Appendix H. Historical heritage assessment report

Shoalhaven Hydro Expansion Project - Main Works Environmental Impact Statement

SSI-10033

Origin Energy Eraring Pty Ltd

November 2022

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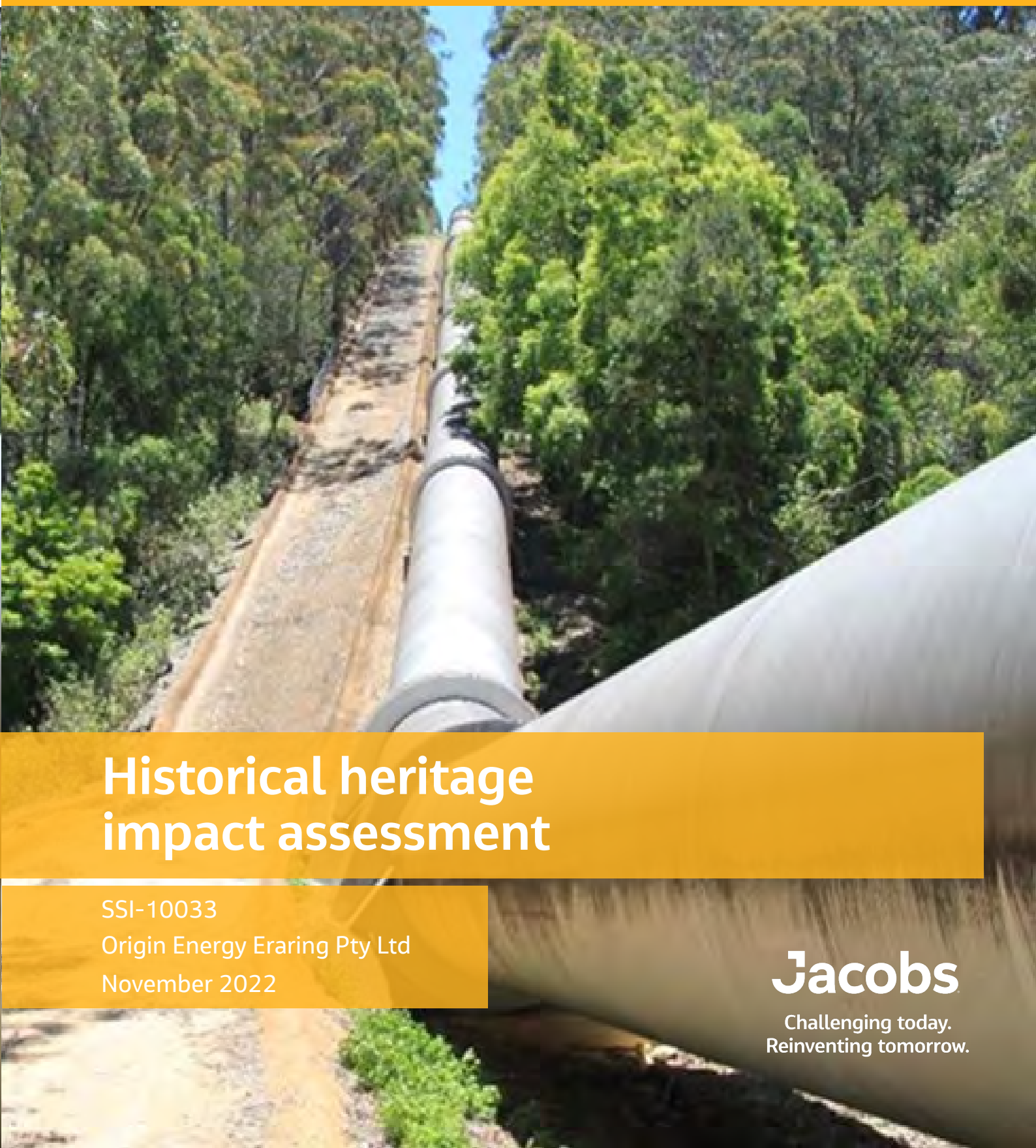
Shoalhaven Hydro Expansion Project - Main Works



Historical heritage impact assessment

SSI-10033

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Shoalhaven Hydro Expansion Project - Main Works

Historical heritage impact assessment

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Executive summary

Origin Eraring Energy Pty Ltd (Origin) proposes to develop the Shoalhaven Hydro Expansion Project, to construct and operate a new pumped hydro power station on and under the land between the Fitzroy Falls Reservoir and Lake Yarrunga (the Project) within the Wingecarribee and Shoalhaven Local Government Areas (LGAs). The Project would involve almost doubling the electricity generation capacity of the existing scheme, providing an approximate additional 235 megawatts (MW) of generation capacity.

Project overview

The Project consists of the construction and operation of scheme components including at the upper intake at the southern end of Fitzroy Falls Canal, the lower intake/outlet structure west of the Bendeela Power Station, pipelines connecting the intakes to a new underground power station, and other associated operational and safety infrastructure.

The Project would also require ancillary works which may include the carrying out of works to upgrade or construct access roads, spoil disposal sites, utilities infrastructure, construction compounds and construction power and water supply. It is proposed that certain non-oversized/over-mass (OSOM) vehicles (28-seater buses and 20 t dump trucks) would access the site from the township of Kangaroo Valley via Hampton Bridge.

Heritage context

There are no listed heritage items within the study area and would be no impacts to World, National, Commonwealth, State or locally listed heritage as a result of the construction or operation of the Project.

The results of the desktop historic research identified a potential archaeological site which intersects with the study area: the former Bendeela Public School (Portion 216).

Non-OSOM vehicles need to access the site via the township of Kangaroo Valley. This route crosses the heritage-listed Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621), which is of state-level significance.

No other heritage items or places of archaeological potential were identified within or adjacent to the Project area.

Site inspection

A targeted archaeological site inspection of the former Bendeela Public School (Portion 216) on WaterNSW land was undertaken on 17 April 2019. No remains of buildings, or remnant building materials, were noted. While the former location of the school buildings themselves were not positively identified, a relatively level area which was suitable for buildings was recorded at the centre of the property boundary. It is unknown, however, whether this is a natural feature or whether the landform had been modified to accommodate the school.

Archaeological assessment

An archaeological assessment was undertaken on the former Bendeela Public School. Historical information suggests that the school comprised a slab hut which was constructed in 1878 by the local community using local materials. This comprised the cheapest and most convenient construction method of the time. The school building was likely built directly on the ground, with no excavation taking place. It is therefore unlikely that there will be any archaeological evidence remaining of the school building and is concluded that there is low archaeological potential within the Project area.

Significance assessment

The former Bendeela Public School (Portion 216) is not listed on any heritage register. The archaeological research potential of this site is considered to be negligible and is unlikely to demonstrate evidence of the past through archaeological methods. As such, even if archaeological remains are uncovered, the significance of those remains are likely to be of low local significance.

Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621) is an historical sandstone bridge situated on Moss Vale Road, over Kangaroo River, to the south of the township of Kangaroo Valley. The historical bridge is assessed under the Heritage Significance Criteria as satisfying Criterion A (Historical significance), Criterion B (Associative significance), Criterion C (Creative/technical significance), and Criterion F (Rarity). This heritage item comprises a bridge of state-level significance.

Impact assessment

Impacts upon the former Bendeela Public School (Portion 216) site comprises the works associated with the maximum disturbance footprint (Project area). As such, any works that involve ground disturbance within this area have the potential to impact on unexpected remains associated with the former Bendeela Public School. However, this is considered unlikely as the potential archaeological assessment has concluded that there is little to no archaeological potential within the site. Detailed design and construction planning would seek to minimise the footprint within Lot 216/DP751262 with the aim of avoiding any existing archaeological potential.

As there are no planned works occurring at Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621), there would not be any direct impacts to the heritage item. However, incidental impacts to this heritage bridge may result from the use of non-OSOM vehicles on the bridge. This may comprise physical impacts to the elliptically arched crossbeams from any vehicles which may near 5.4 metres (m) in height (when fully loaded with fully inflated tyres). Additionally, fully loaded vehicles which near 42.5 tonnes (t), or driving more than one non-OSOM vehicle on the bridge at once, may cause physical impact to the deck of the bridge. The Project would be undertaken in a manner such that established road use limits on the use of Hampden Bridge are not exceeded.

As there are no listed heritage items, or places of archaeological potential, situated along the tunnel alignments or within proximity of vibration-generating Project works, indirect heritage impacts are not anticipated.

The closest listed historical heritage items to the Project is Kangaroo Valley (RNE 1589), situated approximately 230 m to the east of the study area. The Kangaroo Valley site comprises the valley in which settlement occurred in the 19th century, with villages, hamlets and farms dating to this period, including Hampden Bridge. As the Project seeks to duplicate the existing scheme, visual heritage impacts to Kangaroo Valley are not anticipated.

No cumulative impacts to heritage items are expected as a result of the Project.

Mitigation measures

The following mitigation measures detailed in Table 1 have been developed to avoid and manage potential historic heritage impacts resulting from construction and operational Project activities.

Table 1. Historic heritage environmental management measures

Reference	Impact	Mitigation measure	Timing
HH1	Unexpected historical archaeology	Should any unexpected historical heritage, including archaeological relics, be uncovered during the course of the proposed works, works should stop, and the area cordoned off. If any heritage items (either on the surface or buried archaeological items) are discovered on land in the ownership of WaterNSW. WaterNSW must be notified about the discovery. A qualified archaeologist and, if	Construction

Reference	Impact	Mitigation measure	Timing
		necessary, Heritage NSW (in accordance with section 146 of the Heritage Act) should be contacted to assess significance and advise on further requirements before work can recommence.	
HH2	Historical heritage items	Prior to construction, design to avoid or minimise incidental physical impacts where possible to historical heritage. This includes the following site-specific management measures at Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621): ▪ Ensure the existing heavy vehicle load limit of 42.5 tonne (t) is in place ▪ Ensure no more than one non-OSOM vehicles to be on the bridge at any one time ▪ Ensure all non-OSOM vehicles using the bridge have adequate height clearances ▪ Any accidental damage is reported to the site supervisor and advice sought from a qualified heritage specialist	Pre-Construction and Construction
HH3	Unexpected historical archaeology and historical heritage items	Training and awareness. All Project staff and contractors are to attend, prior to their commencement of works, training on the historic heritage environmental management measures outlined here, including unexpected historical archaeology obligations. Training can include Project induction; toolbox talks and staff inductions.	Pre-Construction and Construction

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Glossary and terms

Term	Definition
CHL	Commonwealth Heritage List
CMP	Conservation Management Plan
HMS	Heritage Management System
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
the Heritage Act	*Heritage Act 1977*
Jacobs	Jacobs Group (Australia) Pty Ltd
km	Kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
MW	Megawatts
NEM	National Energy Market
NHL	National Heritage List
NSW	New South Wales
Origin	Origin Energy Eraring Pty Ltd (a subsidiary of Origin Energy Limited)
OSOM	Oversized/over-mass
RNE	Register of the National Estate
RMS	Roads and Maritime Services
s170	Section 170 of the Heritage Act
SEARs	Secretary's Environmental Assessment Requirements
SHI	State Heritage Inventory
Shoalhaven LEP	Shoalhaven Local Environmental Plan 2014
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
t	Tonnes
Wingecarribee LEP	Wingecarribee Local Environmental Plan 2010
WHL	World Heritage List

1. Introduction

1.1 Project overview

Origin Energy Eraring Pty Ltd (Origin), proposes to develop the Shoalhaven Hydro Expansion Project, to construct and operate a new pumped hydro power station on and under the land between the Fitzroy Falls Reservoir and Lake Yarrunga (the Project). The Project would draw on Origin's existing water allocations to pump water up from Lake Yarrunga consuming energy when it is in less demand. Energy would then be generated through the return of water from Fitzroy Falls Reservoir to Lake Yarrunga when demand for energy increases.

The Project would involve almost doubling the electricity generation capacity of the existing scheme, providing an approximate additional 235 megawatts (MW). The operation of the scheme would respond to the needs of the National Energy Market (NEM) and involving up to one pumping and generation cycle per day. Each generation cycle is anticipated to involve up to 8 hours of generation and 16 hours of pumping, each of which could be divided into shorter durations to best satisfy the needs of the NEM.

The Project is located in the New South Wales (NSW) Southern Highlands, approximately 150 kilometres (km) southeast of Sydney, as shown in Figure 1-1. The indicative Project layout is shown in Figure 1-2 and consists of the construction and operation of:

- Upper scheme components (Upper Scheme) including:
  - Connection to the upper intake control structure at the southern end of the Fitzroy Falls Canal
  - A surface penstock (water transfer pipeline and associated infrastructure) from the existing Fitzroy Canal control structure to the vicinity of the existing scheme surge tank
  - A new surge tank adjacent to the existing scheme surge tank
  - A further section of surface penstock, adjacent to the existing scheme, from the new surge tank to the high pressure shaft
- Underground works (Underground Works) including:
  - Vertical shaft and headrace tunnel connecting to the southern end of Upper Scheme surface penstock to an underground power station
  - An underground power station cavern housing a transformer, reversible motor generator and pump turbine capable of supplying a nominal 235 MW of hydroelectric power
  - Associated access tunnel and multipurpose (egress, ventilation and services) tunnel with an entrance in the vicinity of the existing Kangaroo Valley Power Station
  - A tailrace tunnel, including an underground surge chamber located just downstream of the underground power station, terminating west of the existing Bendeela Power Station on Lake Yarrunga
- Lower scheme surface components (Lower Scheme) including:
  - Lower intake /outlet structure west of the Bendeela Power Station connected to the tailrace tunnel
  - Spoil emplacement facility east of Bendeela Pondage
  - High voltage network connection to existing Kangaroo Valley substation
  - Operational surface infrastructure including administration building, water treatment infrastructure and ventilation building.

The Project would also require ancillary works which may include the carrying out of works to upgrade or construct access roads, spoil disposal sites, utilities infrastructure, construction compounds and construction power and water supply.

Importantly, the Project essentially duplicates the existing scheme and as such, does not propose any new water storages or connections between waterbodies that have not already been utilised for the existing scheme. In addition, no transmission line augmentations are required to receive or distribute electricity from the existing Kangaroo Valley Power Station substation.

Plant equipment and construction material will generally be containerised and transported with standard semi-trailers or flatbed trucks. Heavy vehicles and trucks (OSOM) making these deliveries to the site are assumed to travel from Port Kembla via Wilton and would access the site from the north. Lighter (non-OSOM) vehicles, including 28-seater buses and 20 tonne (t) dump trucks, would access the site via the township of

Kangaroo Valley. The route for lighter vehicles would be via the Hampden Bridge at Kangaroo Valley, which has a weight limit of 42.5 t.

A full Project description is provided in Chapter 3 of the Environmental Impact Statement (EIS). Assumptions relevant to this assessment are provided in Section 3.1.1

1.2 Project location

The Project is to be carried out in the Wingecarribee and Shoalhaven LGAs. Access to the upper portion of the Project on the plateau, for pipeline, surge tank and vertical shaft construction would be via the Promised Land Trail. The Promised Land Trail is accessed from Moss Vale Road and traverses both WaterNSW land and the Morton National Park and was constructed as part of the existing scheme. Access to the lower portion of the Shoalhaven Hydro Expansion Project within Kangaroo Valley would be via Bendeela Road from Moss Vale Road in the vicinity of the townships of Kangaroo Valley and Barrengarry.

The Project is predominantly located within Kangaroo Valley. Part of the Project being within Barrengarry, in the Shoalhaven LGA, with access and water for the scheme drawn from and returned to the existing Fitzroy Falls reservoir and canal. The canal enters Fitzroy Falls in the Wingecarribee LGA. The major features of the area surrounding the Project include:

- The existing scheme
- Morton National Park
- Shoalhaven Special Area
- Bendeela Recreation Area
- Rural landholdings.

The Project's surface works would be largely limited to land owned by WaterNSW associated with the existing Kangaroo Valley and Bendeela Power Stations and water transfer operations. Access to the Fitzroy Falls Canal control structure, surface pipeline, surge tank and vertical shaft on the plateau during construction would be required via existing access tracks through the Morton National Park. Below ground works for the high-pressure headrace tunnel would be required beneath a 100 metres (m) wide strip of Morton National Park located below the escarpment. These works would also be required beneath private freehold land located between the surge tank and Jacks Corner Road.

The Morton and Budawang National Parks together comprise an area of over 190,000 hectares (ha) on the eastern escarpment of the Southern Tablelands. The Parks stretch from Bundanoon in the north to southeast of Braidwood and covers a diverse, rugged and scenically magnificent landscape. The Morton National Park is managed in accordance with the Morton and Budawang National Parks Plan of Management (NSW NPWS 2001). This document recognises the important landscape, geology, biodiversity, heritage and wilderness values of the Morton National Park. The document also recognises existing uses associated with water and electricity infrastructure.

Construction and operational access would be via short sections of existing access tracks established as part of the construction of the existing scheme. It would also involve the establishment of a tunnel deep below a small section of the National Park. No ongoing surface impacts to the National Park are anticipated as a result of the Project.

The main Project features are located in close proximity to the existing scheme and generally in areas of prior disturbance. Despite this prior disturbance history, the Project is located in an area of elevated environmental sensitivity. In particular, the Project is located partly within the WaterNSW Shoalhaven Special Area catchment. The above ground pipeline, surge tank and vertical shaft is located within a narrow (80 to 300 m wide) strip of land excised from the Morton National Park associated with the existing scheme.

Legend

- Points of interest
- Indicative Project footprint
- Project location
- NPWS Reserve
- State Forest

0 5 10 km

1:300,000 at A4

GDA2020 MGA Zone 56

Data sources

Jacobs 2022
Department of Planning and Environment 2022
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Figure 1-1 Shoalhaven Hydro Expansion Project Location

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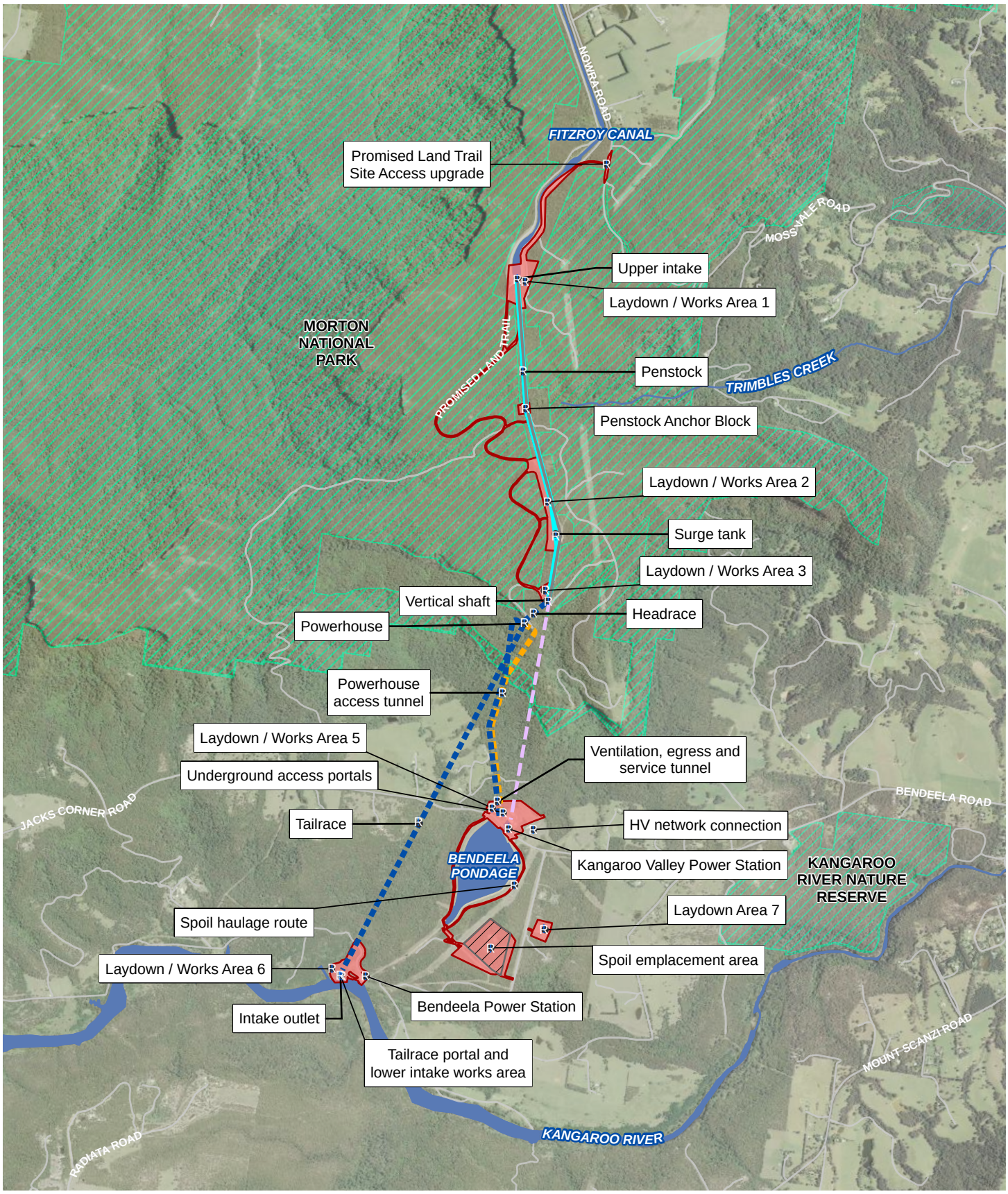


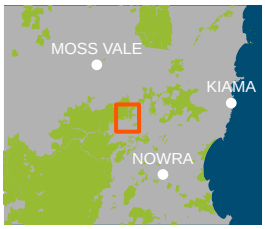
Legend

- Points of interest
- Existing KV tunnel alignment
- Existing scheme pipeline
- Indicative above ground pipeline
- Indicative tunnel alignment
- Indicative access tunnel
- Project area
- Spoil site
- Waterway
- Road
- NPWS Reserve
- Waterbody

0 1 2 km

1:40,000 at A4

GDA2020 MGA Zone 56



Data sources

Jacobs 2022
Department of Planning and Environment 2022
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Figure 1-2 Indicative Project layout

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Created by : NT | QA by : CC

1.3 Secretary's Environmental Assessment Requirements

This assessment forms part of the EIS for the Project, which is being prepared under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The heritage assessment addresses the Secretary's Environmental Assessment Requirements (SEARs) relating to historic heritage and will assist the Minister for Planning to make a determination on whether or not to approve the Project.

Table 1-1 outlines the SEARs relevant to this assessment along with a reference to where these are addressed in the report.

Table 1-1. SEARs relevant to historic heritage

Secretary's requirement	Where addressed in this report
- **Heritage** – including assessment of the impacts to historic heritage having regard to the NSW Heritage Manual;	An assessment of the impacts to historic heritage is provided in Section 9 of this report.

1.4 Report structure

The structure and content of this report are outlined in Table 1-2.

