Munsell: 7.5YR7/6 Description: Silty clay. Common sandstone cobble and boulder inclusions gravel inclusions. Charcoal fragments (1-2%) also present. A clear horizon boundary.
B-Horizon	Depth: 250-500 mm Munsell: 7.5YR7/8 Description: Clay. Few (<10%) degraded ironstone fragments and very few (1-2%) fine charcoal fragments present.

8.5.20.3 Artefact analysis

Cultural material was recovered from test pits 1, 2, 5 and 7 with a total of 19 artefacts recovered during the archaeological test excavation within this area. All of the artefacts were recovered from a depth of zero to100 millimetres. Artefact distribution was characterised by a low-density deposit distributed across the area investigated. However, most of the artefacts were recovered from test pit 5.

Table 8-29 YAS01 artefact numbers per pit

Test Pit	Artefacts	Per centage of the total site assemblage
1	1	5.26 %
2	2	10.52 %
5	15	78.94%
7	1	5.26%

Silicified mudstone was the most common raw material used within the assemblage identified with 15 (78.94 per cent) artefacts made out of this material. Three (15.78 per cent) artefacts were made of quartz and one (5.26 per cent) was made of indurated mudstone. This range of materials is typically found in the region.

The assemblage consisted of six (31.57 per cent) complete flakes, three (15.78 per cent) longitudinally split flakes, one distal flake (5.26 per cent), one (5.26 per cent) medial flake, seven (36.84 per cent) angular flakes and one (5.26 per cent) multiplatform core.

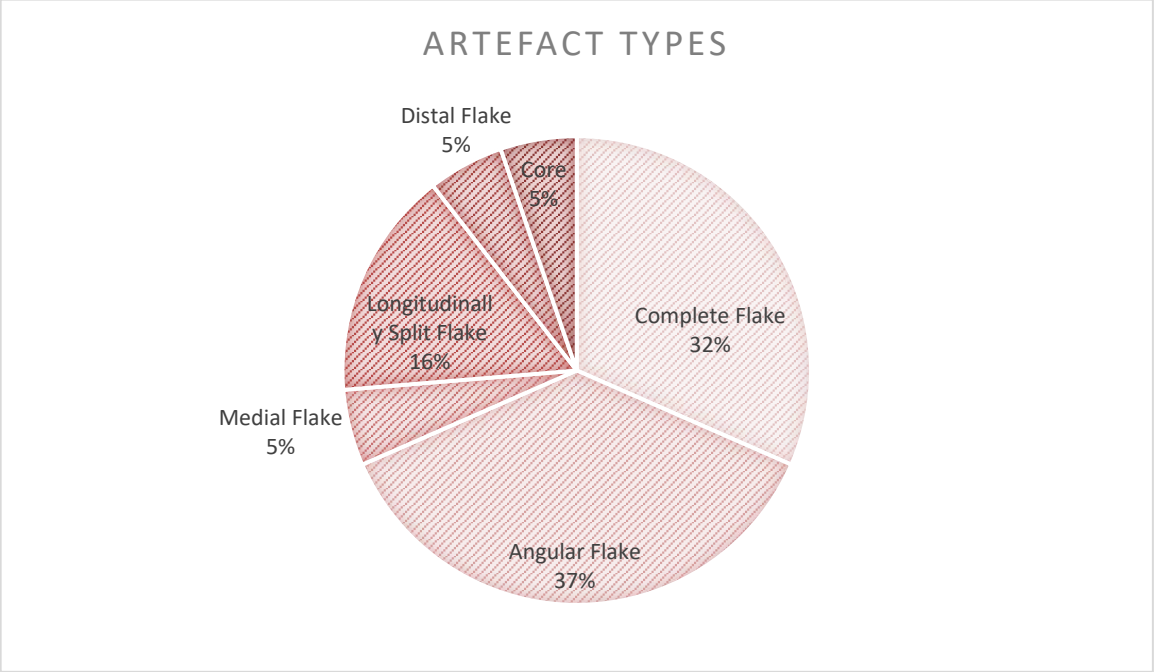


Figure 8-99 YAS01 artefact types

Figure 8-100. Multiplatform core made from silicified mudstone (YAS01 TP5A Spit 1 [3])

Figure 8-101. Multiplatform core made from silicified mudstone (YAS01 TP5A Spit 1 [3])

Most of the assemblage consisted of fragmented artefacts and complete flakes with no evidence of use wear. The identified assemblage, particularly the higher density and distribution localised within test pit 5 potentially represents an occupation event. It is not considered to be a long-term or seasonal occupation.

8.5.21 YAS02

***Bioregion**: South Eastern Highlands* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within YAS02 consisted of two transects, both of which were established on an east-west alignment. A total of six test pits were excavated in transect 1 (southern transect), while two test pits were excavated in transect 2 (northern transect), with intervals of 10 metres between each test pit.

Figure 8-102 YAS02 test pit locations

8.5.21.1 Landform

YAS02 is located on a gently inclined slope approximately 40 metres west of Jugiong Creek.

8.5.21.2 Soils, disturbance and features

Ground surface across the area displays evidence of land clearance. High levels of soil erosion are evident on the bank of Jugiong Creek in close vicinity to the investigation area.

The soil profiles across the assessed area were relatively consistent in terms of composition, depth and inclusion percentage. In general, the stratigraphic profile consisted of a silty loam topsoil (A1) with abundant (greater than 20 per cent) grass root bioturbation and common (10 to 30 per cent) quartz and sandstone gravel and cobble inclusions. The A1 Horizon overlayed a moist silty clay (A2) that consisted of common (10 to 40 per cent) sandstone cobble and boulder inclusions, very few fine grass roots (one to two per cent) and very few (one to two per cent) fine charcoal fragments associated with burnt tree roots. The B-Horizon consisted of a wet, compact silty clay to clay.

In many instances, particularly downslope, the water table was hit at shallow depths prior to the B-Horizon being reached.

Figure 8-103 YAS02 Flooded Test Pit 1 showing the bank of Jugiong Creek in the background

Figure 8-104 YAS02 Test Pit 4

Table 8-30 YAS02 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-220 mm Munsell: 7.5YR3/1 Description: silty loam. Abundant grass roots bioturbation. Common (10-30%) quartz and sandstone cobble inclusions. A gradual horizon boundary.
A2 Horizon	Depth: 60-450 mm Munsell: 2.5YR4/3 Description: Silty clay. Common sandstone cobble and boulder inclusions. Charcoal fragments (1-2%) also present. A clear horizon boundary.
B-Horizon	Depth: 400-600 mm Munsell: 5YR5/6 Description: Clay. Few (<10%) sandstone cobble inclusions.

8.5.21.3 Artefact analysis

A total of 37 artefacts were recovered during the archaeological test excavation within this area. Cultural material was recovered from test pits 2 and 5 within spit 1 (zero to 100 millimetres depth) and spit 2 (100 to 200 millimetres depth). The assemblage consisted of 10 complete flakes, five longitudinally split flakes, one proximal flake, one medial flake, two distal flakes, a multiplatform core and a bipolar core, a steep edge scraper, two backed artefacts and 13 angular flakes.

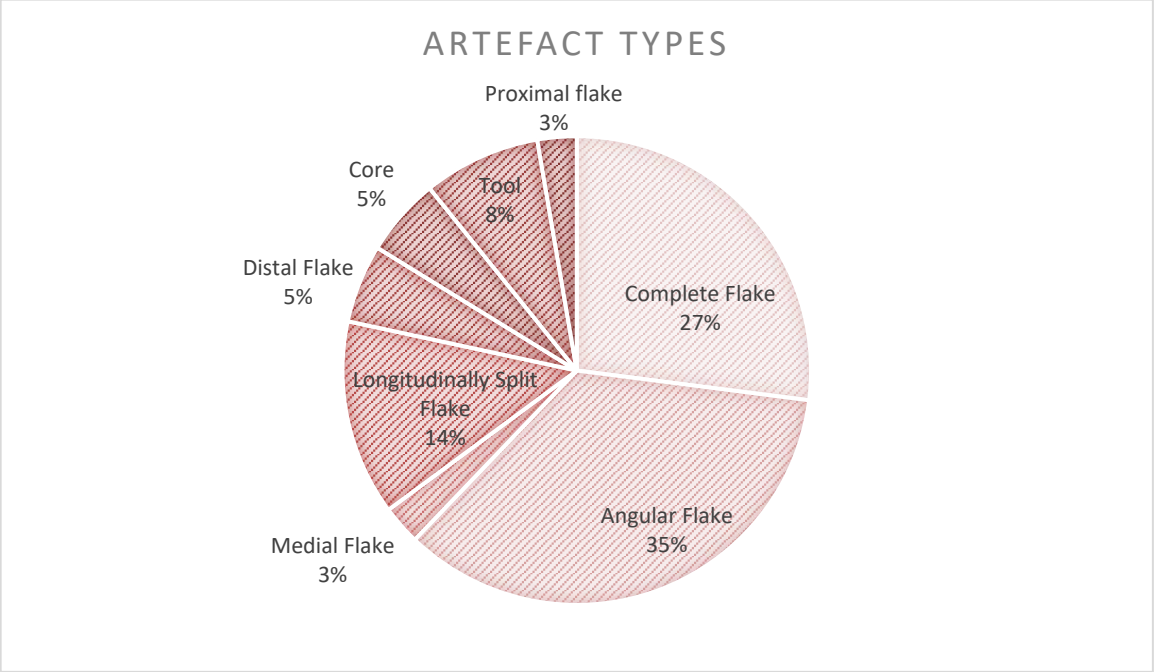


Figure 8-105 YAS02 artefact types

Figure 8-106 Multiplatform core made from indurated mudstone (YAS02 TP2B Spit 2)

Figure 8-107 Multiplatform core made from indurated mudstone (YAS02 TP2B Spit 2)

Figure 8-108 Steep edge scraper made from indurated mudstone (YAS02 TP5A Spit 1 [4])

Figure 8-109 Steep edge scraper made from indurated mudstone (YAS02 TP5A Spit 1 [4])

As noted above, angular flakes and complete flakes with no visible evidence of use wear dominate the assemblage. There is a considerably high presence of fragmented artefacts and a low presence of tool types and cores. As the cores identified do not present evidence of cortex and only a small percentage (n=3, 8.1 per cent) had some amount of cortex, the assemblage is considerate to represent late stages of reduction during knapping events and that primary reduction was likely to have occurred elsewhere. Indurated mudstone was the predominant raw material within the assemblage with a total of 31 artefacts made from this material. Four artefacts were made of quartz and two from silicified mudstone. This range of raw materials are typically found in the region.

Artefact distribution was characterised by a moderate density deposit present at the centre of the area investigated. The proximity to the creek and the presence of water tables in the area during the test investigation suggest that artefact distribution between the spits probably indicates natural artefact movement through the soil profile. Furthermore, the conditions of the stratigraphic profile assessed during the test investigation suggest that the identified levels of soil erosion and ground disturbance associated with grazing have had a significant effect on the density and distribution of artefacts in the area The assemblage is likely to represent different occupation events in the area. The proximity to water and the elevated location of the area investigated is consistent with the sensitivity model demonstrating high potential for cultural activity in the area. The assemblage recovered during the archaeological test investigation is considered to represent a focused used of the landscape. The presence of cores and the high presence of angular flakes and complete flakes with no evidence of use wear within the assemblage suggest knapping activity. It is likely that the assemblage represents an accumulation of multiple short visits to the landscape rather than a long-term occupation. Therefore, the archaeological test investigation has demonstrated the presence of archaeological deposits in the area.

8.5.22 YAS03

***Bioregion**: South Eastern Highlands* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within this area consisted of a transect established on a north-north-west to south-south-east alignment with a total of 10 test pits placed at intervals of 10 metres within the transect. Some test pits were placed outside of the amended project footprint to avoid areas of apparent ground disturbance along the transect alignment.

Figure 8-110 YAS03 test pit locations

8.5.22.1 Landform

YAS03 is located on a gently inclined slope approximately 30 metres west of Talmo Road and 80 metres west of Jugiong Creek. The investigation area is also located approximately 300 metres east of a 1st order tributary associated with Oak Creek.

8.5.22.2 Soils, disturbance and features

Ground surface disturbance identified in the investigation area was associated with land clearance and various levels of agricultural activity. An artificial dam is located to the immediate south of the transect.

In general, the soil profile across the investigated area consisted of a silty loam topsoil (A1) with abundant greater than 20 per cent grass root bioturbation and few (less than 10 per cent) fine quartz gravel inclusions and very few fine charcoal fragments associated with burnt tree roots. The A1 Horizon overlays a silty clay deposit (A2) with very few (less than 10 per cent) fine to medium-sized gravel inclusions of quartz and ironstone. In some test pits, very few small charcoal fragments were identified. Below the A2 Horizon, lay a wet, weakly compacted clay deposit (B-Horizon) that consisted of few (10 per cent) fine gravel inclusions of ironstone.

Figure 8-111 Landscape view showing the gradient of the slope in the vicinity of the transect

Figure 8-112 YAS03 TP2

Figure 8-113 YAS03 TP3

Table 8-31 YAS03 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-160 mm Munsell: 5YR6/4 Description: silty loam. Abundant (>20%) grass roots bioturbation. A clear horizon boundary
A2 Horizon	Depth: 70-320 mm Munsell: 5YR6/2 Description: Silty clay. Few (<10%) quartz and ironstone gravel inclusions. Charcoal fragments (1-2%) also present. A clear horizon boundary.
B-Horizon	Depth: 200-400 mm Munsell: 5YR9/6 Description: Clay. Few (<10%) ironstone gravel inclusions.

8.5.22.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.23 YAS04

***Bioregion**: South Eastern Highlands* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within this area consisted of one transect established on an east-west alignment with a total of 11 test pits placed at intervals of 10 metres within the transect.

Figure 8-114 YAS04 test pit locations

8.5.23.1 Landform

YAS04 is located on a gently inclined lower slope approximately 150 metres east of a 2nd order tributary associated with Bogolong Creek. The investigated area is also located 200 metres south of a 1st order tributary associated with Bogolong Creek.

8.5.23.2 Soils, disturbance and features

The area displayed evidence of ground surface disturbance associated with land clearance. Two small artificial dams are located 100 metres to the east of the transect. Disturbance is also associated with the construction of the existing transmission line structures located 50 metres south-east of the transect.

The soil profile demonstrated consistency across the investigated area. Overall, the stratigraphic profile comprised of a sandy loam topsoil (A1) with abundant (greater than 20 per cent) grass root bioturbation and common (10 to 20 per cent) sandstone gravel inclusions with a clear horizon boundary overlaying a sandy clay deposit (A2) with many (20 to 50 per cent) sandstone gravels and cobbles present. Some of the test pits contained very few (less than 2 per cent) charcoal fragments that are associated with burnt tree roots. This deposit transitioned to a wet, weakly compacted clay (B-Horizon) with common (10 to 20 per cent) degraded sandstone gravel inclusions present.

Figure 8-115 Landscape view showing the landform unit associated with the transect

Figure 8-116 YAS04 TP7

Figure 8-117 YAS04 TP10

Table 8-32 YAS04 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-180 mm Munsell: 7.5YR6/4 Description: sandy loam. Abundant (>20%) grass roots bioturbation. Common (10-20%) sandstone gravel inclusions. A clear horizon boundary.
A2 Horizon	Depth: 50-300 mm Munsell: 10YR9/6 Description: sandy clay. Many (20-50%) sandstone gravel and cobble inclusions. Charcoal fragments (<2%) also present. A clear horizon boundary.
B-Horizon	Depth: 250-400 mm Munsell: 10YR9/4 Description: Clay. Common (10-20%) degraded ironstone gravel inclusions.

8.5.23.3 Artefact analysis

Cultural material was recovered from test pits 1 and 7 with a total of five artefacts identified within the area investigated.

The assemblage consisted of three angular flakes recovered from test pit 7 and two complete flakes recovered from test pit 1. All of the artefacts were recovered from spit 1 with a ranging depth of zero to 100 millimetres. Of these, two artefacts were made of silicified mudstone, two from indurated mudstone and one from quartz. These materials occur naturally in the region.

The low density and distribution of artefacts indicate that the area has been subjected to ground disturbance in which potential archaeological deposits that may have been in the area have been displaced. The assemblage recovered represents a low background scatter potentially associated to routes of transportation to and from water sources.

8.5.24 YAS05

***Bioregion**: South Western Slopes* ***LGA**: Yass Valley* ***LALC**: Onerwal*

Testing within this area consisted of one transect established on an east-west alignment with a total of 5 test pits placed at intervals of 10 metres within the transect.

Figure 8-118 YAS05 test pit locations

8.5.24.1 Landform

YAS05 is located on a lower slope floodplain and is located 100 metres south of a 3rd order tributary associated with Bango Creek. A 1st order tributary associated with Yellow Creek is also located approximately 300 metres south of the investigated area.

8.5.24.2 Soils, disturbance and features

Ground surface displayed evidence of land clearance associated with various agricultural activity. Two artificial dams are located in the vicinity of the transect, including one being located 60 metres south-west of the transect and another located 100 metres north of the transect. The investigated area is also located approximately 80 metres north-west of a transmission line structure. Due to the very extensive grass coverage across the area, no ground surface visibility was present.

Due to the nature of the landform, being located on a lower slope of a floodplain, the water table was hit at shallow depths across the entirety of the investigated area. As such, four of the five test pits were flooded prior to the B-Horizon being reached. Generally, the stratigraphic profile consisted of a silty loam topsoil (A1) with abundant (20 to 25 per cent) grass root bioturbation and few (one to 10 per cent) fine-medium sized sandstone gravel inclusions present. This transitioned to a weakly compacted silty clay loam deposit (A2) with common (10 to 20 per cent) fine sandstone and ironstone gravel inclusions. Test pit 3 was the only test pit in which the B-Horizon was reached, which consisted of a weakly compacted, wet sandy clay with few (2 to 10 per cent) fine ironstone fragments. Water began seeping

through the base of test pit 3 shortly after the B-Horizon was reached at a depth of 250 to 300 millimetres.

