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HumeLink

Aboriginal Cultural Heritage
Assessment Report
EIS Technical Report 2

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Aboriginal Cultural Heritage Assessment Report

June 2023

Redacted

Navin Officer

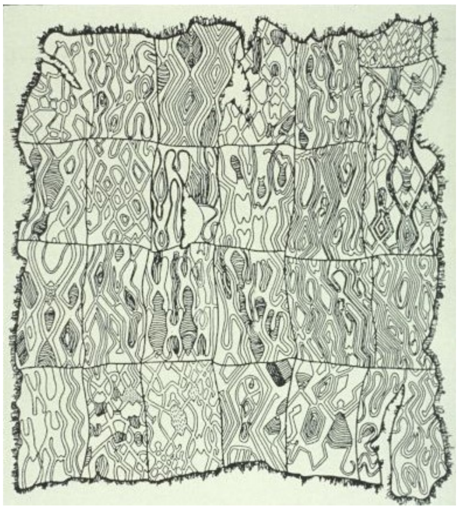
heritage consultants Pty Ltd

acn: 092 901 605

Number 4
Kingston Warehouse
71 Leichhardt St.
Kingston ACT 2604

www.nohc.com.au

ph 02 6282 9415
fx 02 6282 9416



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

EXECUTIVE SUMMARY

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 360 kilometres of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga City, Bannaby and Maragle. This project is collectively referred to as HumeLink. The project would be located across five Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire and Yass Valley. The location of the project is shown on Figure 1-1.

HumeLink would involve construction of a new substation east of Wagga Wagga, the proposed Gugaa 500 kV substation, as well as connection to existing substations at Wagga Wagga and Bannaby and a future substation at Maragle in the Snowy Mountains (referred to as the future Maragle 500 kV substation). The future Maragle 500 kV substation is subject to a separate major project assessment and approval (reference SSI-9717, EPBC 2018/836).

Construction of the project is targeted to commence in 2024, subject to the required planning and regulatory approvals. Once construction has commenced, the project is estimated to take approximately 2.5 years to build and become operational by the end of 2026.

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) 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 14/03/2022 identified Aboriginal heritage as a key issue that must be addressed by the Environmental Impact Statement (EIS).

Project footprint

The project footprint is the area that has been 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.

For the purpose of this report the study area is referred to as the 'project footprint' as described above.

AHIMS search area

The NSW Department of Planning and Environment's Aboriginal Heritage Information Management System (AHIMS) database search has been undertaken for the project footprint plus a one kilometre buffer from the edge of the project footprint to obtain additional data on sites in proximity to the 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 larger area than the project footprint was searched to allow adequate landscape interpretation and to capture enough site numbers to assess the distribution of sites across the landscape. A buffer is also used to capture any known sites which may have been originally recorded in AHIMS with minor location inaccuracies and which actually occur within the project footprint.

Archaeological survey

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 survey area was the project footprint excluding where access approval was not secured. The survey was carried out on foot in conjunction with the historic heritage survey.

The purpose of the archaeological survey was to:

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

The archaeological survey enabled Registered Aboriginal Parties (RAPs) to visit the project footprint and to discuss the management of Aboriginal sites and cultural heritage values across the project footprint.

Some sections of the project footprint could not be accessed as landowners did not grant approval to access land for the field survey. Therefore, 69.5 per cent of the project footprint has been directly assessed via 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 project footprint, and the views and concerns of Aboriginal people about the project. There are 40 RAPs for this project.

Previously recorded sites

A total of 235 Aboriginal heritage sites are included on AHIMS within the project footprint plus a one kilometre buffer from the edge of the project footprint (searched 02/02/2023). Of these, 21 Aboriginal heritage sites are located within the project footprint, of which 19 are registered as artefact sites. The results of the search indicate that stone artefact sites (isolated finds and scatters) are the most common site type occurring throughout the project footprint with the further two recorded locations within the project footprint being Potential Archaeological Deposits (PADs).

Survey results

A total of 63 Aboriginal sites and six PADs were identified in the project footprint during the field survey. Six additional trees were identified by the RAPs as being possible modified trees however the assessment found that the modification was due to natural causes. Five 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 (see Attachment 4), they are not Aboriginal objects as defined the *NPW Act 1974*. An area of cultural significance was also identified by a RAP, again the area is not an Aboriginal object as defined the *NPW Act 1974.* The RAPs that identified these locations, requested that they be avoided.

Archaeological test excavation

The test excavation program aimed to characterise the nature and occurrence of subsurface archaeological resources within PADs identified during the archaeological survey within the 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 Navin Officer Heritage Consultants (NOHC) aiming to identify, characterise and assess any previously unidentified cultural material within the project footprint and to test the archaeological sensitivity model.

A total of 203 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.

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. 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 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 project footprint to assess the potential of the landscape to contain Aboriginal heritage in order to inform potential field survey locations and predict potential sensitivity where the project footprint was not accessible. This model was also developed due to anticipated lack of surface visibility, which was in part because of the extreme wet conditions associated with the existing La Niña weather pattern during the test excavation program. A preliminary Aboriginal archaeological sensitivity model was developed for the 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 project footprint and the hydrology along the 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.

Following the field survey, the model was refined using multiple datasets in order to achieve a weighted, multi-criteria analysis of the potential landform archaeological sensitivity of the 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).

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. The final version of the model presented in this report aims to represent the likely subsurface archaeological sensitivity across the 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:

- cannot assess the scientific significance prior to excavation
- low scientific significance
- moderate (local) scientific significance.

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

Assessment of impacts

There are 90 Aboriginal sites including eight PADs (including previously recorded sites and those sites that have been found during the current assessment) identified within the project footprint 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. All Aboriginal sites were assessed to have low or moderate significance, four PADs are assessed as having moderate to high significance. However, not all of the project footprint would be used during construction or operation of the project, so these findings are conservative. The Aboriginal sites within the project footprint are summarised in Table 10-1. 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.

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 a direct impact for the project is the installation of a transmission line structure.

- 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 90 sites in the project footprint, the majority are within the transmission line portion of the project footprint. Ten are near the future Maragle 500 kV substation, three are near the existing Bannaby 500 kV substation, five are on indicative access tracks and one is within the Snowy Mountains Highway compound (C02).

The project footprint comprises approximately 1,108 hectares of land identified as high archaeological sensitivity and 2,529 hectares identified as moderate sensitivity. However, not all the land within the 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 and would be confirmed during detailed design.

Management of impacts

The project aims to avoid heritage items as a first principle and as such impacts to Aboriginal heritage have been considered during the corridor and route selection phases of the project. Avoidance of identified Aboriginal sites will be considered further through detailed design. Mitigation measures aim to further manage impacts by undertaking salvage and recording prior to impacts occurring to sites.

Heritage Management Plan

A Heritage Management Plan (HMP) 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 HMP would address the processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. The HMP 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 HMP 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:

- The 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 practical. The objective is to further reduce potential impacts through transmission line structure location and design refinement and construction methodology. Avoidance and minimisation of harm to features/items and PADs are to be prioritised.
- Additional assessment would occur in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (2010a) 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 (including areas where only visual inspection has been undertaken).
- Identified Aboriginal sites of cultural value, should 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

- 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 construction and tree removal that includes the root ball.
- A desktop assessment will be completed in areas assessed as having high archaeological sensitivity, and/or desktop and field assessment 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.
- Harm to modified trees (including those of cultural significance) 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. Reports would be provided to RAPs and Heritage NSW. Following this, the scarred trunk would be salvaged.
- All portions of artefact scatters and isolated finds that are to be directly impacted will require surface collection and salvage 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.
- 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 CEMP 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 shall 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 items of potential Aboriginal heritage archaeological significance, 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 – Aboriginal Cultural Heritage Assessment Report.

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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 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 project footprint plus a one kilometre buffer either side from of the project footprint.
Angular fragment / debitage	A piece of debris exhibiting evidence of knapping but lacking key diagnostic traits (e.g. platform, termination, bulb of percussion)
APZ	Asset protection zone
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, 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 are usually 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. Typically, this category did not include isolated finds. 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 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.

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).

CEMP Construction Environmental Management Plan

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.

CSSI Critical State Significant Infrastructure

DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DECCW	Department of Environment, Climate Change and Water
DEC	Department of Environment and Conservation
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
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 locations would require wider easements up to 110 metres wide at transposition locations and up to 130 metres wide where the new transmission line would parallel the relocated section of Line 51. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
EIS	Environmental Impact Statement
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
GSV	Ground Survey Visibility
ha	hectare

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
kV	Kilovolt
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).
LEPs	Local Environmental Plans
LGAs	Local Government Areas
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
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).
NHL	National Heritage List
NOHC	Navin Officer Heritage Consultants
NPW Act	*National Parks and Wildlife Act 1974*
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.
Project	The CSSI project “HumeLink”, which is the subject of this Environmental Impact Statement.
Project footprint	The area that has been 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. The study area for this report is defined as the project footprint.
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
Retouch	Alteration of the cutting edges of a flake or tool to refine sharpness, shape, angle or strength.
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 project footprint. See project footprint
Survey area	The survey area is within the project footprint where access approval had been secured and surveyed. It excludes that part of the 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 route	The location of the transmission line structures along the middle of the transmission line easement.
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 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 Overview

The Australian energy landscape is transitioning to a greater mix of low-emission renewable energy sources, such as wind and solar. To support this transition, meet our future energy demands and connect Australian communities and businesses to these lower cost energy sources, the national electricity grid needs to evolve.

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of around 360 kilometres 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 five Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire and Yass Valley. The location of the project is shown on Figure 1-1.

HumeLink would involve construction of a new substation east of Wagga Wagga as well as connection to existing substations at Wagga Wagga and Bannaby and a future substation at Maragle in the Snowy Mountains (referred to as the future Maragle 500 kV substation). The future Maragle 500 kV substation is subject to a separate major project assessment and approval (reference SSI-9717, EPBC 2018/836).

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. It would achieve this by supporting the transfer of energy from existing renewable generation as well as facilitate development of new renewable generation in the Wagga Wagga and Tumut Renewable Energy Zones (REZs). The project would provide the required support for the network in southern NSW, allowing for the increase in transfer capacity between new renewable generation sources and the state’s demand centres of Sydney, Newcastle and Wollongong. The project would also improve the efficiency and reliability of the current energy transfer in this part of the network.

Furthermore, HumeLink would form a key part of the transmission line infrastructure that supports the transfer of energy within the National Electricity Market by connecting with other major interconnectors. The NEM incorporates around 40,000 kilometres of transmission lines across Queensland, NSW, Australian Capital Territory (ACT), Victoria, South Australia and Tasmania

Construction of the project is targeted to commence in 2024, subject to the required planning and regulatory approvals. Once construction has commenced, the project is estimated to take approximately 2.5 years to build and would become operational by the end of 2026.

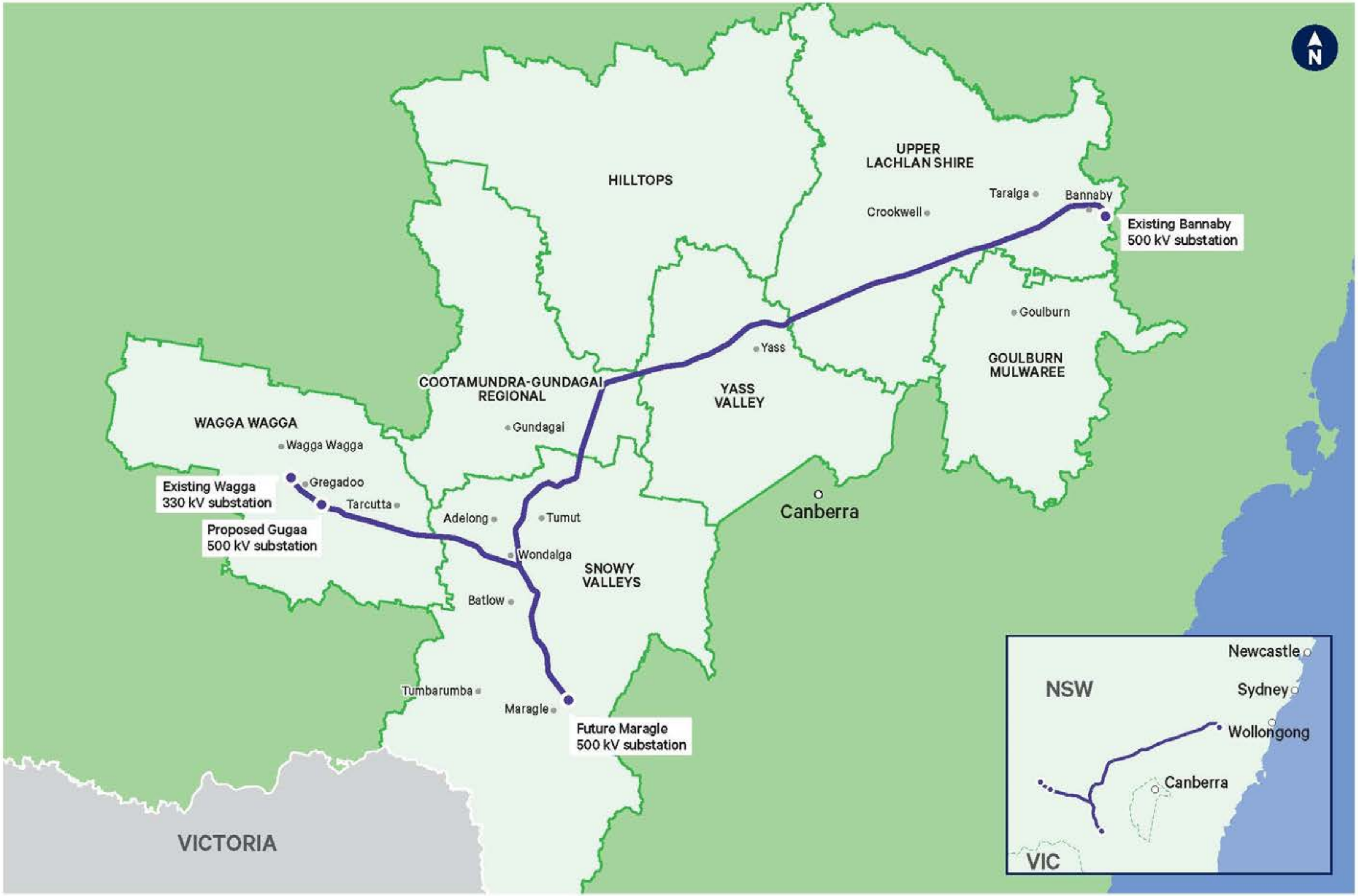
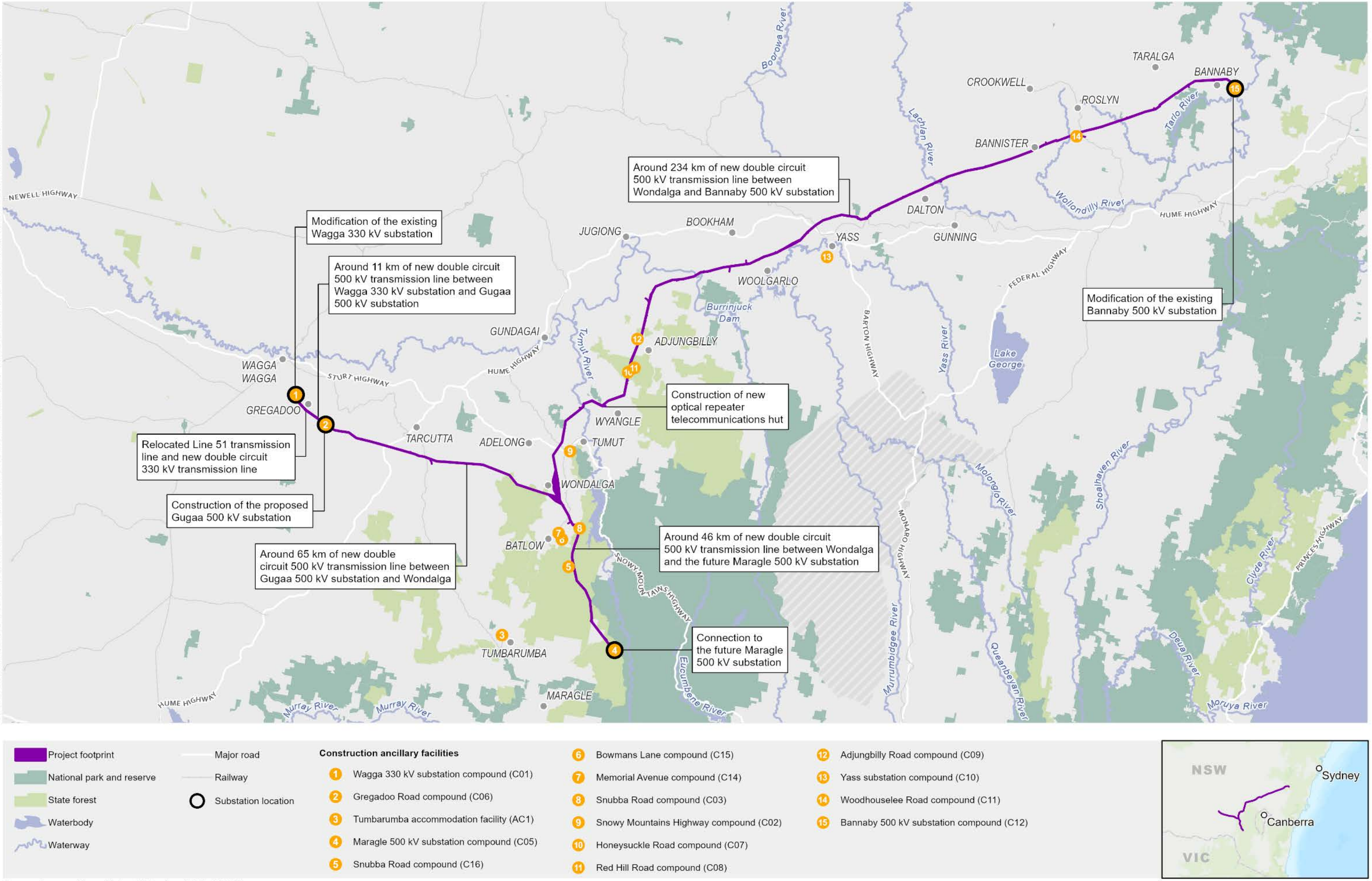


Figure 1-1 Location of the project

The project includes the following key components (refer to Figure 1-2):

- 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.



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

1:925,000

0 20 40km

Projection: GDA 1994 MGA Zone 55

HumeLink **Aboriginal Heritage**

FIGURE 1-2: Key components of the project

1.2 Objectives of this report

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

1.3 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 lists relevant matters of the SEARs addressed in this report.

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.
	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.

1.4 Structure of this report

This report:

- provides a description of the project and construction methodology (Chapter 2)
- outlines the legislative and policy context relevant to the 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 project footprint, and document the consultation process for the project (Chapter 5)
- provides an environmental context for the 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 project footprint and AHIMS search area (Chapter 8)
- describes the cultural heritage values, assesses the significance of Aboriginal objects and places in the 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 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 predictive model to assess the archaeological potential of the project footprint. The field survey and test excavation phase has aimed to verify the accuracy of the predictive modelling and PAD identification to aid in assessing the impact of the project on Aboriginal cultural heritage and to provide advice on mitigating that impact.

1.5.1 Project footprint

The area that has been 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.

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

1.5.2 AHIMS search area

On 2 February 2023 an AHIMS database search was undertaken of the project footprint plus a one kilometre buffer from the edge of the footprint to obtain additional data on sites in proximity to the project footprint. 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 large enough site numbers to allow adequate understanding of the distribution of sites within the landscape.

1.5.3 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 project footprint to contain Aboriginal sites. This model is described in Section 4.2.2.

1.5.4 Survey area

The field survey was undertaken within the project footprint where access approval had been secured. Therefore the 'survey area' is that part of the project footprint that was surveyed during the field investigation and excludes some parts of the project footprint that were not accessible.

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 project footprint
- identify and record any new Aboriginal sites or landforms with archaeological potential observed
- 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 project footprint and to discuss the management of Aboriginal sites and cultural heritage values across the project footprint.

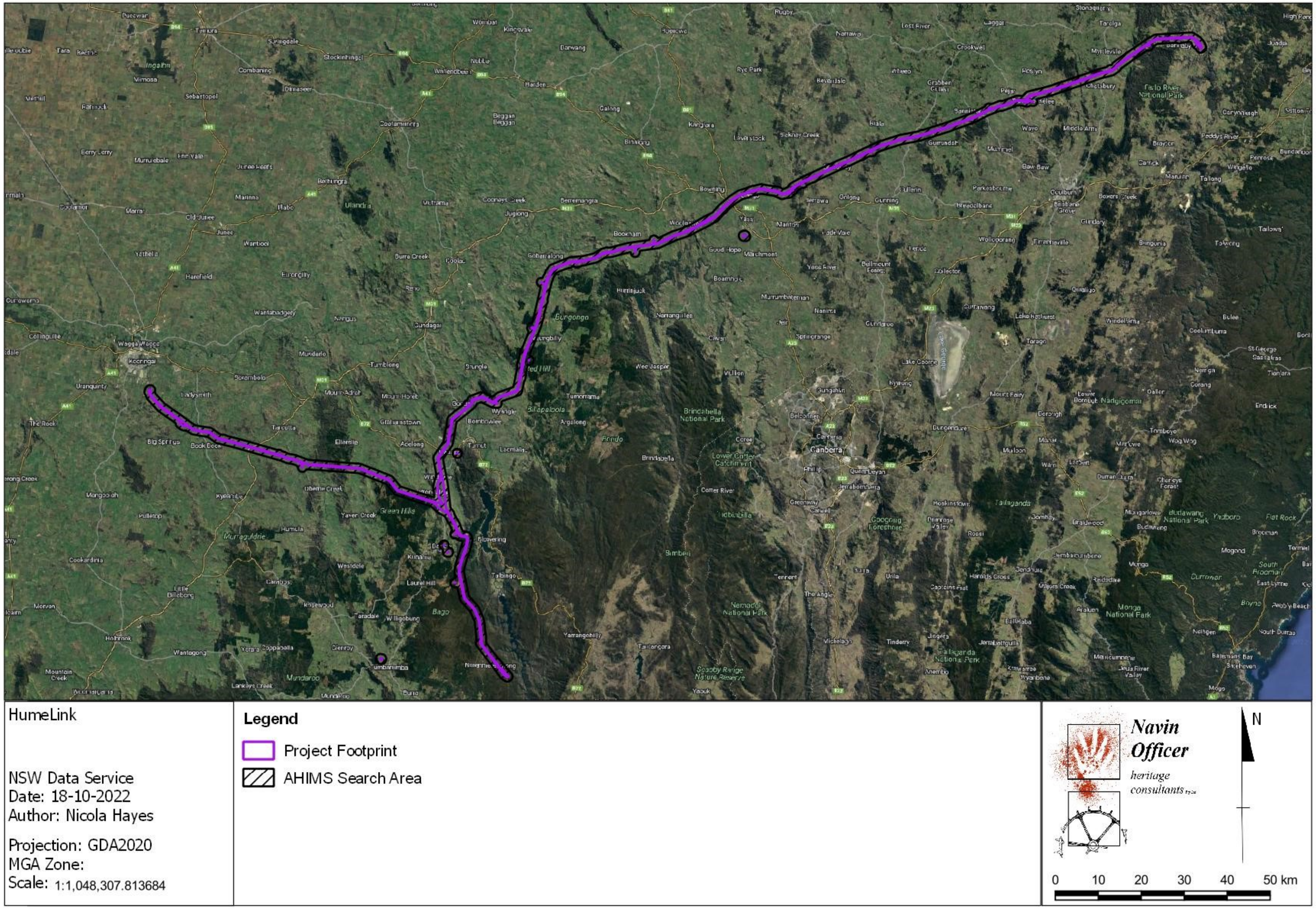

Figure 1-3 Project footprint (study area) and AHIMS search area

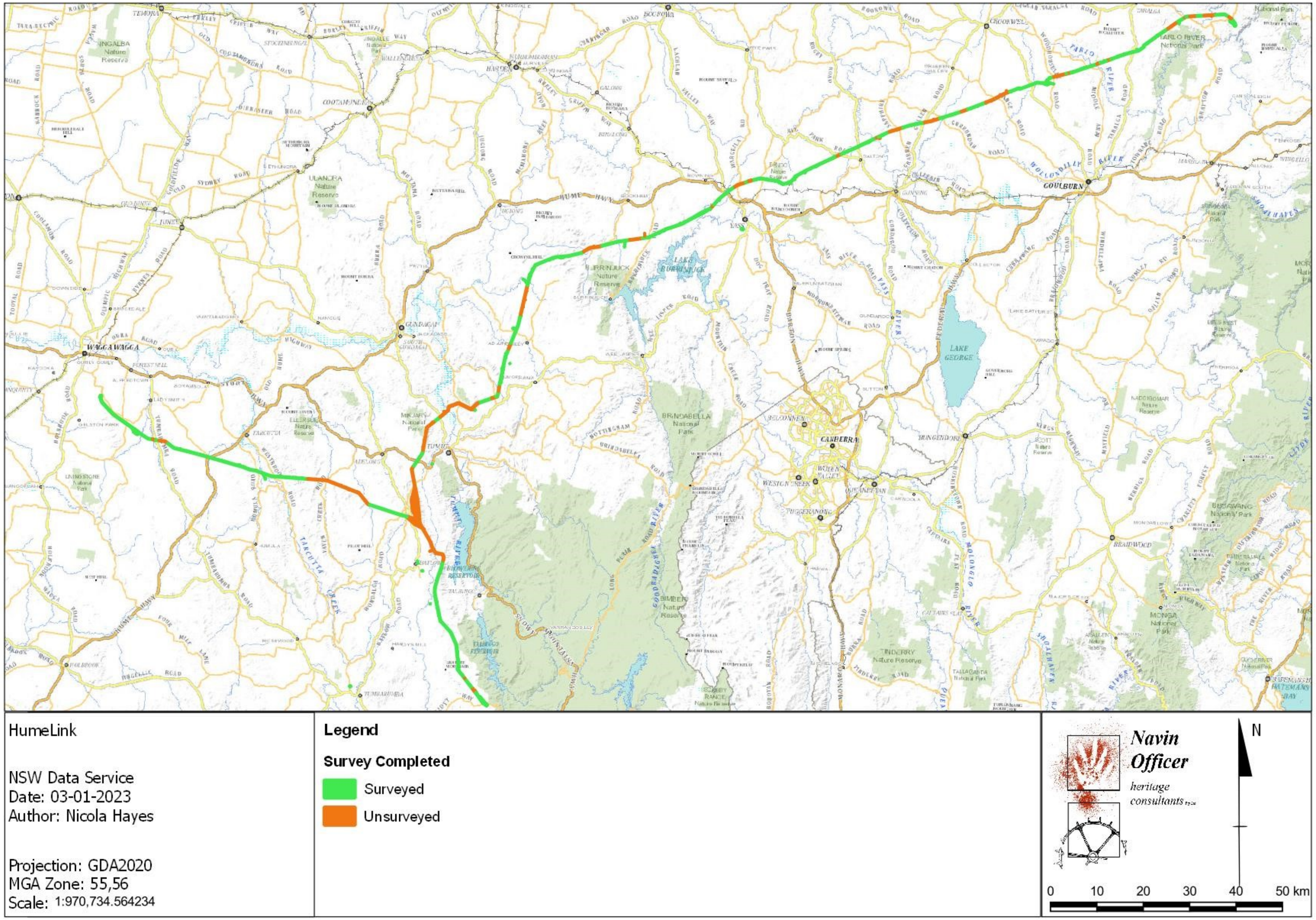

Figure 1-4 Survey completion showing the survey area in green

2 PROJECT DESCRIPTION SUMMARY

2.1 Summary of key components of the project

The project description in this chapter is based on a concept design and indicative construction methodology for the project. The design and construction methodology would continue to be refined and confirmed during detailed design and construction planning by the construction contractors. Further details on the project are provided in Chapters 3 and 4 of the EIS.

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 Gugaa 500 kV substation (approximately 11 km) • Gugaa 500 kV substation and Wondalga (approximately 65 km) • Wondalga and Maragle 500 kV substation (approximately 46 km) • Wondalga and Bannaby 500 kV substation (approximately 234 km). The transmission line section between the Wagga 330 kV substation and proposed Gugaa 500 kV substation would operate at 330 kV under HumeLink. 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 around 50 m up to a maximum of 76 m in height and generally spaced between 300 to 600 m apart. The typical transmission line structure height would be around 60 m. 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 up to 300 m^2 to 450m^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.

Component	Description
Transmission line easements	The easements for the 500 kV transmission lines are typically 70 m wide. However, a number of locations may require wider easements of up to 110 m wide at transposition locations[1] and up to 130 m wide where the new transmission line would parallel the relocated section of Line 51. 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.
Telecommunications hut	Telecommunications huts, which contain optical repeaters, would be required to boost the signal in the optical fibre ground wire (OPGW). One telecommunications hut would be required for the project. The telecommunications hut would be located adjacent to existing transmission line structures. Cables would be installed between the transmission line structure and the local power supply. The telecommunications hut would be surrounded by a security fence. A new easement would be established for the telecommunications hut power connection. The project also involves a telecommunications connection of OPGW between two proposed transmission line structures and the future Rye Park Wind Farm substation (SSD-6693). This removes the need for an additional telecommunications hut in this area of the project.
Substation activities	
Construction of the new 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 seven new 500/330 kV transformers and three 500 kV reactors. The proposed Gugaa 500 kV substation is expected to occupy an area of approximately 22 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 works 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.

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

Component	Description
Ancillary facilities	
Access tracks	Access to the transmission line structures and the substations would be required during construction and operation. Wherever possible, existing roads, tracks and other existing disturbed areas would be used to minimise vegetation clearing or disturbance. Upgrades to existing access tracks may be required. In areas where there are no existing roads or tracks, suitable access would be constructed. This may include waterway crossings.
Construction compounds	Construction compounds would be required during construction to support staging and equipment laydown, concrete batching, temporary storage of materials, plant and equipment and worker parking required to construct the various elements of the project. Fourteen potential construction compound locations have been identified. The proposed use of the construction compounds and their proposed boundaries/layout would be refined as the project design develops in consultation with relevant stakeholders and the construction contractors.
Worker accommodation	Existing accommodation facilities within towns adjacent to the project would provide temporary accommodation for the majority of the construction workers. However, a potential shortage in accommodation has been identified close to the project footprint. A potential option to provide additional temporary worker accommodation during the construction period is the establishment of a temporary worker accommodation facility at the corner of Courabyra Road and Alfred Street, Tumbarumba to accommodate about 200 construction workers. The worker accommodation facility would consist of demountable cabins and would be connected to existing utilities. All required amenities for the accommodation facility would be provided including services and worker parking for light and heavy vehicles. However, the ultimate delivery of the project may include multiple temporary worker accommodation facilities in various forms, which would be outlined in the Worker Accommodation Strategy for the project. The strategy will be developed in consultation with councils, and other relevant stakeholders. Any new or changed worker accommodation facility would be subject to additional environmental assessment, as required.
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. Eight locations have been identified and assessed as potential helipad locations. The exact locations to be used would be confirmed during detailed design by the construction contractors. In addition to this, the existing facilities at the Wagga Wagga Airport and Tumut Airport may be used.

Component	Description
Utility connections, adjustments and protection	The project would require utility connections, adjustments and protection. Such works include 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 works would be determined in consultation with the relevant asset owners.

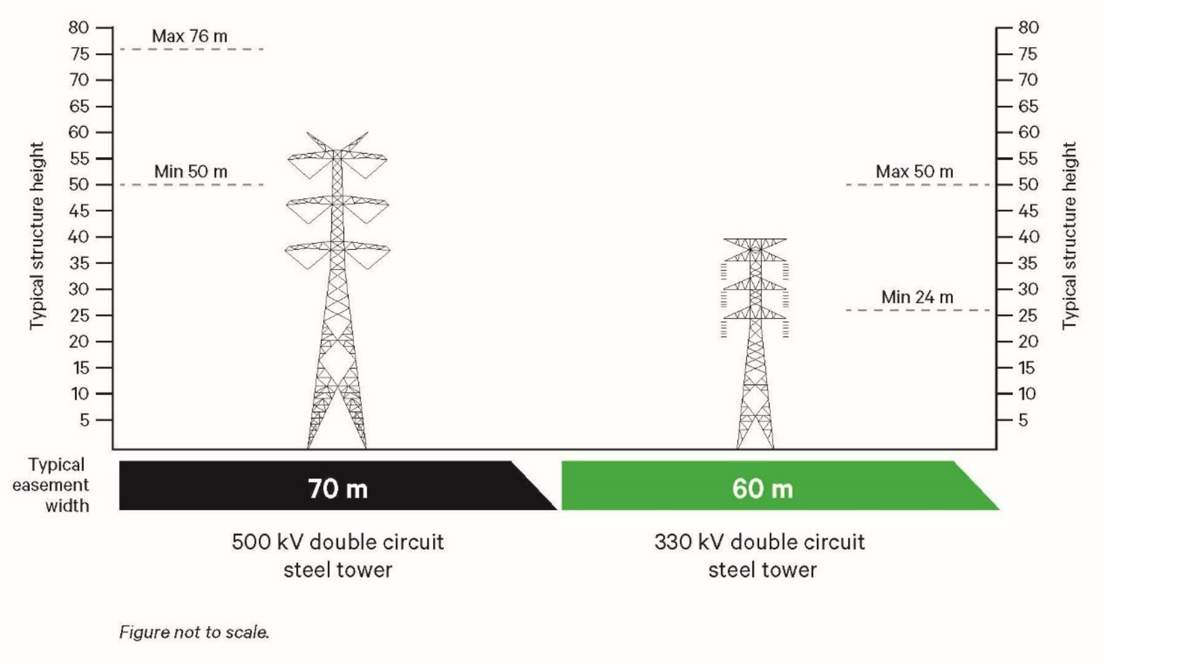

Figure 2-1 Indicative transmission line structures

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 and helipad/helicopter 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
    - establishment of environmental management measures and security fencing
    - construction of temporary worker accommodation
- construction of the transmission lines, including:
    - earthworks and establishment of construction benches and brake and winch sites for each transmission line structure
    - construction of footings and foundation work for the new transmission line structures including boring and/or excavation, steel fabrication works and concrete pours
    - erection of the new transmission line structures
    - stringing of conductors, overhead earth wires and OPGW
    - installation of associated transmission line structure fittings inclusive of all earthing below ground level
- relocation of a section of Line 51, including:
    - demolition of the existing section of Line 51
    - 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
    - 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
    - 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
    - testing and commissioning
    - 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 works 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
    - testing and commissioning
    - 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 hut, including:
    - bulk earthworks to form the pad for the hut
    - excavation and preparation for concrete foundations
    - installation of reinforced concrete and piled foundations
    - excavation and installation of electrical equipment conduits, trenches and general site drainage work

- installation of the building, site wiring and electrical equipment
- installation of security fencing and site access gates

- installation of buried cabling from the 500 kV transmission line structures to Rye Park Wind Farm substation
- 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.

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).

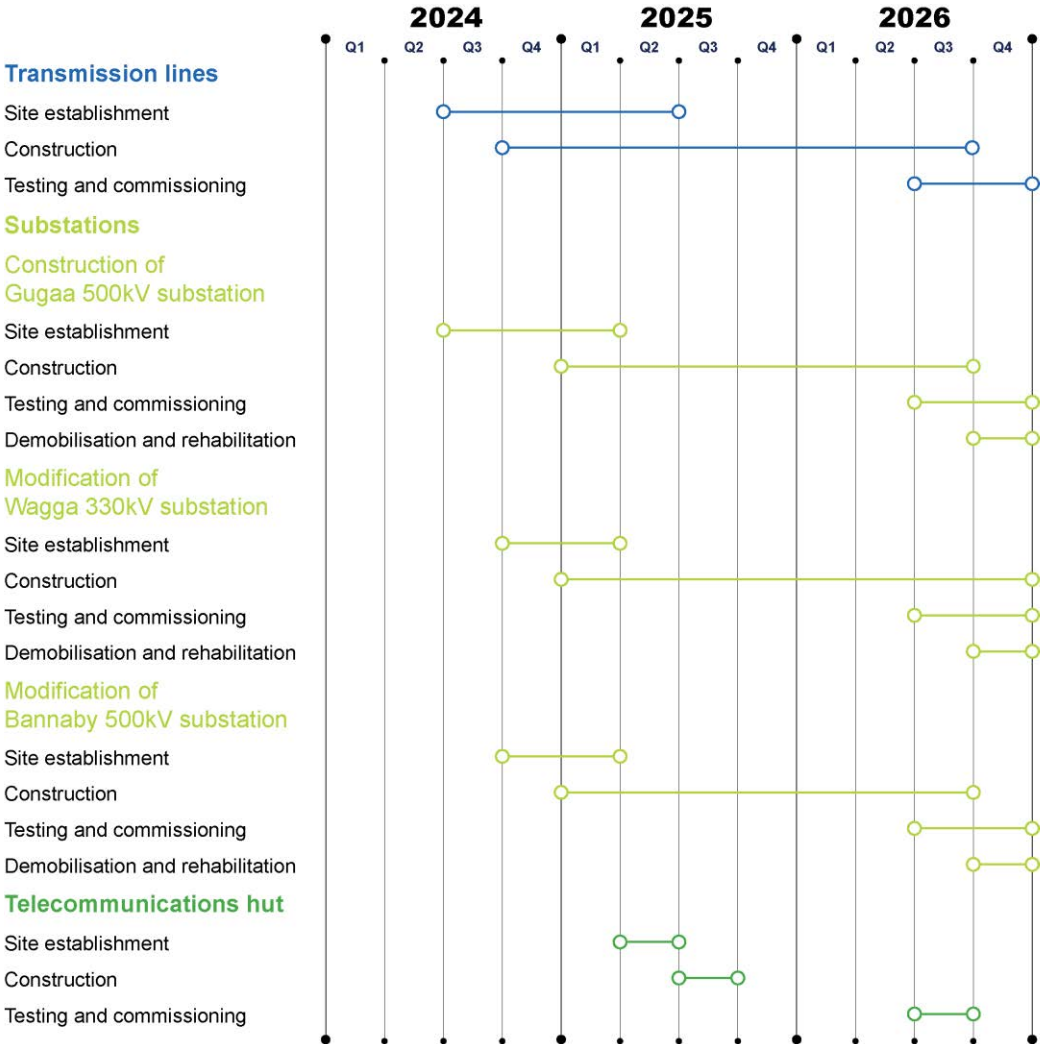

Figure 2-2 HumeLink indicative construction program

2.2.3 Indicative duration of construction activities

Construction at each transmission line structure would be intermittent and construction activities would not occur for the full duration at any one location. Durations of any particular construction activity, and inactive/respite periods, may vary for a number of reasons including (but not limited to):

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

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

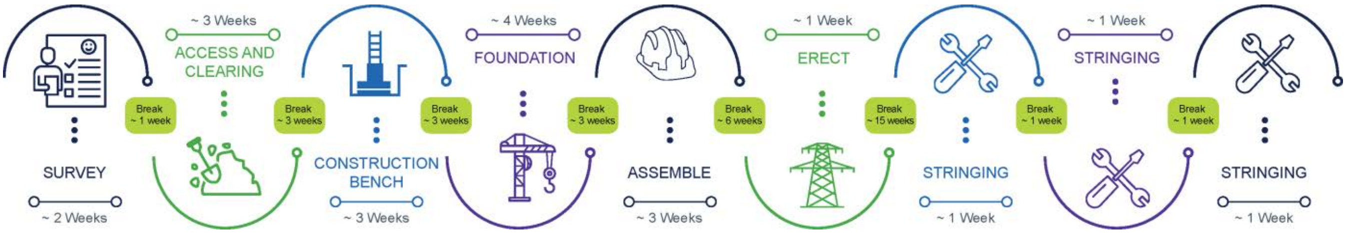

Figure 2-3 Indicative duration and sequence of construction activities for transmission line structures

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 works outside the proposed construction hours for the project are anticipated including (but 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 works for activities such as conductor stringing over the crossing(s)
- works 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 works (e.g. oil filling of the transformers)
- connection of the new assets to existing assets under outage conditions (e.g. modification and/or connection works at Bannaby 500 kV substation, Wagga 330 kV substation and Maragle 500 kV substation), which is likely to require longer working hours
- 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
- fuel trucks
- generators
- graders
- helicopters and associated support plant/equipment
- mulchers
- piling rig
- pneumatic jackhammers
- rigid tippers
- rollers (10 to 15 and 12 to 15 tonnes)
- semi-trailers
- tilt tray trucks
- trenchers
- transport trucks
- 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 heavy vehicles would be required during the main civil construction work associated with the substations. Non-standard or oversized loads would also be required for the substation work (e.g. for transformer transport) and transportation of transmission line structure materials and conductors.

Hume Highway, Sturt Highway, Snowy Mountains Highway, Batlow Road and Gocup Road are the main national and state roads proposed to provide access to the project footprint. These roads would be supported by regional and local roads throughout the Local Government Areas (LGAs) of Wagga Wagga City, Snowy Valleys, Yass Valley, Cootamundra-Gundagai Regional and Upper Lachlan Shire that connect to the 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 1,200 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 rehabilitation would be undertaken progressively throughout the project footprint and would include the following typical activities:

- demobilisation of construction compounds and worker accommodation facility
- removal of materials, waste and redundant structures not required during operation of the 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 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 light vehicles and/or small to medium plant (depending on the works 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*
  - *Environmental Planning and Assessment Act 1979*
  - *Aboriginal Land Rights Act 1983*
- Commonwealth:
  - *Environment Protection and Biodiversity Conservation Act 1999*
  - *Native Title Act 1993*
  - *Aboriginal and Torres Strait Islander Heritage Protection Act 1984.*

3.1 National Parks and Wildlife Act 1974

National Parks and Wildlife Act 1974 Part 6 of the *National Parks and Wildlife Act 1974* (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 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 DPE, 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 Act to notify DPE 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 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 Critical SSI (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 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 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:

(a) take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law
(b) 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 project footprint extends across the boundaries of Wagga Wagga, Brungle/Tumut, Onerwal and Pejar Local Aboriginal Land Councils (LALCs).

3.4 Environment Protection and Biodiversity Conservation Act 1999

The objectives of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (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:

a. the National Heritage List (NHL) – a list of Indigenous, historic and natural places of outstanding significance to the nation, and

b. 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 (DCCEEW) 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. You should consider all of these factors 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 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* (NOHC 2023)[3].

3.5 Native Title Act

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

(a) recognise and protect native title

(b) 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

(c) establish a mechanism for determining claims to native title

(d) 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 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 5 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. Approximately 1,163 hectares of the project footprint falls within the ILUA area. Tarlo River National Park and Back Arm Nature Reserve are locations within the ILUA area and are (in part) located immediately adjacent to the project footprint.

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[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

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 sq km. The agreement expires upon expiration or earlier termination of the last mining tenement to be granted to ACG in relation to the Deed Area or 20 years from the 26/08/1998, whichever is the later. The project traverses this agreement area.

3.6 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the "preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to 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 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 project footprint, with specific consideration to its implications for past Aboriginal land use
- to review relevant archaeological and ethnohistoric information for the project footprint
- to prepare a predictive model for the Aboriginal archaeological record of the 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 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 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). This literature and data review was used to determine if known sites are located within the 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 DPE 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 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 project footprint and the hydrology along the 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 such:

- 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.

The sensitivity model was created using geographic variables such as slope and distance to water within the project footprint.

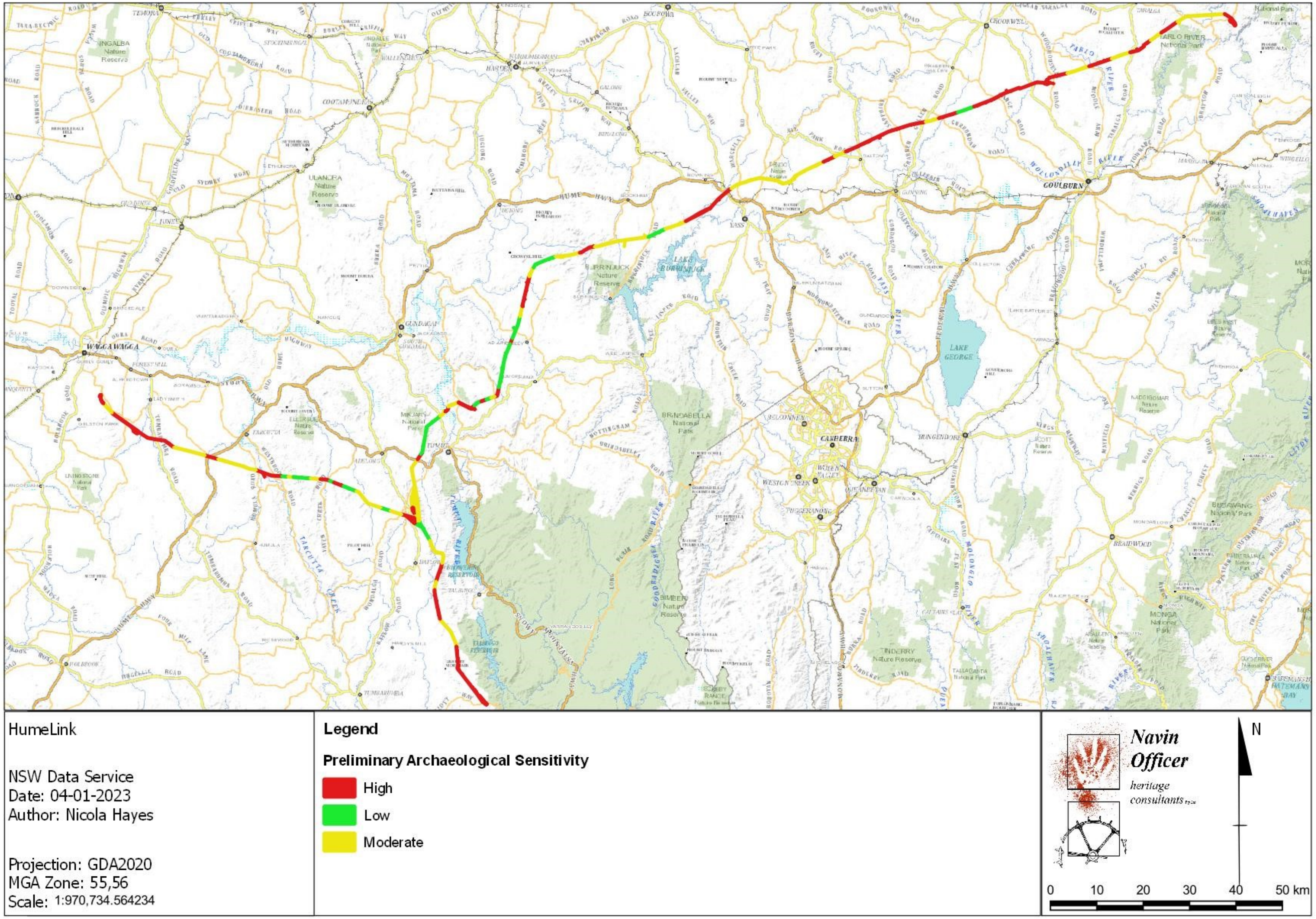


Figure 4-1 Preliminary archaeological sensitivity within the project footprint

4.2.3 Field survey

The field investigation involved physical inspection of the survey area across all accessible properties. The aims of the survey were to identify archaeological sites and areas of potential archaeological deposit (PAD) not previously recorded, assess all areas of identified moderate and high archaeological sensitivity, sample areas of low archaeological sensitivity, and find, inspect, and assess the condition of known Aboriginal sites recorded on the AHIMS database. 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 cultural and archaeological sites. The preliminary version of the model was created based on the criteria mentioned above 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.

The landform archaeological sensitivity model has been refined following the field survey using multiple datasets in order to achieve a weighted, multi-criteria analysis of the potential landform archaeological sensitivity of the 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).

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 DPE to obtain LiDAR imagery of the coastal areas and major population areas of NSW.

Using QGIS, it was possible to derive from the DEM 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 transverse or any areas of gradual sloping to flat ground that would be likely to be used by humans in the past. To highlight these latter areas, values were given to areas that were below 15 degrees of incline with areas closest to zero being valued more highly.

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 project footprint.

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

- good being 0 to 6 degrees
- moderate as 6.1 to 15 degrees
- high as 15.1 degrees plus.

4.2.4.2 AHIMS

There have been numerous previous surveys around the Wagga Wagga area at the northern and western extents of the project footprint. Beyond this area, previous archaeological survey coverage has been 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 235 recorded AHIMS sites located 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.

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 with the project footprint (e.g. Murrumbidgee River, Tumut River, etc.). In developing the sensitivity model, the Classical Stream Order Model has been utilised. Classical Stream Order levels 2 to 9 have been used, there are no stream order 1 in the project footprint (ie. no Murray River). The model testing has shown that for HumeLink, recorded sites are more likely to occur within 350 metres of stream order 2 to 8 and within 200 metres of 9th order streams.

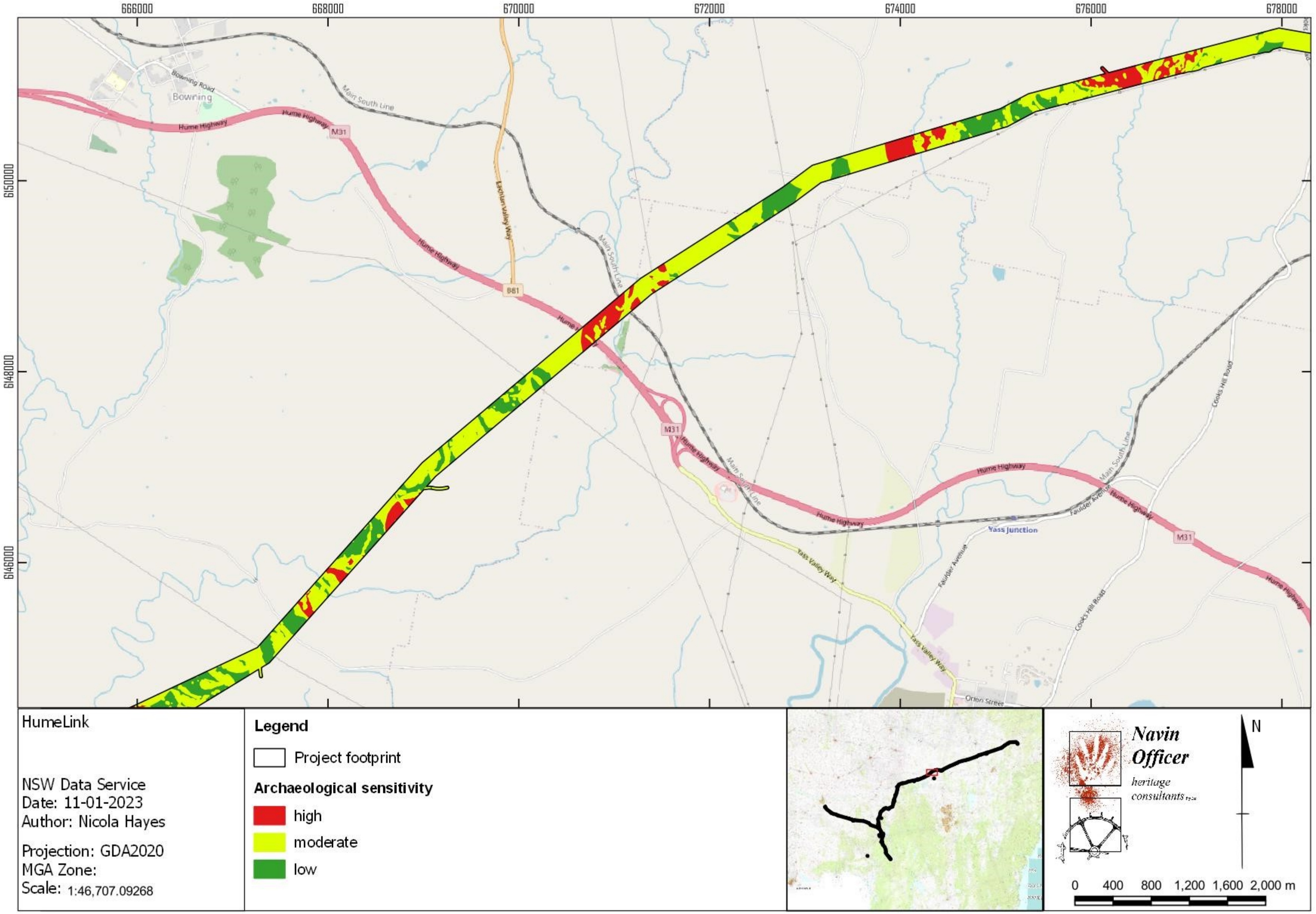


Figure 4-2 Example of landform archaeological sensitivity model following the field survey

4.2.5 Test excavation

4.2.5.1 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 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 developed by NOHC. Testing surveyed areas with poor GSV based on the archaeological sensitivity model aims to identify, characterise and assess any previously unidentified cultural material within the project footprint and to test the archaeological sensitivity model. The methodology will not conclusively prove or disprove that Aboriginal heritage objects are present or absent from the wider area of the project 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 potential. The test excavation program also aimed to identify disturbance, soil profiles as well as cultural material density and distribution.

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).

4.2.5.2 Test excavation locations

Test excavation was undertaken in three of the six PADs identified in the project footprint during the survey program. The remaining three PADs could not be accessed due to weather conditions and safety concerns. 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 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 potential. Testing within these areas consisted of a linear transect placed within the boundaries of the project footprint. Transect length will vary based on landscape conditions including to avoid trees, highly disturbed areas, wet/boggy areas and surface bedrock. 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 traversed areas of high, moderate and low sensitivity and a sample of each sensitivity type was tested.

Figure 4-3 shows all of the test excavation locations targeted for testing.

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.

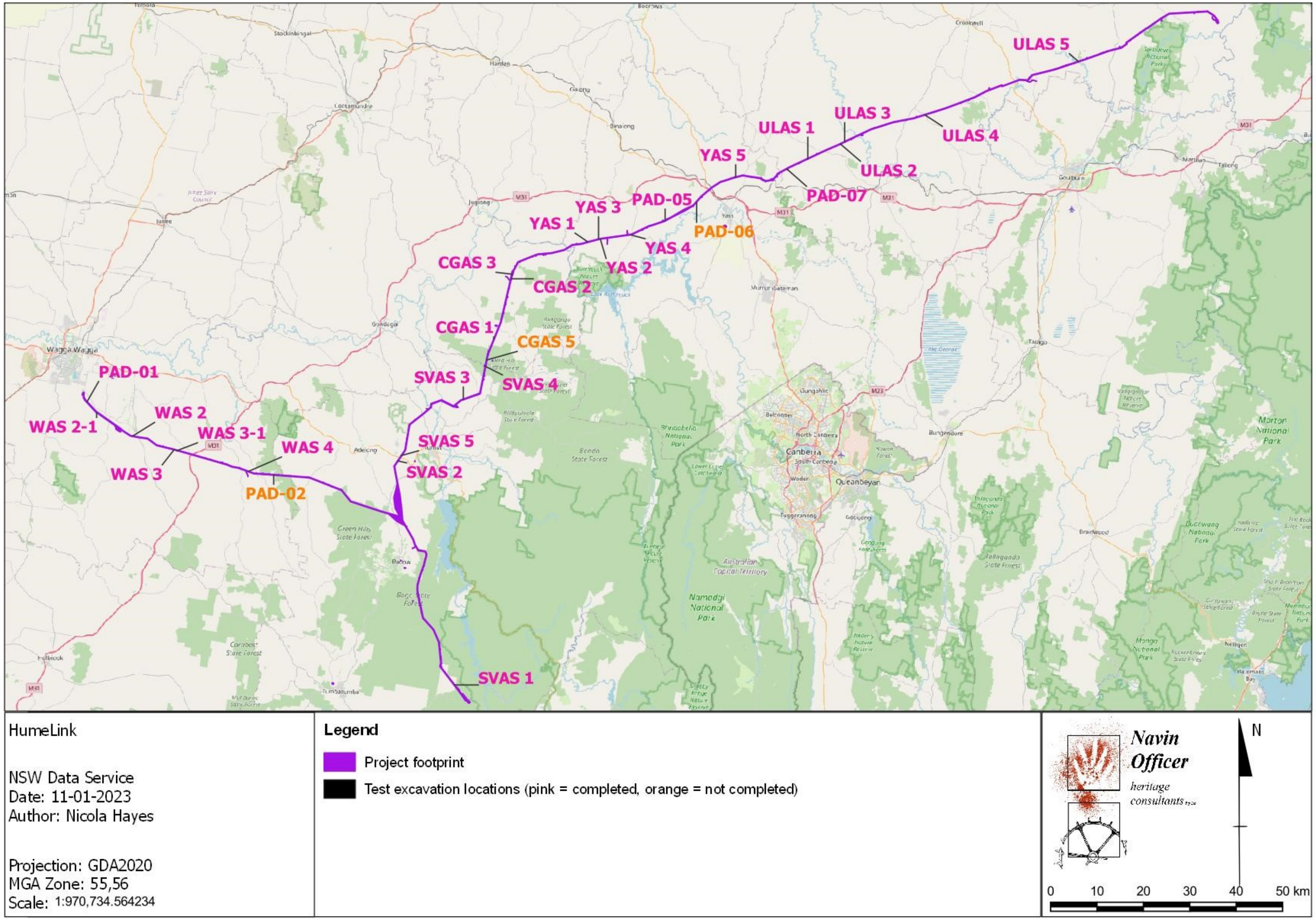


Figure 4-3 Test excavation locations

4.2.5.3 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 project footprint. Test pits were placed at intervals of 5 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 in order 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 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 in order 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, which are excavation units 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.

4.2.5.4 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.

4.2.5.5 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.

4.2.5.6 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 4-1.

Table 4-1 Analysis terminology

Analytical Terms	Definition
Angular fragment / Debitage	A piece of debris exhibiting evidence of knapping but lacking key diagnostic traits (e.g. 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).

Analytical Terms	Definition
Platform	Planar surface marking the location from which the flake was struck from the core.
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.

4.2.6 Post subsurface test excavation sensitivity model adjustments and reviews

The refined model is then used in determining impact from the project and mitigation measures.

The sensitivity model parameters, which were refined following the results of the test excavations were:

- Reduce “good” slope from 0 to 6 degrees to 0 to 5 degrees.
- Remove stream order 9 as having sensitivity.
- Areas of “good” slope within 100 metres of archaeological site given high sensitivity.
- Areas of “moderate” slope within 100 metres of archaeological site given moderate sensitivity.

In addition, available data on disturbance have been incorporated into the model including roads, railway lines, dams and waterways, and farm dams. Refer to Figure 4-4 for an example of the revised model and Attachment 5 for mapping of the model across the whole project footprint.

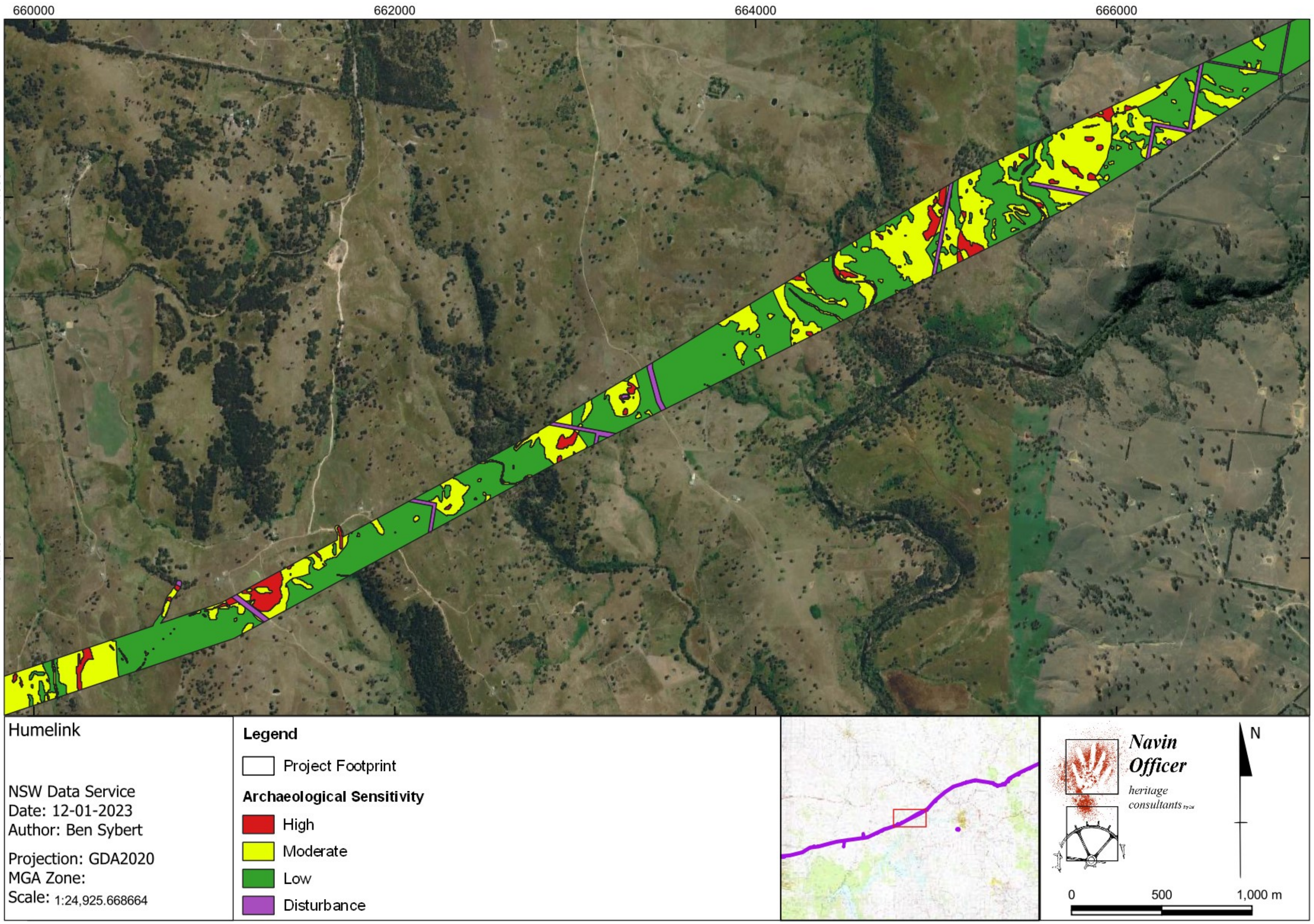


Figure 4-4 Example of the final archaeological sensitivity model

4.3 Personnel

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

- Alex Isaac
- Amir Zaribaf
- Azura Watson
- Ben Sybert
- Brad Dare
- Bria Milligan
- Chantelle Laucht
- Christian Keyes
- Darren Curnoe
- David O'Brien
- Elisa Scorsini
- Ellie Dickins
- Emma Dougherty
- Emma Spencer
- Jasmine Fenyvesi
- Joel Mason
- Kate Dale
- Kiara Jodlowsk-Tan
- Lachlan Sharp
- Meg Walker
- Miles Robson
- Nathan Crockford
- Ngaire Richards
- Nicola Hayes
- Reanna Pullen
- Ricardo Servin
- Robert (Jack) Bogdanek
- Roxanne Tsang
- Sophie Brettell
- Tealeah Prior
- Tessa Bryant
- Tiffany Reyonolds-Flannery
- Zoe Mortimer.

This report was prepared by Ricardo Servin with assistance from Nicola Hayes, Jasmine Fenyvesi, Ben Sybert, Meg Walker, Ellaine Dickens 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.

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.

4.4 Limitations and uncertainty

4.4.1 Land access restrictions

Some sections of the project footprint could not be accessed due to a lack of landowner consent to enter, therefore approximately 70 per cent of the project footprint has been directly assessed via survey while the remainder has been indirectly assessed. In addition to the above constraint, terrain, vegetation and weather have also restricted access to some areas of the project footprint. Some areas of the project footprint are extremely steep and inaccessible. Some sections of the 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 these guidelines will apply to this project. The aim of undertaking the consultation is to understand the cultural heritage values present in the 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 Stage 1

Relevant organisations were contacted with a request to provide information about potential Aboriginal stakeholders who may have an interest in the 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.

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 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	Murrabidgee Mullangari
Enid Clarke (Elder)	individual
Glen Freeman	Gulgunya Ngunawal Heritage Aboriginal Consultancy (GNHAC)
Jahnayah Freeman	individual
James Ingram	Bidya Marra Consultancy
Jesse Johnson	Muragadi Heritage Indigenous Corporation
Jirrah Freeman	individual
Keith Freeman (Elder)	individual
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

Individual Name	Organisation
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

5.2 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 project footprint.

All RAPs were invited to provide cultural information concerning Aboriginal objects and places within the project footprint, in order 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.

5.3 Field participation – field survey

The Aboriginal organisations represented in the field during the various field survey events were:

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

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

5.4 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 9th March 2023.

5.5 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 proposal 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	No registered native title claimants, native title holders, or Indigenous land use agreements (ILUAs) were identified within the project footprint (Section 3.5.1).
	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		
	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.
	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.
	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.
4	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, will be provided to each of the RAPs.

5.6 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.

No responses to the draft report 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.

6 ENVIRONMENTAL CONTEXT

A review of the landscape can assist in predicting the ways in which Aboriginal people have used the 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 project footprint 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 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 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 project footprint extends across the Yass Valley, Upper Lachlan Shire 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 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 (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 Mt 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 1100 metres altitude (NPWS NSW, 2003:217-221).

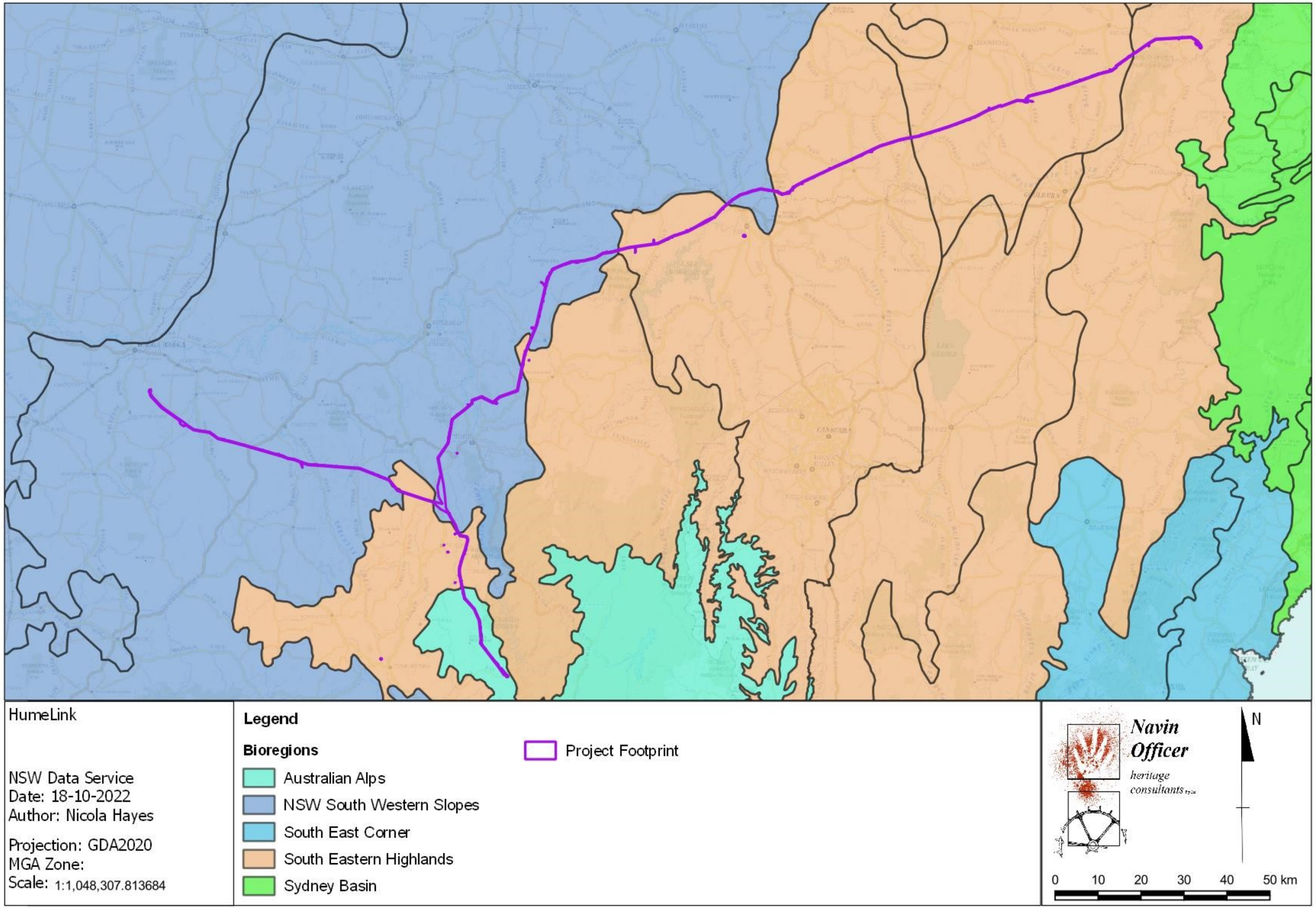


Figure 6-1 Project footprint and bioregions

6.2 Geology and soils

6.2.1 Geology

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

Table 6-1 Geological formations within the 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

Geological Unit	NSW code	Description	Province
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
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

Geological Unit	NSW code	Description	Province
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
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.

Geological Unit	NSW code	Description	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 palaeosol 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

Geological Unit	NSW code	Description	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
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

Geological Unit	NSW code	Description	Province
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
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

Geological Unit	NSW code	Description	Province
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
Elmside Formation - limestone	**Shae_l**	A Monograptus transgrediens to Monograptus uniformis shallow marine carbonate formation of Algal limestone.	Lachlan Orogen

Geological Unit	NSW code	Description	Province
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

Geological Unit	NSW code	Description	Province
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
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

Geological Unit	NSW code	Description	Province
Nacka 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
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

Geological Unit	NSW code	Description	Province
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 northwest 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 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 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 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 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)

GSG Soil Type	Soil Description	ASC
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)
Red Earths - less fertile (granites and metasediments) (REl)	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) (YPl)	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 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

<u>Wagga Wagga City LGA</u>

Within the NSW South Western Slopes bioregion, the project footprint extends from the Wagga 330 kV substation within the Wagga Wagga City LGA. The 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 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.

<u>Snowy Valleys LGA</u>

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 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 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 project footprint also extends across a large number of low order non-perennial waterways.

<u>Cootamundra-Gundagai Regional LGA</u>

Within this LGA and within the NSW South Western Slopes Bioregion, the 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 project footprint extends across rivers and perennial creeks such as Adjungbilly Creek, O'Brien's Creek, Cart Road Creek, Oak Creek, Murrumbidgee River. The 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.

<u>Yass Valley LGA</u>

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 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 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 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 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 project footprint also runs across tributaries and low order perennial waterways within this region.

Cootamundra-Gundagai Regional LGA

The extension of the 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 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 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 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 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.

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 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 project footprint also runs across low order non-perennial creeks, waterways and tributaries.

6.4 Land-use history

The 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 project footprint. A review of historical and ethnohistorical records, and the findings of previous archaeological investigations, has been undertaken in order 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 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 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, 20th November, 1861). A local history of Wagga Wagga by J 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). This male centric focus stems from the recorders being men who would not have been privy to any ‘women’s business’ and often overlooked domestic or mundane tasks as being unimportant. The practise of ceremony, particularly ceremonies with large gatherings, declined quickly following European settlement in the region as Aboriginal people’s movement across their land became increasingly restrained and introduced diseases took their toll. Contemporary reference to ceremonial activity after 1900 is rare although it is likely 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 had spread ahead of European settlement so that by the early 1830s Aboriginal groups had already suffered dramatic population loss. 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 previously estimated population of 3,000, only 1,000 Aboriginal people survived (Garland, 1984).

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 were relocated to these missions. Only six Aboriginal people were counted in Wagga Wagga in the 1901 census (Green, 2002).

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 State 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 thirteen houses were built at the site in 1888, and by 1890 it was recorded that 78 people were living at the site across twelve 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 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.

The Jindabyne region, largely to the south of the 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).

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 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 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 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 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 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 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 National Parks and Wildlife Service (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 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 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 project footprint, with one site 50 metres north of 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 project footprint at Days Road. Sixteen Aboriginal sites were identified during the assessment including three artefact scatters, ten isolated finds, and three possible quartz quarrying sites which may have been used as stone procurement areas, ten of these sites fall within one kilometre from the current 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 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 ten 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 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 project footprint. Twenty-six previously unrecorded sites were located during the route survey. Two of these were located within 500 metres of the current 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 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 1 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 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 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 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 eleven 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 turbine along with associated infrastructure such as access roads and power line connections. As a result of the investigations ten 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 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 eleven 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 eleven 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 amount 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 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 eleven11 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 ten 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 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.

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.

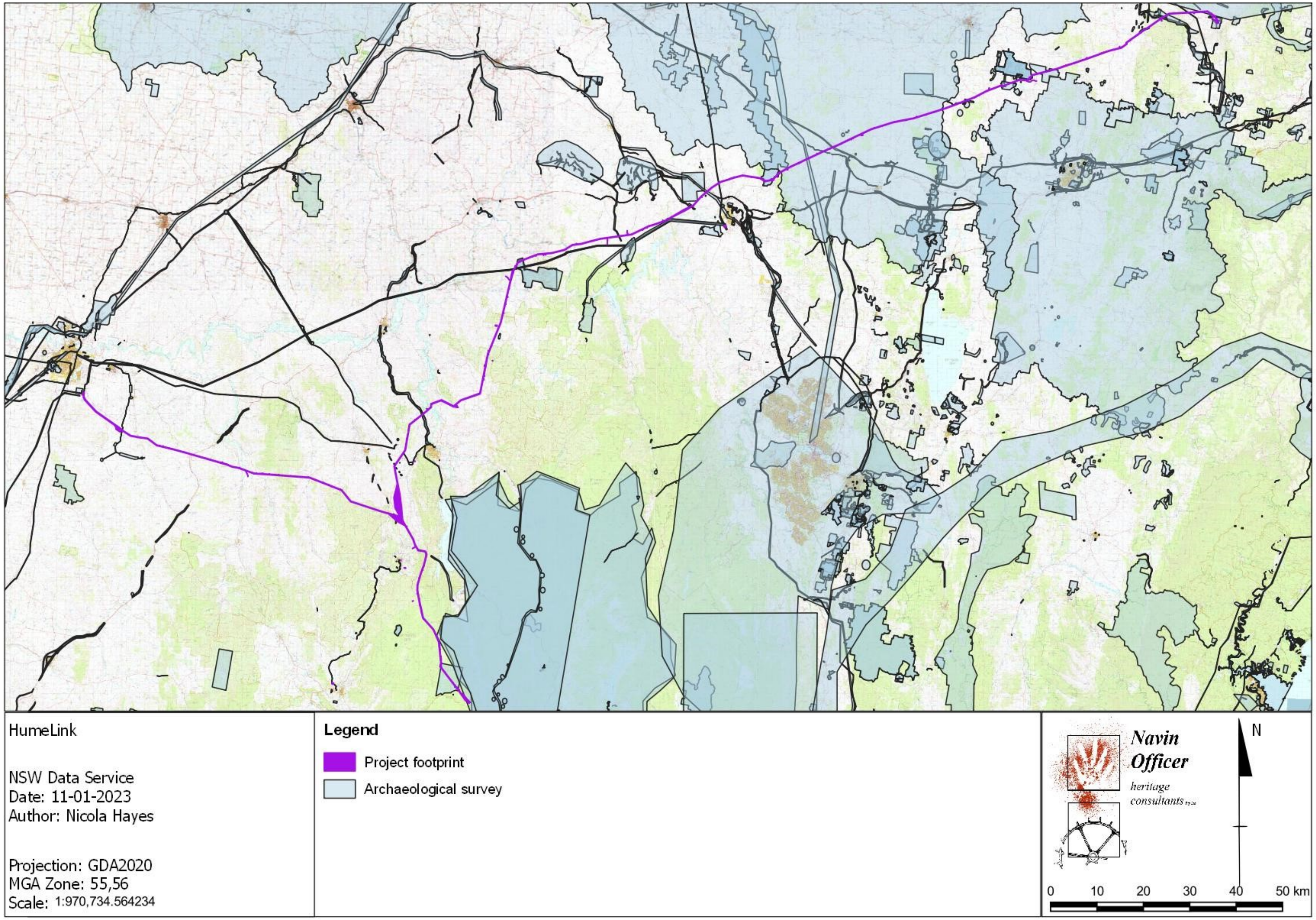


Figure 7-1 Aboriginal archaeological studies and the project footprint

7.4 Aboriginal heritage recordings

A total of two hundred and thirty-five (235) Aboriginal heritage items/recordings are included on the AHIMS database within a one kilometre buffer from the edge project footprint (AHIMS search area) (searched 02/02/2023). This wider search area was conducted to obtain additional data on sites within the wider region and to assist in interpreting the patterns in the data. Within the AHIMS search area, a large concentration of sites (number = 137) is located in the Nurenmerenmong area near the southern most extent of the project. Two ceremonial sites are identified approximately 500 to 800 metres from the project footprint. They are located in the Tumut area, and within the Nurenmerenmong area. Figure 7-2 shows the location of the sites in the AHIMS search area.

