

Appendix L

Aboriginal heritage

Executive Summary

The Great Western Highway is the key east-west road freight and transport route between Sydney and Central West New South Wales. Together, the Australian Government and the NSW Government are investing more than \$4.5 billion towards upgrading the Great Western Highway between Katoomba and Lithgow (the Upgrade Program). Once upgraded, over 95 kilometres of the Great Western Highway will be two lanes in each direction between Emu Plains and Wallerawang.

The Upgrade Program comprises the following components:

- Great Western Highway Upgrade – Medlow Bath (Medlow Bath Upgrade): upgrade and duplication of the existing surface road corridor with intersection improvements and a new pedestrian bridge (approved)
- Great Western Highway East – Katoomba to Blackheath (Katoomba to Blackheath Upgrade): upgrade, duplication and widening of the existing surface road corridor, with connections to the existing Great Western Highway east of Blackheath (approved)
- Great Western Highway Upgrade Program – Little Hartley to Lithgow (West Section) (Little Hartley to Lithgow Upgrade): upgrade, duplication and widening of the existing surface road corridor, with connections to the existing Great Western Highway at Little Hartley (approved)
- Great Western Highway Blackheath to Little Hartley: construction and operation of a twin tunnel bypass of Blackheath and Mount Victoria and surface road works for tie-ins to the east and west of the tunnel (the project).

Transport for NSW (Transport) is seeking approval under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) to upgrade the Great Western Highway between Blackheath and Little Hartley (the project).

The project would comprise the construction and operation of new twin tunnels around 11 kilometres long between Blackheath and Little Hartley, and associated surface road upgrade work for tie-ins to the east and west of the proposed tunnel portals.

The project would be located around 90 kilometres northwest of the Sydney central business district and located within the Blue Mountains and Lithgow local government areas.

The majority of the project would be located below ground generally along or adjacent to the west of the existing Great Western Highway between Blackheath and Little Hartley.

This report has been prepared as an addendum to the Great Western Highway Duplication - Katoomba to Lithgow PACHCI Stage 3: Aboriginal Cultural Heritage Assessment Report (Transport for NSW, 2021) provided in Annexure A (PACHCI 2021). The PACHCI 2021 was prepared for the Upgrade Program between Katoomba and Lithgow and was based on early design concepts for the Upgrade Program.

This report summarises the results of previous desktop and field assessment conducted as part of the PACHCI 2021 and additional Aboriginal archaeological survey undertaken for three areas identified as part of the project study area (PACHCI Addendum) that were outside the PACHCI 2021 study area. These areas are associated with the tunnel portals at Blackheath and Little Hartley; as well as the tunnel mid-point construction access at Soldiers Pinch. Refined construction footprints have been used to assess direct impacts to Aboriginal heritage. Parts of the Blackheath and Little Hartley sites will have already been impacted by the Katoomba to Blackheath Upgrade and Little Hartley to Lithgow Upgrade respectively prior to commencement of construction of the project.

The assessment presented in this report found that:

- no Aboriginal objects or PADs were identified within the Soldiers Pinch construction footprint and the area has been subject to substantial and widespread disturbance
- one previously unidentified Aboriginal site was identified within the Blackheath construction footprint, being Blackheath Portal Scar Tree 1 (#45-4-1200). It is anticipated that the site will be salvaged by the Katoomba to Blackheath Upgrade prior to construction of this project
- one previously unidentified Aboriginal site was identified in proximity to but outside the Little Hartley construction footprint, being Hammer Stone 1 GWH (#45-4-1201)
- two previously identified Aboriginal sites were reassessed near the Little Hartley construction footprint and were determined to be no longer PADs as per Section 5.4. The two previously identified sites are:
 - i. Hartley Grange 2 (#45-4-1190): determined to be an artefact scatter following the identification of surface artefacts. The site is outside the project construction footprint and no direct impacts are expected. Potential indirect impacts through construction vibration would be unlikely
 - ii. GWH12 (#45-4-1075): determined not to be a PAD and invalid.

It is therefore recommended that:

- no further assessment is required for the project
- if unexpected Aboriginal heritage items, including potential Aboriginal burials or skeletal material are uncovered during the works, all works in the vicinity of the find must cease. The Transport for New South Wales, 2022) will be followed.

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Acronyms and Abbreviations

ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIMS	Aboriginal Heritage Information Management System
ASR	Archaeological Survey Report
Code of Practice	Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW
DECCW	Department of Environment, Climate Change and Water
DPE	Department of Planning and Environment
GPS	Global Positioning System
GSV	Ground Surface Visibility
The Guide	The Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW
NP&W Act	The National Parks and Wildlife Act 1974
ICOMOS	International Council on Monuments and Sites
NSW	New South Wales
PACHCI	RMS Procedure for Aboriginal Cultural Heritage Consultation and Investigation 2011
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
RMS	Roads and Maritime Services
Transport	Transport for New South Wales

1. Introduction

1.1 Project context and overview

The Great Western Highway is the key east-west road freight and transport route between Sydney and Central West New South Wales (NSW). Together, the Australian Government and the NSW Government are investing more than \$4.5 billion towards upgrading the Great Western Highway between Katoomba and Lithgow (the Upgrade Program). Once upgraded, over 95 kilometres of the Great Western Highway will be two lanes in each direction between Emu Plains and Wallerawang.

The Upgrade Program comprises the following components:

- Great Western Highway Upgrade – Medlow Bath (Medlow Bath Upgrade): upgrade and duplication of the existing surface road corridor with intersection improvements and a new pedestrian bridge (approved)
- Great Western Highway East – Katoomba to Blackheath (Katoomba to Blackheath Upgrade): upgrade, duplication and widening of the existing surface road corridor, with connections to the existing Great Western Highway east of Blackheath (approved)
- Great Western Highway Upgrade Program – Little Hartley to Lithgow (West Section) (Little Hartley to Lithgow Upgrade): upgrade, duplication and widening of the existing surface road corridor, with connections to the existing Great Western Highway at Little Hartley (approved)
- Great Western Highway Blackheath to Little Hartley: construction and operation of a twin tunnel bypass of Blackheath and Mount Victoria and surface road works for tie-ins to the east and west of the tunnel (the project).

The components of the Upgrade Program are shown in Figure 1-1.

Transport for NSW (Transport) is seeking approval under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) to upgrade the Great Western Highway between Blackheath and Little Hartley (the project).

The project would comprise the construction and operation of new twin tunnels around 11 kilometres in length between Blackheath and Little Hartley, and associated surface road upgrade work for tie-ins to the east and west of the proposed tunnel portals.

The project would be located around 90 kilometres northwest of the Sydney central business district and located within the Blue Mountains and Lithgow local government areas (LGA).

The majority of the project would be located below ground generally along or adjacent to the west of the existing Great Western Highway between around Blackheath and Little Hartley.

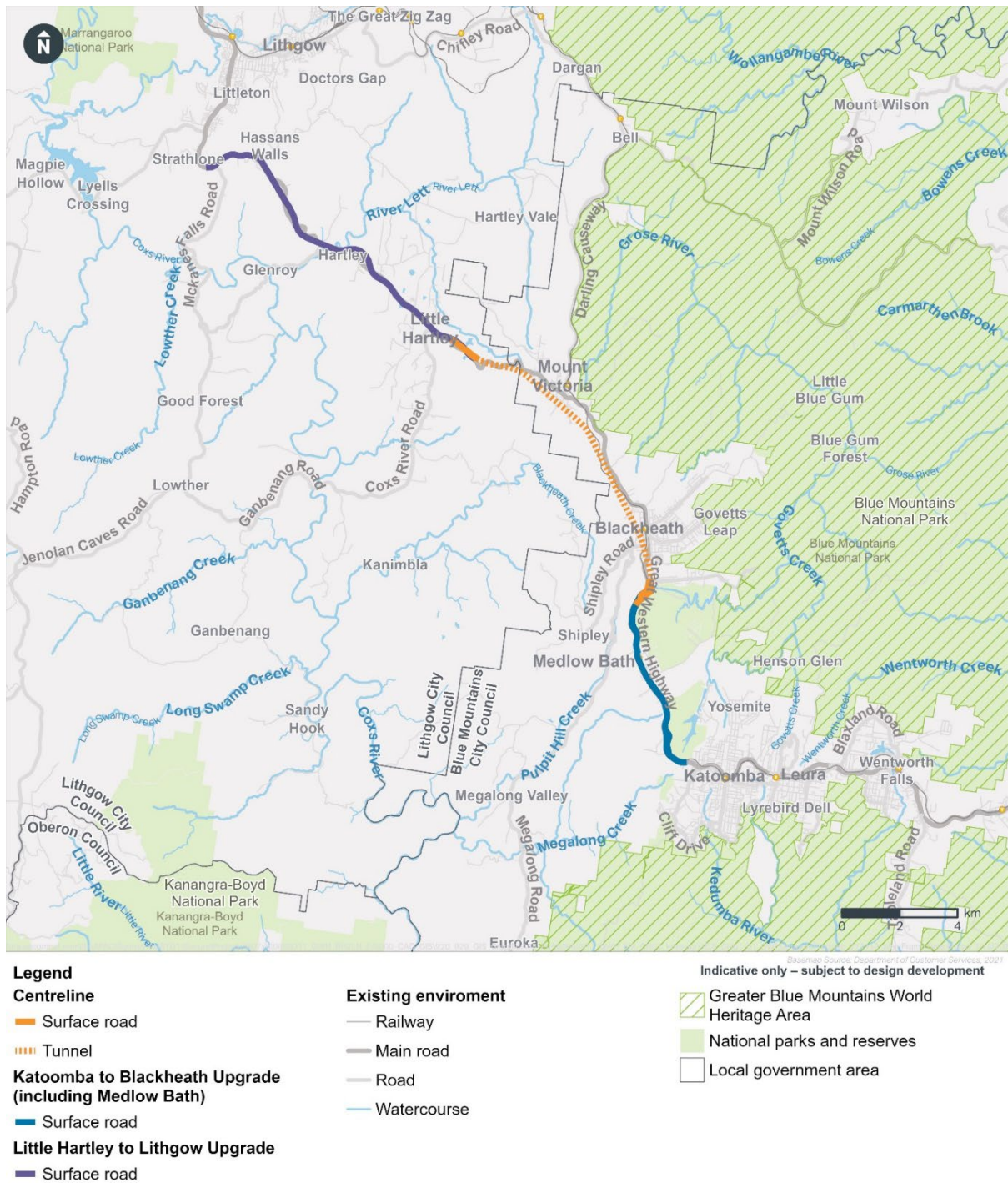


Figure 1-1 The Great Western Highway Upgrade Program

1.2 The project

1.2.1 Key components of the project

Key components of the project are summarised in Table 1-1 and shown in Figure 1-2. These components are described in more detail in Chapter 4 (Project description) of the environmental impact statement (EIS).

The indicative operational configuration of the surface road network at Blackheath and Little Hartley is shown in Figure 1-3 and Figure 1-4.

Subject to approval, the project is anticipated to be open to traffic in 2030.

Table 1.1 Key components of the project

Key project component	Summary
Tunnels	Twin tunnels around 11 kilometres in length between Blackheath and Little Hartley, connecting to the upgraded Great Western Highway at both ends. Each tunnel would include two lanes of traffic and road shoulders and would range in depth from just below the surface near the tunnel portals, to up to around 200 metres underground at Mount Victoria.
Surface work	<p>Surface road upgrade work would be required to connect the tunnels and surface road networks south of Blackheath and at Little Hartley. The twin tunnels would connect to the surface road network via:</p> <ul style="list-style-type: none"> mainline carriage ways and on- and off-ramps at the Blackheath portal, located adjacent to the existing Great Western Highway and south of Evans Lookout Road mainline carriageways at the Little Hartley portal, located adjacent to the existing Great Western Highway at the base of the western escarpment below Victoria Pass and southwest of Butlers Creek.
Operational ancillary facilities	<p>Operational infrastructure that would be provided by the project includes:</p> <ul style="list-style-type: none"> a tunnel operations facility adjacent to the Blackheath portal in-tunnel ventilation systems including jet fans and ventilation ducts connecting to the ventilation facilities one of two potential options for tunnel ventilation currently being investigated, being: <ul style="list-style-type: none"> ventilation design to support emissions via ventilation outlets; or ventilation design to support emissions via portals water quality infrastructure including sediment and water quality basins, an onsite detention tank at Blackheath and a water treatment plant at Little Hartley fire and life safety systems, emergency evacuation and ventilation infrastructure and closed circuit television lighting and signage including variable message signs and associated infrastructure such as overhead gantries.
Utilities	<p>Key utilities required for the project would include:</p> <ul style="list-style-type: none"> a new electricity substation at Little Hartley to facilitate construction and operational power supply a new pipeline between Little Hartley and Lithgow to facilitate construction and operational water supply other utility connections and modifications, including electricity substations in the tunnel.
Other project elements	<p>The project would also include:</p> <ul style="list-style-type: none"> integrated urban design initiatives landscape planting.

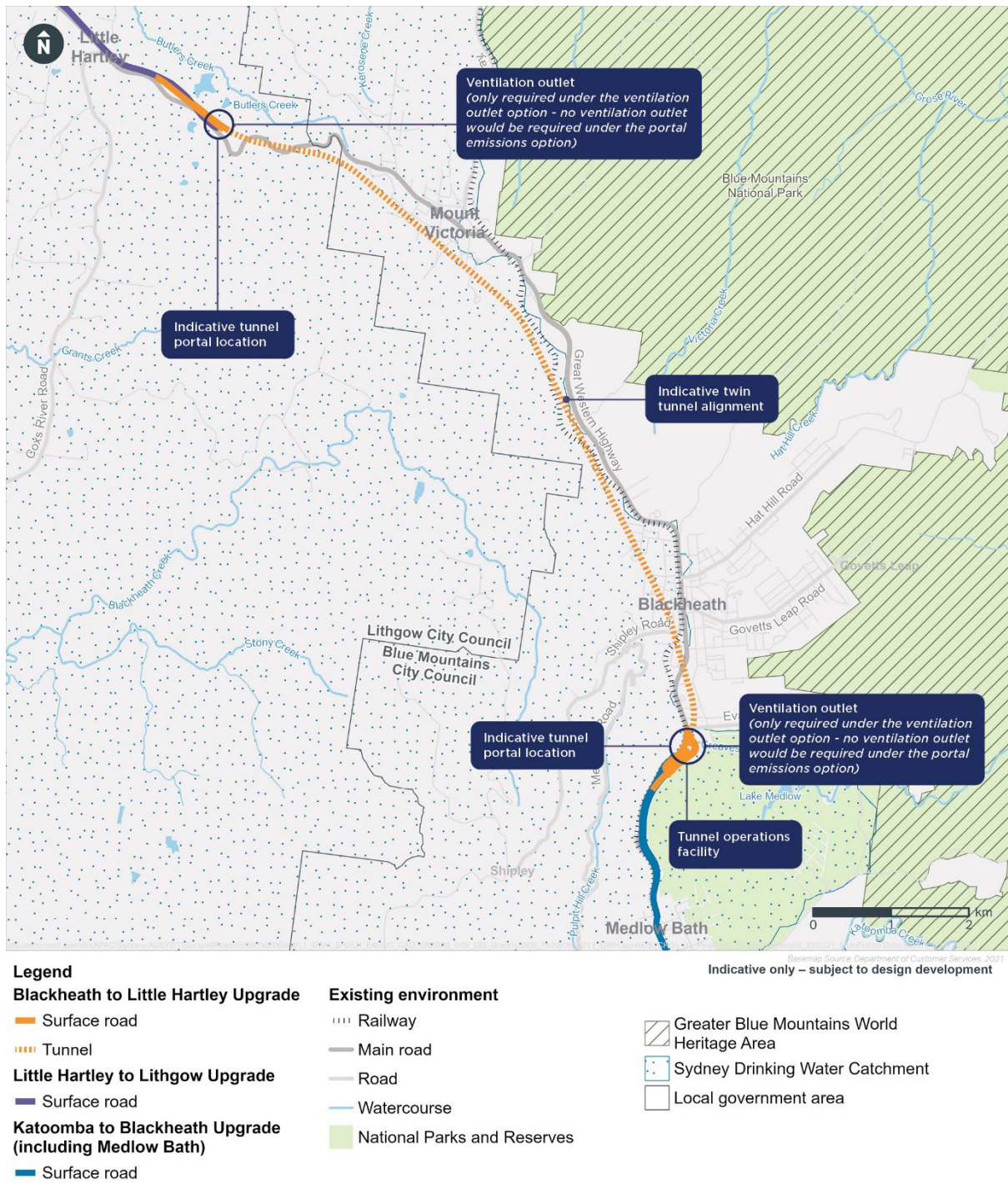


Figure 1-2 Overview of the project



Figure 1-3 Indicative operational configuration at Blackheath

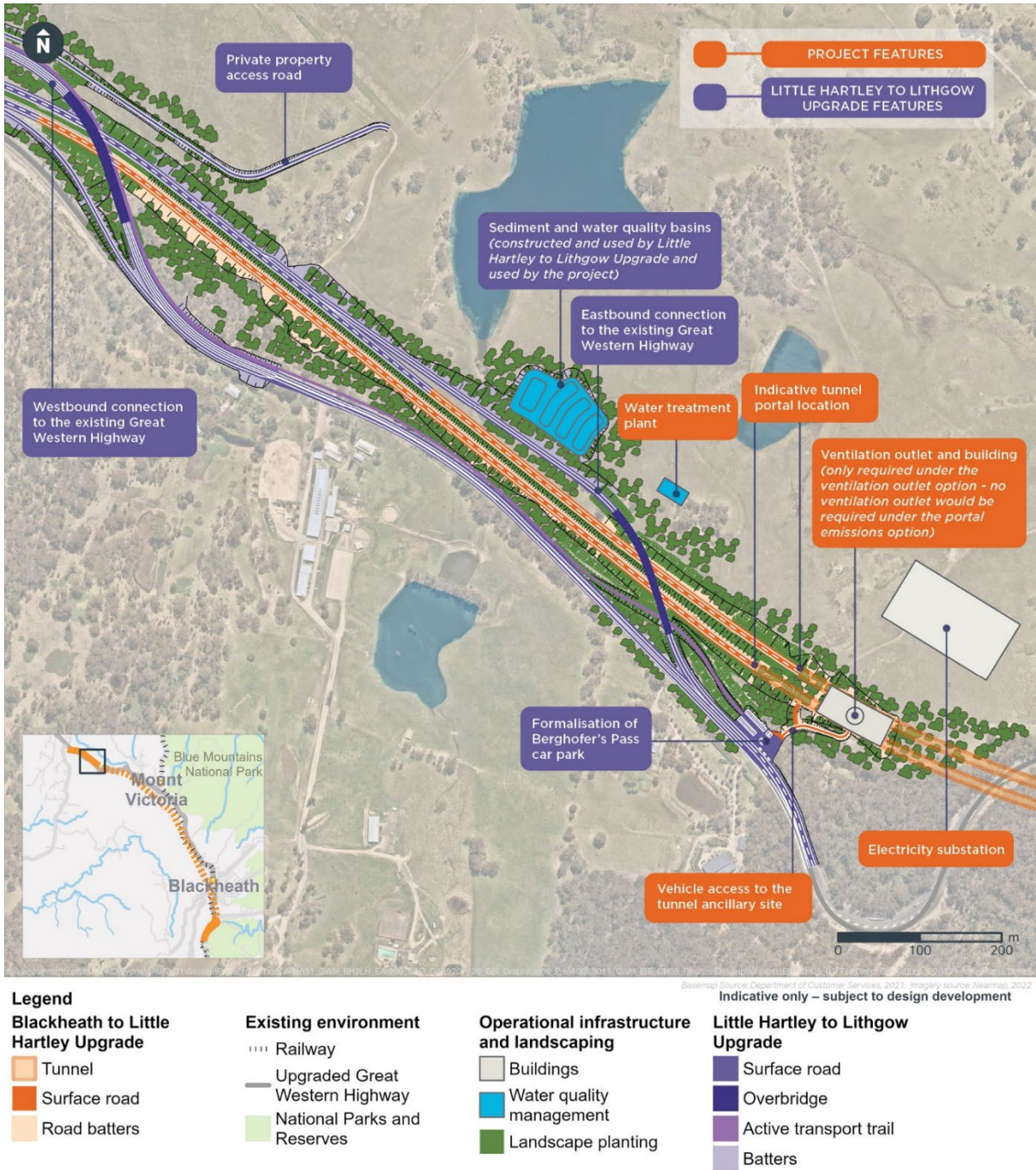


Figure 1-4 Indicative operational configuration at Little Hartley

1.2.2 Project construction

Construction of the project would include:

- site establishment and enabling works
- tunnel portal construction
- tunnelling and associated works
- surface road upgrade works
- operational infrastructure construction and fit-out, including construction of operational environmental controls
- finishing works, testing, and commissioning.

These activities are described in more detail in Chapter 5 (Construction) of the EIS.

The indicative construction footprint for the project is shown in Figure 1-5 to Figure 1-7, including construction site layout and access arrangements.

Construction of the project is expected to take around eight years. Subject to planning approval, construction is planned to commence in 2024 and be completed by late 2031; however, the project would be open to traffic by 2030.



Figure 1-5 Indicative construction footprint at Blackheath



Figure 1-6 Indicative construction footprint at Soldiers Pinch

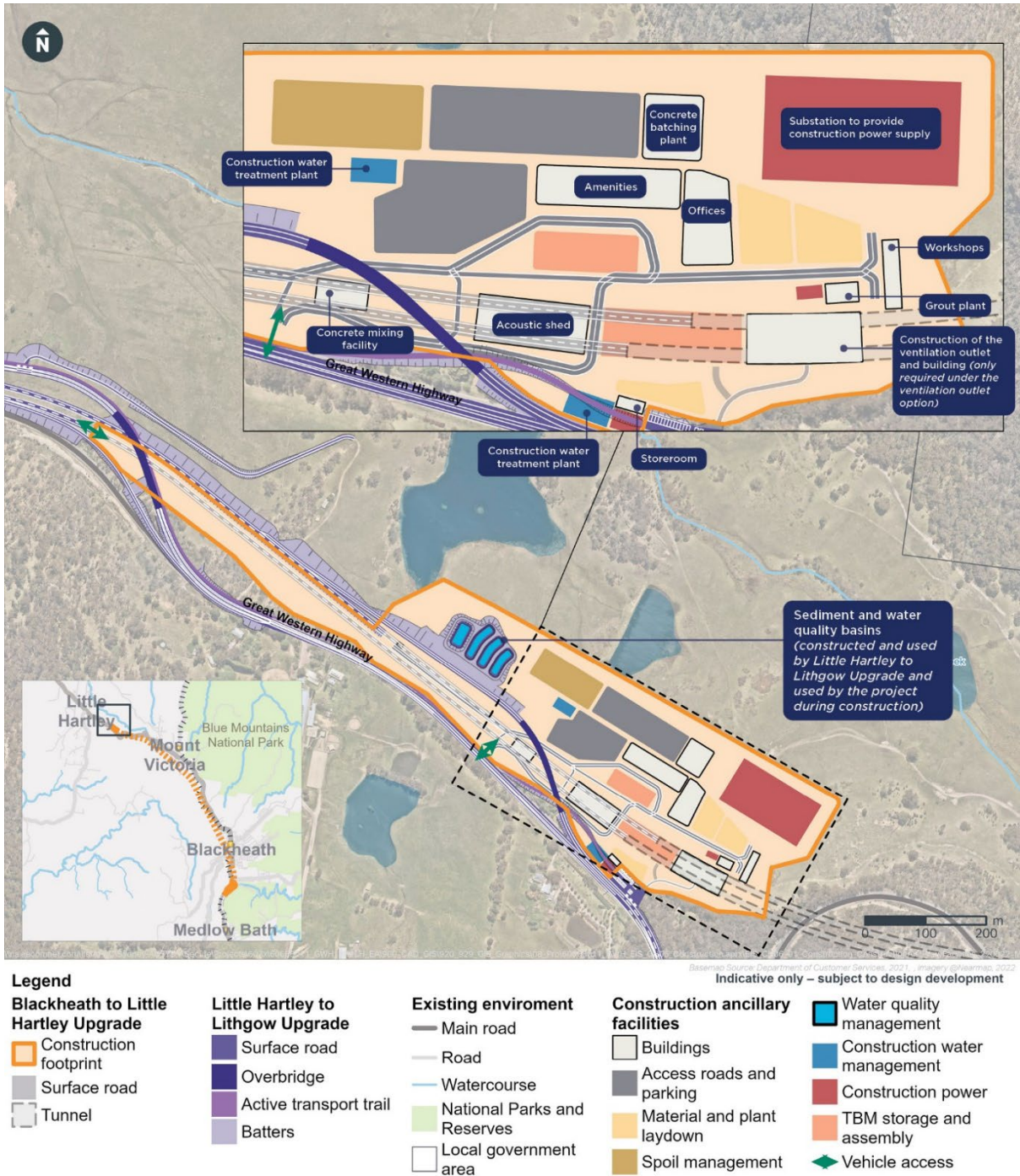


Figure 1-7 Indicative construction footprint at Little Hartley

1.2.3 Baseline environment

The Katoomba to Blackheath Upgrade and Little Hartley to Lithgow Upgrade adjoining the project to the east and west respectively would be under construction when construction of the project commences (refer to Figure 1-8). To minimise environmental impacts, parts of the Katoomba to Blackheath Upgrade and Little Hartley to Lithgow Upgrade construction footprints would be used to support construction of the project.

As a result, the following activities will be undertaken at the construction sites as part of the Katoomba to Blackheath and Little Hartley to Lithgow Upgrades:

- vegetation would be cleared
- topsoil would be levelled and compacted
- site access tracks would be established
- water quality controls such as water quality and sediment basins would be installed.

The environmental impacts associated with these works have been assessed as part of the Katoomba to Blackheath Upgrade and the Little Hartley to Lithgow Upgrade.

The construction footprint for these projects are shown in Figure 1-9 and Figure 1-10 and form the baseline environment considered at Blackheath and Little Hartley for the EIS.

No work is proposed at Soldiers Pinch as part of the Katoomba to Blackheath Upgrade or the Little Hartley to Lithgow Upgrade and therefore the existing environment forms the baseline environment for this EIS.

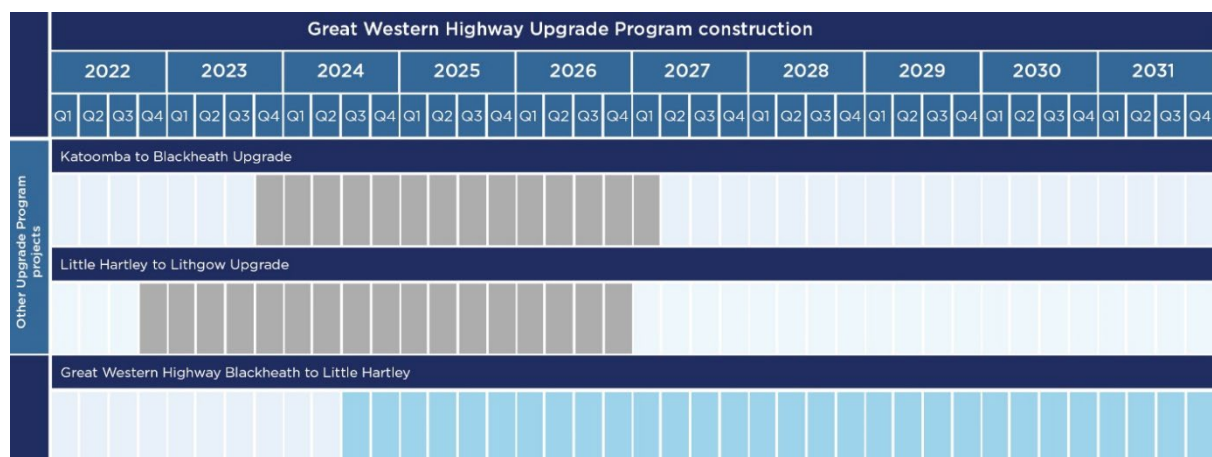


Figure 1-8 Great Western Highway Upgrade construction program

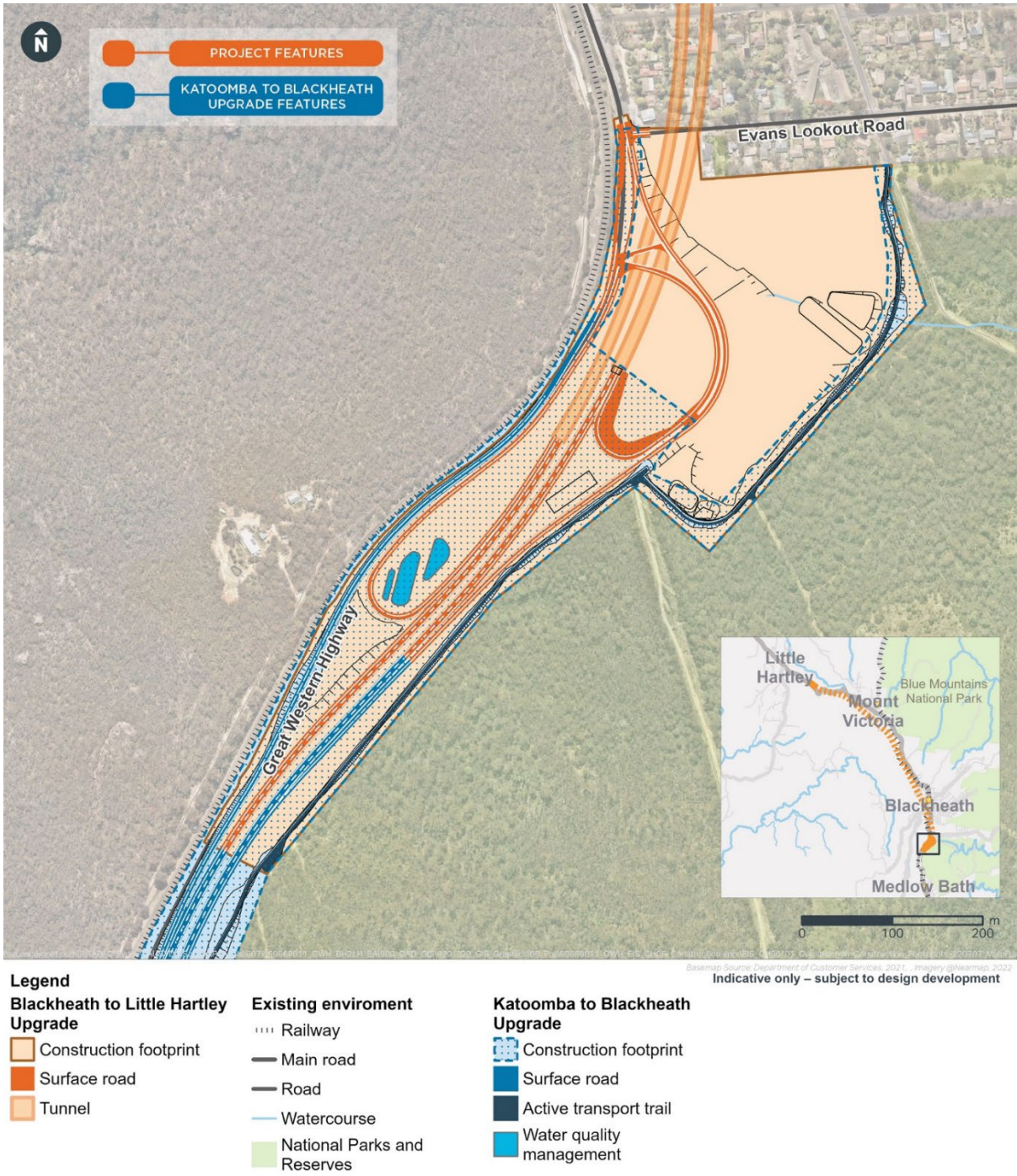


Figure 1-9 Baseline environment at Blackheath

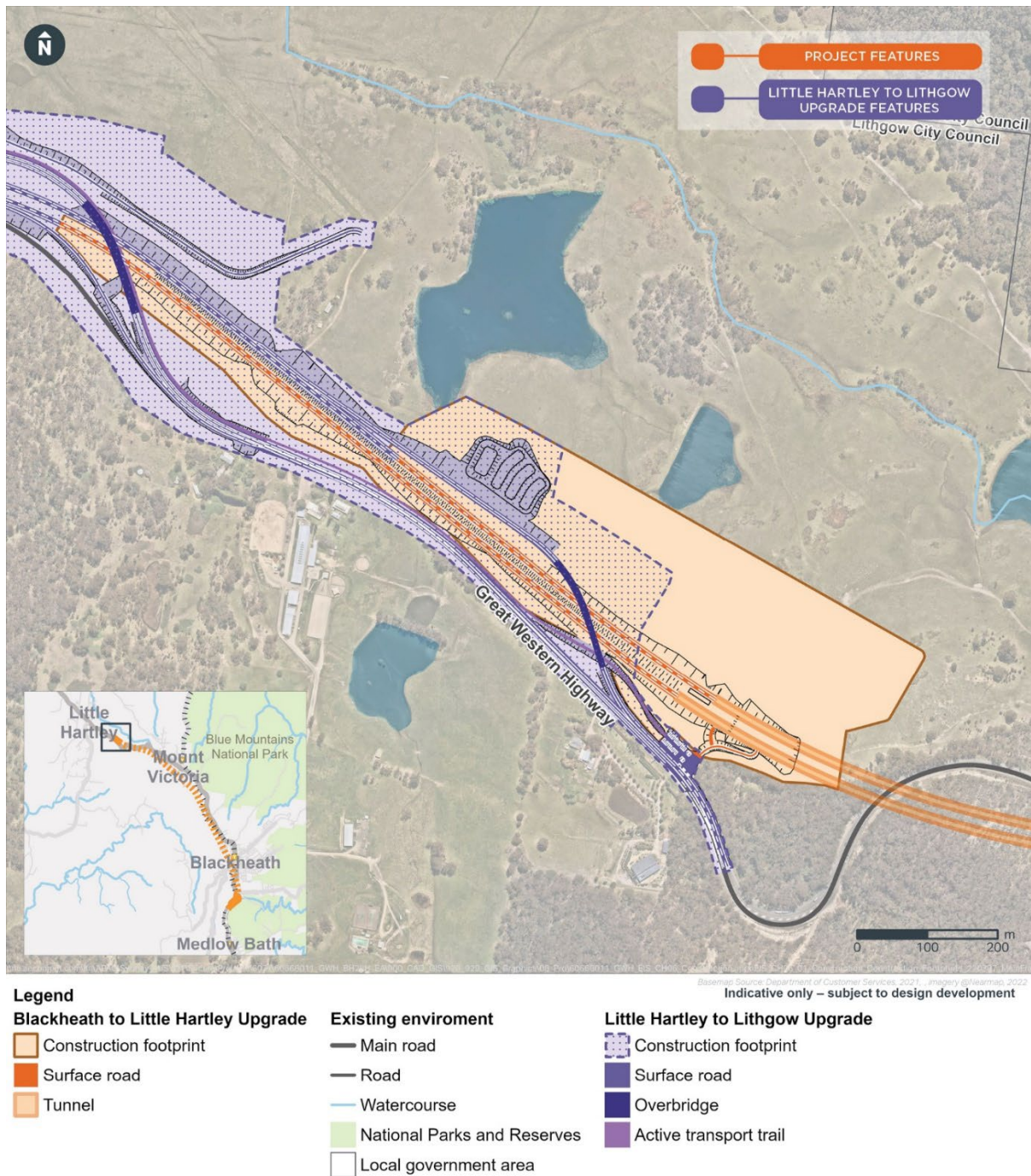


Figure 1-10 Baseline environment at Little Hartley

1.3 Purpose of this report

Transport for NSW has prepared the Great Western Highway Duplication - Katoomba to Lithgow PACHCI Stage 3: Aboriginal Cultural Heritage Assessment Report (PACHCI 2021) provided in Annexure A. The PACHCI 2021 forms the supporting documentation for an Aboriginal Heritage Impact Permit (AHIP) for the Katoomba to Blackheath Upgrade and the Little Hartley to Lithgow Upgrade projects.

This report has been prepared as an addendum to the PACHCI 2021 prepared for the Upgrade Program, and specifically considers impacts relevant to the Blackheath to Little Hartley Upgrade (the project). It also includes

additional assessments for areas not previously considered in the PACHCI 2021. It outlines the results of previous desktop assessment conducted for the PACHCI 2021 and additional Aboriginal archaeological survey undertaken for three areas identified as part of the project study area assessment (at Blackheath, Soldiers Pinch and Little Hartley).

This report also describes the design process to assist with the interpretation and integration of intangible Aboriginal cultural values collected during Aboriginal consultation and (refer to Section 7.3).

1.3.1 Assessment requirements

The Secretary's environmental assessment requirements issued by the NSW Department of Planning and Environment (DPE), relating to Aboriginal heritage and where these requirements are addressed in this technical report are outlined in Table 1.2.

Table 1.2 Secretary's environmental assessment requirements – Aboriginal heritage

SEARs		
Desired performance outcome	Requirement	Section where addressed in report
8. Heritage – Aboriginal Cultural Heritage The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places.	1. Identify and assess the direct and/or indirect impacts to the significance of:	
	(a) Aboriginal places, objects and cultural heritage values (including landscapes of cultural value), as defined under the <i>National Parks and Wildlife Act 1974</i> and in accordance with the principles and methods of assessment identified in the current guidelines; and	Sections 3, 4, 5 and 6
	(b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan.	Sections 3, 4, 5 and 6
	2. The assessment must:	
	(a) identify the potential for unknown Aboriginal cultural heritage in the form of submerged terrestrial sites;	Section 4 and 5
	(b) provide a discussion of alternative locations and design options that have been considered to reduce impacts to Aboriginal places, objects and cultural heritage values; and	Section 7.1
	(c) describe the management measures to avoid and minimise impacts to Aboriginal places, objects and cultural heritage values.	Sections 8.2
	3. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, meeting the minimum qualification requirements specified in section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010).	Section 1.5

SEARs		
	4. Identify and describe the Aboriginal cultural heritage values that exist across the whole area that would be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). The assessment of Aboriginal cultural heritage values must include a surface survey and the results of the survey used to inform the need for test excavation. Results of the surface surveys and test excavations must be documented in the ACHAR. The identification of cultural heritage values must be conducted in accordance with the <i>Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW</i> (DECCW, 2010), and guided by the <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW</i> (DECCW, 2011).	This report
	5. Consultation with Aboriginal people must be undertaken and documented in accordance with the <i>Aboriginal cultural heritage consultation requirements for proponents</i> (DECCW, 2010). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.	Section 3.2
	6. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to Heritage NSW.	Sections 7 and 8
	7. The ACHAR must outline the procedures to be followed if Aboriginal objects or Aboriginal burials or skeletal material are found.	Section 8.2

1.4 Assessment methodology

1.4.1 Relevant guidelines and policies

This report has been prepared in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime, 2011). The assessment of harm in this report has been guided by the definition of harm in the *National Parks and Wildlife Act 1974* (NP&W Act), the requirements of Section 90K (1) (b) of that Act and the guidance in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (DECCW, 2011). Section 90K (1) (b) states that when making a decision in relation to any AHIP application, consideration should be given to the actual or likely harm to Aboriginal objects that will take place as a result of the proposed activities.