Table 1-2. Structure and content

Chapter	Description
Chapter 1 Introduction	Outlines key elements of the Project, SEARs and the purpose of this report (this Chapter)
Chapter 2 Legislative and policy context	Provides an outline of the statutory context, including applicable legislation and planning policies
Chapter 3 Assessment methodology	Provides a description of the assessment methodology for this assessment
Chapter 4 Historical context	Provides a background historical history of the region
Chapter 5 Heritage context	Provides details of the heritage of the study area
Chapter 6 Site inspection	Provides a summary of previous site inspections of the study area
Chapter 7 Archaeological assessment	Provides an archaeological assessment of heritage places which may comprise archaeological sites
Chapter 8 Significance assessment	Provides a significance assessment of heritage places that may be impacted by the Project
Chapter 9 Impact assessment	Presents the outcomes of the impact assessment
Chapter 10 Mitigation measures	Presents the historic heritage management measures applicable for the Project
Chapter 11 Conclusion	Summarises the findings and conclusions of this report

1.5 Authorship

This report was prepared by Caroline Seawright (Project Archaeologist, Jacobs). Mapping was prepared by Hamid Karimi (Spatial Consultant, Jacobs). A technical review was undertaken by Gretta Logue (Principal Heritage Consultant, Jacobs).

2. Legislative and policy context

The following are relevant sections of commonwealth, state and local planning and heritage legislative that underpin heritage and archaeological management in NSW. Any specific questions regarding the operation of the legislation presented in following overview in relation to individual project should be directed to a qualified legal professional.

Project implications arising from commonwealth, state and local planning and heritage legislative are considered in Section 5 (Heritage Context), Section 10 (Mitigation Measures) and Section 11 (Conclusions).

2.1 Commonwealth legislation

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of legal framework for the protection and management of matters of national environmental significance (that is flora, fauna, ecological communities and heritage places).

World heritage items listed on the United Nations Educations, Scientific and Cultural Organisation (UNESCO) World Heritage List (WHL) in Australia are protected and administered by the EPBC Act.

- WHL includes heritage items of such outstanding universal value (physical or cultural) that its conservation is important for both current and future generations. Each WHL items includes a buffer zone which recognizes the value of the environment that surrounds a site – it is a space that is not of outstanding value of itself but influences and supports the value of the WHL item.

The EPBC Act established the National Heritage List (NHL) and the Commonwealth Heritage List (CHL):

- The NHL includes those places of outstanding heritage significance to the Australian nation (including places overseas) and includes natural, Aboriginal and historical places
- The CHL includes heritage places that are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. It includes natural, Aboriginal and historical heritage places which meet one or more Commonwealth heritage value.

The EPBC Act stipulates that a person or entity who has proposed an action that will, or is likely to, have a significant impact on a WHL, NHL or CHL item must refer the action to the Department of the Environment and Minister for the Environment. The Minister then determines if the action requires approval (referral) under the EPBC Act. If this is the case, an environmental assessment is required, and the Minister then approves (or declines) the action based on that assessment.

A significant impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity'. The level of significance of the action is based on the sensitivity, value and quality of the environment that is to be impact, and the duration, scale and geographic extent of the impact. If the action is to be undertaken in accordance with an approved management plan, approval is not required, and the matter does not need to be referred to the Minister.

2.1.2 Non Statutory

The Register of the National Estate (RNE) was originally established under the *Australian Heritage Commission Act 1975*. Under that Act, the Australian Heritage Commission entered more than 13,000 places of natural, Indigenous and historic heritage places throughout Australia. In 2004, responsibility for maintaining the RNE shifted to the Australian Heritage Council, under the *Australian Heritage Council Act 2003 (AHC Act)*. At the same the NHL was established under the EPBC Act (see above) and a period of transition to this new national heritage system commenced. From 2007 no additional items were added or removed from the RNE. The RNE ceased being a statutory heritage register in 2012, at which time references to the RNE were removed from commonwealth legislation. Today the RNE is a non-statutory archived list which can be viewed at the National Heritage Database.

2.2 State legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) requires that environmental impacts are considered in land-use planning, including impacts on Aboriginal and non-Aboriginal heritage. The Project has been declared critical State significant infrastructure and would require approval under Part 5 Division 5.2 of the EP&A Act. Division 5.2 requires environmental assessment to be carried out and documented in an EIS for consideration by the determining authority. This report forms part of the EIS for the Project.

2.2.2 Local Environmental Plans

Local Environmental Plans (LEPs) guide planning decisions for LGAs through zoning and development controls. Zoning is based on the features of the area, including existing infrastructure, residential or commercial buildings and environmental characteristics. LEPs include a list of items of recorded local heritage significance within the LGA. The upper portion of the Project is located within the Wingecarribee Shire LGA and the lower portion is located within the Shoalhaven LGA. Therefore, any listed items of local heritage significance would be listed on the LEPs *Wingecarribee Local Environmental Plan 2010* (Wingecarribee LEP) *Shoalhaven Local Environmental Plan 2014* (Shoalhaven LEP).

2.2.3 Heritage Act (NSW) 1977

The *Heritage Act 1977* (Heritage Act) provides a number of mechanisms by which items and places of heritage significance may be protected. The Heritage Act is designed to protect both listed heritage items, such as standing structures, and potential archaeological remains or relics. Different parts of the Heritage Act deal with these different situations.

2.2.3.1 State Heritage Register

The Heritage Act established the State Heritage Register (SHR) for those items in NSW with State heritage significance. The Heritage Council of NSW, also established under the Heritage Act, makes recommendations to the responsible Minister for the listing of items on the SHR.

The SHR is a searchable online database that records all State heritage items and places and their curtilages. Associated with the SHR is the State Heritage Inventory (SHI), an online database that records some local heritage items and items owned by State statutory authorities.

When a place is listed on the SHR, the approval of the Heritage Council of NSW is required for major work, including the following:

- Demolishing a building or work
- Carrying out any development in relation to the land on which the building, work or relic is situated, the land that comprises the place, or land within the precinct
- Altering a building, work, relic or moveable object.

An application under Section 60 of the Heritage Act must be made to the Heritage Council of NSW in order to carry out such activities. Certain activities are exempt from requiring a Section 60 approval. These 'exempt' activities must have little to no impact on the item's heritage significance and works must be undertaken in accordance with the *Schedule of Standard Exemptions (*Gazetted 17 June 2022).

2.2.3.2 Archaeological relics

Part 6 Division 9 of the Heritage Act protects archaeological 'relics' from being 'exposed, moved, damaged or destroyed' by the disturbance or excavation of land. This protection extends to the situation where a person has 'reasonable cause to suspect' that archaeological remains may be affected by the disturbance or excavation of the land. It applies to all land in NSW that is not included in the SHR. A 'relic' is defined by the Heritage Act as:

> *Any deposit, object of material evidence which relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and has local or state significance.*

Section 139 of the Heritage Act requires any person who knows or has reasonable cause to suspect that their proposed works will expose or disturb a 'relic' to first obtain a Section 140 excavation permit (pursuant to section 140). A Section 140 excavation permit application is required to be submitted through the Heritage NSW Heritage Management System (HMS) with appropriate supporting information (such as this heritage assessment). If the Director of the Heritage NSW (or their delegate) is satisfied of the relevant matters relating to the proposal, the application will be approved. In certain circumstances a Section 140 excavation permit is not required when excavating land in NSW, these exceptions are outlined in the NSW Government Gazette (no 59, 18 February 2022, in force from 1 March 2022).

Section 146 of the Heritage Act requires any person who is aware or believes that they have discovered or located a relic must notify the Heritage Council of NSW providing details of the location and other information required.

2.2.3.3 Works

The Heritage Act identifies 'works' as a category separate to relics. Works are considered past evidence of public works infrastructure which may be buried and are therefore archaeological in nature. Examples of 'works' include previous road and rail infrastructure features and services like rail track, culverts, previous road/rail formation, buried retaining walls, tramlines, cisterns and conduits etc. As 'works' are not considered 'relics' they are not subject to the physical protections under the Heritage Act. Exposure of a 'work' does not trigger Section 146 notification obligations to the Heritage Council of NSW. The implementation of a comprehensive unexpected finds protocol would satisfy heritage best practice in the unexpected discovery of a 'work'.

2.2.3.4 Section 170 Heritage and Conservation Registers

Government agencies have responsibilities under Section 170 of the Heritage Act. Section 170 requires agencies to identify, conserve and manage heritage assets owned, occupied or managed by that agency. Section 170 requires government agencies to keep a register of heritage items, which is called a Heritage and Conservation Register or more commonly, an S170 Register. Section 170 of the Heritage Act requires all statutory authorities to advise the Heritage NSW of their heritage assets for recording on the SHI.

The Heritage Act obliges government agencies to maintain their assets with due diligence in accordance with State-Owned Heritage Management Principles approved by the Minister on the advice of the Heritage Council and notified by the Minister to government instrumentalities from time to time.

3. Assessment methodology

3.1 Study area

The Project's maximum disturbance footprint (Project area) encompasses an area of 52.5 ha in the NSW Southern Highlands, approximately 150 km southeast of Sydney (see Figure 1-2).

A buffer zone of 50 m has been established as a study area to identify heritage listed items in or with proximity to the Project. This study area is shown in Figure 3-1.

Additionally, as lighter vehicles would be travelling to the site via Hampden Bridge in the township of Kangaroo Valley, this is assessed individually.

3.1.1 Assumptions

It is assumed for the purposes of this report that:

- All works would be contained within the maximum disturbance footprint except for vehicular movements and construction traffic
- The Project area may require the clearance of all vegetation, stripping of the topsoil, and levelling of the area.

3.2 Register searches

A search of the heritage databases to identify previously recorded non-Aboriginal heritage items in the study area, and the legislative obligations related to these, including the:

- NSW State Heritage Register (SHR)
- NSW State Heritage Inventory (SHI)
- Section 170 Registers (s170)
- World Heritage List (WHL)
- National Heritage List (NHL)
- Commonwealth Heritage List (CHL)
- Register of National Estate (RNE)
- Shoalhaven LEP 2014
- Wingecarribee LEP 2010
- Regional Environmental Plan.

Register searches were undertaken on 25 July 2022; the results of which are provided in Section 5.1.

3.3 Historic research

Desktop historical research was undertaken to inform a targeted site inspection. Key historical resources that were analysed included heritage studies, historical records, historical mapping, historical and modern aerial imagery, and secondary sources, including books and publications from local historical societies. The findings of the historic research are provided in Section 5.

3.4 Site inspection

A targeted site inspection was undertaken by Deborah Farina (Senior Heritage Consultant, Jacobs) with Jorja Vernon (Graduate Planner, Jacobs) on 17 April 2019. A pedestrian survey was undertaken of Lot 216/DP751262, the area identified as the site of the former Bendeela Public School as shown in Figure 3-1. This parcel of land is owned by WaterNSW. Items of interest were photographed and recorded. The survey of this site was undertaken by walking transects in a west-east direction, then north-south. General photographs were taken of the site and an iPad with the cadastral imagery was used to track the survey across the site. The results of the site inspection are provided in Section 6.

3.5 Assessment

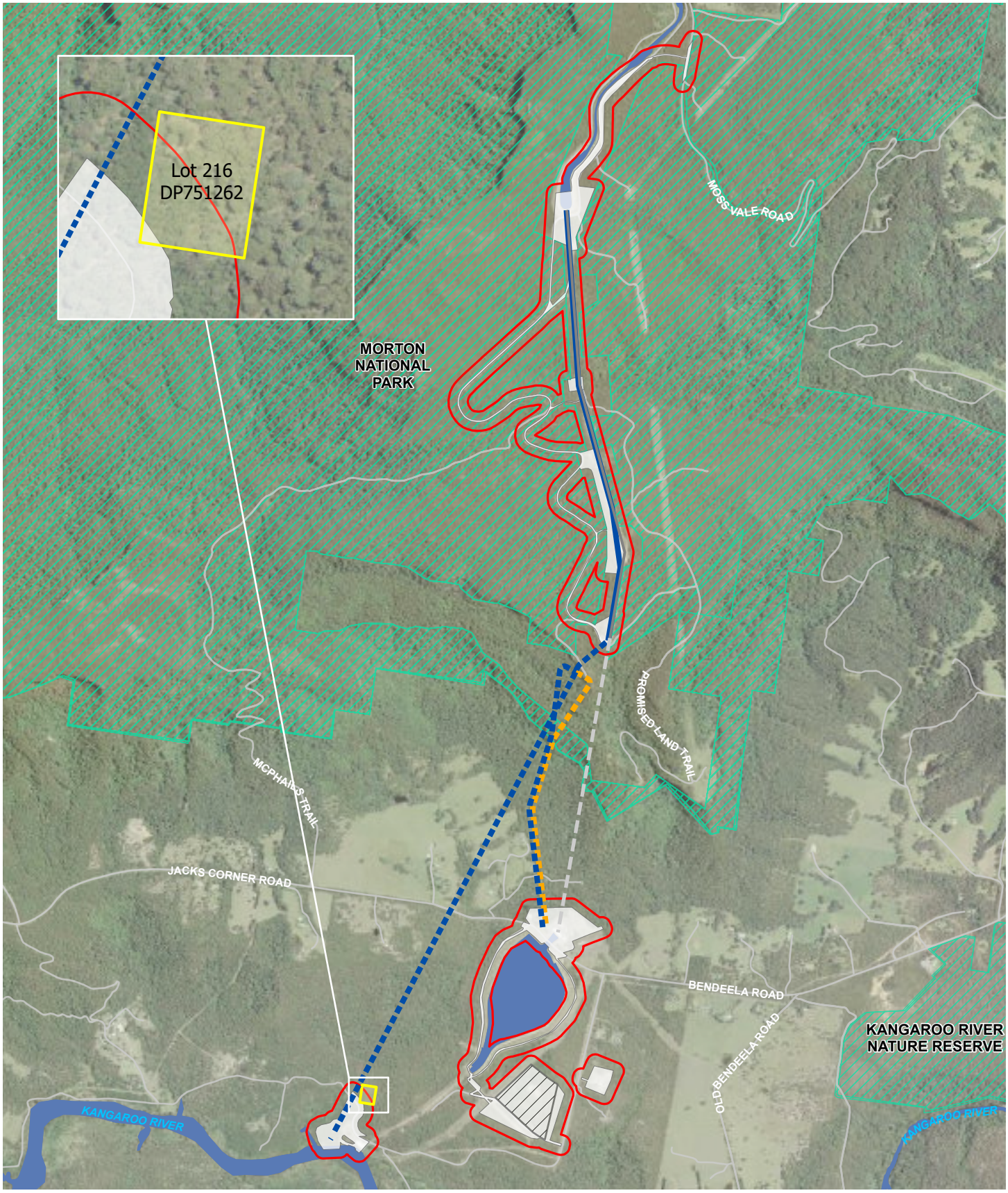
Assessment methodologies follow the NSW Heritage Manual (NSW Heritage Office 1996b) and principles laid down in the *Burra Charter*. Heritage significance assessment methodology has applied the NSW Heritage Significance Criteria (further detailed in Section 8.1), and the *Archaeological Assessment Guidelines* (NSW Heritage Office 1996a). The heritage impact assessment section has been prepared in line with the Statement of Heritage Impact guideline (NSW Heritage Office 2002).

Impacts on heritage are identified as either:

- Direct (physical) impacts, resulting in the demolition or alteration to places including their curtilage of heritage significance or significant archaeological remains
- Indirect (including visual, vibration) impacts, resulting in changes to significant heritage settings, views or view corridors.

Once the impacts on heritage significance are assessed, an overall level of impact to the heritage item can be determined. Should impacts to heritage significance be assessed as major, discussion would be provided on whether the item would continue to meet the threshold of significance necessary for heritage listing.

Specific terminology and corresponding definitions are used in this assessment to consistently identify the magnitude of the Project's direct, indirect or potentially direct impacts on heritage items or archaeological remains.



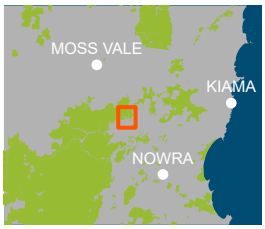
Legend

- Project area
- Spoil site
- Study area
- Site inspection area
- Existing KV tunnel alignment
- Existing scheme pipeline
- Indicative above ground pipeline
- Indicative tunnel alignment
- Indicative access tunnel
- Road
- NPWS Reserve
- Waterbody

0 1 2 km

1:30,000 at A4

GDA2020 MGA Zone 56



Data sources

Jacobs 2022
Department of Planning and Environment 2022
© Department of Customer Service 2020

Figure 3-1 Location of the study area

Date: 25/08/2022 Path: \\ausyd0vs01\GISProj\NSW_IS392600_ShoalhavenEIS\Apps\IS392600_SOHI.aprx
Created by : JB | QA by : CC

4. Historical context

4.1 Exploration of Shoalhaven

The shoals at the mouth of Shoalhaven River were noticed by non-Aboriginal explorers as early as 1797 by the naval surgeon and explorer, George Bass (Shoalhaven City Council 2003). However, the non-Aboriginal exploration of Shoalhaven first began in 1805, when surveyor James Meehan and explorer Lieutenant Bartholomew Kent first reported red cedar trees (*Toona ciliata*) along the river (Scowen n.d.; Shoalhaven City Council 2003).

Meehan's observation of cedar in area, primarily to the north of the Shoalhaven LGA around Kiama and Jamberoo, was paramount to the utilisation and subsequent colonisation of Shoalhaven. This spurred on the growth of the timber industry in the area. By 1811, independent cedar-getters occupied areas of the Shoalhaven (Scowen n.d.; Shoalhaven City Council 2003; Weatherburn 1974). Subsequently, ships such as the *Mary and Sally*, the *Speedwell* and the *Trial* brought cedar from Shoalhaven to Sydney (Kangaroo Valley Historical Society 2014; Shoalhaven City Council 2003).

The first attempts at creating a land-based route to Shoalhaven comprised that by surveyor George William Evans (from Jervis Bay to Appin) in 1812, and by explorer Charles Throsby (travelling southeast from Sutton Forest) in 1818. Throsby recorded the headwaters of Bundanoon Creek and the Kangaroo Valley area in March of that year (Kangaroo Valley Historical Society 2014; Shoalhaven City Council 2003). In 1821 Throsby camped at Bendeela, recording that 'Captain Brooks has cattle 3 miles distant' on 700 acres granted in 1817 north of Hampden Bridge (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997).

By April 1818, Governor Lachlan Macquarie had instructed Meehan to seek a practical road from Bong Bong to Jervis Bay; by 1819, Meehan's first reference to the Kangaroo Valley area was under the name, 'Kangaroo Ground'. Pastoralist Captain Richard Brooks took his cattle to the Kangaroo Valley in 1820, as he was promised 700-acres of land in 1817 by Governor Macquarie. Brooks set up his hut and stockyards on the land, approximately 1 km from Hampton Bridge. Another pastoralist, Cornelius O'Brien, was given a ticket of occupation at Kangaroo Valley in 1823, nearby. After taking up the land, his overseer was assaulted by Brooks; Brooks and O'Brien were in dispute with court case in Campbelltown in 1824. Following the death of Brooks in 1833 and his wife in 1835, Henry Osborne bid for the land and, although he never lived there, began operating a cattle station there (Griffith 2015; Kangaroo Valley Historical Society 2014; Traveller 2008).

4.1.1 Early settlement around Kangaroo Valley

In 1831, the surveyor Robert Hoddle attempted to survey the land between Bong Bong and Kiama. However, he was unable to accurately survey Kangaroo Valley due to its rugged terrain (Kangaroo Valley Historical Society 2014). Land within the Kangaroo Valley was eventually surveyed in 1836 by Philip Elliot. This included a survey of the 700-acre land grant originally granted to Brooks, along with an 800-acre parcel of land for James Osborne, cousin of Henry Osborne, to the southeast of the former Brooks property (Griffith 1978; 1988). The survey also resulted in a parcel of 980 acres being offered for sale in early 1837; although Henry Osborne was keen on extending his Brooks holding, the land was purchased by businessman Alexander Brodie Spark and named 'Glenmurray'. Two years after missing out on the Glenmurray property, Henry Osborne was granted Barrengarry, in the Parish of Illawarra, in 1839. Both Glenmurray and Barrengarry were run by overseers and convicts (Griffith 1978; 1988).

It is unlikely that either Spark or Osborne ever lived on their Kangaroo Valley properties; the year before Spark bought Glenmurray he had commissioned colonial architect, John Verge, to design a residence near the Cooks River in Sydney which he called 'Tempe'. Spark died there in 1856 (Casey and Lowe 2010, pp. 4-6). Osborne settled on his property near Dapto named Marshall Mount, where he died in 1859 (Griffith 1988, pp. 4, 7).

By 1840 (Figure 4-1), Henry Osborne had the 2560 acres of land at Barrengarry on Barrengarry Creek, along with the 700 acres of land which he purchased from Brooks, situated to the south of the larger property on Kangaroo River. Spark had 980 acres of land at Glenmurray, which was located to the east of Brooks old grant on the south side of Kangaroo River. Leslie Duguid had 650 acres of land immediately adjacent to Glenmurray in the east, which he won from Spark in 1839, after Spark did not produce the balance of

purchase for the land. To the west, Collins had 800 acres of land at Bendeela (Griffith 1988, pp. 12-13, 17-18).