Figure 8-119 Landscape view showing the landform unit along the transect

Figure 8-120 YAS05 TP3

Table 8-33 YAS05 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-150 mm Munsell: 5Y6/8 Description: silty loam. Abundant (>20%) grass roots bioturbation. Few (1-10%) sandstone gravel inclusions. A clear horizon boundary.
A2 Horizon	Depth: 80-300 mm Munsell: 5Y8/4 Description: silty clay loam. Common (10-20%) sandstone and ironstone gravel inclusions. Charcoal fragments (1-2%) also present. A diffuse horizon boundary.
B-Horizon	Depth: 250-300 mm Munsell: 5Y7/5 Description: Clay. Few (2-10%) fine ironstone gravel inclusions.

8.5.24.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.25 ULAS01

***Bioregion**: South Eastern Highlands* ***LGA**: Upper Lachlan* ***LALC**: Onerwal*

Testing within this area consisted of a transect established on a north-west-south-east alignment within the boundaries of the PAD. A total of 10 test pits were placed within the transect with intervals of 10 metres between each test pit.

Figure 8-121 ULAS01 test pit locations

8.5.25.1 Landform

ULAS01 is located on a gently inclined slope within a floodplain area. Flacknell Creek, a perennial creek, runs 180 metres east of the area investigated. There is also evidence of a tributary approximately 85 metres north of the transect.

8.5.25.2 Soils, disturbance and features

Ground surface displayed evidence of extensive land clearance. The site is located 25 metres north of an existing transmission line and 45 metres north-west of a transmission line structure. The transect is located 85 metres east of Flacknell Creek Road. Two artificial dams were identified near the transect, one is located 157 metres north-east and the other was located 147 metres south-east of the investigated area. A residential house is located 125 metres to the south of the transect and the area is currently used for grazing.

Soil profiles across the area are consistent with the disturbances identified within proximity to the area investigated. Ground disturbance has resulted in the formation of a topsoil directly above a sterile wet clay deposit with the absence of a mineral soil formation in between. The general stratigraphic profile in the area investigated consisted of a silty loam topsoil (A1) with greater than 20 per cent grass root bioturbation and greater than 10 per cent ironstone and mudstone inclusion with an abrupt horizon

boundary overlaying a silty clay to clay deposit (B-horizon). Test pits 7, 9 and 10 contain coarse mudstone clasts within the B-horizon deposit.

Figure 8-122 ULAS01Test Pit 6

Table 8-34 ULAS01 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-11 0mm Munsell: 7.5YR5/6 Description: Silty loam with >20% grass root bioturbation and 10% fine to medium ironstone and mudstone clasts inclusions. Clear horizon boundary.
B-Horizon	Depth: 80-200 mm Munsell: 7.5YR7/8 Description: Silty clay to clay. Coarse mudstone clasts inclusions.

8.5.25.3 Artefact analysis

No artefacts were identified within this area during the archaeological test excavation program.

8.5.26 ULAS02

***Bioregion**: South Eastern Highlands* ***LGA**: Upper Lachlan* ***LALC**: Onerwal*

Testing within ULAS02 consisted of two transects, both of which were established on a north-south alignment. A total of seven test pits were excavated in transect 1 (eastern transect), while three test pits were excavated in transect 2 (western transect), with intervals of 10 metres between each test pit. Some test pits were placed outside of the amended project footprint in order to avoid the drainage line in the north part of the transect.

Figure 8-123 ULAS02 test pit locations

8.5.26.1 Landform

ULAS02 is located on a moderately-inclined hillslope approximately 200 metres north of Jerrawa Creek.

8.5.26.2 Soils, disturbance and features

The ground surface across the excavation area ULAS02 displayed evidence of land clearance as very few trees existed in the vicinity. The area has been used for various agricultural activity in the past, including grazing.

The stratigraphy of the test pits differed across ULAS02, displaying variation across all units of the soil profile. The upper units of the soil profile within test pits 1 to 6 in transect 1 comprised of a dark brown silty loam topsoil (A1 Horizon) with very few fine gravel inclusions (less than two per cent) ranging from two to six millimetres in length. There is evidence of topsoil thinning and the minimal organic matter and lack of inclusions present in this upper unit indicates that it is a recently formed topsoil deposit. The A2 Horizon within test pits 1 to 6 ranged from a moist silt to a moist silty clay with an increasing percentage of fine gravel inclusions (five to 10 per cent). Other inclusions within the A2 Horizon in test pits 1 to 5 included fine charcoal fragments ranging from 10 to 20 millimetres in diameter. The B-

Horizon was not reached in test pit 1 and 3 as the water table was hit at a depth of 350 millimetres in test pit 1 and 400 millimetres in test pit 3. The B-Horizon in test pits 2, 4, 5 and 6 was relatively consistent and comprised of a compact, reddish-brown clay with frequent gravel inclusions. Overall, the soil profile in test pits 1 to 6 in transect 1 displayed low levels of disturbance, which is further demonstrated by the recovery of lithic artefacts in test pits 2 and 5.

The soil profile of test pit 7 demonstrated higher levels of disturbance in the upper units. The topsoil deposit has been removed, most likely from recent grading. The upper unit of the soil profile in test pit 7 consists of a compact, reddish-brown silty clay with no inclusions. This transitioned to a moist, compact red clay B-Horizon at a depth of 200 millimetres.

The soil profile of test pits 1 to 3 in transect 2 were similar to that of test pits 1 to 6 in transect 1, as they all displayed evidence of topsoil thinning in the upper units. The topsoil (A1 Horizon) consisted of a dark brown silty loam with relatively high per centages of gravel and quartz cobble inclusions (20 per cent) present. This transitioned to a silty clay loam with an increasing water content. The depth of the transition to the B-Horizon varied from test pits 1 to 3 in transect 2 from 200 to 330 millimetres. This comprised of an orange-brown clay with few gravel inclusions (one to 10 per cent) and very few fine charcoal fragments caused by burnt tree roots.

Figure 8-124 Pre-excavation view of Test Pit 1 showing the gradient of the slope

Figure 8-125 ULAS02 Test Pit 2 Expansion

Figure 8-126 ULAS02 Test Pit 3

Table 8-35 ULAS02 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-150 mm Munsell: 7.5YR3/4 Description: silty loam. Very few (2-4%) gravel inclusions. 5% grass roots bioturbation. A diffuse horizon boundary.
A2 Horizon	Depth: 50-350 mm Munsell: 7.5YR4/6 Description: Silty clay. Charcoal fragments (2-5%), gravel (5-10%). A diffuse horizon boundary.
B-Horizon	Depth: 150-300 mm Munsell: 5YR4/6 Description: Clay.

8.5.26.3 Artefact analysis

A total of 32 artefacts were recovered during the archaeological test excavation within this area. Cultural material was recovered from test pits 2, 4 and 5 within spit 1 (zero to 100 millimetres depth), spit 2 (100 to 200 millimetres depth), spit 3 (200 to 300 millimetres depth) and spit 4 (300 to 400 millimetres depth).

The recovered assemblage consisted of 12 complete flakes, two longitudinally split flakes, three proximal flakes, three distal flakes, two multiplatform cores, one tool identified as a backed point and nine angular flakes. Cores identified did not present evidence of cortex and only a small percentage (n=2, 6.25 per cent) had some amount of cortex, the assemblage is considerate to represent late stages of reduction during knapping events and that primary reduction was likely to have occurred elsewhere.

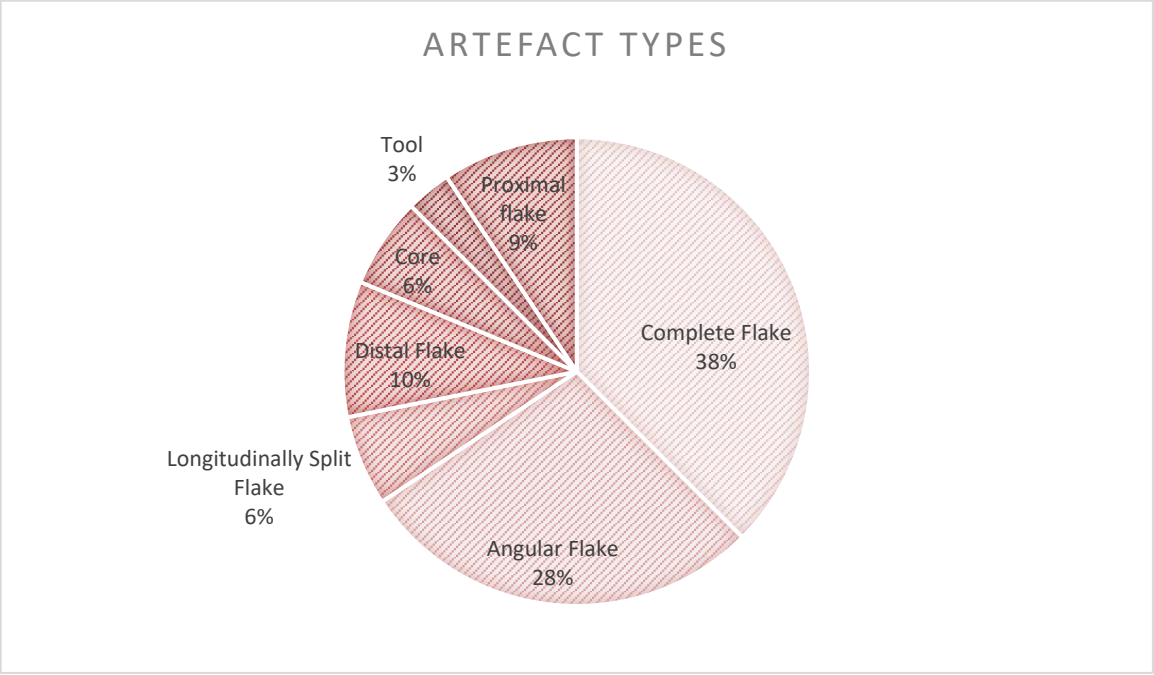


Figure 8-127 ULAS02 artefact types

Most of the artefacts recovered were made from indurated mudstone (n=14, 43.75 per cent) followed by quartz (n=9, 28.12 per cent) and silcrete (n=7, 21.87 per cent). There is also a small presence of other raw materials such as quartzite (n=1, 3.12 per cent) and silicified mudstone (n=1, 3.12 per cent) in the assemblage. These types of raw materials naturally occur in the region, however, silcrete is not as common which suggests that the high presence of this type of raw material in the area is indicative of long occupation events.

Figure 8-128. Multiplatform core made from silcrete (ULAS02 TP2C Spit 1)

Figure 8-129. Multiplatform core made from silcrete (ULAS02 TP2C Spit 1)

Figure 8-130. Multiplatform core made from silcrete (ULAS02 TP5A Spit 2)

Figure 8-131. Multiplatform core made from silcrete (ULAS02 TP5A Spit 2)

Artefact distribution was concentrated at the centre east of the investigated area. Vertical distribution exhibited a gradual increase of artefact density from spits 1 to 3 with a drastic decrease in spit 4 (N=1). The sudden decrease of artefacts within spit 4 suggests the potential vertical movement of the artefact but likely to be part of the same deposit as the ones recovered from spit 3. The identified concentration of the archaeological deposit at the centre east of the area investigated is associated with the conditions of the landscape and the nearby disturbances in the area.

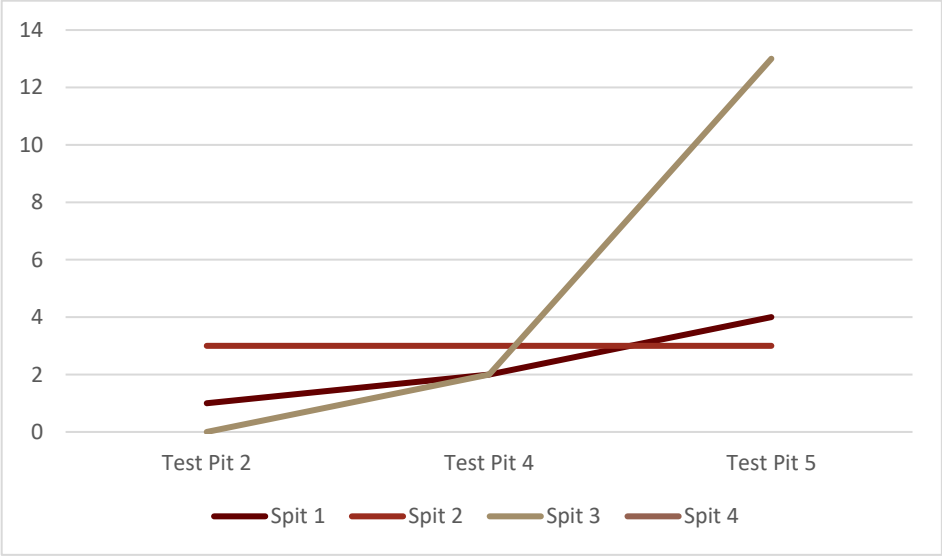


Figure 8-132 ULAS02 artefact numbers per pit and spit

The assemblage density and distribution is considered to represent a series of knapping events and a continuous use of the landscape. The archaeological test investigation demonstrated the presence of intact archaeological deposits in the area.

8.5.27 ULAS03

***Bioregion**: South Eastern Highlands* ***LGA**: Upper Lachlan* ***LALC**: Onerwal*

The site consists of two transects established on a north-west south-east alignment parallel to each other 10 metres apart. Transect one consisted of eight test pits placed at 10 metre intervals within the transect. 10 test pits could not be placed within this transect as the area to the north of the transect was very wet and swampy and some sections in this area were underwater.

Transect 2, established 10 metres to the south of transect one, consisted of two test pits placed at 10 metre intervals within the transect and in alignment with test pits 1 and 2 of transect 1.

Figure 8-133 ULAS03 test pit locations

8.5.27.1 Landform

ULAS03 is located on a moderately-inclined upper slope. To the north of the site, approximately 100 metres from the northern end of transect one, Dowlings Creek runs in an east west alignment and to the east, approximately 250 metres the site is surrounded by the confluence with Sams Creek and to the west approximately 200 metres by Oolong Creek. These low order creeks surrounding the site merged from Jerrawa Creek, a perennial creek located approximately 320 metres west from the site.

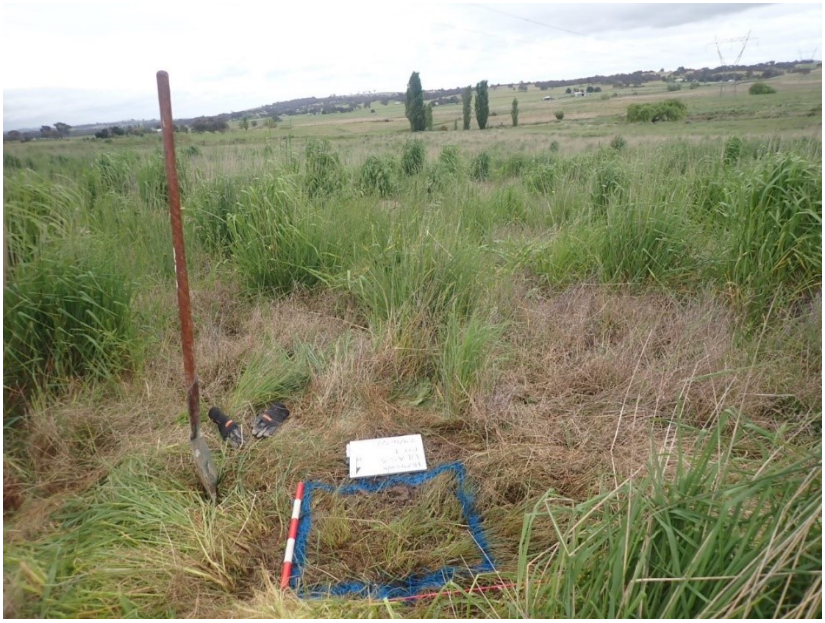


Figure 8-134 Landscape view showing the gradient of the slope

8.5.27.2 Soils disturbance and features

Ground surface across the investigated area displayed evidence of extensive land disturbance. The transects were located 15 metres west of a graded access road track and 25 metres west of a residential farm complex. A transmission line structure is located 60 metres south-east of the transect and an artificial dam was identified 130 metres south-east of the investigated area. The area also displays evidence of land clearance and soil erosion. A catchment pit for irrigation was identified approximately 8 metres west of transect 1 near test pit 6.

Soil profiles across the investigated area varied mainly as a result of extensive ground disturbance associated with land clearance, potential grading and soil redeposition, particularly to the north of the transect. The stratigraphic profile of test pit 7 within transect one clearly displayed evidence of soil disturbance and redeposition as the topsoil deposit sits above a silty clay layer identified as a B-horizon on more uniform profiles in the area and then reoccurring again below the clay deposit. Glass, plastic and charcoal inclusions were identified across the material excavated within this test pit.

Figure 8-135 ULAS03 T1 TP7 – Redeposit soils (Bottom deposit same as top deposit). Glass and plastic identified on both deposits

Soil profiles to the south of transect 1 and within transect 2 displayed a more uniform stratigraphic profile with soil disturbance associated with land clearance but with no evidence of soil redeposition.