Of the above, 21 Aboriginal heritage items/recordings are located within the project footprint. The results of the search indicate that artefact sites (isolated finds and scatters) are the most common site type occurring throughout the project footprint with 19 sites recorded. PADs are the second most commonly occurring type, accounting for two of the total registered sites through the project footprint. Table 7-1 outlines site types and features identified within the AHIMS database within the project footprint.

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

Site feature(s)	Number of sites	Per cent of total (%)
Artefact	19	90.5
Potential Archaeological Deposit (PAD)	2	9.5
Total	**21**	**100.00**

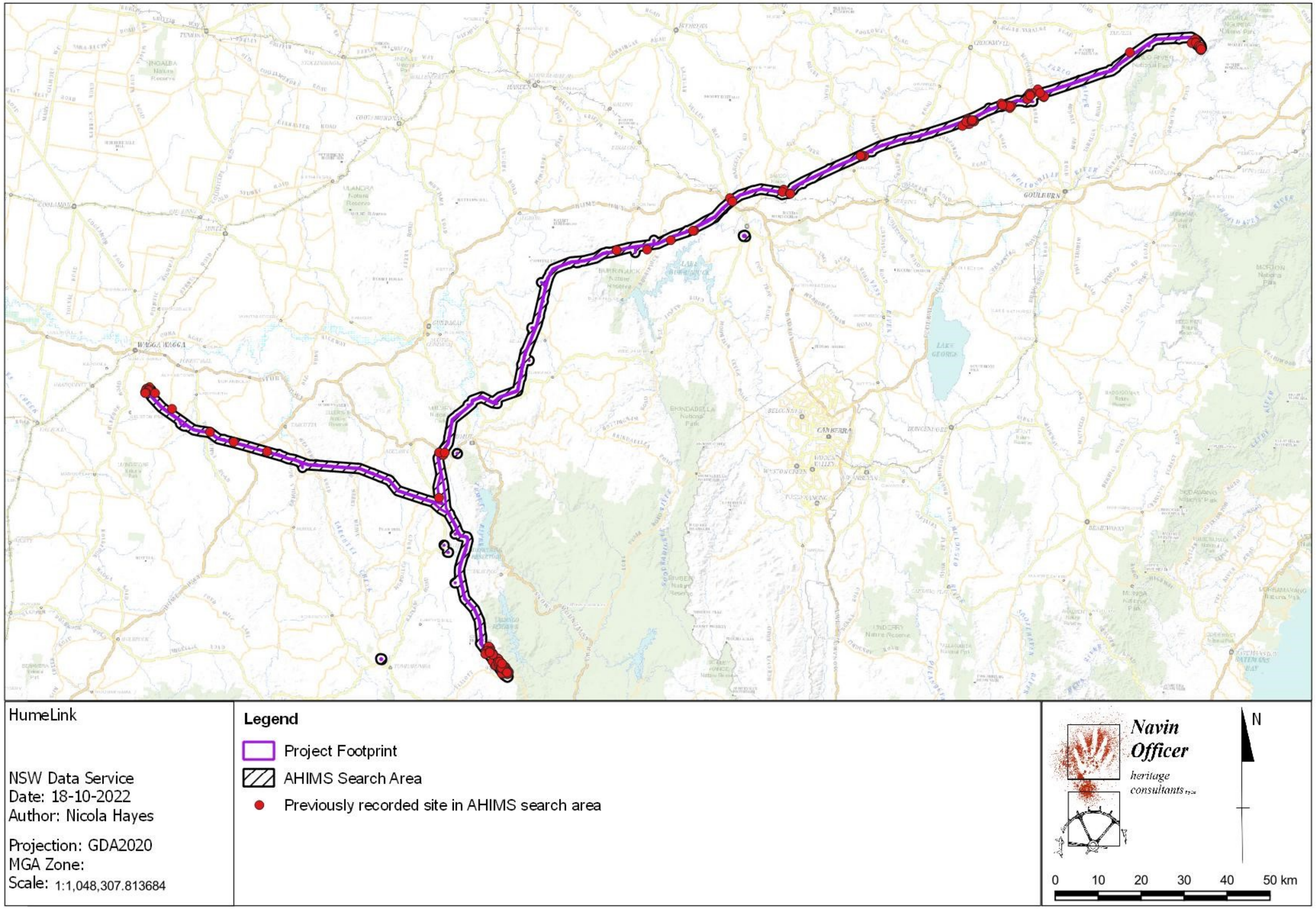


Figure 7-2 Location of registered Aboriginal sites in the AHIMS search area

7.5 Australian Alps National Parks and Reserves

There are two places on the National Heritage List (NHL) located partly within the AHIMS search area, but not within the 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 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 around 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 project footprint. From this existing body of work, the following set of broad site location criteria have been summarised for the 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 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 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 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.

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 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 twelve 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 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 project footprint, it is possible to provide a predictive model for the types and topographic context in which sites may occur across the different LGAs covered by the project footprint (Figure 7-3). This model has 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).

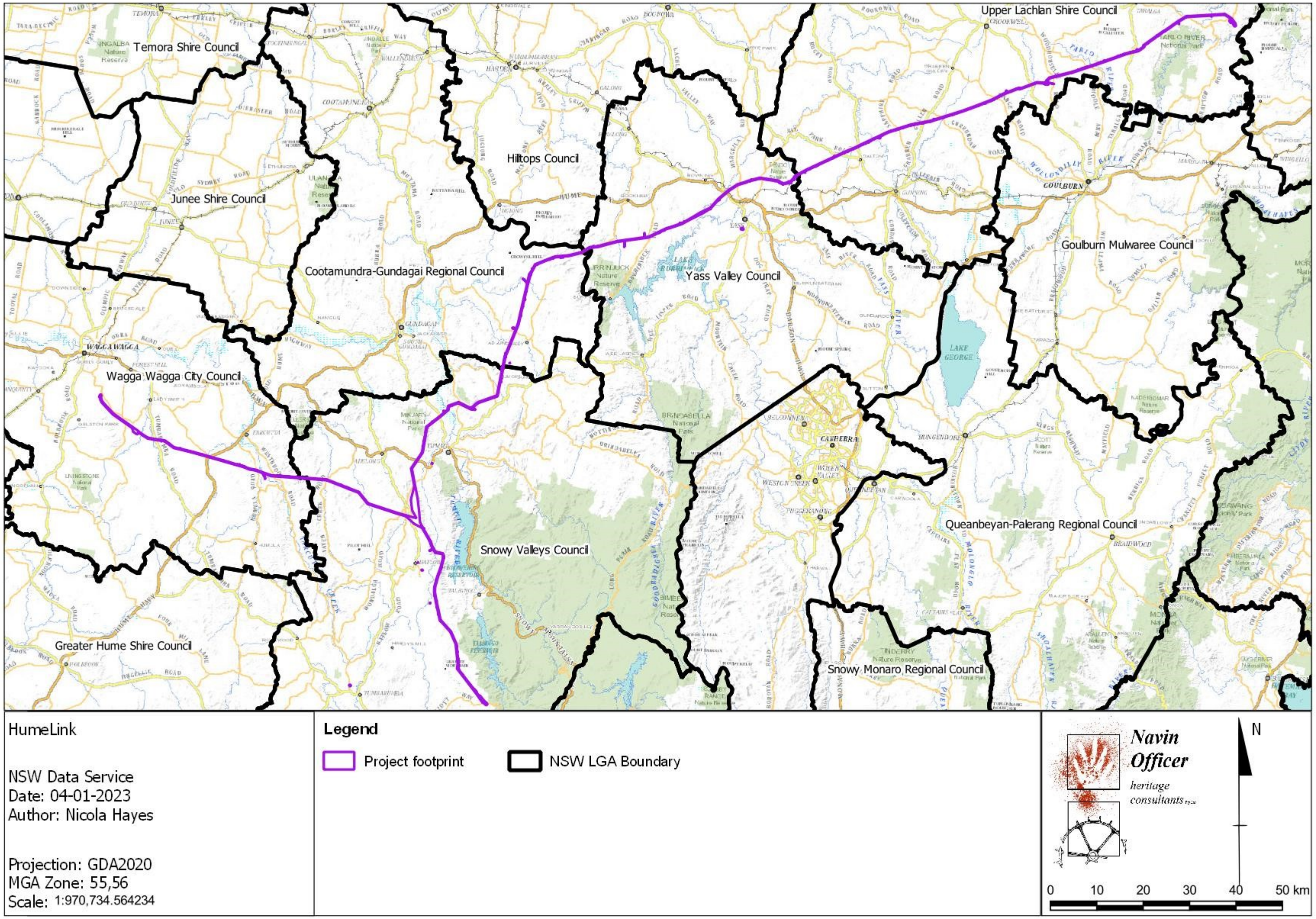


Figure 7-3 Local government areas

7.6.2.1 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 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.

7.6.2.2 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.

Site type	Predicted occurrence
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.

7.6.2.3 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 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.
PADs	PADs have been recorded within the Yass Valley LGA and some have been located within the boundaries of the 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.

7.6.2.4 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 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 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 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.

7.6.2.5 Snowy Valleys

The section of the 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 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 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 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 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 project footprint.
Stone quarry	A stone quarry site (C114-Q5-1 - # 56-6-0390) has been identified 5 kilometres west of the 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 project footprint.
Ceremonial site	Three ceremonial sites has been identified 500 to 800 metres outside of the 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.

Site type	Predicted occurrence
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 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 project footprint undertaken as part of this ACHAR.

There are 21 sites recorded on AHIMS within the project footprint (Figure 7-2), of these, two were re-located during the field survey program. In addition, a total of 63 Aboriginal sites and six PADs were identified in the 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 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 project footprint and to test the archaeological sensitivity model.

8.1 Previously recorded sites

There are 21 sites recorded on AHIMS within the project footprint. Three previously recorded sites located within the project footprint were revisited. Gullen Solar Farm 13 (AHIMS #51-5-0254) site, previously recorded within the project footprint, was revisited but could not be located during the archaeological field survey program.

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 cm with a 177 cm 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 the following:

- 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: 73 centimetres
- Height of base of outer scar (outside regrowth): 68 centimetres.

Figure 8-1 Scar **Figure 8-2 Modified tree**

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

Original identified as '*an artefact on the edge of a road. It would be minimally disturbed by the activity*' (Dibden, 2015). 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 mm
- grey fine grained volcanic flake, 41 x 21 x 8 mm
- grey fine grained volcanic core, 36 x 27 x 20 mm
- dark grey fine grained volcanic flake, 12 x 10 x 3 mm
- grey silcrete flaked piece, 22 x 17 x 14 mm
- grey silcrete flaked piece, 34 x 25 x 15 mm
- white quartz flake 25 x 20 x 7 mm
- black chert flake 19 x 20 x 8 mm
- brown silcrete flake, 27 x 20 x 8 mm
- pink and grey silcrete flake 38 x 17 x 9 mm

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

8.2 New sites and PADs

A total of 63 previously unrecorded Aboriginal sites and six PADs were identified during the field survey program in the project footprint. New site descriptions are summarised in Table 8-1 and depicted in Attachment 3.

Table 8-1 Summary of sites

Site name	Site features	GPS Location (GDA2020 / MGA Zone 55)	Associated PAD
HL-01	Artefact scatter (10)		HL-PAD-01
HL-02	Artefact scatter (3)		
HL-03	Isolated find		
HL-04	Isolated find		
HL-05	Isolated find		
HL-07	Modified tree		
HL-08	Isolated find		
HL-11	Isolated find		
HL-12	Artefact scatter (2)		
HL-13	Artefact scatter (2)		
HL-15	Modified tree		
HL-21	Isolated find		
HL-22	Isolated find		
HL-23	Isolated find		
HL-24	Artefact scatter (4)		
HL-25	Isolated find		
HL-26	Isolated find		
HL-27	Isolated find		
HL-28	Isolated find		
HL-29	Artefact scatter (9)		HL-PAD-05
HL-31	Isolated find		

Site name	Site features	GPS Location (GDA2020 / MGA Zone 55)	Associated PAD
HL-33	Artefact scatter (3)		
HL-34	Isolated find		
HL-35	Isolated find		
HL-37	Artefact scatter (4)		
HL-38	Artefact scatter (3)		HL-PAD-07
HL-41	Isolated find		
HL-43	Artefact scatter (2)		
HL-44	Artefact scatter (4)		HL-PAD-08
HL-45	Isolated find		
HL-46	Artefact scatter (11)		
HL-47	Isolated find		
HL-48	Isolated find		
HL-49	Isolated find		
HL-50	Isolated find		
HL-51	Artefact scatter (30+)		
HL-55	Isolated find		
HL-59	Artefact scatter (2)		
HL-61	Isolated find		
HL-64	Isolated find		
HL-65	Modified tree		
HL-66	Artefact scatter (3)		
HL-67	Isolated find		
HL-68	Isolated find		
HL-70	Isolated find		
HL-71	Isolated find		

Site name	Site features	GPS Location (GDA2020 / MGA Zone 55)	Associated PAD
HL-72	Artefact scatter (5)		
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-99	Artefact scatter (15+)		
HL-100	Artefact scatter (2)		
HL-101	Isolated find		
HL-102	Artefact scatter (2)		
HL-104	Artefact scatter (20+)		
HL-105	Artefact scatter (2)		

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). The boundaries of 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. This situation is due mostly to poor ground surface visibility. All PADs are considered to have moderate to high archaeological potential. All areas of low potential have been discounted.

A total of six PADs have been identified in the project footprint (Table 8-2). Of these, three PADs have been identified as having one or more Aboriginal sites associated with them within the project footprint (associated sites in the table below).

Table 8-2 PADs Summary

Site name	Area m^2	Easting	Northing	Associated Site
HL-PAD-01	1016.085			HL-01
HL-PAD-02	216995.711			
HL-PAD-05	10159.722			HL-29
HL-PAD-06	7165.051			
HL-PAD-07	10610.070			HL-38
HL-PAD-10	59529.792			

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.

Five unscarred trees were also identified by RAPs during field surveys and reported as trees that they considered to have cultural significance. These five 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:

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

2. 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.

In another example, 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.

The incidence of old growth trees is an important consideration in identifying both survey effectiveness and site location patterns outside of environmentally determined factors.

Table 8-3 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 69.5 per cent of the project footprint was inspected during the survey, with nine per cent providing useable archaeological exposures.

Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was two per cent of the total surveyed area. The ESC attempts to provide an estimate of the proportion of the project footprint that provides a net 100 per cent level of ground surface visibility to archaeological surveyors.

Table 8-3 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	727,617	0	0	0	0%	
W-SU02	Completed	Slope	857,144	30	5	12857.16	2%	HL-01 HL-02
W-SU03	Completed	Plain	789,132	90	80	568175.04	72%	
W-SU04	Partially completed	Plain	4,423,137	5	5	11057.8425	0%	HL-03
W-SU05	Completed	Slope	562,782	30	10	16883.46	3%	
W-SU06	Completed	Slope	1,157,699	10	5	5788.495	1%	HL-04 HL-05
W-SU07	Completed	Plain	708,283	40	20	56662.64	8%	
W-SU08	Completed	Slope	784,212	70	20	109789.68	14%	
W-SU09	Completed	Slope	654,606	20	10	13092.12	2%	
W-SU10	Completed	Slope	691,775	5	5	1729.4375	0%	HL-71
W-SU11	Completed	Plain	1,449,804	5	0	0	0%	HL-05 HL-08 HL-95
W-SU12	Completed	Valley flat	272,611	80	70	152662.16	56%	
W-SU13	Partially completed	Slope	930,240	0	0	0	0%	
W-SU14	Completed	Slope	327,105	5	5	817.7625	0%	
SV-SU01	Not completed	Crest	512,689	-	-	-	-	
SV-SU02	Not completed	Slope	748,154	-	-	-	-	
SV-SU03	Not completed	Slope	1,291,638	-	-	-	-	
SV-SU04	Partially Completed	Slope	1,639,411	20	10	32788.22	2%	
SV-SU05	Completed	Slope	1,167,636	20	10	23352.72	2%	HL-90
SV-SU06	Partially completed	Slope	2,245,209	5	5	5613.0225	0%	HL-100
SV-SU07	Not completed	Slope	10,307,776	-	-	-	-	

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-SU08	Not completed	Slope	1,026,290	-	-	-	-	
SV-SU09	Partially completed	Slope	701,918	50	30	105287.7	15%	HL-13
SV-SU10	Completed	Slope	999,492	20	5	9994.92	1%	
SV-SU11	Completed	Slope	447,971	10	5	2239.855	1%	
SV-SU12	Completed	Slope	1,702,438	0	0	0	0%	HL-11 Hl-12 HL-105
SV-SU13	Completed	Slope	1,702,623	20	10	34052.46	2%	HL-97 HL-99 HL-104
SV-SU14	Completed	Slope	1,488,152	0	0	0	0%	
SV-SU15	Partially completed	Slope	2,458,420	5	5	6146.05	0%	HL-15
SV-SU16	Completed	Slope	666,247	5	5	1665.6175	0%	
SV-SU17	Not completed	Slope	2,452,522	-	-	-	-	
SV-SU30	Partially completed	Slope	597,377	0	0	0	0%	HL-68
SV-SU32	Not completed	Slope	879,434	-	-	-	-	
SV-SU33	Partially completed	Slope	699,574	10	5	3497.87	1%	
SV-SU34	Partially completed	Slope	400,791	0	0	0	0%	HL-70
SV-SU35	Partially completed	Slope	2,254,959	0	0	0	0%	
SV-SU36	Partially completed	Slope	440,981	0	0	0	0%	
SV-SU37	Completed	Valley flat	324,307	0	0	0	0%	
SV-SU39	Not completed	Slope	373,078	-	-	-	-	
SV-SU40	Not completed	Slope	316,989	-	-	-	-	
SV-SU41	Not completed	Slope	671,196	-	-	-	-	
SV-SU42	Not completed	Slope	786,396	-	-	-	-	
SV-SU43	Partially completed	Streambank	527,708	0	0	0	0%	
SV-SU44	Completed	Slope	320,269	0	0	0	0%	

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-SU45	Partially completed	Valley flat	274,936	0	0	0	0%	
CG-SU01	Partially completed	Streambank	281,879	60	30	50738.22	18%	
CG-SU02	Partially completed	Slope	561,648	0	0	0	0%	
CG-SU03	Not completed	Slope	1,032,854	-	-	-	-	
CG-SU04	Partially completed	Crest	764,512	70	10	53515.84	7%	HL-22
CG-SU05	Completed	Slope	641,088	90	20	115395.84	18%	HL-91 HL-93
CG-SU06	Completed	Saddle	1,328,143	50	10	66407.15	5%	
CG-SU07	Partially completed	Streambank	878,324	80	30	210797.76	24%	
CG-SU08	Completed	Saddle	1,034,281	50	10	51714.05	5%	HL-23
CG-SU12	Completed	Slope	543,332	50	10	27166.6	5%	
CG-SU13	Completed	Slope	548,758	50	10	27437.9	5%	
CG-SU14	Partially completed	Slope	714,907	50	10	35745.35	5%	
CG-SU15	Partially completed	Slope	531,279	0	0	0	0%	HL-21
CG-SU16	Not completed	Slope	189,227	-	-	-	-	
CG-SU17	Completed	Slope	396,532	5	5	991.33	0%	
CG-SU18	Completed	Slope	651,680	10	5	3258.4	1%	
CG-SU19	Completed	Slope	271,637	50	5	6790.925	3%	
CG-SU20	Completed	Slope	309,414	0	0	0	0%	
YV-SU01	Partially completed	Ridge	99,742	0	0	0	0%	HL-67
YV-SU02	Partially completed	Slope	665,893	0	0	0	0%	HL-94
YV-SU03	Completed	Slope	1,454,090	50	10	72704.5	5%	Hl-26 HL-28 HL-29
YV-SU04	Completed	Slope & crest	854,730	0	0	0	0%	HL-31
YV-SU05	Partially completed	Crest	1,530,564	20	10	30611.28	2%	

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-SU06	Completed	Slope	803,340	0	0	0	0%	HL-33 HL-34
YV-SU07	Partially completed	Crest	931,534	0	0	0	0%	
YV-SU08	Partially completed	Slope & streambank	1,317,851	0	0	0	0%	HL-35
YV-SU09	Completed	Plain & slope	1,317,782	70	30	276734.22	21%	HL-37
YG-SU10	Completed	Slope	1,010,578	50	10	50528.9	5%	
ULS-SU01	Completed	Slope & ridge	974,881	10	10	9748.81	1%	HL-38
ULS-SU02	Completed	Plain	653,876	0	0	0	0%	
ULS-SU03	Partially completed	Ridge	499,874	30	10	14996.22	3%	HL-41
ULS-SU04	Partially completed	Slope & crest	3,065,325	10	10	30653.25	1%	HL-43 HL-44 HL-45 HL-46 HL-47 HL-48 HL-49 HL-51 HL-50
ULS-SU05	Partially completed	Slope & ridge	1,262,406	0	0	0	0%	
ULS-SU06	Not completed	Slope	460,514	-	-	-	-	
ULS-SU07	Partially completed	Crest	786,692	0	0	0	0%	HL-87 HL-89 HL-92 HL-96 HL-101 HL-102
ULS-SU08	Partially completed	Plain & slope	2,722,905	40	50	544581	20%	HL-55 HL-66 HL-72

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-SU09	Partially completed	Slope	1,378,754	0	0	0	0%	HL-59
ULS-SU10	Partially completed	Slope	995,436	20	10	19908.72	2%	
ULS-SU11	Partially completed	Slope	1,105,785	50	50	276446.25	25%	HL-61
ULS-SU12	Completed	Slope	1,106,354	0	0	0	0%	
ULS-SU13	Completed	Slope & streambank	1,115,945	0	0	0	0%	
ULS-SU14	Completed	Streambank & slope	524,854	0	0	0	0%	
ULS-SU15	Partially completed	Slope	674,094	0	0	0	0%	
ULS-SU16	Partially completed	Slope	221,095	0	0	0	0%	
ULS-SU17	Partially completed	Slope	352,764	0	0	0	0%	
ULS-SU18	Partially completed	Slope	1,432,753	20	10	28655.06	2%	HL-64
ULS-SU19	Partially completed	Slope & crest	898,294	30	10	26948.82	3%	HL-65
ULS-SU20	Partially completed	Crest	896,414	20	10	17928.28	2%	
Total			96,557,342	20%	9%	1791643.382	2%	

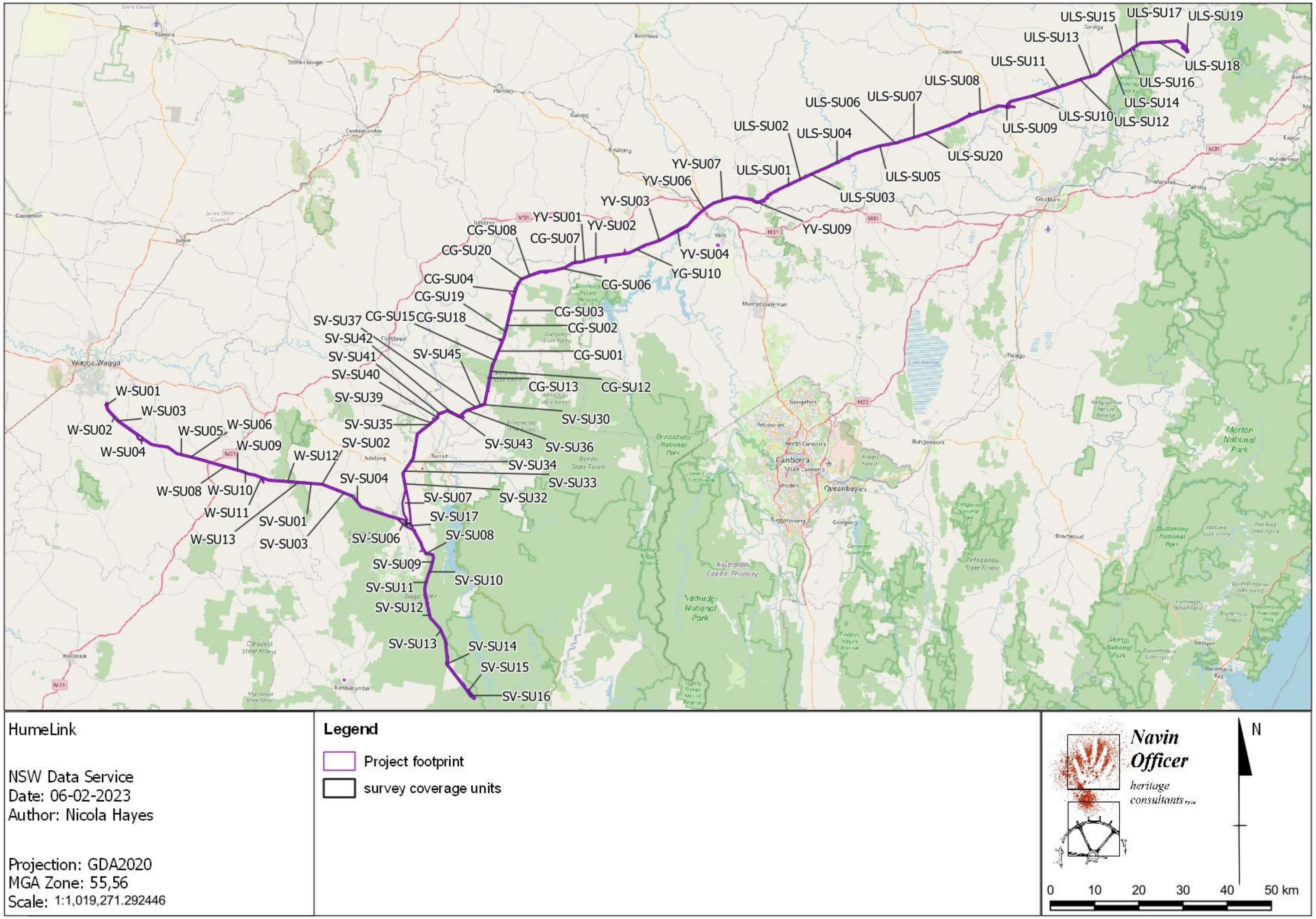


Figure 8-3 Survey Units

8.4 Analysis of Aboriginal archaeological survey and discussion

There are 21 previously recorded Aboriginal heritage items located within the project footprint. A total of 63 previously unrecorded Aboriginal sites and six PADs have been identified during the field survey program within the project footprint. The majority of sites are artefact occurrences, with 19 of the 21 previously recorded sites and 60 of the 63 newly recorded sites being either artefact scatters or isolated finds. The remaining three newly recorded sites were Aboriginal modified trees.

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.

Five unscarred trees were also identified by RAPs during field surveys as trees of cultural significance. However, these five 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.

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

- Crest, 6%
- Plain 7%
- Plain and slope 20%
- Plain 5%
- Ridge 2%
- Saddle 5%
- Slope 3%
- Slope and crest 2%
- Slope and streambank 0%
- Streambank 15%
- Valley flat 17%.

A majority of sites recorded during the field surveys were located on slopes (42), followed by plain (10, crest (7) and saddle (1) (refer to Figure 8-4). The slope landform indicates areas of rolling hills and plain indicates a flatter landform. The slope landform applies to the majority of the project footprint and most artefacts were found in this landform.

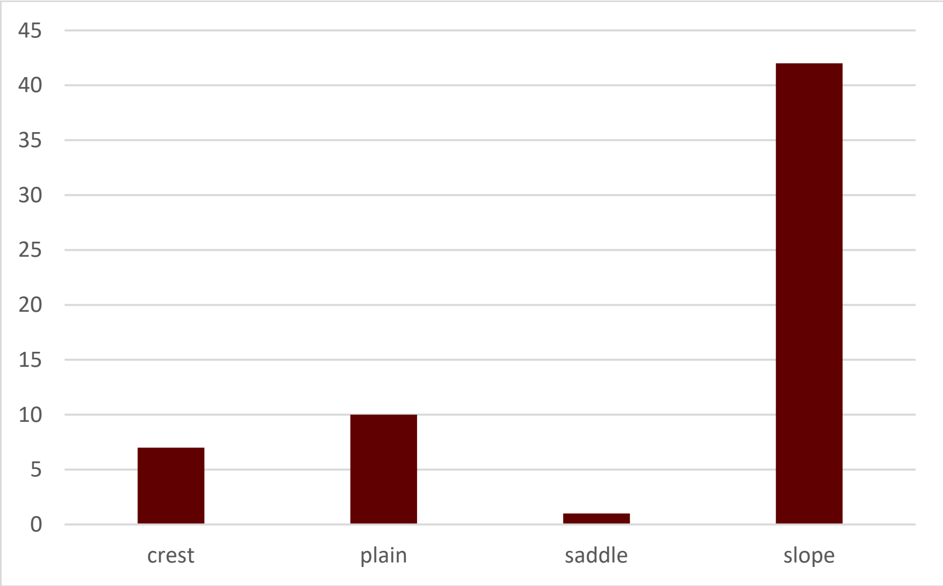


Figure 8-4 Site distributions across landforms

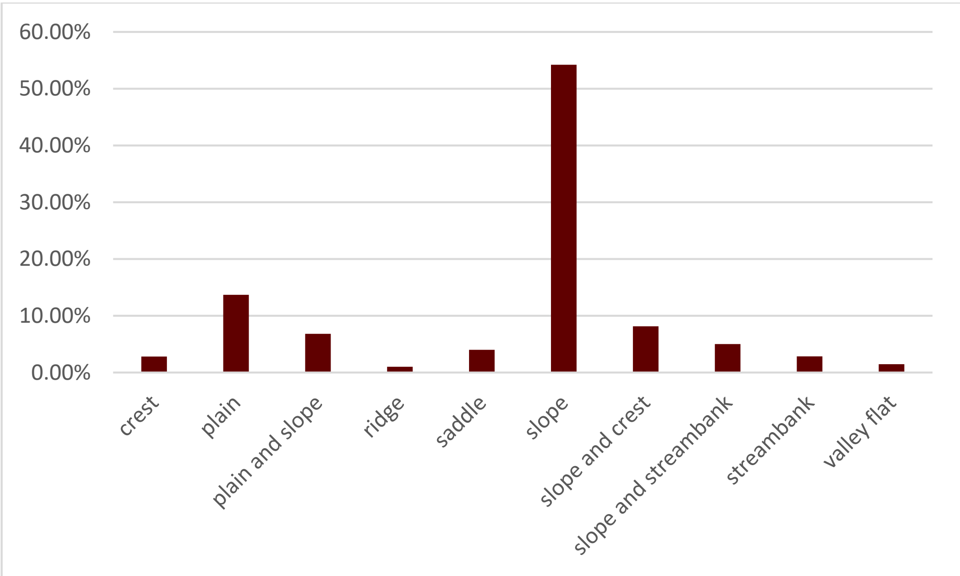


Figure 8-5 Landform percentage across the project footprint

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 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 project footprint and to test the archaeological sensitivity model.

The artefacts recovered during the test excavation program within the project footprint underwent a detailed lithic analysis by Ricardo Servin (Senior 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 203 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.

Table 8-4 Artefact numbers and percentage per test location

Site	Number of artefacts	Per cent
PAD01	23	11.33
PAD05	4	1.97
PAD07	8	3.94
CGAS04	7	3.44
SVAS03	5	2.46
ULAS02	32	15.76
ULAS03	11	5.42
ULAS04	12	5.91
ULAS05	16	7.88
WAS2.1	23	11.33
WAS03	1	0.49
YAS01	19	9.35
YAS02	37	18.22
YAS04	5	2.46
Total	**203**	-

8.5.1 HL-PAD-01

Testing within this PAD consisted of a transect established on a north-west-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 shot 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 (0-100 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 8-5 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.
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 8-6 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.

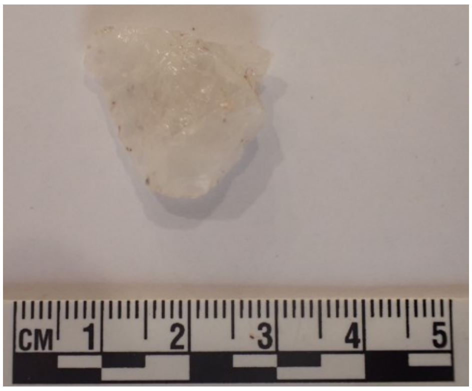


Figure 8-10 Ventral surface of a quartz backed tool (PAD01 TP3 Spit 1 [2])

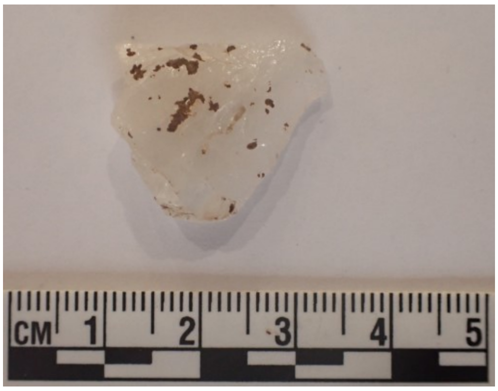


Figure 8-11 Dorsal Ventral surface of a quartz backed tool (PAD01 TP3 Spit 1 [2])

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 0-100 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-05

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.

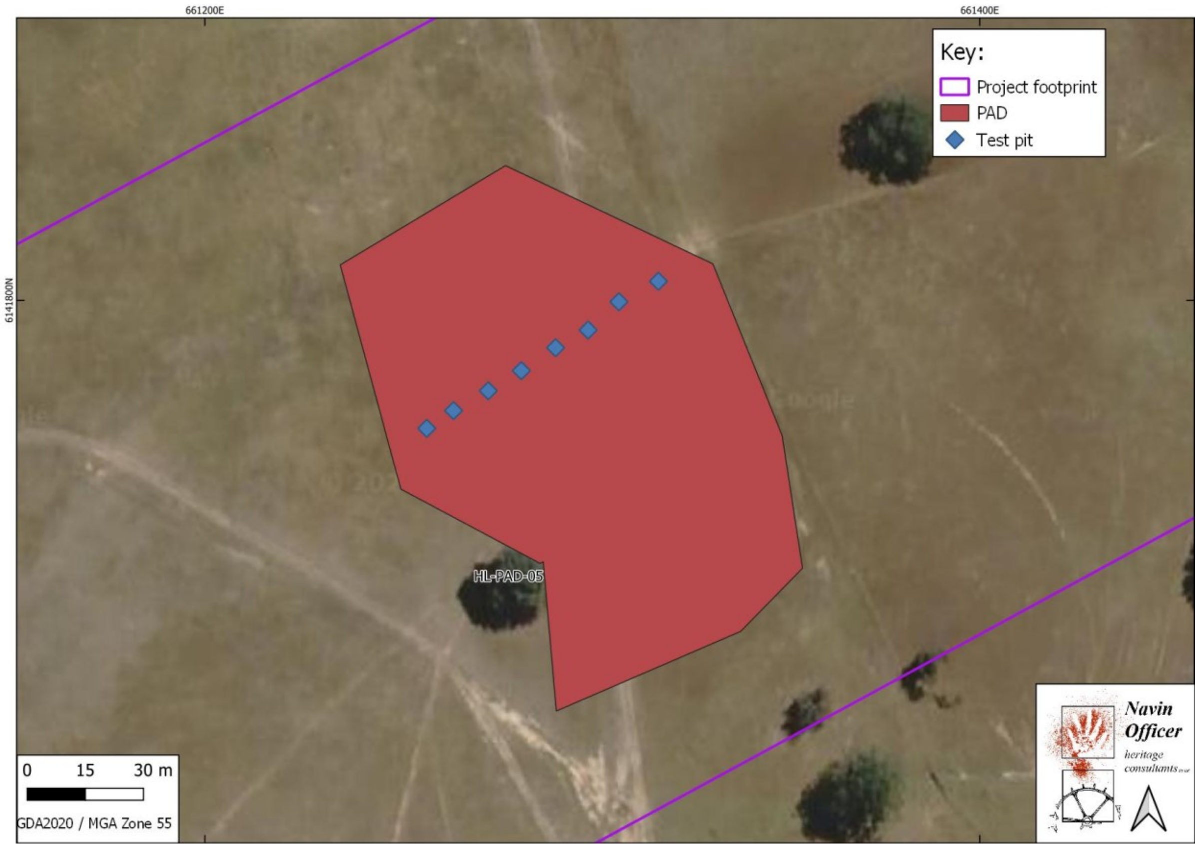


Figure 8-14 HL-PAD-05 test pit locations

8.5.2.1 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.

8.5.2.2 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 8-15 Overview shot of HL-PAD-05 Pit 3 showing the gradient of the gentle slope in the background

Figure 8-16 HL-PAD-05 Test Pit 3

Figure 8-17 HL-PAD-05 Test Pit 5

Table 8-7 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.

8.5.2.3 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 (0-10 centimetres depth) with only one artefact recovered within spit 2 (10-20 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.

8.5.3 HL-PAD-07

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.

8.5.3.1 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.

8.5.3.2 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 (25-30 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 (10-20 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 (10-20 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 8-18 HL-PAD-07 Test Pit 3

Figure 8-19 HL-PAD-07 Test Pit 4

Table 8-8 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.

8.5.3.3 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 spits 1 (0-100 millimetres depth) and spit 2 (10-200 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. The assemblage consisted of two artefacts made out of each identified raw material.

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.

8.5.4 WAS01

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 8-20 WAS01 test pit locations

8.5.4.1 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.

8.5.4.2 Soils, disturbance and features

Ground surface across the area displays evidence of land clearance. The area is used for grazing and 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 8-21 Pre-excavation photo of WAS01 Test Pit 1 showing the gradient of the slope

Figure 8-22 WAS01 Test Pit 3

Figure 8-23 WAS01 Test Pit 9

Table 8-9 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

8.5.4.3 Artefact analysis

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

8.5.5 WAS02

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 project footprint at the request of the landowner on the placement of test pits.

Figure 8-24 WAS02 test pit locations

8.5.5.1 Landform

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

8.5.5.2 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 (>15 per cent) and few (2-10 per cent) shale and quartz gravel inclusions. The A1 Horizon overlays a weakly compacted silty clay loam (A2) with few grass roots (less than 5 per cent), few (5-10 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 (2-15 per cent) fine quartz gravel inclusions, few (5 per cent) fine manganese flecks present and few (less than 5 per cent) charcoal fragments present.

Figure 8-25 View showing the access track in close vicinity to the transect

Figure 8-26 WAS02 Test Pit 3

Figure 8-27 WAS02 Test Pit 9

Table 8-10 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.

8.5.5.3 Artefact analysis

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

8.5.6 WAS02-1

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

Figure 8-28 WAS02-1 test pit locations

8.5.6.1 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.

8.5.6.2 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 powerline tower 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 8-29 Landscape shot showing the gradient of the slope and the existing transmission tower in the vicinity

Figure 8-30 WAS02-1 Test Pit 1 Expansion

Figure 8-31 WAS02-1 Test Pit 4

Table 8-11 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

8.5.6.3 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 (0-100 millimetres depth) and 17 (73.91 per cent) artefacts recovered from spit 2 (100-200 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.

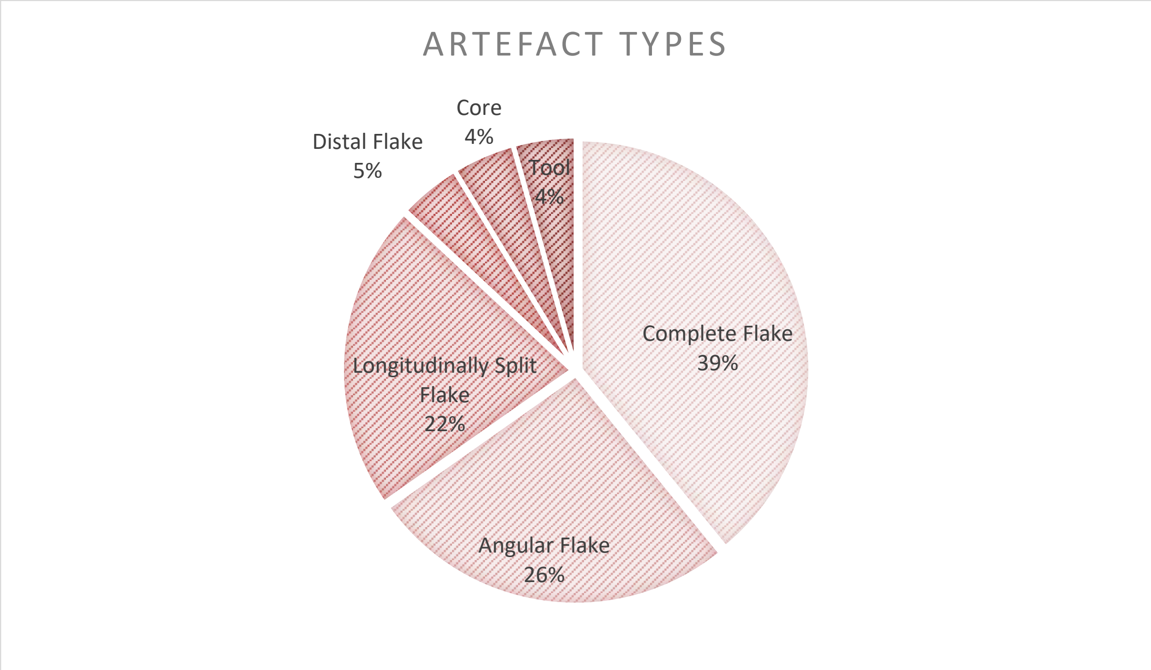


Figure 8-32 WAS02-1 artefact types

Figure 8-33 Multiplatform core made from granite (WAS2-1 TP1 Spit 2 [1])

Figure 8-34 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.

8.5.7 WAS03

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 8-35 WAS03 test pit locations

8.5.7.1 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.

8.5.7.2 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 (5-10 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 (1-5 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 8-36 WAS03 Test Pit 3 Expansion

Figure 8-37 WAS03 Test Pit 7

Table 8-12 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.

8.5.7.3 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.

8.5.8 WAS03-1

Testing within WAS03-1 consisted of one transect established on a north-south alignment with 5 test pits placed at 10 metre intervals within the transect.

Figure 8-38 WAS03-1 test pit locations

8.5.8.1 Landform

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

8.5.8.2 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 (2-10 per cent) coarse quartz gravel inclusions. Two of the test pits contained very few (less than 2 per cent) small charcoal fragments present. This deposit transitioned sharply to a compact, moist brownish-red clay (B-Horizon) with very few (less than 2 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 5 per cent) fine quartz gravel inclusions.

Figure 8-39 View showing gradient of slope within WAS03-1

Figure 8-40 WAS03-1 Test Pit 1

Figure 8-41 WAS03-1 Test Pit 4

Table 8-13 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.

8.5.8.3 Artefact analysis

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

8.5.9 WAS04

Testing within this area consisted of two transects, both of which were established on a north-west-southeast 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.

Figure 8-42 WAS04 test pit locations

8.5.9.1 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 8-43 Landscape shot showing the gradient of the slope within the transect

8.5.9.2 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 8-44 Post-excavation shot 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 8-45 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% 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 8-46 WAS04 Transect 2 Test Pit 1

Table 8-14 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

8.5.9.3 Artefact analysis

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

8.5.10 SVAS01

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 project footprint due to thick vegetation cover within the project footprint at this location.

Figure 8-47 SVAS01 test pit locations

8.5.10.1 Landform

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

8.5.10.2 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 subjected to continuous stages of land clearance. The area also displays evidence of erosion and vehicle damage. The stratigraphic profile across the area was consistent with the ground disturbance identified in the area and generally consisted of a silty loam top soil (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 8-48 SVAS01 Test Pit 2

Figure 8-49 SVAS01 TP6

Table 8-15 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.

8.5.10.3 Artefact analysis

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

8.5.11 SVAS02

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 8-50 SVAS02 test pit locations

8.5.11.1 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.

8.5.11.2 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.

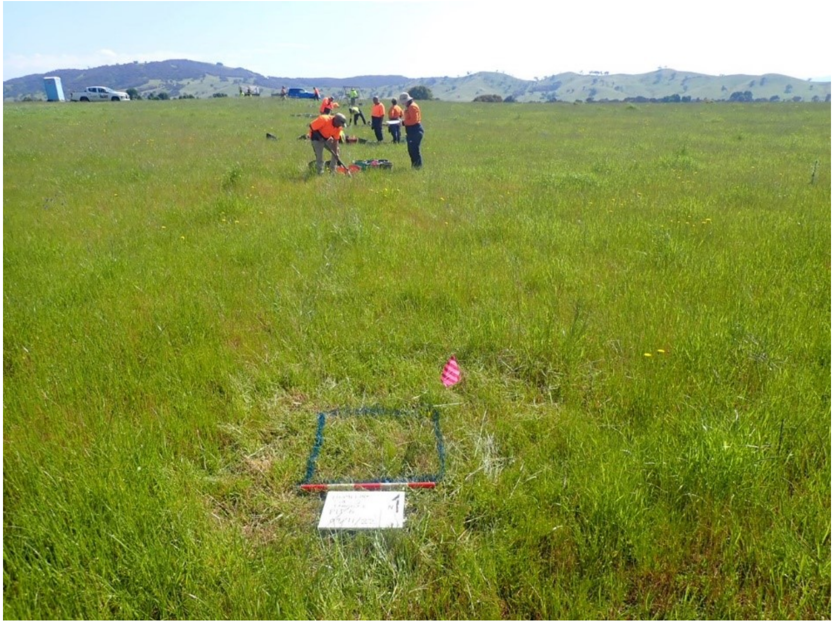


Figure 8-51 Landscape shot of SVAS02 showing the gradient of the slope

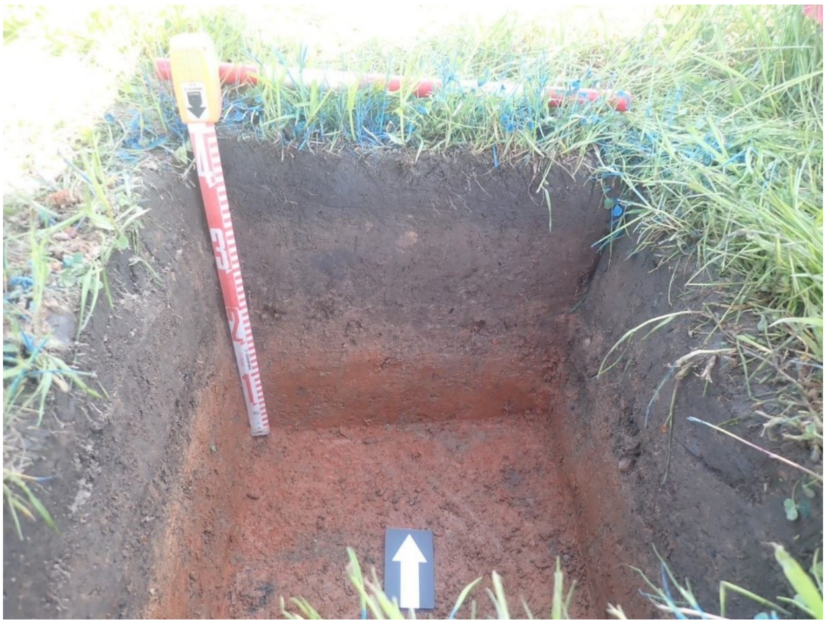


Figure 8-52 SVAS04 Test Pit 2

Figure 8-53 SVAS02 Test Pit 6

Table 8-16 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 Munsel: 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.

8.5.11.3 Artefact analysis

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

8.5.12 SVAS03

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 8-54 SVAS03 test pit locations

8.5.12.1 Landform

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

8.5.12.2 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 5 per cent gravel inclusions with a clear horizontal boundary above a wet silty clay loam deposit (A2) with greater than 2 per cent grass root bioturbation and greater than 10 per cent gravel inclusions transitioning into a moderately compacted wet silty clay (B-horizon).

Figure 8-55 Base of SVAS03 Test Pit 4 showing the water table being hit

Figure 8-56 SVAS03 TP1

Table 8-17 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.

8.5.12.3 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 (200-100 millimetres depth), one recovered from test pit 3 spit 1 (0-100 millimetres depth) and one recovered from test pit 6 spit 3 (200-100 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 (200-100 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.

8.5.13 SVAS04

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 8-57 SVAS04 test pit locations

8.5.13.1 Landform

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

8.5.13.2 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 2-6 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 2-6 demonstrated a very diffuse horizon boundary, as a reddish-brown silty clay deposit lay below the upper unit from a depth of 200-250 millimetres. Inclusions of 2-5 per cent medium-sized gravels and very few (2 per cent) charcoal fragments were present within this deposit. Other inclusions within this deposit included granite cobble ranging from 50-200 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 7-10 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 (2-5 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 7-10. Large granite cobble inclusions ranging from 50-200 millimetres in length were present within this silty clay deposit. The B-Horizon was not reached in test pits 7-10 due to the evident ground disturbance present and the sterile composition of the soil profile.

Figure 8-58 Landscape shot showing the landform unit along the transect

Figure 8-59 SVAS04 TP2

Figure 8-60 SVAS04 TP8

Table 8-18 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.

8.5.13.3 Artefact analysis

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

8.5.14 SVAS05

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 8-61 SVAS05 test pit locations

8.5.14.1 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.

8.5.14.2 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.

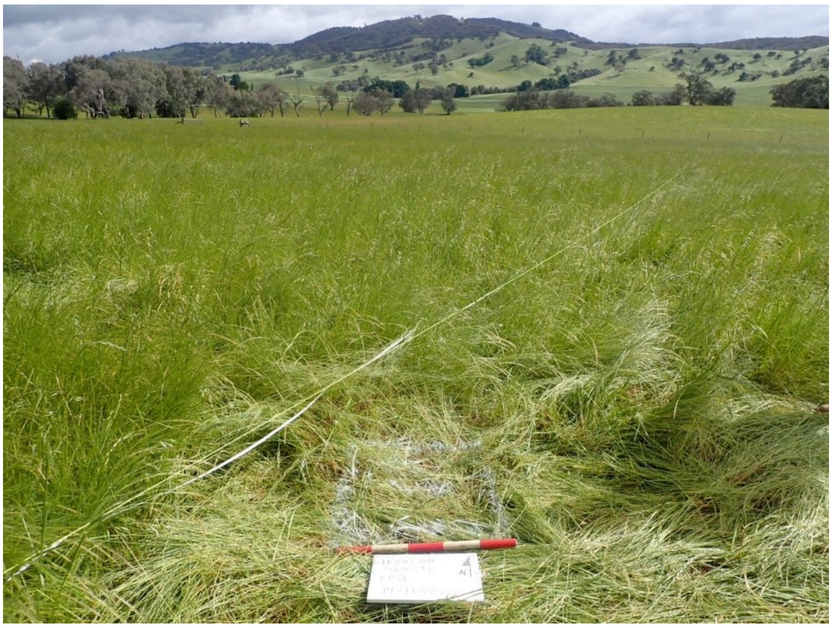


Figure 8-62 Landscape shot showing the gradient of the slope along the transect

Figure 8-63 SVAS05 TP4

Figure 8-64 SVAS05 TP8

Table 8-19 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.

8.5.14.3 Artefact analysis

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

8.5.15 CGAS01/02

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 8-65 CGAS01/02 test pit locations

8.5.15.1 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.

8.5.15.2 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% 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 8-66 CGAS01 Test Pit 4

Figure 8-67 CGAS01 TP7

Table 8-20 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.

8.5.15.3 Artefact analysis

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

8.5.16 CGAS03

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 8-68 CGAS03 test pit locations

8.5.16.1 Landform

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

8.5.16.2 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 1-2 located north of a fence line that displayed strong evidence of disturbed soil. Test pits 3-10 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 (1 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 (2-5 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 3-10 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 3-10) 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 3-10. This overlaid a pale brown silty clay loam deposit, which transitioned to a pale orange-brown silty clay from a depth of 300-400 millimetres. Quartz gravel inclusions within test pits 3-10 were present (5-20 per cent), while charcoal fragments were also present (2 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 3-9 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 8-69 CGAS03 TP1

Figure 8-70 CGAS03 Test Pit 6

Table 8-21 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.

8.5.16.3 Artefact analysis

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

8.5.17 CGAS04

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 8-71 CGAS04 test pit locations

8.5.17.1 Landform

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

8.5.17.2 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 (5-20 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 (5-25 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 (5-20 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 8-72 Landscape shot showing the gradient of the slope

Figure 8-73 CGAS04 Test Pit 4

Figure 8-74 CGAS04 Test Pit 10

Table 8-22 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.

8.5.17.3 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 (0-100 millimetres depth), two (28.57 per cent) artefacts were recovered from spit 2 (100-200 millimetres depth) and two (28.57 per cent) were recovered from spit 3 (200-300 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 8-75. Ventral view of longitudinally split flake (CGAS04, TP9A, Spit 1)

Figure 8-76. 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.

8.5.18 YAS01

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 8-77 YAS01 test pit locations

8.5.18.1 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.

8.5.18.2 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 >20 per cent of grass root bioturbation and common inclusions (5-30 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 (10-50 per cent) of sandstone cobbles and boulders. Very few (1-2 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 (5-10 per cent) degraded ironstone fragments and very few (1-2 per cent) fine charcoal fragments present.

Figure 8-78 Landscape shot showing the landform units within the vicinity of the transect

Figure 8-79 YAS01 Test Pit 1 Expansion

Figure 8-80 YAS01 Test Pit 3

Table 8-23 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.

8.5.18.3 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 0-100 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 8-24 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.

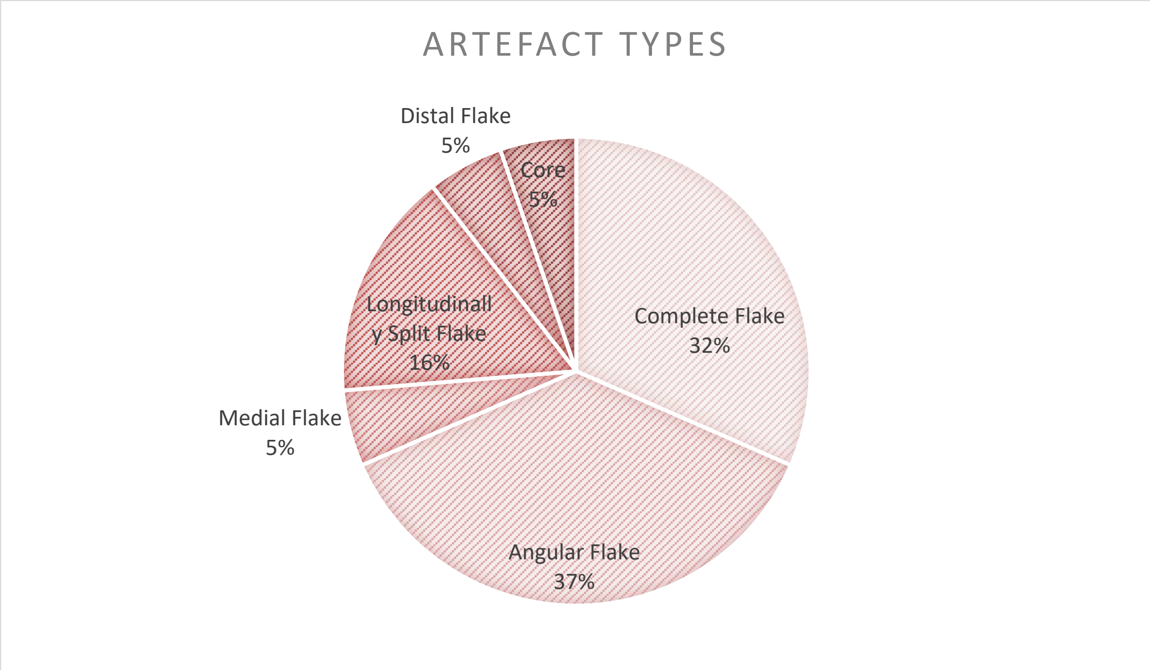


Figure 8-81 YAS01 artefact types

Figure 8-82. Multiplatform core made from silicified mudstone (YAS01 TP5A Spit 1 [3])

Figure 8-83. 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.

8.5.19 YAS02

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 8-84 YAS02 test pit locations

8.5.19.1 Landform

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

8.5.19.2 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 (10-30 per cent) quartz and sandstone gravel and cobble inclusions. The A1 Horizon overlayed a moist silty clay (A2) that consisted of common (10-40 per cent) sandstone cobble and boulder inclusions, very few fine grass roots (1-2 per cent) and very few (1-2 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 8-85 YAS02 Flooded Test Pit 1 showing the bank of Jugiong Creek in the background

Figure 8-86 YAS02 Test Pit 4

Table 8-25 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.

8.5.19.3 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 (0-100 millimetres depth) and spit 2 (100-200 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.

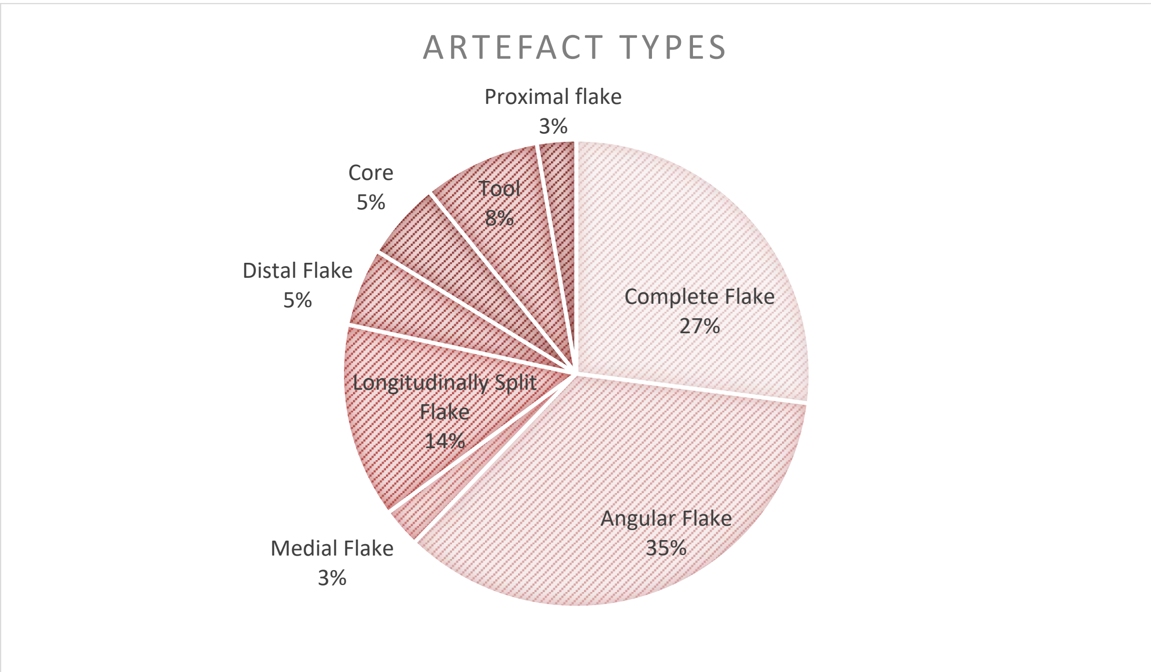


Figure 8-87 YAS02 artefact types

Figure 8-88 Multiplatform core made from indurated mudstone (YAS02 TP2B Spit 2)

Figure 8-89 Multiplatform core made from indurated mudstone (YAS02 TP2B Spit 2)

Figure 8-90 Steep edge scraper made from indurated mudstone (YAS02 TP5A Spit 1 [4])

Figure 8-91 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 usewear 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 usewear 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.

8.5.20 YAS03

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 project footprint to avoid areas of apparent ground disturbance along the transect alignment.

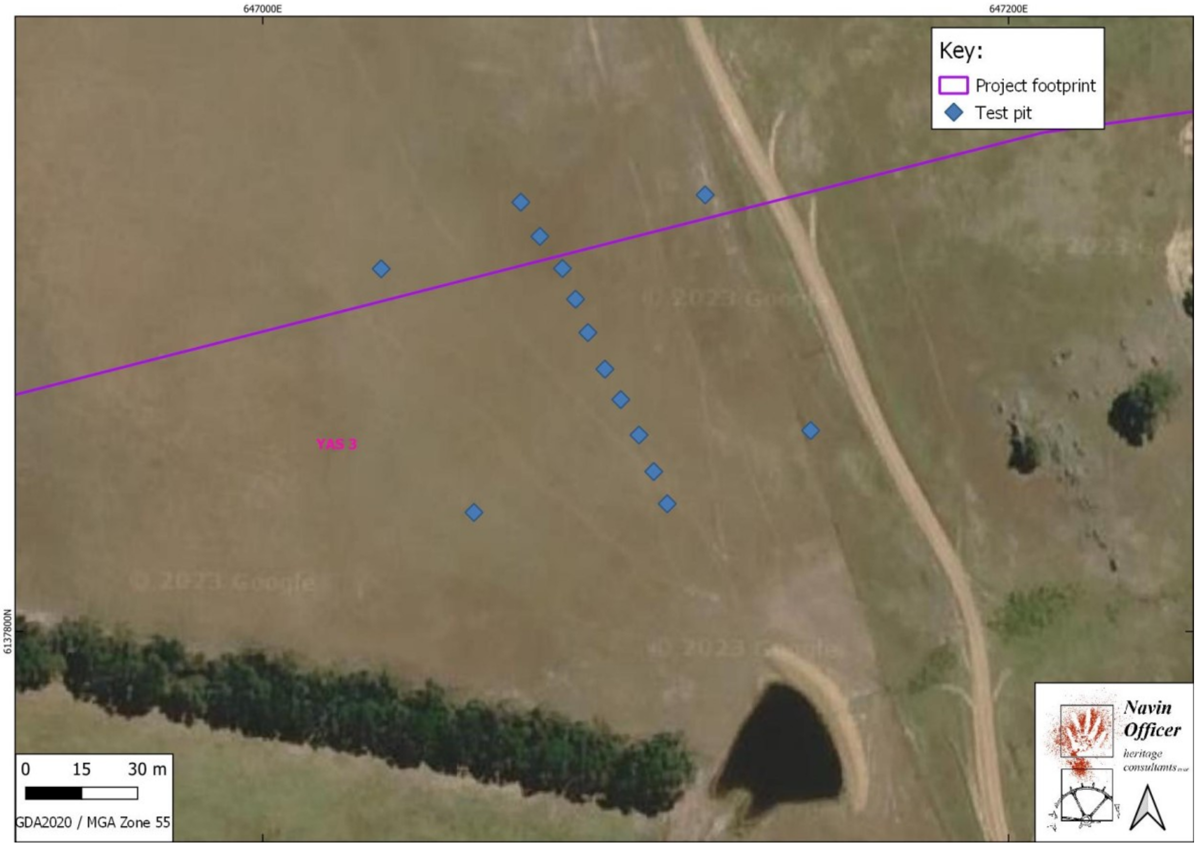


Figure 8-92 YAS03 test pit locations

8.5.20.1 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.

8.5.20.2 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 8-93 Landscape shot showing the gradient of the slope in the vicinity of the transect

Figure 8-94 YAS03 TP2

Figure 8-95 YAS03 TP3

Table 8-26 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.

8.5.20.3 Artefact analysis

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

8.5.21 YAS04

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 8-96 YAS04 test pit locations

8.5.21.1 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.

8.5.21.2 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 (10-20 per cent) sandstone gravel inclusions with a clear horizon boundary overlaying a sandy clay deposit (A2) with many (20-50 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 (10-20 per cent) degraded sandstone gravel inclusions present.

Figure 8-97 Landscape shot showing the landform unit associated with the transect

Figure 8-98 YAS04 TP7

Figure 8-99 YAS04 TP10

Table 8-27 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.

8.5.21.3 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 0 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.

8.5.22 YAS05

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 8-100 YAS05 test pit locations

8.5.22.1 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.

8.5.22.2 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 (20-25 per cent) grass root bioturbation and few (1-10 per cent) fine-medium sized sandstone gravel inclusions present. This transitioned to a weakly compacted silty clay loam deposit (A2) with common (10-20 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 (2-10 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 250-300 millimetres.

Figure 8-101 Landscape shot showing the landform unit along the transect

Figure 8-102 YAS05 TP3

Table 8-28 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.

8.5.22.3 Artefact analysis

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

8.5.23 ULAS01

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 8-103 ULAS01 test pit locations

8.5.23.1 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.

8.5.23.2 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 8-104 ULAS01Test Pit 6

Table 8-29 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.

8.5.23.3 Artefact analysis

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

8.5.24 ULAS02

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 project footprint in order to avoid the drainage line in the north part of the transect.

Figure 8-105 ULAS02 test pit locations

8.5.24.1 Landform

ULAS02 is located on a moderately-inclined hillslope approximately 200 metres north of Jerrawa Creek.

8.5.24.2 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 1-6 in transect 1 comprised of a dark brown silty loam topsoil (A1 Horizon) with very few fine gravel inclusions (less than 2 per cent) ranging from 2-6 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 1-6 ranged from a moist silt to a moist silty clay with an increasing percentage of fine gravel inclusions (5-10 per cent). Other inclusions within the A2 Horizon in test pits 1-5 included fine charcoal fragments ranging from 10-20 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 1-6 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 1-3 in transect 2 were similar to that of test pits 1-6 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 1-3 in transect 2 from 200 to 330 millimetres. This comprised of an orange-brown clay with few gravel inclusions (1-10 per cent) and very few fine charcoal fragments caused by burnt tree roots.

Figure 8-106 Pre-excavation shot of Test Pit 1 showing the gradient of the slope

Figure 8-107 ULAS02 Test Pit 2 Expansion

Figure 8-108 ULAS02 Test Pit 3

Table 8-30 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.

8.5.24.3 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 (0-100 millimetres depth), spit 2 (100-200 millimetres depth), spit 3 (200-300 millimetres depth) and spit 4 (300-400 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.

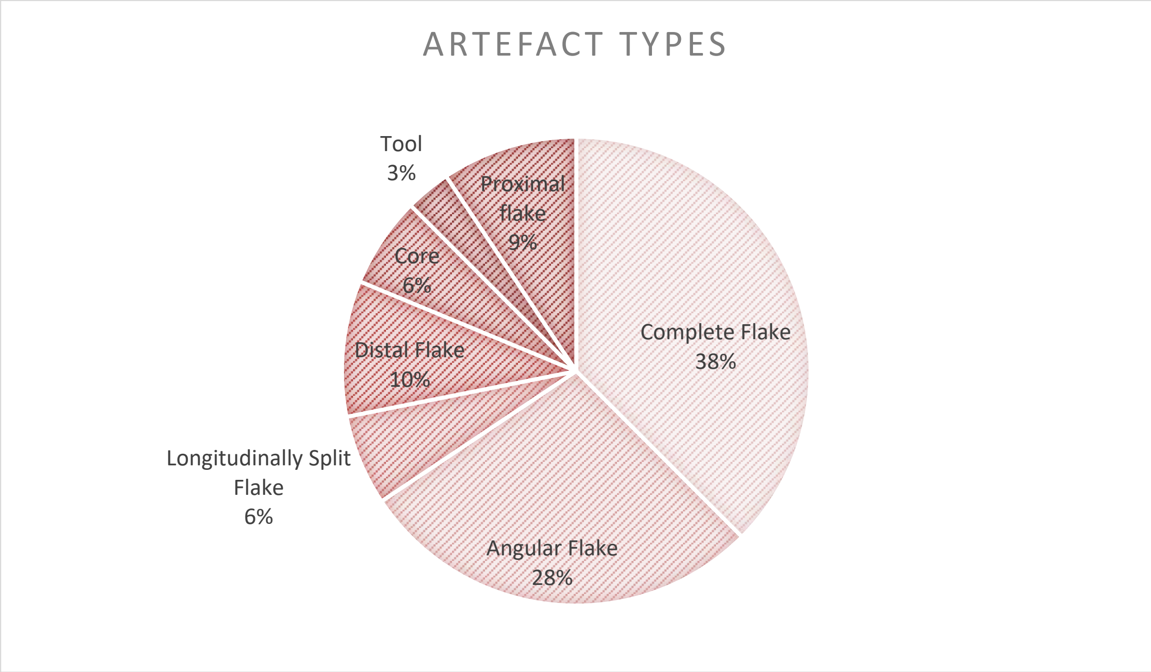


Figure 8-109 ULAS02 artefact types

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 8-110. Multiplatform core made from silcrete (ULAS02 TP2C Spit 1)

Figure 8-111. Multiplatform core made from silcrete (ULAS02 TP2C Spit 1)

Figure 8-112. Multiplatform core made from silcrete (ULAS02 TP5A Spit 2)

Figure 8-113. 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.

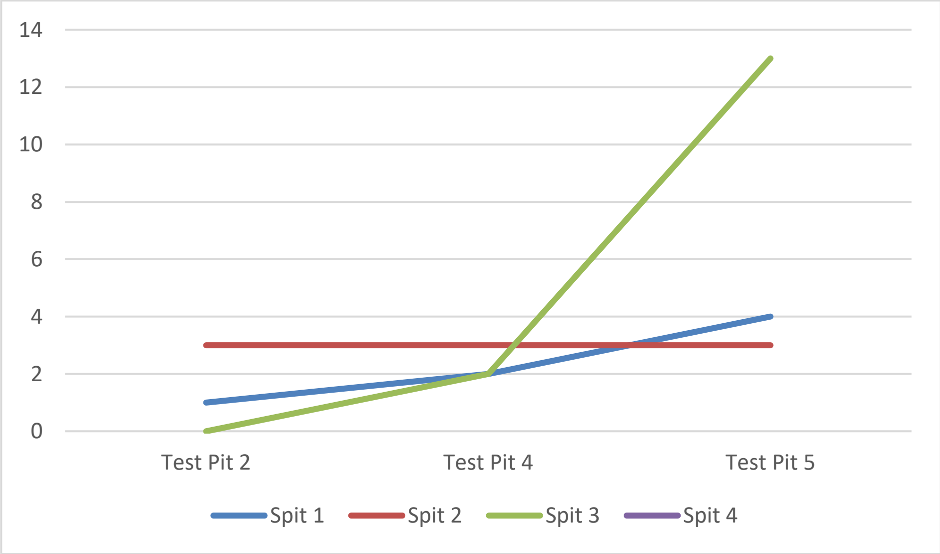


Figure 8-114 ULAS02 artefact numbers per pit and spit

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.

8.5.25 ULAS03

The site consists of two transects established on a north-west southeast alignment parallel to each other 10 metres apart. Transect one consisted of eight test pits placed at 10 metre intervals within the transect. Ten 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 8-115 ULAS03 test pit locations

8.5.25.1 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, Dowlins 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 8-116 Landscape shot showing the gradient of the slope

8.5.25.2 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 tower 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 8-117 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 (200-300 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 8-118 ULAS03 T1 TP1

Table 8-31 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.

8.5.25.3 Artefact analysis

A total of eleven 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 (0-100 millimetres depth) (n=9) and only two artefacts were recovered from spit 2 (100-200 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 8-119 Ventral surface of a quartz backed point (ULAS03 TP2A Spit 1 [1])

Figure 8-120 Dorsal surface of a quartz backed point (ULAS03 TP2A Spit 1 [1])

Figure 8-121 Ventral surface of a silcrete backed tool (ULAS03 TP2B Spit 2 [2])

Figure 8-122 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.

8.5.26 ULAS04

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 8-123 ULAS04 test pit locations

8.5.26.1 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.

8.5.26.2 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 southeast 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 (50-90 per cent) mudstone cobbles within the B-Horizon. An A2 Horizon was present only in test pits 7-10, which consisted of a moist clay loam with few less than15 per cent fine gravel inclusions.

Figure 8-124 ULAS04 TP3

Figure 8-125 ULAS04 Test Pit 7 Expansion

Table 8-32 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.

8.5.26.3 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 (0-100 millimetres depth) (n=3) spit 2 (100-200 millimetres depth) (n=8) and spit 3 (200-300 millimetres depth) (n=1).

Table 8-33 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 8-126 Ventral surface of a notched tool made from quartz (ULAS04 TP2 Spit 2 [4])

Figure 8-127 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.

8.5.27 ULAS05

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 8-128 ULAS05 test pit locations

8.5.27.1 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.

8.5.27.2 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 (2-10 per cent) fine gravel inclusions ranging from 2-6 millimetres in length. In the few test pits that contained an A2 Horizon, the upper unit transitioned to a silty clay (A2) with common (10-20 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 -250 millimetres. The B-Horizon consisted of a compact, moist clay with common (10-25 per cent) quartz cobble inclusions ranging from 60-200 millimetres in length.

Figure 8-129 Landscape shot showing the gradient of the slope

Figure 8-130 ULAS05 Test Pit 2 Expansion

Figure 8-131 ULAS05 Test Pit 7

Table 8-34 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.

8.5.27.3 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 0-100 millimetres and 100-200 millimetres. Most of the artefacts were recovered from a depth of 0-100 millimetres (n=13, 81.25 per cent) with only three artefacts (18.75 per cent) recovered from a depth of 100-200 millimetres.

Table 8-35 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 8-132. Single platform core made from indurated mudstone (ULAS05 TP1 Spit 1)

Figure 8-133. Single platform core made from indurated mudstone (ULAS05 TP1 Spit 1)

Figure 8-134. Multiplatform core made from silicified mudstone (ULAS05 TP2 Spit 2)

Figure 8-135. 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 to be 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 Potential Archaeological Deposits (PADs) previously 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, 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 in order 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 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 to 8 but on moderate slope (5.1 to 15 degrees), or are on good slope within 700 metres of stream order 2 to 8, 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 (0-5 degrees), are easily accessible areas that are within 350 metres of stream order 2 to 8 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 project footprint. Following testing of the model using AHIMS sites and sites found to date for the project, we have found that 85 per cent of sites are captured by this model. The archaeological sensitivity of the project footprint is depicted in Attachment 5.1.

8.7.1 Archaeological sensitivity of unsurveyed areas

The remaining unsurveyed portions of the project footprint have been categorised by their archaeological sensitivity (refer to Attachment 5.2). These values were calculated using the most recent archaeological sensitivity model produced by NOHC. Table 8-36 shows the sensitivity percentage within each unsurveyed area, i.e. 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 8-36 Archaeological sensitivity of unsurveyed areas

Survey unit	**Sensitivity percentage**			
	High	**Moderate**	**Low**	**Disturbance** (%)
WAS1	34.2	40.8	24.6	0.3
SVAS1	3.9	32.0	62.3	1.8
SVAS2	1.9	20.1	75.2	2.7
SVAS3	7.5	13.7	75.2	3.6
SVAS4	12.2	20.0	66.6	1.2
SVAS5	47.9	14.9	37.3	0.0
CGAS1	1.4	26.3	63.2	9.1
CGAS2	10.1	27.7	61.4	0.9
YAS1	9.9	32.5	55.7	1.9
YAS2	13.2	35.7	46.5	4.5
ULAS1	30.8	39.9	27.4	1.9
ULAS2	13.7	31.7	52.1	2.5
ULAS3	26.2	50.4	20.2	3.2
ULAS4	14.1	43.9	39.9	2.1
ULAS5	2.5	25.4	69.7	2.4
ULAS6	4.3	34.0	58.7	3.0
Total	**7.4**	**25.8**	**64.3**	**2.4**

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 Burra Charter, 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 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 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 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 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

No information has been provided by Aboriginal stakeholders to suggest the sites and objects identified within the project footprint are historically important in terms of persons, events, phases or activities in the Aboriginal community. This is likely due to the fact that the 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 project footprint became available, it would be discussed with relevant Aboriginal stakeholders.