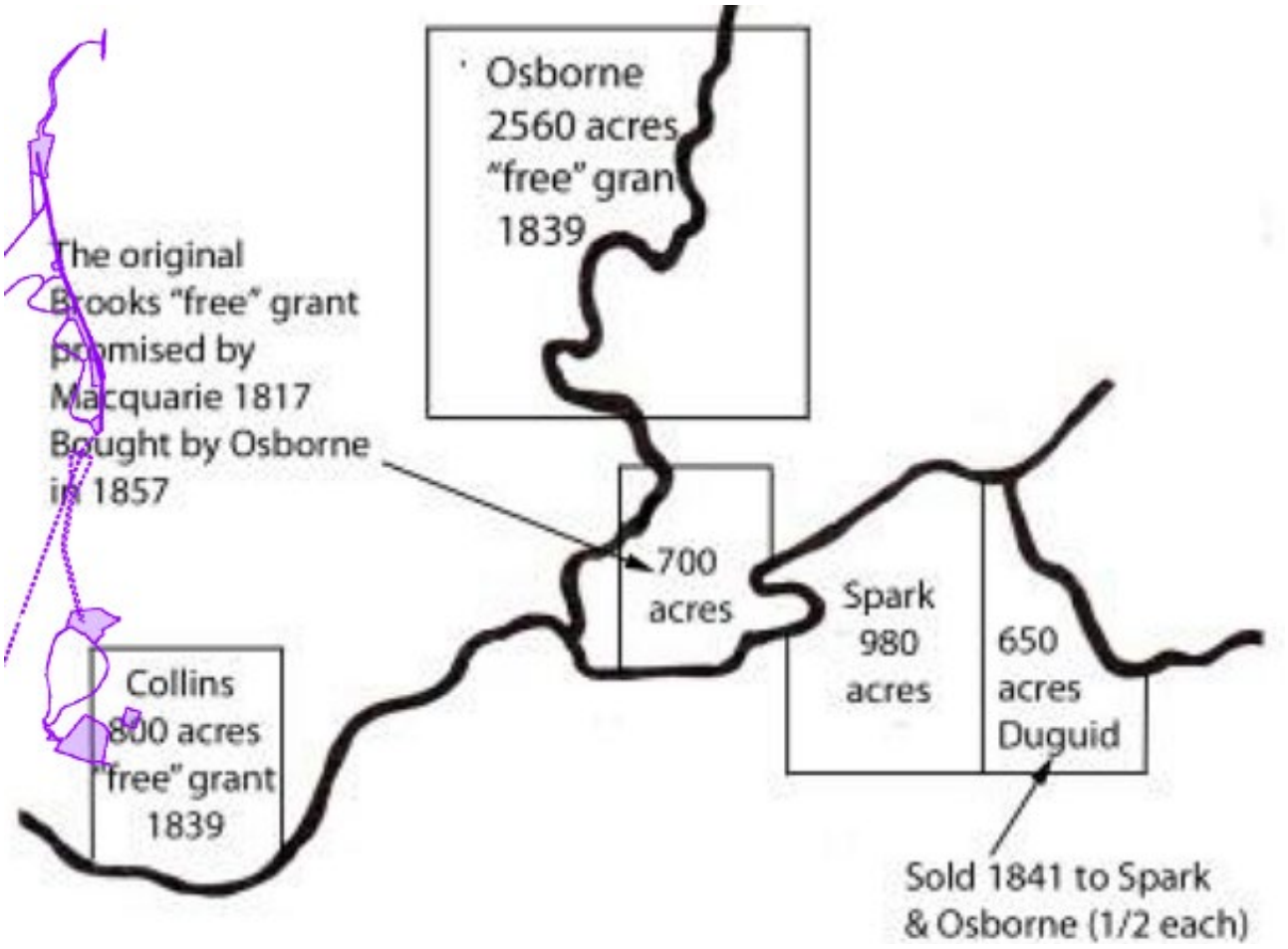


Figure 4-1. Land ownership in Kangaroo Valley on 31 December 1840, with the approximate location of the Project outlined in purple (Griffith 1988, p. 18)

The Kangaroo Valley area underwent a land speculation boom in the 1840s, entering a more stable period between 1846 and 1852, with resident free tenant families taking up in the region. Osborne used his property for dairy farming and from 1846 and under the supervision of Osborne's overseer, Charles McCaffery, Barrengarry began producing enough butter to be transported to Sydney markets. The McCaffery family introduced dairy farming and butter-making to the area (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997, p. 8; Shoalhaven City Council 2003). The advances in technology led to four dairy factories constructed in Kangaroo Valley between 1888 and 1894, being the Barrengarry Butter Factory, the Kangaroo River Dairy Co, the Upper River Butter Factory and the Kangaroo Dairy Co (Greenwell Point Bi-Centennial Sub-Committee 1988). Outside of dairying, the aforementioned O'Brien pioneered the processing of sheep using boiling down-vats at Yass, which became a common subsidiary industry for the Kangaroo Valley area in the 1840s, and has since remained a minor feature of Shoalhaven pastoralism (Shoalhaven City Council 2003, pp. 26, 31).

4.1.2 Bendeela Station and surrounds

This 800-acre grant on the northern bank of Kangaroo River, on the alluvial flats, named Bendeela (Bendiela, Bendella, Bindella), is situated to the west of the present Kangaroo Valley village, and is within the current study area (Figure 4-2). This property was first taken up by Sparks, who had put a man named Conroy in charge of the property 'in the late thirties' (McCaffrey 1922, p. 54). In 1839, Captain John Gunn Collins acquired the land for free on 31 December of that year, as it was granted so that he could breed horses for the Indian Army. However, he sold the grant a year later for £850 (Griffith 1988, p. 19). In 1843, Osborne bought the grant for £300, but sold it shortly thereafter for the same price to McKenzie and Holden in 1844 (Griffith 1988, p. 19; McCaffrey 1922, p. 54).

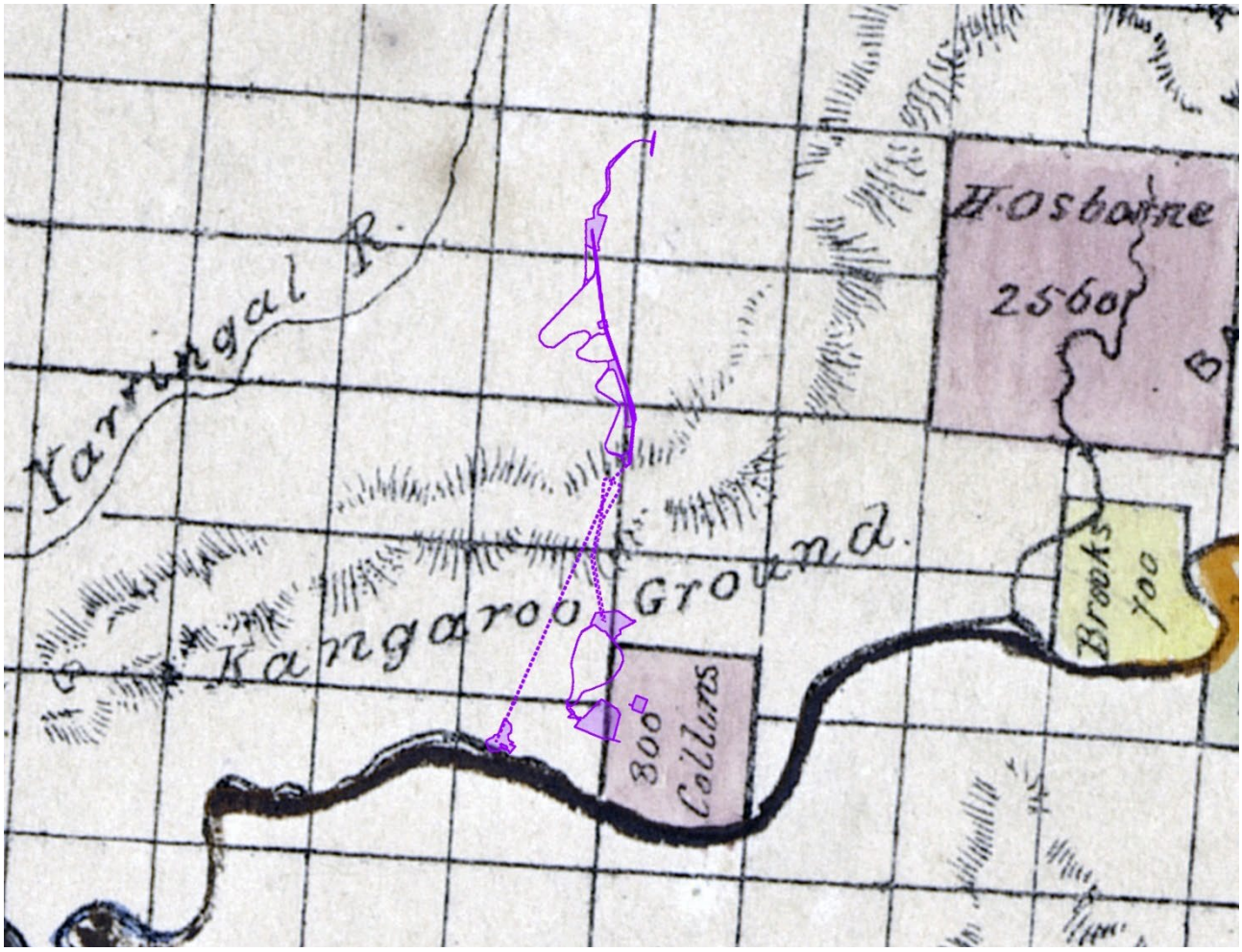


Figure 4-2. 1846 map of the County of Camden, with the approximate location of the Project outlined in purple (Baker 1846)

The property changed hands numerous times, at numerous prices, until it was purchased on 2 December 1854 by Samuel William Gray. An advertisement in *Empire* (6 March 1854, p. 4) describes the allotment as:

> ***Lot 1 – Bendella**, a splendid estate of 800 acres, situated on the Kangaroo River, Illawarra, and close to the dairy establishment of Henry Osborne, MC.*
>
> *A very large portion of this property is beautiful alluvial soil, fit for maize or other grain; there are about 100 acres cleared, and now covered with luxuriant clover. The land is divided into six paddocks, with good substantial fences.*
>
> *The IMPROVEMENTS consist of the following: – A capital newly-erected slab-house, containing four rooms, with dairy at the back, men's hut; barn, nearly finished; milking yard; stock-yard, and piggery, &c.*

While some improvements had been made to the property, Gray was the first owner of this property to begin farming the land. He stayed at Bendeela until he began a political career, becoming representative of Kiama during the third Australian Parliament in 1859 (Griffith 1988, p. 19; McCaffrey 1922, p. 54; Midgley 1989). He also leased 3,950 acres of land in the Camden District in 1860 (Parliament of New South Wales n.d.). He married Mary Bray in 1862, fathering five daughters and two sons (Hoctor 2013). Gray sat as a member for Kiama until 1863, after which he sold Bendeela and took up land at Tweed River where he grew sugar cane. He was one of the first non-Aboriginal settlers in the Tweed River district (Griffith 1988, p. 19; McCaffrey 1922, p. 54; Midgley 1989). He returned to Kiama after several years, upon hearing of his father's ill health. He settled at Omega Retreat, his family property near Kiama, in 1877 (Hoctor 2013; Midgley 1989; Parliament of New South Wales n.d.).

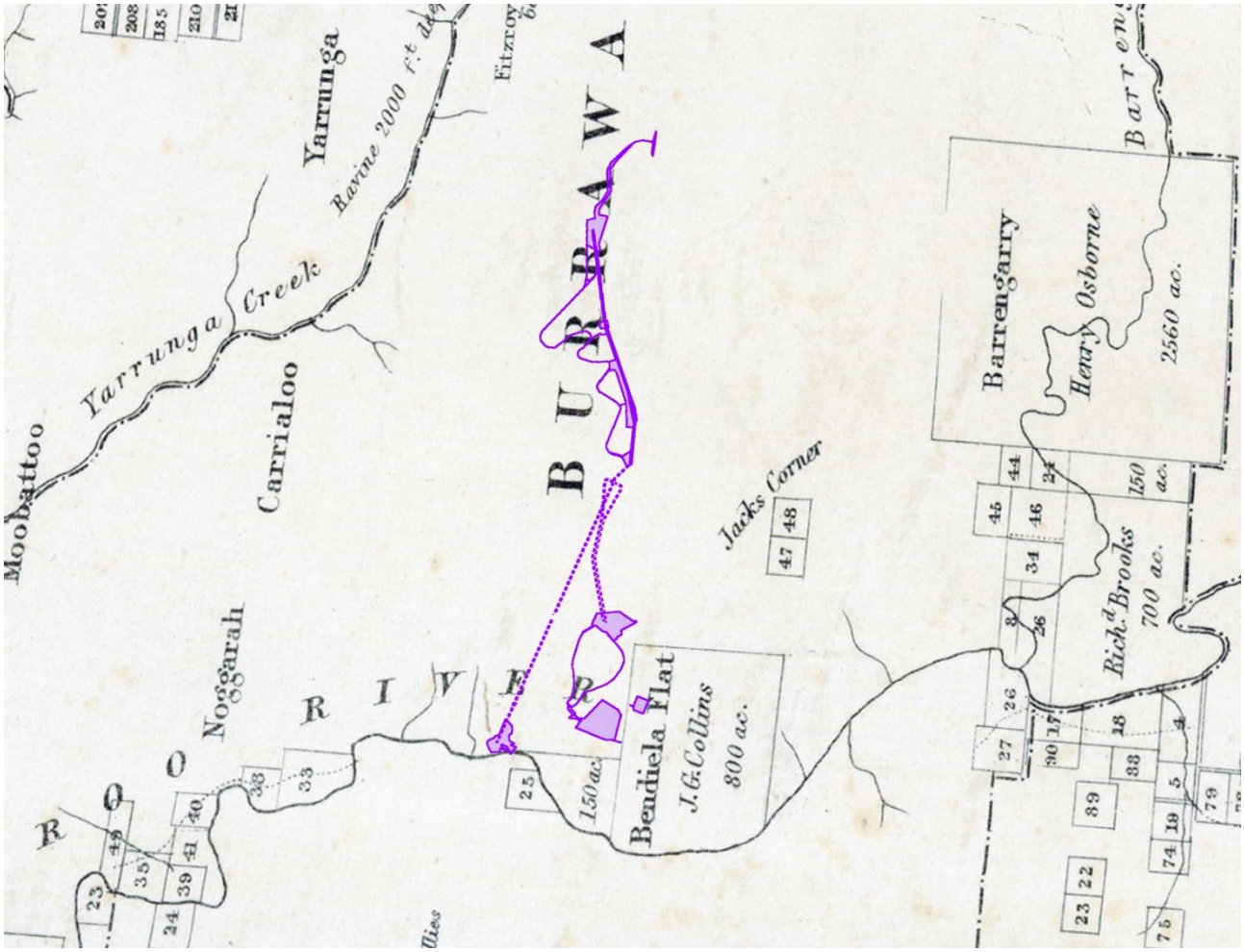


Figure 4-3. 1866 map of the County of Camden, with the approximate location of the Project outlined in purple (Braddock & Baly 1866)

John Thomas Milligan purchased Bendeela from Gray in 1863 for £7500. He ran the property as a dairy, along with his family. He converted the land into a large dairying and horse breeding business, with milk and butter being sent to Moss Vale (*The Manning River Times and Advocate for the Northern Coast Districts of New South Wales*, 22 May 1946, p. 8). By 1871, he had over 100 milk cows on the property (Carrick 2016). *Empire* (18 September 1871, p. 3) provides a traveller's report of the property in 1871:

> *…we crossed the Kangaroo River and found ourselves on Bindella station, the property of John Milligan, Esq. Bindella was formerly owned by G W Gray, Esq., and was purchased of him for £7500. It consists of good pastoral country, having a frontage of several miles to the Kangaroo River. There are, beside the comfortable house, a large number of outbuildings, sheds and yards. Over 100 cows are milked daily, and the butter and cheese here made has achieved a reputation in the market for excellence of quality.*

Milligan died on 10 September 1885 (*New South Wales Government Gazette*, 17 February 1885, p. 1222). He was followed by Thomas Rendall, who took up Bendeela in 1866. Subsequent owners included the King, Bryen and Rous families (Simpson Dawbin Associates 2000, p. 7).

Mapping dating to 1866 show the property by the name of its original owner, JG Collins, with the name of the property being 'Bendiela Flats'. An adjacent allotment in the west had been surveyed on the Kangaroo River, being 150 acres of land, immediately opposite allotment 25 on the south side of the river. Otherwise, the area remained relatively free of subdivision; two other allotments, portions 47 and 48, were surveyed north of Bendeela, under the name 'Jacks Corner' (Figure 4-3).

County of Camden mapping dating to 1895 shows the property as portion 110 of the Parish of Burrawang, 'Bendiela', with Bendiela Flat along the south of the property (Figure 4-4). By 1895, most of the land surrounding the property had been subdivided into small rural allotments.

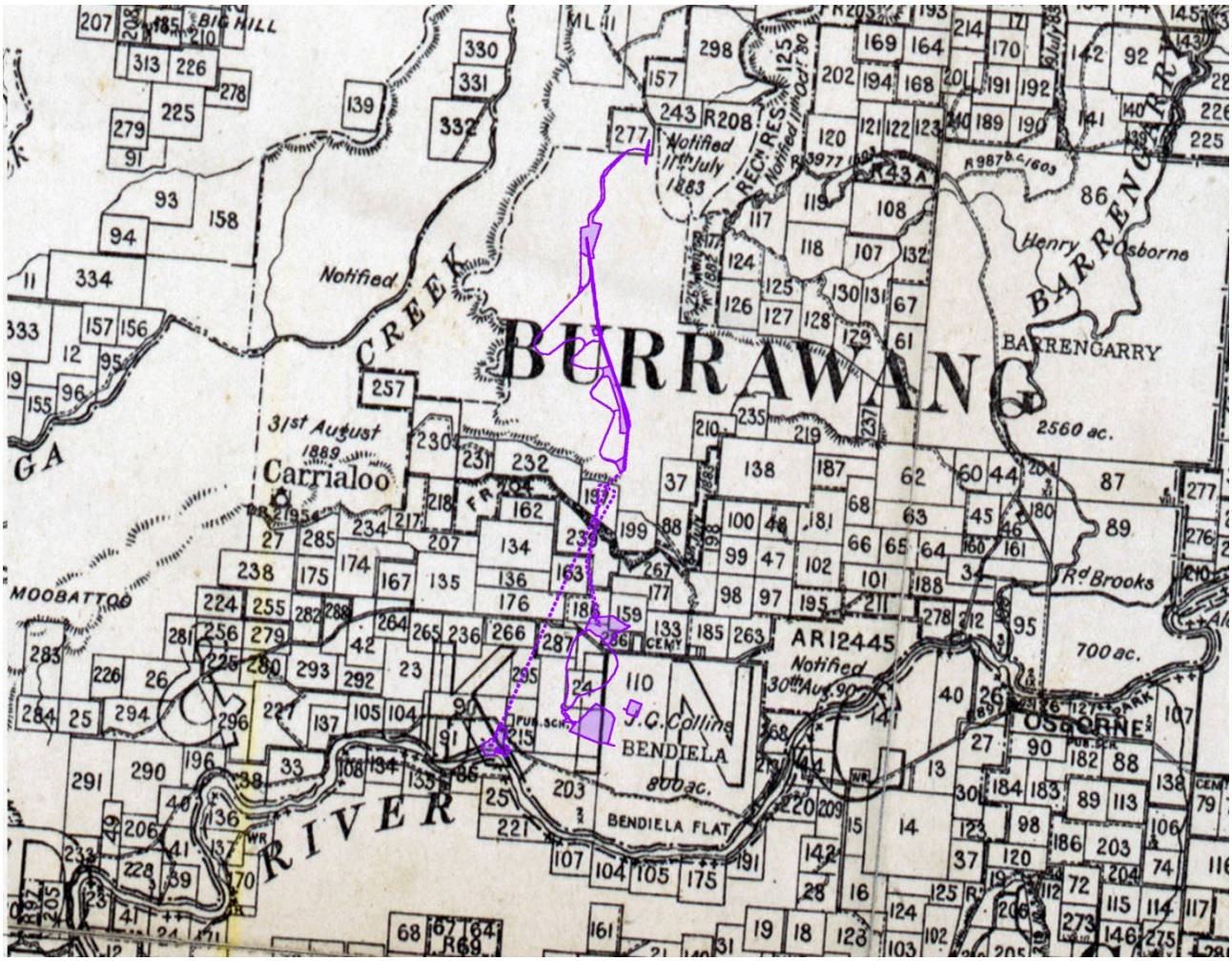


Figure 4-4. 1895 map of the County of Camden, with the approximate location of the Project outlined in purple (Department of Lands 1895)

In 1877, the *New South Wales Government Gazette* (13 March 1877, p. 1044) details that portion 216 (a small section of land within portion 215, which is situated to the west of the Bendeela grant), was dedicated as land for a public school (Figure 4-4). Land for a second school was also set up in portion 182, adjacent to the Wesleyan Church land on portion 183, opposite Bendeela in the north. Further details are found in Section 4.1.3.

Historical mapping from 1895 shows that there was also a cemetery situated between portions 133 and 286 of the Parish of Burrawang, immediately opposite the Bendeela grant property in the north (Figure 4-4). This cemetery, known as the former Barrengarry cemetery, is located to the east of the Bendeela pondage associated within the Kangaroo Valley Power Station, on the northern side of Bendeela Road opposite the Bendeela dairy property (*Gazette No. 52*, 14 May 1971, pp. 1549-1550). Further details of the cemetery are found in Section 4.1.4.

This 1895 mapping shows the other main feature within proximity to the study area comprises reserve land (FR 204), north of the cemetery. There is also a reserve at the northern end of the study area (R208), which is dated 11 July 1883 (Figure 4-4). However, the depression of the 1890s, in combination with a lack of land in the area, lead to many families leaving the region (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997).

Parish of Burrawang mapping dating to 1911 shows that the Bendeela property had, by then, been subdivided (Figure 4-5). The two resultant allotments were portion 303 (eastern half), which was taken up by

FW Madge on 1 July, and portion 302 (western half), by RH Shepherd on 7 August. This subdivision also includes 150 acres of land to the southwest, portion 301, which was taken up by JW Lidbitter on 1 July. Altogether, these three allotments were noted in a later annotation as 'Bendiela Flat', which was gazetted 16 September 1921. Otherwise, there is little change to the allotments along the study area.

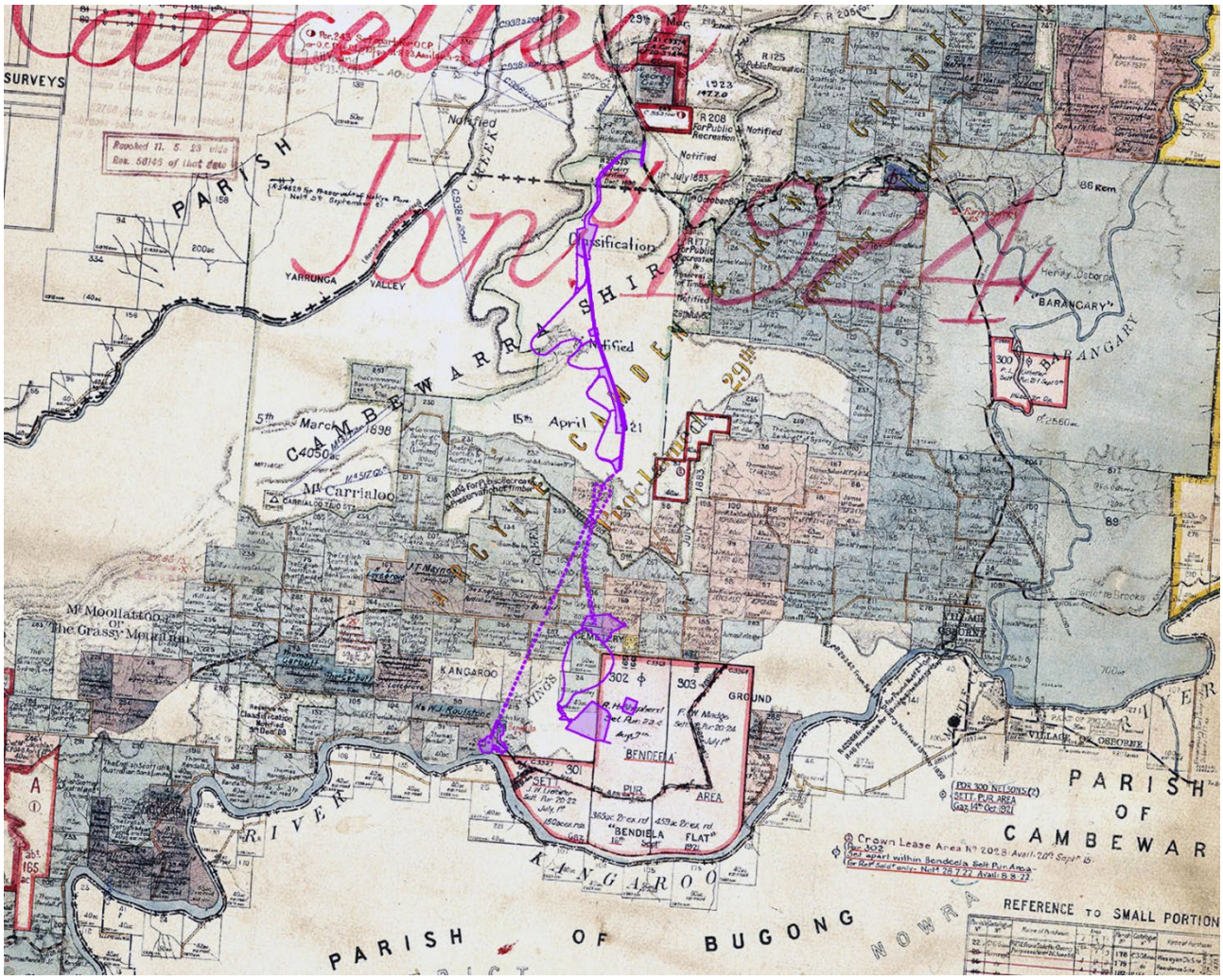


Figure 4-5. 1911 map of the Parish of Burrawang, with the approximate location of the Project outlined in purple (NSW Land Registry Services 2022)

Ownership of the land on the 1911 Parish mapping is clearly noted. The Project traverses the following parcels of land: 90 (N & WJ Roulstone), 215 (John King), 295 (N/A), 302 (RH Shepherd), 24 (William Bailey), 266 (The Commercial Banking Company of Sydney Limited), 287 (The English, Scottish and Australian Bank Ltd), 286 (William Bailey), 176 (owned originally by William Henry King, then by The English, Scottish and Australian Bank Ltd), 186 (The City Bank),163 (The City Bank), 239 (William Bailey), R204 (public recreation and preservation of timber, notified 9 July 1883), 197 (William Jas. Murray), a large area of reserve land (classification notified 15 April 1921), R28573 (for quarry, notified 3 December 1898), 277 (George Hidson Faulks). The majority of these bank-owned properties were situated on both sides of Bendeela Road.