Following on from this, the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (DECCW, 2011) identifies two types of harm: direct (occurring as a direct result of any activity which disturbs the ground, generally considered to be construction works and certain mitigation activities); and indirect (harm

to objects that are not within the area of the proposed activity, but that may be impacted as a result of the proposed activity).

Examples of direct harm includes (but is not limited to) removal of Aboriginal objects through construction or earth moving, as well as mitigation activities like 'movement' (where surface artefacts are moved within but not out of a site), 'excavation' (usually archaeological excavation), 'community collection' (where objects are removed by members of the Aboriginal community).

Examples of indirect harm includes (but is not limited to) impacts associated with construction vibrations and changes to vistas/landscapes.

The majority of potential impacts to Aboriginal sites within and adjacent to the construction footprint may occur during the construction phase of the project. Potential impacts may include:

- 'direct' impacts being the removal, modification or destruction of an Aboriginal site
- 'indirect' impacts associated with construction vibration generated by tunnelling or surface works and the settlement of land due to tunnelling below or in proximity to Aboriginal sites
- 'indirect' impacts associated with Aboriginal site setting (visual impacts, changes to vistas/landscapes), changes to ongoing use or environmental association.

The 'degree of harm' is categorised as:

- "total", meaning the entire site would be harmed
- 'partial', meaning part of the site would be harmed
- 'none', meaning there would be no movement of any Aboriginal object from a site or within a site, including covering sites by burial or inundation.

The 'consequence of harm' makes reference to the loss of heritage value and is defined here as the loss of cultural significance taking into account the five heritage values under the Burra Charter. Loss is categorised as:

- 'total loss of value', meaning the site is destroyed to the extent that its embodiment of heritage value is irretrievably lost
- 'partial loss of value', meaning the site is harmed to the extent that there is incomplete representation of its original fabric, retaining some potential for the site to be appreciated by present and future generation
- 'no loss of value', meaning that the site retains its full potential to be valued and enjoyed by present and future generations.

The project would affect land within the Blue Mountains and Lithgow LGAs. The Lithgow Local Environmental Plan 2014 and Blue Mountains Local Environmental Plan 2015 include provisions relating to Aboriginal heritage.

Part 5 Section 5.10 of the Local Environment Plans (LEPs) deals with heritage conservation within the area covered by the LEP.

The objectives of this clauses are as follows:

- (a) to conserve the environmental heritage of Lithgow
- (b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings, and views
- (c) to conserve archaeological sites
- (d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

1.4.2 Key assumptions

This report is intended to be read in conjunction with the PACHCI 2021 provided in Annexure A. Background information, details of archaeological survey, and other site information reported in the PACHCI 2021 have only been repeated in this report where required.

The scope the PACHCI Addendum is based on information supplied by the proponent and existing, publicly available, environmental and archaeological information. No independent verification of the results or interpretations of externally sourced reports was completed, except where archaeological investigation indicated inconsistencies. The Aboriginal Heritage Information Management System (AHIMS) data was provided by Heritage NSW and information in this report reflects the scope and the accuracy of the supplied AHIMS data. This report is limited to an assessment of Aboriginal objects and places in accordance with Stage 2 of the PACHCI and the Code of Practice.

1.5 Report authorship and qualifications

This report has been prepared by Matt Finlayson (Project Archaeologist, Jacobs), Pauline Ramsey (Project Archaeologist, Jacobs) and Jake Ferguson (Graduate Archaeologist, Jacobs). Technical review was conducted by Ryan Taddeucci (Senior Archaeologist, Jacobs) and Fran Scully (Principal Archaeologist, Jacobs). All are suitably qualified heritage consultants.

1.6 Study area

The Upgrade Program study area identified in the PACHCI 2021 incorporates the maximum area that may be disturbed during the construction and operation of the Upgrade Program.

The project study area identified for this report includes the additional areas identified for further assessment including Blackheath, Soldiers Pinch and Little Hartley. The details of these areas are as follows:

- Blackheath study area – located between Brightlands Avenue, Blackheath and the Water NSW Special Catchment Area to the south
- Soldiers Pinch study area – including most of Lot 7300 DP 1129198, south of Browntown Oval
- Little Hartley study area – including land within the boundaries of Lot 1 DP 587763, Lot 1 DP 840442, Lot 279 DP 751644 and Lot 7313 DP 1162788, found at 2200 Great Western Highway, Little Hartley, NSW.

An outline of these areas is shown in Figure 1-11.

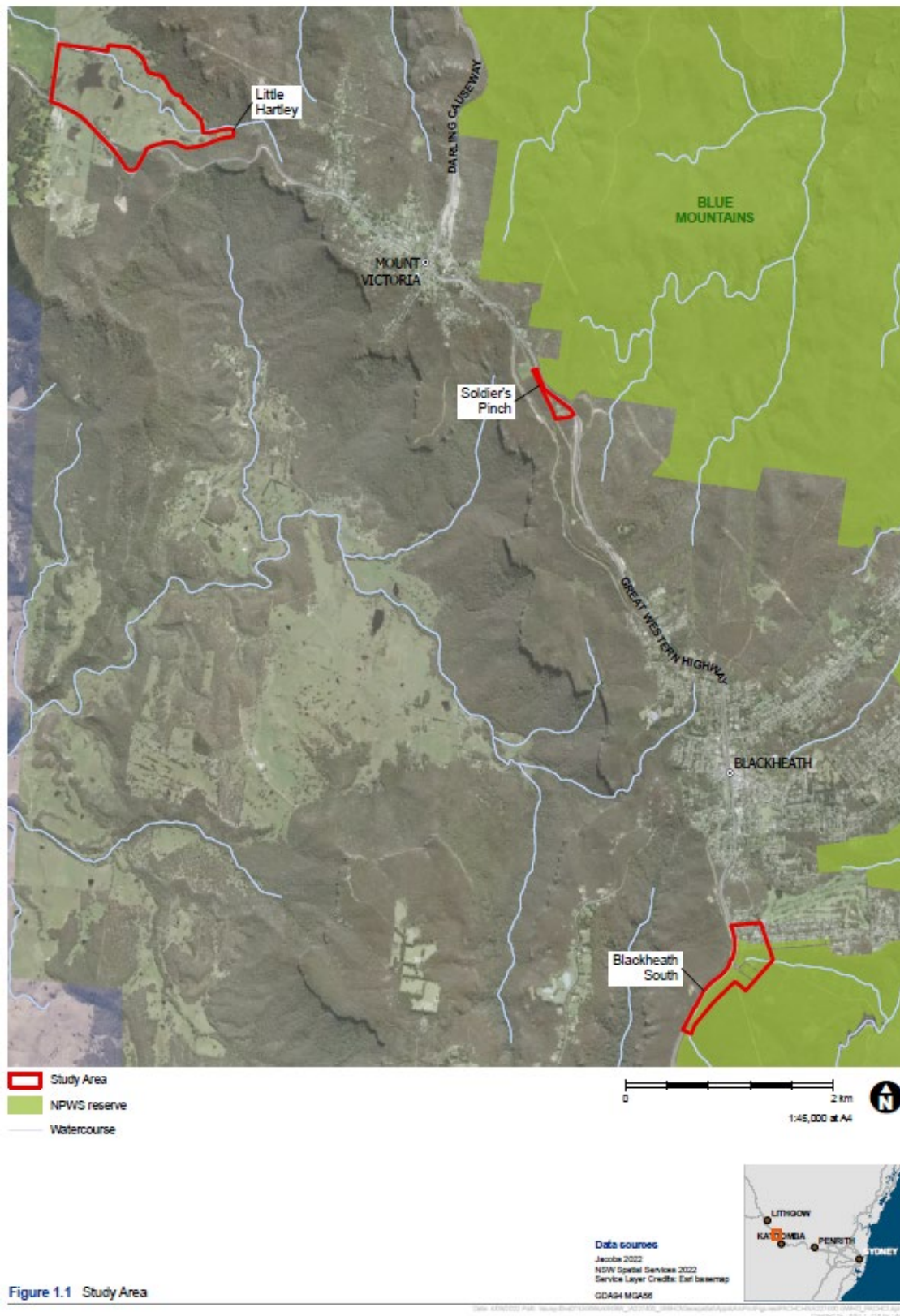


Figure 1-11 Study area

2. Environmental and archaeological context

2.1 Geology and soils

The project would be located generally to the south west of the existing alignment of the Great Western Highway corridor located in the Upper Blue Mountains. The Upper Blue Mountains contain valleys which have been incised by tributaries of the Grose River into Middle Triassic sedimentary rocks (Figure 1-11). As a result, escarpments rising above an undulating plain have been formed with the Newnes Plateau to the north, Mount Victoria, Mount York and Sugarloaf Mountain to the east and Hassans Walls to the northwest (Comber Consultants 2009: 22).

The Blue Mountains consist of a mountainous, sandstone plateau located on the western edge of the Sydney Basin (Keith and Benson 1988: 109). The sandstone plateau rises to around 1100 metres near Mount Victoria and terminates in a north-south line of cliffs along the eastern side of the Hartley, Kanimbla and Megalong Valleys. The plateau consists of the Narrabeen Group consisted up of undifferentiated sandstone, shale, and tuff.

2.2 Historic land use

Within months of settlement in Sydney cove in 1788, colonists looked toward the major barrier separating them from the west, the Blue Mountains. The creation of the first road through the mountains by William Cox's convicts set up the foundation for land use within the Blue Mountains. The project area follows a route that has been in use as a transport footprint since the early nineteenth century. The first European crossing of the Blue Mountains took place in 1813. A track was created the following year, this route followed the present alignment of the Great Western Highway and has been subject to maintenance and upgrade works through to the present. Substantial works were undertaken to upgrade and re-align the road in the 1830s, with the later addition of a railway line in the 1860s which followed a parallel alignment to the highway. The project area runs through four significant areas of past land use.

2.3 AHIMS search results

As part of the PACHCI 2021, an initial search of the AHIMS database was undertaken in 2019. An updated search was undertaken in 2021. 36 registered Aboriginal sites were identified within search area.

A further search of the AHIMS database was undertaken for this report on 23 June 2022 by Easting 232404, 249434 to Northings 6267004, 6288908 (#695140) and is included in Annexure B. Within the search area, a total of 93 Aboriginal sites were identified (see Table 2.1), of which seven are located within the study area for the project (see Table 2.2 and Figure 2-1).

The most frequent site feature within the 93 AHIMS search results is 'Artefact' with 51 occurrences. The remaining sites have a frequency of 1 – 5, however it is noted that numerous site features overlap which has provided a wider range of results.

While the majority of sites have been recorded in proximity to the existing Great Western Highway, numerous sites have also been recorded in the nearby Megalong Valley, including a large number of 'Closed' sites indicating likely sandstone shelter sites.

Great Western Highway Blackheath to Little Hartley
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Table 2.1 Frequency of site features from AHIMS data

Site Feature	Frequency	Percentage
Aboriginal Resource and Gathering, Art	2	2%
Aboriginal Resource and Gathering, Art, Artefact	1	1%
Aboriginal Resource and Gathering, Art, Artefact, Hearth	1	1%
Aboriginal Resource and Gathering, Artefact	4	4%
Aboriginal Resource and Gathering, Artefact, Art	1	1%
Aboriginal Resource and Gathering, Artefact, Art, Hearth	1	1%
Aboriginal Resource and Gathering, Artefact, Grinding Groove	1	1%
Art (Pigment or Engraved)	4	4%
Art (Pigment or Engraved), Artefact	3	3%
Artefact	51	55%
Artefact, Aboriginal Resource and Gathering	1	1%
Artefact, Aboriginal Resource and Gathering, Art	1	1%
Artefact, Modified Tree	2	2%
Artefact, Water Hole	1	1%
Burial	1	1%
Grinding Groove	2	2%
Habitation Structure and PAD	5	5%
Habitation Structure, PAD, Modified Tree	1	1%
Habitation Structure	2	2%
Modified Tree	4	4%
Ochre Quarry	2	2%
Nil	2	2%
Total	93	100

Table 2.2 Sites within the project study area

Site Name (ID)	Datum	Easting	Northing	Feature
GWH12 Great Western Highway (#45-4-1075)	GDA	241715	6281786	2 Artefacts
GWH13 Great Western Highway (AHIMS #45-4-1076)	GDA	241994	6281238	1 Artefact
GWH14 Great Western Highway (AHIMS #45-4-1077)	GDA	242183	6281267	30 Artefacts
GWH15 Great Western Highway (AHIMS #45-4-1078)	GDA	242313	6281100	Artefact
GWH16 Great Western Highway (AHIMS #45-4-1079)	GDA	242447	6281047	30 Artefacts
GWH17 Great Western Highway (AHIMS #45-4-1080)	GDA	242612	6281011	100 Artefacts
Great Western Highway (GWH) 44a (#45-4-1112)	GDA	242409	6280911	1 Artefacts

Great Western Highway Blackheath to Little Hartley
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It is noted that the PACHCI 2021 determined that the sites GWH 13 Great Western Highway (AHIMS #45-4-1076), GWH 14 Great Western Highway (AHIMS #45-4-1077), GWH 15 Great Western Highway (AHIMS #45-4-1078), GWH 16 Great Western Highway (AHIMS #45-4-1079), GWH 17 Great Western Highway (AHIMS #45-4-1080) and GWH 44a Great Western Highway (AHIMS #45-4-1112) are invalid sites. Therefore, they have not been considered further.

AHIMS sites are not presented in the public exhibition version of this appendix.

Figure 2-1 AHIMS registered sites within the project study area

2.4 Predictive model

The following predictive model is extracted from the PACHCI 2021 and is determined to be applicable to the current study. This data has been synthesized into a visual representation of the predicted archaeological constraints within the study area as shown in Figure 2-2.

Katoomba to Mt Victoria (ca. 17.2 kilometres) comprises Narrabeen Sandstone forming abrupt scarp edges and sandstone outcrops exposed within the dissected sandstone plateau landform pattern. The Upgrade Program passes along the ridgetop existing road reserve, with a new section dipping into valley head upper slopes close to Katoomba and new escarpment slope by Victoria Pass. Aboriginal site predictions include (ordered from most likely to not anticipated):

- rock shelters are anticipated on slopes at valley heads and Victoria Pass
- pigment rock art may occur within rock shelters
- grinding grooves may occur on sandstone surfaces, most likely dipping into water
- scarred trees may occur, but rarely
- stone artefact sites in open contexts may occur, but rarely in the general environment. They are more likely in association with hanging swamps on the plateau top
- engraved rock art is not anticipated due to the unsuitability of Narrabeen sandstone compared to Hawkesbury sandstone which occurs outside the study area between Linden and Glenbrook
- other site types not anticipated.

Mt Victoria to Hartley (ca. 7.2 kilometres) comprises Shoalhaven Sandstone, shale and conglomerate with markedly reduced relief with rolling hills landform pattern.

- open stone artefact sites are anticipated as surface expressions of underlying low density (up to 10 artefacts per square metre) artefact distributions within topsoil in association with watercourses. This is suggested by the abundance of small open stone artefact site recordings in the 2011 corridor survey by Stening
- grinding grooves may occur on sandstone surfaces, most likely dipping into water
- scarred trees may occur but rarely
- rock shelters are not anticipated
- rock art is not anticipated
- other site types are not anticipated.

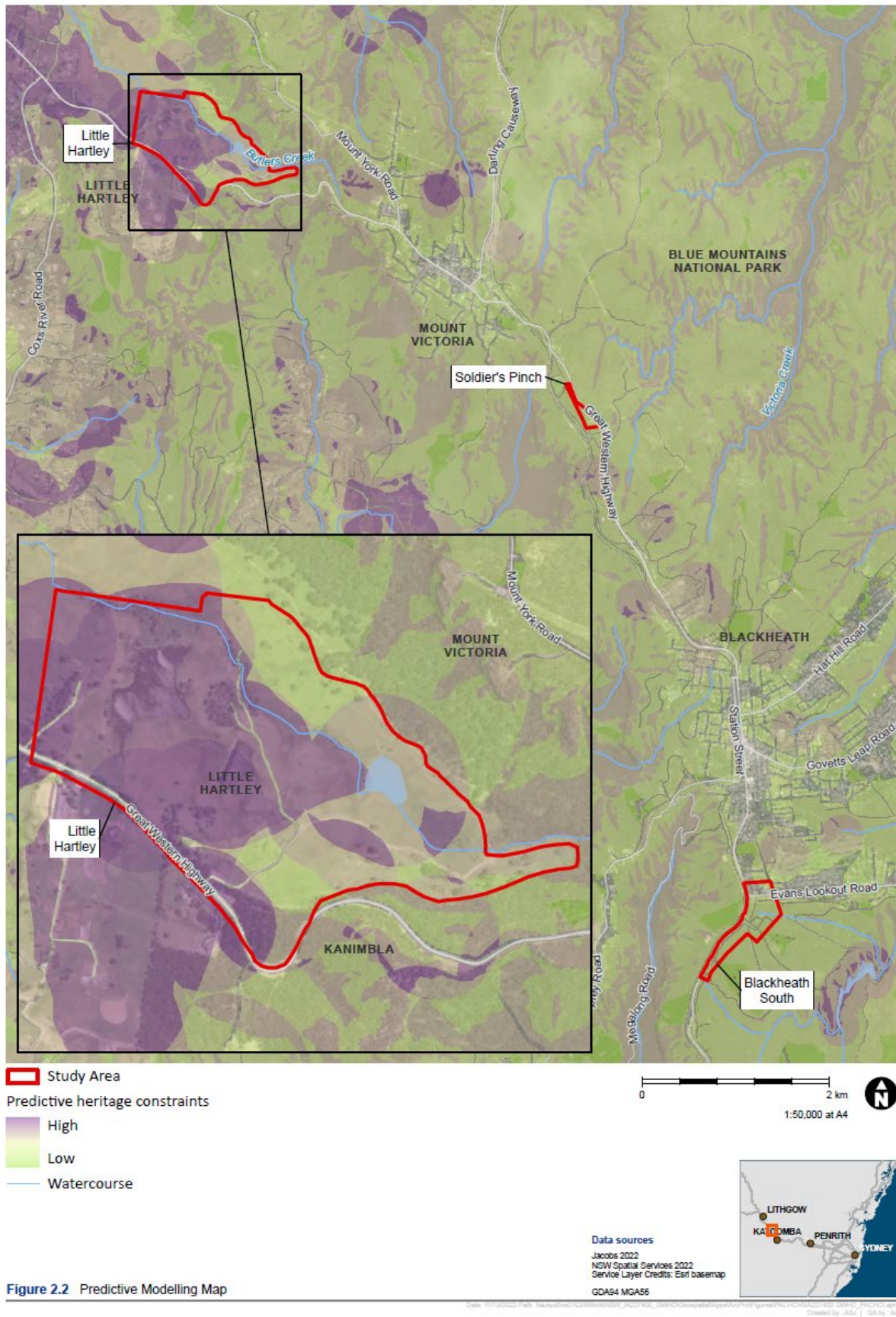


Figure 2-2 Predictive modelling for the project study area

3. Archaeological survey methodology

3.1 Aims

The aim of the survey was to undertake a pedestrian survey of the study area in order to locate Aboriginal objects (including places associated with intangible cultural heritage) and areas of Potential Archaeological Deposits (PAD).

3.2 Survey personnel

Pauline Ramsey (Project Archaeologist, Jacobs) and Luke Griffith (Graduate Archaeologist, Jacobs) participated in this survey, with the assistance of the following Registered Aboriginal Parties (RAPs) (see Table 3.1).

Table 3.1 List of RAP participants for the archaeological survey

Date	Surveyed area	Name / Organisation
23 May 2022	Blackheath and Soldiers Pinch	Adam Gunther / Waawaar Awaaa Aboriginal Corporation
23 May 2022	Blackheath and Soldiers Pinch	Rodney Gunther / Waawaar Awaaa Aboriginal Corporation
23 May 2022	Blackheath and Soldiers Pinch	John Hausia / Dharug Ngurra Aboriginal Corporation
23 May 2022	Blackheath and Soldiers Pinch	Shaun Obryan / Dharug Ngurra Aboriginal Corporation
26 May 2022	Little Hartley	Adrian Williams / Bathurst Local Aboriginal Lands Council
26 May 2022	Little Hartley	Toni Lee Scott / Bathurst Local Aboriginal Lands Council
26 May 2022	Little Hartley	Hellen Riley / Mingaan Wiradjuri Aboriginal Corp
26 May 2022	Little Hartley	Sharon Riley / Mingaan Wiradjuri Aboriginal Corp
27 May 2022	Little Hartley	Adrian Williams / Bathurst Local Aboriginal Lands Council
27 May 2022	Little Hartley	Toni Lee Scott / Bathurst Local Aboriginal Lands Council
27 May 2022	Little Hartley	Sharon Riley / Mingaan Wiradjuri Aboriginal Corp Hellen Riley

3.3 Survey strategy and procedure

The survey was carried out on foot by a team of archaeologists and Aboriginal representatives in accordance with the Code of Practice. Only the newly defined portions of the study area were subject to archaeological survey. The overall strategy was to complete a full coverage survey, where possible. All identified surface exposures were inspected for the presence of Aboriginal objects.

A handheld Global Positioning System (GPS) was used to track the path of the survey team and record the coordinates of identified features and disturbances. Detailed aerial maps marked with grid coordinates for the

survey unit was carried by the survey team. The coordinate system projection used for all data recording was GDA94 MGA 56.

A photographic record was kept during the survey. Photographs were taken to record aspects of each survey unit including disturbance and recorded Aboriginal sites. Scales were used for photographs where appropriate.

Where archaeological sites or areas of PAD were encountered, the following attributes were recorded:

- site location (single point for isolated artefacts, or as a boundary drawn around larger sites such as artefact clusters or middens)
- site type
- landform context
- vegetation type
- land use
- categories of features and artefacts present on the site
- orientation/aspect of the site
- observations on individual cultural features
- observations on modified trees: living status of tree; condition of tree; condition of scar; tree species; length and width of scar; height above ground; presence of regrowth; depth of scar (height of regrowth); shape of scar; orientation of scar; presence/absence of axe marks
- observations of other specific site types (burials, ceremonial sites) following the requirements of Heritage NSW site recording forms
- photographs of the site and individual site features/artefacts will be taken as judged necessary by the field team
- any other comments or information as judged relevant by the field team.

Where sites or places in the landscape were found to be associated with intangible cultural heritage, the information provided by RAPs in the field was recorded.

When an Aboriginal object was found within the study area, the area was recorded as an Aboriginal site. Aboriginal Site Recording Forms for these sites are in the process of being completed by Jacobs and will be lodged with AHIMS as soon as is practicable.

During the survey, RAPs were given the opportunity to provide Jacobs with any relevant information on the study area and the surrounding region, including information on cultural heritage values. It should be noted that RAPs have the opportunity to provide any information relating to the cultural significance of the study area at any point during the cultural heritage assessment process prior to the finalisation of the ACHAR.

3.4 Site definitions and recording

The NP&W Act defines an Aboriginal object as “any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains”. This definition defines Aboriginal objects as tangible evidence of Aboriginal life and includes items like stone tools, scarred trees and rock art. Archaeological deposits are also incorporated into this definition. Once an object is recorded on the AHIMS database, it is often referred to as an AHIMS site, or Aboriginal site. Section 84 of the NP&W Act allows locations of particular cultural significance to be gazetted as Aboriginal Places. Aboriginal Places are protected under the NP&W Act in the same way as Aboriginal objects. The significance can be intangible, tangible or both.

Requirement 6 of the Code of Practice state that one or more of the following criteria must be used when recording material traces of Aboriginal land use:

- the spatial extent of the visible objects, or direct evidence of their location
 - obvious physical boundaries where present, e.g., mound site and middens (if visibility is good), a ceremonial ground
 - identification by the Aboriginal community on the basis of cultural information.
- For the purposes of this assessment, sites and feature extents were defined by recording the spatial extent of visible traces or the direct evidence of their location.

4. Survey overview

4.1 Description of survey units

4.1.1 Blackheath

The Blackheath component of the study area is located on the eastern side of the Great Western Highway, and encompasses Brightlands Avenue, Evans Lookout and Valley View roads in its northern section. The southern section of the study area is a Special Area managed by Water NSW.

The survey area was found to be a gently sloping landscape with rises and falls associated with water movement across the landscape. Areas of visibility were restricted to the exposure encountered on the various tracks (see Figure 4-1 to Figure 4-4). Outside of the tracks, the survey area was composed of densely forested areas, where the leaf litter and overgrowth of bushes and trees covered the ground entirely. These forested areas were also very slippery given the recent rain, fallen trees and cut branches which also littered the ground and reduced visibility. The open areas were limited to the northern boundary of the forested areas, to the south of Valley View Road Fire Trail, a clearing 150 metres south of the fire trail, the area associated with B4 Relton Creek Trail, B4B Trail and B6 Lake Medlow Trail.

The B4B Trail is a corridor built to accommodate the construction and maintenance of power lines. The area is thus cleared of vegetation. The other tracks are also cleared and have mostly tall grasses growing on either side of the tracks.

One new Aboriginal site, being the Blackheath Portal Scar Tree 1 was identified within this survey area and is discussed in Section 5.1.



Figure 4-1 View towards the west of Brightlands Avenue, typical disturbance in northern section of the survey area



Figure 4-2 View towards the south of B6 Lake Medlow Trail with typical track exposure



Figure 4-3 View the north of densely forested central section of the survey area



Figure 4-4 View towards the east from cleared buffer section along GWH

4.1.2 Soldiers Pinch

The Soldiers Pinch component of the study area was investigated on Monday 23 May 2022 by the participants outlined in Table 3.1. No Aboriginal cultural material or sites were located within this part of the study area. The area consisted of much of the cadastral Lot 7300 DP 1129198, south of Browntown Oval.

Generally, the study area consisted of a slope, both uphill and downhill surrounding a low-lying area. Most of the smaller rises have been created naturally by the movement of water. Ground Surface Visibility (GSV) was varied throughout the area, with greater visibility surrounding the unnamed track along the western border of the area, as well as the junction leading towards a modern tunnel under the Great Western Highway. This GSV was at 70 per cent, whereas in the rest of the survey area which was either covered in tall grasses or bushes or densely forested areas, GSV was reduced to zero per cent. These densely forested areas were similar in nature and accessibility to those encountered at the Blackheath Portal survey area shown in Figure 4-5.

Large amounts of disturbance were observed throughout this survey area. On the sides of the unnamed roads, where different levels of exposure were noted, evidence of modern detritus such as plastic, ceramics and metal wires were found. Large scale earth movement was also visible, with the large artificial depression in the south-eastern corner of the area, and the evident impacts on the landscape from the construction of the stock access highway underpass / tunnel in the eastern section of the survey area. Large scale fluvial disturbance across the landscape has added a further dimension to the impacts suffered on these landforms. Fluvial activity has visibly resulted in deep depression lines, forming natural mounds and crevasses.

Due to this widespread disturbance, the visibility of natural soils was nil throughout the entirety of the survey area. It is impossible to gauge how deep these disturbances reach or if the natural ground remains unimpacted, except in areas where clearly grading or soil extractions have occurred.



Figure 4-5 View towards the east of the main track with densely forested central section in left of frame.

4.1.3 Little Hartley

The Little Hartley component of the study area was investigated between 26 and 27 May 2022 by the participants outlined in Table 3.1 and Figure 4-6 to Figure 4-13. The area surveyed is in a valley, composed of undulating hills, crests and depressions most likely the result of continuous water movement across this low-lying landscape. The survey area is bordered by Mount Victoria to the south-east and Kanimbla ranges to the north-east (Figure 4-7).

The landscape has been greatly modified by the historical and contemporary use of the property. The building of three artificial dams has left their mark on the landscape in the form of large earth banks, the alteration of watercourses and the formation of swamps as a result. Several earth mounds were also found, consisting of past building debris including concrete. To the south of the central dam, is a crest with high levels of disturbance: a cattle yard, an abandoned car and other farming detritus, impacting the ground surface.

The survey area is mostly cleared forest, with some *Eucalyptus* sparsely populating the landscape. GSV was overall low, as the surface not encompassed by exposures resulting from erosion, the road or other disturbances, was covered in tall grasses or comprised swampy, waterlogged conditions. The swampy areas were deemed mostly inaccessible, due to inherent safety risks to Jacobs staff and RAP sites officers (e.g. snakes, ticks, trips hazards).

The RAPs identified several pieces of mudstone near the farm road as potential Aboriginal objects. Upon closer inspection, no diagnostic features were noted, they were assessed as being the product of mechanical grading of the road. The road also contained clear machinery tracks, road base, plastic and other detritus.

A *Eucalyptus piperita* tree (Culturally Modified Tree 1 GWH) was identified as a potential birthing tree within a forested creek line. The hollow opening is north-eastern facing, it measures 1.2 metres long, 800 millimetres wide, the hollow is 1.25 metres wide and 1.10 metres long, and the scar measures 300-millimetres-thick. The hollow opening is consistent with 'fire scarring' as it features a triangular shape, widest at the base of the tree. Evidence of charring was also identified on the tree and the surrounding vegetation (Figure 4-10, Figure 4-11). The tree is outside the area that would be directly disturbed by the project.

One rocky outcrop located above the western most dam on the property, was identified by RAPs as having possible sharpening grooves, as well as possible cultural “footprints”. However, it has been determined that this outcrop does not contain diagnostic features consistent with Aboriginal sharpening grooves. As such, this feature is not an Aboriginal object (Figure 4-12, Figure 4-13).

One previously unidentified Aboriginal site was identified in Little Hartley and two sites identified as part of the PACHCI 2021 surveys were re-visited as part of the 2022 survey (see Section 5.3).



Figure 4-6 View towards the north-west of western most dam with typical landform observed: swamp, crests and foothills associated with the valley



Figure 4-7 View towards the north of the Kanimbla Ranges from the southern boundary of the survey area



Figure 4-8 View towards the west of typical overgrown construction debris



Figure 4-9 Typical GSV and conditions in swamp.



Figure 4-10 Culturally Modified Tree 1 GWH with burnout scar facing northeast and outline of scar facing south-west



Figure 4-11 Culturally Modified Tree 1 GWH with burnout scar facing northeast and outline of scar facing north-east



Figure 4-12 East facing view of the 'Potential Rock Engravings 1' above western-most dam



Figure 4-13 Detail of the 'Potential Rock Engravings 1

4.2 Survey coverage

A preliminary summary of survey coverage, in accordance with the Code of Practice, is outlined in Table 4.1.

Table 4.1: Survey coverage summary.

Survey unit	Landform	Survey unit area (m ²)	Visibility (%)	Exposure (%)	Effective coverage area (m ²)	Effective coverage (%)
Blackheath Portal	Slope	268,438m ²	0	90	0	0
Soldiers Pinch	Slope	40,829m ²	10	90	3,675m ²	9
Little Hartley	Undulating hills	1,042,888m ²	0	90	0	0

The Code of Practice requires that percentages for visibility and exposure are rounded up to the nearest 10 per cent. Actual visibility at the Blackheath study area and the Little Hartley study area were less than five per cent.

5. Survey Results

5.1 Blackheath

Blackheath study area was the site of 'Blackheath Portal Scar Tree 1' (AHIMS ID #45-4-1200) as shown in Figure 5-1. This is the only site to be located in this area during the survey. The site is located within the construction footprint for the Katoomba to Blackheath Upgrade.

This tree is located in the south-western section of the survey area, in a cleared area along a dirt track (Figure 5-2). It is a Bloodwood *Corymbia* sp.. It has a south facing, oval-shaped scar, approximately 600 millimetres from the ground. The scar faces south and measures 450 millimetres wide, 700 millimetres long, 40 millimetre scar depth, 40 millimetre regrowth and is located 60 centimetres off the ground.



Figure 5-1 Northwest facing view of Blackheath Portal Scar Tree 1

Unregistered sites are not presented in the public exhibition version of this appendix.

Figure 5-2 Location map of Blackheath Portal Scar Tree 1

5.2 Soldiers Pinch

No Aboriginal sites or PADs were identified within the Soldiers Pinch study area.

5.3 Little Hartley

5.3.1 Hammer Stone 1 GWH (#45-4-1201)

Hammer Stone 1 GWH: a granite hammer stone was found in a highly disturbed context (Figure 5-4), within the Little Hartley study area but outside the area that would be directly disturbed by the project. On top of a crest, lining the southern side of the central dam, this elevated point is the location of current construction activities and a cattle yard. Jerry cans and an abandoned car, along with other leftover building material was also found on this landform. The hammer stone is oval shaped, with ground and round edges (Figure 5-3). There was no evidence of pitting on either end of the hammer stone, but the material is in stark contrast to other available materials on the landform.

Hammer Stone 1 GWH measures 18 centimetres long, eight centimetres wide and three centimetres thick.



Figure 5-3 Hammerstone 1 GWH



Figure 5-4 Location of hammerstone 1 GWH

5.3.2 Hartley Grange 2 (#45-4-1190)

Hartley Grange 2: an artefact scatter clustered on the dirt track leading into the survey area from the Great Western Highway near the western end of the survey area, and outside the area that would be directly disturbed by the project. It was originally identified in 2021 during the previous survey for the Upgrade Program, however, it was not fully investigated with testing due to access constraints on the property (refer to Section 8.2 of Annexure A).

The site is found on the dirt road leading into 2200 Great Western Highway. The road is built on top of an elevated ridgeline which follows from the crest overlooking the western most dam. The road is exposed but highly disturbed following its construction. The scatter measures 200 metres long by 60 metres wide and incorporates the previously identified PAD and current survey results.

As a result of the 2022 survey, Hartley Grange 2 (#45-4-1190) is no longer considered to be a PAD and is considered to be an 'Artefact' site. At least nine surface artefacts were identified and recorded as part of this survey, their attributes are outlined in Table 5.1.

Table 5.1 Hartley Grange 2 artefacts

Material	Dimensions	Attributes
Quartz	2.6 mm long, 2.7 mm wide and 0.9 mm thick.	Complete flake with flaked platform and feather termination.
Quartz	15 mm long, 16 mm wide and 3 mm thick.	Complete flake with flaked platform and feather termination.
Quartz	4 mm long and 9 mm wide	Angular fragment.
Chert	31 mm long, 14 mm wide and 3 mm thick.	Geometric microlith, blade with use wear along both edges, medial flake.
Chert	Largest negative scar measures: 19 mm long, 22 mm wide, and the core is 11 mm thick.	Multiplatform core with two negative scars.
Chert	20 mm long, 28 mm wide and 5 mm thick.	Proximal flake with flaked platform.
Glass	Largest negative scar measures: 18 mm long and 21 mm wide.	Dark black and thick historic glass with three negative scars.
Quartz	10 mm long, 14 mm wide and 3 mm thick.	Proximal flake, with a flaked platform.
Quartz	13 mm long, 11 mm wide and 8 mm thick.	Medial flake.

A culturally significant tree was identified by RAPs and is referred to as Grandfather Tree 1 GWH. It is approximately 140 metres north-west from the largest dam in the survey area. On the western foot-slopes of a crest, this very tall and very old Ribbon Gum *Eucalyptus viminalis* tree (Figure 5-5).

No cultural modifications were observed and the tree is not deemed an Aboriginal site. However, the significance of this tree should not be discounted, as it houses important native animals which play a key role in the social and cultural landscape of Aboriginal people.



Figure 5-5 East facing view of the Grandfather Tree 1 GWH.

5.3.3 GWH12 (AHIMS #45-4-1075)

Seven previously recorded sites are located within the study area at Little Hartley (see Table 5.2). Five of these were reassessed as not being Aboriginal objects (PACHCI 2021). GWH12 was not able to be accessed in 2021.

Site GWH12 was revisited with the results described below.

GWH12 Great Western Highway (AHIMS #45-4-1075) was revisited in this survey. GWH12 is an 'Artefact' site which was found to be in a highly disturbed location. It is located at a gate to a horse paddock which at the time of the survey, had become highly impacted by trampling and water movement. The chert flake and core, previously described by Comber Consultants (2009) in an eroding patch of ground near the fence line, were not relocated. This is not unusual, given that they were originally recorded in 2009. Due to the high level of disturbance at GWH12, the site is not considered to be a PAD and invalid.

Table 5.2 Sites within study area at Little Hartley.

Site Name (ID)	Datum	Easting	Northing	Status
GWH12 Great Western Highway (#45-4-1075)	GDA	241715	6281786	Invalid
GWH13 Great Western Highway (AHIMS #45-4-1076)	GDA	241994	6281238	Invalid
GWH14 Great Western Highway (AHIMS #45-4-1077)	GDA	242183	6281267	Invalid
GWH15 Great Western Highway (AHIMS #45-4-1078)	GDA	242313	6281100	Invalid
GWH16 Great Western Highway (AHIMS #45-4-1079)	GDA	242447	6281047	Invalid
GWH17 Great Western Highway (AHIMS #45-4-1080)	GDA	242612	6281011	Invalid
Great Western Highway (GWH) 44a (#45-4-1112)	GDA	242409	6280911	Valid

5.4 Summary of results

As detailed in Table 5.3 and Figure 5-6, it was found that:

- no Aboriginal objects or PADs were identified within the study area at Soldiers Pinch and the area has been subject to significant and widespread disturbance
- one previously unidentified Aboriginal site was identified within the study area at Blackheath, being Blackheath Portal Scar Tree 1 (#45-4-1200)
- one previously unidentified Aboriginal site was identified within the study area at Little Hartley, being Hammer Stone 1 GWH (#45-4-1201)
- two previously identified Aboriginal sites were reassessed within the Little Hartley study area. GWH12 (#45-4-1075) was determined to no longer be a PAD and invalid as per Section 5.2. Hartley Grange 2 (#45-4-1190) was confirmed to be an 'artefact' site, not a PAD.

