EnergyConnect (NSW – Western Section)

SA/NSW Border to Buronga to NSW/Vic Border, NSW

Non-Aboriginal & Aboriginal Cultural Heritage Assessment Report

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Executive summary

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria (VIC). Collectively, the proposed interconnector is known as EnergyConnect.

The proposal, focusing on the western section of EnergyConnect in NSW, would involve the construction and operation of new 330kV transmission lines between the SA/NSW border and Buronga, an upgrade and expansion of the existing Buronga substation from an operating capacity of 220kV to 330kV and an upgrade of the existing transmission line between Buronga substation and the border of NSW and Victoria.

This technical paper, the Non-Aboriginal and Aboriginal Cultural Heritage Assessment Report (ACHAR), is one of a number of technical documents that form part of the Environmental Impact Statement (EIS) for the proposal.

Since the exhibition of the EIS, a number of amendments have been proposed, including changes to Buronga substation upgrade and expansion to avoid PAD sites. To reflect these changes, the ACHAR has been updated to outline the potential impact and revised mitigation measures, and will support the Submissions Report (WSP, 2021a) and the Amendment Report (WSP, 2021).

Impact assessment

Aboriginal sites

Before the amendments the project impacts were:

- the Buronga substation upgrade and expansion would result in a partial direct impact to PEC-PAD-27.
- the Buronga construction compound and accommodation camp would not impact on any recorded Aboriginal heritage sites or PADs
- the Anabranch South construction compound and accommodation camp would result in full direct impact to three sites, all of which are isolated finds of low scientific value (PEC-W-74, PEC-W-75 and PEC-W-76)
- the transmission line alignment would have a range of direct and potential direct impacts on a total of 77 sites, which consist of sites of low and moderate scientific significance. There was also the potential for indirect impacts including inadvertent direct impacts during vegetation clearance activities.

In summary, based on the amended indicative disturbance area the project impacts are:

- the Buronga substation upgrade and expansion would not impact on any recorded Aboriginal heritage sites or PADs
- the Buronga and Wentworth construction compound and accommodation camps would not impact on any recorded Aboriginal heritage sites or PADs
- the Anabranch South construction compound would result in full direct impacts to one site (PEC-W-75), which is an isolated find of low scientific value

- the transmission line corridor may have a range of direct and potential direct impacts on a total of 77 sites, which consist of sites of low and moderate scientific significance (refer to Table 10.1). The exact nature and extent of impact would be confirmed following detailed analysis. Some of these sites form part of the 25 PADs which may be impacted by the amended indicative disturbance areas. The significance of the PADs would be confirmed during test excavation prior to the commencement of construction in these areas

- all sites directly and potentially directly impacted are of cultural significance.

Non-Aboriginal sites

Before the amendments the project impacts were:

- The transmission line easement passed through the property boundary (curtilage) of three listed heritage items (Nulla Nulla Woolshed, Nulla Nulla Homestead and Sturts Billabong). In addition, one unlisted heritage item, a survey marker tree, was identified during survey

In summary, based on the amended indicative disturbance area:

- The transmission line easement passes through the property boundary (curtilage) of three listed heritage items (Nulla Nulla Woolshed, Nulla Nulla Homestead and Sturts Billabong). In addition, two unlisted heritage items (survey marker trees) have been identified.

- Given the distance the proposal would not have any direct impact to the items associated with the listings and would not have any impact on the significance of the items.

Mitigation measures

Aboriginal sites

The mitigation measures to manage potential Aboriginal heritage impacts of the proposal during the construction and operation phase include (refer to Section 11 for further detail):

- Aboriginal stakeholder consultation will be carried out in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). Registered Aboriginal Parties will be active participants in all proposed site inspections and test excavations, with further cultural information to be gathered during consultation undertaken in association with these activities.

- Prior to the commencement of construction, a survey will be carried out with Registered Aboriginal Party representatives where ground or vegetation disturbance activities are required in all locations outside of the previously surveyed 100 metres heritage survey area (including the water supply locations).

- Following detailed design and prior to the commencement of construction, test excavation will be undertaken in areas of moderate and high archaeological significance and/or archaeological subsurface potential (e.g. PADs) to determine the presence or absence of subsurface archaeological deposits, where direct impacts are anticipated based on the detailed design.

- All portions of artefact scatters that are to be directly impacted will require surface collection prior to construction commencement. Additionally, based on the outcomes of the test excavation, items or PADs will be subject to surface collection or salvage prior to the commencement of construction.

- All scarred trees identified will be assessed by a qualified arborist in order to accurately assess scientific significance. If any scarred tree cannot be avoided, the tree will be subject to 3D scanning, followed by salvage of the scarred trunk.

- Exclusion zones will be established to protect sites that would remain in-situ throughout construction. Suitable controls will be identified in the heritage management sub-plan, which may include site fencing.

The mitigation measures have been amended in response to the Heritage NSW submission received during the exhibition of the EIS in addition to reflect the application of these measures to amended indicative disturbance area.

Non-Aboriginal sites

The mitigation measures to manage potential non-Aboriginal heritage impacts of the proposal during the construction and operation phase include (refer to Section 11 for further detail):

- Sites PEC-W-H-1 and PEC-W-SE-H1 (survey marker trees) will be fenced during construction and vegetation clearance for the proposal, to avoid inadvertent impacts during works. This measure has been amended to reflect the amended indicative disturbance area impacts to PEC-W-SE-H1.

- Should the disturbance area for the proposal extend beyond the survey area, further assessment by an archaeologist will be carried to determine the likelihood of occurrence and significance of potential archaeology and impacts from the proposal (including built heritage).

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Glossary

Term/Acronym	Description
Aboriginal object	Means an object associated with Aboriginal people because of Aboriginal tradition (*Heritage Act 2004*).
Aboriginal place	Means a place associated with Aboriginal people because of Aboriginal tradition (*Heritage Act 2004*).
Aboriginal site	A place or location which relates to past or contemporary Aboriginal occupation. Sites can be divided into those identified from archaeological evidence (archaeological sites), and those related to intangible cultural values, such as revealed by oral tradition and lore, or from the historical record. An Aboriginal site may have both archaeological and intangible values.
Archaeological site	A place or location with the confirmed presence of archaeological evidence of Aboriginal occupation, where the context of that evidence can be reliably related to the Aboriginal actions which produced the evidence.
Artefact	An object, normally portable, made or modified by human hand (see 'stone artefact').
Artefact scatter	A formerly used open site-type classification defined as two or more stone artefacts situated no more than a specified distance (such as 60 metres) away from any other included artefact. Typically, this category did not include isolated finds. The use of the term *scatter* was intended only to be descriptive and did not infer the original human behaviour which formed the site. The term *open camp site* has been used extensively in the past to describe open artefact scatters.
Background discard/scatter	There is no single concept for background discard or 'scatter', and therefore no agreed definition. The definitions in current use are based on the postulated nature of prehistoric activity, and often they are phrased in general terms and do not include quantitative criteria. It is commonly agreed that background discard occurs in the absence of 'focused' activity involving the production or discard of stone artefacts in a particular location. An example of unfocused activity is occasional isolated discard of artefacts during travel along a route or pathway. Examples of 'focused activity' are camping, knapping and heat-treating stone, cooking in a hearth, and processing food with stone tools. In practical terms, over a period of thousands of years an accumulation of 'unfocused' discard may result in an archaeological concentration that may be identified as a 'site'. Definitions of background discard comprising only qualitative criteria do not specify the numbers (numerical flux) or 'density' of artefacts required to discriminate site areas from background discard.

Term/Acronym	Description
Isolated find	A single stone artefact, not located within a rock shelter, and which occurs without any associated evidence of Aboriginal occupation within a specified radius, such as 60 metres (depending on which archaeological convention is used). Isolated finds may represent single discard events, be constituent components of background scatter, or be indicative of larger obscured, remnant and disturbed sites.
Lithic assemblage (of stone)	A collection of whole and fragmentary stone artefacts and manuports obtained from an archaeological site, either by collecting items scattered on the present ground surface (see lithic scatter) or by controlled excavation (see also 'stone artefact').
Open camp site	A formerly used site type classification defined as an open context stone artefact occurrence (or artefact scatter), containing two or more artefacts situated no more than a specified arbitrary distance (such as 60 metres) away from any other included artefact. 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 description from the interpretation of field evidence, both open camp sites and isolated finds are now referred to as *artefact occurrences.*
Proposal study area	The study area for this EIS, which comprises a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga substation and a 200 metre wide corridor between Buronga substation and the NSW/Victoria border at Monak, near Red Cliffs. Encompasses the disturbance area and a buffer zone which has been applied to identify the constraints nearby to the proposal which may or may not be indirectly impacted by the proposal.
(the) proposal	The proposal is known as 'EnergyConnect (NSW – Western Section)' The proposal would involve the following key features: — construction of new high voltage transmission lines and associated infrastructure between the SA/NSW border near Chowilla and the existing Buronga substation — an upgrade to the existing transmission line between the Buronga substation and the NSW/Victoria border at Monak, near Red Cliffs, and the decommissioning of the 220kV single circuit transmission line (known as Line 0X1) — an significant expansion and upgrade of the existing Buronga substation from an operating capacity of 220 kV to 330kV — Establishment and upgrade of access tracks and roads, as required — Other ancillary works required to facilitate the construction of the proposal e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps.

Term/Acronym	Description
(the) proponent	The proposal is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd as a trustee for NSW Electricity Operations Trust (referred to as TransGrid). TransGrid is the operator and manager of the main high voltage (HV) transmission network in NSW and the Australian Capital Territory (ACT), and is the Authorised Network Operator (ANO) for the purpose of an electricity transmission or distribution network under the provisions of the *Electricity Network Assets (Authorised Transactions) Act 2015*.
Potential archaeological deposit (PAD)	A discrete location or area, defined spatially either by geomorphological, disturbance or administrative criteria, within which there is a predicted likelihood that subsurface archaeological material is present, and that this material would warrant archaeological investigation in order to determine its scientific, cultural, or statutory value and status.
Heritage study corridor	A 10-kilometre site search corridor used to develop a preliminary predictive model focused on Aboriginal site locations. This area is based on the proposal study area centreline between the SA/NSW border and Buronga and down to the NSW/Victoria border at Monak (approximately five kilometres either side).
historic period	Pot colonisation period of Australian history
Survey area	100 metre corridor subject to archaeological survey along the length of the proposal
ACHA(R)	Aboriginal Cultural Heritage Assessment (Report)
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ANU	Australian National University
BP	Before Present
DAWE	Australian Department of Agriculture, Water and the Environment
DECCW	Department of Environment, Climate Change and Water (NSW)
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESC	effective survey coverage
ESD	ecological sustainable development
FGS	Fine Grained Siliceous (stone material type)
GIS	geographic information system
GPS	global positioning system
HV	high voltage

Term/Acronym	Description
ICOMOS	International Council on Monuments and Sites
ILUA	Indigenous land use agreement
kV	kilovolt
LEP	Local Environmental Plan
LGA	Local Government Area
NES	national environmental significance
NOHC	Navin Officer Heritage Consultants Pty Ltd
NPWS	National Parks and Wildlife Service
NTA	*Native Title Act 1993*
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PAD	potential archaeological deposit
RAP	registered Aboriginal party
SA	South Australia
SEAR	Planning Secretary's Environmental Assessment Requirement
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State Significant Development
SSI	State Significant Infrastructure
VIC	Victoria

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1 Introduction

1.1 Overview of EnergyConnect

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

EnergyConnect comprises several components or 'sections' (shown on Figure 1.1). The Western Section (referred to as 'the proposal') is the subject of this technical paper.

EnergyConnect aims to reduce the cost of providing secure and reliable electricity transmission between NSW and SA in the near term, while facilitating the longer-term transition of the energy sector across the National Electricity Market (NEM) to low emission energy sources.

EnergyConnect has been identified as a priority transmission project in the NSW Transmission Infrastructure Strategy (Department of Planning and Environment, 2018), linking the SA and NSW energy markets and would assist in transporting energy from the South-West Renewable Energy Zone to major demand centres.

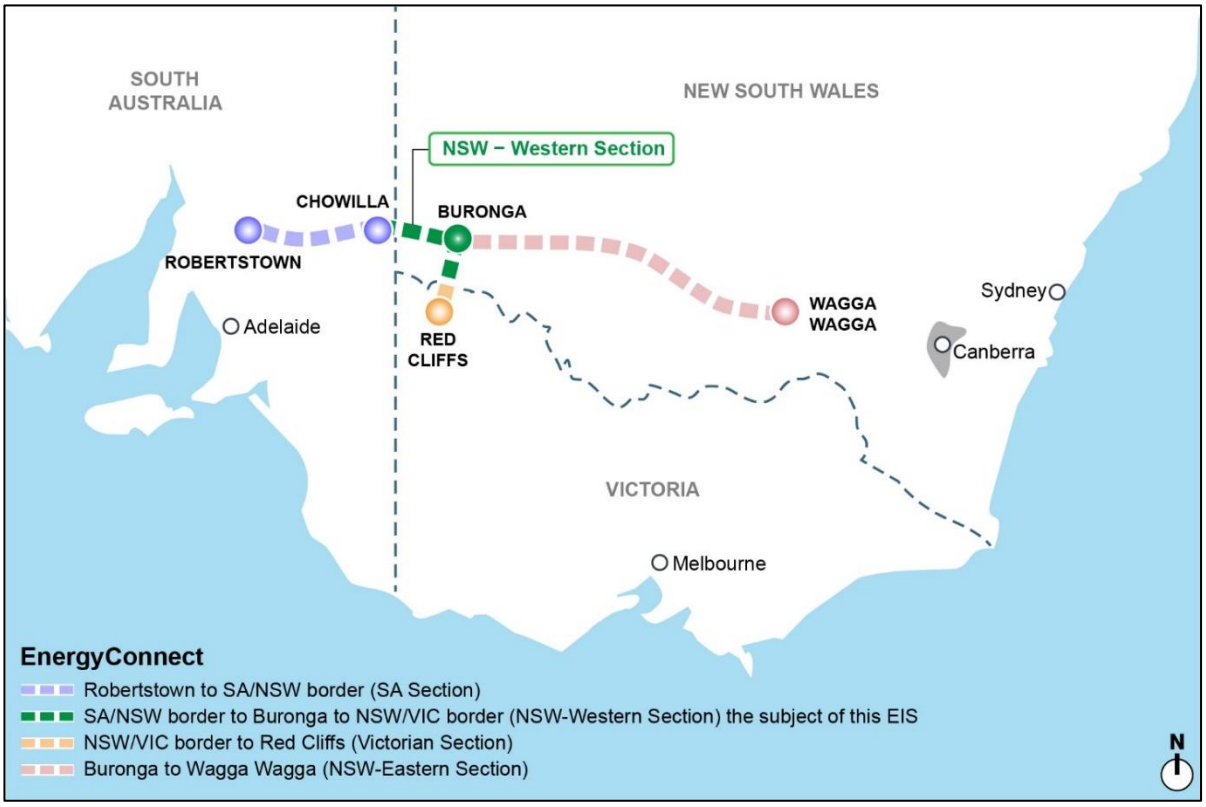

Figure 1.1 Overview of EnergyConnect

1.2 The proposal

TransGrid is seeking approval under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) to construct and operate the proposal. The proposal has been declared as Critical State significant infrastructure under Section 5.13 of the EP&A Act.

The proposal was also declared a controlled action on 26 June 2020 and requires a separate approval under the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*. The proposal is subject to the bilateral assessment process that has been established between the Australian and NSW governments.

The proposal is located in regional western NSW within the Wentworth Local Government Area (LGA), approximately 800 kilometres west of Sydney at its nearest extent. The proposal spans between the SA/NSW border near Chowilla and Buronga and the NSW/Victoria border at Monak, near Red Cliffs. It traverses around 160 kilometres in total.

1.2.1 Key proposal features

The key components of the proposal include:

- a new 330 kilovolt (kV) double circuit transmission line and associated infrastructure, extending around 135 kilometres between the SA/NSW border near Chowilla and the existing Buronga substation
- an upgrade of the existing 24 kilometre long 220kV single circuit transmission line between the Buronga substation and the NSW/Victoria border at Monak (near Red Cliffs, Victoria) to a 220kV double circuit transmission line, and the decommissioning of the 220kV single circuit transmission line (known as Line 0X1)
- a significant upgrade and expansion of the existing Buronga substation to a combined operating voltage 220kV/330kV
- new and/or upgrade of access tracks as required
- a minor realignment of the existing 0X2 220kV transmission line, in proximity to the Darling River
- ancillary works required to facilitate the construction of the proposal (e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps).

Subject to approval, construction of the proposal would commence in mid-2021. The construction of the transmission lines would take approximately 18 months. The Buronga substation upgrade and expansion would be delivered in two components and would be initially operational by the end of 2022.The final construction program would be confirmed during detailed design.

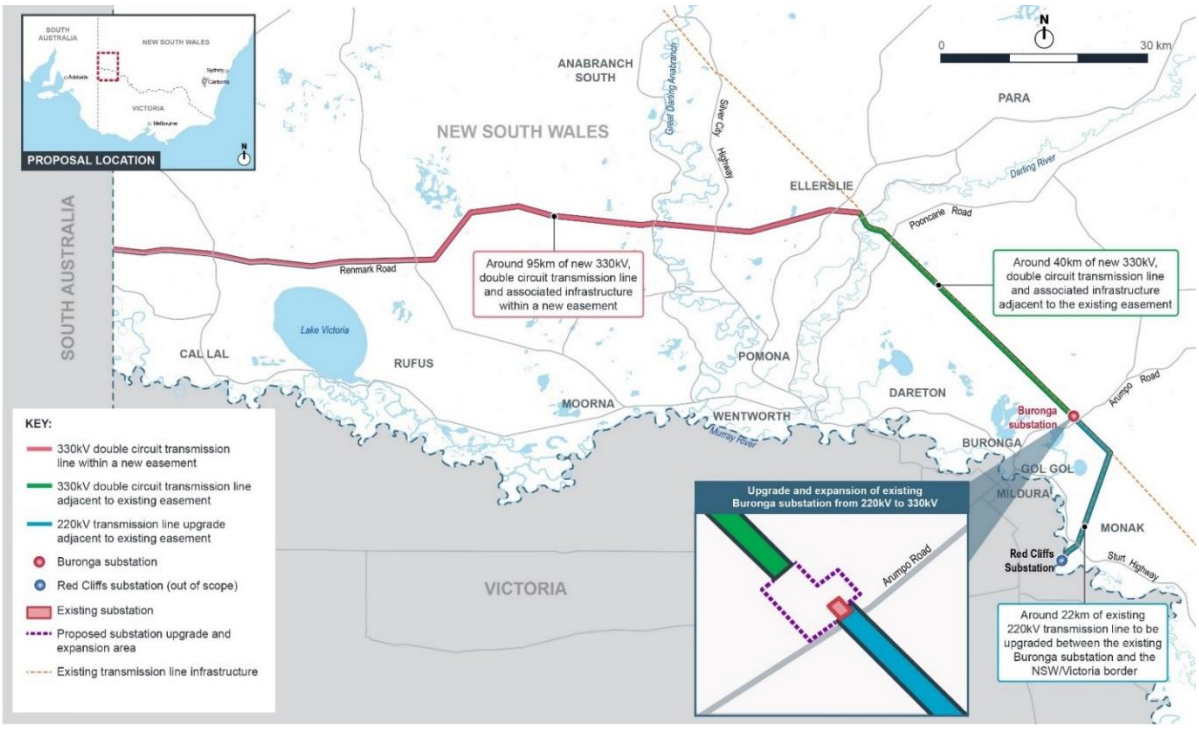

Figure 1.2 Overview of the proposal as shown in the EIS

1.2.2 Key amendments to the proposal since public exhibition

An EIS was prepared for the proposal in accordance with the requirements of Division 5.2 of the EP&A Act and was supported by the Cultural Heritage Assessment Report (ACHAR). The EIS was placed on public exhibition by the NSW Department of Planning, Industry and Environment (DPIE) between 30 October 2020 and 10 December 2020.

An Amendment Report (WSP, 2021b) has been prepared to assess the proposed amendments to the proposal. The proposed amendments have been made in response to both issues raised in community and stakeholder submissions received during the public exhibition of the EIS, as well as changes which have been made by TransGrid (and its nominated construction contractor) as part of ongoing design development of the proposal.

Key amendments to the proposal are:

- accommodating the proposed design amendments including:
    - the inclusion of the confirmed location of the accommodation camp and construction compound west of Wentworth
    - the revised substation layout for the Buronga Substation upgrade and expansion site to avoid PAD 27
    - addition of two earthwork material sites at the Buronga substation
    - the proposed temporary bypass for around 6.5 kilometres to the south of the Buronga substation
    - construction water supply points
- refinement to the indicative disturbance area to take into account:
    - refinement of the proposed tower locations and transmission line alignment
    - refinement of the proposed tower footprint to reflect generally smaller tower footprints for most towers
    - changes to the categorisation of disturbance along the transmission line alignment to reflect refinements to the vegetation clearing strategy
    - revision to the proposed access track strategy to make use of existing access tracks (wherever possible) in order to seek a reduction in the overall the amount of clearing required
    - avoidance of PAD 19 and PAD 25 through the amendment of proposed access requirements in order to minimise subsurface impacts.

An overview of the amended proposal is provided in Figure 1.3. The final alignment and easement of the transmission line would be confirmed during detailed design and would be located within the transmission line corridor as shown in Figure 1.3.

1.2.3 Proposal need

The proposal is required to complete the missing transmission link between SA and NSW transmission networks. The upgrade to the existing transmission line between Buronga and Red Cliffs would also enhance the capacity of the network to provide electricity between NSW and Victoria.

This connection would relieve system constraints and allow for NSW, SA and Victorian consumers to benefit from significant amounts of low-cost, large-scale solar generation in south-west NSW. The proposal is an essential component of EnergyConnect.

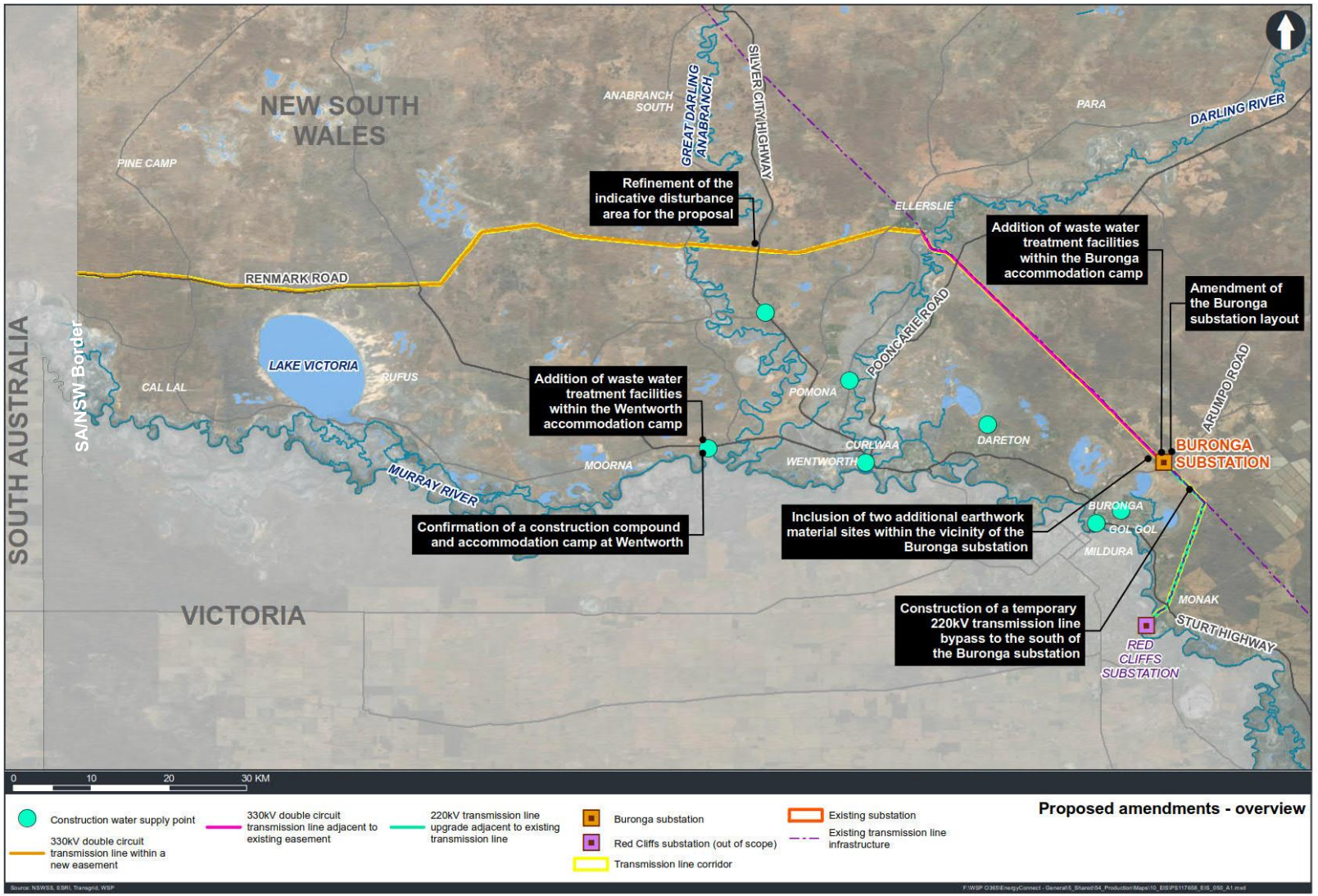

Figure 1.3 Overview (aerial) of the amended proposal

1.3 Purpose of this technical report

This report is one of several technical papers that form part of the EIS for the proposal. This has been updated to reflect the proposed amendments to the proposal, as described in Section 1.2.2.

The purpose of this technical paper is to identify and assess the potential impacts of the proposal in relation to Aboriginal and non-Aboriginal heritage. It responds directly to the Secretary's Environmental Assessment Requirements (SEARs) and has been prepared with consideration of *Aboriginal Cultural Heritage Consultation Requirements for Proponents (Department of Environment, Climate Change and Water* (NSW) (DECCW), 2010).

1.3.1 Secretary's environmental assessment requirements

The NSW Department of Planning, Industry and Environment (DPIE) has provided the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Environmental Impact Statement (EIS). The requirements specific to this assessment and where these aspects are addressed in this technical report are outlined in Table 1.1.

Table 1.1 Secretary's environmental assessment requirements – heritage

Reference	Secretary's environmental assessment requirements	Where addressed
Key Issue – Heritage	an assessment of the Aboriginal and non-Aboriginal (historic) heritage (cultural and archaeological) impacts of the proposal	This report
	adequate consultation with the local Aboriginal community and other relevant stakeholders, having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010)	Section 4

1.4 Report objectives

This report aims to:

- describe the proposed development/works etc. (Section 1)
- describe the statutory and policy context of the proposal (Section 2)
- describe the study methodology (Section 3)
- provide a description of the study area (Section 4)
- describe consultation with Aboriginal people (Section 5)
- provide an Aboriginal heritage context for the study area (Section 6)
- provide an historic heritage context for the study area (Section 7)
- describe the results and analysis of the archaeological survey (Section 8)
- describe the cultural heritage values and significance statement of the study area (Section 9)
- describe the proposed activity (Section 10)
- provide management recommendations and mitigations measures to avoid and minimise harm (Section 11)
- References (Section 12).

1.5 Report terminology

The following terms are discussed throughout this report and are defined as:

- **The proposal:** EnergyConnect (NSW–Western Section).

- **Proposal study area:** The proposal, including transmission line corridor, Buronga substation upgrade and expansion, access tracks, and the construction compounds and accommodation camps at Buronga and Anabranch South would be contained within the proposal study area. The proposal study area comprises of a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga and a 200 metre wide corridor between Buronga and the NSW/Victoria border at Monak, near Red Cliffs, and is used in the environmental assessment to provide a broader understanding of the constraints and conditions of the locality.

- **Amended indicative disturbance area:** the area that would be directly impacted by both construction and operation of the proposal including all proposal infrastructure elements (including the proposed transmission line alignment, substation expansion site works and other ancillary works, i.e. the permanent works footprint) as well as locations for currently proposed construction elements such as construction compounds, access tracks and site access points, laydown and staging areas, concrete batching plants, brake/winch sites, and accommodation camps.

  The disturbance area would have varying degrees of physical disturbance along the transmission line alignment to reflect construction and operational requirements. For the purposes of this assessment and determining a level of impact to Aboriginal and non-Aboriginal heritage, this has been defined as (Figure 1.4):

  - Disturbance area A – this is the area where ground disturbance would be required. It refers to an area around the transmission towers in which all vegetation would be removed during construction. It would include potential sub-surface impacts through construction activities such as grading, excavation, and full tree removal. This area would also be subject to ongoing maintenance during operation (i.e. removal to ground level) for operational and safety requirements (including bushfire).

  - Disturbance area A (centreline clearing) – this is the area where ground disturbance would be minimised wherever possible. It refers to areas between the proposed transmission towers in which all vegetation would be removed during construction to ground however topsoil materials and ground material would be retained and would not require sub-surface impacts in these locations. This area would also be subject to ongoing maintenance during operation (i.e. removal to ground level) for operational and safety requirements (including bushfire).

  - Disturbance area B – this is the area where ground disturbance would not be required except in limited circumstances. It refers to an area between transmission towers in which trimming of vegetation above about four metres in height would be required to meet the vegetation clearance heights.

- **Survey area**: the area subject to which the archaeological survey was based on an indicative disturbance area, which was generally a 100 metre wide corridor with some broader sections where construction facilities are proposed or design options are likely. If following detailed design sections of the proposal are to be located outside the 100 metre survey area these areas will be subject to further assessment.

- **Transmission line corridor:** the corridor in which the final easement and transmission line is expected to be contained within. It would consist of a 200 metre corridor along the transmission line component of the proposal. Transmission line construction activities would be contained within this area, but some access tracks may extend beyond this corridor.

- **Heritage study corridor:** a 10 kilometre site search corridor used to develop a preliminary predictive model focused on Aboriginal site locations. This area is based on the proposal study area centreline between the SA/NSW border and Buronga and down to the NSW/Victoria border at Monak (approximately five kilometres either side).

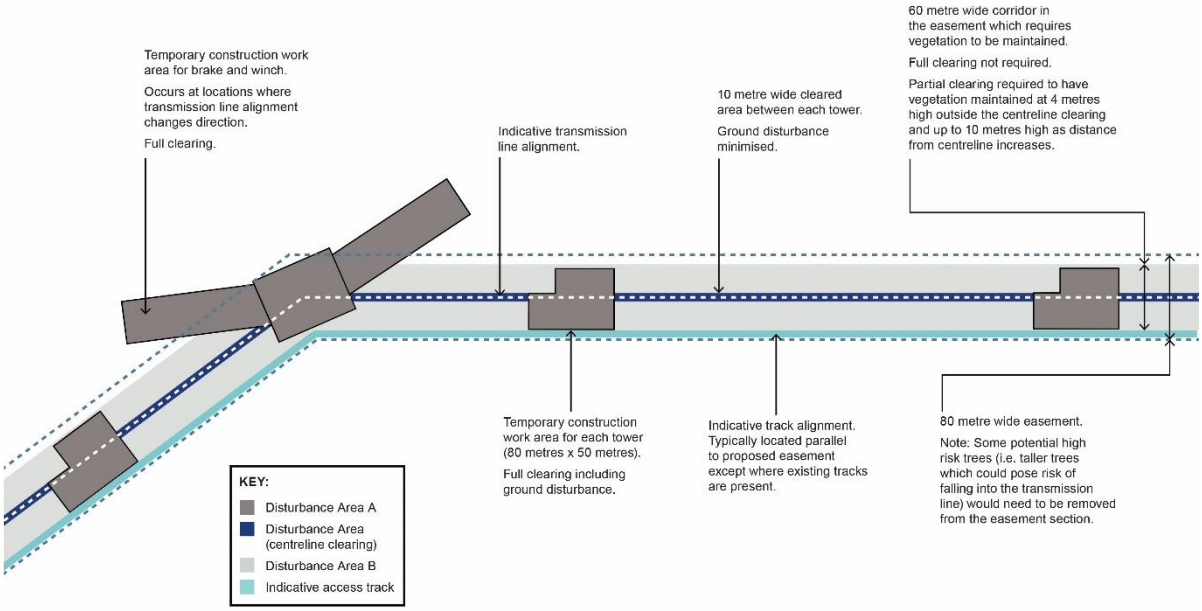

Figure 1.4 Disturbance Areas A and B (as amended)

1.5.1 Restricted information

Information in this report relating to the exact location of Aboriginal sites should not be published or promoted in the public domain. The following images and report sections should be restricted in a public version of this document:

- Figures 6.1 to 6.5, 10.1 to 10.24
- all tabulated data in Appendix 1
- Appendix 4

No information provided by Aboriginal stakeholders in this report has been specifically identified as requiring access restrictions due to its cultural sensitivity.

1.5.2 Confidentiality

No information in this report has been classified as confidential.

1.6 Contributors

Field survey was carried out by:

Archaeologists and Navin Officer Heritage Consultants (NOHC) field assistants

- Adrian Cressey
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- Joel Mason
- Ben Sybert
- Madelaine van Ewyk
- Murray Holland.

Aboriginal representatives

- Ernest Mitchell, Russell Taylor, and James Toomey (Dareton Local Aboriginal Land Council)
- Warren Clark, Warwick Clark, Alynthia Kennedy, and Malcolm Mathers (Barkandji Native Title Group Aboriginal Corporation)
- Roland J Smith and Nicholas Smith (Barkindji-Maraura Elders Council)
- Colin Mitchell
- Rodney Lawson
- Arthur Kirby
- Ricky Handy
- Damien Kennedy.

This report was prepared by Adrian Cressey, Adrian has a Bachelor Archaeological Practice with Honours from the Australian National University (ANU) and a Diploma in Environmental Science from the Canberra Institute of Technology.

This report was edited by Nicola Hayes. Nicola has a Bachelor of Arts and Science, as well as a Graduate Diploma in Archaeology from the ANU.

With geographic information system (GIS) support from Joel Mason. Joel has a Masters of Archaeological Science from the ANU.

Background research by Madelaine van Ewyk. Madelaine has a Bachelor of Arts from the University of Notre Dame (Sydney), as well as a Graduate Certificate and Graduate Diploma in Archaeology and Cultural Heritage Management from Flinders University.

2 Statutory context

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act focuses Australian Government interests on the protection of matters of national environmental significance, with the states and territories having responsibility for matters of state and local significance.

The objectives of the 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 (NES) without approval from the Australian Minister for the Environment (the Environment Minister).

Under the EPBC Act, a proposal is required to be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for activities that have the potential to significantly impact on matters of NES. If the proposal is considered likely to significantly affect matters of NES, the Environment Minister can deem the proposal a controlled action, and their approval is required prior to proceeding to construction. A controlled action may comprise a project, development, undertaking, activity or series of activities.

The proposal has been determined to be a 'controlled action' as it is likely to have a significant impact on certain listed threatened species. The proposal will be assessed under the bilateral agreement between the State and Australian Governments under section 45 of the EPBC Act.

With respect to heritage (for the proposal as exhibited and amended):

- matters of NES include World heritage properties and National heritage places
- There are no World Heritage properties within the proposal study area
- The Australian Government maintains two heritage registers – the National Heritage List and the Commonwealth Heritage List. There are no listed items within the proposal study area.

2.1.2 Native Title Act 1993

The *Native Title Act 1993* (Commonwealth) provides for the recognition and protection of native title where it may still exist. The NTA sets up a process for native title claims and compensation claims to be determined in the Federal Court, a determination of native title provides a declaration that native title continues to exist in the area. A successful compensation claim will provide compensation, monetary and other forms to native title holders whose native title was extinguished by inconsistent grant of interests in land after 1975 (when the *Racial Discrimination Act 1975* (Commonwealth) was enacted). Prior to this any extinguishment of native title does not provide a legal right to compensation.

One of the main purposes of the NTA was to protect native title where it still exists; however, the Government realised that there would still be necessary works and other activity undertaken that will affect and impair native title. In order to do this legally the Government provided that any impairment of native title would be valid if according to the procedures set out in the NTA, and any effect on native title rights and interests would be converted to a right to compensation. This is called the future act regime (future means after the date the NTA came into effect in 1994).

It is important to remember that the NTA protects all native title, not only in areas where there is a registered native title claim or a determination of native title. If native title has not been extinguished and there is still connection by the native title holders to the land, then the processes outlined in the NTA must be followed. It is only for mining and certain other acts (like compulsory acquisition) that give rise to the right to negotiate, that a native title claim must be registered. The National Native Title Tribunal imposes the registration test.

Part of this future act regime also provides for Indigenous Land Use Agreements (ILUA). An ILUA is a special type of agreement between a native title group and the State or third parties about the use and management of land and waters. An ILUA allows for proposed works and other activities to validly affect native title. ILUAs can allow people to negotiate flexible, pragmatic agreements to suit their particular circumstances, all compensation for the impairing effects of native title must be included in the ILUA.

While there is no specific linkage in NSW between the heritage legislation and the NTA however the guidelines provided that 'In the first instance "traditional owners or custodians" are to be identified as native title holders, registered native title claimants, and Aboriginal Owners registered under the *Aboriginal Land Rights Act 1983* (NSW). Where native title has been determined to exist for an area, only the native title holders or the relevant prescribed body corporate need to be consulted. Otherwise, as well as contacting native title claimants and Aboriginal Owners, the person or company is also required to seek input more broadly from a range of organisations, including Heritage NSW, the Local Aboriginal Land Council, Catchment Management Authorities, Native Title Services, and also to place a notice in the local newspaper' (DECCW 2010). In summary:

- where native title has been **determined** consultation is required only with the native title holders
- where a native title claim has been **registered and/or lodged** but not yet determined the proponent must ensure that they involve the registered applicants in consultation regarding the cultural knowledge of the area in addition to any other Registered Aboriginal Parties for the proposal under the NSW OEH Consultation Guidelines.

The proposal intersects with the Barkandji Traditional Owners #8 (Part A) native title area (determined). Barkindji Traditional Owners have been included in consultation, including being involved in the additional surveys undertaken and archaeological survey to date, and this will continue moving forward.

The amended proposal has been reviewed and no additional native title areas have been found.

2.2 State legislation

2.2.1 Environmental Planning and Assessment Act 1979

As stated above the proposal is subject to environmental assessment under Division 5.2, Part 5 of the EP&A Act. As discussed in Section SS, the proposal is CSSI and requires approval from the NSW Minister for Planning and Public Spaces.

Under section 5.23 of the EP&A Act, the following authorisations are not required under other legislation for the proposal:

- Approvals under Part 4, or an excavation permit under section 139 of the *Heritage Act 1977*
- Aboriginal heritage impact permits under section 90 of the *National Parks and Wildlife Act 1974*.

The EP&A Act and its regulations, schedules and associated guidelines require that environmental impacts are considered in land use planning and decision making. Environmental impacts include cultural heritage assessment. The Secretary's Environmental Assessment Requirement (SEARs) for this proposal require adequate consultation with the local Aboriginal community and other relevant stakeholders, having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

2.2.2 National Parks and Wildlife Act 1974 (NSW)

Part 6 of the *National Parks and Wildlife Act 1974* (NPW Act) provides protection for Aboriginal cultural heritage in New South Wales, 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 New South Wales declared by the Minister for the Environment to be of special significance to Aboriginal culture.

It is an offence under section 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 Heritage NSW under section 90 of the NPW Act will be required. An AHIP application must be accompanied by an Aboriginal cultural heritage assessment report (ACHAR), which details the results of an archaeological investigation, assesses the Aboriginal cultural heritage values associated with the area, and identifies any potential harm the proposed activity may cause. Consultation with Aboriginal communities must also be undertaken in relation to the AHIP application and adhere to the consultation process set out in clause 60 of the National Parks and Wildlife Regulation 2009. Heritage NSW have published several codes that regulate how ACHAR assessments and Aboriginal consultation are to be undertaken, they include:

- *Aboriginal Cultural Heritage Consultation Requirements for Propone*nts (2010)
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (2010)
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (2011).

As stated in Section 2.2.1, the proposal is CSSI and an AHIP is not required. Nonetheless, the assessment has been carried out with reference to the above guidelines.

The Aboriginal Heritage Information Management System (AHIMS) was also established to collate information on known Aboriginal objects, sites and places. The AHIMS is a database kept by Heritage NSW which contains information about Aboriginal objects and places in New South Wales, 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 section 89A of the Act to notify DPIE of the object's location.

2.2.3 Aboriginal Land Rights Act

The *Aboriginal Land Rights Act 1983* (ALRA) is a New South Wales statute that was established to return land to Aboriginal peoples through a process of lodging claims for certain Crown lands and the establishment of Aboriginal Land Councils. Aboriginal Land Councils constituted under the ALRA in NSW can claim Crown land.