In 1906 the valley was part of the Cambewarra Shire Council area, but the decline in population continued into the 1920s. A total of around 20 farms went out of business from 1908-1918. By 1925, all butter factories had closed. Of 11 full-time schools, five became half-time schools. By 1969, only one school remained (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997). John Nelson and family lived at Bendeela homestead (Figure 4-10) from the late-1800s until 1919, when the land was subdivided for repatriation purposes (Dumbrell 2016).

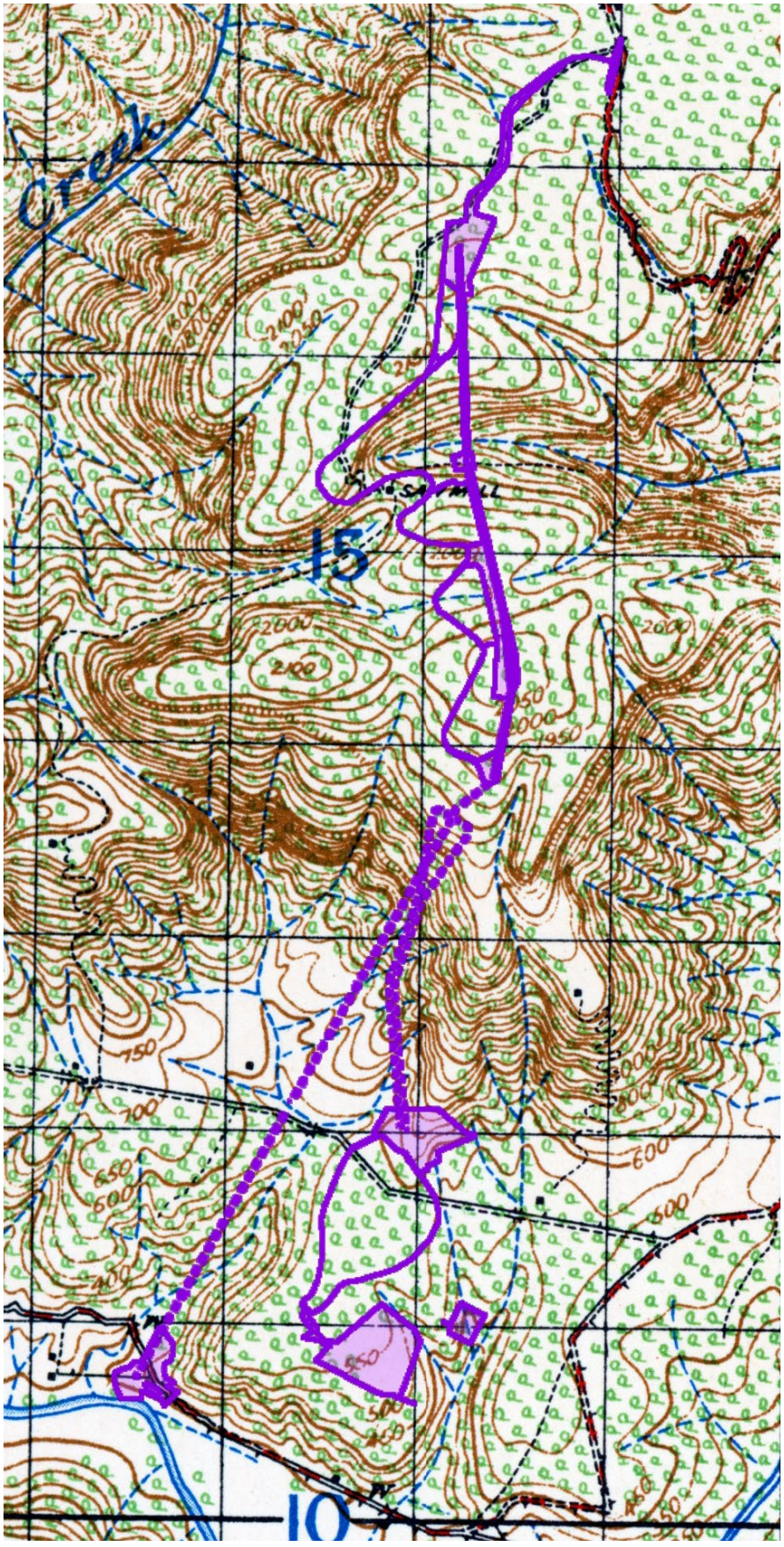


Figure 4-6. 1930 military sketch mapping, with the approximate location of the Project outlined in purple (Australian Section Imperial General Staff 1930; 1932)

Military sketch mapping dating to the early 1930s shows the location of buildings and other structures within the vicinity of the Project (Figure 4-6). The mapping shows the rugged landscape, much of it thickly wooded, through which the Project is situated. The approximate location of watercourses, and other natural features, along with major and minor roadways, houses, and other structures are also depicted. A house was then present at the end of a driveway, just to the east of the Kings Creek bridge crossing in the vicinity of today's Bendeela Power Station; this is likely to have been the Bendeela primary school, however the accuracy of the sketch map makes this difficult to ascertain. A sawmill was also then present at the end of a track, near a curve in Promised Land Trail. The old roadway to the sawmill crosses the study area several times, terminating at Moss Vale Road. No other structures are present within close proximity to the study area, with few structures being present within this rural area. Features such as Fitzroy Canal and Bendeela Pondage were not then present.

By 1957, the subdivisions across the region are primarily the same (Figure 4-7). Section 297 has been added, in a formerly empty area, between sections 215 and 295 in the west, and sections 24, 286 and 302 in the east. The primary school and cemetery are still noted in the 1957 mapping. The main difference comprises a long and narrow hand-annotated allotment which runs from the northern boundary section 197 in the south, up to, and including, section 277 in the north. This allotment cuts through a large swath of reserve land (notified 15 April 1921).

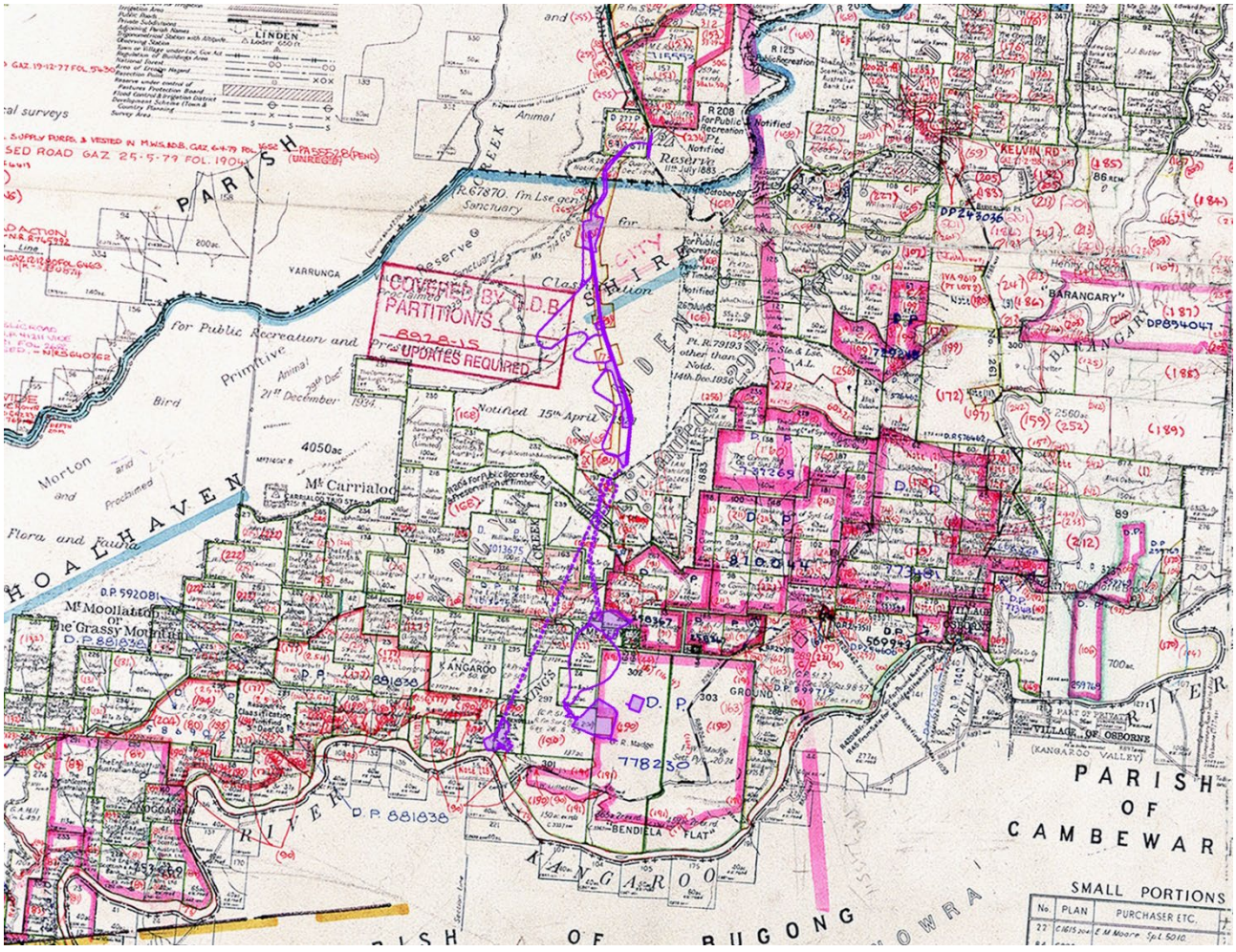


Figure 4-7. 1957 map of the Parish of Burrawang, with the approximate location of the Project outlined in purple (NSW Land Registry Services 2022)

By 1970, the Parish of Burrawang mapping shows that little had changed across the subdivisions around the study area (Figure 4-8). The land associated with the public school and the cemetery were still detailed, as were the reserves which previously crossed the study area. The large reserve, however, had been deemed to be Morton National Park. The hand-annotated allotment is present, and has replaced R28573 in the north. A transmission line is also shown, running to the east of the study area. This power line is shown to cut through the former cemetery along a northeast/southwest alignment, with a smaller northwest/southeast aligned transmission line entering portion 286.

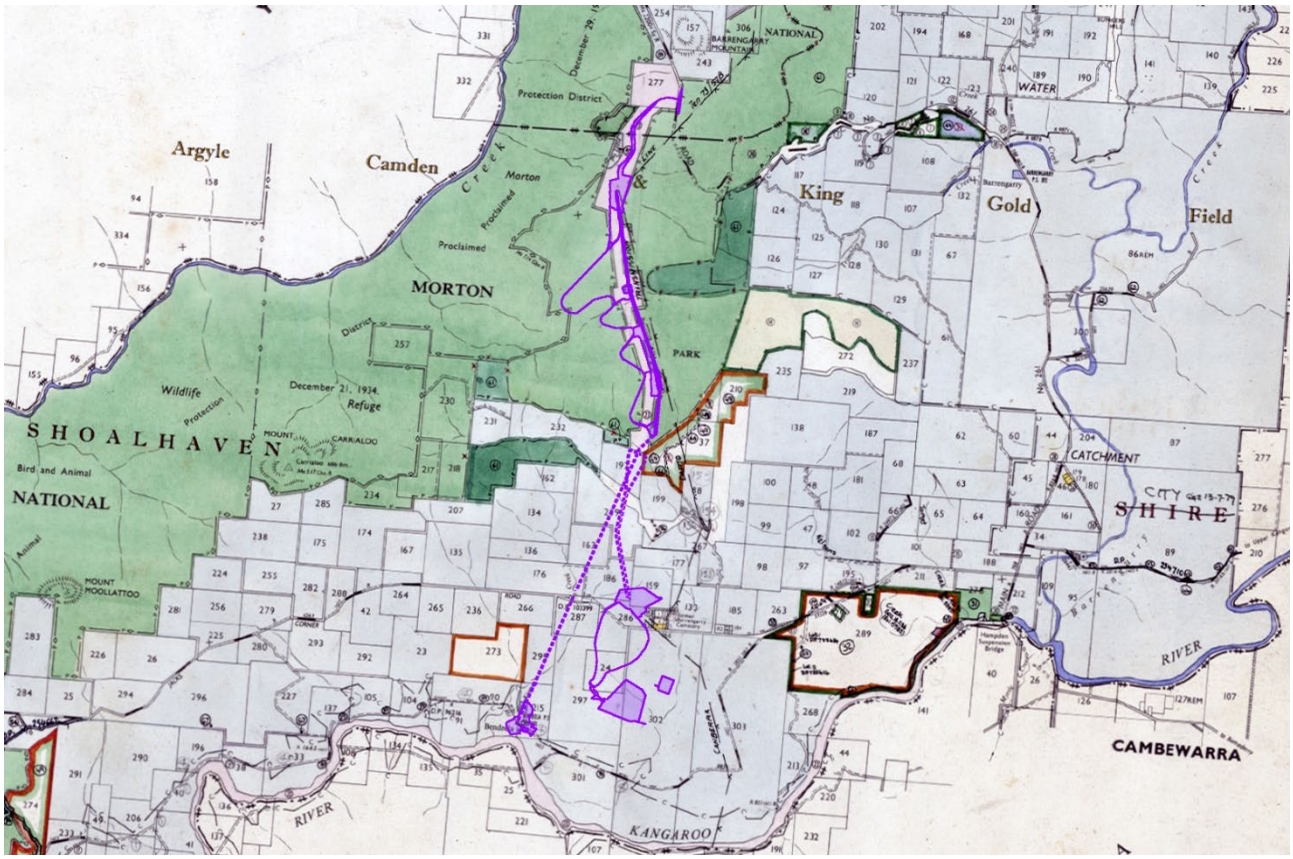


Figure 4-8. 1970 map of the Parish of Burrawang, with the approximate location of the Project outlined in purple (NSW Land Registry Services 2022)

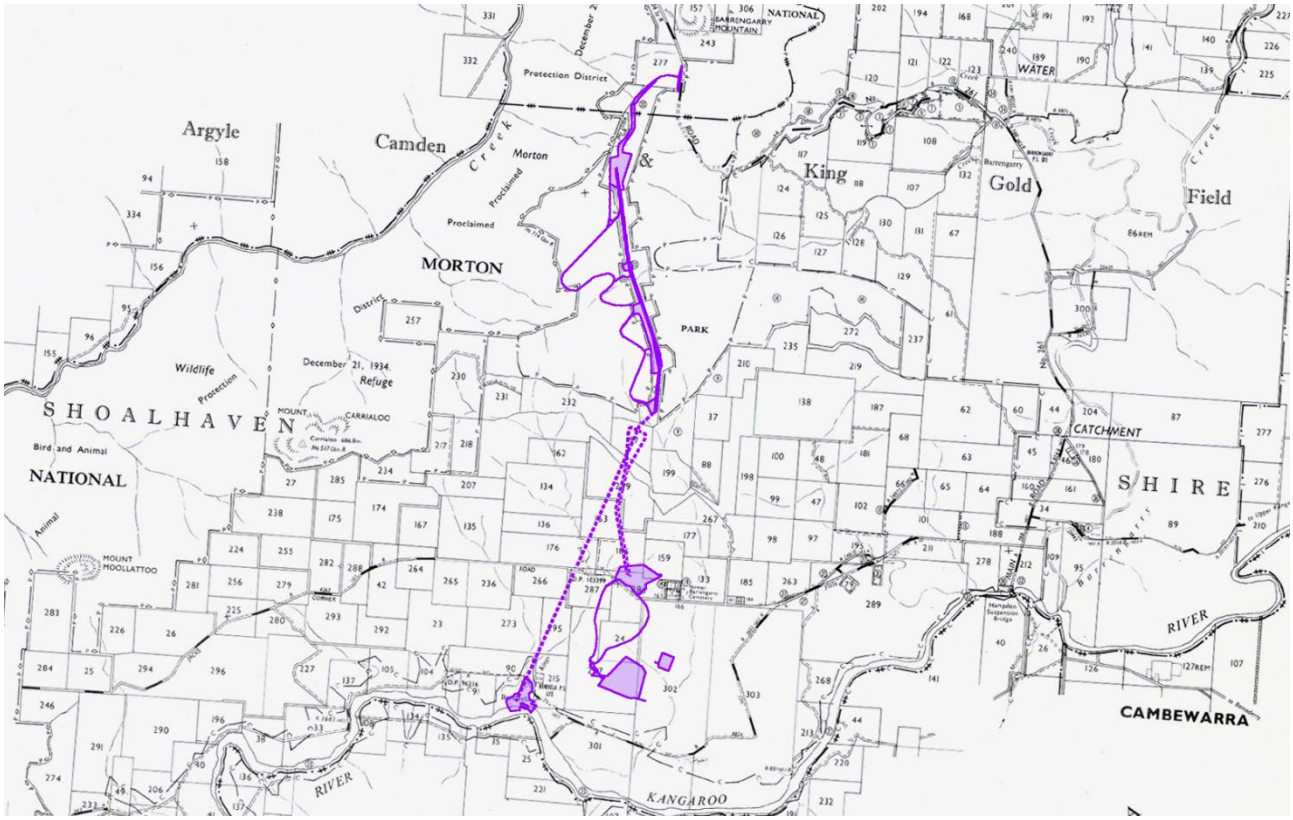


Figure 4-9. 1973 map of the Parish of Burrawang, with the approximate location of the Project outlined in purple (NSW Land Registry Services 2022)

The 1973 Parish of Burrawang mapping also shows little change since 1970 (Figure 4-9). The second page of the parish mapping shows details relating to the allotments. Allotment 216, which comprises public school land, states that the school land is 8094 m^2 in size and was dedicated on 13 March 1877. It also shows the cemetery allotments but notes that the roads were closed on 23 January 1970. While the area of each cemetery allotment is stated, no purchaser information is noted for the Former Barrengarry Cemetery. The use of the long and narrow allotment, which cuts through Morton National Park, is also detailed in the parish plan. It states that this land was appropriated for Metropolitan Water Sewerage & Drainage Board purposes and was gazetted on 28 July 1972.

Due to population decline, societies such as the Bendeela Progress Association (1952), were set up in the 1940s and 1950s (Kangaroo Valley Historical Society 2014; Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997). Despite this, the number of people Involved in the dairy industry in the Kangaroo Valley area dropped to 60 by 1978. In 1979, Cambewarra Shire was incorporated into the City of Shoalhaven. By the 1990s, the region was subject to changes in farming policy, which brought in an influx of new residents, as dairying gave way to stock breeding and less labour-intensive types of farming (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997).

Figure 4-10. Kangaroo Valley Museum, c.1974. Formerly the Rendall family home, removed from Bendiela to its present location near Hampden Bridge, Kangaroo Valley, and constructed with materials from Milligan's homestead (Wollongong City Libraries 1974)

The plan to develop a water supply system in the region first rose towards the end of World War I, but wasn't begun until the 1970s. The Shoalhaven Scheme was built to the west and north of Bendeela Station, with construction beginning in 1971. Built under the supervision of the Snowy Mountains Engineering Corporation, the Scheme was finalised in 1977 (WaterNSW 2015). The Scheme included the Kangaroo Valley-Fitzroy Falls complex. This complex includes the Bendeela Power Station on Kangaroo River, Bendeela Pondage which extends into the Bendeela property, the Kangaroo Valley Power Station to the west of Barrengarry Cemetery, and the tunnels, shafts and pipes that lift the water from the flats up 480 m to the Fitzroy Canal in the north (WaterNSW 2015). The *Government Gazette of the State of New South Wales* (28 July 1972, p. 3013) confirms that the government acquired land at Fitzroy Falls, Bendeela (as well as at Tallowa) for water supply purposes. This land was likely for Bendeela Pondage, which was built in 1972 (WaterNSW 2015). The land-use within the properties taken up by the Scheme were thus transformed from pastoral in nature to large scale water management.

Bendeela Public School (Section 4.1.3) and the Former Barrengarry Cemetery (Section 4.1.4) have been identified in the historical research as being two places of historical heritage potential within/adjacent to the study area (Figure 4-11). These places, along with land associated with a Wesleyan church (approximately 770 m east of study area), represent the educational and religious aspirations of the community living around Bendeela. A second school (dated to 1873), which is in portion 182 to the east of the cemetery, is not within proximity to the Project.

4.1.3 Former Bendeela Public School Reserve

Analysis of early historical parish maps shows a Bendeela Public School located within the study area (Figure 4-13). By the late 19th Century, the historic records show there were plans for two sites at Bendeela reserved for schools. Of the two, only portion 216 intersects with the study area (Figure 4-11).