9.3 Scientific (archaeological) value

Archaeological sites recorded during the archaeological survey and previously recorded sites that were re-located were assigned to one of the following assessment categories:

- previously recorded sites not accessed so not able to be confirmed
- cannot assess the scientific significance prior to excavation
- low scientific significance
- moderate (local) scientific significance
- moderate to high (local) scientific significance.

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

9.3.1 Potential Archaeological Deposits

A total of six PADs were identified across the 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 three PAD sites potentially impacted by construction. All of the remaining PADs have been identified as having moderate to high archaeological potential (Table 9-2).

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 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 i.e 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.	Hl-PAD-02 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

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-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
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-10	PAD	Potential for subsurface archaeological deposits.	HL-PAD-10 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

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
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
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

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
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
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.	
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

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
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	No Aboriginal objects were 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

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
YAS05	No sites identified	Nil	No Aboriginal objects were 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
ULAS01	No sites identified	Nil	No Aboriginal objects were 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

Test	Preliminary site description	Characteristics relevant to significance assessment	Assessment following archaeological subsurface testing	Potential to yield significant cultural information through further excavation
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.	High significance

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 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-11	Isolated find	Low artefact numbers and no assessed archaeological potential
HL-12	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
HL-13	Artefact scatter (2)	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-24	Artefact scatter (4)	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-31	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-37	Artefact scatter (4)	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-55	Isolated find	Low artefact numbers and no assessed archaeological potential

Site number	Summary description	Characteristics relevant to significance assessment
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-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-105	Artefact scatter (2)	Low artefact numbers and no assessed archaeological potential
51-5-0254	Artefact	Low artefact numbers and no assessed archaeological potential
51-6-0811	Artefact	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
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

Site number	Summary description	Characteristics relevant to significance assessment
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 middens. 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-15	Modified tree	Modified tree, rarer site type
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)	High artefact numbers
HL-51	Artefact scatter (30+)	High artefact numbers
HL-65	Modified tree	Modified tree, rarer site type
HL-99	Artefact scatter (15+)	High artefact numbers
HL-104	Artefact scatter (20+)	High artefact numbers
51-5-0201	Artefacts	High artefact numbers
51-5-0202	Artefacts	High artefact numbers
52-1-0152	Artefacts	High artefact numbers
56-6-0262	Modified tree/PAD	Modified tree, rarer site type

9.3.4 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. '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 striping 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. (Table 9-5).

Table 9-5 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

9.4 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.

To date, RAPs have not identified any cultural landscape values/aesthetic values in the project footprint.

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 project footprint. This area has been identified by a RAP as an important traditional women's site.

Five unmodified trees were identified by RAPs during field surveys, these are shown in Table 9-6. 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.

Table 9-6 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-83	RAP requested that this tree, a sorry tree, be recorded away from the tree. No photograph or other information were to be noted

10 ASSESSMENT OF IMPACTS

Using the assessment of cultural heritage values and significance, the project is considered, and an impact assessment made. The impact assessment for the project has considered the potential for direct and indirect impacts on heritage. The assessment is completed considering a worst-case scenario, as the final impacted area would be much smaller than the project footprint assessed, not all of the project footprint would be used during construction/operation of the project, so these findings are conservative.

The construction activities and 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 project footprint include:

- establishment works such as clearing of vegetation
- transmission line structure construction
- proposed Gugaa 500 kV substation construction
- Bannaby 500 kV substation and Wagga 330 kV substation modification
- telecommunications hut construction
- new and upgraded access track and road construction
- installation of buried cabling from the 500 kV transmission line structures to Rye Park Wind Farm substation
- worker accommodation facility and construction compound establishment.

The project components 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 a total loss of heritage value at a site. An example of a direct impact for the project is the installation of a transmission line structures.
- Partial direct harm or disturbance, where direct impacts would occur to only some of the surface and/or subsurface features, could result at an item. Partial direct harm generally results 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, could result. 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 requirements that may impact upon heritage items include:

- vegetation clearing/trimming within the easement
- 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.

10.1 Potential harm

There are 90 Aboriginal sites and PADs located within the project footprint 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 eight PADs and three modified trees. In addition, five cultural trees, six modified trees of non-Aboriginal origin and one cultural site. The potential harm of the proposed activity on Aboriginal sites within the project footprint is summarised in Table 10-1 and shown in Attachment 5.3. The assessment is conservative as it is based off the project footprint and there will be opportunities to avoid impact to sites through locating transmission line structures and access tracks during detailed design.

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.

Table 10-1 Aboriginal sites within the project footprint

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	HL-01	GPS locations have been redacted due to sensitivity of information.	Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-02		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-03		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-04		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-05		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-07		Modified tree	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-08		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-11		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-12		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-13		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-15		Modified Tree	Moderate	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-21		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-22		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-23		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-24		Artefact scatter	Low	This site is within a potential indicative access track alignment within the project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	HL-25		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-26		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-27		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-28		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-29		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-31		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-33		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-34		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-35		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-37		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-38		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-41		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-43		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-44		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-45		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-46		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-47		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	HL-48		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-49		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-50		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-51		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-55		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-59		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-61		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-64		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-65		Modified tree	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-66		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-67		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-68		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-70		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-71		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-72		Artefact scatter	Low	This site is within the transmission line portion of the 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-76		Cultural tree	Culturally significant	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	HL-80		Cultural tree	Culturally significant	This site is within the transmission line portion of the 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-83		Cultural tree	Culturally significant	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-87		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-89		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-90		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-91		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-92		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-93		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-94		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-95		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-96		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-97		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-99		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-100		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-101		Isolated find	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-102		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	HL-104		Artefact scatter	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-105		Artefact scatter	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-01		PAD	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-02		PAD	N/A	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-05		PAD	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-06		PAD	N/A	This site is within the transmission line portion of the 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
pending	HL-PAD-10		PAD	N/A	This site is within the transmission line portion of the 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 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 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 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 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 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
Pending	YAS04		Artefact scatter	Low	This site is within the transmission line portion of the 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 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
pending	ULAS04		Artefact scatter	Low	This site is within the transmission line portion of the 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
	Derringullen Creek Womens site		Cultural site	Culturally significant	This site is within the transmission line portion of the project footprint.	All or 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 project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-5-0202	Dalton 7		Artefact	Moderate	This site is within the transmission line portion of the project footprint	All or part of this site may be directly or indirectly impacted by the project
51-5-0254	Gullen Solar Farm 13		Artefact	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
51-6-0811	PJ58		Artefact	Low	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
52-1-0152	Bannaby 1		Artefact	Moderate	This site is within the transmission line portion of the project footprint.	All or part of this site may be directly or indirectly impacted by the project
52-1-0272	BA1 (Bannaby Substation)		Artefact	Low	This site is within the current Bannaby 500 kV substation.	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 project footprint adjacent to the current Bannaby 500 kV substation.	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 project footprint adjacent to the current Bannaby 500 kV substation.	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 an indicative access track within the project footprint.	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 an indicative access track within the project footprint.	All or part of this site may be directly or indirectly impacted by the project
56-3-0266	Gilmore-AD-01		Artefact	Low	This site is within the Snowy Mountains Highway compound (C02).	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 an indicative access track within the 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	This site is within an indicative access track within the project footprint.	All or part of this site may be directly or indirectly impacted by the project

AHIMS number	Site name	GPS location * (GDA2020 / MGA Zone 55)	Site type	Significance	Project component	Impact
56-6-0153	BSF-OS-2 J26		Artefact	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0177	Logbridge creek - 1F-1 - J43		Artefact	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0180	Logbridge Ck-1F-3 - J46		Artefact	Low	This site is within the transmission line portion of the 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 project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0262	BSF-05-46/PAD (J195)		Modified tree/PAD	moderate	This site is within the transmission line portion of the 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)		Artefact	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0300	LBC-IF-11/PAD (J191)		PAD	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0301	LBC-IF-11 (J190)		Artefact	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project
56-6-0302	LBC-IF-10 (J189)		Artefact	Low	This site is within the transmission line portion of the project footprint near the future Maragle 500 kV substation.	All or part of this site may be directly or indirectly impacted by the project

Note:

* 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 *Technical Report 1 – 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 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 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 project footprint would result in the loss of approximately 1,124.66 ha 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.

10.1.2 Mudjarn Nature Reserve

Mudjarn Nature Reserve is an Aboriginal place about 300 metres from the project. 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 distance of Mudjarn Nature Reserve from the project footprint means that the indirect visual impact to the significance of this site is assessed to be negligible.

10.2 Areas of Aboriginal Archaeological Sensitivity

The modelled archaeological sensitivity of the project footprint is depicted in Attachment 5.1 and 5.2. Of the total project footprint area, 16 per cent is classified as high, 38 per cent is classified as moderate and the remaining 46 per cent is classified as low or already disturbed. A total of 84.6 per cent of all Aboriginal sites identified during the survey program are located in areas identified as moderate or high archaeological sensitivity, of which 44 per cent of sites are in high and 40 per cent are in moderate areas of archaeological sensitivity. This result further confirms the veracity of the archaeological sensitivity model.

The project footprint includes approximately 1,108 hectares of land identified as high archaeological sensitivity and 2,529 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 only a small proportion of these areas would be impacted. The 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.

10.3 Consideration of the principles of ecologically sustainable development

According to the Operational Policy: Protecting Aboriginal Cultural Heritage, an object of the *National Parks and Wildlife Act 1974* 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.

10.3.1 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.

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 they would be subject to continuing consultation with the appropriate RAPs regarding their long-term storage and keeping.

10.3.2 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 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 state 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:

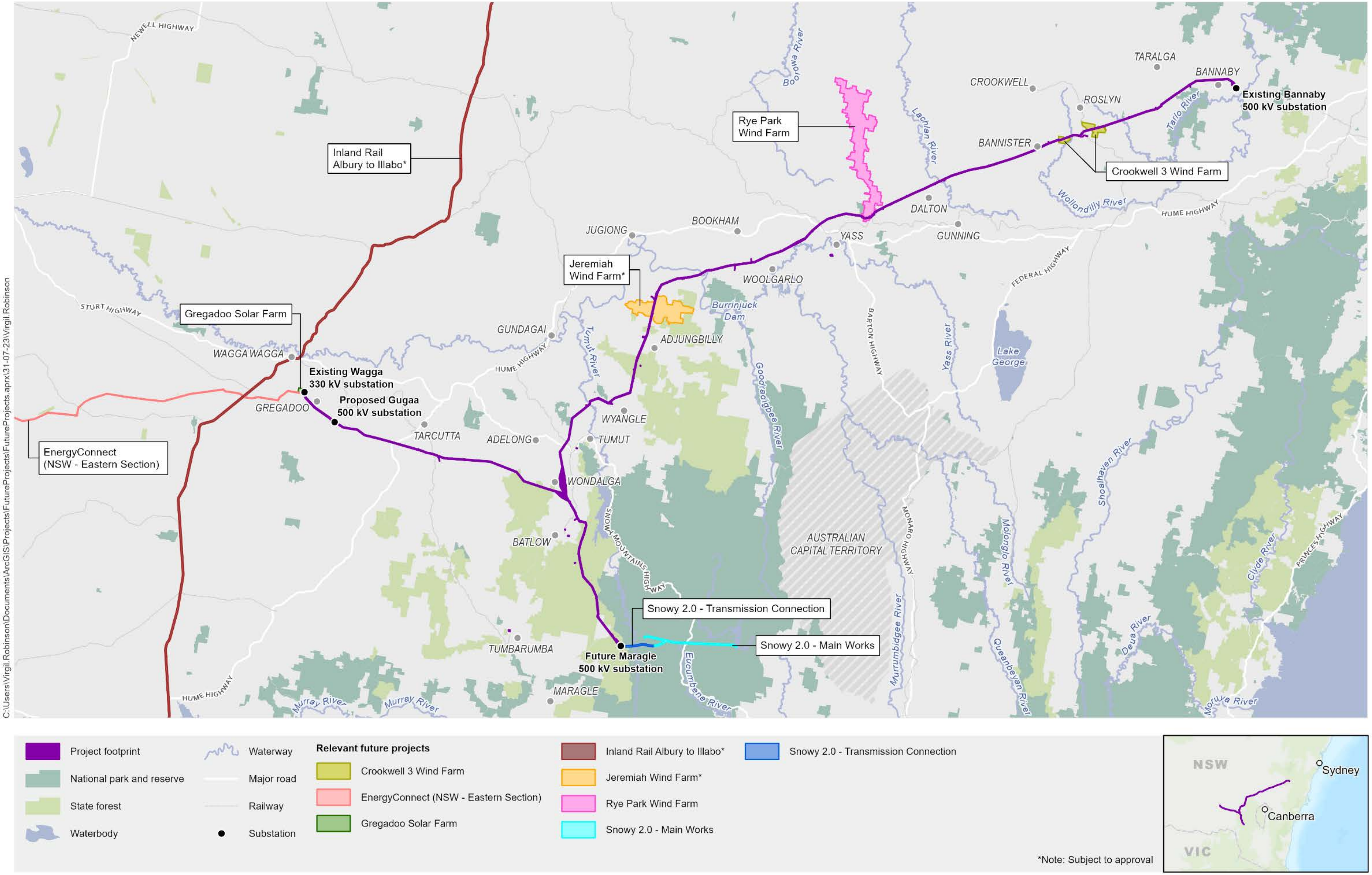
- DPE's Major Projects register
- DPE's Southern Regional Planning Panel project register
- NSW Independent Planning Commission project register
- Transport for NSW Projects Map.

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.

Further detail on each of the above projects is provided in Table 11-1 and Figure 11-1 below.



C:\Users\Virgil.Robinson\Documents\ArcGIS\Projects\FutureProjects\FutureProjects.aprx\31-07-23\Virgil.Robinson

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

1:925,000

0 20 40 km

Projection: GDA 1994 MGA Zone 55

HumeLink **Aboriginal Heritage**

FIGURE 11-1: Relevant future projects

11.1 Summary

The 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 structure location impacts would result in impacts being spread across landforms. There will also be an opportunity in the detailed design process to adjust transmission line structure locations and align access tracks in some locations to avoid or minimise impact to Aboriginal sites. Wherever the direct impacts do occur in the 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 from other projects with 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 infrastructure (optical repeater	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 be. There are no Aboriginal sites that would be impacted by both the EnergyConnect project and the HumeLink project. The HumeLink project 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
	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 project footprint. The HumeLink project 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 include noise and vibration, landscape and visual amenity, traffic and transport, biodiversity, Aboriginal	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 Wind Farm development area	• 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 within the HumeLink project footprint. In addition to the Jeremiah Wind Farm project the HumeLink project would not see

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	cultural heritage, non-Aboriginal heritage, water use and impacts on water quality, hazards and risks and social and economic. • Controlled action under EPBC Act				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 Dec 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 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) Website link	• 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 technical and economic viability of expanding transmission interconnector capacity between Victoria and NSW • Several options have been developed	Scoping/market modelling phase Underwriting agreement with Commonwealth Government April 2022	VNI West may require connection at the existing Wagga 330 kV substation (depending on preferred option) The current scope that interfaces with HumeLink includes a new double circuit transmission line	• 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 projects. However as stated there is the potential to avoid impacts to sites through the siting of project elements away from sites. There

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	with new interconnector corridors (VNI 6–8) connecting to the existing Wagga 330 kV substation		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.		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 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	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 are within the HumeLink project footprint. The HumeLink project would not see a substantial increase in impact to Aboriginal sites.

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
	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.				
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 Access Tunnel and Marica areas of the project (further east than Talbingo Reservoir site). • Controlled action under EPBC Act.	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 addition to the Snowy 2.0 main works 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
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 project footprint, the project area is 9 km north-west of the HumeLink 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.
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 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 project

Project	Details	Status	Distance/ Interface	Timing	Aboriginal cultural heritage impacts
					footprint, the other sites are located immediately adjacent to or within 2 km of the HumeLink 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.

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 Heritage Management Plan

A HMP 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 HMP would address the processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. The HMP 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 HMP would be communicated to all relevant construction personnel prior to construction commencing in that area.

12.2 Avoidance and minimisation of impacts

There are 90 Aboriginal sites and PADs located within the project footprint that may be directly or indirectly impacted by the project. These include eight PADs and three modified trees. The remaining 79 sites are stone artefact occurrences including artefact scatters and isolated finds. There are five cultural trees, six modified trees of non-Aboriginal origin and one cultural site 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 project footprint will be refined (eg the 70 m 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 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. The objective is to further reduce potential impacts through transmission line structure location and design refinement of proposed infrastructure and construction methodology. Avoidance and minimisation of harm to sites and PADs will be prioritised.	Detailed design	All locations

Reference	Impact	Mitigation measures	Timing	Relevant location
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 (2010a) 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 (including areas where only 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 area of PAD 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 • 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.	Detailed design	All locations (outside of the previously assessed area)
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

Reference	Impact	Mitigation measures	Timing	Relevant location
AH6	Impacts to areas of high Aboriginal archaeological sensitivity	Where detailed design confirms there would be direct impacts in area with high archaeological sensitivity that have not been previously subject to test excavations, a desktop assessment will be completed 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 sensitivity not already tested where project activities would have direct impact
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 moderate sensitivity not already tested where project activities would have direct impact
AH8	Impact to Aboriginal sites – Modified trees	Harm to modified trees (including those 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) 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.	Detailed design	Modified trees
AH9	Impact to Aboriginal sites – Isolated Finds, Artefact scatters and PADs	All portions of artefact scatters and isolated finds that will be directly impacted will require surface collection and salvage 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.	Detailed design	Directly impacted sites and PADs

Reference	Impact	Mitigation measures	Timing	Relevant location
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 constructi on	Transmission line.
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.	Constructi on	All locations
AH12	Unexpected finds	If at any time during construction, any items of potential Aboriginal heritage archaeological significance, 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 report.	Constructi on	All locations.
AH13	Retrieved archaeological material	Retrieved archaeological materials will be stored in appropriate facilities confirmed in consultation with the RAPs.	Constructi on	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 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.

13 CONCLUSION

As a result of this assessment, 90 Aboriginal sites and PADs have been identified within the project footprint that may be directly or indirectly impacted by the project. These include eight PADs and three modified trees. The remaining 79 sites are stone artefact occurrences including artefact scatters and isolated finds. There are also five cultural trees, six modified trees of non-Aboriginal origin and one cultural site 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 no longer require assessing for this project.

The assessment completed within this report identifies that the majority (69) of sites (excluding PADs) within the project footprint have low scientific significance, with a lower number (15) having moderate (local) scientific significance. Of the PADs four are assessed as having moderate to high significance and two as moderate.

Of the 90 sites in the project footprint, the majority are within the transmission line portion of the project footprint. Ten are near the future Maragle 500 kV substation, three are near the existing Bannaby 500 kV substation, five are on indicative access tracks and one is within the Snowy Mountains Highway compound (C02). In addition, the identified cultural site is within the transmission line portion of the project footprint.

The project footprint includes approximately 1,108 hectares identified as high archaeological sensitivity and 2,529 hectares identified as moderate sensitivity. However, not all the land within the 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 and would be confirmed during detailed design.

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 project footprint assessed and not all of the 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 HMP would include relevant mitigation measures that would be implemented during construction in addition to providing the processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project.

14 REFERENCES

Anderson 2010 Indigenous and non-indigenous archaeological heritage for proposed Crookwell 3 Wind Farm. Report to Union Fenosa. Pty Ltd.

Australian Museum Business Services (AMBS) 2012 Goulburn Mulwaree LGA Aboriginal Heritage Study. Report to Goulburn Mulwaree Council.

Australia ICOMOS 2013a *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013*. Burwood, Victoria.

Australia ICOMOS, 2013b. Burra Charter Practice Note - Understanding and assessing cultural significance.

Barker Ryan Stewart Pty Ltd and Sue Rosen and Associates, 2018 Goulburn Mulwaree Council Heritage Study Review. Report to Goulburn Mulwaree Council.

Baylis, J. J. 1927 Early History of the Murrumbidgee. *Royal Australian Historical Society Journal*, Vol. 13.

Bell, D. 1979 Aboriginal Carved Trees in NSW – a Survey Report. Part 1. Report to the NSW NPWS.

Bell, D. 1980 Aboriginal Carved Trees in NSW – a Survey Report. Part 2. Report to the NSW NPWS.

Bell, D. 1982 Aboriginal Carved Trees in Southeastern Australia. Report to the NSW NPWS.

Bell, D and White, E. 1996 Preliminary Archaeological Inspection of a Proposed Windfarm Crookwell NSW. Report to Pacific Power International, Sydney.

Bennett, G 1834 *Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China: being the journal of a naturalist in those countries, during 1832, 1833, and 1834*, vols 1-2, London.

Biosis Research 2004 Indigenous and Non-Indigenous Archaeological Assessment of the proposed Crookwell 2 Wind Farm, Crookwell, NSW Report for URS.

Biosis 2005 Archaeological Sub-Surface Testing at the Proposed Crookwell 2 Wind Farm, New South Wales. Report to Gamesa Energy Australia.

Bowen Heritage Management 2017 Aboriginal Cultural Heritage Assessment Report for Crookwell 2 Wind Farm Modification 2. Report to Crookwell Development Pty Ltd

Brayshaw, H. and Dallas, M. 1990 Mount Piper–Marulan 500kv transmission line. Stage 1 archaeological study: Marulan substation to Mares Forest Creek areas. Report to Electricity Commission of NSW

Chapman, V. 1977 The Jindabyne Valley in Southern uplands prehistory: an archaeological investigation. Unpublished MA Thesis. Australian National University: Canberra.

Commonwealth of Australia 2002 A*ustralian Natural Heritage Charter for the Conservation of Places of Natural Heritage Significance*, Canberra ACT. Australian Heritage Commission in association with the Australian Committee for the International Union for the Conservation of Nature (ACIUCN).

Department of Environment and Climate Change, 2009 *Interim Construction Noise Guideline*

Department of Environment, Climate Change and Water (DECCW) 2010a *Code of practice for archaeological investigation of Aboriginal objects in New South Wales.* DECCW, Sydney South.

Department of Environment, Climate Change and Water (DECCW) 2010b *Aboriginal cultural heritage consultation requirements for proponents 2010*. DECCW, Sydney.

Department of Planning and Environment 2022 *Cumulative Impact Assessment Guideline for State Significant Projects*

Dearling, C. and Grinbergs, A. 2002 Preliminary Aboriginal Cultural Heritage Study Selected National Parks and Nature Reserves, South West Slopes Region, NSW. Report to NSW NPWS.

Department of Planning, Industry and Environment (DPIE) 2021 *Soil Group (GSG) Soil Type map of NSW* - Version 4.5. Department of Planning, Industry and Environment, Parramatta.

Department of Primary Industries (DPI) 2001 *Soil health: the foundation of sustainable agriculture. Proceedings of a workshop on the importance of soil health in agriculture,* Wollongbar Agricultural Institute, NSW Agriculture.

Dibden, J., 2013 Rye Park Wind Farm Aboriginal Cultural Heritage Assessment Report. Report for Rye Park Wind Farm Pty Ltd.

Dibden, J. 2015 Gullen Solar Project Aboriginal Cultural Heritage Assessment Report. Report to Gullen Solar Pty Ltd.

Dibden, J. 2018 Gullen Solar Project AHIP C000043 Harm Report. Report to Gullen Solar Pty Ltd.

Eades, D. K. 1976 *The Dharawal and Dhurga languages of the New South Wales south coast*, Australian Institute of Aboriginal Studies, Canberra.

Eddy, M. 1985 *Marulan; A Unique Heritage, 'Marulan 150'*, Canberra Publishing, Canberra.

Electricity Commission of NSW 1991 Mt Piper–Marulan 500kv transmission line report on ground preparation for pylon 349 (Archaeological site Bannaby1). Report to Electricity Commission of NSW.

Environmental Resources Management (ERM) 2014 Crookwell 3 Windfarm: Supplementary Aboriginal and Historical Cultural Heritage Assessment.

Etheridge, R. 1918 *The dendroglyphs or "carved trees" of New South Wales*. Dept. of Mines, Sydney.

Feary, S. and Niemoeller, G. 2017 Snowy Mountains Iconic Walk Project, Kosciuszko National Park: Aboriginal Cultural Heritage Assessment. Report for NSW National Parks and Wildlife Service.

Feary, S. and Niemoeller, G. 2019 Snowy Mountains Iconic Walks Project, Kosciuszko National Park: Aboriginal Cultural Heritage Assessment – Addendum June 2019. Report for NSW National Parks and Wildlife Service.

Flood, J. 1980 *The Moth Hunters*. Australian Institute of Aboriginal Studies, Canberra.

Fuller, N. 1989 Goulburn City – An archaeological investigation of Aboriginal site location, ANUTECH Pty Ltd for Goulburn City Council.

Garland, W. J. 1984 The history of Wagga Wagga, Centre for Library Studies [for] Riverina College Archives and Records Service, Riverina College of Advanced Education, Wagga Wagga, New South Wales. Godden Mackay Logan (GML) 2022 Inland Rail – Albury to Illabo. Technical paper 2 – Aboriginal cultural heritage assessment report. Report for ARTC

Godwin, L., 2011 The application of assessment of cumulative impacts in cultural heritage management: A critique, *Australian Archaeology,* 73: 88–91.

Green, D. 2002 Wiradjuri Heritage Study for the Wagga Wagga Local Government Area of New South Wales. Report to Wiradjuri and associated Indigenous and non-Indigenous Community of Wagga Wagga, Wagga Wagga City Council and N.S.W Heritage Office.

Green, K. 2010 The aestivation sites of bogong moths, Agrotis Infusa (boisduval) (Lepidoptera: Noctuidae), in the snowy mountains and the projected effects of climate change, *Australian Entomologist*, 37(3): 93-104.

Green, K., Broome, L., Heinze, D. 2001 Long distance transport of arsenic by migrating Bogong Moth from agricultural lowlands to mountain ecosystem, *Victorian Naturalist*, 118; 112-116.

Green, K., Caley, P., Baker, M., Warrant, E. 2021 Australian Bogong Moths Agrotis infusa (Lepidoptera: Noctuidae), 1951–2020: decline and crash, *Austral Entomology*, 60(1): 66-81.

Haglund, L. 1991 Mt Piper Marulan 500 kV transmission line: Third progress report on excavations archaeological site Bannaby 1: Preliminary site analysis. Report to Electricity Commission of NSW.

Hancock, W. K. 1972 *Discovering Monaro: a study of man's impact on his environment,* Cambridge University Press, London.

Hardy, V. and Thomson, M. 2004 Indigenous and Non-Indigenous Archaeological Assessment of the Proposed Crookwell II Windfarm, Crookwell, NSW. Report to URS Australia Pty Ltd.

Helms, R. 1895 Anthropological notes. *Proceedings of the Linnean Society, NSW* Series 2, 20: 387-407.

Howitt, A. W. 1884 Remarks on the Class Systems collected by Mr. E. Palmer. In Palmer, E. Notes on some Australian Tribes. *Journal of the Anthropological Institute*, G.B. London 13(3): 276-347.

Isbell, R. 2020 *The Australian Soil Classification* – Third Edition. National Committee on Soil and Terrain.

Jackson-Nakano, A. 2001 The Kamberri: A History of Aboriginal Families in the ACT and Surrounds. *Aboriginal History Monograph 8, Weereewaa History Series 1,* Australian National University Press, Canberra.

Jacobs 2020 Snowy Hydro 2.0 Transmission Connection Project: Aboriginal Cultural Heritage Assessment. Report to Transgrid.

Kabaila, P. 1998 *Wiradjuri Places: The Murrumbidgee River Basin with a section on Ngunawal country*. Black Mountain Projects: ACT.

Kayandel Archaeological Services 2010 Aboriginal Archaeological and Cultural Heritage Significance Assessment of 'Tulla Park' Good Hope Road Yass NSW. Report for Lennon Silvestro Planning.

Keaney, B. 2016 Bogong Moth aestivation sites as an archive for understanding the floral, faunal and Indigenous history of the Northern Australian Alps. Unpublished PhD thesis, ANU.

Kelleher and Nightingale Consulting Pty Ltd (KNC) 2008 Wagga Wagga Local Environmental Study: Aboriginal Cultural Heritage Assessment. Report for Willana Associates.

Kelleher and Nightingale Consulting Pty Ltd (KNC) 2012 Gocup Road (MR 297) Upgrade. Aboriginal Archaeological Survey Report. Stage 2 PACHCI Prepared for Roads and Maritime Services.

Kelleher Nightingale Consulting Pty Ltd (KNC) 2015 Gocup Road (MR297) Upgrade. Report to Roads and Maritime Services.

Kelton, J. 2004 BSF-05-46 (J195), Site Recording Form, National Parks and Wildlife Service, 9 October 2004.

Knight, T. 2001 Stepping Stones to the Sky Archaeological Perspectives on the Cultural Significance of the Weddin Mountains in Recent Prehistory. Unpublished Master of Arts by Research Thesis. School of Archaeology and Anthropology Australian National University, Canberra.

Koettig, M. 1986a Survey for Aboriginal sites along the proposed water pipeline between Bowning and Yass. Report to Public Works Department, NSW.

Koettig, M. 1986b Test excavations at Derringullen Creek, near Yass. Report to Public Works Department, NSW.

Koettig M. and A. Lance 1986 An Aboriginal Resources Planning Study for the City of Goulburn, New South Wales. Report by ANU Archaeological Consultancies to the Goulburn City Council.

Long, A., 2005. *Aboriginal scarred trees in New South Wales: A field manual*. Department of Environment and Conservation, Hurstville.

MacAlister, C. 1907 *Old Pioneering Days in the Sunny South.* Chas. MacAlister Book Publication Committee, Goulburn.

Mackaness, G. 1941 *George Augustus Robinson's journey into south eastern Australia: with George Henry Haydon's narrative of part of the same journey*, Sydney.

MacDonald, J. and Garling, S. 1997 The Proposed Crookwell Wind Farm Test Excavation Report. Report to Union Fenosa. Pty Ltd.

MacDonald, J. and Garling, S. 1998 Salvage Excavation at the Proposed Crookwell Wind Farm, Crookwell, NSW. Report to Union Fenosa Pty Ltd.

National Committee on Soil and Terrain 2009 Australian Soil And Land Survey Field Handbook. CSIRO Publishing

National Parks and Wildlife Service New South Wales (NPWS NSW) 2003 The bioregions of New South Wales: their biodiversity, conservation and history. NSW National Parks and Wildlife Service, Hurstville.

Navin Officer Archaeological Resource Management 1995 Archaeological survey proposed extension to Bogo Quarry, south of Yass, NSW. Report for David Hogg Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 1998 Cultural Heritage Assessment Proposed Visy Pulp and Paper Mill Gadara Plains, Tumut, NSW. Report to Nolan-ITU Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 2000a Proposed widening of concrete bridge over Kangiara Creek, Lachlan Valley Way (Main Road 56), Yass Shire, NSW. Report for URSCorp.

Navin Officer Heritage Consultants (NOHC) 2000b Nesbitt Holden Site, Corner Comur Street and Adele St Yass NSW (DA86/00i): Archaeological Assessment of the Nesbitt Holden Site and the Significance of the Old Yass Swimming Baths Site. Report for Barrons Road Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 2006 Scarred Tree Site (A5) Visy Pulp and Paper Mill Tumut, NSW. Report to Visy Pulp and Paper Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 2007 Proposed Bannaby Electricity Substation, Access Road Upgrade and Transmission Line Rearrangement. Report to Parsons Brinckerhoff Australia Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 2008 Construction of Electricity Substation, Bannaby, NSW: Archaeological Subsurface Testing and Collection program. Report to Parsons Brinckerhoff Australia Pty Ltd.

Navin Officer Heritage Consultants (NOHC) 2009 Dalton Peaking Power Plant Cultural Heritage Assessment. Report to URS for AGL.

Navin Officer Heritage Consultants (NOHC) 2023 HumeLink EIS Technical Report 3: Historic Heritage Impact Assessment. Report to Transgrid.

NGH Environmental 2018 Aboriginal Cultural Heritage Assessment Gregadoo Solar Farm. Report for Gregadoo Solar Farm Pty Ltd.

NSW Archaeology 2007 Proposed Gullen Range Wind Farm Archaeological Assessment. Report for NGH Environmental on behalf of Epuron Pty Ltd.

NSW Archaeology Pty Ltd, Dibden, J. 2012 Rye Park Wind Farm: Aboriginal Cultural Heritage Assessment Report. Report to Epuron.

NSW Archaeology Pty Ltd, Dibden, J. 2013 Rye Park Wind Farm: Aboriginal Cultural Heritage Assessment Report (revised version). Report to Epuron.

NSW Archaeology 2015 Addendum Rye Park Wind Farm: Aboriginal Cultural Heritage Assessment Report. Report for Rye Park Renewables Pty Ltd.

NSW Archaeology Pty Ltd 2018 Snowy 2.0 Exploratory Works: Aboriginal Cultural Heritage Assessment Report. Report to Snowy Hydro Limited.

Office of Environment and Heritage (OEH) 2011 Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW. OEH, Sydney South.

Office of Environment and Heritage (OEH) 2012 *Guide to completing the AHIMS Site Recording Form*. OEH, Sydney.

Office of Environment and Heritage (OEH) 2017 *Declared Aboriginal Places: Guidelines for Developing Management Plans*. OEH, Parramatta.

OzArk Environmental and Heritage Management 2004 Indigenous and Non - Indigenous Heritage Assessment: Taralga Windfarm, Taralga NSW. Report to Geolyse Pty Ltd.

OzArk Environmental and Heritage Management 2007 Ecology & Heritage Assessment: Wagga Wagga–Yass Line 990 132kV Transmission Line. Report to International Environmental Consultants Pty Ltd.

OzArk Environment & Heritage 2019 Aboriginal Impact Assessment, Bangus Quarry Landfill. Report for Salvestro Planning.

Packard, P. and Hughes, P. J. 1983 An archaeological survey of the proposed soil extraction development on Gundaroo Creek, NSW. A report to Amey Bros., Queanbeyan, NSW.

Past Traces Pty Ltd 2017 Aboriginal Heritage Archaeological Report: Crookwell 2 Wind Farm Modification 1 Woodhouselee Road Access Alignment LOT 1 DP 965855. Report to Crookwell Development Pty Ltd.

Paton, R. and P. J. Hughes 1985 An Archaeological Investigation of the Ulandra Nature Reserve. Report to the NSW NPWS, Tumut.

Paton, R. 1990 Excavations at Site G17, Goulburn NSW. Report to the RTA.

Smith, J. 1992 *Aborigines of the Goulburn District.* Goulburn Historical Society.

Steele, D. 2003 Aboriginal Archaeological Survey and Assessment Report - Proposed Goulburn Sewerage Augmentation Proposal. Report for the Dept of Public Works and Services.

Stern, H., de Hoedt, G. and Ernst, J. 2000 *Objective Classification of Australian Climates, Australian Bureau of Meteorology,* Melbourne.

Swan, K. 1970. *A History of Wagga Wagga*. Sydney, Australia: Hogbin, Poole Pty. Ltd

Thackway, R. and Cresswell, 1995 An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves – Version 4.0. Australian Nature Conservation Agency.

Tindale, N. 1940 Australian Aboriginal Tribes: A Field Survey. *Transactions Royal Society of South Australia*. No 64.

Tindale, N. B. 1974 *Aboriginal Tribes of Australia*. University of California Press.

Warrant, E. & Dacke, M. 2016 Visual navigation in nocturnal insects. *Physiology* 31: 182-192.

Warrant, E., Frost, B., Green, K., Mouritsen, H., Dreyer, D., Adden, A., Brauburger, K., Heinze, S. 2016 The Australian Bogong moth Agrotis infusa: A long-distance nocturnal navigator. *Frontiers in Behavioural Neuroscience*, 10(77): 1-17.

Waters Consultancy Pty Ltd 2015 Gocup Road Upgrade, Aboriginal Cultural Assessment. Report to RMS.

White, I. and Cane, S. 1986 An Investigation of Aboriginal Settlements and Burial Patterns in the Vicinity of Yass. Report to the NSW NPWS, Queanbeyan.

Witter, D. 1980 Draft Research Design and Interim Report on the Development of a Predictive Approach to the Distribution of Archaeological Sites in Australia. NPWS.

Witter, D. 1992 Regions and Resources. Unpublished Ph.D. thesis. Dept. Prehistory and Anthropology, ANU. Canberra.

Wood, V. 1992 Further archaeological studies of the proposed NAVCOMMSTA facilities in the Wagga Wagga region. Report to Dept of Defence.

Wyatt, R.T.1941 *The History of Goulburn, NSW.* Landsdowne Press, Epping.

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ATTACHMENT 1

ABORIGINAL COMMUNITY CONSULTATION

See attached documents:

(a) Consultation log
(b) Consultation records

Consultation records have been removed and consultation log has been redacted due to the restricted nature of the information.

A - Consultation log

Communication ID	Date	Method of communication	Organisation	Individual	Matters discussed
1	19/04/2021	newspaper ads	Tumut-Adelong Times Goulburn Post Yass Tribune Koori Mail Cootamundra Herald Crookwell Gazette Southern Weekly: no longer exists Wagga Daily Advertiser		responses due by 4 June
2	20/04/2021	email	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		14 day response time
3	20/04/2021	email	SELLS		auto reply

Communication ID	Date	Method of communication	Organisation	Individual	Matters discussed
4	20/04/2021	email	Heritage NSW		auto reply
5	20/04/2021	email	Onerwal LALC		
6	20/04/2021	email	Snowy Valley Council		auto reply
7	20/04/2021	email	Wagga Wagga City Council		auto reply
8	20/04/2021	email	Cootamundra-Gundagai Regional Council		auto reply
9	20/04/2021	email	from Shirley Marlowe	Shirley Marlowe	registration of interest
10	20/04/2021	email	from Shirley Marlowe	Matthew Marlowe	registration of interest
11	20/04/2021	email	from Shirley Marlowe	Lawrence Marlowe	registration of interest
12	20/04/2021	email	from Shirley Marlowe	Priscilla Marlowe	registration of interest
13	20/04/2021	email	from Shirley Marlowe	Braiden Ede	registration of interest
14	20/04/2021	email	Heritage NSW	Dan Clegg	list of possible RAPs
15	21/04/2021	email	Bangerang Aboriginal Corporation	Vicki Atkinson	registration of interest
16	21/04/2021	email	Yass Valley Council		auto reply
17	21/04/2021	email and post	all in notification letters tab		14 day response time
18	21/04/2021	email	Didge Ngunnawal	Paul Boyd and Lilly Carroll	registration of interest
19	21/04/2021	email	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	registration of interest
20	21/04/2021	email	Gunjeewong	Cherie (Carroll) Turrose	registration of interest
21	21/04/2021	email	Bidya Marra Consultancy	James Ingram	registration of interest
22	21/04/2021	email	Muragadi Heritage Indigenous Corporation	Jesse Johnson	registration of interest
23	21/04/2021	email		Clive Freeman	registration of interest
24	22/04/2021	email	Ngunawal heritage Aboriginal Corporation	Dean Delponte	registration of interest
25	22/04/2021	email	PD Ngunawal Consultancy	Tammy Muscat	registration of interest
26	22/04/2021	email	Yass Valley Council	Liz Makin	

Communication ID	Date	Method of communication	Organisation	Individual	Matters discussed
27	23/04/2021	email	Yalmambirra		registration of interest
28	23/04/2021	phone		Rob Clegg	registration of interest
29	25/04/2021	email	Buru Ngunnawal	Wally Bell	registration of interest
30	25/04/2021	email		mark Saddler	registration of interest
31	26/04/2021	email	Konanggo Aboriginal Cultural Heritage Services	Robert Young	registration of interest
32	26/04/2021	email	Yurwang Gundana CHS	Dean Bell	registration of interest
33	27/04/2021	phone	Ngurambang	Robert Monaghan	registration of interest
34	27/04/2021	email	Thunderstone Cultural & Land Management Services Aboriginal Corporation	Tyrone Bell	registration of interest
35	27/04/2021	email		Norma Freeman	registration of interest
36	27/04/2021	email	Riverina LLS	Julie Heath	
37	28/04/2021	email	Snowy Valley Council	Andrew Vaz	suggested contacting LALC
38	29/04/2021	email		Janice Williams	
39	3/05/2021	phone call	Konanggo Aboriginal Cultural Heritage Services	Robert Young	
40	5/05/2021	email		Arnold Williams	son Rob registering an interest for Arnold
41	7/05/2021	email		Rodney Penrith	registration of interest
42	10/05/2021	email	Gulgunyah NHAC	Glen Freeman	registration of interest
43	13/05/2021	phone call		Rolly Williams	registration of interest
					TransGrid have undertaken various consultation efforts including the participation of RAPs in the fieldwork program

Communication ID	Date	Method of communication	Organisation	Individual	Matters discussed
44	9/03/2023	email	All RAPs		Draft report with an invitation for comment
45	16/3/23	email		Rolly 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.

Encl: Attachment A: Registered Aboriginal Interests – CootamundraGundagai Regional Local Government Area
Attachment B: Registered Aboriginal Interests – Hilltops Local Government Area
Attachment C: Registered Aboriginal Interests – Snowy Valleys Local Government Area
Attachment D: Registered Aboriginal Interests – Upper Lachlan Local Government Area
Attachment E: Registered Aboriginal Interests – Wagga Wagga Local Government Area
Attachment F: Registered Aboriginal Interests – Yass Valley Local Government Area

Attachment A: Registered Aboriginal Interests

Cootamundra-Gundagai Regional Local Government Area

Organisation/ Individual Name	**Address**	**Contact Details**
Gunjeewong Cultural Heritage Aboriginal Corporation	[redacted]	[redacted]
Alice Williams	[redacted]	[redacted]
Koomurri Ngunawal Aboriginal Corporation (KNAC)	[redacted]	[redacted]
Corroboree Aboriginal Corporation	[redacted]	[redacted]
Murri Bidgee Mullangari Aboriginal Corporation.	[redacted]	[redacted]
Thunderstone Cultural & Land Management Services Aboriginal Corporation	[redacted]	[redacted]
Barking Owl Aboriginal Corporation	[redacted]	[redacted]
Glen Freeman - Gulgunya Ngunawal Heritage Aboriginal Consultancy (GNHAC)	[redacted]	[redacted]
Oak Hill Enterprises	[redacted]	[redacted]
Dean Delponte - Ngunawal Heritage Aboriginal Corporation	[redacted]	[redacted]

Attachment B: Registered Aboriginal Interests

<u>Hilltops Local Government Area</u>

Organisation/ Individual Name	Contact Details	Address
Young Local Aboriginal Land Council	[redacted]	[redacted]
Onerwal Local Aboriginal Land Council	[redacted]	[redacted]
Alice Williams	[redacted]	[redacted]
Gunjeewong Cultural Heritage Aboriginal Corporation Contact: Cherie Carroll Turrise	[redacted]	
Corroboree Aboriginal Corporation Contact: Director Marilyn Carroll-Johnson	[redacted]	[redacted]
Murri Bidgee Mullangari Aboriginal Corporation Contact: Darleen Johnson	[redacted]	[redacted]
Didge Ngunawal clan Contact: Lillie Carroll	[redacted]	[redacted]
Ginninderra Aboriginal Corporation Contact: Krystle Carroll	[redacted]	[redacted]
Merrigarn Indigenous Corporation Contact: Shaun Carroll	[redacted]	[redacted]
Thunderstone Aboriginal Cultural and Land Management Services Aboriginal Corporation Contact: Tyronne Bell	[redacted]	[redacted]
Karlari Ngunnawal Pajong Wallabalooa Descendants Contact: Rebecca Ingram	[redacted]	[redacted]
Ngunnawal Pajong Wallabalooa Descendants Contact: Lavinus Ingram	[redacted]	
Ngunnawal Pajong Wallabalooa Descendants Contact: Matthew Glass	[redacted]	[redacted]

Janine Thompson		[redacted]
Ngurambang Contact: Robert Monaghan	[redacted]	[redacted]
Clorine Lyons	[redacted]	[redacted]
Oak Hill Enterprises Contact: Sonia Shea		[redacted]
Clive Freeman	[redacted]	[redacted]
Yurwang Gundana Consultancy Cultural Heritage Services. Contact: Dean Bell	[redacted]	[redacted]

Attachment C: Registered Aboriginal Interests

<u>Snowy Valleys Regional Local Government Area</u>

Organisation/ Individual Name	Address	Contact Details
Snowy Mountains Indigenous Elders Group	[redacted]	[redacted]
Alice Williams	[redacted]	[redacted]
Matilda House (on behalf of Williams, Freeman and Simpson-Wedge families)	[redacted]	[redacted]
Ngunawal Heritage Aboriginal Corporation	[redacted]	[redacted]
Colleen Dixon	[redacted]	[redacted]
Murra Bidgee Mullangari Aboriginal Corporation	[redacted]	[redacted]
Gunjeewong Cultural Heritage Aboriginal Corporation	[redacted]	[redacted]
Ngunnawal Elders Corporation	[redacted]	[redacted]
Koomurri Ngunawal Aboriginal Corporation (KNAC)	[redacted]	[redacted]
Thunderstone Cultural & Land Management Services Aboriginal Corporation	[redacted]	[redacted]
Glen Freeman – Gulgunya Ngunawal Heritage Aboriginal Consultancy (GNHAC)	[redacted]	[redacted]

Organisation/ Individual Name	Address	Contact Details
Oak Hill Enterprises	[redacted]	[redacted]
Adrian Brown	[redacted]	[redacted]

Attachment D: Registered Aboriginal Interests

<u>Upper Lachlan Shire Local Government Area</u>

Organisation/ Individual Name	Address	Contact Details
Cowra Local Aboriginal Land Council	[redacted]	[redacted]
Gundungurra Aboriginal Heritage Association Inc. :	[redacted]	[redacted]
Pejar Local Aboriginal Land Council	[redacted]	[redacted]
Buru Ngunawal Aboriginal Corporation	[redacted]	[redacted]
Alice Williams	[redacted]	[redacted]
Gundungurra Tribal Council Aboriginal Corporation.	[redacted]	[redacted]
Gundungurra Aboriginal Heritage Association Inc.	[redacted]	[redacted]
Thunderstone Aboriginal Cultural and Land Management Services Aboriginal Corporation	[redacted]	[redacted]
Onerwal Local Aboriginal Land Council	[redacted]	[redacted]
Karlari Ngunnawal Pajong Wallabalooa Descendants	[redacted]	[redacted]
Ngunnawal Pajong Wallabalooa Descendants	[redacted]	[redacted]
Janine Thompson		[redacted]
Ngurambang :	[redacted]	[redacted]
Clorine Lyons	[redacted]	[redacted]

	[redacted]	
Oak Hill Enterprises		[redacted]
Clive Freeman	[redacted]	[redacted]
Yurwang Gundana Consultancy Cultural Heritage Services.	[redacted]	[redacted]
Will Carter	[redacted]	[redacted]

Attachment E: Registered Aboriginal Interests

Wagga Wagga Local Government Area

Organisation/ Individual Name	Address	Contact Details
Waagan Waagan Project Group	[redacted]	[redacted]
Yalmambirra	[redacted]	[redacted]
Bundyi Aboriginal Cultural Knowledge	[redacted]	[redacted]
Robert Carroll - Miyagan Culture & Heritage	[redacted]	[redacted]

Attachment F: Registered Aboriginal Interests

<u>Yass Valley Local Government Area</u>

Organisation/ Individual	Address	Contact Details
Onerwal Local Aboriginal Land Council	[redacted]	[redacted]
Yass Valley Indigenous Consultative Committee	[redacted]	[redacted]
Ngunawal Heritage Aboriginal Corporation Contact: Mrs Dorothy Carroll	[redacted]	[redacted]
Ngunnawal Elders Corporation Contact: Mr Arnold Williams CEO		[redacted]
Yurwang Gundana Consultancy Cultural Heritage Services. Contact: Dean Bell	[redacted]	[redacted]
Buru Ngunawal Aboriginal Corporation Contact: Wally Bell	[redacted]	[redacted]
Tina Brown	[redacted]	[redacted]
Gunjeewong Cultural Heritage Aboriginal Corporation Contact: Cherie Carroll Turrise	[redacted]	[redacted]
Alice Williams	[redacted]	[redacted]
Corroboree Aboriginal Corporation Contact: Director - Marilyn Carroll-Johnson	[redacted]	[redacted]
Murri Bidgee Mullangari Aboriginal Corporation Contact: Darleen Johnson	[redacted]	[redacted]
Merrigarn Indigenous Corporation Contact: Shaun Carroll	[redacted]	[redacted]
Ginninderra Aboriginal Corporation	[redacted]	[redacted]

Contact: Krystle Carroll		
Muragadi Heritage Indigenous Corporation Contact: Jesse Johnson	[redacted]	[redacted]
Thunderstone Aboriginal Cultural and Land Management Services Aboriginal Corporation Contact: Tyronne Bell	[redacted]	[redacted]
Karlari Ngunnawal Pajong Wallabalooa Descendants Contact: Rebecca Ingram	[redacted]	[redacted]
Ngunnawal Pajong Wallabalooa Descendants Contact: Lavinus Ingram	[redacted]	
Goodradigbee Cultural and Heritage Aboriginal Corporation Contact: Caine Carroll	[redacted]	[redacted]
Ngunnawal Pajong Wallabalooa Descendants Contact: Matthew Glass	[redacted]	[redacted]
Janine Thompson		[redacted]
Ngurambang Contact: Robert Monaghan	[redacted]	[redacted]
Clorine Lyons	[redacted]	[redacted]
Ngunawal Consultancy Contact: Peiro Delponte		[redacted]
Mura Indigenous Corporation Contact: Phillip Carroll	[redacted]	[redacted]
Ngurambang Contact: Valentine Wright	[redacted]	[redacted]
Will Carter	[redacted]	[redacted]
Oak Hill Enterprises Contact: Sonia Shea		[redacted]
Clive Freeman	[redacted]	[redacted]
Dean Delponte - Ngunawal Heritage Aboriginal Corporation	[redacted]	[redacted]
Adrian Brown	[redacted]	[redacted]

	[redacted]	[redacted]

ATTACHMENT 2

EXTENSIVE AHIMS SEARCH AREA RESULTS

This attachment has been removed due to the restricted nature of the information shown.

ATTACHMENT 3

NEWLY RECORDED SITE DESCRIPTIONS

The following incudes all artefact scatters. isolated finds, and modified trees recorded in the survey area.

HL-01.(Artefact Scatter)

GDA2020 MGA Zone 55

The site consists of a low density artefact scatter containing at least 10 artefacts across a 40 x 30 metre area. It is associated with HL-PAD-01. The site is located 20 east of Ivydale Rd and 30 metres west of an unnamed ephemeral creek. The site is on a stream bank within an open plain landscape context

Artefacts:

- milky white quartz split longitudinal flake, step termination: 10 x 11 x 2 mm
- milky white quartz flake, evidence of usewear on the lateral margin and distal end: 25 x 24 x 5 mm
- milky white quartz distal flake, step termination: 11 x 15 x 2 mm
- milky white quartz flake, potential usewear on lateral margin: 23 x 21 x 3 mm
- milky white quartz longitudinal split flake: 29 x 18 x 3 mm
- milky white quartz flake piece, evidence of usewear on lateral margin: 38 x 41 x 14 mm
- milky white quartz flake: 21 x 20 x 4 mm
- milky white quartz, negative scars on each surface: 30 x 25 x 5 mm.

Soils were brown silt clay impacted by sheet erosion and stock damage. Ground exposure averaged 40 per cent, with 60 per cent visibility within exposures. Vegetation is an open forest context with the land use being pastoral grazing grounds.

There is moderate potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing South

HL-02.(Artefact Scatter)

GDA2020 MGA Zone 55

The site consists of a low density artefact scatter of three artefacts across a 15 x 20 metre area. The site is located 500 metres south of Ivydale Rd and 100 metres east of Coxs Creek. The site is on a stream bank amongst a steep hills context.

Artefacts:

- quartz flake piece, flaked platform, feather termination, 5 per cent cortex: 12 x 25 mm
- quartz flake piece

- quartz debitage.

Soils were brown silty clay impacted by water wash, sheet erosion and stock damage. Ground exposure averaged 100 per cent, with 90 per cent visibility within exposures. Vegetation is an open forest context with the land use being pastoral grazing grounds.

There is moderate potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing Southeast

HL-03.(Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated milky quartz flake measuring 19 x 23 x 8 mm. The site is located 685 metres west of Big Springs Road and 635 metres from Gregadoo Creek. This site is located on a moderately inclined mid-slope within a rolling hills landscape.

Soils were strong brown sandy silt impacted by sheet erosion and wind. Ground exposure averaged 50 per cent, with 70 per cent visibility within exposures. The vegetation surrounding the site is open woodland adjacent to a riparian zone, surrounded by pastoral paddocks.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing North East

HL-04. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated milky quartz flaked piece measuring 12 x 15 x 2 mm. The site is located 4.6 kilometres from Keajura Creek. This site is located on a gently inclined mid-slope within a rolling hills landscape context.

Soils were brown silty loam impacted by sheet erosion and wind. Ground exposure averaged 20 per cent, with 80 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral grazing.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing North

HL-05.(Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated milky quartz flaked piece measuring 25 x 18 x 3 mm. The site is located 4.4 kilometres from Keajura Creek. This site is located on a moderately inclined mid-slope of a rolling hills landscape.

Soils were alluvial silt impacted by sheet erosion and wind. Ground exposure averaged 20 per cent, with 20 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing North

HL-07. (Modified Tree)

GDA2020 MGA Zone

This site consists of a single modified tree of probable Aboriginal origin. The tree is alive and in good condition and is located. The site sits in a grassland on the valley floor, adjacent to alluvial flats. These trees are located 1,100 metres west of Westbrook Rd and 600 metres east of Tarcutta Creek.

Species: River Red Gum

Estimated Height: 20 metres

Girth cm: 800 centimetres

Condition: Good

Aspect: Southeast

Length excluding regrowth: 81 centimetres

Length including regrowth: 95 centimetres

Width excluding regrowth: 16 centimetres

Width including regrowth: 29 centimetres

Height of base of scar: 60 centimetres

Height of base of outer scar (outside regrowth): 56 centimetres

Features: Large/small borer holes/tracks

Checklist:

Tree is endemic to area? Yes

Scar is at least 100 years old? Yes

Regrowth deep/old enough? Yes

Scar does not extend to ground? Yes

Scar edges are even and regular? Yes

Scar edge uniform and roughly symmetrical? Yes

Other natural and human origins less likely than Aboriginal Origin? Yes

Scar condition: Excellent

Conclusion: Probably of Aboriginal origin.

Modified Tree

Scar

HL-08. (Isolated find)

GDA2020 MGA Zone – 55

This site consists of an isolated brown volcanic hammerstone/anvil measuring 100 x 100 x 60 mm with 90 per cent cortex visible. Located 140 metres west of Westbrook Rd and 1.2 kilometres north-east from Tarcutta Creek, the site sits on a gently inclined mid-slope within a rolling hills landscape context. The surrounding landscape has been used for farming, low intensity grazing and presently consists mainly of grasslands.

Soils presented an orangish brown loamy clay with 80 per cent exposure with 100 per cent visibility. The artefact was identified adjacent to a farm track that was impacted by stock, vehicles, and general weathering.

On request of the RAPs, the artefact was relocated to the tree south of the track.

There is low potential for other archaeological features/objects to be present in subsurface context.

Hammerstone **View of site facing**

Relocation site

HL-11. (Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated grey mudstone flake measuring 20 x 16 x 4 millimetres. The site is located 110 metres west of Snubba Road and one kilometre from Gilmore Creek. This site is located on a mid-slope within a rolling hills landscape context.

Soils were orange brown silty clay impacted by forestry clearing, erosion and wind. Ground exposure averaged 20 per cent, with 40 per cent visibility within exposures. The vegetation surrounding the site is pine plantation

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact | **View of site facing North**

HL-12. (Artefact Scatter)

GDA2020 MGA Zone 55

This site consists of a small scatter of two grey indurated mudstone tuff (IMT) flakes. The site is located 250 metres north of Snubba Road and 850 metres from Gilmore Creek. This site is located on a mid-slope of a moderately inclined rolling hills landscape context.

Soils were orange brown silty clay impacted by vehicle damage, erosion and wind. Ground exposure averaged 50 per cent, with 70 per cent visibility within exposures. The vegetation surrounding the site is a dense forest.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact | **View of site facing North**

HL-13. (Artefact scatter)

GDA2020 MGA Zone 55

The site consists of two artefacts. The site is located 1.19 kilometres east of Gilmore Creek and 55 metres west of Snubba Road. Situated on a high inclined slope within a rolling hills landscape context.

Soils were orangey brown clay impacted by forestry activities, erosion, and wind. Overall exposure was 50 per cent with 30 per cent visibility. The surrounding area has been cleared and replanted with pine trees for forestry use.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-15. (Modified tree)

GDA2020 MGA Zone 55

This site consists of a single modified tree of probable Aboriginal origin within the Bago State Forest. It is located 27 metres east of the E Bago Powerline Road. The surrounding mountainous landscape still contains native closed forest vegetation and is intersected by creek lines including Logbridge Creek 580 metres south of the site. An unnamed drainage line into Logbridge Creek is also located 300 metres to the east of the site.

The site is in close proximity to two previously recorded AHIMS sites. An area of PAD, BSF-05-46/PAD (J195) (AHIMS #56-6-0262), and an artefact, BSF-05-46 (J193) (AHIMS 56-6-0263), are both located 22 metres north-east of the site. The surrounding region consists of a large number of previously recorded artefacts, PADs, modified trees and a hearth.

Species: Eucalypt

Estimated Height: 230 centimetres

Girth cm: 177 centimetres

Condition: Dead, missing crown, major crown limb missing, insect attack, hollow, burnt

Aspect: South-east

Length excluding regrowth: 49

Length including regrowth: 51

Width excluding regrowth: 24

Width including regrowth: 33

Height of base of scar: 73

Height of base of outer scar (outside regrowth): 68

Features: Scar surface burnt, core wood missing

Checklist:

Tree is endemic to area? Y

scar is at least 100 years old? Yes

Regrowth deep/old enough? Yes

Scar does not extend to the ground? Yes

Scar edges are even and regular? Yes

Scar edge uniform and roughly symmetrical? Yes

Other natural and human origins less likely than Aboriginal Origin? Yes

Scar condition: Very poor

Conclusion: Likely of Aboriginal origin

Scar

Modified tree

HL-21. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated brown volcanic, broken hammerstone measuring 90 x 80 x 38 mm. The artefact was identified in the wall cut adjacent to Sawmill Creek Road, between two tributaries of Sawmill Creek in the east (25 metres) and west (160 metres). Sawmill Creek lies 180 metres north-west of the site. The site lies in the walls of a man-made cliffed terrace on the upper slope within a steep hill landscape context.

Soils presented a yellow brown silty sand with 90 per cent exposure and 80 per cent visibility. The feature has been impacted by the construction of the road where it remained exposed in the side wall. Vegetation has been cleared for industrial purposes where pine trees have been planted in associated with the forestry works.

There is low potential for other archaeological features/objects to be present in subsurface context.

Hammerstone

View of site facing west

HL-22. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated dark grey IMT core measuring 55 x 50 x 35 mm with 30 per cent cortex. A quartz cobble measuring 65 x 50 mm was also identified in the road. The site sits on the level lower slope within a rolling hills landscape context. It was identified on a farm track that runs off the Bundarbo Road 5.76 kilometres north of the site. Oak Creek lies 642 metres to the south of the site and Yellow Clay Creek lies 760 metres to the north.

Soils presented a brown sandy clay silt with 100 per cent exposure and 100 per cent visibility. The track feature has been impacted by vehicle damage, construction and maintenance of the road, surface water wash, and erosion. Surrounding vegetation has been cleared for low intensity farming (grazing) purposed where native trees remain clustered in the landscape to form an open woodland context.

The Representative Aboriginal Parties requested to relocate the IMT core off the road to prevent further damage during track maintenance. It was placed on the southern side of the track adjacent to a culvert.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

In situ quartz cobble

View of site facing west

Relocation of artefact

HL-23. (Artefact)

GDA2020 MGA Zone 55

This site consists of an isolated grey brown volcanic hammerstone/manuport measuring 131 x 70 x 47 mm with 100 per cent cortex. The site sits on a level crest within a rolling hill landscape. The artefact was identified next to a gate on a farm track, 2.6 kilometres south of Bundarbo Road. Small unnamed tributaries of Dicks Gully are located 244 metres south, 400 metres east, and 585 metres west of the site.

Soils presented a brow silty loam with 30 per cent exposure and 60 per cent visibility. The track feature has been impacted by vehicle damage and erosion. Surrounding vegetation has been cleared and consists of a native open woodland used for low intensity farming (grazing).

The Representative Aboriginal Parties requested to relocate the manuport off the vehicle tack to prevent damage. It was placed adjacent to the southern gate post.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing west

HL-24. (Artefact scatter)

GDA2020 MGA Zone 55

This site consists of a low density artefact scatter with four artefacts. The site is 15 by 5 metres along the Black Range Road adjacent to Woolgarlo Creek. The scatter sites on a very gently inclined stream bank within a rolling hills landscape context. Four artefacts were identified on the exposed track off the Black Range Road and in the gravel pile associated with road grading.

Artefacts:

- grey chert proximal flake: 19 x 28 x 8 mm
- grey chert complete flake, flaked platform, feather termination: 17 x 20 x 8 mm.
- grey quartzite proximal flake: 28 x 32 x 8 mm
- black IMT flake: 27 x 26 x 10 mm.

Soils presented a light brown sandy silt with 100 per cent exposure and 80 per cent visibility. The feature has been impacted by vehicle damage. Surrounding vegetation has been cleared with remnant isolated clumps of trees. The land is currently used for pastoral grazing.

The feature has been impacted by general weathering, vehicle damage, surface water wash and erosion that has exposed the archaeological material. Vegetation has been cleared for industrial purposes associated with the existing transmission line and forestry works.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing west

HL-25. (Artefact)

GDA2020 MGA Zone 55

This site consists of an isolated white quartz proximal flake measuring 26 x 30 x 15 mm, with a flaked platform. The site is located 20 metres east of Black Grange Road on a paddock fence line track; Woolgarlo Creek sites 50 metres west of the site. The site sits on a gently inclined lower slope within a rolling hills landscape context.

Soils were light brown sandy silt, impacted by sheet wash, vehicle damage and stock damage. Ground exposure averaged 100 per cent, with 80 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland with isolated clumps of trees used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-26. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated grey quartzite core measuring 55 x 18 mm. The site is located 70 metres east of the farm track connected to Black Range Road, and 3.4 kilometres from the Yass River. This site is located on a moderately inclined mid-slope within a rolling hills landscape context.

Soils were brown silt loam impacted by sheet erosion and wind. Ground exposure averaged 80 per cent, with 80 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing west

HL-27. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated grey IMT flake measuring 23 x 17 x 5 mm. The site is located 1.9 kilometres south of Black Range Road, 3.3 kilometres from the Yass River and is adjacent to a drainage channel. This site is located on a moderately inclined lower slope within a rolling hills landscape context.

Soils were brown silt loam impacted by sheet erosion and wind. Ground exposure averaged 30 per cent, with 40 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-28.(Isolated find)

GDA2020 MGA Zone 55–

This site consists of an isolated grey IMT flake measuring 25 x 38 x 12 mm. The site is located on a farm track and fence line, three kilometres from Washpan Creek. This site is located on a gently inclined crest within a rolling hills landscape context.

Soils were brown silt loam impacted by sheet erosion and wind. Ground exposure averaged 80 per cent, with 90 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing north**

HL-29.(Artefact scatter)

GDA2020 MGA Zone 55

This site consists of a low-density artefact scatter with nine artefacts. The site extends 20 x 5 metres along an erosion scar, either side of the gate, and sits on a very gently inclined crest within a rolling hills landscape context. Mccullums Creek lies 350 metres north of the site and Black Range Road is 1.58 kilometres to the north.

Artefacts:

- grey chert core with 20 per cent cortex: 31 x 36 x 19 mm
- grey chert flaked core, weathered: 39 x 40 x 10 mm
- grey chert flaked cobble:52 x 42 x 20 mm
- grey chert complete flake, hinge termination: 20 x 15 x 6 mm
- grey chert proximal flake: 19 x 10 x 4 mm
- grey chert complete flake with retouch: 13 x 9 x 4 mm
- grey chert complete flake with retouch: 12 x 30 x 5 mm
- grey chert singular fragment: 16 x 9 x 6 mm
- grey chert proximal flake: 8 x 9 x 3 mm.

Soils presented reddish brown silty sand and has been impacted by general weathering, vehicle damage, and stock damage. Ground surface exposure was 80 per cent with 50 per cent visibility within the exposures. Some shale outcrops are visible across the landscape along with frequent graves, occasional cobbles, and some small pieces of natural quartz. Vegetation has been cleared for pastoral grazing purposes with isolated trees across the landscape.

There is moderate potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing north-east**

HL-31. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated blue-grey IMT flake measuring 50 x 42 x 8 mm. The site is located 668 metres from the Washpan Creek. This site is located on a level dam wall within a rolling hills landscape context.

Soils were light brown clayey silty loam impacted by vehicle damage, water wash, sheet erosion and wind. Ground exposure averaged 90 per cent, with 90 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing North**

HL-33. (Artefact scatter)

GDA2020 MGA Zone 55

The site consists of a low-density artefact scatter containing of three artefacts across a 30 x 30 metre area. The site is located one kilometre from Derringullen Creek. The site is on a gently inclined sloped ridgeline amongst a rolling hills landscape context.

Artefacts:

- brown grey quartzite hammerstone – 120 x 100 x 70 mm
- brown grey quartzite hammerstone – 80 x 70 x 40 mm
- grey quartzite flake 11 x 21 x 6 mm.

Soils were brown clay impacted by surface water wash, sheet erosion and stock damage. Ground exposure averaged 90 per cent, with 20 per cent visibility within exposures. Vegetation is an open forest context with the land use being pastoral grazing grounds.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing west

HL-34. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated brown quartzite hammerstone measuring 100 x 90 x 50 mm. The site is located 1.1 kilometres from Derringullen Creek. This site is located on the gently inclined upper slopes within a rolling hills landscape context.

Soils were alluvial silt impacted by vehicle damage, sheet erosion and wind. Ground exposure averaged 80 per cent, with 80 per cent visibility within exposures. The vegetation surrounding the site is cleared grassland used for pastoral reasoning.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing north

HL-35. (Isolated find)

GDA2020 MGA Zone 55 –

This site consists of a single isolated white quartz flake with a single platform, feathered termination, and measures 27 x 22 x 11 mm. It sits on a gently inclined upper slope of a rolling hills landscape context. It is 455 metres east of Bango Lane and 350 metres north-west of Yellow Creek.

Soils presented a grey-brown sandy silt with 60 per cent exposure and 50 per cent visibility within the exposure. The feature is in generally good condition but has been exposed to general weathering and surface water wash. The surrounding landscape consists of native open forest which has been partially cleared and modified for pastoral and grazing properties.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact, dorsal

Artefact, ventral

HL-37. (Artefact scatter)

GDA2020 MGA Zone 55

This site consists of a low-density artefact scatter with four artefacts across a 15 x 10 metre area. It is positioned north of an informal animal track and on a very gently inclined crest in a rolling hills landscape context, 324 metres west of Bushes Road and 190 metres east of Three Waterholes Creek.

Artefacts:

- light brown chert scraper: 25 x 13 x 5 mm
- milky quartz scraper: 19 x 10 x 5 mm
- milky quartz flaked piece: 21 x 13 x 7 mm
- milky quartz flaked piece: 18 x 15 x 9 mm.

Soils presented a brown clayey silt with 20 per cent exposure and 70 per cent visibility within that exposure. The site feature is in generally good condition but impacted by vehicle damage, surface water wash, erosion and stock damage. The surrounding landscape has been partially cleared and modified for pastoral and grazing properties, leaving remnant isolated clumps of native trees.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing north

HL-38. (Artefact scatter)

GDA2020 MGA Zone 55

This site consists of a low-density artefact scatter with three lithic items across a 20 x 20 metre area. It is located 60 metres west of a paddock fence line on a very gently inclined crest within a rolling hills landscape context. It is 190 metres south-west of Catherine's Creek and one kilometre east of Bushes Road.

Artefacts:

- grey IMT complete flake: 39 x 32 x 10 mm
- grey IMT proximal flake 50 x 29 x 12 mm
- grey IMT flaked piece: 31 x 30 x 10 mm.

Soils presented a reddish-brown sandy silt 80 per cent exposure and 50 per cent visibility within that exposure. The feature is in generally good condition but has been exposed to general weathering and sock damage. The surrounding landscape has been partially cleared and modified for pastoral and grazing properties, leaving remnant isolated clumps of native trees.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing north

HL-41. (Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated white quartz proximal flake measuring 32 x 21 x 11 mm. It sits on a gently inclined mid-slope within a rolling hills landscape context, 28 metres north of Rye Park Road and 1.77 kilometres west of Jerrawa Creek.

Soils presented a brown silty sand with 80 per cent exposure and 60 per cent visibility within the exposure. The feature is in good condition but has been impacted by vehicle damage and surface water wash. Surrounding vegetation has been cleared for pastoral and grazing purposes, with remnant trees along the property boundary fence line.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-43. (Artefact scatter)

GDA2020 MGA Zone 55

This site consists of a low density artefact scatter with two lithic items across a 4 x 1 metre area. It sits within an exposed animal track on a gently inclined mid-slope within a rolling hills landscape context. Dowlings Creek lies 70 metres to the east of the site, and Walshs Road lies 730 metres to the west.

Artefacts:

- grey chert proximal flake, flaked platform: 17 x 15 x 8 mm
- grey chert flaked piece: 19 x 15 x 6 mm.

Soils presented a brown sandy silt with 80 per cent exposure and 90 per cent visibility within the exposure. The feature is in good condition but has been impacted by stock damage and surface water wash. Surrounding vegetation has been cleared for pastoral and grazing purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-44. (Artefact scatter)

GDA2020 MGA Zone 55

The site consists of a low-density artefact scatter containing at least 10 artefacts across a 25 x 20 metre area. The site is located 1.4 kilometres south-west of the Lachlan River. The site is on a moderately sloped ridgeline amongst a rolling hills context.

Artefacts:

- quartz, flaked piece, no cortex: 24.4 x 23.8 x 13.5 mm
- quartz, medial flake, no cortex: 9.4 x 4.8 x 2.4 mm
- pink silcrete distal split flake, feather termination, moss growing on distal surface: 37 x 28.5 x 8 mm, 1-25 per cent cortex weathered
- dark grey chert, core, unifacial, negative flake scars, 25-50 per cent cortex, weathered: 35 x 21.6 x 13.3 mm.

Soils were brown clay impacted by sheet erosion, vehicle damage and stock damage; a vehicle track runs through the site. Ground exposure averaged 10 per cent, with 10 per cent visibility within exposures. Vegetation is an open forest context with the land use being pastoral grazing grounds.

There is moderate potential for other archaeological features/objects to be present in subsurface context.

Pink silcrete distal split flake

Quartz flaked piece and medial flake

Dark grey cert core

View of site facing north-west

HL-45.(Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated white quartz proximal flake with a flaked platform, measuring 28 x 19 x 7 mm. It is located on a gently inclined mid-slope within a rolling hills landscape context, between two sites HL-44 and HL-45 (including AHIMS #51-5-0202). Dowlings Creek lies 230 metres south of the site, and Walshs Road 1.27 kilometres to the west.

Soils presented a brown sandy silt with 50 per cent exposure and 20 per cent visibility within the exposure. The feature is in good condition but has been impacted by stock. Vegetation is an open forest context with the land use being pastoral grazing grounds.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing east**

HL-46.(Artefact scatter)

GDA2020 MGA Zone 55

The site consists of an artefact scatter of at least 11 artefacts across a 145 x 30 metre area that has been exposed on informal vehicle and stock tracks. One isolated find has been previously recorded and is now included in this larger site area (Dalton 7; AHIMS #51-05-0202). The site is located 1.5 kilometre east of Walshs Road and one kilometre from the Lachlan River. This site is located across the gently inclined upper slope, level valley flat and moderately inclined lower slope within a rolling hills landscape context.

Artefacts:

- milky white quartz flake, contracting form, plain platform, feather termination, no cortex: 30 x 20 x 13 mm, 20.7 axial length, 19 x 11 platform
- AHIMS # 51-05-0202: milky white quartz flake, feather termination, plain platform, no cortex: 16.6 x 14.3 x 3.2, 15.7 axial, 8.5 x 3.9 mm platform
- grey silcrete flake: 31 x 12 x 8 mm
- grey silcrete flake: 35 x 25 x 14
- grey silcrete complete flake: 17 x 12 x 3 mm
- black chert proximal flake: 27 x 21 x 9 mm
- black chert broken core: 40 x 27 x 20 mm
- black chert flaked piece: 26 x 16 x 12
- black chert complete flake: 21 x 14 x 5 mm
- black chert flaked piece: 25 x 17 x 7.

Soils were alluvial silt impacted by vehicle damage, stock damage, surface water wash, and sheet and wind erosion. Ground exposure averaged 30 per cent, with 40 per cent visibility within exposures. The vegetation surrounding the site is open woodland, native scrub, with the land use currently being used for pastoral reasons. A dam is also located within the new site boundary.

There is moderate potential for other archaeological features/objects to be present in subsurface context.

Artefact

Artefact

View of site facing at centre facing north-east

View of site at eastern most point facing south-west

HL-47. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated grey quartzite complete flake, abrupt, expanding, no cortex, plain platform measuring: 59 x 54 x 10 mm, axial length 49 mm, and 18 x 7.5 platform.

The site is located on an exposed shallow water course. The site is located 1.7 kilometres east of Walshs Road and 965 metres from the Lachlan River. This site is located on a gently inclined lower slope within a rolling hills landscape context.

Soils were brown sand silt, impacted by water, sheet erosion and wind. Ground exposure averaged 30 per cent, with 30 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land use currently being used for pastoral reasons.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing south-west

HL-48. (Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated milky quartz medial flake measuring 23 x 17.2 x 6 mm, no cortex. The site is located two kilometres east of Walshs Road and 738 metres from the Lachlan River. This site is located on a crest of a rolling hills landscape.

Soils were brown sandy silt, impacted by sheet erosion and wind. Ground exposure averaged 10 per cent, with 10 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land use currently being used for pastoral reasons.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing east

HL-49.(Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated milky quartz flake measuring 19 x 14 x 04 mm. The site is located 2.8 kilometres east of Walshs Road and 180 metres from the Lachlan River. This site is located on a moderately inclined mid-slope within a rolling hills landscape context.

Soils were brown sandy silt impacted by sheet erosion and wind. Ground exposure averaged 20 per cent, with 20 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land being used for pastoral purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact, ventral **Artefact, dorsal**

HL-50.(Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated white quartz proximal flake, no cortex, crushed platform, measuring 12.9 x 8.8 x 5.5 mm. The site is located 40 metres north of a transmission line maintenance track and 38 metres from Merill Creek. This site is located on a mid-slope within a rolling hills landscape context.