The purposes of the ALRA are set out in section 3:

- to provide land rights for Aboriginal persons in New South Wales
- to provide for representative Aboriginal Land Councils in New South Wales
- to vest land in those Councils
- to provide for the acquisition of land, and the management of land and other assets and investments, by or for those Councils and the allocation of funds to and by those Councils
- to provide for the provision of community benefit schemes by or on behalf of those Councils.

It may be that some Crown land in the proposal has been claimed by an Aboriginal Land Council, there are however provisions to exclude land from a claim if it is required for an essential public purpose such as a transmission line.

2.2.4 NSW Heritage Act 1977

The purpose of the *Heritage Act 1977* (the Heritage Act) is to ensure that the heritage of New South Wales is adequately identified and conserved. In practice the Act has focused on items and places of non-Indigenous heritage to avoid overlap with the NP&W Act, which has primary responsibilities for nature conservation and the protection of Aboriginal relics and places in NSW.

Key provisions of the Heritage Act include:

- establishment of the State Heritage Register under section 22 of the Heritage Act
- the requirement for approvals for works that impact State heritage items as required under Part 4 of the Heritage Act
- excavation permits under section 139 of the Heritage Act where works would disturb or excavate relics, or where there is reasonable cause to suspect the disturbance or excavation of relics. Under the Heritage Act a 'relic' relates to any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and is of State or local heritage significance
- notification under section 146 of the Heritage Act for the discovery of relics.

As stated in Section 2.2.1, the proposal is CSSI and approvals under Part 4 and section 139 of the Heritage Act are not required. Further, there are no State heritage items located within the proposal as exhibited and amended.

Nonetheless, the SEARs require an assessment of impacts to non-Aboriginal heritage, and guidelines established by Heritage NSW *Assessing Heritage Significance* (2015) have been applied.

2.2.5 Wentworth Local Environmental Plan 2011

The proposal study area is located within the Wentworth local government area. The LGA is regulated by the Wentworth Local Environmental Plan 2011 (the LEP), and contains provisions relating to the conservation of the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings, views and archaeological sites. The LEP lists items of heritage significance within the LGA.

Under the EP&A Act provides that environmental planning instruments (including local environmental plans) do not apply to State significant infrastructure projects. Nonetheless, this assessment has considered items listed in the Wentworth LEP.

3 Study methodology

This section presents the methodology used to undertake this assessment including:

- literature and database review
- geotechnical investigations
- determination of the survey area and assessment approach
- field methodology.

This section also provides definitions of site types encountered during the field survey.

3.1 Literature and database review

A range of archaeological and historical data was reviewed for the proposal study area and its surrounds. This literature and data review was used to determine if known Aboriginal and historical/non-Aboriginal sites were located within the area under investigation, 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 Aboriginal Heritage Information Management System (AHIMS) maintained by Heritage NSW and associated files and 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. Searches were undertaken of the following statutory heritage registers and schedules:

- AHIMS (NSW Heritage)
- Atlas of Aboriginal Places (NSW Heritage)
- World Heritage List
- National Heritage List (Department of Environment and Energy)
- Commonwealth Heritage List (Department of Environment and Energy)
- State Heritage Register (NSW Heritage)
- Section 170 Heritage and Conservation Register(s)
- Heritage Schedules from the Wentworth Local Environmental Plan 2011.

Searches were undertaken of the heritage study corridor a 10 kilometre corridor along the proposal study area. This data is used to develop a preliminary predictive model focused on Aboriginal site locations. Additional searches were made for the amended proposal study area.

3.2 Pre-geotechnical investigation

Archaeological field assessment of geotechnical testing locations (boreholes and CPT) for the proposal were undertaken from the 2 to 6 December 2019. These assessments followed the *Due Diligence Code of Practice* (DECCW 2010) and were undertaken with Registered Aboriginal Parties (RAPs) from Barkandji Native Title Claim Group Aboriginal Corporation (RNTBC), Barkindji Maraura Elders Environment Team (BMEET), and Dareton Local Aboriginal Land Council. Geotechnical locations that were assessed to have a low probability of impacting to Aboriginal objects were given the go ahead by project archaeologists, with RAPs monitoring all geotechnical works.

3.3 Determination of the survey area and approach to assessment

3.3.1 Survey area

A proposal study area comprises a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga substation and a 200 metre wide corridor between Buronga substation and the NSW/Victoria border at Monak, near Red Cliffs. Field survey was also undertaken of the proposed Wentworth accommodation camp.

Within this corridor, a narrower corridor was subject to survey, which generally comprised a 100 metre wide corridor with some broader sections where construction facilities are proposed or design options are likely. The survey area encompasses the indicative disturbance area and was applied to allow for design refinement to occur in consideration of surrounding heritage values.

If following detailed design sections of the proposal are to be located outside the 100 metre survey area these areas will be subject to further assessment.

A section of the transmission line section survey area was not available for access due to landowner access restrictions and therefore has been excluded from the survey area. As above when access is granted to this area then this section will be subject to further assessment.

The proposal study area, survey area and heritage study corridor are shown in Figure 3.1 and Figure 3.2.

3.3.2 Disturbance area

The works to construct and operate the proposal would occur within the 'disturbance area' which would be within the proposal study area and survey area.

The proposal is still subject to detail design and refinement. As a result, and for the purpose of this assessment, an amended indicative disturbance area has been developed based on current concept design and construction methodology. The disturbance area has been defined into three sub-set areas as follows (Figure 1.4):

- Area A: Areas subject to ground disturbance across the defined area due to construction and/or operation. This would include the construction compounds and accommodation camps sites, upgraded and/or new access tracks, and areas around transmission towers.
- Area A (centreline clearing): Areas where ground disturbance would be minimised wherever possible. It refers to areas between the proposed transmission towers in which all vegetation would be removed during construction to ground however topsoil materials and ground material would be retained and would not require sub-surface impacts in these locations. This area would also be subject to ongoing maintenance during operation (i.e. removal to ground level) for operational and safety requirements (including bushfire).
- Area B: Areas that would not require ground disturbance, except in limited circumstances. This is the area between and around transmission towers in which trimming would only be required to meet the vegetation clearance heights (four metres). These areas which would not require disturbance at ground level, but may require removal of trees that have the potential to exceed vegetation clearance heights (where such trees would be removed temporary ground disturbance may occur).

3.3.3 Significance and impact assessment

The significance of each Aboriginal site is assessed using *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS Burra Charter, 2013a) with a refence to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010:iii). For non-Aboriginal sites the NSW Heritage Office publication 'Assessing Heritage Significance' (2015) has been referenced.

From this assessment the proposal is considered, and an impact assessment made. The impact assessment for the proposal has considered the potential for direct and indirect impacts on Aboriginal and non-Aboriginal heritage based on the disturbance area as defined in Section 4.3.2.

3.3.3.1 Aboriginal heritage

Direct impacts can be defined as impacts that move or physically alter items, objects, or features of a site. This includes, but is not limited to, direct physical impacts to midden/shell, hearths, stone artefacts, and scarred trees. Also, as impacts that directly and physically disturb the sediments and deposits of PADs.

Area A disturbance would directly impact all items, objects, or features of a site and or PAD located in this area.

Area A centreline clearing would directly impact all scarred trees, as well as directly impacting archaeological deposits associated with surface sites and/or PADs when removing vegetation root-balls that are above or have the potential to grow above four metres in height, that are located in this area. Furthermore, there is the risk of potential direct impacts from heavy machinery to all known items, objects, or features that are not fenced and marked on maps. Vegetation management methodologies should be developed in the heritage management subplan, so as to minimise ground disturbance in PADs during vegetation clearance.

Area B disturbance would directly impact all scarred trees, as well as directly impacting archaeological deposits associated with surface sites and/or PADs when removing vegetation root-balls that are above or have the potential to grow above four metres in height, that are located in this area. Furthermore, there is the risk of potential direct impacts from heavy machinery to all known items, objects, or features that are not fenced and marked on maps. Vegetation management methodologies should be developed in the heritage management subplan, so as to minimise ground disturbance in PADs during vegetation clearance.

Indirect impacts for areas A and B can be defined as impacts that alter the relationship of an item to other site features and/or its position in the natural landscape. For example, if a site was fenced, but then the landscape around it was subject to significant cut and fill land forming, this site would be assessed as having been subject to indirect impacts. Depending on site type, site context, and its archaeological and cultural significance, indirect impacts to a site may or may not result in a loss of heritage value.

Area A disturbance is unlikely to have significant indirect impacts on sites, except where sites extend across disturbance areas A and B. In this case, the direct impacts of features/objects within Area A would indirectly affect the portions of the site that extend into area B, as these impacts would alter the relationship of an item to other site features and/or its position in the natural landscape.

Area A centreline clearing has the potential to indirectly impact midden/shell, hearths, stone artefact sites, and PADs, located in areas that have not been subject to significant vegetation clearance historically. Vegetation clearance in these areas may indirectly impact the relationships of such sites with the broader landscape and would likely result in changes in erosion and accretion of sediments, with the potential of destabilising some sites.

Area B disturbance has the potential to indirectly impact midden/shell, hearths, stone artefact sites, and PADs, located in areas that have not been subject to significant vegetation clearance historically. Vegetation clearance in these areas may indirectly impact the relationships of such sites with the broader landscape and would likely result in changes in erosion and accretion of sediments, with the potential of destabilising some sites.

The potential for indirect impacts may extend outside of areas A and B depending on the nature of impact, for example the movement of sediment across sites resulting from run-off management during construction. This would be considered following detailed design and managed during construction through provisions in the construction heritage management sub-plan. Consideration will be given to protecting sites from indirect impacts during construction by considering the location of recorded sites and any construction impact mitigations that are to be put in place.

The magnitude of impacts that a site is subject to would vary depending on whether those impacts are direct or indirect, and total or partial. Whether an impact is total or partial depends on the type of impacts and how those impacts interact with site specific variables such as site type, site complexity, density of artefacts/features, areal spread of the site, and the assessed presence of subsurface archaeological deposits and the depth of those deposits. Given these complexities, assessment of indirect impacts in relation to Aboriginal sites is best done during the detailed design phase, where micro-siting of infrastructure locations is being finalised, as stated this will be considered through the construction heritage management sub-plan.

3.3.3.2 Non-Aboriginal heritage

Direct impacts can be defined as impacts that move or physically alter items, objects, or features of a site. This includes, but is not limited to, direct physical impacts to immovable items such as historic buildings, deposits, historic trees/gardens, fences), as well as significant features of historic landscapes.

Area A disturbance would directly impact all historic items, objects, or features of a site and historic archaeological deposit located in this area.

Area A centreline clearing disturbance would directly impact all historically significant trees, as well as directly impacting historic archaeological deposits when removing vegetation that is above or has the potential to grow above two metres in height, that are located in this area. Furthermore, there is the risk of inadvertent direct impacts from heavy machinery to all items, objects, or features of a site and or archaeological deposits located in this area, that are not fenced and marked on maps, therefore sites will be fenced during all construction works.

Area B disturbance would directly impact all historically significant trees, as well as directly impacting historic archaeological deposits when removing vegetation that is above or has the potential to grow above four metres in height, that are located in this area. Furthermore, there is the risk of inadvertent direct impacts from heavy machinery to all items, objects, or features of a site and or archaeological deposits located in this area, that are not fenced and marked on maps, therefore sites will be fenced during all construction works.

Indirect impacts can be defined as impacts that alter the relationship of an item to other site features and/or its position in the natural landscape, including visual and/or aesthetic impacts. Depending on site type, site context, and the primary and secondary features of significance associated with an historic item, indirect impacts to historically significant aspects of a site may, or may not, cross the requisite impact threshold to assess a loss of heritage value.

For both Area A disturbance and Area B disturbance indirect impact would be most likely to occur where sites have been assessed as having primary aesthetic and/or landscape setting significance associated with vistas to and from the historic item/s and or features. For Area A disturbance the indirect visual or aesthetic impacts would predominantly exist once the proposed transmission towers were constructed and would last for the lifespan of the proposal. Area B disturbance the indirect visual or aesthetic impacts would potentially be caused by clearance of vegetation, and most significantly old growth trees of significance, which could reduce the overall significance of historically significant landscapes.

3.3.3.3 Performance outcomes and future heritage assessment

During detailed design, opportunities to avoid or minimise impacts would be determined in order to achieve the environmental performance outcomes (refer to sections 10 and 11). There will be a requirement for additional heritage assessment in the future in the following circumstances:

- if new archaeological features, objects, or PADs are identified and they are not able to be avoided from impact through final design process
- if there are areas outside of the survey area requiring impact from the proposal (including areas where property access was restricted) which would be impacted by final design. Archaeological survey would occur in such areas.

This is discussed further in Section 11.

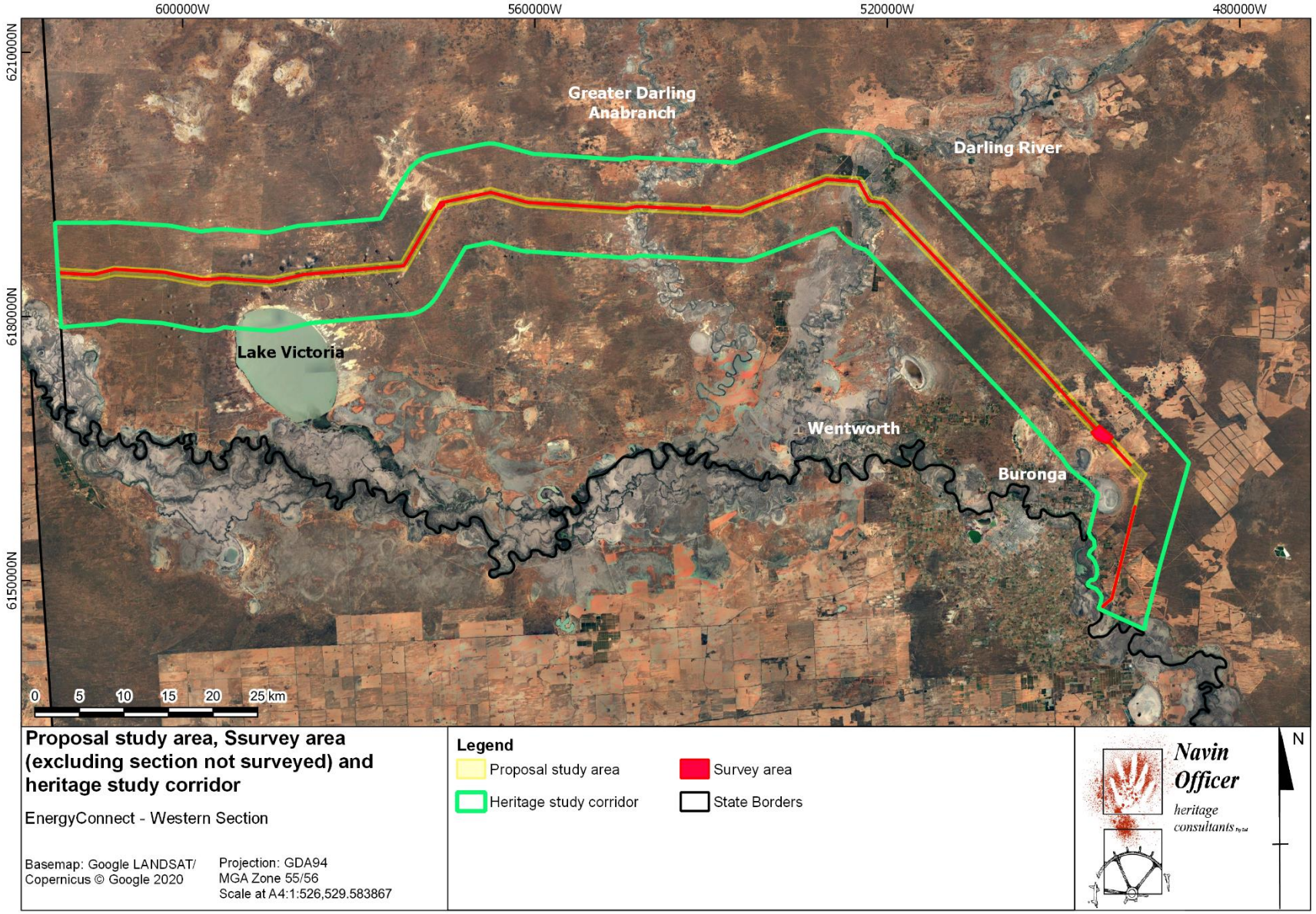

Figure 3.1 Proposal study area, survey area (excluding section not surveyed) and heritage study corridor

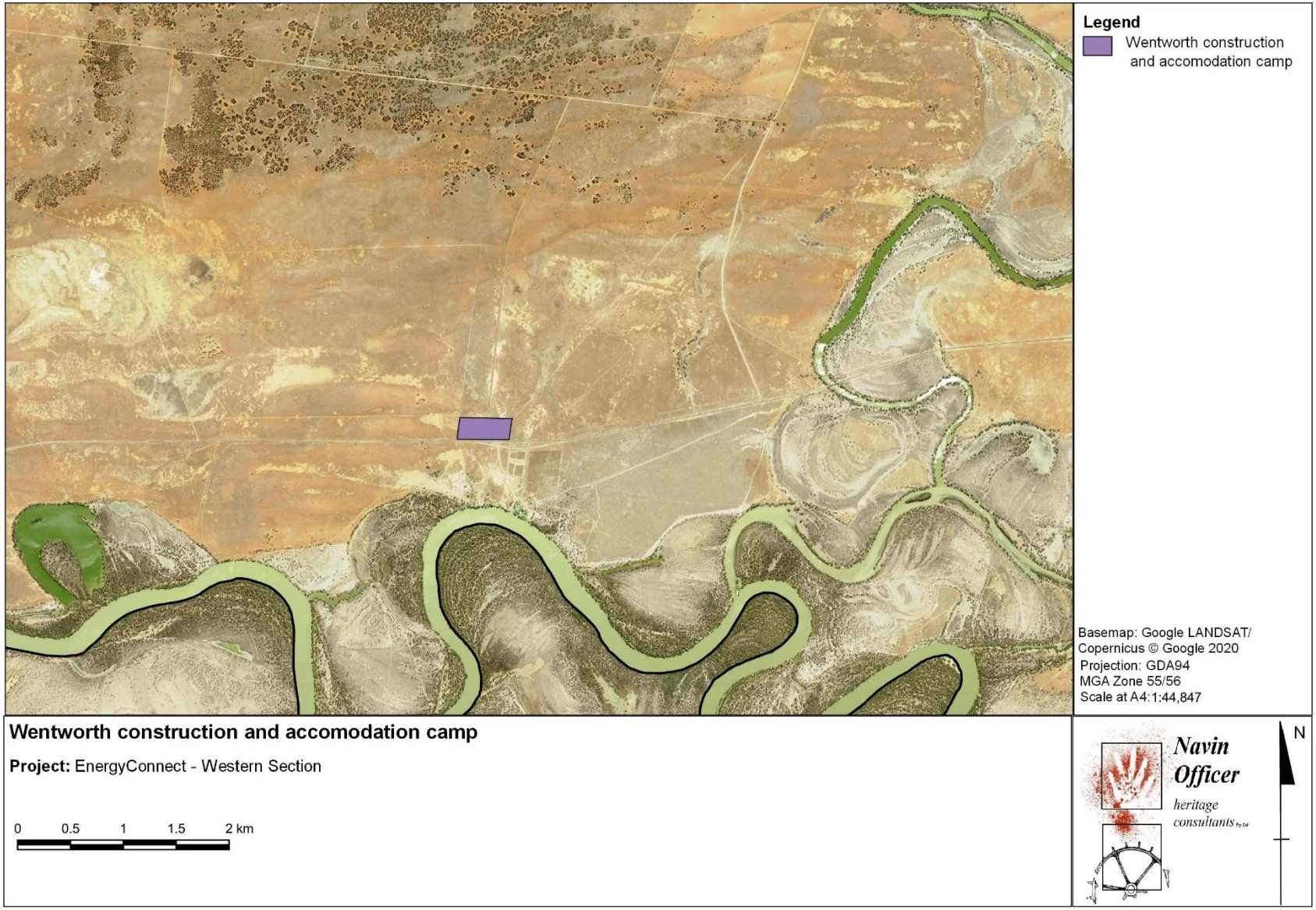

Figure 3.2 Wentworth Construction and Accommodation Camp survey area

3.4 Desktop assessment of construction water supply points

A desktop assessment of seven proposed construction water supply locations required for the construction phase of the EnergyConnect (Western Section) transmission line proposal was completed and is detailed in Appendix 5.

An estimated 616 megalitres of water would be required throughout the construction period. The water supply points assessed were:

- Alcheringa Road, Buronga
- River Drive, Buronga
- Fletchers Lake Drive, Dareton
- Beverly Street, Wentworth
- Milpara Road (and Silver City Highway corner), Anabranch South
- Wentworth construction compound and accommodation camp, west of Wentworth
- 690 Pomona Road, Pomona.

3.5 Field survey

3.5.1 Field methodology

Field survey of the survey area was undertaken between 22 June and 3 July 2020 the field survey of the Wentworth construction and accommodation camp was completed on the 17th February 2020. The aims of the survey were to identify any archaeological sites and areas of potential archaeological deposit (PAD) not previously recorded, assess all areas of identified archaeologically sensitivity, and relocate, inspect, and assess the condition of known Aboriginal sites recorded on the AHIMS database (shown in Figure 6.1 to Figure 6.4 and listed in Appendix 1).

The survey consisted of three teams conducting pedestrian survey of the survey area. The survey teams were made of up to five participants who were spaced at 10 to 20 metre intervals depending on the estimated probability of encountering Aboriginal sites. Each team walked along the length of the survey area.

Extra focus was applied to locations of already recorded sites or PADs and areas yielding high ground surface visibility and exposures. Where feasible, all old-growth native trees in the survey area were inspected for the presence of culturally derived scars.

Portions of previously recorded Non-Aboriginal sites and their curtilage located in the survey area were inspected during the field survey to assess if any associated items or PADs of significance are within the survey area.

The project team consulted with the RAPs in order to conduct the cultural assessment program in a culturally sensitive manner and have treated all information provided with respect (and in confidence, where requested and required). Aboriginal field participants were encouraged to communicate knowledge regarding the cultural heritage values of the proposal study area, archaeological and cultural sites, and the overall landscape.

3.5.2 Site recording

All encountered surface archaeological objects, sites, potential archaeological deposits and places of Aboriginal cultural value were documented. All sites had the following details recorded using standardised recording forms:

- site name, recorder and date
- site type
- global positioning system (GPS) coordinates
- landscape and landform character
- context information – cultural/spiritual location, proximity to other objects/sites etc.
- site dimensions
- site condition and potential to be larger
- site content including numbers and artefact types, raw materials and detailed recording of a sample of artefacts
- photos
- any other relevant information, such as oral information and informant details.

3.6 Definitions – Aboriginal heritage

The archaeological survey aimed at identifying material evidence of Aboriginal occupation as revealed by surface artefacts and areas of archaeological potential un-associated with surface artefacts. Potential recordings fall into two broad categories: sites and PADs.

3.6.1 Sites

A site is defined as any material evidence of past Aboriginal activity that remains within a context or place which can be reliably related to that activity. Many Aboriginal archaeological sites are identified by the stone or shell artefacts situated on or in a sedimentary matrix, marks located on or in rock surfaces, scars on trees, stones placed in arrangements at ceremonial sites, human skeletal remains, earthen mounds and hearths. Some significant sites bear no visible artefacts but are natural features related to Aboriginal creation stories.

Frequently encountered site types within the region include stone artefact occurrences – including isolated finds and open artefact scatters, earth mounds and hearths, burial sites, freshwater middens, and scarred trees. Other sites common in south-eastern Australia but which are not common to the proposal study area include coastal middens, rock shelter sites with occupation deposit and/or rock art, and grinding groove sites. For the purposes of this section, only the methodologies used in the identification of these site types are outlined.

3.6.2 Stone artefact occurrences

Stone artefact occurrences are the most commonly recorded site type in Australia. They may consist of single artefacts – described as isolated finds; or as a distribution of more than one artefact – often described as an artefact scatter or ‘open camp site’ when recording surface artefacts, or as a subsurface artefact distribution when dealing with an archaeological deposit.

Where artefact incidence is very low, either in terms of areal distribution (artefacts per square metre) or density (artefacts per cubic metre), then the differentiation of the recording from background artefacts counts or *background scatter* may be an issue.

3.6.3 Isolated finds

An isolated find is a single stone artefact, not located within a rock shelter, which occurs without any associated evidence of Aboriginal occupation within a radius of 60 metres. Isolated finds may be indicative of:

- random loss or deliberate discard of a single artefact
- the remnant of a now dispersed and disturbed artefact scatter, and
- an otherwise obscured or subsurface artefact scatter.

Except in the case of the latter, isolated finds may be considered to be constituent components of the *background scatter* present within any particular landform.

The distance used to define an isolated artefact varies according to the survey objectives, the incidence of ground surface exposure, the extent of ground surface disturbance, and estimates of *background scatter* or *background discard* densities. In the absence of baseline information relating to background scatter densities, the defining distance for an isolated find must be based on methodological and visibility considerations. Given the varied incidence of ground surface exposure and deposit disturbance within the proposal study area, and the lack of background baseline data, the specification of 60 metres is considered to be an effective parameter for surface survey methodologies. This distance provides a balance between detecting fine scale patterns of Aboriginal occupation and avoiding environmental biases caused by ground disturbance or high ground surface exposure rates. The 60 metre parameter has provided an effective separation of low-density artefact occurrences in similar southeast Australian topographies outside of semi-arid landscapes.

3.6.4 Background scatter

Background scatter is a term used generally by archaeologists to refer to artefacts which cannot be usefully related to a place or focus of past activity (except for the net accumulation of single artefact losses).

There is no single concept for background discard or ‘scatter’, and therefore no agreed definition. The definitions in current use are based on the postulated nature of prehistoric activity, and often they are phrased in general terms and do not include quantitative criteria. It is commonly agreed that background discard occurs in the absence of ‘focused’ activity involving the production or discard of stone artefacts in a particular location. An example of unfocused activity is occasional isolated discard of artefacts during travel along a route or pathway. Examples of ‘focused activity’ are camping, knapping and heat-treating stone, cooking in a hearth, and processing food with stone tools. In practical terms, over a period of thousands of years an accumulation of ‘unfocused’ discard may result in an archaeological concentration that may be identified as a ‘site’. Definitions of background discard comprising only qualitative criteria do not specify the numbers (numerical flux) or ‘density’ of artefacts required to discriminate site areas from background discard.

3.6.5 Artefact scatters

Artefacts situated within an open context are classed as an open artefact scatter (or ‘open camp site’) when two or more occur no more than 60 metres away from any other constituent artefact. The 60 metre specification relates back to the definition of an isolated find (see above). The use of the term *scatter* is intended only to be descriptive of the current archaeological evidence and does not infer the original human behaviour which formed the site. The term *open camp site* has been used extensively in the past to describe open artefact scatters. This was based on ethnographic modelling suggesting that most artefact occurrences resulted from activities at camp sites. However, in order to separate the description from the interpretation of field evidence, the terms *artefact scatter*, *artefact distribution* or *artefact occurrence* are now more extensively used. The latter two options can also be used to categorise artefacts occurring in subsurface contexts.

3.6.6 Scarred/modified trees

Trees with scars of Aboriginal origin form the other major type of artefactual evidence. Each tree is normally considered to be a separate site. The identification of a scar as Aboriginal in origin is dependent on a set of inter-related interpretive criteria. The credibility of alternative causal explanations such as natural traumas and other types of human scarring must be tested for each scar.

A range of diagnostic criteria has been developed to assist in the identification of Aboriginal scarred trees. The following criteria are based on archaeological work conducted by Simmons (1977) and Beesley (1989), and the field manual for Aboriginal scarred trees developed by Long (2005):

1. (a) the scar does not normally run to ground level: (scars resulting from fire, fungal attack or lightning nearly always reach ground level). However, ground termination does not necessarily discount an Aboriginal origin (some ethno-historical examples of canoe scars reach the ground)

   (b) if a scar extends to the ground, the sides of the original scar must be relatively parallel: (natural scars tend to be triangular in shape the scar is either approximately parallel sided or concave, and symmetrical: (few natural scars are likely to have these properties except fire scars which may be symmetrical but are wider at the base than their apex. Surveyors marks are typically triangular, and often adzed)

2. the scar is either approximately parallel sided or concave, and symmetrical: (few natural scars are likely to have these properties except fire scars which may be symmetrical but are wider at the base than their apex. Surveyors marks are typically triangular, and often adzed)

3. the scar should be reasonably regular in outline and regrowth: scars of natural origin tend to have irregular outlines and may have uneven regrowth

4. the ends of the scar should be ‘shaped’, either squared off, or pointed (often as a result of regrowth): (a ‘keyhole’ profile with a ‘tail’ is suggestive of branch loss)

5. a scar which contains adze or axe marks on the original scar surface is likely to be the result of human scarring. Their morphology and distribution may lend support to an interpretation of an Aboriginal origin: (marks produced after the scarring event may need to be discounted)

6. the scar must date to the time of Aboriginal bark exploitation within its region: the traditional Aboriginal exploitation of bark probably ceased in most regions between 100 and 150 years ago – however, in some locations associated with Aboriginal settlement, the Aboriginal removal of bark may have continued to the present day or restarted as part of new cultural movements

7. the tree must be endemic to the region: (and thus exclude historic plantings).

Field-based identification of Aboriginal scars is based on surface evidence only and will not necessarily provide a definitive classification. In many cases the possibility of a natural origin cannot be ruled out, despite the presence of several diagnostic criteria or the balance of interpretation leaning toward an Aboriginal origin. For this reason, interpretations of an Aboriginal origin are qualified by the recorder’s degree of certainty. The following categories were used:

- Aboriginal scar – this is a scar where an Aboriginal origin is considered the most likely; the scar conforms to all of the criteria and a natural origin is considered unlikely and improbable

- probable Aboriginal scar – this is a scar that conforms to all of the criteria and where an Aboriginal origin is considered to be the most likely; despite this, a natural origin cannot be ruled out, and

- possible Aboriginal scar – this is a scar which conforms to all or most of the criteria and where an Aboriginal origin cannot be reliably considered as more likely than alternative natural causes; the characteristics of this scar will also be consistent with a natural cause.

3.6.7 Earth mounds

Earth mounds can result from a number of Aboriginal uses, in some areas of eastern Australian ceremonial rings (bora rings) are made by forming earth into shallow circular ridges and pathways. In the proposal study area however, earth mounds have been recorded that are related to a variety of uses including food preparation and camping.

3.6.8 Burial sites and burial grounds

Burials within the region are generally found either in mound sites, or in elevated natural topographies consisting of soft, easily dug, sediments, such as aeolian sands or unconsolidated alluvial silts. They may occur in isolation or in groups and may also be association with occupation site debris. Burials are generally only visible where there has been some disturbance of subsurface sediments or where some erosional process has exposed them.

3.6.9 Potential archaeological deposits

A potential archaeological deposit, or PAD, is defined as any location where the potential for subsurface archaeological material is considered to be moderate or high, relative to the surrounding landscape. 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 (Table 3.1). The boundaries of PADs are generally defined by the extent of particular micro-landforms 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 will be 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.

Table 3.1 Matrix showing the basis for assessing the archaeological potential (shown in bolded black text) of a PAD

		Potential to contain Aboriginal objects		
		Low	*Moderate*	*High*
Potential archaeological significance	*Low*	---	**low**	**moderate**
	Moderate	---	**moderate**	**high**
	High	---	**high**	**high**

3.7 Definitions – Non-Aboriginal heritage

Historical archaeology refers to the 'post-contact' period and includes domestic, commercial and industrial sites as well as most maritime sites. It is the study of the past using physical evidence in conjunction with historical sources. The three primary types of places or items that may form part of the historical archaeology context include:

1. below ground evidence, including building foundations, occupation deposits, features and artefacts; and above ground evidence, including buildings, works, industrial structures and relics that are intact or ruined

2. areas of land that display evidence of human activity or occupation, and

3. shipwrecks, deposits and structures associated with maritime activities (not applicable to the proposal study area).

Within these broad parameters, an historical archaeological site may include:

- topographical features and evidence of past environments (that is, resident in pollens and diatoms)
- evidence of site formation, evolution, redundancy and abandonment (that is, features and materials associated with land reclamation, sequences of structural development, demolition/deconstruction, and renewal)
- evidence of function and activities according to historical theme/s represented (for example, an industrial site may contain diagnostic evidence of process, products and by-products)
- evidence associated with domestic occupation including household items and consumables, ornaments, personal effects and toys
- evidence of diet including animal and fish bones, and plant residues
- evidence of pastimes and occupations including tools of trade and the often-fragmentary signatures of these activities and processes
- methods of waste disposal and sanitation, including the waste itself which may contain discarded elements from all classes of artefact as well as indicators of diet and pathology, and
- any surviving physical evidence of the interplay between site environment and people.

The information found in historical archaeological sites is often part of a bigger picture which offers opportunities to compare and contrast results between sites. The most common comparisons are made at the local level, however, due to advances in research and the increasing sophistication and standardisation of methods of data collection, the capacity for wider reference (nationally and, occasionally, internationally) exists and places added emphasis on identification and conservation of historical archaeological resources.

4 Description of the area

4.1 Location of proposal

The proposal, as exhibited and amended, begins at its western most point at the SA/NSW border passing about three kilometres north of Lake Victoria, immediately north of Renmark Road, following a general west–east alignment, crossing the Darling Anabranch River and continuing east until the proposal intersects with the existing Broken Hill 220 kV line. From this point the proposal would run adjacent to the existing Broken Hill 220 kV line in a broadly south-easterly direction crossing the Darling River north of Pomona and continuing to the Buronga substation. The proposal would then deviate in a southerly direction adjacent to existing TransGrid infrastructure and terminate on the northern banks of the Murray River. In addition, a construction and accommodation camp is proposed for a location near Wentworth. The proposal is located in the Wentworth Shire Council Local Government Area (LGA.).

4.2 Environment

The proposal as exhibited and amended broadly traverses the Murray Darling Depression Bioregion, while also briefly encountering the Darling Riverine Plains Bioregion (at the Darling and Darling Anabranch Rivers). Photo 4.1 to Photo 4.3 depict examples of the landscapes traversed by the proposal.

4.2.1 Murray Darling Depression Bioregion

The Murray Darling Depression Bioregion covers a broad swathe of the south-western NSW, as well as north-western Victoria, and eastern SA. The sediments of the basin are Tertiary and Quaternary deposits formed during by shallow seas, and later lakes, and rivers. Aeolian sands of the Woorinen formation overlay many of these deposits forming the dunes and sandplains that characterise the bioregion today. Other geomorphic categories in the region include alluvial plains, playas, and basins.

4.2.2 Darling Riverine Plains Bioregion

The proposal only crosses a small portion of this bioregion where it traverses the Darling and Greater Darling Anabranch Rivers. These rivers bifurcate about 130 kilometres north of the proposal study area, and flow into the Murray River. The geology and geomorphology of this bioregion is very similar to the Riverina Bioregion, with a decrease in water and sediment discharge over time. Both rivers are subject to extreme variation in flows. The Greater Darling Anabranch is an ephemeral system characterised by meandering stream channels with terraces, which then flood into overflow lakes, while the Darling River has a broader and slightly straighter main channel, which when breached, inundates the adjacent floodplains. Most dry lakes have lunettes on their eastern margin and are of high archaeological sensitivity.

There is a distinct contrast between the riparian vegetation where the proposal study area intersects the Darling and Anabranch Rivers. The Darling River (as well as the Murray River) is dominated by large mature river red gums (*E. camaldulensis*), while the Greater Darling Anabranch is supports by smaller Box eucalypts.

4.3 Land use

Land use varies across the 160 kilometres length of the proposal. The proposal largely traverses property held through western lands leases, under the *Crown Land Management Act 2016*. Land use is predominantly large sheep and goat stations, with most sheep stations growing a proportion of fodder, while those focused on goats allow stock to subsist on native and invasive heath and ground covers. Properties subject to overstocking and dryland cropping have been heavily degraded. Where properties retain patches of native vegetation on sand-plains they typically supporting rosewood, belah, and white cypress trees, while the dune landscapes support various mallee eucalypts. Vegetation understorey/ground cover varies considerably between properties, but when present includes hopbush, copper burrs, bluebush, and porcupine grass (NPWS 2003:80).

Photo 4.1 Example of landscape near the Greater Darling Anabranch: note the preservation of soil around large old growth trees (middle) in comparison to eroded surfaces (foreground) subject to erosion from stock impacts, wind erosion, and surface water wash

Photo 4.2 Example of difference in visibility between eroded claypan surface and those with significant groundcover following recent rainfall (north of Lake Victoria)

Photo 4.3 Example of mallee bushland between Lake Victoria and the SA border

5 Consultation process

The document *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water (DECCW, 2010) that sets out the requirements for 'consulting with those Aboriginal people who can provide information about the significance of Aboriginal cultural heritage as part of the heritage assessment process. The requirements are referred to in the SEARs for this proposal and have therefore been applied to this assessment. The requirements specify four stages of consultation:

- Stage 1 – notification of this 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 stages are explained in the sections below with Appendix 3 containing the full consultation log.

5.1 Stage 1

Public notices were placed in the *Koori Mail* (22/04/2020), *Weekly Times* (15 April 2020), and *Mildura Weekly* (10 April 2020). A search was made of the National Native Title Tribunal registers on 5 March 2020. Letters were sent to:

- Office of the Registrar Aboriginal Land Rights Act (1983)
- Dareton Local Aboriginal Land Council
- DPIE
- Western Local Land Services
- Wentworth Shire Council
- Barkindji Traditional Owner Group, and
- Native Title Services Corporation Ltd.

Following advice received from DPIE and Wentworth Shire Council, letters were sent to:

- Murra Bidgee Mullangari
- Murugadi
- Barkindji-Maraura Elders Environmental Team
- Arthur Kirby
- Barkindji Maroura Elders Council
- Ms Mary Ann Marton
- WLRWHA Aboriginal Advisory Group
- Pappin Family Aboriginal Corporation

- Gary Pappin
- Wakool Indigenous Corporation
- NTSCorp Barkandji #8 Native Title Determinants
- Ta-Ru Board of Management/ Maroura Barkindji Traditional Owners
- NTSCorp.

The closing date for expressions of interest was 6 May 2020. Registrations of interest were received from:

- Muragadi
- Murra Bidgee Mullangari
- Merrigarn
- Dareton Local Aboriginal Land Council
- Arthur Kirby
- Barkandji Native Title Claim Group Aboriginal Corporation (RNTBC)
- Barkandji Native Title Claim Group Aboriginal Corporation
- Barkindji Maraura Elders Environment Team (BMEET)
- Riverina Murray Regional Alliance
- Ricky Handy
- Hector Hudson
- Kingsley Abdulla
- Warren Clarke
- Barkindji-Maraura Elders Council
- Ta-Ru Board of Management/Maroura Barkindji Traditional Owners
- Biodiversity and Conservation Department of Planning, Industry and Environment
- C/- Damos Family Dream
- Alynthia Kennedy.

5.2 Stage 2 and 3

A preliminary survey methodology and cultural information request was sent to registered groups on 8 May 2020. A revised survey methodology with updated details of the upcoming archaeological field survey was sent to all registered Aboriginal parties (RAPs) on 2 June 2020, for further comment.

5.2.1 Field participation

Aboriginal representatives who participated in the field study, including the survey of the Wentworth construction compound and accommodation camp were:

- Ernest Mitchell, Russell Taylor, and James Toomey (Dareton Local Aboriginal Land Council)
- Warren Clark, Warwick Clark, Alynthia Kennedy and Malcolm Mathers (Barkandji Native Title Group Aboriginal Corporation)
- Ronald J Smith and Nicholas Smith (Barkindji-Maraura Elders Council)
- Colin Mitchell
- Rodney Lawson
- Arthur Kirby
- Ricky Handy, and
- Damien Kennedy.

5.3 Stage 4

A draft copy of the report, as exhibited, was provided to all RAPs on 4 September 2020 with an invitation to comment by 20 October 2020. No comments were received.

A draft copy of the amended report, reflecting updated project details and additional areas survey, was provided to all RAPs on 1 March 2021 with an invitation to comment 29 March 2021.