Table 5.3 Results summary

Site Number	Feature(s)	Survey Unit	Landform
(#45-4-1200) Blackheath Portal Scar Tree 1	Culturally Modified Tree (Carved or Scarred)	Blackheath study area	Slope
(#45-4-1201) Hammer Stone 1 GWH	Isolated find	Little Hartley study area	Undulating hills
(#45-4-1190) Hartley Grange 2	Artefact: 9	Little Hartley study area	Undulating hills

Unregistered sites are not presented in the public exhibition version of this appendix.

Figure 5-6 Little Hartley survey results, confirmed Aboriginal heritage sites

6. Significance assessment

6.1 Assessment criteria

In accordance with the Code of Practice and the PACHCI 2021, an assessment of the scientific value of an Aboriginal object or place is required in order to form the basis of its management. The Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (the Guide) (Office of Environment and Heritage, 2011) provides the following criteria for the assessment of scientific value:

- research potential – does the evidence suggest any potential to contribute to an understanding of the area and/or region and/or state's natural and cultural history?
- representativeness – how much variability (outside and/or inside the subject area) exists, what is already conserved, how much connectivity is there?
- rarity – is the subject area important in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised? Is it in danger of being lost or of exceptional interest?
- education potential – does the subject area contain teaching sites or sites that might have teaching potential?

It is important to note that heritage significance is a dynamic value.

6.2 Scientific values

The addendum survey has resulted in the identification of one additional site in the Little Hartley study area and one additional site in the Blackheath study area. Two previously identified Aboriginal sites have also been re-assessed within the Little Hartley study area.

A summary of scientific significance for the study area is provided in Table 6.1.

Table 6.1 Summary of scientific values

Site name (AHIMS ID)	Research potential	Representativeness	Rarity	Education potential	Overall significance assessment
(#45-4-1200) Blackheath Portal Scar Tree 1	Low	Moderate	Moderate	Moderate	Moderate
(#45-4-1201) Hammer Stone 1 GWH	Low	Moderate	Low	Moderate	Moderate
(#45-4-1190) Hartley Grange 2	Moderate	Low	Low	Moderate	Moderate

7. Impact assessment

7.1 Potential direct impacts

Table 7.1 assumes that sites or parts of sites within the boundaries of the Katoomba to Blackheath Upgrade (Blackheath Portal Scar Tree 1) and Little Hartley to Lithgow Upgrade (Hartley Grange 2) construction footprints will be salvaged prior to construction of this project as described in their approved Review of Environmental Factors and Cultural Heritage Impact Assessments via AHIPs under the NP&W Act. This is illustrated in Figure 7-1 and Figure 7-2. Hartley Grange 2 and Hammer Stone 1 are outside the construction footprint of this project (Figure 7-2). No Aboriginal sites are expected to be directly impacted by the project, therefore no further options to avoid sites are required.

AHIMS sites are not presented in the public exhibition version of this appendix.

Table 7.1 Summary of potential impacts

Site name (AHIMS ID)	Type of harm	Degree of harm	Consequence of harm
Blackheath Portal Scar Tree 1 (#45-4-1200)	None	None	No loss of value
Hammer Stone 1 GWH (#45-4 1201)	None	None	No loss of value
Hartley Grange 2 (#45-4-1190)	None	None	No loss of value

Figure 7-1 Construction footprint in relation to Aboriginal heritage sites at Blackheath

Figure 7-2 Construction footprint in relation to Aboriginal heritage sites at Blackheath at Little Hartley

7.2 Potential indirect impacts

7.2.1 Vibration from tunnelling and at-surface activities

Vibration from construction activities has the potential to result in physical damage to Aboriginal sites. Vibration modelling for surface works (EIS Appendix G) has recommended minimum working distances for vibration intensive plant ranging from 2 metres (jackhammer) to 68 metres (vibratory roller over 18 tonnes) based on *Heritage structures – German Standard DIN 4150 – Part 3 – Structural Vibration in Buildings – Effects on Structures (DIN 4150)*.

Blackheath Portal Scar Tree 1 (#45-4-1200) will be salvaged by the Katoomba to Blackheath Upgrade prior to the commencement of this project and will not be affected by vibration.

Hammer Stone 1 GWH (#45-4-1201) is approximately 220 metres from the construction boundary, outside all minimum working distances and not expected to be indirectly impacted by vibration from the project.

Hartley Grange 2 (#45-4-1190) is approximately 30 metres from the construction footprint and within the minimum working distance for some types of vibration intensive plant. However, it is noted Hartley Grange 2 consists of individual stone artefacts which are unlikely to be damaged by vibration and are within or adjacent to a dirt road regularly traversed by light vehicles and farming machinery, therefore impacts are considered to be minor.

EIS Appendix G also presents modelling of vibration generated by TBM tunnelling activities, including vibration contours in Annexure F to that appendix. The modelling demonstrates that vibration levels above the tunnel alignment would typically be less than 2.5 millimetres per second peak particle velocity. Therefore it is highly unlikely that any of the Aboriginal heritage items identified in this report would be affected by TBM tunnelling vibration.

7.2.2 Settlement from tunnel excavation

Tunnel excavation, combined with the subsequent impacts on groundwater levels, is expected to result in settlement at the ground surface. To assess the impact on Aboriginal sites, it is important to estimate potential levels of settlement.

Estimates of ground settlement associated with tunnelling activities for the project have been developed as part of ongoing design development (refer to Chapter 13 (Groundwater and geology) of the EIS). The settlement estimates indicate that all of the Aboriginal heritage items identified in this report would be outside the settlement zone of influence, and would therefore not be impacted by settlement.

7.2.3 Intangible cultural heritage values

A preliminary Aboriginal Narrative Report and Body of Story Report has been prepared for the Upgrade Program to assist with the interpretation and integration of intangible Aboriginal cultural values collected during Aboriginal consultation and exploratory workshops by giving Aboriginal communities a voice in the design of the Upgrade Program. The report includes a series of core narratives and stories and outlines a set of overarching cultural design principles to inform the projects design principles. These highlight opportunities to develop a design that would deepen the understanding of place and the rich history of the Aboriginal cultural, spiritual and physical connection to the area and importantly will facilitate greater Aboriginal visibility.

Examples of how some of the cultural values identified in this chapter would be considered in the project design are discussed in Section 5.6 of Appendix N (Technical report – Urban design, landscape and visual).

7.3 Summary of impacts to identified sites

Based on the results of this assessment and in consultation with the RAPs:

- there are no Aboriginal sites within the construction footprint that would be directly impacted by the project
- one Aboriginal site (Blackheath Portal Scar Tree 1 (#45-4-1200)) is located within the project construction footprint at Blackheath, but it is assumed the item will be salvaged prior to the commencement of this project
- one site (Hartley Grange 2 (#45-4-1190)) would not be affected directly or indirectly by the project.

8. Environmental mitigation measures

8.1 Guiding principles

The overall guiding principle for cultural heritage management is that where possible Aboriginal sites would be conserved. If conservation is not practical, measures would be taken to mitigate against impacts to Aboriginal sites.

Where unavoidable impacts occur then measures to mitigate and manage impacts are proposed. Mitigation measures primarily concern preserving the heritage values of sites beyond the physical existence of the site. The most common methods involve detailed recording of Aboriginal objects, archaeological salvage excavations, artefact analysis and, where appropriate, reburial of Aboriginal objects in a location determined by the RAPs.

Mitigation measures vary depending on the assessment of archaeological significance of a particular Aboriginal site and are based on its research potential, rarity, representatives and educational value. In general, the significance of a site would influence the choice of preferred conservation outcomes and appropriate mitigation measures, usually on the following basis:

- 1 low archaeological significance – conservation where possible, but usually no mitigation required if impacts are unavoidable
- 2 moderate archaeological significance – conservation where possible. If conservation is not practicable, salvage excavations or similar mechanisms determined in consultation with the Aboriginal community may be necessary
- 3 high archaeological significance – conservation as a priority. Only if all practicable alternatives have been exhausted would impacts be considered justified. Comprehensive salvage excavations may be necessary.

8.2 Performance outcomes

Performance outcomes for the project in relation to Aboriginal cultural heritage are listed in Table 8-1 and identify measurable performance-based standards for environmental management.

Table 8-1 Aboriginal cultural heritage performance outcomes

SEARs desired performance outcome	Project performance outcome	Timing
The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of Aboriginal objects and places.	Avoid or minimise direct and indirect impacts on known or unexpected Aboriginal values, objects and places.	Construction
	Incorporate Aboriginal heritage interpretation and Aboriginal cultural design principles into the design of the project in consultation with Aboriginal stakeholders.	Design

8.2 Environmental mitigation measures

The project is not anticipated to impact known Aboriginal items or objects and therefore no further assessment is required for the project.

Mitigation measures to manage potential unexpected Aboriginal heritage impact are summarised in Table 8.2.

Table 8.2 Environmental mitigation measures – Aboriginal cultural heritage

ID	Mitigation measure	Timing
AH1	If unexpected items of potential Aboriginal cultural heritage significance, including potential Aboriginal burials or skeletal material, are discovered during construction of the project, all relevant activities in the vicinity of the find will cease and the unexpected/chance finds requirements specified in the Unexpected Heritage Items Procedure (Transport for NSW, 2022) will be followed.	Construction

9. References

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Annexure A. Great Western Highway Duplication - Katoomba to Lithgow PACHCI Stage 3: Aboriginal Cultural Heritage Assessment Report

Great Western Highway Duplication - Katoomba to Lithgow

PACHCI Stage 3: Aboriginal Cultural Heritage Assessment Report

V4

13 October 2021

Transport for New South Wales



Great Western Highway Duplication - Katoomba to Lithgow

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Cover photo was taken at 45-4-1095 (GWH 35). The site is located adjacent to the Great Western Highway after Hartley Historic Village. Photo is facing north west.

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Executive summary

Background

Transport for NSW (Transport) proposes to upgrade the Great Western Highway (GWH) between Katoomba and Lithgow. The Great Western Highway Upgrade Program (GWHUP) will deliver around 34 kilometres of four lane divided highway between Katoomba and Lithgow (Figure 1-1:). The program is needed to provide a safer and more efficient link between the Central West NSW and the Sydney Motorway Network for freight, tourists and general traffic.

The GWHUP is packaged into separate East, Central and West Packages. Jacobs has been engaged to undertake the Aboriginal Cultural Heritage Assessment Report to contribute to the concept design and prepare a review of environmental factors, including specialist environmental investigations, for the entirety of the GWHUP (the project).

Purpose of this report

This ACHAR has been prepared to support an Aboriginal Heritage Impact Permit (AHIP) application for the Eastern and Western Packages and an REF process for the Central Package and complies with the reporting requirements of Heritage NSW guidelines. This Aboriginal Cultural Heritage Assessment Report (ACHAR) documents consultation with Aboriginal communities about the project in accordance with the NSW Roads and Maritime Service's Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services 2011). Full details of consultation are in Section 3.

This report has been prepared in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2011), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (Code of Practice) (DECCW 2010b), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP) (DECCW 2010a), and the *Procedure for Aboriginal cultural heritage consultation and investigation* (PACHCI) (Roads and Maritime Services 2011).

Summary of archaeological assessment

This ACHAR undertook assessment of impacts to Aboriginal heritage using the methods set out in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2011). Full results of the archaeological assessment are located in the Archaeological Assessment Report (AAR), located Appendix C. Test excavations were undertaken in 17 locations. A total of 113 test pits were excavated throughout the project area, a total of 144.5m². Over 1790 artefacts were recovered at these locations.

Test excavation found evidence of repeated Aboriginal stone artefact use in the areas on River Lett Hill, Hartley and on the [REDACTED] property, camping activity along River Lett at Jenolan Caves Road, and artefact scatters along tributaries associated with Whites Creek, Butlers Creek, and Boxes Creek. Evidence of activities along minor watercourses and occupation at the western margin of the construction footprint on an alluvial terrace in South Bowenfell was also confirmed.

There was absence of evidence in several locations: TBD (River Lett Hill), 45-4-1081 (GWH 18), 45-4-1082 (GWH 19), and 45-4-1102 (GWH 29). This is taken to reflect a low level of Aboriginal activity in the Coxs River Road Intersection and some sections of the Little Hartley to River Lett Hill areas, particularly where agricultural and infrastructure development has caused significant ground disturbance. The absence of evidence in these areas also reflects a focus of Aboriginal settlement in the major creek valleys and primarily along River Lett and the areas with associated vantage points on River Lett Hill, such as TBD (GWH 20-2), and TBD ([REDACTED] Site). It should be noted during test excavations at TBD ([REDACTED] Site), the TBD (Forty Bends Contact Site) was identified within the original PAD area.

Summary of cultural values assessment

The cultural values assessment includes cultural information collected during consultation, field surveys and during the test excavation program. Aboriginal community members have stated the entire area within the project is significant to Aboriginal people, however knowledge holders have described key sites within the area that are of high importance (Section 7). Jacobs engaged Cox Inall Ridgeway, an Aboriginal strategic consultancy, to undertake an independent Aboriginal Cultural Values Assessment for the project. This report is provided as Appendix A. The Cultural Values Assessment identified numerous places within the project area of high cultural significance, with several falling within or partly within the project area.

Overview of potential impact

The potential impacts to Aboriginal cultural places and archaeological sites recorded within the project area boundary have been considered. Most of the Aboriginal sites located in the project area consist of distributions of Aboriginal stone artefacts associated with PADS. These sites are expected to extend well into comparable landscapes outside of the construction footprint. For this reason, the degree of harm to sites whose boundaries likely extend beyond the construction footprint is listed as partial. This assessment is considered valid, notwithstanding the projected loss of the transects of test pits that were sampled in the test excavations. Based on the results of this assessment and in consultation with the RAPs:

- There are **20 Aboriginal sites within the construction footprint** that would be directly impacted by the project
- **Nine Aboriginal sites are located within the project area** including two sites that will be subject to minor indirect impacts associated with vibration and settlement, and one site subject to moderate indirect impacts also associated with vibration and settlement
- Three sites within the construction footprint (45-4-1099 (GWH 24), 45-4-1082 (GWH 19), 45-4-1081 (GWH 18)) do not require active protection measures due to low archaeological significance primarily due to the disturbed nature of the landform in that location.

Recommendations

Management recommendations have been developed to avoid impacts where possible and where impacts are unavoidable, to effectively mitigate them. Management recommendations have been drafted in accordance with the type of impact and site significance. All management recommendations will be presented to the registered Aboriginal parties. Specific environmental management measures have been developed for each of the Aboriginal heritage items identified within the construction footprint. General requirements relating to the management and mitigation measures apply to:

- Impacts identified in Section 9
- Cultural values and assessed significance of each Aboriginal site
- Degree of impact to each Aboriginal site
- Need to address intergenerational equity in the experience of Aboriginal heritage
- Need to protect sites not impacted by the project but under the care of the proponent
- Need to mitigate the loss and disturbance of impacted Aboriginal sites.

Management of Aboriginal sites would include protection and salvage measures, development of a curation policy for salvaged Aboriginal objects and procedures for unexpected discovery of Aboriginal objects. Site specific management measures would be described in an Aboriginal Heritage Management Plan (AHMP) that would form part of the construction environmental management plan (CEMP) that would be developed for the project.

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Abbreviations

Acronym / term	Definition
AAR	Archaeological Assessment Report
ACHCRP	Aboriginal Cultural Heritage Consultation Requirements for Proponents
AFG	Aboriginal Focus Group
AHD	Australian Heritage Database
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASDST	Aboriginal Sites Decision Support Tool
ASR	Archaeological Survey Report
ATP	Archaeological Test Pits
BLALC	Bathurst Local Aboriginal Land Council
BP	Before Present
CHAR	Cultural Heritage Assessment Report
CHL	Commonwealth heritage list
CIRIA	Construction Industry Research and Information Association
CVA	cultural values assessment
Code of Practice	the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales
CRR	Coxs River Road Intersection
DCP	Development control plans
DECCW	Department of Environment, Climate Change and Water
DLALC	Deerubbin Local Aboriginal Land Council
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
DTAC	Darug Tribal Aboriginal Corporation
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
F2L	Forty Bends to Lithgow
GBMWA	Greater blue mountains world heritage area
GPS/GLONASS	Global Positioning System/ Global Navigation Satellite System
GTC	Gundungurra Tribal Council
GTP	Geotechnical Test Pits
GWH	Great Western Highway
GWHUP	The Great Western Highway Upgrade Program
Heritage NSW	Heritage New South Wales

Acronym / term	Definition
GWH AS01	Great Western Highway Artefact Scatter 01
ICOMOS	International Council on Monuments and Sites
ILUAs	Indigenous Land Use Agreements
JCR	Jenolan Caves Road
LALC	Local Aboriginal Land Council
LEP	Local Environment Plans
LGA	Local Governmental Area
LGM	Last Glacial Maximum
L2R	Little Hartley to River Lett Hill
MGA	Map Grid of Australia
MHR	Magpie Hollow Road
MNES	Matters of national environmental significance
NHL	National heritage list
NNTT	National Native Title Tribunal
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PAD	Potential archaeological deposits
RAP	Registered Aboriginal Parties
R2F	River Lett Hill to Forty Bends
RNE	Register of the National Estate
RTA	Roads and Traffic Authority
SBRFB	South Bowenfells Rural Fire Brigade Site
SHR	State Heritage Register
SKM	Sinclair Knight Merz
SSD	State Significant Development
The Proposal	duplication of the Great Western Highway
Transport	Transport for NSW (internal)
Transport	Transport for NSW
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHL	World heritage listing

1. Introduction

1.1 Great Western Highway Upgrade Program

Transport for NSW (Transport) proposes to upgrade the Great Western Highway (GWH) between Katoomba and Lithgow. The Great Western Highway Upgrade Program (GWHUP) will deliver around 34 kilometres of four lane divided highway between Katoomba and Lithgow (Figure 1-1:). The program is needed to provide a safer and more efficient link between the Central West NSW and the Sydney Motorway Network for freight, tourists and general traffic.

The GWHUP is packaged into separate East, Central, Medlow Baths and West Upgrade Packages. Jacobs has been engaged to undertake an Aboriginal Cultural Heritage assessment and prepare the Aboriginal Cultural Heritage Assessment Report (ACHAR) to contribute to the concept design and prepare an AHIP for the Central and Western Package Upgrades, and a review of environmental factors for the Medlow Baths and Eastern Package Upgrade, including specialist environmental investigations. The Aboriginal Cultural Heritage assessment has been undertaken for the entirety of the GWHUP (the project), from Katoomba to Lithgow.

In May 2010 a preferred route for the GWHUP between Mount Victoria and Lithgow (i.e. the West Package) was announced and the preferred construction footprint was subsequently reserved via SP2 Infrastructure zoning in the Blue Mountains Local Environmental Plan (LEP) 2015 and the Lithgow LEP 2014. The majority of the project impacts to Aboriginal cultural heritage will occur in the in the Western Package of work as the Central, Medlow Baths and East Upgrade Packages primarily involve duplication of existing highway and tunnelling sections which will avoid impacting any Aboriginal sites.

The GWHUP consists of:

- Medlow Bath Upgrade: An upgrade and duplication of the existing road surface with intersection improvements and a new pedestrian bridge
- East Upgrade - Katoomba to Medlow Bath and Medlow Bath to Blackheath: Upgrade, duplication and widening of the existing road surface, with connections to a tunnel portal at Blackheath
- West Upgrade - Little Hartley to Lithgow: Upgrade, duplication and widening of the existing road surface, with connections to a tunnel portal at Little Hartley
- Central Upgrade - Blackheath to Little Hartley: Construction of a tunnel bypass of Blackheath and Mount Victoria, with connectivity between the two proposed tunnels currently under further investigation.

1.2 Proposed works

The proposed works for each package are presented below.

1.2.1 Central Upgrade

The Central Upgrade Package comprises the Blackheath to Little Hartley section of the GWHUP, which will be developed almost entirely in tunnel, and will be subject to the outcomes of community and stakeholder engagement and design and environmental investigations. The options being considered during design development are shown in Figure 1-2: Project design

. It should be noted that the preferred option will be subject to surface impacts during construction (in the form of construction worksites) and operation (in the form of tunnel portals for connection to the surrounding road network).

Transport is considering the following options for the Central Package:

- Blackheath to Little Hartley Tunnel: Approximately 11km long twin tunnels from the east of Blackheath to the bottom of Mount Victoria pass, generally following the alignment of the existing highway.
- Two Separate Tunnels: Two 4.1-kilometre tunnels, one underneath Blackheath and one from east of Mount Victoria to the bottom of Mount Victoria Bypass, joined by a 2-kilometre surface upgrade to widen the existing highway between Blackheath and Mount Victoria.
- Potential for further surface works to be included within the Central Package include the:
- Upgrade of the existing GWH alignment between Blackheath and Little Hartley
- Removal of the existing railway level crossing at Blackheath and construction of a new underpass/overpass of the railway line at Shipley Road.
- Relocation of the existing heavy vehicle checking station and safety camera gantry structures
- Upgrade of a bypass connection between the existing GWH and the Darling Causeway.

1.2.2 East Upgrade:

- Widening of the GWH to provide a four-lane divided carriageway for about 3.5 kilometres between Rowan Lane in Katoomba and Bellevue Crescent in Medlow Bath
- New concrete twin bridges (about 400 metres long) over the valley from Pulpit Hill near Explorers Road
- Upgrades to intersections at:
 - Nellies Glen Road, which would involve realigning Nellies Glen Road to connect to the GWH further south. Access into / out of Nellies Glen Road would be left in left out only. To access the eastbound carriageway, vehicles would need to divert to Explorers Road.
 - Explorers Road, which would become a right in right out only access, with eastbound vehicles turning from the existing highway into or out of Explorers Road. To access the westbound carriageway, Explorer Road traffic would need to divert to Nellies Glen Road.
 - Foy Avenue, which would become a left in left out with a channelised right turn bay for eastbound vehicles turning right into Foy Avenue. Due to sight distance restrictions, vehicles wanting to turn right out of Foy Avenue would need to turn left heading into Medlow Bath to turn around at Bellevue Crescent.
- Adjustments to the Pulpit Hill heritage interpretation area on Nellies Glen Road including improved visitor parking
- Reuse of existing highway pavement to the north of Explorers Road and Nellies Glen Road for:
 - A new truck stopping bay north of Explorers Road
 - A service road, for Explorers Road traffic to merge into the new highway eastbound carriageway opposite Nellies Glen Road
- Modification and improvements to the Great Blue Mountains trail to maintain active transport connectivity between Katoomba and Medlow Bath
- Providing bus stops on the highway at Nellies Glen Road (westbound), Explorers Road (eastbound) and Foy Avenue
- Substantial earthworks including cuts and fills
- Upgrading and installing new drainage infrastructure and water quality controls
- Relocating utilities and providing access for maintenance (including electrical, railway services, water and telecommunications)
- Finishing works including pavement, kerb and gutters, signs, lighting and line marking

- New intelligent transport systems including, but not limited to, closed-circuit television, variable-message signs and variable speed limit signs
- Ancillary work for the proposal including, but not limited to, road furniture, tie-in works, landscaping, earthworks and property adjustments
- Establishment of temporary ancillary facilities to support construction, including compound sites, site offices, stockpile and laydown locations, temporary access tracks, water quality controls and concrete batching plants
- Tie in with the GWHUP: Medlow Bath at Bellevue Crescent, Medlow Bath.

1.2.3 West Upgrade:

- Upgrade of about 14 kilometres of the GWH between Katoomba to Lithgow to a four-lane divided highway
- Minor embankment work and median adjustment in the Forty Bends section (upgraded in 2017) to provide a fourth lane
- Provision of service roads, where feasible and reasonable, to minimise direct access to the GWH from adjacent properties
- Upgrade and/or adjustment of existing intersections at local roads
- Provision of two heavy vehicle rest areas, one eastbound and one westbound, near Mid Hartley Road and Carroll Drive
- Temporary and permanent water quality treatment basins
- Provision of five new bridges, including twin bridges over River Lett and Jenolan Caves Road
- Upgrade of the existing bridge over River Lett as part of a local service road network
- Extension of existing drainage culverts at Rosedale Creek and Boxes Creek
- Provision of three combined drainage and fauna crossing culverts
- Establishment and use of temporary ancillary facilities during construction
- Property works including acquisition, demolition and adjustments to accesses
- Adjustment of existing utility infrastructure, including overhead powerlines, poles and underground communications cables
- Rehabilitation of disturbed areas and landscaping, where required.

The west project has been designed in four sections to allow flexibility in construction staging and delivery and includes:

- Little Hartley to River Lett Hill
- Coxs River Road Intersection
- River Lett Hill to Forty Bends
- Forty Bends to Lithgow.

A description of the key features of each section is provided below and in Figure 1-2.

1.2.3.1 Little Hartley to River Lett Hill

The Little Hartley to River Lett Hill section involves the realignment of about three kilometres of the GWH with two lanes in each direction from the base of Mount Victoria Pass, where it would tie into the GWHUP – Central Package, to east of the River Lett, excluding Coxs River Road Intersection (see Section 1.1.2). Key features include:

- Two span 'Super T' bridges over the new GWH east of Coxs River Road and west of Mid Hartley Road to maintain the local access road connection
- Realignment of the highway to improve alignment and provide two lanes in each direction. The existing highway would become a local service road
- Upgrade at the intersection of the GWH and Carroll Drive
- Eleven temporary construction sediment basins and three permanent operational water quality control basins (noting three of the temporary basins would be converted to permanent basins at completion for construction)
- Construction of two heavy vehicle rest areas near Mid Hartley Road and Carroll Drive, connected by a service road.

1.2.3.2 Coxs River Road Intersection

The Coxs River Road Intersection section involves the realignment of about 2.4 kilometres of the GWH with two lanes in each direction from east of the Coxs River Road intersection to near the Hartley Cemetery. Key features include:

- A grade separated interchange at Coxs River Road, supplemented by new sections of connecting roadway to create a local service road network
- Realignment of the existing highway near Browns Gap Road to create a local service road
- Upgrades to intersections at Browns Gap Road and Baaners Lane, including a vehicle turning facility on Baaners Lane
- Six temporary construction sediment basins and four permanent operational water quality control basins (noting two of the temporary basins would be converted to permanent basins at completion for construction)
- Retaining wall on the GWH eastbound adjacent to the Lolly Bug.

1.2.3.3 River Lett Hill to Forty Bends

The Forty Bends to Lithgow section involves an upgrade of about 4.5 kilometres of the GWH to two lanes in each direction from Forty Bends Road to Magpie Hollow Road. Key features include:

- Tie-ins with the existing Forty Bends section of the highway (upgraded in 2017)
- Upgrades to intersections at McKanes Falls Road, Old Bathurst Road and Mudgee Street
- Modifications to the intersection at Forty Bends Road (western junction)
- Five permanent operational water quality control basins (noting two of these would be used as temporary basins during construction and converted to permanent basins at completion of construction)
- Four retaining structures on the eastbound alignment and one westbound
- Six drainage culverts traversing under the proposed highway, as well as additional minor culverts under local service roads and/or property access.

1.2.3.4 Forty Bends to Lithgow

The Forty Bends to Lithgow section involves an upgrade of about 4.5 kilometres of the GWH to two lanes in each direction from Forty Bends Road to Magpie Hollow Road. Key features include:

- Tie-ins with the existing Forty Bends section of the highway (upgraded in 2017)
- Upgrades to intersections at McKanes Falls Road, Old Bathurst Road and Mudgee Street
- Modifications to the intersection at Forty Bends Road (western junction)

- Five permanent operational water quality control basins (noting two of these would be used as temporary basins during construction and converted to permanent basins at completion of construction)
- Four retaining structures on the eastbound alignment and one westbound
- Six drainage culverts traversing under the proposed highway, as well as additional minor culverts under local service roads and/or property access.

1.3 Project area

The project area is located within the Blue Mountains Local Government Area (LGA) and Lithgow LGA, within New South Wales, Australia (Figure 1-1:). The project spans approximately 34 kilometres along the GWH from Magpie Hollow Rd, South Bowenfels to the Pass of Victoria, Little Hartley to Katoomba and is within an area covered by the Deerubbin Local Aboriginal Land Council (LALC), Bathurst LALC, Darug Tribal Aboriginal Corporation (DTAC), and Gundungurra Tribal Council (GTC).

1.3.1 Definitions

This assessment has investigated known and potential Aboriginal cultural heritage that is likely to be impacted by the project.

In this report the following definitions apply:

- *Construction footprint*: Defined as the zone in which construction activities would take place. The boundaries of this area shifted slightly during the assessment period, to the extent that some sections of the footprint are shown outside of the project area defined in this report. Although outside the defined project area, these sections of the construction footprint have been considered in the impact assessment. **[Authors note: Please note the construction footprint has not been finalised as of 23/09/2021. The report is based off a construction footprint provided during test excavations].**
- *Project area*: Refers to the area where detailed investigations were undertaken as part of the archaeological assessment. This covered an area that may be subject to ground disturbance and extends approximately 50 m either side of the construction footprint. Further amendments to the design, such as the inclusion of ancillary areas and design adjustments may occur within the project area.
- *Broader study area*: Area surrounding the project (and including the project area) that was investigated as part of the desktop assessment, hereafter referred to as the 'project area'.

1.4 Scope and objectives

The scope and objective of this ACHAR is to detail the results of the archaeological survey and test excavation program, the consultation process, the cultural values assessment (CVA), and the recommendation of management measures recommended to prevent or mitigate any impacts to archaeological sites.

This report has been prepared in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (DECCW 2011), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (Code of Practice) (DECCW 2010b), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP) (DECCW 2010a), and the *Procedure for Aboriginal cultural heritage consultation and investigation* (PACHCI) (RMS 2011).

1.5 Report outline

The report is structured as follows:

- Section 1 provides the project outline and proposed works, and the scope and objectives of this report.
- Section 2 outlines the legislative and policy framework relevant to the investigation and assessment of Aboriginal cultural heritage in New South Wales

- Section 3 presents an overview of consultation undertaken with the Aboriginal community in relation to the project, with supporting information provided in Appendix A. Consultation was carried out in accordance with the Transport procedure for Aboriginal cultural heritage consultation and investigation (PACHCI) (Roads and Maritime Services 2011) and the ACHCRP (DECCW 2010a)
- Section 4 presents background information relevant to the project, including environmental information (geology, soils, climate and vegetation) as well as a discussion of ethnographic data
- Section 5 describes the method and results of the desktop Aboriginal archaeological assessment of the project area. This includes the archaeological research, and analysis that have been conducted in support of this report
- Section 6 presents the results of the test excavation stage of the project, including the archaeological research, fieldwork and analysis that have been conducted in support of this report. While the archaeological assessment report (AAR) focuses solely on the archaeological (scientific) investigation, this report covers both cultural and scientific values.
- Section 7 presents the results of the Aboriginal cultural values assessment of the project area
- Section 8 presents the significance assessment of the identified Aboriginal sites as a result of survey and text excavation
- Section 9 assesses the project's direct and indirect impact on any identified Aboriginal sites and Potential Archaeological Deposits (PADs) and the significance of these impacts
- Section 10 presents recommended management measures to mitigate the impact of the project on Aboriginal sites and associated cultural values within the project area.

1.6 Authorship

This report was authored by:

- Andrew Costello (Associate Archaeologist, Jacobs). Andrew holds a Bachelor of Arts with Honours in Archaeology from the University of Melbourne and has over 16 years' experience as a cultural heritage consultant
- Alexandra Seifertova (Project Archaeologist, Jacobs). Alexandra holds a Bachelor of Arts with Honours from the University of Sydney and has over three years of experience as an archaeologist
- Jake Ferguson (Intern Archaeologist, Jacobs). Jake is currently in his last year of his archaeology degree at Macquarie University. Jake has worked with Jacobs for over 2 years
- Oliver Macgregor (Senior Archaeologist, Jacobs). Oliver holds a PhD in Archaeology and Palaeoanthropology from the Australian National University and has over 10 years' experience as an archaeologist.

Mapping was prepared by Ajay Arcot (Senior Spatial Consultant, Jacobs) and Alana Salvador Jara (Undergraduate Geospatial Consultant, Jacobs).

A technical review was completed by:

- Fran Scully (Principal Archaeologist, Jacobs). Fran holds a Master of Science in archaeological geophysics from the University of Bradford and has over 28 years' experience as a field archaeologist, consultant archaeologist, cultural heritage advisor, heritage regulator and policy advisor.

The authors would like to acknowledge the assistance of the following individuals in the preparation of this report:

- Neville Baker (Consultant Archaeologist, Baker Archaeology). Neville Baker has over 25 years' experience as a heritage consultant predominantly in archaeological heritage. He has worked in private practice, as a government archaeologist and has previously developed successful archaeology consulting practices within

Australian Museum Business Services (1995-2002), ERM (2002-2007), AECOM (2007-2011) and EMGA Mitchell McLennan (EMM – 2011-2013)

- Nestor Nicola (Consultant Archaeologist). Nestor has over four years' experience as an archaeologist, working on Aboriginal and historical projects across Western Sydney, rural NSW, and the Mediterranean
- Luke Griffiths (Consultant Archaeologist) has over three years' experience working in archaeological heritage both in historical and aboriginal excavations.