The more uniform and less disturbed stratigraphic profile identified within the investigated area consisted of a silty clay loam tops soil deposit (A1) with greater than 20 per cent fine grass root bioturbation and greater than 5 per cent small quartz gravel inclusion with a clear horizon boundary overlaying a wet moderately compacted silty clay deposit (A2) with less than10 per cent grass root bioturbation and greater than 15 per cent quartz gravel inclusions including some quartz cobbles (200 to 300 millimetres). This deposit sat above a wet deposit of silty clay to clay (B-horizon moderately compacted with greater than 10 per cent inclusions of small quartz gravel and mudstone clasts. Some test pits, including test pit 1 and 2 of transect 2, lacked an A2 horizon formation potentially as a result of extensive land clearance.

Figure 8-136 ULAS03 T1 TP1

Table 8-36 ULAS03 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-180 mm Munsell: 10YR3/2 Description: Silty loam with 20% grass bioturbation and 5% quartz inclusions. A diffuse horizon boundary.
A2 Horizon	Depth: 100-340 mm Munsell: 2.5YR5/3 Description: Silty clay. with <10% grass root bioturbation and >15% quartz gravel inclusions including some quartz cobbles (200-300 mm). A clear horizon boundary.
B-Horizon	Depth: 150-300 mm Munsell: 10YR5/6 Description: Silty clay - clay. > 5% quartz and mudstone clasts inclusions.

8.5.27.3 Artefact analysis

A total of 11 artefacts were recovered within the investigated area during the archaeological test excavation. Cultural material was recovered from test pits 2 and 3 within transect 1. Most of the artefacts were recovered from spit 1 (zero to 100 millimetres depth) (n=9) and only two artefacts were recovered from spit 2 (100 to 200 millimetres depth).

The assemblage consisted of one (9.09 per cent) complete flake, a longitudinal split flake (9.09 per cent), one (9.09 per cent) medial flake, four (36.36 per cent) angular flakes and four (36.36 per cent) artefacts identified as tools. The modified artefacts identified as tools all consisted of backed artefacts. Most of the artefacts recovered were made from quartz (n=10) and one recovered artefact was made from silcrete. Both materials occur naturally in the region, however, silcrete is less abundant.

Figure 8-137 Ventral surface of a quartz backed point (ULAS03 TP2A Spit 1 [1])

Figure 8-138 Dorsal surface of a quartz backed point (ULAS03 TP2A Spit 1 [1])

Figure 8-139 Ventral surface of a silcrete backed tool (ULAS03 TP2B Spit 2 [2])

Figure 8-140 Dorsal surface of a silcrete backed tool (ULAS03 TP2B Spit 2 [2])

The assemblage is representative of a low-density background scatter. Artefact density and distribution indicate the presence of archaeological deposits in the area, however, extensive levels of disturbance and soil redeposition were identified in the area. This indicates that intact archaeological deposits can be present and sparse in the area. It also suggests that previous intact deposits that have been impacted could have been redeposited in the area which requires caution and critical analysis of the stratigraphic profile for any future investigation of the area.

8.5.28 ULAS04

***Bioregion**: South Eastern Highlands* ***LGA**: Upper Lachlan* ***LALC**: Onerwal*

Testing within this area consisted of one transect established on a north-east-south-west alignment. A total of 10 test pits were placed within the transect at intervals of 10 metres between each test pit.

Figure 8-141 ULAS04 test pit locations

8.5.28.1 Landform

ULAS04 is located on a gently inclined slope within a floodplain area. The transect was located approximately 200 metres east-west of Flacknell Creek, a perennial creek. A 1st order tributary associated with Flacknell Creek is located 50 metres north of the transect.

8.5.28.2 Soils, disturbance and features

Ground surface in the vicinity of the transect demonstrated evidence of disturbance associated with land clearance and various agricultural activities. A residential house and two small outbuildings are located 80 metres south of the transect and the area is currently used for grazing. The transect is also located approximately 30 metres west of an existing transmission line structure and 50 metres east of Flackness Road. Two artificial dams are located in close vicinity to the transect, one being located 70 metres south-east of the transect and the other is located 120 metres north of the excavation area.

The soil profiles within the area correspond to the ground disturbances associated with agricultural activity that are evident in the vicinity of investigation area. In general, the soil profile consists of a relatively shallow topsoil (A1) above a sterile clay deposit (B-Horizon). The stratigraphic profile along the transect consisted of a dark brown sandy loam topsoil (A1) with greater than 20 per cent grass root bioturbation and greater than 10 per cent medium-sized gravel inclusions that transitioned to a moist clay deposit (B-Horizon). Test pits 6 and 8 contained very few fine charcoal fragments associated with burnt tree roots within the B-Horizon, while test pit 8 also contained abundant (50 to 90 per cent)

mudstone cobbles within the B-Horizon. An A2 Horizon was present only in test pits 7 to 10, which consisted of a moist clay loam with few less than 15 per cent fine gravel inclusions.

Figure 8-142 ULAS04 TP3

Figure 8-143 ULAS04 Test Pit 7 Expansion

Table 8-37 ULAS04 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-120 mm Munsell: 7.5YR7/6 Description: Sandy loam with >20% grass root bioturbation and 10-50% medium-sized mudstone gravel inclusions. Clear horizon boundary.
A2 Horizon	Depth: 80-330 mm Munsell: 7.5YR6/8 Description: Silty clay loam to clay loam. Few (1-2%) fine grass root bioturbation. Few (<15%) fine gravel inclusions. Clear horizon boundary.
B-Horizon	Depth: 110-400 mm Munsell: 7.5YR6/6 Description: Clay. Abundant (50-90%) mudstone cobble inclusions.

8.5.28.3 Artefact analysis

A total of 12 artefacts were recovered during the archaeological test excavation within the investigated area. Cultural material was identified within test pits 2, 4 and 7. Artefacts were recovered from spit 1 (zero to 100 millimetres depth) (n=3) spit 2 (100 to 200 millimetres depth) (n=8) and spit 3 (200 to 300 millimetres depth) (n=1).

Table 8-38 ULAS04 artefact numbers per pit

Test Pit	Artefacts	Per centage of the total site assemblage
2	7	58.33 %
4	2	16.66 %
7	3	25%

The assemblage consisted of complete flakes (n=3, 25 per cent), angular flakes (n=5, 41.66 per cent) a longitudinal split flake (8.3 per cent), a proximal flake (8.3 per cent), a distal flake (8.3 per cent), and an artefact identified as a notched tool (8.3 per cent). Most of the artefacts recovered were made from quartz (n=11) and one recovered artefact was made from quartzite. Both materials occur naturally in the region.

Figure 8-144 Ventral surface of a notched tool made from quartz (ULAS04 TP2 Spit 2 [4])

Figure 8-145 Dorsal surface of a notched tool made from quartz (ULAS04 TP2 Spit 2 [4])

The density and distribution of artefacts, particularly within spit 2 and the presence of a tool, fragmented artefacts and complete flakes suggest cultural occupation of the landscape within the area investigated. Artefact density and distribution characterised the assemblage as a low background scatter. However, the area has been subjected to different types of ground disturbances which have potentially displaced any previously intact archaeological deposits in the area.

8.5.29 ULAS05

***Bioregion**: South Eastern Highlands* ***LGA**: Upper Lachlan* ***LALC**: Onerwal*

Testing within ULAS05 consisted of one transect that was established in an east-west alignment. A total of 10 test pits were excavated in the transect with intervals of 10 metres between each test pit.

Figure 8-146 ULAS05 test pit locations

8.5.29.1 Landform

ULAS05 is located on a moderately-inclined hillslope surrounded by catchments to the south and to the east. Turrallo Creek is located approximately 150 metres east of ULAS05.

8.5.29.2 Soils, disturbance and features

The ground surface across the excavation area ULAS05 displayed evidence of disturbance in the form of land clearance and soil erosion. It is clear that the surrounding area has been subject to agricultural activity in the past. An artificial dam is located 50 metres south of the excavation area ULAS05.

In general, the soil profile demonstrated evidence of disturbance, as many of the test pits lack an A2 Horizon. Overall, the soil profile consisted of a dark greyish brown silty loam with abundant grass roots and few (two to 10 per cent) fine gravel inclusions ranging from two to six millimetres in length. In the few test pits that contained an A2 Horizon, the upper unit transitioned to a silty clay (A2) with common (10 to 20 per cent) quartz cobble inclusions present. A clear transition to the B-Horizon was evident across the test pits, and which was identified between depths of 100 to 250 millimetres. The B-Horizon consisted of a compact, moist clay with common (10 to 25 per cent) quartz cobble inclusions ranging from 60 to 200 millimetres in length.

Figure 8-147 Landscape view showing the gradient of the slope

Figure 8-148 ULAS05 Test Pit 2 Expansion

Figure 8-149 ULAS05 Test Pit 7

Table 8-39 ULAS05 summary of soil characters

Soil horizon	Description
A1 Horizon	Depth: 0-100 mm Munsell: 5YR5/1 Description: silty loam. Few (2-10%) gravel inclusions. Grass roots bioturbation. A clear horizon boundary.
A2 Horizon	Depth: 50-200 mm Munsell: 7.5YR7/3 Description: Silty clay. Common (10-20%) quartz coarse gravel. A diffuse horizon boundary.
B-Horizon	Depth: 100-300 mm Munsell: 5YR6/1 Description: Clay.

8.5.29.3 Artefact analysis

A total of 16 artefacts were recovered during the archaeological test excavation within the investigated area. Cultural material was identified within test pits 1, 2, 4, 5, 6 and 8. Artefacts were recovered from ranging depths of zero to 100 millimetres and 100 to 200 millimetres. Most of the artefacts were recovered from a depth of zero to 100 millimetres (n=13, 81.25 per cent) with only three artefacts (18.75 per cent) recovered from a depth of 100 to 200 millimetres.

Table 8-40 ULAS05 artefact numbers per pit

Test Pit	Artefacts	Per centage of the total site assemblage
1	3	18.75 %
2	2	12.5 %
4	3	18.75%
5	4	25%
6	3	18.75
8	1	6.25%

The assemblage consisted of complete flakes (n=5), longitudinally split flakes (n=2), angular flakes (n=4), a distal flake, a single platform and two multiplatform cores and an artefact identified as an

amorphous tool unifacially retouched. Most of the artefacts recovered from the test excavation were made from quartz (n=8, 50 per cent) followed by silcrete (n=5, 31.25 per cent). Small numbers of other raw materials such as indurated mudstone (n=2, 12.5 per cent) and silicified mudstone (n=1, 6.25 per cent) were also present.

Figure 8-150. Single platform core made from indurated mudstone (ULAS05 TP1 Spit 1)

Figure 8-151. Single platform core made from indurated mudstone (ULAS05 TP1 Spit 1)

Figure 8-152. Multiplatform core made from silicified mudstone (ULAS05 TP2 Spit 2)

Figure 8-153. Multiplatform core made from silicified mudstone (ULAS05 TP2 Spit 2)

Artefact density and distribution are consistent across the investigated area which, despite the ground disturbances identified in the area, demonstrates the presence of archaeological deposits in the area. The presence of cores and a tool demonstrates cultural occupation of the area. While it is likely that the density of artefacts might have been affected by the historical use of the area and its current use, the assemblage recovered suggest the potential presence of archaeological deposits with higher densities in the area. The assemblage recovered is considered representative of a background scatter.

8.6 Analysis of test excavation results and discussion

The test excavation program established the presence of archaeological deposits within the PADs identified during the survey program. However, cultural material density and distribution within the assessed PADs were generally low. This is not necessarily associated with a low-intensity use of the landscape. Each of the PADs investigated demonstrated different levels of ground disturbances and potential soil redeposition that have significantly affected the integrity of the archaeological deposits identified.

Testing of additional sites targeting areas of low, moderate and high archaeological potential defined by the refined archaeological sensitivity model developed by NOHC demonstrated to be beneficial to characterise and assess any previously unidentified cultural material. The assessment of the stratigraphic profile of the additional sites investigated and the identification of disturbances contributed to a better understanding of the landscapes and the occurrence of archaeological material within them.

In general, the results of the additional sites investigated were consistent with the sensitivity model. Cultural material was recovered from sites established within areas of moderate and high sensitivity. Artefact density and distribution varied on each site; however, this was not defined by the location sensitivity of the sites but mainly by the conditions and extent of disturbances of the areas.

Most of the additional sites investigated demonstrated evidence of previous ground disturbances. In some cases, identified ground disturbances were considerably deep and extensive, leaving heavily eroded sterile soils exposed.

While the assemblages identified within the additional sites investigated demonstrated the presence of archaeological deposits and the use of the landscape, density and distribution in conjunction with ground disturbances identified on these sites suggest that archaeological deposits are likely to occur sparsely within the landscape. This is likely to occur generally in areas of moderate and high sensitivity.

The identification of ground disturbances in the areas investigated demonstrated how the integrity of archaeological deposits is affected. In some areas, it was considered that archaeological deposits were completely removed and redeposited in a different location. Ground disturbances were also determined to impact on the density and distribution of assemblages concluding that some assemblages were partially present within the landscape or truncated by recent activities and use of the landscape.

The results of the test investigation on additional sites also demonstrated the limitations of the sensitivity model. While the results were generally consistent with the predicted conditions of the areas investigated, the level of previous ground disturbance in test excavation areas could not be definitively determined prior to the test excavation program. As discussed, in Section 8.3 ground disturbances significantly impacted in the identification and conditions of cultural material within the areas assessed and the condition and preservation of cultural material. Despite the limitations, the refined sensitivity model has demonstrated to be a reliable tool to predict potential areas with cultural and archaeological material.

8.7 The landform archaeological sensitivity model

As described in Section 4.2, NOHC has designed a landform archaeological sensitivity model to predict potential areas of cultural and archaeological sites. The landform archaeological sensitivity model has been refined following the field survey and subsurface test excavation program using multiple datasets in order to achieve a weighted, multi-criteria analysis of the potential landform archaeological sensitivity of the amended project footprint. The model is built on the combination of several criteria including slope, previously recorded AHIMS sites data, and large bodies of permanent water and waterways (referred further as hydrology).

Each of these criteria were treated equally in respect to the overall impact on determining landform sensitivity. Land clearing for grazing was not factored into the model because land clearing methods vary widely in terms of their potential to disturb Aboriginal archaeological sites and without detailed information on the methods of clearing, which may vary across areas, we have taken the precautionary view and assumed that Aboriginal archaeological deposits would remain intact. The model uses three broad categories that can be defined as:

- **Low sensitivity**: Areas that are low sensitivity are generally categorised as high gradient, difficult to access landforms that are distant to the closest water source, they do not meet any of the criteria utilised for moderate and high sensitivity areas. There is a low chance of finding archaeological material in this zone.
- **Moderate sensitivity**: Areas that are moderate sensitivity are classified in the model as occurring within 350 metres of stream order 2 and above but on moderate slope (6.01 to 11 degrees) or are on good slope within 500 metres of stream order 2 and above, in addition to areas within 100 metres of previously recorded sites and on moderate slope. There is a moderate chance of finding archaeological material in this zone.
- **High sensitivity**: Areas that are high sensitivity are classified in the model as occurring on good slope (zero to 6 degrees), are easily accessible areas that are within 350 metres of stream order 2 or higher and within 100 metres of a previously recorded site on good slope. There is a high chance of finding archaeological material in this zone.

The landform archaeological sensitivity model was created using a classification of areas within 500 metres of the amended project footprint. Following testing of the model using AHIMS sites and sites found to date for the project, we have found that 92 per cent of sites are captured by this model. The archaeological sensitivity of the amended project footprint is depicted in Attachment 5.1.

8.7.1 Archaeological Sensitivity and PADs

As discussed above in Section 8.4, prior the current field assessment, two PADs and one modified tree/PAD had been identified in the amended project footprint, the current assessment has identified a further 10 PADs. Therefore, a total of 12 PADs and one modified tree/PAD are within the amended project footprint. The archaeological sensitivity model has been applied to predict potential areas of cultural and archaeological sites across the amended project footprint.

Following test excavation, the subsurface archaeological data was incorporated into the surface model and the relevant landscape criteria such as slope and distance to water for test pits containing artefacts was investigated. The final surface model captured 27 of the test pits in areas of high sensitivity, 9 in moderate and 3 in low (Table 8-41). The landscape criteria of the test pits containing artefacts was more concentrated towards higher order streams and gentler slopes than the surface artefact data. This led to a separate model with more specific landscape criteria to reflect these differences in position within the landscape. The final subsurface model captured 22 pits in areas of high sensitivity, 17 in moderate and zero in low (Table 8-42). The final surface model identifies subsurface archaeological sites with much greater efficiency than the broader surface model. The subsurface model sensitivity categories can be defined as:

- **Low sensitivity**: Areas that are low sensitivity are generally categorised as high gradient, difficult to access landforms that are distant to the closest perennial water source, they do not meet any of the criteria utilised for moderate and high sensitivity areas. There is a low chance of finding archaeological material in this zone.
- **Moderate sensitivity**:
    - Areas of “good” slope within 650 metres of an order 3 stream or higher.
    - Areas of “moderate” slope within 200 metres of an order 3 stream or higher.
    - Areas of “good” slope within 450 metres of an order 4 stream or higher.

  There is a moderate chance of finding archaeological material in this zone.
- **High sensitivity**:
    - Areas of “good” slope within 200 metres of an order 3 stream or higher.
    - Areas of “good” slope within 400 metres of an order 4 stream or higher.

  There is a high chance of finding archaeological material in this zone.