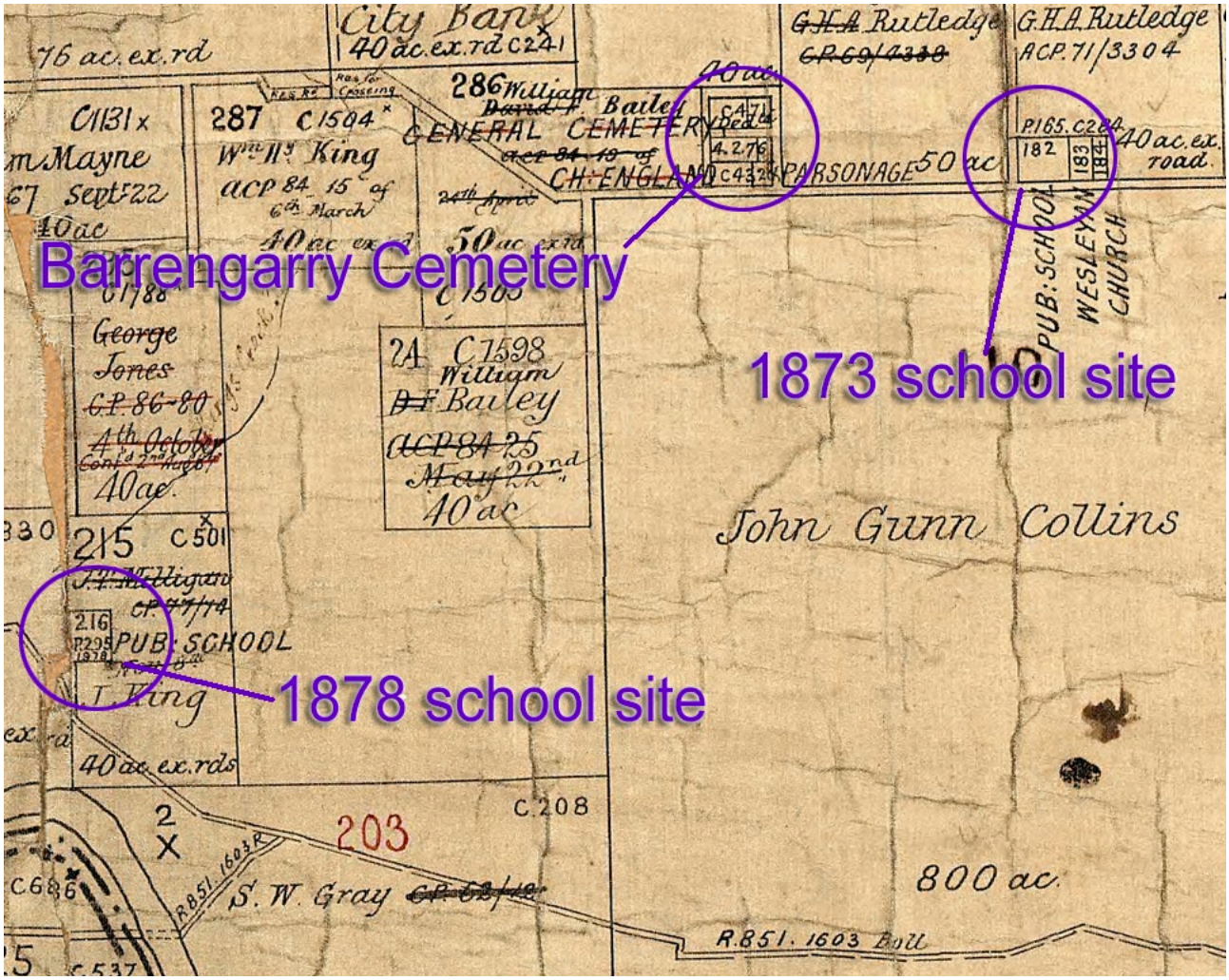


Figure 4-11. Detail of an 1886 map of Parish of Burrawang, showing both public school sites and the Barrengarry Cemetery (Historical Land Records Viewer, CD PMAPNA02)

The *New South Wales Government Gazette* (13 March 1877, p. 1044) detailed that, in 1877, Portion 216 (a small section of land within portion 215 (Lot 216/DP751262), west of the Bendeela grant in the Parish of Burrawang, was dedicated as land for a public school. In 1878, a two-acre block was granted to the Crown for educational purposes (Certificate of Title Volume 461 Folio 128, Figure 4-12). The government appointed four local men to the school's board, being John King, Robert Martin, John Thomas Milligan and John Rendall. The school was classified as a provisional school.

There are no existing plans of the buildings that made up the public school, however the limited information that does exist assists in building a broad picture of the school. According to the Kangaroo Valley Voice, the school was built by the community a couple of years earlier in 1876 from local materials. It was described as:

> '*A small slab building with a shingled roof, a chimney, a water tank and outhouse… situated just past where the Power Station is today*' (Bray 2008, p. 15).

It officially opened as a public school in May 1878, and remained as such (off and on) until May 1926 (Bray 2008, p. 15), as outlined in Table 4-1.

Table 4-1. Chronology of Bendeela Public School

Date	Event
1878	School opens as a full-time public school
1890	Construction of a weather-shed by P Donnelly of Kangaroo Valley
1900	New fencing installed at the school by W King of Kangaroo Valley
1904	School reduces to a half-time school
1914-1919	School closes temporarily
1919	School reopens as a half-time school
1926	School closes
1957	Sold to Charles McKenna of Clovelly
1970	Sold to the Metropolitan Water Sewerage and Drainage Board

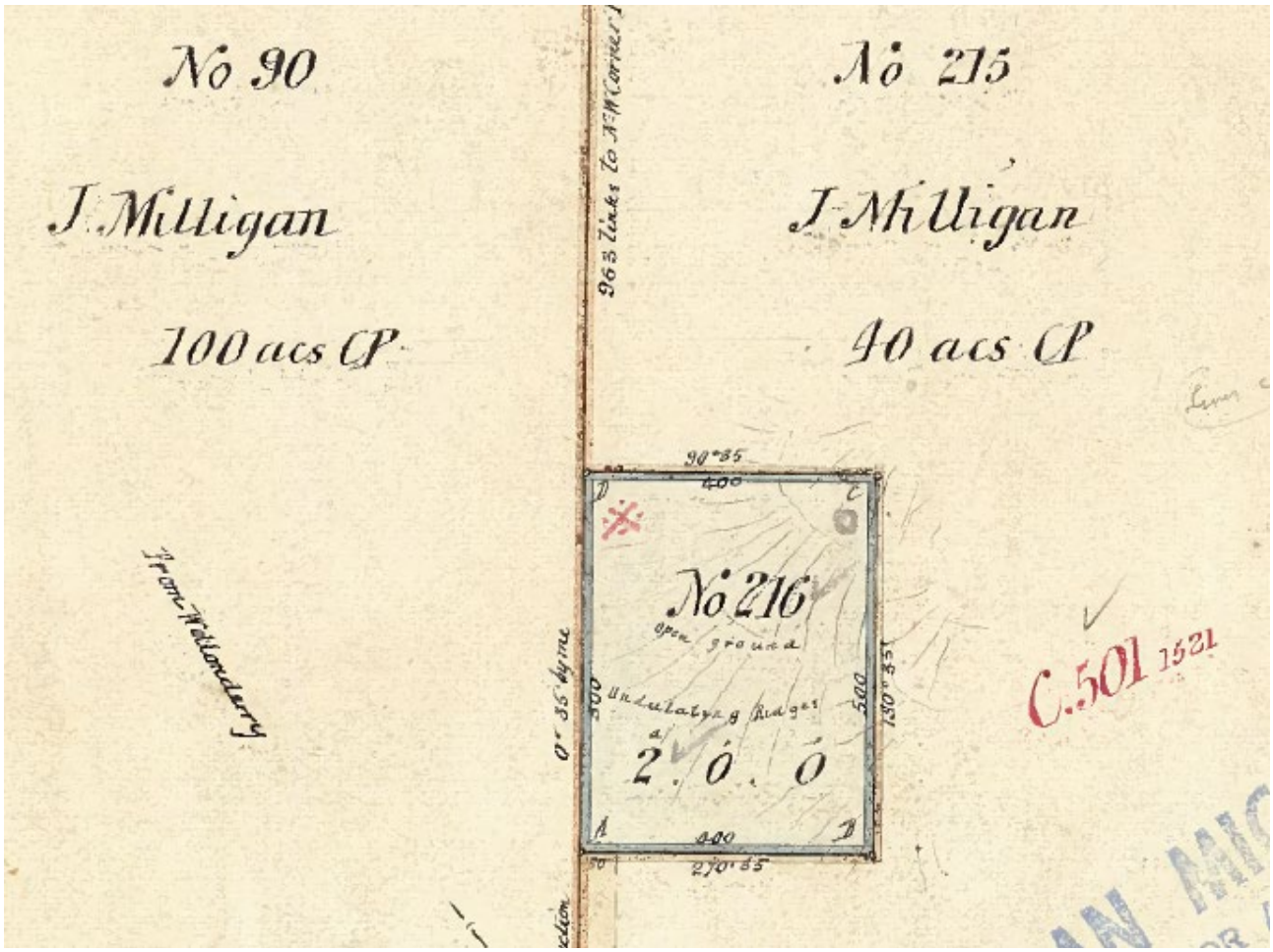


Figure 4-12 Portion 216 allocated for Bendeela Public School, c.1876 (Land & Property Information)

In 1889 the Parents and Citizens Association petitioned the Minister for Public Education for a weather-shed for the school. A tender for these works, gazetted as repairs and improvements, was awarded to P Donnelly of the Kangaroo Valley for the value of £23 2s 6d in March 1889. In 1900, £12 worth of fencing was awarded to WH King.

There were several times in the school's history where the school closed for a time. A measles outbreak closed the school for a week in November 1887, with parents unwilling to send their children owing to illness in the area. The school (Figure 4-13) also closed in 1914 owing to the outbreak of World War I and did not reopen until 1919. The school remained open until 1926 and the land sold in 1957. In 1970, the site passed to the Metropolitan Water Sewerage and Drainage Board, the forerunner of Sydney Water. From historic

records it is not clear when the school was removed from the land, but it would have been removed some time after the school's closure in 1926. The school building may be that noted on mapping from 1930 (Figure 4-6), so it may have survived until then. None of the later mapping shows features such as buildings. However, no building can be seen in aerial photography from 1963 on Parcel 216 (Figure 4-20).

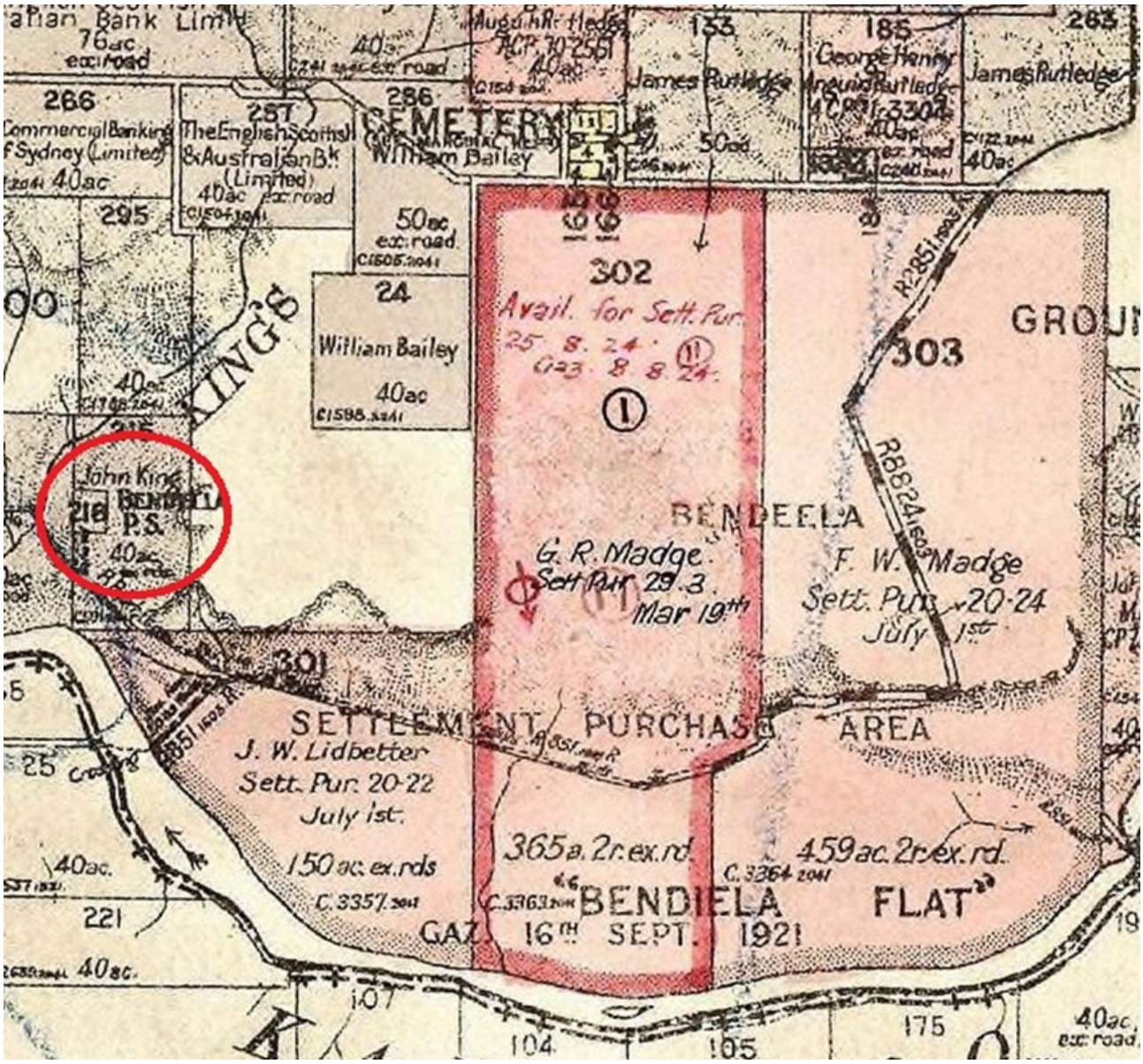


Figure 4-13 Detail of parish map of Burrawang (c.1911) showing location of school site (Historical Land Records Viewer, CD Title PMAPGN05)

4.1.4 Former Barrengarry Cemetery

The cemetery opposite the Bendeela grant was dedicated on 4 February 1876. Known as Barrengarry Cemetery, it was situated within its own gazetted allotment, comprising allotments 1-7 (Lot 1/DP545735) of the Parish of Burrawang. As this land is approximately 35 m to the east of the Project further historical information is provided here. The land is situated between portion 133 of the Parish of Burrawang in the east and portion 286 of the Parish of Burrawang in the west.

A Church of England church and parsonage were also planned for that parcel of land; however it is unclear if these were ever constructed. The *New South Wales Government Gazette* (28 February 1894, p. 712) notes the appointment of the Trustees for the Wesleyan portion of the burial ground at Barrengarry Cemetery. The Trustees comprised Thomas William Vance, Thomas Nelson, Thomas Watters, Thomas Rendell, Thomas Moffitt, George Erwin and James Chittick. In 1901, the *Nowra Colonist* (6 March 1901, p. 1) stated that

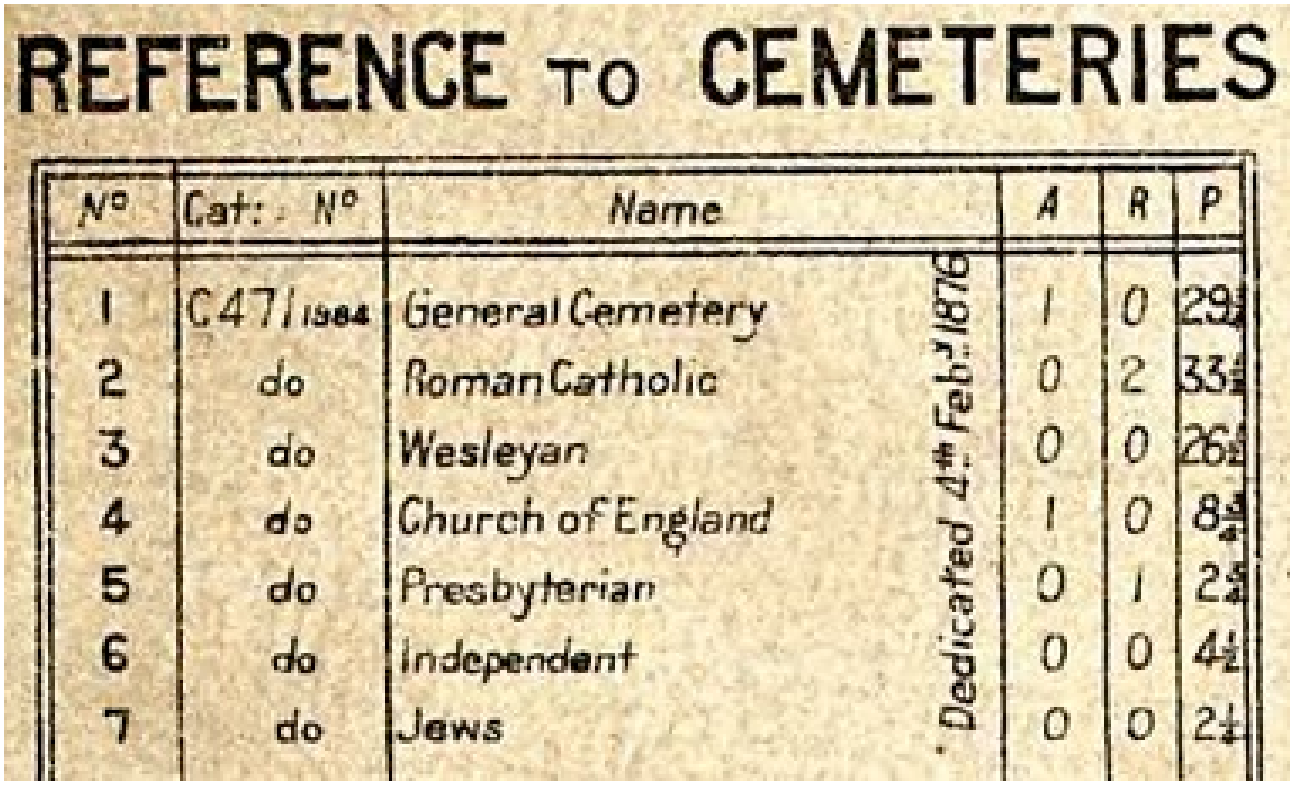
Thomas Maguire had been appointed as Trustee of the Church of England portion of the general cemetery at Barrengarry, after the resignation of W Randall.

In 1911, the Parish of Burrawang mapping details the seven allotments within the cemetery grounds, and assigns the different allotments of the cemetery for different burial types (Figure 4-14). Allotment 1 comprised the general cemetery, while allotment 2 was for Roman Catholic burials, allotment 3 for Wesleyan burials, allotment 4 for those belonging to the Church of England, allotment 4 to Presbyterians, allotment 6 to Independents, and allotment 7 to those of the Jewish faith. The allotments are still noted as such in 1957 Parish of Burrawang mapping, which also provides a diagram of the cemetery (Figure 4-15). According to the National Trust of NSW's master list of cemeteries, there is no evidence that Barrengarry Cemetery was ever used (National Trust 2022).

The *Government Gazette of the State of New South Wales* (18 July 1969, p. 2787) detailed the proposed revocation of dedication of the General Cemetery at Barrengarry, under the *Crown Lands Consolidation Act* 1913. It is stated that this was because 'the purpose of the dedication of the area described hereunder has failed'. Shortly thereafter, the *Government Gazette of the State of New South Wales* (7 November 1969, p. 4561; 23 January 1970, p. 240) shows a list of proposed road closures within NSW. One of the notifications comprised the proposed closure of the roads adjacent to, and within the former Barrengarry Cemetery. It also stated that, 'Road, if closed, proposed to be disposed of, together with former Barrengarry Cemetery'.

Allotments 1 to 7 of the Cemetery at Barrengarry, along with other land, was acquired by the Metropolitan Water Sewerage & Drainage Board in 1971 (*Gazette No. 52*, 14 May 1971, pp. 1549-1550).

The Project does not intersect with the former Barrengarry Cemetery, but due to its proximity of this potential heritage item will be referenced later in the report and in mapping. However, its significance will not be assessed, nor will it be assessed for potential impacts.


REFERENCE TO CEMETERIES

No	Cat: No	Name	A	R	P
1	C47/1884	General Cemetery	1	0	29½
2	do	Roman Catholic	0	2	33½
3	do	Wesleyan	0	0	26½
4	do	Church of England	1	0	8¾
5	do	Presbyterian	0	1	2¾
6	do	Independent	0	0	4½
7	do	Jews	0	0	2¼

* Dedicated 4th Feb.y 1876

Figure 4-14. 1911 Parish of Burrawang map showing details of the allotments within Barrengarry Cemetery (NSW Land Registry Services 2022)

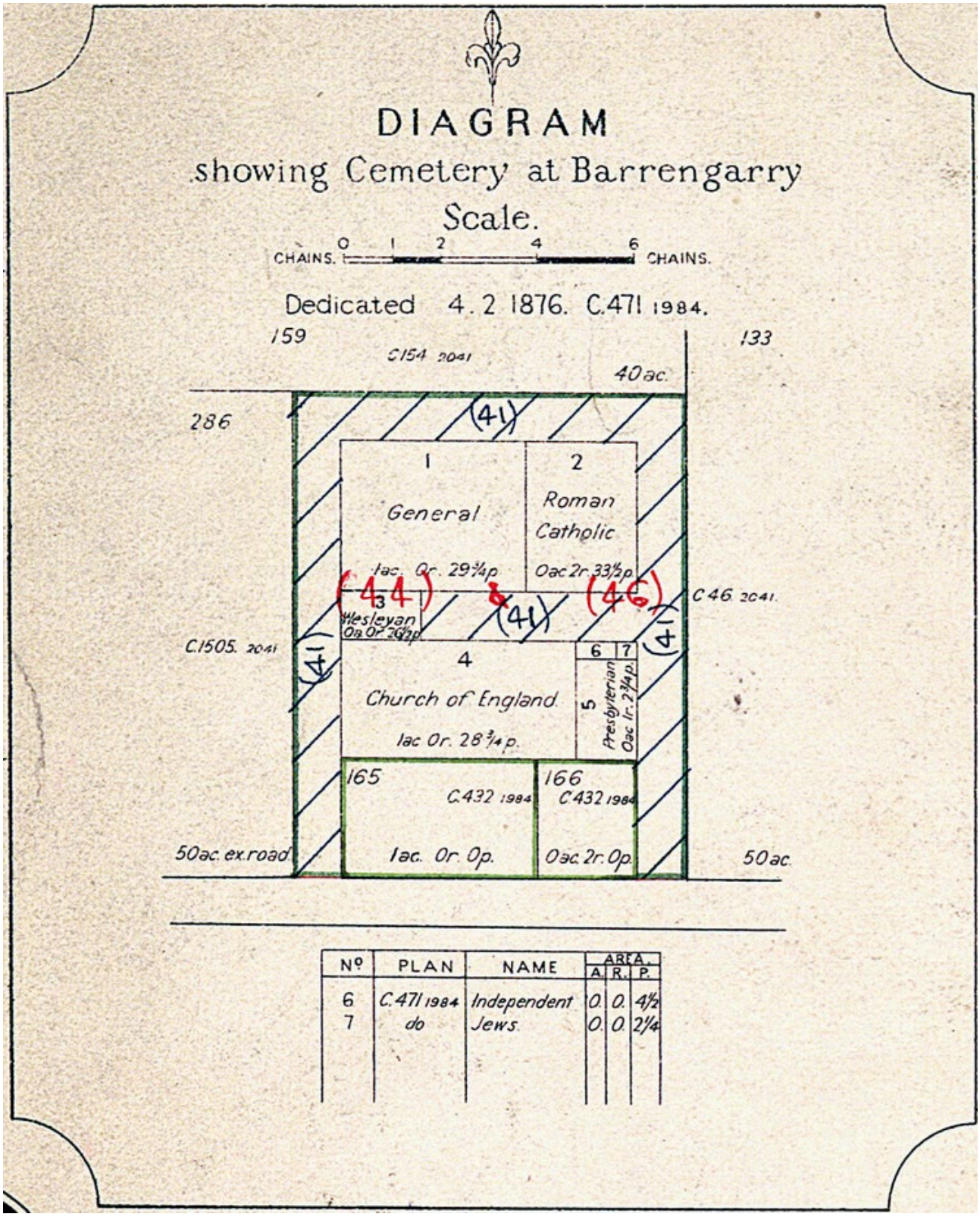


Figure 4-15. 1957 Parish of Burrawang map showing Barrengarry Cemetery (NSW Land Registry Services 2022)

4.2 Aerial imagery review

4.2.1 Historical aerial imagery

Aerial imagery dating to 1963 and 1970 (Figure 4-16, Figure 4-17) show that the Project is situated within a landscape that is primarily forest-covered along its central and northern portions, with farmland and some forest in the southern portion. The only major difference between the two landscapes is that the location of today's reservoir was covered in trees in 1963, but had been cleared for farming by 1970.