The Indigenous Engagement Team (TransGrid) contacted RAPs from 18-24 March 2021, to confirm receipt of amended report and elicit comments/feedback. The following table provides a summary:

Table 5.1 Comments pertaining to amended draft ACHA report (via phone)

RAP	Comments	Response to comments
Arthur Kirby (BMEET)	• no problems with report • do not have an AHIP or salvage , avoid using AHIP and don't damage sites • most people in the area are against AHIP and due diligence , as these allow sites to be destroyed • not happy with some of the consultants in the field • Happy with how frequent conversation about the project are • Will there be extra benefits for the community from the project	• The proposal will be assessed under SSI, so no AHIP's are planned within the approval process. While it will be very difficult to avoid damage to Aboriginal sites completely, the SSI framework will give us the opportunity to develop specific conditions of approval to mitigate impacts. • The non-contiguous nature of the project mean we will have the opportunity to move some impacts (e.g. tower locations) in order to reduce impacts to sites

RAP	Comments	Response to comments
Rodney Lawson (TO/BMEET)	• Lake Victoria have a large monitoring crew and should do the surveys moving forward • new property owners around Lake Vic are grading and damaging sites • happy with consultation to date and want to be informed and involved moving forward	• Noted
Roland Smith Deputy Chair BMEC (Lake Victoria Advisory Committee)	• Page 8 in report, Roland J Smith not Ronald J Smith (name spelt incorrectly in EIS) • scar trees, if required to be removed need to record location, date etc around Lake Victoria, we should either fenced or place at a safe area to protect • around Lake Victoria , new property owners are damaging sites and putting up new fence line, they aren't culturally aware people • Lake Victoria mob to do surveys moving forward, monitoring and geotech • since last site visit, possible new sites due to wind, rain now exposing them • a new AHIP in area, just been finished, Lake Victoria, Nulla, Anabranch, Taroo • are they going to use the same archaeologist? Will the same team keep me informed going forward with the project? • Good to come out to site every now and then to keep the committee up to date	• Page 8 typo corrected (apologies for the misspelling) • Next step for identified scarred trees will be assessment by arborist (AH5). Once this assessment has occurred, we can further develop a salvage methodology with RAPs • Other comments noted
Pamela Handy (Dareton LALC)	• management plan needs to be agreed on for construction and should have input from LALC • Plans must mention that any site/area are to be avoided OR to go around as preferred, this needs to be made very clear	• Consultation with all RAPs will continue throughout the project • Mitigation measure AH7 covers how Aboriginal heritage exclusion zones will be administered. • Next step for identified scarred trees will be assessment by

RAP	Comments	Response to comments
	• scar trees should be fenced and maybe put cover over them like they do around Dubbo area, to protect them • happy with consultation to date, need to be kept in the loop when people are on Barkindji Country or when doing works in the area	arborist (AH5). Once this assessment has occurred, we can further develop a salvage methodology with RAPs
Warren Clark (Deputy Chair Native Title)	• Any scar trees need to be recorded and if they need to relocate, they should be kept near to where tree was originally located, and made secure from any harm • all sites will need to be surveyed again before any construction as there maybe new sites coming up due to weather conditions • use of all-terrain vehicles to check over sites again or any new finds. Use of such vehicles would help with fatigue for elders and older monitors with health conditions • review of document should be only Aboriginal part not the non-Aboriginal part	• Next step for identified scarred trees will be assessment by arborist (AH5). Once this assessment has occurred, we can further develop a salvage methodology with RAPs • Test excavation phase will provide some opportunity to get an updated understanding of sites within the proposal study area • Other comments noted
Ernest Mitchell (Dareton LALC)	• Need to protect sites, need to fence them off • Records should be kept of the sites and sent back to LALC • Monitors should be used from all works that involve digging up the ground	• Mitigation measure AH7 covers how Aboriginal heritage exclusion zones will be administered. • NOHC can provide copies of submitted site cards for LALC's records, if that would be of use • Noted
Hector Hudson	• No comments about the works • Happy how the communication and phone calls about the project are going • Keep the community up to date with the project all the time	• All comments noted

6 Aboriginal heritage context

6.1 Aboriginal history

6.1.1 Ethnohistory

This proposal encompasses the lands of the Barkindji and Maraura People. The Aboriginal people living along the Darling River are the Barkindji, named after the Darling River, which they referred to as the Barka (Hardy, 1976). The local Barkindji form substantial communities at Wentworth, Dareton and Buronga. Barkindji, Baakundji or Bagundji (different spellings) was a term used to refer to a cluster of related groups living along the lower reaches of the Darling River, sharing a common language (Paakantyi).

Tindale (1974) found two common language groups shared the area from NSW to SA. The Kureinji group occupied the Murray River between Euston and Wentworth, and the Maraura were located along the Murray River between Wentworth and Paringa, associated with the area around Lake Victoria. Tindale suggests in his notes the group situated around Lake Victoria were named Pampmalka. Tindale worked with a Maraura informant, Robert McKinley, who provided Tindale with accounts of some of his groups' traditions. McKinley stated that the best camping places of the Maraura were around Lake Victoria in the summer and the back plains in winter when rain filled small waterholes. The language groups outlined by Tindale have now been grouped together as Barkindji. By the early 1860s the Barkindji tribes along the Darling River frontage were under pressure or already displaced from their traditional lands by pastoralists (Edmonds, 2002a).

6.2 Material evidence of Aboriginal land use

6.2.1 Regional archaeological context

The oldest archaeological evidence of Aboriginal occupation in and around the proposal study area is from Lake Victoria, dating back 21,000 years, and regional occupation to at least 45,000 years ago (Balme and Hope, 1990).

Archaeological research in western NSW and the Murray Darling Basin began during the early 20th Century with work undertaken by Tindale as part of a mapping project at Lake Menindee in 1939, conducted in conjunction with Birdsell. In the course of that project various Aboriginal sites, including burials, and fossil of extinct animals, were recorded and later investigated by Tindale, Tedford and Stirton in 1953. Research at Menindee Lakes into the antiquity of human occupation in Australia and potential links between humans and the extinction of megafauna continued into the 1960s with a particular emphasis on Lake Tandou (Hope, 1981).

The next significant piece of research in western NSW was Harry Allen's (1972) PhD thesis on the Darling Basin. Allen's (1972, 1974) research indicated that Pleistocene conditions in the Darling Basin were better for hunter-gatherers than they are now. He suggested that from around 40,000 Before Present (BP) to around 15,000 BP the lake systems would have contained water, unlike their current desert state. He also noted that collection of seeds is not evidenced prior to 15,000 BP, with grinding stones first appearing at Lake Tandou, Kennif Cave and around Willandra Lakes and Mungo (Allen, 1974:315). From 15,000 BP onwards, the economy appears to have shifted to one based on fish, shellfish, small mammals and cereal, essentially the same as that recorded for the Bagundji during the 19th Century (Allen, 1974:316).

No other archaeological work was undertaken on the Lower Darling until the late 1970s when a series of surveys were begun within Willandra Lakes. These surveys developed into the Darling Project, which aimed to provide a more detailed and systematic set of archaeological data for the region. The Darling Project focused on sites directly associated with primary water sources such as those on lunette systems and the major river channels (Hope, 1981).

Since the late 1970s there have been various studies that have relevance at a regional level. One of the first broad scale surveys to be undertaken within a heritage management context was the survey for assessment of impacts to sites by the proposed Mildura–Broken Hill electricity line that was undertaken in 1977. The study area for that project was 285 kilometres long and three to seven kilometres wide. Survey along most of the route focused on the centreline and the areas immediately adjacent (few hundred metres wide). However, in areas of poor visibility the survey focused just on the proposed easement. In areas of uncertainty about the centreline, a wider area was inspected. Similarly, the entire width of the study area was inspected at the Darling River crossing.

The transmission line survey located 132 sites comprising 106 open camp sites, five shell middens, 10 PADs, seven burial sites and four isolated finds (McIntyre, 1981). Surface scatters of artefacts were not only the predominant site type but also the most common type in each geomorphic unit. These sites varied enormously in size and in terms of associated features such as hearths, faunal remains and stone artefact assemblage (McIntyre, 1981:27). Old channels and the claypans and swamps along them were major focal points of Aboriginal settlement. The sand-plains swamps, and to a lesser extent clay pans, were also the focus of activity (McIntyre, 1981:32).

As part of the cultural resources database provided in a report to the Murray Darling Basin Commission, Johnston and Witter (1996) produced a site location model for western New South Wales based on groups of land systems and their margins. Hope and Jacobs (1982), Martin (1985) and) have also provided predictive archaeological statements concerning areas within western NSW. The reliability and effectiveness of Johnston and Witter's predictive model for site location was tested using archaeological field studies and it was found that:

- Aboriginal occupation commonly occurs near to water and the quantity of archaeological evidence should be relative to the quality of the water source i.e. reliability, salinity and vegetation
- a variety of environmental factors influence occupation of an area such as the existence of ephemeral water and the quality, quantity and diversity of available food resource
- occupation focus may be directed by transitional zones between plant community boundaries
- it is predicted large increases in stone artefact numbers occurs within a 2-kilometre radius of areas of known stone sources
- to avoid potential biases when deriving information relating to Aboriginal heritage and archaeology of an area, it is necessary to consider the effective visibility for each environmental type.

Bonhomme Craib and Associates (1999) provided a largely desktop review for an area of some 900,000 hectares for the Murray Darling Water Management Action Plan. The study area for that project extended five kilometres either side of the Darling River from Menindee Lakes to Wentworth and included a 10 kilometre band along the northern side of the Murray River from Wentworth to the Murrumbidgee River confluence in the east. The study was prompted in part because of recognised knowledge gaps in the distribution of heritage resources in this area, and the low archaeological visibility that is often encountered.

Sturts Billabong, located near the Darling River about one kilometre south west kilometre southwest of the survey area, is an Aboriginal burial site situated in a dune system. At least 36 burials have been observed, ranging from scattered bone, to cremations, and semi-intact burials (Littleton, 2000).

Cupper (2004) surveyed approximately 315 kilometres of pipeline and 100 kilometres of associated spur lines for proposed stock and domestic water pipelines along the Anabranch. During that survey, 129 sites were recorded; those sites comprised 91 open camp sites, 13 middens, nine isolated finds, six scarred trees, six burial/open camp sites and four hearths. The site distribution was interpreted by Cupper (2004) to reflect semi-sedentary occupation, as indicated by ethnographic accounts, with a higher density and site diversity in association with major water courses and smaller more sporadic distributions of sites across the dune field and sandplain hinterlands that were occupied by smaller groups during wetter seasons.

Gilding (2007) examined fence line alignments at Noola Station. This study located 13 previously unidentified sites including hearths, artefacts (both scatters and isolated finds), and midden.

Cupper (2008) conducted an assessment of proposed alterations to instream infrastructure along the Darling Anabranch. The study identified 19 new sites, consisting of an artefact scatter, dispersed hearths and shell fragments.

Cupper (2009) undertook an assessment of proposed bore holes at Lake Gol Gol, within the heritage study corridor. Three site complexes were recorded during this assessment, which including mounds incorporating midden shell, hearths, stone artefacts, scarred trees, and an Aboriginal burial.

Johnston (2011) was engaged by DECCW to inspect a rural driveway from which Aboriginal remains were eroding. The study recorded the remains of a minimum of nine individuals buried in a calcareous sand deposits between 30–60 cm depth. Mitigation measures were put in place to manage the erosion of these sites.

Edmonds (2002a, 2002b) conducted archaeological survey assessments for previous iterations of the proposal, between the SA/NSW border and Red Cliffs. Edmonds (2002a) initially conducted vehicular and pedestrian transects along the original proposal alignment, recording 80 archaeological sites. These recordings were dominated by shell middens, scarred trees, and campsites, but also included hearths, isolated finds, and at least four burials. Many of these sites had multiple site features. Edmonds (2002a) developed archaeological sensitivity mapping, informed by known site locations and the categorisation of land systems of western NSW (Walker, 1991). Land systems identified as moderate and/or high archaeological sensitivity by Edmonds were:

- moderate archaeological sensitivity:
    - Anabranch
    - Belvedere
    - Bulgamurra
    - Menilta
    - Overnewton
- high archaeological sensitivity:
    - Canally
    - Darling
    - Roo Roo.

Further archaeological survey was conducted by Edmonds (2002b) due to realignments of the previous alignment of the proposal, which was predominantly focused on the Darling River. Edmonds noted that visibility was limited by a combination of groundcover vegetation and a mobilised cap of windblown sand. Thirteen previously unrecorded sites were identified during this study. All sites recorded during Edmonds' assessments were situated in good proximity to water.

Niche (2017) conducted an archaeological assessment for the proposed water pipeline between Wentworth and Broken Hill. A total of 240 new Aboriginal sites were recorded during surface and subsurface archaeological investigations, with the most common sites yielding stone artefacts either isolated, as artefact scatters, or in combination with hearths and/or shell. It was also suggested that surface artefacts can be found as deep as 15 centimetres. Lunettes, source bordering dunes, sandhills, and alluvial terraces within 600 metres of significant sources of water were assessed as having increased predicted archaeological sensitivity.

6.3 Aboriginal heritage recordings in the survey area

Six previously recorded Aboriginal sites are listed on the AHIMS database within the survey area. Sites comprise of:

- one modified/scarred tree site (39-6-0029)
- four artefact sites (39-6-0023, 39-6-0030, 39-6-0026, and 46-3-0086)
- one combined modified/scarred tree and artefact site (39-6-0022).

6.4 Aboriginal heritage recordings in the proposal study area

A total of forty-three (43) Aboriginal heritage items/recordings are included on AHIMS database within the one kilometre proposal study area between the SA/NSW border and Buronga. No Aboriginal heritage items have been recorded in the 200 metre wide branch of the proposal that extends towards the Victoria border near Monak. Figure 3.1 shows an overview of the proposal study area with locations of the Aboriginal heritage recordings. All 43 AHIMS sites are listed in Appendix 1. No *Restricted* AHIMS recordings are listed within the proposal study area.

There are eight (8) Aboriginal heritage items/recordings are included on AHIMS database within five kilometres of the Wentworth construction compound and accommodation camp.

6.5 Aboriginal heritage recordings within heritage study corridor

A search of the AHIMS database for Aboriginal sites within a broader heritage study corridor was conducted in order to further investigate site typologies and site patterning across differing landscapes the around proposal study area. This search focused on broadening the pool of AHIMS data to five kilometres either side of the proposal study area centreline (10 kilometre wide total corridor) (See Figure 6.1 to Figure 6.4 for an overview). A total of 297 known Aboriginal sites occur within this search area, and encompassed the following archaeological site types/features:

- artefacts (both isolated finds and artefact scatters)
- Aboriginal burials
- hearths
- modified trees
- freshwater shell
- non-human bone and organic material.

Many of these sites are associated with areas of PADs, as well as features of cultural and historical importance to Aboriginal people. Many of the 297 sites display multiple archaeological and/or non-archaeological features within each recording. All Aboriginal heritage recordings within the heritage study corridor are shown in Figure 6.1 to Figure 6.5.

6.6 Aboriginal site types and locations

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 in the proposal study area. From this existing body of work, the following set of broad site location criteria have been summarised for the proposal.

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 to become self-perpetuating.

Artefact scatters

Open artefact scatters are likely to be the most common site type encountered. They may occur almost anywhere that Aborigines 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 general region of the transmission line, artefact scatters tend to be dominated by assemblages of quartz, with lesser percentages of other rock types such as silcrete, sandstone, quartzite and volcanic.

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 study corridor potential site locations include elevated banks, terraces and sand bodies associated with streamlines, 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.

Isolated

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.

Hearths

In archaeology, a hearth is a firepit or other fireplace feature. Hearths are common within the proposal study area and are often made of fired clay balls and sometimes reflect multiple use.

Burials

Burials within the region are generally found either in mound sites, or in elevated natural topographies consisting of soft, easily dug, sediments, such as aeolian sands or unconsolidated alluvial silts. They may occur in isolation or in groups and may also be association with occupation site debris. Burials are generally only visible where there has been some disturbance of subsurface sediments or where some erosional process has exposed them.

Within the proposal study area burials may occur in sand bodies, in mound sites and on elevated fine sediment topographies on floodplains. It should be noted that the incidence of some isolated burials cannot be accurately predicted beyond the broad parameters of deposits with deep, fine sediments.

Freshwater middens

Freshwater middens are defined as a concentration of artefactual debris that includes a significant percentage of freshwater shell (predominantly mussel shell *Velesunio sp*. or *Alathyria sp*.). They are usually the result of interim or base camp activity and are normally situated within riparian zones characterised by relatively permanent water.

Within the proposal study area freshwater middens may be associated with creeks, rivers, billabongs, and prior stream channels. Midden material may be buried by overlying silt deposits.

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 problematical. Most of the transmission line easement has been cleared of native vegetation. The potential for scarred trees to survive within the corridor is moderate to high.

Other site types

More fragile/rare sites such as ceremonial bora rings, stone arrangements, habitation structures, and carved trees may also be present in the proposal study area as evidenced by these site types being present within five kilometres of the study area at very low densities. 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 corridor to the present day is considered low.

The site types which are most likely to occur in the proposal study area are artefact scatters, isolated finds, modified/scarred trees, and hearths. Other site types which may occur in the transmission line easement are mound sites, freshwater middens, and burials. The most archaeologically sensitive topographic contexts in the proposal study area are elevated ground adjacent to water sources, lunettes, sand bodies and sand sheets within valley floor contexts, and the margins of lakes and river terraces.

Figure removed for public display

Figure 6.1 Aboriginal sites in relation to the survey area

Figure removed for public display

Figure 6.2 Aboriginal sites in relation to the western portion of the proposal study area

Figure removed for public display

Figure 6.3 Aboriginal sites in relation to the central portion of the proposal study area

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Figure 6.4 Aboriginal sites in relation to the eastern portion of the proposal study area

Figure removed for public display

Figure 6.5 Aboriginal sites in relation to the Wentworth construction compound and accommodation camp

6.7 Survey units and landform mapping site location model

The most common Aboriginal site type present in the proposal study area and the broader region is the open artefact scatter (also termed open campsite on many of the AHIMS site cards for the region), which 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 density of artefacts represented in these scatters can vary dramatically, based on several variables including landscape features, proximity to water, and proximity of food resources.

Isolated finds, generally defined as a single stone artefact which occurs without any associated evidence of Aboriginal occupation within a radius of 60 metres, are also common in the proposal study area. Isolated finds may 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 obscured or subsurface artefact scatter. Except in the case of the latter, isolated finds are constituent components of the *background scatter* of Aboriginal artefacts present within any landform.

Previous archaeological studies in and around the proposal as well as the broader Murray Darling region suggest the following archaeological attributes and site location parameters for the proposal study area:

- the largest and most dense archaeological sites correlate to freshwater resources (lakes, rivers, claypans, swamps (e.g. Figure 6.1)
- sand bodies including lunettes and dunes, are of high sensitivity due to their association with Aboriginal burials
- transitional zones between plant communities may be a predictor for Aboriginal occupation
- aeolian sands commonly obscure surface sites within the region, and ground exposure and visibility should be considered where assessing site significance as well as subsurface potential.

Figure 6.6 outlines the pre-survey predictive site model based on both Edmonds (2002a) previous work along previous alignments of the proposal as well as selective preliminary ground-truthing.

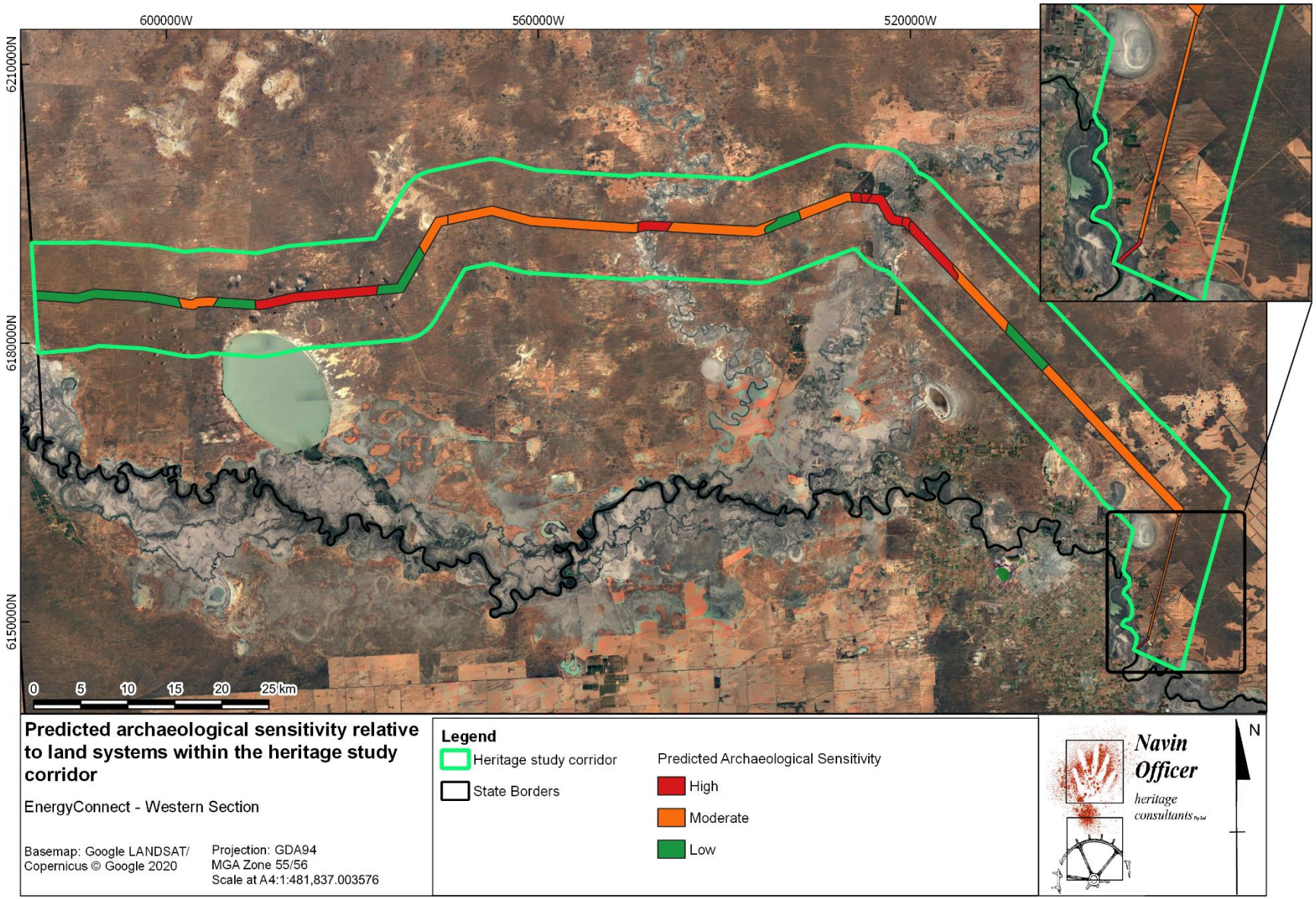

Figure 6.6 Predicted archaeological sensitivity relative to land systems within the heritage study corridor

6.8 Limitations on use of existing information

As described in Section 3.3.1 a section of the transmission line section survey area was not available for access due to landowner access restrictions and therefore has been excluded from the survey area and this assessment.

The data used to generate the general interpretation of Aboriginal prehistoric land use in the proposal study area, as exhibited and amended, has been drawn from previous archaeological work carried out on areas being developed, as well as a number of broad scale research projects, and on the data gathered during the current cultural heritage assessment. These sources of data can be biased in their sampling of the landscape and are limited in their scope. Consequently, the data currently available are unlikely to have provided a completely accurate and comprehensive representation of the distribution of archaeological sites across the landscape, or of the relative frequency of different site types. Archaeological assessments commissioned for development projects are restricted to the specific footprint that will be impacted by the project. The area of land being assessed is specifically constrained, and in many cases, will not representatively sample the different landforms found across the wider region being studied.

These limitations will usually become less pronounced as more assessments are carried out in a region, since more and more areas of ground are being assessed. A systematic bias in the data can still easily occur, however, if the areas of ground are concentrated in one landform type over another. This could be the case if the assessments relate to developments which preferentially occur on specific landforms, for example roads tend not to traverse steep slopes, wind-farms tend not to be built in valleys, and housing developments are preferentially situated on flat land, for example.

Data on uses of the land by Aboriginal groups in the post-contact period, including the present day, might be limited if activities practised by Aboriginal groups have not been reported in the public domain, and have not been reported to NOHC during consultations with Aboriginal groups. This could occur if land use practises are associated with knowledge that is culturally restricted.

7 Non-Aboriginal heritage context

7.1 Historical overview

Since display of this assessment, the historical context has been updated in response to HeritageNSW submission on the EIS to add further detail including reviewing parish maps and local heritage studies.

7.1.1 Exploration

Explorers began their searches for inland river systems from the 1800s onwards. In 1817 John Oxley completed his survey of the land within the Murrumbidgee Province and by 1827 Oxley, William Hovell and Hamilton Hume had recorded eight major river systems flowing westward (Allen 1972). Following Charles Sturt's expedition in 1829 which yielded the discoveries of the Darling and Rufus rivers, Surveyor-General of New South Wales, Major Thomas Mitchell set out to explore the Darling River from the North in 1835 (Hardy 1976). Mitchell planned to follow the river down to its junction with the Murray River.

Once the early explorers had established a route overland with a permanent water source, overland trails linking New South Wales with the new colony of South Australia were further developed (Hardy 1976). Joseph Hawdon and Charles Bonney were then involved in introducing cattle to the region early in 1838. Following the Rufus River, Hawdon and Bonney came across the lake now known as Lake Victoria.

Between April 1838 and April 1841, a minimum of 36 parties travelled the western central Murray route, bring with them at least 480 Europeans, 90,000 sheep and 15,000 cattle as well as horses, bullocks, drays and goods into Aboriginal territories (Burke et al 2016). Tensions came to a head between European over-landers and the Barkindji people at Rufus River. On April 1841 one of these overlanding parties led by Henry Inman, consisting of 11 men and 5,000 sheep, was confronted by a group of Aboriginal people local to the Rufus River area. Once Inman and his party reached Adelaide and recounted the incident this set-in motion a series of events which led to the Rufus River Massacre. Approximately thirty Aboriginal people were killed as a result of consecutive encounters with Inman, his party and a subsequent police party.

7.1.2 European settlement

Squatters quickly followed and claimed land along the Darling and Murray Rivers, with the Murray/Darling Junction becoming a focal point, first known as 'Hawdon's Ford', and then 'McLeod's Crossing', and later Wentworth (in 1859). The squatters introduced both sheep and cattle to the region, as well pests such as rabbits from at least 1841.

Pastoral leases were granted from 1847 onwards, after western NSW was brought under government control. Initially it was called the District of Lower Darling, and subsequently subdivided with lands west of the Darling River forming the District of Albert (Hope & Gottschutzke 1998). In 1855, Aboriginal mission station was established by the Anglican Church at Yelta. The mission provided a refuge for many Maraura people. The Maraura people worked on stations and employed as trackers for the police. The settlers of the region were subject to periods of boom and bust associated with drought, flood, land degradation caused by hard-hoofed stock, as well as land clearing and rabbit infestations.

Many pastoral runs across the study area changed hands regularly between settlers through the 1850s and 60s. For example, J. McKinley obtained a number of scrub runs to the west of the Anabranch after they had been forfeited around 1858 (Jervis 1948:151) , which he added to his holdings around Lake Victoria, as well the 'Paringi Run' east of the Darling River (Jervis 1948:150). In 1860, the runs to the west of the Anabranch were then transferred to Charles Brown, and later that year to John Hay (Jervis 1948:152-153, Hope & Gottschutzke 1998).

The introduction of paddle steamers in 1853 made remote places along the Murray more accessible and European labour came flooding in. A sophisticated way of living was now open to European settlers living along the Murray (Hardy 1976). Paddle steamers enabled more diversified industries and employment in the region, leading to the establishment of Wentworth. In 1879 reinforced steel fencing was invented and introduced to Australia and the need for Aboriginal labour diminished. By the 1880s artesian bores lined much of the drier country west of the Darling pushing pastoralism inland and therefore eliminating the last refuge for Barkindji tribes, it was also at this time that irrigated land was establish at Curlwaa, enabling subdivision of larger properties and the introduction of higher value horticulture to the region.

The management of pastoral runs was changed by the 1884 Land Act (NSW) whereby large pastoral properties, in the newly established Western Division of NSW, were divided into areas covered by 15 year pastoral leases, and areas covered by yearly homestead leases. The idea was that the yearly leases would foster closer settlement (Hope & Gottschutzke 1998: 57), however this was only attractive where larger pastoral runs possessed moderately well-watered landscapes, which was not always the case, e.g. the 'Scrub' runs in the west of the study area.

A development of regional rail networks in NSW and Victoria in the mid to late 19th century, as well as the progressive regional and later federal regulation of the rivers, creeks and lakes in the early 20th century, put economic pressure on the river boat industry. Works at Lake Victoria between late 1919 and late 1927 converted the water body into a regulated water reservoir.

7.2 The proposal study area

The proposal traverses lands that have historically been used predominantly for pastoral purposes. Figure 7.1 outlines the historic pastoral districts that were established from 1847 onwards. From west to east the proposal crosses the Lake Victoria (#170) (SA border to the Darling Anabranch, Avoca (#174) (Darling Anabranch to Darling River), Tapio (#102)(Darling River to Gol Gol), and Mallee Cliffs (#91) (southeast of Gol Gol) pastoral districts.

Between the SA border and Darling Anabranch (Figure 7.2) the proposal traverses 'Wannwanna', 'Tara', 'Scrub Block No.3', and 'Westbrook' pastoral runs. Moving east, between the Darling Anabranch and Darling River (Figure 7.3) the proposal traverses the Anabranch East' and 'Sturts Billabong' pastoral runs. From the Darling River to around Gol Gol (Figure 7.4), the proposal traverses the 'Tapio', 'Outer 'Tapio', 'Outer Tiltao', and 'West Paringi Block A' pastoral runs. East and southeast of Gol Gol (Figure 7.5), the proposal traverses the 'Outer Paringi', 'Paringi', and 'Mallee Cliff' pastoral runs.

An assessment of the historic pastoral and parish maps across the proposal study area reveals few features likely to be of historical significance. Most of the features associated with the pastoral properties are tank locations, fences, and dirt access tracks. The pastoral maps (Figures 7.2 through to Figure 7.5) do show the smaller holdings adjacent to the dominant hydrological features within the study area, particularly at along the banks of Lake Victoria, the Anabranch, and the Darling River, with this intensification dating to the early to mid-1880's.

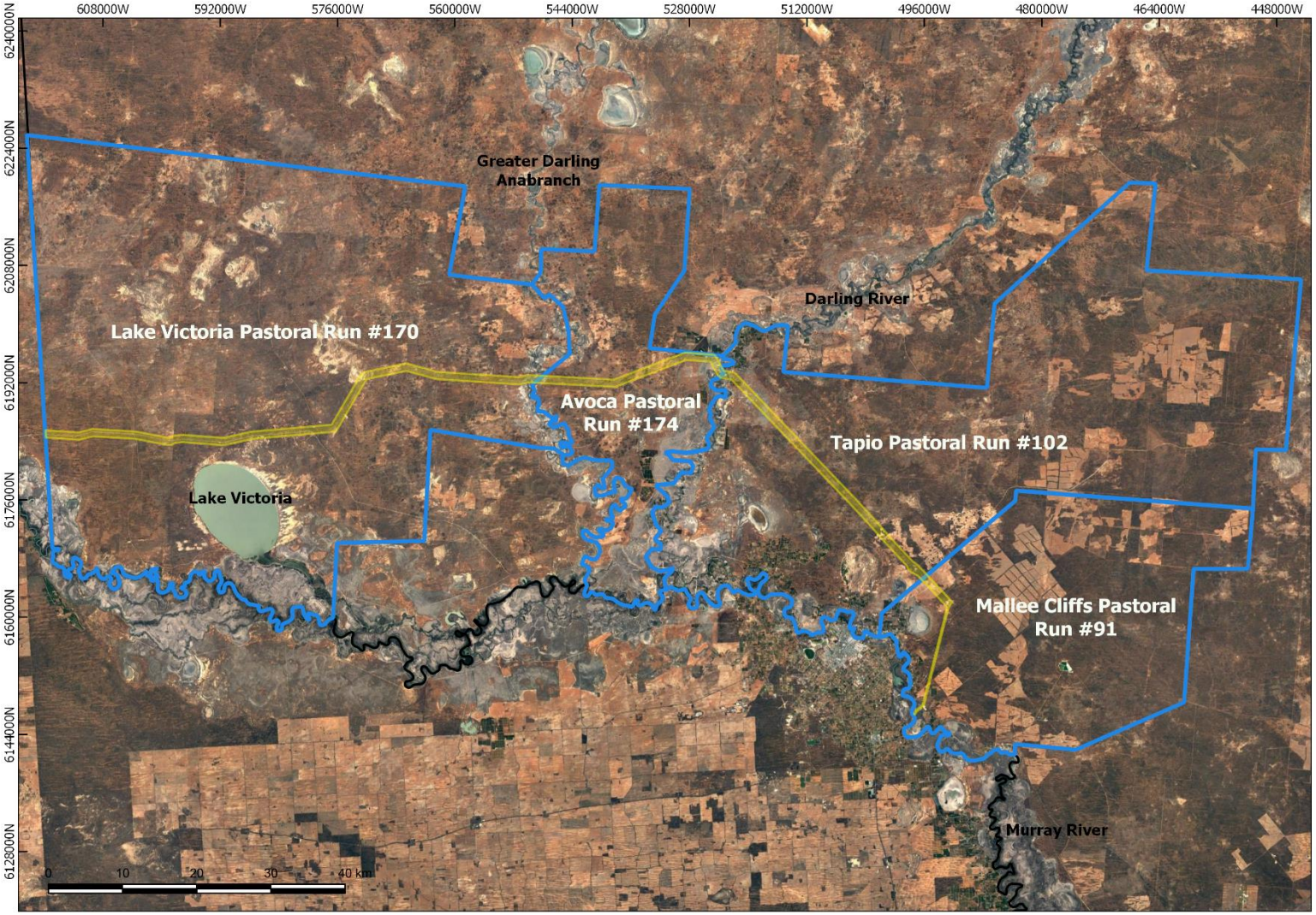

Figure 7.1 Overview of pastoral land district maps (established from 1847 onwards) relative to the proposal study area (yellow)

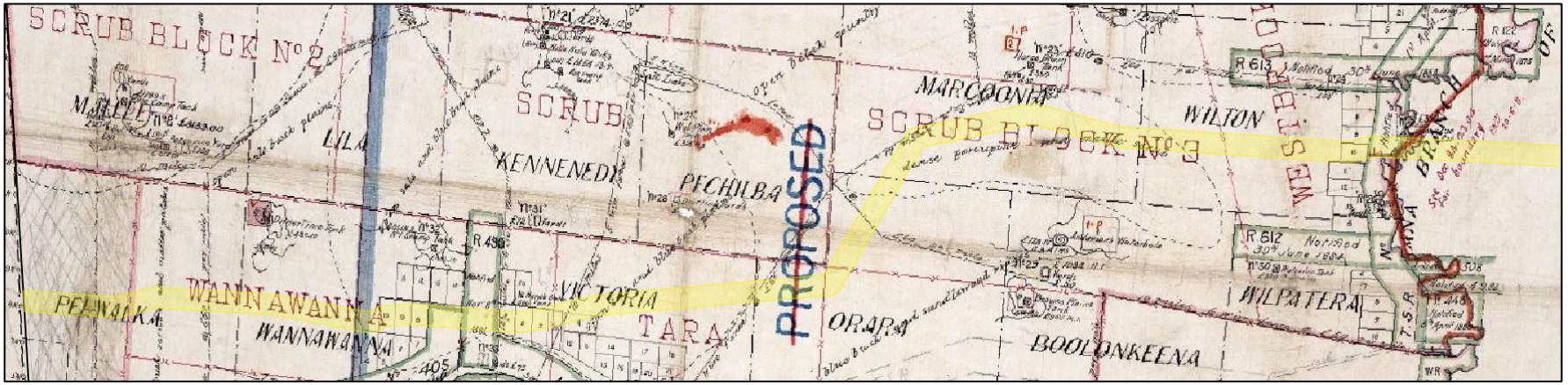

Figure 7.2 Detailed view of Lake Victoria Pastoral Run #170 (n.d) relative to proposal study area (yellow)(closely post-dates 1884)(HLR Viewer)

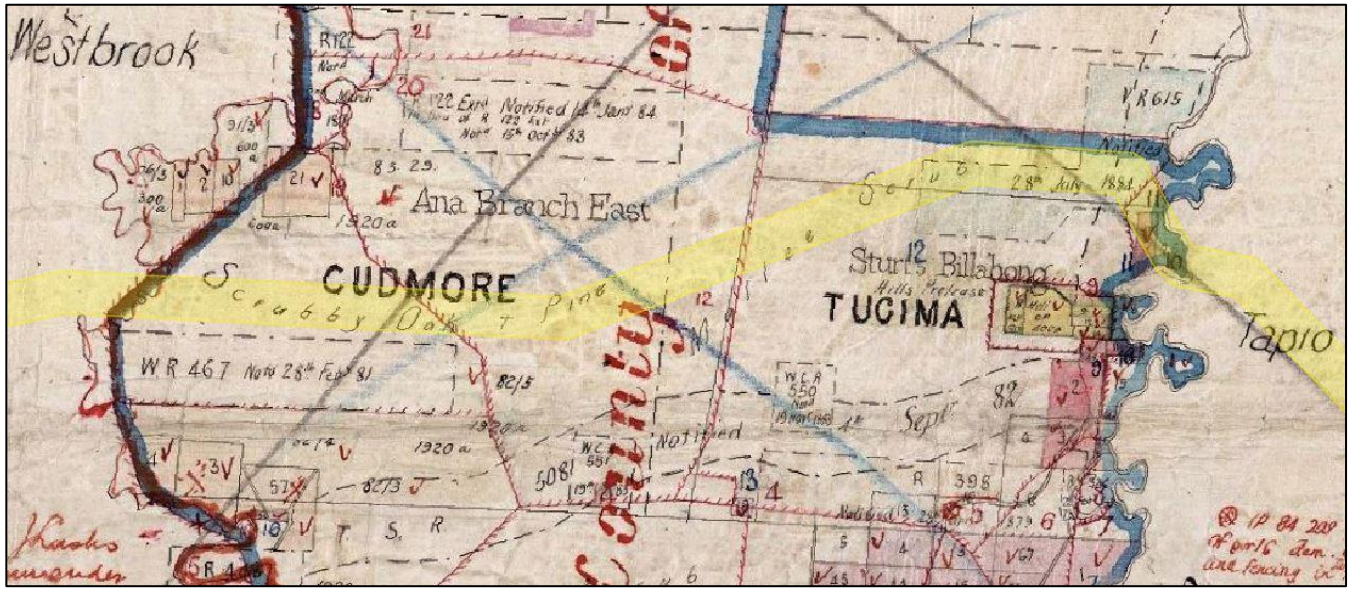

Figure 7.3 Detailed view of Avoca Pastoral Run #174 (n.d) relative to proposal study area (yellow)(closely post-dates 1884) (HLR Viewer)

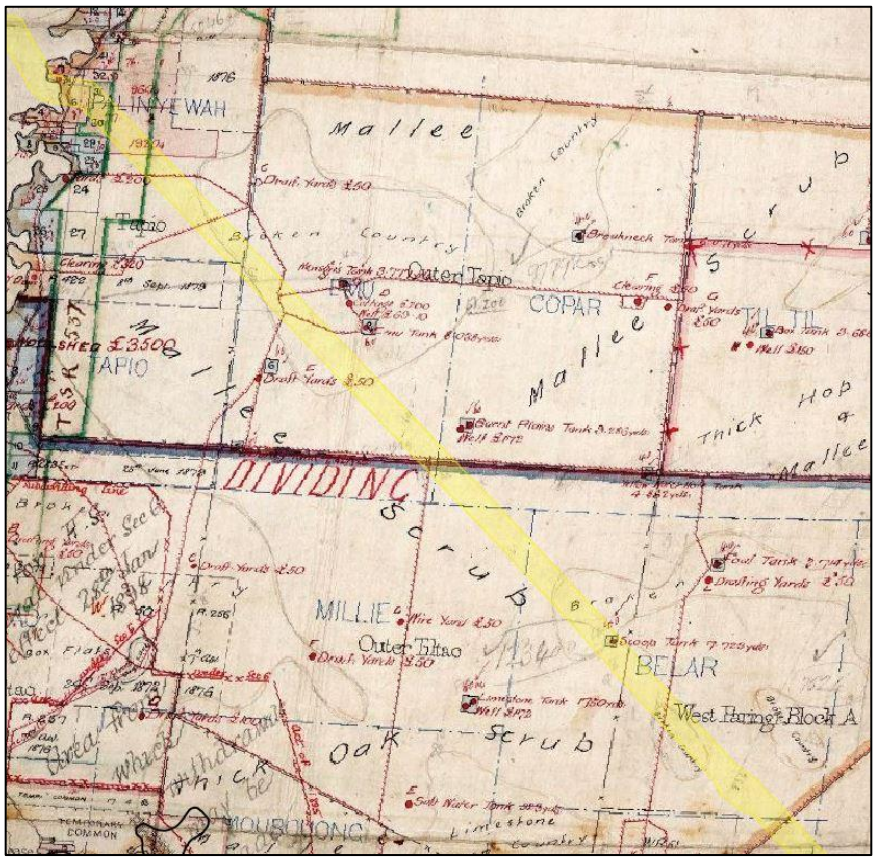

Figure 7.4 Detailed view of Tapio Pastoral Run #102 (n.d) relative to proposal study area (yellow)(likely post-dates 1884) (HLR Viewer)

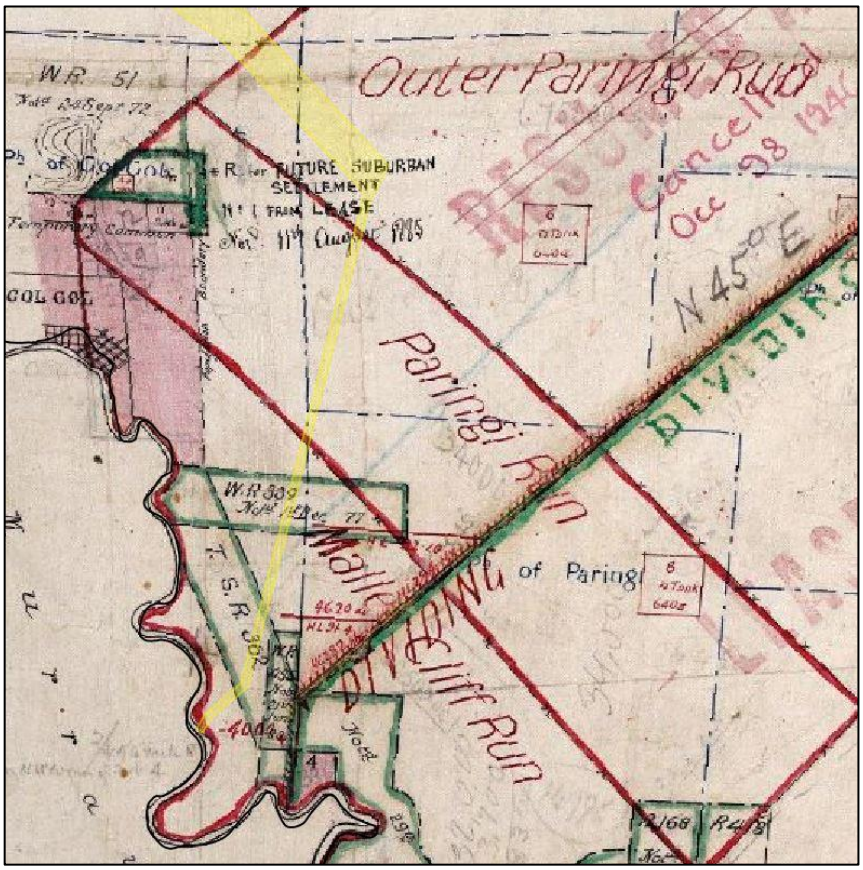

Figure 7.5 Detailed view of Mallee Cliffs Pastoral Run #91 (n.d) relative to proposal study area (yellow)(post-dates 1879) (HLR Viewer)

7.3 Heritage listed items

Three (3) heritage listed sites have property boundaries that are located entirely or partially within the proposal study area. These sites are listed on the Wentworth Local Environmental Plan 2011. All are described as having local heritage significance. A further five (5) heritage listed sites have curtilages that are located entirely or partially within the heritage study corridor. These sites are listed on the Wentworth LEP. This results in a total of seven (7) locally listed sites. Six (6) of these sites are built heritage, with the majority associated with farming and agriculture. The remaining site is an area of historic landscape associated with Sturts Billabong (Item #27).