Table 8-41 Test pits with artefacts final surface model

Sensitivity	Test Pits with Artefacts	Percentage Sites	Area m^2	Percentage Area	Efficiency
High	27	69.2	25548197	28.1	2.46
Moderate	9	23.1	24508700	27.0	0.85
Low	3	7.7	37893685	41.7	0.18
Disturbed	0	0.0	2819886	3.1	
Total	39		90770468		

Table 8-42 Test pits with artefacts final subsurface model

Sensitivity	Test Pits with Artefacts	Percentage Sites	Area m^2	Percentage Area	Efficiency
High	22	56.4	12724689	14.0	4.02
Moderate	17	43.6	17863746	19.7	2.21
Low	0	0.0	57214526	63.1	
Disturbed	0	0.0	2819886	3.1	
Total	39	100	90622847	14.0	

8.7.2 Archaeological sensitivity of unsurveyed areas

The remaining unsurveyed portions of the amended project footprint have been categorised by their surface archaeological sensitivity (refer to Attachment 5.2). As the model has been tested both by field survey and test excavation the use of the model to predict the archaeological sensitivity of the areas unsurveyed provides an indication of the likelihood of their being un-recorded Aboriginal objects within those areas. As discussed in Section 4.2.4 the aims of the model are to use landscape criteria to identify areas of high and moderate sensitivity that contain the highest number of archaeological sites within the smallest footprint while producing areas of low sensitivity that contain the lowest number of archaeological sites with the largest footprint. The model cannot predict the number of sites in an area but can be used to predict that there will be a greater number of sites within the area of high sensitivity compared to the moderate and low. This is because visibility and disturbance have an influence on site identification which cannot be accurately predicted by the model and is likely to change over time.

These values were calculated using the most recent surface archaeological sensitivity model produced by NOHC. Table 8-43 shows the sensitivity percentage within each unsurveyed area, ie of the total unsurveyed area how much of the area (in percentage) is of high, moderate, low sensitivity and how much is disturbed. Areas with a greater percentage of high archaeological sensitivity will generally have more areas that are gently sloped and close to water sources. Moderately sensitive areas will generally be further away from water or have increased slope. Areas of low sensitivity are either highly sloped, far away from water sources or both.

Table 8-43 Surface Archaeological sensitivity of unsurveyed areas

Survey unit	Sensitivity percentage			
	High	Moderate	Low	Disturbance (%)
CG-SU01	14.7	54.6	14.1	16.6
CG-SU03	23.6	40.3	34.5	1.7
CG-SU04	0.0	19.7	80.0	0.4
CG-SU07	11.6	17.1	69.4	1.9
CG-SU14	24.1	36.2	38.2	1.5
CG-SU15	17.3	33.8	47.0	1.9
CG-SU16	1.7	35.8	52.5	10.0
SV-SU02	6.2	40.4	41.2	12.2
SV-SU03	2.6	25.3	71.2	0.9
SV-SU04	13.8	31.7	54.6	0.0
SV-SU05	0.0	0.0	100.0	0.0
SV-SU06	1.3	18.8	75.5	4.5
SV-SU07	14.1	30.1	50.6	5.2
SV-SU08	34.6	44.3	21.2	0.0
SV-SU17	5.4	25.2	69.5	0.0

Survey unit	Sensitivity percentage			
SV-SU18	0.1	3.9	96.0	0.0
SV-SU19	37.4	45.3	13.8	3.4
SV-SU20	0.1	1.9	95.6	2.4
SV-SU30	6.3	55.6	33.9	4.3
SV-SU32	34.0	34.1	27.3	4.5
SV-SU33	16.1	27.5	49.1	7.3
SV-SU35	45.8	44.5	9.7	0.0
SV-SU36	0.5	4.5	94.9	0.0
SV-SU37	0.0	0.0	100.0	0.0
SV-SU39	94.0	3.2	1.4	1.4
SV-SU40	61.5	5.4	33.1	0.0
SV-SU41	10.0	22.1	67.9	0.0
SV-SU42	2.5	21.6	72.3	3.6
SV-SU43	21.5	39.7	38.8	0.0
SV-SU45	6.7	46.6	44.1	2.6
ULS-SU03	0.1	9.1	90.5	0.4
ULS-SU04	15.4	7.5	75.2	2.0
ULS-SU05	59.4	35.0	1.0	4.6
ULS-SU06	17.9	23.7	56.7	1.7
ULS-SU07	0.0	0.0	100.0	0.0
ULS-SU08	34.0	32.7	30.7	2.5
ULS-SU11	9.1	45.5	45.4	0.0
ULS-SU18	15.6	49.7	30.5	4.2
ULS-SU19	15.8	55.8	26.5	1.9
ULS-SU20	0.0	0.0	94.3	5.7
W-SU01	100.0	0.0	0.0	0.0
W-SU04	87.6	11.6	0.9	0.0
YV-SU01	7.2	27.7	62.6	2.5
YV-SU05	26.5	34.7	32.6	6.1
YV-SU07	35.2	43.1	18.8	2.9
YV-SU08	37.8	35.9	15.8	10.5

9. CULTURAL HERITAGE VALUES AND STATEMENT OF SIGNIFICANCE

9.1 Assessment criteria

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance defines cultural significance as 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS, 2013a).

Assessing the Aboriginal cultural significance of a place involves identifying the range of values that are present and assessing them against relevant criteria, in order to define why a place is important and inform future planning and management. Table 9-1 provides definitions of these values and outlines the criteria for assessment.

Table 9-1 Criteria used to assess the cultural significance of a place

Definition of value	Assessment criteria (after OEH, 2011:10)
Historic value refers to the associations of a place with a historically important person, event, phase or activity in an Aboriginal community (OEH, 2011:9).	Are the Aboriginal sites and objects in the amended project footprint important to the cultural or natural history of the local area and/or region and/or state?
Scientific (or archaeological) value refers to the information content of a place and its ability to reveal more about an aspect of the past through examination or investigation of the place, including the use of archaeological techniques (Australia ICOMOS, 2013b). Sites may meet this criterion because they: contain intact archaeological deposits, have potential to answer research questions on past human behaviour, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, are well preserved, or form part of a larger site complex or cultural landscape.	Do any of the sites and objects in the amended project footprint have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state?
Aesthetic value refers to refers to the sensory and perceptual experience of a place – that is, how we respond to visual and non-visual aspects such as sounds, smells and other factors having a strong impact on human thoughts, feelings and attitudes. Aesthetic qualities may include the concept of beauty and formal aesthetic ideals (Australia ICOMOS, 2013b:3).	Are the sites and Aboriginal objects in the amended project footprint important in demonstrating aesthetic characteristics in the local area and/or region and/or state?
Social (or cultural) value refers to the spiritual, traditional, historical or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them (OEH, 2011:8). Spiritual value is included in the definition of social value and refers to the intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual identity, or the traditional knowledge, art and practices of Aboriginal people (Australia ICOMOS, 2013b:4).	Do any of the sites and Aboriginal objects in the amended project footprint have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* identify that 'Aboriginal people are the primary determinants of the cultural significance of their heritage' (DECCW, 2010b:iii). The significance of a place can be the result of a number of factors including:

- continuity of tradition
- occupation or action
- historical association
- custodianship or concern for the protection and maintenance of places

- the value of sites as tangible and meaningful links with the lifestyle and values of ancestors.

Aboriginal cultural significance may or may not parallel the archaeological significance of a site.

The following assessment of significance is made with reference to the criteria outlined above.

9.2 Historic value

The amended project footprint does not impact known Aboriginal reserves or early historical properties where documented significant historical interactions with Aboriginal people occurred. If evidence of historically significant information relevant to the amended project footprint became available, it would be shared and discussed with relevant Aboriginal stakeholders.

9.3 Scientific (archaeological) value

Archaeological sites recorded during the archaeological survey and previously recorded sites were assigned to one of the following assessment categories:

- potential archaeological deposits
- low scientific significance
- moderate (local) scientific significance
- high (local) scientific significance
- modified trees identified by RAPs
- sites indicated as destroyed by AHIMS and non-sites.

No sites have been assessed to have national or stave level scientific significance.

9.3.1 Potential Archaeological Deposits

A total of 10 PADs were identified as part of this assessment across the amended project footprint. Areas of PAD that are not associated with surface artefacts can only be assessed for archaeological significance through subsurface archaeological testing. In terms of significance, the assessment of a PAD relates to its potential or likelihood of yielding significant cultural information through archaeological research.

Archaeological subsurface test excavation has been undertaken at five PAD sites potentially impacted by construction. Following the results of the archaeological test excavation program any portions of the PADs that yield artefacts or cultural material have been able to be assessed from a scientific perspective. The areas of PADs, which have not been tested or PADs not subject to archaeological test excavations at all are still considered a PAD. Areas that are not found to yield artefacts or cultural material during the archaeological test excavations have been re-assessed and some have been deemed to be ‘not a PAD’. (Table 9-2).

Test excavation was undertaken at an additional 25 test areas. Of these subsurface artefacts were found at 11 locations. The 11 locations have been determined to be sites and have been entered on AHIMS.

Table 9-2 PAD site status

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
HL-PAD-01	PAD	Potential for subsurface archaeological deposits.	Test excavation confirmed that the PAD is a site ie contains evidence of Aboriginal occupation- Object protected under the NPW Act. Excavations revealed Aboriginal objects and intact deposits and although the assemblage from test excavations was small and of no inherent particular scientific significance, it is a strong indicator that further excavation is likely to yield more archaeological material that may yield important cultural material. Following the results of the test excavation program, there is moderate to high potential to contain subsurface archaeological deposits within HL-PAD-01. Further investigation and salvage excavations as per the mitigation measures should be undertaken prior to any impacts proposed within HL-PAD-01.	Moderate to high
HL-PAD-02	PAD	Potential for subsurface archaeological deposits.	Test excavation was undertaken in the areas most likely to be impacted by the project. The test excavation found no subsurface artefacts in the area tested and therefore did not confirm the PAD is a site in the area tested. Following the results of the test excavation program, there is low potential to contain subsurface archaeological deposits within HL-PAD-02 within the area tested. Further investigation and salvage excavations as per the mitigation measures should be undertaken prior to any impacts proposed within the untested area of HL-PAD-02.	Low in area tested. Moderate in untested area
HL-PAD-03	PAD	Potential for subsurface archaeological deposits.	HL-PAD-03 was not subject to test excavations due to access restrictions. The site remains a PAD.	Moderate to high
HL-PAD-05	PAD	Potential for subsurface archaeological deposits.	Test excavation confirmed the presence of archaeological material within this PAD and indicates that there is potential for further archaeological material within HL-PAD-05. The archaeological excavations represented a small sample of the area of HL-PAD-05, and the remaining portion of HL-PAD-05 must still be regarded as having potential to contain Aboriginal objects/deposits. The findings indicate the presence of subsurface archaeological deposits within HL-PAD-05. As the proposed work has the potential to impact Aboriginal objects (subject to detailed design) within HL-PAD-05, mitigation measures may be required prior to construction such as avoidance during detailed design or salvage.	Moderate
HL-PAD-06	PAD	Potential for subsurface archaeological deposits.	HL-PAD-06 was not subject to test excavations due to access restrictions. The site remains a PAD.	Moderate to high

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
HL-PAD-07	PAD	Potential for subsurface archaeological deposits.	Test excavation confirmed that there is a site present within this PAD and indicates that there is potential for further archaeological material. There is moderate potential to contain intact subsurface archaeological deposits in HL-PAD-07 following the results of the archaeological test excavations. The findings indicate the presence of subsurface archaeological deposits within HL-PAD-07. As the proposed work has the potential to impact Aboriginal objects (subject to detailed design) within HL-PAD-07, mitigation measures may be required prior to construction such as avoidance during detailed design or salvage.	Moderate
HL-PAD-08	PAD	Potential for subsurface archaeological deposits.	HL-PAD-08 was not subject to test excavations due to access restrictions. The site remains a PAD.	Moderate to high
HL-PAD-09	PAD	Potential for subsurface archaeological deposits.	HL-PAD-09 was not subject to test excavations due to access restrictions. The site remains a PAD.	Moderate to high
HL-PAD-10	PAD	Potential for subsurface archaeological deposits.	Test excavation confirmed that there is a site present within this PAD and indicates that there is potential for further archaeological material. There is high potential to contain intact subsurface archaeological deposits in HL-PAD-10 following the results of the archaeological test excavations. The findings indicate the presence of subsurface archaeological deposits within HL-PAD-10. As the proposed work has the potential to impact Aboriginal objects (subject to detailed design) within HL-PAD-10, mitigation measures may be required prior to construction such as avoidance during detailed design or salvage.	High
HL-PAD-11	PAD	Potential for subsurface archaeological deposits.	HL-PAD-11 was not subject to test excavations due to access restrictions. The site remains a PAD.	Moderate to high
WAS02-1	Artefact scatter	Subsurface artefact scatter	The test excavations identified a moderate to high density of lithic material within WAS02-1. As the proposed work has the potential to impact substantial subsurface archaeological deposits that may prove to be of high archaeological significance within WAS02-1, following detailed design mitigation measures may be required prior to construction, which may include salvage excavations.	High
WAS01	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within WAS01. The findings indicate a low potential for subsurface archaeological deposits within WAS01 and construction is considered suitable within this location.	Low
WAS02	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within WAS02. The findings indicate a low potential for subsurface archaeological deposits within WAS02 and construction is considered suitable within this location.	Low

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
WAS03	Isolated find	Subsurface isolated find	The test excavations identified a low density of lithic material and indicate that there is a low potential to contain substantial subsurface archaeological deposits within the impacted area for the proposed work. Construction work is considered suitable within the boundaries of WAS03.	Low
WAS03-1	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within WAS03-1. The findings indicate a low potential for subsurface archaeological deposits within WAS03-1 and construction is considered suitable within this location.	Low
WAS04	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within WAS04. The findings indicate a low potential for subsurface archaeological deposits within WAS04 and construction is considered suitable within this location.	Low
SVAS01	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within SVAS01. The findings indicate a low potential for subsurface archaeological deposits within SVAS01 and construction is considered suitable within this location.	Low
SVAS02	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within SVAS02. The findings indicate a low potential for subsurface archaeological deposits within SVAS02 and construction is considered suitable within this location.	Low
SVAS05	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within SVAS05. The findings indicate a low potential for subsurface archaeological deposits within SVAS05 and construction is considered suitable within this location.	Low
SVAS03	No sites identified	Nil	The test excavations within SVAS03 revealed a low-density artefact scatter and indicate there is a low potential to contain subsurface archaeological deposits within the impacted area for the proposed work. Construction work is considered suitable within the boundaries of SVAS03.	Low
SVAS04	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within SVAS04. The findings indicate a low potential for subsurface archaeological deposits within SVAS04 and construction is considered suitable within this location.	Low
CGAS01	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within CGAS01. The findings indicate a low potential for subsurface archaeological deposits within CGAS01 and construction is considered suitable within this location.	Low

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
CGAS02	No Sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within CGAS02. The findings indicate a low potential for subsurface archaeological deposits within CGAS02 and construction is considered suitable within this location.	Low
CGAS03	No sites identified	Nil	No Aboriginal objects were identified during the test excavations for the proposed work within CGAS03. The findings indicate a low potential for subsurface archaeological deposits within CGAS03 and construction is considered suitable within this location.	Low
CGAS04	No sites identified	Nil	The test excavations revealed a low-density artefact scatter and a low potential for intact substantial subsurface archaeological deposits within the impacted area. Construction is considered suitable within the boundaries of CGAS04.	Low
YAS01	Artefact scatter	Subsurface artefact scatter	The test excavations within YAS01 revealed a low-moderate density artefact scatter and moderate potential to contain intact subsurface archaeological deposits within the impacted area. As the proposed work has the potential to impact substantial subsurface archaeological deposits within YAS01, mitigation measures may be required prior to construction, which may include salvage excavations.	High
YAS02	Artefact scatter	Subsurface artefact scatter	The test excavations within YAS02 revealed a moderate to high density of lithic material. As the proposed work has the potential to impact substantial subsurface archaeological deposits, mitigation measures may be required prior to construction, which may include salvage excavations.	Moderate to High
YAS03	No sites identified	Nil	Aboriginal objects were not identified during the test excavations for the proposed work within YAS03. The findings indicate a low potential for subsurface archaeological deposits within YAS03 and construction is considered suitable within this location.	Low
YAS04	Artefact scatter	Subsurface artefact scatter	The test excavations within YAS04 revealed a low-density artefact scatter and indicate there is a low potential to contain subsurface archaeological deposits within the impacted area for the proposed work. Construction work is considered suitable within the boundaries of YAS04.	Low
YAS05	No sites identified	Nil	Aboriginal objects were not identified during the test excavations for the proposed work within YAS05. The findings indicate a low potential for subsurface archaeological deposits within YAS05 and construction is considered suitable within this location.	Low

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
ULAS01	No sites identified	Nil	Aboriginal objects were not identified during the test excavations for the proposed work within ULAS01. The findings indicate a low potential for subsurface archaeological deposits within ULAS01 and construction is considered suitable within this location.	Low
ULAS02	Artefact scatter	Subsurface artefact scatter	The test excavations identified a moderate to high density of lithic material within ULAS02. As the proposed works have the potential to impact substantial subsurface archaeological deposits within ULAS02, mitigation measures may be required prior to construction, which may include salvage excavations.	High to moderate
ULAS03	Artefact scatter	Subsurface artefact scatter	The test excavations within ULAS03 revealed a low-density artefact scatter and indicate there is a low potential to contain subsurface archaeological deposits within the impacted area for the proposed work. Construction work is considered suitable within the boundaries of ULAS03.	Low
ULAS04	Artefact scatter	Subsurface artefact scatter	The test excavations within ULAS04 revealed a low-density artefact scatter and indicate there is a low potential to contain subsurface archaeological deposits within the impacted area for the proposed work. Construction work is considered suitable within the boundaries of ULAS04.	Low
ULAS05	Artefact scatter	Subsurface artefact scatter	The test excavations within ULAS05 revealed a low-moderate density artefact scatter and moderate potential to contain intact subsurface archaeological deposits within the impacted area. As the proposed work has the potential to impact substantial subsurface archaeological deposits within ULAS05, mitigation measures may be required prior to construction, which may include salvage excavations.	Moderate

9.3.2 Low Scientific Significance

Low scientific significance has been attributed to all surface sites that have been identified as either highly disturbed (relative to the surrounding landscape) or, have been assessed as having low or low to moderate subsurface archaeological potential (Table 9-3). These sites have low numbers of artefacts (less than five) and little potential to provide data that would substantially add to our understanding of Aboriginal occupation and land-use in the local area, beyond the information they have already provided through being discovered and recorded during this study.