Soils were brown alluvial silt impacted by sheet erosion and wind. Ground exposure averaged 10 per cent, with 10 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land being used for pastoral purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing south**

HL-51.(Artefact scatter)

GDA2020 MGA Zone 55

The site consists of a low-density artefact scatter containing at least 30 artefacts across a 122 x 40 metre area with potential for archaeological deposit. The densest part of the visible site included seven artefacts across a one metre area. The site is located 733 metres north-east of Merill Creek. The site is on a crest amongst a moderately inclined rolling hills context.

Artefacts:

- milky quartz complete split flake, no cortex: 10.8 x 9 x 4.3 mm
- milky quartz proximal flake, elongated form, no cortex: 18.4 x 12.7 x 5 mm
- milky quartz flaked piece, no cortex: 19.7 x 12.3 x 7.4 m
- milky quartz complete split flake, no cortex, feather termination: 9.3 x 7.2 x 6.2 mm
- milky quartz distal tool, scraper, no cortex: 21.1 x 16.8 x10 mm
- milky quartz core, microblade, no cortex: 21.6 x 13 x 11.3 mm, 21 mm lcs length
- milky quartz medial flake, no cortex: 13.6 x 9 x 3.6 mm
- milky quartz complete flake, feather termination, plain platform: 21.7 x 13.7 x 6.5 mm, 7.9 x 6 mm platform
- milky quartz complete split, plain platform, feather termination, indeterminate form: 11.6 x 7.7 x 6.3 mm
- milky quartz distal flake, feather termination: 26.1 x 13 x 4.1 mm
- milky quartz flaked piece, no cortex: 17.4 x 13 x 9.7 mm
- milky quartz distal flake feather termination indeterminate form: 21.6 x 13.8 x 4.7 mm
- milky quartz flaked piece, no cortex: 14.7 x 10.9 x 11.5 mm
- milky quartz distal flake, feather termination, contracting form: 15 x 14 x 3 mm
- milky quartz complete flake, feather termination, indeterminate form, crushed platform: 13.4 x 12 x 4 mm, flake length 13 mm
- milky quartz flaked piece, no cortex: 14 x 9 x 5 mm
- milky quartz proximal flake, elongated form, plain platform no cortex: 14.7 x 8.2 x 4.8 mm, platform 6.1 mm x 5.2 mm
- milky quartz complete flake, elongated form, plain platform: 39.1 x 26.5 x 5.2 mm, 34 mm flake length, 12.8 x 8 mm platform
- milky quartz complete flake, single platform, feather termination: 20 x 16 x 4 mm.

Soils were brown clay impacted by vehicle damage, sheet erosion and stock damage. Ground exposure averaged 40 per cent, with 30 per cent visibility within exposures. Vegetation is an open forest context with the land being used for pastoral purposes.

There is high potential for other archaeological features/objects to be present in subsurface context.

Artefacts

Artefacts

View of site facing east across site from western most boundary

View looking east across scatter from central area of site

HL-55. (Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated white quartz proximal flake measuring 17 x 11 x 7 mm, and with a single platform. It is located on a gently inclined mid-slope within a rolling hills landscape context, 780 metres south-east of Storriers Lane and 480 metres north of Ryans Creek. The sites are within proximity. AHIMS site Gullen Solar Farm – Alt site 8 (#51-5-0254) is located 115 metres to the south of the site.

Soils were light orange brown clayey silt and ground exposure averaged 70 per cent, with 80 per cent visibility within exposures. The feature is in good condition, impacted by erosion. Vegetation has been cleared with isolated clumps of native trees.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing south

HL-59. (Artefact scatter)

GDA2020 MGA Zone 55

The site consists of a low-density artefact scatter containing at least two artefacts across a 10 x 20 metre area. The site is located 750 metres south-west of Pejar Creek. The site is on a crest within a rolling hills landscape context.

Artefacts:

- grey silcrete flake: 33 x 28 x 9 mm
- milky white quartz core: 22 x 18 mm.

Soils were alluvial silt impacted by sheet erosion and stock damage. Ground exposure averaged 20 per cent, with 60 per cent visibility within exposures. Vegetation is a cleared grassland context with the land being used for pastoral purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact | **View of site facing North**

HL-61. (Isolated find)

GDA2020 MGA Zone 55

This site consists of a single isolated grey chert flake, 10 per cent cortex measuring 30 x 16 x 16 mm. The site is located 650 metres north of a Middle Arm Road and 178 metres south from the Tarlo River. This site is located on a moderately inclined mid-slope within a moderately inclined rolling hills landscape context.

Soils were strong brown clayey silt impacted by general weathering, vehicle damage, and bioturbation (ants). Ground exposure averaged 50 per cent, with 50 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land being used for pastoral purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact | **View of site facing North**

HL-64. (Isolated find)

GDA2020 MGA Zone 55

This site consists of an isolated grey chert longitudinal split flake measuring 58 x 35 x 12 mm, and with evidence of use wear. The site is located 60 metres west of Adavale Road and 786 metres south from Bannaby Creek. This site is in an erosion scale on a terrace flat within a gently inclined steep hills landscape context.

Soils were sandy silt impacted by sheet erosion and wind. Ground exposure averaged 90 per cent, with 90 per cent visibility within exposures. The vegetation surrounding the site is open woodland with the land use currently being used as a creek boundary.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site facing North

HL-65.(Modified tree)

GDA2020 MGA Zone 55

A single scar tree located adjacent to a minor stream margin within an upper valley. The sites sits within a grassland landscape context with sparse canopy reaching up to 30 metres.

Species: Eucalypt

Estimated Height: 30 metres

Girth cm: 375 centimetres

Condition: Good, some insect attack

Aspect: South

Length excluding regrowth: 155

Length including regrowth: 190

Width excluding regrowth: 50

Width including regrowth: 80

Height of base of scar:45

Height of base of outer scar (outside regrowth): 35

Features: Termite activity

Checklist:

Tree is endemic to area? Yes

scar is at least 100 years old? Yes

Regrowth deep/old enough? Yes

Scar does not extend to the ground? Yes

Scar edge uniform and roughly symmetrical? Yes

Other natural and human origins less likely than Aboriginal Origin? Yes

Scar condition: Good

Conclusion: Most likely of Aboriginal origin

Modified tree

View of site facing North

HL-66. (Artefact scatter)

GDA2020 MGA Zone 55

This site is allow-density artefact scatter of three artefacts. The site is located mid-slope on a moderately inclined rolling hills landscape, surrounded by pastoral grasslands. The site is a 2 x 4 metre visible area of exposure at the base of a tree, 400 metres north of an unnamed access track, located 30 metres south-west of a tributary of the First Creek which feeds into the Wollondilly River. There is an artificial dam 20 metres northwest of the site. The site is approximately 1.2 kilometres north of the Wollondilly River and 2.2 kilometres west of Pejar Dam.

Artefacts:

- Quartz, longitudinal split, flake with potential usewear on exposed margin 29 x 18 x 7 millimetres
- Quartz, complete flake 12 x 8 x 2 millimetres
- Quartzite, flake with potential backing on lateral margin.

Site area was heavily eroded. The area has also been impacted by surface water wash, trampling, and weathering. Ground exposure averages 20 per cent, with 20 per cent visibility within exposures. The featured condition is regarded as being poor. There is low potential for subsurface archaeological deposits.

Artefact **View of site facing North**

HL-67. (Isolated find)

GDA2020 MGA Zone 55

An isolated find that consists of a grey, very hard, compacted quartzite – quilartzite/deolorite, potential chopping adze 90 x 80 x 35-37 mm. The microwear on the artefact is consistent with multiple uses including; the distal end was likely created for chopping, the opposite margin (proximal) has very likely evidence of use wear, with the end being truncated. One surface has clear evidence of use wear, scarring and polishing. The negative scar on the chopping margins are clear.

The site has an extension of approximately 1 square metre located on a steep inclined upper slope within a rolling hills landscape. The artefact was found amongst a scattered conglomerate outcrop. The site is located approximately 1.1 kilometres south of Chilldowla Road and 1.3 kilometres south of Oak Creek.

Site area was heavily eroded. The area has also been impacted by surface water wash, trampling, and wind. Ground exposure averaged 0 per cent, with 0 per cent visibility within exposures. The featured condition is regarded as being poor. There is low potential for subsurface archaeological deposits.

Artefact **View of site facing North**

HL-68. (Isolated find)

GDA2020 MGA Zone 55

An isolated find consisting of a grey, chert, longitudinal split, feathered flake 26 x 18 x 4 mm with 0 per cent cortex. The site has an extension of approximately 1 square metre located on a steep mid-slope within a rolling hills landscape, surrounded by pastoral grasslands on the northern, eastern and southern sides and a more heavily wooden area of grasslands to the west. The site is located within a conglomerate deposited 40 metres south of an unnamed access track which connects 2.2 kilometres south-south-west to Brungle Creek Road.

Site area was eroded. The area has also been impacted by surface water wash. Ground exposure averaged 0 per cent, with 0 per cent within exposure. The length of the assessed site area is 5 x 5 m$^{2.}$ The featured condition is regarded as being poor. There is low potential for subsurface archaeological deposits.

Artefact

View of site facing North

HL-70. (Isolated find)

GDA2020 MGA Zone 55

An isolate find that consists of a brown, conglomerate, core, likely part of a ballast 48 x 36 x 25 mm with 30 per cent core. The object has approximately five negative scars and is likely to be natural breakage. Object was found within the railing ballast of an unused rail line. This site is located approximately 40 metres south and 40 metres west from Gadara Road, it is approximately 160 metres north-east from Sandy Creek. This site has an extension of approximately 1 x 1 metre on the lower slope of a gently inclined undulating plain, surrounded by pastoral grasslands for grazing. There is low potential for subsurface archaeological deposits.

Artefacts **View of site facing north**

HL-71.(Isolated find)

GDA2020 MGA Zone 55

An isolate find that consists of a milky, quartz, feathered, flaked, complete flake 21 x 22 x 3 mm with 0 per cent cortex. The site has an extension of 1 x 1 metre located on a moderately inclined, lower slope within a rolling hills landscape, surrounded by pastoral grasslands for grazing. The site is located approximately 190 metres east of College Creek and 380 metres west of Humula Road. The landscape context included several artificial dams, the closest being 130 metres to the south-east of the site and feeding trenches.

Site area was heavily eroded. The area has also been impacted by vehicle damage, surface water wash, trampling, wind, and land clearing associated with the artificial dams in the area. Ground exposure averaged 20 per cent, with 10 per cent visibility within exposures. The featured condition is regarded as being poor. There is low potential for subsurface archaeological deposits.

Artefacts **View of site facing north**

HL-72.(Artefact scatter)

GDA2020 MGA Zone 55

This site consists of five artefacts, approximately one artefact per square metre. The site has an extension of approximately five square metres on a steep mid-slope on the bank of a creek within a rolling hills landscape. The site is a 3 x 3 metre visible area of exposure at the base of a tree 380 metres west of an unnamed access road connecting to Crookwell Road. The creek flows to the east and west of the site, joining into one creek at the southern end of the site and feeds into the Wollondilly River which is approximately 1.2 kilometres south. The site is approximately 700 metres west of Pejar Dam.

Artefacts:

- Milky, quartz, complete flake 4 x 9 x 2 millimetres
- Milky, quartz, longitudinal split 26 x 15 x 6 millimetres
- Milky, quartz, distal flake 11 x 9 x 2 millimetres
- Milky, quartz, angular flake 9 x 9 x 2 millimetres
- Milky, quartz, longitudinal split 23 x 16 x 2 millimetres.

Site area was heavily eroded. The area has also been impacted by fire damage, trampling, and weathering. Ground exposure averaged 40 per cent, with 30 per cent visibility within exposures. The featured condition is regarded as being poor. There is low potential for subsurface archaeological deposits.

Artefacts

View of site facing east

HL-87. (Isolated find)

GDA2020 MGA Zone 55/56

This site consists of an isolated milky quartz flake measuring 23 x 18 x 9 mm. The site is located 420 metres from Humes Creek. This site is located on a small exposure in the on a gently inclined mid-slope within a rolling hills landscape.

Soils were moist mid-brown gravelly silt impacted by sheet erosion and wind. Ground exposure averaged 50 per cent, with 40 per cent visibility within exposures. The vegetation surrounding the site is open forest and has been used for low intensity grazing.

There is low potential for other archaeological features/objects to be present in a subsurface context.

Artefact **View of site facing South West**

HL-89. (Isolated Find)

GDA2020 MGA Zone 55/56

This site consists of an isolated quartz flake measuring 14 x 12 x 6 mm. The artefact was identified in a small erosion scald in the mid-slope of a moderately inclined rolling hills context. The site is located 350 metres from Humes Creek.

Soils presented as orange-brown gravelly silty clay with 25 per cent exposure and 60 per cent visibility. The vegetation surrounding the site consists of grassland and isolated clumps of trees and is used for pastoral and grazing purposes.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact **View of site facing North**

HL-90.(Artefact scatter)

GDA2020 MGA Zone 55/56

This site consists of a low density artefact scatter with two artefacts. The site is 30 x 3 metres in area. The site is located 1275 metres from Adelong Creek. The scatter sits on the mid-slope of a forestry track that has been cut into a steep hills landscape.

Artefacts:

- Yellow-brown flaked IMT pebble (potential scraper) with edge retouch: 22 x 23 x 9 mm.
- Black volcanic flake: 28 x 25 x 6 mm.

Soils presented as wet red-brown gravelly silt with 80 per cent exposure and 50 per cent visibility. The site has been impacted by vehicle and fire damage, surface water wash, and erosion. Vegetation has been cleared from the site for forestry operations.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing South West

HL-91.(Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a low-density scatter with two artefacts. The site is 10 x 5 metres in area. The site is located 717 metres from Yellow Clay Creek. The site is situated on the mid-slope of gently inclining rolling hills.

Artefacts:

- IMT flaked piece: 36 x 51 x 7 mm
- Sandstone flaked piece: 16 x 22 x 5 mm.

Soils were yellow-grey gravelly silt with 100 per cent exposure and 90 per cent visibility. The site has been impacted by vehicle damage, general weathering, stock damage, and surface water wash. There is a large pile of gravel/graded material present to the southeast of the site. The site consists of grassland and open woodland and has been used for low-intensity farming.

Artefacts were relocated at the request of the RAPs to the gate post to prevent further vehicle damage.

Site was recorded; however, artefacts are likely instead a product of grading/machine impacts given similarities between material on side of road and artefacts.

There is low potential for other archaeological features/objects to be present in a subsurface context.

Artefacts

View of site facing South

HL-92. (Artefact Scatter)

GDA2020 MGA Zone 55/56–

This site consists of a low-density scatter with three artefacts. The site is 2 x 1 metres in area. The site is located 360 metres from Humes Creek. The site is situated on the mid-slope of moderately inclined rolling hills. The artefacts consist of three milky quartz flakes.

Soils were orange-brown silty clay with 50 per cent exposure and 30 per cent visibility. The surrounding area consists of open forest and cleared land and has been used for grazing and as a transport corridor.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing North East

HL-93.(Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a low-density artefact scatter containing three artefacts across a 5 x 5 metre area. The site is located 168 metres from Yellow Clay Creek. The site is in vehicle tracks in the mid-slope of gently inclining rolling hills. Artefacts consisted of three grey IMT flakes and flake pieces measuring 23 x 26 x 5 mm, 12 x 17 x 6 mm and 12 x 10 x 4 mm.

Soils presented as yellow-grey silt with 80 per cent exposure and 90 per cent visibility. The site has been exposed to vehicle damage, surface water wash, stock damage, and general erosion. Surrounding vegetation has been cleared as for low-intensity farmland, however some open woodland remains.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site facing East

HL-94.(Isolated find)

GDA2020 MGA Zone 55/56

This site consists of an isolated surface artefact presenting as a dark grey IMT flake with a feather termination. The site is located 30 metres from Jugiong Creek. This site is located on a very steep stream bank in an undulating plain.

Soils presented as light brown gravelly silt with 50 per cent exposure and 60 per cent visibility. The site had been exposed to general erosion and stock damage. Vegetation surrounding the site has been predominantly cleared as grasslands for low-intensity farming.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site

HL-95.(Isolated Find)

GDA2020 MGA Zone 55/56

This site consists of an isolated grey dolerite grinding stone measuring 24 x 19 x 4 cm. The site is located 230 metres from Umbango Creek. The site is located on the upper slope of moderately inclined rolling hills. The grinding stone was found on top of a wooden fence post.

Due to the thick covering of grass, there was 0 to 5 per cent exposure and visibility. Vegetation surrounding the site was predominantly cleared, allowing for use as grassland for livestock.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefact

View of site from the North

HL-96.(Artefact Scatter)

GDA2020 MGA Zone 55/56

This site represents an artefact scatter consisting of four artefacts with an area of 4 x 2 metres. The site is located 415 metres from Humes Creek. The site is located on top of a gently inclined crest within a rolling hills landscape.

The site includes four milky quartz flakes found near a large ant mound.

Soils presented orange-brown clay silt with 80 per cent exposure and 70 per cent visibility. The site has been affected by vehicular damage, surface water wash and general weathering. Surrounding land has been cleared for farming and as a transport corridor, however some isolated clusters of trees remain.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts

View of site from the East

HL-97.(Artefact Scatter)

GDA2020 MGA Zone 55/56

The site consists of a low-density artefact scatter consisting of two artefacts. The site encompasses a 3 x 3 metre area along a vehicle track in Bago State Forest. The site is located 60 metres from Buddong Creek. This site sits mid-slope in a moderately inclined open forest.

Artefacts:

- Black IMT flake, with retouch along margin: 22 x 18 x 9 mm.
- Grey volcanic flake, with 15 per cent cortex: 47 x 73 x 19 mm.

Soils at the site presented as red-brown silty-clay with 50 per cent exposure and 60 per cent visibility. The site has been impacted by vehicle damage due to access track, surface water wash, fire damage and general erosion resulting in exposed archaeological material. Vegetation consists of eucalyptus trees and other native scrub as the area has been preserved for conservation. Artefacts were relocated off the track to prevent further vehicle damage.

There is low-moderate potential for other archaeological features/objects to be present in subsurface context.

Artefacts **View of site from the North**

HL-99. (Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a moderate-density artefact scatter with 15+ artefacts present across a 50 x 15 metre area in Bago State Forest. The site is located 32 metres from Sheepyard Creek. The site is on the mid-slope of a moderately inclined rolling hills landscape.

Ten artefacts were recorded:

- Grey IMT flake: 18 x 34 x 5 mm
- Grey IMT flake: 19 x 16 x 3 mm
- Grey IMT flake with 2 per cent cortex present: 25 x 15 x 10 mm
- Grey IMT flake: 10 x 14 x 5 mm
- Milky quartz flake: 14 x 14 x 8 mm
- Milky quartz flake: 41 x 22 x 14 mm
- Milky quartz flake: 17 x 21 x 10 mm
- Milky quartz flake: 10 x 7 x 4 mm
- Milky quartz flake: 15 x 13 x 5mm
- Milky quartz flake: 16 x 8 x 3 mm.

Soils were red-brown silty clay with 90 per cent exposure and 70 per cent visibility. The site has been impacted by vehicle damage due to access track, surface water wash, fire damage and general erosion resulting in exposed archaeological material. Vegetation consists of eucalyptus trees and other native scrub as the area has been preserved for conservation. Artefacts were relocated off the track to prevent further vehicle damage.

There is moderate-high potential for other archaeological features/objects to be present in subsurface context.

Artefacts **View of site from the North**

HL-100. (Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of two artefacts across a 15 x 3 metre area. The site is located 360 metres from Adelong Creek. The site is on the crest of a gently inclined steep hills landscape context.

Artefacts:

- Purple chert flake: 39 x 25 x 7 mm
- Milky quartz flake: 21 x 10 x 8 mm.

Soils were moist mid-brown silty loam with 15 per cent exposure and 20 per cent visibility within exposures. Vegetation consisted of cleared grasslands for forestry activities with some remaining scrub.

There is low potential for other archaeological material/objects to be present in subsurface context.

Artefacts **View of site from the North**

HL-101. (Isolated Find)

GDA2020 MGA Zone 55/56

This site consists of an isolated quartz flake found on an overgrown dirt track. The site is located 360 metres from Humes Creek. The site lies in the mid-slope of a moderately inclined rolling hills context.

Soils presented as orange-brown silty loam with 30 per cent exposure and 30 per cent visibility. The site has been impacted by general erosion and was a combination of open forest and cleared grassland. This site was used for livestock grazing and as a transport corridor.

There is low potential for other archaeological material/objects to be present in subsurface context.

Artefact

View of site from the North East

HL-102. (Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a low-density artefact scatter containing two quartz flakes across a 1 x 1 metre area. The site is located 360 metres from Humes Creek. Artefacts were found on the mid-slope of a moderately inclined rolling hills context.

Soils were orange-brown silty clay with 60 per cent exposure and 60 per cent visibility. The site had been impacted by stock damage, general sheet erosion and surface water wash. Vegetation consisted of open forest and some cleared areas, with the land use being for livestock grazing and as a transport corridor.

There is low potential for other archaeological material/objects to be present in subsurface context.

Artefacts | **View of site from the South West**

HL-104. (Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a high-density artefact scatter containing 20+ artefacts across a 60 x 40 metre area in Bago State Forest. The site is located 100 metres from Buddong Creek and 80 metres from Sheepyard Creek. This site is located on the mid-slope of a moderately inclined rolling hills landscape.

Nine artefacts were recorded:

- Black volcanic flaked piece: 26 x 33 x 10 mm
- Grey IMT flake: 20 x 26 x 6 mm
- Grey IMT flake: 23 x 13 x 4 mm
- Grey IMT flake: 25 x 16 x 7 mm
- Grey IMT flake: 17 x 13 x 6 mm
- Milky quartz flake: 14 x 10 x 7 mm
- Milky quartz flake: 8 x 14 x 7 mm
- Milky quartz flake: 12 x 11 x 7 mm
- Milky quartz flake: 13 x 9 x 3 mm.

Soils were red-brown silty clay with 60 per cent exposure and 60 per cent visibility. The site has been impacted by vehicle damage due to access track, surface water wash, fire damage and general erosion resulting in exposed archaeological material. Vegetation consists of eucalyptus trees and other native scrub as the area has been preserved for conservation.

There is moderate-high potential for other archaeological features/objects to be present in subsurface context.

Artefacts **View of site from the North East**

HL-105. (Artefact Scatter)

GDA2020 MGA Zone 55/56

This site consists of a low-density artefact scatter containing two artefacts across a 1 x 1 metre area in Bago State Forest. The site is located 8 metres from Yellowin Creek. This site is situated on the lower slope of a very gently inclined rolling hills landscape.

Artefacts:

- Milky quartz flake piece: 19 x 16 x 7 mm
- Milky quartz flake piece: 35 x 22 x 9 mm.

Soils consisted of red-brown clayey-silt with 90 per cent exposure and 90 per cent visibility. The site has been impacted by vehicle damage due to access track, surface water wash, fire damage and general erosion resulting in exposed archaeological material. Vegetation consists of eucalyptus trees and other native scrub as the area has been preserved for conservation.

There is low potential for other archaeological features/objects to be present in subsurface context.

Artefacts **View of site from the south-east**

ATTACHMENT 4

ADDITIONAL TREES IDENTIFIED BY RAPS AND ASSESSED AS NOT MEETING THE CRITERIA FOR AN ABORIGINAL OBJECT UNDER THE NPW ACT

The following sites have been identified by RAPs as modified trees or those that hold other cultural values.

HL-74. Modified tree

GDA2020 MGA Zone 55

Identified on a crest of a mid-valley of a rolling hills landscape. The tree was identified within an agricultural grassland where many of the original native trees have been cleared.

Species: Red gum

Estimated Height: 20 m

Girth cm: 80-100 cm

Condition: Very poor (dead)

Aspect: NA

Length excluding regrowth: 200 cm

Length including regrowth: 200 cm

Width excluding regrowth: 100 cm

Width including regrowth: 100 cm

Height of base of scar: NA

Height of base of outer scar (outside regrowth): NA

Checklist:

Tree is endemic to area? Yes

Scar is at least 100 yrs old? Unlikely

Regrowth deep/old enough? Unlikely

Scar does not extend to ground? No

Other natural and human origins less likely than Aboriginal Origin? Yes

Scar condition: Poor

Conclusion: Unlikely of Aboriginal Origin and more likely a natural scar.

Identified scar

HL-75. Cultural Tree

GDA2020 MGA Zone 55

According to the RAP representative this is a shelter tree in which the branch was modified. Please note that there was a large fallen branch on top of modified branch with the same angle.

HL-76. Cultural Tree

GDA2020 MGA Zone 55

RAP would like this tree preserved. Has a special physical presence, with cultural and spiritual significance to him.

HL-77. Modified Tree

GDA2020 MGA Zone 55

RAP requested that the tree at this location be recorded as a ring tree.

Species: Box

Estimated Height: 15 metres

Girth cm: 200 centimetres

Condition: Good

Aspect: South-east

Length excluding regrowth: 150 centimetres

Length including regrowth: NA

Width excluding regrowth: 50 centimetres

Width including regrowth: NA

Height of base of scar: NA

Height of base of outer scar (outside regrowth): 5 metres

<u>Checklist:</u>

Tree is endemic to area? Yes

Scar is at least 100 yrs old? Timing of modification unable to be determined

Regrowth deep/old enough? unknown

Scar does not extend to ground? N/A

Other natural and human origins less likely than Aboriginal Origin? No

Condition: Good

Conclusion: Unlikely to be a culturally modified tree

Tree modification

Modified tree

HL-78. Modified Tree

GDA2020 MGA Zone 55

RAP requested that the tree at this location be recorded as a ring tree.

Species: Eucalyptus (Yellow Box)

Estimated Height: 20 metres

Girth cm: 393 centimetres

Eastern modified branch girth is 363 centimetres and approximately 10 metre long.

<u>Checklist:</u>

Tree is endemic to area? Yes

Scar is at least 100 yrs old? No scar

Regrowth deep/old enough? N/A

Scar does not extend to ground? N/A

Other natural and human origins less likely than Aboriginal Origin? No

Condition: Good

Conclusion: Unlikely to be a culturally modified tree.

Modified limb

Modified limb

Modified limb

Modified tree

HL-79. Modified Tree

GDA2020 MGA Zone 55

Species: Yellow Box

Estimated Height: 25 metres

Condition: Good

Aspect: south

Length excluding regrowth: 30 centimetres

Length including regrowth: 12 centimetres

<u>Checklist:</u>

Tree is endemic to area? Yes

Scar is at least 100 yrs old? yes

Regrowth deep/old enough? unknown

Scar does not extend to ground? N/A

Other natural and human origins less likely than Aboriginal Origin? No

Condition: Good

Conclusion: This is likely be a product of a natural growth.

Modified tree

Tree ring

HL-80. Cultural Tree

GDA2020 MGA Zone 55

Cultural tree identified by RAP.

HL-81. Cultural Tree

GDA2020 MGA Zone 55

Cultural tree identified by RAP.

HL-83. Cultural Tree

GDA2020 MGA Zone 55

RAP requested that this tree, a sorry tree, be recorded away from the tree. No photograph or other information were to be noted.

HL-85. Modified Tree

GDA2020 MGA Zone 55

Located on a major ridge line, mid-slope. In grassland.

Species: Eucalyptus

Estimated Height: 14 metres

Girth cm: 145 centimetres

Condition: Dead

Aspect: South

<u>Checklist:</u>

Tree is endemic to area? Yes

Scar is at least 100 yrs old? Unknown

Regrowth deep/old enough? Unable to record

Scar does not extend to ground? No

Other natural and human origins less likely than Aboriginal Origin? No

Scar condition: <u>Unclear due to height</u>

Conclusion: Unlikely

Identified scar

Modified tree

HL-86. Modified Tree

GDA2020 MGA Zone 55

The tree is in good condition located mid-slope within a basal slopes landscape, surrounded by pastoral grasslands for grazing. The tree is located 520 metres east of Sawpit Gully and 500 metres west of a tributary to sawpit gully.

Species: Box Tree

Estimated Height: 6 metres

Girth: 310 centimetres

Condition: Good

Aspect: South

Length excluding regrowth: 55 centimetres

Length including regrowth: 62 centimetres

Width excluding regrowth: 19 centimetres

Width including regrowth: 29 centimetres

Height of base of scar (inside regrowth): 65 centimetres

Height of base of outer scar (outside regrowth): 62 centimetres

Features: Machine damage

Checklist:

Tree is endemic to area? Yes

Scar is at least 100 yrs old? Unclear

Regrowth deep/old enough? Yes

Scar does not extend to ground? Yes

Other natural and human origins less likely than Aboriginal Origin? No

Scar condition: Unclear

Conclusion: Non-Aboriginal

Identified scar

Looking north

Derringullen Creek Women's Site

Site Recording

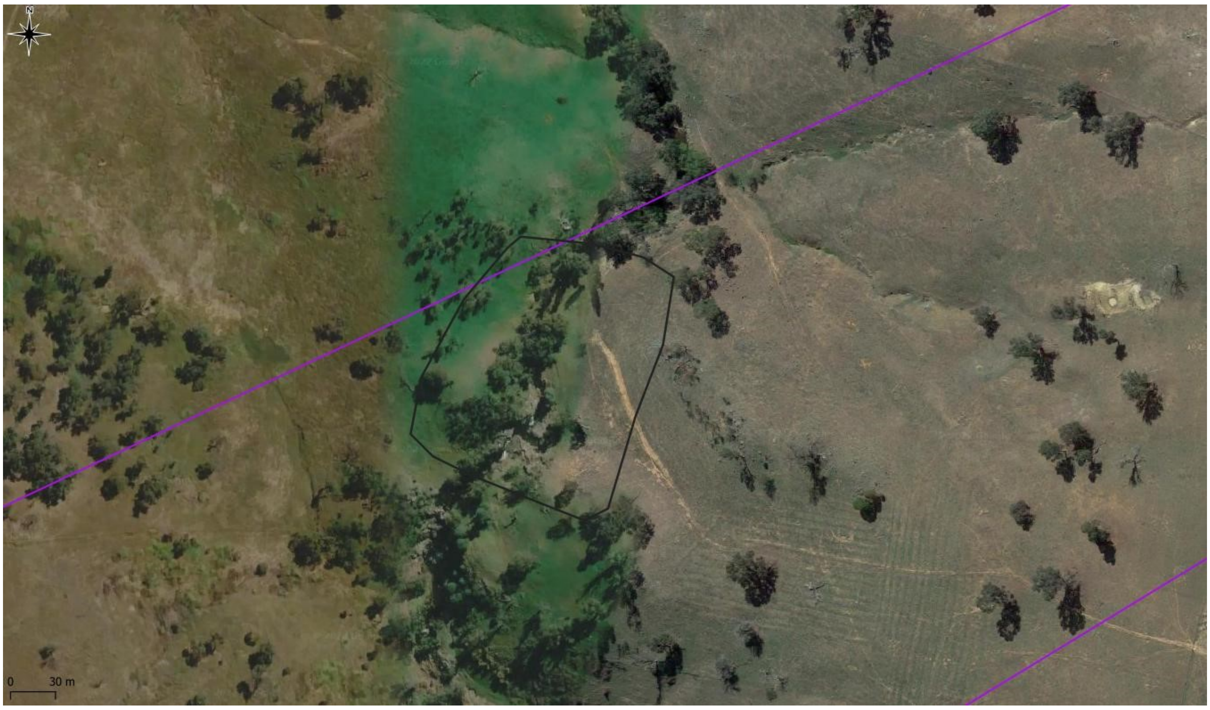
GDA94/MGA zone 55:

This area is identified by Karen Bell (Ngunawal) as an important traditional women's site.

The site is located on Derringullen Creek above the Derringullen Creek waterfall. The site encompasses the calmer pools and gentle bend in the creek as well as the banks and sandy beach.

Karen identified that the location would have been used for women's ceremony particularly around women's life stages as well as a birthing area.

Karen requested that the location be restricted and not shared publicly or with other Aboriginal groups.

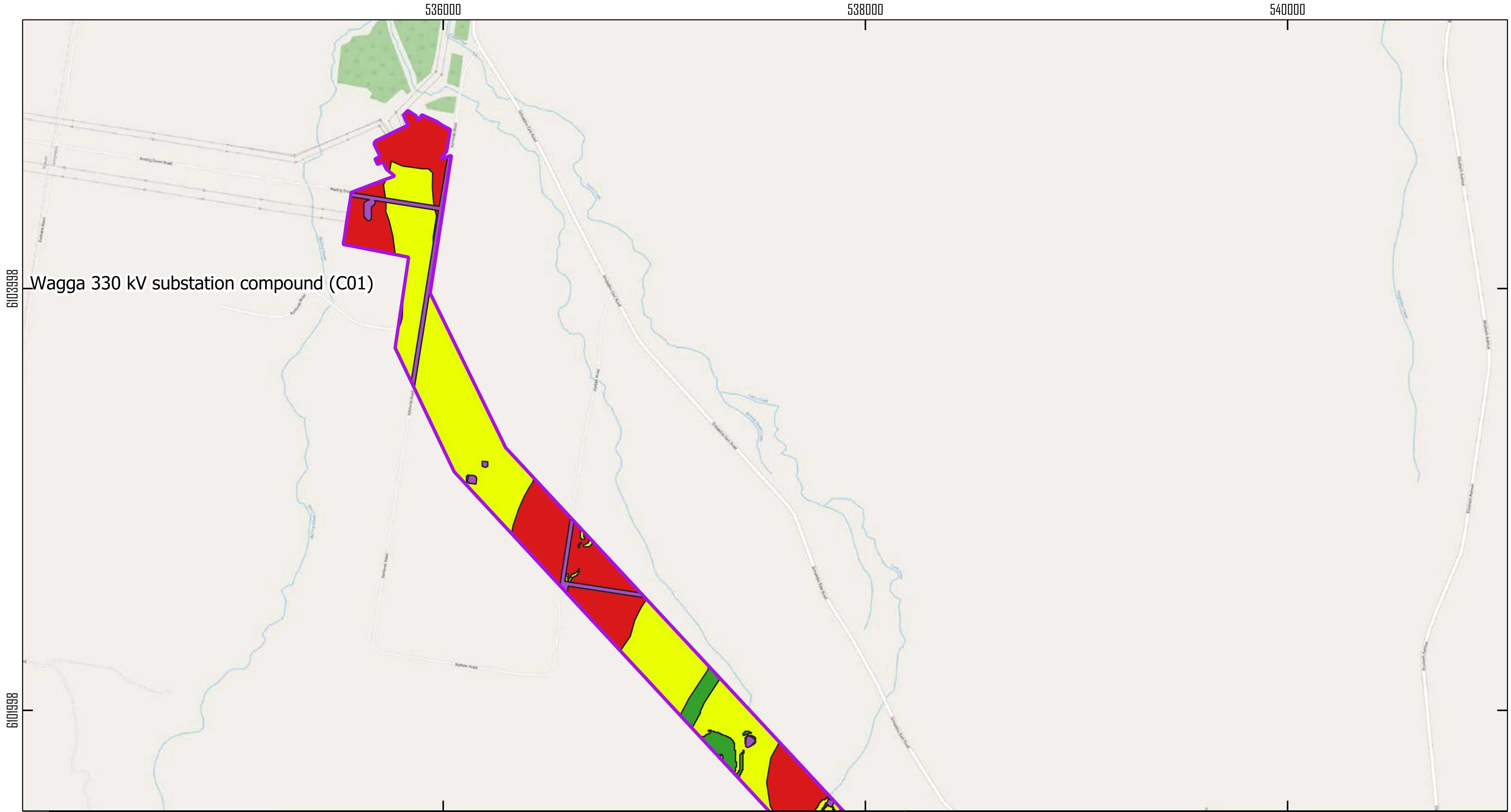


Map of location

ATTACHMENT 5

PROJECT MAPPING

A5.1 Archaeological Sensitivity



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

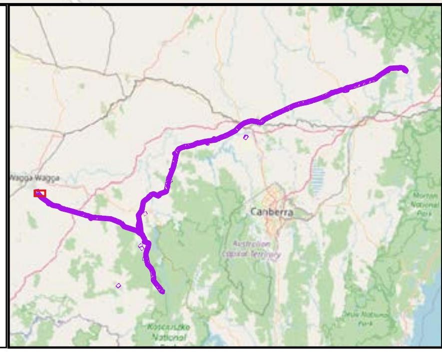
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

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Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

Archaeological sensitivity

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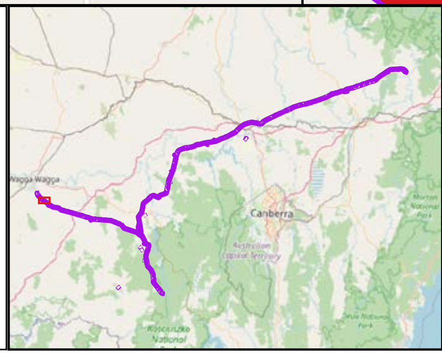
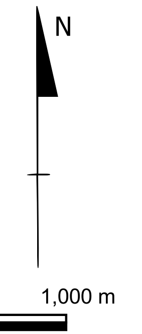
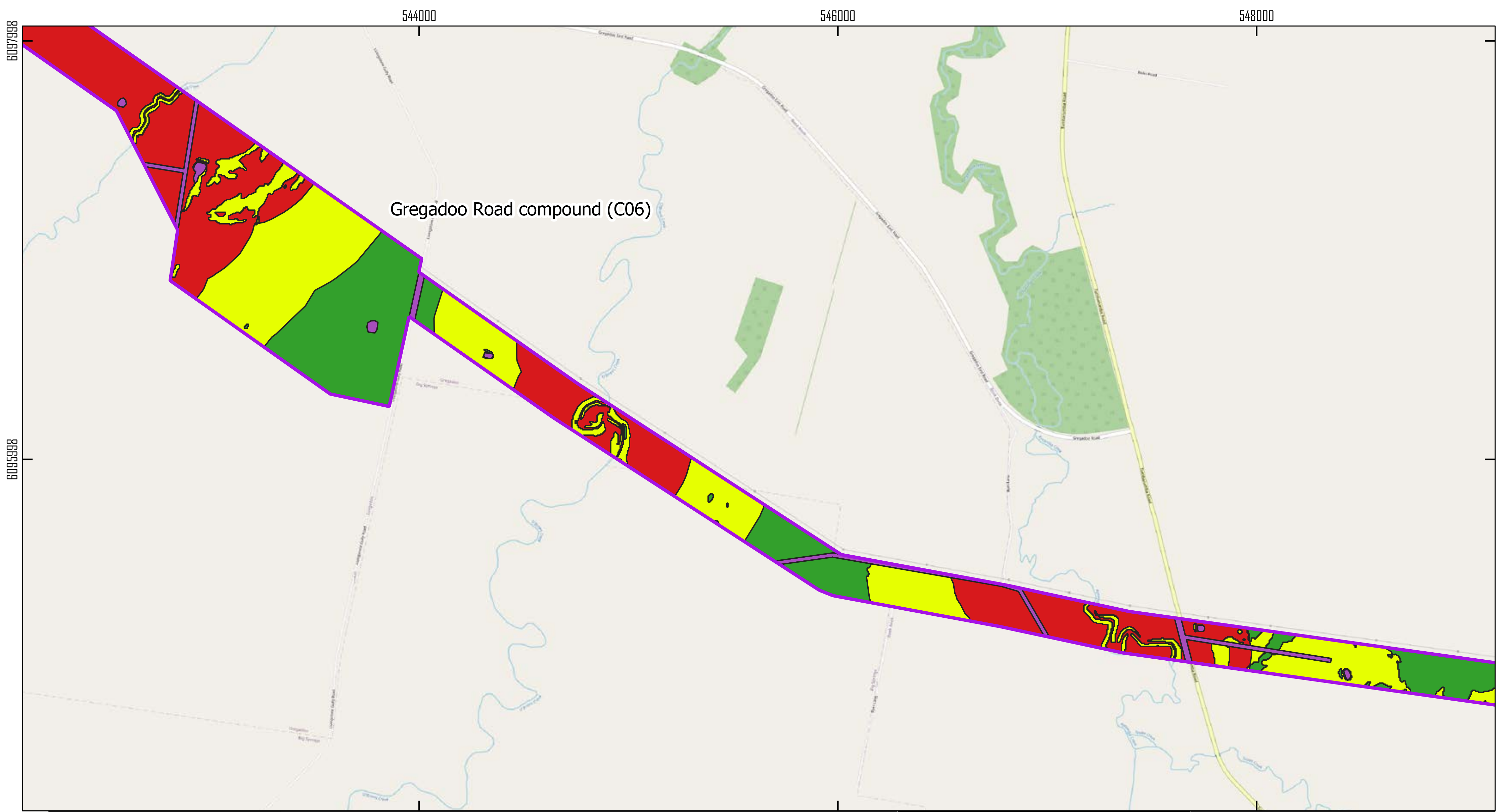
Moderate







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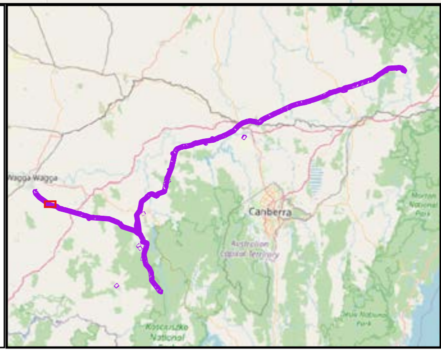

Navin Officer heritage consultants

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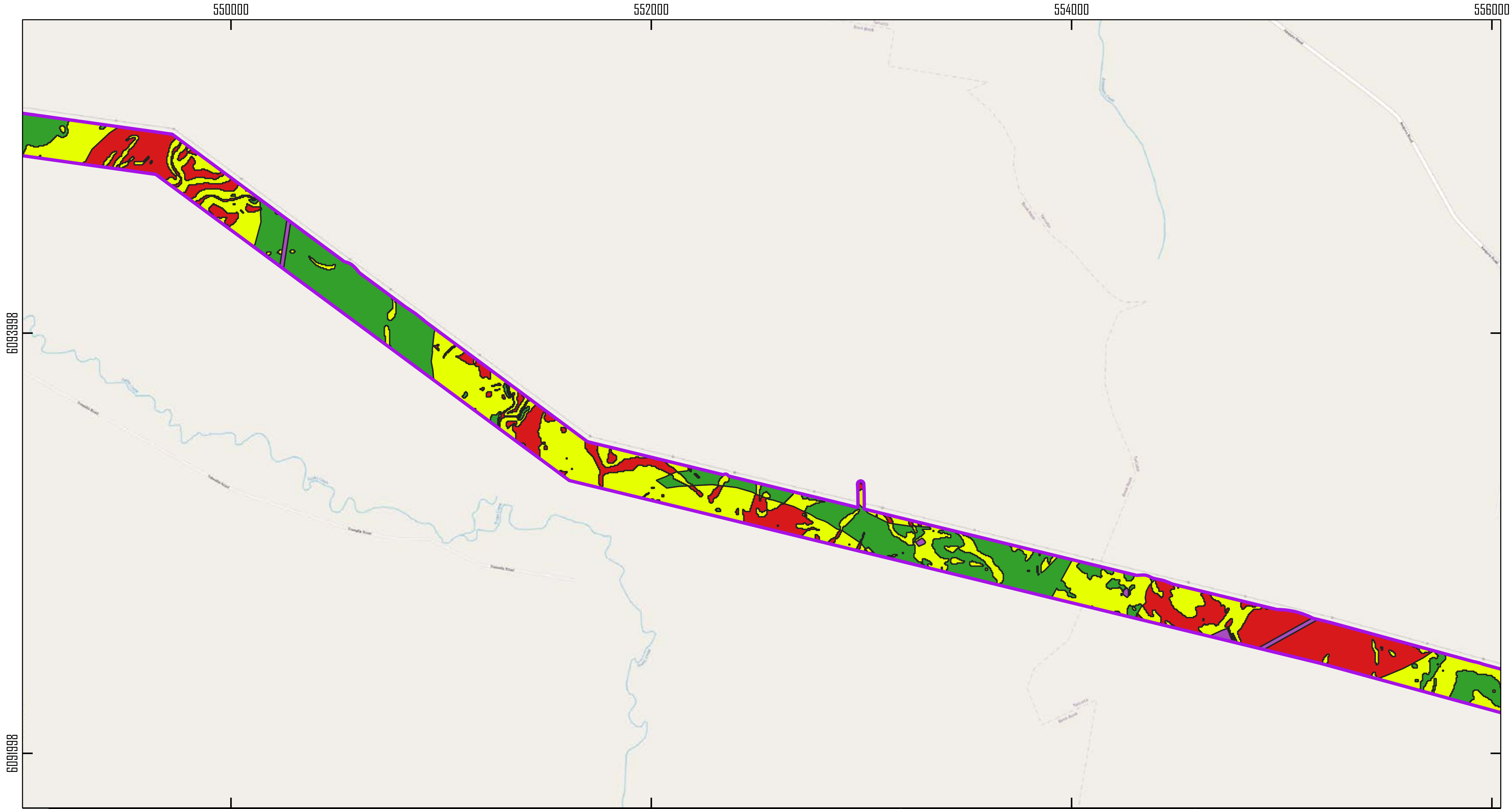

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Project footprint

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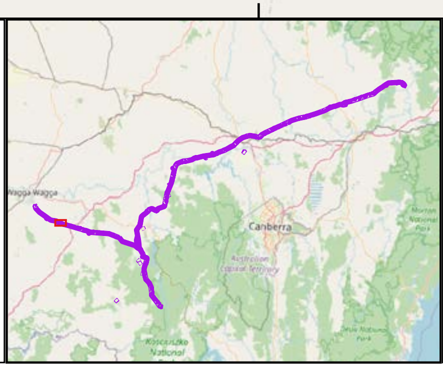
Low
Moderate



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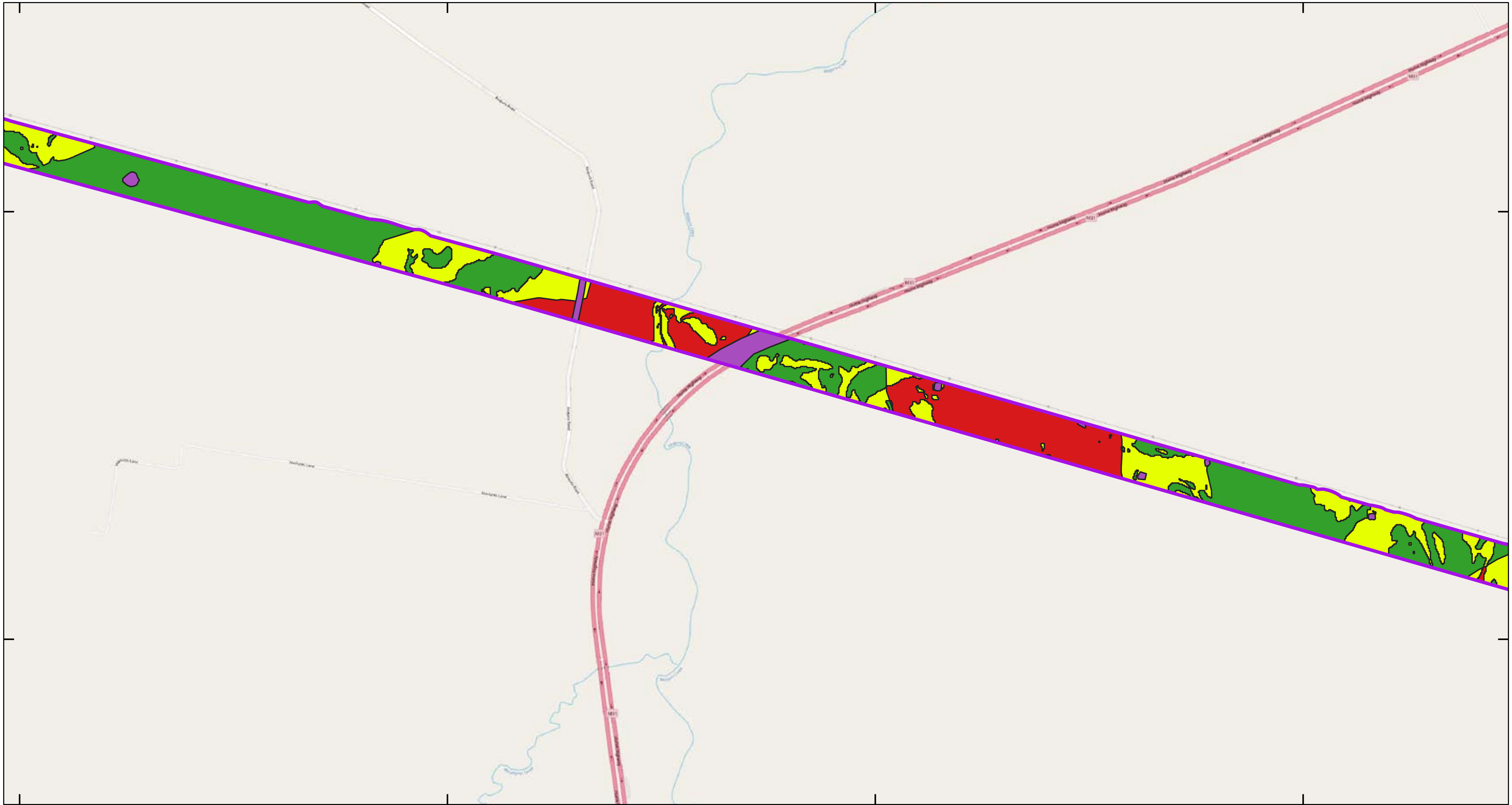

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Legend

Project footprint

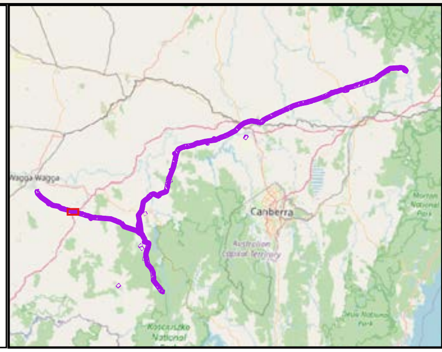
Archaeological sensitivity

Disturbance

High

Low

Moderate



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heritage consultants Pty Ltd

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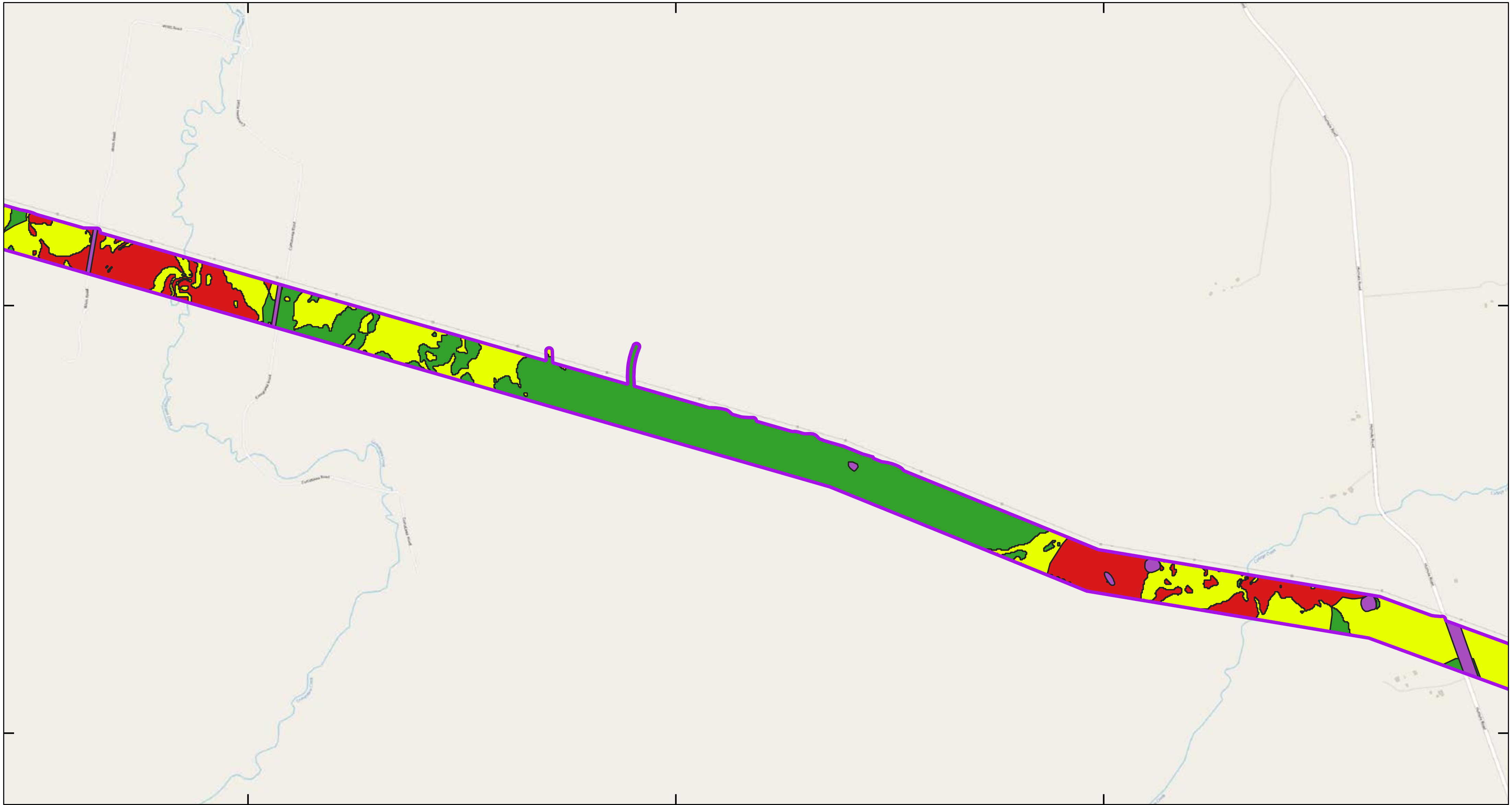

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Legend

Project footprint

Archaeological sensitivity

- Disturbance
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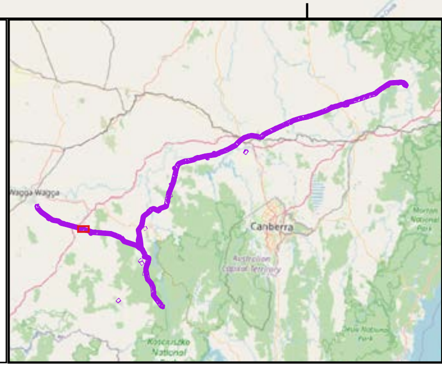
- Low
- Moderate



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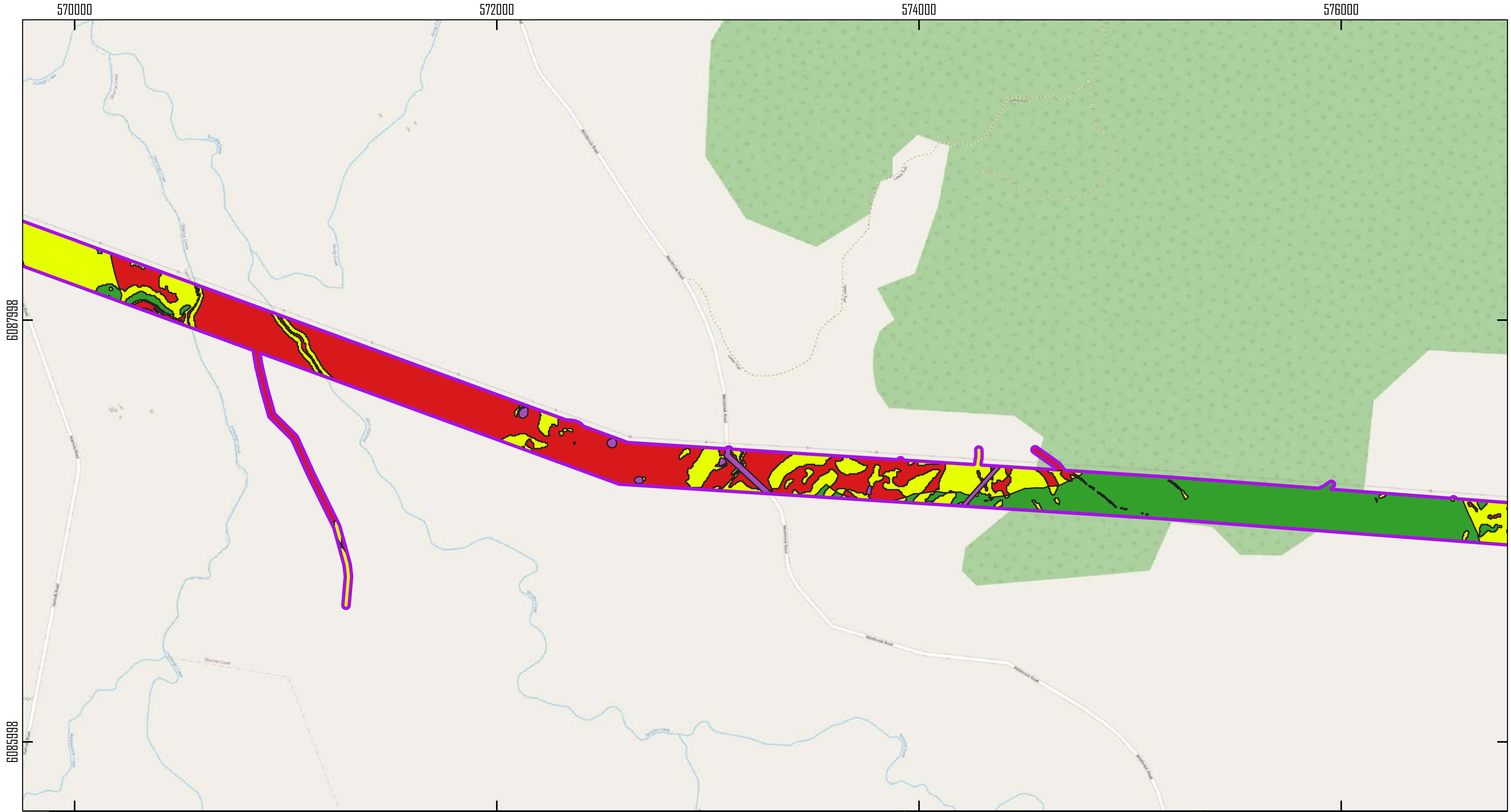

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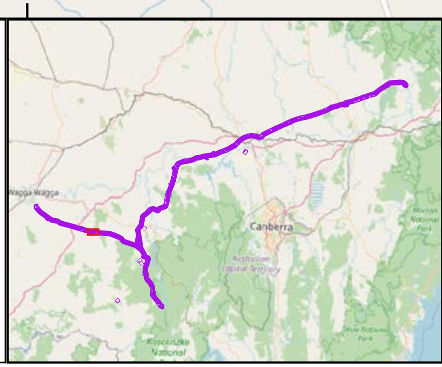

Navin Officer heritage consultants Pty Ltd

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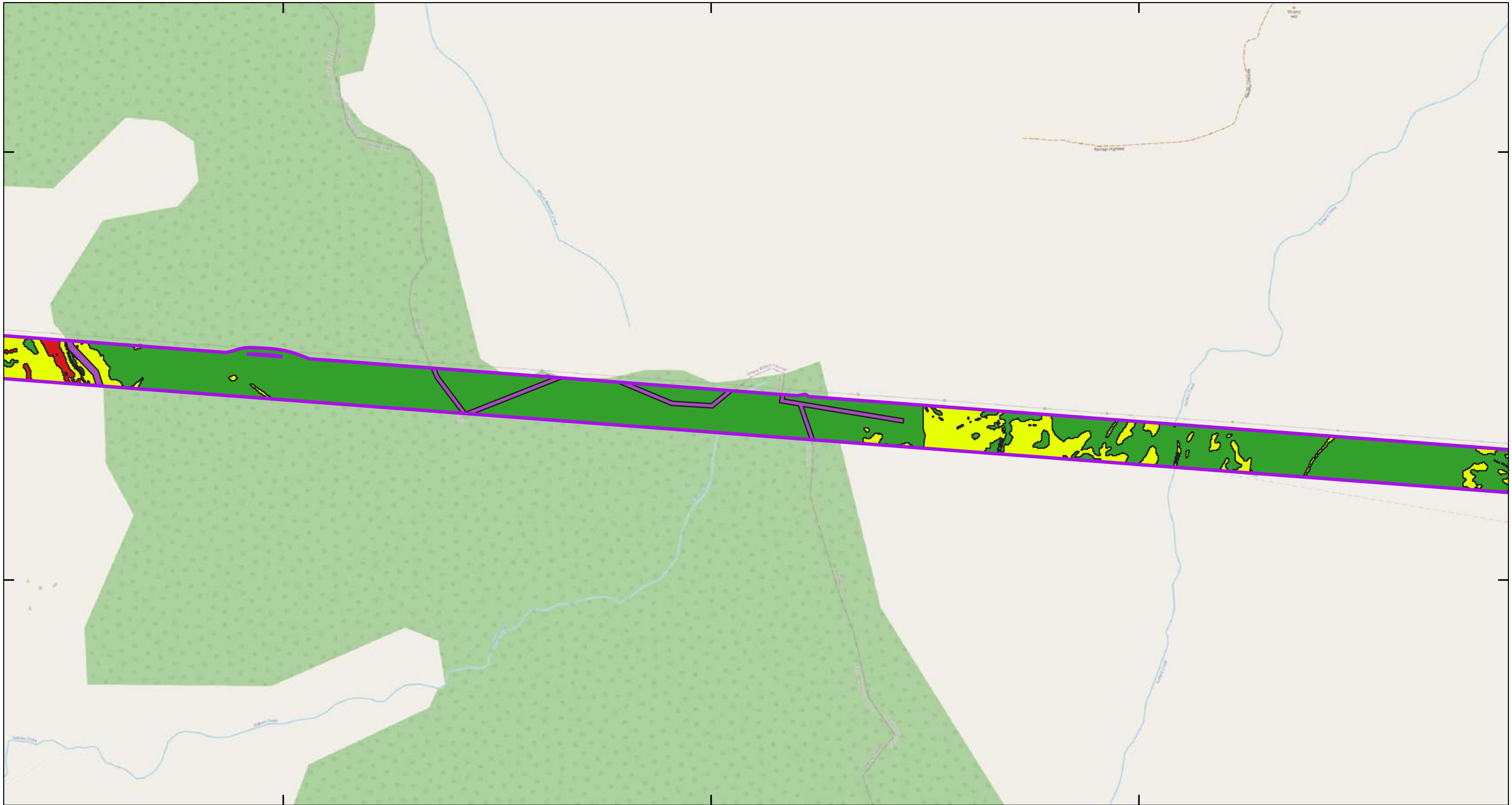
0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

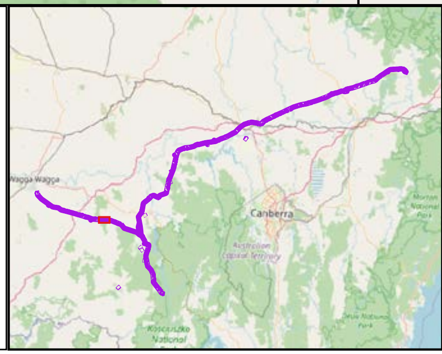
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

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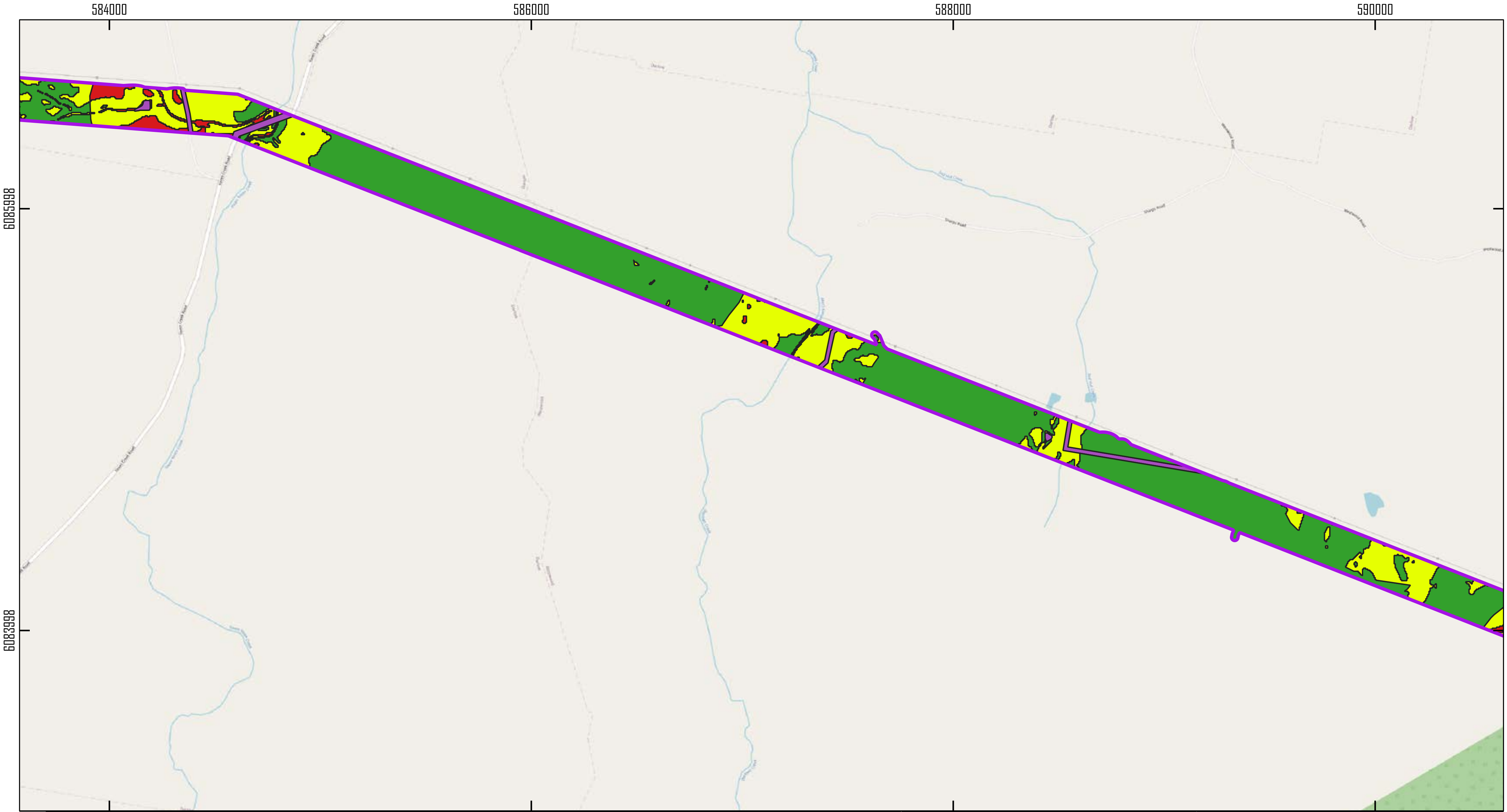

Humelink

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MGA Zone:
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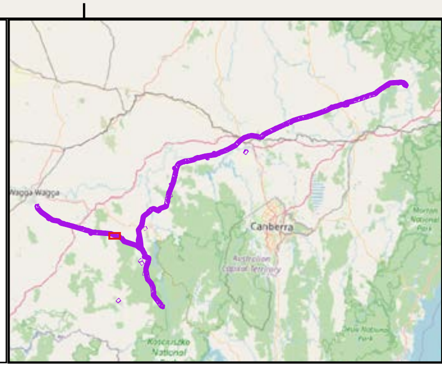
Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

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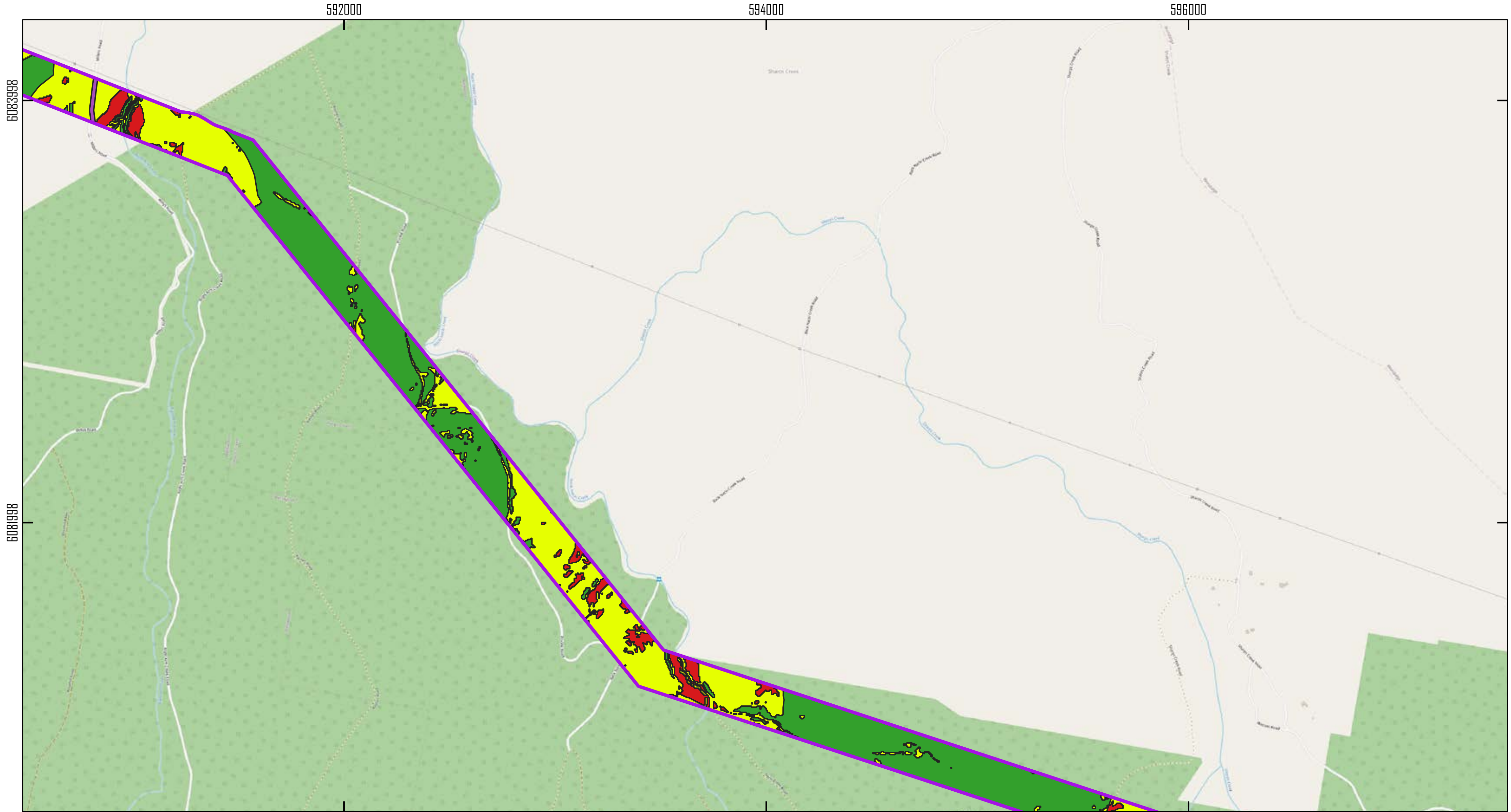

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Legend

Project footprint

Archaeological sensitivity

Disturbance

High

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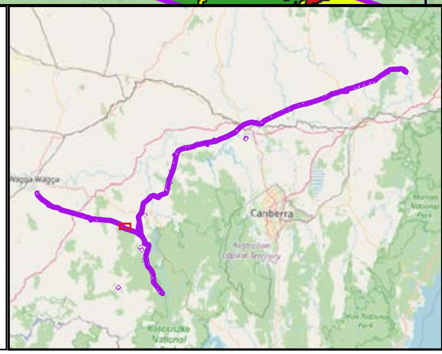

Navin Officer
heritage consultants Pty Ltd

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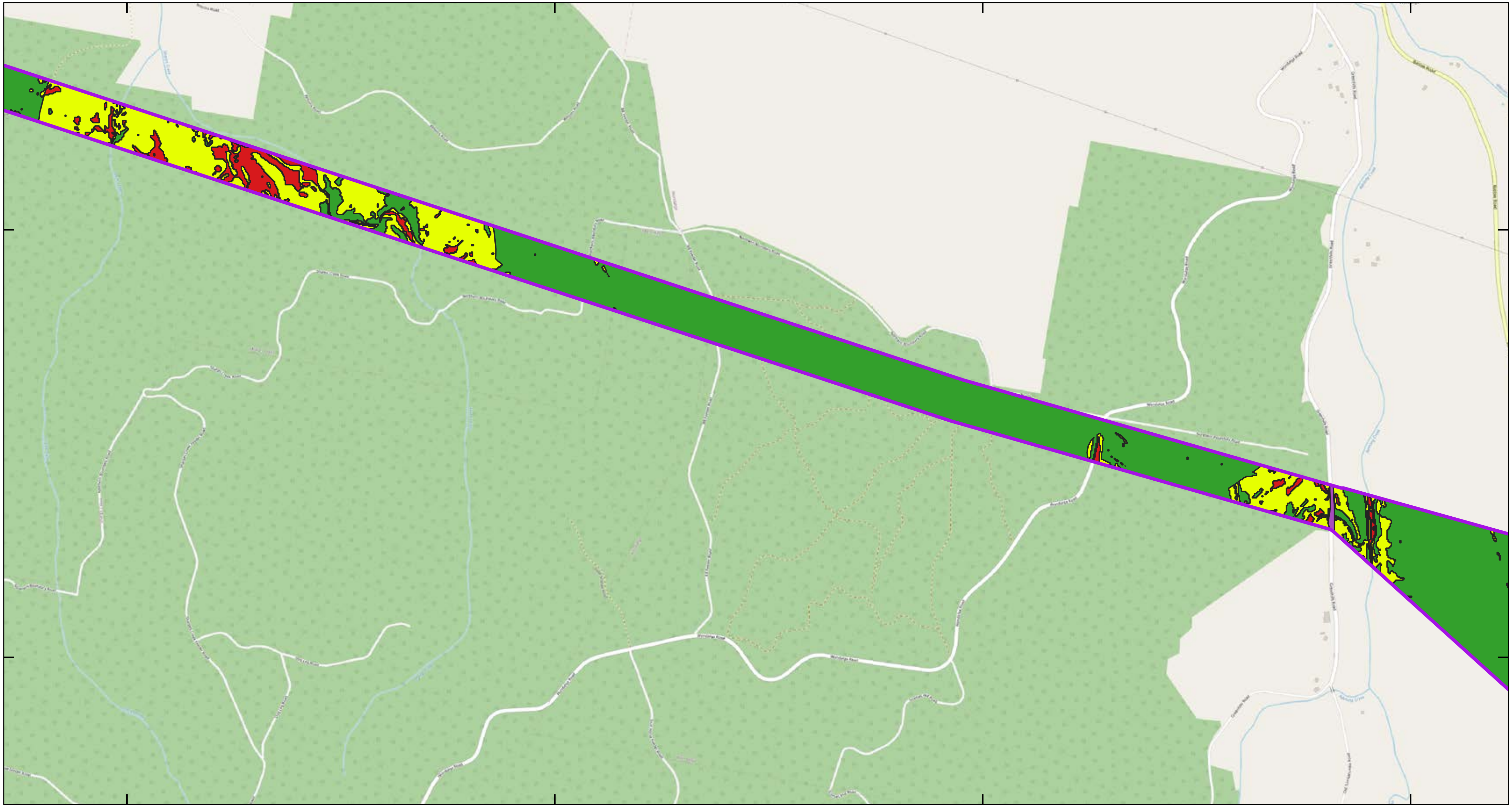

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Legend

Project footprint

Archaeological sensitivity

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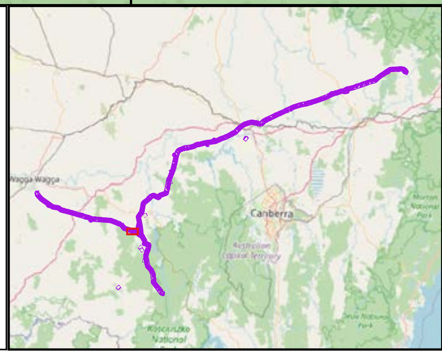