Table 7.1 lists heritage items that interact with either the proposal study area or the heritage study corridor, Section 8 provides more detail on the listed heritage items. Figure 7.6 shows an overview of the proposal study area (only the largest sites are visible on the map), while Figures 7.7–7.10 show more focused views of the site curtilages and the locations of the historically significant items. Only historic sites in close proximity to the proposal study area are mapped.

Table 7.1 Heritage listed items within the proposal study area and the heritage study corridor

Item	Item ID	Category	Significance	Listing\
Within proposal study area				
Sturts Billabong*	I27	Historic landscape	Local	Wentworth LEP 2011
Nulla Nulla Woolshed	I81	Woolshed (built)	Local	Wentworth LEP 2011
Nulla Nulla Homestead	I82	Homestead (built)	Local	Wentworth LEP 2011
Within heritage study area				
Anabranch Hall	I1	Hall (built)	Local	Wentworth LEP 2011
Hazeldell Homestead	I28	Agriculture (built)	Local	Wentworth LEP 2011
Noola Homestead	I75	Homestead complex (built)	Local	Wentworth LEP 2011
Provincial Obelisk	I95	Monument (built)	Local	Wentworth LEP 2011
Moorna Station Woolshed	I83	Woolshed (built)	Local	Wentworth LEP 2011

** For Sturts Billabong there is no clear information associated with the LEP listing that outlines the boundaries of the significant landscape features that make up this site. therefore. The location of the Billabong and the riparian zone along the outer edge of the Billabong, which includes the mature River Redgums that represent the aesthetic significance of the listed landscape feature, have been demarcated as the outline of the historically significant item (see Figure 7.9).*

7.4 Predictive historical archaeology

Unrecorded historic sites and features of heritage significance that may occur within the proposal study area include:

- old historic non-Aboriginal graves
- old fence lines, such as post and rail fencing – these may occur along road easement boundaries and farmlands
- traces of agricultural and industrial processing or extractive sites
- archaeological sites, such as the occupation remains of former dwellings including homesteads, houses and huts – these will be distributed in close association with land settlement patterns, trading nodes and transport corridors

- 19th Century structures, such as farm dwellings, outbuildings – these may survive as standing buildings, ruins or archaeological deposits and are most likely to survive on less developed rural properties, on early portion numbers, and in or near established farm building complexes
- sites associated with early roads – these will be closely associated with early cadastral road reserves, watershed ridgelines, and related to early river and creek crossing points
- transport and access routes, such as bridle paths, stock routes, and roads of varying forms and ages – these may survive as abandoned remnants adjacent to modern transport routes, or as alignments now followed by more modern or upgraded road and track infrastructure
- structures of historical interest and heritage significance – these may be standing, ruined, buried, abandoned or still in use.

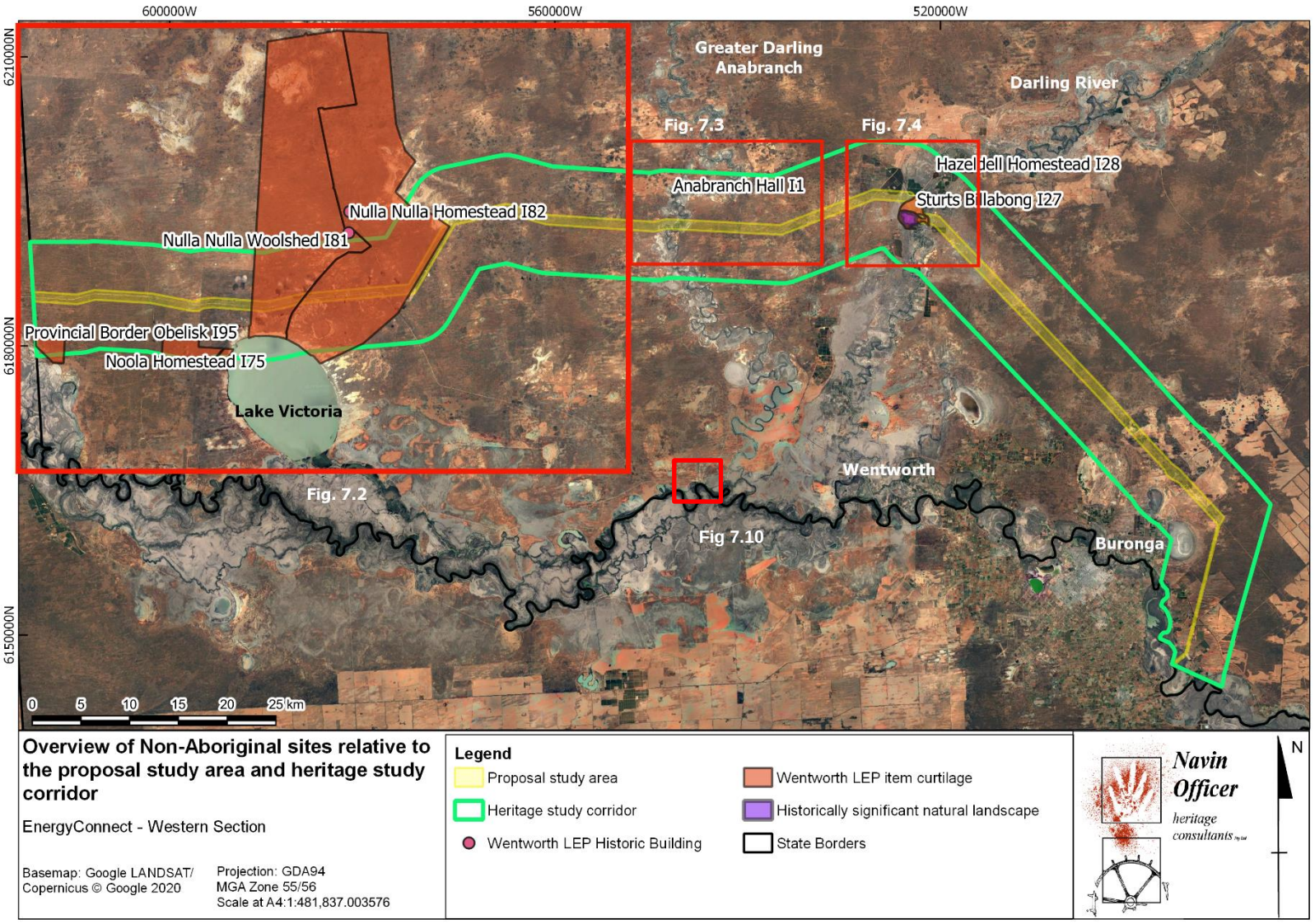

Figure 7.6 Overview of Non-Aboriginal sites relative to the proposal study area and heritage study corridor

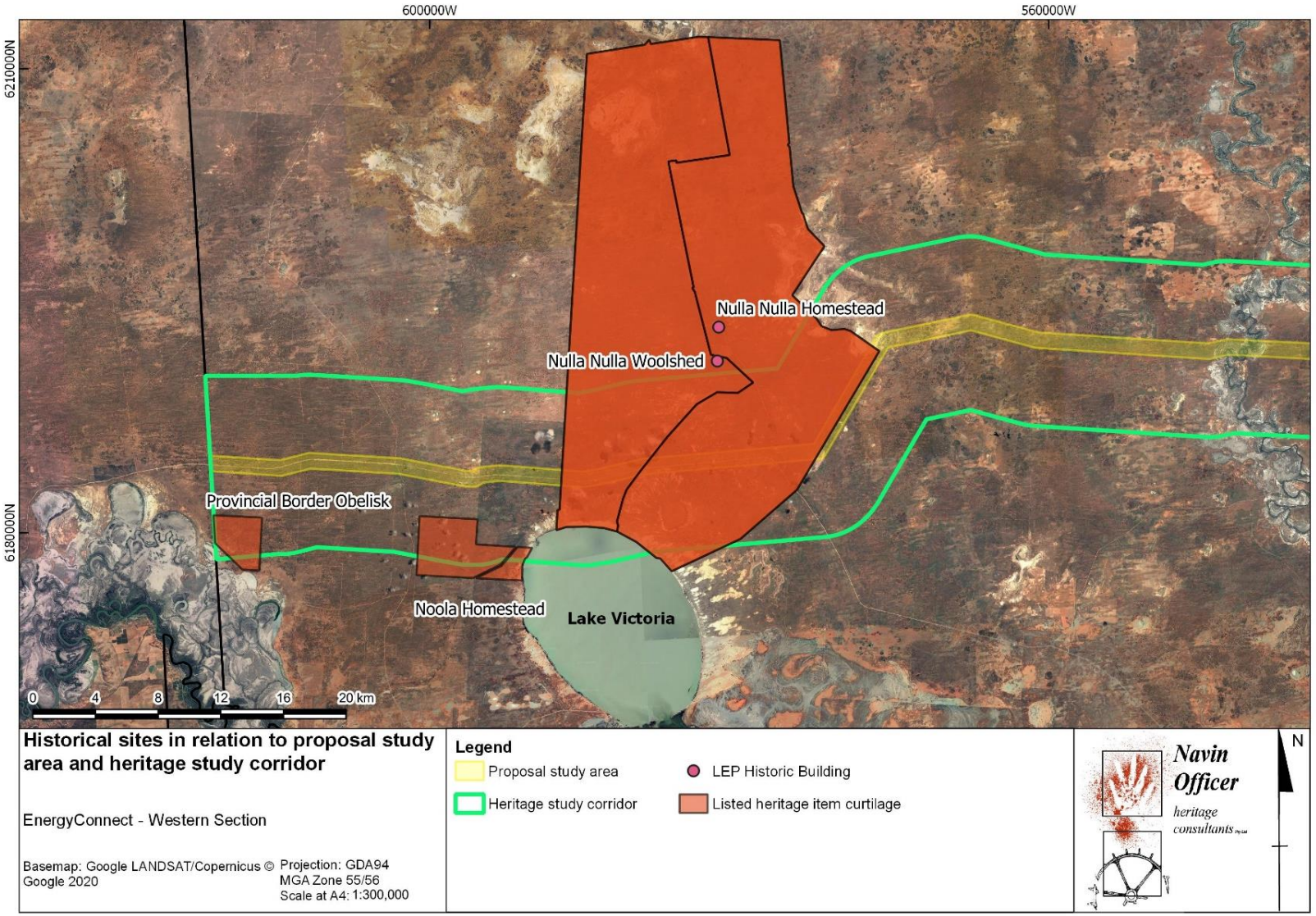

Figure 7.7 Non-Aboriginal sites relative to the proposal study area and heritage study corridor around the Lake Victoria

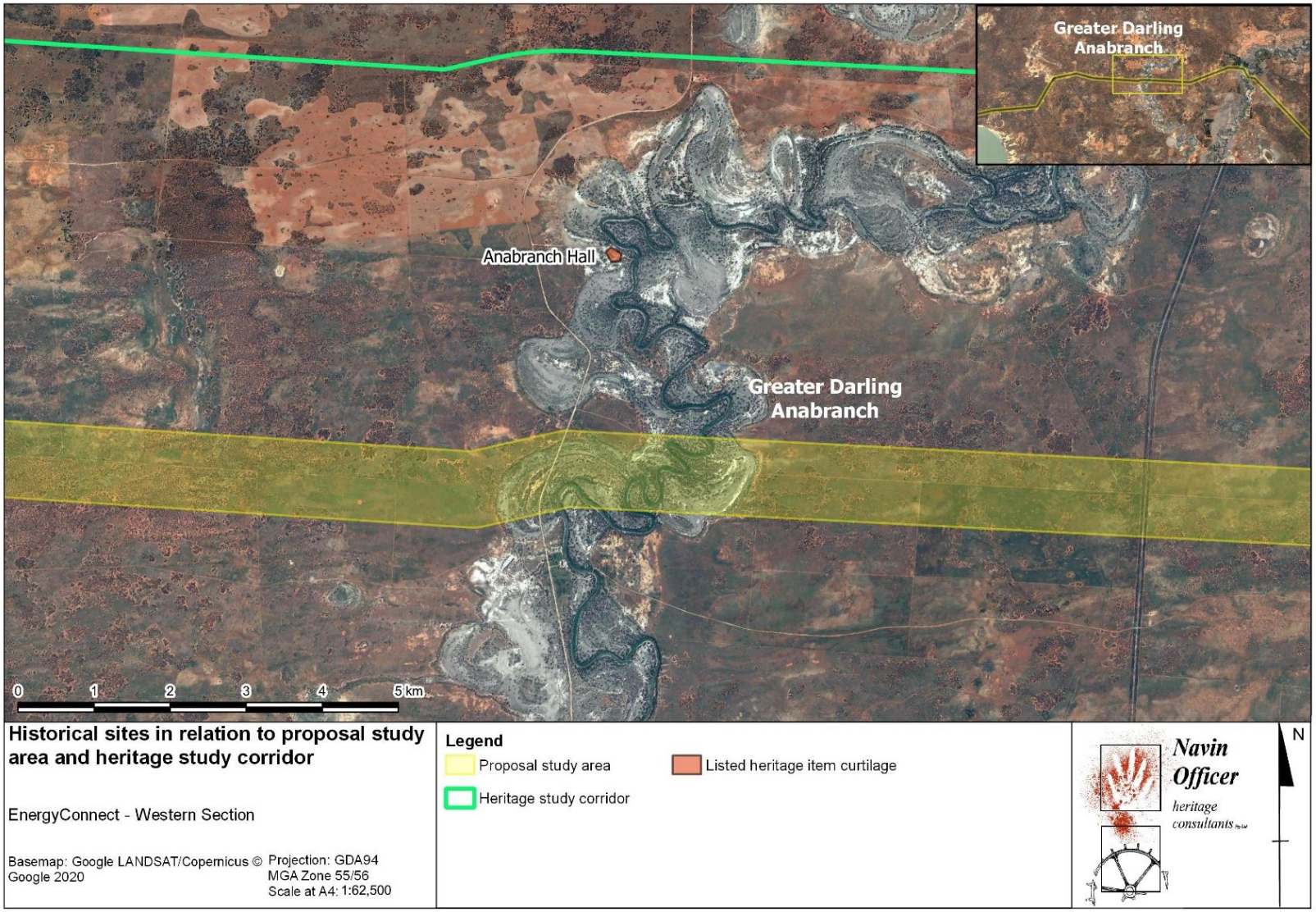

Figure 7.8 Non-Aboriginal sites relative to the proposal study area and heritage study corridor around the Greater Darling Anabranch River

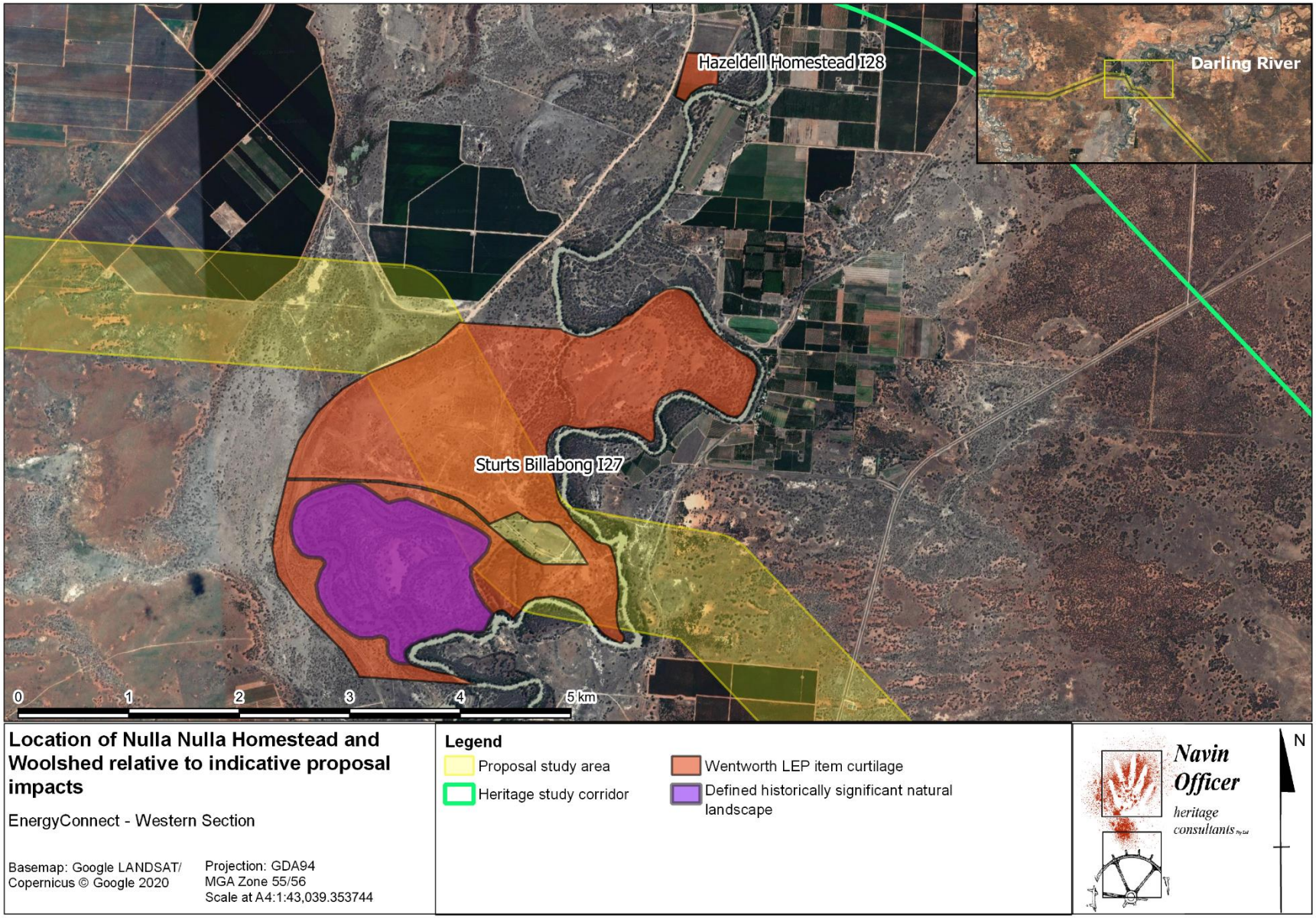

Figure 7.9 Non-Aboriginal sites relative to the proposal study area and heritage study corridor around the Darling River

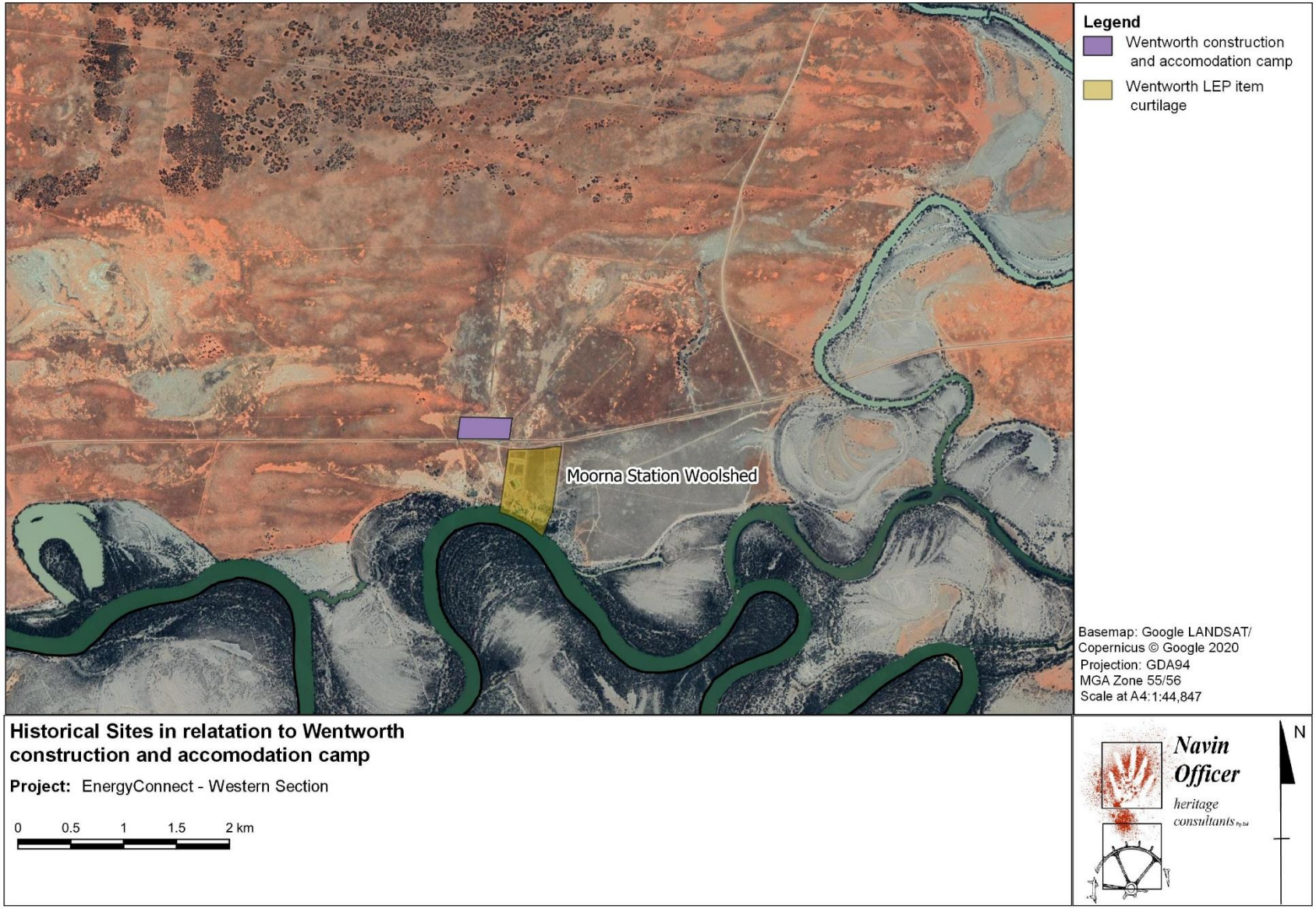

Figure 7.10 Non-Aboriginal sites relative to the Wentworth construction and accommodation camp

8 Results

This section presents the results of the field survey of the survey area (100 metres wide corridor) and site inspections.

8.1 Aboriginal heritage

8.1.1 Previously recorded Aboriginal sites

8.1.1.1 AHIMS

Six previously recorded Aboriginal sites occur in the survey area. These comprise:

- four open artefact scatters/isolated finds – 46-3-0086, 39-6-0026, 39-6-0030, 39-6-0023
- one modified/scarred tree – 39-6-0029
- one combined recording of a modified/scarred tree and artefact – 39-6-0022.

The locations specified for AHIMS sites 39-6-0029, 39-6-0023, 39-6-0030, 39-6-0026, 46-3-0086, 39-6-0022 were inspected but the items could not be located.

While not visible, the items associated with these sites are assumed to be present in the general location. Therefore, these locations/sites cannot be impacted without appropriate approvals. Site 39-6-0030 will be directly impacted (disturbance area A) and 46-3-0086 may be impacted by potential direct disturbance (disturbance area B), an additional site inspection should occur at these locations prior to constriction impacts.

8.1.1.2 Geotechnical investigations

Nine sites were recorded during previous geotechnical investigations completed for EnergyConnect. Of these four are in the survey area. These comprise:

- sites within the survey area:
    - three hearths – PEC-G-1, PEC-G-2, PEC-G-9
    - one combined recording of hearths and artefacts – PEC-G-7.
- sites outside of the survey area:
    - shell midden – PEC-G-4, PEC-G-5, PEC-G-8
    - shell midden and artefacts – PEC-G-3, PEC-G-6.

8.1.2 New sites and PADs

One-hundred and thirty-one previously unidentified and unrecorded Aboriginal sites, as well as 28 PADs, were identified during this archaeological field survey completed for the EIS. These comprise of the following:

- sites with single archaeological typologies:
    - thirty-four stone artefact scatters

      PEC-W-7, PEC-W-20, PEC-W-22, PEC-W-26, PEC-W-28, PEC-W-30, PEC-W-31, PEC-W-34, PEC-W-35, PEC-W-37, PEC-W-39, PEC-W-42, PEC-W-43, PEC-W-45,

PEC-W-47, PEC-W-48, PEC-W-50, PEC-W-51, PEC-W-52, PEC-W-54, PEC-W-55, PEC-W-56, PEC-W-64, PEC-W-69, PEC-W-70, PEC-W-82, PEC-W-84, PEC-W-100, PEC-W-102, PEC-W-103, PEC-W-114, PEC-W-116, PEC-W-119, PEC-W-129

- thirty scarred trees

  PEC-W-57, PEC-W-67, PEC-W-80, PEC-W-85, PEC-W-86, PEC-W-88, PEC-W-90, PEC-W-91, PEC-W-99, PEC-W-104, PEC-W-105, PEC-W-106, PEC-W-107, PEC-W-108, PEC-W-109, PEC-W-110, PEC-W-111, PEC-W-112, PEC-W-113, PEC-W-115, PEC-W-118 ,PEC-W-121, PEC-W-122, PEC-W-123, PEC-W-124, PEC-W-125, PEC-W-126, PEC-W-127, PEC-W-128, PEC-W-130

- twenty-nine isolated finds

  PEC-W-9, PEC-W-11, PEC-W-14, PEC-W-15, PEC-W-16, PEC-W-17, PEC-W-18, PEC-W-19, PEC-W-24, PEC-W-25, PEC-W-32, PEC-W-40, PEC-W-44, PEC-W-46, PEC-W-49, PEC-W-53, PEC-W-60, PEC-W-62, PEC-W-63, PEC-W-73, PEC-W-74, PEC-W-75, PEC-W-76, PEC-W-81, PEC-W-89, PEC-W-97, PEC-W-101, PEC-W-120, PEC-W-131

- twelve hearths

  PEC-W-21, PEC-W-38, PEC-W-58, PEC-W-59, PEC-W-66, PEC-W-71, PEC-W-72, PEC-W-83, PEC-W-87, PEC-W-94, PEC-W-95, PEC-W-98

- six shell middens

  PEC-W-2, PEC-W-4, PEC-W-5, PEC-W-8, PEC-W-13, PEC-W-79

- one post contact artefact scatter (glass) — PEC-W-117.

- sites with multiple site typologies:
  - eight artefact scatters with hearth/s

    PEC-W-33, PEC-W-36, PEC-W-61, PEC-W-65, PEC-W-68, PEC-W-77, PEC-W-93, PEC-W-96

  - six artefact scatters with midden/s

    PEC-W-1, PEC-W-6, PEC-W-12, PEC-W-27, PEC-W-78, PEC-W-92

  - two artefact scatters with midden/s and hearth/s – PEC-W-23, PEC-W-29
  - two isolated finds with midden/s – PEC-W-3, PEC-W-10
  - one isolated find with hearth/s – PEC-W-41.
- PADs PEC-W-PAD1 through PEC-W-PAD28:

These sites are shown in Figure 8.1 to Figure 8.4 below. See Appendix 4 for the full descriptions of all the Aboriginal sites and areas of potential archaeological deposit recorded as part of this assessment.

There were no new sites located in the Wentworth construction and accommodation camp survey area.

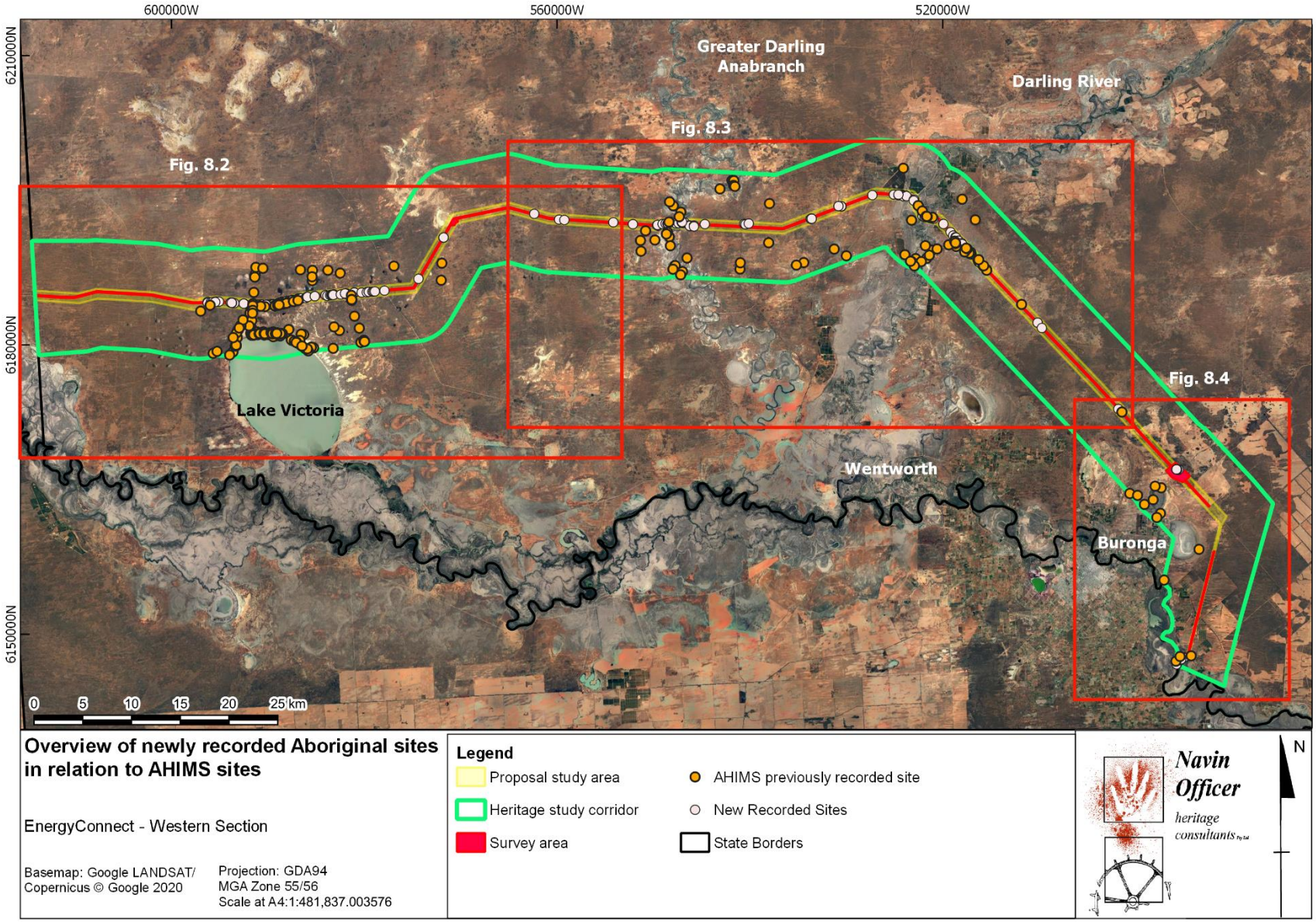

Figure 8.1 Overview of newly recorded Aboriginal sites in relation to AHIMS sites

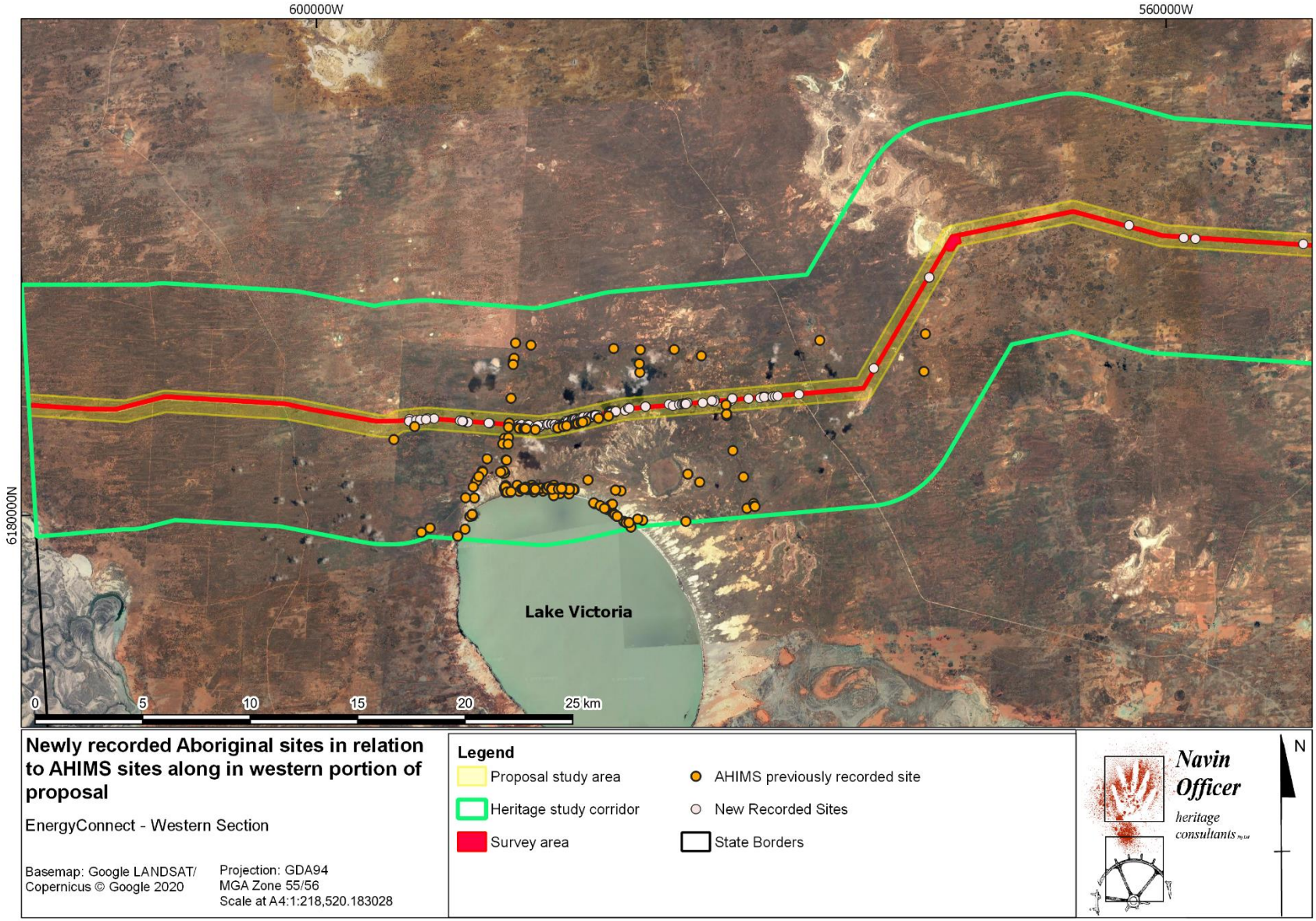

Figure 8.2 Newly recorded Aboriginal sites in relation to AHIMS sites along in western portion of proposal

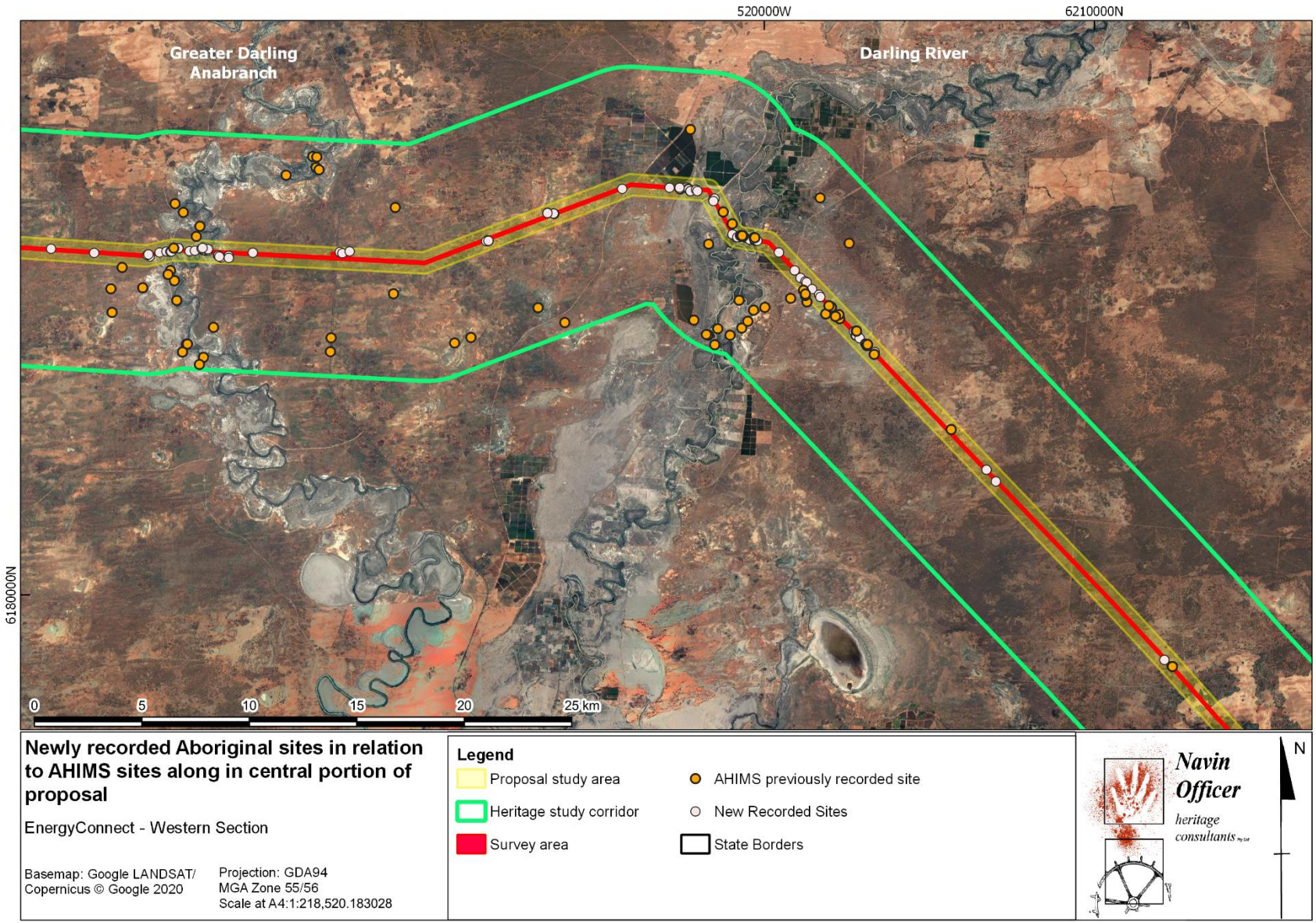

Figure 8.3 Newly recorded Aboriginal sites in relation to AHIMS sites along in central portion of proposal

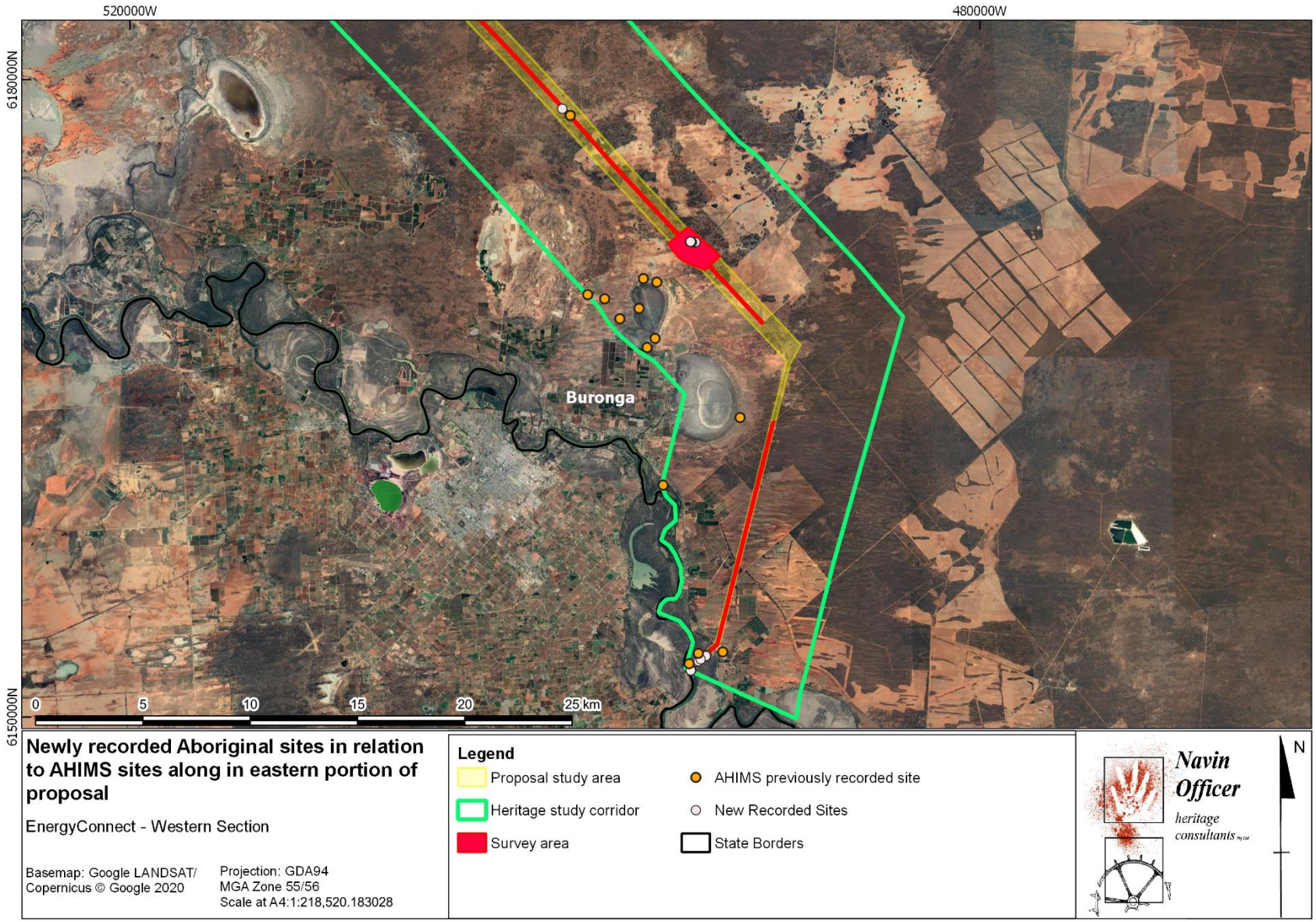

Figure 8.4 Newly recorded Aboriginal sites in relation to AHIMS sites along in eastern portion of proposal

8.2 Non-Aboriginal

No non-Aboriginal archaeological sites were found during the field survey.