Table 9-3 Sites of low scientific significance

Site number	Summary description	Characteristics relevant to significance assessment
HL-02	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-03	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-04	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-05	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-08	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-09	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-19	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-21	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-22	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-23	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-25	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-26	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-27	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-28	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-30	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-31	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-32	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-33	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-34	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-35	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-36	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-37	Artefact scatter (4)	Low artefact numbers and no assessed archaeological potential
HL-39	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-40	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-41	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-43	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-45	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-47	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-48	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-49	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-50	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-53	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-55	Isolated find	Low artefact numbers and no assessed archaeological potential

Site number	Summary description	Characteristics relevant to significance assessment
HL-56	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-59	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-61	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-64	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-66	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-67	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-68	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-70	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-71	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-72	Artefact scatter (5)	Low artefact numbers and no assessed archaeological potential
HL-87	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-89	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-90	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-91	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-92	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-93	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-94	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-95	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-96	Artefact scatter (4)	Low artefact numbers and no assessed archaeological potential
HL-97	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-98	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-100	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-101	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-102	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-107	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-111	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-112	Artefact scatter (5)	Low artefact numbers and no assessed archaeological potential
HL-113	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-114	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
HL-115	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-116	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-121	Artefact scatter (4)	Low artefact numbers and no assessed archaeological potential
HL-122	Artefact scatter (4)	Low artefact numbers and no assessed archaeological potential
HL-123	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-126	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-127	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-128	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-129	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-130	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-131	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-132	Isolated find	Low artefact numbers and no assessed archaeological potential

Site number	Summary description	Characteristics relevant to significance assessment
HL-133	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-134	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-136	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-137	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-138	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-139	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-140	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-141	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-145	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-146	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-147	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-150	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-151	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-152	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-153	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-154	Isolated find	Low artefact numbers and no assessed archaeological potential
51-5-0254	Isolated find	Low artefact numbers and no assessed archaeological potential
51-5-0330	Isolated find	Low artefact numbers and no assessed archaeological potential
51-6-0718	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
51-6-0811	Artefact scatter (3)	Low artefact numbers and no assessed archaeological potential
51-6-0879	Artefact scatter (4)	Low artefact numbers and no assessed archaeological potential
51-6-0899	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
52-1-0272	Artefact	Low artefact numbers and no assessed archaeological potential
52-1-0273	Artefact	Low artefact numbers and no assessed archaeological potential
52-1-0277	Artefact	Low artefact numbers and no assessed archaeological potential
52-1-0279	Artefact	Low artefact numbers and no assessed archaeological potential
52-1-0280	Artefact	Low artefact numbers and no assessed archaeological potential
52-1-0281	Artefact	Low artefact numbers and no assessed archaeological potential
56-3-0235	Artefact	Low artefact numbers
56-3-0288	Artefact	Low artefact numbers
56-6-0143	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0152	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0153	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0177	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0180	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0181	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0263	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0300	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0301	Artefact	Low artefact numbers and no assessed archaeological potential
56-6-0302	Artefact	Low artefact numbers and no assessed archaeological potential

9.3.3 Moderate Scientific Significance

Moderate (local) scientific significance has been attributed to all surface sites that are associated with areas of moderate to high or high potential for subsurface archaeological deposits (Table 9-4) and rarer site types such as modified trees and charcoal occurrences. Any subsurface deposits at these sites are predicted to contain a higher number of artefacts compared to the other sites in the survey area and, therefore, have potential to provide a large enough sample to enable analyses of assemblage compositions that could be used to derive statements on the technological systems being employed by Aboriginal groups living in this region.

Table 9-4 Sites of moderate (local) scientific significance

Site number	Summary description	Characteristics relevant to significance assessment
HL-01	Artefact scatter (10)	Associated with HL-PAD-01
HL-07	Modified tree	Modified tree, rarer site type
HL-14	Modified tree	Modified tree, rarer site type
HL-15	Modified tree	Modified tree, rarer site type
HL-18	Artefact scatter (6)	Moderate artefact numbers
HL-29	Artefact scatter (9)	Associated with HL-PAD-05
HL-38	Artefact scatter (3)	Associated with HL-PAD-07
HL-44	Artefact scatter (4)	Associated with HL-PAD-08
HL-46	Artefact scatter (11)	Moderate artefact numbers
HL-63	Artefact scatter (32)	High artefact numbers
HL-65	Modified tree	Modified tree, rarer site type
HL-73	Artefact scatter (8)	Moderate artefact numbers
HL-99	Artefact scatter (15+)	High artefact numbers
HL-104	Artefact scatter (20+)	High artefact numbers
HL-106	Modified Tree	Modified tree, rarer site type
HL-108	Artefact scatter (8)	Moderate artefact numbers
HL-117	Artefact scatter (9)	Moderate artefact numbers
HL-118	Artefact scatter (7)	Moderate artefact numbers
HL-119	Artefact scatter (6)	Moderate artefact numbers
HL-120	Artefact scatter (6)	Moderate artefact numbers
HL-124	Artefact scatter (9)	Moderate artefact numbers
HL-125	Artefact scatter (7)	Associated with HL-PAD-10
HL-143	Isolated Find and Charcoal Stain	Rarer site type
HL-147	Isolated find	Associated with HL-PAD-10
HL-155	Isolated find	Associated with HL-PAD-11
51-5-0201	Artefacts	Moderate artefact numbers
51-5-0253	Artefact	Moderate artefact numbers
52-1-0152	Artefacts	Moderate artefact numbers
56-6-0262	Modified tree/PAD	Modified tree, rarer site type
56-6-0273	PAD	Archaeological potential
51-5-0335	Artefact scatter (10)	Moderate artefact numbers
51-6-0714	Artefact scatter (17)	Moderate artefact numbers

9.3.4 High Scientific Significance

High (local) scientific significance has been attributed to all surface sites that are associated with areas of very high artefact numbers and high potential for subsurface archaeological deposits (Table 9-5). Any subsurface deposits at these sites are predicted to contain a higher number of artefacts compared to the other sites in the survey area and, therefore, have potential to provide a large enough sample to enable analyses of assemblage compositions that could be used to derive statements on the technological systems being employed by Aboriginal groups living in this region.

Table 9-5 Sites of high (local) scientific significance

Site number	Summary description	Characteristics relevant to significance assessment
HL-20	Artefact scatter (100+)	High artefact numbers, associated with HL-PAD-03
HL-51	Artefact scatter (30+)	High artefact numbers, associated with HL-PAD-08
HL-60	Artefact scatter (50+)	High artefact numbers, associated with HL-PAD-09
HL-62	Artefact scatter (30+)	High artefact numbers, associated with HL-PAD-10

9.3.5 Additional modified trees identified by RAPs

Criteria have been developed to assist with determining whether the scars on trees can be attributed to deliberate action by Aboriginal people (Long, 2005). 'Aboriginal scarred tree', 'Scarred Tree' or 'Modified Tree' is generic term given to trees where the bark has been deliberately removed by Aboriginal people in the past for one of a variety of purposes (including use for torches, huts, coolamons, boomerangs, canoes, etc). However, scars on trees can result from a number of non-Aboriginal causes such as mechanical damage, historic and modern survey/boundary marks, limb loss, bird and insect damage, damage from goats and cattle rubbing and stripping bark and fire. Six modified trees were identified by the RAPs as possible culturally modified trees but after being assessed against these criteria were determined not to be Aboriginal modified trees (refer to Table 9-6).

Table 9-6 Modified trees of non-Aboriginal origin

Site number	Archaeological assessment
HL-74	Assessed as unlikely to be a culturally modified tree
HL-77	Assessed as unlikely to be a culturally modified tree
HL-78	Assessed as unlikely to be a culturally modified tree
HL-79	Assessed as unlikely to be a culturally modified tree
HL-85	Assessed as unlikely to be a culturally modified tree
HL-86	Assessed as unlikely to be a culturally modified tree

9.3.6 Sites indicated as destroyed on AHIMS and non-sites

The following sites are indicated on AHIMS as being destroyed to no longer have scientific significance or are recordings determined to not be sites (refer to Table 9-7):

Table 9-7 Sites indicated as destroyed on AHIMS

Site number	Summary description	Characteristics relevant to significance assessment
51-6-0720	Isolated find	Indicated as destroyed by AHIMS
51-6-0871	Artefact	Indicated as destroyed by AHIMS
51-6-0872	Artefact	Indicated as destroyed by AHIMS
51-6-0880	Artefact	Indicated as destroyed by AHIMS
51-6-0881	Artefact	Indicated as destroyed by AHIMS
51-6-0888	Artefact	Indicated as destroyed by AHIMS
51-6-0889	Artefact	Indicated as destroyed by AHIMS
51-6-0902	Artefact	Indicated as destroyed by AHIMS
HL-144	Area of Charcoal Staining	Not a site

9.4 Aesthetic value

As noted in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (OEH, 2011), aesthetic value is often closely associated with social values. Culturally significant places are of high aesthetic value to the local Aboriginal community and expectations are that any development in the area would be sympathetic to natural sighting and vistas.

Aboriginal stakeholders have identified Mudjarn (a sacred men's site) as having aesthetic value. Stakeholders identified how the sun and shadows hit Mudjarn at a certain time of day – at this time, Mudjarn looks as though a goanna is wrapped around it.

9.5 Social (or cultural) value

Aboriginal people alone can determine the Aboriginal cultural significance of a place. The following is the result of the ongoing consultation that has occurred as part of this assessment.

All archaeological objects and sites have cultural value for present-day Aboriginal people, as they were created by ancestral Aboriginal people and provide tangible evidence of past occupation of the landscape. All sites have cultural significance to present-day Aboriginal groups as manifestations of their ancestors' past occupation of the landscape.

Some objects and places might have cultural value that were not communicated to NOHC. This could be the case for objects or places that are associated with information that is culturally restricted.

9.5.1 Sites of cultural significance

One potentially culturally significant location, Derringullen Creek Women's Site, has been identified in the amended project footprint. This area has been identified by a RAP as an important traditional women's site.

Nine unmodified trees were identified by RAPs during field surveys, these are shown in Table 9-8. The RAPs that identified these trees reported that they felt these trees had cultural importance. These trees are not 'objects' as defined by the NPW Act.

In addition, Aboriginal stakeholders identified the possibility of burial grounds in the broader HumeLink project footprint. However, specific locations of these sites were not shared as Aboriginal stakeholders wished to maintain the privacy of sites.

Aboriginal stakeholders noted women's sites have been identified through previous project work near Canberra and Yass River.

Aboriginal stakeholders have identified the pathway between Mudjarn (a sacred men's site) and Minjary (a place of resources), as an extremely culturally sensitive area. Both places are situated between the town of Tumut, and Brungle mission.

Brungle and Yass missions were also identified as having cultural value, these places are not being impacted by the project.

Table 9-8 Tree identified by RAPs as culturally significant trees

Site number	Summary description
HL-75	According to the RAP representative this is a shelter tree in which the branch was modified
HL-76	Has a special physical presence, with cultural and spiritual significance
HL-80	Cultural tree identified by RAP
HL-81	Cultural tree identified by RAP
HL-82	Cultural tree identified by RAP
HL-83	According to the RAP representative this is a sorry tree. No photograph or other information were to be noted
HL-84	Cultural tree identified by RAP
HL-148	Cultural tree identified by RAP
HL-149	Cultural tree identified by RAP

10. ASSESSMENT OF IMPACTS

Following the determination of cultural heritage values and significance, an impact assessment was carried out that considered the potential for direct and indirect impacts on heritage. The assessment was based on a worst-case scenario that assumes heritage items throughout the entire amended project footprint could be impacted. However, as the final impacted area (for construction and operation) would be much smaller than the amended project footprint, the impact assessment findings presented in this section are conservative.

The construction activities and project components are outlined in Chapter 2. The project components and activities that have been assumed to have the potential to cause direct impact in the amended project footprint include:

- establishment work such as clearing of vegetation
- transmission line structure construction
- relocation of a section of Line 51 and other utility adjustments
- proposed Gugaa 500 kV substation construction
- Bannaby 500 kV substation and Wagga 330 kV substation modification
- telecommunications connections to existing substations
- new and upgraded access tracks/roads
- worker accommodation facility and construction compound establishment.

The project could impact heritage items in the following ways:

- Total direct harm or disturbance to all surface and/or subsurface features could result at an item. This would generally result in a total loss of heritage value at a site. An example of a direct impact for the project is the installation of transmission line structures and substation infrastructure.
- Partial direct harm or disturbance, where direct impacts would occur to only some of the surface and/or subsurface features at an item. Partial direct harm generally results in partial loss of value at a site. An example of a partial direct harm would be where part of a site is impacted due to the installation of an access track or transmission line infrastructure.
- Potential direct harm or disturbance (total or partial), where direct impacts are occurring adjacent to sites, or where vegetation clearance requires the use of heavy machinery to be active near sites. Such impacts would likely be inadvertent.
- Indirect impacts, including to the views to and from heritage items, may occur. Indirect impacts could include impacts from vegetation clearance, erosion and visual impacts to cultural values and views.

Potential impacts of the project are most likely to occur during construction. However, operation activities that may impact on heritage items include:

- vegetation clearing/trimming
- access track maintenance
- transmission line structure and line maintenance including heavy machinery placement
- stormwater drainage systems maintenance.

Operational impacts are likely to be indirect and are likely to be minimal due to the following:

- The location of the sites is known and will be included in operational planning so it is unlikely that there will be impact to known Aboriginal heritage items or places.
- The risk of impacts to previously unknown sites will also be low as the operational areas would be included in all current and future assessments so the possibility of finding unrecorded sites is low.
- The types of impact are also less likely to impact the ground surface in undisturbed locations.

10.1 Potential harm

There are 195 Aboriginal recordings, including 166 Aboriginal sites and 13 PADs that may be directly or indirectly impacted by the project. The majority of the sites are stone artefact occurrences including artefact scatters and isolated finds. This also includes five modified trees, 11 test locations, nine cultural trees, six modified trees of non-Aboriginal origin, one cultural site and one charcoal occurrence that have been determined not to be sites.

There are five sites that are outside of the amended project footprint that would not be impacted by the project but are near upgraded tracks and a further six sites that are outside of the amended project footprint are located near the transmission line route.

The potential harm of the project construction impacts on Aboriginal sites within the amended project footprint is summarised in Table 10-1 and shown in Attachment 5.3. The assessment is conservative as it is based off the amended project footprint and there will be opportunities to avoid impacts to sites through micro-siting transmission line structures and access tracks during detailed design.

Three of the PADs in the amended project footprint previously recorded as part of the Snowy 2.0 Transmission Connection project, sites 56-6-0300, 56-6-0263 and 56-6-0262, have been subject to subsurface test excavation as part of that project and require no further assessment.