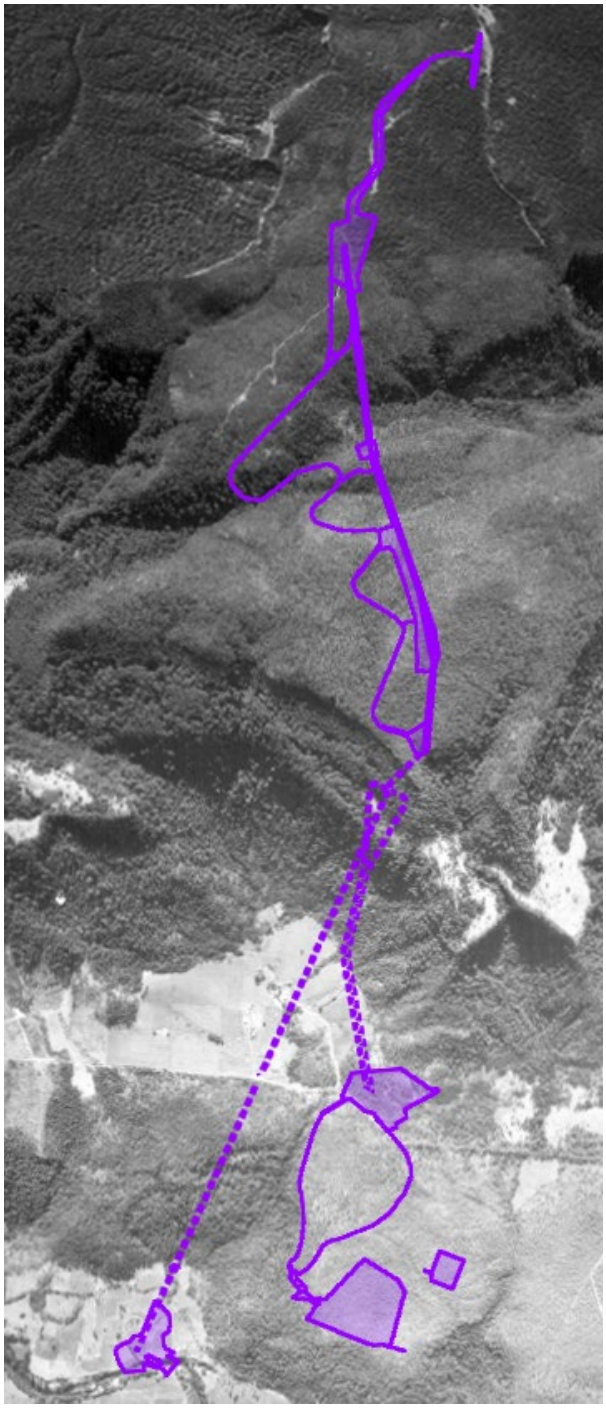


Figure 4-16. 1963 aerial imagery, with the Project in purple (NSW Government n.d.)

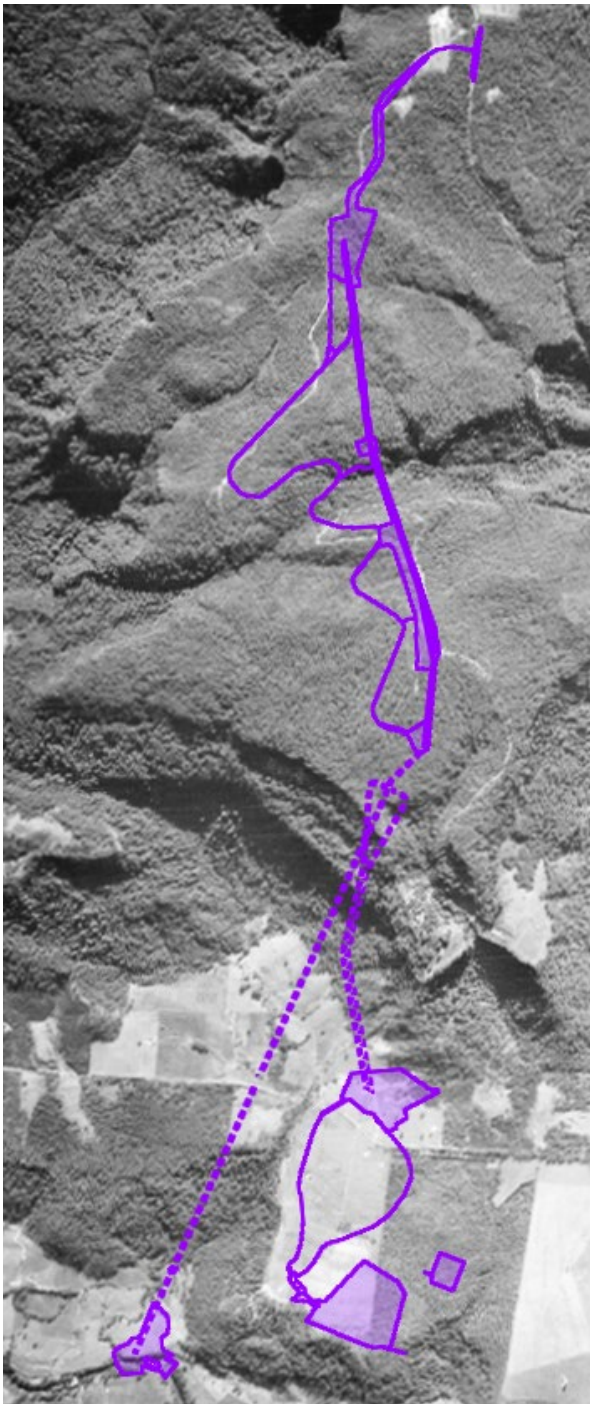


Figure 4-17. 1970 aerial imagery, with the Project in purple) (NSW Government n.d.)

A farming complex is visible within proximity to the southwest portion of the study area just north of a bend in Kangaroo Creek (to the east of Kings Creek). This is consistent with the military sketch mapping from 1930, which depicts a house in this location. It appears to be within the land associated with portion 90. A single building is located immediately opposite the roadway, to the northeast, apparently associated with portion 215, and not associated with the former school, which is situated further to the north than this.

Several buildings are present within the cleared land to the west of the cemetery, in areas that had formerly been covered in trees in 1963. A farming complex is also present opposite the north end of the study area, on land associated with portion 243. Otherwise, the tree cover is too dense across the rest of the study area to identify whether there were any buildings, including the former sawmill, present within proximity to the study area. Several tracks are visible across Morton National Park.

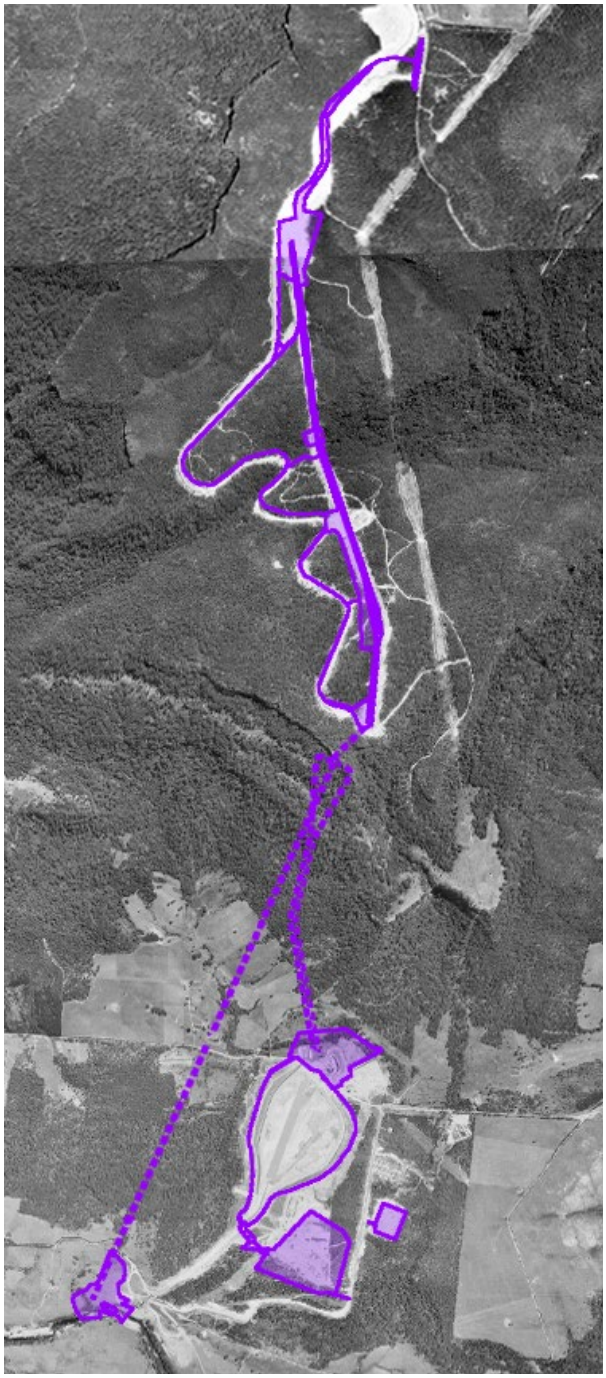


Figure 4-18. 1974 aerial imagery, with the Project in purple (NSW Government n.d.)

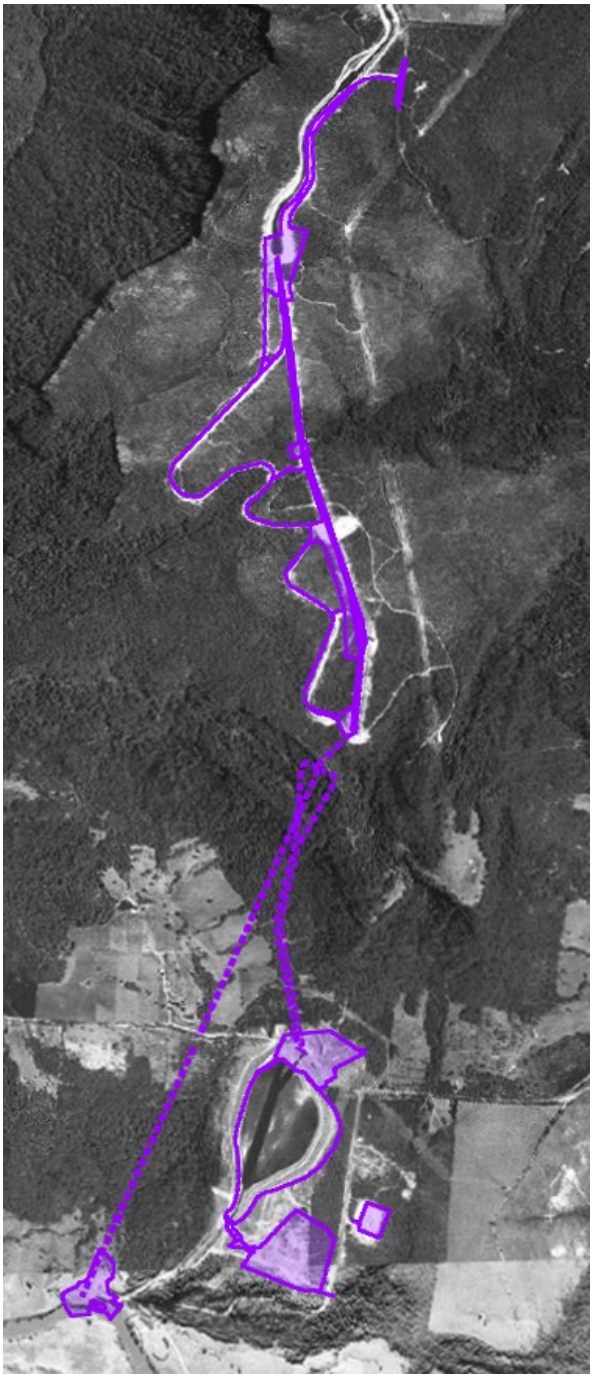


Figure 4-19. 1979 aerial imagery, with the Project in purple) (NSW Government n.d.)

In both historical aerial images, the former Barrengarry Cemetery is covered in trees. By 1970, the land immediately adjacent in the west has been cleared. Due to the tree cover, there is little to indicate the former roadways that once ran around the cemetery grounds.

The Bendeela school on Portion 182 is situated within a tree-covered allotment, to the east of Barrengarry Cemetery. No buildings are visible amongst the moderate tree growth. By 1974 (Figure 4-18), aerial imagery shows that construction had started on the Bendeela Power Station and the Kangaroo Valley Power Station. This includes the tracks and other infrastructure associated with the power station. Additionally, the Bendeela Pondage has been excavated, and the transmission line easement has been established to the east of the study area, with smaller transmission easements running through the cemetery area. Promised Land Trail has also been firmly established.

By 1979 (Figure 4-19), the power stations appear to be in operation, with the Bendeela Pondage full of water. Few other changes are apparent across the study area.

4.2.1.1 Former Bendeela Public School (Portion 216)

The Bendeela school which was on Portion 216 is seen in 1963 (Figure 4-20) and 1970 (Figure 4-21) to be within a portion of land covered in moderate tree growth in its northwest half. There is no obvious sign of a building within the allotment, but this is possibly due to tree cover. In the 1974 (Figure 4-22) aerial imagery, much of the tree cover has been removed. There is a small, lighter coloured rectangular area in the cleared area to the northwest, but the low resolution of the aerial imagery makes it impossible to positively identify the nature of this feature. Little has changed by 1979 (Figure 4-23), however the feature may have been a puddle as it was situated along what appears to be a runoff channel. No school building is present.

Figure 4-20. 1963 aerial imagery showing the approximate location of the Bendeela school grounds, outlined in green, in proximity to the Project, outlined in purple (NSW Government n.d.)

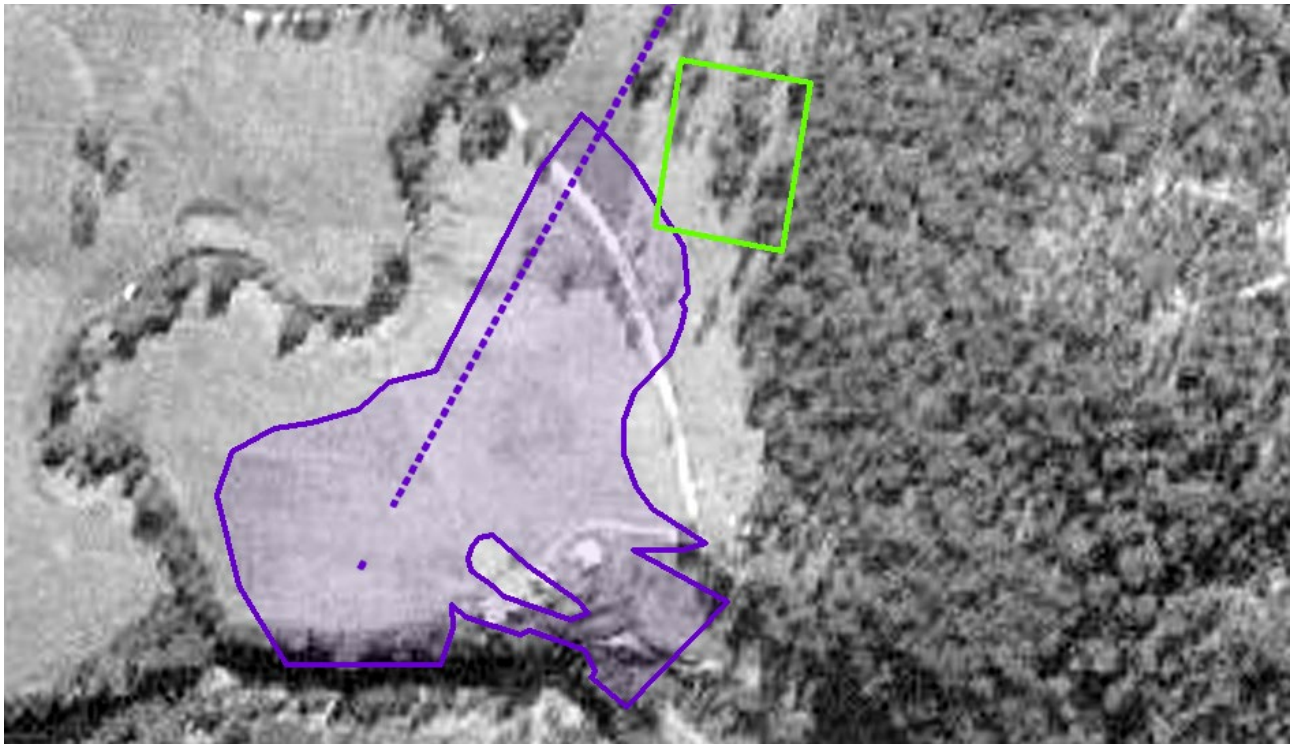


Figure 4-21. 1970 aerial imagery showing the approximate location of the Bendeela school grounds, outlined in green, in proximity to the Project, outlined in purple (NSW Government n.d.)

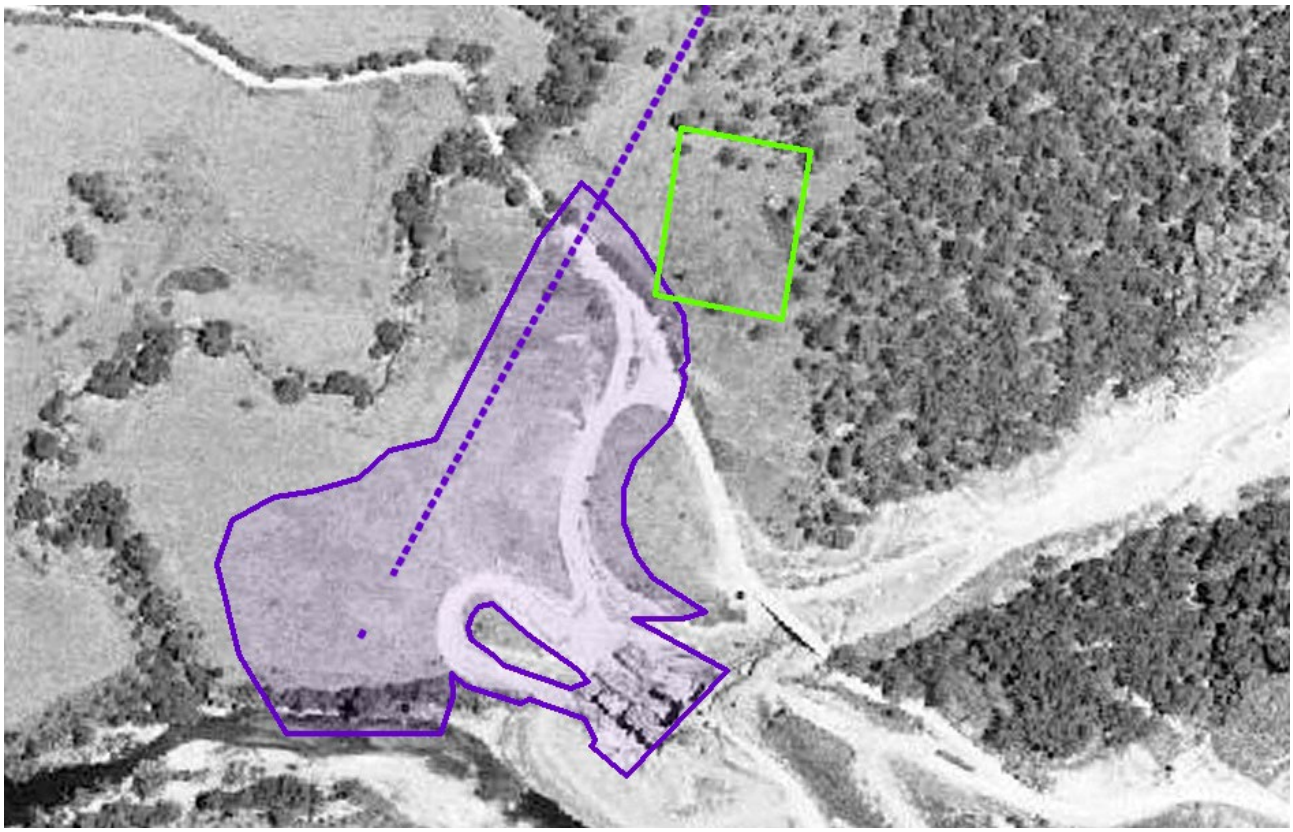


Figure 4-22. 1974 aerial imagery showing the approximate location of the Bendeela school grounds, outlined in green, in proximity to the Project, outlined in purple (NSW Government n.d.)

Figure 4-23. 1979 aerial imagery showing the approximate location of the Bendeela school grounds, outlined in green, in proximity to the Project, outlined in purple (NSW Government n.d.)

4.2.2 Modern aerial imagery

Modern aerial image of the study area, using Google Earth Pro (version 7.3.4.8642), shows that the region comprises a mixture of open farmland and wooded areas in the south, with the northern portion being primarily being heavily tree-covered. The farmland is restricted to relatively flat sections of the landscape to the north of Kangaroo River, on both sides of Bendeela Road. Landscape usage is associated with the Bendeela Power Station and the Kangaroo Valley Power Station, which are situated in heavily wooded areas. Bendeela Pondage is clearly visible between the two power stations, as are a number of easements and roadways which cut through the trees in the area. To the north of Bendeela Road, the land rises sharply, as evidenced by the contours shown in the 1930 military mapping (Figure 4-6). On the flatter land on top of this landscape, a large surface pipe is clearly visible, along with its associated infrastructure. This leads to the Fitzroy Canal, which connects to Fitzroy Falls Reservoir in the north. Tracks and accessways are also present, including Promised Land Trail.