Navin Officer heritage consultants Pty Ltd

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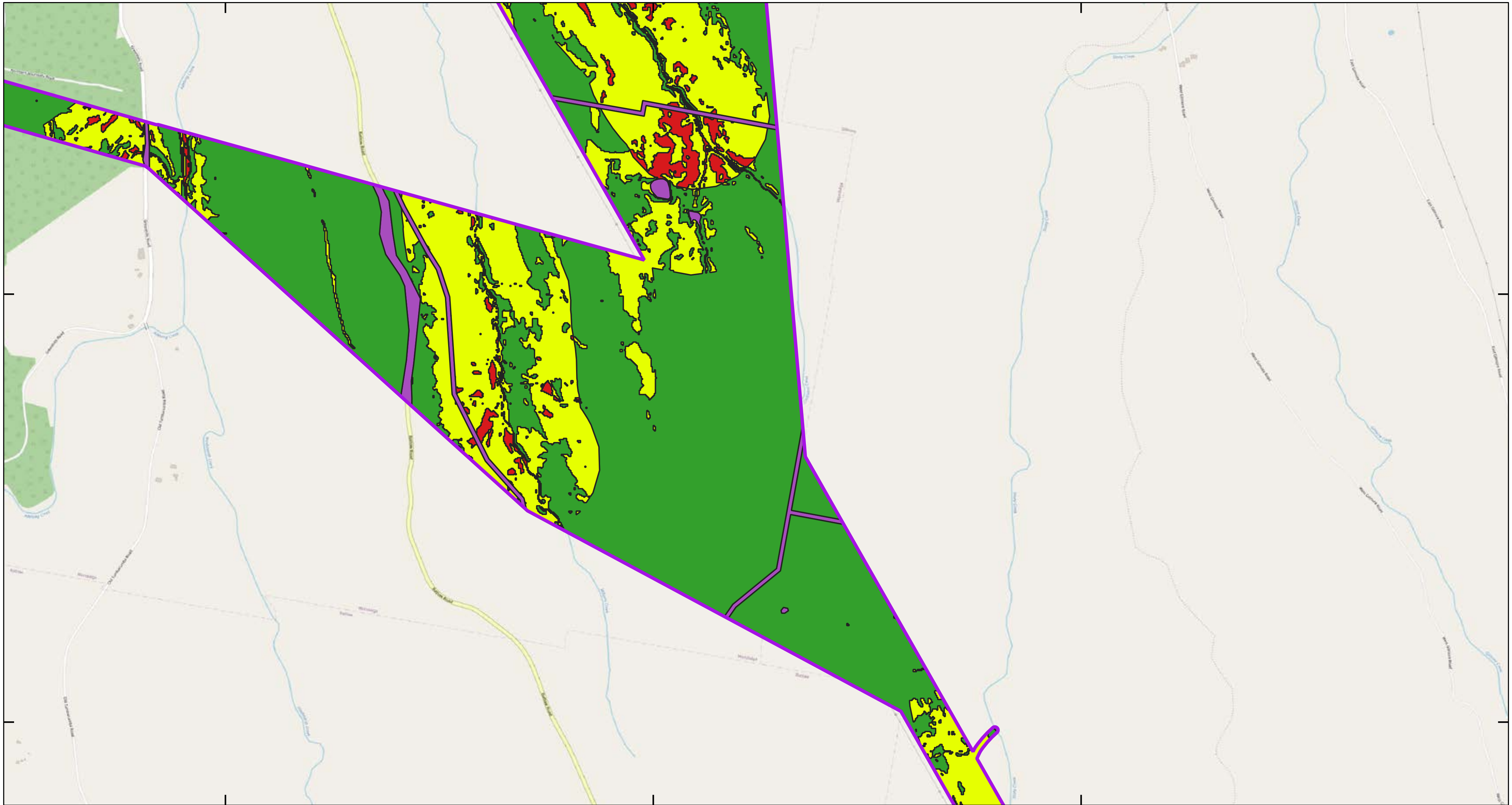

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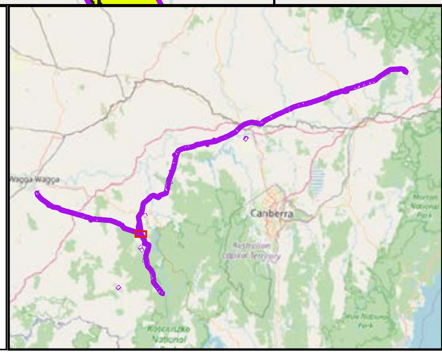
Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

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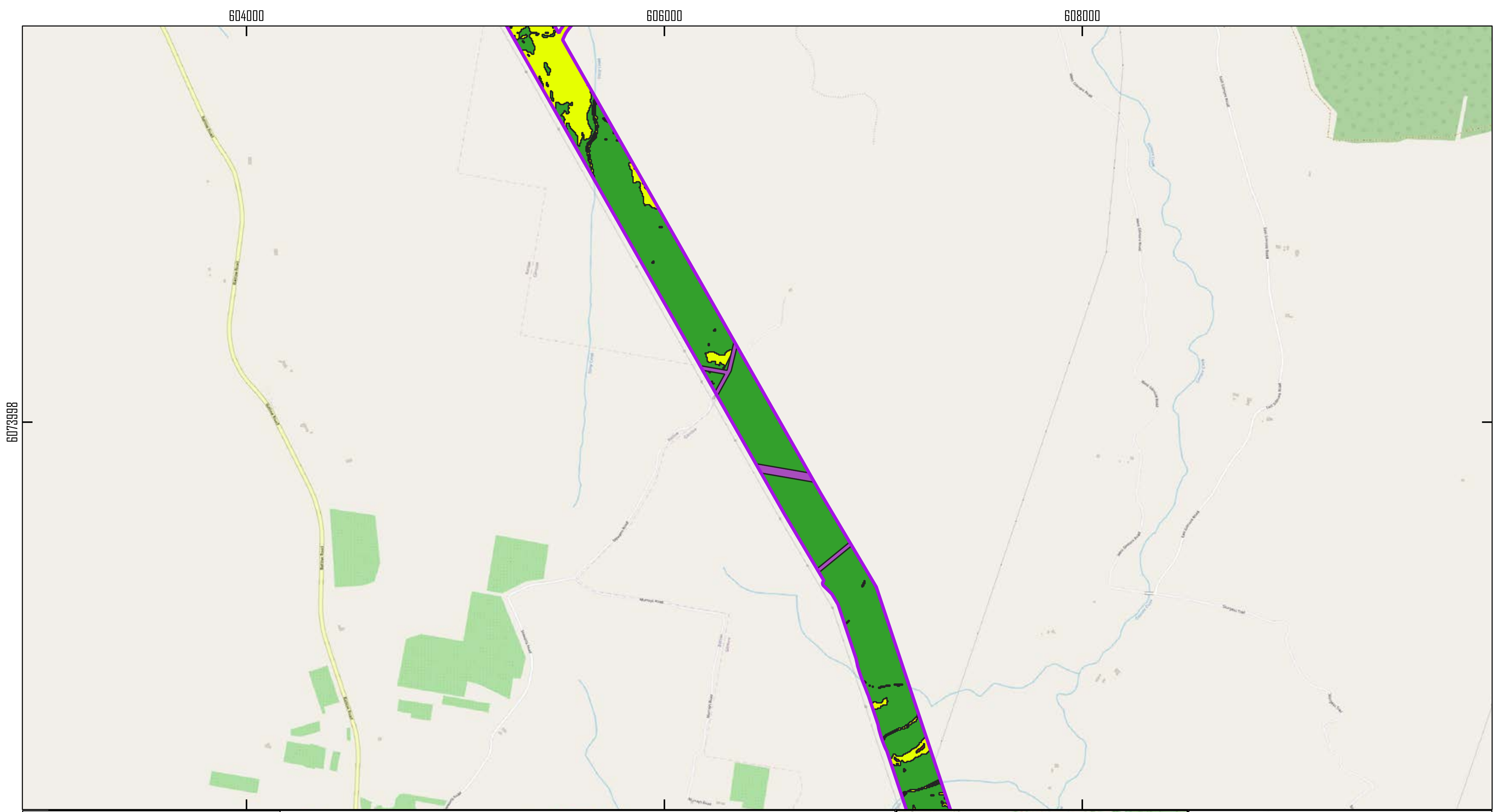

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Legend

Project footprint

Archaeological sensitivity

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- Low
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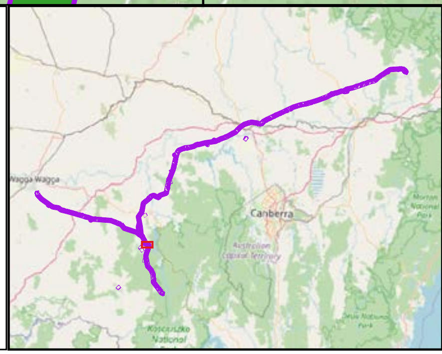

Navin Officer heritage consultants Pty Ltd

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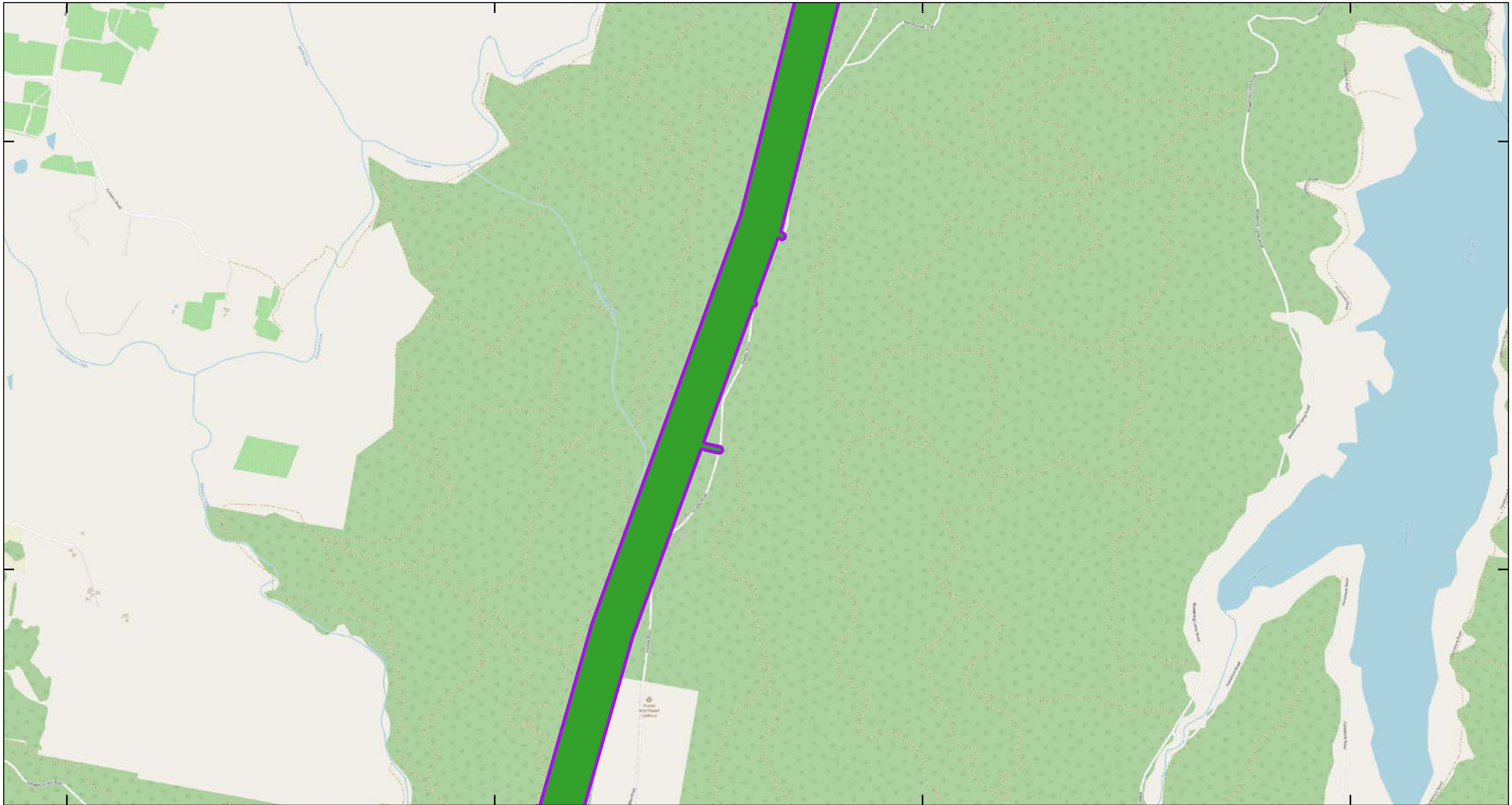

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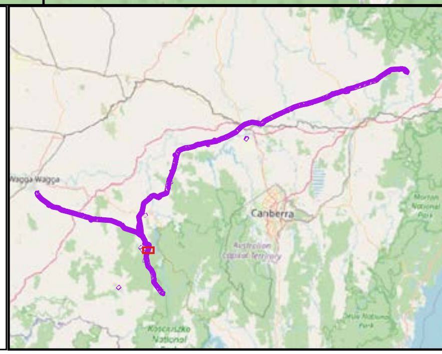
Legend

Project footprint

Archaeological sensitivity

Low



Navin Officer heritage consultants Pty Ltd

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Legend

Project footprint

Archaeological sensitivity

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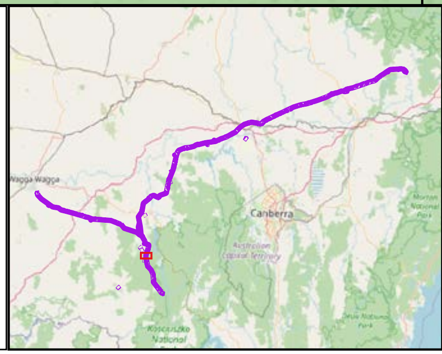
Low

Moderate



Navin Officer heritage consultants Pty Ltd

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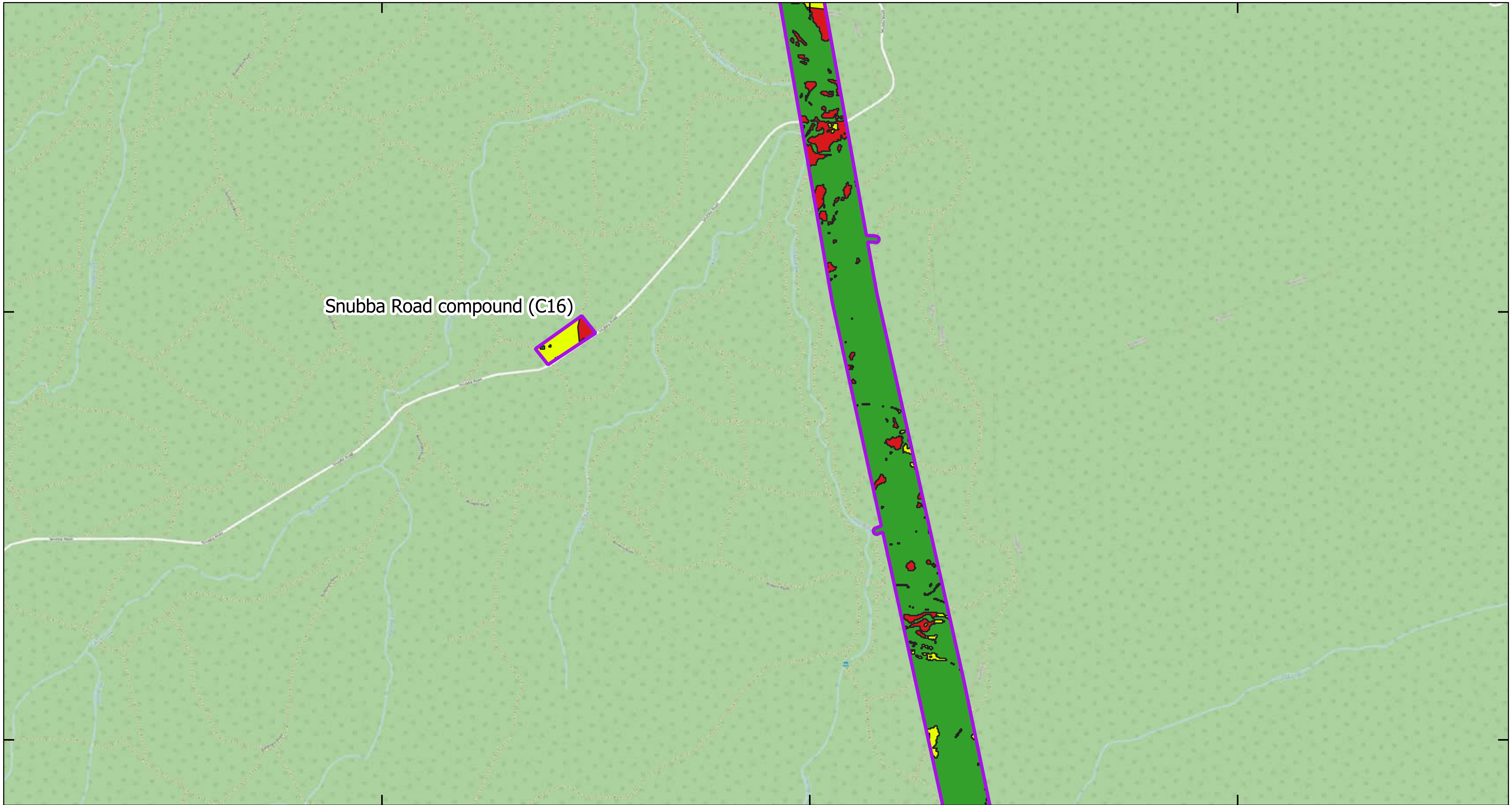

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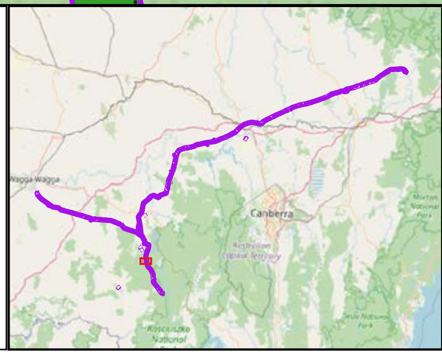

Navin Officer heritage consultants Pty Ltd

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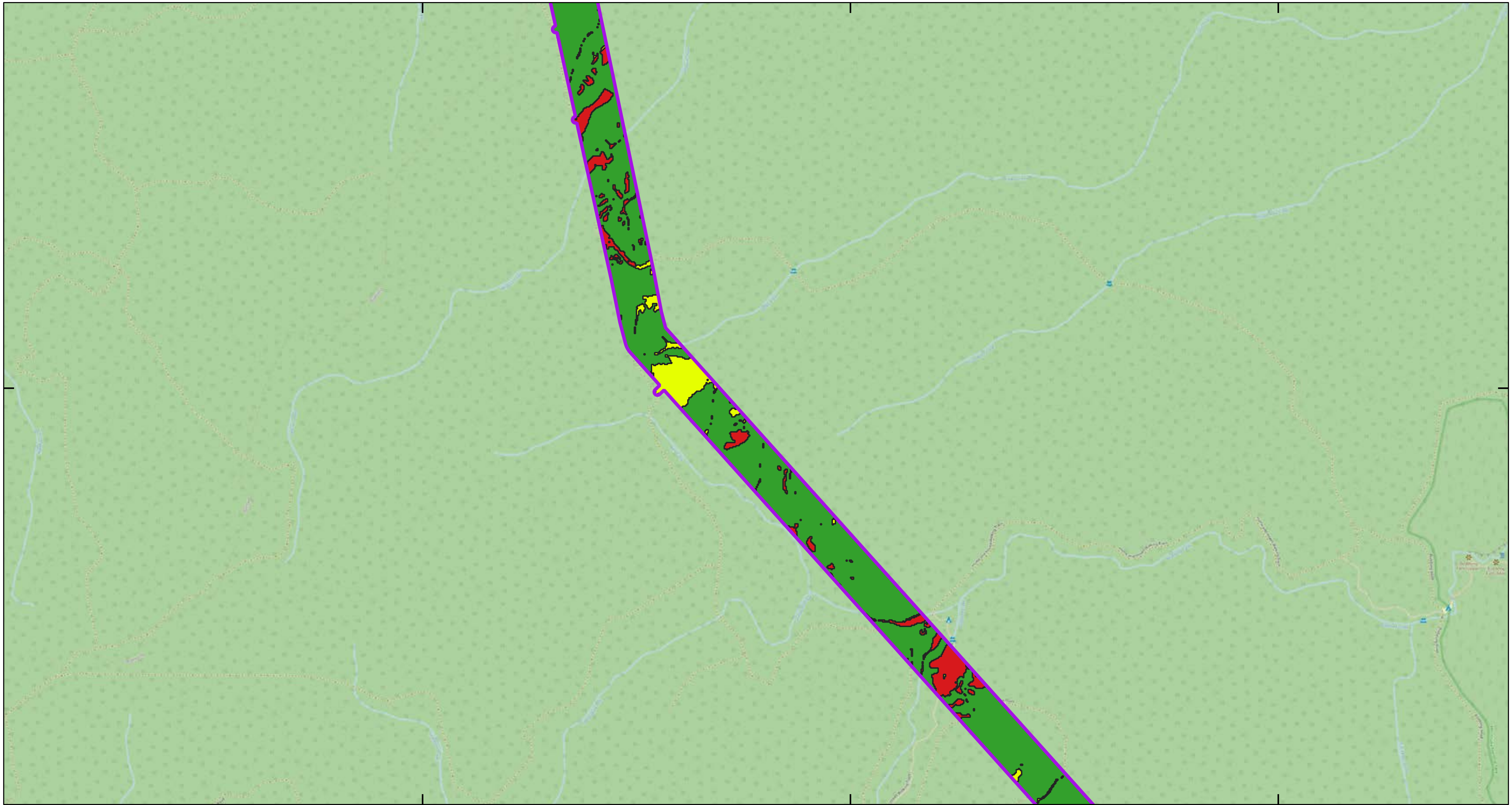

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Project footprint

Archaeological sensitivity

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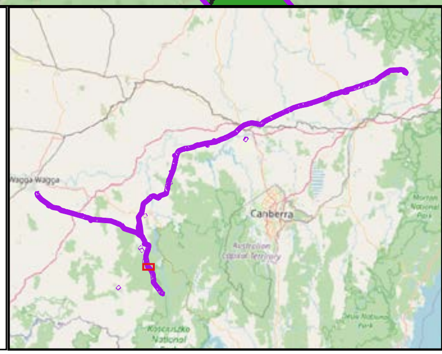

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MGA Zone:
Scale: 1:24,235.648646

Legend

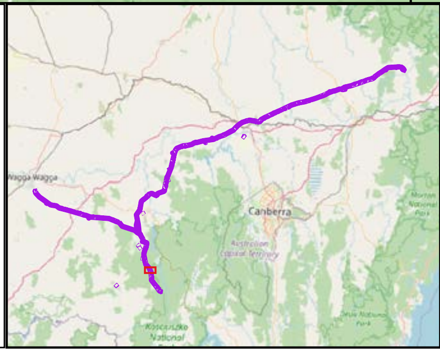
Project footprint

Archaeological sensitivity

High

Low

Moderate



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Legend

Project footprint

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Low

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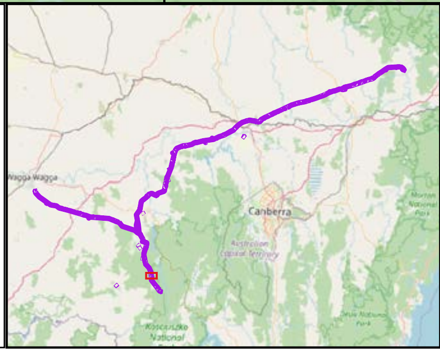

Navin Officer heritage consultants Pty Ltd

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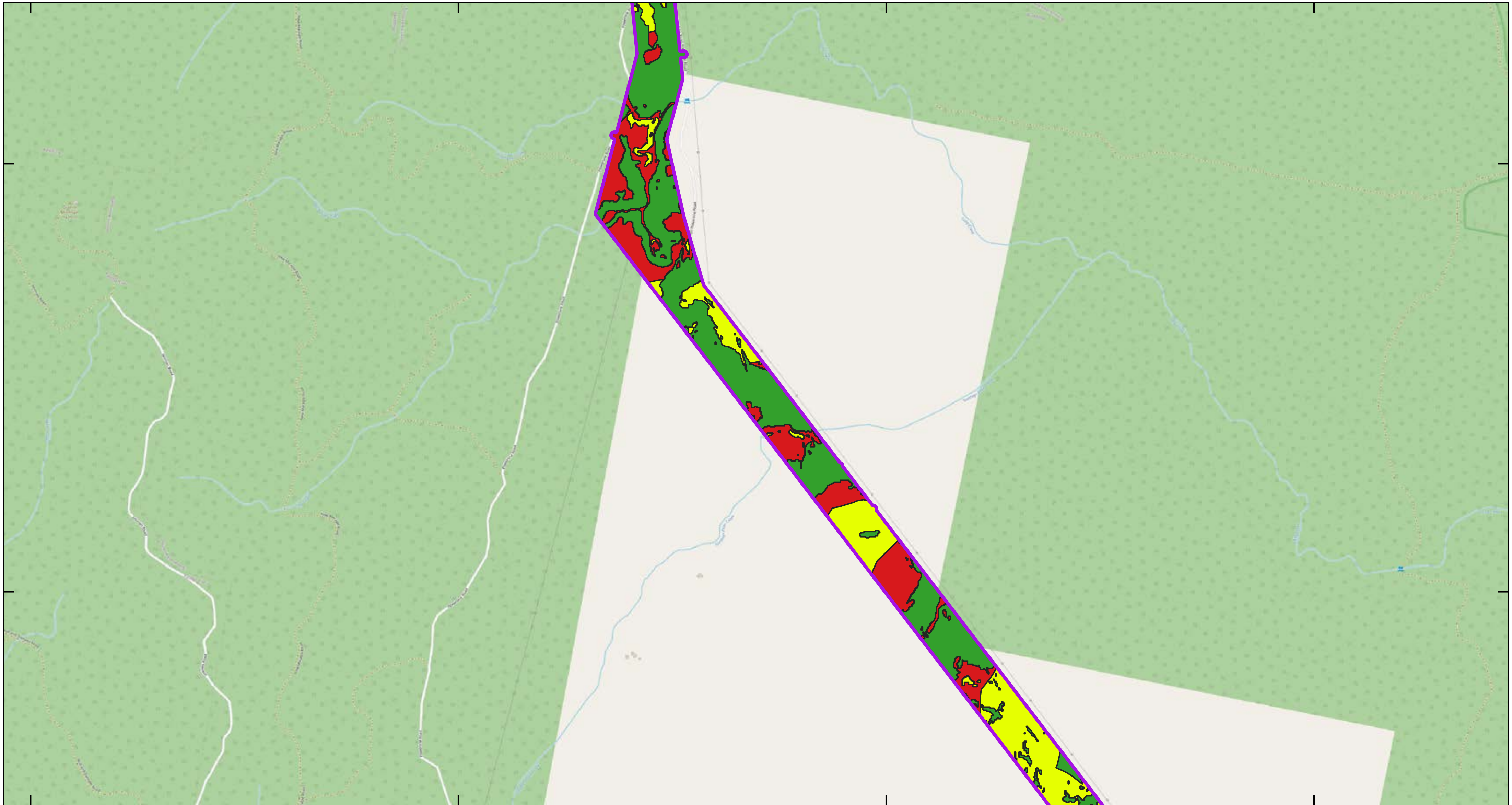
0 500 1,000 m



Humelink

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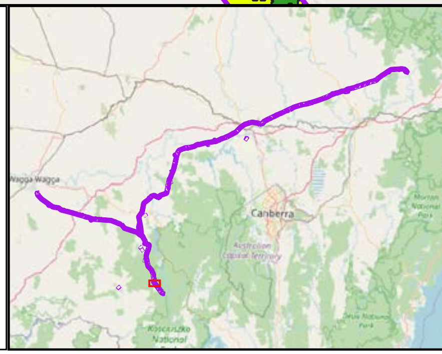
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

Archaeological sensitivity

High
Low
Moderate



Navin Officer
heritage consultants Pty Ltd

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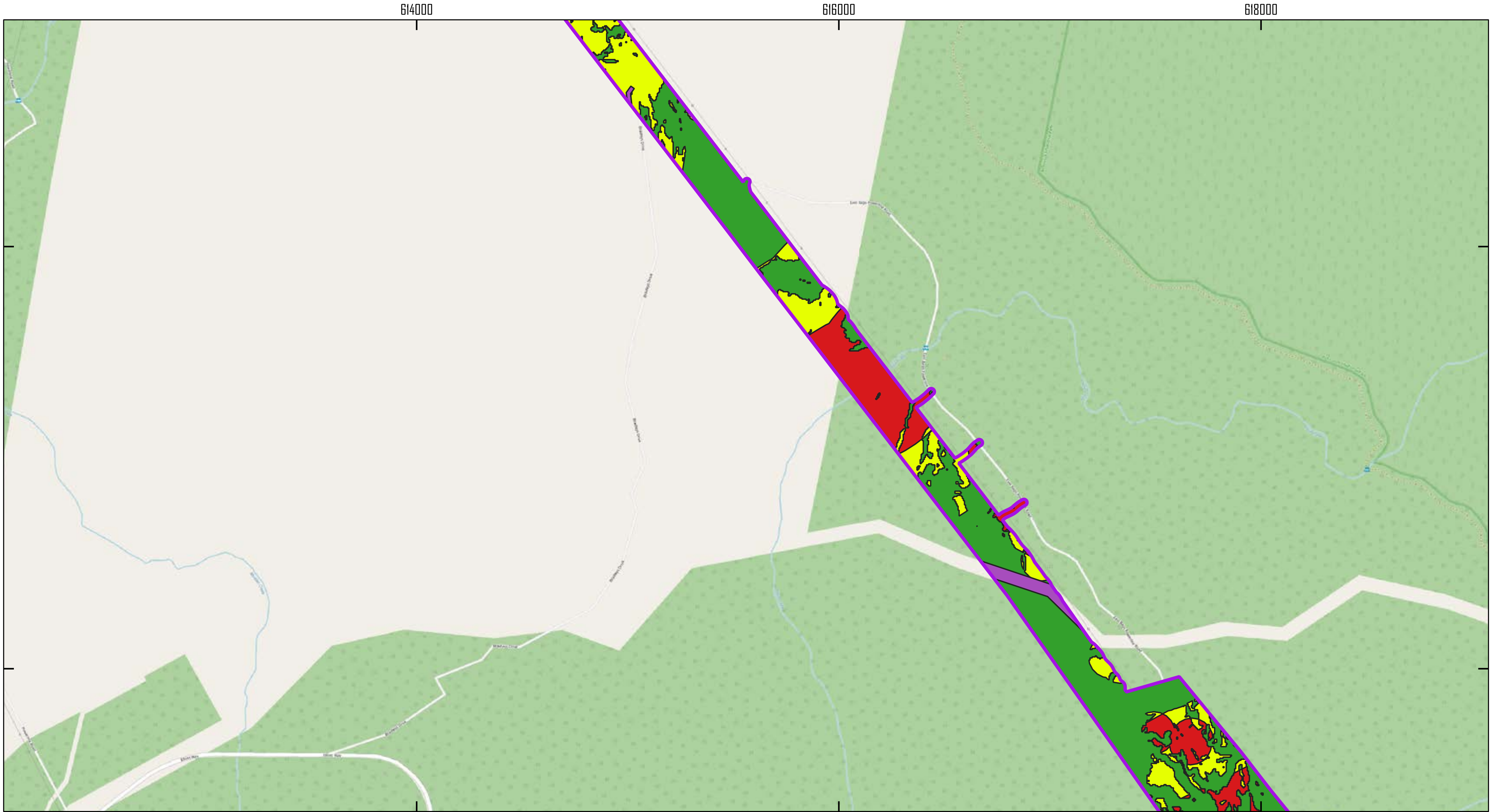
0 500 1,000 m



Humelink

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Projection: GDA2020
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

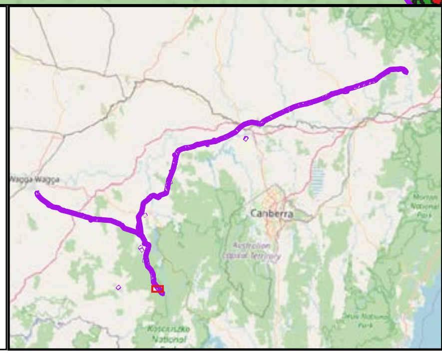
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

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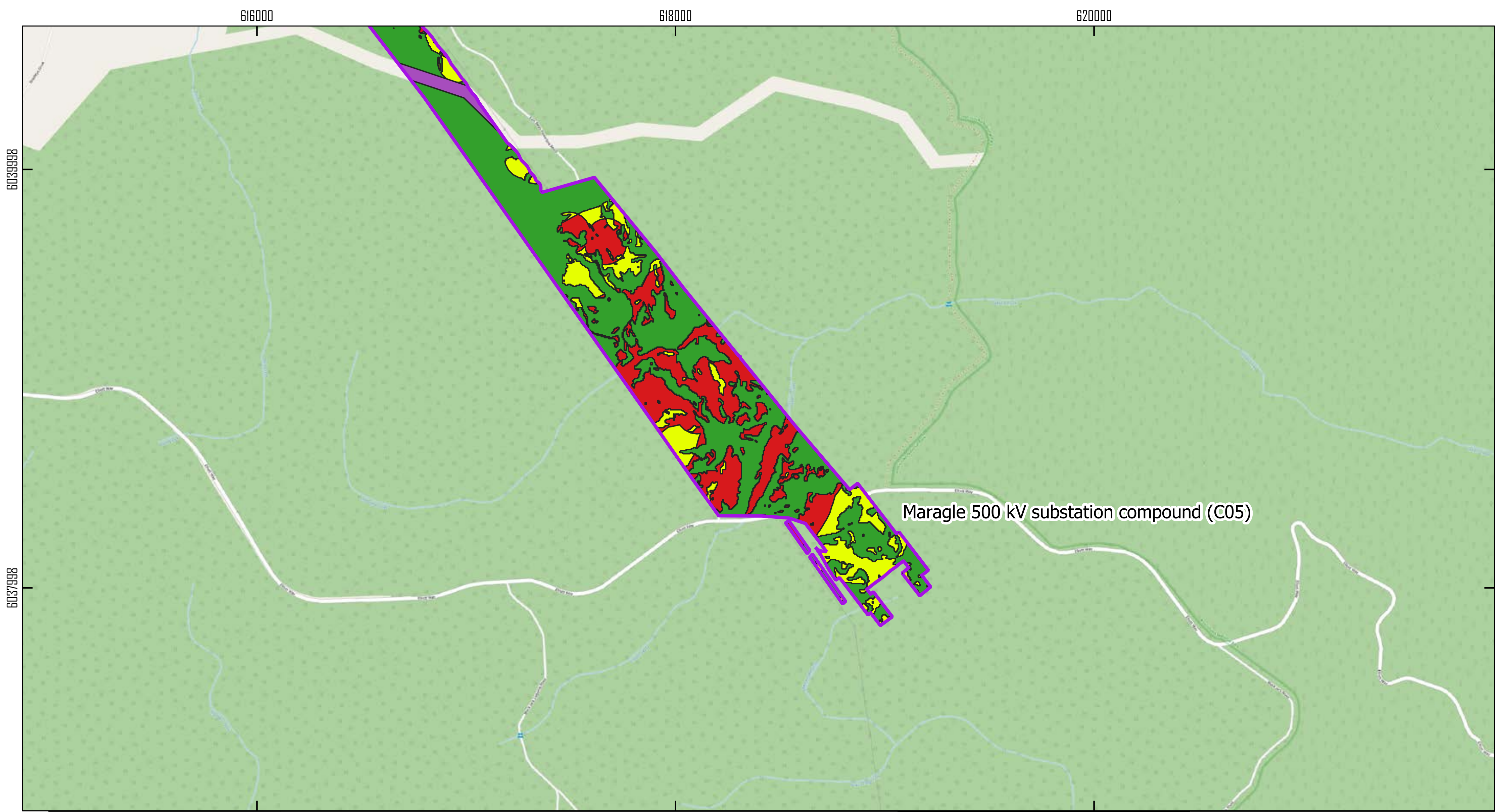
0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

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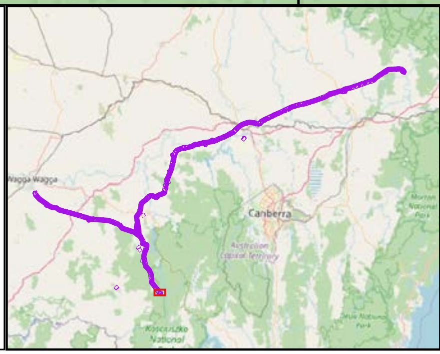
MGA Zone:
Scale: 1:24,235.648646

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

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0 500 1,000 m

Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
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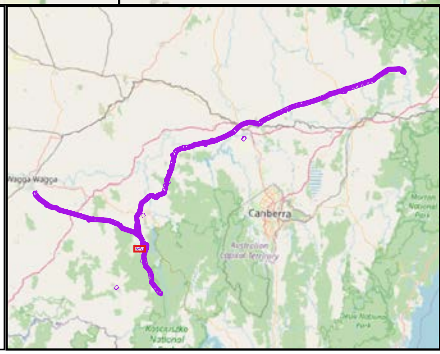
Legend

Project footprint

Archaeological sensitivity

Disturbance

Low



Navin Officer heritage consultants Pty Ltd

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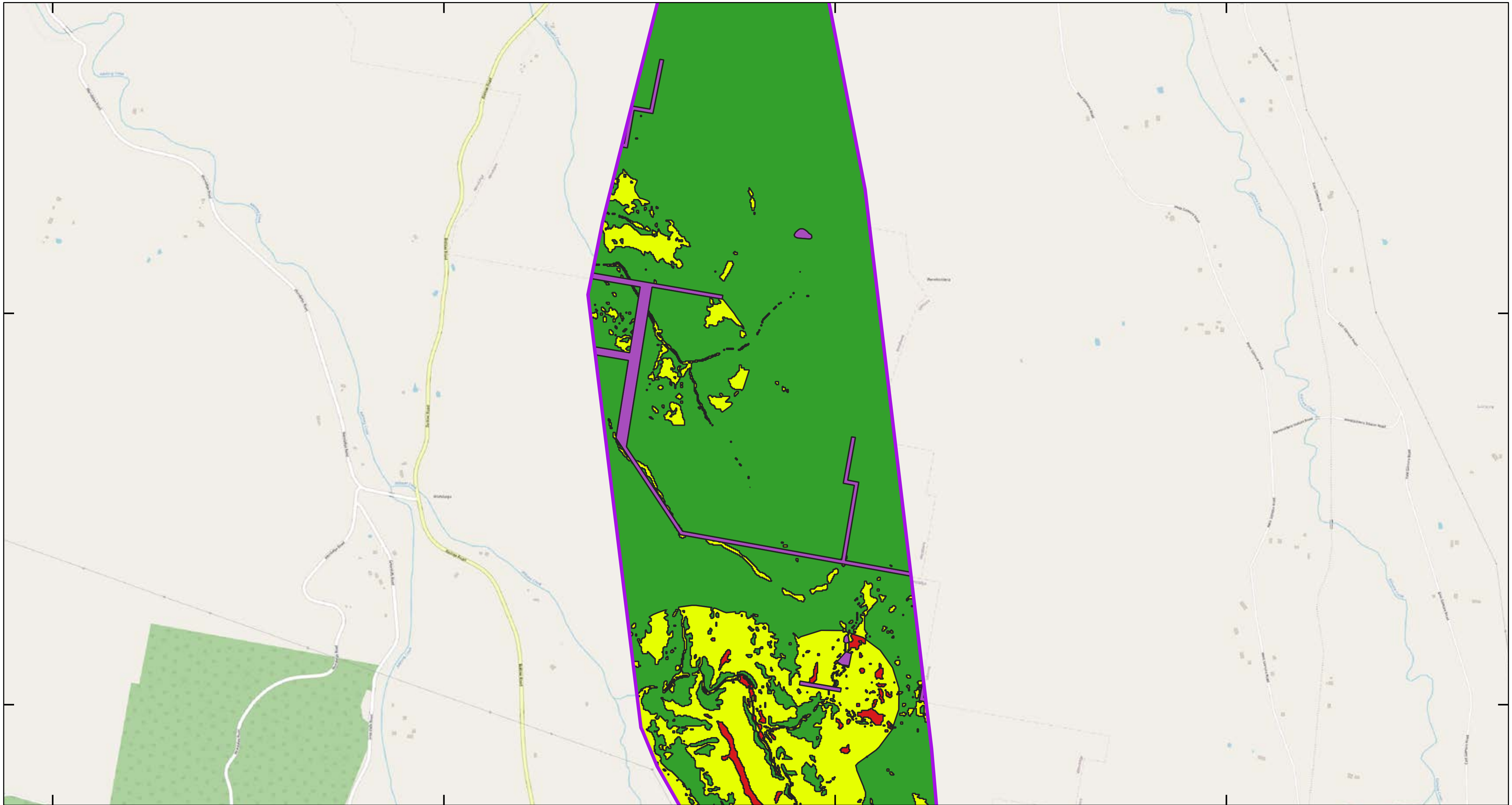


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

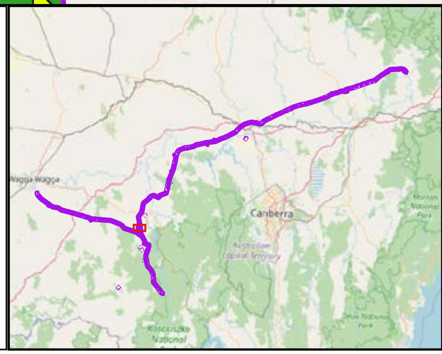
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

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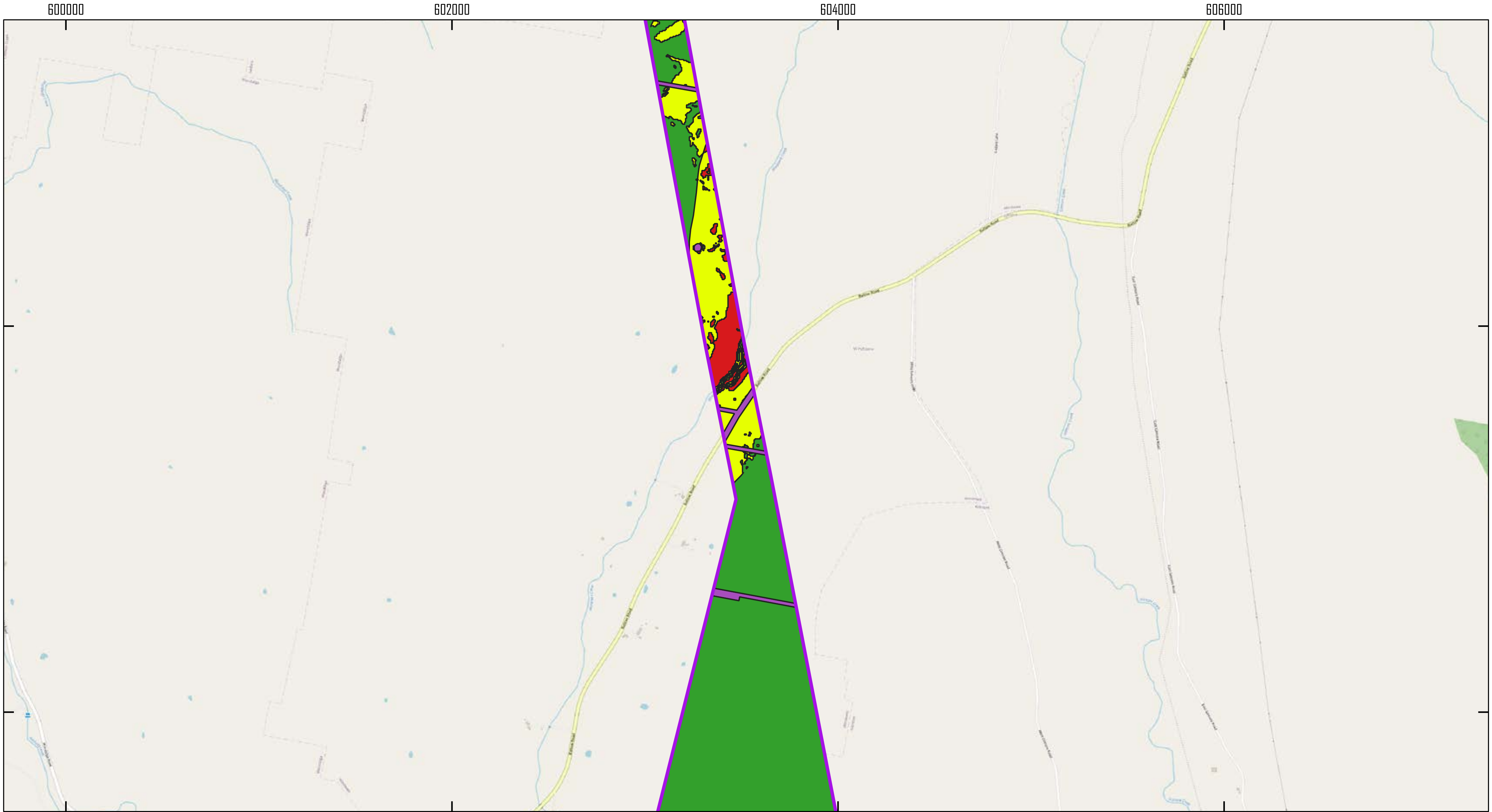

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Legend

Project footprint

Archaeological sensitivity

- Disturbance
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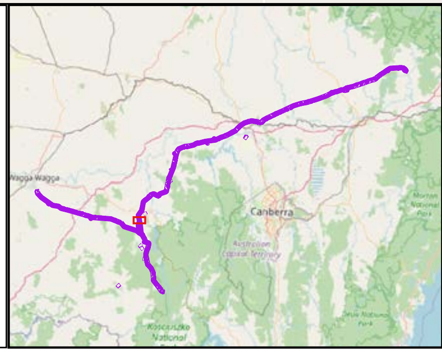
- Moderate



Navin Officer heritage consultants Pty Ltd

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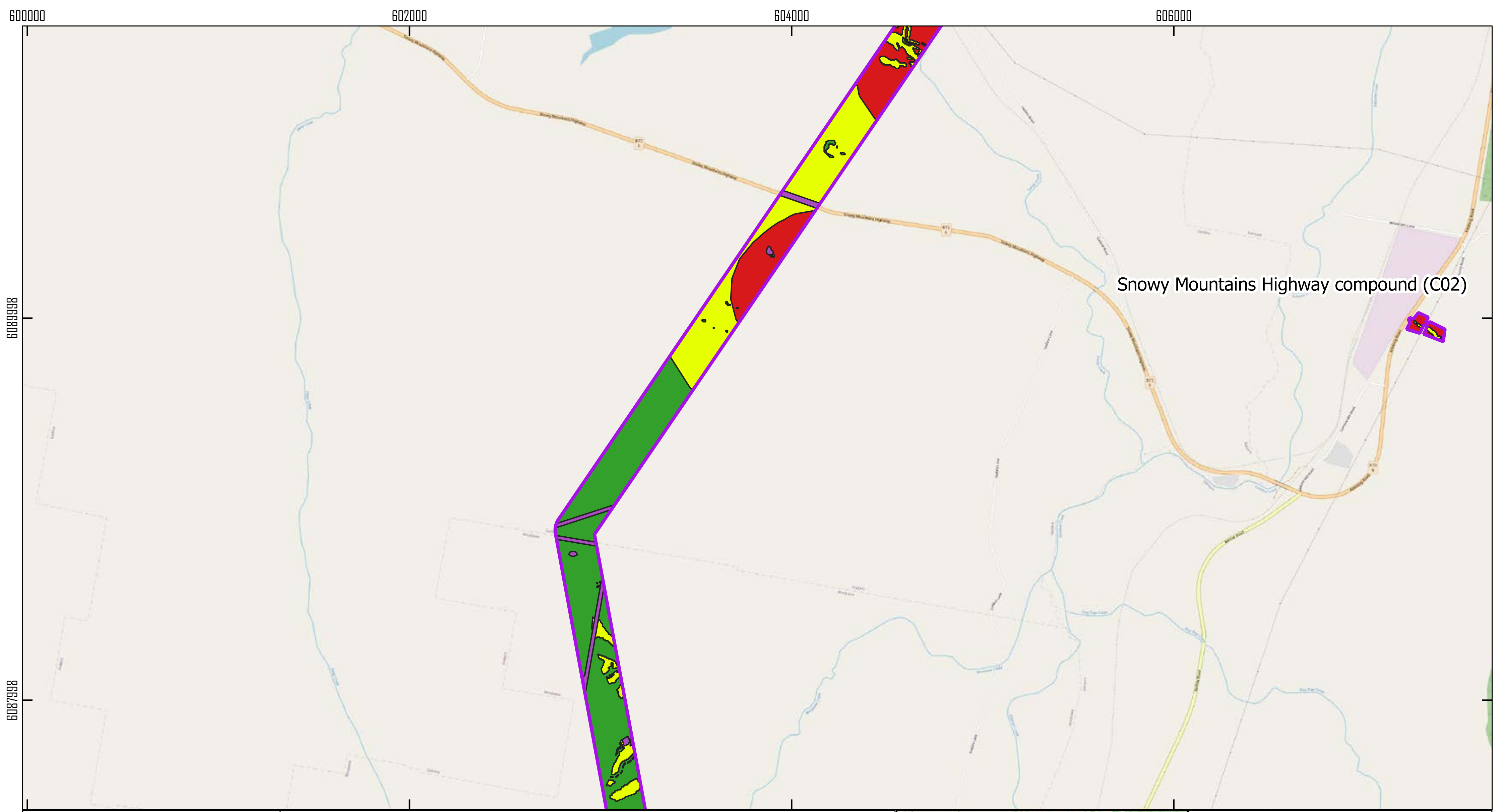
0 500 1,000 m



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Project footprint

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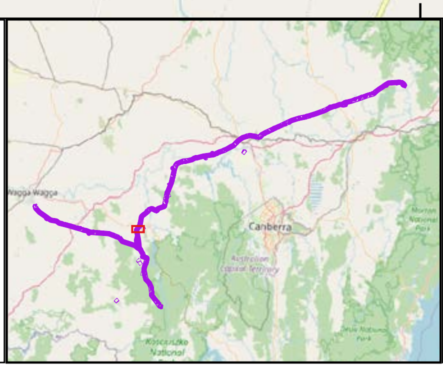
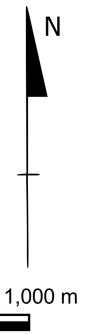
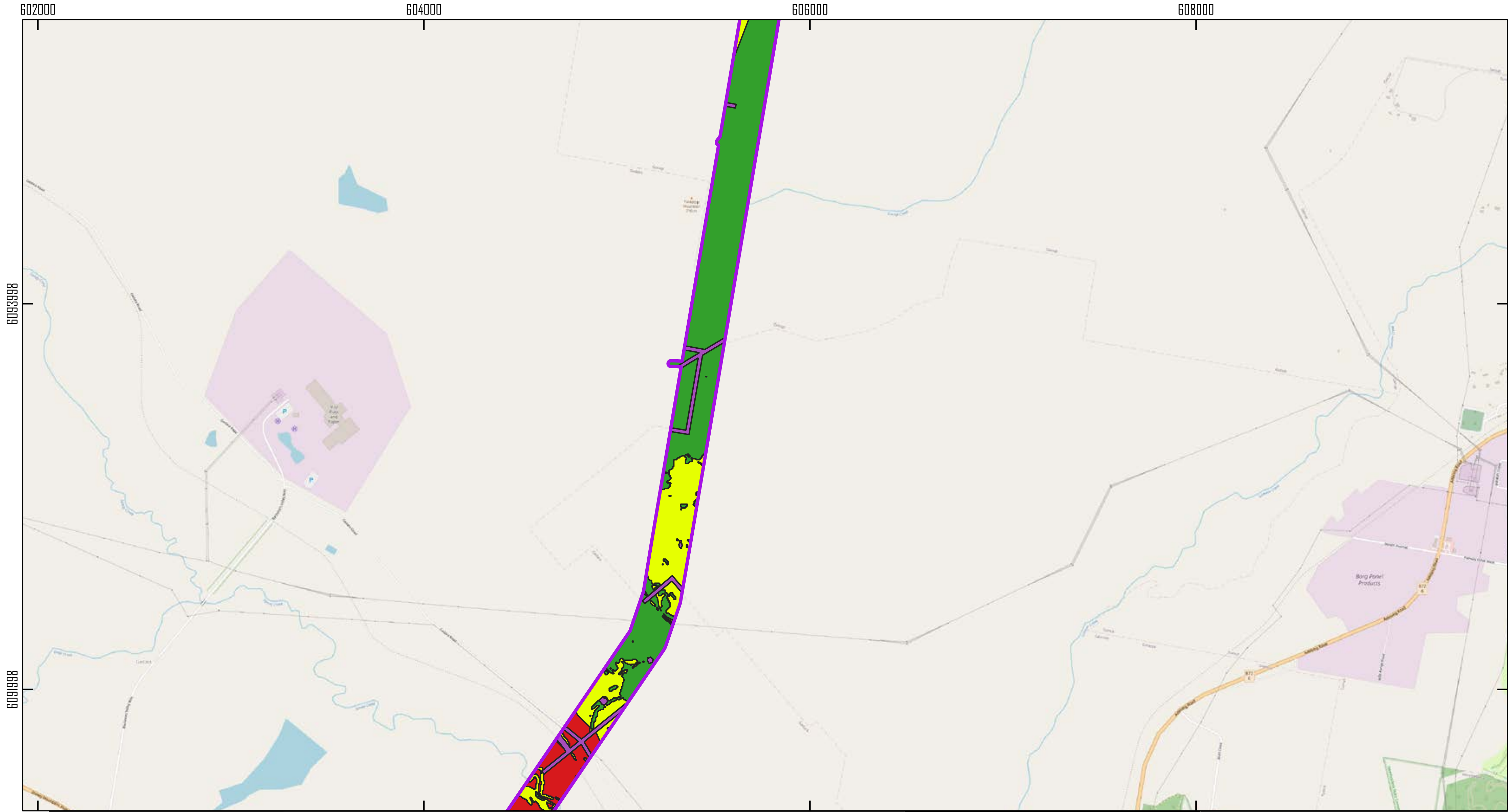


Navin Officer heritage consultants Pty Ltd





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Project footprint

Archaeological sensitivity

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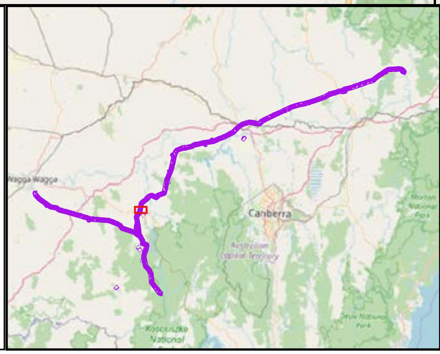

Navin Officer heritage consultants Pty Ltd

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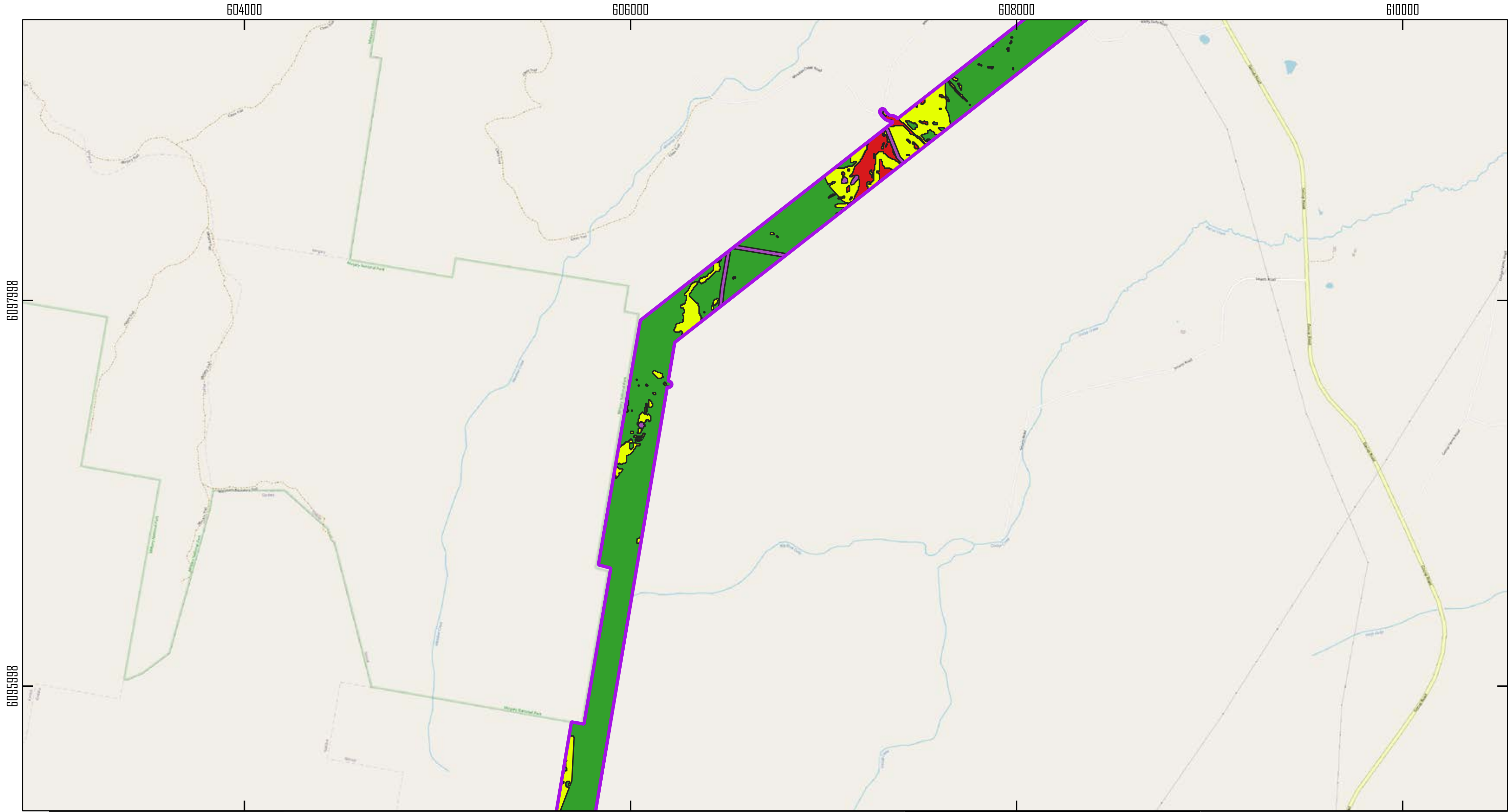

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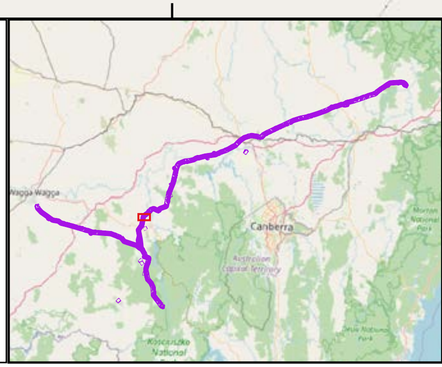

Navin Officer *heritage consultants* Pty Ltd

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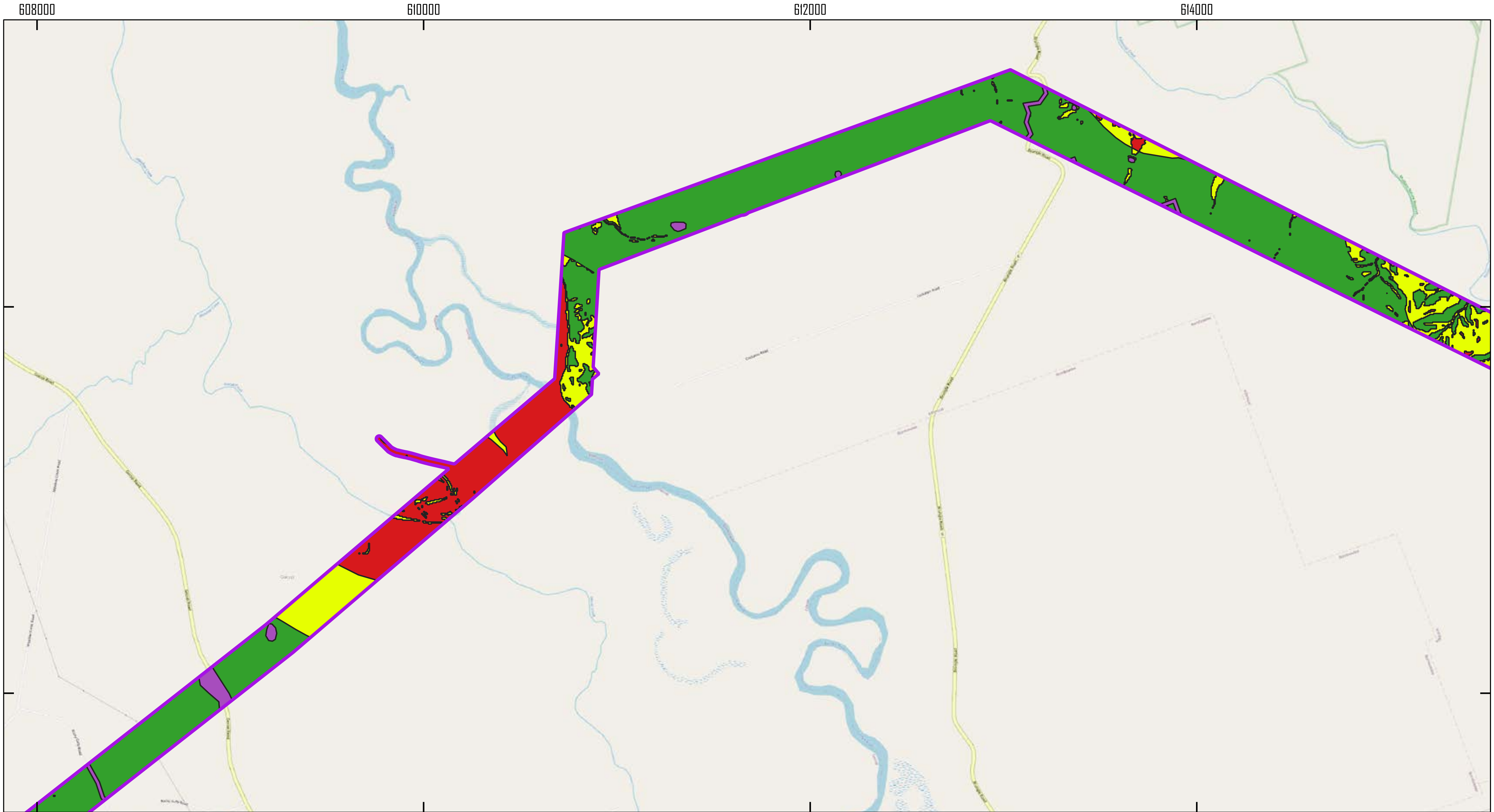
0 500 1,000 m



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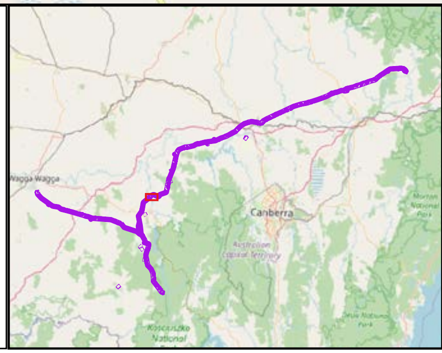

Navin Officer heritage consultants Pty Ltd

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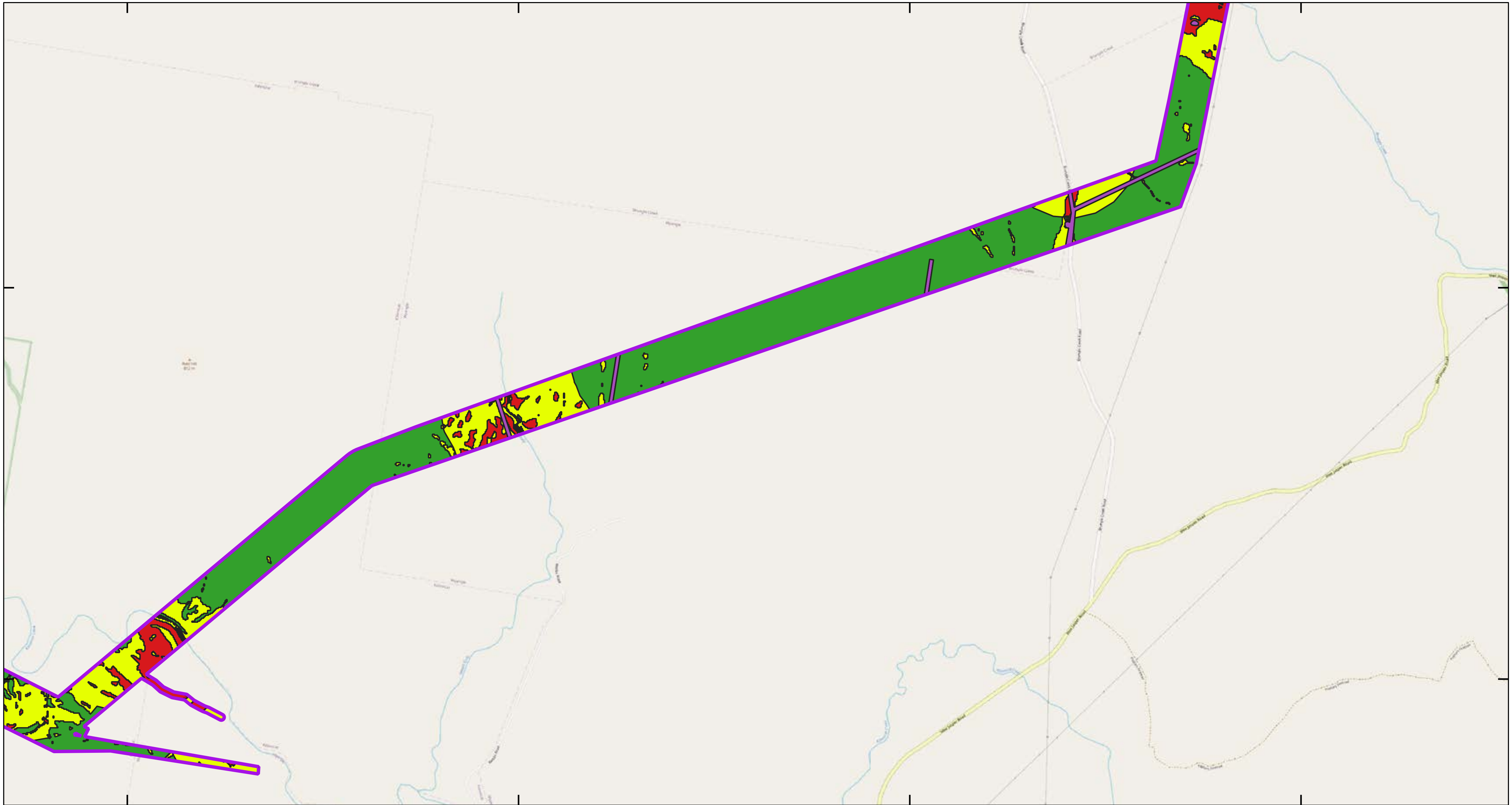

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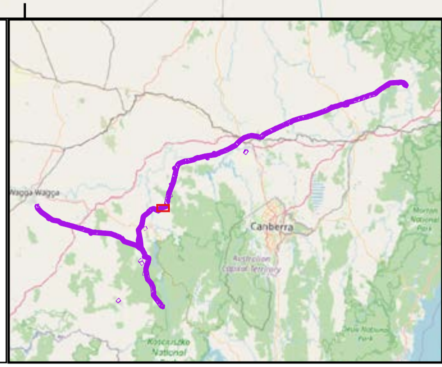

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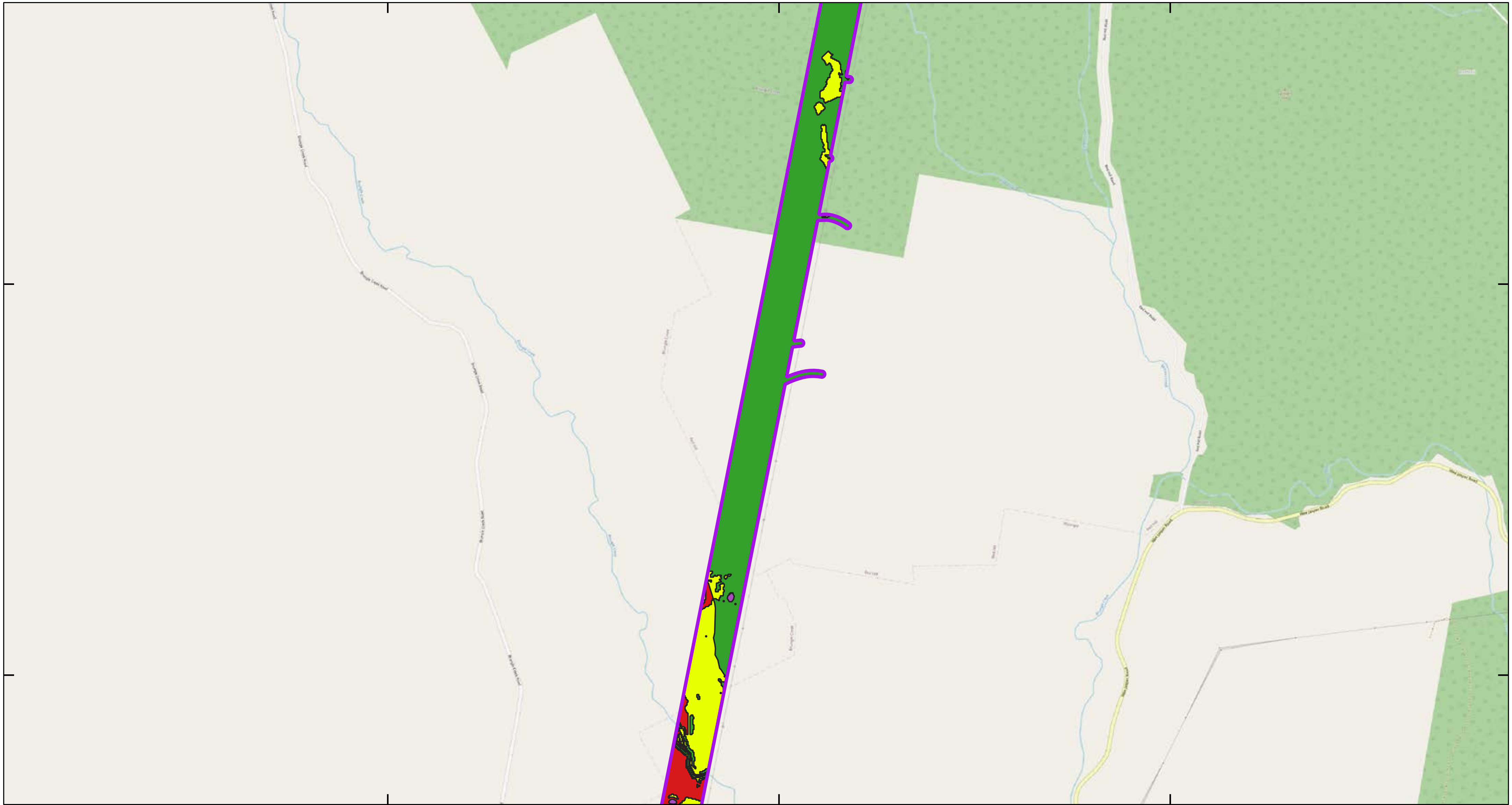

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Project footprint

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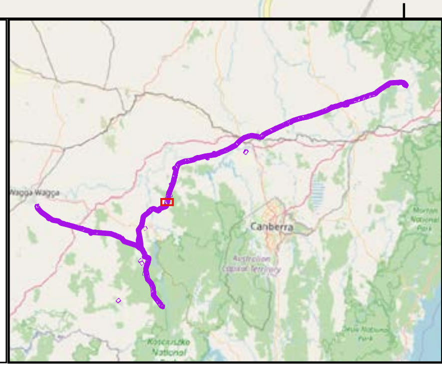

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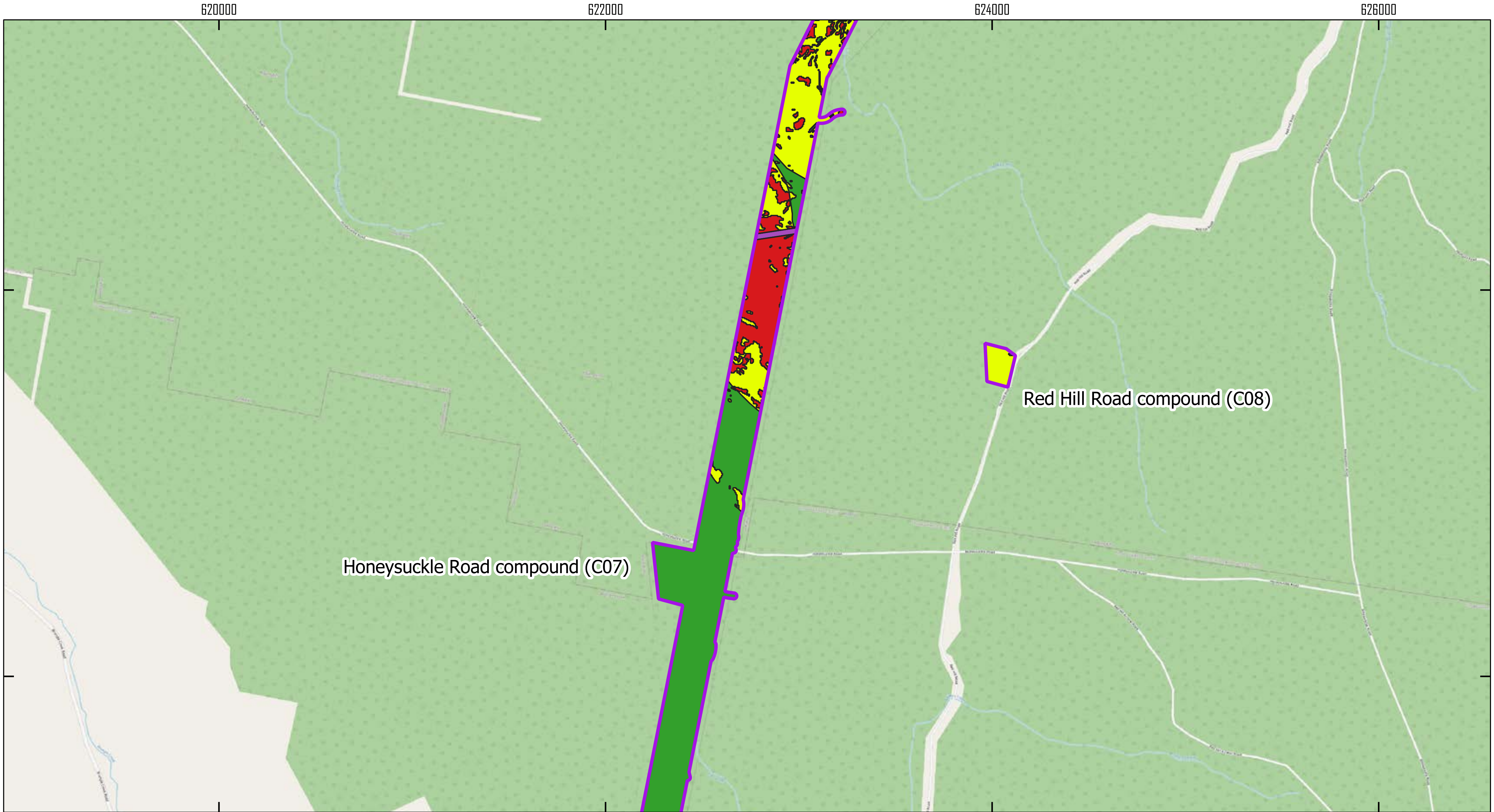