Table 10-1 Impact Assessment of Aboriginal sites within the amended project footprint from construction

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
56-1-0729	HL-01		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-1-0730	HL-02		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-1-0731	HL-03		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0313	HL-04		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0314	HL-05		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0315	HL-07		Modified tree	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0316	HL-08		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0569	HL-09		Isolated find	Low	Not impacted	Not impacted
56-6-0569	HL-14		Modified tree	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0566	HL-15		Modified Tree	Moderate	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-3-0277	HL-18		Artefact scatter (6)	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-3-0278	HL-19		Artefact scatter (3)	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-3-0279	HL-20		Artefact scatter (100+)	High	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-3-0273	HL-21		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
50-6-0315	HL-22		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
50-6-0316	HL-23		Isolated find	Low	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
51-4-0463	HL-25		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0464	HL-26		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0466	HL-27		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0467	HL-28		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0468	HL-29		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0475	HL-30		Isolated find	Low	Not impacted	Not impacted
51-4-0472	HL-31		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0475	HL-32		Isolated find	Low	Not impacted	Not impacted
51-4-0469	HL-33		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0470	HL-34		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0471	HL-35		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0476	HL-36		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-5-0368	HL-37		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
51-5-0369	HL-38		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-375	HL-39		Isolated find	Low	Not impacted, adjacent to the transmission line portion of the amended project footprint.	All or part of this site may be indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
51-5-0376	HL-40		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-5-0370	HL-41		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0365	HL-43		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0364	HL-44		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0372	HL-45		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0363	HL-46		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0362	HL-47		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-5-0374	HL-48		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0373	HL-49		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0367	HL-50		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0366	HL-51		Artefact scatter	High	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0379	HL-53		Isolated find	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-5-0371	HL-55		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0950	HL-56		Artefact scatter (3)	Low	New access track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-6-0946	HL-59		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0951	HL-60		Artefact scatter (50+)	High	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
51-6-0947	HL-61		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0949	HL-62		Artefact scatter (30+)	High	Not directly impacted, adjacent to the transmission line portion of the amended project footprint	All or part of this site may be indirectly impacted by the project
51-3-0099	HL-63		Artefact scatter (32)	Moderate	Establishment of new access track and use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-3-0097	HL-64		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
52-1-0415	HL-65		Modified tree	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0948	HL-66		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0465	HL-67		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0271	HL-68		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0272	HL-70		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0312	HL-71		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0945	HL-72		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0473	HL-73		Artefact scatter (8)	Moderate	New access track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
Not a site	HL-74		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-75		Cultural tree	Culturally significant	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
pending	HL-76		Cultural tree	Culturally significant	Not directly impacted, adjacent to the transmission line portion of the amended project footprint.	All or part of this site may be indirectly impacted by the project
Not a site	HL-77		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
Not a site	HL-78		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
Not a site	HL-79		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-80		Cultural tree	Culturally significant	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-81		Cultural tree	Culturally significant	This site is within the transmission line portion of the amended project footprint and within an area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-82		Cultural tree	Culturally significant	Not impacted	Not impacted
pending	HL-83		Cultural tree	Culturally significant	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-84		Cultural tree	Culturally significant	Not directly impacted, adjacent to the transmission line portion of the amended project footprint.	All or part of this site may be indirectly impacted by the project
Not a site	HL-85		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
Not a site	HL-86		Modified tree, not of Aboriginal origin	nil	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
51-5-0360	HL-87		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0361	HL-89		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0285	HL-90		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
50-6-0318	HL-91		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0385	HL-92		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
50-6-0317	HL-93		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0477	HL-94		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0320	HL-95		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0384	HL-96		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0571	HL-97		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
51-5-0386	HL-98		Isolated find	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0570	HL-99		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
56-3-0284	HL-100		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
51-5-0383	HL-101		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0382	HL-102		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
56-6-0567	HL-104		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint and within the area of controlled blasting.	All or part of this site may be directly or indirectly impacted by the project
51-5-0381	HL-106		Modified Tree	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-2-0326	HL-107		Artefact scatter (3)	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0584	HL-108		Artefact scatter (8)	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0327	HL-111		Artefact scatter (3)	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-2-0325	HL-112		Artefact scatter (5)	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-2-0328	HL-113		Artefact scatter (2)	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-6-0978	HL-114		Artefact scatter (3)	Low	Within the Crookwell accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0979	HL-115		Artefact scatter (2)	Low	Within the Crookwell accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0980	HL-116		Artefact scatter (2)	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-3-0112	HL-117		Artefact scatter (9)	Moderate	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-4-0489	HL-118		Artefact scatter (7)	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-4-0490	HL-119		Artefact scatter (6)	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-4-0491	HL-120		Artefact scatter (6)	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-6-0974	HL-121		Artefact scatter (4)	Low	Not impacted	Not impacted
56-2-0321	HL-122		Artefact scatter (4)	Low	This site is within the Tarcutta accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
56-2-0322	HL-123		Artefact scatter (2)	Low	This site is within the Tarcutta accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0975	HL-124		Artefact scatter (9)	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0976	HL-125		Artefact scatter (7)	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-2-0323	HL-126		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-2-0324	HL-127		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0578	HL-128		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0579	HL-129		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0580	HL-130		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0581	HL-131		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0582	HL-132		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0295	HL-133		Isolated find	Low	This site is within the transmission line portion of the amended project footprint and withing the Gadara Road compound.	All or part of this site may be directly or indirectly impacted by the project
56-3-0296	HL-134		Isolated find	Low	New tracks requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-3-0110	HL-136		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-3-0111	HL-137		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
56-6-0583	HL-138		Isolated find	Low	This site is within the Ardrossan Headquarters Road compound	All or part of this site may be directly or indirectly impacted by the project
56-3-0297	HL-139		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
51-3-0108	HL-140		Isolated find	Low	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-3-0109	HL-141		Isolated find	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-6-0972	HL-143		Isolated Find and Charcoal Stain	Moderate	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
Not a site	HL-144		Areas of Charcoal Staining	Nil	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0577	HL-145		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0294	HL-146		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0973	HL-147		Isolated find	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
pending	HL-148		Cultural tree	Culturally significant	Not impacted	Not impacted
pending	HL-149		Cultural tree	Culturally significant	Not directly impacted, adjacent to the transmission line portion of the amended project footprint.	All or part of this site may be indirectly impacted by the project
51-4-0480	HL-150		Artefact scatter (2)	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0481	HL-151		Artefact scatter (2)	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0482	HL-152		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0483	HL-153		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0484	HL-154		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-4-0485	HL-155		Isolated find	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
pending	HL-PAD-01		PAD	Moderate to high	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-02		PAD	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-03		PAD	Moderate to high	Establishment of new tracks and use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-05		PAD	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-06		PAD	Moderate to high	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-07		PAD	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-08		PAD	Moderate to high	Use of existing access track requiring upgrades/widening	Part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-09		PAD	Moderate to high	Use of existing access track requiring upgrades/widening	Part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-10		PAD	High	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-11		PAD	Moderate to high	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	WAS02-1		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	WAS03		Isolated find	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	SVAS03		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	CGAS04		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	YAS01		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	YAS02		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
Pending	YAS04		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	ULAS02		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	ULAS03		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	ULAS04		Artefact scatter	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	ULAS05		Artefact scatter	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	Derringullen Creek Women's site		Cultural site	Culturally significant	New track requiring establishment	Part of this site may be directly or indirectly impacted by the project
51-5-0201	Dalton 8		Artefact	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0253	Gullen Solar Farm 12		Artefact	Moderate	New track requiring establishment	All or part of this site may be directly or indirectly impacted by the project
51-5-0254	Gullen Solar Farm 13		Artefact	Low	Indicated as partially destroyed by AHIMS. This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0330	RPWF IF 2		Artefact	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-5-0335	RPWF AFT 1 + PAD		Artefact	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-6-0714	Hillview Park		Artefact	Moderate	Indicated as partially destroyed by AHIMS. Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
51-6-0718	Hillview Park 4		Artefact	Low	Within the Crookwell accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0720	HP7		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound. Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
51-6-0811	PJ58		Artefact	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0871	CWF7		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS Crookwell accommodation facility and compound. Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0872	CWF6		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0879	Crookwell WF12		Artefact	Low	Within the Crookwell Accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0880	CWF11		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0881	CWF10		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0888	CWF8		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0889	CWF9		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Crookwell accommodation facility and compound Access Road, use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
51-6-0899	Crookwell WF23		Artefact	Low	Within the Crookwell accommodation facility and compound	All or part of this site may be directly or indirectly impacted by the project
51-6-0902	CWF21		Artefact	Indicated as destroyed by AHIMS	Indicated as destroyed by AHIMS. Use of existing access track requiring upgrades/widening	Indicated as destroyed by AHIMS; no additional impact from this project
52-1-0152	Bannaby 1		Artefact	Moderate	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
52-1-0272	BA1 (Bannaby Substation)		Artefact	Low	This site is within the current Bannaby 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
52-1-0273	BA2 (Bannaby Substation)		Artefact	Low	This site is within the amended project footprint adjacent to the current Bannaby 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
52-1-0277	BA6 (Bannaby Substation)		Artefact	Low	This site is within the amended project footprint adjacent to the current Bannaby 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
52-1-0279	BA8 (Bannaby Substation)		Artefact	Low	This site is within a new access track adjacent to the current Bannaby 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
52-1-0280	BA9 (Bannaby Substation)		Artefact	Low	This site is within a new access track adjacent to the current Bannaby 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
52-1-0281	BA10 (Bannaby Substation)		Artefact	Low	Intersection upgrade for the Bannaby 500 kV substation compound	All or part of this site may be directly or indirectly impacted by the project
56-3-0235	Kylies Run Redhill		Artefact	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-3-0288	Kylies Run/Roberts Rd		Artefact	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0143	BM-OS-1		Artefact	Low	This site is within the transmission line portion of the amended project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-6-0152	BSF-OS J68		Artefact	Low	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0153	BSF-OS-2 J26		Artefact	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
56-6-0177	Logbridge creek - 1F-1 - J43		Artefact	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	[redacted]	Site type	Heritage Significance	Project component	Impact
56-6-0180	Logbridge Ck-1F-3 - J46		Artefact	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0181	BSF-OS-1		Artefact	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
56-6-0262	BSF-05-46/PAD (J195)		Modified tree/PAD	moderate	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0263	BSF-05-46 (J193)		PAD	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
56-6-0273	BSF-IF-34/PAD J174		Artefact	Moderate	Use of existing access track requiring upgrades/widening	All or part of this site may be directly or indirectly impacted by the project
56-6-0300	LBC-IF-11/PAD (J191)		PAD	Low	Indicated as partially destroyed by AHIMS. This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
56-6-0301	LBC-IF-11 (J190)		Artefact	Low	This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project
56-6-0302	LBC-IF-10 (J189)		Artefact	Low	Indicated as partially destroyed by AHIMS. This site is within the transmission line portion of the amended project footprint near the future Maragle 500 kV substation compound.	All or part of this site may be directly or indirectly impacted by the project

*GPS locations have been redacted

10.1.1 Australian Alps National Parks and Reserves

As described in Section 7.5, the AANP is listed on the NHL. The AANP contains the Indigenous history of Bogong Moth feasting, which involved the use of an adult insect – the moth – as the basis for large-scale annual gatherings of different Aboriginal groups for ceremonies.

The following is from the *Technical Report 1 – Revised Biodiversity Development Assessment Report*:

Key summer aestivation sites are generally found in the caves, boulder fields and tors of the Australian Alps (Green, 2010). These sites are scattered across the south-eastern Australian alpine areas (limited to areas of the amended project footprint occurring the Snowy Mountains IBRA subregion) (Keaney, 2016).

Over the past decade, there has been a rapid decline in Bogong Moth numbers within the Australian Alps, and this likely due to several factors. In Green *et al*. (2021) study, they reported a 99.5 per cent decline in Bogong Moth numbers at alpine summer aestivation sites. It is possible that severe drought and warmer temperatures had impacted cave microclimates (maximum temperature for aestivation is 16°C) used by the species, restricting aestivation sites to higher altitudes. Further, larvae of Bogong Moth are susceptible to ingesting arsenate from agricultural sprays, used against their weedy food plants amongst crops, and the developing migrant adults transport this to high altitudes. Analysis of soils washed out of aestivation sites revealed high levels of arsenic (Green *et al.,* 2001), possibly accumulated from larval food, and later released from the bodies of dead adult moths in the new environment. Other secondary threats include increased artificial light hampering migration efforts (Warrant and Dacke, 2016), and changes in agricultural practices; this includes the replacement of traditional agricultural land with cotton and rice monocultures that do not provide suitable larval host plants (Green *et al.,* 2021).

Within the amended project footprint, the Bogong Moth has a moderate likelihood of occurrence during spring migration to summer aestivation sites in the Bogong Ranges. Adult moths are likely to forage on myrtaceous and proteaceous shrubs and trees, and agricultural crops (Warrant *et al.,* 2016) during this period. The amended project footprint would result in the loss of approximately 619.66 hectares of potential foraging habitat for the species. There is also likely to be an increase in artificial lighting during construction of the project, however, the consequences of this would be relatively minor given work would mostly be carried out during daylight hours.

10.2 Areas of Cultural Significance

10.2.1 Mudjarn Nature Reserve

Mudjarn Nature Reserve is an Aboriginal place about 300 metres from the transmission line portion of the amended project footprint, there is therefore no direct impact to the reserve.. Mudjarn is associated with significant ceremonial sites, burials and a source of natural materials to manufacture traditional weapons and tools. It is the dwelling place of the spirit being Dulargul. Mudjarn represents the long-term occupation of the Wiradjuri, Ngunnawal and Walgalu of the Tumut River Valley. The Landscape Character and Visual Impact Assessment Addendum states "*The amended project would not cross the hills or remove any vegetation within Mudjarn Nature Reserve. Overall, there would be a moderate magnitude of change and a moderate-low visual impact during operation."* (IRIS, 2024). The distance of Mudjarn Nature Reserve from the amended project footprint means that the indirect visual impact to the significance of this site is assessed to be negligible.

10.2.2 Derringullen Creek Women's Site

As discussed in Chapter 3 (Description of the amendments) of the Amendment Report, the transmission line at Bowning was narrowed to avoid traversing the Derringullen Creek Women's Site. However, the amended project footprint includes an existing access track that traverses the Derringullen Creek Women's Site. This track would be used to provide access to a limited number of transmission line structures (two to three) along the transmission line corridor. Minor upgrades of the access track may be required to allow for heavy vehicle access.

The amended project footprint provides the potential for the construction of a new two-kilometre access track from the transmission line corridor at this location connecting to Black Range Road to the north, this new access track would traverse the property of a new landowner who is not otherwise impacted by the project. Therefore, it may not be feasible to construct this new access track. This area has been

identified by a RAP as an important traditional woman's site. NOHC consulted further with the RAP over the phone on 14 December 2022 regarding the potential impact to this site by the project. Specifically, the RAP was asked if it was appropriate or not for overhead lines to traverse the site. The RAP thought transmission lines crossing the site would be disruptive to the connection of the site to the sky and was also concerned about helicopters flying overhead during line inspections. The amended project footprint no longer involves overhead lines crossing the site.

In order to avoid potential impacts to Derringullen Creek Women's Site associated with upgrading the existing access track, it is recommended that consideration is given to the placement of infrastructure (including access tracks) outside of the site where feasible. Where this is not feasible, further consultation with the RAP should be undertaken to seek guidance around minimising and managing the extent of impacts. In addition, construction personnel briefings and cultural awareness training would be implemented to ensure workers in the area are aware of this culturally sensitive site and the relevant protocols that need to be followed to minimise inadvertent impacts to the site.

10.3 Areas of Aboriginal Archaeological Sensitivity - Surface

The modelled archaeological sensitivity of the amended project footprint is depicted in Attachment 5.1 and 5.2. Of the total amended project footprint area, 28 per cent is classified as high, 27 per cent is classified as moderate and the remaining 45 per cent is classified as low or already disturbed. A total of 86 per cent of all Aboriginal sites identified during the survey program are in areas identified as moderate or high archaeological sensitivity, of which 61 per cent of sites are in high and 25 per cent are in moderate areas of archaeological sensitivity. This result further confirms the veracity of the archaeological sensitivity model.

The amended project footprint includes approximately 2,554 hectares of land identified as high archaeological sensitivity and 2,450 hectares identified as moderate sensitivity. However, due to the nature of the project and the ability to adjust the location of infrastructure it is likely that a smaller area would be impacted. The amended project footprint presents a conservative 200 metre wide corridor for the transmission line portion, while the final transmission line easement is likely to generally be about three times smaller at 70 metres in width.

10.4 Consideration of the principles of ecologically sustainable development

According to the Operational Policy: Protecting Aboriginal Cultural Heritage, an object of the NPW Act is to conserve places, objects and features of significance to Aboriginal people (s.2A(1)(b)(i)). This is to be achieved by applying the principles of ecologically sustainable development (ESD) (s.2A(2)). An ESD (defined in section 6 of the *Protection of the Environment Administration Act 1991*) requires the integration of economic and environmental considerations (including cultural heritage) in the decision-making process. In regard to heritage, ESD can be achieved by applying the principle of intergenerational equity and the precautionary principle.

10.4.1 Intergenerational equity

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations. The precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In applying the precautionary principle, decisions should be guided by:

- a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- an assessment of the risk-weighted consequences of various options.

Intergenerational equity is being considered through the avoidance of impact to archaeological sites where possible, and through the salvaging of archaeological sites where impacts cannot be avoided. Measures taken to avoid impact to sites (including planning the location of work to physically avoid sites, and the use of protective measures such as site fencing) ensures that these sites remain in their current condition and are available for future generations. The initial design and construction planning process has sought to minimise potential impacts to sites and features of Aboriginal heritage significance. In addition, a change in the vegetation clearing methodology would also result in the

reduction of direct impacts to sites, for example the approach is to retain root balls in areas of PADs to avoid impacts. Further design refinements and construction methodology changes will be completed during detailed design to continue to avoid or minimise impacts.

Where impacts are unavoidable for Aboriginal sites/PADs, salvage of the archaeological material through surface collection and/or excavation would identify, recover and analyse Aboriginal objects that would potentially be subject to harm. To ensure that the objects themselves would be available for future generations to potentially access, the recovered object(s) would be subject to continuing consultation with the appropriate RAPs regarding their long-term storage and keeping.

10.4.2 Precautionary principle

The precautionary principle is relevant to the consideration of potential impacts to Aboriginal cultural heritage where:

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

Where this is the case, a precautionary approach should be taken, and all cost-effective measures should be implemented to prevent or reduce damage to the objects/place.

The archaeological survey and subsurface test excavations, engagement with the RAPs and preparation of a thorough ACHAR have improved the understanding of the cultural heritage of the amended project footprint. This knowledge will allow design and construction measures to be prepared with impact avoidance as a priority.

Where impacts cannot be avoided, the proposed salvage of surface artefacts and subsurface deposits, represents a precautionary measure against the harm to archaeological material at these locations. The recorded finds from these actions would inform an understanding of past human behaviour. The subsequent written record created through the reporting process would create new knowledge. The knowledge generated through the reporting process acts as another harm mitigation measure.

11. CUMULATIVE IMPACT

The cumulative impact assessment was prepared in accordance with the *Cumulative Impact Assessment Guideline for State Significant Projects* (DPE, 2022). Assessing cumulative impacts involves the consideration of the proposed impact in the context of existing developments and past destruction of heritage sites, as well as the population of heritage sites that still exist in the region of interest (Godwin, 2011). The assessment of cumulative impacts also considers projects that are currently under development, or at the planning stage that may also influence the assessment of this project's potential impacts. The concept of assessing cumulative impacts aims to avoid discussing the impact of a development in isolation and aims to assess the impact in terms of the overall past and future degradation of a region's heritage resource.

Searches for relevant projects were carried out in March 2023 and included the following data sources:

- DPHI's Major Projects register
- DPHI's Southern Regional Planning Panel project register
- NSW Independent Planning Commission project register
- Transport for NSW Projects Map.