8.2.1 Listed Non-Aboriginal heritage items

The sections of the survey area that interact with the curtilages of three locally listed non-Aboriginal (historic) heritage sites interact were inspected.

8.2.1.1 Nulla Nulla Woolshed – Building (Item #81)

Nulla Nulla Woolshed is located 6.2 kilometres north of the survey area. The Wentworth LEP (2011) lists the Woolshed as locally significant against the following SHR criteria:

a) Historical significance – associations with Lake Victoria Station and the change of transport from river to road

c) Aesthetic significance – significant building off road on almost featureless landscape

d) Social significance – point of gathering in the district for shearers and others involved in the wool industry

e) Research potential – timber saw tooth roof structure is innovative of the evolution of the shearing shed building type

f) Rarity – Representative of sheep industry

g) Representativeness – Representative of sheep industry.

The statement of significance on Wentworth LEP (2011) states that the large modern shearing shed with sawtooth roof, representative of the pastoral industry modernisation, and associated with Lake Victoria (refer to Photo 8.2).

No specific features associated with this site were recorded during the survey. The woolshed is the primary item of heritage significance. The yards and nearby shearers quarters are also mentioned in the physical description of the site. The survey area cuts through the southern portion of the heritage curtilage. No buildings associated with the heritage item were visible from the survey area.

Photo 8.1 View of Nulla Nulla Woolshed facing northwest (NSW heritage website listing)

8.2.1.2 Nulla Nulla Homestead – Buildings (Item #82)

The site is located about eight kilometres north of the proposal on the west side of Nulla Road. The Wentworth LEP (2011) lists the Homestead as locally significant against the following SHR criteria:

a) Historical significance – The homestead is historically significant associated with the modernisation of agriculture in the 1920s

c) Aesthetic significance – The dwelling is aesthetically significant because of its unique elevated design

f) Rarity – The high set dwelling is unique in the Shire.

Statement of significance on Wentworth LEP (2011) states that the item is a rare elevated homestead representative of management changes in the pastoral industry in the twentieth century (refer to Photo 8.2 and Photo 8.3).

No specific features associated with this site were recorded during the survey. The buildings of architectural and heritage significance are the main homestead and the buildings located to the northwest of the survey area, these items were not visible from the survey area. The survey area skirts the south-eastern boundary of the heritage items curtilage.

Photo 8.2 Eastern façade of main homestead (NSW heritage website listing)

Photo 8.3 Northern side of main homestead showing elevation of building, facing southwest (NSW heritage website listing)

8.2.1.3 Sturts Billabong – Historically Significant Landscape (Item I27)

The survey area cuts through the central portion of the heritage curtilage of Sturts Billabong. The Wentworth LEP (2011) lists Sturts Billabong as locally significant against the following SHR criteria:

c) Aesthetic significance – The site has high aesthetic significance with large mature river red gums

f) Rarity – The landscape is a rare historical site associated with Sturt.

The statement of significance on Wentworth LEP (2011) states that Sturts Billabong has aesthetic significance is a quiet stretch of water off the Darling River with majestic river red gum trees (Photo 8.4 and Photo 8.5). It has historical significance because of its association with Captain Sturt on his exploration in 1829.

No specific historic or landscape features were recorded at this site during the survey. There is no clear information associated with the LEP listing that outlines the boundaries of the significant landscape features that make up this site. The NSW cadastral map as well as google maps place Sturts Billabong in the south western portion of the heritage curtilage. This and the riparian zone along the outer edge of Sturts Billabong, which includes the mature River Redgums that represent the aesthetic significance of the listed landscape feature, have been demarcated as the outline of the historically significant item (see Figure 7.4). The survey area is located about 200 metres northeast of the Sturts Billabong historically significant natural landscape. This area is unlikely to be impacted by the proposal, which is running directly adjacent to an existing transmission line.

Photo 8.4 View of mature River Redgums adjacent to a flood channel of the Darling River, similar to those at Sturts Billabong facing south

Photo 8.5 View of approximate position of proposal alignment facing west. Note: existing transmission line infrastructure

8.2.2 New heritage item

8.2.2.1 PEC-W-H-1 (Survey marker tree)

GDA Zone 54 (centrum) – 590390.166,6255732.195

This site consists of a survey reference tree (Photo 8.6). The scar is of European origin evidenced by the cutting method at the base of the scar. Trees were commonly marked as reference points for marking the corner boundaries of properties into the late 19th and early 20th Century.

A clear arrow can be seen at the top of the scar, with no visible letters or numbering. The scar has been cut with an axe (see cut marks in Photo 8.7 and Photo 8.8), and then marked with a broad arrow. Extracts from the 1901 Regulations Issued suggest that this could be a reference point marker on a Feature Survey, and likely referencing a feature within about five chains (each chain is about 66 feet or 20 metres) of the marked tree (Marshall, 2004:55). These scar types were often also marked with a copper tack at the apex of the broad arrow; however, it is not clear if a copper tack has fallen out or if there was ever one attached. Inspection of historic maps for the Parish of Tugima, County of Wentworth (1884), suggest do not shed any further on the feature.

Land use in the area is a combination of farming and mining, and the surrounding vegetation is open forest.

Tree height:	10 metres
Scar length:	Excluding regrowth 25 centimetres, including regrowth 50 centimetres
Scar height:	Excluding regrowth 57 centimetres, including regrowth 70 centimetres

Regrowth:	Maximum width 15 centimetres, maximum depth 6 centimetres
Height of scar above ground:	Internal base of scar 1 metre
Endemic:	Yes
Tree >150 years:	Unsure
Regrowth >100 years:	No

Photo 8.6 Far view of tree

Photo 8.7 Close-up of scar and blaze

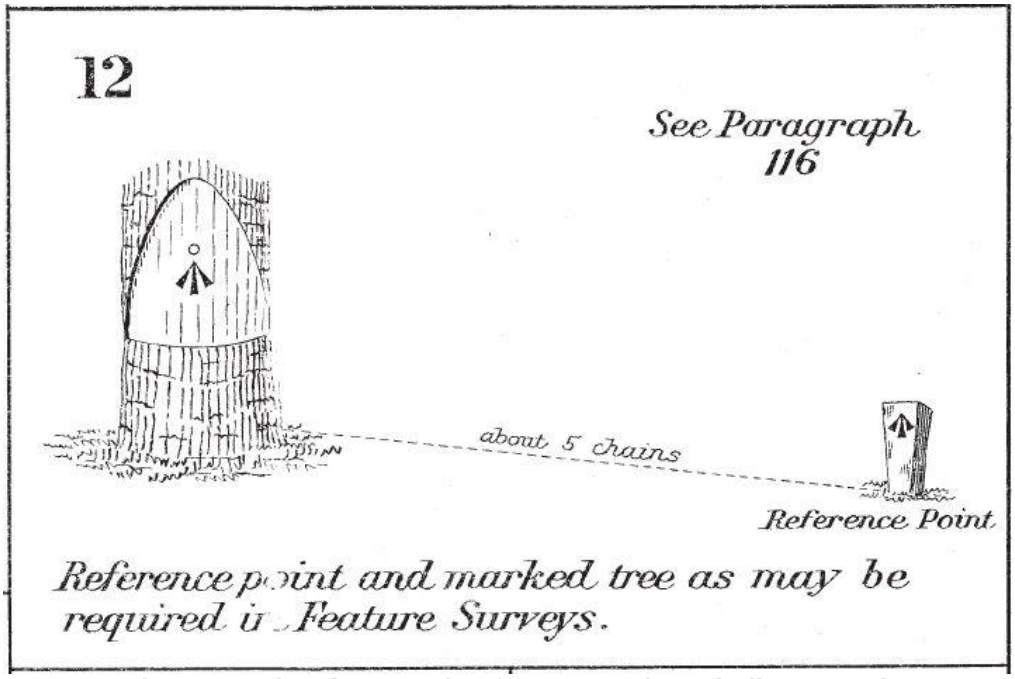

Figure 8.5Sketch example of scar type (Marshall, 2004:58)

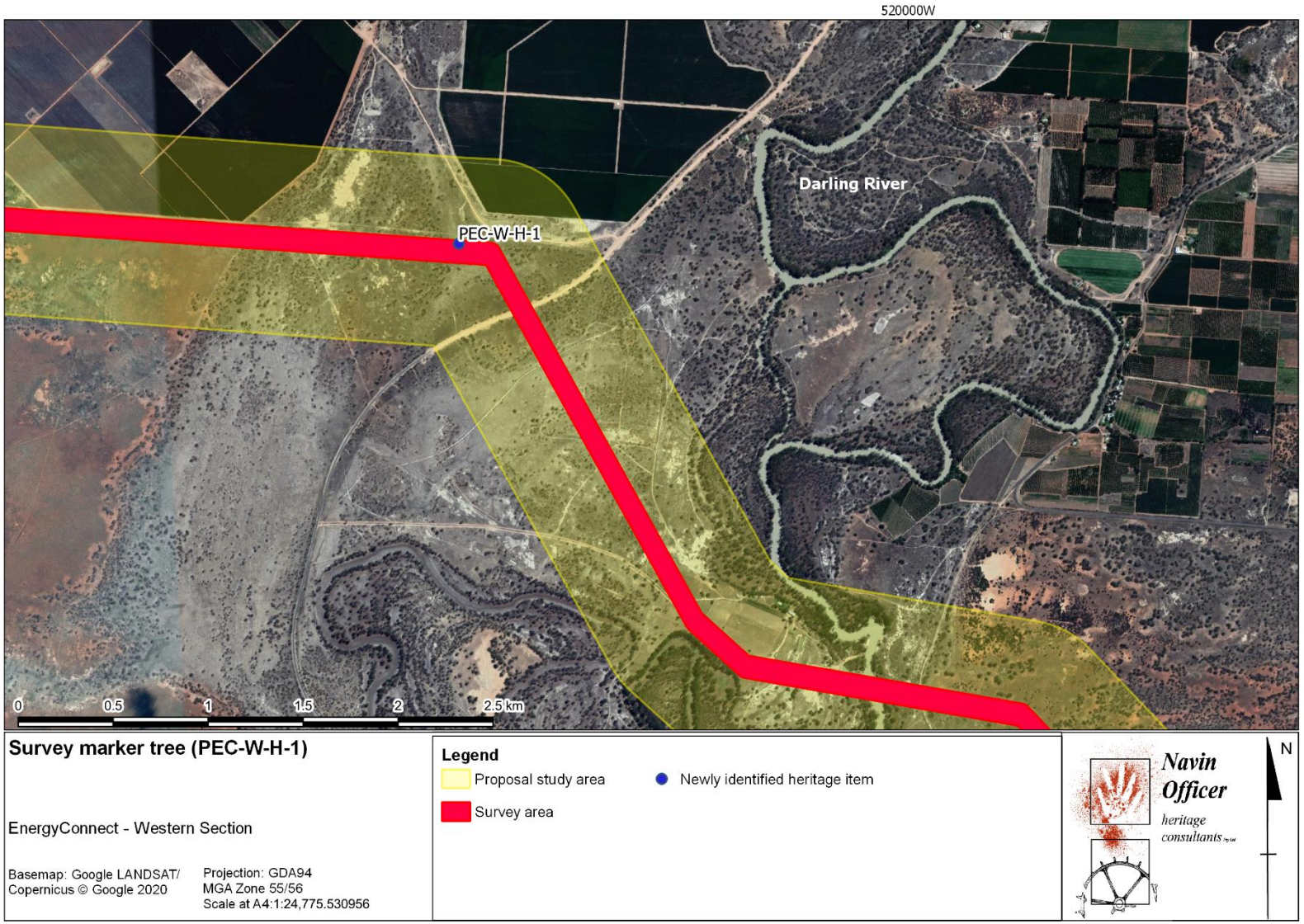

Figure 8.6 Survey marker tree (PEC-W-H-1)

8.3 Survey coverage and visibility variables

The effectiveness of archaeological field survey is to a large degree related to the obtrusiveness of the sites being looked for and the incidence and quality of ground surface visibility. Visibility variables were estimated for all areas of comprehensive survey within the survey area. 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 depth and origin of exposure, the extent of recent sedimentary deposition, and the level of visual interference from surface gravels. Two variables of ground surface visibility were estimated during the survey:

- a percentage estimate of the total area of ground inspected which contained useable exposures of bare ground, and

- 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 archaeological potential of the sediment or rock exposed.

The obtrusiveness of different site types 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 encountered than sites with no surface relief located on, or within, sedimentary matrices. Rock platform sites are still subject to visibility constraints in the form of obscuring ground litter, flood debris and sedimentation, however, rock shelters are less likely to go uninspected. The inspection rate of rock shelters is likely to be 100 per cent in a comprehensive survey, however, the extent of leaf litter and recent sediment on a rock shelter floor may be an important factor in a recorder's ability to detect either a site, or simply a PAD.

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 natural incidence of sandstone platforms suitable for grinding grooves or engraving, together with the incidence of old growth trees, are important considerations in identifying both survey effectiveness and site location patterns outside of environmentally determined factors.

The total area covered by this assessment is 19,879,671.84 metres square.

Error! Reference source not found. (Appendix 4) summarises estimates for the degree to which s eparate landforms within the survey area were examined and also indicates the ground surface exposure incidence and average ground visibility present in each case. Figures 17.287 to 17.300 depict the survey units recorded for the field survey. A total of 74.69 per cent of the surveyed ground area was inspected during the survey, with 67.35 per cent providing useable archaeological exposures.

Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was 51.54 per cent of the total surveyed area. The ESC attempts to provide an estimate of the proportion of the proposal study area that provided a net 100 per cent level of ground surface visibility to archaeological surveyors.

8.4 Analysis of Aboriginal and non-Aboriginal archaeological survey and discussion

Following the results of the archaeological survey it can be concluded that there is little potential of unrecorded non-Aboriginal sites to be in the proposal study area. There are however a number of Aboriginal site location patterns that have emerged from the archaeological survey of the proposal, much of which were expected given the predictive model.

The paucity of non-Aboriginal (historical) archaeological site along the proposal study area is not surprising. The arid landscape, and boom and bust nature of the hydrological features across the region, particularly prior to regulation of the Murray/Darling system in the early 20th century, has resulted relatively low populations of permanent pastoral settler populations. The low rainfall has historically (on average) only supported low densities of stock per acre, thus requiring large property holdings and large pastoral blocks. In many cases these pastoral blocks were not initially fenced, as required significant labour and fencing materials. During much of the 19th century, the labourers in the pastoral industry lived within the vicinity of the station homesteads, due to the large distances and long travel times, resulting in relatively focussed loci for historical assemblages associated with homelife. The possible presence of the following historic features were predicted in Section 7.4:

- old historic graves – these sites would most likely occur near homesteads or old townships, neither of which are traversed by the proposal
- old fence lines – It was noted during archaeological survey that property owners west of the Anabranch had recently invested in tall (9 feet) highly secure fencing for retaining farming goats. The eastern portion of the proposal follows an existing power easement an lacks historic fences of significance.
- 19th Century structures/Archaeological sites – The proposal does not traverse any locations with standing or ruined structures. Desktop analysis of the parish maps also suggests that the probability of encountering ruined 19th century structures is low. This is not considered a consequence of these items not being mapped historically, as the parish maps clearly show the buildings on the Nulla Nulla Station (which are well outside of the proposal study area).
- sites associated with early roads – there was little early road infrastructure in the region bar farm access tracks. The low density of early public roads may be due to the initial reliance on the river boats for transporting goods and stock to and from the region. There was no evidence in the field or on the parish maps, that the proposal alignment interacts with any relict riverboat moorings or significant crossings at the Anabranch, Darling, or Murray Rivers.

NOHC have consulted directly with Wentworth Shire Council regarding historic sites in and around the proposal study area. Verbal discussions with Michele Bos (Strategic Development Officer)(11/02/21), council agreed that the proposal will not impact the heritage significance of either of the Nulla sites (#I81 and #I82). Council are cognisant that the current listing of Sturts Billabong (#I27) is based on an old heritage study (Hassell 1989), and they are hoping to update, in order to refine the area of significance, and narrow down the area where Sturt originally camped. Depending of future heritage studies, council may look at including the river inlet/billabong area between Sturts Billabong (purple area in Figure 10.27) and the proposal, and would also prefer river red gums associated with this area not be impacted by the proposal.

The biggest predictor for Aboriginal sites within the survey area is proximity to water and this is clearly evident in mapping the raw survey data (see Figure 8.7). Sites are concentrated north of Lake Victoria, on the banks and floodplains of the Greater Darling Anabranch River, on the banks and floodplains of the Darling River, and to a lesser degree at the Murray River. Furthermore, and as expected, less conspicuous features such as dry lake beds were also a focus of Aboriginal occupation. The results of the archaeological survey point to differing site distributions and typologies between the landforms that form the approaches and margins of these rivers and lakes.

The portion of the proposal north of Lake Victoria presents by far the highest density and variety of surface artefacts, as well as concentrated midden deposits. These sites are broadly located on an elevated flat to low gradient undulating sandplain ridge situated between Lake Victoria to the south (three to five kilometres) and an internal drainage system (300 to 900 metres north) that links through to the overflow lakes to the northeast associated with water discharge from the Greater Darling Anabranch system. While this system is now dry and arid, in wetter periods of prehistory this would have formed a chain of very shallow interconnected lakes and would have been the focus of occupation. The high number of grindstones at these sites suggests that seed grinding was a focus at these locations, with some of the largest sandstone grindstones weighing at least five to 10 kilograms. These artefacts would have been site furniture that remained at these locations between periodic/seasonal visitation. While recent rains have resulted in increased groundcover, ground exposure and visibility were generally good.

The Greater Darling Anabranch is a highly complex ephemeral river system. The current main channel of the waterway is dry, with artefact scatters and freshwater shell midden common along the banks of the incised valley floor channel. A larger system of broad flood channels is typified by longer more sweeping bends compared to the regular switchbacks evident along the incised main channel. The higher elevation banks along the margins of the flood channels are characterised by low sand dunes and more orange to brown silts and seem to be of greater age and stability from a geomorphological perspective. The archaeological survey suggests these locally elevated flood channel margins are likely to yield archaeological deposits of significance, as evidenced by claypan exposures yielding high densities of *in situ* hearths.

The most common site types along the Darling River and its floodplains were hearths and low-density artefact scatters. Clear ground exposures are less common along the margins of the main river channel, due to the large riparian red gums. Even on the elevated flood plains the accretion of silt can easily cover archaeological material. Areas of disturbance suggest high subsurface archaeological potential. For example, one location on an elevated bank on the western side of the river had an exposure of over 50 hearths, that were only made visible by a large grader scrape area. Without such disturbance, it is unlikely these features would have been visible during archaeological survey. The Darling River is straighter than the Greater Darling Anabranch with little evidence of changing channel courses over time. It is flanked by extensive flat floodplain to the west and undulating alluvial flats with occasional high relief sand dunes to the east.

The floodplains and banks of the Murray River were characterised by open Box eucalypt forest, resulting in lower ground exposure and visibility than other parts of the proposal study area. While surface archaeological sites were observed, Aboriginal scarred trees clearly evidence the utility of these area to Aboriginal people.

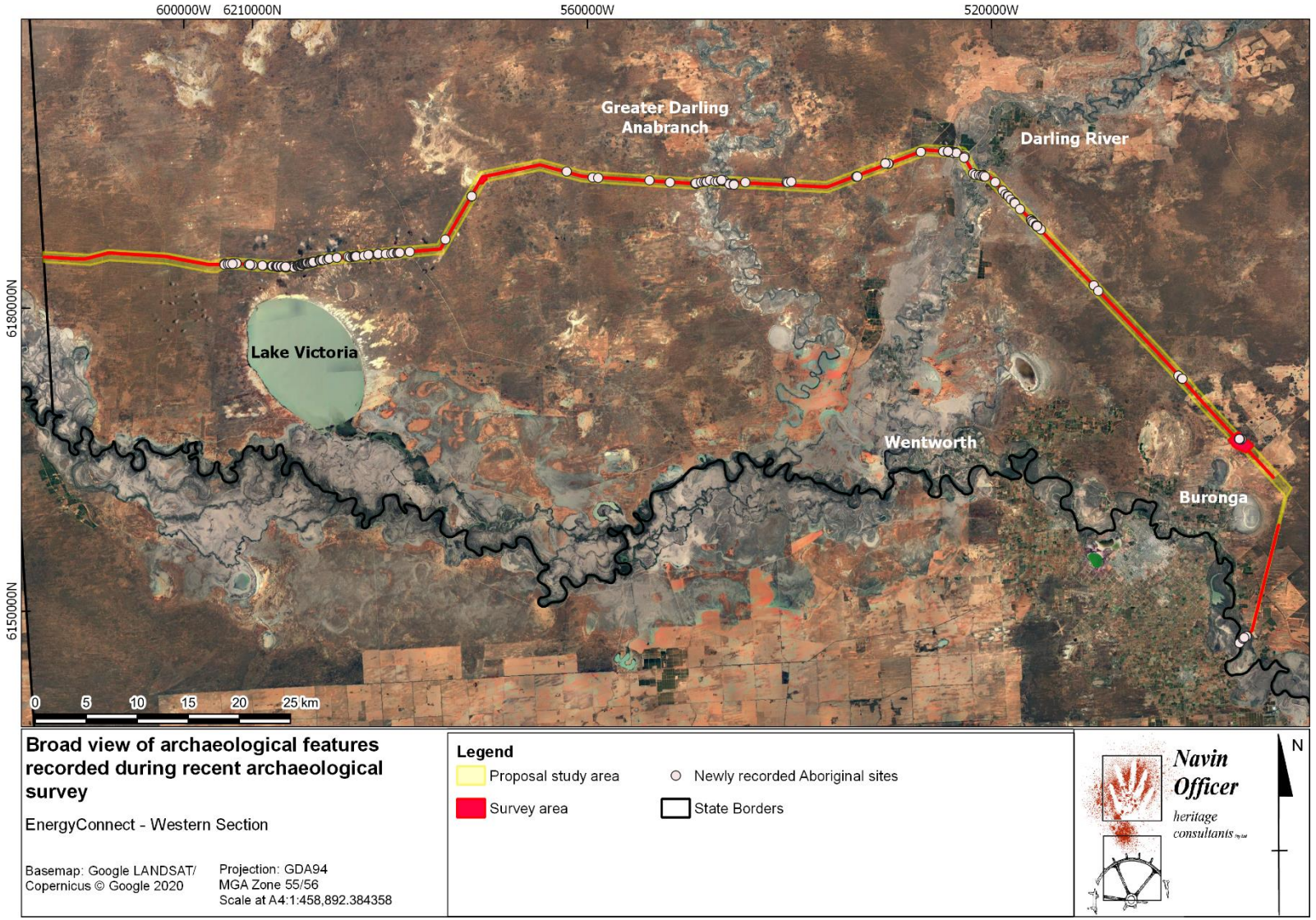

Figure 8.7 Broad view of archaeological features recorded during recent archaeological survey

The distribution of sites found during the archaeological survey broken down by landform is shown in Figure 8.8. Once again this clearly supports a preference for landforms associated with the margins of water bodies, such as floodplains, riverbanks, and the sandplains north of Lake Victoria.

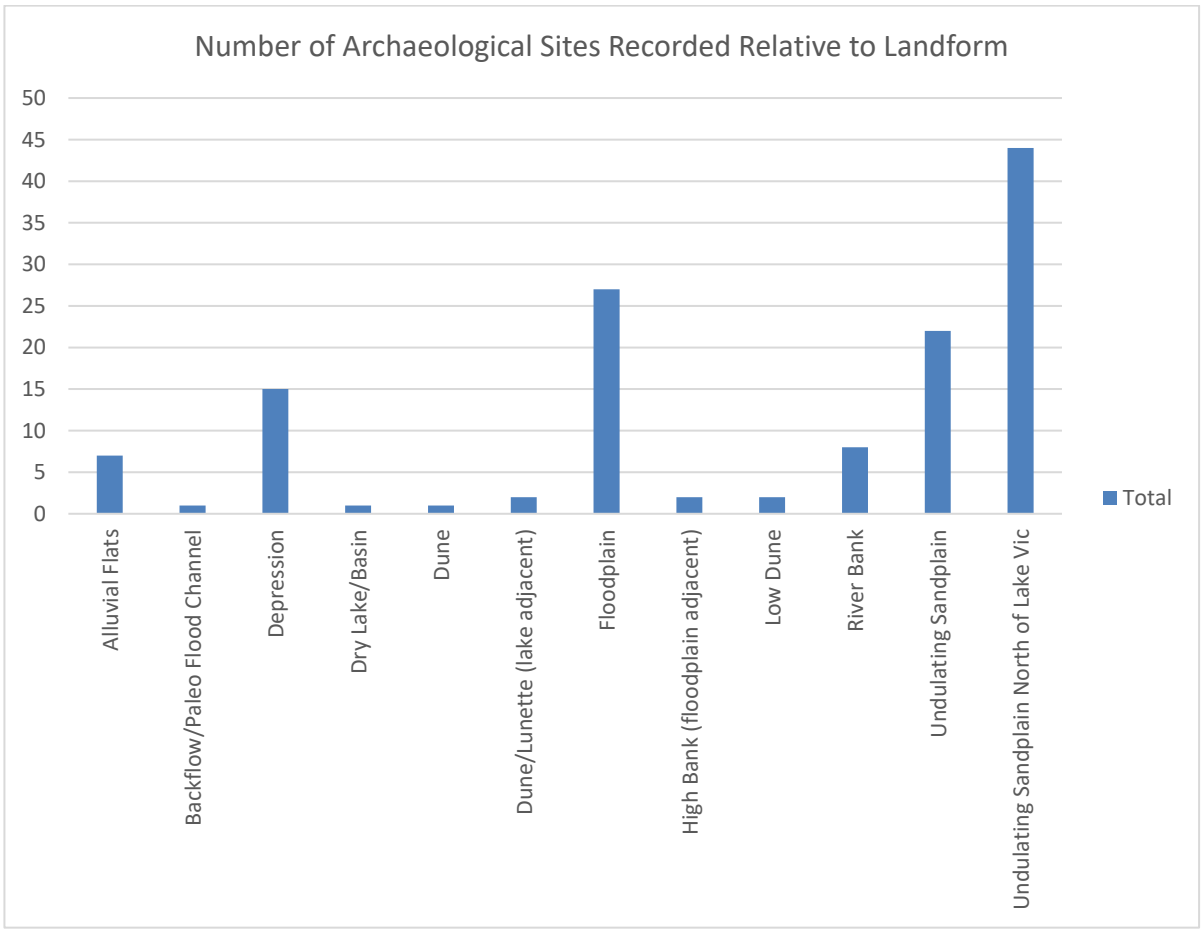

Figure 8.8 Number of archaeological sites recorded relative to landform

When distributions of sites in Figure 8.8 are compared with the percentage of the survey area represented by landform types in Figure 8.9, it becomes clear that the undulating sandplains north of Lake Victoria are heavily overrepresented in site numbers, therefore supporting the predictive model developed prior to the survey. It also shows that while undulating sandplains (not spatially associated with Lake Victoria) yielded a good number of sites during the archaeological survey, that the density of sites within this landform is in fact quite low, given that 58.4 per cent of the survey area was designated this landform type.

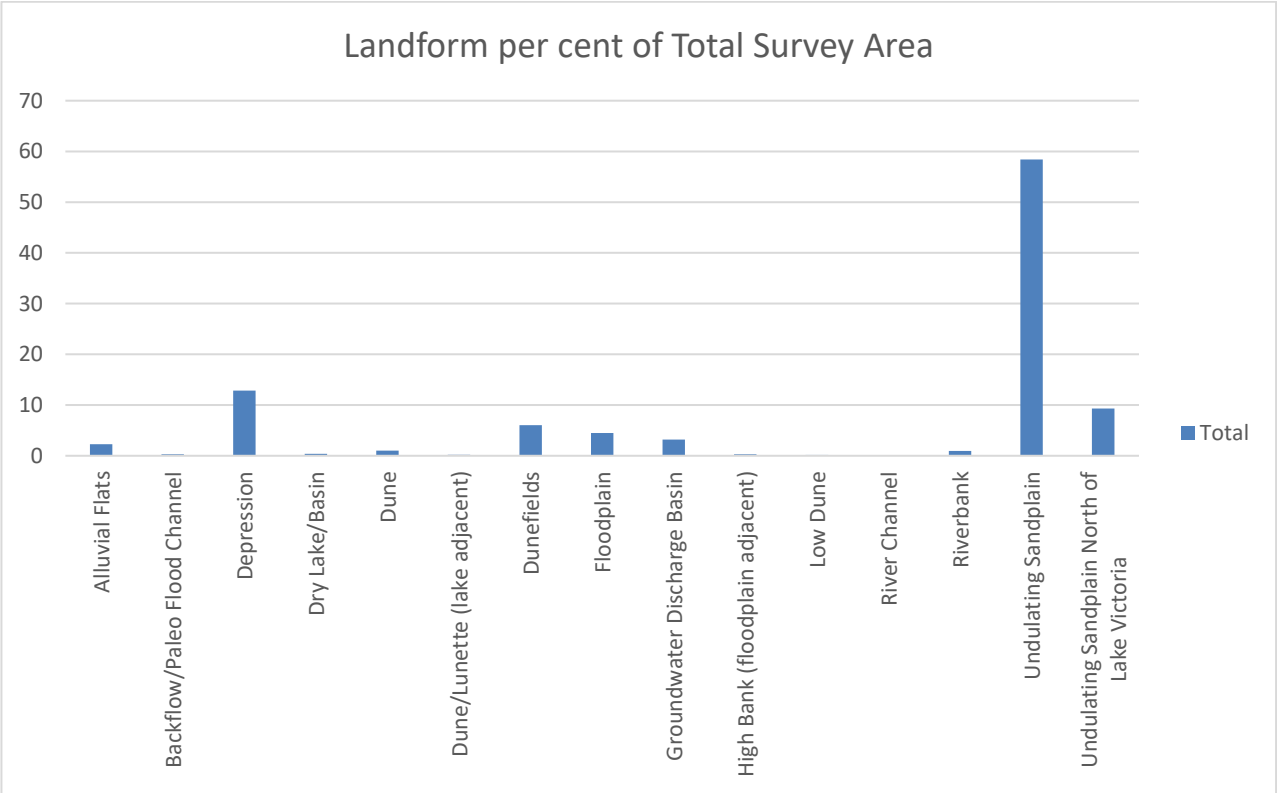

Figure 8.9 Landform per cent of total survey area

8.5 Additional survey site walkovers, surveys, and desktop assessments

Ongoing design of the proposal and comments received during exhibition of the EIS, as well as the appointment of the nominated construction contractor have led to subsequent site walkovers and archaeological survey of areas within and outside the initial survey area.

8.5.1 Additional survey at the Buronga and Wentworth construction compound and accommodation camps with RAPs

On 17 November 2020, traditional owners Arthur Kirby, Rodney Lawson, and Ricky Handy were accompanied by archaeologists Jasmine Fenyvesi and Ben Sybert (NOHC) to assess two additional areas that had not be covered in the initial archaeological survey for the EIS. No unlisted sites of Aboriginal or non-Aboriginal heritage were located during this assessment and no previously recorded sites were listed in the study areas. These areas were assessed to have low potential for subsurface archaeological deposits.

Further details of this assessment can be found in Appendix 5 or refer to PEC West Addendum Report #1 (NOHC 2020).

8.5.2 SecureEnergy site walkover with RAPs

On 9-10 December 2020, traditional owners Arthur Kirby and Ricky Handy were accompanied by four SecureEnergy personnel and TransGrid representative Will Kroker to inspect a number of easement locations, they identified the following Aboriginal sites:

- A number of unidentifiable white fragments (interpreted as human bone by Arthur) at AHIMS site # 39-6-0021. Emu egg fragments and cow bone was also identified. The archaeological significance of this site is not be assessed in this report as it has not ground-truthed in person by an archaeologist. The site has Aboriginal cultural significance.

- Three scarred trees
    - Two are new recordings (PEC-W-SE1 and PEC-W-SE2)
    - One was already recorded as PEC-W-126
- One new recording of a stone artefact (PEC-W-SE3) located within previously identified PEC-W-PAD22

The further works identified the following historic site:

- One new recording of a Survey marker tree (PEC-W-SE-H1)

Detailed descriptions, photos, and maps of new recordings associated with additional assessments can be found in Appendix 5.

8.5.3 Desktop assessment of construction water supply points

A desktop assessment report was prepared for the addition of water supply points which would be required for construction and accommodation camp activities associated with the proposal. Table 8.1 summarises the desktop assessment.

Table 8.1 Summary of water supply points, works required, and archaeological potential

Name	Area	Above ground water supply	Works required	Area currently cleared	Estimated peak loads/day	Nearest AHIMS site	Predicted Archaeological Potential*
Alcheringa Road	Buronga	Yes	Yes	Yes	20	230m	Moderate-High
River Drive	Buronga	Yes	No	Yes	2-3	700m	Moderate
Fletchers Lake Drive	Dareton	No	Yes	No	20	1200m	Moderate
Beverly Street	Wentworth	Yes	No	Yes	2	500m	Low
Milperra Road (and Silver City Highway corner)	Anabranch South	No	Yes	Yes	20	2500m	Low
Wentworth construction compound and accommodation camp	West of Wentworth	No	Yes	No	?	1600m	Low-Moderate
690 Pomona Road	Pomona	Yes	No	Yes	4-5	1000m	Moderate

The desktop report recommends that archaeological survey is conducted in areas where ground disturbance in required for pipe infrastructure, as per mitigation measure AH3. This would apply to the following locations:

a. Alcheringa Road
b. Fletchers Drive
c. Milpara Road
d. The pipe connection to the Wentworth construction compound and accommodation camp site Construction Compound.

Further details of this assessment, including maps, can be found in Appendix 5 or refer to PEC West Addendum Report #2 (NOHC 2021).

9 Cultural heritage values and statement of significance

9.1 Aboriginal heritage

9.1.1 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.

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, 2010: iii). The significance of a place can be the result of several factors including continuity of tradition, occupation or action; historical association; custodianship or concern for the protection and maintenance of places; and 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 sections provides an assessment of significance with reference to the criteria outlined in Table 9.1.

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).	Is the subject area 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.	Does the subject area 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?

Definition of value	Assessment criteria (after OEH 2011:10)
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).	Is the subject area 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).	Does the subject area have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?

9.1.2 Significance assessment

9.1.2.1 Historic value

No information has been provided by Aboriginal stakeholders to suggest the proposal study area is historically important in terms of persons, events, phases or activities in the Aboriginal community. This is not to say that they do not have such significance, simply that no evidence has been forthcoming. The Sturts Billabong site, which is listed on the LEP for its historic association with Charles Sturt, as well as its landscape values and large river red gums, is also associated with an area of Aboriginal burials, and may be associated with historical value, but further consultation with relevant knowledge holders in the local Aboriginal community is necessary for clarification.

9.1.2.2 Scientific (archaeological) value

Archaeological sites recorded during the archaeological survey (and earlier geotechnical clearance) and previously recorded sites that were able to be re-found have been placed into the following assessment categories:

- cannot assess the scientific significance prior to excavation
- require scientific significance to be confirmed by a qualified arborist
- low scientific significance
- moderate (local) scientific significance
- high (local) scientific significance.

Areas of PAD that are not associated with surface artefacts can only be assessed for archaeological significance through subsurface archaeological testing, and therefore have not been assessed at this point (Table 9.2). Any portions of the PADs that yield artefacts will then be able to be assessed from a scientific perspective, and areas that are not found to yield artefacts during excavation will be assessed as ‘not a site’.