Due to the heavy tree cover, there is no sign of the aforementioned building near the Kings Creek bridge in the south, nor the sawmill near one of the Promised Land Trail curves. Additionally, the properties on which the former public schools (Portions 216 and 182) are situated is also within a highly dense areas of trees, through which the ground surface is not visible. The Former Barrengarry Cemetery is partially covered in trees across its northern, southwest and southeast portions, with two easements cutting through it from Bendeela Road. Both easements have high voltage electricity lines running along them, and a track is also visible along the easement which rungs along northeast/southwest alignment. This is consistent with the hand-annotated transmission lines shown in the 1970 Parish of Burrawang mapping (Figure 4-8). As such, it appears that part of the former cemetery grounds has been disturbed through the installation of the power lines and other infrastructure related to the Kangaroo Valley Power Station.

5. Heritage context

The following section provides the results from statutory and non-statutory heritage register listing searches of the study area. Also included in this section is a summary of previous heritage studies to identify any potential unlisted heritage items within the study area.

5.1 Heritage register search results

A search of federal, state and local heritage registers was undertaken on 25 July 2022, as outlined in Section 3.2. This was done to determine the presence of any historical heritage items located within the study area, or its immediate vicinity (Figure 5-1).

Register search results did not identify any listed historical heritage items located within the study area.

The closest listed historical heritage item comprises Kangaroo Valley (RNE 1589), which is situated approximately 230 m to the east of the study area. The Kangaroo Valley site comprises the valley in which settlement occurred in the 19th century, with villages, hamlets and farms dating to this period, including Hampden Bridge.

Although this is outside the study area, there is one heritage-listed place which may be impacted by Project construction vehicles travelling to the site in association for works. This comprises Hampden Bridge (SHR 02024/LEP 241/LEP C4/RNE 1621), which is listed on the SHR, the LEP and the RNE. Hampden Bridge is located approximately 3.5 km to the east of the Project.

No items of World, National, Commonwealth, State or Local heritage significance were identified within the study area.

5.2 Previous heritage studies

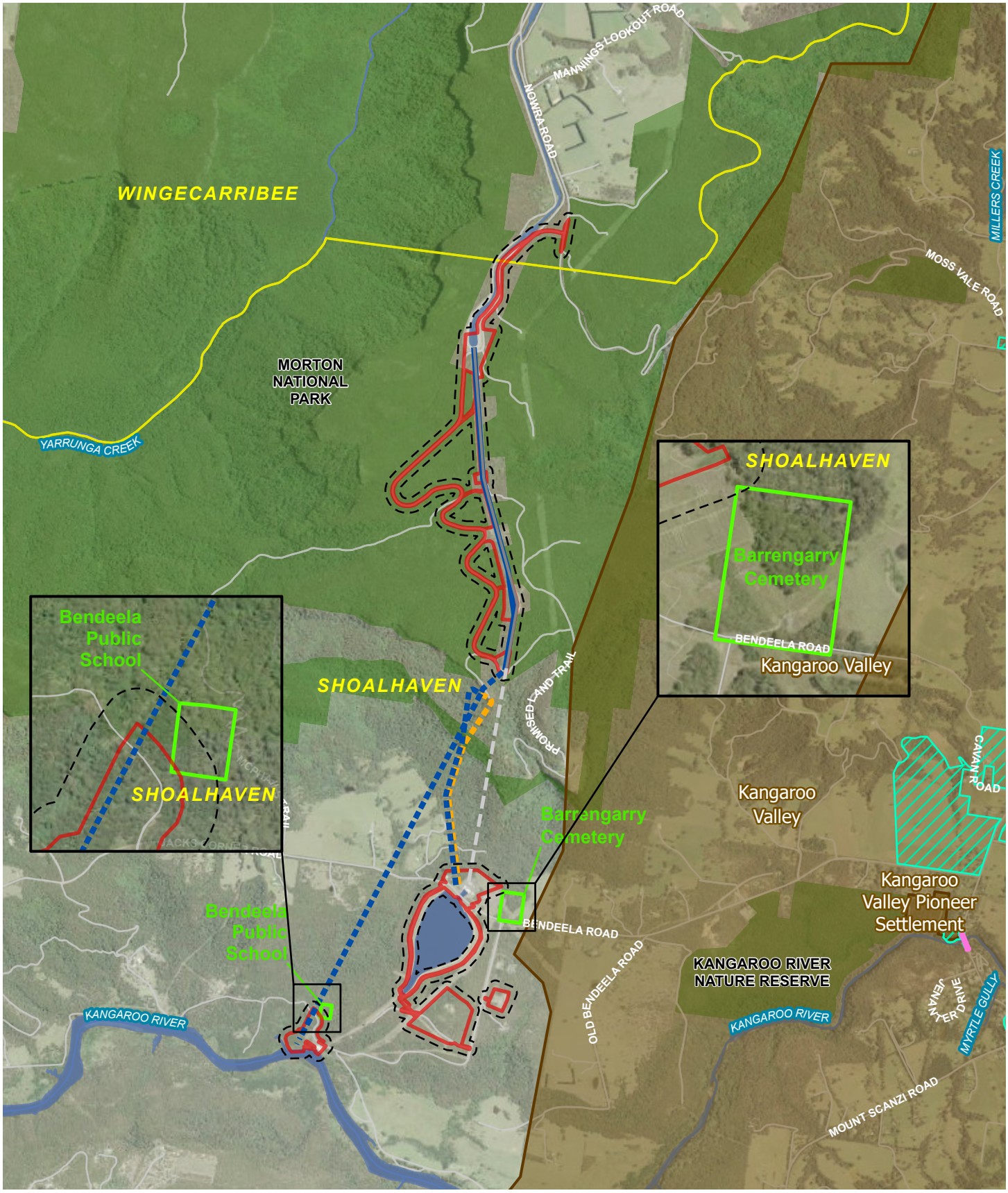
5.2.1 Shoalhaven Heritage Study

The *Shoalhaven Heritage Study 1995-1998, February 2003* (Shoalhaven City Council 2003) was undertaken by Peter Freeman Pty Ltd (originally Freeman Collett & Partners) for Shoalhaven City Council. The study included a thematic history, inventory analysis and planning recommendations, historical maps, and an inventory of historical heritage places. Stage 1 of the heritage study focussed on rural areas, the Nowra-Bomaderry area, Milton and Ullanulla, while Stage 2 of the study focussed on the remaining urban areas. To accomplish this, the Council area was split into zones, one of which comprised the Kangaroo Valley area, which was examined during Stage 1. This zone incorporates the Project's study area.

Within Barrengarry, there were ten historical heritage items. These comprised a house of state-level significance, a residence (former school) of regional significance, a lodge of local significance, a store/post office/residence of local significance, three farmhouses of local significance, a farm complex of local significance, a butter factory of local significance, and a drive/approaches which is of local significance.

Within Kangaroo Valley, there were 70 heritage items identified. Of these, there were nine heritage items within the Kangaroo Valley rural area, a dairy farm which was assessed as being of regional significance, three cottages of local significance, a house of local significance, a general cemetery (Kangaroo Valley) of local significance, a caravan park of local significance, a dairy farm of provisional significance, and a cottage with no noted significance. Additionally, there was one landscape identified: Kangaroo Valley Pastoral Landscape, which was assessed as being of state-level significance.

Mapping of the cultural landscapes within Shoalhaven shows that the Kangaroo Valley Pastoral Landscape area is situated to the east of the Project. As such, no historical items were identified within proximity to the study area.



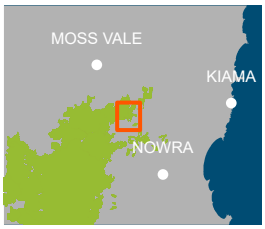
Legend

- Project area
- Study area
- Existing KV tunnel alignment
- Existing scheme pipeline
- Indicative above ground pipeline
- Indicative tunnel alignment
- Indicative access tunnel
- LGA
- NPWS estate
- Road
- Waterways
- Waterbody
- LEP Heritage (DPIE)
- State Heritage Register (DPIE)
- Register Of The National Estate (AUDEE)
- Potential historical heritage places

0 1 2 km

1:40,000 at A4

GDA2020 MGA Zone 56



Data sources

Jacobs 2022
Department of Planning and Environment 2022
© Department of Customer Service 2020

Figure 5-1 Location of historical heritage places within proximity to the study area

Date: 24/08/2022 Path: \\ausyd0vs01\gisproj\NSW_IS392600_ShoalhavenEIS\Apps\IS392600_SOHI.aprx
Created by : JB | QA by : CC

5.2.2 Shoalhaven Dairy Industry Study

The *Shoalhaven Dairy Industry Stage 1* (Peter Freeman Pty Ltd and Edward Higginbothom & Associates Pty Ltd 1997) study examined four major pastoral and dairying landscape areas: Kangaroo Valley, the Milton-Ulladulla area, the Berry Bolong area and the Crookhaven River Area. Peter Freeman Pty Ltd undertook this study on behalf of Shoalhaven City Council.

One of the sites examined included the Kangaroo Valley Pastoral Landscape, which was identified in the *Shoalhaven Heritage Study 1995-1998*. It provided a rundown on the history of the area, stating that the valley can be broken into three main areas: land held predominantly by the Osbornes north of the Kangaroo Valley township i.e. the 'Kangaroo Grounds'; the valleys draining into the Kangaroo Grounds; and the transitional areas of Bellawongarah (Kangaroo Mountain) and Wood Hill.

The historical notes state that one of the settlements in Kangaroo Valley Pastoral Landscape was Bendeela. However, the description noted that Bendeela has been extensively modified by the Bendeela pumped storage facility and recent subdivision. Mapping confirms that Bendeela, and the current Project, are situated outside the heritage item to the west.

5.2.3 Wingecarribee Heritage Study

The *Wingecarribee Heritage Study* (JRC Planning Services 1993) comprises a heritage study undertaken by JRC Planning Services for the Wingecarribee Council. The study presents a number of recommendations for the proper and sensitive management of the Shire's heritage resources and explores statutory planning control techniques, and new approaches incorporating educational and promotional initiatives, covering both the Wingecarribee and the Wollondilly LGAs.

The study area was divided into 11 areas, comprising three key historic units and eight cultural landscapes units. The northern end of the study area is situated within the Robertson key historic unit. This unit comprises a landscape which was described as having small sized paddocks, intimate scale reinforced by vegetation patterns, and by the mixed farming of dairying and crops with emphasis on potatoes. The rural region is characterised by homestead groups. Homestead groups are sited along roads or mid-way up slopes reflecting the need for ease of access in this undulating landscape form. A notable cultural landscape component comprises dry stone walls, which act as paddock boundaries. The spatial landscape organisation and vernacular nature of the rural scene is dated to post-1860s settlement. The townships of Robertson, Kangaloon and Burrawang have a number of nineteenth and early twentieth century buildings.

No heritage items identified in this Wingecarribee Heritage Study are located in the study area.

5.2.4 Wingecarribee Heritage Survey

In 2008, the Wingecarribee Shire Council (2022) undertook a survey to investigate the heritage significance of approximately 700 buildings and places within the Wingecarribee Shire. Council engaged heritage consultants to research each identified site and to evaluate its heritage significance. The consultants have recommended that nearly 400 of the investigated properties be made heritage items under the Wingecarribee LEP 2010.

None of the items listed on the Wingecarribee LEP 2010 are situated within the locality of Fitzroy Falls and are not within the study area.

5.3 Heritage Summary

As a result of heritage register searches no items of World, National, Commonwealth, State or Local heritage significance are located within the study area. One heritage-listed place is located outside the study area may be impacted by Project construction vehicles travelling to the site: Hampden Bridge (SHR 02024/LEP 241/LEP C4/RNE 1621). Historical research undertaken in Section 4 identified two potential heritage items within and adjacent to the study area: the former Barrengarry Cemetery and the former Bendeela Public School. No further potential heritage items were identified from reviewing previous heritage studies (above). Figure 5-1 provides the location of known and potential heritage items within the study area.

While identified as being on the margin of the study area, the Project area does not intersect with the former Barrengarry Cemetery, therefore it will not be assessed further. The following sections of the report will address the former Bendeela Public School and Hampden Bridge.

6. Site inspection

A targeted archaeological site inspection of former Bendeela Public School (Portion 216) was undertaken by Deborah Farina (Senior Heritage Consultant, Jacobs) with Jorja Vernon (Graduate Planner, Jacobs) on 17 April 2019, using the methodology outlined in Section 3.4. Weather conditions during the site inspection were fine and cool.

6.1 Former Bendeela Public School (Portion 216)

The former Bendeela Public School site is located to the west of the Bendeela Pondage and within the study area. The site is a sloped block located in bushland to the west of the village of Kangaroo Valley, and on the northern banks of the Kangaroo River. It is not accessible to the public, being part of the existing scheme. Access to the site was via a track from the Origin secure compound and a second locked gate.

Site inspection observations noted that the property had been in use recently, with several trees cut close to the ground, and refuse in the form of food/drink containers noted. It was also noted that current fencing does not follow the cadastral boundaries for Portion 216 (now Lot 216/DP751262) (Figure 6-1).

Figure 6-1. Fence running north to south in the centre of the property (Jacobs 2019)

No remains of buildings, or remnant building materials, were noted. The site looked relatively undisturbed; however, it was noted that vegetation was regenerated bushland. Bushfire is therefore likely to have burnt away any structures or materials left on the property.

Visibility of the ground's surface was moderate with several exposures noted across the site. However, no archaeological or cultural material noted. No other surface material, either structural or cultural material, was identified on site. Some leaf litter obscured some areas however was not thick. Other areas of the site were grassed. A gate post was noted at the southwestern portion of the site and appeared to mark an entrance; blue metal had been laid in a drainage ditch from the track to allow vehicular access to the block (Figure 6-2, Figure 6-3).

Figure 6-2. General view of Portion 216, looking northeast toward a vehicular entrance. Note blue metal allowing traction for vehicles in foreground (Jacobs 2019)

Figure 6-3. Gate post at vehicular entrance. Note the slope of the block in the background (Jacobs 2019)

It is unknown precisely where on the block the school buildings were. However, there was one area which was relatively level and therefore a suitable site for the school (Figure 6-4, Figure 6-5). It was located in the approximate centre of the site and has a rough earthen embankment to its northeast. It is unknown, however, whether this is a natural feature or whether the landform had been modified to accommodate the school. In addition, as no remains of any construction or building materials were noted on the site, it cannot be assumed that this was the former site of the school buildings.

Figure 6-4. Potential site for buildings, looking north (Jacobs 2019)

Figure 6-5. Potential site for school buildings, looking south (Jacobs 2019)

6.2 Aboriginal cultural heritage

Archaeological test excavations were undertaken over two days on 29 June and 30 June 2022 at the Bendeela Power Station, which was identified as having potential archaeological deposits. These were undertaken by Ryan Taddeucci (Senior Archaeologist, Jacobs), Matt Finlayson (Project Archaeologist, Jacobs) and representatives from the Registered Aboriginal Parties). This investigation is detailed in the *Shoalhaven Power Station Expansion – Aboriginal Archaeological Report* (Jacobs, 2022).

Five small ceramic fragments and one piece of glass were also recovered during sieving of excavated material from ACH TP1 and 2 in Works Area 6 (see Figure 1-2 for location of this area within the indicative Project layout). They were not believed to be of historic nature or associated with any historical sites or structures. Rather, they were likely the result of alluvial activities flood deposition or ground disturbances associated with modern construction activities.

As such, they will not be considered further as part of this assessment.

7. Archaeological assessment

The former Bendeela Public School (Portion 216) site in the Parish of Burrawang, to the west of the Bendeela Pondage (now Lot 216/DP751262) is located within the study area. Historical research indicated that a school once stood on this site, however there are no known plans of the school to assist in locating the precise site of the school.

Historical information notes that the school operated from 1878 until 1926, with several breaks in that period. As noted in Table 4-1, use of the school was substantially reduced after 1904. The original school building was constructed in 1878, and no information exists indicating that it was ever replaced or upgraded.

As noted in the historical context (Section 4.1.3), the only information regarding the school building construction is that it was of slab construction and constructed in 1878 by the local community using local materials. Slab constructions of that time were the cheapest and convenient constructions in the mid-19th century. An undated image of the school was published for the Kangaroo Valley Public School centenary (Figure 7-1), and describes the school as operating between 1876 and 1926. This photo conforms to the description Bray (2008, p. 15) gave of a small building with a chimney, a water tank and outhouse. However, the photograph appears to have a corrugated iron roof, rather than a shingled roof. A fence can also be seen in the background.

Figure 7-1. Bendeela Public School, unknown date (Kangaroo Valley Historical Society 1971)

The heritage listing for Fig Tree Farm building at Kembla Grange (see Figure 7-2) on the *Wollongong Local Environmental Plan 2009* notes:

> '*The slab dwelling was made from vertical timber labs split with maul and wedge. The base of the slab was chamfered and sat in a bottom plate. The top of the slab was also chamfered and house in a top plate. Both top and bottom plates were similar sizes to the slabs themselves. In some instances the slabs were joined by strips of tin plate nailed to cover the gaps. Internally the slabs were often covered with paper or in a more sophisticated instances the building would be lined with timer boards. The roof was bark. A bark ceiling was added if storage was required*' (Heritage NSW 2017b).

While it is difficult to tell from the photograph of the school, the slab hut construction appears therefore to have been directly on the ground. A fireplace and associate chimney were likely also built in the most expedient manner. As with the Fig Tree Farm slab hut, it can be assumed that there was no excavation

undertaken during the construction of the Bendeela Public School. It is therefore unlikely that there will be any archaeological evidence remaining of the school building and is concluded that there is little to no archaeological potential within the study area. However, the outhouse suggests that there was likely a pit latrine a short distance from the school.

Figure 7-2. Example of Fig Tree Farm slab hut (Wollongong LEP 6433) in the Illawarra (Heritage NSW 2017c)

8. Significance assessment

8.1 Assessment Criteria

Heritage significance in NSW is assessed using the Heritage Significance Criteria. If an item meets one of the seven heritage criteria described in Table 8-1, and retains the integrity of its key attributes, it can be considered to have heritage significance. The significance of an item or potential archaeological site can then be assessed as being of local or state significance. If a potential archaeological resource does not reach the local or state significance threshold, then it is not classified as a relic under the Heritage Act.

Table 8-1. NSW Heritage Significance Criteria

Criterion	Description	Short title
(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)	Historical significance
(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)	Associative significance
(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)	Creative/technical significance
(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	Social significance
(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)	Research potential
(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)	Rarity
(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)	Representatives

8.1.1 Former Bendeela Public School (Portion 216)

The only potential heritage item within the Project area is the former Bendeela Public School site. As this is not a site listed on any heritage inventory and is archaeological in nature, it is assessed against the suggested criteria for archaeological sites published by the Heritage Division to determine archaeological significance (NSW Heritage Office 1996a).

Table 8-2. Significance assessment for former Bendeela Public School Site

Criterion	Assessment
Archaeological research potential (NSW Heritage Criterion E)	Historical data states that the former Bendeela School was a slab construction built by the community from local materials. This implies that the material was primarily timber. The history of the site's land use is confined to its single use as a school, and any remains are therefore likely to represent that single occupation and for a limited time period (1878-1926). Even during that time, the school's occupation was limited – it was a public school from 1878 until 1908, after which it became a half-time school. It also closed completely between 1914-1919 because of the First World War, then closed for good in 1926. Given its construction and limited time of operation, it is considered unlikely that any significant archaeological remains are present on the property.

Criterion	Assessment
Associations with individuals, events or groups of historical importance (NSW Heritage Criteria A, B & D)	Although connected with the education of children from the rural community of Bendeela, it is not considered that this association could be characterised as of historical importance.
Aesthetic or technical significance (NSW Heritage Criterion C)	There are no known detailed plans of the school.
Ability to demonstrate the past through archaeological remains (NSW Heritage Criteria A, C, F & G)	As the archaeological research potential is considered to be negligible and does not satisfy this criterion.

Although historical records demonstrate that this site was once the site of a public school, there is no physical evidence remaining of the school. It is also assessed unlikely for there to be significant archaeological remains of the school on the property. However, if archaeological remains do exist, they are likely to be of low local significance. As no footings from the school building are expected, potential finds may comprise subsurface remains of the school chimney and outhouse, which would identify the location of the former school buildings, pit latrine associated with the outhouse where school refuse may be identified, and rubbish pits. Fence holes may also be present.

8.1.2 Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621)

Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621) is an historical sandstone bridge situated on Moss Vale Road, over Kangaroo River, to the south of the township of Kangaroo Valley. The following significance assessment (Table 8-3) and statement of significance (Section 8.1.2.1) has been taken verbatim from the SHI (Heritage NSW 2017a).

This historical bridge comprises a heritage item of state-level significance.

Table 8-3. Hampden Bridge (SHR 02024) Heritage Significance Criteria

Criterion	Assessment
Criterion A (Historical significance)	In service for over 110 years, on a route of major importance for the dairy industry of Kangaroo Valley and a route for communication and transport between both Sydney and inland centres and the south coast, Hampden Bridge facilitated the agricultural prominence of the Kangaroo Valley area in the first decades of the twentieth century. The application of a relatively sophisticated but uncommon structural design, in combination with elaborate (and structurally unnecessary) tower castellations and other embellishments, reflect the cultural importance afforded this crossing on what was then both a major route to the south of the state, and an area of emerging prosperity. The bridge now facilitates the growing importance of the area as a tourist destination. As a meeting and gathering place for the local Aboriginal people, the land occupied by Hampden Bridge is of historic significance. Kangaroo Valley was a place frequented as a meeting and gathering and the Dharawal (Tarawal or Thuruwal) travelled through the valley. The rock art sites nearby and camping areas are evidences of active Aboriginal occupation in this region. Hampden Bridge meets this criterion at a state level.
Criterion B (Associative significance)	Hampden Bridge, as a major work of design and construction and a rare application of the suspension bridge principles in NSW, is strongly associated with in particular, E.M. De Burgh, eminent design engineer in NSW, who designed the bridge and has today a bridge named after him over the Lane Cove River, near Macquarie Park in

Criterion	Assessment
	Sydney. He was also responsible for the design of the Maldon suspension bridge, completed in 1903. In 1913 he was appointed chief engineer for water supply and sewerage, and was responsible for the design and construction of the Cordeaux, Avon and Nepean dams (Sydney water supply), the Chichester scheme for Newcastle and the Umberumberka scheme for Broken Hill. In 1921-25 he was a member of the Federal Capital Advisory Committee and prepared the original plans for Canberra's water supply. The bridge construction is also associated with the prominent late nineteenth century stonework and construction specialists, Loveridge and Hudson, with their company name having carried into the twentieth century. Loveridge and Hudson founded in 1882 are also notable for their quarrying and application of the rarely deposited rock, trachyte (also known as Bowral tracyhte) which was used in Hampden Bridge (Meyers, 2009) as well in the construction of a number of historic buildings in Sydney (for example Queen Victoria Building and Equitable Life Assurance), Canberra (for example National Library and Treasury buildings) and the Southern Highlands (for example Bowral Courthouse). Hampden Bridge meets this criterion at a state level.
Criterion C (Creative/technical significance)	The bridge is a highly attractive and distinctive structure. It has outstanding landmark qualities, spanning a serpentine ravine and announcing its presence with magnificent castellated sandstone towers which are joined by an elliptically arched cross beam under which traffic passes. The structure forms a gateway to the Kangaroo Valley township and to the South Coast beyond along the road from Moss Vale. The construction of the bridge at the end of the nineteenth century was a major and technically challenging undertaking incorporating sophisticated structural engineering for its time. The early suspension bridge form is well suited to the site, with its deep, sheer sided ravine, and the necessity for a single long span was exemplified by loss of the previous two spanned, timber truss bridge to a major flood. Notwithstanding, the loss of some original fabric over time necessitated by maintenance and structural reasons, the defining components of the bridge (towers and suspension system) are readily visible and interpretable from deck level and from public spaces provided to each side of the bridge, its context and setting and in the gully below. The movement of the deck and cables as heavy traffic passes across the bridge is a distinctive experience for drivers, pedestrians and observers. The early suspension form clearly demonstrates the available technology and scope of construction at the time of its construction. It is a demonstration of the inventiveness of the early engineers in finding design solutions to develop infrastructure in daunting terrain. As such it ranks with other engineering feats such as the Zig Zag Railway at Lithgow. Hampden Bridge meets this criterion at a state level.
Criterion D (Social significance)	-
Criterion E (Research potential)	-
Criterion F (Rarity)	Hampden Bridge has rarity value at a State level as the only surviving timber decked vehicular suspension bridge from the nineteenth century. The bridge is a rare example of a historic type of road bridge of which few were ever constructed in NSW. It was the second major suspension bridge in NSW. As the sole surviving suspension bridge in NSW, it provides rare evidence of this bridge type and construction especially since the earlier Long Gully, Northbridge suspension bridge was replaced with a concrete arch bridge in 1929.It retains rare qualities of early suspension bridge design and technology which were not commonly applied elsewhere in the state or in other engineering structures.