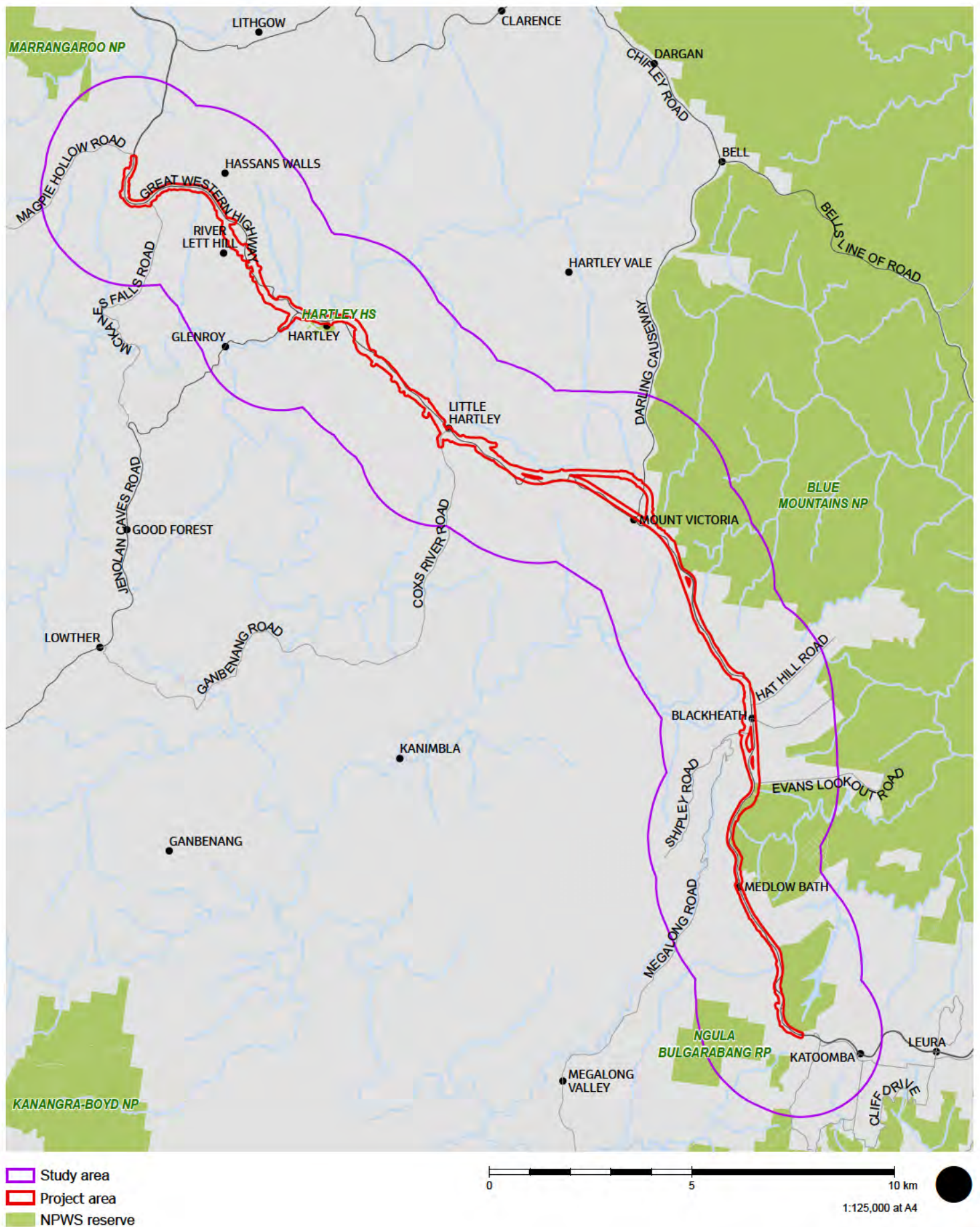


Figure 1.1 Project area

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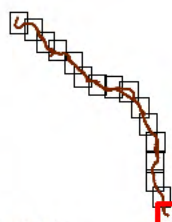
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- Study area
- Project area
- NPWS reserve
- Katoomba to Mt Vic design
- MtVic to Lithgow design
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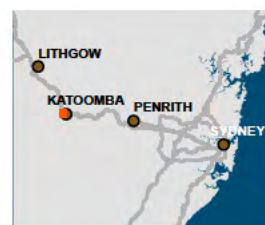
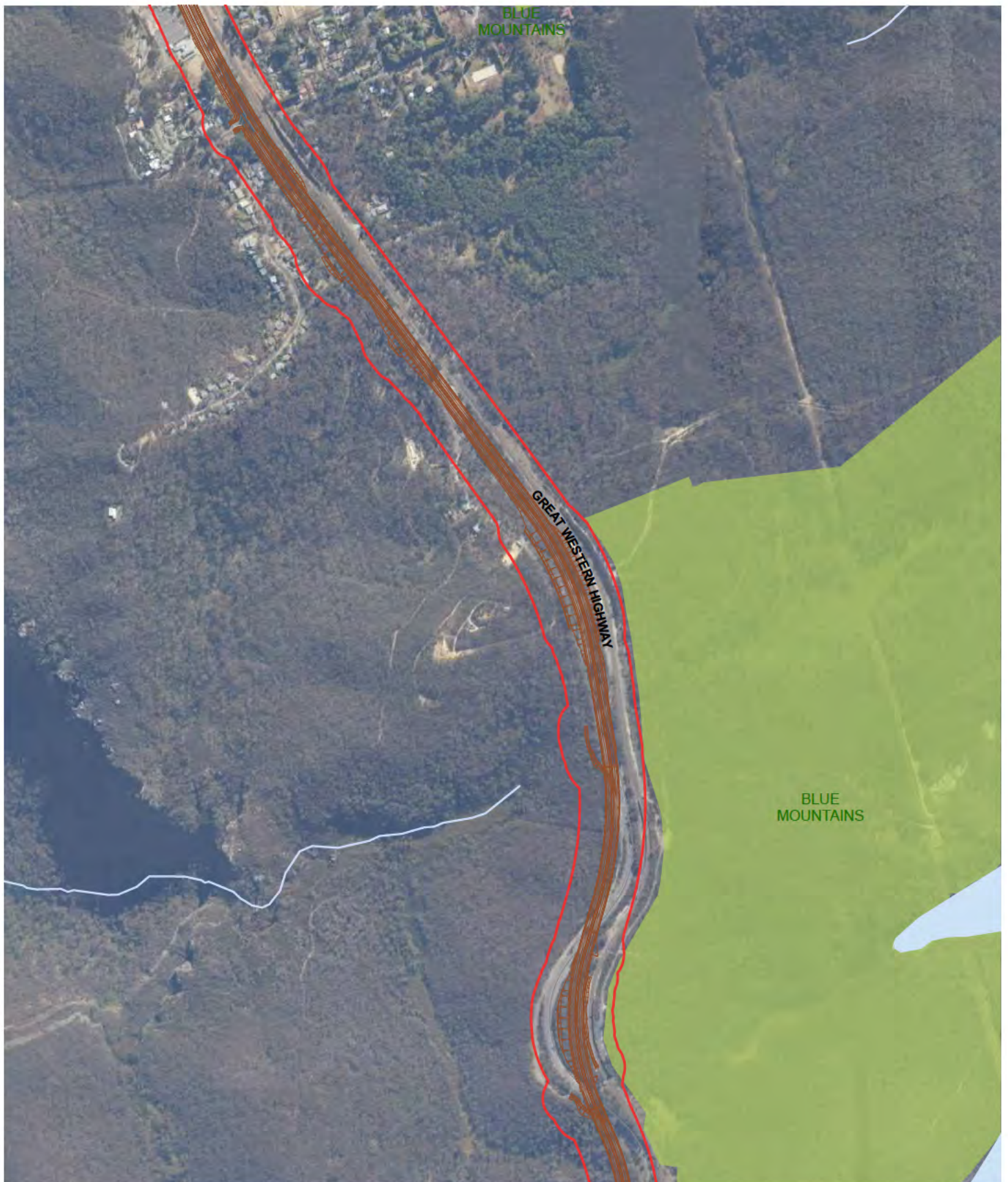
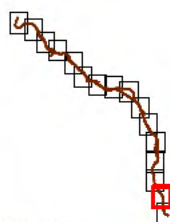


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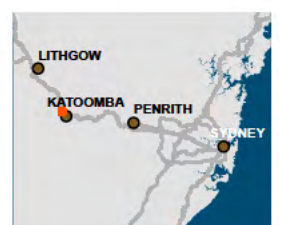
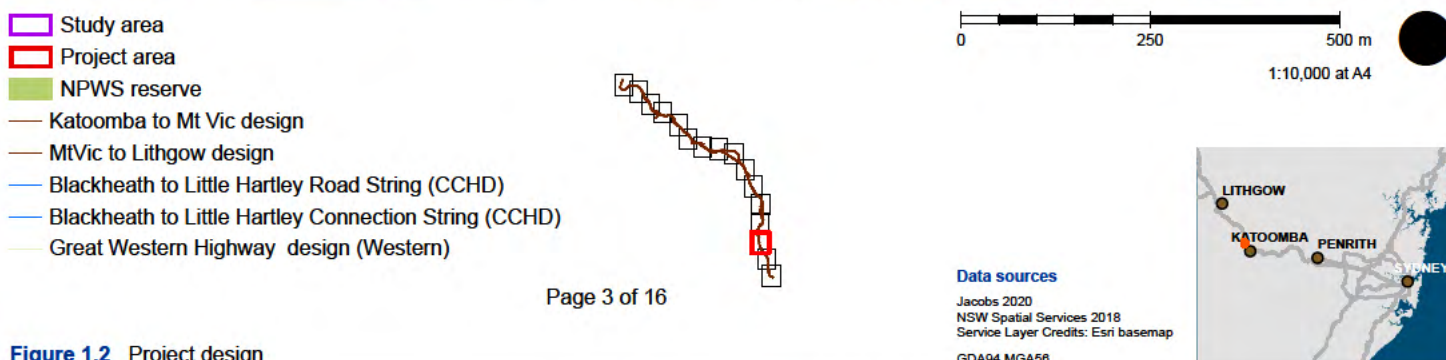
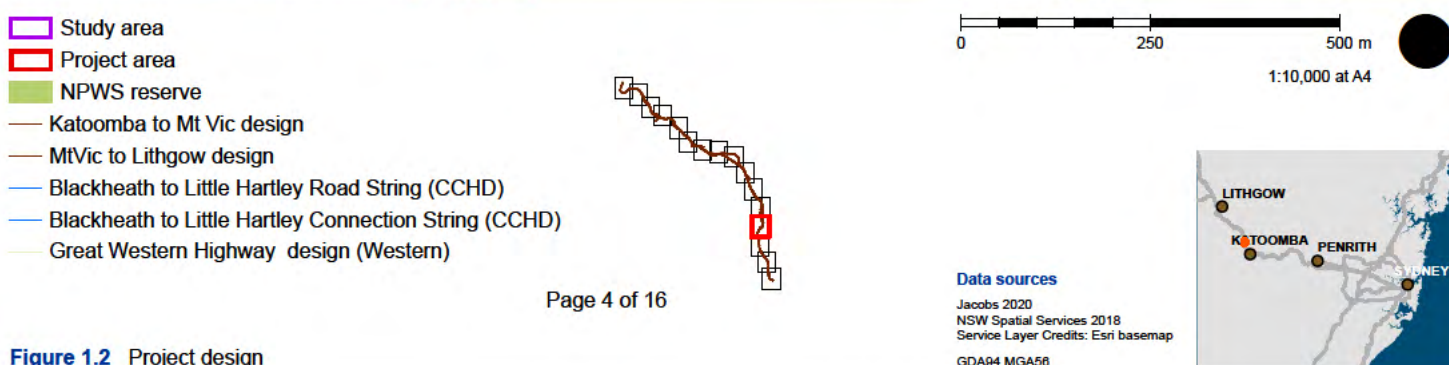
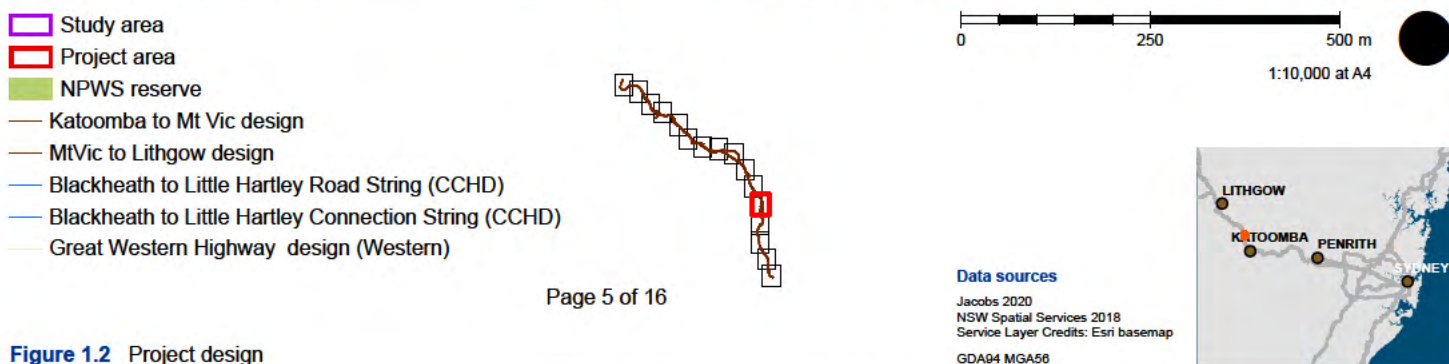


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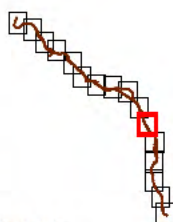








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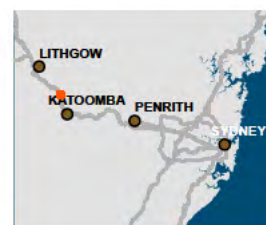
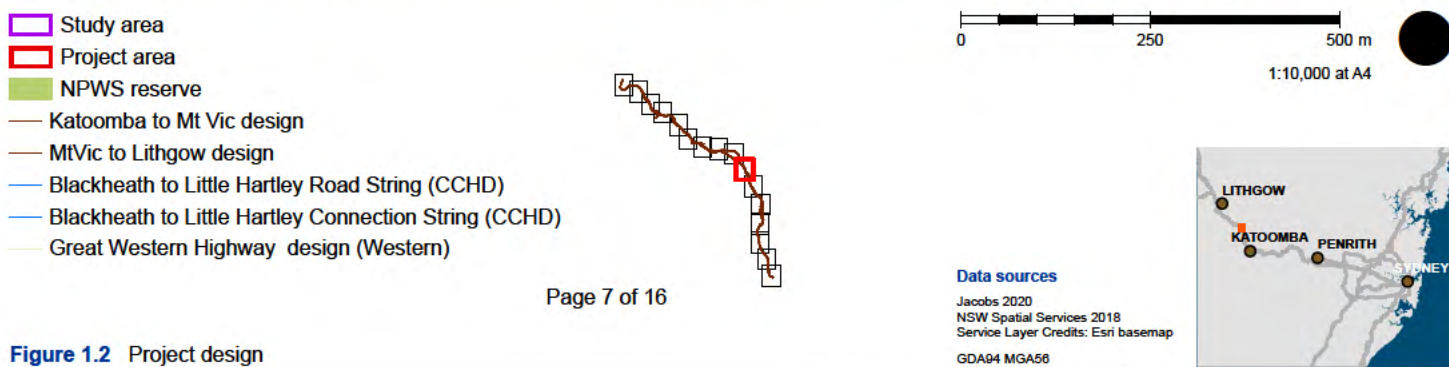
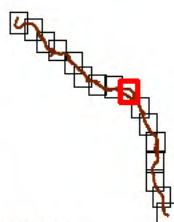


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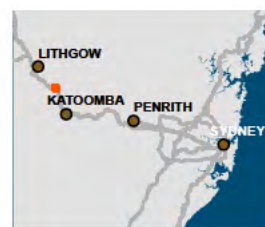
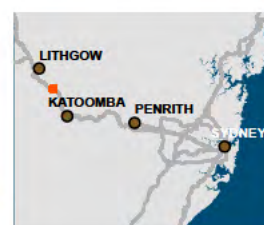
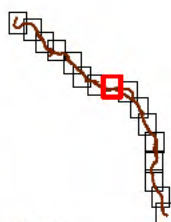


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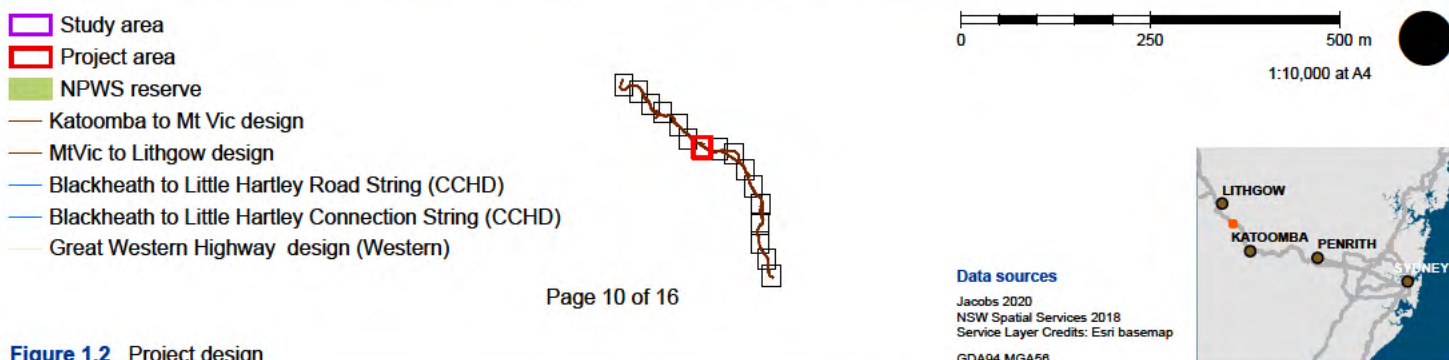
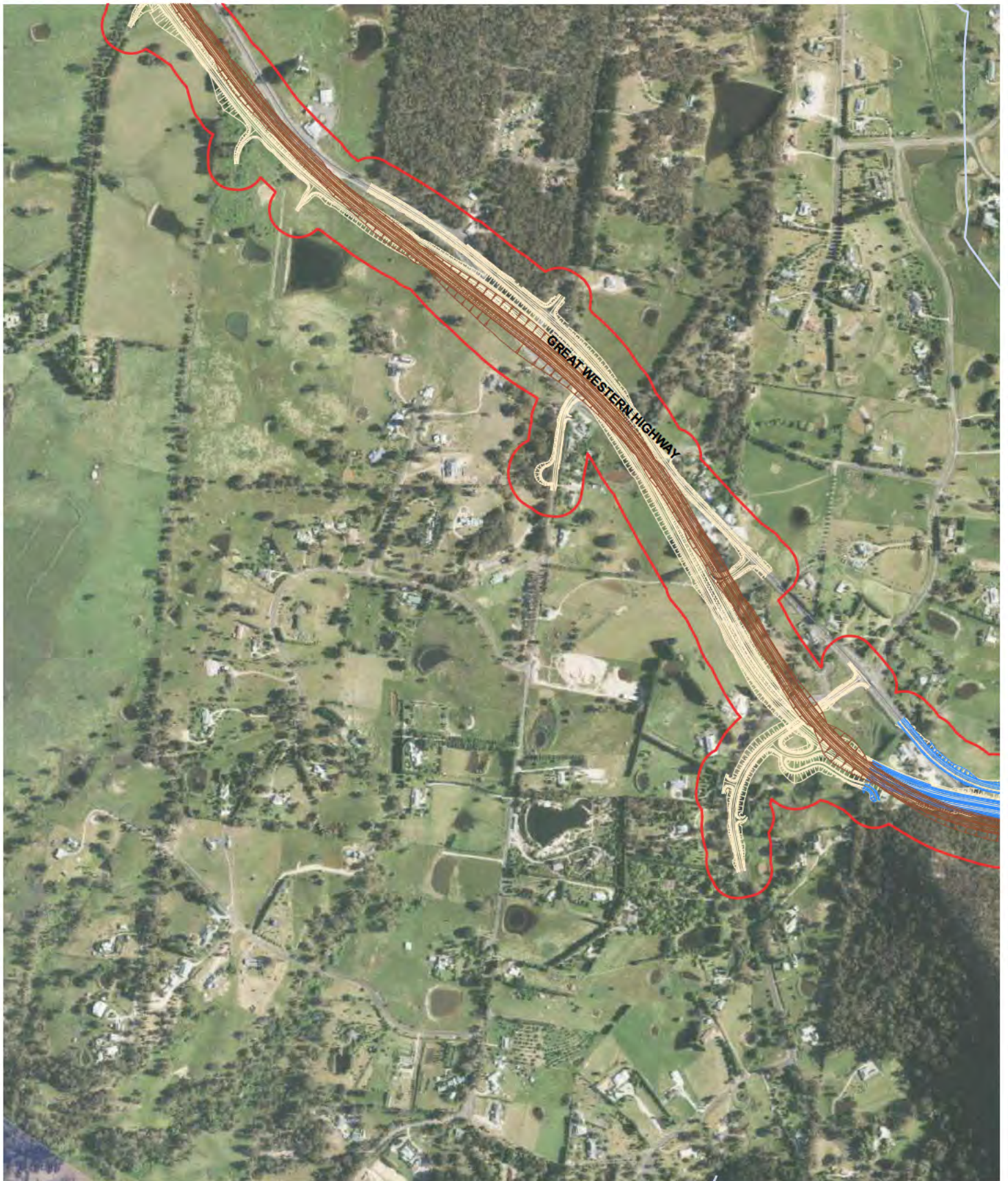
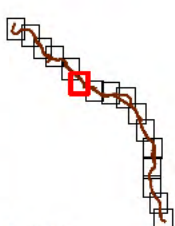


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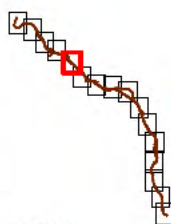


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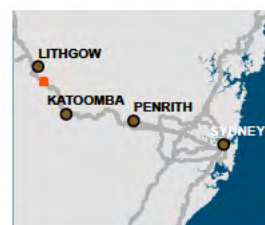
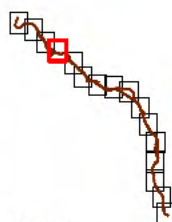


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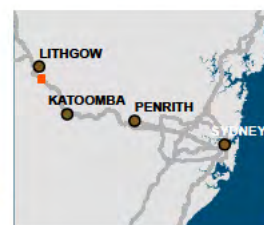
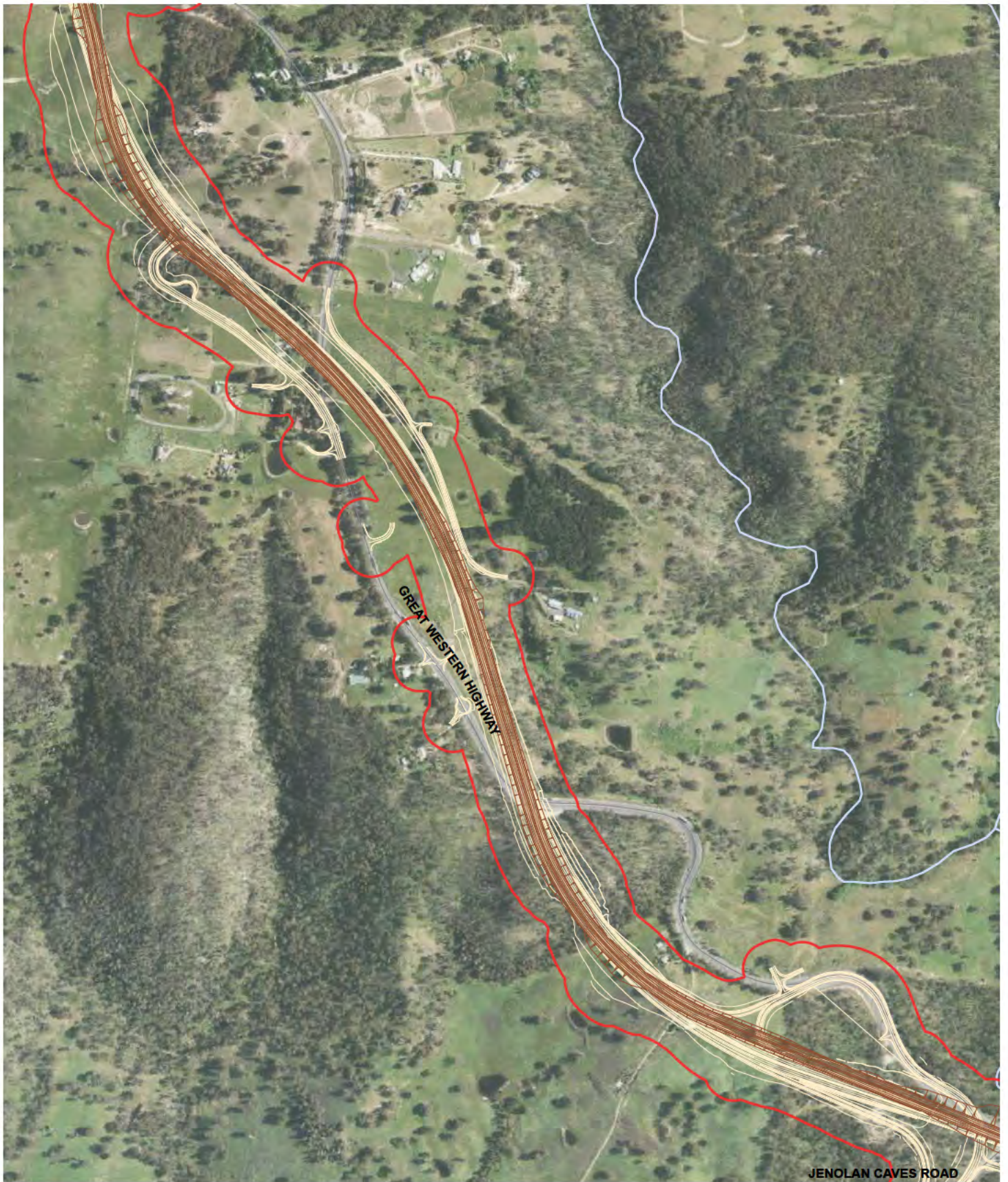
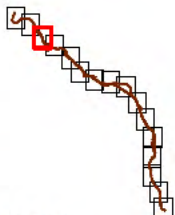


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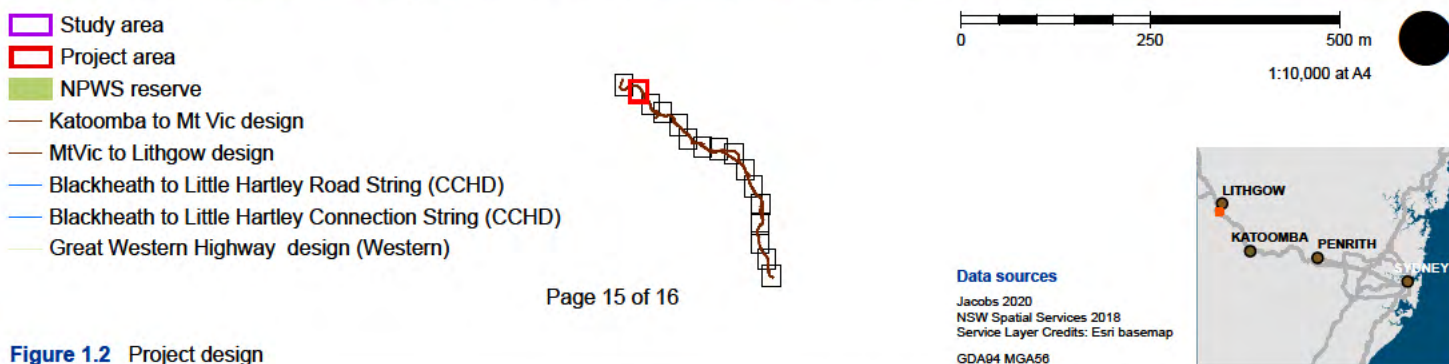
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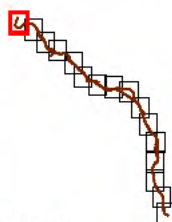
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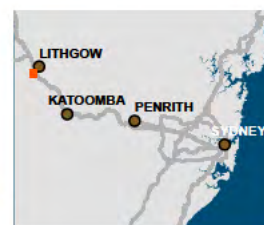


Figure 1.2 Project design

2. Legislative framework

The following subsections present a summary of Commonwealth and State heritage legislation relevant to the Project for Aboriginal cultural heritage (Table 2-1 and Table 2-2). Any specific questions regarding the legislation, including its operation specific to a project and any potential legal ramifications to the client as a result of this general overview, should be addressed to a qualified legal practitioner.

The protection and administration of heritage in Australia is mainly legislated by the States. There is, however, a national heritage scheme as per the *Environment Protection and Biodiversity Act 1999* (EPBC Act) which governs heritage for World, National and Commonwealth heritage. This applies to both Aboriginal and non-Aboriginal heritage.

Commonwealth legislation:

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Environment Protection and Biodiversity Act 1999*
- *Native Title Act 1993*.

In NSW, Aboriginal heritage, apart from being administered by the *National Parks and Wildlife Act 1974* (NPW Act), is also informed by the Acts which contain some heritage administrative function.

NSW legislation:

- *Environmental Planning and Assessment Act 1979*
- *National Parks and Wildlife Act 1974*
- *National Parks and Wildlife Regulation 2019*
- *Native Title Act 1994* (NSW)
- *Aboriginal Land Rights Act 1983* (NSW).

These Acts and how their relevant sections and associated regulatory documents (e.g. codes of practice, regulations, guidelines, etc.) govern the project are described in the tables below.

Table 2-1: Commonwealth legislation

Legislation	Requirements
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) (Australian Government 1999)	<p>The EPBC Act 1999 provides for the protection of the environment, especially in matters of national environmental significance (MNES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have significant impacts on any of the MNES without approval from the Australian Government Environment Minister. The definition of the environment under the EPBC Act includes both natural and cultural elements.</p> <p>The EPBC Act includes provisions to protect matters of national environmental significance and Commonwealth land. Lists and registers made under the Act include:</p> <ul style="list-style-type: none"> ▪ A National Heritage List (NHL) of places of national heritage significance ▪ A Commonwealth Heritage List (CHL) of heritage places owned or managed by the Commonwealth ▪ An independent expert body, the Australian Heritage Council, which advises the Minister on the listing and protection of heritage places.

Legislation	Requirements
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Australian Government 2005)</i>	Protects Aboriginal cultural property in a wider sense and includes any places, objects and folklore that 'are of particular significance to Aboriginals in accordance with Aboriginal tradition'. The Act may apply to contemporary Aboriginal cultural property as well as ancient sites. The responsible Minister may make a declaration under s10 of the Act in situations where state or territory laws do not provide adequate protection of heritage places.
<i>Native Title Act 1993 (Australian Government 2011)</i>	<p>Recognises and protects native title and provides that native title cannot be extinguished contrary to the <i>Native Title Act 1993</i>. The National Native Title Tribunal (NNTT) is a Commonwealth Government agency set up under this Act and mediates native title claims under the direction of the Federal Court of Australia. NNTT maintains the following registers:</p> <ul style="list-style-type: none"> ▪ National Native Title Register ▪ Register of Native Title Claim ▪ Unregistered claimant applications ▪ Register of Indigenous Land Use Agreements (ILUAs). <p>The ACHCRP stipulates that where relevant, consultation must be conducted with Native title holders or registered native title claimants in accordance with the <i>Native Title Act 1993</i>.</p>

Table 2-2: NSW legislation

Legislation	Requirements
<i>Environmental Planning and Assessment Act 1979 (EP&A Act) (DPE 1979)</i>	<p>This legislation provides the framework for environmental planning and assessment in NSW. The EP&A Act includes the requirement for environmental impacts to be considered prior to development approval including:</p> <ul style="list-style-type: none"> ▪ The requirement for impacts or likely impacts upon Aboriginal cultural heritage to be assessed as part of a project's environmental approval ▪ Local government areas prepare Local Environment Plans (LEPs) and Development Control Plans (DCPs) in accordance with the EP&A Act to provide guidance on the level of environmental assessment required.
<i>National Parks and Wildlife Act 1974 (NPW Act) (DECCW 2012a)</i>	<p>The NPW Act provides for the protection of Aboriginal objects and Aboriginal places. Under section 5 of the Act, an Aboriginal object is defined as:</p> <p><i>'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.'</i></p> <p>An Aboriginal place is defined under the NPW Act as an area that has been declared by the Minister administering the NPW Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.</p> <p>Under s86 of the NPW Act it is an offence to harm an Aboriginal object or harm or desecrate an Aboriginal place, without the prior written consent from the Deputy Secretary of Department of Premier and Cabinet. Penalties apply to the offence of impacting on an Aboriginal object or Aboriginal place. The largest penalties apply when a person harms an object that they know to be an Aboriginal object (called a 'knowing offence'). However, a 'strict liability'</p>

Legislation	Requirements
	<p>offence still applies whether or not a person knows it is an Aboriginal object or place. Under section 89A of the NPW Act it is a requirement to notify the Deputy Secretary of Department of Premier and Cabinet of the location of an Aboriginal object on identification within a reasonable time after identification. Identified Aboriginal objects and sites are registered in NSW on the Aboriginal Heritage Information Management System (AHIMS) database.</p> <p>Guidelines and procedures that accompany the <i>NPW Act</i> include the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (DECCW 2010), <i>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales</i> (DECCW 2010c), the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents</i> (DECCW 2010a), the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW 2010b) and <i>Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants</i> (DECCW 2010).</p>
<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (the Code of Practice) (DECCW 2010b).	<p>The Code of Practice sets out the detailed requirements for archaeological investigations of Aboriginal objects in NSW for activities that require assessment under Part 4 or Part 5 of the EP&A Act. The Code of Practice sets out in detail:</p> <ul style="list-style-type: none"> ▪ Minimum qualifications for anyone undertaking archaeological investigation under the Code in NSW ▪ Assessment steps required to be undertaken for all archaeological investigation ▪ Assessment steps that may be required to be undertaken to adequately characterise the Aboriginal objects being investigated.
<i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i> (ACHCRP) (DECCW 2010a)	<p>The ACHCRP establishes the requirements for consultation with Aboriginal stakeholders as part of the heritage assessment process to determine potential impacts of proposed activities on Aboriginal objects and places in accordance with Clause 60 of the <i>National Parks and Wildlife Regulations 2019</i>. Consultation comprises four stages with associated timeframes which must be adhered to:</p> <ul style="list-style-type: none"> ▪ Stage 1 - Notification of project proposal and registration of interest (14 days from date letter sent to register as a registered Aboriginal stakeholders) ▪ Stage 2 - Presentation of information about the proposed project (set up Aboriginal Community Group meetings, prepare info etc) ▪ Stage 3 - Gathering information about cultural significance (28 days for registered Aboriginal stakeholders to provide a review and feedback to consultants' methodology) ▪ Stage 4 - Review of draft cultural heritage assessment report (registered Aboriginal stakeholders have 28 days from sending of the report to make a submissions).
<i>Native Title Act 1994</i> (NSW) (DECCW 2012b)	<p>The <i>Native Title Act 1994</i> (NSW) was introduced to ensure that the laws of NSW are consistent with the Commonwealth <i>Native Title Act 1993</i>.</p> <p>The ACHCRP stipulates that where relevant, consultation must be conducted with Native title holders or registered native title claimants in accordance with the <i>Native Title Act 1994</i> (NSW).</p>

Legislation	Requirements
<i>Aboriginal Land Rights Act 1983 (NSW)</i> (NSW Government 1983)	<p>The <i>Aboriginal Land Rights Act 1983</i> (NSW) recognises the rights of Aboriginal people in NSW and provides a vehicle for the expression of self-determination and self-governance. The purposes of the Act are:</p> <ul style="list-style-type: none"> ▪ To provide land rights for Aboriginal persons in NSW ▪ To provide for representative LALCs in NSW ▪ To vest land in those LALCs ▪ To provide for the acquisition of land, and the management of land and other assets and investments, by or for those LALCs and the allocation of funds to and by those LALCs ▪ To provide for the provision of community benefit schemes by or on behalf of those LALCs.

2.1 Native Title

An initial search of the National Native Title Register on 7/11/2019 was conducted by Transport. An updated search was conducted on 7/07/2021 and shows one active native title claim or application for Native Title over the project area. The location of the area is detailed in Figure 2-1. The native title claimants are Wendy Lewis, Mavis Agnew, Martin de Laune of the Warrabingina Native Title Claimants Aboriginal Corporation on behalf of the Wiradjuri people. The National Native Title Tribunal number listed as (NSD857/2017) filed 31/08/2018 is still being reviewed.

Warrabingina Native Title Claimants Aboriginal Corporation was contacted on 7/07/2021 by Jake Ferguson (Project Archaeologist, Jacobs) regarding any additional documents they may have. No response has been received.

2.2 Local environment plans

LEPs are a type of environmental planning instrument. They are legal documents that control development and set out how land in all or part of a Local Government Area is to be used and guide planning decisions. LEPs allocate 'zones' to different parcels of land, such as rural, residential, industrial, public recreational, environmental conservation, and business zones. Each zone has a number of objectives, which indicate the principal purpose of the land, such as agriculture, residential or industry. Each zone also lists which developments are permitted with consent, permitted without consent, or prohibited. All land, whether privately owned, leased or publicly owned, is subject to the controls set out in the LEP. LEPs determine the form and location of new development and provide for the protection of open space and environmentally sensitive areas.

The project area is located within the Blue Mountains and Lithgow local government areas (LGA). In accordance with the local planning instruments, being the Blue Mountains Local Environment Plan (NSW 2015) and Lithgow Local Environment Plan (NSW 2014), Aboriginal heritage is protected as follows:

In respect to places of Aboriginal heritage significance the consent authority must, before granting consent under this clause to the carrying out of development in a place of Aboriginal heritage significance:

- consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place
- notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.



3. Consultation

Aboriginal stakeholder engagement and involvement is essential for the identification and management of Aboriginal cultural heritage values that may be impacted by the project. Consultation and engagement for this project has been undertaken in accordance with the Aboriginal Consultation Requirements for Proponents (DECCW 2010) and the Procedure for Aboriginal cultural heritage consultation and investigation (RMS 2011).

The Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI) (RMS 2011) provides guidance on the process of investigation and assessment of Aboriginal heritage values for Transport projects, in accordance with relevant legislation and guidance documents. The PACHCI outlines a four-stage process for investigating potential impacts to Aboriginal cultural heritage as a result of Transport road planning, development, construction and maintenance activities.

This section presents a summary of each stage of consultation with Aboriginal stakeholders. Documentation of the consultation process is provided in Appendix A, including AFG meeting minutes, examples of the letters sent to RAPs and knowledge holders, native title search results, records of cultural heritage values workshops and interviews and a detailed consultation log that has been kept for the duration of the project.

Consultation for this project has been managed by Transport.

3.1 Summary of consultation

The following table provides a summary of the consultation undertaken for this project. Detail on each action can be found in Section 3.1 to Section 3.5.

Table 3-1: Summary of Aboriginal community consultation

Consultation stage/ task	Completed by	Start	Finish
Stage 2 – Identification of key Aboriginal stakeholders	Transport	4 November 2019	6 November 2019
Stage 2 – Engage Aboriginal stakeholders to undertake a site survey	Transport	5 November 2019	6 November 2019
Stage 2 – Undertake the archaeological survey	Transport / Jacobs	6 November 2019	26 March 2020
Stage 3 – Seek the names of Aboriginal people with cultural knowledge by letter or notify native title holders	Transport	11 August 2020	28 August 202
Stage 3 – Notify Aboriginal people with cultural knowledge by letter	Transport	11 August 2020	28 August 202
Stage 3 – Notify Aboriginal people with cultural knowledge by advertisement	Transport	11 August 2020	28 August 202
Stage 3 – Send the names of registered parties to Heritage NSW and local Aboriginal land councils	Transport	11 August 2020	21 August 202
Stage 3 – Send an invitation to attend an AFG meeting and a draft methodology for review	Transport	21 February 2021	10 March 2021

Consultation stage/ task	Completed by	Start	Finish
Stage 3 – Hold an AFG meeting (AFG 1)	Transport	22 February 2021	22 February 2021
Stage 3 - Provide meeting minutes to Aboriginal parties	Transport	26 February 2021	26 February 2021
Stage 3 – Finalise methodology	Jacobs	22 April 2021	22 April 2021
Stage 3 – Engage Aboriginal site officers to participate in fieldwork	Transport	19 April 2021	29 June 2021
Stage 3 – Present the results of archaeological assessment at AFG (AFG 2)	Jacobs	30 August 2021	30 August 2021
Stage 3 – Present the draft CHAR for review and comment	Jacobs	23 August 2021	23 August 2021
Stage 3 – Finalise CHAR incorporating RAP comments	Jacobs	6 September 2021	10 September 2021

3.2 PACHCI Stage 1

Stage 1 of the PACHCI activities undertaken for this assessment involved a desktop risk assessment and internal Transport action to determine whether the project would potentially impact on Aboriginal cultural heritage and therefore require further assessment. This included an assessment of potential impacts on Aboriginal objects and Aboriginal Places as defined in the NPW Act and to determine if there were any current Native Title holders or claims or Aboriginal Land Claims in the project area.

The Transport desktop risk assessment determined that impacts to Aboriginal cultural heritage were likely given existing information about the distribution of Aboriginal cultural sites within and in the vicinity of the project area. This result therefore triggered the subsequent actions under Stage 2 of the PACHCI.

3.3 PACHCI Stage 2

Consultation undertaken in relation to the archaeological survey were conducted by Transport and followed the requirements described for Stage 2 of PACHCI (Roads and Maritime Services 2011) and in accordance with DECCW consultation guidelines (DECCW 2010a). The consultation actions are described below.

Action 1 – Identify key Aboriginal stakeholders

A search of the National Native Title Register to identify and registered native title claimants or Native Title holders for the options assessment area. This search was originally conducted on 7/11/2019. This search confirmed that there were two native title claimants or native title holders for the project area. An additional search was conducted on 7/11/2021. There is one active native title claim (NC2018/002 - Warrabinga-Wiradjuri #7) and one Land Use Agreement (NI2014/001 - Gundungurra Area Agreement) over the project area. Documentation for this Native Title Register search is presented in Appendix B.

- Identifying the LALCs relevant to the project area. These are:
 - Deerubbin Local Aboriginal Land Council (DLALC)
 - Bathurst Local Aboriginal Land Council (BLALC)
 - Darug Tribal Aboriginal Corporation (DTAC)
 - Gundungurra Tribal Council (GTC).

Action 2 – Engage Aboriginal stakeholders to undertake an archaeological survey

Nominated representatives for the relevant LALCs, Native Title and Traditional Owner groups were engaged to participate in the archaeological survey where the project area traversed their boundaries. Details of this participation are presented below.

Actions 3 & 4 – Undertake the archaeological survey

Consultation was conducted with nominated representatives for the LALCs and Traditional Owner groups during the field surveys. Field surveys were undertaken through November 2019 until March 2020. Details of the fieldwork activities and associated personnel included are provided in Appendix B.