Table 9.2 Sites that cannot be assessed prior to excavation

Site number	Summary description	Characteristics relevant to significance assessment
PEC-W-PAD1	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD2	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD3	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD4	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD5	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD6	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD7	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD8	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD9	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD10	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD11	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD12	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD13	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD14	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD15	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD16	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD17	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD18	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD19	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD20	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD21	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD22	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.

Site number	Summary description	Characteristics relevant to significance assessment
PEC-W-PAD23	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD24	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD25	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD26	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD27	PAD	Moderate potential for subsurface archaeological deposits. Not associated with surface artefacts.
PEC-W-PAD28	PAD	High potential for subsurface archaeological deposits. Not associated with surface artefacts.

Scarred trees are best assessed from an archaeological perspective by arborists in respect to tree age and cause of the scarring. Scarred trees have been assessed from an archaeological perspective as unlikely, possible, or probable Aboriginal origin (Table 9.3). Many of these trees have also been identified as being of cultural significance to RAPs during field survey.

Table 9.3 Scarred tree sites that require further assessment by an arborist

Site number	Summary description	Archaeological assessment
PEC_W_57	Scarred Tree	Possible Aboriginal scar
PEC_W_67	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_80	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_85	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_86	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_88	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_90	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_91	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_99	Scarred Tree	Probable Aboriginal scar
PEC_W_104	Scarred Tree	Probable Aboriginal scar
PEC_W_105	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_106	Scarred Tree	Possible Aboriginal scar
PEC_W_107	Scarred Tree	Probable Aboriginal scar
PEC_W_108	Scarred Tree	Probable Aboriginal scar
PEC_W_109	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_110	Scarred Tree	Probable Aboriginal scar
PEC_W_111	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_112	Scarred Tree	Possible Aboriginal scar
PEC_W_113	Scarred Tree	Possible Aboriginal scar
PEC_W_115	Scarred Tree	Possible Aboriginal scar
PEC_W_118	Scarred Tree	Possible Aboriginal scar
PEC_W_121	Scarred Tree	Probable Aboriginal scar
PEC_W_122	Scarred Tree	Possible Aboriginal scar

Site number	Summary description	Archaeological assessment
PEC_W_127	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_128	Scarred Tree*	Unlikely Aboriginal scar
PEC_W_130	Scarred Tree	Probable Aboriginal scar
PEC_W_SE1	Scarred Tree*	Yet to be assessed by archaeologist or arborist
PEC_W_SE2	Scarred Tree*	Yet to be assessed by archaeologist or arborist

* CS denotes cultural 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 9.4). 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 9.4 Sites of low scientific significance

Site number	Summary description	Characteristics relevant to significance assessment
PEC_W_1	Midden & Artefact Scatter	Low to moderate subsurface potential
PEC_W_2	Midden	Low to moderate subsurface potential
PEC_W_3	Midden & Isolated Find	Low to moderate subsurface potential
PEC_W_4	Midden	Low to moderate subsurface potential
PEC_W_5	Midden	Low to moderate subsurface potential
PEC_W_7	Artefact Scatter	Low to moderate subsurface potential
PEC_W_8	Midden	Low to moderate subsurface potential
PEC_W_9	Isolated Find	Low to moderate subsurface potential
PEC_W_56	Artefact Scatter	Low subsurface potential
PEC_W_58	Hearth	Low subsurface potential
PEC_W_59	Hearth	Low subsurface potential
PEC_W_60	Isolated Find	Low subsurface potential
PEC_W_73	Isolated Find	Low subsurface potential
PEC_W_74	Isolated Find	Low to moderate subsurface potential
PEC_W_75	Isolated Find	Low to moderate subsurface potential
PEC_W_76	Isolated Find	Low to moderate subsurface potential
PEC_W_78	Artefact Scatter, Midden	Low to moderate subsurface potential
PEC_W_79	Midden	Low to moderate subsurface potential
PEC_W_81	Isolated Find	Low to moderate subsurface potential
PEC_W_82	Artefact Scatter	Low to moderate subsurface potential
PEC_W_83	Hearth	Low to moderate subsurface potential
PEC_W_84	Artefact Scatter	Low to moderate subsurface potential
PEC_W_87	Hearth	Low subsurface potential
PEC_W_89	Isolated Find	Low subsurface potential
PEC_W_97	Isolated Find	Low subsurface potential
PEC_W_98	Hearth	Low subsurface potential
PEC_W_101	Isolated Find	Low subsurface potential

Site number	Summary description	Characteristics relevant to significance assessment
PEC_W_114	Artefact Scatter	Low subsurface potential
PEC_W_116	Artefact Scatter	Low subsurface potential
PEC_W_119	Artefact Scatter	Low subsurface potential
PEC_W_120	Isolated Find	Low subsurface potential
PEC_W_129	Artefact Scatter	Low subsurface potential
PEC_W_131	Isolated Find	Low subsurface potential
PEC-G-1	Hearth	Low subsurface potential
PEC-G-4	Hearth	Low to moderate subsurface potential
PEC-G-5	Hearth	Low to moderate subsurface potential
PEC-G-6	Hearth	Low to moderate subsurface potential
PEC-G-8	Hearth	Low to moderate subsurface potential
PEC-G-9	Hearth	Low subsurface potential
39-6-0030	Artefact	Low subsurface potential
46-3-0086	Artefact	Low subsurface potential

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 9.5). The PADs that are associated with surface artefact scatters also meet this significance level. The subsurface deposits at these sites are predicted to contain a higher number of artefacts compared to the other sites in the survey area and, therefore, have potential to provide a large enough sample to enable analyses of assemblage compositions that could be used to derive statements on the technological systems being employed by Aboriginal groups living in this region.

Table 9.5 Sites of moderate (local) scientific significance

Site number	Summary description	Characteristics relevant to significance assessment
PEC_W_6	Midden & Artefact Scatter	High subsurface potential
PEC_W_10	Midden & Isolated Find	Moderate subsurface potential
PEC_W_11	Isolated Find	Moderate subsurface potential
PEC_W_12	Artefact Scatter & Middens	High subsurface potential
PEC_W_13	Midden	Moderate subsurface potential
PEC_W_14	Isolated Find	Moderate subsurface potential
PEC_W_15	Isolated Find	Moderate subsurface potential
PEC_W_16	Isolated Find	Moderate subsurface potential
PEC_W_17	Isolated Find	Moderate subsurface potential
PEC_W_18	Isolated Find	Moderate subsurface potential
PEC_W_19	Isolated Find	Moderate subsurface potential
PEC_W_20	Artefact Scatter	Moderate subsurface potential
PEC_W_21	Hearth	Moderate subsurface potential
PEC_W_22	Artefact Scatter	Moderate to high subsurface potential
PEC_W_23	Artefact Scatter, Hearth, Midden	Moderate to high subsurface potential
PEC_W_24	Isolated Find	Moderate to high subsurface potential

Site number	Summary description	Characteristics relevant to significance assessment
PEC_W_25	Isolated Find	Moderate to high subsurface potential
PEC_W_26	Artefact Scatter	Moderate to high subsurface potential
PEC_W_27	Artefact Scatter & Midden	Moderate to high subsurface potential
PEC_W_28	Artefact Scatter	Moderate to high subsurface potential
PEC_W_29	Artefact Scatter, Midden, Hearth	Moderate to high subsurface potential
PEC_W_30	Artefact Scatter	Moderate to high subsurface potential
PEC_W_31	Artefact Scatter	Moderate to high subsurface potential
PEC_W_31	Artefact	Moderate to high subsurface potential
PEC_W_32	Isolated Find	Moderate to high subsurface potential
PEC_W_33	Artefact Scatter, Hearth	Moderate to high subsurface potential
PEC_W_34	Artefact Scatter	Moderate to high subsurface potential
PEC_W_35	Artefact Scatter	Moderate to high subsurface potential
PEC_W_36	Artefact Scatter, Hearth	High subsurface potential
PEC_W_37	Artefact Scatter	Moderate subsurface potential
PEC_W_38	Hearth	Moderate subsurface potential
PEC_W_39	Artefact Scatter	Moderate subsurface potential
PEC_W_40	Isolated Find	Moderate subsurface potential
PEC_W_41	Isolated Find, Hearth	Moderate subsurface potential
PEC_W_42	Artefact Scatter	High subsurface potential
PEC_W_43	Artefact Scatter	Moderate subsurface potential
PEC_W_44	Isolated Find	Moderate subsurface potential
PEC_W_45	Artefact Scatter	High subsurface potential
PEC_W_46	Isolated Find	Moderate subsurface potential
PEC_W_47	Artefact Scatter	Moderate subsurface potential
PEC_W_48	Artefact Scatter	Moderate subsurface potential
PEC_W_49	Isolated Find	Moderate subsurface potential
PEC_W_50	Artefact Scatter	Moderate subsurface potential
PEC_W_51	Artefact Scatter	Moderate subsurface potential
PEC_W_52	Artefact Scatter	Moderate subsurface potential
PEC_W_53	Isolated Find	Moderate subsurface potential
PEC_W_54	Artefact Scatter	Moderate subsurface potential
PEC_W_55	Artefact Scatter	Moderate subsurface potential
PEC_W_61	Artefact Scatter, Hearth	High subsurface potential
PEC_W_62	Isolated Find	Moderate subsurface potential
PEC_W_63	Isolated Find	High subsurface potential
PEC_W_64	Artefact Scatter	High subsurface potential
PEC_W_65	Artefact Scatter, Hearth	Moderate subsurface potential
PEC_W_66	Hearth	Moderate subsurface potential
PEC_W_68	Artefact Scatter, Hearth	High subsurface potential
PEC_W_69	Artefact Scatter	High subsurface potential
PEC_W_70	Artefact Scatter	Moderate subsurface potential

Site number	Summary description	Characteristics relevant to significance assessment
PEC_W_71	Hearth	Moderate subsurface potential
PEC_W_72	Hearth	Moderate subsurface potential
PEC_W_77	Hearth, Artefact Scatter	Moderate subsurface potential
PEC_W_92	Artefact Scatter, Midden	High subsurface potential
PEC_W_93	Artefact Scatter, Hearth	High subsurface potential
PEC_W_94	Hearth	High subsurface potential
PEC_W_95	Hearth	High subsurface potential
PEC_W_96	Hearth, Artefact Scatter	High subsurface potential
PEC_W_100	Artefact Scatter	High subsurface potential
PEC_W_102	Artefact Scatter	High subsurface potential
PEC_W_103	Artefact Scatter	Moderate subsurface potential
PEC_W_117	Post Contact Artefact Scatter (Glass)	Moderate subsurface potential
PEC-G-2	Hearth, Artefact Scatter	High subsurface potential
PEC-G-7	Hearth, Artefact Scatter	Moderate subsurface potential
PEC_W_SE3	Isolated Find	High subsurface potential

9.1.2.3 Aesthetic value

As noted in the OEH *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (OEH, 2011), aesthetic value is often closely associated with social values. Culturally significant places outside the survey area, such as Lake Victoria, are of high aesthetic value to the local Aboriginal community and expectations are that any development in the area would be sympathetic to such vistas. The Landscape and visual impact assessment (IRIS Visual Planning + Design 2020: 7) for the proposal has assessed visual impacts on Lake Victoria. The concludes that visual impacts of the Lake Victoria area:

> include moderate adverse visual impacts during construction and operation on views within the vicinity of Lake Victoria, with views from Renmark Road being of **low visual impact** but would be experienced for a long duration as the proposal alignment parallels the road for several kilometres. There would also be **low** to **moderate visual impact** in views from the land between Renmark Road and Lake Victoria. This is due to the increased visual sensitivity of these locations and the importance of views to the sense of place of this significant cultural landscape.

To date, RAPs have not identified any cultural landscape values/aesthetic values in the proposal area

9.1.2.4 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.

9.2 Non-Aboriginal heritage

9.2.1 Assessment criteria

The NSW Heritage Office publication 'Assessing Heritage Significance' (2015) provides the procedural basis for assessment of heritage significance of an item or place. This is achieved by evaluating the place or item's significance in reference to specific criteria that can be applied at a national, state or local level. The criteria are:

- **Criterion (a)** An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area)
- **Criterion (b)** An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area)
- **Criterion (c)** An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area)
- **Criterion (d)** An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons
- **Criterion (e)** An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)
- **Criterion (f)** An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area)
- **Criterion (g)** An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments (or a class of the local area's cultural or natural places; or cultural or natural environments.).

In using these criteria, it is important to assess the values first, then the local or State context in which they may be significant. Different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases, it is constructive to note the relative contribution of an item or its components. Table 9.6 provides a guide to ascribing relative value. All significance assessments may be updated if new information comes to light through further research or archaeological investigation.

Table 9.6 Guide to ascribing relative heritage value

Grading	Justification	Status
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness Item can be interpreted relatively easily.	Fulfils criteria for local or State listing.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or State listing.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

9.2.2 Significance assessment

9.2.2.1 PEC-W-H1 (Survey marker tree)

Assessment

Criterion (a) The site is not important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not significant against this criterion.

Criterion (b) The site does not have a strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not having significance against this criterion.

Criterion (c) This site is not important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) and is therefore not significant against this criterion.

Criterion (d) This site does not have a strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons and therefore is assessed as not having significance against this criterion.

Criterion (e) This site does not have potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not having significance against this criterion.

Criterion (f) Survey marker trees are increasingly rare and uncommon within the landscape, and therefore is assessed as having significance against this criterion at a local level.

Criterion (g) This site is not important in demonstrating the principal characteristics of a class of NSW's, and therefore is assessed as not having significance against this criterion.

Statement of significance

This type of item is increasingly rare and uncommon, and further research is likely to yield more detail regarding the provenance, age, and function of this specific item. The item is assessed as meeting criterion 'f' at a local level, and its inclusion on a local heritage register is recommended.

9.2.2.2 PEC-W-SE-H1 (Survey marker tree)

Assessment

Criterion (a) The site is not important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not significant against this criterion.

Criterion (b) The site does not have a strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not having significance against this criterion.

Criterion (c) This site is not important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) and is therefore not significant against this criterion.

Criterion (d) This site does not have a strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons and therefore is assessed as not having significance against this criterion.

Criterion (e) This site does not have potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). The site is assessed as not having significance against this criterion.

Criterion (f) Survey marker trees are increasingly rare and uncommon within the landscape, and therefore is assessed as having significance against this criterion at a local level.

Criterion (g) This site is not important in demonstrating the principal characteristics of a class of NSW's, and therefore is assessed as not having significance against this criterion.

Statement of significance

This item has not yet been fully recorded, but assessment of field photos confirms the site to be of some historical significance. This type of item is increasingly rare and uncommon, and further research is likely to yield more detail regarding the provenance, age, and function of this specific item. The item is assessed as meeting criterion 'f' at a local level, and its inclusion on a local heritage register is recommended.

10 Proposed activity

10.1 Historical overview

The survey area has been subject to varying degrees of disturbance by European (post-contact) activities. A discussion of the impacts likely to have occurred to archaeological sites in the proposal study area through historic land use is included in Section 3.3.

The native vegetation in the proposal study area was variably cleared in the historic period and is now a mixture of cleared open pastures for grazing. Native scrub of hopbush, copper burrs, bluebush, and porcupine grass, still dominates the landscape west of the Darling River, dune landscapes not subject to historic vegetation clearance supporting Mallee eucalypts in the far west of the proposal study area.

Clearance of trees, where it has occurred in the proposal study area, can substantially disturb archaeological material on the surface and in subsurface sediments (Wildesen 1982). If trees are uprooted, they drag subsurface sediments up to the surface. If tree stumps are left in the ground to rot, or are burned out, their roots create vacuities that are filled by intrusive sediment. This intrusive sediment can carry archaeological material down through the sediment profile.

In addition, the introduction of stock has contributed significantly to degradation of landscapes the proposal study area, with properties subject to overstocking and dryland cropping have been most heavily degraded. A combination of overstocking and vegetation clearance has intensified erosion, which can move archaeological material across ground surfaces, and can mix material together that was initially separated, as the intervening sediment is stripped away. Erosion as well as accretion can also bury archaeological sites in areas where mobilised sediments settle, such as on floodplains and sandplains.

10.2 The proposal

As described in Section 1.2.1 and 1.2.2, the key components of the amended proposal include:

- a new 330 kilovolt (kV) double circuit transmission line and associated infrastructure, extending around 135 kilometres between the SA/NSW border near Chowilla and the existing Buronga substation
- an upgrade of the existing 24 kilometre long 220kV single circuit transmission line between the Buronga substation and the NSW/Victoria border at Monak (near Red Cliffs, Victoria) to a 220kV double circuit transmission line, and the decommissioning of the 220kV single circuit transmission line (known as Line 0X1)
- a significant upgrade and expansion of the existing Buronga substation to a combined operating voltage 220kV/330kV
- new and/or upgrade of access tracks as required
- a minor realignment of the existing 0X2 220kV transmission line, in proximity to the Darling River
- ancillary works required to facilitate the construction of the proposal (e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps).

Key amendments to the proposal are:

- accommodating the proposed design amendments including:
    - the inclusion of the confirmed location of the accommodation camp and construction compound at Wentworth
    - the revised substation layout for the Buronga Substation upgrade and expansion site to avoid PAD 27
    - addition of two earthwork material sites at the Buronga substation
    - the proposed temporary bypass for around 6.5 kilometres to the south of the Buronga substation
    - construction water supply points
- refinement to the indicative disturbance area to take into account:
    - refinement of the proposed tower locations and transmission line alignment
    - refinement of the proposed tower footprint to reflect generally smaller tower footprints for most towers
    - changes to the categorisation of disturbance along the transmission line alignment to reflect refinements to the vegetation clearing strategy
    - revision to the proposed access track strategy to make use of existing access tracks (wherever possible) in order to seek a reduction in the overall the amount of clearing required
    - avoidance of PAD 19 through the amendment of proposed access requirements in order to minimise subsurface impacts.

10.3 Potential impact types

The above described proposal components may impact heritage in the following ways:

- total direct harm or disturbance to all surface and/or subsurface features at an item. This would generally result a total loss of heritage value at a site. An example of a direct impact for the proposal is the Buronga substation upgrade and expansion area, including the asset protection zones (APZ)
- partial direct harm or disturbance, where direct impacts would occur to only some of the surface and/or subsurface features at an item. Partial direct harm generally results 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.

For the purposes of this assessment:

- direct impacts are assumed to occur across the footprint for the following components of the proposal:
    - Buronga substation upgrade and expansion
    - Buronga construction compound and accommodation camp

- Anabranch South construction compound
- Wentworth construction compound and accommodation camp

- for sites along the transmission line impacts may be direct and potential direct impacts, to all or parts of a site. Indirect impacts would include impacts from vegetation clearance and to cultural values and views. Direct impacts would include excavation and boring as part of structure installation, surface impacts associated with brake and winch equipment for line stringing and access track construction/upgrade.

As discussed in Section 2, the disturbance area is subject to confirmation during detailed design. However, there is greater potential for movement during future stages of the design process for the transmission line alignment. As stated above the potential for indirect impacts may extend outside of areas A and B depending on the nature of impact, for example works occurring adjacent to site and sites. This will be assessed further following detailed design.

10.4 Aboriginal heritage impact assessment

Before the amendments the project impacts were:

- the Buronga substation upgrade and expansion would result in a partial direct impact to PEC-PAD-27.
- the Buronga construction compound and accommodation camp would not impact on any recorded Aboriginal heritage sites or PADs
- the Anabranch South construction compound and accommodation camp would result in full direct impact to three sites, all of which are isolated finds of low scientific value (PEC-W-74, PEC-W-75 and PEC-W-76)
- the transmission line alignment would have a range of direct and potential direct impacts on a total of 77 sites, which consist of sites of low and moderate scientific significance. There was also the potential for indirect impacts including inadvertent direct impacts during vegetation clearance activities.

In summary, based on the amended indicative disturbance footprint:

- the Buronga substation upgrade and expansion would not impact on any recorded Aboriginal heritage sites or PADs
- the Buronga and Wentworth construction compound and accommodation camp sites would not impact on any recorded Aboriginal heritage sites or PADs
- the Anabranch South construction compound would result in full direct impacts to one site (PEC-W-75), which is an isolated find of low scientific value
- the transmission line corridor may have a range of direct and potential direct impacts on a total of 77 sites, which consist of sites of low and moderate scientific significance (refer to Table 10.1). The exact nature and extent of impact would be confirmed following detailed analysis. Some of these sites form part of the 25 PADs which may be impacted by the amended indicative disturbance areas. The significance of the PADs would be confirmed during test excavation prior to the commencement of construction in these areas
- all sites directly and potentially directly impacted are of cultural significance.

The potential impacts associated with the proposal include:

- direct impacts associated with tower locations, brake and winch sites, and upgrading of existing or construction of new vehicle tracks, within disturbance area A

- potential direct impacts associated with vegetation clearance (six to 12 inches height) for stringing lines in disturbance area A (clearing area), which extend between the transmission towers

- potential direct impacts to scarred trees where vegetation clearance to certain heights are required in disturbance area B. For the purposes of this assessment, this is assumed to be all vegetation that is or can grow above four metres in height

- indirect impacts including inadvertent direct impacts during vegetation clearance activities.

As discussed in Section 11.2, the disturbance area is indicative only and is subject to detailed design. While the proposal would aim to avoid all heritage items as a first principle, where this is not possible, design would prioritise the avoidance/minimisation of impacts and harm at locations of moderate and above scientific significance, as well as moderate and high archaeological potential. This is further discussed in Section 13.

Indirect impacts, depending on the site type, site context, and its archaeological and cultural significance, may not result in a loss of heritage value. Indirect impacts may occur to areas beyond the indicative disturbance area, however, the impact would be dependent on several factors, including aerial extent of the site, depth of deposits, and the works being conducted adjacent to these areas. Whilst the number of sites potentially indirectly impacted have not been quantified, construction planning and management for the proposal would ensure that indirect impacts that could potentially result in a loss of heritage values due to physical disturbance will not occur (including physical disturbance from surface water drainage or other mechanism).

- The sites potentially impacted by the proposal are summarised in Table 10.2 and depicted in Figure 10.1 through Figure removed for public display

Figure 10.24.

Impacts outlined in Table 10.2 are only preliminary at this stage, and the position of sites relative to the proposal, and therefore relative to disturbance areas A and B, may change following detailed design. Any changes in impacts to sites would be addressed in future addendum reports.

Table 10.1 Transmission line alignment – impact summary

Site features and significance	Impact type					Total sites impacted
	Direct (Area A)	Potential direct impact (Area A centreline clearing)	Potential direct impact only (Area B)	Direct and potentially direct (Area A & B)	Potential direct impact only (A centreline clearing & B)	
Artefact						
Low scientific significance	1	4	7	-	1	13
Moderate scientific significance	8	3	10	3	1	25
Hearth						
Low scientific significance	-	-	3	-	-	3
Moderate scientific significance	-	-	4	-	-	4
Hearth, Artefact						
Moderate scientific significance	1	2	-	-	2	5
Midden						
Low scientific significance	1	-	3	-	-	4
Midden, Artefact						

Site features and significance	Impact type					Total sites impacted
	Direct (Area A)	Potential direct impact (Area A centreline clearing)	Potential direct impact only (Area B)	Direct and potentially direct (Area A & B)	Potential direct impact only (A centreline clearing & B)	
Low significance	-	-	-	-	1	1
Moderate scientific significance	-	-	2	-	2	4
Midden, Hearth, Artefact						
Moderate scientific significance	-	-	1	-	-	1
Scarred Tree						
Potential scarred trees	5	4	8		-	17
Total	**16**	**13**	**38**	**3**	**7**	**77**

*Area B impacts may or may not be direct for scarred trees depending on their height, and the vegetations clearance height required for their position relative to the proposal

Table 10.2 Summary of confirmed (grey) and indicative (white) impacts to Aboriginal sites

Site number	Feature(s)	Scientific Significance	Cultural significance	Impact zone	Impact type	Potential loss of significance
PEC-W-1	Midden	Low	Yes	Area B	Potential direct	Partial loss
PEC-W-4	Midden	Low	Yes	Area B	Potential direct	Partial loss
PEC-W-5	Midden	Low	Yes	Area B	Potential direct	Partial loss
PEC-W-6	Midden, Artefact	Moderate	Yes	Area A centreline clearing & B	Direct & potential direct	Partial loss
PEC-W-7	Artefact	Low	Yes	Area A centreline clearing & B	Direct & potential direct	Total loss or partial loss
PEC-W-8	Midden	Low	Yes	Area A	Direct	Total loss
PEC-W-10	Midden, Artefact	Moderate	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-11	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-12	Midden, Artefact	Moderate	Yes	Area A centreline clearing & B	Direct & potential direct	Partial loss
PEC-W-15	Artefact	Moderate	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-17	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-18	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-23	Midden, Hearth, Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-27	Midden, Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-29	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-30	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-31	Artefact	Moderate	Yes	Area A centreline clearing	Potential direct	Partial loss
PEC-W-35	Artefact	Moderate	Yes	Area A & B	Direct & potential direct	Partial loss
PEC-W-36	Hearth, Artefact	Moderate	Yes	Area A centreline clearing & B	Potential direct	Partial loss
PEC-W-37	Artefact	Moderate	Yes	Area A & B	Direct & potential direct	Partial loss
PEC-W-38	Hearth	Moderate	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-41	Hearth	Moderate	Yes	Area B	Potential direct	Total loss or partial loss

Site number	Feature(s)	Scientific Significance	Cultural significance	Impact zone	Impact type	Potential loss of significance
PEC-W-45	Artefact	Moderate	Yes	Area A centreline clearing & B	Potential direct	Partial loss
PEC-W-46	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-47	Artefact	Moderate	Yes	Area A & B	Direct & potential direct	Partial loss
PEC-W-48	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-49	Artefact	Moderate	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-50	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-51	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-52	Artefact	Moderate	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-53	Artefact	Moderate	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-54	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-55	Artefact	Moderate	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-60	Artefact	Low	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-61	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-62	Artefact	Moderate	Yes	Area B	Potential direct	Total loss
PEC-W-63	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-W-66	Hearth	Moderate	Yes	Area B	Potential direct	Total loss
PEC-W-67	Scarred Tree	TBC via arborist	Yes	Area B	Potential direct	Total loss
PEC-W-73	Artefact	Low	Yes	Area A	Potential direct	Total loss
PEC-W-75*	Artefact	Low	Yes	Area A	Potential direct	Total loss
PEC-W-78	Midden, Artefact	Low	Yes	Area A centreline clearing & B	Potential direct	Total loss or partial loss
PEC-W-80	Scarred Tree	TBC via arborist	Yes	Area A	Potential direct	Total loss
PEC-W-81	Artefact	Low	Yes	Area B	Potential direct	Total loss
PEC-W-82	Artefact	Low	Yes	Area B	Potential direct	Partial loss
PEC-W-83	Hearth	Low	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-84	Artefact	Low	Yes	Area B	Potential direct	Total loss or partial loss
PEC-W-87	Hearth	Low	Yes	Area B	Potential direct	Total loss

Site number	Feature(s)	Scientific Significance	Cultural significance	Impact zone	Impact type	Potential loss of significance
PEC-W-89	Artefact	Low	Yes	Area B	Potential direct	Total loss
PEC-W-93	Hearth, Artefact	Moderate	Yes	Area A	Direct	Total loss or partial loss
PEC-W-95	Hearth	Moderate	Yes	Area B	Potential direct	Total loss
PEC-W-96	Hearth, Artefact	Moderate	Yes	Area A	Potential direct	Total loss
PEC-W-97	Artefact	Low	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-98	Hearth	Low	Yes	Area B	Potential direct	Total loss
PEC-W-99	Scarred Tree	TBC via arborist	Yes	Area A	Direct	Total loss
PEC-W-100	Artefact	Moderate	Yes	Area B	Potential direct	Partial loss
PEC-W-101	Artefact	Low	Yes	Area A	Direct	Total loss
PEC-W-102	Hearth, Artefact	Moderate	Yes	Area A (direct & centreline clearing) & B	Direct & potential direct	Partial loss
PEC-W-104	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-106	Scarred Tree	TBC via arborist	Yes	Area A	Direct	Total loss
PEC-W-109	Scarred Tree	TBC via arborist	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-110	Scarred Tree	TBC via arborist	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-111	Scarred Tree	TBC via arborist	Yes	Area A centreline clearing	Potential direct	Total loss
PEC-W-113	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-114	Artefact	Low	Yes	Area A centreline clearing	Potential direct	Partial loss
PEC-W-119	Artefact	Low	Yes	Area B	Potential direct	Partial loss
PEC-W-121	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-122	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-123	Scarred Tree	TBC via arborist	Yes	Area A	Direct	Total loss
PEC-W-124	Scarred Tree	TBC via arborist	Yes	Area A	Direct	Total loss
PEC-W-125	Scarred Tree	TBC via arborist	Yes	Area A	Direct	Total loss
PEC-W-126	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss

Site number	Feature(s)	Scientific Significance	Cultural significance	Impact zone	Impact type	Potential loss of significance
PEC-W-128	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-130	Scarred Tree	TBC via arborist	Yes	Area B	Direct	Total loss
PEC-W-SE3	Artefact	Moderate	Yes	Area A	Direct	Total loss
PEC-G-7	Hearth, Artefact	Moderate	Yes	Area A centreline clearing	Potential direct	Total loss
39-6-0030	Artefact	Low	Yes	Area A centreline clearing	Potential direct	Total loss
46-3-0086	Artefact	Low	Yes	Area B	Potential direct	Total loss
PEC-PAD-1	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-2	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-3	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-4	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-5	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-6	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-7	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-8	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-9	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-10	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-11	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-12	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-13	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-14	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-16	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss

Site number	Feature(s)	Scientific Significance	Cultural significance	Impact zone	Impact type	Potential loss of significance
PEC-PAD-17	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-18	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-19	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Potential direct	Potential partial loss (works unlikely to impact subsurface deposits
PEC-PAD-20	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-21	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-22	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-23	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-24	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-25	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-26	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss
PEC-PAD-28	Potential Archaeological Deposit	TBC via excavation	TBC via RAP consultation	Area A & B	Direct & potential direct	Partial loss

* Anabranch South construction compound

Figure removed for public display

Figure 10.1 Potentially impacted sites

Figure removed for public display

Figure 10.2 Potentially impacted sites

Figure removed for public display

Figure 10.3 Potentially impacted sites

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Figure 10.4 Potentially impacted sites

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Figure 10.5 Potentially impacted sites

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Figure 10.6 Potentially impacted sites

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Figure 10.7 Potentially impacted sites

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Figure 10.8 Potentially impacted sites

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Figure 10.9 Potentially impacted sites

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Figure 10.10 Potentially impacted sites

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Figure 10.11 Potentially impacted sites

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Figure 10.12 Potentially impacted sites

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Figure 10.13 Potentially impacted sites

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Figure 10.14 Potentially impacted sites

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Figure 10.15 Potentially impacted sites

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Figure 10.16 Potentially impacted sites

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Figure 10.17 Potentially impacted sites

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Figure 10.18 Potentially impacted sites

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Figure 10.19 Potentially impacted sites

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Figure 10.20 Potentially impacted sites

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Figure 10.21 Potentially impacted sites

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Figure 10.22 Potentially impacted sites

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Figure 10.23 Potentially impacted sites

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Figure 10.24 Potentially impacted sites

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Figure 10.25 Potentially impacted sites

10.5 Impacts to Aboriginal cultural values

All Aboriginal sites within the proposal study area are of cultural significance to the local Aboriginal community. Also, independent of archaeological sites and objects within the survey area, the landscape, native flora, and fauna of the proposal are of high cultural significance.

10.6 Impact to Non-Aboriginal heritage

Impacts to non-Aboriginal heritage are discussed below and summarised in Table 10.3.

10.6.1 Nulla Nulla Woolshed (Item #81)

The transmission line easement and survey area pass through the southern portion of the curtilage. The woolshed is located 6.2 kilometres north of the survey area (See Figure 10.26).

Based on the indicative disturbance area the proposal would not directly impact the local significance of the item with respect to SHR criteria a), d), e), f), and g).

The Nulla Nulla Woolshed (Item #81) is identified as having aesthetic significance against SHR criteria c, due to its setting in ‘an almost featureless landscape’. The aesthetic qualities of this setting would not be significantly altered by the proposal. While the landscape is largely open, with low arid vegetation, the distance and effect of this vegetation and gentle changes in landform over this area, would result in the transmission line and towers being absorbed into the far background of this view. Therefore, there would be no appreciable change to the views from the Woolshed. The item therefore remains significant against SHR criteria c). In summary, the proposal would not impact the significance of this heritage item.

10.6.2 Nulla Nulla Homestead (Item #82)

The proposal study area passes through the southern portion of the curtilage. The buildings of significance are eight kilometres north of the proposal (See Figure 10.26) and would not be directly impacted. Further, the transmission lines and towers would be absorbed into the far background given the distance to the item. As such, the proposal would not directly or indirectly impact the significance of the item.

10.6.3 Sturts Billabong (Item #27)

The proposal study area passes through the central portion of the curtilage. Sturts Billabong is located in in the south western portion of the curtilage. While the LEP listing for Sturts Billabong does not clearly demarcate the area of significance, the area outlined in this report has set out a buffer around the landscape of Sturts Billabong associated with old growth River Redgums (see Figure 10.26).

The proposal study area is 200 metres northeast of the demarcated buffer of Sturts Billabong, and would not directly impact any features (landscape or mature trees) of significance to this item. While the new transmission towers would be easily visible from the northern and north-eastern banks of Sturts Billabong, the visual impact is considered low given the presence of transmission lines within the existing easement. In summary, the proposal would not impact the significance of this heritage item.

10.6.4 PEC-W-H-1 (survey marker tree)

The PEC-W-H-1 (survey marker tree) is located with the proposal study area but is immediately adjacent (10 metres) to the indicative disturbance area B (Figure 10.28). As such, the unlisted heritage item could be at risk of inadvertent impacts, if not protected. To avoid potential impacts the site should be delineated and protected during construction and identified on relevant GIS systems maintained by TransGrid to ensure ongoing protection during operations. In summary, the proposal will not impact the significance of this heritage item.

10.6.5 PEC-W-SE-H1 (survey marker tree)

The PEC-W-H-1 (survey marker tree) is located with the proposal study area but is immediately adjacent (10 metres) to the indicative disturbance area B (Figure 10.28). As such, the unlisted heritage item could be at risk of inadvertent impacts, if not protected. To avoid potential impacts the site should be delineated and protected during construction and identified on relevant GIS systems maintained by TransGrid to ensure ongoing protection during operations. In summary, the proposal will not impact the significance of this heritage item.

Table 10.3 Summary of indicative impacts to non-Aboriginal sites

Site number	Feature(s)	Listed significance	Impact to item	Impact to curtilage	Distance from proposal	Will proposal impact the significance of an item?
Nulla Nulla Woolshed (Item # 81)	Woolshed (Built)	Local	No	Yes	6.2 kilometres	No
Nulla Nulla Homestead (Item # 82)	Homestead (Built)	Local	No	Yes	8 kilometres	No
Sturts Billabong (Item #27)	Historic Landscape	Local	No	Yes	200 metres	No
PEC-W-H-1	Survey Marker Tree	N/A	No	N/A	10 metres from indicative disturbance area B	No
PEC-W-SE-H1	Survey Marker Tree	N/A	No	N/A	10 metres from indicative disturbance area B	No

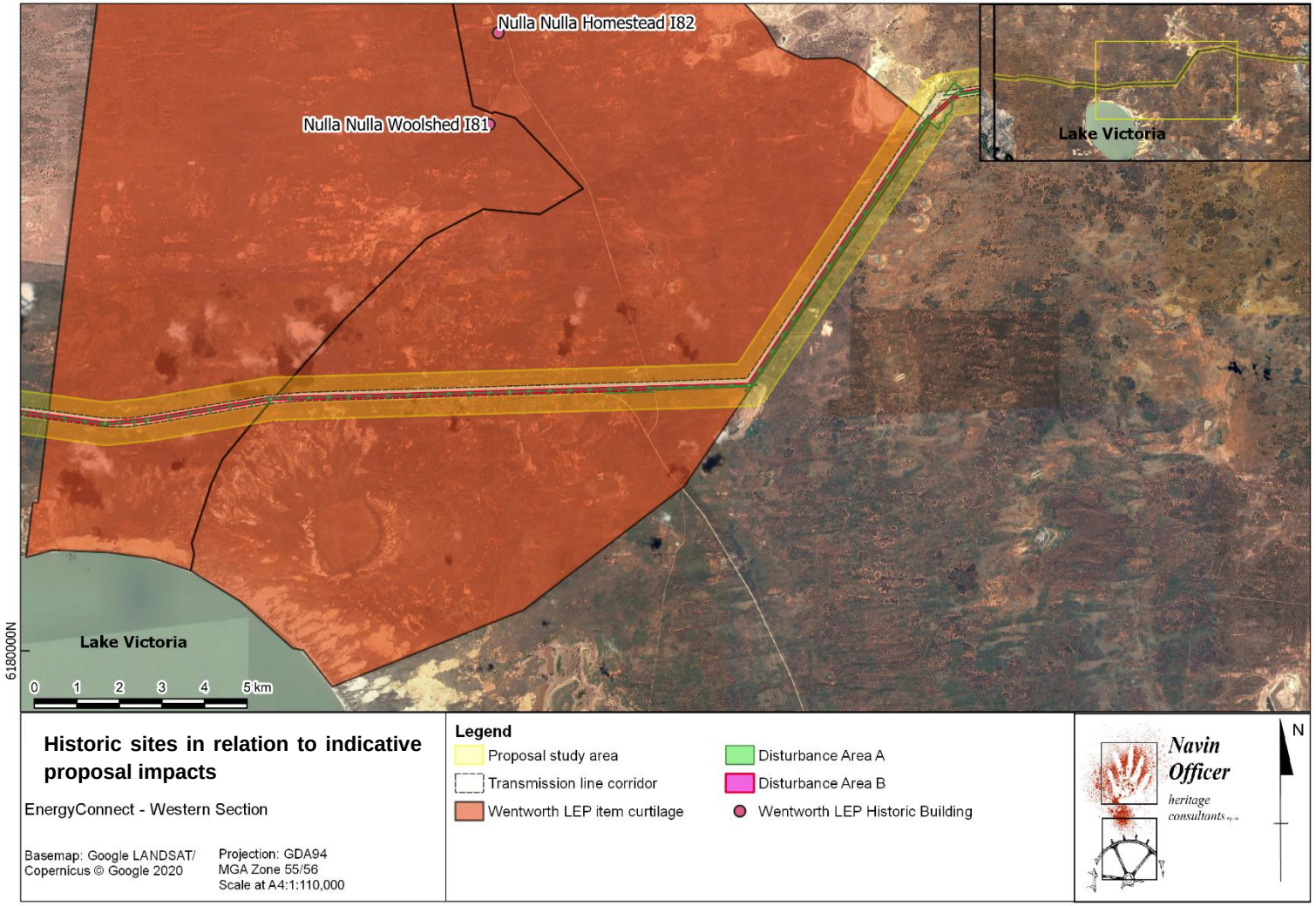


Figure 10.26 Location of Nulla Nulla Homestead and Woolshed relative to indicative proposal impacts

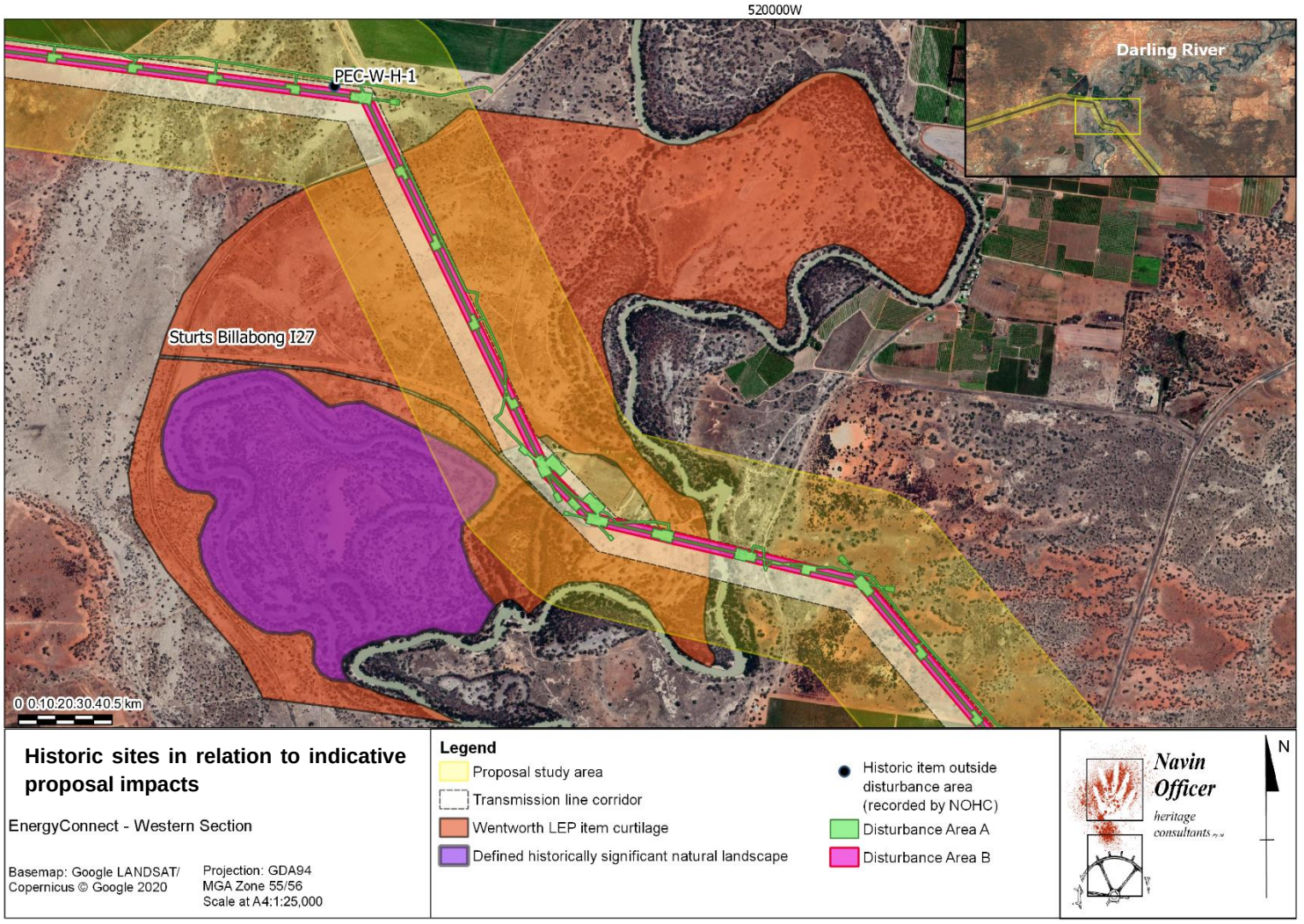


Figure 10.27 Location of Sturts Billabong relative to indicative proposal impacts

Figure removed for public display

Figure 10.28 Location of survey marker trees PEC-W-H1 and PEC-W-SE-H1 relative to indicative proposal impacts

10.7 Consideration of the principles of ecological 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)). 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.