Searches were limited to the LGAs of Wagga Wagga City, Snowy Valleys, Yass Valley, Cootamundra-Gundagai Regional Upper Lachlan Shire, Goulburn Mulwaree, and Hilltops.

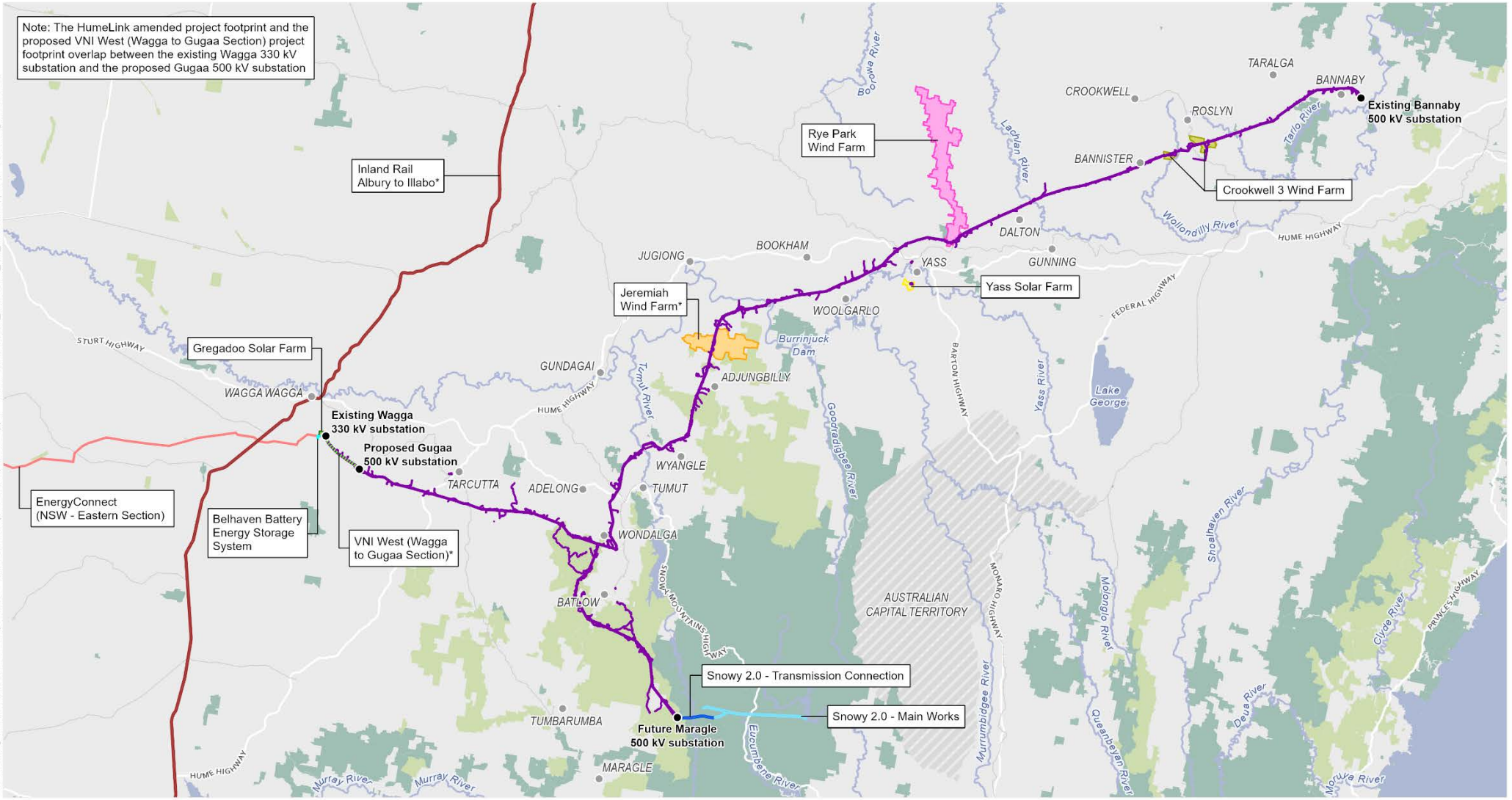
Based on the above searches, the following projects are to be considered in the cumulative impact assessment for potential Aboriginal heritage impacts:

- EnergyConnect (NSW – Eastern Section)
- Gregadoo Solar Farm
- Jeremiah Wind Farm
- Rye Park Wind Farm
- Victoria to NSW Interconnector West (VNI West)
- Snowy 2.0 – Transmission Connection
- Snowy 2.0 – Main Works
- Inland Rail – Albury to Illabo
- Crookwell 3 Wind Farm.

Since the public exhibition of the EIS, an updated cumulative impact search has been undertaken. This updated search has identified the following two proposed projects that had not been considered in Chapter 25 of the EIS:

- Belhaven Battery Energy Storage System
- Yass Solar Farm.

Further detail on each of the above projects is provided in Table 11-1 and Figure 11-1 below.



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

1:925,000

0 20 40km

Projection: GDA 1994 MGA Zone 55

HumeLink **Aboriginal Heritage**

FIGURE 11-1: Relevant future projects

11.1 Summary

The amended project footprint has not been historically subject to high levels of impact from residential, commercial, or government development. The linear nature of the HumeLink project, as well as the large spans between transmission line structures would result in impacts being spread across landforms. The detailed design process will adjust transmission line structure locations and align access tracks in some locations to avoid or minimise impact to Aboriginal sites, where practicable. Wherever the direct impacts do occur in the amended project footprint, there are likely to be numerous similar landforms and Aboriginal sites within the surrounding landscape that would be retained and preserved. There is little overlap with sites impacted by other projects and the HumeLink project. Therefore, the cumulative impacts from the project on the Aboriginal heritage of the region are assessed as low.

Table 11-1 Cumulative impacts

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
EnergyConnect (NSW – Eastern Section)	• The project includes a new transmission line connecting the existing Buronga substation and existing Wagga 330 kV substation, and construction of the new Dinawan substation (170 km west of Wagga Wagga). The new transmission line comprises: o 375 kilometres of new 330 kV double circuit transmission line and associated infrastructure between the Buronga substation and the proposed Dinawan substation o 162 kilometres of new 500 kV double circuit transmission line (operated at 330 kV) and associated infrastructure between the proposed Dinawan substation and the existing Wagga 330kV substation o Connection of the proposed transmission lines to the proposed Dinawan 330kV substation • Construction of a new 330kV substation around 30 kilometres south of Coleambally, referred to as the proposed Dinawan substation • Upgrade and expansion of the Wagga 330 kV substation to accommodate the new transmission line connectors including o Installation of new line bays o Relocation and upgrade of existing bays and associated electrical and civil works • The project also involves associated	EIS approved 2022	HumeLink and EnergyConnect (NSW – Eastern Section) both require upgrades of the existing Wagga 330 kV substation	• Early 2023–late 2024 • Upgrade and expansion of the existing Wagga 330 kV substation as part of EnergyConnect (NSW – Eastern Section) to be complete by August 2024	Of the 147 Aboriginal sites (previously and newly identified), and PADs within the EnergyConnect (NSW – Eastern Section) survey area, 55 would not be impacted at all by the project and 92 may potentially be. There are no Aboriginal sites that would be impacted by both EnergyConnect and the HumeLink project. HumeLink would not see a substantial increase in impact to Aboriginal sites across the very large area encompassed by both projects.

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	infrastructure (optical repeater structures), new and/or upgrade of access tracks as required and ancillary works to support construction • Key impacts identified in the EIS include biodiversity, Aboriginal heritage, visual amenity during operation, noise impacts during construction and operation, dust impacts (amenity) during construction, impacts to road conditions and social impact during construction. • Controlled action under EPBC Act				
Gregadoo Solar Farm	• The project includes around 122,000 solar panels constructed on about 96 ha of land, with associated infrastructure. • The project also includes grid connection to the Gregadoo substation. • Access to site from Boiling Down Road, Gregadoo • Key assessment issues for the project included the compatibility of the proposed land use, the potential impacts on amenity (visual, traffic) and the potential impact to surface water resources. • Three additional Aboriginal Heritage items were identified in the assessment of Modification 2.	EIS approved 2018 Modification 2 approved 2021	On land adjacent the existing Wagga 330 kV substation. Gregadoo Solar Farm is proposed to connect to existing Wagga 330 kV substation on the northern side of substation.	• Construction expected to commence mid-2023 • 9 months to construct	NGH Environmental (2018) reported for the EIS assessment that seven Aboriginal stone artefacts were found across the proposal area immediately west of the Wagga 330 kV substation, none of the sites are within the HumeLink amended project footprint. HumeLink would not see a substantial increase in impact to Aboriginal sites.
Jeremiah Wind Farm	• The project is located approximately 29 km east of Gundagai around the Adjungbilly area • The project proposes a 65 turbine wind farm with a maximum tip height of 300 metres, battery energy storage system and associated ancillary infrastructure • Key issues from the scoping report	EIS in preparation	Transmission lines between Gugaa 500 kV substation and Bannaby 500 kV substation, and future Maragle 500 kV substation and Bannaby 500 kV substation go through the Jeremiah	• Project approval expected in 2023 • Construction expected to be 24-30 months	Six AHIMS sites are located within the Project Site of this project. Based on the findings of this assessment, it is highly likely that further Aboriginal heritage sites would be present within the Jeremiah Wind Farm study area. None of the sites are

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	include noise and vibration, landscape and visual amenity, traffic and transport, biodiversity, Aboriginal cultural heritage, non-Aboriginal heritage, water use and impacts on water quality, hazards and risks and social and economic. • Controlled action under EPBC Act		Wind Farm development area		within the HumeLink amended project footprint. In addition to the Jeremiah Wind Farm project the HumeLink project would not see a substantial increase in impact to Aboriginal sites.
Rye Park Wind Farm	• The project is located to the west of Rye Park, to the north-west of Yass and south-east of Boorowa • Modified project includes maximum 80 wind turbines with a maximum tip height of 200 m. The project also includes construction of associated infrastructure (substations, operation and maintenance facilities) and upgrades to local roads • A 330 kV switching station is proposed to the north of the HumeLink transmission line at Bango. • Main project impacts relate to visual amenity, noise, biodiversity and traffic and transport • Modification 2 has reduced the overall biodiversity impacts of the approved project and assessments have identified two new areas of Aboriginal cultural heritage.	EIS approved 2017 Modification 1 approved 2021 Modification 2 preparation 2022	Transmission lines between Gugaa 500 kV substation and Bannaby 500 kV substation, and future Maragle 500 kV substation and Bannaby 500 kV substation go through the southern end of the wind farm project boundary at Bango (near Bango Nature Reserve). HumeLink includes the connection of optical ground wire (OPGW) from the HumeLink 500 kV transmission line into the Rye Park 330 kV switching station auxiliary services building (the Rye Park Wind Farm substation).	• Under construction since December 2021 with commissioning scheduled for June 2023 • Original EIS suggested an 18-24 month construction period	Dibden in 2013 undertook an Aboriginal Cultural Heritage Assessment for this project. Thirteen Aboriginal object locales were recorded during the field survey, 10 of which are single stone artefacts. Undetected or subsurface stone artefacts are predicted to be present in extremely low density. In addition, three quartz outcrops have been recorded which may have been used as stone procurement areas by Aboriginal people. None of these sites are within the HumeLink amended project footprint. In addition to the Rye Park Wind Farm project, the HumeLink project would not see a substantial increase in impact to Aboriginal sites.
Victoria to NSW Interconnector West (VNI West)	• The project involves targeted interconnector expansion between Victoria and NSW to address transmission network limitations, and improve supply reliability • VNI West is still in scoping/market modelling phase to assess the	Scoping/market modelling phase Underwriting agreement with Commonwealth	VNI West may require connection at the existing Wagga 330 kV substation (depending on preferred option)	• Construction proposed to commence in 2026 with commissioning by 2028.	There are three Aboriginal sites in footprint between the Wagga 330 kV substation and the proposed Gugaa 500 kV substation. There is therefore potential for three sites to be impacted by both

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
Website link	technical and economic viability of expanding transmission interconnector capacity between Victoria and NSW • Several options have been developed with new interconnector corridors (VNI 6–8) connecting to the existing Wagga 330 kV substation	Government April 2022	The current scope that interfaces with HumeLink includes a new double circuit transmission line between Wagga 330 kV substation and Gugaa 500 kV substation to extend the EnergyConnect lines, upgrade above lines to 500 kV and at Gugaa a cut in line 51 and one additional transformer.		projects. However as stated there is the potential to avoid impacts to sites through the siting of project elements away from sites. There is likely not to be a substantial increase impact to Aboriginal sites.
Snowy 2.0 - Transmission Connection	• New transmission connection between the proposed Snowy 2.0 pumped hydro and generation project to the existing high voltage transmission network. • A new substation located within Bago State Forest (Maragle substation) and adjacent to Transgrid's existing Line 64 that forms a 330 kV connection between Upper and Lower Tumut switching stations • Upgrade and widening of an existing access road of Elliot Way to the substation including the construction of new driveways into the 330 kV and 500 kV switchyards • Two new 330kV overhead double-circuit transmission lines from the Snowy 2.0 cable yard to the new substation • Short overhead 330 kV transmission line connection (approximately 300 metres in length) comprising both steel lattice structures and pole structures as required between the	EIS approved 2022	HumeLink to connect to the new Maragle substation being constructed as part of the Snowy 2.0 - Transmission Connection project	• Construction expected to begin in late 2023 with expected completion by end of 2025	Jacobs completed an ACHAR in 2020 and an amended ACHAR in 2021. The assessment identified that Snowy 2.0 - Transmission Connection Project would have full or partial impacts on five Aboriginal heritage sites of low significance. These sites are all located at the eastern end of the project near the Snowy 2.0 cable yard in Lobs Hole. The ACHAR (Jacobs, 2020) identified one PAD (Substation PAD) at the future Maragle 500 kV substation site. However, no Aboriginal objects were identified at Substation PAD, and it was concluded that the area is not an archaeological site. As such, none of the sites identified for Snowy 2.0 - Transmission Connection

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	substation and Line 64 • Construction of access tracks to the transmission structures, and upgrade to existing tracks where required • Ancillary works to support construction • Key impacts identified in the EIS include biodiversity, Aboriginal and non-Aboriginal heritage, potential impact to water quality, erosion and sedimentation and contamination risks (from Naturally Occurring Asbestos (NOA)), temporary impacts on traffic and access, dust generation, noise and vibration impacts, visual amenity impacts and socio-economic impacts during construction • Controlled action under EPBC Act • Note that Amendment Report for the project has resulted in less disturbance than that described in the EIS. However, a wider asset protection zone and substation footprint is provided for the Maragle substation.				Project are within the HumeLink amended project footprint. The HumeLink project would not see a substantial increase in impact to Aboriginal sites.
Snowy 2.0 - Main Works	• The project includes an underground pumped hydro power station and ancillary infrastructure. • Main works at Talbingo Reservoir site include excavated rock placement, portal construction and tunnelling, access roads and ancillary facilities for emplacement activities and tunnelling support • Key impacts identified in the EIS for Talbingo Reservoir site include water quality and aquatic ecology impacts, temporary impacts to visual and recreational values and impacts associated with clearing and excavation to facilitate construction • Modification 1 relates the Main	EIS approved 2020 Modification 1 approved 2022	Talbingo Reservoir site is approximately 5 km east of transmission lines between Maragle substation and Bannaby substation	• Construction began in October 2020 with expected completion by 2026	New South Wales Archaeology completed an Aboriginal Cultural Heritage Assessment for this project in 2019. Some 29 previously recorded Aboriginal object sites were known to be present in survey area. A total of 306 additional sites were recorded during the field survey. An extensive program of subsurface test excavation has been undertaken. A total of 654 test squares has been excavated and 3,394 stone artefacts retrieved. In

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	Access Tunnel and Marica areas of the project (further east than Talbingo Reservoir site). • Controlled action under EPBC Act.				addition to the Snowy 2.0 main works project the HumeLink project would not see a substantial increase in impact to Aboriginal sites.
Inland Rail – Albury to Illabo	• Upgrade 185 km of rail track from Albury to Illabo • The upgrade of rail track passes through Wagga Wagga • Key issues could include workforce availability and accommodation capacity around Wagga Wagga during peak construction periods with a large influx of workers using short-term accommodation during the scheduled rail possessions in March and September 2024. Without mitigation, this demand would have an impact on the local economy when short-term accommodation demand is high. A workforce accommodation strategy would be prepared to manage demand on local accommodation and detailed construction planning would look to scheduling opportunities to minimise the peak demand on the short-term accommodation market.	• EIS exhibited between 17/08/22 and 28/09/22 • Responding to submissions	Roughly 9 km north-west of existing Wagga 330 kV substation	Construction is proposed to commence in early 2024 and is expected to take about 16 months.	GML Heritage undertook an Aboriginal cultural heritage assessment of the project in 2022. Site investigations were completed at nine locations that were determined through desktop assessment as having archaeological potential. Of those surveyed areas, one was found to have the potential to contain archaeological deposits and two isolated artefacts were found at two separate locations. A number of Aboriginal cultural places were also identified. None of these sites are within the HumeLink amended project footprint, the project area is 9 km north-west of the HumeLink amended project footprint. In addition to the Inland Rail – Albury to Illabo project the HumeLink project would not see a substantial increase in impact to Aboriginal sites.