Consultation conducted during survey provided an opportunity for the Aboriginal stakeholder representatives to provide:

- Comment on the potential for Aboriginal cultural material to be present within the project area
- Comments on the cultural significance of any Aboriginal cultural heritage sites identified during the survey
- Comment on proposed management recommendations, including recommendations for further assessment.

Action 5 – Aboriginal stakeholder(s) prepare cultural heritage survey report

In accordance with PACHCI, the Bathurst and Deerubbin LALCs were also requested to provide a cultural heritage survey report to Transport for NSW advising on Aboriginal cultural heritage issues that may arise as a result of the proposed project. Deerubbin LALC provided a report they produced for a previous survey which encompassed much of the project area (Appendix A). No report has been provided by Bathurst LALC at the time of writing.

3.4 PACHCI Stage 3

Action 1 – Seek the names of Aboriginal people with cultural knowledge by letter or notify native title holders

Letters were written and sent to the statutory organisations (Appendix B) on 11/08/2020 seeking the details of Aboriginal people who may have an interest in the project and who hold cultural knowledge about objects and places relevant to the project:

Following the statutory response time of 14 days, a list of 46 Aboriginal groups or people with potential cultural knowledge was compiled.

Action 2 – Notify Aboriginal people with cultural knowledge by letter

On 11/08/2020 a letter of notification was sent to all of the Aboriginal groups or people identified in Action 1 inviting them to register their interest in the project.

Action 3 – Notify Aboriginal people with cultural knowledge by advertisement

Advertisements inviting Aboriginal groups or people to register their interest in the project were placed in the public notices section of the following newspapers on the following dates:

- 21/04/2020 & 28/04/2020 - Lithgow Mercury
- 22/04/2020 - The Koori Mail
- 22/04/2020 & 29//04/2020 - The Blue Mountains Gazette

Action 4 – Engage an archaeologist to implement the archaeological methodology and prepare a cultural heritage assessment report

Jacobs were engaged on 26/09/2021 to prepare and implement the archaeological methodology for the project.

Action 5 – Prepare a register of Aboriginal parties

A register of RAPs who responded to the notification letters and advertisements was compiled and continues to be maintained for the project. Each RAP was sent a letter confirming receipt of their registration. Thirty-four RAPs registered their interest for the project.

Action 6 – Send the names of registered parties to Heritage NSW and local Aboriginal land councils

The list of RAPs was issued to DLALC, BLALC and Heritage NSW on 11/08/2020.

Action 7 – Send an invitation to attend an AFG meeting and a draft methodology for review

On 21/02/2021 invitations to attend the first AFG meeting were sent to all RAPs registered for the project. Included with the invitation letters was:

- An agenda for the AFG meeting
- A copy of PACHCI Resource 19 – Aboriginal site officer application form
- A draft copy of the Test Excavation Methodology for the project

On 1/04/2021 a notification was issued to Heritage NSW to inform them of the commencement on the draft Test Excavation Methodology for the project. An invitation to attend the AFG meeting was also provided.

Action 8 – Hold an AFG meeting

An initial AFG meeting for the Project was held on 19/04/2021. During the meeting, the project and associated works were presented to participants. The draft archaeological methodology was also reviewed and feedback from RAPs documented.

Action 9 – Provide meeting minutes to Aboriginal parties

Written summary of the comments and minutes from AFG 1 was provided to RAPs via email on 23/04/2021.

Action 10 – Finalise methodology

Review of the archaeological methodology commenced on 21/02/2021 when the draft methodology was sent to the RAPs. Comments from RAPs and Heritage NSW were compiled for consideration and incorporated where appropriate to refine the methodology. The review period ended on 19/04/2021.

Action 14 – Engage Aboriginal site officers for test excavation

The invitation to attend AFG 1 also included an invitation to apply to be an Aboriginal site officer during the test excavations, with all nominations to be received by 19/04/2021. Nominations to participate in the cultural values assessment were also opened at AFG 1 and remained open throughout the test excavations.

3.4.1 Timing and personnel

The field excavation team was led by Andrew Costello (Associate Archaeologist, Jacobs) accompanied by Neville Baker (Principal Archaeologist, Baker Archaeology), Alexandra Seifertova (Project Archaeologist, Jacobs), Jake Ferguson (Intern Archaeologist, Jacobs), Nestor Nicola (Project Archaeologist, Baker Archaeology), and Luke

Griffiths (Intern Archaeologist, Jacobs), along with a site officer team representing the RAPs. A detailed table of timing and field personal is present in Appendix B.2.

3.5 PACHCI Stage 4

As outlined in PACHCI and the ACHCRP, a copy of this ACHAR has been provided to Heritage NSW and all RAPs for the project for review and comment. A review period of at least 28 days has been allowed, with another AFG meeting held during this period to provide a forum for the discussion of the project impacts and proposed management recommendations documented in this ACHAR.

Any additional comments received during ongoing consultation will be included in the final version of the ACHAR. During future stages of the project, RAPs would be consulted about significant design or construction changes in a manner consistent with the relevant guidelines.

3.6 Sensitive cultural information and management protocol

It was possible that during the consultation process, RAPs would provide sensitive cultural information to which access needs to be restricted. When such information was supplied, the RAP supplying the information would state to Jacobs how they wish that information to be treated, and how access to the information should be restricted.

Jacobs has followed the stated wishes provided by the RAP group in question when managing and using the information provided to Jacobs. All stated restrictions of access, communication and publication of the information have and will continue to be followed. These include:

- Restrictions on reproducing the information (in whole or in part) in reports
- Restrictions on reproducing the information in reports provided to different audiences (for example, the version provided to the client, the version provided to DPIE and the AHIMS database)
- Restrictions on communication of the information in other ways
- Restrictions on the location/storage of the information
- Other required processes relating to handling the information
- Any names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the information, and their degree of authorisation
- Any details of any consent given in accordance with customary law
- Any restrictions on access to and use of the information by RAPs.

3.7 Consultation log

A log summarising the consultation carried out with RAPs in relation to the project to date is provided in Appendix A.

4. Existing environment

4.1 Landscape context

A detailed investigation of topography, geomorphology, vegetation and hydrology is located in Section 2 of the AAR (Appendix C).

The project area is located in a diverse topographic and ecological environment, that crosses some important landforms and waterways. The geological and soil landscape contains sources for cultural sites such as rock shelters and artefacts.

The current landscape that the project crosses has been highly modified. It contains the GWH and associated infrastructure such as lighting, secondary roads and picnic areas. The road either side of the highway includes a mix of commercial farming and smaller rural residential farm lots.

Despite this modification, Aboriginal objects are present within the project area. The integrity of Aboriginal objects located in areas of intensive ground disturbance has been affected, however, there are areas where Aboriginal objects have retained their integrity. Added to which, lesser integrity does not necessarily equate to lesser importance, both culturally and archaeologically.

4.2 Cultural context

Ethnographic information relating to Aboriginal peoples' occupation of the Blue Mountains is derived from publications and other surviving forms of documentation which were compiled by early non-Aboriginal explorers, settlers, missionaries and government officials from 1813, and increasingly in the 1820s. As such much of the information contains problems with language barriers, cultural bias, and ethnocentrism.

The project area spans three distinct Aboriginal language groups, these are the Darug, the Gundungurra, and the Wiradjuri peoples. Each group have their own distinctive cultural identity and will be examined in relation to the project area.

4.2.1 Aboriginal tribal boundaries

The project area transverses part of Darug, Gundungurra and Wiradjuri Countries. During European contact it was recorded that the Darug occupied the main east-west ridge of the Blue Mountains, the northern Blue Mountains and the Cumberland Plain. The Gundungurra were to the south, and the Wiradjuri were to the west (Attenbrow 1993; Attenbrow 2010; Breckell 1993).

The Darug were described by Tindale (1974) to have their tribal boundaries as expanding from the mouth of the Hawkesbury River inland to Lithgow and the Newnes Plateau. The Darug spoke different dialects depending on their location. The dialect in coastal areas varied from areas in the mountains, this area was known as Muru-Marak or mountain pathway (Attenbrow 2003: 34).

The Gundungurra were described by Tindale (1974) as occupying an area south to Goulburn and Berrima, down the Hawkesbury River (Wollondilly) and over to the vicinity of Camden. As well as defining their boundaries, Tindale (1974) recorded that the name Gundungurra incorporated terms meaning 'east' and 'west'. Attenbrow (2003: 34) provides a clearer description, stating they encompass the 'southern rim of the Cumberland Plain west of the Georges River, as well as the southern Blue Mountains', while more recently (Smith 2009: 131) describes Gundungurra country as encompassing most of the 'Cox and Wollondilly catchments and some adjacent areas west of the Great Dividing Range'.

The word 'Wiradjuri' is thought to mean 'people of three rivers', the rivers being the Macquarie, Lachlan and Murrumbidgee. Wiradjuri people occupy the westernmost section of the project area. Their land is part of the Riverine region of New South Wales, on the central - west slopes and plains and extends from Nyngan to Albury,

and Bathurst to Hay covering over 80,000 - 100,000 square kilometres (Horton 1994; Macdonald 2004: 22; Macdonald and Powell 2001: 1).

The various tribal boundaries defined by Tindale (1974) have been disputed by Bowdler (Bowdler cited in Cardno 2008: 18) who states that these are a 'zone of interaction' rather than a hardened line of territory. Attenbrow (2009: 120) adds that many of the boundaries which are defined by Tindale (1974) are 'almost straight lines' which cannot be considered correct due to the varying topography present in the Blue Mountains. Instead, Attenbrow (2009: 120) provides more accurate tribal boundaries for each group. For the Darug, lands include the lower Grose Valley and adjacent parts of the main east- west ridges separating the catchments of the Cocks Grose and Colo Rivers.

Tribal boundaries are often recorded from linguistic boundaries. Governor Macquarie in 1815 noted that the Sydney Aborigines could not understand those at Bathurst, although John Oxley observed that the language at Bathurst, Wiradjuri, was understood to the south and west. The Wiradjuri language included non-verbal and oral forms. Oral tradition used with other forms of non-verbal communication including signs and symbols inscribed or painted on surfaces within the landscape. It meant that hand signals and body language contributed to the richness of the language (Green 2002: 63).

4.2.2 Social organisation, settlement, and subsistence

Descriptions of social organisation, settlement, and subsistence for the upper Blue Mountains are provided by Annabella Boswell in the 1890s. Boswell described the way of life of a small extended family group of Aboriginal people who camped near the family's property in the Bathurst district between 1835 and 1840. They are identified as the 'Capita Tribe', the Capertree site is located north east of Bathurst. She described their camps as:

'...in fine weather their camps were composed of a half circle of green boughs interlaced so as to form a sheltering wall about three or four feet high. In wet or stormy weather they stripped sheets of bark from the tall gum trees or stringy bark trees, and sticking two forked posts into the earth about eight feet apart, put a ridge pole across between them. Against this rested the bark slanting...' (Boswell 1890: 4).

An area described in oral traditions as a summer camping place prior to European settlement is Katoomba Falls Creek Valley. The location was close to an Aboriginal travel route and it was supplied with a fresh water spring that fed the Katoomba Falls. The natural amphitheatre formed by the topography provided protection from the westerly winds and the presence of artefacts and archaeological sites demonstrate its importance for Aboriginal people (Attenbrow 1993: 201; Johnson 2009).

The social system of the Wiradjuri is described by Read (1983) as a two-moiety matrilineal arrangement where descent was recognised through the female line. Furthermore, extended family groups travelled periodically over long distances to link up with kin groups, and occasionally with neighbouring language groups, for ceremonies, marriage or trade thus widening social systems and groups (Read 1988: 3).

Cultural practices continued following European disruption in the project area. In the early nineteenth century corroborees and other ceremonies were reported as being held in the Bathurst District and at times observers were permitted at gatherings such as Boswell (1890). Boswell (1890: 7-8) recalls a corroboree occurring in 1837 and that it appeared to mark the 'conclusion of some religious ceremony or consultation, as there was a great gathering of strangers from distant tribes', possibly from the Hunter River, Goulburn and Maneroo areas.

4.2.3 Resources

A variety of resources were exploited by Aboriginal groups within the upper Blue Mountains. Louisa Meredith noted that in 1839 that the Macquarie River was a valuable source of food. Fishing skills were considered expert as Aboriginal people showed 'patience and ingenuity' in making and using snares to catch prey (Meredith 1973: 104). Fishing techniques were first described by John Oxley in 1817, where he noted that a hook and line for fishing were not used, rather it appears the spear was used for this purpose (Meredith 1973: 105; Towle n.d: 22).

Domesticated 'native dogs [dingoes]' were used to hunt game such as kangaroo and emus, a technique recorded by Major Antill in a trip to Bathurst (Antill 1815). Possums were often caught by tree climbing, a technique aided by the cutting of notches in tree trunks for foot and hand holds.

In 1813, Gregory Blaxland described an Aboriginal camp near River Lett where the honeysuckle flower was used for food (Towle n.d: 18). Yam daisy tubers, wattle seeds, and orchid tubers were exploited by the Gundungurra people during certain months of the year (DECCW 2016).

Stone material

In the Blue Mountains, basalt is available as water-rolled pebbles in the Grose River, and other major streams. Chert is another raw material known to be used for tool use. Chert is a glossy, fine-grained siliceous stone which was often used to create knives, scrapers, and points due to the sharp edge it can create. Chert occurs at outcrops at the base of sandstone/ shale cliff lines of great valleys. Though there is evidence of it being quarried, most of the chert used for toolmaking appears to have been found as pebbles in the Grose River and tributaries.

Chert and silcrete objects that have been found display a greater economy in reduction than those found closer to their geological sources. This indicates possible trade links and routes.

4.2.4 Material culture

Clothing

Types of clothing are described by both Francis Barrallier, Major Antill and Annabella Boswell. In 1802, Francis Barrallier describes the women of the Burraborang Valley as having head dresses made of bands on which kangaroo teeth were strung. The men wore necklaces of reeds wound round their neck a number of times with a length hanging down their backs. Both genders are described as wearing cloaks made from the hide of various animals stitched together with sinew (Johnson 2007: 25).

Animal cloaks are also described by Major Antill in 1815, where he noted that Aboriginals near Bathurst wore cloaks of kangaroo and emu which were carved on the inside with a variety of figures (Antill 1815). He also states that the cloaks were worn for warmth rather than modesty, and that women wore them in a way that they could carry their children in them

Annabella Boswell provides a descriptive process of how these cloaks were made. She estimates that it took 30 to 40 skins to make a good-sized cloak or rug. The remaining fur was used for 'spinning', a process much like a distaff and spindle, to make a strong thread (Boswell 1890: 6-7) (Figure 4-1: Windradyne, Aboriginal Warrior of the Wiradjuri Nation drawn by J.W. Lewin and engraved by R. Havell & Son (Oxley 1820: 302)

). The thread would be made into a cord and would make 'nets' for the men's belts and girdles and sometimes for nets for hair and small bags. Other types of bags and baskets are described by Meredith (1973: 107) as woven from 'fine long dry grass'.



Figure 4-1: Windradyne, Aboriginal Warrior of the Wiradjuri Nation drawn by J.W. Lewin and engraved by R. Havell & Son (Oxley 1820: 302)

Stone artefacts

Open archaeological sites in eastern NSW are usually dominated by stone artefacts. Most artefacts on open sites are unretouched flakes, though sites are also commonly characterised by the presence of backed artefacts (McCarthy 1976) and other small retouched flakes including thumbnail scrapers and end scrapers. Backed artefacts appear in stratified archaeological deposits in the Sydney region within the Holocene period, proliferating in the late Holocene between 3500 and 2200 years ago (Hiscock 2002; 2008). After this period they become rare in most assemblages, although Henry Lawson Drive Rockshelter has a very high proportion (greater than 25 percent of artefacts in the assemblage) of backed artefacts, in an assemblage dating within the last 1 000 years (Hiscock 2003). Their use was apparently abandoned by the time of European contact, with no historical sources recording observations of backed artefacts.

Commonly observed changes in stone artefacts through time in eastern NSW have been termed the 'eastern regional sequence'. The sequence consists of artefact types that change their appearance, frequencies of production, and use of different materials through time. This sequence of change through time was first proposed by McCarthy (1976) and has been refined as additional sites have been investigated and as dating of the sequence has improved. The sequence is generally depicted as having four distinct phases: Pre-Bondaian (or Capertian), Early Bondaian, Middle Bondaian and Late Bondaian (or Elouran) and are distinguished as follows:

- The Pre-Bondaian (Capertian) period is recorded as having higher proportions of artefacts made from fine-grained materials such as indurated mudstone, silicified tuff, or chert (McDonald 2008). Edge ground artefacts are absent, and backed artefacts are absent (McDonald 2008) or rare (Hiscock and Attenbrow 2005; Robertson et al. 2009). Unifacially retouched flakes are the most common type of retouched flake. Recognising Pre-Bondaian assemblages is problematic, as the artefacts present in these assemblages are also present during all other periods (Lampert 1971).

- In the Early Bondaian phase, fine-grained materials become less abundant in assemblages, with increasing proportions of silcrete artefacts. Bipolar flaking of cores becomes more common, though this varies between sites and on some sites it remains rare (McDonald 2008; White 2018). Backed artefacts appear in assemblages.
- In the Middle Bondaian backed artefacts are more abundant in assemblages than during any other phase. Edge-ground artefacts appear in assemblages for the first time but are relatively rare (Attenbrow 2004: 73). Silcrete usually makes up a higher proportion of assemblages in archaeological sites within the Sydney Basin than in earlier periods (White 2018).
- In the Late Bondaian, backed artefact production becomes rare or absent in assemblages. Bipolar flaking of cores is more frequent than in any preceding phase. Edge-ground artefacts are more abundant than in the Middle Bondaian (Attenbrow 2004; McDonald 2008). Quartz usually makes up a higher proportion of assemblages in archaeological sites within the Sydney Basin than in any preceding phase (White 2018).

It is important to note that not all the stratified sites excavated in the region follow this sequential pattern in all respects. For example, Devlin's Creek shows a decrease in the proportion of quartz artefacts in its upper levels, rather than the increase seen in most other sites (Haglund 1995; White 2018). Barden's Creek 9 shows no change in the proportion of quartz through time (Attenbrow and Negerevich 1981; White 2018). Both these sites span the Middle and Late Bondaian periods, where an increase in the use of quartz through time is generally observed.

Changes in the frequency of material usage on sites is likely to be regionally specific, and not changing across time in the same way in all parts of the greater Sydney region. Availability of silcrete and fine-grained materials is dependent upon the exposure of source areas. Source areas in Sydney are usually river gravels, or outcrops deriving from paleochannels. Exposure of these sources almost certainly varied across time, but also probably varied across the region, with local exposures appearing and disappearing through time. Groups that were close to an exposure of silcrete, for example, would be likely to exploit that source, even if they were living during a time period where fine-grained materials or quartz were more common across the Sydney region overall.

Most data on changing usage of materials through time have been obtained from stratified sites within the Sydney basin. These general patterns of material use through time might not apply on the western flank of the Blue Mountains, where the exposed surface geology is likely to have been different to the Sydney Basin, and consequently the local availability of materials for artefact production would have been different.

Meredith (1973) provides descriptions of stone tools in the area including hafted stone axes and stone knives (Towle n.d: 87). Boswell (1890: 7) also provides descriptions of men carrying spears and nulla nullas 'a sort of rude club', as well as boomerangs which were carried in their belt (Boswell 1890: 7).

Other artefacts

Some historical sources record individual Aboriginal artefacts, providing an incomplete picture of the range of implements used. Fish-hooks are mentioned as being made of bone by Tench (1789: 79). Two fish-hooks, one made from mother-of-pearl, the other from a "hard black wood-like substance" are illustrated in White (1790: plate 62). The mother-of-pearl shell is recorded as being manufactured by grinding a spiral shell. White states that fishing line "consists of two strands very evenly laid, and twisted hard; made with a grassy substance dark in colour, and nearly as fine as raw silk" (White 1790). Early historical accounts of Aboriginal people in the Sydney region are skewed toward their use of the water and of marine and riverine resources, due to the European settlement's location on the shores of Port Jackson and along the major rivers such as the George's and Hawkesbury.

White (1790: plate 63) illustrates two types of Aboriginal spear. The first he terms a 'war spear', composed of a shaft "formed of a light reed-like substance produced by the yellow gum tree" with a long point made from hardwood attached with resin. The second is a fishing spear, with a shaft similar to the 'war spear', and a head composed of four prongs made from "sticks inserted into the shaft with gum, and tied together above with slips

of bark, which are afterwards tightened by little wedges, driven within the bandage: each of these sticks is terminated by the tooth of a fish, very sharp, and stuck on by a lump of the gum cement" (White 1790: plate 63). The shaft of fishing spears were made from the flower stalk of the grass tree (*Xanthoroea* sp.), and the tips were sometimes pointed or barbed with pieces of bone (Lampert 1971: 118). Collins records that Aboriginal people near the coast used fragments of shell to tip spears, while inland tribes (specifically, those living on the Hawkesbury) used stone (Collins 1798).

White (1790: plate 63) also illustrates several other artefacts. A spear-thrower made from wood with a small peg (material unspecified) fastened on the end with resin. A basket made from a single piece of bark, its ends bundled and tied, and coated with resin presumed by White to make it waterproof. A hatchet, with head made from a naturally rounded stone cobble with one end ground to form an edge, and handle made from a spit piece of pliable wood bent around the head and bound with slips of bark. A crescentic artefact described by White as "a kind of blunt Sword, of hard wood" which would now be recognized as a boomerang.

Early accounts state that Aboriginal people constructed huts with bark cladding, large enough to house six to eight people (Collins 1798: 555). No detailed information is recorded on how these huts were constructed, but the use of bark as a waterproofing material in hut construction, as well as for the construction of canoes, indicates that harvesting of this resource would have been an important element of Aboriginal life.

4.2.5 Summary

The project area is located within the tribal boundaries of the Darug, the Gundungurra, and the Wiradjuri. The borders are intertwined with one another, depicting much of the project area as a parallel between tribes and on some sites an intersect between all three. The Blue mountains is culturally depicted as a meeting ground, that bound groups together through shared trade, access routes and shared songlines, showing fluidity within the social organisation systems of these tribes.

Similarities existed amongst these tribal groups in their use of traditional material culture. Wood, stone, shell and bone comprised the raw materials of this world, most of which have little chance of being preserved in the archaeological record. Culturally modified trees, which were used in the production of items such as canoes, containers, shelters and bowls have the potential to be present within the region as do carved trees associated with ceremonial sites. Evidence of campsites, with deposits of stone artefacts, hearths or middens, in contrast, are likely to be found where the landscape has not suffered severe ground disturbance. Ethno-historical accounts aid in developing a predictive model for the location of Aboriginal sites.

4.3 Historical context

4.3.1 European interactions

Interaction with Aboriginal groups was rarely recorded and when it was it was not extremely detailed. The first European thought to have entered the Blue Mountains, specifically into Gundungurra territory, was ex-convict John Wilson in 1792. He is supposed to have lived with the Gundungurra for several years in the Bargo - Picton area (Comber Consultants 2009: 9). Following Wilson was Dr. George Bass who entered the Burragorang Valley in 1796.

Expeditions into the mountains became more frequent in the 1800s with Lt Ensign Francis Barrallier leading an expedition up the Nepean Valley and then to the west to the Nattai River in 1802. The expedition party was accompanied by two Aboriginal men, and in subsequent expeditions would be assisted by Aboriginal people during their travels.

The three most well-known European explorers, Gregory Blaxland, William Lawson and William Charles Wentworth crossed the Blue Mountains in 1813. Their crossing was aided by the assistance of Aboriginal people with food and pathways through the mountains. Accounts of explorations demonstrate that Aboriginal people were often utilised as guides, allowing the explorers to use paths and migration routes normally used by

Aboriginal groups to cross the mountains. For example, the route showed to Charles Throsby linked the Gundungurra peoples summer camp in the Burragorang - Camden area and the winter camps around the head of the Cocks River.

Though multiple expeditions had occurred, it wasn't until John Oxley expedition in the Blue Mountains in 1816 that allowed detailed recounts of Aboriginal people to be recorded. Oxley was instructed by J.T. Campbell, the Secretary of State in London to record:

'...the general appearance of the country, its surface, soil, animals, vegetables and minerals, everything that relates to the population, the peculiar manners, customs, language, &c., of the individual natives, or the tribes of them that [they] may meet with ...the description, and characteristic difference, of the several people whom he may meet; the extent of the population, their occupation, and means of subsistence; whether chiefly, or to what extent, by fishing, hunting or agriculture, and the principal objects of their several pursuits.

A vocabulary of the language spoken by the natives whom he may meet, using in the compilation of each the same English words. If the people are sufficiently numerous to form tribes, it is important to ascertain their condition, and rules of their society; their genius and disposition; the nature of their amusements; their diseases and remedies, &c.; their objects of worship, religious ceremonies; and the influence of those ceremonies on their moral character and conduct...' (Oxley 1820: 360).

As a result of these instructions, Oxley (1820) recordings are able to provide insight the Aboriginal people within the Blue Mountains. In addition to Oxley, there is an official record which notes Aboriginal people in the context of census and blanket returns by Governor Lachlan Macquarie in 1816. These documents can provide detail on the number of Aboriginal people in areas or at least an indication of those who made themselves known to the Europeans. The uncertainty of Aboriginal population groups is most likely a result of the spread of European diseases such as the pox.

Aboriginal and European interaction and contact significantly increased the opening of Cocks Road across the Victoria Pass. The road was built in 1814 – 1815 and is the earliest built road in the Blue Mountains. The road construction and settlement was aided by the presence of a Government provision depot at the Cocks River. Though this aided in the settlement of Europeans it came at the detriment of Aboriginal groups. Conflict and violence began to become more frequent. The depot at Cocks river was reported to have been attacked and plundered'. By 1824 conflicts were occurring in the Bathurst District from both sides (Aboriginal and European). A Wiradjuri leader, Windradyne (c.1800 - 1829) of the Sofala district in central - western New South Wales, is recorded as a key protagonist in the period of conflict between settlers and the Wiradjuri later known as the 'Bathurst Wars' known as 'Saturday', in December 1823. He was identified as an instigator of conflicts that resulted in the death of two convict stockmen at Kings Plains and was captured and imprisoned at Bathurst for one month (Roberts 2005).

Aboriginal people were used to assist with labour at larger stations, though jobs were provided there was pressure on groups such as the Wiradjuri to discontinue cultural practices including speaking their own language and the marriage of older men to younger women. Disposition of Aboriginal groups and their culture continued in the late nineteenth century and in the twentieth centuries. Aboriginal people were moved into missions and reserves where they had their existence monitored and controlled.

4.3.2 Previous land use

Within months of settlement in Sydney cove in 1788, colonists looked toward the major barrier separating them from the west, the Blue Mountains. The creation of the first road through the mountains by William Cox's convicts set up the foundation for land use within the Mountains. The project area follows a route that has been in use as a transport footprint since the early nineteenth century. The first European crossing of the Blue Mountains took place in 1813. A track was created the following year, this route followed the present alignment of the GWH and has been subject to maintenance and upgrade works through to the present. Substantial works

were undertaken to upgrade and re-align the road in the 1830s, with the later addition of a railway line in the 1860s which followed a parallel alignment to the highway. The project area and project area run through 4 significant areas of past land use.

4.3.2.1 Hartley

Hartley Village is located four kilometres to the northwest of Little Hartley along the GWH. The land surrounding Hartley was originally set aside as a Crown reserve for agricultural purposes in 1823, in 1830 land was made available for use for use in the creation of Hartley village. In 1834 the government in Sydney relieved the military of responsibility for law and order in the Blue Mountains resulting in the creation of a police district and courthouse in Hartley. The heritage values of Hartley are acknowledged when nearly the entire village became Hartley Historic Site under the NPWS. National Parks, now part of the Heritage NSW, owns eleven 19th century buildings within Hartley, including the courthouse and a woolshed, as well as four later buildings.

4.3.2.2 Forty Bends

The road at Forty Bends is part of the original sections of Mitchell's Road, the western descent, built in the 1830s by convict iron gangs from Mount Victoria to Bathurst. Mitchell chose a new alignment to take the road over Victoria Pass and then down the slopes of Mount Victoria to avoid the difficult descent over Mount York. The road through Forty Bends had at least five culverts with associated retaining walls in the surviving section, and there were another four or five to the west and a bridge to the east near Fernhill. The culverts were necessary for the construction of a stable road which would survive the water deluges off Hassan's Walls after heavy rain. The section of road at Forty Bends was bypassed in the 20th century and therefore has retained many elements of its original construction.

The Forty bends area has had various modifications and land use in the past, the three most significant sites are:

- Fernhill: a colonial estate built in 1842, it consists of a heritage listed homestead, a second home, gardens, outbuildings and horse track
- Millar and [REDACTED] properties: The road passing through the Millar and [REDACTED] properties appears to be a bypass of Mitchell's original line of road, meeting with the older Lockyer's road. Local oral history states these roads were heavily developed to stop bullock wagons from being bogged. These locations include rubbish dumps from construction and possible bullock camping sites
- Forty bends road: the most intact section of Mitchell's original line of road, the original sandstone culverts are still intact lining the side of the road. Continuous upgrades and maintenance of the road over the period of 30 years has possibly left the area disturbed.

4.3.2.3 South Bowenfels

South Bowenfels is an area located south of Lithgow, with immense historical heritage significance from the early Victoria period of the inner Central West. It was subdivided as a new suburban extension of the industrial town of Lithgow. Many service buildings began arising during the peak of European traffic in the 1830s onwards, South Bowenfels had high land usage due to the intersecting and mixing of Lockyer's and Mitchell's original roads in the area.

5. Summary of archaeological assessment

This section summarises the archaeological methodology and assessment carried out to inform the cultural heritage assessment. Full details of the archaeological assessment can be found in the AAR which accompanies this document (Appendix C).

5.1 Assessment methodology

The methods to assess impacts to Aboriginal heritage in NSW are set out in the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2011). The methods undertaken assess the projects' potential impacts to Aboriginal cultural heritage include:

- Desktop assessment of the project area, including a search of the AHIMS, and a review of Aboriginal site data and relevant available reports, undertaken October 2019 and subsequently updated in July 2021
 - Databases and previous archaeological investigations relevant to the project area were reviewed to extract information about the types, distribution and characteristics of Aboriginal cultural materials across the project area. The desktop assessment also helped to identify any gaps in the coverage of previous assessments
 - The information that was derived from the review enabled the development of a predictive model of site distributions in the project area (Section 5 of this document and Section 3.3 of the AAR).
- Review of relevant landscape and environmental characteristics associated with patterning, preservation and discovery of Aboriginal sites (Section 4)
- Archaeological survey of the project area, conducted between November 2019 and March 2020 with representatives from Transport, Warrabinga-Wiradjuri Native Title Group, Deerubbin and Bathurst Local Aboriginal Land Councils (Section 5 of this document and Section 4 of the AAR)
- Consultation with the Aboriginal community representatives in accordance with ACHCRP, undertaken from November 2019 until present (July 2021) (Section 3)
- Archaeological assessment including field inspection and test excavations within the project area in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) undertaken April – June 2021 (Section 5 of this document and Section 6 of the AAR)
- Significance assessment in accordance with The Australia ICOMOS Burra Charter (Australia ICOMOS 2013) and the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2011) (Section 8)
- Assessment of impacts to items/areas identified in the desktop assessment and verified through surveys and test excavations and of management measures to minimise impacts in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2011) (Section 9)
- Development of management measures in accordance with relevant legislation and guidelines to assess impacts to Aboriginal cultural heritage, primarily to seek to avoid impacts and/or secondarily to mitigate them (Section 10).

5.2 Desktop assessment

5.2.1 Heritage register and database search results

The Australian Heritage Database (AHD) contains items of World, National and Commonwealth heritage items, including Aboriginal heritage. A search of the AHD was undertaken by Alexandra Seifertova (Project Archaeologist, Jacobs) on 14/02/2020, and subsequently updated on 6/07/2021. The search identified one World Heritage site within the project area, and two National heritage items. These are:

- WHL - The Greater Blue Mountains Area (ID 105127)
- NHL - The Greater Blue Mountains Area (ID 105999)
- NHL - The Greater Blue Mountains Area - Additional Values (ID 105696).

A search of the State Heritage Register (SHR) for Aboriginal sites located within the Upper Blue Mountains region was undertaken by Alexandra Seifertova (Project Archaeologist, Jacobs) on 14/06/2020, and subsequently updated on 6 July 2021. Three Aboriginal State Heritage items were identified; however, these are located outside of the project area. The closest Aboriginal Place is recorded 550 metres southeast from the project area (Upper Kedumba River Valley - The Gully, Gazetted number 87).

A search of Aboriginal sites and places listed in Schedule 5 of the Blue Mountains 2015 LEP and Lithgow 2014 LEP within a one-kilometre buffer of the project area was completed by Alexandra Seifertova (Project Archaeologist, Jacobs) on 14/02/2020, and subsequently updated on 6/07/2021. No Aboriginal sites or places identified within this search.

5.2.1.1 Aboriginal Heritage Information Management System

Information on gazetted Aboriginal Places and recorded Aboriginal sites and objects is contained in the AHIMS, a database managed by Heritage NSW. A search of Aboriginal objects, sites, and places registered on AHIMS within 100 metres of project area boundary was completed by Neville Baker (Consultant Archaeologist, Baker Archaeology) on 29/10/2019. This initial search identified 58 previously registered Aboriginal sites or areas of Potential Archaeological Deposits (PAD) within or adjacent to the project area. The 58 sites identified within 100 metres the project area consist of:

- 26 isolated artefacts
- Five modified trees (carved or scarred)
- 15 open camp sites
- Two habitation structures (rock shelters)
- One ochre quarry
- One isolated artefact and modified tree (carved or scarred)
- Two Aboriginal resource and gathering, artefact, art (pigment or engraved)
- Five habitation structures (rock shelters), and PAD
- One habitation structure (rockshelter), PAD, and modified tree (scarred tree).

A subsequent search was completed on 30/07/2021 by Alexandra Seifertova (Project Archaeologist, Jacobs). The search included the project area and a 50 metre buffer. The search resulted in 36 previously registered Aboriginal sites or areas of PAD within the project area, and ten within 50 metres of the project area.

The 36 sites identified within the project area consists of:

- 20 isolated artefacts
- One modified tree (carved or scarred)

- Seven open camp sites
- One isolated artefact and modified tree (carved or scarred)
- Six habitation structures (rockshelters), and PAD
- One habitation structure (rockshelter), PAD, and modified tree (scarred tree).

This figure has been redacted.

5.2.2 Previous archaeological investigation

Previous archaeological investigations in the Upper Blue Mountains have demonstrated the presence of Aboriginal objects such as rock shelters and camp sites throughout the region, with certain areas such as heads of valleys and major creek lines as showing more archaeological potential. Most relevant to our project area is the in-depth archaeological study conducted by Comber Consultants (2009) which mirrored the current proposed works. The archaeological investigation was able to identify several new sites and objects within the vicinity of the GWH. Refer to Section 3.2 of the AAR (Appendix C)

5.2.3 Predictive model

A review of previous archaeological reports indicated that certain landscapes and landforms in the project area are more likely to contain Aboriginal sites. The predictive model is based on a 'land system' or 'archaeological landscape' model of site location. Land systems and landforms in the project area can be analysed to develop predictive models for survey strategy preparation and for comparative analysis of prehistoric Aboriginal settlement patterns between environmental regions.

An analysis of previous predictive models has been completed in Section 3.3 of the AAR (Appendix C). Off this review the following predictions for site type have been made for parts of the project area.

Katoomba to Mt Victoria (ca. 17.2 kilometres) comprises Narrabeen Sandstone forming abrupt scarp edges and sandstone outcrops exposed within the dissected sandstone plateau landform pattern. The GWH construction footprint passes along ridgetop existing road reserve, with new section dipping into valley head upper slopes close to Katoomba and new escarpment slope by Victoria Pass. Aboriginal sites predictions include (ordered from most likely to not anticipated):

- Rock shelters are anticipated on slopes at valley heads and Victoria Pass
- Pigment rock art may occur within rock shelters
- Grinding grooves may occur on sandstone surfaces, most likely dipping into water
- Scarred trees may occur, but rarely
- Stone artefact sites in open contexts may occur, but rarely in the general environment. They are more likely in association with hanging swamps on the plateau top
- Engraved rock art is not anticipated due to the unsuitability of Narrabeen sandstone compared to Hawkesbury sandstone which occurs outside the project area between Linden and Glenbrook
- Other site types not anticipated.

Mt Victoria to Hartley (ca. 7.2 kilometres) comprises Shoalhaven Sandstone, shale and conglomerate with markedly reduced relief with rolling hills landform pattern.

- Open stone artefact sites are anticipated as surface expressions of underlying low density (up to 10 artefacts per square metre) artefact distributions within topsoil in association with watercourses. This is suggested by the abundance of small open stone artefact site recordings in the 2011 corridor survey by Stening
- Grinding grooves may occur on sandstone surfaces, most likely dipping into water
- Scarred trees may occur but rarely
- Rock shelters are not anticipated
- Rock art is not anticipated
- Other site types are not anticipated.

Hartley occurs within a 2.7 kilometre long patch of igneous geology characterised by granite. This area is crossed by the River Lett. The riverine valley depression is the major landform feature and should be considered archaeologically sensitive for stone artefacts within the topsoil.

- Open stone artefact sites are anticipated as surface expressions of an underlying moderate density (ca. 20 artefacts per square metre) artefact distributions within topsoil in association with watercourses. This is suggested by the abundance of small open stone artefact site recordings in the 2011 construction footprint survey by Stening
- Grinding grooves may occur on sandstone surfaces, most likely dipping into water
- Scarred trees may occur but rarely
- Rock shelters are not anticipated
- Rock art is not anticipated
- Other site types are not anticipated.

Hartley to Bowenfels (ca. 5.7 kilometres) comprises Shoalhaven Sandstone, shale and conglomerate with markedly reduced relief with rolling hills landform pattern.

- Open stone artefact sites are anticipated as surface expressions of underlying low-density topsoil distributions in association with watercourses. This is suggested by the abundance of small open stone artefact site recordings in the 2011 construction footprint survey by Stening
- Grinding grooves may occur on sandstone surfaces, most likely dipping into water
- Scarred trees may occur but rarely
- Rock shelters are not anticipated
- Rock art is not anticipated
- Other site types are not anticipated.