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.

This report considers ESD principles in the following ways:

Intergenerational equity

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. Specifically, the amendment to the Buronga substation upgrade and expansion site footprint has resulted in the avoidance of PEC-W-PAD27, which would have been impacted by the proposal as exhibited. In addition, a change in the vegetation clearing methodology should also result in the reduction to direct impacts to sites.

Where impacts are proposed 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. The objects salvaged would be returned to country according to the return to country protocols outlined in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*, to ensure that the objects themselves will be available for future generations to potentially access.

Where impacts are proposed for non-Aboriginal sites of local significance, salvage of moveable heritage, archival recording of immovable heritage, and/or excavation of sites with good subsurface potential would provide the opportunity to allow the recovery and analysis of historic objects that would potentially be subject to harm. Historic archaeological assemblages and objects may then be housed or displayed by local museums or historical societies, ensuring that such items will be available for future generations to potentially access.

Precautionary principle

The precautionary principle is relevant to the consideration of potential impacts to Aboriginal cultural heritage where:

- the proposal 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 implemented to prevent or reduce damage to the objects/place.

The proposed salvage of surface artefacts and subsurface deposits (Aboriginal and non-Aboriginal sites), as well as archival recording (historic sites), 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 and the subsequent written record created through the reporting process would create new knowledge. The knowledge generated through the reporting process acts as a measure to mitigate harm.

10.8 Cumulative impacts

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

The following comparable developments are proposed within the region:

- Copi Mineral Sands Mine
- Buronga Solar Farm
- Buronga – Gol Gol residential expansion.

The Copi Mineral Sands Mine is a proposal to develop an open cut mineral sands mine and associated infrastructure to extract and process up to 1.5 mega tonnes per annum for up to six years, transporting the heavy mineral concentrate via road for off-site processing; and progressively rehabilitating the site. The development is currently at 'prepare EIS stage' and is located about 25 kilometres north of the proposal. The preliminary environmental assessment (R. W. Corkery 2018) cited a due diligence assessment by Landskape (2015) that was focussed on drilling exploration. The report states that no archaeological material was present, nor was there a likelihood of buried archaeological material within the landscape of the development.

The Buronga Solar Farm is a proposal to develop a 400 megawatt solar farm with energy storage and associated infrastructure. The EIS for the development is currently under preparation and would be located about directly adjacent to the Buronga Substation portion of the proposal. The preliminary environmental assessment (Renew Estate 2018) suggests that an AHIMS basic search found five Aboriginal sites within the proposed development area.

Buronga and Gol Gol have been outlined as residential growth areas for communities of the Wentworth Shire, with subdivisions for approximately 500 residential housing allotments planned. There are no set timeframes for the proposed developments. The urban release area mapping from the Wentworth LEP (2011) show the allotments are located between 400 to 1,500 metres from the northern banks of the Murray River. Not taking into consideration existing impacts at these locations, from an Aboriginal heritage perspective these areas would be predicted to have moderate to high archaeological sensitivity.

As cumulative impacts apply to this proposal, the arid and semi-arid nature of the landscape traversed has not historically been subject to high levels of impact from residential, commercial, or government development. The linear nature of the proposal, as well as the large spans between power infrastructure impacts (around 500 metres) would result in impacts being spread across landforms. Impacts to PADs and many sites would be partial in most cases, rather than total, resulting in many impacted sites being partially preserved within the new transmission easement. Wherever the direct impacts do occur in the proposal study area, there are likely to be numerous similar landforms win the surrounding landscape that would be retained and preserved. Therefore, the cumulative impacts from the proposal on the Aboriginal heritage of the region are assessed as low.

There are no impacts to non-Aboriginal heritage, therefore there are no cumulative impacts to non-Aboriginal heritage from this proposal.

11 Mitigation measures

11.1 Environmental management

Environmental management for the proposal would be carried out in accordance with the environmental management approach as detailed in Chapter 23 (Environmental management) of the EIS.

This would include a heritage management sub-plan, prepared as part of the Construction Environmental Management Plan. The sub-plan would manage impacts for both Aboriginal and non-Aboriginal heritage, and would include (but is not limited to):

- appropriate heritage mitigation measures, including identification, protection and/or management of heritage constraints within or adjacent to construction areas
- procedures for carrying out salvage or excavation of heritage items/sites (as relevant) prior to works commencing that would affect the heritage item
- details of management measures to prevent and minimise impacts to heritage items/sites (including additional investigations, recordings, or measures to protect items/sites that would not be directly impacted in the vicinity of construction works)
- procedures for unexpected finds, including procedures for dealing with human remains (refer to Appendix 2 of this technical paper)
- heritage monitoring and compliance management
- induction requirements.

11.2 Aboriginal heritage

11.2.1 Mitigation measures

The mitigation measures to manage potential Aboriginal heritage impacts of the proposal during construction and operation are listed in Table 11.1). All ongoing operational activities would be managed through existing internal policies and management practices of TransGrid.

These measures have been amended since the exhibition of the EIS. New mitigation measures or additions to existing mitigation measures are shown in blue text, with deletions or changes shown with a ~~strikethrough~~ in Table 11.1. Where measures have been significantly changed, the whole of the previous measure has been struck out and the revised measure provided in underlined text for clarity (AH1-AH4 and AH12).. These changes have been made in response to submissions, and are discussed in the Submissions Report (WSP, 2021a).

Table 11.1 Mitigation measures – Aboriginal heritage

Reference	Mitigation measure	Timing	Applicable location(s)
AH1	~~The final disturbance footprint will be designed to avoid impacts to Aboriginal sites as far as practical. Avoidance of sites of moderate or higher archaeological significance will be prioritised.~~ The detailed design and construction methodology, and associated final disturbance area, will be developed to avoid impacts to features/items of	Detailed design	All locations

Reference	Mitigation measure	Timing	Applicable location(s)
	Aboriginal archaeological significance as far as practical. Avoidance and minimisation of impact to features/items and Potential Archaeological Deposits (PADs) of moderate or higher archaeological significance will be prioritised.		
AH2	~~Aboriginal stakeholder consultation will be carried out in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). Registered Aboriginal Parties (RAPs) will be active participants in all proposed mitigation measures for Aboriginal heritage, including site inspections and test excavations, with further cultural information to be gathered during consultation undertaken in association with these activities. All addendum reports to the ACHAR will be provided to RAPs for comment and input.~~ Aboriginal stakeholder consultation will be carried out in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). Engagement with Registered Aboriginal Parties (RAPs) will consist of the following: > Aboriginal heritage site surveys (AH3) – review of proposed methodologies and involvement in the survey activities in the field (for ground or vegetation disturbance outside of previously surveyed areas) > test excavation activities (AH4) – review of proposed methodologies and involvement in the test excavation activities in the field > review of the draft addendum report/s (relating to surveys (AH3), test excavations (AH4) and scar trees (AH5)), and consultation on the draft reports which will typically be in the form of a RAP meeting	Detailed design and pre-construction	All locations

Reference	Mitigation measure	Timing	Applicable location(s)
	> provision of final addendum report/s will be provided to RAPs (AH3, AH4, AH5) > involvement in establishment of Aboriginal heritage exclusion zones prior to construction commencing (AH7). Further cultural information will be gathered during consultation undertaken in association with these activities. All addendum reports to the Aboriginal Cultural Assessment Report (CHAR) will be provided to RAPs for comment, and input will be considered, and actioned wherever practicable.		
AH3	~~A survey will be carried out with Registered Aboriginal Party representatives where ground or vegetation disturbance activities are required in all locations outside of the previously surveyed 100m heritage survey area, prior to works occurring in any such areas.~~ ~~These surveys will be carried out in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (2010) and will be reported on in addendum reports to the ACHAR.~~ ~~Reports will be provided to RAPs for comment and to DPIE.~~ ~~If these sites are identified as having moderate or high scientific significance, impacts will be avoided where possible. If impact avoidance is not possible then recommendations included in the addendum reports to the ACHAR (including requirements for further investigation) will be implemented prior to any construction potentially impacting these sites.~~ An Aboriginal heritage survey will be carried out with RAPs where ground or vegetation disturbance activities are required in all locations outside of the previously surveyed heritage survey area (including water supply points), prior to works occurring in any such areas. These surveys will be carried out in accordance with the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (2010).	Detailed design and pre-construction	All locations

Reference	Mitigation measure	Timing	Applicable location(s)
	If no sites are found or if sites are found and they will not be impacted, then a letter report will be provided that gives notification of this and clearance to proceed. Where sites are located and will be impacted, a draft survey addendum report/s to the ACHAR will be prepared for each of these survey areas. The report(s) will: > detail findings of the survey activities > detail where test excavation is required in accordance with AH4 to inform detailed design > outline any additional mitigation strategies beyond those required by AH5 to AH12 > be presented to the RAPs for comment. Final reports will be provided to RAPs and to Department of Planning, Industry and Environment (Planning and Assessment) for their information prior to the commencement of construction that impacts these locations.		
AH4	~~Prior to the commencement of construction that would impact areas of moderate and high archaeological significance and/or archaeological subsurface potential (e.g. PADs), test excavation will be carried out in these areas to determine the presence or absence of subsurface archaeological deposits, where direct impacts are anticipated based on the detailed design.~~ ~~The test excavation works will be carried out in accordance with a methodology presented to RAPs. The results of the test excavation will be reported on in addendum reports to the ACHAR.~~ ~~Reports will be provided to RAPs for comment and to DPIE.~~ In developing the detailed design and construction methodology, the construction contractor will review the location of all identified PADs and will aim to avoid and/or minimise direct impacts to the identified PADs.	Detailed design and pre-construction impacts to sites/features/ PADs	PEC-W-11, PEC-W-17, PEC-W-18, PEC-W-37, PEC-W-45, PEC-W-47, PEC-W-50, PEC-W-51, PEC-W-63, PEC-W-102, PEC-G-7, PEC-PAD1 through PEC-PAD14, PEC-PAD-16 through PEC-PAD18, PEC-PAD-20 through PEC-PAD26, and PEC-PAD-28

Reference	Mitigation measure	Timing	Applicable location(s)
	Where direct impacts cannot be avoided, test excavation programs will be carried out in the parts of any PADs where direct impact is likely (including where the root-ball of trees are being removed). The purpose of the test excavations will be to determine the presence or absence and significance of subsurface archaeological deposits. Test excavations works will be carried out in accordance with a methodology that is presented to and consulted on with the RAPs. Test excavation addendum report/s to the ACHAR will be prepared for each test excavation program(s) which will: detail findings of the test excavation activities		
AH5	All scarred trees identified during archaeological survey will be assessed by a qualified arborist to determine tree age and likely cause of the scarring in order to confirm the scientific significance prior to any impact to the scarred trees. Impacts to all scarred trees (including those of cultural significance) will be avoided where possible through design or construction methodology and must only be removed for permanent infrastructure and/or to meet *Vegetation Clearance Requirements at Maximum Line Operating Conditions* (TransGrid, 2003). If any scarred tree cannot be avoided, the tree will be subject to 3D scanning, followed by salvage of the scarred trunk. The results of this assessment will be reported on in addendum reports. Reports will be provided to RAPs for comment and to ~~DPIE~~ Heritage NSW.	Detailed design and pre-construction impacts	PEC-W-57, PEC-W-67, PEC-W-80, PEC-W-85, PEC-W-86, PEC-W-88, PEC-W-90, PEC-W-91, PEC-W-99, PEC-W-104, PEC-W-105, PEC-W-106, PEC-W-107, PEC-W-108, PEC-W-109, PEC-W-110, PEC-W-111, PEC-W-112, PEC-W-113, PEC-W-115, PEC-W-118, PEC-W-121, PEC-W-122, PEC-W-127, PEC-W-128, PEC-W-130
AH6	All portions of artefact scatters that are to be directly impacted will require surface collection prior to construction commencement in those areas. Additionally, based on the outcomes of the test excavation, items or PADs will be subject to surface collection or	Detailed design and pre-construction impacts	Surface collection (artefact scatters impacted by disturbance Area A) PEC-W-6, PEC-W-7,

Reference	Mitigation measure	Timing	Applicable location(s)
	salvage prior to the commencement of construction in those areas. The activities will be documented in a surface collection report.		PEC-W-11, PEC-W-12, PEC-W-15, PEC-W-17, PEC-W-18, ~~PEC-W-27~~, PEC-W-31, PEC-W-35, PEC-W-36, PEC-W-37, PEC-W-45, PEC-W-46, PEC-W-47, PEC-W-50, PEC-W-51, PEC-W-55, PEC-W-63, PEC-W-73 PEC-W-75, PEC-W-78, PEC-W-93, PEC-W-96, PEC-W-97, PEC-W-101, PEC-W-102, PEC-W-114, PEC-W-SE3, PEC-G-7, 39-6-0030
AH7	Aboriginal heritage exclusion zones will be established to protect si~~tes that would remain in-situ throughout construction~~: > known features/items of significance that have been identified to remain in-situ throughout construction (and not subject AH6) > scarred trees that are to remain in-situ. Suitable controls will be identified in the heritage management sub-plan, which may include site fencing and sediment control. Aboriginal heritage zones will be demarcated by a suitably qualified archaeologist in consultation with the RAPs prior to the commencement of construction at each location. Areas of PADs that are located within areas of vegetation clearance where ground disturbance will not occur will be managed through construction methodologies and will not be delineated as exclusion zones. These	Pre-construction	PEC-W-1, PEC-W-4, PEC-W-5, PEC-W-6, PEC-W-7, PEC-W-10, PEC-W-12, PEC-W-23, PEC-W-27, PEC-W-29, PEC-W-30, PEC-W-35, PEC-W-36, PEC-W-37, PEC-W-38, PEC-W-41, PEC-W-45, PEC-W-47, PEC-W-48, PEC-W-49, PEC-W-52, PEC-W-53, PEC-W-54, PEC-W-60, PEC-W-61, PEC-W-62, PEC-W-66, PEC-W-67,

Reference	Mitigation measure	Timing	Applicable location(s)
	methodologies will be developed in the heritage sub-plan.		PEC-W-78, PEC-W-81, PEC-W-82,PEC-W-83, PEC-W-84, PEC-W-87, PEC-W-89, PEC-W-95, PEC-W-98, PEC-W-100, PEC-W-102, PEC-W-104, PEC-W-113, PEC-W-119, PEC-W-121, PEC-W-122, PEC-W-126, PEC-W-128, PEC-W-130, 46-3-0086 Any portions of PADs that become a known site following subsurface testing.
AH8	Construction planning and management will ensure that indirect impacts that could potentially result in a loss of heritage values due to physical disturbance will not occur (including physical disturbance from surface water drainage or other mechanism).	Construction	All locations
AH9	Cultural and historic heritage awareness training will be carried out for all personnel working on the proposal prior to the personnel participating in construction activities. The training shall cover features of heritage significance within and adjacent to project locations and project protocols that must be complied with to minimise and manage potential impacts to those features.	Construction	All locations

Reference	Mitigation measure	Timing	Applicable location(s)
AH10	If at any time during construction, any items of potential Aboriginal archaeological or cultural heritage significance, or human remains are discovered, they will be managed in accordance with the Aboriginal heritage unexpected finds protocol (refer to Appendix 2 of the *Non-Aboriginal and Aboriginal Cultural Assessment Report* (Navin Officer, 2021)).	Construction	All locations
AH11	A temporary repository of any retrieved archaeological material and Aboriginal objects will be appropriately secured and under the care of the archaeological consultant. The strategy for the long-term conservation of salvaged or collected Aboriginal objects will be determined in consultation with the ~~Registered Aboriginal Parties~~ RAPs.	Construction	As relevant
AH12	~~Sites~~ Features/items of heritage significance that ~~would~~ will remain in-situ within the transmission line easement will be mapped and recorded within GIS systems managed by TransGrid ~~to ensure inadvertent impacts do not occur during maintenance activities.~~ Relevant TransGrid systems and procedures will be updated as required with protocols that will be implemented during operation to ensure that impacts to the features/items of significance do not occur during maintenance activities.	Operation	Transmission line

11.2.2 Managing residual impacts or uncertainties

The Aboriginal heritage assessment is based on the amended indicative disturbance area to develop an understanding of the magnitude of potential impacts from the proposal and retain flexibility during design refinement (refer to Chapter 8). During design refinement, the locations of recorded Aboriginal sites and PADs will be used to inform the final location of transmission line structures and construction facilities, with an aim to:

Protect, conserve and/or manage the heritage significance of Aboriginal objects and places to ensure the proposal does not diminish the cultural understanding of Aboriginal people in New South Wales

Avoid or minimise impacts on areas of archaeological potential and scientific significance, where feasible and reasonable. Where this is not possible areas of moderate or high archaeological potential and significance are prioritised for avoidance or impact minimisation.

Further archaeological investigation such as subsurface testing may be undertaken once the final impact area is determined, to confirm the potential for impacts on Aboriginal sites. Following further archaeological investigation and design refinement, the potential for direct impacts on known Aboriginal heritage sites would be confirmed.

Where known Aboriginal sites would be located close to construction or maintenance activities for the proposal, mitigation measures to protect the sites from accidental impacts would be implemented such as clear mapping of sites on construction plans and use of high visibility fencing to mark exclusion zones.

Where direct impacts to sites cannot be avoided during design refinement, mitigation measures would be implemented to minimise the potential impacts on Aboriginal heritage, such as surface salvage of artefacts or a program of salvage excavations in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010).

11.3 Non-Aboriginal heritage

11.3.1 Mitigation measures

The mitigation measures to manage potential Aboriginal heritage impacts of the proposal during the construction phase (Table 11.2) are listed below.

Table 11.2 Mitigation measures – non-Aboriginal heritage

Reference	Mitigation measure	Timing	Applicable location(s)
NAH1	A Non-Aboriginal heritage exclusion zone will be established for sites PEC-W-H-1 and PEC-W-SE-H1 (Survey Marker Trees). These sites will be fenced during construction and vegetation clearance for the proposal, to avoid inadvertent impacts during works. If impacts cannot be avoided, then the tree should be archivally recorded and research undertaken to confirm the nature and history of the item prior to impact occurring.	Detailed design and pre-construction	Transmission line.
NAH2	Should the disturbance area for the proposal extend beyond the survey area, further assessment by an archaeologist will be carried to determine the likelihood of occurrence and significance of potential archaeology and impacts from the proposal (including built heritage) prior to the commencement of construction in these areas. The results of this assessment will be reported on in addendum reports for non-Aboriginal heritage. Reports will be provided to ~~DPIE~~ Heritage NSW.	Detailed design and pre-construction	Transmission line.
NAH3	If at any time during construction, any items of potential non-Aboriginal archaeological significance, or human remains are discovered, they will be managed in accordance with the non-Aboriginal unexpected finds protocol.	Construction	All locations.

11.3.2 Residual impacts or uncertainties

Following the implementation of mitigation measures, further impacts to heritage items identified in this assessment are not anticipated.

Whilst the assessment concluded there is a low risk for impacts to archaeology, some potential for this to be encountered during construction of the proposal would remain. In these instances, the process of mitigation outlined in the mitigation above would be implemented for the proposal to prevent residual impacts occurring.

The non-Aboriginal heritage assessment is based on several assumptions to develop an understanding of potential impacts to non-Aboriginal heritage and retain flexibility during design refinement. This includes consideration of the indicative disturbance footprint described in Chapter 8. During design refinement, the final location of transmission line structures and construction facilities would be determined with the aim to avoid or minimise impacts on all areas of non-Aboriginal heritage significance, where feasible and reasonable. Where this is not possible areas of moderate or high significance will be prioritised for avoidance or impact minimisation. Where impacts are not avoided, further assessment by an archaeologist will be carried out to determine the likelihood of occurrence and significance of potential impacts from the proposal in an addendum non-Aboriginal heritage assessment.

12 References

Allen, H. 1972 Where the Crow Flies Backwards: Man and land in the Darling Basin, unpublished PhD thesis, Australian National University, Canberra.

Allen, H. 1974 'The Bagundji of the Darling Basin: Cereal gatherers in an uncertain environment', *World Archaeology*, 5(3):309-322.

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

Australia ICOMOS. 2013b. Burra Charter Practice Note – Understanding and assessing cultural significance, Australia ICOMOS (Inc), Burwood Victoria.

Balme, J. and J. Hope 1990 'Radiocarbon dates from midden sites in the lower Darling River area of western New South Wales', *Archaeology in Oceania,* 25:85–101.

Beesley, J. 1989 The Scarred Tree. Unpublished report to the Victoria Archaeological Survey, Melbourne.

Bonhomme Craib & Associates 1999 *Cultural Heritage Study for the Murray Darling Water Management Action Plan (MDWMAP)*. Report to the MDMWAP Steering Committee.

Burke, H., Roberts, A., Morrison, M., Sullivan, V. and the River Murray and Mallee Aboriginal Corporation (RMMAC) 2016 'The space of conflict: Aboriginal/ European interactions and frontier violence on the western Central Murray, South Australia, 1830–41', *Aboriginal History,* 40.

Cupper M. L. 2004 Darling Anabranch Pipeline – Cultural Heritage. Darling Anabranch pipeline and Environmental Flow EIS. Report to Earth Tech Engineering Pty Ltd for NSW Department of Infrastructure, Planning and Natural Resources.

Cupper M. L. 2008 Darling Anabranch Project Additional In-stream Infrastructure: Cultural Heritage Investigation. Unpublished report prepared for the New South Wales Department of Environment and Climate Change.

Cupper M. L. 2009. Gol Lake Groundwater Observation Bores: Aboriginal Cultural Heritage Assessment.

Department of Environment, Climate Change and Water (DECCW) 2010 *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. DECCW, Sydney.

Edmonds, V. 2002a Cultural Heritage Assessment (NSW): Proposed High Voltage Transmission Line Between South Australia and New South Wales (SNI). Unpublished report prepared for Sinclair Knight Merz, Sydney.

Edmonds, V. 2002b Supplementary Report Post EIS Re-alignment: Cultural Heritage Assessment (NSW) Proposed High Voltage Transmission Line between South Australia and New South Wales (SNI). Unpublished report prepared for Sinclair Knight Merz, Sydney.

Gilding, J. 2007 Archaeological and Cultural Heritage Assessment of Noola Conservation Reserve Infrastructure. Unpublished report prepared for New South Wales Department of Water and Energy and Lower Murray Darling CMA.

Godwin, Luke. 2011. "The Application of Assessment of Cumulative Impacts in Cultural Heritage Management: a Critique." *Australian Archaeology* 73: 88 – 91.

Hardy, B. 1976 *Lament for the Barkandji*. Rigby, Adelaide.

Hassell Planning Consultants Pty Ltd 1989 Wentworth Shire Heritage study.

Hope, J. H. 1981 'Prehistoric research in the lower Darling Basin', in J. Hope (ed.), *Darling Surveys. I: Occasional Papers in Prehistory No. 3*, Australian National University, Canberra.

Hope, J. H., Gottschutzke, T. 1998 The Cultural Heritage of Lake Victoria, Background Paper No. 7. A Report to the Murray Darling Basin Commission as part of the Lake Victoria EIS.

IRIS Visual Planning + Design (2020) EnergyConnect NSW Section. Landscape and Visual Impact Assessment. For WSP on behalf of TransGrid.

Jervis. J. 1948, 'The West Darling Country: Its Exploration and Development', Journal of Proceedings Vol XXXIV, Part II, Royal Australian Historical Society, Sydney.

Johnston, H. 2011 Interim Report on the Potters Lane, Gol Gol, Aboriginal burials and associated Aboriginal objects. Unpublished report prepared for DECCW.

Johnston, H. & D. Witter 1996 *Cultural Resources Database for the Murray Summary Report of Stage 111*. A Report to the Murray Darling Basin Commission.

Littleton, J. 2000 'Taphonomic effect of erosion on deliberately buried bodies', *Journal of Archaeological Science,* 27(1):5 18.

Long, A. 2005 *Aboriginal Scarred Trees in New South Wales: A Field Manual*. Department of Environment and Conservation (NSW).

Marshall, I. H & Board of Surveyors of New South Wales (2004). *Marking the Landscape: A Short History of Survey Marking in New South Wales* (2nd ed). Land Property Information, Bathurst.

McIntyre, M. I. 1981 'An archaeological survey of the Mildura-Broken Hill electricity line corridor', in J. Hope (ed.), *Darling Surveys. I: Occasional Papers in Prehistory No. 3*, Australian National University, Canberra.

Navin, K. 1992 Preliminary Archaeological Investigation of Proposed Expansion to Landfill Facility at Gregadoo, Wagga Wagga, NSW. Report to the GHD Group.

Navin Officer Heritage Consultants 2020 Energy Connect Addendum Report #1 Wentworth and Buronga Construction Compounds and Camps Survey Report. A report to WSP on behalf of TransGrid.

Navin Officer Heritage Consultants 2021 Energy Connect Addendum Report #2 Supply Points Desktop Assessment Report. A report to WSP on behalf of TransGrid.

Niche 2017 Broken Hill Long Term Water Supply Pipeline, NSW Aboriginal Cultural Heritage Assessment. Unpublished draft report prepared for Department of Primary Industries and NSW Water Solutions.

National Parks and Wildlife Service (NPWS) 2003. *The Bioregions of New South Wales – Their Biodiversity, Conservation, and History*. NSW National Parks and Wildlife Service, Hurstville.

NSW Heritage Office. 2015. 'Assessing Heritage Significance'. NSW Heritage Office.

Office of Environment and Heritage (OEH) 2011. *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*. OEH, Sydney South.

Officer, K. 1994 Archaeological Survey of Proposed Extension to Boral Culcairn Quarry, NSW. Report to Boral Resources.

Renew Estate 2018 Buronga Energy Station Preliminary Environmental Assessment.

R. W. Corkery 2018 Preliminary Environmental Assessment for the Copi Mineral Sands Project. Prepared for Relentless Resources Limited.

Simmons, S. 1977 Hume Freeway – Seymour to Avenel Section; Archaeological Survey Report. Victoria Archaeological Survey, Ministry of Conservation, Melbourne.

Tindale, N. 1974 *Aboriginal tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names*. ANU Press, Canberra.

Walker, P. J. 1991 Land Systems of Western NSW. Soil Conservation Service of NSW.

Wentworth Local Environmental Plan 2011.

Appendix 1

AHIMS recordings within one kilometre of proposal centreline (sites in survey area shaded grey)

Site location data removed for public display

Site ID	Site name	Site status	Site features	Site types	Recorders		
39-6-0031	Bellevue 3	Valid	Artefact : -		Ms Vanessa Edmonds		
39-4-0166	Nulla Nulla fence line 4 (NNF4)	Not a Site	Artefact : 2		Mr John Gilding		
39-4-0167	Nulla Nulla fence line 5 (NNF5)	Partially Destroyed	Artefact : -, Hearth : -		Ms Nicole De Maria		
39-4-0168	Nulla Nulla fence line 6 (NNF6)	Partially Destroyed	Artefact : 2, Hearth : -		Ms Nicole De Maria		
39-4-0169	Nulla Nulla fence line 7 (NNF7)	Partially Destroyed	Artefact : 3		Ms Nicole De Maria		
39-4-0018	Lake Victoria North 4;	Valid	Shell : -, Artefact : -	Midden	Mr Allan Lance		
39-4-0170	Nulla Nulla fence line 8 (NNF8)	Partially Destroyed	Artefact : 4, Hearth : -		Ms Nicole De Maria		
39-5-0147	High Voltage Powerline Artefact 05	Valid	Artefact : -		Niche Environment and Heritage, Mr Samuel Richards		
39-4-0171	Nulla Nulla fence line 9 (NNF9)	Partially Destroyed	Artefact : 3, Shell : -		Ms Nicole De Maria		
39-4-0172	Nulla Nulla fence line 10 (NNF10)	Partially Destroyed	Artefact : 133, Shell : -		Ms Nicole De Maria		
39-5-0149	High Voltage Powerline Hearth 04	Valid	Hearth : -		Niche Environment and Heritage, Mr Samuel Richards		
39-4-0173	Nulla Nulla fence line 12 (NNF12)	Partially Destroyed	Artefact : 5, Shell : -		Ms Nicole De Maria		
39-5-0150	High Voltage Powerline Artefact Hearth 07	Valid	Artefact : -, Hearth : -		Niche Environment and Heritage, Mr Samuel Richards		
39-4-0174	Nulla Nulla fence line 13 (NNF13)	Partially Destroyed	Artefact : 4, Shell : -		Ms Nicole De Maria		
39-5-0151	High Voltage Powerline Artefact Hearth 01	Valid	Artefact : -, Hearth : -		Niche Environment and Heritage, Mr Samuel Richards		
39-4-0175	Nulla Nulla fence line 14 (NNF14)	Partially Destroyed	Artefact : 1		Ms Nicole De Maria		
39-4-0024	Lake Victoria North 10;	Valid	Shell : -, Artefact : -	Midden	Mr Allan Lance		
39-5-0152	High Voltage Powerline Artefact Hearth 03	Valid	Artefact : -, Hearth : -		Niche Environment and Heritage, Mr Samuel Richards		
39-5-0153	High Voltage Powerline Artefact Hearth 02	Valid	Artefact : -, Hearth : -		Niche Environment and Heritage, Mr Samuel Richards		
39-4-0220	Nulla Nulla fence line 20 (NNF20)	Partially Destroyed	Hearth : 1		Mr John Gilding, GHD Melbourne		

Site ID	Site name	Site status	Site features	Site types	Recorders		
39-4-0221	Nulla Nulla fence line 21 (NNF21)	Partially Destroyed	Hearth : 1		Mr John Gilding, GHD Melbourne		
46-3-0086	Tapio 1	Valid	Artefact : -		Ms Vanessa Edmonds		
39-4-0391	Noola Station Road 12	Destroyed	Shell : -		SA Water Corporation, SA Water Corporation, Mr Clay Smith		
39-5-0069	DA35	Valid	Artefact : 4		Dr Matt Cupper		
39-6-0025	Bellevue 17	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0026	Bellevue 18	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0027	Bellevue 19	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0028	Bellevue 20	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0029	Bellevue 21	Valid	Modified Tree (Carved or Scarred) : -		Ms Vanessa Edmonds		
39-6-0030	Bellevue 22	Valid	Artefact : -		Ms. Vanessa Edmonds		
39-4-0163	Nulla Nulla fence line 1 (NNF1)	Destroyed	Artefact : -, Shell : -		Mr John Gilding		
39-4-0164	Nulla Nulla fence line 2 (NNF2)	Partially Destroyed	Hearth : -, Artefact : 2		Mr John Gilding		
39-6-0034	Bellevue 2	Valid	Hearth : -		Ms Vanessa Edmonds		
39-4-0165	Nulla Nulla fence line 3 NNF3	Valid	Artefact : 2, Hearth : -, Shell : -		Ms Nicole De Maria		
39-4-0219	Nulla Nulla fence line 19 (NNF19)	Partially Destroyed	Shell : 1		M .John Gilding, GHD - Melbourne		
39-4-0222	Nulla Nulla fence line 22 (NNF22)	Partially Destroyed	Shell : 1		Mr John Gilding, GHD - Melbourne		
39-6-0021	Bellevue 12	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0022	Bellevue 13	Valid	Modified Tree (Carved or Scarred) : -, Artefact : -		Ms Vanessa Edmonds		
39-6-0023	Bellevue 4	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0024	Bellevue 15	Valid	Artefact : -		Ms Vanessa Edmonds		
39-4-0180	Nulla Nulla fence line 11 (NNF11)	Partially Destroyed	Artefact : -		Ms Nicole De Maria		
39-6-0035	Bellevue 16	Valid	Artefact : -		Ms Vanessa Edmonds		
39-6-0036	Bellevue 4	Valid	Hearth : -		Ms Vanessa Edmonds		

Appendix 2

Unanticipated discovery Protocols

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 will 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 OEH. 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 works 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).

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.

    a. 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

    b. 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 works are 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 project 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 project 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 project 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 works 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.

Appendix 3

Consultation log

From	Medium	Brief Description	Response/Notes
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters, Pam Handy got in contact - incorrect contact person gave correct details, resent latter with correct details	
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters	
TransGrid and NOHC	Mail/email	Stage 1a letters	
NOHC		Will be in 22 April Edition	
NOHC		Will be in 15 April Edition	
NOHC		Will be in 10 April Edition	
Department of Planning Industry and Environment	Email	Response with list of possible interested parties	
Wentworth Shire Council	Email	Response with list of possible interested parties	
TransGrid	Email	Asking for assistance to notify interested parties	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	

From	Medium	Brief Description	Response/Notes
TransGrid and NOHC	Mail/email	Invitation to register an interest in the project	
Muragadi	Email	Registration of interest	
Murra Bidgee Mullangari	Email	Registration of interest	
Merrigarn	Email	Registration of interest	
Dareton Local Aboriginal Land Council	Email	Registration of interest	Yes
Arthur Kirby	Phone	Registration of interest	
Barkandji Native Title Claim Group Aboriginal Corporation (RNTBC)		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Barkandji Native Title Claim Group Aboriginal Corporation		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Barkindji Maraura Elders Environment Team (BMEET)	Email	Registration of interest	
Riverina Murray Regional Alliance		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Ricky Handy		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Hector Hudson		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Kingsley Abdulla		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Warren Clarke		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Barkindji-Maraura Elders Council		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Ta-Ru Board of Management/Maraura Burkini Traditional Owners		Registration of interest	Registered with Sherrie Castaldini - TransGrid
Biodiversity and Conservation Department of Planning, Industry and Environment		Registration of interest	Registered with Sherrie Castaldini - TransGrid
C/- Damos Family Dream		Registration of interest	Registered with Sherrie Castaldini - TransGrid
NOHC (8/5/2020)	Mail/email	Methodology and project info	
Jesse Carroll Johnson	Email	Supports the methodology	
Ryan Johnson	Email	Supports the methodology	
Darleen Johnson	Email	Supports the methodology	
Call from Jayne Sunbird	Phone call	Has not received the methodology	I re-sent the method to her and her personal email address

From	Medium	Brief Description	Response/Notes
NOHC (2/6/2020)	Email	Revised method	
NTSCorp	Email	Only received method today asked for another 7 days	
Derek Hardman Barkandji CEO	Email	Asked about raps involvement in survey – Sherrie C replying with a call	
Kingsley Abdulla	Phone	Asked about raps involvement in field, said we would be contacting everyone in the coming weeks to finalise but had not as yet, Kingstly suggested Barkindji-Maraura Elders Council do days 8 and 9 LLC do 1-4 and T-Ru 5&6	
Derek Hardman Barkandji CEO	Phone	Agrees to methodology	Spoke to Sherrie – email saved from Sherrie
Muragadi - Jesse Carroll Johnson	Email	Supports the methodology	
Murra Bidgee Mullangari – Ryan Johnson	Email	Supports the methodology	
Derek Hardman Barkandji CEO	Email	Supports the method but is concerned about driving over some areas, said we would be doing the whole survey on foot	
Ruth Davies RMRA	Phone	Only just received the documents, have given her 1 more week to comment, no comments at this stage, provided an additional email address	
Murra Bidgee Mullangari – Ryan Johnson	Email	Enquiring into project status	
NOHC	Phone	Return voicemail message	
Alynthia Kennedy	Email	Registration of interest	Replied that she is registered but can't include in current field program
NOHC	In person	Field Survey Program 22/6-02/07/2020	
NOHC	Email/Mail	Providing draft ACHAR to all RAPs (04/09/2020)	No comments were received
Indigenous Engagement Team (Transgrid)	Phone	Engaging selected RAPs for upcoming additional areas survey	
NOHC	In person	Survey of additional areas with Rodney Lawson, Arthur Kirby, & Ricky Handy (17/11/2020)	
NOHC	Email/Mail	Provision of amended draft ACHAR to all RAPs, reflecting project design updates and additional areas survey (01/03/2021)	
Indigenous Engagement Team (Transgrid)	Phone	Attempted phone contact with all RAPs to obtain verbal feedback/comments on amended draft ACHAR (18-19/03/2021)	Detail of comments and responses are in Table 5.1
Indigenous Engagement Team (Transgrid)	Phone	Feedback from Pam Handy (Dareton LALC) regarding amended ACHAR (24/03/2021)	

Appendix 4

Aboriginal site descriptions

Appendix Removed for public display

Appendix 5

Descriptions of additional survey and site walkovers

Additional Survey at Buronga and Wentworth construction camps

This survey was undertaken on the 17 November 2020 by:

Jasmine Fenyvesi, NOHC

Ben Sybert, NOHC

Ricky Handy (Barkindji Traditional Owner)

Rodney Lawson (BMEET)

Arthur Kirby (BMEET)

Will Kroker (TransGrid)

Buronga Construction Camp Study Area

The extra portion of the Buronga construction compound and accommodation camp is located directly southwest of the Buronga Substation and about 1.3 kilometres northeast of the shores of Lake Gol Gol. The area form the low gradient basal slopes and flats within an undulating sandplain landscape context.

The ground visibility in the Buronga area was low with thick wheat crop covering 70 per cent of the study area. Higher visibility was restricted to exposures associated with vehicle tracks and exposures within the section of the study area not subject to cropping. Deposits were yellow to red brown sands, some windblown. Overall exposure of the study area was 25 per cent and visibility within those exposures was 90 per cent. The main ground disturbances are associated with track construction, vehicle movements, and cropping impacts.

Given the distance from permanent water, landscape context, and previous ground disturbance, this area is assessed to have low potential for archaeological materials, which would likely be in a disturbed context.

Figure 12.1 Example **of Buronga** construction compound and accommodation c**amp survey area visibility**

Wentworth construction compound and accommodation camp Study Area

Wentworth construction compound and accommodation camp is located directly north of Remark road about 17 kilometres west of Wentworth. The area is located about 650 metres north of the Murray River and 3km west of the Greater Darling Anabranch. The area is flat alluvial floodplain.

The ground visibility in the Wentworth construction compound and accommodation camp area was medium to high with vegetation limited to sparse low bluebush and other patchy vegetation covering most sections of the study area. Soils were red brown and grey brown sandy silt. Higher visibility was noted within exposures associated with erosion scald. Overall exposure of the study area was 50 per cent and visibility within those exposures was 90 per cent. Disturbance in the area is associated with road construction, patchy sheet erosion, and goats and sheep.

Given the good visibility, distance from the main banks of the Murray and Anabranch, and landform. The area assessed to have low surface and subsurface potential for archaeological material.