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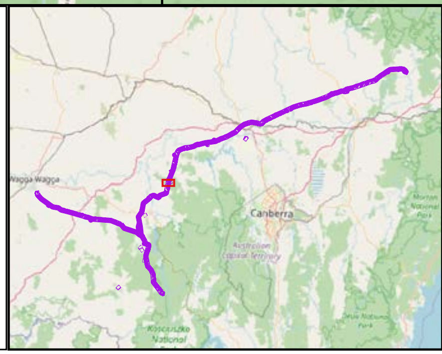

Navin Officer heritage consultants Pty Ltd

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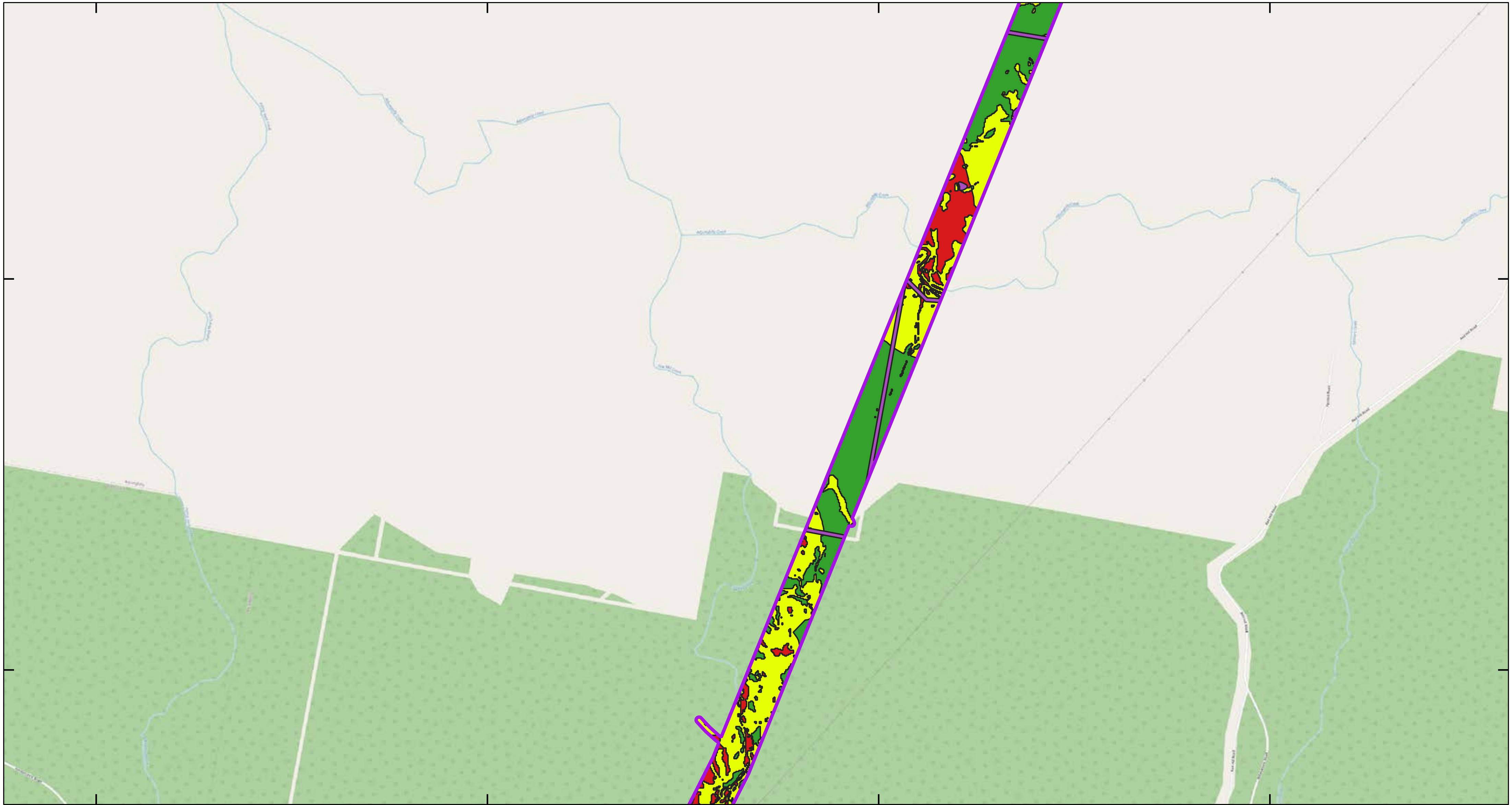

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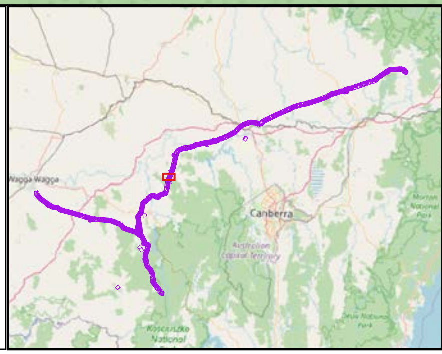

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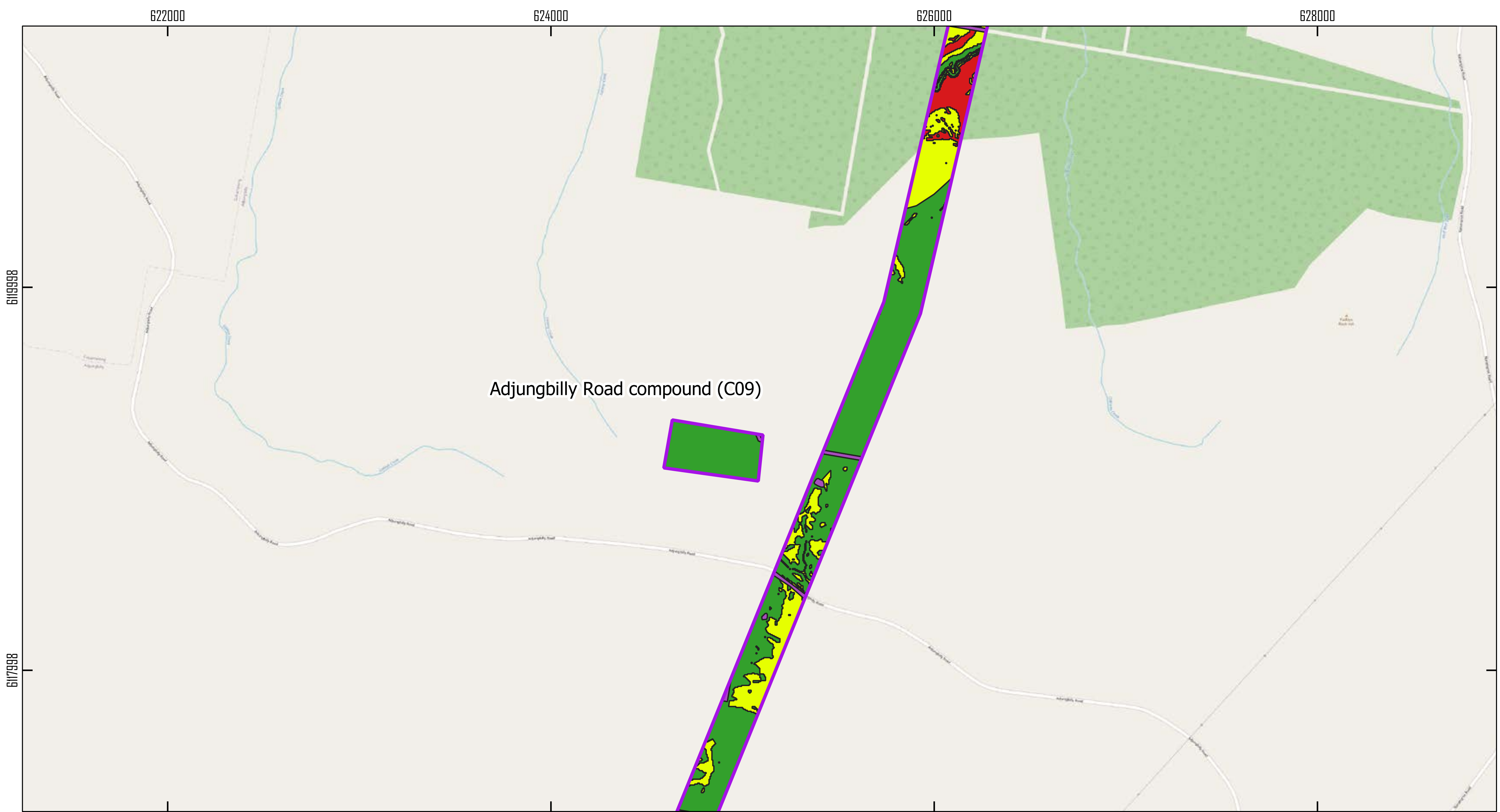

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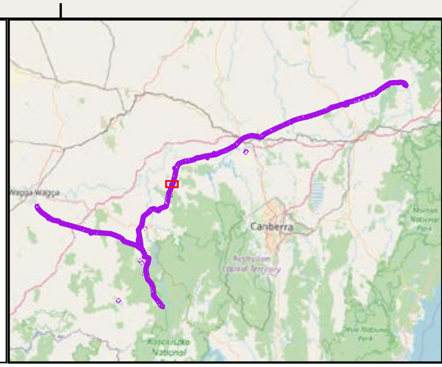
Moderate



Navin Officer heritage consultants Pty Ltd

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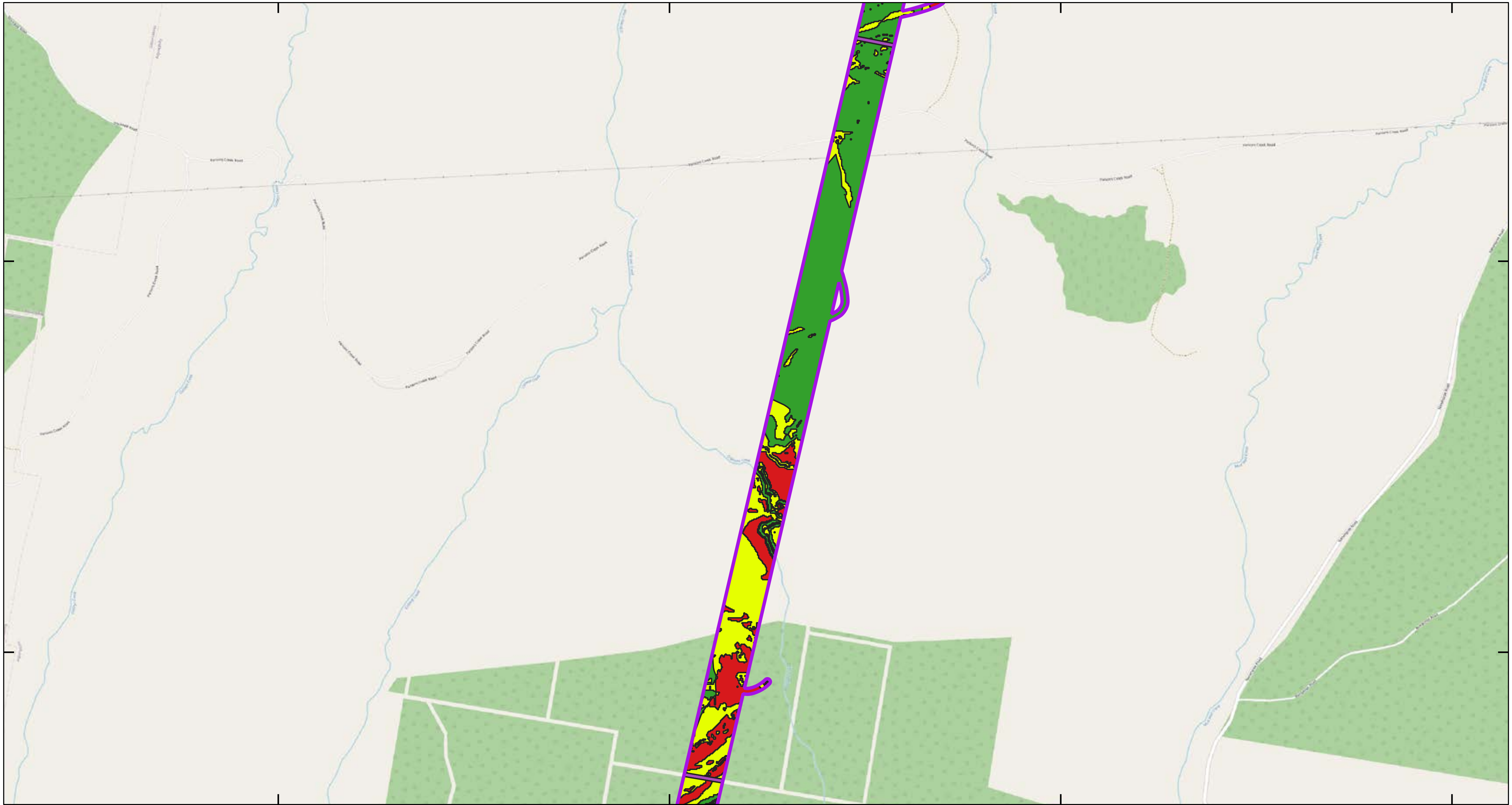


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

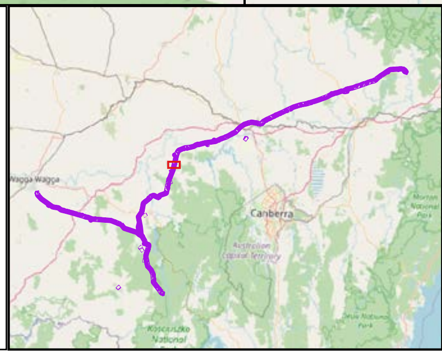
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

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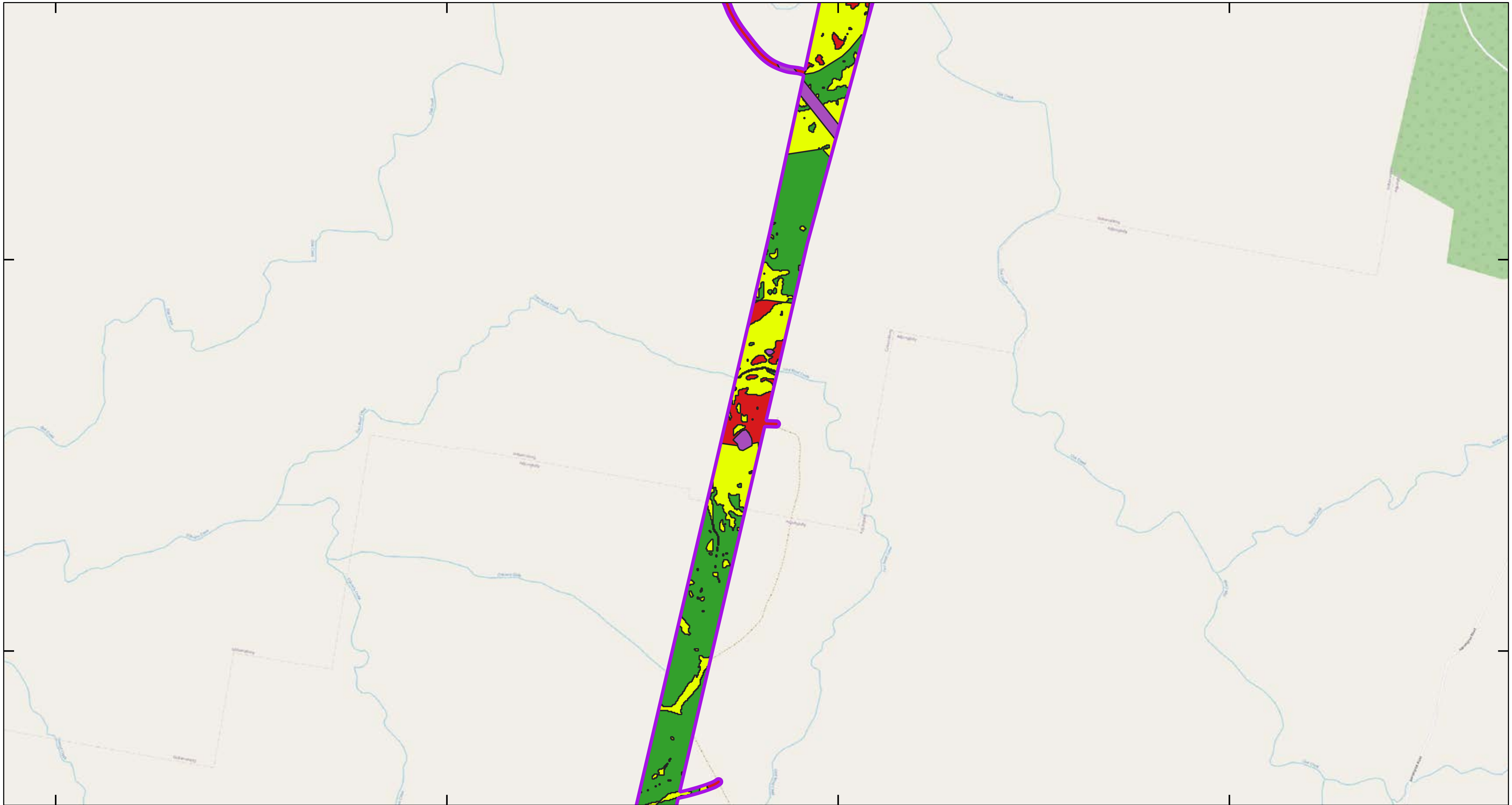


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

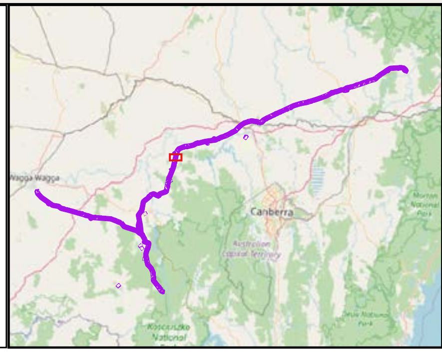
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer
heritage consultants Pty Ltd

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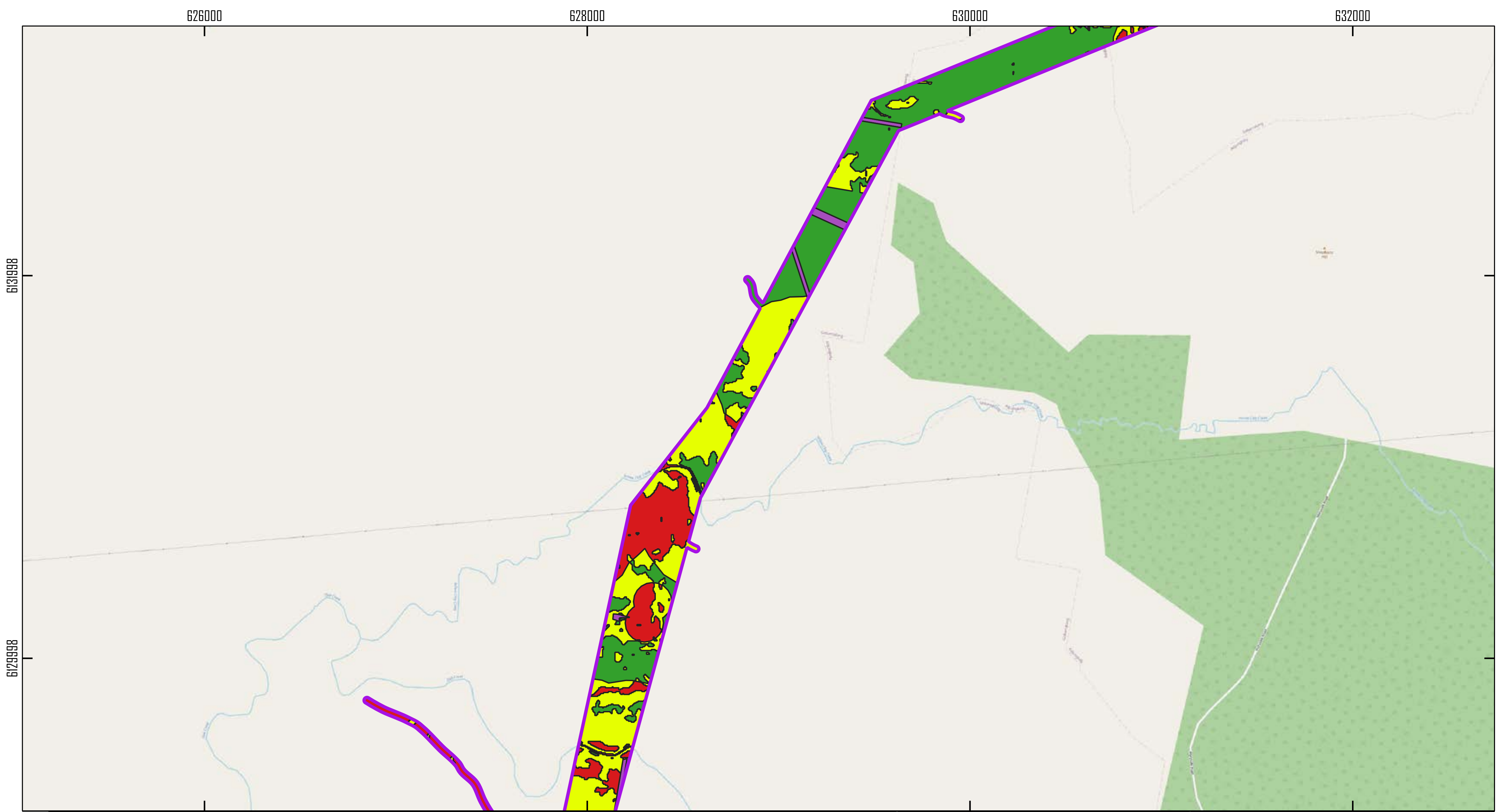

Humelink

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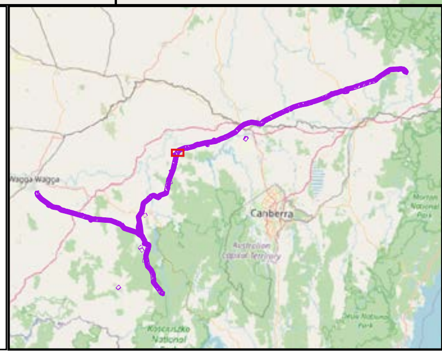
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

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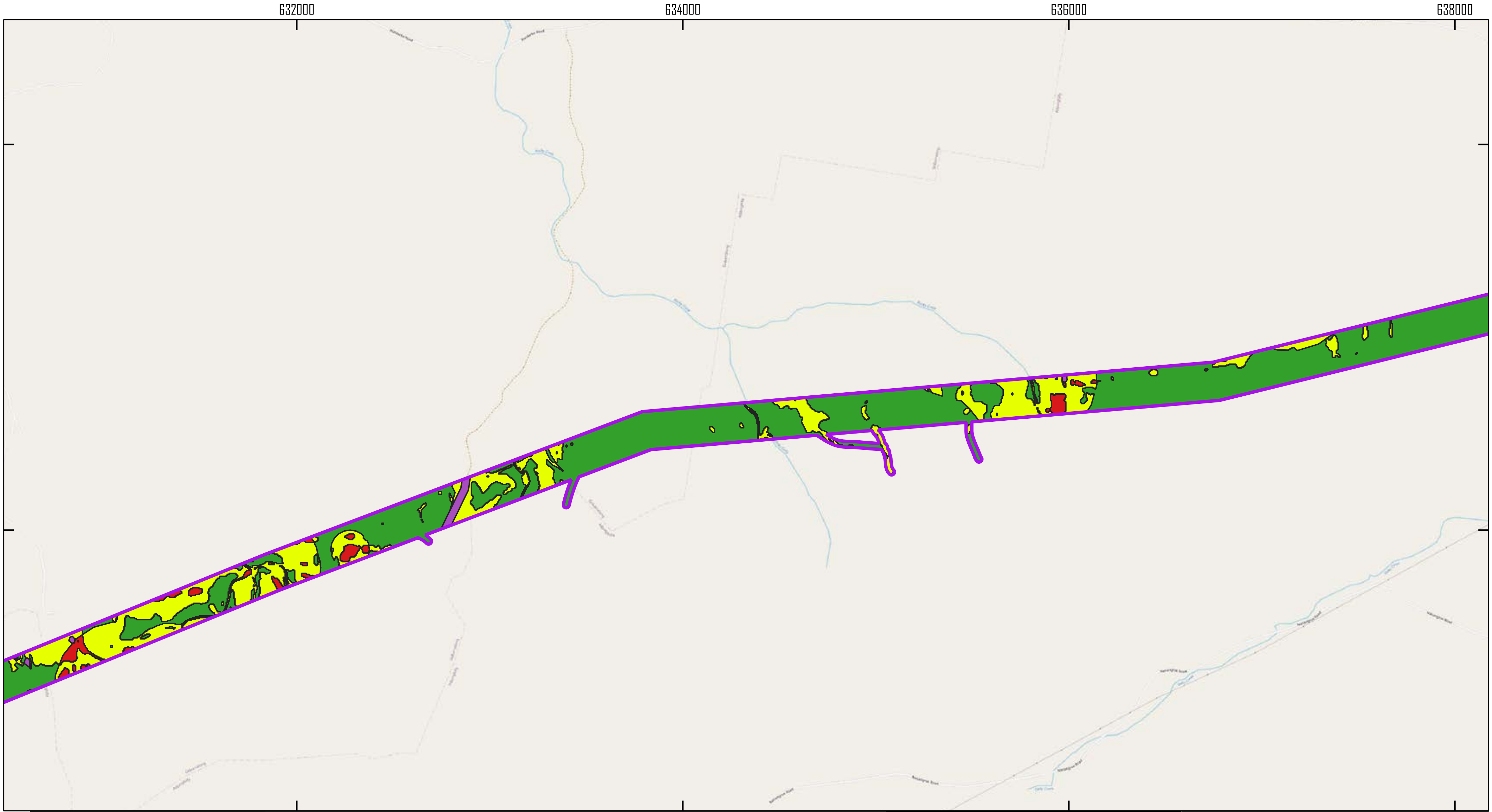

Humelink

NSW Data Service
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Author: Nicola Hayes

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MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

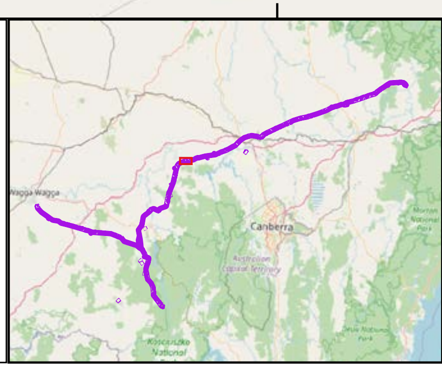
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

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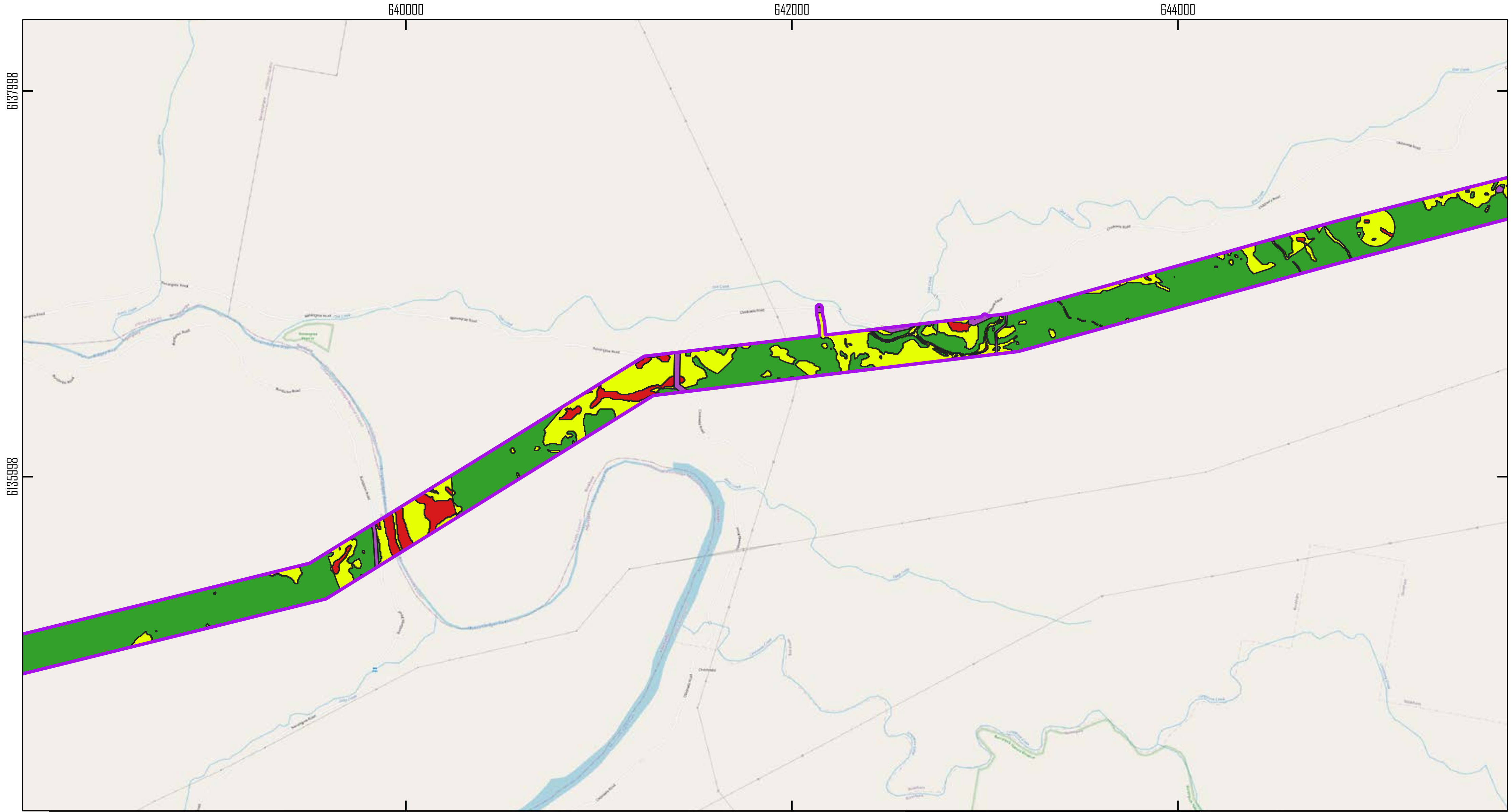


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

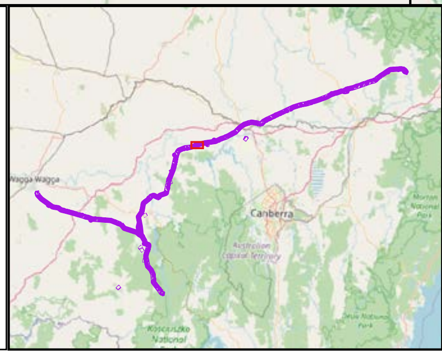
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

N

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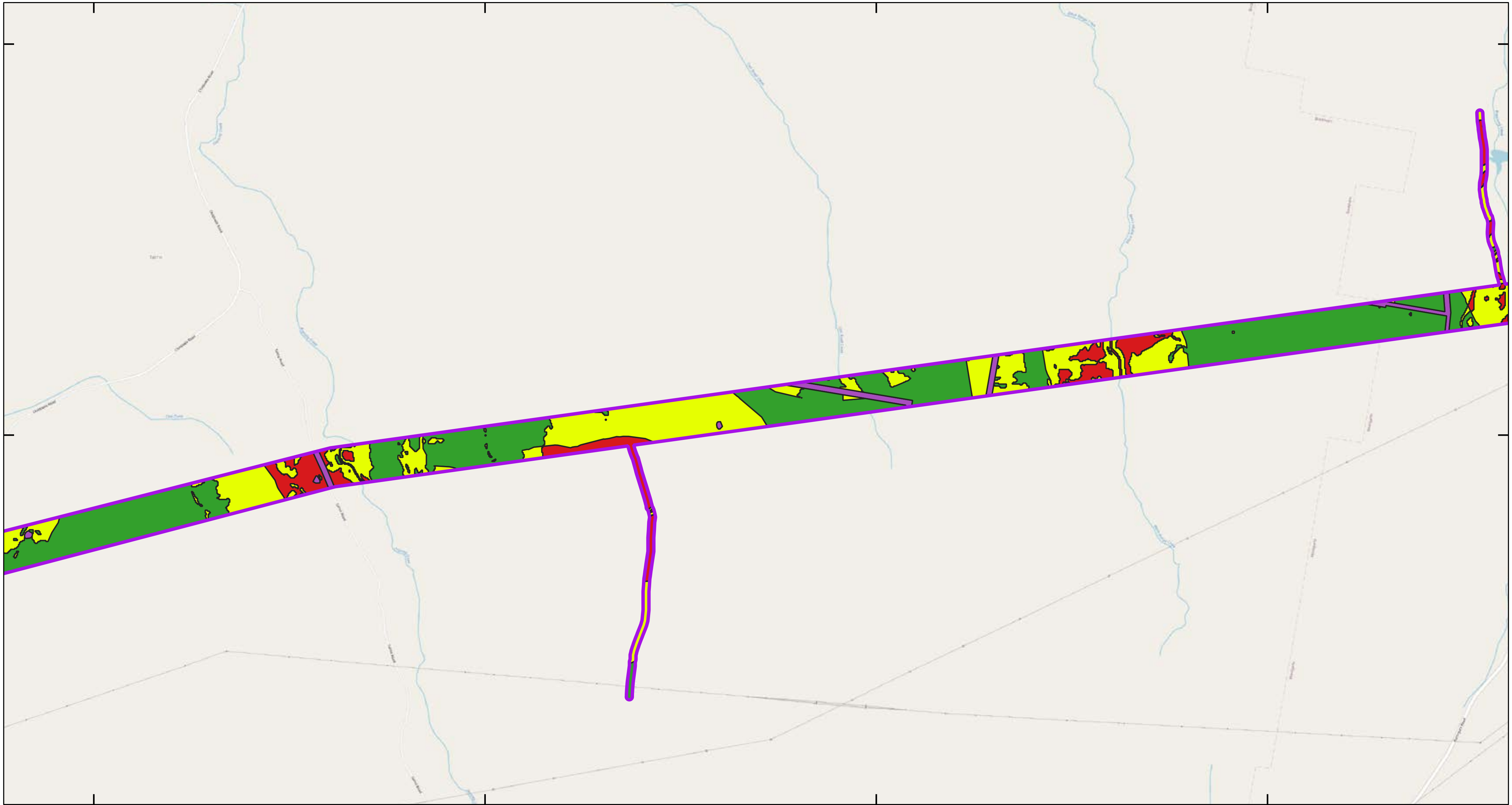


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

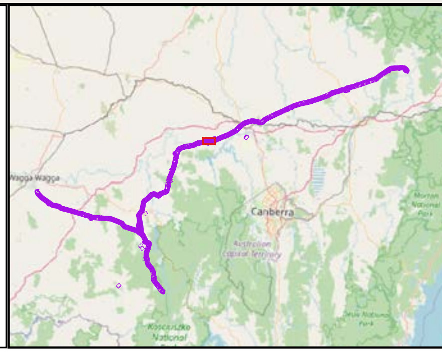
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

N

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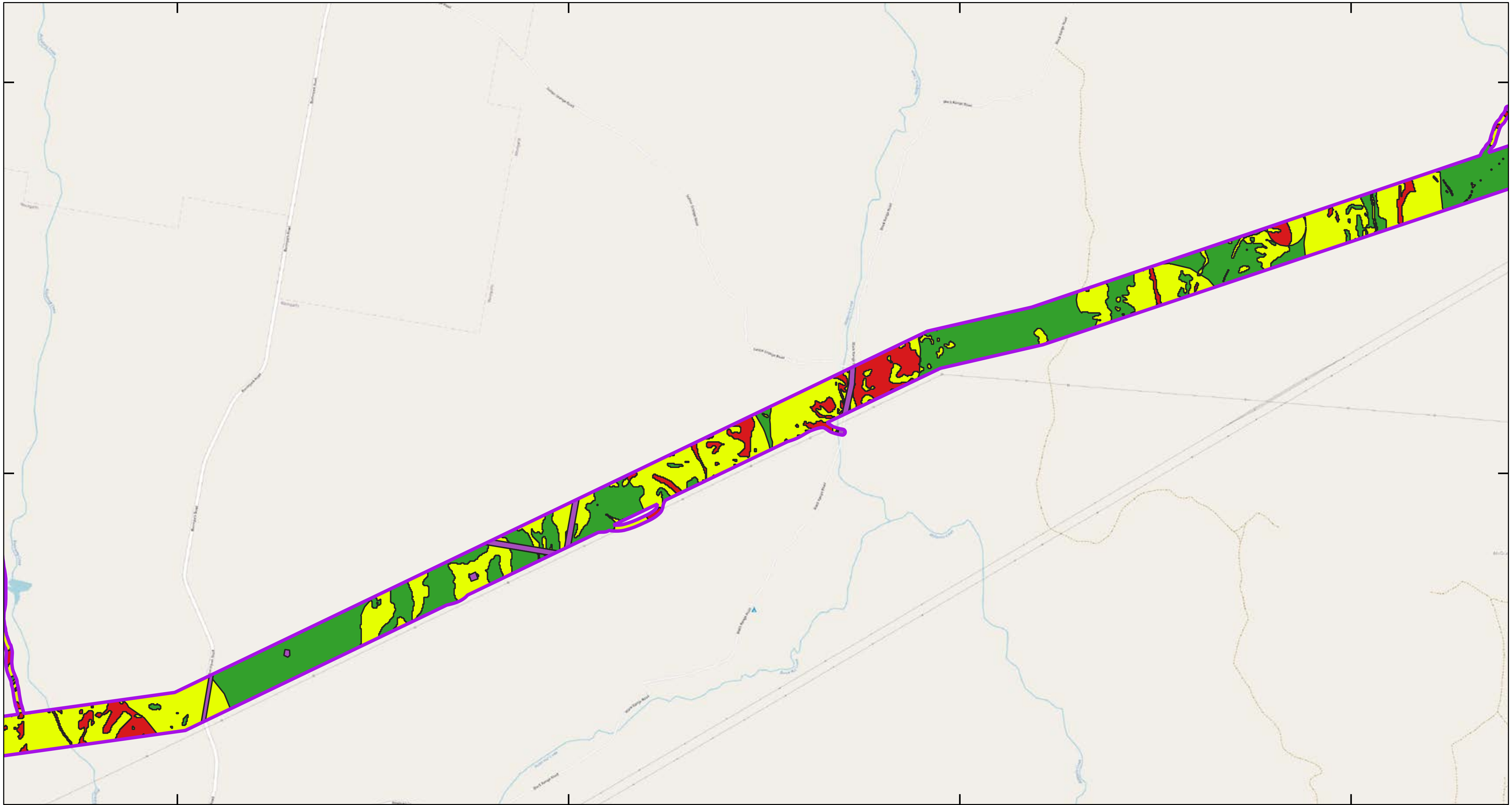


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

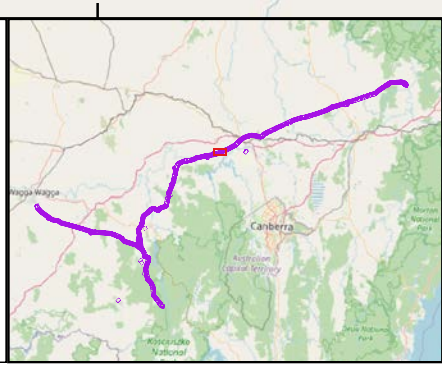
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer
heritage consultants Pty Ltd

N

0 500 1,000 m

Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

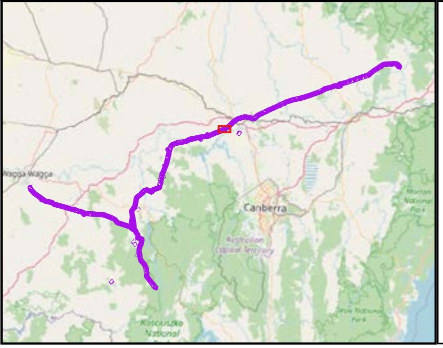
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

N

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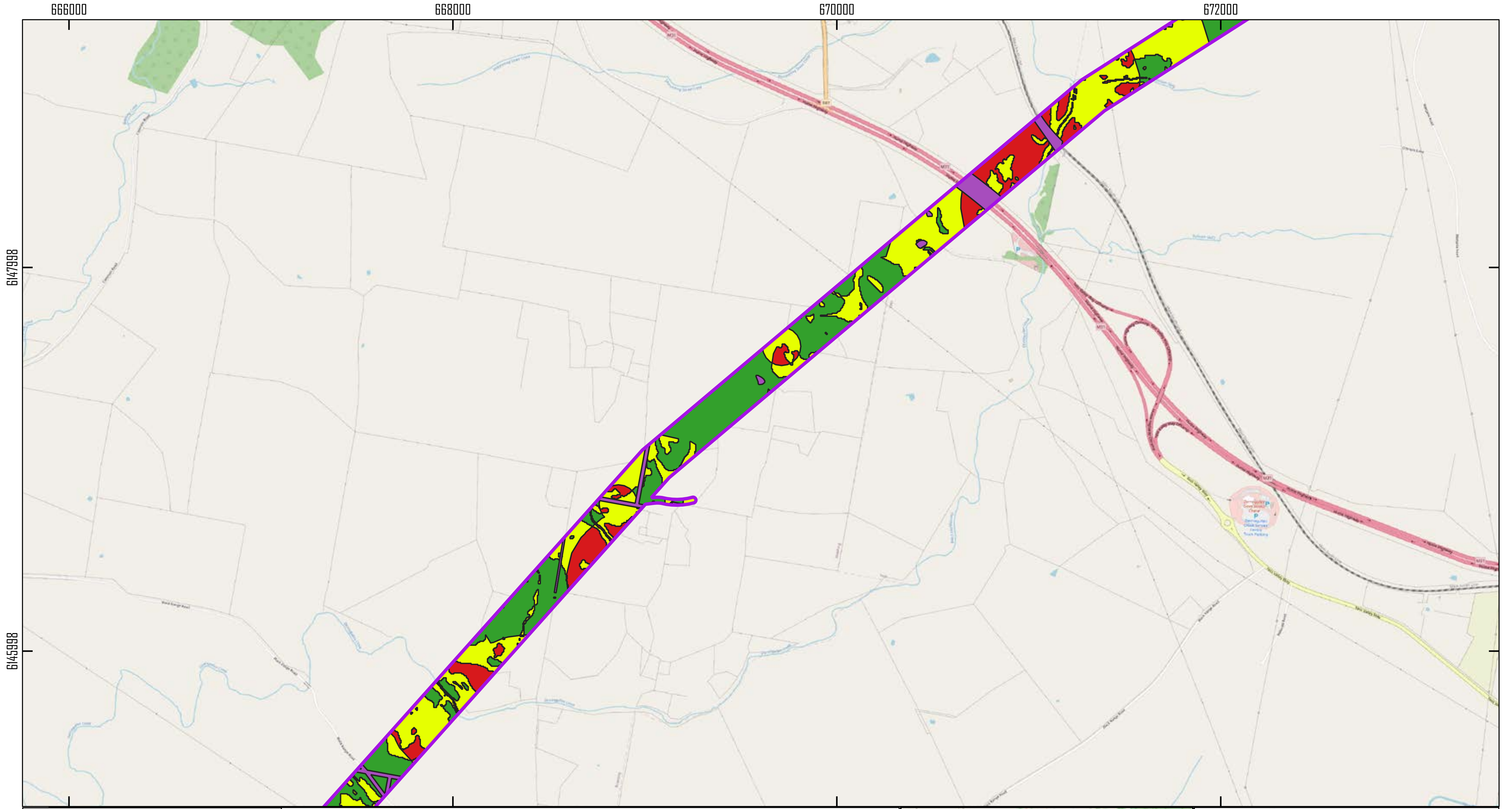


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

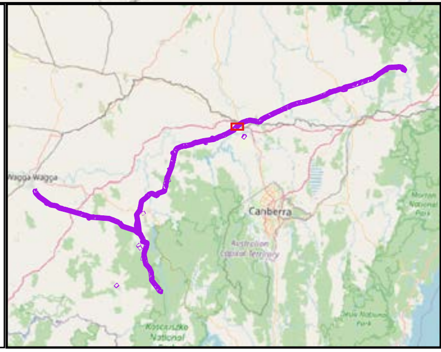
Archaeological sensitivity

Disturbance

High

Low

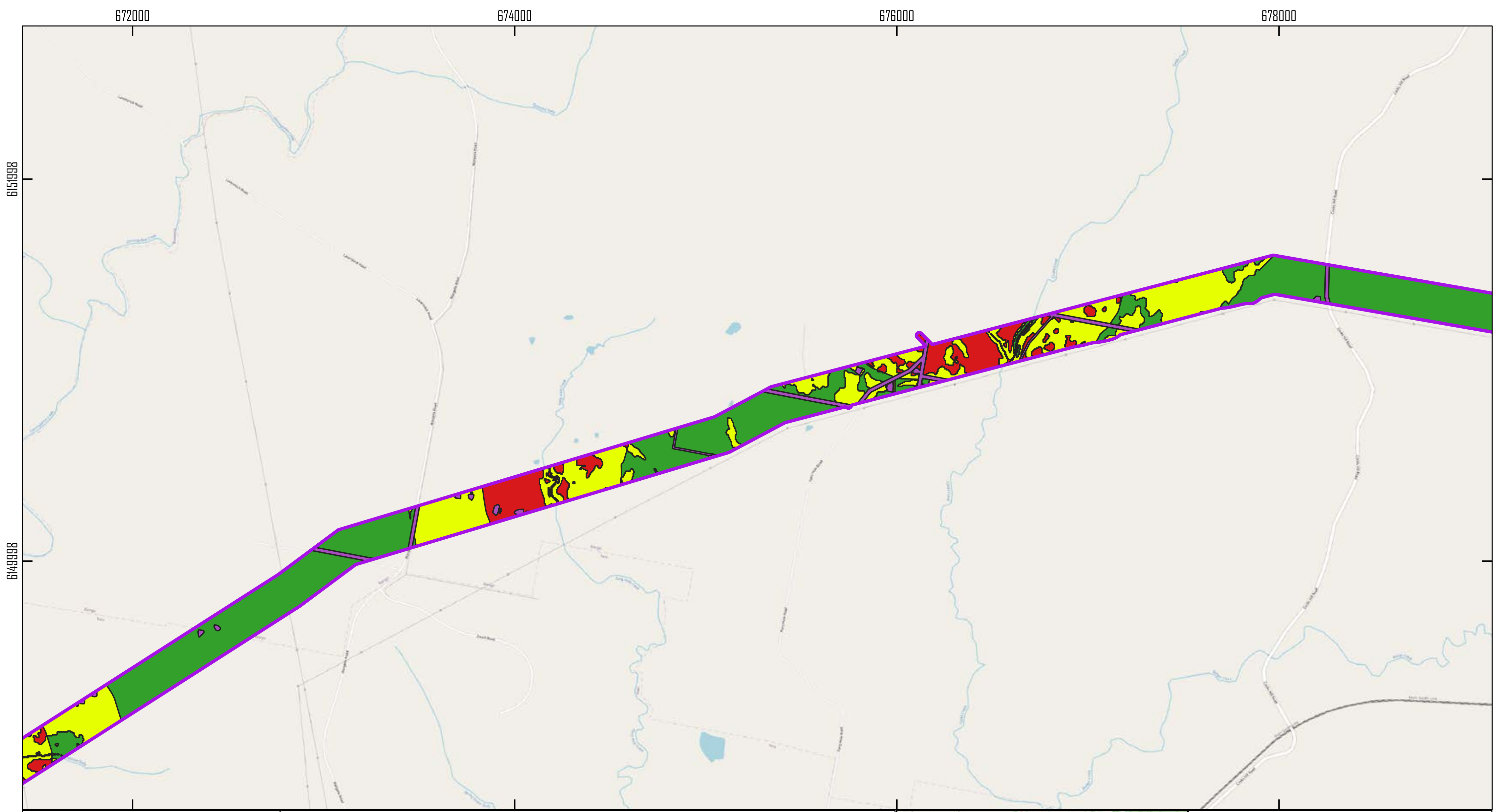
Moderate



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

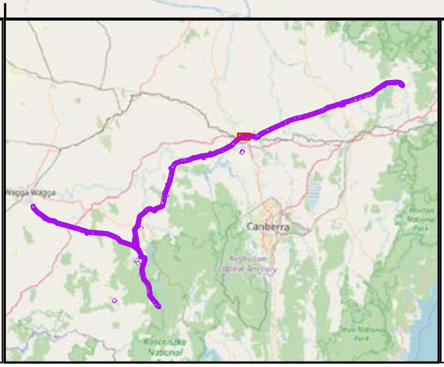
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



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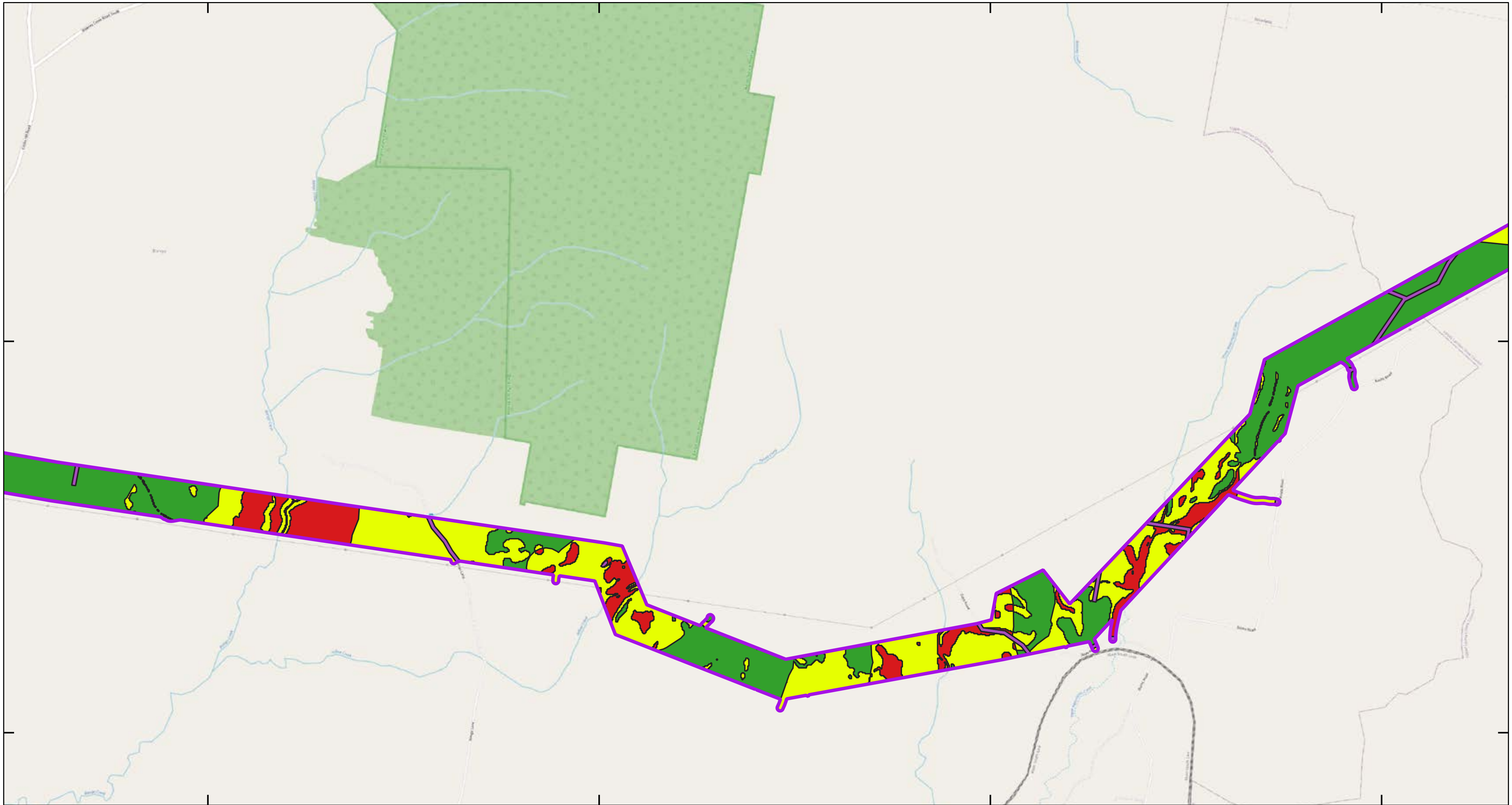


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

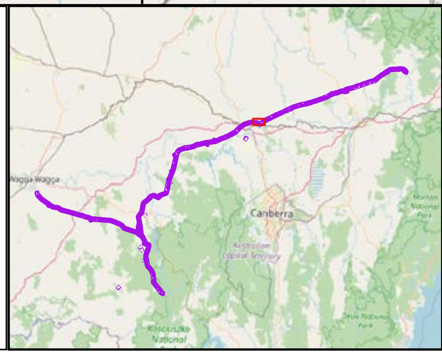
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

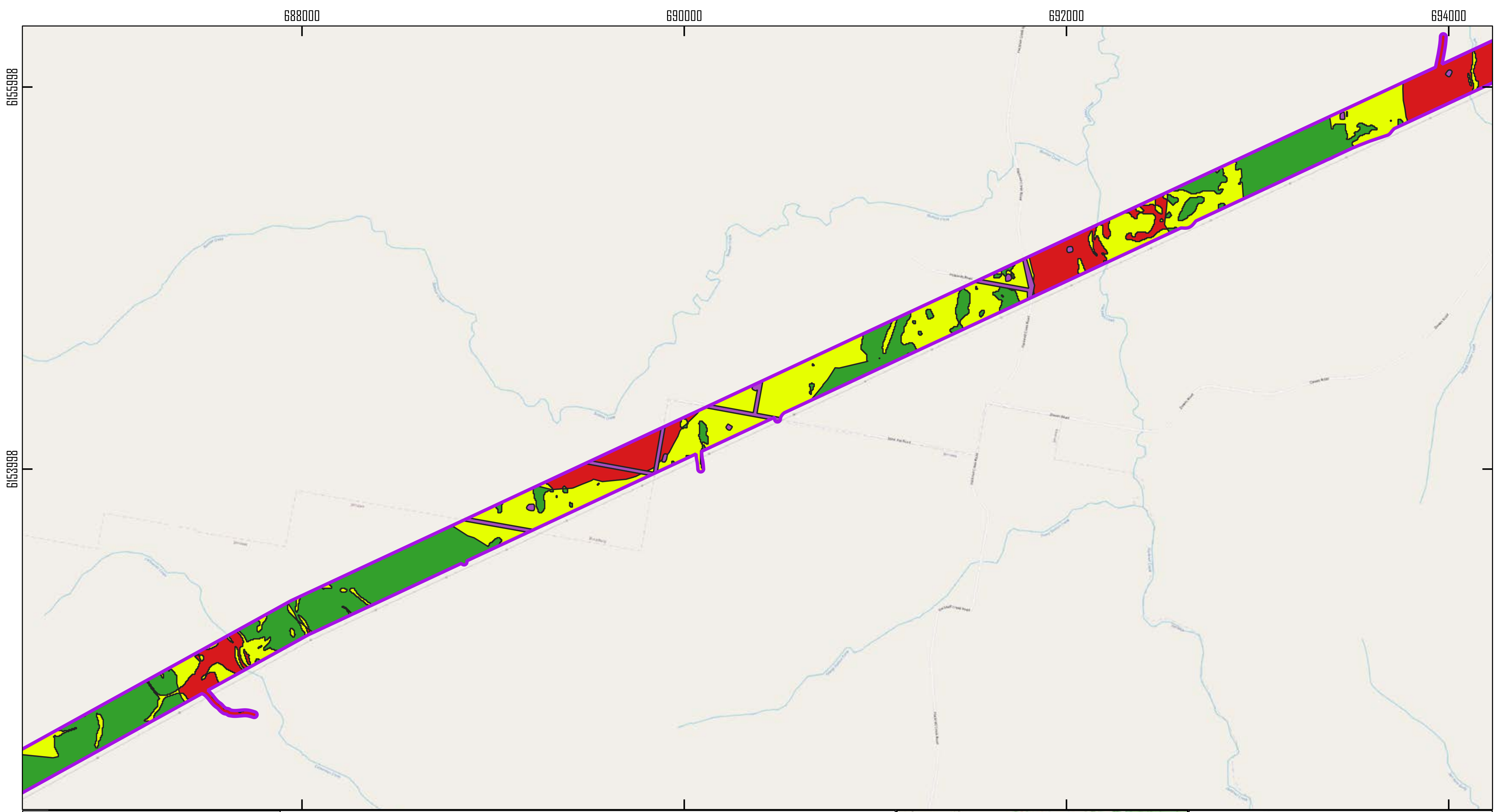
- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

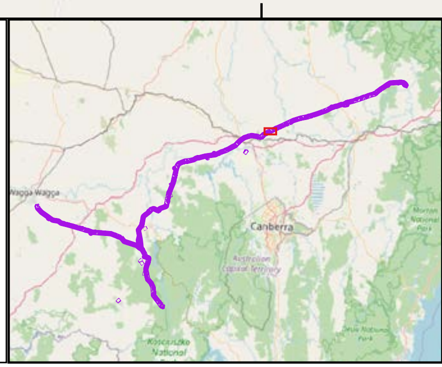
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer *heritage consultants* Pty Ltd

N

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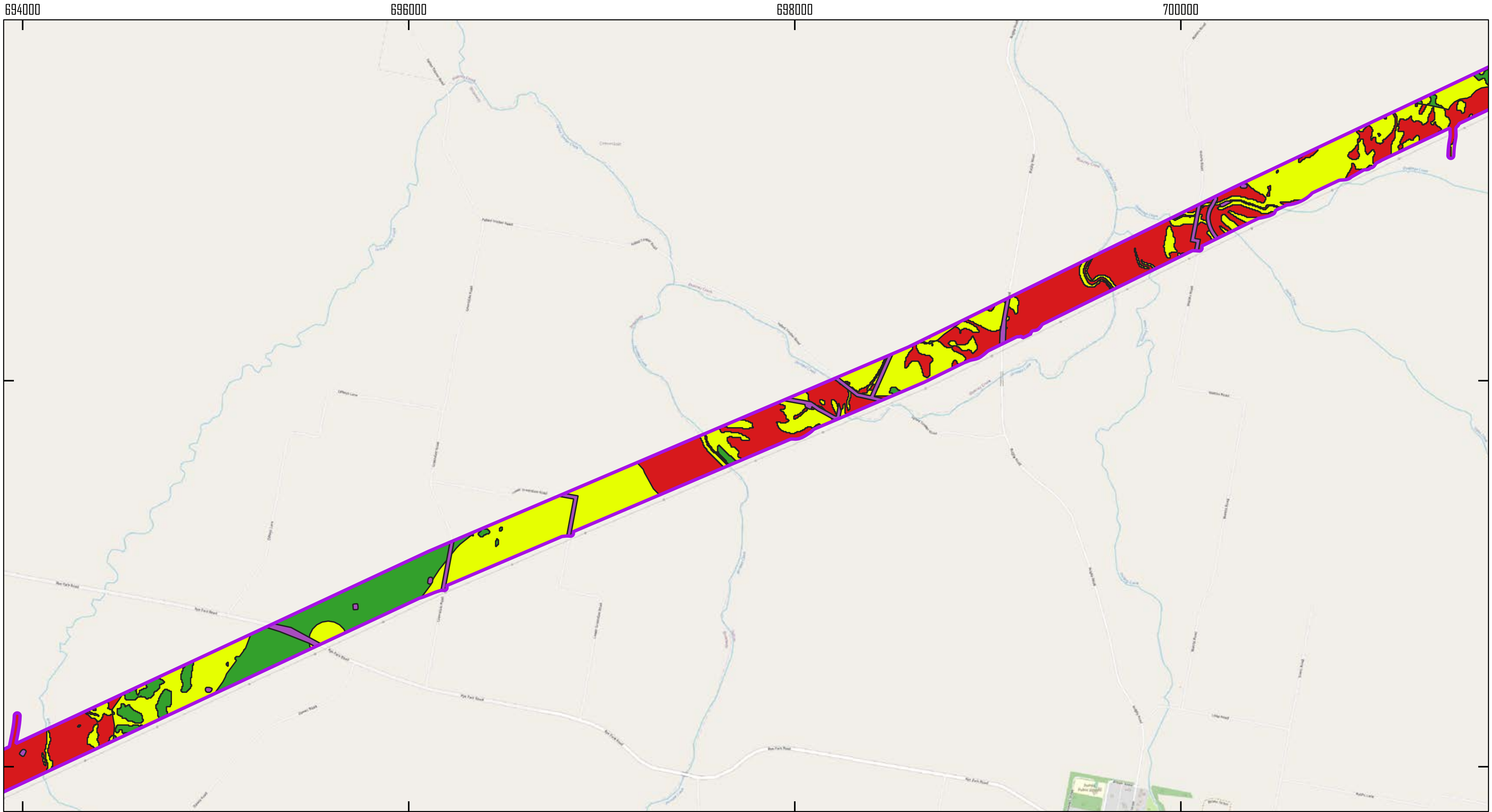


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

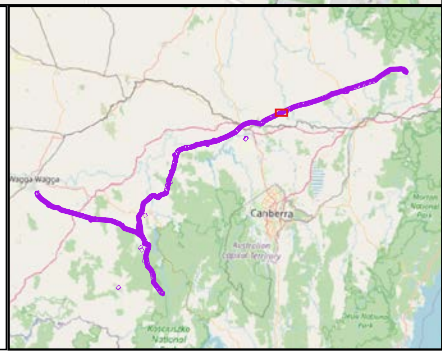
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

Disturbance
High
Low
Moderate



Navin Officer heritage consultants Pty Ltd

N

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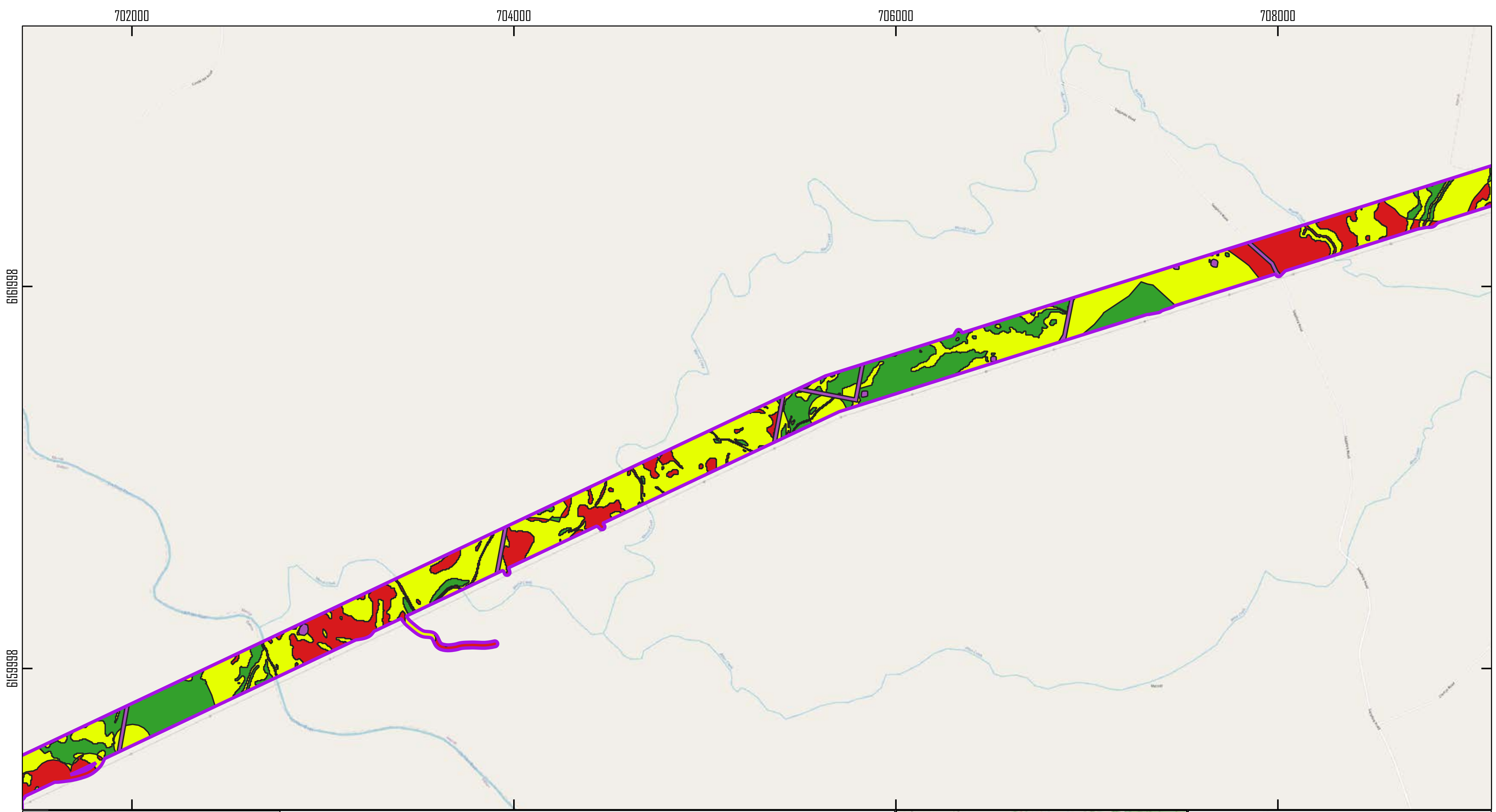


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

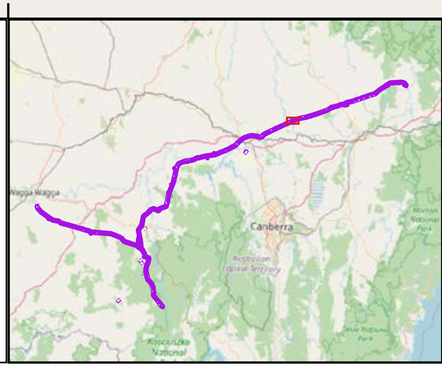
Archaeological sensitivity

Disturbance

High

Low

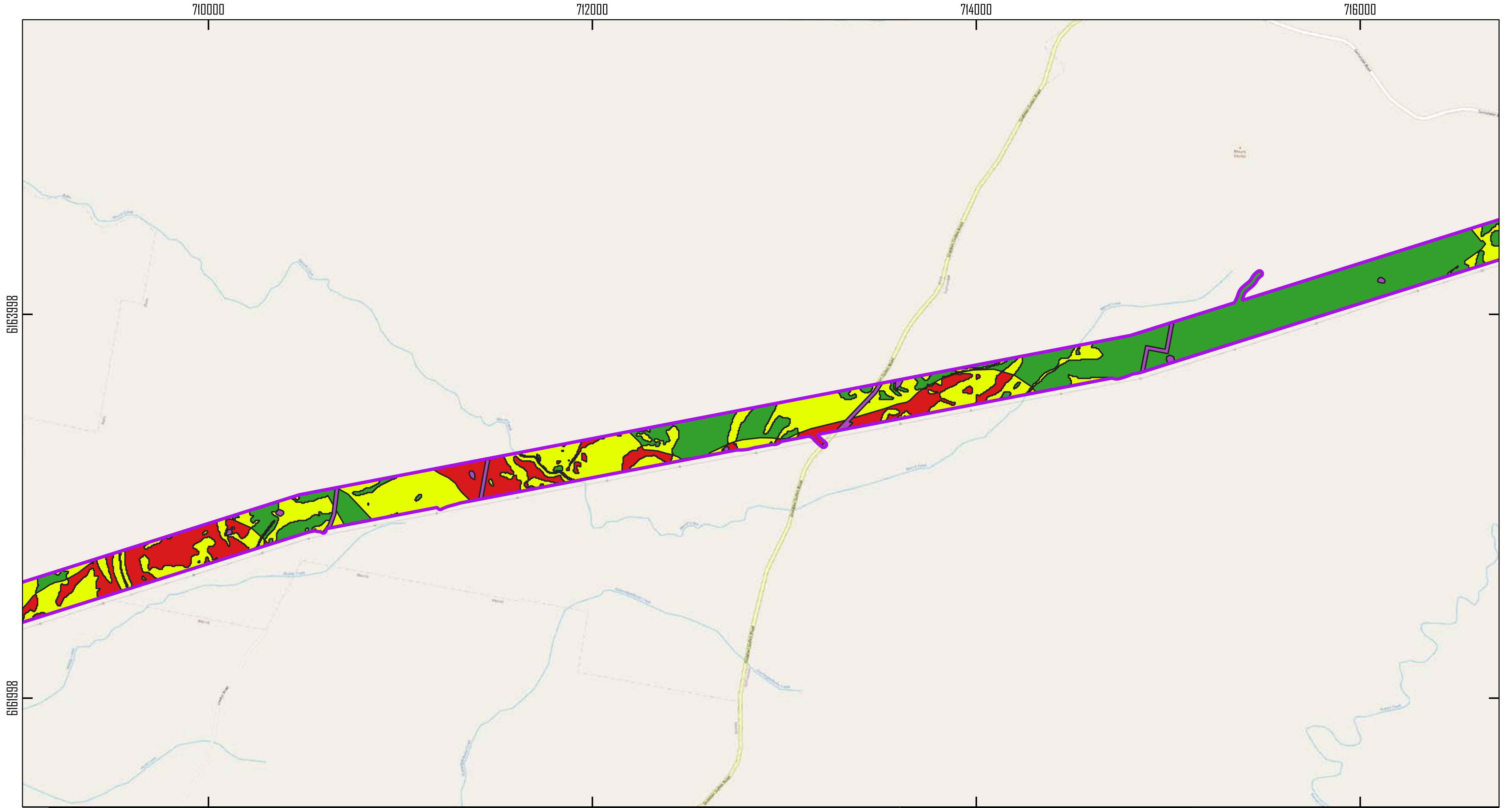
Moderate



Navin Officer *heritage consultants* Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

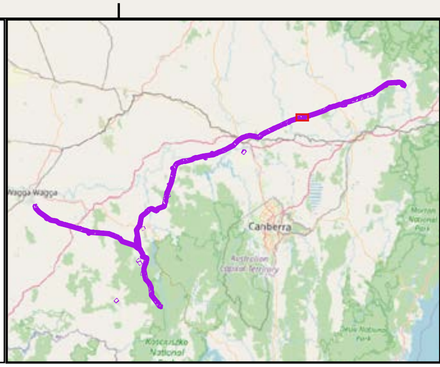
Archaeological sensitivity

Disturbance

High

Low

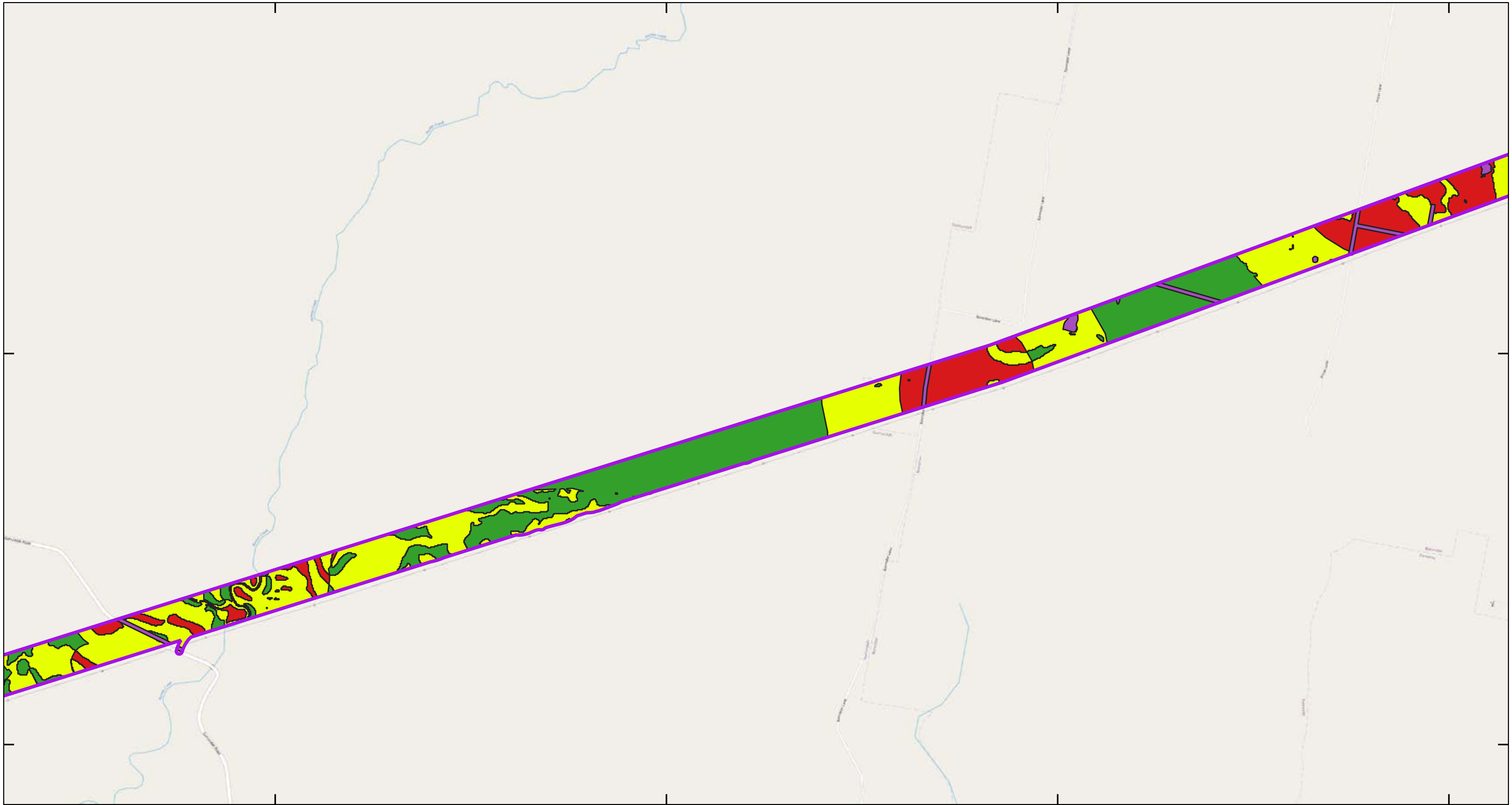
Moderate



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

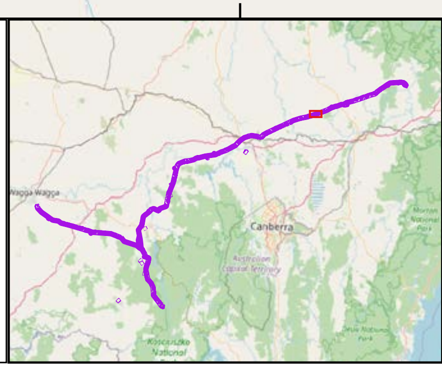
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer
heritage consultants Pty Ltd