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
Crookwell 3 Wind Farm	• 16 wind turbines up to 157 metres in height, connected to the grid via the 330 kV transmission line • Key issues include biodiversity impacts, visual amenity and operational noise. Given timing, there could be potential for "construction fatigue" type impacts related to construction noise and construction traffic management.	Addendum EIS approved 2019	Project site overlaps with the amended project footprint	Detailed design and pre-construction activities are being carried out with main construction work expected to take about 18 months once commenced	Anderson Environmental Consultants completed an indigenous and non-Indigenous heritage assessment for this project in 2010. The results of the surveys undertaken detected 10 new sites during the field assessments. One of these sites is within the HumeLink amended project footprint, the other sites are located immediately adjacent to or within 2 km of the HumeLink amended project footprint. However, as stated, there is the potential to avoid impacts to sites through the siting of project elements away from sites. There is likely not to be a substantial increase impact to Aboriginal sites.
Belhaven Battery Energy Storage System	Construction and operation of a 400 MW / 800 MWh Battery Energy Storage System including transmission connection and associated infrastructure.	EIS being prepared SEARs issued on 18/05/2023	The main site is located about 1.5 km west of the existing Wagga 330 KV substation, but a connection from BESS to the substation (most likely underground) is proposed. Based on publicly available information there are likely to be overlapping construction programs.		The scoping report identified that there are no registered Aboriginal sites within the Belhaven Battery Energy Storage System project area. The scoping report assessed that there may be unidentified Aboriginal site in the project area. The cumulative impact can not be determined for this

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
					project prior to further assessment.
Yass Solar Farm	The construction, operation and decommissioning of a 100 MW solar photovoltaic energy generating facility with an associated battery energy storage system	EIS being prepared SEARs issued on 22/12/2023	The site surrounds the Yass substation, and based on publicly available information, there are likely to be overlapping construction programs. However, given the proximity and likely impacts, cumulative impacts are likely limited to the establishment and use of HumeLink's combines worker accommodation facility and construction compound proposed at Yass during construction only.		The scoping report identified that there are eight registered Aboriginal sites within the Yass Solar Farm project area. HumeLink will utilise the Yass substation compound which is within the Yass Solar Farm project area but HumeLink will not impact any of the identified sites. The HumeLink project would not see a substantial increase in impact to Aboriginal sites

12. MANAGEMENT OF IMPACTS

12.1 Overview of approach

The mitigation measures to manage potential Aboriginal heritage impacts of the project during the detailed design, construction and operational phases of the project are listed below (Table 12-1).

12.1.1 Aboriginal Heritage Management Plan

An Aboriginal Heritage Management Plan (AHMP) would be developed by the construction contractors. It would be prepared by a heritage specialist in consultation with the RAPs and consent authority to provide the post approval framework for managing Aboriginal heritage impacted by the project. The AHMP would address the processes, timing, communication methods and project involvement (eg onsite activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. The AHMP would include the detail for the methods and processes to complete the required mitigation measures such as site fencing and further archaeological collection, testing and salvage. The AHMP would be communicated to all relevant construction personnel prior to construction commencing in that area.

12.2 Avoidance and minimisation of impacts

There are 178 Aboriginal sites and PADs located within the amended project footprint that may be directly or indirectly impacted by the project. These include 12 PADs, one modified tree/PAD, five modified trees and 11 test locations. The remaining 149 sites are stone artefact occurrences including artefact scatters and isolated finds. In addition to 178 Aboriginal sites, there are nine cultural trees, six modified trees of non-Aboriginal origin, one cultural site and one charcoal occurrence that are not ‘objects’ as defined by the NPW Act. The project aims to avoid heritage items as a first principle. As such, impacts to Aboriginal heritage have been considered during the corridor and route selection phases of the project and will be further considered through detailed design. The location of project components within the amended project footprint will be refined (eg the transmission line easement) as design and engagement progress. The impacted area would therefore be smaller than the area considered in this assessment.

12.3 Summary of mitigation measures

Table 12-1 provides a summary of the mitigation measures identified for the project based on the impact assessment.

Table 12-1 Summary of removed, revised and new mitigation measures

Reference	Impact	Mitigation measures	Timing	Relevant location
AH1	Impact to Aboriginal sites	The Aboriginal community consultation process for this project will continue until completion of construction	Detailed design and construction	All locations
AH2	Impact to Aboriginal sites	The finalisation of the project design and construction methodology, and associated final disturbance areas, will be developed to avoid harm to sites of moderate or above Aboriginal heritage significance as far as ~~practical~~ **practicable**. The objective is to further reduce potential impacts through **considered placement of** transmission line structure location**s** and design refinement of proposed infrastructure and **the associated** construction methodology. Avoidance and minimisation of harm to sites and **potential archaeological deposits (**PADs**)** will be prioritised.	Detailed design	All locations
AH3	Impact to Aboriginal sites in unassessed areas of the project footprint	Additional assessment will occur in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (2010b) for areas where ground disturbing activities are required in locations outside of the previously assessed area. Where required, additional heritage surveys will be carried out with the **Registered Aboriginal Parties (**RAPs**)** prior to ground disturbing activities occurring in any such areas ~~(including areas where visual inspection has been undertaken)~~. If no Aboriginal objects are found or if Aboriginal objects are found and they would not be impacted, then a letter report will be prepared by an archaeologist that documents the findings and gives clearance to proceed. Where Aboriginal objects, scarred trees or areas of **potential archaeological deposits (**PAD**s)** are located in unassessed areas and would be directly impacted, ~~addendum~~ report/s ~~to *Technical Report 2 – Aboriginal Cultural Heritage Assessment Report*~~ will be prepared. The report/s will: • detail findings of the survey activities • detail where test excavation is required	Detailed design **and construction**	All locations ~~(outside of the previously assessed area)~~

Reference	Impact	Mitigation measures	Timing	Relevant location
		• outline any additional mitigation strategies beyond those required • be presented to the RAPs for comment. Final reports will be provided to RAPs and to Heritage NSW for their information prior to the commencement of ground disturbing activities in these locations.		
AH4	Impact to Aboriginal sites of cultural value	Identified Aboriginal sites of cultural value will be avoided by the project where feasible. Further consideration of the potential to avoid direct or indirect impacts on the identified Aboriginal sites of cultural value will be carried out during detailed design.	Detailed design	Aboriginal sites of cultural value
~~AH5~~	~~Impact to Aboriginal sites – PADs~~	~~An archaeological subsurface test excavation program will be carried out in parts of any PADs where project activities would have direct impact and a test excavation program has not already been completed in the area of impact. Direct impacts include grading of tracks and construction work sites, excavation for transmission line structure construction and tree removal that includes the root ball.~~	~~Detailed design~~	~~PAD areas not already tested~~
AH5 ~~AH6~~	Impacts ~~to~~ **from construction of transmission line structures, new waterway crossings, worker accommodation facilities and construction compounds in** areas of high **and moderate** Aboriginal archaeological sensitivity **(subsurface archaeological sensitivity model)**	Where detailed design confirms there would be direct impacts **from the construction of transmission line structures, new waterway crossings, worker accommodation facilities and construction compounds** in areas of high **and moderate** archaeological sensitivity that have not previously subjected to test excavations, **prior to impact** a desktop assessment **and site inspection** will be completed to determine the level of previous impact from past ground disturbance activities **and to determine if the area contains a potential archaeological deposit (PAD)**. If it is that the area **contains a PAD and** has undergone low previous impact, then an archaeological sub surface test excavation program will be carried out **in the area of direct impact.** ~~Direct impacts include grading of tracks and construction areas, excavation for transmission line structure construction and tree removal that includes the root ball.~~	Detailed design **and construction**	Areas of high **and moderate** sensitivity not already tested where project activities would have direct impact

Reference	Impact	Mitigation measures	Timing	Relevant location
~~AH7~~	~~Impacts to areas of moderate Aboriginal archaeological sensitivity~~	~~A field and desktop assessment will be completed in areas assessed as having moderate archaeological sensitivity where detailed design has confirmed project activities would have direct impact and a test excavation program has not already been completed in the area of impact. This is to determine the level of previous impact from past ground disturbing activities. If it is determined that the area has undergone low previous impact then an archaeological subsurface test excavation program will be carried out. Direct impacts include grading of tracks and construction areas, excavation for transmission line structure construction and tree removal that includes the root ball.~~	~~Detailed design~~	~~Areas of high and moderate sensitivity not already tested where project activities would have direct impact~~
AH6	**Impacts from the construction of new or upgraded access tracks in areas of high and moderate Aboriginal archaeological sensitivity (model for predicting surface artefact scatters)**	**Following any stripping and grading works and prior to placement of any fill or road base material for construction of the access track, a site walkover will be completed and any surface artefacts will be recorded and moved off of the track. The artefact locations will be recorded as sites and then entered on the AHIMS database. The recording will include a record of their original location. Artefacts may be grouped into sites and the date provided to AHIMS accordingly.**	**Construction**	**Areas of high and moderate sensitivity not already tested where project activities would have direct impact**
AH7	**Tree removal that includes the root ball in areas of high and moderate Aboriginal archaeological sensitivity (model for predicting surface artefact scatters)**	**Following the root ball removal in areas assessed as having high and moderate sensitivity, the area will be inspected and any surface artefacts will be recorded and moved away from the area of impact. The artefact locations will be recorded as sites and then entered on the AHIMS database.**	**Construction**	**Areas of high and moderate sensitivity not already tested where tree root ball removal would be undertaken**

Reference	Impact	Mitigation measures	Timing	Relevant location
AH8	Impact to Aboriginal sites – Modified/**scarred** trees	Harm to modified trees ~~(including those of cultural significance)~~ **and trees of cultural significance** will be avoided where possible through design development and construction planning. Modified trees will only be removed to directly facilitate construction of permanent infrastructure and/or to meet Vegetation Clearance Requirements for the transmission line. If the removal of a scarred tree (a type of modified tree)**, or a tree of cultural significance, that has been assessed to be an Aboriginal object** cannot be avoided, the tree will be subject to 3D scanning. ~~Reports will be provided to RAPs and Heritage NSW. Following this, the scarred trunk will be salvaged.~~ **Prior to any impacts to modified or scarred trees, or a tree of cultural significance, consultation will be undertaken with the RAPs on salvaging the scarred tree trunk.**	Detailed design	Modified/**scarred** trees
AH9	Impact to Aboriginal sites – Isolated Finds, Artefact scatters and **potential archaeological deposits (**PADs**) (moderate or high archaeological significance)**	All portions of artefact scatters and isolated finds **of moderate or high archaeological significance** that will be directly impacted will require surface collection ~~and salvage~~ **and/or movement** prior to construction commencement in those areas. ~~Additionally, based on the outcomes of the test excavations, salvage excavations will occur in accordance with the Code of Practice.~~ **Where test excavations identify archaeological deposits moderate or high archaeological significance which cannot be avoided, salvage excavations will occur.**	Detailed design **and construction**	Directly impacted sites and PADs
AH10	Indirect impact to adjacent heritage items	The locations of known Aboriginal heritage sites within and adjacent to the project footprint and the relevant protocols to avoid and manage any potential harm to the items will be communicated through the Heritage Management Plan to all relevant construction workers prior to construction commencing in that area.	Detailed design and construction	Transmission line

Reference	Impact	Mitigation measures	Timing	Relevant location
AH11	Impact to Aboriginal sites	Cultural heritage awareness training will be carried out for all construction workers working on the project prior to the construction workers participating in construction activities. The training shall cover sites of heritage significance within and adjacent to project work sites and protocols that must be complied with to minimise and manage potential impacts to those sites.	Construction	All locations
AH12	Unexpected finds	If at any time during construction any ~~items of potential Aboriginal heritage archaeological significance~~ **unanticipated Aboriginal objects (which are inconsistent with approved heritage impacts in *Technical Report 2 - Revised Aboriginal Cultural Heritage Assessment Report*)** or human remains are discovered, they will be managed in accordance with an unexpected finds protocol that is aligned with the protocol in Attachment 6 of *Technical Report 2 – **Revised** Aboriginal Cultural Heritage Assessment Report*.	Construction	All locations.
AH13	~~Retrieved~~ **Salvaged** archaeological material	**The long-term management of salvaged** ~~Retrieved~~ archaeological materials will be ~~stored in appropriate facilities confirmed~~ **determined** in consultation with **Registered Aboriginal Parties (**RAPs**)**.	Construction	As relevant
AH14	Post construction impacts to heritage items by maintenance activities	Sites of heritage significance that would remain in-situ within the transmission line easement**, at substation locations** and along access tracks will be mapped and recorded within GIS systems managed by Transgrid to reduce the potential for inadvertent impacts which may occur during maintenance activities.	Operation	Transmission line, substations and access tracks.
AH15	**Impacts from the upgrade of existing access track through Derringullen Creek Women's Site**	**If impacts to the Derringullen Creek Women's Site cannot be avoided during detailed design and construction planning, further consultation with the relevant Registered Aboriginal Party (RAP) will be undertaken to seek guidance around minimising and managing the extent of impacts.**	**Detailed design and construction**	**Derringullen Creek Women's Site**

12.4 Managing the finalisation of the project design

This Aboriginal heritage assessment is based on the current amended project footprint. This assessment aims to develop an understanding of the nature of potential impacts from the project and retain a level of flexibility during design refinement.

During detailed design, the locations of recorded Aboriginal sites, PADs and areas of moderate and high archaeological sensitivity will be used to inform the final location of transmission line structures, and the layout of construction compounds and accommodation facilities, with an aim to:

- Protect, conserve and/or manage the heritage significance of Aboriginal objects and places to ensure the project does not diminish the cultural understanding of Aboriginal people in New South Wales.
- Avoid or minimise impacts on areas of archaeological potential and scientific significance, where feasible and reasonable. Where this is not possible areas of moderate or high archaeological potential and significance are prioritised for avoidance or impact minimisation.

Aspects of the project that may be subject to further refinement include:

- the final transmission line structure locations
- location of new or upgraded access tracks
- final layouts of the construction compounds and accommodation facilities
- construction methods and staging.

Refinements to optimise the design outcomes and construction method would be carried out to further avoid or minimise environmental impacts. This includes approaches to avoid or minimise native vegetation clearing, and areas of moderate to high Aboriginal archaeological sensitivity.

Some refinements might however require changes that could disturb locations outside the project footprint. In such circumstances additional heritage survey would be required before confirming the change.

The final design would be reviewed for consistency with the assessment contained in this report including the proposed mitigation measures, and any conditions of approval. If design refinements are not consistent with the environmental assessment, and any approval from the Minister for Planning, approval would be sought from the Minister for any such modifications in accordance with the requirements of Division 5.2 of the EP&A Act.

Where known Aboriginal sites are be located close to construction or maintenance activities for the project, mitigation measures to protect the sites from accidental impacts would be implemented such as clear mapping of sites on construction plans and use of high visibility fencing to mark exclusion zones.

Where direct impacts to sites cannot be avoided during design refinement, the identified mitigation measures would be implemented to minimise the potential impacts on Aboriginal heritage, such as surface salvage of artefacts or a program of salvage excavations in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a).

13. CONCLUSION

As a result of this assessment there are 195 Aboriginal cultural heritage locations; these include 12 PADs, one modified tree/PAD, five modified trees, one cultural site, nine cultural trees, six modified trees of non-Aboriginal origin, one charcoal occurrence and 11 test locations. . The remaining 149 sites are stone artefact occurrences including artefact scatters, isolated finds and subsurface artefact scatters.

There are nine cultural trees and six modified trees of non-Aboriginal origin that are not 'objects' as defined by the NPW Act.

Two of the PADs previously recorded as part of the Snowy 2.0 Transmission Connection project, sites 56-6-0300 and 56-6-0262 have been subject to subsurface test excavation as part of that project and do not need to be assessed for HumeLink.

In addition to the above, there are five sites that will not be impacted by the project but are near access tracks upgrades and a further six sites that that are not impacted but are located adjacent to the transmission line portion of the amended project footprint.

The assessment completed within this report identifies that the majority (118) of sites (excluding PADs) within the amended project footprint have low scientific significance, with a lower number (35) having moderate (local) scientific significance and four sites having high (local) scientific significance. Of the PADs, three are assessed as having low significance, two as moderate, six as moderate to high and one as high, the modified tree/PAD is assessed as having moderate significance. Eight sites are indicated as destroyed on AHIMS so therefore have no significance. Five PADs have not been subject of test excavation as it was determined that direct impacts are unlikely to occur.

Of the 195 Aboriginal cultural heritage sites, the majority are within the transmission line portion of the amended project footprint (including one indicated as partially destroyed by AHIMS), including eight in the areas of controlled blasting. Forty-six sites are on access tracks or intersection upgrades (seven are indicated as destroyed by AHIMS and four are indicated as partially destroyed). 10 are near the future Maragle 500 kV substation compound (two are indicated as partially destroyed by AHIMS), seven are within the Crookwell accommodation facility and compound access road (these are all indicated as destroyed by AHIMS), five are within the Crookwell accommodation facility and compound, five are in or near the existing Bannaby 500 kV substation compound, two are in the Tarcutta accommodation facility and compound, one is in the Gadara Road compound and one is within the Ardrossan Headquarters Road compound. In total, eight sites are indicated as destroyed by AHIMS and four sites are indicated as partially destroyed. The identified cultural site is within the transmission line portion of the amended project footprint.

The amended project footprint includes approximately 2,554 hectares identified as high archaeological sensitivity and 2,450 hectares identified as moderate sensitivity. However, not all the land within the amended project footprint would be used for construction and operation of the project. Therefore, the amount of land impacted by the project within areas of high or moderate archaeological sensitivity is likely to be substantially less.

The project aims to avoid heritage items as a first principle. As such, impacts to Aboriginal heritage have been considered during the corridor and route selection phases of the project and will be considered further through detailed design. The assessment is completed considering a worst-case scenario, as the final impacted area would be much smaller than the amended project footprint assessed and not all of the amended project footprint will be used during construction/operation of the project. Mitigation measures aim to further manage impacts by undertaking salvage and recording prior to impacts occurring to sites. The AHMP developed by the construction contractors would include relevant mitigation measures that would be implemented during construction.

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