Figure 12.2 Example **of** Wentworth construction compound and accommodation camp **survey area visibility**

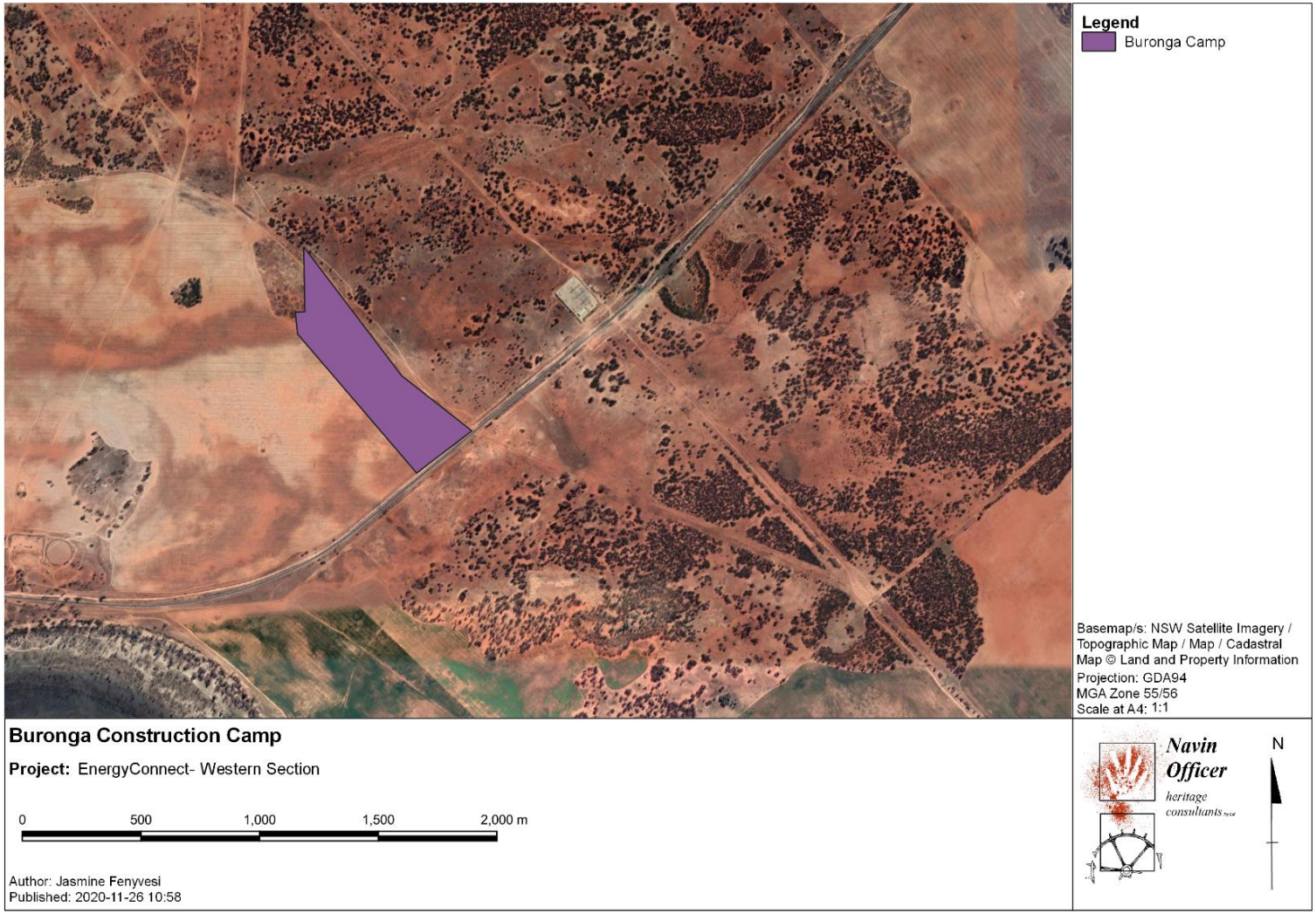


Figure 12.3 Survey area at Buronga Construction Camp

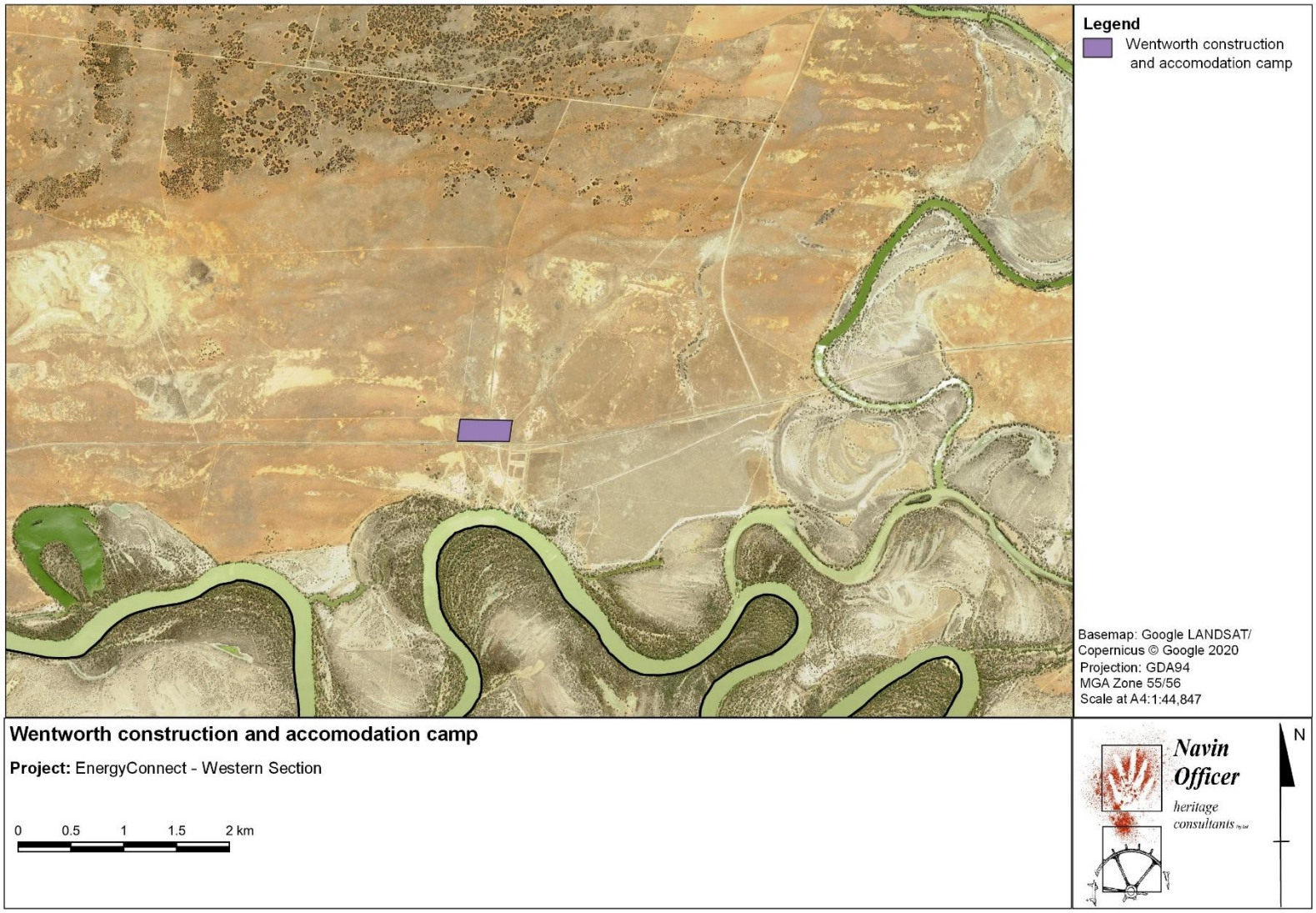


Figure 12.4 Survey area at Wentworth Construction Camp

SecureEnergy site walkover with RAPs

On 9-10 December 2020, traditional owners Arthur Kirby and Ricky Handy were accompanied by four SecureEnergy personnel and TransGrid representative Will Kroker to inspect a number of easement locations, they identified the following Aboriginal sites:

- A number of unidentifiable white fragments (interpreted as human bone by Arthur) at AHIMS site # 39-6-0021. Emu egg fragments and cow bone was also identified. The archaeological significance of this site will not be assessed in this report as it has not ground-truthed in person by an archaeologist. The site clearly has Aboriginal cultural significance.
- Three scarred trees
    - Two are new recordings (PEC-W-SE1 and PEC-W-SE2)
    - One was already recorded as PEC-W-126
- One new recoding of a stone artefact (PEC-W-SE3) located within previously identified PEC-W-PAD22

The further works identified the following historic site:

- One new recording of a Survey marker tree (PEC-W-SE-H1)

Site descriptions removed for public display

Desktop assessment of construction water supply points

This section summarises the PEC West Addendum Report #2 (NOHC 2021), which was an Aboriginal and non-Aboriginal desktop assessment of seven proposed construction water supply locations required for the construction phase of the EnergyConnect (Western Section) transmission line proposal. An estimated 616 megalitres of water would be required throughout the construction period.

The water supply points assessed were:

- Alcheringa Road, Buronga
- River Drive, Buronga
- Fletchers Lake Drive, Dareton
- Beverly Street, Wentworth
- Milpara Road (and Silver City Highway corner), Anabranch South
- Wentworth construction compound and accommodation camp, west of Wentworth
- 690 Pomona Road, Pomona.

Alcheringa Road, Buronga

This site would be located at the point of the existing Buronga re-lift pump station operated by Western Murray Irrigation pipeline. The proposed works would include installation of a new standpipe and connection to the existing Western Murray Irrigation pipeline. The area is currently cleared and adjacent to Alcheringa Road. Aerial imagery suggests it is regularly used for both parking and vehicle access for light and heavy machinery (Figure 12.6).

This water supply point is located in the Canally land system, which is defined by alluvial flats and dunes adjacent to the Darling River. Previous archaeological survey related to the proposal, suggests this is a land system of high archaeological sensitivity (also see Edmonds 2002a). Results of the AHIMS site search associated with this location supports this assessment. The nearest AHIMS sites is about 230 metres north west of the proposal water supply point. It is likely that a number of seasonal and/or semi permanent hydrological features, such as swamps or lakes, were within 500-700 metres of this location. There are no non-Aboriginal heritage listed items at or near this location.

Given the sensitivity of the landform sensitivity, proximity to former water bodies and AHIMS listed sites, and past and current land disturbance, this area is assessed, from a desktop perspective, to have moderate to high potential for archaeological items in a disturbed context.

River Drive, Buronga

The side currently includes an access road to an existing overhead fill point of River Drive, Buronga. No new infrastructure would be required to allow for access to this water supply point. This location is approximately 150 metres north of the Murray River. Aerial imagery shows that the area is cleared and used for vehicle access (Figure 12.7).

This water supply point is located in the Bulgamurra land system, which is defined by slightly undulating sandplains of Quaternary aeolian material and areas of east-west trending dunes and rises. Previous archaeological survey related to the EnergyConnect Western Section proposal, suggests this is a land system of moderate archaeological sensitivity. The closest recorded AHIMS site is 700 metres to the southwest. The most common AHIMS sites types in similar contexts along the river include scarred trees, middens, artefacts, and burials. The Old Mildura Bridge (listed on the Wentworth LEP) is located 800m south. This site will not be impacted as no works are required at this location.

Given the sensitivity of the landform sensitivity, proximity to the Murray River, proximity to AHIMS listed sites and their relative density, and past and current land disturbance, this area is assessed, from a desktop perspective, to have moderate potential for archaeological items in a disturbed context. Use of existing infrastructure is unlikely to impact the significance of archaeological items or deposits at this location.

Fletchers Lake Drive, Dareton

The site does not currently provide any existing aboveground water supply infrastructure. The proposed works would include installation of a new standpipe and connection to the existing Western Murray Irrigation pipeline. The area is currently not utilized and adjacent to Fletchers Lake Drive. Aerial imagery shows that the area is not cleared of vegetation and may have been subject to low level of previous disturbance (Figure 12.8).

This water supply point is located on the edge of the Bulgamurra land system, which is defined by slightly undulating sandplains of Quaternary aeolian material and areas of east-west trending dunes and rises. Previous archaeological survey related to the EnergyConnect Western Section proposal, suggests this is a land system of moderate archaeological sensitivity. The adjacent Roo Roo land system to the north (150 metres) is of high sensitivity and associated with the outer edges and flood margins of Fletchers Lake. The closest recorded AHIMS site is about 1.2 kilometres to the north (see Figure 3). The most common AHIMS site types around Fletchers Lake are artefacts, followed by burials, and scarred trees. There are no non-Aboriginal heritage listed items at or near this location.

Given the sensitivity of the landform sensitivity, proximity to the Fletchers Lake and the margin of Bulgamurra and Roo Roo land systems, proximity to AHIMS listed sites and their relative density, little aerial evidence of land disturbance, this area is assessed, from a desktop perspective, to have moderate potential for archaeological items and deposits.

Beverly Street, Wentworth

The site currently includes an access road to an existing overhead fill point along Beverly Street, Wentworth. No new infrastructure would be required to allow for access to this water supply point. Aerial imagery road location is sealed, in an urban context, and the water supply point is directly adjacent to the road (Figure 12.9).

This water supply point is located on the edge of the Wentworth land system, which is defined by higher-level floodplain of fine-textured Quaternary alluvium, relict channels and depressions. This land system is assessed to be of moderate to high archaeological sensitivity. The nearest AHIMS listed site is over 500 metres to the southwest (see Figure 2). The Old Wentworth Goal (State heritage register SHR#01982) is 100m north of the Beverly Street water supply point. It will not be impacted as no works are required at this location.

Given the landform sensitivity, proximity to the confluence of the Darling and Murray Rivers, distance from AHIMS listed sites and their relative density, urban context, previous ground disturbance, this area is assessed, from a desktop perspective, to have low potential for archaeological items in a disturbed context. Use of existing infrastructure is unlikely to impact the significance of archaeological items or deposits at this location.

Milpara Road (and Silver City Highway corner)

The site does not currently provide any existing aboveground water supply infrastructure. The proposed works would include the installation of a new standpipe and connection to the existing Broken Hill pipeline. The area is currently cleared and adjacent to Milpara Road on the western side of the Silver City Highway (Figure 12.10).

This water supply point is located on the Overnewton land system, which is defined by slightly undulating calcareous sandplain of Quaternary aeolian material with isolated sandy hummocks and depressions. Previous archaeological survey related to the EnergyConnect Western Section proposal, suggests this is a land system of moderate archaeological sensitivity, however the most

sensitive portions of this land system are closest to the Anabranch or relict lakes and swamp depressions. The nearest part of the Anabranch is 2.2 kilometres to the south. The nearest AHIMS sites (see Figure 2) are about 2.5 kilometres southeast and associated with the edge of the banks Anabranch. There are no non-Aboriginal heritage listed items at or near this location.

Given the landform sensitivity, distance from the Anabranch, distance from AHIMS listed sites and their relative density, previous ground disturbance associated with previous installation of the pipeline, this area is assessed, from a desktop perspective, to have low potential for archaeological items in a disturbed context.

Wentworth construction compound and accommodation camp

The site does not currently provide any existing aboveground water supply infrastructure. The proposed works would include installation of above ground pipe connection, as well as underground piping connected to camp and compound infrastructure. The pipe would be located within a corridor around six metres wide adjacent to the existing track. Aerial imagery shows that the area is cleared and a number of existing dirt vehicle tracks extend across the proposed area of impacts. This location is about 60 metres north of the Murray River (Figure 12.11).

This water supply point is located on the edge of the Haythorpe land system, which is defined by broadly undulating sandplain with some well-developed linear, east-west trending dunes, relief to 10 metres; narrow level swales, internal drainage. This land system is assessed to be of moderate archaeological sensitivity. The adjacent Wentworth and Riverland land systems are of moderate to high, and high archaeological sensitivity respectively. The nearest AHIMS site (see Figure 5) is 1.6 kilometres to the southwest. The most common site types of the nearest AHIMS site include middens, burials, and stone artefacts.

Given the sensitivity of the landform sensitivity, proximity to the Murray River, proximity to AHIMS listed sites and their relative density, and past and current land disturbance, this area is assessed, from a desktop perspective, to have low to moderate potential for archaeological items and deposits.

The Moorna Station Woolshed (listed on the Wentworth LEP) is located directly across the road from the Wentworth construction compound and accommodation camp. The works for the water supply will be within the listed curtilage of the site but will not impact the woolshed itself nor diminish its heritage significance.

690 Pomona Road, Pomona

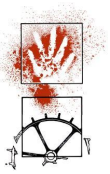
The site currently includes an access road to an existing water pump out point within the property of 690 Pomona Road, Pomona. No new infrastructure would be required to allow for access to this water supply point. Aerial imagery shows that the area is cleared and located about 40m from the Darling River (Figure 12.322).

This water supply point is located on the edge of the Wentworth land system, which is defined by higher-level floodplain of fine-textured Quaternary alluvium, relict channels and depressions. This land system is assessed to be of moderate to high archaeological sensitivity. The nearest AHIMS listed site is over one kilometre to the northeast (see Figure 2).

Given the sensitivity of the landform sensitivity, proximity to the Murray River, proximity to AHIMS listed sites and their relative density, and past and current land disturbance, this area is assessed, from a desktop perspective, to have moderate potential for archaeological items and deposits. Use of existing infrastructure is unlikely to impact the significance of archaeological items or deposits at this location.

Recommendations

It is recommended that:



1. Archaeological survey is conducted in area where ground disturbance in required for pipe infrastructure, as per mitigation measure AH3 of the Cultural Heritage Assessment Report. Namely:
    a. Alcheringa Road
    b. Fletchers Drive
    c. Milpara Road: and
    d. Wentworth construction compound and accommodation camp.

2. The unexpected finds protocols associated with Aboriginal and non-Aboriginal heritage, as well as human remains, outlined in the main Cultural Heritage Assessment Report be followed by all works associated with project.

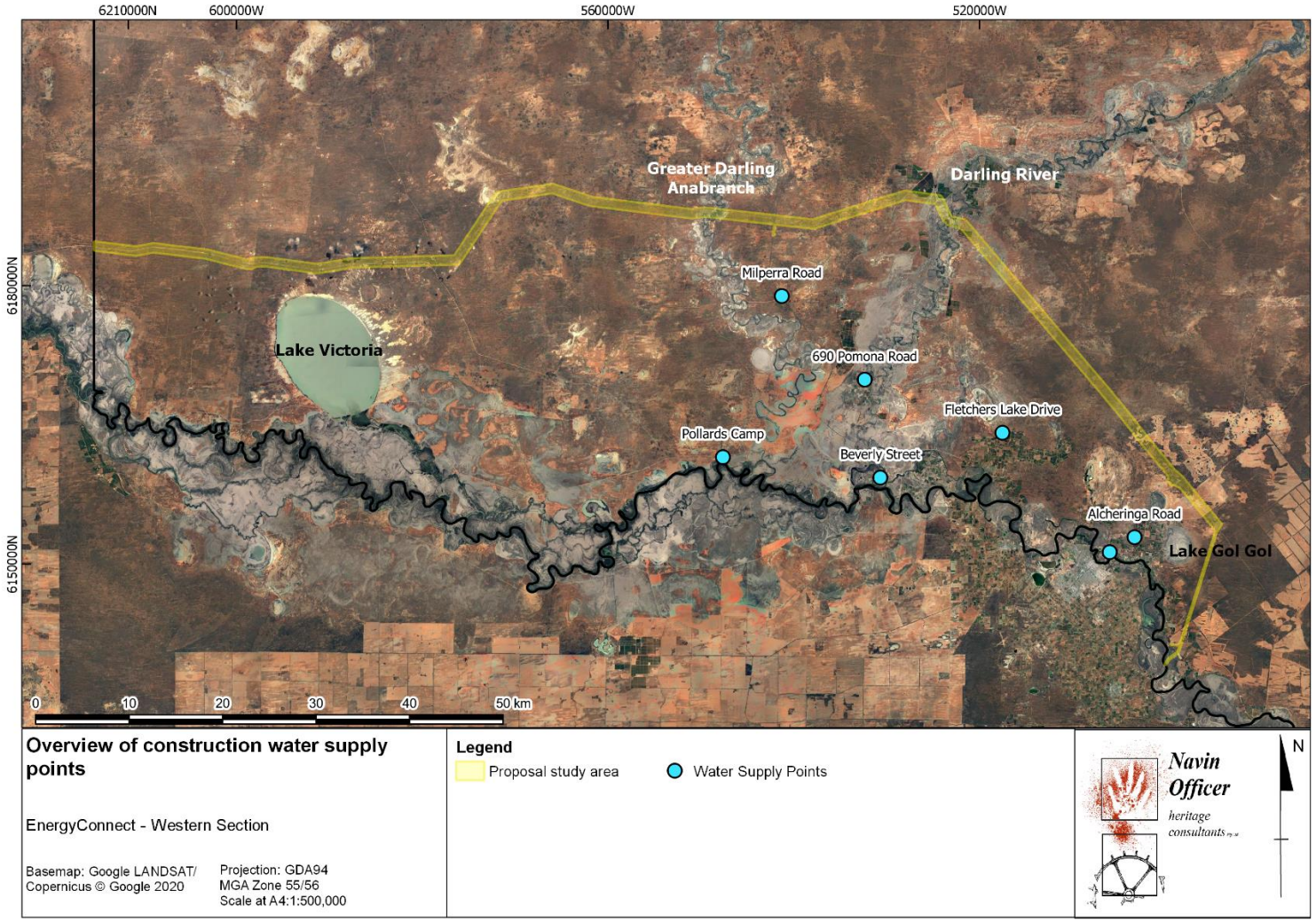


Figure 12.5 Overview of construction water supply points (aqua) relative to broader proposal study area

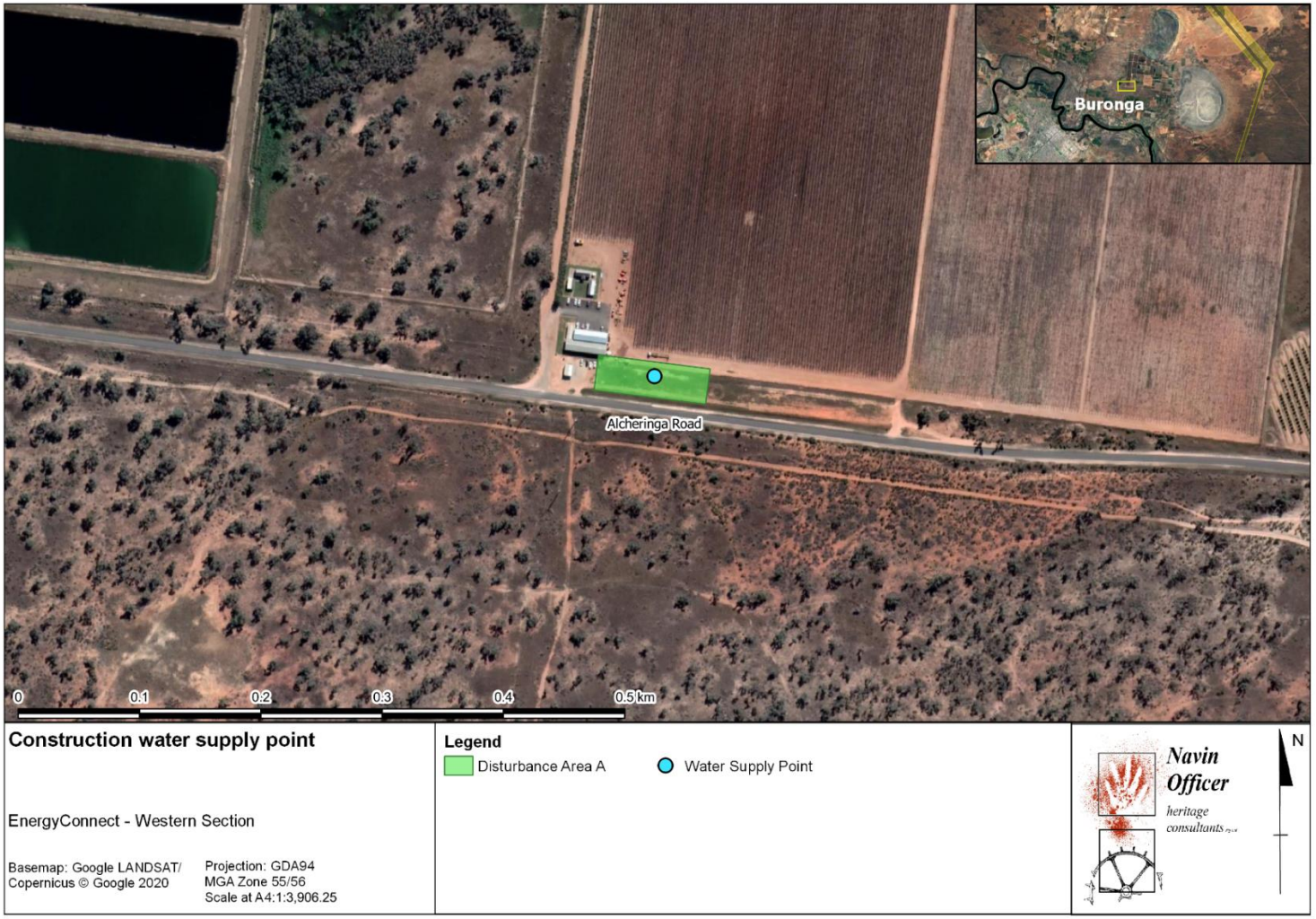


Figure 12.6 Alcheringa Road water supply location

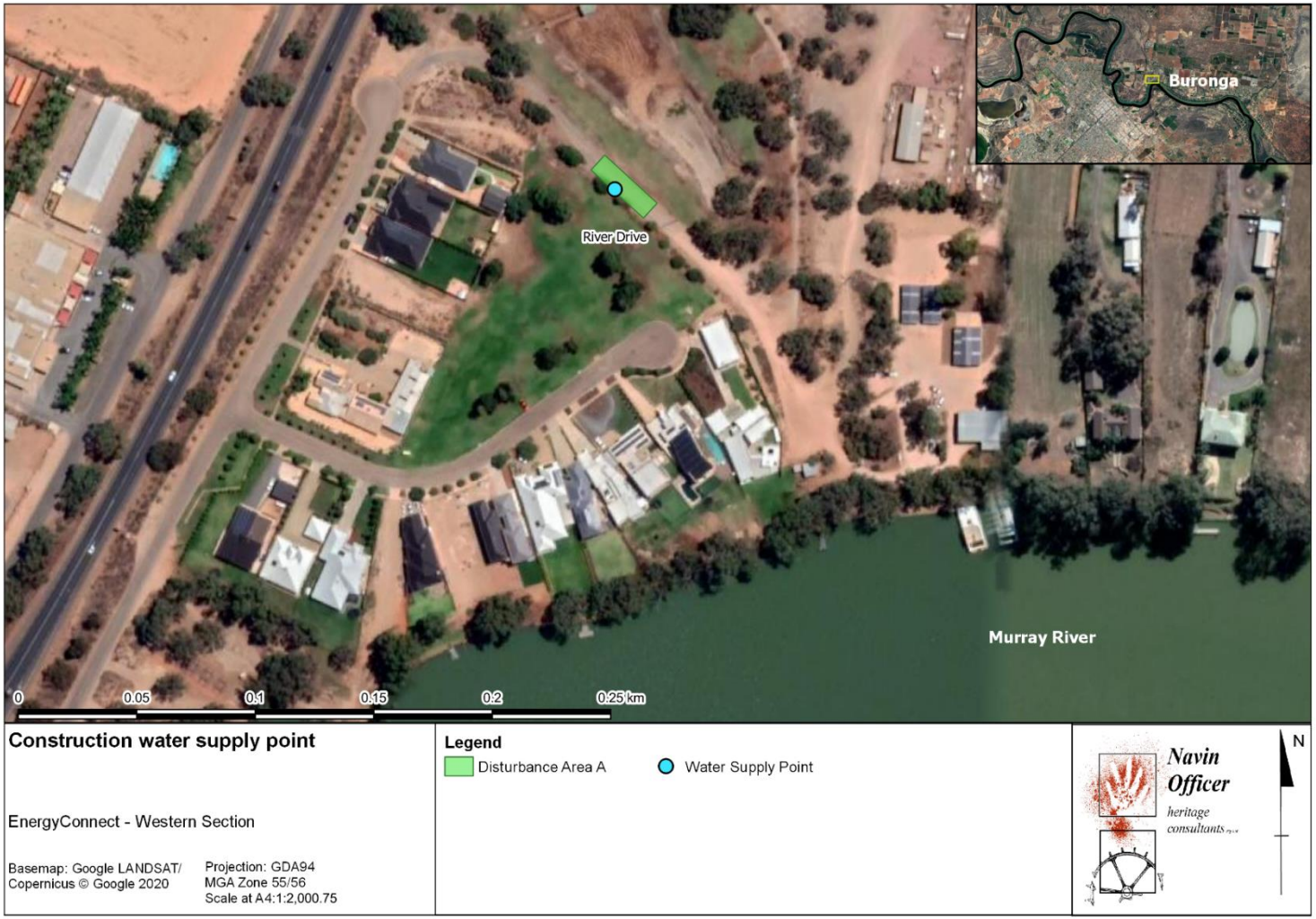


Figure 12.7 River Drive water supply location

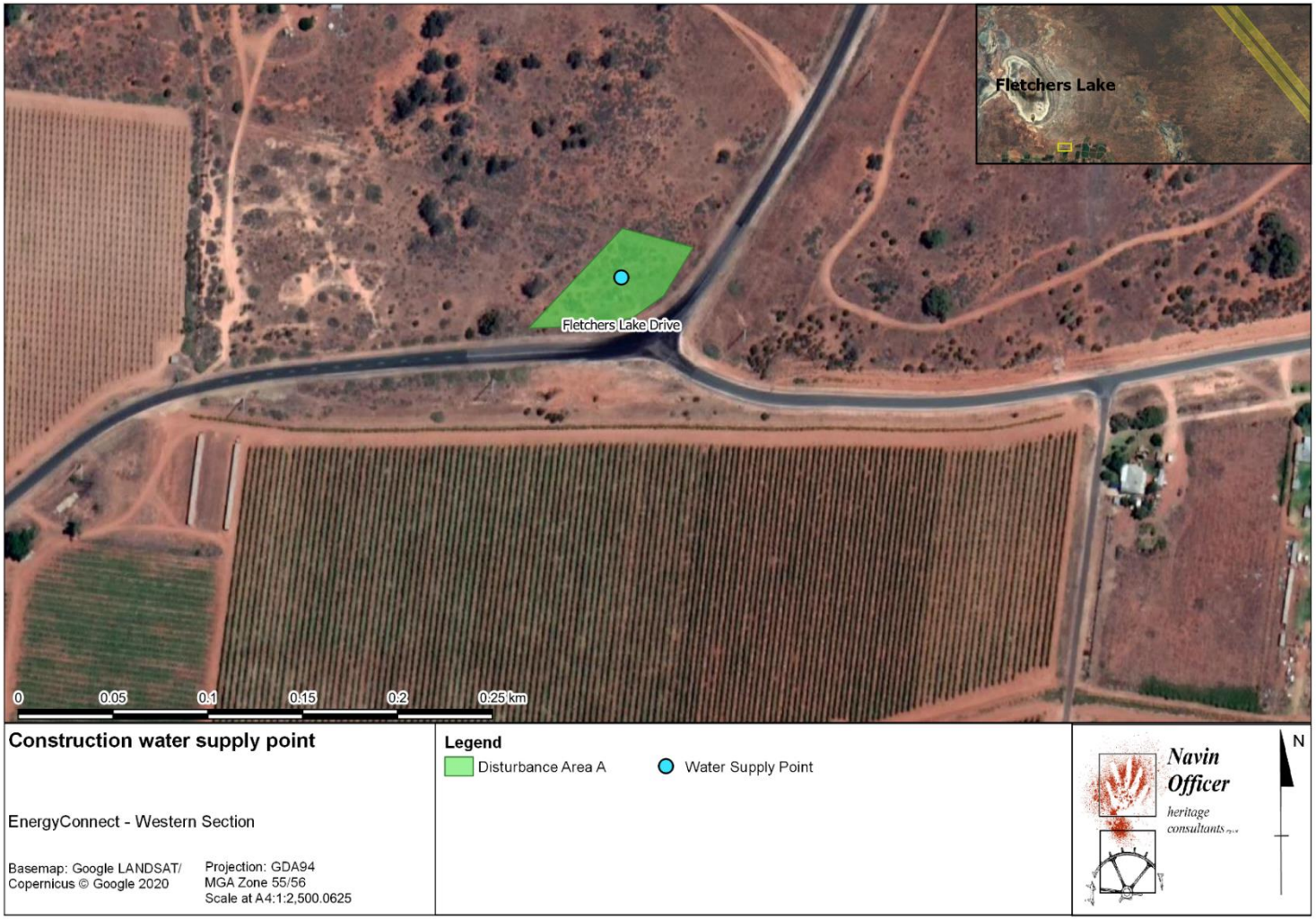


Figure 12.8 Fletchers Lake Drive water supply location

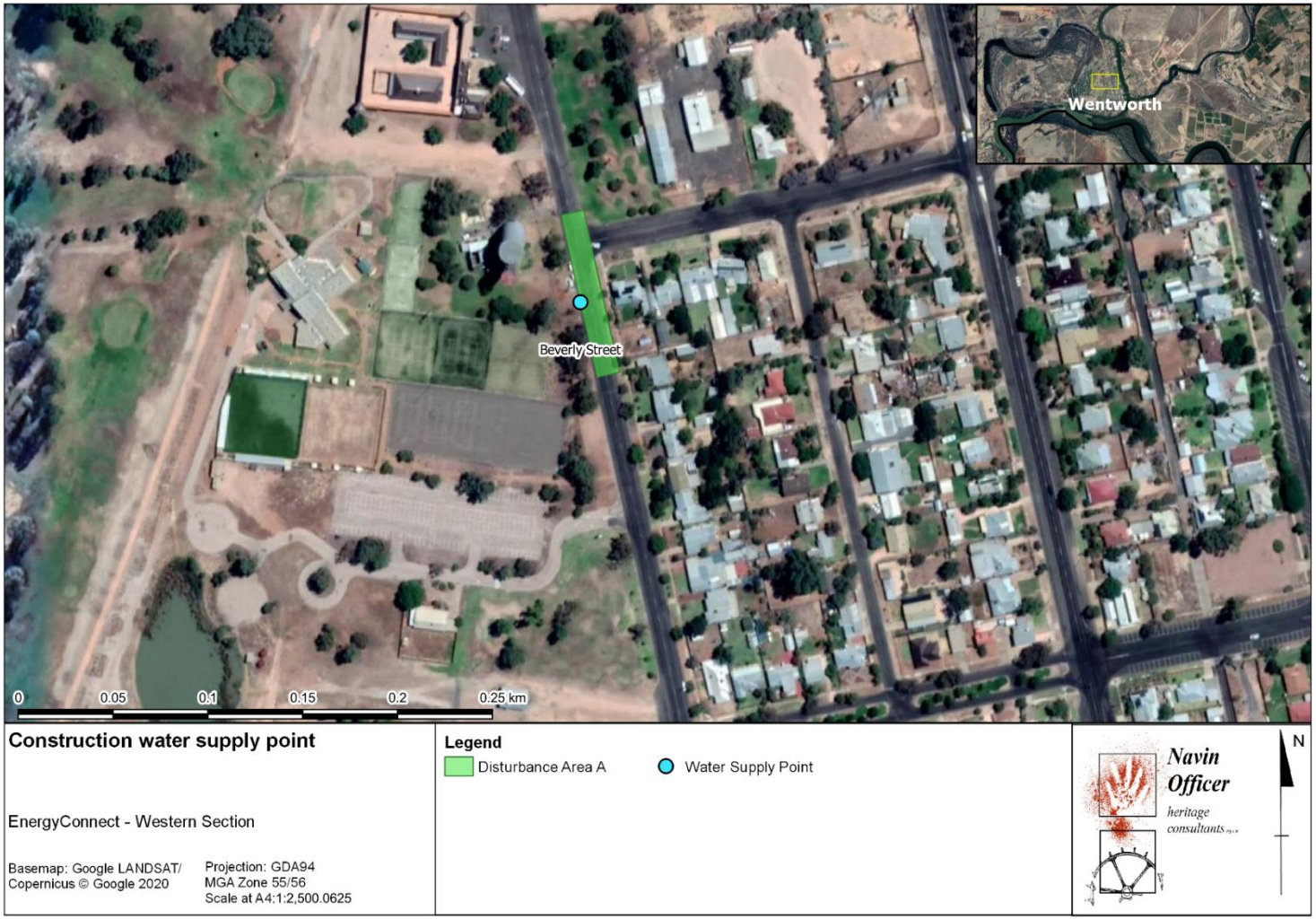


Figure 12.9 Beverly Street water supply location

Figure 12.10 Milpara Road water supply location

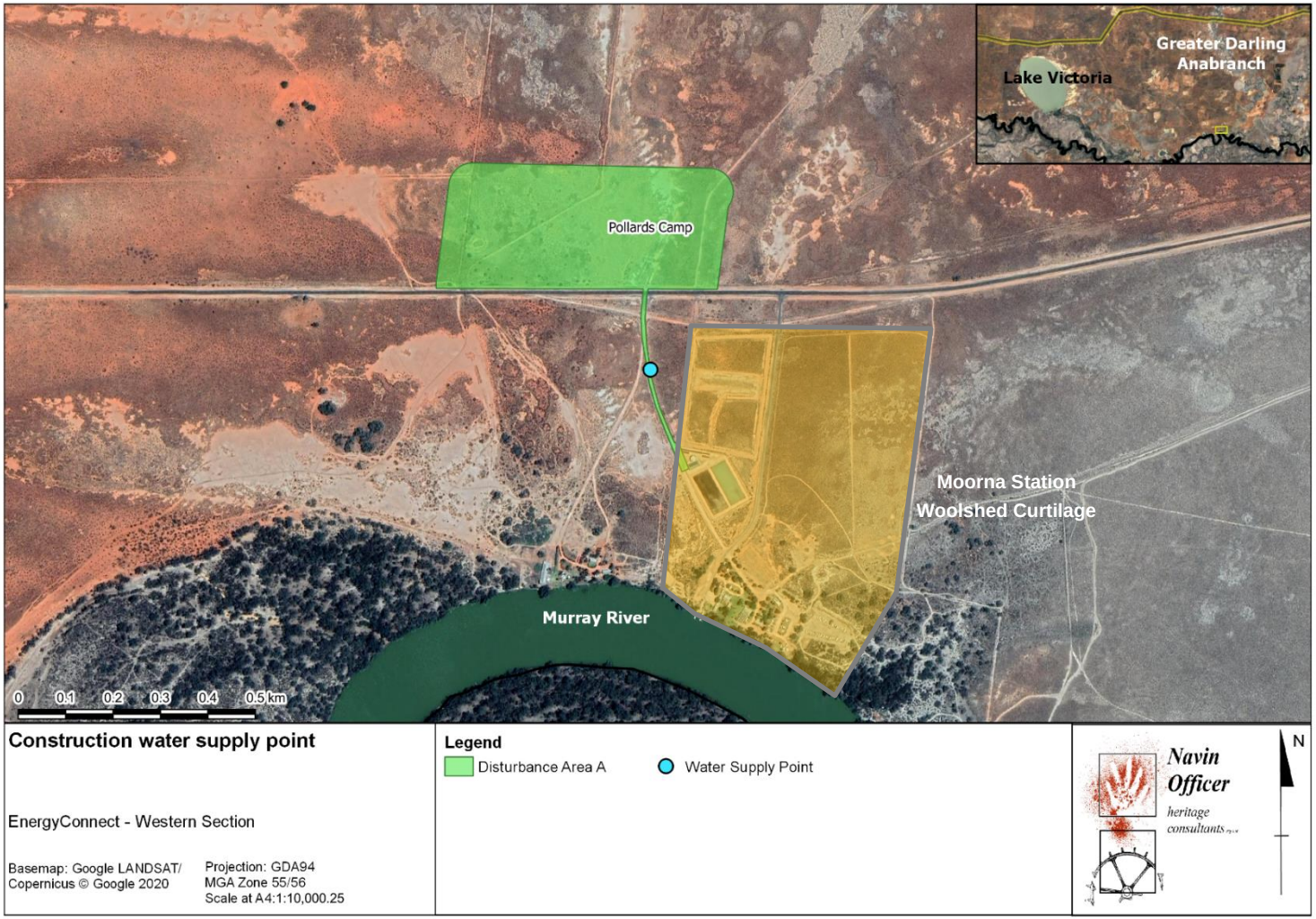


Figure 12.11 Wentworth construction compound and accommodation camp water supply location

Figure 12.12 - 690 Pomona Road water supply location