N

0 500 1,000 m

Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

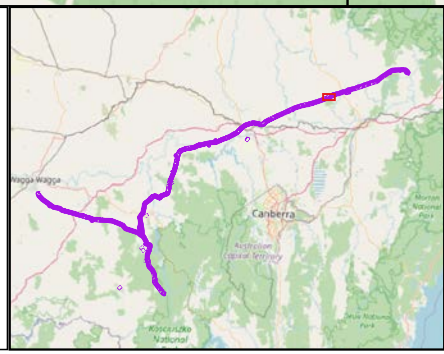
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

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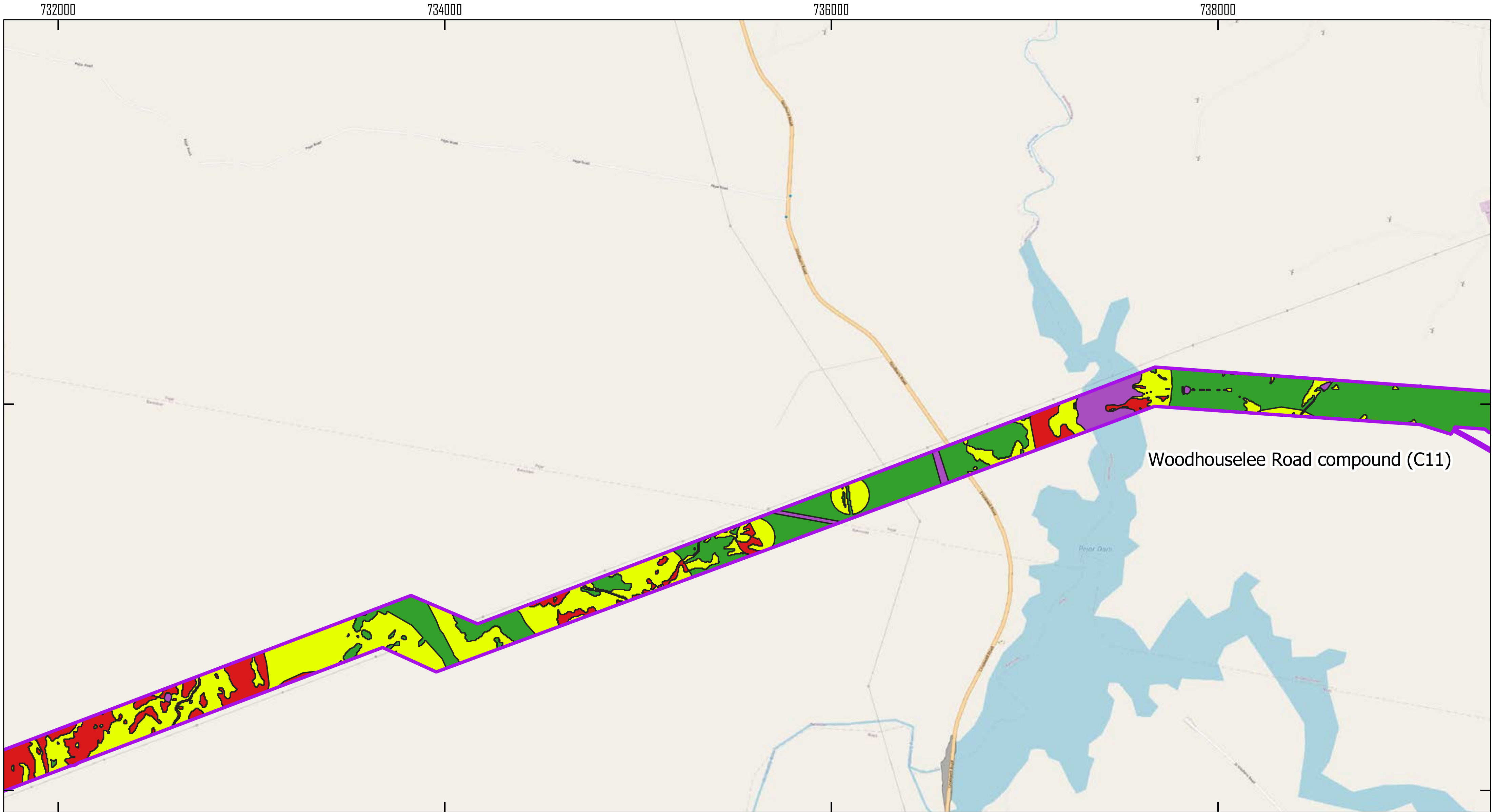


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

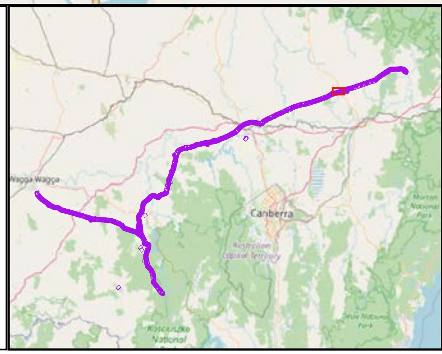
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m

Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

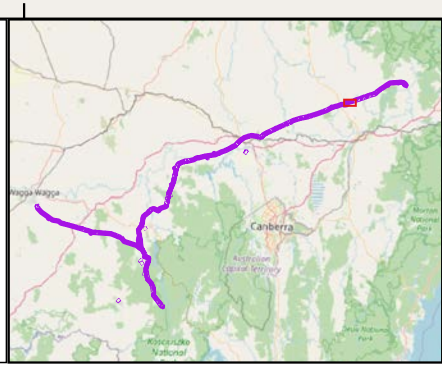
Archaeological sensitivity

Disturbance

High

Low

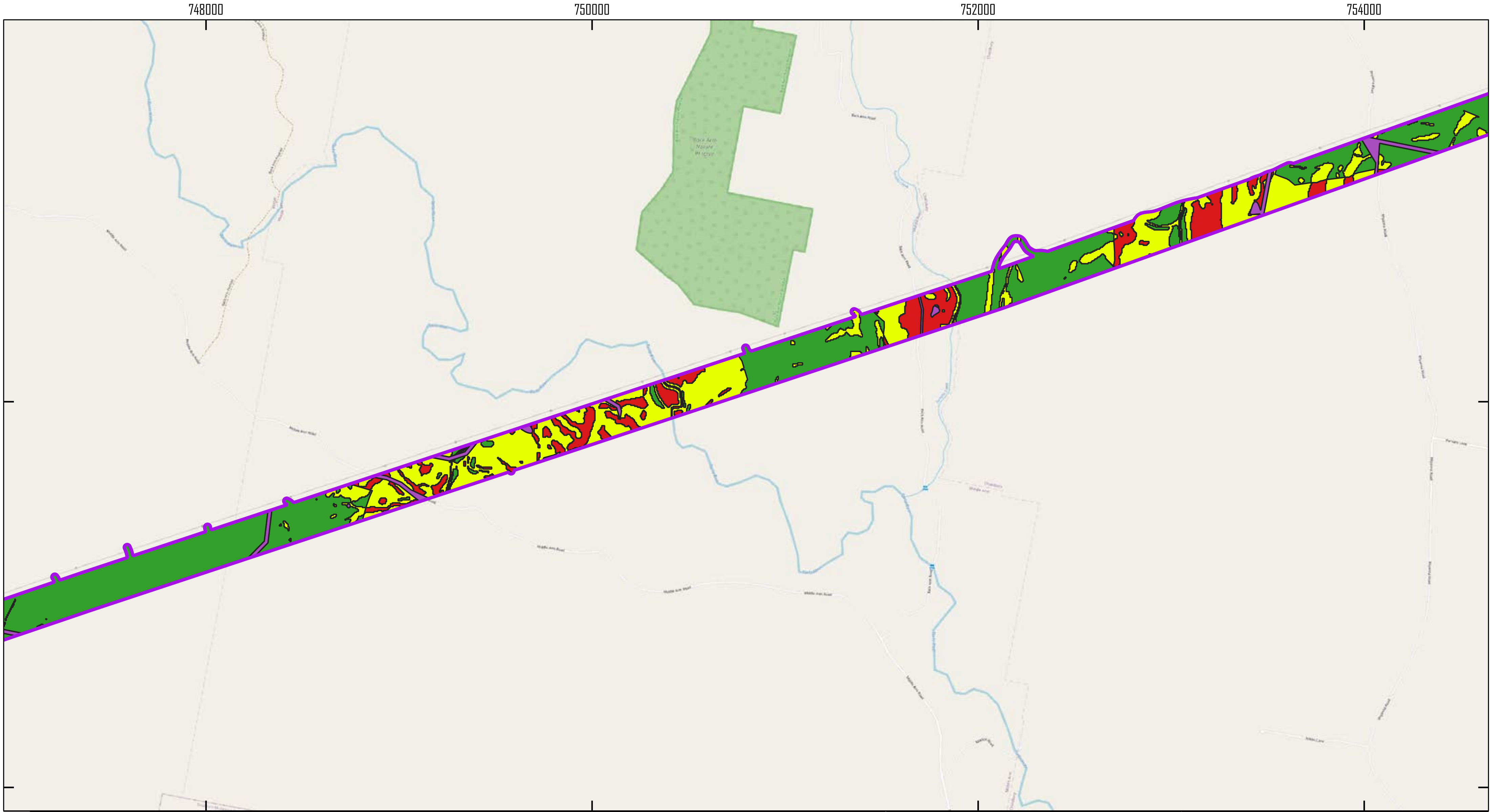
Moderate



Navin Officer *heritage consultants* Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

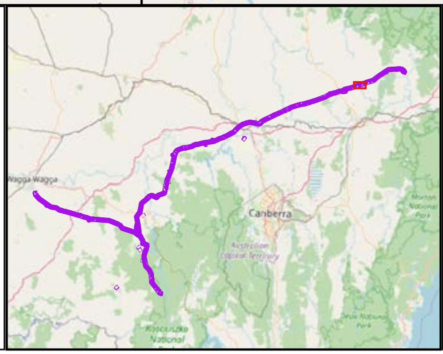
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer *heritage consultants* Pty Ltd

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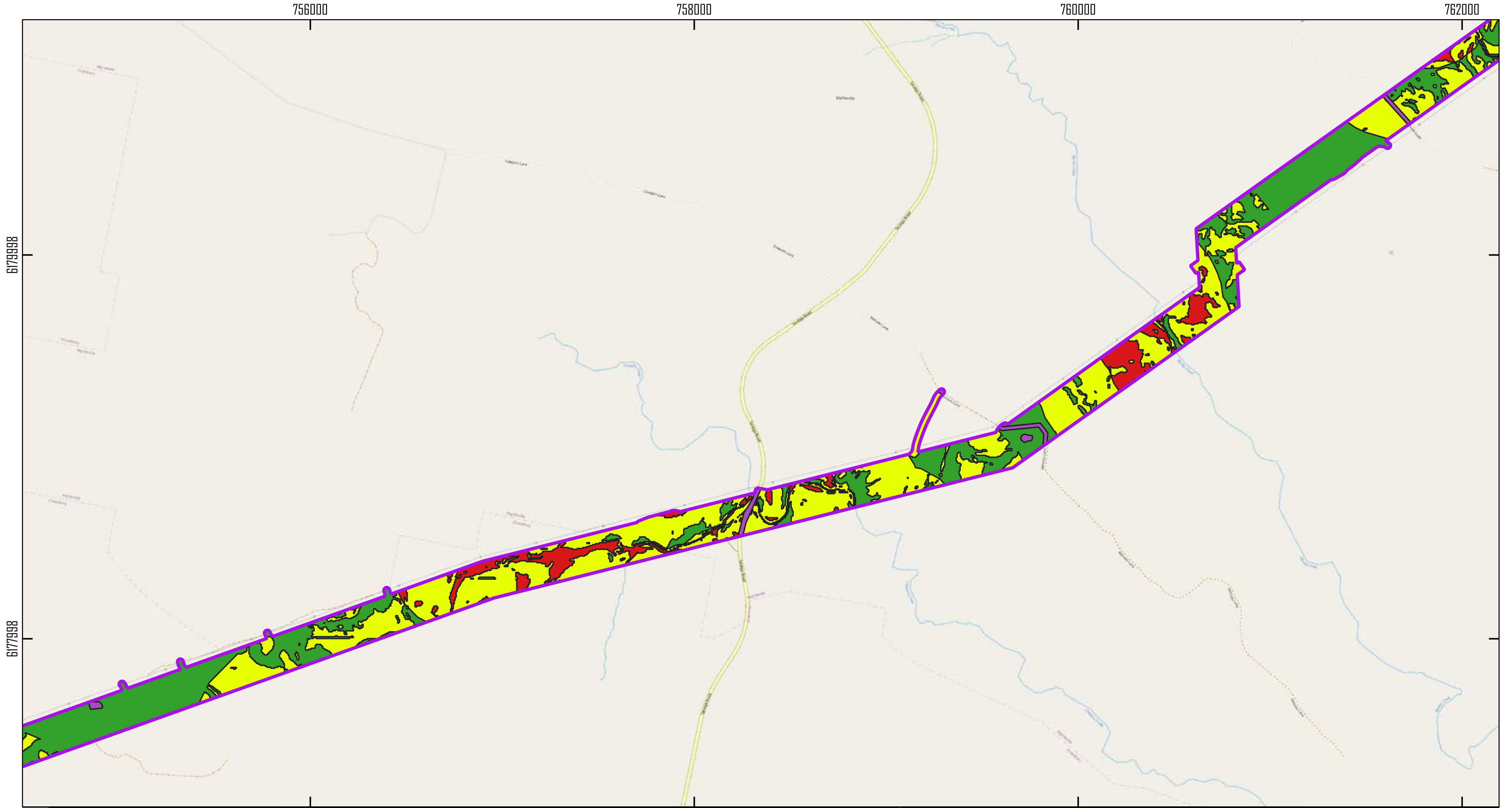


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

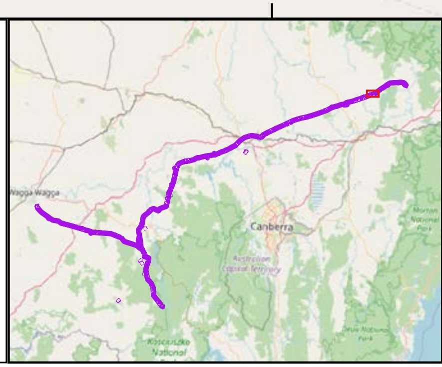
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

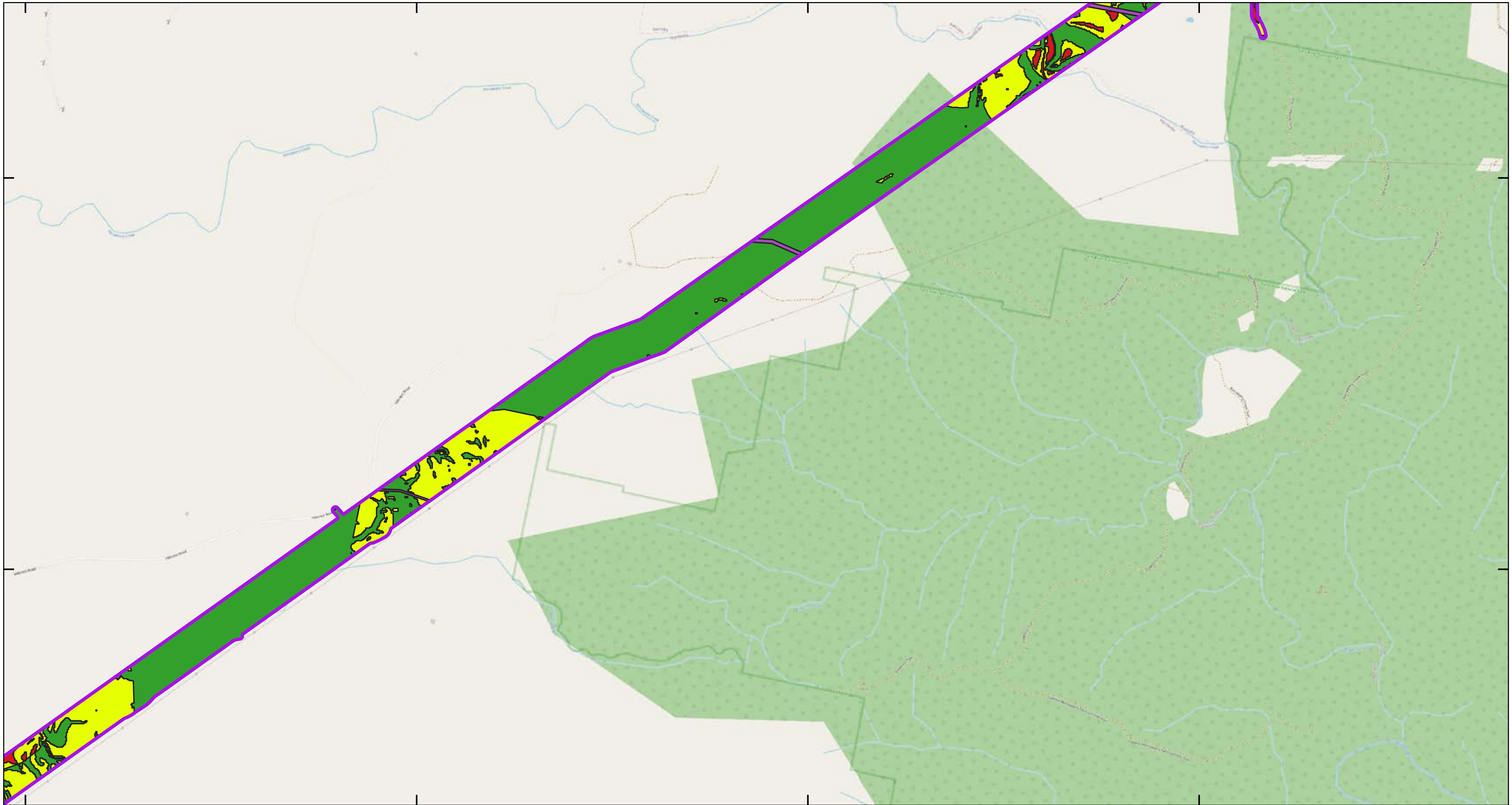
Disturbance
High
Low
Moderate



Navin Officer
heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

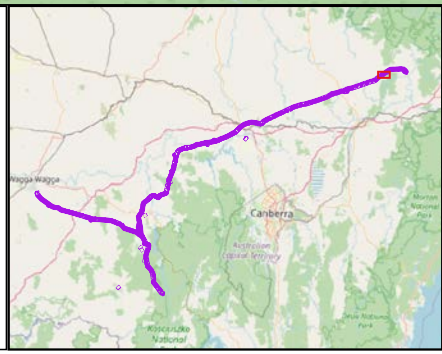
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer heritage consultants Pty Ltd

N

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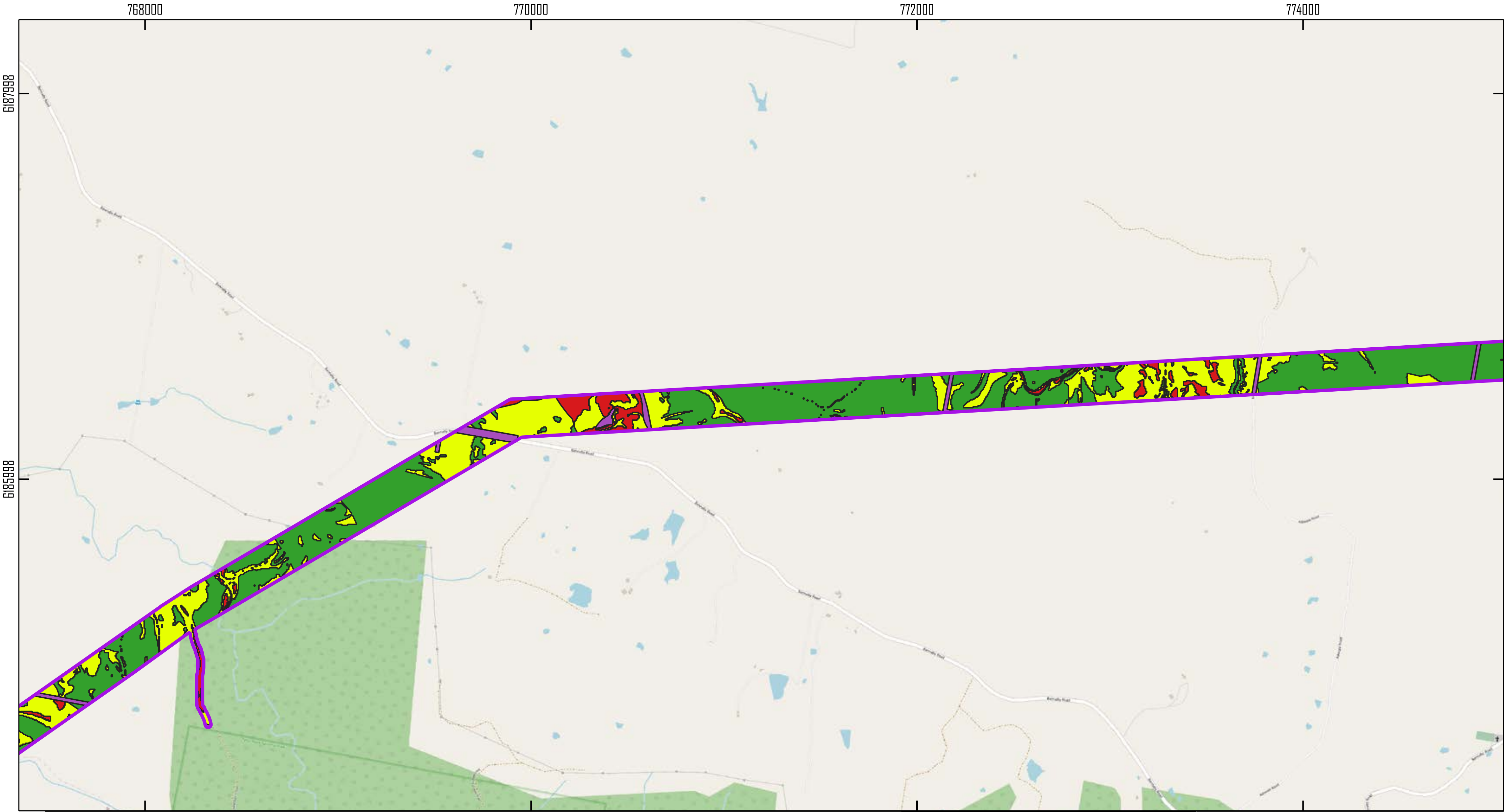


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

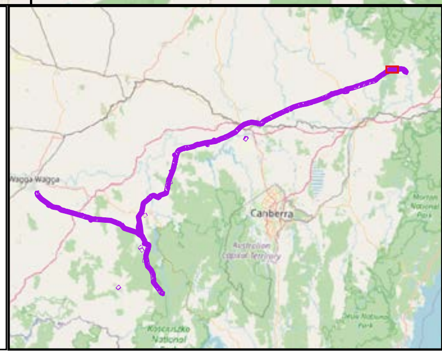
Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

Archaeological sensitivity

- Disturbance
- High
- Low
- Moderate



Navin Officer
heritage consultants Pty Ltd

N

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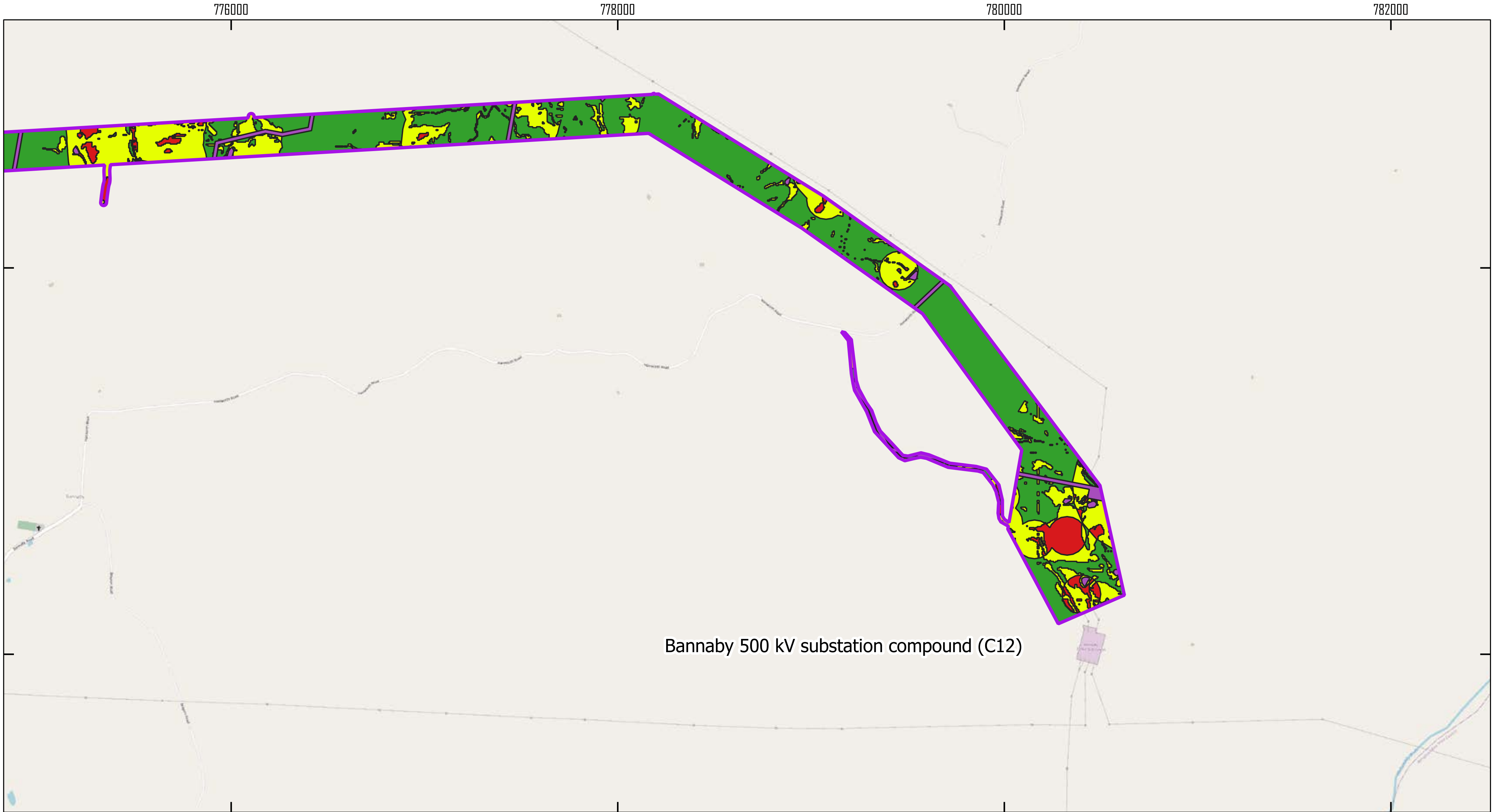


Humelink

NSW Data Service
Date: 08-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:26,503.169637

Legend

Project footprint

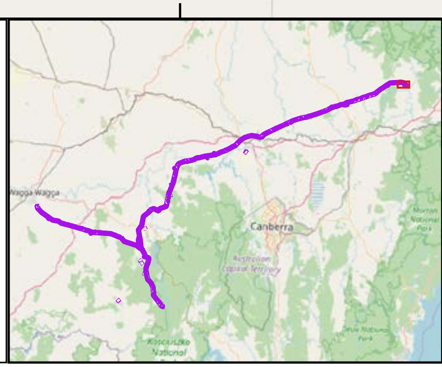
Archaeological sensitivity

Disturbance

High

Low

Moderate



Navin Officer heritage consultants Pty Ltd

N

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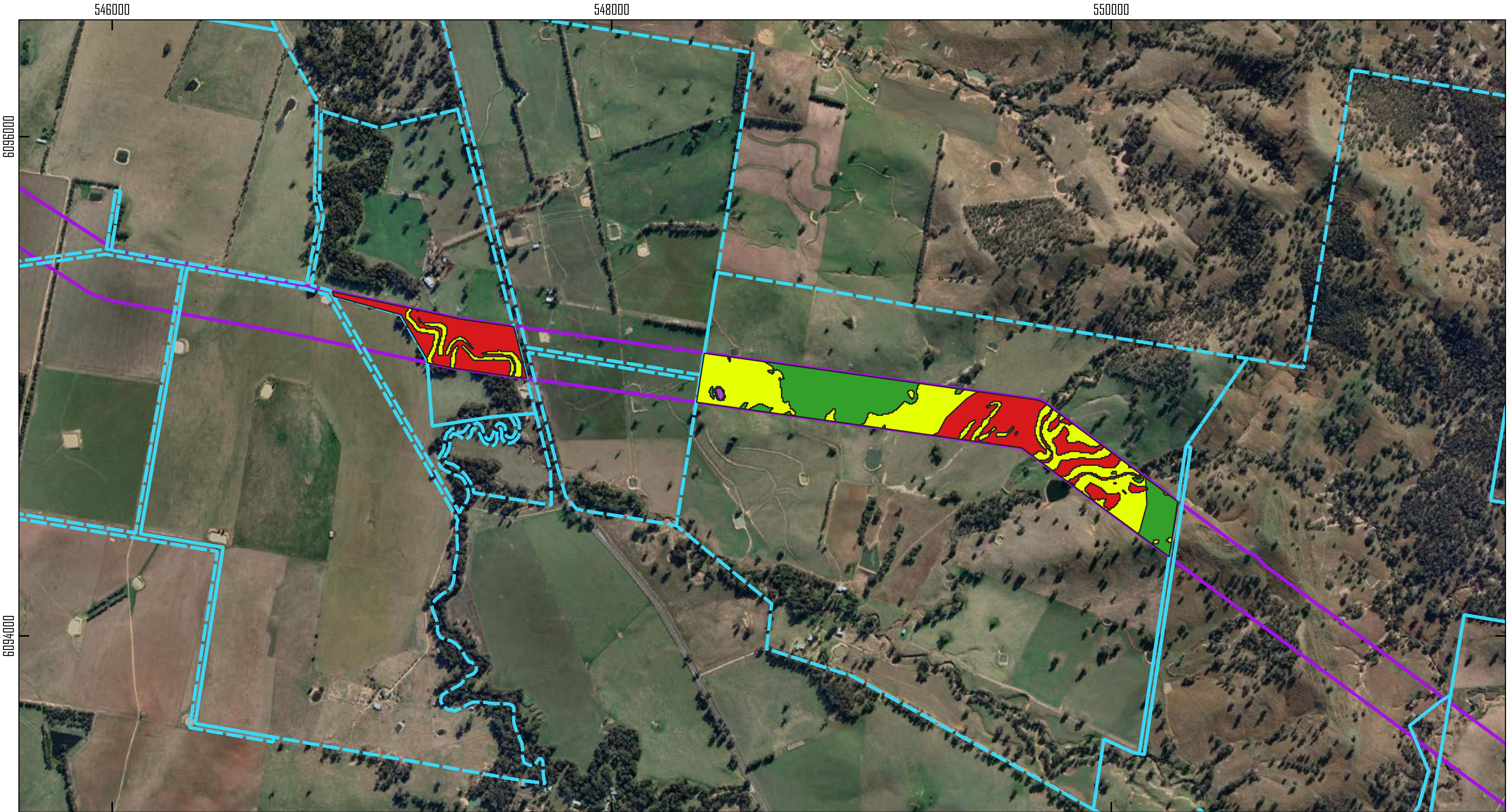
A5.2 Archaeological Sensitivity of Unsurveyed Areas



Humelink

Unsurveyed WAS 1

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:20,506.409296

Legend

Project footprint

Property holding

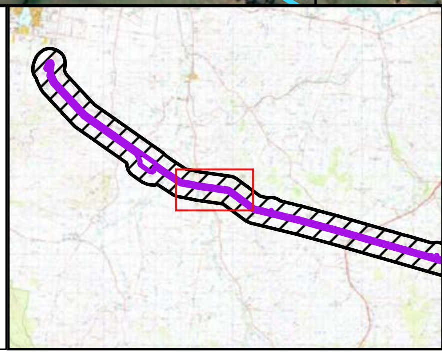
Archaeological sensitivity

High

Moderate

Low

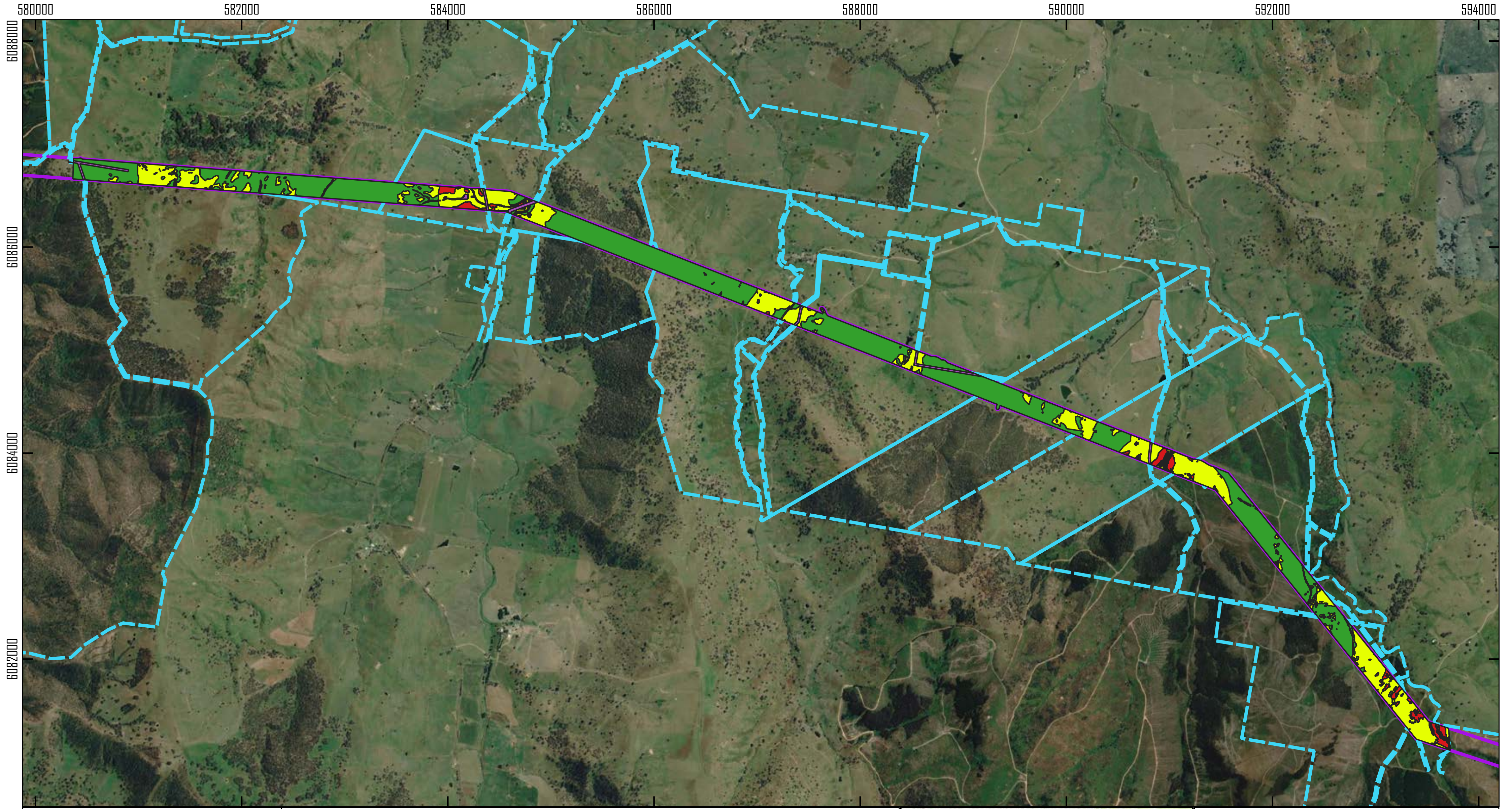
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

Unsurveyed SVAS 1

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

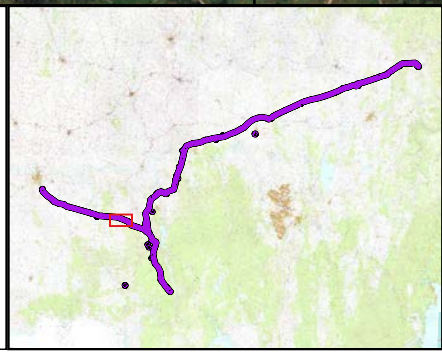
Projection: GDA2020
MGA Zone:
Scale: 1:49,351.119025

Legend

Project footprint
Property holding

Archaeological sensitivity

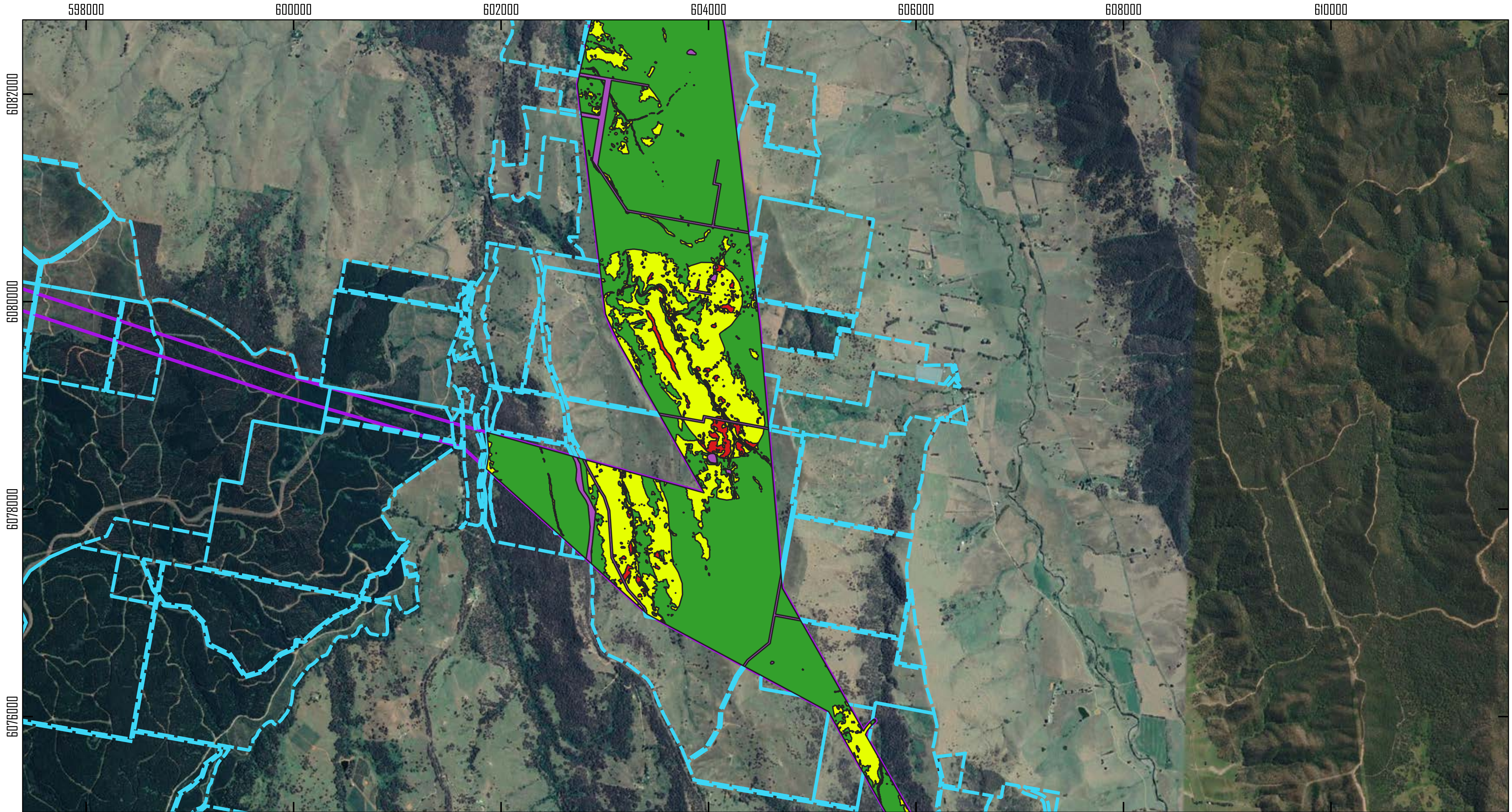
High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 1,500 2,000 m



Humelink

Unsurveyed SVAS 2 (Centre)

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

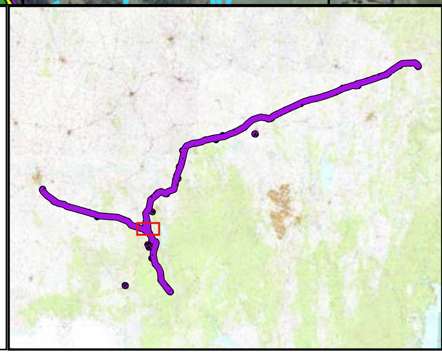
Projection: GDA2020
MGA Zone:
Scale: 1:49,351.119025

Legend

Project footprint
Property holding

Archaeological sensitivity

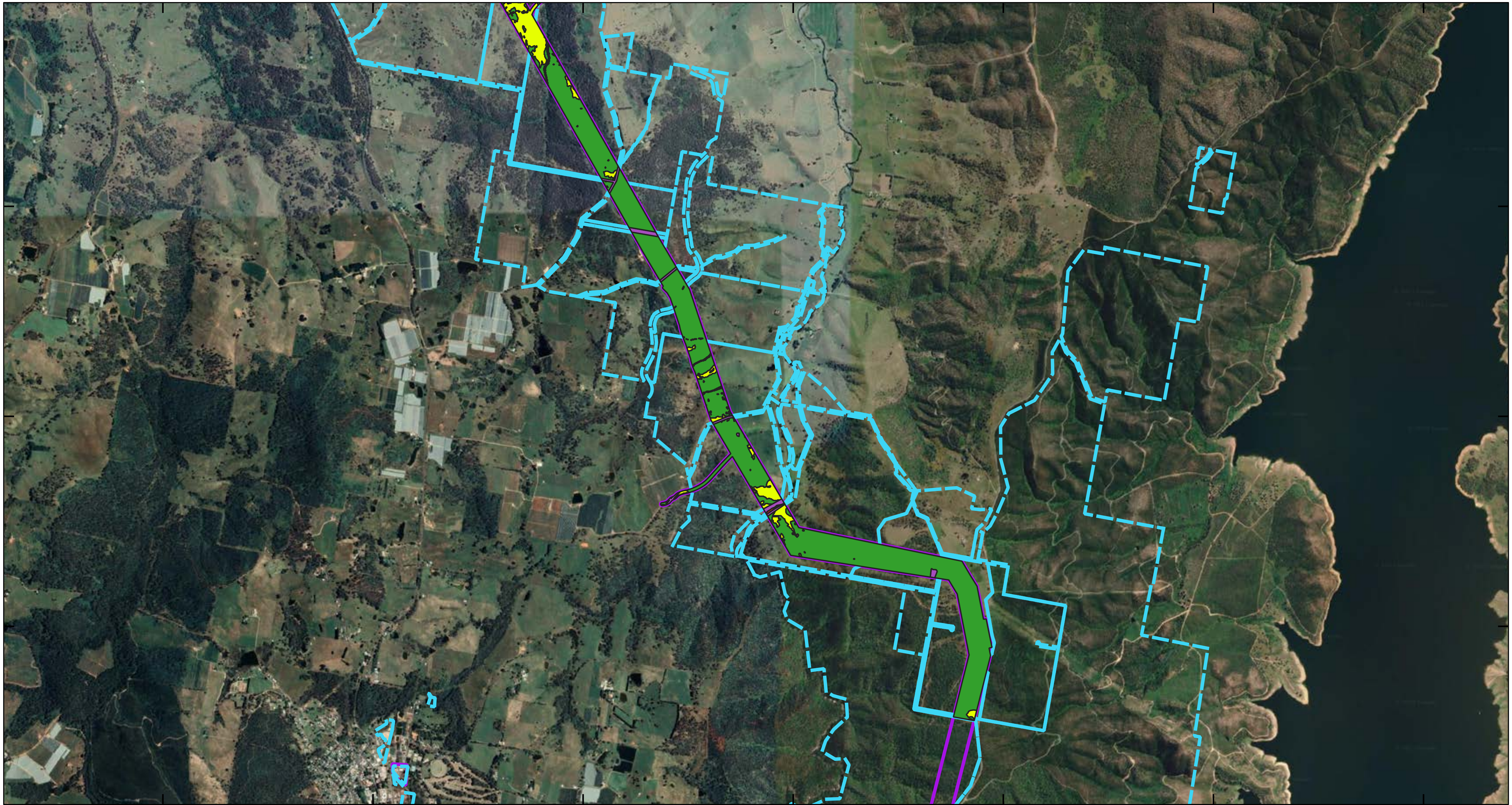
High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 1,500 2,000 m



Humelink

Unsurveyed SVAS 2 (South)

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

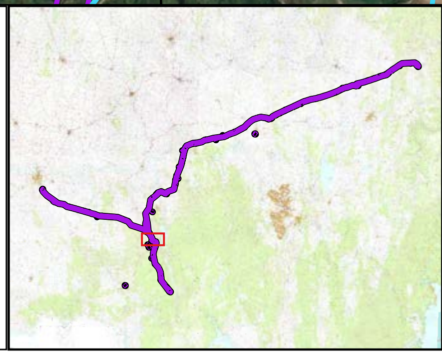
Projection: GDA2020
MGA Zone:
Scale: 1:49,351.119025

Legend

Project footprint
Property holding

Archaeological sensitivity

High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

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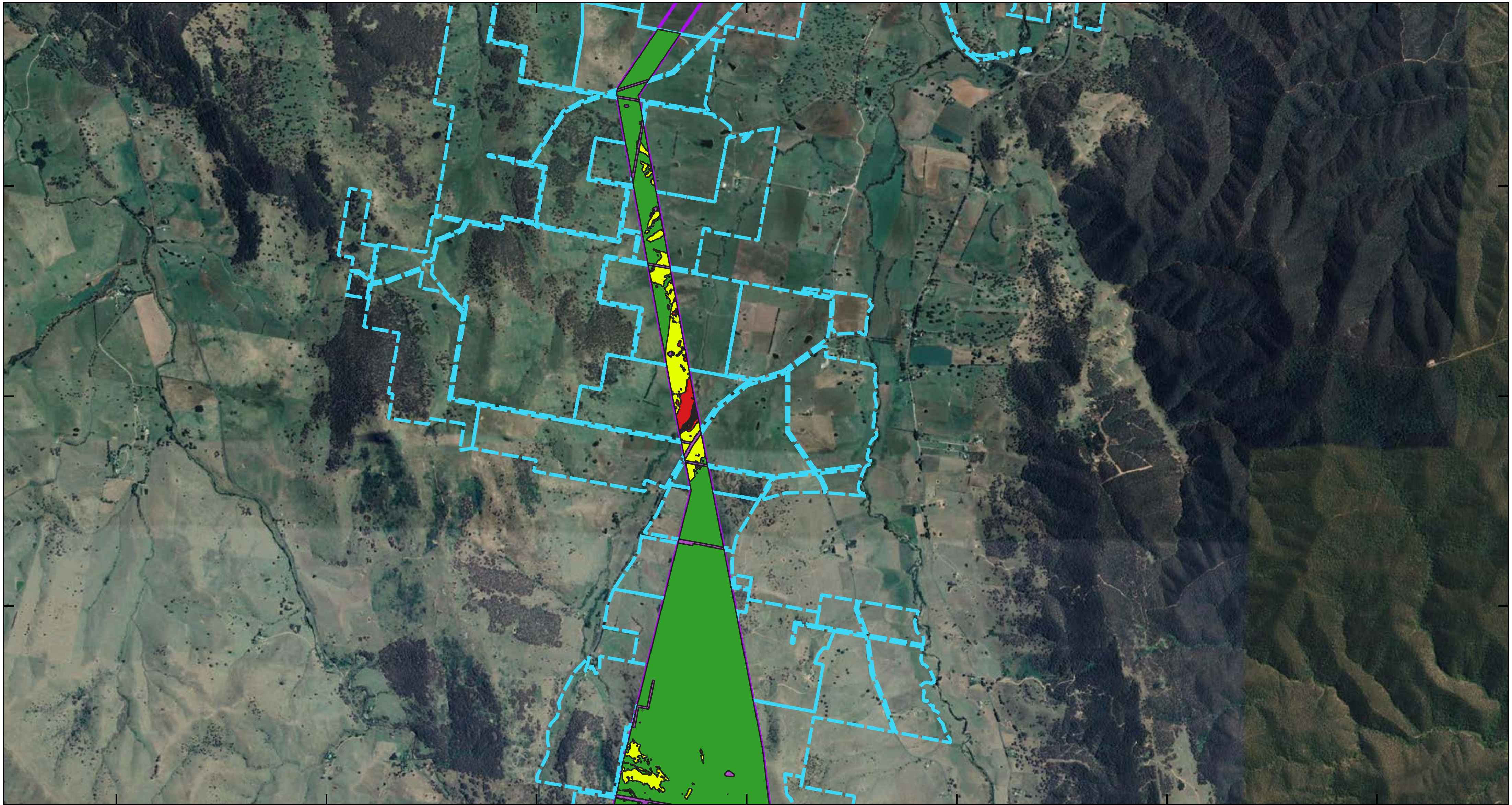


Humelink

Unsurveyed SVAS 2 (North)

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

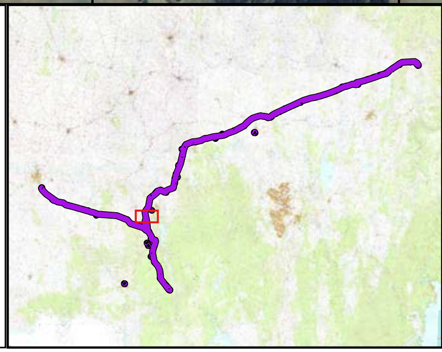
Projection: GDA2020
MGA Zone:
Scale: 1:49,351.119025

Legend

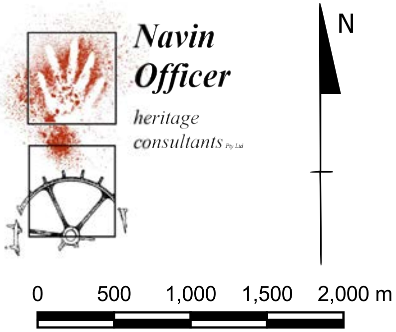
Project footprint
Property holding

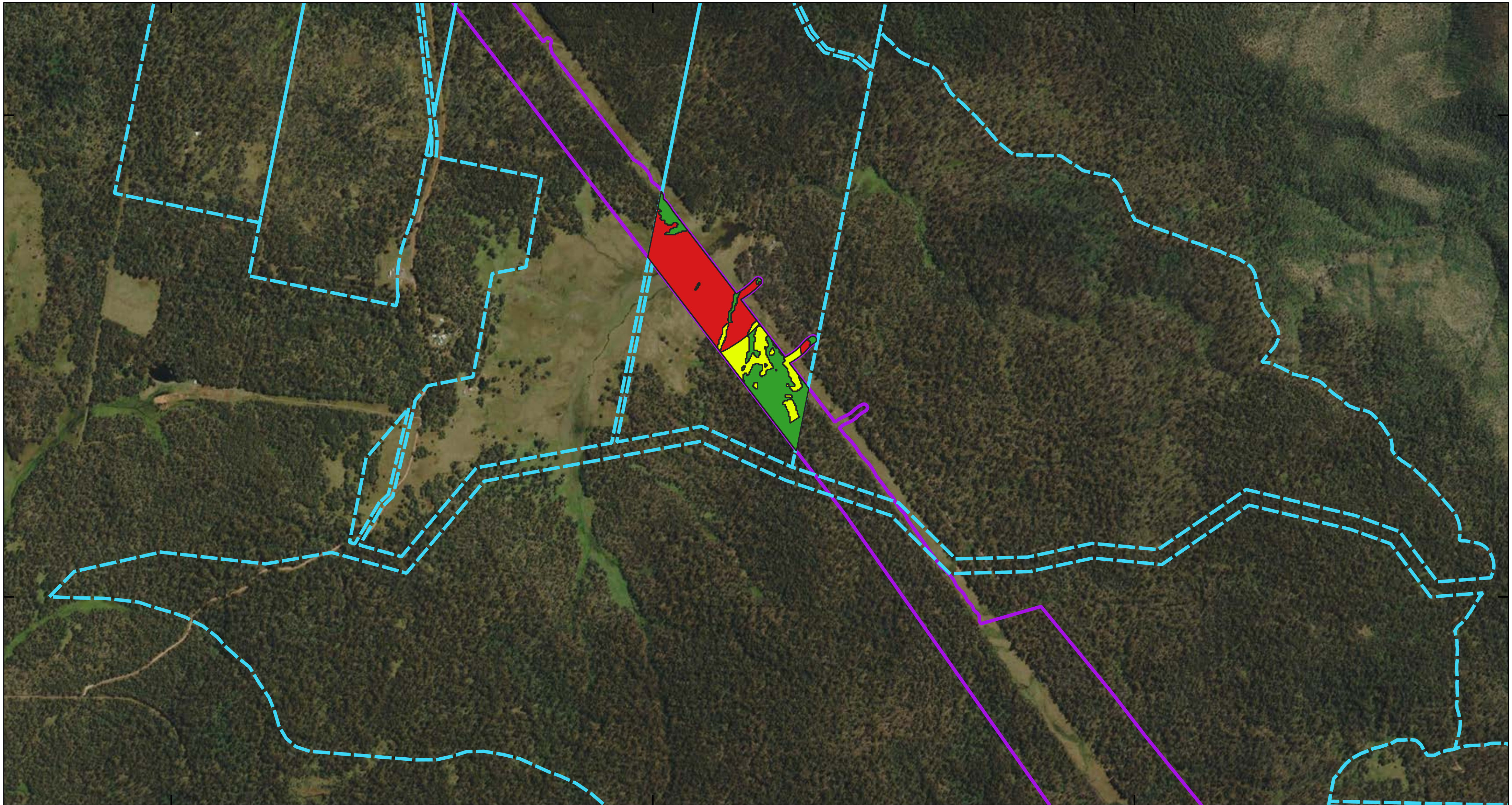
Archaeological sensitivity

High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd





Humelink

Unsurveyed SVAS 5

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

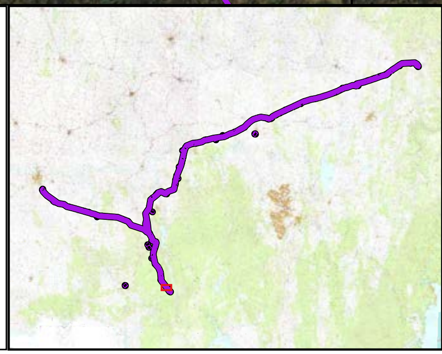
Projection: GDA2020
MGA Zone:
Scale: 1:21,531.72976

Legend

Project footprint
Property holding

Archaeological sensitivity

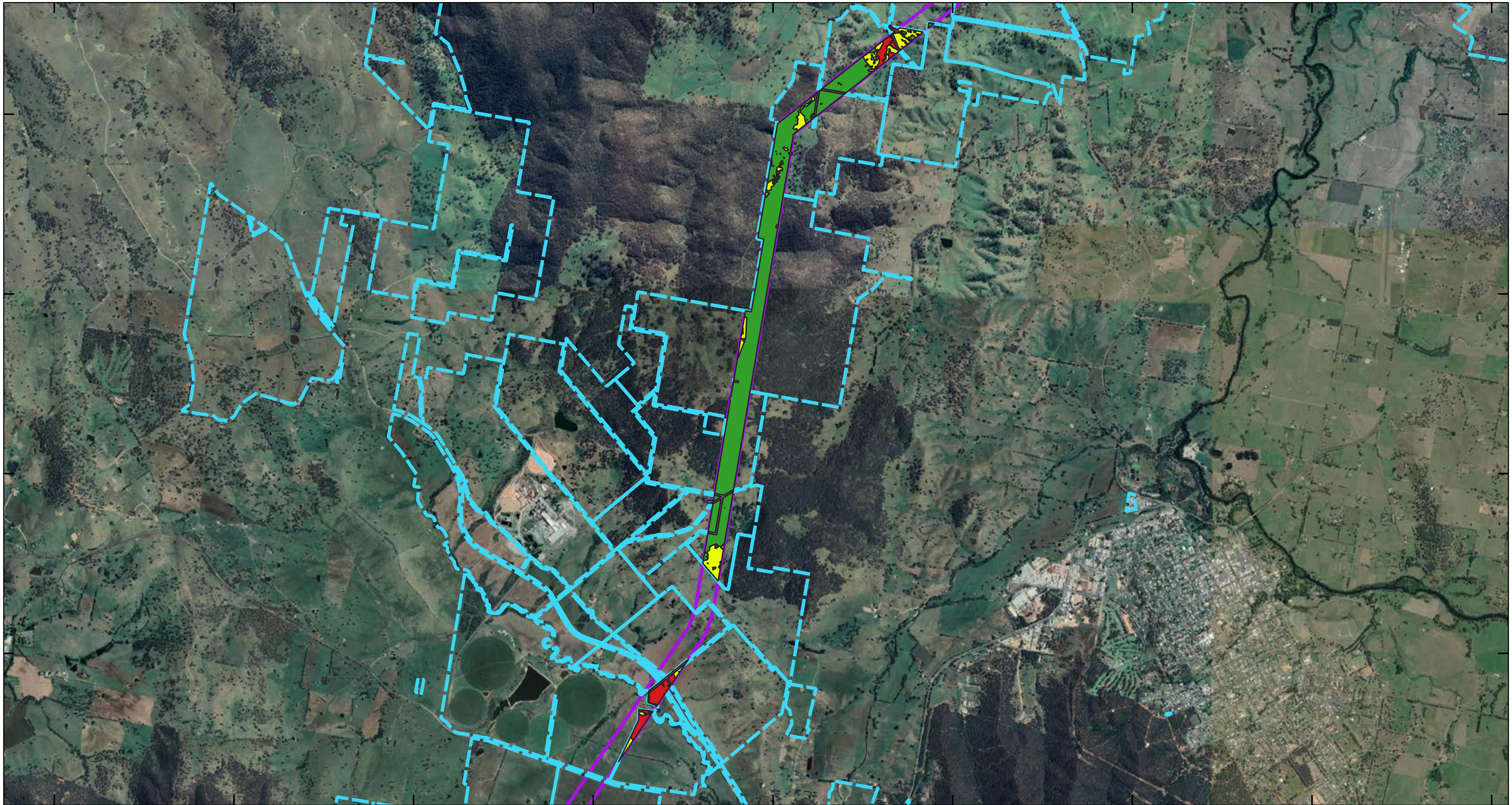
High
Moderate
Low
Disturbance



Navin Officer
heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

Unsurveyed SVAS 3

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:57,709.154374

Legend

Project footprint

Property holding

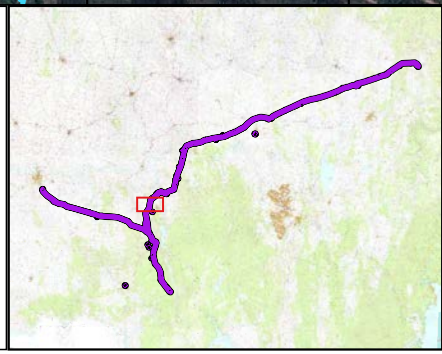
Archaeological sensitivity

High

Moderate

Low

Disturbance



Navin Officer heritage consultants Pty Ltd

N

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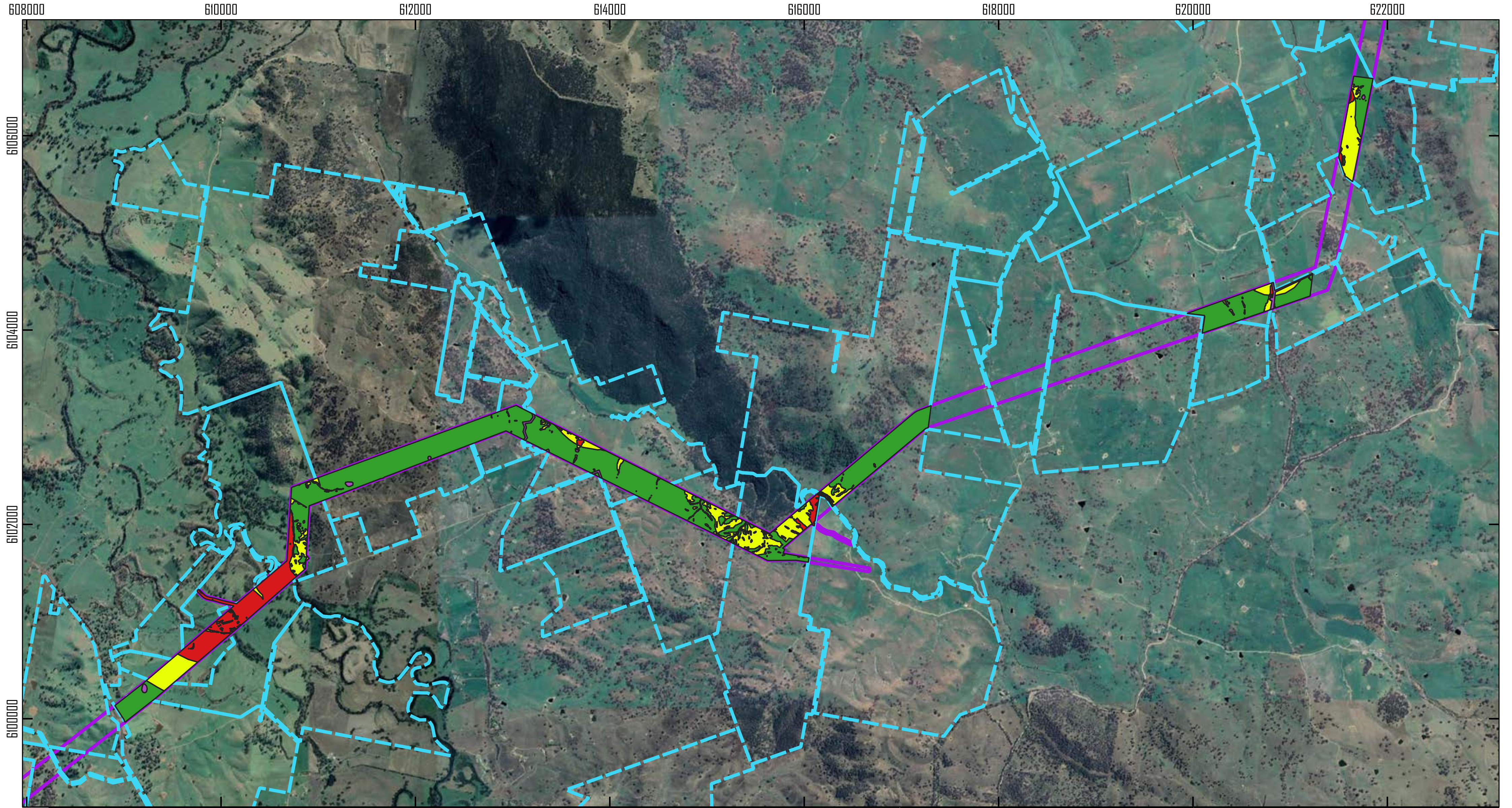


Humelink

Unsurveyed SVAS 4

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

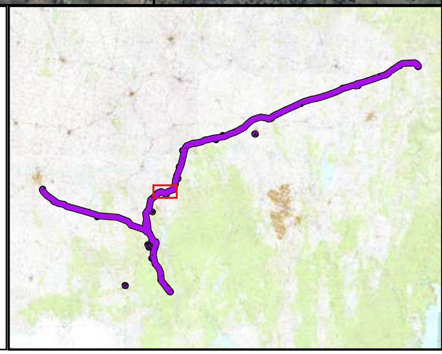
Projection: GDA2020
MGA Zone:
Scale: 1:52,343.904194

Legend

Project footprint
Property holding

Archaeological sensitivity

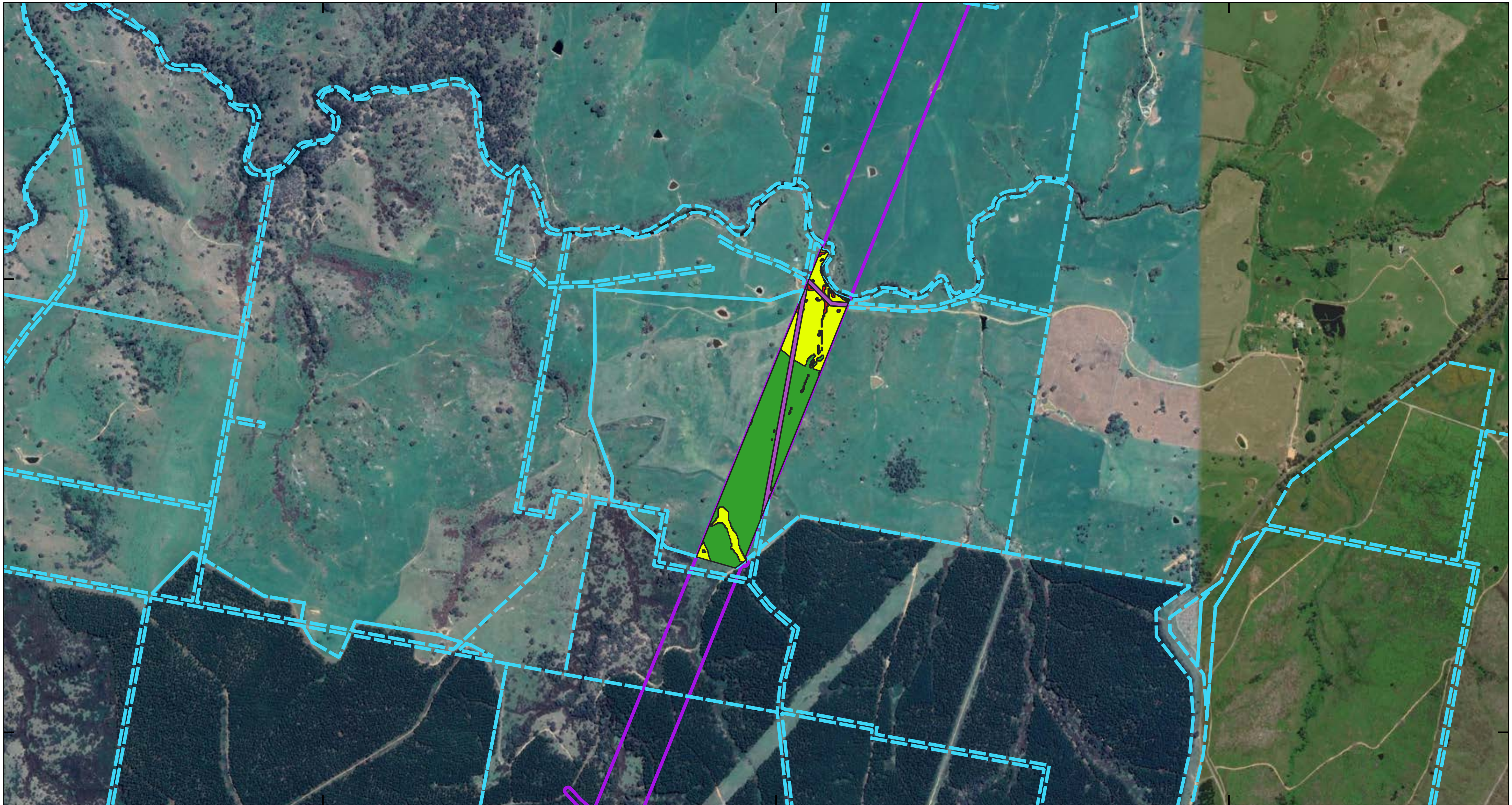
High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 1,500 2,000 2,500 m



Humelink

Unsurveyed CGAS1

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

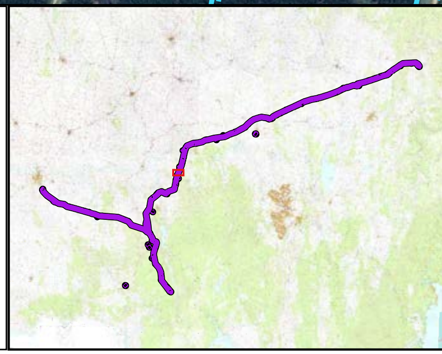
Projection: GDA2020
MGA Zone:
Scale: 1:22,889.375362

Legend

Project footprint
Property holding

Archaeological sensitivity

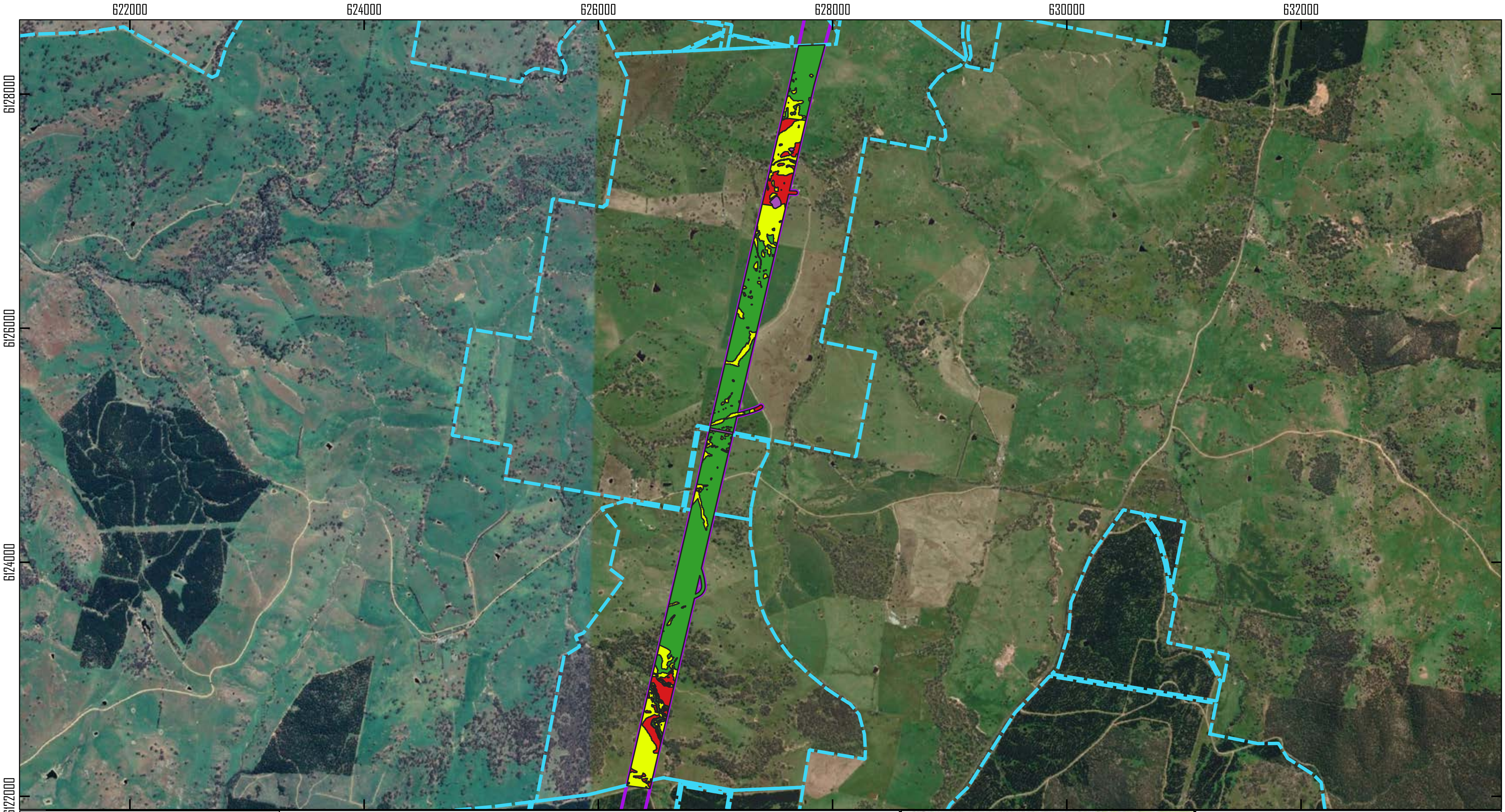
High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

Unsurveyed CGAS2

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

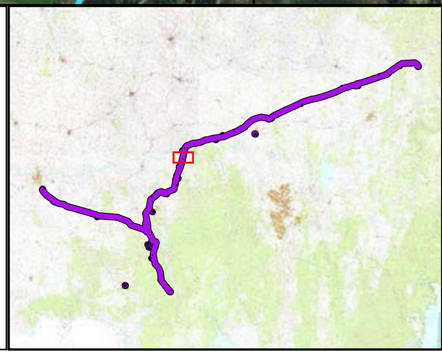
Projection: GDA2020
MGA Zone:
Scale: 1:43,598.810213