5.3 Archaeological survey

The archaeological survey of the project area was carried out between November 2019 and March 2020. At the end of the archaeological survey approximately 100 per cent of the locations within the project area recommended for archaeological site survey were surveyed (Figure 6-1:).

The objective of the archaeological survey was to adequately assess the project area and identify any archaeological objects, or areas with the potential to contain PADs. This included investigating and relocating sites recorded by Stening in the 2011 survey of the present project area (Comber Consultants 2011). On-site consultation with representatives from the relevant Aboriginal stakeholder groups enabled the early development of recommendations for any further assessment (such as test excavation).

In accordance with 'requirement 5' of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b), the archaeological survey adopted a sampling strategy which targeted survey on each distinct landform within a given soil landscape, and in areas where multiple landforms were present, full coverage occurred. Systematic traverses of the entire landscape would not be possible due to heavy vegetation cover, and steep terrain. In addition, the project area had been previously extensively surveyed by Comber Consultants (2009; 2012). As such a targeted sampling was employed. Where the predictive model determined landforms of high potential archaeological sensitivity, these landforms were targeted for full survey coverage, with an awareness of the likelihood of certain site types occurring within particular landforms. Full coverage of the project area associated with sensitive landforms was carried out with the nominated site officer from the Deerubbin LALC, Bathurst LALC, Gundangara LALC and the Warbinga-Waradjiri Tribal Corporation, where feasible.

5.3.1 Timing and personnel

The field excavation of the construction footprint was carried out between November 2019 and March 2020, a total of 15 days. The survey team was led by Andrew Costello (Associate Archaeologist, Jacobs) accompanied by Neville Baker (Principal Archaeologist, Baker Archaeology), Alexandra Seifertova (Project Archaeologist, Jacobs) and Jake Ferguson (Intern Archaeologist, Jacobs), along with Transport Aboriginal heritage personnel Mark Lester and Paul Peters. Detailed information on personnel can be found in Section 4.4 of the AAR (Appendix C).

Initially, the survey was hampered by access restrictions to some private properties. In these instances, survey was postponed until access to remaining properties were secured. A survey was conducted in November 2019 and March 2020 to ensure all areas within the project area were surveyed by an archaeologist and a LALC representative.

5.3.2 Coverage

To assess the effectiveness of the survey it is important to document the conditions present. Ground surface visibility, was variable. The visibility of some site types such as single artefacts or open artefact scatters is dependent upon ground visibility, exposure and disturbance. A table of effective survey coverage is available in Section 4.4 of the AAR (Appendix C).

The project area largely avoids areas close to major watercourses, crossing them only when unavoidable, such as Fairy Dell Creek near Mt Victoria, a second order tributary of Butlers Creek at Hartley and River Lett and second order tributary at little Hartley. Survey coverage was divided in two four survey units, these are based off the predictive modelling examined in the desktop assessment.

- Survey Unit 1: Katoomba o Mt Victoria (17.2 kilometres)
- Survey Unit 2: Mt Victoria to Harley (approximately 7.2 kilometres)
- Survey Unit 3: Hartley (approximately 2.7 kilometres)
- Survey Unit 4: Hartley to Bowenfels (approximately 5.7 kilometres).

5.3.3 Reappraisal of AHIMS sites

Following the survey, 28 AHIMS sites located in the project area were reappraised as not being Aboriginal sites and were removed from further consideration. For the most part this was due to natural stone fragments being mis-identified as Aboriginal flaked stone artefacts.

One site recorded as an “ochre quarry” comprised only an area of eroding sandstone on a lower slope with a reddish tinge and no sign of human extraction activity. Several rock shelters did not have characteristics typical of Aboriginal archaeological rockshelter sites. Several of the rockshelter sites recorded could not be found despite the exact map coordinates being followed with modern GPS/GLONASS receivers.

It is considered that site SP1 - scarred tree (AHIMS #45-4-0969 SP1) was removed as part of previous roadworks, and the tree is presently displayed at the Mount Boyce lookout. A scarred tree fitting the description of SP1 is currently on display at the Mount Boyce lookout. The signage explains that the scarred tree was removed to this location in advance of the recent Soldiers Pinch roadworks. It is probable that the tree on display is AHIMS #45-4-0969. This location is outside of the construction footprint.

The recorded location of a second site on the opposite side of the road (AHIMS #45-4-0980) is approximately 100 metres to the south-west and appears to be a duplicate recording, as the description is the same. This site is a Blackbutt (*Eucalyptus pilularis*) approximately 15 meters in height. The scar is on the eastern side of the tree and is approximately 2 metres in length and 0.25 metres in width and is described as a possible cultural scar. Table 5-1 provides a full list of AHIMS sites deemed not to be Aboriginal.

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Table 5-1: AHIMS sites deemed not to be Aboriginal sites following archaeological survey

AHIMS ID	Site name	Original recording	Datum	Eastings (Zone 56)	Northings (Zone 56)	Reappraisal notes
45-4-1046	GWH 02	Rockshelter PAD	GDA			Site card does not demonstrate presence of deposit; shows wet floor and water pool – Confirmed invalid site during survey
45-4-1047	GWH 03	Rockshelter PAD	GDA			Lack of deposit: rocky floor; photo is of rockshelter observed as GWH05 location – Confirmed invalid site during survey
45-4-1048	GWH 04	Rockshelter PAD	GDA			Photo does not demonstrate presence of deposit – Confirmed invalid site during survey
45-4-1049	GWH 05	Rockshelter PAD	GDA			Site card has no description; no basis for PAD identification – Confirmed invalid site during survey
45-4-1073	GWH 10	Open artefact scatter	GDA			Three natural gravel fragments within a massive artificial deposit of construction scree – Confirmed invalid site during survey
45-4-1076	GWH 13	Isolated find	GDA			Rock does not have artefact features – Confirmed invalid site during survey
45-4-1077	GWH 14	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1078	GWH 15	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1079	GWH 16	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1080	GWH 17	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1093	GWH 20	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1098	GWH 21	Open artefact scatter	GDA			Report photo does not illustrate artefact features –

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AHIMS ID	Site name	Original recording	Datum	Eastings (Zone 56)	Northings (Zone 56)	Reappraisal notes
						Confirmed invalid site during survey
45-4-1089	GWH 22	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1086	GWH 23	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1099	GWH 24	Scarred Tree	GDA			Scarred tree on the shoulder of GWH
45-4-1100	GWH 25	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1101	GWH 26	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1096	GWH 27	Open artefact scatter	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1092	GWH 28	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1088	GWH 30	Isolated find	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1104	GWH 32	Isolated find	GDA			No artefacts observed; all natural gravel – Confirmed invalid site during survey
45-4-1091	GWH 36	Open artefact scatter	GDA			Report photo does not illustrate artefact features – Confirmed invalid site during survey
45-4-1095	GWH 35	Isolated find	GDA			Report photo does not illustrate artefact features
45-4-1107	GWH 37	Rock shelter	GDA			Unsuitable habitation features shown in photo: damp. Rocky sloping floor; lack of artefacts in dripline – Confirmed invalid site during survey

AHIMS ID	Site name	Original recording	Datum	Eastings (Zone 56)	Northings (Zone 56)	Reappraisal notes
45-4-1087	GWH 38	Rock shelter with PAD	GDA			Unsuitable habitation features shown in photo: damp. Rocky sloping floor; lack of artefacts in dripline – Confirmed invalid site during survey
45-4-1108	GWH 39	Ochre	GDA			Natural outcrop of reddish sandstone observed, not suitable ochre – Confirmed invalid site during survey
45-4-1094	GWH 43	Isolated find	GDA			Possible flaked piece in recently graded road verge = possible "graderfact" – Confirmed invalid site during survey
45-4-1090	GWH 44	Open artefact scatter	GDA			No artefact observed in field; in recently graded road verge = possible "graderfacts" – Confirmed invalid site during survey
45-4-1112	GWH 45	Scarred tree and isolated find	GDA			Tree is too young for traditional Aboriginal scarring; rock does not have clear artefact features – Confirmed invalid site during survey

5.3.4 Final sites

The archaeological survey resulted in the identification of four new Aboriginal sites, and 9 PADs (Section 5.3.5):

- TBD (GWHR01)
- TBD (GWHAS01)
- TBD (GWHST01)
- TBD (Forty Bends Contact Site).

Integrating these new sites into the previously recorded sites, a total of 16 Aboriginal sites are located within the construction footprint (Table 5-2), and 8 are located within the project area (but outside of the construction footprint) (Table 5-3). Detailed descriptions of each site are provided in Section 4.5.2.4 of the AAR.

TBD (GWHR01) and TBD (Forty Bends Contact Site) are located within the project area (but outside of the construction footprint). They are protected sites as per the Code of Practice. No test excavation was proposed in these sites. The dominant site types present were open artefact scatters and isolated finds as predicted.

Please note there are two site records names 'SP1'. One is recorded as within the construction footprint, which while the other is located within the project area. This site appears to be the same, the 45-4-0969 (SP 1) originally located in the construction footprint and subsequently being moved to a new position, recorded as 45-4-0980 (SP 1). The first initial recording has not been removed from AHISM to reflect this change.

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Table 5-2: Aboriginal sites located within the construction footprint

Site ID	Site name	Datum	Easting (Zone 56)	Northing (Zone 56)	Site features	Site types	Reappraisal notes
TBD	GWHASO 1	GDA			Artefact - 1	-	NA
45-4-0969	SP 1 *	AGD			Modified Tree (Carved or Scarred)	Scarred tree	Original location of scarred tree which was moved outside during previous GWH construction work
45-4-0993	Lett River Jenolan Caves Rd	AGD			Artefacts: 40	-	Site was not assessed and is outside the project area
45-4-1045	GWH1	GDA			Habitation Structure, PAD, Modified Tree (Carved or Scarred)	-	Site does not demonstrate presence of deposit; rockshelter unsuited for human habitation
45-4-1071	GWH8	GDA			Artefact: 1	-	Large open area artefact scatter and area of PAD below granite hill
45-4-1072	GWH9	GDA			Artefact: 3	-	Large open area artefact scatter and area of PAD
45-4-1074	GWH11	GDA			Artefact: 1	-	Artefact scatter and PAD located near private airstrip
45-4-1075	GWH12	GDA			Artefact: 1	-	Artefact scatter and PAD located within undulating alluvial terraces
45-4-1081	GWH18	GDA			Artefact: 20	-	Low density artefact scatter within a carpark near the Lolly Bug café.
45-4-1082	GWH19	GDA			Artefact: 2	-	Report photo does not illustrate artefact features located

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Site ID	Site name	Datum	Easting (Zone 56)	Northing (Zone 56)	Site features	Site types	Reappraisal notes
							near Coxs River Road
45-4-1084	GWH6	GDA			Artefact: 6	-	Low density artefact scatter
45-4-1097	GWH7	GDA			Artefact: 1	-	Open artefact scatter & bone site
45-4-1102	GWH29	GDA			Artefact: 1	-	Open artefact scatter
45-4-1103	GWH31	GDA			Artefact: 1	-	Open artefact scatter
45-4-1105	GWH 33	GDA			Scarred Tree	-	Scarred Tree
45-4-1106	GWH 34	GDA			Artefact: 1	-	Isolated find

Table 5-3: Aboriginal sites located within the project area (but outside the construction footprint)

Site ID	Site name	Datum	Easting (Zone 56)	Northings (Zone 56)	Site features	Site types	Reappraisal notes
45-4-0181	Blackheath Cemetery	GDA			Artefact: -	Open camp site	
45-4-0935	Hartley Historic Site	GDA			Artefact: -	Isolated find	
45-4-0980	SP 1	GDA			Modified Tree (Carved or Scarred)	Artefact: -	New reposition of 45-4-0969 (SP1)
45-4-0993	Lett River Jenolan Caves Rd	GDA			Artefact: -	-	NA
TBD	GWHR01	GDA			Habitation Structure, PAD	-	NA
45-4-1111	GWH42	GDA			Habitation Structure, PAD	-	NA
TBD	GWHST01	GDA			Scarred tree	-	NA
TBD	Forty Bends Contact Site	GDA			Contact site	-	NA

5.3.5 Potential archaeological deposits

Areas of potential subsurface archaeological deposits are referred to as PADs. Following on from survey, a total of 9 areas of PAD were identified (Table 5-4) "Rock shelters with PAD" are included in the "Aboriginal sites" section above and are not included here.

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Table 5-4: Potential Archaeological Deposits

PAD No#	Datum	Eastings (Zone 56)	Northings (Zone 56)	Landform unit	Size of PAD (m)	Description
GWH 20-1	GDA			Upper slope & Crest	480m x 50m	High ground within 200 metres and overlooking River Lett west/north bank at Little Hartley (area within construction footprint)
GWH 20-2	GDA			Lower slope	190m x 70m	Lower slope within 200 metres and adjacent to second order tributary of River Lett at Little Hartley (area within construction footprint)
GWH 20-3	GDA			Lower slope	370m x 90m	Gentle lower slope within 200 metres of second order tributary to Butlers Creek at Hartley – bisected by current GWH (area within construction footprint)
Magpie Hollow Road (MHR)	GDA			Lower slope	245m x 45m	Gentle lower slope within 200 metres of ephemeral second order tributary to Bowens Creek. PAD is adjacent to the GWH and abutted by Magpie Hollow Road (area within construction footprint)
South Bowenfells Rural Fire Brigade (SBRFB)	GDA			Lower slope	62m x 100m	Gentle lower slope within 200 metres of ephemeral second order tributary to Bowens Creek. PAD is adjacent to the GWH and abutted by Mudgee Street (area within construction footprint)
██████ PAD 1	GDA			Mid slope	260m x 120m	Large PAD area comprising a lower alluvial terrace, spanning both sides of a small third order stream leading to Whites Creek.
██████ PAD 2	GDA			Mid slope	160m x 120m	Elevated hilltop area on a mid slope below Hassan Walls Range. Within 200 m of a small third order stream leading to Whites Creek. PAD is associated with ██████ Contact Site and has shallow soils.
River Lett Hill	GDA			Hill top	100m x 180m	PAD area on an elevated hilltop area on granitic shallow soils overlooking the River Lett Valley to the SE and
Area to the west of 45-4-1097 (GWH 7)	GDA			Mid slope	60m x 100m	A sloping lower slope within 200 m of River Lett. Bisected by Jenolan Caves Road cutting to the east and disturbance from irrigation and the GWH.



Figure 5-2: View toward MHR PAD facing west from SBRFB PAD



Figure 5-3: Showing SBRFB PAD area, facing south



Figure 5-4: Showing crew excavating GWH 20-1 PAD area, facing west toward GWH



Figure 5-5: Showing GWH 20-2 PAD area, facing north west



Figure 5-6: Showing GWH 20-3 area, facing east



Figure 5-7: Showing GWH 7 (JCR) PAD area, facing north-west



Figure 5-8: Showing GWH 7 PAD, looking south toward Jenolan Caves Road



Figure 5-9: Showing River Lett Hill PAD, facing east toward GWH

5.3.6 Summary

Although archaeological evidence was seen throughout the project area, it is clear that varying levels of disturbance have affected the archaeology. For example, the area between Katoomba and Mt Victoria is mostly located within the GWH construction footprint. This area is generally found to be highly disturbed. Various types of disturbance were noted here. Major landform modifications associated with previous expansion and realignment of the highway include cutting into the natural rock and clearance of vegetation on either side of the construction footprint. Other types of disturbance are associated with the maintenance of the highway occur in the form of drainage channels and culverts that have disturbed any deposits that may have existed within the construction footprint. The comparison of historical aerial photographs from 1973 with 2015 photographs indicates that much of the vegetation occurring along the construction footprint is relatively young and largely consists of recent regrowth. The town centres of Blackheath and Medlow Bath feature extensive disturbance with little to no areas of the natural land surface visible. As a result, test excavation was not recommended for this section of the project area.

The project area between Mt Victoria and Bowenfels displays similar disturbance around the GWH, however over all there has been less modern disturbance and expansion, thus retaining more natural land surfaces. It is on these natural land surfaces that previously recorded sites tend to be located, and where several newly identified PADs have been identified. As a result of the survey, it was determined that a program of sub-surface test excavation was required to further assess the nature and extent of the archaeology within the project area.

6. Test excavation

6.1 Archaeological methodology

An archaeological methodology was developed for the project based on the results of the archaeological survey. The methodology was designed in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*, the requirements of Stage 2 of the PACHCI. The archaeological methodology can be found in Appendix D.

6.2 Test excavation

The test excavation was guided by the results of the archaeological survey and developed to be in accordance with the approved archaeological methodology for the project (Appendix D). The purpose of the test excavations was to confirm whether Aboriginal objects were present in the subsurface soils in a site or PAD, and if so to provide information about the type, extent of site boundary and density of Aboriginal cultural materials.

The objective of the test excavation is to fully determine the nature and extent of archaeological deposits. This information allows for a more accurate significance assessment to be undertaken and appropriate management recommendations to be developed. As a result of the desktop assessment and survey, it was identified that sub-surface testing should occur at 22 locations.

Table 6-1: Proposed sub-surface test excavation locations (from East and West)

AHIMS ID	Site/PAD name	Location (Lot//DP)	Site Type	Description
TBD	GWHAS01		Stone artefact site	Mt Victoria between Darling Causeway and Mount York Road bushland.
TBD	GWH 20-3		PAD	Gentle lower slope within 200 metres of second order tributary to Butlers Creek at Hartley – bisected by current GWH (area within construction footprint)
45-4-1074	GWH 11		Isolated find	Isolated chert artefacts eroding out of the bank of the drainage channel.
45-4-1075	GWH 12		Open artefact scatter	Two chert flakes recorded on an eroding patch of ground near fence line.
45-4-1084	GWH 18		Open artefact scatter	Lolly Bug- lolly shop, Little Hartley
45-4-1082	GWH 19		Open artefact scatter and PAD	Small paddock off Coxs River Road
45-4-1084	GWH 06		Open artefact scatter	Low rise south side of existing GWH just west of Browns Gap Road, Hartley

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AHIMS ID	Site/PAD name	Location (Lot//DP)	Site Type	Description
45-4-1102	GWH 29	[REDACTED]	Open artefact scatter	Upper slope area south of GWH near intersection Mid-Hartley Road
TBD	GWH 20-2	[REDACTED]	PAD	Lower slope within 200 metres and adjacent to second order tributary of River Lett at Little Hartley (area within construction footprint)
45-4-1103	GWH 31	[REDACTED]	Open artefact scatter	High ground east of River Lett near houses, north side GWH, Hartley
45-4-1095	GWH 35	[REDACTED]	Open artefact scatter and PAD	Raised landform to the east of Blackman's Creek Road and rising abruptly above the northern side of the GWH
TBD	GWH 20-1	[REDACTED]	PAD	High ground within 200 metres and overlooking River Lett west/north bank at Little Hartley (area within construction footprint)
45-4-1097	GWH 07	[REDACTED]	Open artefact scatter & bone site	Remnant bench area with eroding bone and artefacts on corner of Jenolan Caves Road and GWH, Hartley
45-4-1072	GWH 09	[REDACTED]	Open artefact scatter	Upper slope area west of Jenolan Caves Road and south of GWH
45-4-1171	GWH 08	[REDACTED]	Open artefact site	Upper slope area west of Jenolan Caves Road and south of GWH
TBD	River Lett Hill	[REDACTED]	PAD	PAD area on an elevated hilltop area on granitic shallow soils overlooking the River Lett Valley to the SE and
TBD	[REDACTED] PAD 1	[REDACTED]	PAD	Large PAD area comprising a lower alluvial terrace, spanning both sides of a small third order stream leading to Whites Creek.
TBD	[REDACTED] PAD 2	[REDACTED]	PAD	Elevated hilltop area on a mid slope below Hassan Walls Range. Within 200 m of a small third order stream leading to Whites Creek. PAD is associated with [REDACTED] Contact Site and has shallow soils.
45-4-1106	GWH 34	[REDACTED]	Isolated find	Single chert flake located on a gravel driveway adjacent to the GWH

AHIMS ID	Site/PAD name	Location (Lot//DP)	Site Type	Description
45-4-1105	GWH 33	[REDACTED]	Scarred tree	Located along the north-western fence line of the property to the south-west of a dam at the bottom of a low gradient hill.
TBD	Southern Bowenfells Rural Fire Brigade (SBFRB)	[REDACTED]	PAD	Gentle lower slope within 200 metres of ephemeral second order tributary to Bowens Creek. PAD is adjacent to the GWH and abutted by Mudgee Street (area within construction footprint)
TBD	Magpie Hollow Road (MHR)	[REDACTED]	PAD	Gentle lower slope within 200 metres of ephemeral second order tributary to Bowens Creek. PAD is adjacent to the GWH and abutted by Magpie Hollow Road (area within construction footprint)

6.2.1 Constraints

Several constraints were encountered during the test excavation program. These have been listed below:

- COVID restrictions were in place prior to and during the test excavation program. This hampered who was able to get on site, along with how many people were able to be on site depending on the location. This impacted potential cultural knowledge holders who wanted to attend site but did not feel safe doing such.
- Access to the following properties was not possible during test excavations:
 - 45-4-1075 (GWH 12) [REDACTED]
 - 45-4-1074 (GWH 11) [REDACTED]
 - 45-4-1106 (GWH 34) [REDACTED]
 - 45-4-1105 (GWH 33) [REDACTED]
 - TBD (Hartley Grange 2) [REDACTED]

Please note TBD (GWH 20-3) was identified as being two large PADs, rather than the one PAD originally anticipated. As a result, an additional PAD was identified in [REDACTED] where property was later rescinded.

As a result, no testing has taken place at these locations.

- Test excavation occurred during winter, with the weather varying from cold but dry, sunny days, to days which were wet with cloud cover. Several mornings had temperatures of zero degrees, and with frost covering the ground, and freezing wet sieved buckets. The test excavation program was hampered by these weather conditions.

6.2.2 Timing and personnel

The field excavation of the construction footprint was carried out between 19 April 2021 and 29 June 2021, a total of 38 days. On average, 20 people were on site each day, generally 15 people were involved in the excavation, and up to five people for ancillary services including water truck services and traffic control.

The field excavation team was led by Andrew Costello (Associate Archaeologist, Jacobs) accompanied by Neville Baker (Principal Archaeologist, Baker Archaeology), Alexandra Seifertova (Project Archaeologist, Jacobs), Jake Ferguson (Intern Archaeologist, Jacobs), Nestor Nicola (Project Archaeologist, Baker Archaeology), and Luke Griffiths (Intern Archaeologist, Jacobs), along with a site officer team representing the RAPS. Detailed information on personnel can be found in Section 5.4 of the AAR (Appendix C).

6.2.3 Results

Test excavations were undertaken in 17 locations (Table 6-2). A total of 113 test pits were excavated throughout the project area, a total of 144.5m². Over 1790 artefacts were recovered at these locations.

Table 6-2: Test excavations locations with test pit and artefacts details

AHIMS ID	Site/PAD name	Site Type	Number of test pits	Metred squared excavated (m ²)	Number of artefacts
TBD	GWHAS01	Stone artefact site	5	5	1
TBD	GWH 20-3	PAD	9	13	42
45-4-1084	GWH 18	Open artefact scatter	3	3	0
45-4-1082	GWH 19	Open artefact scatter and PAD	5	7	0
45-4-1084	GWH 06	Open artefact scatter	3	5	1
TBD	GWH 20-2	PAD	18	24	113
45-4-1102	GWH 29	Open artefact scatter	1	0.5	0
45-4-1103	GWH 31	Open artefact scatter	3	9	70
45-4-1095	GWH 35	Open artefact scatter and PAD	2	6	6
TBD	GWH 20-1	PAD	1	1	0
45-4-1097	GWH 07	Open artefact scatter & bone site	18	20	735
45-4-1072	GWH 09	Open artefact scatter	11	19	269
45-4-1171	GWH 08	Open artefact site	11	21	173
TBD	River Lett Hill	PAD	3	3	0
TBD	██████████ (PAD 1 and PAD 2 integrated)	PAD	14	16	396
TBD	Southern Bowenfells Rural Fire Brigade (SBFRB)	PAD	1	3	6
TBD	Magpie Hollow Road (MHR)	PAD	5	7	132
Totals			113	144.5	1790

6.2.4 Geotech test pits and boreholes

A program of geotechnical test pitting and boreholes was required to help refine the final road design and position. Areas identified for geotech and boreholes were broadly identified, with the exact location refined to avoid the risk of harming Aboriginal objects. Where the locations of the geotech and boreholes coincided with areas of known Aboriginal objects, they were moved. Where they were located close to areas likely to contain Aboriginal objects, test pits were excavated to identify if Aboriginal objects were present. As a result of this, geotech and boreholes were located in areas where no Aboriginal objects were present. The results from the geotechnical excavation were included as part of the planned archaeological investigations for Aboriginal heritage impacts and are not described separately.

6.2.5 Test pit locations

The location of the PADs and sites within the construction footprint that were subject to test excavation are shown in Figure 6-1. Of the 23 areas that were identified as appropriate for subsurface test excavation, five were not excavated due to landowners not granting access (45-4-1105 (GWH 33), 45-4-1106 (GWH 34), 45-4-1074 (GWH 11), and 45-4-1075 (GWH 12)). Another PAD, TBD (Hartley Grange 2) was identified during test excavations and was also not excavated due to landowner access constraints. These sites were investigated in line with the test excavation methodology prior to project construction commencing.

Five Aboriginal sites were not excavated due to their location in the project area being outside of the construction footprint or above deep tunnelling sections (TBD (GWHRS01), TBD (GWHR ST01), TBD (40 Bends Contact Site), TBD (Hartley Grange 2), 45-4-1111 (GWH 42)), thus not being significantly impacted by the project and not requiring subsurface investigation.

Of the 16 areas that were subject to test excavation, five produced no or very low numbers of artefacts (45-4-1084 (GWH 6), 45-4-1081 (GWH 18), 45-4-1082 (GWH 19), 45-4-1102 (GWH 29), and TBD (River Lett Hill)). Six areas produced artefact densities and assemblages that were considered sparse and of moderate archaeological significance (45-4-1095 (GWH 35), 45-4-1072 (GWH 9), TBD (GWH 20-3), TBD (MHR), TBD (SBRFB)). Five Aboriginal sites subject to test excavation produced high concentrations of artefacts and significant features, such as the hearth at 45-4-1097 (GWH 7) and have been listed as having high archaeological and cultural significance (TBD (GWH 20-2), 45-4-1097 (GWH 7), 45-4-1071 (GWH 8), 45-4-1103 (GWH 31), and TBD (Site)).

6.3 Artefact analysis

The artefact analysis, including the method and the results are presented in the AAR, please refer to Section 5.6 for this information.

6.4 Residue and usewear analysis

The residue and usewear analysis, including the method and the results are presented in the AAR, please refer to Section 5.7 for this information.

6.5 Radiometric dating

The radiometric dating, including the method and the results are presented in the AAR, please refer to Section 5.8 for this information.

6.6 Summary of test excavation results

6.6.1 Aboriginal occupation

The project test excavation program identified archaeological evidence of Aboriginal occupation widely distributed across rolling hills, flats and plains, waterway terraces and creek valleys crossed by the construction footprint. Artefact density varied considerably across the project area, with higher density subsurface artefact sites in the River Lett, [REDACTED] and Hartley site complexes and much lower artefact density in the areas toward Cocks River Road to the east.

Test excavation found evidence of repeated Aboriginal stone artefact use in the areas on River Lett Hill, Hartley and on the [REDACTED] property, camping activity along River Lett at Jenolan Caves Road, and artefact scatters along tributaries associated with Whites Creek, Butlers Creek, and Boxes Creek. Evidence of activities along minor watercourses and occupation at the western margin of the construction footprint on an alluvial terrace in South Bowenfell was also confirmed.

The River Lett Hill area demonstrated evidence of primary flaking, stone tool production, artefact use and repeated camping activity in strategic locations, such as close to the northern side of the hillslope. Along a central spur above the River Lett on Jenolan Caves a hearth was discovered with associated non-human stone and artefact material which has been sent to a laboratory for radiocarbon dating.

Further afield from vantage points, a consistent low-density artefact signature reflects resource extraction activity. Present evidence does not suggest cultural stratification of archaeological deposit in deep Quaternary Alluvium valley fill. There is no bimodal distribution of artefacts within alluvium suggesting lower Pleistocene and upper Holocene phases, as suggested in deep sand deposits at Pitt Town or Parramatta. The age of the deeper alluvial topsoil is at present unknown. Obtaining an age for the deep alluvial topsoil is a research question worth pursuing to address Aboriginal assemblage age.

There was absence of evidence in several locations: TBD (River Lett Hill), 45-4-1081 (GWH 18), 45-4-1082 (GWH 19), and 45-4-1102 (GWH 29). This is taken to reflect a low level of Aboriginal activity in the Coxs River Road Intersection and some sections of the Little Hartley to River Lett Hill areas, particularly where agricultural and infrastructure development has caused significant ground disturbance. The absence of evidence in these areas also reflects a focus of Aboriginal settlement in the major creek valleys and primarily along River Lett and the areas with associated vantage points on River Lett Hill, such as TBD (GWH 20-2), and TBD (Site). It should be noted during test excavations at TBD (Site), the TBD (Forty Bends Contact Site) was identified within the original PAD area.

6.6.2 Results against original predictive model

Within the desktop assessment, a predictive model was formed for each section of the project area. An examination of the test excavation results against this predictive model, shows that most predictive statements were correct.

The following statements were correct:

- Rock shelters are anticipated on slopes at valley heads and Victoria Pass, but there was low potential for them to be located elsewhere in the project area
- Scarred trees were predicted to occur may occur, but rarely. The potential for scarred trees reduced from Victoria Pass where the construction footprint passed through heavily farmed land which had reduced tree populations.
- Open stone artefact sites from Katoomba to Hartley were anticipated to be represented as surface expressions of underlying low density (up to 10 artefacts per square metre) artefact distributions within topsoil in association with watercourses. In Hartley this underlying density would be increased to moderate density with 20 artefacts were square metre.

One predictive statement was not correct. It was predicted that in the construction footprint from Hartley to Bowenfels, open stone artefact sites would be represented as surface expressions of underlying low-density topsoil distributions, in association with watercourses. This proved to be incorrect, as five sites (45-4-1097 (GWH 7), 45-4-1072 (GWH 9), 45-4-1071 (GWH 8), TBD (Site), and TBD (MHR)) contained sub-surface artefacts density of minimum 40 per square metre, the highest being 128 per square metre. The increase in artefact densities can be attributed to the absence of test excavation investigations within this area.

6.6.3 Amendments to sites and PADs following test excavations

A detailed description of how recorded Aboriginal sites and PADs have changed, been corrected or been absorbed following results of the field surveys and test excavations into the 'final sites' is shown in Table 6-3 and Table 6-4.

The revised site boundaries following test excavation demonstrate there are 20 Aboriginal sites currently within the construction footprint, and six within the project areas. In addition, eight sites and one PAD are within the project area (outside of the construction footprint).

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Areas of PAD identified as being outside of the project area were not investigated, in order to avoid causing harm to Aboriginal objects that would not be impacted by the project. These are no longer considered in this assessment.

Following test excavations, areas previously designated 'Potential Archaeological Deposit' have now been reclassified as Aboriginal objects where artefacts were recovered or have been discarded where none were found. Herein, only the term 'Aboriginal site' or 'Aboriginal object' (as part of the impact assessment) is used.

Table 6-3: Description of site and PADs within construction footprint

AHIMS sites pre- test excavation	PAD as defined by desktop assessment	PAD as refined during excavations	Final sites	Comments
-	TBD (GWHAS01)	TBD (GWHAS01)	TBD (GWHAS01)	Low density site confirmed through test excavation
-	TBD (GWH 20-3)	TBD (GWH 20-3)	TBD (GWH 20-3)	PAD confirmed through test excavation
45-4-1074 (GWH 11)	-	-	45-4-1074 (GWH 11)	Not assessed due to landowner access constraints
45-4-1075 (GWH 12)	-	-	45-4-1075 (GWH 12)	Not assessed due to landowner access constraints
45-4-1081 (GWH 18)	-	-	45-4-1081 (GWH 18)	No artefacts were discovered in sub-surface test excavations. Surface artefacts from original site card not relocated.
45-4-1082 (GWH 19)	-	-	45-4-1082 (GWH 19)	No artefacts were discovered in sub-surface test excavations. Surface artefacts from original site card not relocated.
45-4-1084 (GWH 6)	-	-	45-4-1084 (GWH 6)	Low density site confirmed through test excavation
-	TBD (GWH 20-2)	TBD (GWH 20-2)	TBD (GWH 20-2)	Low density site confirmed through test excavation
45-4-1102 (GWH 29)	-	-	45-4-1102 (GWH 29)	No artefacts were discovered in sub-surface test excavations. Surface artefacts from original site card not relocated.
45-4-1103 (GWH 31)	-	-	45-4-1103 (GWH 31)	Site confirmed through test excavation
	TBD (GWH 20-1)	None	None	No artefacts were discovered in test excavations in the PAD. As a result the PAD is not considered a site.
45-4-1095 (GWH 35)	-	-	45-4-1095 (GWH 35)	Low density site confirmed through test excavation
45-4-1097 (GWH 7)	-	-	45-4-1097 (GWH 7)	Incorporates hearth, PAD and artefact scatter
45-4-1099 (GWH 24)	-	-	45-4-1099 (GWH 24)	Scarred tree.

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AHIMS sites pre- test excavation	PAD as defined by desktop assessment	PAD as refined during excavations	Final sites	Comments
45-4-1072 (GWH 9)	-	-	45-4-1072 (GWH 9)	Large sites and PAD areas with high cultural significance
45-4-1071 (GWH 8)	-	-	45-4-1072 (GWH 9)	Large sites and PAD areas with high cultural significance
-	TBD (River Lett Hill)	None	None	No artefacts were discovered in test excavations in the PAD. As a result, the PAD is not considered a site.
45-4-1106 (GWH 34)	-	-	45-4-1106 (GWH 34)	Not assessed due to landowner access constraints
45-4-1105 (GWH 33)	-	-	45-4-1105 (GWH 33)	Not assessed due to landowner access constraints
-	TBD ([REDACTED] PAD 1)	TBD ([REDACTED] Site)	TBD ([REDACTED] Site)	PAD confirmed through test excavation. Post contact site identified to the north of PAD extent (TBD (Forty Bends Contact Site))
-	TBD ([REDACTED] PAD 2)			
-	TBD (SBRFB)	TBD (SBRFB)	TBD (SBRFB)	PAD confirmed through test excavation
-	TBD (MHR)	TBD (MHR)	TBD (MHR)	PAD confirmed through test excavation
TOTAL				
14 registered sites	9 PADS	6 PADS	20 final sites (within construction footprint)	

Table 6-4: Description of site and PADs within the project area (outside the construction footprint)

AHIMS sites pre- test excavation	PAD as defined by desktop assessment	PAD as refined during excavations	Final sites	Comments
45-4-0181 (Blackheath Cemetery)	-	-	45-4-0181 (Blackheath Cemetery)	
45-4-0935 (Hartley Historic Site)	-	-	45-4-0935 (Hartley Historic Site)	
45-4-0980 (SP 1)	-	-	45-4-0980 (SP 1)	
45-4-0993 (Lett River Jenolan Caves Rd)	-	-	45-4-0993 (Lett River Jenolan Caves Rd)	
45-4-1111 (GWH 42)	-	-	45-4-1111 (GWH 42)	Rockshelter located on the Bergofen Pass hiking trail

AHIMS sites pre- test excavation	PAD as defined by desktop assessment	PAD as refined during excavations	Final sites	Comments
-	-	-	TBD (Forty Bends Contact Site)	Post contact site was identified to the north of TBD (██████ Site).
-	-	-	TBD (Hartley Grange 2)	Not assessed due to landowner access constraints
-	TBD (GWHR501)	-	TBD (GWHR501)	Rockshelter with associated PAD
-	TBD (GWHST01)	-	TBD (GWHST01)	Scarred tree close to GWHR501 with associated PAD
TOTAL				
5 registered sites	2 sites	-	8 Final Sites, and 1 PAD (within project area)	

This figure has been redacted.

7. Aboriginal cultural values

This chapter describes the process used to inform, and summarises the outcomes from, the cultural values assessment.

7.1 Overview

The cultural values assessment includes cultural information collected during consultation, field surveys and during the test excavation program. Jacobs engaged Cox Inall Ridgeway, an Aboriginal strategic consultancy, to undertake an independent Aboriginal Cultural Values Assessment for the project. This report is provided as Appendix A and key findings are incorporated into the cultural values undertaken during AFG meetings and throughout the fieldwork process.

7.2 Cultural significance

Cultural significance is associated, or attached to any place, places, and objects by any individual, group or groups of people. Cultural significance is representative in the place itself; its fabric, setting, use, associations, meanings, records, connected places and objects. 'Place' is a geographically defined area and may include tangible features that embody the physically identifiable landscape; as well as intangible features such as conceptual ideas or spiritual beliefs held over places or landscapes irrespective of observable physical evidence (NSW Heritage Office 2001).

Australia ICOMOS (2013) defines cultural significance as:

'Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.'

7.3 Cultural landscape

The understanding and perception of the landscape expressed by the knowledge holders and the community is an area traversed by an interconnecting network of physical, social and spiritual places. The World Heritage Convention of United Nations Educational, Scientific and Cultural Organization (UNESCO) define an associative cultural landscape as one which has 'powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent' (UNESCO 1991). The relationship between Aboriginal Australians and the land can often be conceived in spiritual terms rather than primarily in material terms (Andrews et al. 2006).

Aboriginal cultural knowledge has been defined as:

'Accumulated knowledge which encompasses spiritual relationships, relationships with the natural environment and the sustainable use of natural resources, and, relationships between people, which are reflected in language, narratives social organisation, values, beliefs and cultural laws and customs.'
(Andrews et al. 2006).

Aboriginal cultural knowledge was traditionally bequeathed through oral traditions from generation to generation. Within all Aboriginal communities there was a time of dislocation and upheaval associated with the arrival of European settlers. This widespread disruption resulted in the loss of varying degrees of detailed knowledge and understanding of many of the elements of the cultural landscape from Aboriginal communities. A recognition and concern regarding this loss of knowledge of the cultural landscape and the meanings embedded in the landscape was expressed by several of the stakeholders during consultation for the Project.