Criterion	Assessment
	It provides clear demonstration of a point in bridge design evolution which was rarely utilised in NSW in the late nineteenth century despite the availability of the technology. It also has a rare and hence unusual group of anchor structures which have a high degree of aesthetic detail when most of the construction effort for them should have been focussed on their strength and function. Hampden Bridge is of significance for its rarity value at the state level.
Criterion G (Representatives)	-

8.1.2.1 Statement of significance

Hampden Bridge is of state significance as the second major suspension bridge in NSW, and as the only surviving timber decked vehicular suspension bridge constructed in the nineteenth century (1898). The bridge is associated with engineer Ernest Macartney de Burgh, and builders Loveridge and Hudson. Hampden bridge has the capacity to represent some of the key characteristics of a small class of Australian suspension bridges, both vehicular and footbridges; many of which do not survive, or do not survive in their original form. The Hampden Bridge also has historic significance because it facilitated the agricultural prominence of the Kangaroo Valley area in the first decades of the twentieth century. The form of the bridge, its relatively sophisticated structural design and elaborate tower castellations, reflects the cultural importance of this crossing at its time of construction, on what was then both a major route to the south of the state, and an area of emerging prosperity. The bridge now facilitates the growing importance of the area as a tourist destination. It is readily viewed and interpreted from the surrounding recreational areas and is held in high esteem by the local and wider community for its historic, aesthetic and technical qualities.

8.1.2.2 Physical description

The following description section is reproduced directly from Hampden Bridge Conservation Management Plan, CMP, by Worsley Parsons Services Pty Ltd, Feb 2011.

Hampden Bridge carries Moss Vale Road (B73) across the Kangaroo River in the picturesque Kangaroo Valley, 120 km southwest of Sydney. The bridge is located in an undulating river valley terrain, with a sheer sandstone face on its northern side and sandy inclined riverbank on the southern side, refer to Figure 8-1. The river flows westward under the bridge.

Hampden Bridge is a suspension bridge using steel cables, a timber deck and sandstone towers of Victorian Gothic style. The deck is stiffened by timber side trusses which are hinged at midspan. The bridge, with a clear main span of 77m, a sag in the cables of 15m, sandstone tower height of 16.8m and height above water also of 16.8m, is an impressive structure in the local landscape and has been a landmark icon of the region for more than 100 years. The bridge is a single lane for vehicular traffic, with two narrow pedestrian walkways; with a maximum truck load of 42.5 t, and no more than one truck on the bridge at a time.

Towers and Abutments

The towers, constructed mainly from sandstone quarried on the site are of Victorian Gothic style, similar to the (former) suspension bridge at Northbridge in Sydney. Each tower has two columns, joined by an elliptically arched crossbeam above traffic height. As described by The Kangaroo Valley Times of April 1896, "These towers will be about 42 ft high, built on concrete blocks resting on the present sandstone formation, the masonry to towers being 8 ft square. Each pair of towers will be connected by a wall containing an arched doorway 18 ft high, and as the top sides of the centre walls and heads of towers will be finished with battlement tops, the whole will present the appearance of a structure similar to the famous "Traitor's" gate of the Tower of London...".

Figure 8-1. Hampden Bridge, view of northern tower and parapet (Heritage NSW 2017a)

In section, the towers are formed by a solid mass concrete core and finished with sandstone blocks. They sit on mass concrete which in turn was cast onto excavations to solid sandstone. Immediately below the roller saddle bearings supporting the cables, the mass concrete is surmounted by bedstones composed of the rarely found hard trachyte weighing 3 t and quarried at Mount Gibraltar at Bowral. The cables enter the towers through openings close to the battlement height of the cross wall, and each tower is then topped with an enlarged battlement. The finish of the sandstone is a combination of smooth ashlar battlement details and rock-faced finish on the main column faces. The original design incorporated drainage gratings in the floor of the upper battlements.

Extending out from the base of each tower are sandstone parapet walls framing the approaches to the bridge. These are rubble filled, and topped with footpaths, kerbs and drainage grates on each side of the roadway. The parapet walls connect the towers to the cable anchorage structures. These consist of a shaft sunk some 25 ft into sound sandstone. At the bottom of each shaft is an enlarged chamber where riveted steel beams transfer the tensile forces from the cables to upthrust in the sandstone above. At the surface there are cast iron shoulder castings which turn the cables from inclined to vertical. The thrust forces from these are transferred into the sandstone bedrock via further 5 ton trachyte thrust blocks set in concrete. Each anchor pit is surmounted by a small crenelated turret, with an access cover adjacent. This allows access to the bottom of the pit via a full height access ladder.

One of the significant construction tasks was the excavation of drainage tunnels for the pit. On the Nowra side, the main drainage drive was some 100 ft, opening to the northeast of the abutment, with a cross cut to the western pit. On the Moss Vale side the main drive was 60 ft long. These tunnels were excavated by drilling and blasting.

Suspension Cables and Anchorages

The main cables of the bridge on each side, consist of fourteen 36mm diameter steel wire ropes, each with a specified tensile strength of 79.6 t. The fourteen ropes are grouped into two cables of 7 ropes each, and each rope consists of 6 strands, each having 7 wires. They are anchored vertically in pits at either end of the bridge and have facility for length adjustment. Each rope has its own anchorage yoke around which it passes and is

then fastened back to itself using 6 U-bolt clips. The fourteen yokes are connected by links and bolts to three anchorage girders using a pattern of 4-6-4, and these girders bear against the top of the anchorage pits.

From the anchorage, the ropes run upwards, over a shoulder casting which bears on the thrust block, leave the sandstone pilaster, run directly to the tower where they turn again on turning saddles which have roller bearings, and cross the span with a low point approximately one m above deck level. In plan the cables angle inwards from the anchorage pits till they leave the towers, and then form a curve back to the tower on the far side of the bridge. This curve is created by the plane of the suspension hangers. The maintenance files on the bridge, describe that in 1970 the cables were coated with Davidsons X3016 Anticorrosive primer, BA77 Lumatint and Line 176 Black Finish.

Suspension Hangers and Cross Girders

From the cables, suspension rods of varying length hang in an inclined plane at 6 ft centres to support the deck. Anchorage on the suspension cables is by way of suspension clips which have a U-bolt to support the eye at the top end of the hanger rods. They terminate through crossbeams which were originally timber, but are now boxes of galvanised steel formed by welding channel sections together. The hangers terminate with wedge-shaped washers, nuts and lock-nuts to allow adjustment of vertical profile.

Deck

Sitting on the cross beams, the current deck consists of longitudinal timber stringers supporting transverse decking of timbers topped by longitudinal timber sheeting, with a bituminous seal. The stringers are of varying depth to provide a camber to the deck.

As part of that work and to compensate for the loss of lateral and torsional stiffness of the new deck, a steel undertruss was installed. This connected to the abutment at each end and, by so doing, changed the manner in which the bridge was designed to articulate. It has since had a history of connection failures. Packed above deck level to allow drainage, there is a timber kerb on each side giving a clearance of 18 ft between kerbs. In its current configuration, plastic flaps are fixed approx 1m in from each kerb to provide pedestrian access to the bridge, leaving approx 3.5 m carriageway for traffic.

Deck Trusses

A suspension bridge is inherently a very flexible structure, with its vertical geometry (referred to as a funicular polygon which approximates a catenary shape which applies when the load on a cable is completely uniform) varying to balance the loads at each node. Stiffening of a minor nature is provided by the deck, but this is insufficient to prevent large vertical movements for heavy vehicles. To control this effect, this bridge is provided with stiffening trusses along each side of the deck. Each truss is pinned at the abutment and at the centre of the span. The truss form is of the Pratt truss configuration with timber top and bottom chords and timber verticals, with steel rod crossed diagonals. This configuration allows the truss to transfer loads from where it is applied in both directions to the elastic supports provided at each node by the suspension cables.

The top and bottom chords consist of pairs of horizontal timber whilst the verticals are single timbers. Splices in the chords have been affected with steel side plates, some of which may be original and some replaced. The original mild steel diagonal rods have been replaced with high strength steel rods (presumably grade 8.8 steel with an ultimate tensile strength of 800 MPa). These bear on galvanised steel thrust plates which are either original or similar to the original detail. To assist with durability, the chords and vertical tops have been capped with galvanised steel flashing.

Bearings and Centre Hinge

The bottom chords of the side trusses terminate at mid-span at a pin joining the two truss halves, and at the abutments in bearings. The northern bearing and centre pin are of fixed pin type whilst the southern bearing is of a swing link style, detailed to allow longitudinal movement. This movement is a combination of thermal and geometric due to articulation of the suspension system. Materials used in the bearings and other ferric components include cast and wrought iron and also cast and wrought steel.

In addition, the bridge consists of a number of other features of a secondary nature. This includes lighting which illuminates the towers. These are in vandal resistant boxes mounted outside the approach parapets. Downpipes and drainage was installed to remove water ponding in 1974 works. Galvanised wire mesh grilles are provided to prevent bird access to the suspension cable saddle areas on each tower. Security grilles are

provided to prevent entry to the anchor pit drainage tunnels. A mesh grille was added as a nut catcher at the end of each steel truss diagonal. A maintenance gantry is suspended from the underside of the bridge. The gantry is a lightweight steel truss structure supporting a personnel platform which can be skidded from the upstream to the downstream side of the bridge. Utility pipes include a water main on the eastern side at the roadway level and two PVC conduits on the western side of the bridge.

A number of plaques and historical markers are present either on the bridge or in its vicinity.

8.1.2.3 Hampden Bridge Conservation Management Plan

The *Hampden Bridge CMP* (WorleyParsons 2011) was completed in 2011 on behalf of the Roads and Traffic Authority of NSW (RTA, now Transport for NSW,TfNSW). In an assessment of significance of the bridge undertaken as part of this CMP, the bridge was found to be an item of state heritage significance through fulfilling criteria of the SHR. The statement of significance for the bridge was taken from the Section 170 Register listing and has been adopted as an adequate summary of its significance, including the statement that: The Hampden Bridge at Kangaroo Valley has historic, technical and aesthetic, and social significance and also has rarity value, as well as having the capacity to represent a small class of structures in the State.

The CMP identified few constraints to the long-term use of the bridge as an operational section of MR 261. However, management issues include the weight and number of heavy vehicles and the enforcement of the 42.5 t load limit for the bridge. The government authority intended to continue the operation of the bridge whilst conserving its heritage significance and had planned an essential maintenance program for 2011. This work involved the replacement of the deck; reinforcement of the abutments; replacement of the bearings; replacement of the mid-span pins; and improvements to the end restraints to the edge stiffening trusses.

The bridge currently operates with a 42.5 t load limit. Signage advising this load limit is provided at various points along MR 261. This roadway carried approximately 3,000 vehicles per day in 2011, six per cent of which heavy vehicles. This route is gazetted for general access only. The movement of heavy vehicles and the load limits for this route has been a subject of longstanding community debate. Thus, the dual concerns are the ongoing management/maintenance of the bridge and conservation of the bridge as an item of heritage significance to enable it to continue as an operational bridge. Of specific note to the movement of heavy vehicle movements, the conservation management plan noted that Stiffening of a minor nature is provided by the deck, but this is insufficient to prevent large vertical movements for heavy vehicles. To control this, the bridge is provided with stiffening trusses along each side of the deck. As such, the intactness of the bridge trusses is constantly being challenged by the stresses generated by heavy vehicles on the bridge. The limits placed upon heavy vehicle movement are to protect the form and fabric of the deck trusses, which were assessed as being of high significance components of the bridge.

Conservation policies were established to guide the ongoing maintenance and operation of Hampden Bridge so that it could retain and protect the above its heritage significance in the short, medium and long term. The policies were grouped under the following four categories: General; Conservation and maintenance; Management framework; and Interpretation. Those which are applicable to the Project are outlined in Table 8-4.

Table 8-4. Hampden Bridge conservation policies (reproduced from the CMP , WorleyParsons 2011)

No.	Policy	Action/ Implementation	Responsibility	Priority
General Conservation Polices				
7.1.1	**General Policy** That Hampden Bridge must be conserved as a place of heritage significance to the state of NSW, and the local and regional community. All elements of cultural significance that form part of Hampden Bridge are to be retained and conserved. The place is to be managed in accordance with the policies of this Conservation Management Plan and the guidelines and philosophy of the Australia ICOMOS *Burra Charter* (the Burra Charter)	Endorsement and implementation of the policies in this Conservation Management Plan	RMS	1
7.1.4	**Works Approvals** All actions, works, or development undertaken at the place should comply with relevant legislation, including the provisions of the EP&A Act, the Heritage Act, *State Environmental Planning Policy (Infrastructure) 2007*, *Deemed State Environmental Planning Policy - lllawarra REP 1986 No 1* and *Shoalhaven LEP 1985*	Preparation of necessary environmental assessments and applications	RMS	1
Management Framework Policies				
7.3.8	**Load Limit and Heavy Vehicle Monitoring** The existing heavy vehicle load limit of 42.5 t and the restriction of no more than one truck to be on the bridge at a time shall remain in force on the bridge. The RMS is to continue regular heavy vehicle monitoring and enforcement on MR 261 and to investigate options for identification and interception of overloaded vehicles. Consideration ought to be given to heavy penalties for breaches in relation to the impact on the heritage values of the bridge which are protected under the EP&A Act and the Heritage Act	Existing heavy vehicle load limit of 42.5t to remain in force. Heavy vehicle monitoring to continue and options investigated	RMS	1
7.3.10	**Heritage Training** That ongoing heritage management and conservation training be made available to managers, contractors and staff working on Hampden Bridge	Provision of training to managers, contractors and staff	RMS	1

9. Impact assessment

9.1 Direct impacts

The maximum disturbance area of the Project includes a small area in the southwest corner of Lot 216/DP751262, where ancillary works area Laydown/Works area 6 would be located. Proposed works in this works area would include land clearing and general construction use, such as construction material lay-down, site offices and work zones. No permanent above-ground infrastructure would be located within Lot 216/DP751262.

This lot has been identified as the site of the former Bendeela Public School (Portion 216). From the historic records the exact site of the former Bendeela Public School within Lot 216/DP751262 is unknown. Site inspection and assessment demonstrated that no physical evidence remain of the school, and archaeological potential the former Bendeela Public School is low.

Detailed design and construction planning would seek to minimise the footprint within Lot 216/DP751262 with the aim of avoiding any archaeological potential and would have a stop works protocol in place should unexpected finds be uncovered.

9.2 Indirect impacts

As there are no listed heritage items, or places of archaeological potential, situated along the tunnel alignments or within proximity of vibration-generating Project works, indirect heritage impacts are not anticipated. An assessment of vibration impacts of the Project has been carried out and documented in Technical Paper – Noise and Vibration provided as Appendix M of the EIS.

The closest listed historical heritage items to the Project is Kangaroo Valley (RNE 1589), situated approximately 230 m to the east of the study area. The Kangaroo Valley site comprises the valley in which settlement occurred in the 19th century, with villages, hamlets and farms dating to this period, including Hampden Bridge. As the Project seeks to duplicate the existing scheme visual heritage impacts to Kangaroo Valley are not anticipated.

9.3 Vehicle access route

There are no planned works occurring at Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621), and therefore would not be any direct impacts to the heritage item. However, incidental impacts to this heritage bridge may result from the use of non-OSOM vehicles on the bridge.

This heritage bridge shas small crenelated turrets with elliptically arched crossbeams, which act as doorways, at 5.4 m (18 foot) above the deck. Any vehicles which may near this height (inclusive of load with fully inflated tyres) may cause physical impacts to these crossbeams.

As per the *Hampden Bridge CMP* (WorleyParsons 2011), the heritage significance of Hampden Bridge must be conserved. All actions, including vehicle movements over the bridge, should comply with relevant legislation, including the provisions of the EP&A Act, the Heritage Act, *State Environmental Planning Policy (Infrastructure) 2007*, *Deemed State Environmental Planning Policy - lllawarra REP 1986 No 1* and *Shoalhaven LEP 1985*. To protect the form and fabric of the heritage bridge's trusses, the vehicle load limit is 42.5 t and only one heavy vehicle to cross the bridge at any one time (as per Section 8.1.2.2 and Table 8-4); this applies to both Project-related and non-Project related vehicles. The use of non-OSOM vehicles, such as fully occupied 28-seater busses and fully ladened 20 t dump trucks, must adhere to these limits.

The CMP does not address vibration from heavy vehicle movements over the bridge. The standards and the works typically addressed in vibration analysis considers earth moving equipment or equipment creating ground vibration near sensitive structures. The vibration caused by movements of vehicles on top of an historical bridge is therefore not applicable. As such, it is assumed that as long as there is no more than one truck on the bridge at any one time, and the weight does not exceed the maximum weight limit of the bridge, there are unlikely to be any impacts upon the bridge from vibration.

A Traffic and Transport Assessment has been carried out for the Project, documented in Technical Report – Traffic and Transport (Jacobs, 2022) provided as Appendix M of the EIS. The assessment identifies mitigation measures to manage potential traffic and transport impacts, including the preparation and implementation of a Construction Traffic Management Plan by the construction contractor. The Construction Traffic Management Plan will include confirmation of haulage routes and access.

9.4 Cumulative impacts

Cumulative impacts have the potential to occur when impacts from a Project interact or overlap with impacts from other Projects and can potentially result in a larger overall effect (positive or negative) on the environment, businesses or local communities. Cumulative impacts may occur during construction stages when Projects are constructed concurrently or consecutively. Projects constructed consecutively (or sequentially) can result in construction activities occurring over an extended period of time with little or no break in construction activities, potentially causing increased impacts and construction fatigue for local communities.

The extent to which another development or activity could interact with the construction of the Project would depend on its scale, location and/or timing of construction. Generally, cumulative impacts would be expected to occur where multiple long-duration construction activities are undertaken close to, and over a similar timescale to, construction activities for the Project, or where consecutive construction occurs in the same area.

The approach to assessing cumulative impacts for the Project is described in Chapter 6 of the EIS. The historic heritage impacts of the Project would be limited to the disturbance of unexpected archaeological remains within the study area (including those associated with the former Bendeela Public School site) and Hampden Bridge. There are no Projects identified through the cumulative impact assessment that are expected to have potential historic heritage impacts within the study area, or on the State listed Hampden Bridge heritage item, As such, no cumulative impacts to heritage items are expected as a result of the Project.

10. Mitigation measures

The following mitigation measures detailed in Table 10-1 have been developed to avoid and manage potential historic heritage impacts resulting from construction and operational Project activities.

Table 10-1. Historic heritage environmental management measures

Reference	Impact	Mitigation measure	Timing
HH1	Unexpected historical archaeology	Should any unexpected historical heritage, including archaeological relics, be uncovered during the course of the proposed works, works should stop, and the area cordoned off. If any heritage items (either on the surface or buried archaeological items) are discovered on land in the ownership of WaterNSW. WaterNSW must be notified about the discovery. A qualified archaeologist and, if necessary, Heritage NSW (in accordance with section 146 of the Heritage Act) should be contacted to assess significance and advise on further requirements before work can recommence	Construction
HH2	Historical heritage items	Prior to construction, design to avoid or minimise incidental physical impacts where possible to historical heritage. This includes the following site-specific management measures at Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621): ▪ Ensure the existing heavy vehicle load limit of 42.5 t is in place ▪ Ensure no more than one non-OSOM vehicles to be on the bridge at any one time ▪ Ensure all non-OSOM vehicles using the bridge have adequate height clearances ▪ Any accidental damage is reported to the site supervisor and advice sought from a qualified heritage specialist.	Pre-Construction and Construction
HH3	Unexpected historical archaeology and historical heritage items	Training and awareness. All Project staff and contractors are to attend, prior to their commencement of works, training on the historic heritage environmental management measures outlined here, including unexpected historical archaeology obligations. Training can include Project induction; toolbox talks and staff inductions	Pre-Construction and Construction

11. Conclusion

There are no listed heritage items within the study area and so impacts are not anticipated to World, National, Commonwealth, State or locally listed heritage as a result of the construction or operation of the Project. However, non-OSOM vehicles would access the construction site via the township of Kangaroo Valley. This route crosses the heritage-listed Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621), which is of state-level significance.

Desktop historic research was undertaken for the study area and a targeted site inspection was undertaken of the former Bendeela Public School site (Portion 216 at Lot 216/ DP751262). The former Bendeela Public School was located within a parcel of land that may be partially used for construction of the Project. No physical remains of the school were observed during the site inspection and assessment found that little to no archaeological potential existed in this area.

There are no other potential heritage items or areas of archaeological potential anticipated to be impacted, either directly or indirectly, by Project area. Therefore, any potential impact of the Project on historic heritage would be limited to the disturbance of unexpected archaeological remains (including those associated with the former Bendeela Public School site) and would be appropriately managed with an unexpected finds protocol.

While not part of the study area, Hampden Bridge (SHR 02024/LEP 241/LEP C4/s170 4301059/RNE 1621) would be utilised by non-OSOM vehicles, including 20 t dump trucks carrying deliveries, and 28-seater busses transporting workers, to the Project site. As such, there may be incidental impacts to this heritage item from the use of these vehicles. As such, it is recommended that incidental physical impacts be minimised through further consideration to be given to the total possible weight and maximum possible height of non-OSOM vehicles, and the erection of physical barrier protection and/or exclusion zones along the Hampden Bridge approaches to protect historical heritage item.

Additionally, training and awareness must be undertaken by all staff and contractors prior to their commencement of works, in relation to their historic heritage places and obligations.

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