Legend

- Project footprint
- Property holding

Archaeological sensitivity

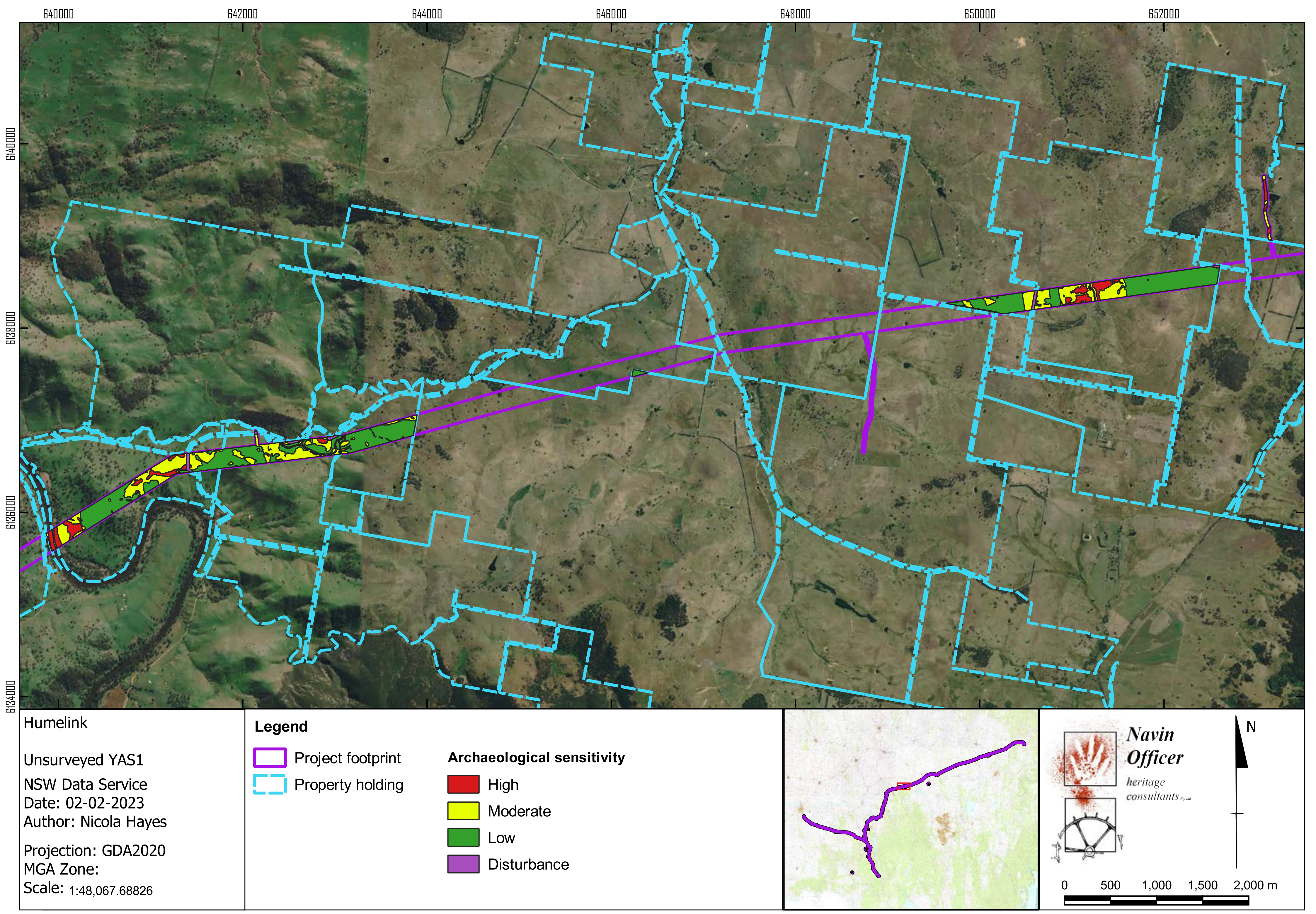
- High
- Moderate
- Low
- Disturbance

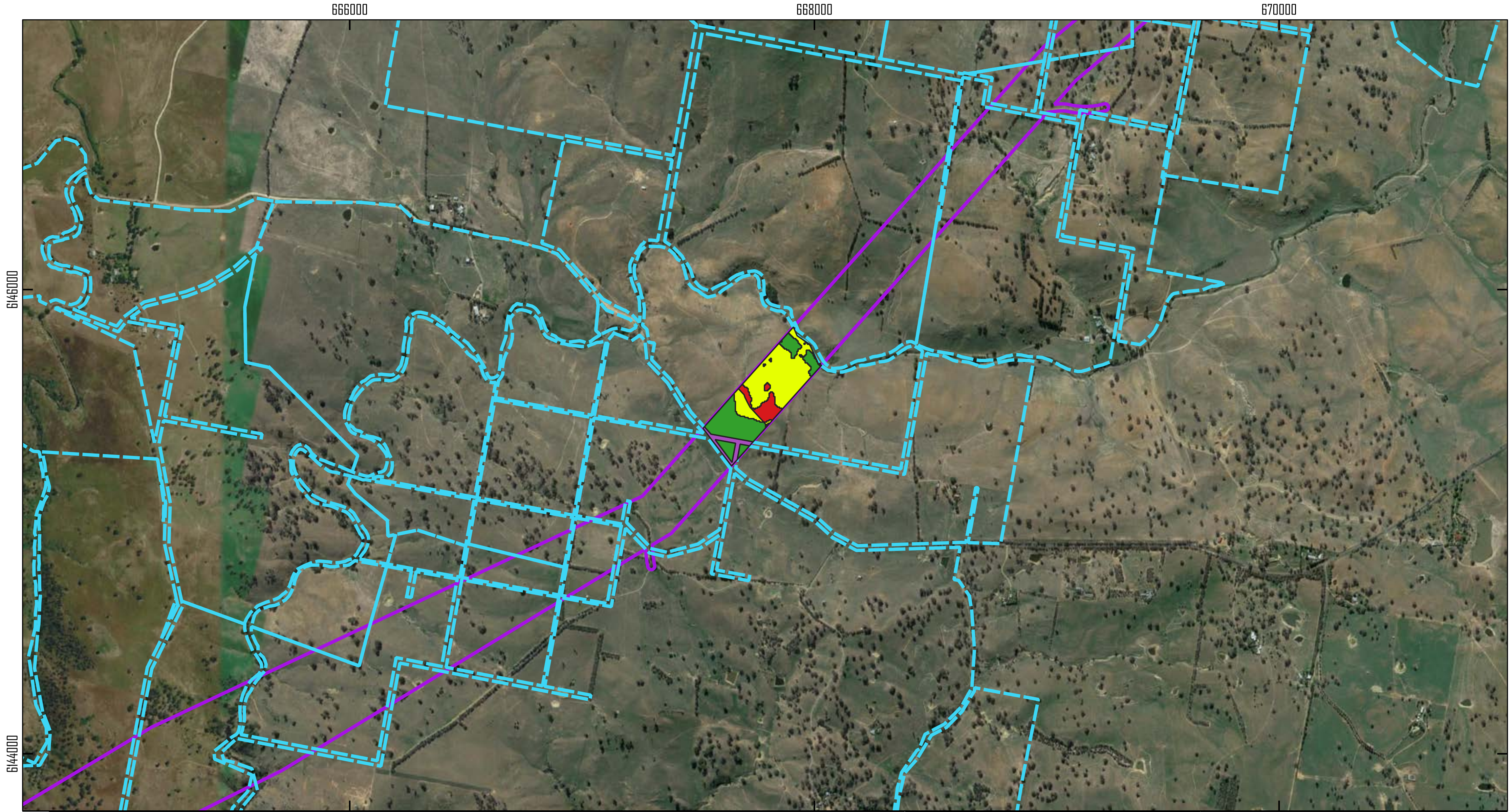


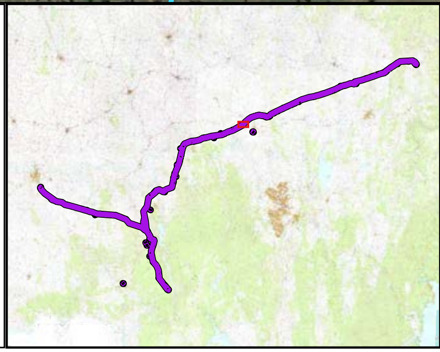
Navin Officer heritage consultants Pty Ltd

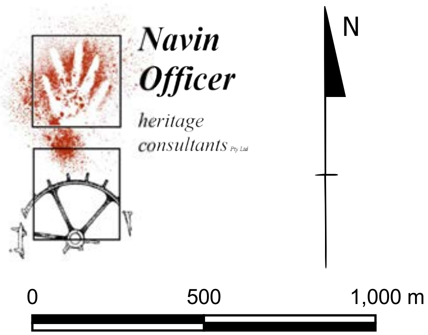
N

0 500 1,000 m


640000
642000
644000
646000
648000
650000
652000
6140000
6138000
6136000
6134000
Humelink
Unsurveyed YAS1
NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes
Projection: GDA2020
MGA Zone:
Scale: 1:48,067.68826
Legend
Project footprint
Property holding
Archaeological sensitivity
High
Moderate
Low
Disturbance
Navin Officer
heritage consultants
N
0
500
1,000
1,500
2,000 m







Humelink

Unsurveyed YAS2 (West)

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:22,020.361827

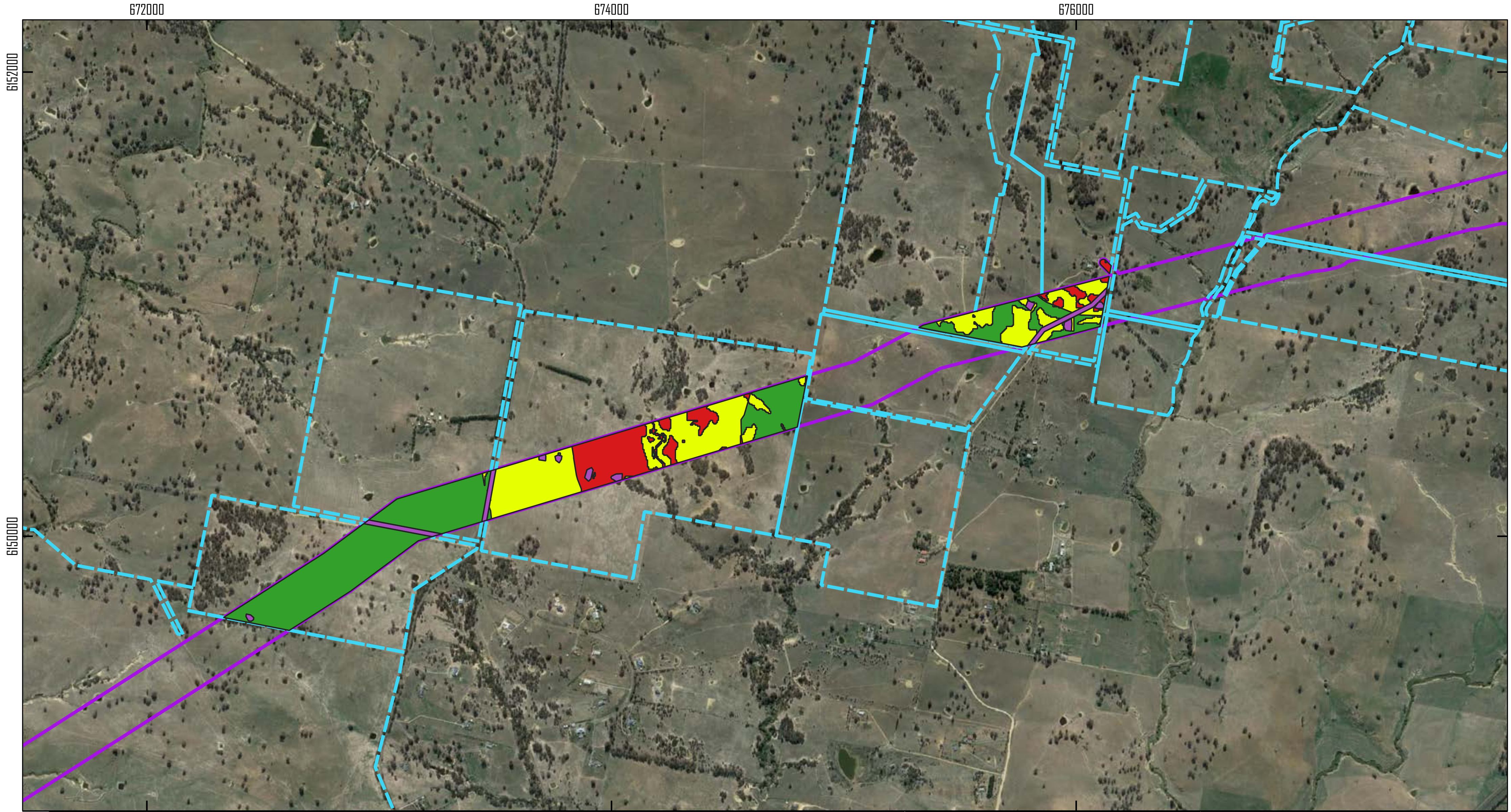
Legend

Project footprint
Property holding

Archaeological sensitivity

High
Moderate
Low
Disturbance

Navin Officer heritage consultants Pty Ltd



Humelink

Unsurveyed YAS2 (East)

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:22,020.361827

Legend

Project footprint

Property holding

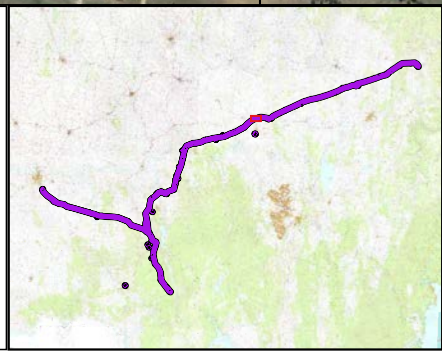
Archaeological sensitivity

High

Moderate

Low

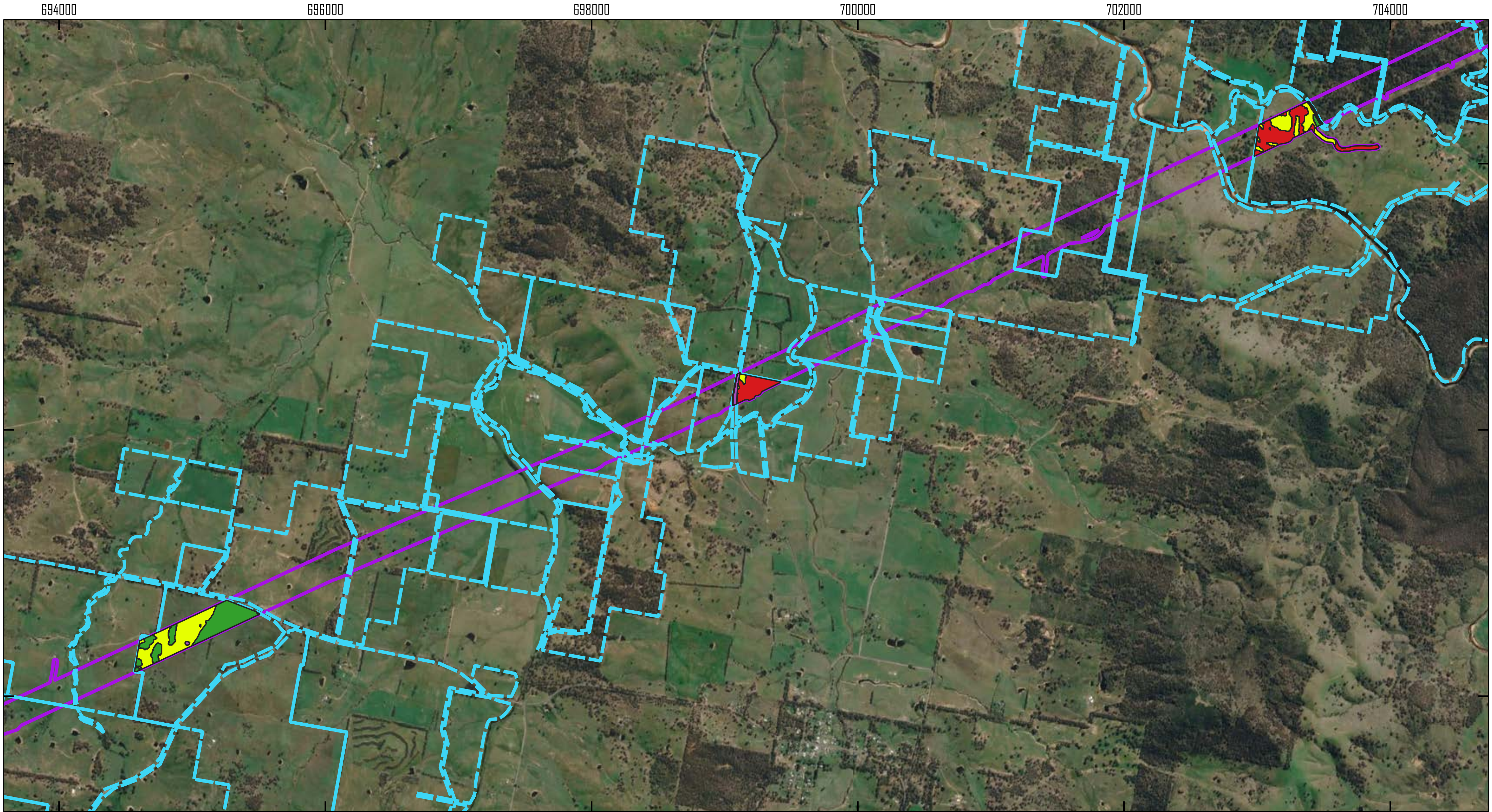
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m



Humelink

Unsurveyed ULAS1

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

Projection: GDA2020
MGA Zone:
Scale: 1:38,429.643701

Legend

Project footprint

Property holding

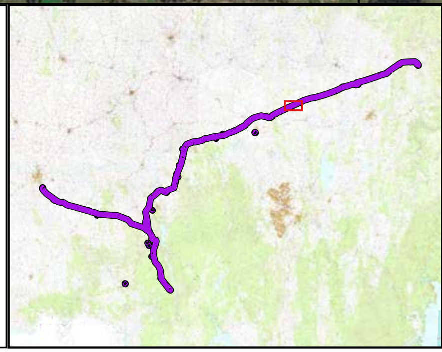
Archaeological sensitivity

High

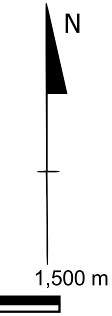
Moderate

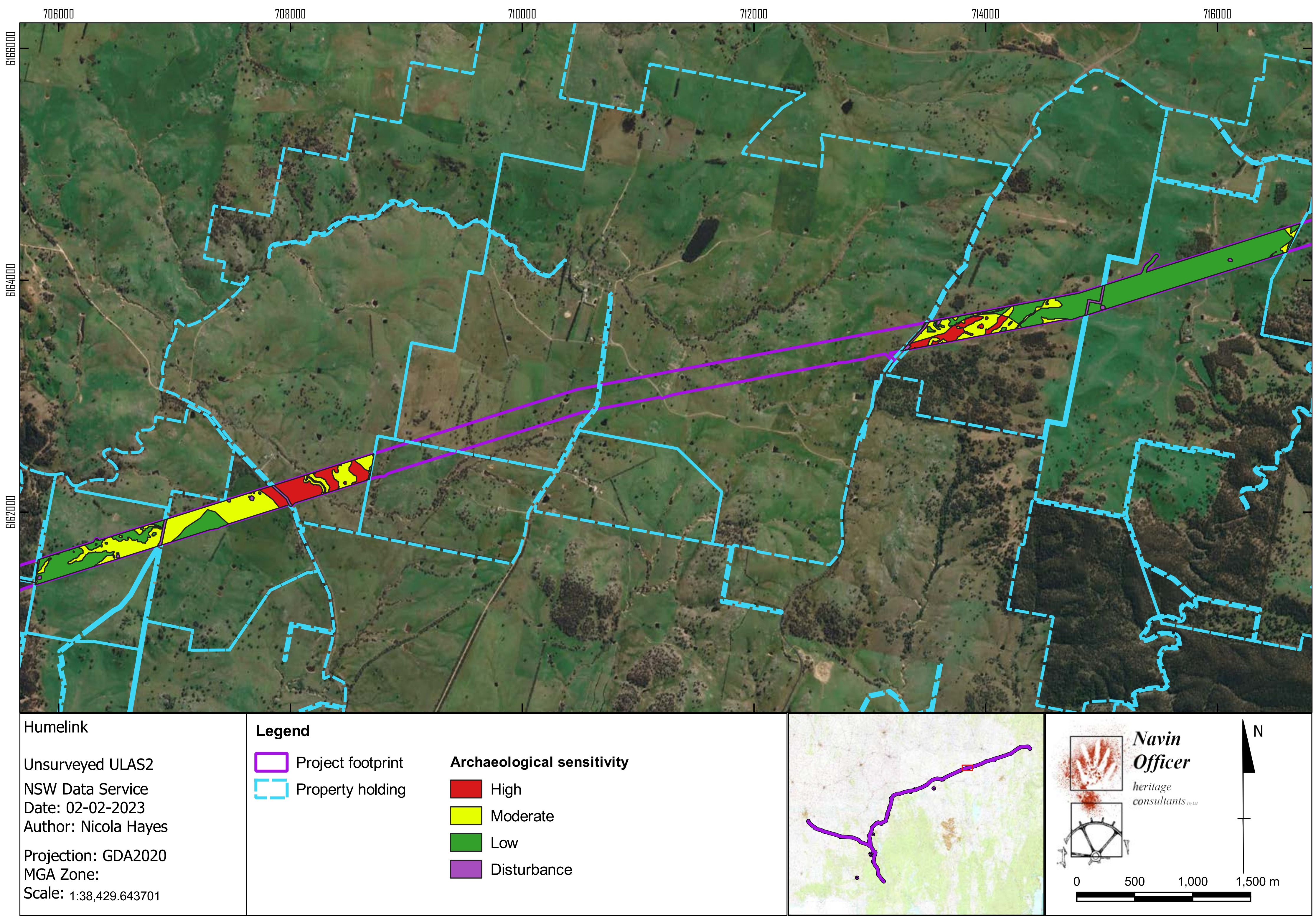
Low

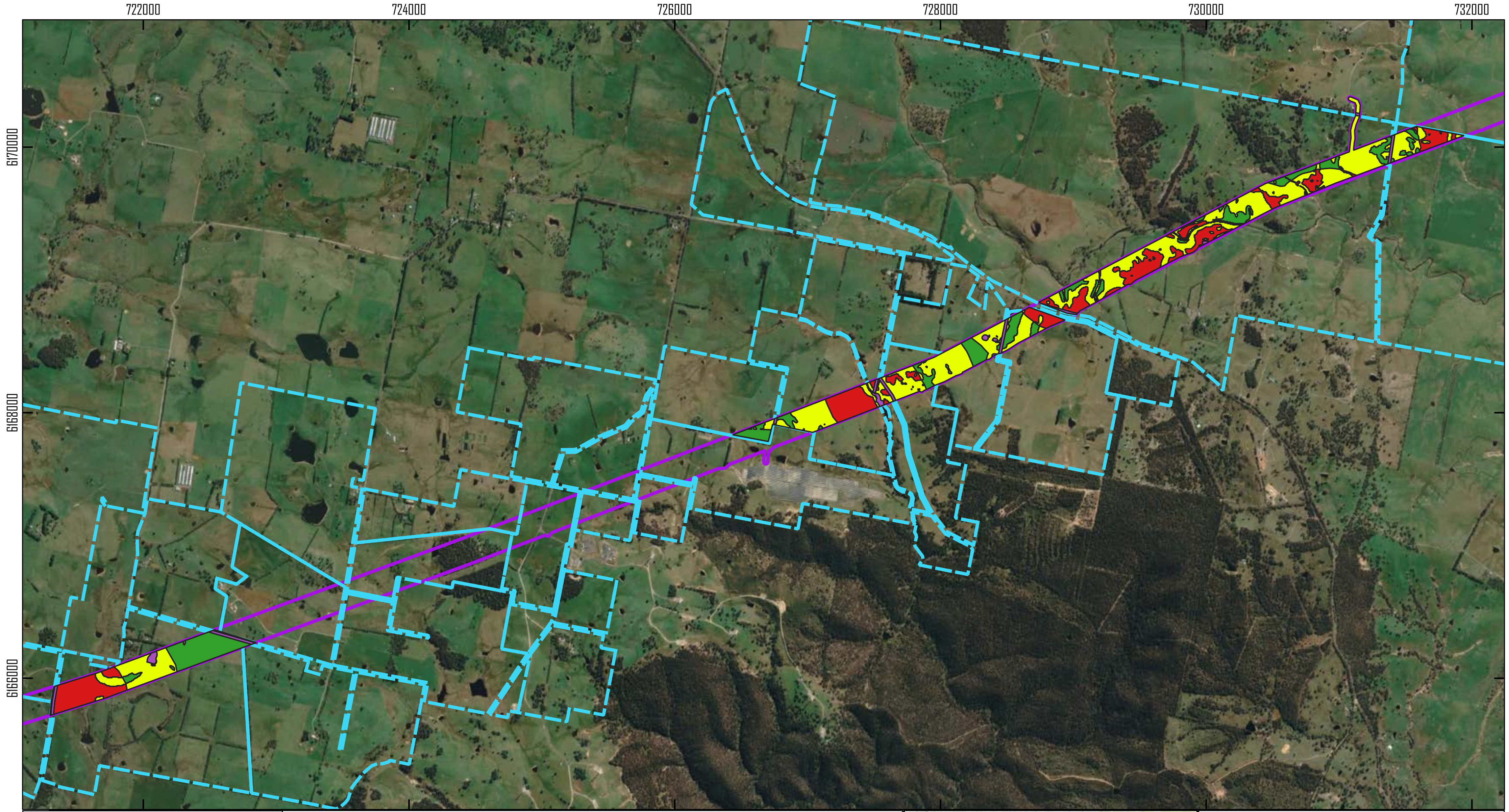
Disturbance

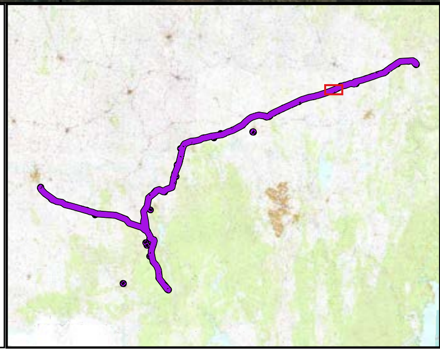


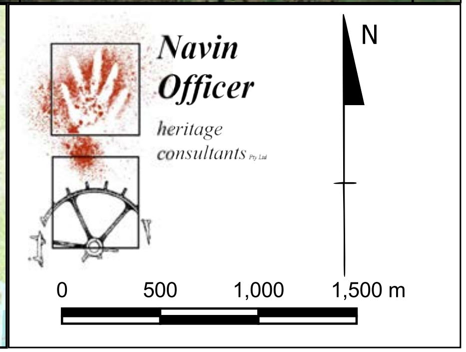
Navin Officer heritage consultants Pty Ltd




706000
708000
710000
712000
714000
716000
6166000
6164000
6162000
Humelink
Unsurveyed ULAS2
NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes
Projection: GDA2020
MGA Zone:
Scale: 1:38,429.643701
Legend
Project footprint
Property holding
Archaeological sensitivity
High
Moderate
Low
Disturbance
Navin Officer
heritage consultants Pty Ltd
N
0
500
1,000
1,500 m







Humelink

Unsurveyed ULAS3
NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

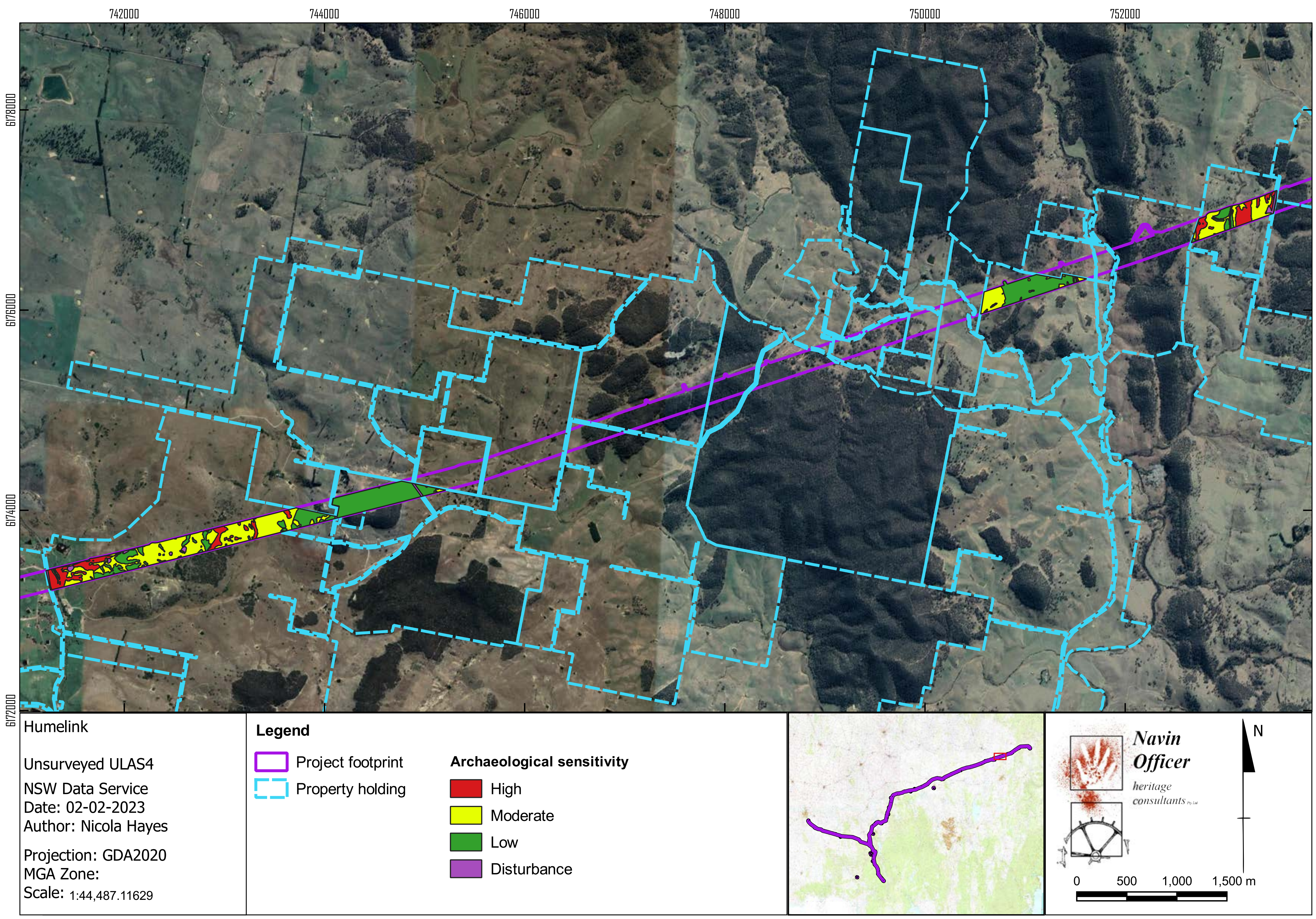
Projection: GDA2020
MGA Zone:
Scale: 1:38,429.643701

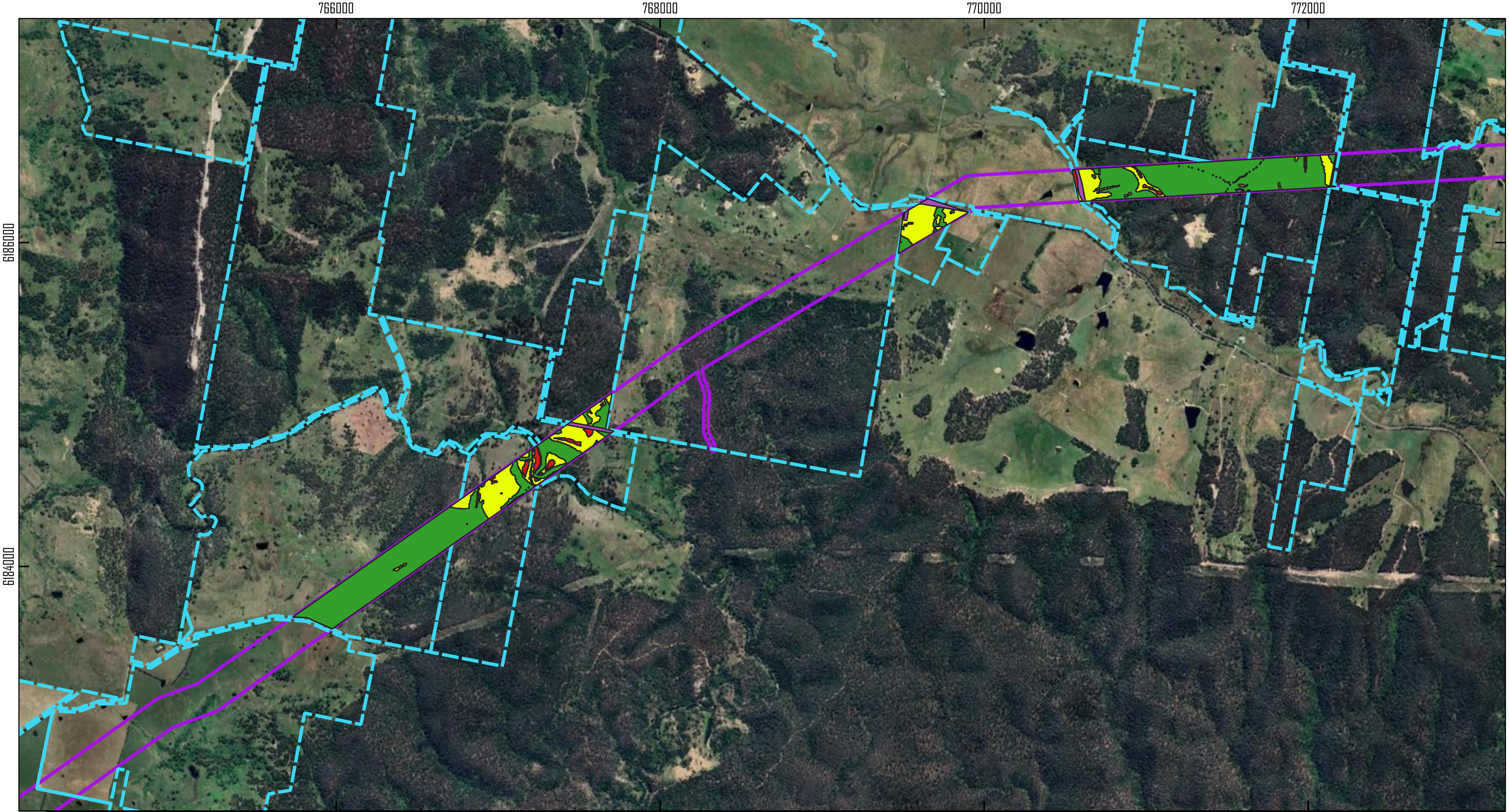
Legend

Project footprint
Property holding

Archaeological sensitivity

High
Moderate
Low
Disturbance


742000
744000
746000
748000
750000
752000
6178000
6176000
6174000
6172000
Humelink
Unsurveyed ULAS4
NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes
Projection: GDA2020
MGA Zone:
Scale: 1:44,487.11629
Legend
Project footprint
Property holding
Archaeological sensitivity
High
Moderate
Low
Disturbance
Navin Officer
heritage consultants
N
0
500
1,000
1,500 m



Humelink

Unsurveyed ULAS5

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

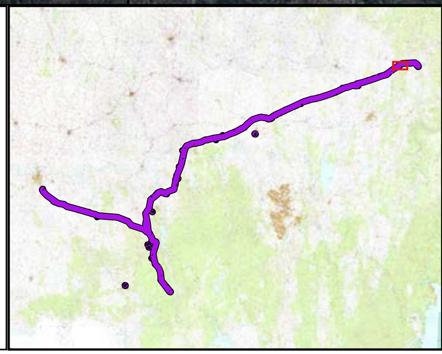
Projection: GDA2020
MGA Zone:
Scale: 1:31,616.162978

Legend

Project footprint
Property holding

Archaeological sensitivity

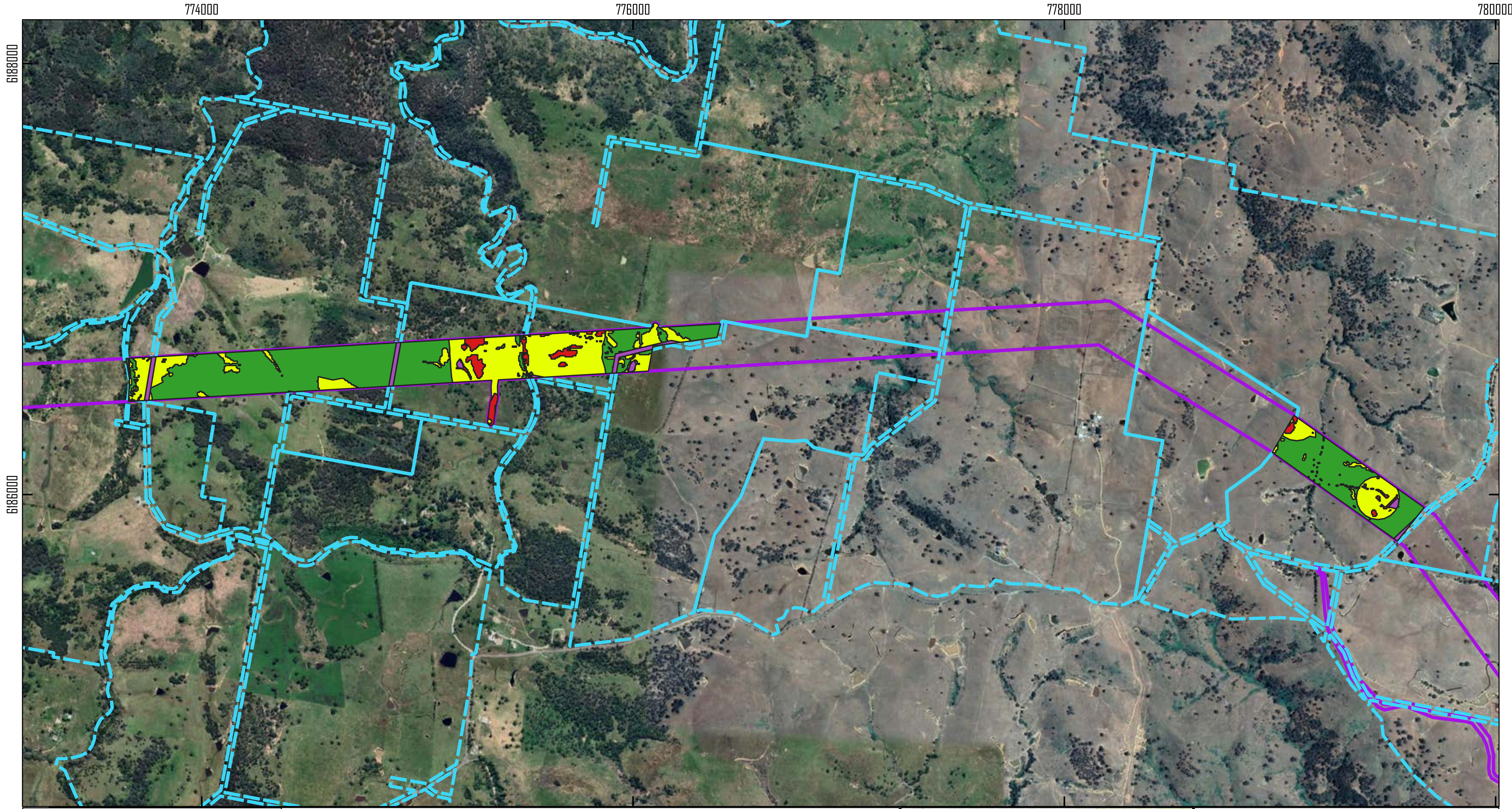
High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 1,500 m



Humelink

Unsurveyed ULAS6

NSW Data Service
Date: 02-02-2023
Author: Nicola Hayes

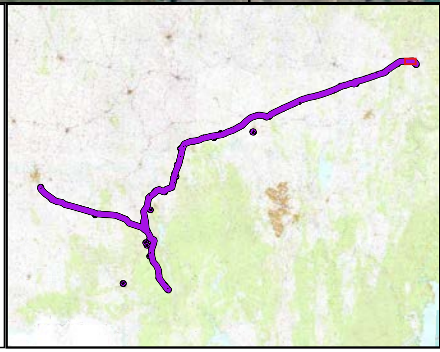
Projection: GDA2020
MGA Zone:
Scale: 1:23,592.467597

Legend

Project footprint
Property holding

Archaeological sensitivity

High
Moderate
Low
Disturbance



Navin Officer heritage consultants Pty Ltd

N

0 500 1,000 m

A5.3 All Sites and PADs

This attachment has been removed due to the restricted nature of the information shown.

ATTACHMENT 6

UNEXPECTED FINDS PROTOCOLS

A6.1 Protocol to follow if Aboriginal object(s) or historical relics (other than human remains) are encountered

In the event that object(s) which are suspected of being Aboriginal object(s) or relic(s) are encountered during development works, then the following protocol would be followed.

1. Cease any further excavation or ground disturbance, in the area of the find(s):

   a. the discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be temporarily halted, and

   b. the site supervisor and the Principal will be informed of the find(s).

2. Do not remove any find(s) or unnecessarily disturb the area of the find(s).

3. Ensure that the area of the find(s) is adequately marked as a no-go area for machinery or further disturbance, and that the potential for accidental impact is avoided.

4. Note the location and nature of the finds, and report the find to:

   a. relevant project personnel responsible for project and construction direction and management, and

   b. report the find to the Heritage NSW.

5. Where feasible, ensure that any excavation remains open so that the finds can be recorded and verified. An excavation may be backfilled if this is necessary to comply with work safety requirements, and where this action has been approved by the Heritage NSW. An excavation that remains open should only be left unattended if it is safe and adequate protective fencing is installed around it.

6. Following consultation with the relevant statutory authority Heritage NSW and, where advised, any other relevant stakeholder groups, the significance of the finds should be assessed and an appropriate management strategy followed. Depending on project resources and the nature of the find(s), this process may require input from a consulting heritage specialist.

7. Development work in the area of the find(s) may re-commence, if and when outlined by the management strategy, developed in consultation with, and approved by the relevant statutory authority.

8. If human skeletal material is encountered, the protocol for the discovery of human remains should be followed (refer attached).

A6.2 Protocol to follow in the event of the discovery of suspected human remains

The following protocol will be actioned if suspected human material is revealed during development activities or excavations.

1. All works must halt in the immediate area of the find(s) and any further disturbance to the area of the find(s) prevented.

    c. The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted; and

    d. The site supervisor and the Principal/Project manager will be informed of the find(s).

2. If there is substantial doubt regarding a human origin for the remains, then consider if it is possible to gain a qualified opinion within a short period of time. If feasible, gain a qualified opinion (this can circumvent proceeding further along the protocol for remains which are not human). If conducted, this opinion must be gained without further disturbance to the find(s) or the immediate area of the find(s). (Be aware that the site may be considered a crime scene that retains forensic evidence). If a quick opinion cannot be gained, or the identification is positive, then proceed to the next step.

3. Immediately notify the following of the discovery:

    a. the local Police (this is required by law)

4. Co-operate and be advised by the Police and/or coroner with regard to further actions and requirements concerning the find area. If required, facilitate the definitive identification of the material by a qualified person (if not already completed).

5. In the event that the Police or coroner instigate an investigation, construction work is not to resume in the designated area until approval in writing is gained from the NSW Police.

6. In the event that the Police and/or Coroner advise that they do not have a continuing or statutory role in the management of the finds then proceed with the following steps.

7. If the finds are not human in origin but are considered to be archaeological material relating to Aboriginal occupation then proceed with Protocol for the discovery of Aboriginal objects (other than human remains).

8. If the finds are **Aboriginal or probably Aboriginal in origin**:

    a. Heritage NSW archaeologist or Aboriginal Heritage Officer

    b. representative(s) from the registered Aboriginal parties (RAPs), and

    c. the proposal archaeologist (if not already notified).

    d. ascertain the requirements of Heritage NSW, the Project Manager, and the views of the Aboriginal Focus Group (AFG), and the proposal archaeologist;

    e. based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

        i. avoiding further disturbance to the find and conserving the remains *in situ*

        ii. conducting archaeological salvage of the finds following receipt of any required statutory approvals

iii. scientific description (including excavation where necessary), and possibly also analysis of the remains prior to reburial

iv. recovering samples for dating and other analyses, and/or

v. subsequent reburial at another place and in an appropriate manner determined by the AFG.

9. If the finds are **non-Aboriginal in origin**:

a. ascertain the requirements of the Heritage Branch, Project Manager, and the views of any relevant community stakeholders and the proposal archaeologist.

b. based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

i. avoiding further disturbance to the find and conserving the remains *in situ*

ii. conducting archaeological salvage of the finds following receipt of any required statutory approvals

iii. scientific description (including excavation where necessary), and possibly also analysis of the remains prior to reburial

iv. recovering samples for dating and other analyses, and/or

v. subsequent reburial at another place and in an appropriate manner determined in consultation with the Heritage Office and other relevant stakeholders.

10. Construction related work in the area of the remains (designated area) may not resume until the proponent receives written approval in writing from the relevant statutory authority: from the Police or Coroner in the event of an investigation, from Heritage NSW in the case of Aboriginal remains outside of the jurisdiction of the Police or Coroner, and from the Heritage Branch in the case of non-Aboriginal remains outside of the jurisdiction of the Police or Coroner.

ATTACHMENT 7

LITHIC DATABASE

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	PAD05		6		1		1	Angular flake	Silicified mudstone	0							23.35	15.73	4.9			2.09	Potential usewear in Q1	
HumeLink -Testing	PAD05		6		2		1	Complete flake	Silicified mudstone	0							39.3	21.6	13.01	3		13.81		
HumeLink -Testing	PAD05		6	A	1		1	Complete flake	Silicified mudstone	10	Flaked	4.93	2.57	Step	Usewear and backing	Q 2&4	31.05	15.42	4.12			2.43		
HumeLink -Testing	PAD05		6	A	1		2	Complete flake	Silicified mudstone	0	Flaked	6.87	1.24	Feather			10.51	13.9	2.03			0.41		
HumeLink -Testing	CGAS4		9	A	1		1	Longitudinal split flake	Silcrete	0	Flaked	11.97	7.53	Feather			34.7	21.91	9.73			9.55		9070
HumeLink -Testing	CGAS4		9	C	3		1	Distal flake	Silcrete	0				Feather			25.99	19.79	5.39			3.18	Notched on Q4	9070
HumeLink -Testing	CGAS4		9	C	3		2	Complete flake	Silcrete	0	Flaked	16.18	4.56	Feather	Notched	Q 2	17.95	15.92	5.12			2.39		9070
HumeLink -Testing	CGAS4		9	B	2		1	Proximal flake	Silicified mudstone	0	Flaked	2.41	1.35				11.85	15.87	3.86			0.82		9070
HumeLink -Testing	CGAS4		9	B	1		1	Tool	Silicified mudstone	0	Flaked	5.07	2.56		Backed	Q2	12.08	7.94	1.75		Backed artefact	0.3		9070
HumeLink -Testing	CGAS4		9	A	1		1	Longitudinal split flake	Silicified mudstone	0	Flaked			Feather			17.95	13.29	3.17			1.01		9070
HumeLink -Testing	CGAS4		9	D	2		1	Complete flake	Quartzite	0	Flaked	6.92	0.84	Feather			10.31	10.42	1.61			0.22		9070
HumeLink -Testing	PAD01		1		2		1	Distal flake	Quartz	0				Feather			10	17.59	5.98			0.94		8861
HumeLink -Testing	PAD01		1		2		2	Tool	Quartz	0					Backed	Q2	13.58	9.84	3.2		Backed artefact	0.74		8861
HumeLink -Testing	PAD01		1		2		3	Angular flake	Quartz	0							20.13	15.6	3.86			1.48		8861
HumeLink -Testing	PAD01		1		3		1	Angular flake	Quartz	0							8.49	4.49	1.79			0.09		8861
HumeLink -Testing	PAD01		1		4		1	Angular flake	Quartz	0							7.71	4.85	1.32			0.06		8861
HumeLink -Testing	PAD01		3		1		1	Complete flake	Quartz	0	Flaked	12.11	5.75	Feather			13.35	16.42	5.8			1.88		8863
HumeLink -Testing	PAD01		3		1		2	Tool	Quartz	0					Backed	Q2	17.4	18.32	5.44		Backed artefact	2.92	Clear quartz. Backed Q2. Potential split Q3. Potential usewear on Q4	8863
HumeLink -Testing	PAD01		3		1		3	Complete flake	Quartz	0		11.91	5.56	Split			15.36	11.62	5.51			1.15		8863
HumeLink -Testing	PAD01		3		1		4	Medial flake	Quartz	0							5.73	12.96	2.17			0.25		8863
HumeLink -Testing	PAD01		3		1		5	Angular flake	Quartz	0							18.36	10.52	10.47			2.2		8863
HumeLink -Testing	PAD01		3		1		6	Angular flake	Quartz	0							6.25	6.35	2.28			0.1		8863
HumeLink -Testing	PAD01		4		2		1	Angular flake	Quartz	0							13.7	9.68	6.34			0.91		8864
HumeLink -Testing	PAD01		4		2		2	Complete flake	Quartz	0	Flaked	12.83	7	Feather			16.4	15.37	7.12			1.57		8864
HumeLink -Testing	PAD01		4		1		1	Angular flake	Quartz	0							13.83	15.96	8.58			2.15	Core rejuvenation flake	8864
HumeLink -Testing	PAD01		4		1		2	Complete flake	Quartz	0	Flaked	10.31	2.86	Feather			9.99	11.28	2.39			0.33		8864
HumeLink -Testing	PAD01		4		1		3	Proximal flake	Quartz	0	Flaked	5.15	2.58				14.17	14.16	3.44			1.08		8864
HumeLink -Testing	PAD01		4		1		4	Tool	Quartz	0	Flaked	8.62	4.74	Feather	Backed	Q2	16.54	9.76	4.34		Backed artefact	0.95		8864

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Co	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	PAD01		4		1		5	Complete flake	Quartz	0	Flaked	8.2	5.47	Feather			22.79	15.42	9.12			4.12	Core rejuvenation flake	8864
HumeLink -Testing	PAD01		5		1		1	Proximal flake	Quartz	0	Flaked	15.17	9.43				18.02	22.87	11.23			6.09		8865
HumeLink -Testing	PAD01		5		1		2	Medial flake	Quartz	0							10.85	15.3	7.25			1.75		8865
HumeLink -Testing	PAD01		5		1		3	Complete flake	Quartz	0	Flaked	2.22	0.9	Feather			8.38	9.07	2.53			0.28		8865
HumeLink -Testing	PAD01		5		1		4	Angular flake	Quartz	0							6.82	7.02	1.08			0.06		8865
HumeLink -Testing	PAD01		5		2		1	Proximal flake	Quartz	0	Flaked	16.35	6.32				9.98	18.28	6.04			1.21		8865
HumeLink -Testing	ULAS03	1	2	A	1		1	Tool	Quartz	0					Backed	Q2	23.06	8.21	4.89		Backed	1.24		8925
HumeLink -Testing	ULAS03	1	2	A	1		2	Longitudinal split flake	Quartz	0	Flaked	4.94	4.12				14.92	17.09	5.9			1.83		8925
HumeLink -Testing	ULAS03	1	2	C	1		1	Tool	Quartz	0					Backed	Q2	23.54	27.89	9.79			6.49	Potential usewear on Q3	8925
HumeLink -Testing	ULAS03	1	3	A	1		1	Complete flake	Quartz	0	Flaked	15.67	7.59	Feather			18.67	15.88	8.15		Backed artefact	3.35		8926
HumeLink -Testing	ULAS03	1	3	B	1		1	Angular flake	Quartz	0							18.82	10.78	4.03			1.24		8926
HumeLink -Testing	ULAS03	1	3	C	1		1	Tool	Quartz	0					Backed	Q 1 & 2	18.2	11.3	6.21		Backed artefact	1.62	Potential usewear on Q4	8926
HumeLink -Testing	ULAS03	1	3	C	1		2	Medial flake	Quartz	0							6.95	11.35	3.2			0.46		8926
HumeLink -Testing	ULAS03	1	3	D	1		1	Angular flake	Quartz	0							9.5	10.92	3.5			0.46		8926
HumeLink -Testing	ULAS03	1	3	C	1		2	Angular flake	Quartz	0							17.48	10.33	4.29			0.92		8926
HumeLink -Testing	ULAS03	1	3	B	2		1	Angular flake	Quartz								20.84	13.64	6.42			2.47		8926
HumeLink -Testing	ULAS03	1	3	B	2		2	Tool	Silcrete	0	Flaked	11.41	3.59		Bifacial backing / usewear	Q 4& 3 / Q3	33.63	33.33	8.74		Backed artefact	8.95	Backed artefact wih potential usewear on Q2. Potentially a backed point	8926
HumeLink -Testing	YAS01		1		2	5-10 cn	1	Angular flake	Silicified mudstone	0							9.49	9.93	2.51			0.37		8866
HumeLink -Testing	YAS01		2		1		1	Medial flake	Silicified mudstone	0							14.83	28.59	10.4			7.4		8867
HumeLink -Testing	YAS01		2		1		2	Angular flake	Silicified mudstone	0							40.12	35.1	15.37			26.71		8867
HumeLink -Testing	YAS01		5	A	1		1	Angular flake	Quartz	0							20.18	18.16	16.5			8.64		8869
HumeLink -Testing	YAS01		5	A	1		2	Complete flake	Silicified mudstone	0	Flaked	5.2	1.73	Feather			33.03	13.87	6.06			3.45		8869
HumeLink -Testing	YAS01		5	A	1		3	Core	Silicified mudstone	15							39.53		28.36	6	Multiplatf orm core	22.57		8869
HumeLink -Testing	YAS01		5	C	1		1	Complete flake	Silicified mudstone	0	Flaked	6.04	1.76	Step			18.82	8.58	2.87			0.68		8869
HumeLink -Testing	YAS01		5	C	1		2	Angular flake	Quartz	0							9.42	8.05	3.45			0.42		8869
HumeLink -Testing	YAS01		5	C	1		3	Distal flake	Quartz	5				Feather			14.53	21.3	4.5			1.87		8869
HumeLink -Testing	YAS01		5	C	1		4	Longitudinal split flake	Silicified mudstone	0	Flaked	2.33	1.19	Feather			4.87	3.83	1.36			0.04		8869
HumeLink -Testing	YAS01		5	C	1		5	Complete flake	Silicified mudstone	0	Shattered			Step			22.17	7.63	3.19			0.89		8869
HumeLink -Testing	YAS01		5	C	1		6	Complete flake	Silicified mudstone	0	Flaked	12.83	3.76	Hinge			21.43	25.83	5.25			3.49		8869

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	YAS01		5	D	1		1	Longitudinal split flake	Silicified mudstone	0	Flaked	5.32	0.58	Feather			12.91	8.96	1.64			0.26		8869
HumeLink -Testing	YAS01		5	D	1		2	Longitudinal split flake	Indurated Mudstone	0	Flaked	8.27	4.45	Hinge			22.34	11.64	3.79			1.68		8869
HumeLink -Testing	YAS01		5	D	1		3	Angular flake	Silicified mudstone	0							14.19	14.16	4.8			2.26		8869
HumeLink -Testing	YAS01		5	D	1		4	Angular flake	Silicified mudstone	0							12	11.98	2.07			0.58		8869
HumeLink -Testing	YAS01		5	D	1		5	Complete flake	Silicified mudstone	0	Flaked	3.98	1.88	Feather			30.27	12.5	6.09			3		8869
HumeLink -Testing	YAS01		5	D	1		6	Angular flake	Silicified mudstone	30							14.26	5.67	3.01			0.44		8869
HumeLink -Testing	YAS01		7		1		1	Complete flake	Silicified mudstone	30	Flaked	15.71	6	Cortical			14.88	20.2	6.49			303		8870
HumeLink -Testing	ULAS05		1		2	5-10 cn	1	Complete flake	Silcrete	5	Flaked	8.1	3.6	Feather			27.85	13.03	5.33			2.48		8904
HumeLink -Testing	ULAS05		1		1	0-5cm	1	Longitudinal split flake	Quartz	0	Flaked	15.72	5.43	Feather			22.8	16.96	4.92			2.21		8904
HumeLink -Testing	ULAS05		1		1	0-5cm	2	Core	Indurated Mudstone	0							89.68		40.6	5	Single Platform	247.78		8904
HumeLink -Testing	ULAS05		2		1		1	Core	Silcrete	0							21.23		11.65	4	Multiplatf orm core	3.87		8905
HumeLink -Testing	ULAS05		2		2		1	Core	Silicified mudstone	0							24.51		21.9	7	Multiplatf orm core	18.48		8905
HumeLink -Testing	ULAS05		4		1		1	Angular flake	Quartz	0							15.08	14.96	10.77			3.04		8907
HumeLink -Testing	ULAS05		4		1		2	Distal flake	Quartz	0				Feather			12.54	17.4	7.5			1.69		8907
HumeLink -Testing	ULAS05		4		1		3	Tool	Quartz	10					Unifacial retouch and usewear	Q2	27.63	37.18	17.21		Amorpho us tool	20.2		8907
HumeLink -Testing	ULAS05		5		1		1	Longitudinal split flake	Silcrete	0	Flaked	14.46	7.55				26.53	16.51	11.91			7.72		8908
HumeLink -Testing	ULAS05		5		1		2	Complete flake	Silcrete	0	Flaked	7.97	1.82	Split			22.78	9.07	3.19			0.62		8908
HumeLink -Testing	ULAS05		5		1		3	Angular flake	Quartz	0							6.65	7.57	1.19			0.08		8908
HumeLink -Testing	ULAS05		5		2		1	Complete flake	Silcrete	0	Flaked	7.72	2.86	Step			28.26	13.01	7.2			2.69		8908
HumeLink -Testing	ULAS05		6		1		1	Complete flake	Quartz	0	Flaked	16.11	9.38	Step			19.48	28.18	10.75			8.8		8909
HumeLink -Testing	ULAS05		6		1		2	Angular flake	Quartz	0							24	14.93	14.6			5.7		8909
HumeLink -Testing	ULAS05		6		1		3	Angular flake	Quartz	0							10.25	13.82	5.66			1.05		8909
HumeLink -Testing	ULAS05		8		2		1	Complete flake	Indurated Mudstone	0	Flaked	7.41	1.6	Step			16.86	17.53	4.93			1.97		8911
HumeLink -Testing	ULAS04		2		1		1	Angular flake	Quartz	0							26.21	21.52	10.04			7.63		8874
HumeLink -Testing	ULAS04		2		2		1	Complete flake	Quartz	5	Flaked	22.43	10.37	Cortical			56.27	28.35	14.67			37.03		8874
HumeLink -Testing	ULAS04		2		2		2	Angular flake	Quartz	0							17.73	11.57	5.57			1.28		8874
HumeLink -Testing	ULAS04		2		2		3	Complete flake	Quartzite	20	Flaked	11.08	5.87	Feather			15.28	21.13	9.96			3.91		8874
HumeLink -Testing	ULAS04		2		2		4	Tool	Quartz	0					Notched	Q 2, 3 & 4	38.82	20.55	9.87		Notched	11.37	Potentially a piercer	8874

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Co	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	ULAS04		2		2		5	Proximal flake	Quartz	0	Flaked	14.66	3.31				8.66	18.48	3.01			0.74		8874
HumeLink -Testing	ULAS04		2		2		6	Angular flake	Quartz	0							6.72	6.14	1.86			0.09		8874
HumeLink -Testing	ULAS04		4		1		1	Complete flake	Quartz	0	Flaked	12.85	5.03	Feather			9.9	11.49	4.78			0.81		8876
HumeLink -Testing	ULAS04		4		2		1	Longitudinal split flake	Quartz	0	Flaked	3.69	1.58	Feather			8.96	8.66	3.37			0.38		8876
HumeLink -Testing	ULAS04		7		1		1	Distal flake	Quartz	0				Feather			16.71	27.4	11.54			6.08		8879
HumeLink -Testing	ULAS04		7		2		1	Angular flake	Quartz	0							20.03	11.29	6.78			2.06		8879
HumeLink -Testing	ULAS04		7		3		1	Angular flake	Quartz	0							19.1	14.44	5.55			1.86		8879
HumeLink -Testing	WAS03		3		1		1	Proximal flake	Quartz	0	Flaked	8.37	4.21				14.11	13.36	3.93			1.07		8633
HumeLink -Testing	PAD07		6		1		1	Complete flake	Silcrete	10	Flaked	11.84	2.05	Step			34.63	25.24	8.39			8.19		8856
HumeLink -Testing	PAD07		6		1		2	Angular flake	Quartz	0							9.52	7.78	3.75			0.55		8856
HumeLink -Testing	PAD07		6		2		1	Proximal flake	Silcrete	20	Cortical	22.6	10.41				13.4	23.42	9.16			4.86		8856
HumeLink -Testing	PAD07		6		2		2	Complete flake	Granite	40	Flaked	14.11	6.11	Step			36.94	26.6	9.64			13.18		8856
HumeLink -Testing	PAD07		6		2		3	Medial flake	Granite	30							12.1	31.57	11.12			6.27		8856
HumeLink -Testing	PAD07		8		1		1	Complete flake	Indurated Mudstone	0	Flaked	8.88	2.07				9.81	10.57	2.09			0.36		8858
HumeLink -Testing	PAD07		8		1		2	Angular flake	Indurated Mudstone	0							4.58	7.1	0.79			0.05		8858
HumeLink -Testing	PAD07		8		2		1	Angular flake	Quartz	0							27.02	13.56	9.11			4.68		8858
HumeLink -Testing	SVAS03		3		1		1	Distal flake	Quartz	0				Feather			6.8	15.62	2.77			0.45		8946
HumeLink -Testing	SVAS03		5	B	3		1	Complete flake	Indurated Mudstone	0	Flaked	8.5	3.64	Step			22.96	14.82	5.09			2.41		8948
HumeLink -Testing	SVAS03		5	B	3		2	Angular flake	Quartzite	0							18.5	5.94	5.71			0.54		8948
HumeLink -Testing	SVAS03		5	A	3		1	Core	Metamorphic material	50							34.02	47.13	14.51		Multiplatform core	30.3		8948
HumeLink -Testing	SVAS03		6	A	3		1	Manuport	Silicified mudstone	0							62.64	37.31	24.59			62.64		
HumeLink -Testing	YAS04		1		1		1	Complete flake	Silicified mudstone	0	Flaked	11.33	4.22	Step			20.81	13.24	5.04			1.96		8884
HumeLink -Testing	YAS04		1		1		2	Complete flake	Silicified mudstone	0	Flaked	16.21	4.76	Feather			26.36	38.4	13.78			2076		8884
HumeLink -Testing	YAS04		7		1		1	Angular flake	Indurated Mudstone	0							20.38	15.29	5.72			2.33		8890
HumeLink -Testing	YAS04		7		1		2	Angular flake	Indurated Mudstone	0							25.34	10.81	9.49			1.98		8890
HumeLink -Testing	YAS04		7		1		3	Angular flake	Quartz	0							12.04	9.82	2.55			0.32		8890
HumeLink -Testing	WAS2.1		1		1		1	Complete flake	Granite	0	Flaked	19.08	4.08	Step			25.06	42.5	8.2			9.78		8850
HumeLink -Testing	WAS2.1		1		1		2	Complete flake	Granite	0	Flaked	11.07	5.23	Step			24.47	23.97	5.49			3.95		8850
HumeLink -Testing	WAS2.1		1		1		3	Angular flake	Granite	0							45.44	25.48	17.32			18.86		8850
HumeLink -Testing	WAS2.1		1		1		4	Complete flake	Quartz	10	Cortical	9.75	5.88	Feather			23.54	12.35	5.7			1.93		8850

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	WAS2.1		1		1		5	Complete flake	Quartz	0	Flaked	10.09	2.07	Step			15.22	17.98	3.52			1.26		8850
HumeLink -Testing	WAS2.1		1		1		6	Longitudinal split flake	Granite	0	Flaked	19.61	15.16	Step			55.74	32.04	16.51			28.32		8850
HumeLink -Testing	WAS2.1		1		2		1	Core	Granite	0							35.15		36.11	6	Multiplatform core	30.93		8845
HumeLink -Testing	WAS2.1		1		2		2	Longitudinal split flake	Granite	0	Flaked	12.94	4.44	Feather			12.27	15.91	3.73			0.98		8845
HumeLink -Testing	WAS2.1		1		2		3	Longitudinal split flake	Quartz	0	Flaked	8.4	2.59	Feather			9.72	10.38	4.41			0.5		8845
HumeLink -Testing	WAS2.1		1		2		4	Longitudinal split flake	Quartz	0	Flaked	30.24	10.16	Feather			26.14	32.46	11.64			13.49		8845
HumeLink -Testing	WAS2.1		1		2		5	Distal flake	Quartz	0				Feather			9.74	23.14	4.53			1.09		8845
HumeLink -Testing	WAS2.1		1		2		6	Angular flake	Quartz	0							12.88	14.76	3.25			0.82		8845
HumeLink -Testing	WAS2.1		1		2		7	Angular flake	Quartz	0							8.31	12.87	2.01			0.35		8845
HumeLink -Testing	WAS2.1		1		2		8	Tool	Quartz	0							18.84	22.23	6.2		Notched	2.09		8845
HumeLink -Testing	WAS2.1		1		2		9	Angular flake	Granite	0							30.22	28.78	9.91			10.76		8845
HumeLink -Testing	WAS2.1		1		2		10	Angular flake	Quartz	0							9.29	5.28	1.45			0.1		8845
HumeLink -Testing	WAS2.1		1		2		11	Complete flake	Granite	0	Flaked	4.56	1.44	Step			19.62	13.28	5.31			1.15		8845
HumeLink -Testing	WAS2.1		1		2		12	Complete flake	Granite	0	Flaked	13.41	3.24	Hinge			23.68	18.46	4.47			1.87		8845
HumeLink -Testing	WAS2.1		1		2		13	Complete flake	Granite	0	Flaked	15.53	5.77	Feather			16.46	14.49	8.75			1.17		8845
HumeLink -Testing	WAS2.1		1		2		14	Complete flake	Granite	0	Flaked	11.75	5.41	Feather			15.15	15.5	5.99			1.62		8845
HumeLink -Testing	WAS2.1		1		2		15	Angular flake	Granite	0							17.1	13.98	8.6			2.24		8845
HumeLink -Testing	WAS2.1		1		2		16	Longitudinal split flake	Granite	0	Flaked	8.13	4.03				14.02	13.27	3.92			0.99		8845
HumeLink -Testing	WAS2.1		1		2		17	Complete flake	Granite	0							13.44	10.74	2.13			0.47		8845
HumeLink -Testing	ULAS02	1	2	C	1		1	Core	Silcrete	0							67.44		49.1	10	Multiplatform core	99.93		8935
HumeLink -Testing	ULAS02	1	2	A	2		2	Complete flake	Silicified mudstone	0	Flaked	9.29	3.87	Plunge			29.69	12.63	4.9			2.36		8935
HumeLink -Testing	ULAS02	1	2	B	2		3	Angular flake	Quartz	0							24.31	27.31	9.66			8.05		8935
HumeLink -Testing	ULAS02	1	2	B	2		4	Angular flake	Quartz	0							27.49	16.1	8.33			6.95		8935
HumeLink -Testing	ULAS02	1	4	A	1		1	Complete flake	Quartzite	10	Flaked	20.64	12.52	Feather			24.9	27.8	14.94			12.67		8937
HumeLink -Testing	ULAS02	1	4	A	1		2	Proximal flake	Quartz	0	Flaked	13.11	3.92				14.46	24.1	4.75			1.99		8937
HumeLink -Testing	ULAS02	1	4	A	2		1	Complete flake	Quartz	0	Flaked	5.47	1.94	Feather			27.85	27.3	5.09			6.69		8937
HumeLink -Testing	ULAS02	1	4	C	2		1	Complete flake	Quartz	5	Cortical	11.89	4.35	Step			23.27	10.92	6.92			2.32		8937
HumeLink -Testing	ULAS02	1	4	C	2		1	Angular flake	Quartz	0							7.15	11.69	1.79			0.21		8937
HumeLink -Testing	ULAS02	1	5	A	1		1	Longitudinal split flake	Silcrete	0	Flaked	2.18	1.19	Split			12.31	9.02	1.39			0.23		8938

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	ULAS02	1	5	A	1		2	Proximal flake	Quartz	0	Flaked	12.24	2.65				13.64	12.29	4.25			1.12		8938
HumeLink -Testing	ULAS02	1	5	C	1		1	Angular flake	Silcrete	0							12.46	13.24	3.33			0.85		8938
HumeLink -Testing	ULAS02	1	5	C	1		2	Angular flake	Silcrete	0							10.17	6.56	2.36			0.2		8938
HumeLink -Testing	ULAS02	1	5	A	2		1	Core	Silcrete	0							27.89		15.71	7	Multiplatform core	11.85		8938
HumeLink -Testing	ULAS02	1	5	C	2		1	Proximal flake	Silcrete	0	Flaked	9.02	3.9				12.27	9.96	2.82			0.55		8938
HumeLink -Testing	ULAS02	1	5	D	2		1	Longitudinal split flake	Indurated Mudstone	0	Flaked	12.49	2.43	Feather			15.43	24.97	4.24			1.63		8938
HumeLink -Testing	ULAS02	1	5	B	3		1	Complete flake	Indurated Mudstone	0	Flaked	18.75	6.39	Split			17.04	19.1	4.84			2.25		8938
HumeLink -Testing	ULAS02	1	5	B	3		2	Complete flake	Indurated Mudstone	0	Flaked	13.22	4.82	Hinge			19.89	14.55	4.49			1.28		8938
HumeLink -Testing	ULAS02	1	5	B	3		3	Complete flake	Indurated Mudstone	0	Flaked	11.04	3.46	Feather			12.49	13.84	3.42			0.65		8938
HumeLink -Testing	ULAS02	1	5	B	3		4	Distal flake	Indurated Mudstone	0				Feather			8.29	17.11	2.59			0.5		8938
HumeLink -Testing	ULAS02	1	5	B	3		5	Angular flake	Indurated Mudstone	0							9.46	5.89	4.81			0.45		8938
HumeLink -Testing	ULAS02	1	5	C	3		1	Angular flake	Indurated Mudstone	0							24.31	13.81	5.52			1.62		8938
HumeLink -Testing	ULAS02	1	5	C	3		2	Distal flake	Indurated Mudstone	0				Feather			6.46	8.4	1.99			0.14		8938
HumeLink -Testing	ULAS02	1	5	C	3		3	Distal flake	Indurated Mudstone	0	Flaked			Feather			7.9	4.11	1.12			0.05		8938
HumeLink -Testing	ULAS02	1	5	D	3		1	Complete flake	Indurated Mudstone	0	Flaked	7.38	2.85	Feather			16.66	17.24	6.59			2.37		8938
HumeLink -Testing	ULAS02	1	5	D	3		2	Complete flake	Indurated Mudstone	0	Flaked	15.27	7	Feather			23.2	19.46	7.98			3.64		8938
HumeLink -Testing	ULAS02	1	5	D	3		3	Complete flake	Quartz	0	Flaked	13.02	5.3	Feather			20.28	19.52	8.34			3.12		8938
HumeLink -Testing	ULAS02	1	5	D	3		4	Tool	Indurated Mudstone	0	Flaked	11.05	5.08		Backed	Q4	27.84	10.34	5		Backed point	1.58		8938
HumeLink -Testing	ULAS02	1	5	D	3		5	Complete flake	Indurated Mudstone	0	Flaked	1.96	0.43	Feather			7.86	8.31	1.59			0.12		8938
HumeLink -Testing	ULAS02	1	5	A	4		1	Complete flake	Silcrete	0	Flaked	7.05	0.91	Feather			20.3	10.92	3.31			0.62		8938
HumeLink -Testing	ULAS02	1	5		Clean up		1	Angular flake	Quartz	0							13	7.66	3.98			0.55		8938
HumeLink -Testing	ULAS02	1	5		Clean up		2	Angular flake	Indurated Mudstone	0							13.3	8.55	2.78			0.31		8938
HumeLink -Testing	YAS02	1	2	A	1		1	Distal flake	Indurated Mudstone	0				Feather			13.39	21.67	4.71			1.62		8917
HumeLink -Testing	YAS02	1	2	A	1		2	Medial flake	Indurated Mudstone	0							13.89	24.64	5.59			2.41		8917
HumeLink -Testing	YAS02	1	2	A	1		3	Complete flake	Indurated Mudstone	0	Flaked	8.6	2.44	Feather			12.74	13.47	3.44			1.05		8917
HumeLink -Testing	YAS02	1	2	A	1		4	Angular flake	Indurated Mudstone	0							9.96	10.12	3.08			0.33		8917

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	YAS02	1	2	B	2		1	Core	Indurated Mudstone	0							44.5		46.81	5	Multiplatform core	99.6		8917
HumeLink -Testing	YAS02	1	5	A	1		1	Longitudinal split flake	Indurated Mudstone	0	Flaked	12.33	8.15	Feather			33.18	28.47	8.73			8.9		8920
HumeLink -Testing	YAS02	1	5	A	1		2	Longitudinal split flake	Indurated Mudstone	10	Cortical	3.95	1.49	Feather			26.06	18.21	9.9			5.81		8920
HumeLink -Testing	YAS02	1	5	A	1		3	Angular flake	Indurated Mudstone	0							17.3	12.1	4.97			1.31		8920
HumeLink -Testing	YAS02	1	5	A	1		4	Tool	Indurated Mudstone						Steep/Usewear	Q1 /Q4	24.7	29.65	10.17		Steep edged scraper	9.5	Steep edge retouch on platform on dorsal surface	8920
HumeLink -Testing	YAS02	1	5	A	1		5	Complete flake	Quartz	0	Flaked	10.77	6.25	Feather			35.74	15.11	11.21			7.75		8920
HumeLink -Testing	YAS02	1	5	A	1		6	Complete flake	Indurated Mudstone	0	Flaked	8.19	13.44	Feather			27.58	23.62	8.8			8.05		8920
HumeLink -Testing	YAS02	1	5	A	1		7	Complete flake	Indurated Mudstone	0	Flaked	7.88	1.25	Feather			17.97	11.77	3.93			0.76		8920
HumeLink -Testing	YAS02	1	5	A	1		8	Angular flake	Indurated Mudstone	0							15.14	12.21	2.57			0.52		8920
HumeLink -Testing	YAS02	1	5	A	1		9	Complete flake	Indurated Mudstone	0	Crushed	4.04	0.83	Hinge			18.1	22.99	4.31			2.11		8920
HumeLink -Testing	YAS02	1	5	A	1		10	Complete flake	Indurated Mudstone	0	Flaked	3.23	1.01	Step			15.39	7.34	1.24			0.23		8920
HumeLink -Testing	YAS02	1	5	A	1		11	Angular flake	Indurated Mudstone	0							15.71	4.89	1.3			0.11		8920
HumeLink -Testing	YAS02	1	5	B	1		1	Tool	Indurated Mudstone	0					Backed	Q1 , 2 & 3	40.14	40.05	11.96			23.14		8920
HumeLink -Testing	YAS02	1	5	B	1		2	Angular flake	Indurated Mudstone	0							12.7	9.39	2.03			0.34		8920
HumeLink -Testing	YAS02	1	5	B	1		3	Tool	Quartz	0					Backed/Usewear	Q4/Q2	15.69	11.41	3.95		Backed point	0.85		8920
HumeLink -Testing	YAS02	1	5	B	1		4	Angular flake	Indurated Mudstone	0							9.11	8.46	1.31			0.16		8920
HumeLink -Testing	YAS02	1	5	A	2		1	Angular flake	Indurated Mudstone	0							19.13	14.78	2.46			0.68		8920
HumeLink -Testing	YAS02	1	5	A	2		2	Complete flake	Indurated Mudstone	10	Crushed			Feather			12.32	10.88	2.76			0.43		8920
HumeLink -Testing	YAS02	1	5	A	2		3	Complete flake	Indurated Mudstone	0	Flaked	7.78	1.92	Hinge			9.47	12.85	2.07			0.34		8920
HumeLink -Testing	YAS02	1	5	A	2		4	Angular flake	Quartz	0							18.09	11.88	9.78			2.98	Core rejuvenation flake	8920
HumeLink -Testing	YAS02	1	5	A	2		5	Distal flake	Indurated Mudstone	0				Feather			7.29	17	1.99			0.37		8920
HumeLink -Testing	YAS02	1	5	A	2		6	Angular flake	Indurated Mudstone	0							16.99	12.51	3.3			0.56		8920
HumeLink -Testing	YAS02	1	5	A	2		7	Longitudinal split flake	Indurated Mudstone	5	Cortical	10.5	8.63	Split			17.99	10.66	7.23			0.88		8920
HumeLink -Testing	YAS02	1	5	A	2		8	Longitudinal split flake	Silicified mudstone	0	Flaked	12.86	8.8	Feather			19.81	14.01	8.15			2.97	Potential usewar Q4	8920

Project	PAD # / A	Tr	Te	Qu	Spit#	Depth (	Art	Type	Raw Material	Cor	Platform Ty	Platfor	Platfor	Terminat	Retouch Type	Retouch Loca	Length	Width	Thickn	Fla	Tool Type	Weight	Comments	CAT ID
HumeLink -Testing	YAS02	1	5	A	2		9	Complete flake	Indurated Mudstone	0	Flaked	6.07	1	Feather			19.84	8.71	2.41			0.28		8920
HumeLink -Testing	YAS02	1	5	A	2		10	Angular flake	Indurated Mudstone	0							11.64	12.54	1.17			0.22		8920
HumeLink -Testing	YAS02	1	5	A	2		11	Angular flake	Indurated Mudstone	0							14.53	15.41	2.11			0.47		8920
HumeLink -Testing	YAS02	1	5	A	2		12	Proximal flake	Indurated Mudstone	0	Flaked	10.4	3.5		Usewear	Q4	20.31	15.32	2.65			1.36		8920
HumeLink -Testing	YAS02	1	5	A	2		13	Angular flake	Quartz	0							14.53	5.36	4.17			0.85		8920
HumeLink -Testing	YAS02	1	5	A	2		14	Angular flake	Indurated Mudstone	0							5.44	6.09	1.84			0.08		8920
HumeLink -Testing	YAS02	1	5	D	2		1	Complete flake	Indurated Mudstone	20	Flaked	6.39	1.88	Feather			29.04	12.78	6.36			2.73		8920
HumeLink -Testing	YAS02	1	5	D	2		2	Longitudinal split flake	Indurated Mudstone	0	Flaked	8.53	5.65	Step			27.44	7.43	4.44			1.24		8920
HumeLink -Testing	YAS02	1	5	D	2		3	Core	Silicified mudstone	5							28.47		4.83		Bipolar core	3.44		8920