It should be noted that Indigenous communities across Australia are extremely diverse, and generally defy generalisation. The above descriptions are common conceptions of Aboriginal cultural landscapes and values;

however, a large range of beliefs and practices are evident across Australia and uniformity should not be assumed.

7.4 Identified Aboriginal cultural heritage values

General discussions with Aboriginal people and knowledge holders have identified various key elements that makeup cultural heritage values within the landscape of the project area (Table 7-1).

Table 7-1: Identified Aboriginal cultural heritage values from the project area

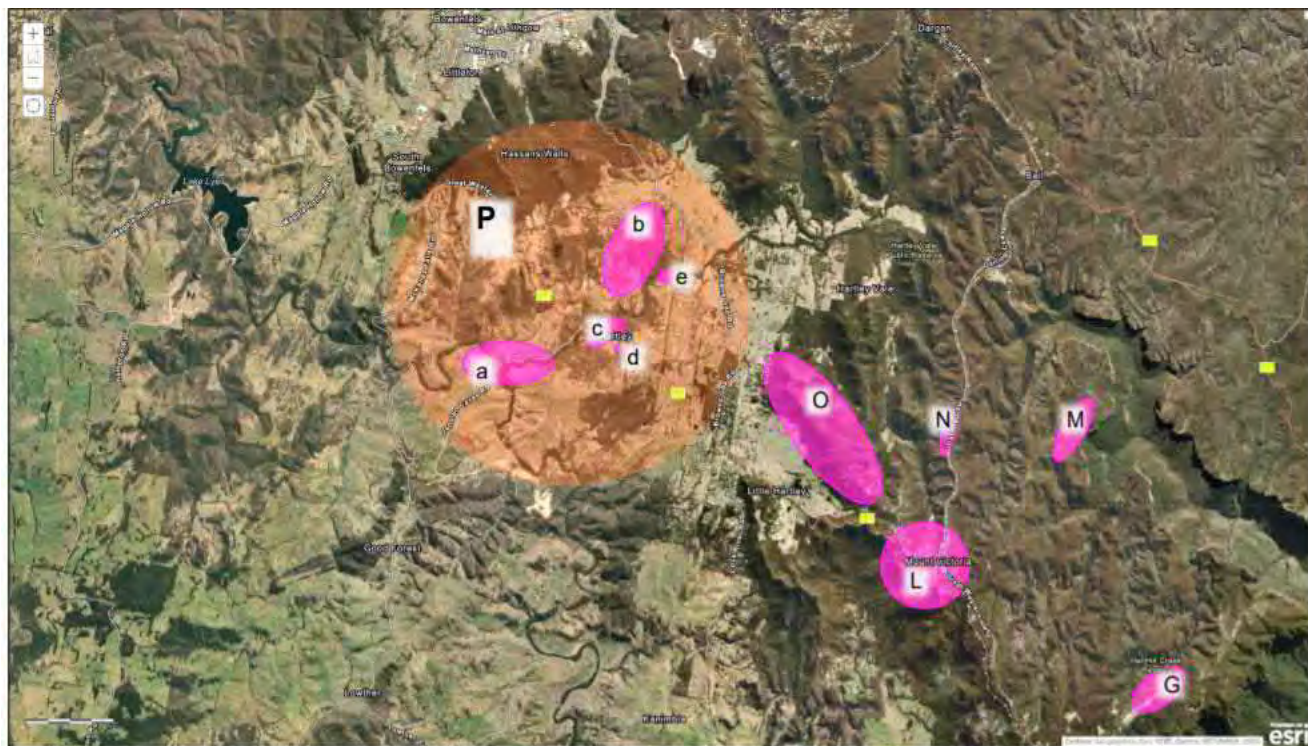
Cultural heritage values	Description
Resource gathering locations and techniques	Indigenous communities note that fish, plants and other foods are still collected throughout the region. The primary resource gathering locations, and the techniques used, are known and passed down through the generations.
Campsites	Indigenous people identify campsites as culturally significant as they provide a link to the ancestral past. Identifying significant resource zones, pathways taken by their ancestors through the landscape and communication between other groups. Identified site locations containing hearths and/or stone artefact scatters were noted as having these types of cultural significance.
Culturally modified or scarred trees	Scarred trees are of great importance to knowledge holders as they are of sacred and ceremonial importance. European land use and agricultural practices has resulted in scarred trees can often be the only remaining markers for ceremonial sites and burials in the landscape. It is also noted that scarred trees may be located at junctions, ceremonial sites or other significant points in the landscape. A scar tree was noted during survey, however with the current plans for the upgrade it will not be impacted.
Transit routes/pathways through the landscape and songlines	Aboriginal people place cultural value through the pathways and routes that their ancestors would have taken. These pathways connect ceremonial and spiritual sites as well as a connection route for trading and meeting with neighbouring tribes. The Blue Mountains is interwoven with songlines, with many knowledge holders believing that the GWH itself was built over one of the main songlines of the area. Songlines are an intangible cultural value, that must be considered, Aboriginal people feel connection to these spiritual pathways.
Water courses, water holes, springs, and waterfalls	<p>Permanent water bodies are culturally significant as a central location for the gathering of people, resource collection and camping. Gullies and creeks provided rich resources for Indigenous people in the area, also housing platypuses which was a totem within the project area. Knowledge holders have expressed concern with the projects potential effect on the waterways of the mountains, in particular the Coxs river.</p> <p>The Gundungurra people believe the Coxs river which flows through the Blue Mountains was created through the result of a great battle between the hunter Gurangatch and Mirragan. Connection to dreamtime beings and the knowledge of continual use of these waterways by their ancestors define waterways as an essential cultural value to the Indigenous people of the area.</p>
Plants and animals	Flora and fauna are not only seen as resources but hold cultural significance in spiritual and ceremonial values. Knowledge holders have expressed great concern with the effects the project may have on impacting wildlife and fauna. Key animals preside within the rivers and waterways of the project area, platypuses and eels have been flagged as being in danger by many community members. The possum skin processing ground located within the

Cultural heritage values	Description
	project area has been deemed valuable by the Wiradjuri people. Possums are used within traditional ceremonies as markers for progression into adulthood.
Burial sites	Burial sites are of great importance and their protection is a high concern to Aboriginal people as the locations of burials are rarely documented. There have been no known locations that have been identified within the confines of the Project area. Knowledge holders have noted that scarred trees can be a marker for burial within the landscape.
Post contact sites	Post-contact sites are places that have gained significance to Aboriginal people since the arrival of European settlers. Defined as an area where Indigenous people would have had deep interaction with settlers. Contact sites predominantly depict an altering and destructive process, as European settlers left destruction and death in their wake. A knowledge holder reported that Hartley Valley was the first contact point between Wiradjuri people and the settlers.
Massacre sites	These sites are highly significant and share great importance to Aboriginal people. Knowledge holders reported that in 1819, there was a massacre of nineteen Aboriginal men at the hands of white settlers at a stockade where the Glenroy property is now situated. The massacre site is situated within the project area, with a second potential massacre site in relatively proximity to the Possum Skin Processing Place, further information is needed for proximate location.
Ridgelines	knowledge holders commented on the importance of ridgelines as routes for travel and connectors to ceremony, resources, and the receiving of sacred knowledge.
Cultural Knowledge	Knowledge holders expressed that possessing cultural knowledge is both sacred and a "cultural right", and that sharing and passing on this knowledge can be a "culturally burdensome" task. Conversely, knowledge holders also noted that there is a strong history of losing cultural knowledge. Community members asserted that the loss of cultural knowledge that began with early colonization and settlement has been exacerbated by the significant and ongoing development in the region.
Astronomy	Indigenous Australians are the world's oldest astronomers, presenting an unprecedented knowledge of the stars over the span of thousands of years of observation. Astronomy was used by indigenous Australians to develop calendars and navigate the land. Each tribe lived according to the cycle of the stars, which influenced what they hunted and ate, and where they travelled. Aboriginal people would have taken advantage of the high elevation of certain ridgelines and mountains within the project area.

7.4.1 Oral testimonies and statements of cultural significance

The methodology undertaken by Cox Inall Ridgeway's consultation with Aboriginal cultural knowledge holders (including with both the RAPs and other nominated knowledge holders as identified by the RAPs) regarding historical and cultural values within the project area included several workshops, consultations and discussions.

Oral history depicts a strongly interlinked web of communities stretching from the Burraborang Valley up into the Blue Mountains, down into the Megalong Valley and across the Bathurst plains. There were well established Aboriginal movement routes that linked Country and people across the whole landscape of the Blue Mountains. Cox Inall Ridgeway's consultants in correlation with local knowledge holders have depicted areas of significant cultural value within the project area



Map 3: Indicative Location of Some Places of Cultural Value within the Study Area (Waters Consultancy)

Pa = Cox's River & River Lett Junction Cultural Place, Pb = Ceremony Place, Pc = Possum Skin Processing Place, Pd = Key-Y-Ahn Tor, Pe = Marriage Ceremony Place (see Map 1 for G, L, M, N, O).

Table 7-2: Indicative locations of cultural values within the project area

7.5 Aboriginal cultural values within the project area

Community members have stated the entire area within this project is significant to Indigenous people, however knowledge holders have described key sites within the project area that are of high importance (Table 7-).

7.5.1 Coxs River & River Lett Junction cultural place (Pa)

Both Coxs River and River Lett (Label 'a' in Table 7-) hold significant value to the community, the main concerns of knowledge holders within the area were centred around the environmental impacts of the project. Community members voiced concerns for native wildlife, particularly the platypus and freshwater eels that can be found in sections of Coxs River. Stakeholders noted that such wildlife can only sustain and thrive in ideal environmental conditions, and that the proposed development will result in detrimental impacts to the health of Country and its water systems. In turn, knowledge holders expressed fears that this will make the river inhabitable for the local aquatic wildlife in particular eels and platypuses.

Dreamtime stories depict connection to the area through the creation of the rivers as the result of the ancestral beings Gurrangatch and Mirrigan. At an undisclosed location a knowledge holder reported that there was most likely a gathering place located at junction of Coxs River and the River Lett.

7.5.2 River Let Hill – GWH 8 and GWH 9

Fieldwork conducted at GWH 8 (AHIMS ID: 45-4-1071) and GWH 9 (AHIMS ID: 45-4-1072) has unearthed what is reported to be a possum skin processing ground for the Wiradjuri people. This area was reportedly used to craft possum skins that were gifted to Aboriginal people upon birth. Knowledge holders have expressed concerns with the disruption of this area, the site is of high social significance due to the belief that the site is the

only known area that this practice would of have taken place. A knowledge holder also noted that that Country spanning the location of the possum skin processing site toward Coxs River may have also been a massacre site.

7.5.3 Key-Y-Ahn (Pd)

The granite outcrop known as Key-Y-Ahn or Bell's rock is a significant feature of the Hartley landscape that local Aboriginal communities today feel a sense of connection with (Label 'd' in Table 7-). The outcrop may have been a meeting place on the valley side and is also known to have had spiritual significance to local Aboriginal people. The extensive views that it affords across the plains provide an excellent vantage point, from where movements of people or game can be observed. It does not seem unlikely that in 1815 when Governor Macquarie and his entourage arrived at the Hartley Valley, their progress was being marked by Aboriginal people watching from Key-Y-Ahn.

7.5.4 Massacre site

Knowledge holders reported that in 1819, there was a massacre of nineteen Aboriginal men at the hands of white settlers at a stockade where the Glenroy property is now situated. Due to the historical nature of this reported event, little desktop information is available regarding this massacre. "There is an area at the foot of the hill near where nineteen Aboriginal men were massacred that relates to Sorry Business in connection to this event. This site should be preserved and acknowledged." – Knowledge holder. Further engagement with knowledge holders and community members at planned AFG meetings with focus on subsequent, targeted research on this event should be undertaken to determine appropriate, future decisions made about this site. It is further recommended that mapping exercises are undertaken to determine (if feasible) an exact or more specific location of the reported event took place. A knowledge holder also noted that that Country spanning the location of the possum skin processing site (described previously in this report) toward Coxs River may have also been a massacre site. A knowledge holder noted that Martial law being declared on the Wirajduri people by colonists was often used to justify every atrocity and massacre committed against Aboriginal people. The knowledge holder reported that there were approximately 20- 30 massacres committed against local Wiradjuri people during this time.

7.5.5 Additional sites

- **Megalong Valley** – it was reported that pathways through the Megalong Valley would have been used by Gundungarra people when visiting Country.
- **Mount Tomah** – likely used as a gathering place for Darug people.
- **Mount Victoria** – it was noted that there is a large goanna rock art engraving (location not disclosed) that is highly significant due to the styles incorporated into the art, with a knowledge holder reporting that, "the engraving has a braided outline and a drilled infill. This is an interesting blend of styles and can be connected to Central Western art styles. The goanna also three eyes on its head, which could be concerned with Diamond Lore. This Lore is associate with your identity and who you are." It is recommended that further engagement with knowledge holders is undertaken to assess this goanna rock art engraving.
- **Wollemi** – it was reported that the local Aboriginal people sort refuge in the landscape of Wollemi after early settlement.
- **Hat Hill Road** – While not reporting knowledge of specific or exact locations, consultations revealed that there likely to be several sites along Hat Hill Road (at Blackheath) that would have been used for ceremony or teaching.
- **Mount Yengo** – visible from the Bora grounds at Tesselate Hill, a knowledge holder reported that the practice of Burbung would have been performed in these mountains.
- **Coxs River Valley** – this is reported to have been the pathway in which the Gundungarra people would have traversed to attend ceremony and trade meetings

- **Great Western Highway** – generally speaking, all knowledge holders reported the significance of the GWH as a songline and walking track for all Aboriginal people, and that it was a connector to other pathways such as Mount York and Bells Line of Road
- **Emu Cave** – this well-known cave is located on the norther side of Bells Line of Road between Mt Charles and Mt Bell. Engraved with 176 emus, it is reported to have been a very important gathering place.
- **Mount York** – consultations revealed that Mount York one of the key directional markers for the Wiradjuri People to enter Country and that this directional marker would have dictated the travel routes of certain clans, language groups, and genders.
- **Linden Ridge** – a knowledge holder commented that this is also a site that was most likely used for ceremonial purposes.
- **Corroboree ring** – a knowledge holder noted that there is a corroboree ring located between River Lett and Browns Gap Road, approximately four hundred metres from the foot of the hill. It is reported to be resting in a local farmer's paddock.
- **Undisclosed mountain location** – a knowledge holder reported that there was most likely a gathering place located at junction of Coxs River and the River Lett.
- **River Lett Hill** – the consultant heard that there is a very old colonial sandstone house at the top of River Lett Hill that was unable to be part of the test excavation due to the landowner's request. It is not known if there are items of cultural value on this land.

7.5.6 Aboriginal cultural landscape

The Country of the Blue Mountains that the GWH travels through is an incredibly rich cultural landscape. Throughout this Country there are myriad places of cultural value and meaning including contemporary, historical, and traditional living places, trading places, rich resource areas, ceremonial places, women's and men's business sites, and a complex network of movement routes linking them all together. The living importance of this Country to the Gundungurra, Wiradjuri, and Darug people is clear in the consultation section of this report.

7.5.7 Oral testimonies

With respect to knowledge holders within the community names have been left under discretion by Cox Inall Ridgeway (Appendix A).

Table 7-3: Oral testimonies by Cox Inall Ridgeway

Knowledge Holder Statement summaries	Testimonies
Possessing cultural knowledge	"Our knowledge, our culture, and our ceremonial sites have always been sacred to us. There is an old Darug and Gundungarra story from around the time when Blaxland entered our Country in 1813. When a local Aboriginal man encountered Blaxland and a group of white settlers, he led them out of certain parts of Country to keep them away from sacred sites, but in the end, Blaxland shot and killed him."
The loss of cultural knowledge	"Losing cultural knowledge and the destruction of Country is a vicious cycle. There is a certain sense of guilt and shame in not being able to protect your own Country, and each time you see your Country be destroyed or impacted, the reluctance to share your cultural knowledge gets stronger because it's obvious that sharing our culture doesn't stop the continual destruction of our Country." –
The importance of country	"All of this Country is important, and Country as a whole is a cultural site. All of the sites in this project are interconnected and it is impossible to

Knowledge Holder Statement summaries	Testimonies
	individualise one site without losing connections to or having impacts on other sites."

8. Significance assessment

8.1 Overview

A significance assessment is fundamental to the complete understanding of the intrinsic heritage values of a place, elements of place or specific items or objects. Consideration of significance allows a common framework in which the different elements of a site (social, scientific, historic, aesthetic) can be considered. This, in turn, supports a co-ordinated, collaborative and strategic approach to the development of appropriate management and mitigation measures.

Significance assessments generally use a series of standard criteria to define why a site is important. The criteria used in this significance assessment are described in the NSW guide to assessing heritage significance (NSW Heritage Office 2001). They are:

- Social value
- Historical value
- Scientific value
- Aesthetic value

The individual criteria are applied to each of the Aboriginal sites that have been identified in the construction footprint. An overall significance rating site is assigned to a site based on an average across the criteria. While this may oversimplify the significance of particular sites or their attributes to particular stakeholders, it does provide a consistent basis for comparing the relative significance of sites.

Please note, spiritual values have not been included in this significance assessment. The spiritual significance of individual sites and places is cultural information that is not generally disclosed to persons who are not traditional knowledge holders. A Cultural Values Assessment has been undertaken separately for this project (see ACHAR). Where Aboriginal people have determined that is appropriate to share this information, it will be provided in the Cultural Values Assessment.

8.1.1 Social value

The social value or cultural significance of an Aboriginal site or place can only be assessed by Aboriginal people. Information on cultural significance has been obtained from input from the registered Aboriginal parties throughout the consultation process. It should be noted that the social significance assessment may not reflect the views of all members of the Aboriginal community.

While the social values of each site are the purview of Aboriginal people, all aspects of the significance assessments have been informed by the RAPs, through ongoing conversations throughout the project.

8.1.2 Historic significance

The historic value of a site is determined through its association with historically important people, events or activities. A place or object can have cultural significance if it is significant in exhibiting particular historic characteristics. Such as:

- It is significant in the evolution or pattern of the history of a locality, region, state, nation or people
- Importance for the density or diversity of cultural features illustrating the human occupation and evolution of the locality, region, state or nation
- Importance in relation to an event, phase or activity of historic importance in the region, state or nation
- Importance for close association with an individual or individuals whose life, works or activities have been significant within the history of the region, state or nation

- Importance as an example of technical, creative, design or artistic excellence, innovation or achievement in a particular period.

8.1.3 Scientific significance

A concept, place or object can have cultural significance if it is significant in exhibiting particular scientific characteristics. Such as:

- It has demonstrable potential to yield information that will contribute to an understanding of the natural or cultural history of the region, state or nation
- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the locality, region, state or nation
- It is significant in demonstrating a high degree of technical innovation or achievement
- Research potential or scientific significance of an Aboriginal archaeological site can be assessed by using the criteria set out below. Each criterion is rated as low, moderate or high
- Site integrity – The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors including natural erosion processes, destructive land use practices or repeated use of a site in the past by both humans and animals
- Site structure – Structure refers to a site's physical dimensions, that is, size and stratigraphy. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts
- Site contents – This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non-organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. For scarred trees, contents may refer to the size and type of scar and/or how many scars there are on the one tree
- Representativeness and rarity – Representativeness refers to how much variability exists between the subject site and others inside or outside the subject area. It also considers the types of sites already conserved in the area and how much connectivity between sites exists. Rarity considers how often a particular site type occurs in an area. Assessment of representativeness and rarity requires some knowledge of the background archaeology of the area or region in which a study is being carried out. Rarity also relates to whether the subject site or area is important in demonstrating a distinctive way of life, custom, process, land use, function or design which is no longer practiced (NSW Heritage Office 2001).

8.1.4 Aesthetic significance

This refers to the sensory value of a place, and can include aspects such as form, texture, and colour, and can also include the smell and sound elements associated with use or experience of a site (Australia ICOMOS 2013). Aesthetic significance can be closely linked to the social value of a site.

A place or object can have cultural significance if it is significant in exhibiting particular aesthetic characteristics, such as:

- Importance to a community for aesthetic characteristics
- Importance for its creative, design or artistic excellence, innovation or achievement

- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.

8.2 Site significance assessments

Significance assessments have been undertaken for 16 sites located within the construction footprint. These include (from east to west):

- TBD (GWHAS01)
- TBD (GWH 20-3)
- 45-4-1081 (GWH 18)
- 45-4-1082 (GWH 19)
- 45-4-1099 (GWH 24)
- 45-4-1084 (GWH 6)
- TBD (GWH 20-2)
- 45-4-1102 (GWH 29)
- 45-4-1103 (GWH 31)
- 45-4-1095 (GWH 35)
- 45-4-1097 (GWH 7)
- 45-4-1072 (GWH 9)
- 45-4-1071 (GWH 8)
- TBD (██████ Site)
- TBD (SBRFB)
- TBD (MHR).

Significance assessments have been undertaken for eight sites located within the project area (but outside of the construction footprint). These include (from east to west): 45-4-0181 (Blackheath Cemetery)

- 45-4-0935 (Hartley Historic Site)
- 45-4-0980 (SP 1)
- TBD (GWHRS01)
- 45-4-0993 (Lett River Jenolan Caves Rd)
- 45-4-1111 (GWH 42)
- TBD (GWHST01)
- TBD (Forty Bends Contact Site)

Significance assessment were not undertaken for sites that were assessed as not being valid or where no artefacts were identified following survey and test excavations.

No significance assessment were undertaken for sites which were not test excavated due to land owner access constraints. These include:

- TBD (Hartley Grange 2)
- 45-4-1075 (GWH 12)
- 45-4-1074 (GWH 11)

- 45-4-1106 (GWH 34)
- 45-4-1105 (GWH 33)

8.2.1 Located within the construction footprint

8.2.1.1 TBD (GWHAS01)

Table 8-1 presents the significance assessment for TBD (GWHAS01).

Table 8-1: TBD (GWHAS01) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low to moderate .
Scientific significance	This site contains a low-density distribution of sub-surface stone artefacts. The integrity of the site is moderate as a result of historic and natural erosion. The site has moderate representativeness/rarity value as low-density sub-surface distribution of stone artefacts. The site has moderate scientific significance at a local level.
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation. The site is located in a densely wooded area with high aesthetic significance .
Summary statement of significance	Overall, GWH AS01 is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has low scientific significance as the integrity and structure of the site is low due erosion. The site has low representativeness/rarity value due to the paucity of cultural materials and the high levels of disturbance. The site has low research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.2 TBD (GWH 20-3)

Table 8-2 presents the significance assessment for TBD (GWH 20-3).

Table 8-2: TBD (GWH 20-3) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	This site is associated with the original thoroughfare through the Blue Mountains. There is an historic building on the opposite side of the GWH, Hartley range. The historical significance is considered moderate .

Criterion	Assessment
Scientific significance	Test excavation demonstrated a low density of artefacts within intact subsurface deposits. The scientific significance is considered moderate .
Aesthetic significance	It has spectacular views over the stunning river valley, overlooking a creek and a picturesque dam. The site has high aesthetic significance .
Summary statement of significance	The presence of natural stone resources suitable for stone tool production elevate the research potential of the site. The site has low artefact density, and the overall significance of TBD (20-3) is moderate-high .

8.2.1.3 45-4-1081 (GWH 18)

Table 8-3 presents the significance assessment for 45-4-1081 (GWH 18).

Table 8-3: 45-4-1081 (GWH 18) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low .
Scientific significance	The site has low integrity and structure due to the high level of ground disturbance. The single surface artefact has very limited capacity for further research or educational purposes. Excavations demonstrated the absence of subsurface artefacts in the area near the artefact. The site is assessed as having low scientific significance .
Aesthetic significance	The surface artefact was located on a small knoll within a paddock. As a result of the disturbed carpark and driveway area the site is of low aesthetic significance .
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the South Creek catchment. The site has low significance .

8.2.1.4 45-4-1082 (GWH 19)

Table 8-4 presents the significance assessment for 45-4-1082 (GWH 19).

Table 8-4: 45-4-1082 (GWH 19) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.

Criterion	Assessment
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historic significance is considered low.
Scientific significance	The site has low integrity and structure due to the high level of ground disturbance. The single artefact has very limited capacity for further research or educational purposes. Excavations demonstrated the absence of subsurface artefacts in the area near the artefact and a high level of disturbance. The site is assessed as having low scientific significance.
Aesthetic significance	The artefact was located on a small knoll within a paddock. As a result of the disturbed carpark and driveway area the site is of low aesthetic significance.
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the River Lett catchment. The site has low significance.

8.2.1.5 45-4-1099 (GWH 24)

Table 8-5 presents the significance assessment for 45-4-1099 (GWH 24).

Table 8-5: 45-4-1099 (GWH 24) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people, despite the fact it is not a tree deliberately culturally modified by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historic significance is considered low.
Scientific significance	The site is most likely not a scarred tree caused by cultural modification, and was probably impacted by a vehicle. The site is assessed as having low scientific significance.
Aesthetic significance	The scarred tree is located on the roadside behind a barrier on the GWH. As a result of the disturbed and developed setting the site is of low aesthetic significance.
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the River Lett catchment. The site has low significance.

8.2.1.6 45-4-1084 (GWH 6)

Table 8-6 presents the significance assessment for 45-4-1084 (GWH 6).

Table 8-6: 45-4-1084 (GWH 6) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low .
Scientific significance	The site has low integrity and structure due to the high level of ground disturbance. The single artefact has very limited capacity for further research or educational purposes. Excavations demonstrated the absence of subsurface artefacts in the area near the artefact and a high level of disturbance. The site is assessed as having low scientific significance .
Aesthetic significance	The artefact was located on a section of land adjacent to the GWH. Disturbance is present from the construction of the highway. As a result, the site is of low aesthetic significance .
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the Hartley Valley catchment. The site has low significance.

8.2.1.7 TBD (GWH 20-2)

Table 8-7 presents the significance assessment for TBD (GWH 20-2).

Table 8-7: TBD (GWH 20-2) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low .
Scientific significance	This site contains a low-density distribution of subsurface stone artefacts. The integrity of the site is moderate as a result of historic and ongoing agricultural activities. The site has moderate representativeness/rarity value as low-density sub-surface distribution of stone artefacts. The site has moderate scientific significance at a local level.
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation. The surface of the site is partially cleared

Criterion	Assessment
	agricultural land, with visual connections largely limited to heavily modified surrounding landscapes. The site is considered of low aesthetic significance .
Summary statement of significance	Overall, River Lett site is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has moderate scientific significance as the integrity and structure of the site is low due to past and ongoing agricultural activities. The site has moderate representativeness/rarity value due to the low density of cultural materials and the moderate levels of disturbance. The site has low research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.8 45-4-1102 (GWH 29)

Table 8-8 presents the significance assessment for 45-4-1102 (GWH 29).

Table 8-8: 45-4-1102 (GWH 29) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low .
Scientific significance	This site contains a low-density distribution of subsurface stone artefacts. The integrity of the site is moderate as a result of historic and ongoing agricultural activities. The site has moderate representativeness/rarity value as low-density sub-surface distribution of stone artefacts. The site has moderate scientific significance at a local level.
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation. The surface of the site is partially cleared agricultural land, with visual connections largely limited to heavily modified surrounding landscapes. The site is considered of low aesthetic significance .
Summary statement of significance	Overall, River Lett site is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has moderate scientific significance as the integrity and structure of the site is low due to past and ongoing agricultural activities. The site has moderate representativeness/rarity value due to the low density of cultural materials and the moderate levels of disturbance. The site has low research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.9 45-4-1103 (GWH 31)

Table 8-9 presents the significance assessment for 45-4-1103 (GWH 31).

Table 8-9: 45-4-1103 (GWH 31) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The site is located 200 m from the historic Hartley village across the GWH. No historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered moderate .
Scientific significance	The soils at GWH 31 offer the opportunity to investigate the distribution of relatively rare artefacts in a moderately deep soil profile at varying distances from reliable water. However, the integrity of the site is low as a result of historic and ongoing disturbance, including large scale earthworks associated with the construction of private property and the GWH bridge crossing over River Lett. The site had moderate representativeness/rarity as a subsurface distribution of stone artefacts, particularly in close proximity to major water sources. GWH 31 is assessed as being of moderate scientific significance .
Aesthetic significance	This site has a good vantage point upon high flat terrace overlooking River Lett and has moderate aesthetic significance .
Summary statement of significance	Overall, GWH 31 is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has moderate scientific significance as the integrity and structure of the site is low-moderate as the site has been subject to significant disturbance. However, the site has moderate representativeness/rarity due to its artefact content and location within the agricultural environment. The site has low-moderate research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.10 45-4-1095 (GWH 35)

Table 8-10 presents the significance assessment for 45-4-1095 (GWH 35).

Table 8-10: 45-4-1095 (GWH 35) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint. Overall, the location of the site in correlation with historical sites within the immediate vicinity depict the historical significance as low to moderate .
Scientific significance	This site exhibits a very low-density distribution of sub-surface stone artefacts. The integrity of the site is moderate because of the ridgeline landform's unsuitability for agricultural activities and the retention of woodland vegetation. The low-density

Criterion	Assessment
	subsurface stone artefacts site has low representativeness/rarity value at the local. The site has an overall low scientific significance .
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation. The site is located in a densely wooded area with high aesthetic significance .
Summary statement of significance	Overall, GWH 35 is of low significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has moderate scientific significance as the integrity and structure of the site is low due to disturbance. The site has low representativeness/rarity value due to the paucity of cultural materials and the high levels of disturbance. The site has moderate research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.11 45-4-1097 (GWH 7)

Table 8-11 presents the significance assessment for 45-4-1097 (GWH 7).

Table 8-11: 45-4-1097 (GWH 7) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance . The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	Government distribution of blankets to Aboriginal people was documented at the nearby historic Hartley village, located only a few hundred metres to the south of the site across the River Lett. It is possible that intermittent Aboriginal camping at the site continued into the 1800s due to its proximity and views toward the village across the River Lett crossing. The site and its context have high historic significance .
Scientific significance	Such a site could potentially address questions pertaining to stone technology in use in the locality, occupation density of particular landforms and contact between language groups (Darug, Gundungurra and Wiradjuri) via artefact raw material sourcing. A larger sample of stone artefacts has higher potential to contain utilised pieces which may retain organic residues or use specific damage. The presence of no-human bone is a rare opportunity to investigate organic remains on an open site and whether its presence can be attributed to resource utilisation by Aboriginal people. This site is of high scientific value .
Aesthetic significance	The site has a visible artefacts scatter, including the presence of bones, GWH 7 is located on an upper ridge looking over the River Lett to the southeast. The intersecting roads create a subdivide between the site and JCR west taking away an otherwise complete landform. The site is of moderate aesthetic significance .
Summary statement of significance	This JCR GWH 7 site has high overall significance , depicted through the prominent number of artefacts within the area and an intact hearth. The site has high historical value through the progressive demonstration of Indigenous land use, the high number of artefacts and presence of a has the potential hearth to provide reliable radiocarbon dating data and insights into the subsistence practice of Aboriginal people showing its use over an extended period.

8.2.1.12 45-4-1072 (GWH 9)

Table 8-12 presents the significance assessment for 45-4-1072 (GWH 9).

Table 8-12: 45-4-1072 (GWH 9) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. Fieldwork conducted at GWH 9 has unearthed what is reported to be a possum skin processing ground for the Wiradjuri people. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. Knowledge holders regarded this site as a possum skin processing ground, a highly significant site in relation to Wiradjuri customs and ritual. The immediate area northwest of this site has been deemed a massacre site, ranging from GWH 8, GWH 9, towards River Lett and GWH 7. Further recording and mapping exercises have been requested to pinpoint the exact location, regardless of exact whereabouts knowledge holders feel deep connection to this area. An historical connection to the Glenrowan property to the south links this site to some of the first settlement outside of Sydney. The historical significance for the site is high .
Scientific significance	The site has medium integrity and structure due to its use within a domestic farming context. However, the relatively high number of artefacts recovered from subsurface testing and the potential for high density artefacts to continue in the subsurface deposit deems this location as valuable for further research. The site is assessed as having high scientific significance .
Aesthetic significance	The site is located on an elevated plateau lookout area, above the River Lett. Although the view is intruded by the busy GWH to the north. The site has excellent views to the south, located in a heavily grazed farmland that extends into a reserved woodland area. The site location has high aesthetic significance .
Summary statement of significance	Overall GWH 9 has high cultural significance . The site has the capacity for further research and educational purposes due to the high density of artefacts present and the location on the north side of River Lett Hill has the potential to inform Aboriginal resource use, linked to possum skinning practices. Aboriginal people of the local area have also deemed this an important area for further studies.

8.2.1.13 45-4-1071 (GWH 8)

Table 8-13 presents the significance assessment for 45-4-1071 (GWH 8).

Table 8-13: 45-4-1071 (GWH 8) significance assessment

Criterion	Assessment
Social significance	The Registered Aboriginal Parties' representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance . Fieldwork conducted at GWH 8 and GWH 9 has unearthed what is reported to be a possum skin processing ground for the Wiradjuri people. The site has a high social significance at the local level as it provides tangible evidence of the use of the area by Aboriginal people.

Criterion	Assessment
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. Knowledge holders regarded this site as a possum skin processing ground, a highly significant site in relation to Wiradjuri customs and ritual. The immediate area northwest of this site has been deemed a massacre site, ranging from GWH 8 and GWH 9, towards River Lett and GWH 7. Further recording and mapping exercises have been requested to pinpoint the exact location, regardless of exact whereabouts knowledge holders feel deep connection to this area. An historical connection to the Glenrowan property to the south links this site to some of the first settlement outside of Sydney. This site has high historical significance .
Scientific significance	The site has medium integrity and structure due to its use within a domestic farming context. However, the high density of artefacts deems this location as valuable for further research. The site is assessed as having high scientific significance .
Aesthetic significance	The site is located on an elevated plateau lookout area, above the River Lett the view is intruded by the busy GWH to the north. The site has excellent views to the south, located in a heavily grazed farmland that extends into a reserved woodland area. There is a granite rise overlooking the area and the site location has high aesthetic significance .
Summary statement of significance	Overall GWH 8 has high cultural significance . The site has the capacity for further research and educational purposes due to the high level of artefacts present. Aboriginal people of the local area have also deemed this an important area for preservation, regarding the sites continual use by indigenous people in the past.

8.2.1.14 TBD (Site)

Table 8-14 presents the significance assessment for TBD (Site).

Table 8-14: TBD (Site) significance assessment

Criterion	Assessment
Social significance	This site is considered to be of high social significance , located in a valley between the men's and women's sites with a creek below and a mountain valley behind, along which people would have walked to gain access to this location. It is possible that this was a meeting place or that it was a major campsite related to the men's and women's sites.
Historical significance	This site has high historical significance due to its proximity to the 40 Bends Contact Site.
Scientific significance	This site has high scientific significance because it represents an aspect of Aboriginal history demonstrating the survival techniques utilised prior to European occupation. It is also an important educational tool in demonstrating Aboriginal history. The interrelated nature of this site and its relationship to the nearby Forty Bends Contact Site, demonstrate Aboriginal land use patterns. The high number of artefacts recorded at this site indicates a high use of this area. This site is located in a valley between the men's and women's sites with a creek below and a mountain valley behind, along which people would have walked to gain access to this location. It is possible that this was a meeting place or that it was a major campsite related to the men's and women's sites.

Criterion	Assessment
Aesthetic significance	The site is situated in a picturesque creek valley with views to a nearby mountain valley and ridgeline. The site has high aesthetic significance .
Summary statement of significance	Overall, [REDACTED] Site is of high significance as it has the potential to provide extensive evidence of the use of the area by Aboriginal people. The integrity and structure of the site is moderate to high as a result of limited disturbance through historic and current agricultural activities. The site has high representativeness / rarity value as an opportunity to the manufacture of stone artefacts and their movements across the broader landscape. The high overall significance rating of the site is a reflection of the exceptional research and educational potential of the site in association with the Forty Bends Contact Site.

8.2.1.15 TBD (South Bowenfells Rural Fire Brigade Site (SBRFB))

Table 8-15 presents the significance assessment for TBD (SBRFB).

Table 8-15: TBD (SBRFB) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historic significance is considered low .
Scientific significance	This site exhibits a very low-density distribution of sub-surface stone artefacts. The integrity of the site is moderate because of the spurs landform's unsuitability for intensive agricultural activities. The low-density subsurface stone artefacts site has moderate representativeness/rarity value at the local level. The site has an overall moderate scientific significance .
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation associated with eroding creeklines. The surface of the site is a grassed agricultural area adjacent to the GWH with proposed development and a service station at the western end of the site. The site is considered of low aesthetic significance .
Summary statement of significance	Overall, MHR is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has low-moderate scientific significance due to the overall paucity of cultural materials and good structural integrity. The site has moderate representativeness/rarity value. The site has low-moderate research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.1.16 TBD (Magpie Hollow Road (MHR))

Table 8-16 presents the significance assessment for TBD (MHR).

Table 8-16: TBD (MHR) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historic and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historic references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered low .
Scientific significance	This site exhibits a very low-density distribution of subsurface stone artefacts. The integrity of the site is moderate because of the spurs landform's unsuitability for intensive agricultural activities. The low-density subsurface stone artefacts site has low representativeness/rarity value at the local level. The site has an overall moderate scientific significance .
Aesthetic significance	The artefacts that define the site are a sub-surface scatter which is not visible apart from small areas of exposure and deflation associated with eroding creeklines. The surface of the site is a grassed agricultural area adjacent to the GWH with proposed development and a service station at the western end of the site. The site is considered of low aesthetic significance .
Summary statement of significance	Overall, MHR is of moderate significance at a local level as it provides limited evidence of the use of the area by Aboriginal people. The site has low-moderate scientific significance due to the overall paucity of cultural materials and good structural integrity. The site has moderate representativeness/rarity value. The site has low-moderate research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.2 Located within the project area

8.2.2.1 45-4-0181 (Blackheath Cemetery)

Table 8-17 presents the significance assessment for 45-4-0181 (Blackheath Cemetery)

Table 8-17: 45-4-0181 (Blackheath Cemetery) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. In the context of this association of the Aboriginal and early European history of the project area with this specific site, historical significance is considered high
Scientific significance	The occurrence of post contact Aboriginal sites is extremely rare and as such this site has high scientific significance .

Criterion	Assessment
Aesthetic significance	The artefact was located on a section of land adjacent to the GWH. Disturbance is present from the construction of the highway. As a result, the site is of low aesthetic significance .
Summary statement of significance	Overall, the site has moderate significance .

8.2.2.2 45-4-0935 (Hartley Historic Site)

Table 8-18 presents the significance assessment for 45-4-0935 (Hartley Historic Site).

Table 8-18: 45-4-0935 (Hartley Historic Site) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. Historical references link Aboriginal individuals to the specific area through blanket distributions. In the context of this broad association of the Aboriginal history of the construction footprint with this specific site, historical significance is considered high .
Scientific significance	The site has low integrity and structure due to the high level of ground disturbance. The site is assessed as having low scientific significance .
Aesthetic significance	The artefact was located on a section of land adjacent to the GWH and within Historic Hartley. Disturbance is present from the construction of the highway, and the town. As a result, the site is of low aesthetic significance .
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the Hartley Valley catchment. The site has low significance .

8.2.2.3 45-4-0980 (SP 1)

Table 8-19 presents the significance assessment for 45-4-0980 (SP 1).

Table 8-19: 45-4-0980 (SP 1) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the

Criterion	Assessment
	context of this broad association of the Aboriginal history of the project area with this specific site, historical significance is considered low.
Scientific significance	This site contains a scarred tree which was originally located in the construction footprint. It was subsequently moved to its current location. The area is of moderate scientific significance
Aesthetic significance	The tree that defines this site is of little aesthetic value, with the area itself located adjacent to the GWH and is surrounded by a fenced structure. This site is of low aesthetic significance.
Summary statement of significance	Overall, the site has moderate significance.

8.2.2.4 TBD (GWHR501)

Table 8-20 presents the significance assessment for TBD (GWHR501).

Table 8-20: TBD (GWHR501) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	Rockshelters are indicative of Aboriginal occupation and use, the sandy deposit located within the confines of this protected area represents the possibility of a PAD. The site has high historical significance.
Scientific significance	Rockshelters provide invaluable evidence of Aboriginal occupation and use. There may be subsurface deposits retained within this site. The site has high scientific significance.
Aesthetic significance	This site is surrounded by bushland with a scarred tree located a few metres from the entrance. The site has high aesthetic significance.
Summary statement of significance	Overall, the site type is rare and rock shelters are relatively scarce in the area which designate this site has high overall significance.

8.2.2.5 45-4-0993 (Lett River Jenolan Caves Rd)

Table 8-21 presents the significance assessment for 45-4-0993 (Lett River Jenolan Caves Rd)

Table 8-21: 45-4-0993 (Lett River Jenolan Caves Rd) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. In the context of this broad association of the Aboriginal

Criterion	Assessment
	history of the construction footprint with this specific site, historical significance is considered low.
Scientific significance	The site has low integrity and structure due to the high level of ground disturbance. The site is assessed as having low scientific significance.
Aesthetic significance	The artefact was located on a section of land adjacent to the GWH. Disturbance is present from the construction of the highway. As a result, the site is of low aesthetic significance.
Summary statement of significance	The site has very limited capacity for further research or educational purposes. The main value lies in its' contribution to the regional pattern of site distributions across the Hartley Valley catchment. The site has low significance.

8.2.2.6 45-4-1111 (GWH 42)

Table 8-22 presents the significance assessment for 45-4-1111 (GWH 42).

Table 8-22: 45-4-1111 (GWH 42) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	This site is associated with the original thoroughfare through the Blue Mountains. There is historic graffiti and rock markings related to road construction associated with this site. The site has high historical significance.
Scientific significance	There may be subsurface deposits retained within this site with a high scientific significance.
Aesthetic significance	The site has spectacular views over the valley to the west and is of high aesthetic significance.
Summary statement of significance	Overall, the site type is rare and rock shelters are relatively scarce in the area which designate this site a high overall significance.

8.2.2.7 TBD (GWHST01)

Table 8-23 presents the significance assessment for TBD (GWHST01)

Table 8-23: TBD (GWHST01) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the project area are considered to be of high social significance. The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the construction footprint by Aboriginal peoples from the contact period through to the present. However, no historical references that link Aboriginal individuals to the specific area encompassed by this site have been sourced. In the

Criterion	Assessment
	context of this broad association of the Aboriginal history of the project area with this specific site, historical significance is considered low.
Scientific significance	This site contains an apparent scarred tree; however, it does not fit the criteria for to be classified as one. This area is of low scientific significance
Aesthetic significance	The tree that defines this site is of little aesthetic value, with the area itself located on a driveway to the property it resided in. This site is of low aesthetic significance.
Summary statement of significance	Overall, GWH ASO1 is of moderate significance as it provides limited evidence of the use of the area by Aboriginal people. The site has low scientific significance as the integrity and structure of the site is low due erosion. The site has low representativeness/rarity value due to the paucity of cultural materials and the high levels of disturbance. The site has low research and educational potential about the manner in which Aboriginal populations lived in the area.

8.2.2.8 TBD (Forty Bends Contact Site)

Table 8-24 presents the significance assessment for TBD (Forty Bends Contact Site).

Table 8-24: TBD (Forty Bends Contact Site) significance assessment

Criterion	Assessment
Social significance	The RAP representatives confirm that all Aboriginal cultural heritage objects, sites and values in the construction footprint are considered to be of high social significance . The site has a high social significance as it provides tangible evidence of the use of the area by Aboriginal people.
Historical significance	The historical and ethnographic sources described in this report demonstrate occupation of the project area by Aboriginal peoples from the contact period through to the present. Historical references link Aboriginal people to the garrison established at the nearby Glenrowan property and to early settlers through the modified modern resource materials found at the site. In the context of this association of the Aboriginal and early European history of the construction footprint with this specific site, historical significance is considered high.
Scientific significance	The occurrence of post contact Aboriginal sites is extremely rare and as such this site has high scientific significance.
Aesthetic significance	This site has unimpeded views of the nearby mountainous valleys to the east and west toward the Hassan Range and other lower ridgelines. The aesthetic significance of the site is high.
Summary statement of significance	Overall the Forty Bends Contact site has high overall significance.

8.3 Summary of significance

A summary of the assessments of significance for individual sites discussed in this chapter is presented in Table 8-25.

Table 8-25: Summary of individual site significance (for the construction footprint)

AHIMS ID	Site name	Social significance	Historical significance	Scientific significance	Aesthetic significance	Overall significance
TBD	GWH AS01	High	Low-moderate	Moderate	High	Moderate
TBD	GWH 20-3	High	Moderate	Moderate	High	Moderate – high
45-4-1081	GWH 18	High	Low	Low	Low	Low
45-4-1082	GWH 19	High	Low	Low	Low	Low
45-4-1099	GWH 24	High	High	Low	Low	Low
45-4-1081	GWH 6	High	Low	Low	Low	Low
TBD	GWH 20-2	High	High	Low	Low	Moderate
45-4-1074	GWH 11	No significance assessment undertaken due to access constraints				
45-4-1075	GWH 12	No significance assessment undertaken due to access constraints				
45-4-1102	GWH 29	High	Low	Low	Low	Low
45-4-1095	GWH 31	High	High	Moderate	Moderate	Moderate - high
45-4-1095	GWH 35	High	High	Low	Moderate	low
45-4-1097	GWH 7	High	High	High	Moderate	High
45-4-1072	GWH 9	High	High	High	High	High
45-4-1071	GWH 8	High	High	High	High	High
45-4-1105	GWH 33	No significance assessment undertaken due to access constraints				
45-4-1106	GWH 34	No significance assessment undertaken due to access constraints				
TBD	██████ Site	High	High	High	High	High
TBD	SBRFB	High	Low	Moderate	Low	Moderate
TBD	Magpie Hollow Road	High	Low	Moderate	Low	Moderate

Table 8-26: Summary of individual site significance (for the project area)

AHIMS ID	Site name	Social significance	Historical significance	Scientific significance	Aesthetic significance	Overall significance
45-4-0181	Blackheath Cemetery	High	High	High	Low	Moderate
45-4-0935	Hartley Historic Site	High	High	Low	Low	Low
45-4-0980	SP 1	High	Low	Moderate	Low	Moderate
TBD	GWHST01	High	Low	Low	Low	Moderate
45-4-0993	Lett River Jenolan Caves Rd	High	Low	Low	Low	Low
TBD	Hartley Grange 2	No significance assessment undertaken due to access constraints				
45-4-1111	GWH 42	High	High	High	High	High
TBD	GWHR01	High	High	High	High	High
TBD	Forty Bends Contact Site	High	High	High	High	High

9. Impact assessment

This section describes the impacts that are anticipated to occur as a result of the construction and operation of the GWH upgrade. A consideration of cumulative impact is also included.

9.1 Project development and impact consideration

A comprehensive route options and selection process was carried out to identify feasible route options GWHUP. A value management process was used to bring together a wide range of stakeholder interests and expertise to review the revised shortlisted alignment options being put forward for evaluation. One of the key issues to consider in the assessment included minimising the impact of the project on the natural, cultural and built environment. Technical, socio-economic and environmental considerations, while achieving a value for money solution for the community, have been at the forefront of decisions during project development.

The concept design has changed from the original construction footprint as development has reconsidered key aspects such as project functionality and performance, key design and engineering lessons learnt such as constructing across floodplains and over waterways, and cultural heritage and environmental impacts.

A principle of cultural heritage management is to avoid impact before applying mitigation. During project development, the following activities were carried out to identify Aboriginal cultural heritage so, where possible, strategies to avoid impacts could be developed:

- Consultation with relevant Aboriginal stakeholders and Heritage NSW (refer to Section 3)
- Site archaeological survey
- Assessment to identify regional, national and locally significant features.

Design and alignment refinements were made and the location of ancillary facilities were selected to avoid impacts to Aboriginal cultural heritage sites where possible, while considering engineering, environmental, social and economic requirements. For example, the design for the project has adopted as narrow a footprint as possible in all areas in order to minimise various impacts, including those to Aboriginal heritage sites. The design has also placed the alignment as close as practicable to existing development and infrastructure to limit regional fragmentation impacts by consolidating the project area with existing development, utilities and road footprints. Tunnelling options will also minimise impacts to Aboriginal sites, however tunnel portals will impact the surface and where possible have been located away from significant Aboriginal sites. Further design adjustments, including the location of ancillary areas, will be made in consideration of the location of Aboriginal sites and the recommendations of this report.

A total of 19 Aboriginal sites may be directly impacted by the project. Section 10 provides recommendations on impact avoidance, minimisation and mitigation.

9.2 Aspects of activity

Aboriginal heritage sites within the construction footprint would be impacted by ground disturbance works.

The construction footprint is indicative only and may be refined during detailed design. Factors that could affect the final footprint include the location and size of water quality basins, the construction methodology, and arrangements made with affected landowners. The project area for this assessment is larger than the construction footprint and provides flexibility for minor amendments to the impact footprint.

Areas of fill over Aboriginal heritage are regarded as an impact adversely affecting heritage values. Any works on existing roads within the project area are considered to be highly disturbed areas not affecting Aboriginal heritage.

9.3 Impacts

9.3.1 Definitions

The assessment of harm in this report has been guided by the definition of harm in the *National Parks and Wildlife Act 1974*, the requirements of Section 90K (1) (b) of that Act and the guidance in the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage (DECCW 2011).

Section 90K (1) (b) states that when making a decision in relation to any Aboriginal Heritage Impact Permit (AHIP) application, consideration should be given to the actual or likely harm to Aboriginal objects that will take place as a result of the proposed activities.

Following on from this, the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage* (DECCW 2011) identifies two types of harm: direct (occurring as a direct result of any activity which disturbs the ground, generally considered to be construction works and certain mitigation activities); and indirect (harm to objects that are not within the area of the proposed activity, but that may be impacted as a result of the proposed activity).

Examples of direct harm includes (but is not limited to) removal of Aboriginal objects through construction or earth moving, as well as mitigation activities like 'movement' (where surface artefacts are moved within but not out of a site), 'excavation' (usually archaeological excavation), 'community collection' (where objects are removed by members of the Aboriginal community).

Examples of indirect harm includes (but is not limited to) impacts associated with construction vibrations and changes to vistas/landscapes

The majority of potential impacts to Aboriginal sites within and adjacent to the construction footprint may occur during the construction phase of the project. Potential impacts may include:

- 'Direct' impacts being the removal, modification or destruction of an Aboriginal site
- 'Indirect' impacts associated with construction vibration generated by tunnelling or surface works and the settlement of land due to tunnelling below or in proximity to Aboriginal sites
- 'Indirect' impacts associated with Aboriginal site setting (visual impacts, changes to vistas/landscapes), changes to ongoing use or environmental association

The 'degree of harm' is categorised as:

- "Total", meaning the entire site would be harmed
- 'Partial', meaning part of the site would be harmed
- 'None', meaning there would be no movement of any Aboriginal object from a site or within a site, including covering sites by burial or inundation.

The 'consequence of harm' makes reference to the loss of heritage value and is defined here as the loss of cultural significance taking into account the five heritage values under the Burra Charter. Loss is categorised as:

- 'Total loss of value', meaning the site is destroyed to the extent that its embodiment of heritage value is irretrievably lost
- 'Partial loss of value', meaning the site is harmed to the extent that there is incomplete representation of its original fabric, retaining some potential for the site to be appreciated by present and future generation
- 'No loss of value', meaning that the site retains its full potential to be valued and enjoyed by present and future generations.

9.3.2 Significance of impact

Table 9-1 has been developed to assess the level of potential impact and associated significance for Aboriginal sites within the project area. The significance of impact ratings corresponds with the damage classification model used for the project (CIRIA 1996). The significance of impact to each site within the project area is presented in Table 9-2.

Table 9-1: Impact assessment matrix

Impact rating	Scale	Intensity	Duration/frequency
Major	Medium – large	Moderate – high	Permanent/irreversible
Moderate	Small – medium	Moderate	Medium – long term
Minor	Small/localised	Low	Short term/reversible
Negligible	Little or no potential physical impact to an Aboriginal site.		

9.4 Impact avoidance

All recorded Aboriginal sites within the project area have been considered in relation to the proposed road construction, operation and associated activities, and wherever possible, Transport for NSW has sought to avoid and reduce impacts to Aboriginal sites.

Throughout design development and refinement, the project's alignment and associated required infrastructure has been modified where possible, to avoid or reduce the impact to identified Aboriginal sites, particularly those of high significance.

9.5 Types of potential indirect impact

9.5.1.1 Vibration from tunnelling and at-surface activities

Vibration from construction activities has the potential to result in physical damage to Aboriginal sites. Depending on the outcomes of vibration modelling, the vibration levels may exceed the minimum working distance to achieve a screening level of 2.5 mm/s for Aboriginal sites. The vibration screening level of 2.5 mm/s for avoiding damage to Aboriginal sites is a conservative figure based on modelling provided by the Commonwealth Department of Industry, Innovation and Science (Deutsches Institut für Normung 1999). It assumes that all Aboriginal sites are structurally unsound and that the most sensitive items are located at the closest point to the tunnel. A large rock hammer could be used during bench clearing tunnelling activities, which typically has a minimum working distance during tunnelling of 20 metres for unsound structures (Renzo Tonin & Associates 2018).

If vibration levels are expected to exceed this goal, mitigation and management measures would be implemented as outlined in Section 10. This would include carrying out Aboriginal site condition surveys prior to and post construction and conducting continuous vibration monitoring during vibration intensive construction works.

9.5.1.2 Settlement from tunnel excavation

Tunnel excavation, combined with the subsequent impacts on groundwater levels, is expected to result in settlement at the ground surface. To assess the impact on Aboriginal sites (particularly rock shelters), it is important to estimate potential levels of settlement.

The project tunnels for the project would be constructed the Narrabeen Group of Sandstone, comprising undifferentiated sandstone, shale, and tuff. Predicted surface settlement contours due to stress redistribution induced by tunnel excavation involve a maximum predicted surface settlement range of between 15 mm and 24

mm directly above the mainline tunnels (Jacobs 2018). A damage classification model (CIRIA 1996) used for the project describes this settlement range as having a 'slight' degree of sensitivity and the description of typical damage being potential for cracks to form in buildings.

For the project area, Sefton's (Sefton 1996) investigation of the effects of mining-related subsidence on Aboriginal rock shelter sites remains the most useful study into the effects of subsidence on rock shelters specifically (note, rock engravings are not covered in this study). The results of Sefton's analysis showed that the determining probability of subsidence related impacts to a rock shelter was overhang size, with larger shelters (greater than 50 cubic metres) at greater risk of impact. No rock shelter site less than 50 cubic metres was found to have been impacted by subsidence and impacts to larger shelters were also rare (Sefton 1996). Detailed analysis of rock shelters within the project area will be required to assess the potential indirect vibration impacts once tunnel options have been finalised.

9.5.2 Impacts to identified sites

Most of the Aboriginal sites listed in Table 9-2 below consist of distributions of Aboriginal stone artefacts associated with PADS. These sites are expected to extend well into comparable landscapes outside of the construction footprint. For this reason, the degree of harm to sites whose boundaries likely extend beyond the construction footprint is listed as partial. This assessment is considered valid, notwithstanding the projected loss of the transects of test pits that were sampled in the test excavations.

Based on the results of this assessment and in consultation with the RAPs:

- There are **20 Aboriginal sites within the construction footprint** that would be directly impacted by the project
- **Nine Aboriginal sites are located within the project area** including two sites that will be subject to minor indirect impacts associated with vibration and settlement, and one site subject to moderate indirect impacts also associated with vibration and settlement
- Three sites within the construction footprint (45-4-1099 (GWH 24), 45-4-1082 (GWH 19), 45-4-1081 (GWH 18)) do not require active protection measures due to low archaeological significance primarily due to the disturbed nature of the landform in that location.

Maps showing the project construction footprint in relation to Aboriginal sites identified through this assessment are presented below. The potential impact to Aboriginal sites recorded within and adjacent to the project area is summarised in Table 9-2.

Table 9-2: Summary of significance and impact to Aboriginal sites within the construction footprint

Heritage item name (AHIMS ID)	Heritage item type	Overall significance	Location relative to project area sections	Type of potential impact	Degree of harm	Significance of potential impact
TBD (GWHAS01)	Stone artefact site	Low	Within 50 m of B2L	Direct	Total	Minor
45-4-1105 (GWH 33)	Scarred tree	Low	Within 50 m of project section River Lett Hill to Forty Bends (R2F)	Direct	Total	Negligible
45-4-1106 (GWH 34)	Artefact site	Moderate	Within 50 m of R2F	Direct	Total	Minor
TBD (20-2)	Site and PAD	Moderate	Within 50 m of R2F	Direct	Partial	Moderate
45-4-1074 (GWH 11)	Site and PAD	Moderate	Within 50 m of L2R	Direct	Partial	Moderate
45-4-1075 (GWH 12)	Site and PAD	Moderate	Within 50 m of L2R	Direct	Partial	Moderate
45-4-1071 (GWH 08)	Artefact site	High	Within 50 m of R2F	Direct	Partial	Moderate
45-4-1072 (GWH 09)	Artefact site	High	Within 50 m of R2F	Direct	Partial	Major
45-4-1097 (GWH 7)	Stone artefact site, hearth	High	Within 50 m of R2F	Direct	Total	Major
45-4-1095 (GWH 35)	Sites and PAD	Moderate	Within 50 m of project section Little Hartley to River Lett Hill (L2R)	Direct	Partial	Minor
45-4-1103 (GWH 31)	Stone artefact site	Moderate-High	Within 50 m of L2R	Direct	Total	Moderate
45-4-1099 (GWH 24)	Scarred Tree	Low	Within 50 m of project section Cops River Road Intersection (CRR)	Direct	Total	Negligible
45-4-1081 (GWH 18)	Artefact site	Low	Within 50 m of L2R	Direct	Total	Negligible

Heritage item name (AHIMS ID)	Heritage item type	Overall significance	Location relative to project area sections	Type of potential impact	Degree of harm	Significance of potential impact
45-4-1082 (GWH 19)	Artefact site	Low	Within 50 m of CRR	Direct	Total	Negligible
45-4-1084 (GWH 06)	Artefact site	Low	Within 50 m of CRR	Direct	Partial	Negligible
TBD (GWH 20-3)	Site and PAD	Moderate	Within 50 m of L2R	Direct	Partial	Moderate
TBD (Site)	Site and PAD	High	Within 50 m of R2F	Direct	Partial	Major
TBD (SBRFB Site)	Site and PAD	Moderate	Within 50 m of project section Forty Bends to Lithgow (F2L) surface works	Direct	Partial	Moderate
TBD (Magpie Hollow Road Site)	Site and PAD	Moderate	Within 50 m of F2L surface works	Direct	Partial	Moderate

Table 9-3: Summary of significance and impact to Aboriginal sites within the project area

Heritage item name (AHIMS ID)	Heritage item type	Overall significance	Location relative to project area sections	Type of potential impact	Degree of harm	Significance of potential impact
45-4-0181 (Blackheath Cemetery)	Site	Moderate	Within 50 m of B2L	Indirect	None	Negligible
45-4-0935 (Hartley Historic Site)	Site	Low	Within 50 m of R2F	Indirect	Partial	Negligible
45-4-0980 (SP 1)	Site	Moderate	Within 50 m of B2L	Indirect	None	Negligible
TBD (GWHST01)	Site	Moderate	Within 50 m of CRR	Direct	Partial	Moderate

Heritage item name (AHIMS ID)	Heritage item type	Overall significance	Location relative to project area sections	Type of potential impact	Degree of harm	Significance of potential impact
45-4-0993 (Lett River Jenolan Caves Rd)	Site	Low	Within 80 m of R2F	Indirect	Partial	Negligible
TBD (Hartley Grange)	PAD	NA	Within 50 m of L2R	Direct	Partial	Moderate
GWH 42 (45-4-1111)	Rockshelter	High	Within 50 m of B2L	Indirect	Partial	Minor
TBD (GWHR501)	Rockshelter and PAD	High	Within 50 m of B2L	Indirect	Partial	Moderate
TBD (Forty Bends Contact Site)	Post contact site	High	Within 50 m of R2F	Indirect	Partial	Minor

This figure has been redacted.

9.6 Impacts to cultural values

The cultural values assessment includes cultural information collected during consultation, field surveys and consultation during the test excavation program. Aboriginal community members have stated the entire area within the project is significant to Aboriginal people, however knowledge holders have described key sites within the area that are of high importance (Section 7). Jacobs engaged Cox Inall Ridgeway, an Aboriginal strategic consultancy, to undertake an independent Aboriginal Cultural Values Assessment for the project. This report is provided as Appendix A. The Cultural Values Assessment identified numerous places within the project area of high cultural significance, with several falling within or partly within the project area. These sites are:

Coxs River & River Lett Junction cultural place

Both rivers hold significant value to the community, the main concerns of knowledge holders within the area were centred around the environmental impacts of the project.

River Let Hill – GWH 8 and GWH 9

Fieldwork conducted at GWH 8 and GWH 9 has unearthed what is reported to be a possum skin processing ground for the Wirajrudi People. Knowledge holders have expressed concerns with the disruption of this area, the site is of high social significance due to the belief that the site is the only known area that this practice would have taken place. A knowledge holder also noted that that Country spanning the location of the possum skin processing site toward Coxs River may have also been a massacre site.

Mount Victoria

It was noted that there is a large goanna rock art engraving (location not disclosed) that is highly significant due to the styles incorporated into the art. It is recommended that further engagement with knowledge holders is undertaken to assess this goanna rock art engraving.

Coxs River Valley

The Coxs River Valley is reported to have been the pathway in which the Gundungarra people would have traversed to attend ceremony and trade meetings.

Great Western Highway

Generally speaking, all knowledge holders reported the significance of the GWH as a songline and walking track for all Aboriginal people, and that it was a connector to other pathways such as Mount York and Bells Line of Road.

9.7 Cumulative impacts

9.7.1 Introductions

Cumulative impacts can be defined as the combined effects of environmental or social impacts that occur because of multiple activities and developments with similar impacts within a particular local area and region. Cumulative impacts can be measured generally overtime, or within discrete periods, such as the cumulative impacts of a project, or the cumulative impacts of European land-use activities.

There is currently no defined or endorsed process for the assessment of cumulative impacts on Aboriginal cultural heritage in New South Wales. Therefore, a range of approaches have been used in the past and the scope and complexity of these assessments have generally related to the scale of the project, the predicted interactions and the nature of the available comparative and baseline data.

The assessment of cumulative impacts on cultural heritage values must take into account the fact that many cultural values are non-renewable, associated with a finite and limited number of surviving places and objects. Except for those cultural traditions which revive or reinterpret past belief within new material forms, cultural

heritage is mainly invested in the material evidence of the past. As such there is little ability to revive or re-establish the material past. It follows that each incremental loss of the material record of the past is irreversible, and itself a factor in changing perceptions of rarity and value (SKM 2012).

Ideally an assessment of cumulative impacts should be measured against a baseline of data which characterises the existing cultural resources to be impacted, and the cumulative loss already realised. In the case of the local and regional contexts of the GWHUP, effective data sets of such cultural heritage information do not exist. The AHIMS database provides a register of known Aboriginal sites in NSW, but is limited in its application due to the selective factors which affect the registration of recordings.

Whilst only a small proportion of NSW has been the subject of comprehensive archaeological survey, there have been some reasonably comprehensive surveys conducted in the Blue Mountains. However, there is still potential for patterns and trends evident within AHIMS site distributions to reflect variables in data collection rather than the actual surviving resource. For example, following cultural heritage investigation for a project that identifies new Aboriginal sites, the AHIMS register would show a concentration of sites in and around the boundary of the project compared to the surrounding region. This merely reflects the level of investigation carried out for the given project, rather than the actual distribution of sites. It is also possible for example that unrecorded sites exist in private property that has historically not been accessed or available to survey. Much of the GWH project area is made up of National and State parks, or agricultural or commercial private property that would normally be avoided by development or infrastructure projects, resulting in any intact Aboriginal sites being unrecorded.

The gaps in archaeological survey across the Blue Mountains mean that the AHIMS register does not provide a complete baseline for a comprehensive cumulative impact assessment. However, as the only baseline data available it does help inform qualitative observations and discussion on the cumulative impact.

9.7.2 Assessment

In considering the regional scale cumulative impact of the project, archaeological values across a range of site types and landforms must be assessed. Sites do not exist in isolation. They are associated with particular landforms and natural features. Considering the combinations of these sites and features in an area assists in drawing conclusions about cumulative impacts. For example, a single site assessment identifying an artefact scatter in association with a rock shelter may find this site type common and typical. However, this site type and component association may be rare within the region. As a result, this site and its context have significance at a regional level. Further it would pose a cumulative impact if it were to be impacted. Likewise, the relative rarity of a site type needs to be considered when assessing the cumulative impacts of a project for a region's archaeology.

The construction footprint contains 20 Aboriginal sites, of which four sites (AHIMS 45-4-1105 (GWH 33), 45-4-1106 (GWH 34), 45-4-1074 (GWH 11), and 45-4-1075 (GWH 12)) were not assessed during the test excavation phase. The project area contains nine Aboriginal sites. Overall, potential direct impact would occur to 22 Aboriginal sites (20 within the construction footprint, and two within the project area), negligible impact would occur to nine Aboriginal sites (five within the construction footprint, and four within the project area), and no impact would occur to three Aboriginal sites (TBD (Forty Bends Contract Site), TBD (GWHRST01), and 45-4-1111 (GWH42)). The overall significance of these Aboriginal sites falls within a range of low to high.

The sites themselves, whilst being expected site types found within the project area (artefact scatters, isolated artefacts, rock shelters, engravings and one post-contact site), are of increased significance due to their rarity in an increasingly developed environment. Therefore, the regional Aboriginal cultural heritage values across the project would be reduced significantly by the cumulative impacts from the project if serious harm such as complete loss of a site was to occur. However, potential negligible or indirect impacts to a site are not considered to be a risk for cumulative impacts to the region's archaeology should the mitigation measures outlined be followed. Measures to mitigate the cumulative impacts are included in Section 10. These measures have been developed in conjunction with the RAPs for the project

9.7.3 Residual impacts

It has been conservatively assumed that all of the land surfaces within the construction footprint would be impacted to the degree that none of the original soils or any identified Aboriginal objects (including those

Aboriginal objects within complete Aboriginal sites or parts of Aboriginal sites falling within the construction footprint) would be retained. As a result, and despite the effective implementation of the environmental management measures discussed above, the residual impacts would be effectively the same as the initial impact.

10. Management recommendations

To manage impacts to Aboriginal sites and cultural heritage values the broad objectives for the project are to:

- Avoid or minimise impacts on significant cultural heritage
- Preserve as much cultural heritage in its original environment as possible
- Maintain cultural heritage through preservation and increased knowledge.

10.1 Management of Aboriginal sites

The first principle of cultural heritage management is impact avoidance and minimisation of harm before mitigation. If it is not possible to avoid sites (either completely or partially), then appropriate management and mitigation is. Where harm will occur, management recommendations must be implemented for impacted areas of each of the archaeological sites.

The following recommendations have been developed to avoid impacts where possible and where impacts are unavoidable, to effectively mitigate them. Management recommendations have been drafted in accordance with the type of impact and site significance. All management recommendations will be presented to the RAPs. A summary of the management recommendations for Aboriginal sites is provided in Table 10-1.

All accessible Aboriginal site locations within the project area have been visited during PACHCI Stage 3 fieldwork and new, detailed site cards have been prepared for each site. Updated recording has involved preparing extensive photographic records, stratigraphic drawings, site plans, landform descriptions, updated condition assessments, flora and faunal surveys, and community consultation. Effort has been made to go beyond the requirements of Heritage NSW site card recording forms so as to provide comprehensive baseline data for further assessment of Aboriginal sites before construction activities.

Heritage impacts for the project occur at high level at several sites of high significance. Traditional heritage interpretation such as place-based signage may not be appropriate, but there are opportunities to integrate relevant themes and present information through urban design supported by other forms of interpretation.

10.1.1 Management principles

The project will have a detrimental impact to sites within the construction footprint.

Aboriginal heritage management is predicated on the principle of intergenerational equity. This means that the current generation should allow future generations the opportunity to enjoy the cultural legacy of past generations. Although total equity between generations is never possible, the intention of the principle is for present generations to consider future generations when making management decisions. For this reason, the principle of intergenerational equity is a core element of the notion of ecologically sustainable development (ESD) which commonly guides regulators in their review of Aboriginal heritage management.

Intergenerational equity may be achieved through a regional program of protection for representative cultural landscapes and sites. At a local level, the project achieves this by protection and salvage of Aboriginal sites. Both of these measures allow retention of cultural materials for the enjoyment and education of future generations. Measures which respond to development impacts on cultural heritage should be of a nature which passes on knowledge and access to Aboriginal cultural materials, allowing options for future experience, enjoyment, study and curation of those materials.

The management of Aboriginal cultural heritage values within the project is based on:

- The identification of Aboriginal heritage values

- Aboriginal heritage values of the project are defined here as the extensive physical record of Aboriginal hunter-gatherer life demonstrating aspects of implement manufacture and maintenance, and strategic positioning of activities focused on the River Lett Hill, Hartley and Jenolan Cave Road site complexes.
- The extensive distribution of Aboriginal objects within defined landscapes (Section 5.2)
- The assessed significance of individual sites (Section 8.2)
- Avoidance of Aboriginal heritage through design, where feasible (Section 10.1.2)
- The nature of proposed project impacts on Aboriginal heritage values (Section 7)
- The views of the Aboriginal community, represented by RAPs (Section 3).

10.1.2 Avoidance

It is recommended that impacts to site TBD (Forty Bends Contact Site), 45-4-111 (GWH 42) and TBD (GWHRS01) be minimised where feasible. These sites are located at a unique point in the landscape and have a lack of alternative representation of such to mitigate the proposed impact.

It is recommended that the feasibility of retaining portions of sites that are located under elevated structures (bridges) over River Lett and on River Lett Hill be investigated as part of the detailed design process, including the following sites:

- 45-4-1097 (GWH 7)
- 45-4-1072 (GWH 9)
- TBD (Site)
- TBD (GWH 20-2).

The objective will be to maximise the retention of intact, cultural deposits in the zone between bridge pylons. This strategy will depend upon the effectiveness of measures to protect the deposits during construction. Potential protective strategies might include fencing and covering the cultural deposits with geotextile fabric and clean fill to reduce the potential for inadvertent damage.

Another active avoidance strategy is to ensure that construction works are closely confined to the minimum possible area required for construction activities. Haulage and other access roads should be designed and located to minimise potential disturbance of soils. Maximising the protection is particularly important in the zone within 100 meters of highly significant sites and may require covering the original cultural deposits in temporary protective barriers such as geotextile fabric and a layer of clean fill.

No further management is required for the following sites:

- 45-4-1084 (GWH 6)
- 45-4-1081 (GWH 18)
- 45-4-1082 (GWH 19)
- GWH 35 (GWH PAD20-1).

10.1.3 Aboriginal cultural values interpretation

A strategic objective for the project is to create a unique and distinct identity interpreting the rich sense of place, Aboriginal and cultural heritage. Celebration and interpretation of the project acknowledges the Aboriginal history of the local area and today's Aboriginal community that connects with the area. There is a growing global acknowledgement of the power of First Nations' knowledge for enriched placemaking, however this is not yet visible in major public projects in Australia. In relation to the project, there are opportunities to redress this invisibility with strong creation stories, song, dance and cultural practices embedded in the landscape and built forms, that tell the story of those who travelled the route long before us (Balarinji 2018a).

There is a growing global acknowledgement of the power of First Nations' knowledge for enriched placemaking, however this is not yet visible in major public projects in Australia. The project approach set out in the Cox Innal Ridgeway report (Appendix A) pursues such enrichment, not only through effective engagement with the Aboriginal community, but by going further by conceptualisation and design. It presents a sense of scale and imagination that will inspire and educate locals and tourists alike. Deep cultural stories and history can be experienced leisurely or at speed, on the ground or from the air, and from a range of views and perspectives. The project area will bring stories to life in a celebration of culture and resilience. The Dreaming survives in ways we can all respect and appreciate (Appendix A).

Across the project, the following interpretation elements have been considered for design integration:

- Public works of art
- Interpretive signage
- Bridges
- Earthworks
- Plantings
- Noise walls.

The work aims to:

- Be appreciated at different scales, speeds and time of day depending on user type, which will include motorists, cyclists, pedestrians and aircraft passengers
- Respond to the context of the construction footprint being an international arrival and departure point.

The story, scale, form, placement, colour, lighting and materiality will be explored further in the next phase of the project when concepts are developed in consultation with locally connected Aboriginal artists. Further details are provided in the Cox Innal Ridgeway Report (Appendix A).

10.1.4 Active protection

Active protection is necessary on the boundaries of all Aboriginal sites that are partially impacted by the project. The intent is to limit impacts to the portion of the site inside the construction footprint. Protection will include suitable temporary fencing with signage notifying construction personnel to avoid ground impacts in protected areas. Details of fencing locations, permissible activities and permissible vehicle access inside protected Aboriginal areas should be documented in an AHMP.

Sites to be fenced along the boundary of the construction footprint include:

- TBD (GWHAS01)
- TBD (GWH 20-3)
- TBD (GWH 20-2)
- 45-4-1103 (GWH 31)
- 45-4-1097 (GWH 7)
- 45-4-1072 (GWH 9)
- 45-4-1071 (GWH 8)
- TBD (██████ Site)
- TBD (SBRFB)
- TBD (MHR)
- 45-4-1111 (GWH 42)

- TBD (Forty Bends Contact Site).

10.1.5 Community collection

Salvage collection is warranted at those Aboriginal sites in the construction footprint where stone artefacts have been recorded on the surface. Salvage collection is to record MGA coordinates of each artefact by GPS and relevant artefact attributes consistent with the broader archaeological salvage analysis. The results of salvage collection should be collated in an Aboriginal Site Salvage Report (ASSR).

Salvage collection will be undertaken by a suitably qualified archaeologist.

Sites requiring salvage collection include:

- 45-4-1103 (GWH 31)
- 45-4-1097 (GWH 7)
- 45-4-1075 (GWH 12)
- 45-4-1074 (GWH 11)
- TBD (20-3).

10.2 Salvage excavation

Salvage excavation is warranted at those Aboriginal sites that were assessed as having high scientific and high overall significance. Salvage excavation will be undertaken by a suitably qualified archaeologist. Sites requiring salvage excavation include:

- TBD (GWH 20-2)
- 45-4-1103 (GWH 31)
- 45-4-1097 (GWH 7)
- 45-4-1072 (GWH 9)
- 45-4-1071 (GWH 8)
- TBD (██████ Site)
- TBD (SBRFB)
- TBD (MHR).

Salvage excavation will be conducted by appropriately qualified and experienced archaeologists (as per Section 1.6 of the Code of Practice) (DECCW 2010b) and nominated site officers for the relevant RAPs.

The salvage excavation methodology will be collaboratively designed by the archaeologist and the RAPs.

In general, it is proposed that an excavation team consisting of five field archaeologists and a maximum of eight nominated site officers conduct the open area excavation. Where additional resources are required, it is proposed that a ratio of three site officers to one field archaeologist is preferred, with a maximum of seven field archaeologists and 12 site officers engaged at any one time.

If required, a dedicated artefact specialist may also be engaged during the salvage excavation program to assist with the analysis of large volumes of artefacts. The artefacts will be analysed with assistance from nominated site officers for the RAPs.

The excavation strategy should address specific questions about each site and be elaborated in the AHMP. The extent of salvage excavation is estimated here subject to development of a detailed salvage methodology in the AHMP. Issues for investigation include:

- Hearth at 45-4-1097 (GWH 7)
- Non-human bone at 45-4-1097 (GWH 7)
- High artefact density at TBD (██████ Site) and 45-4-1072 (GWH 9).

The presence of abundant flaked stone artefacts, bone and evident archaeological deposit observed eroding from the Jenolan Caves Road cutting provides excellent research potential. Such a site could potentially address questions pertaining to stone technology in use in the locality, occupation density of particular landforms and contact between language groups (Darug, Gundungurra and Wiradjuri) via artefact raw material sourcing. A larger sample of stone artefacts has higher potential to contain utilised pieces which may retain organic residues or use specific damage. The presence of bone is a rare opportunity to investigate organic remains on an open site and whether its presence can be attributed to resource utilisation by Aboriginal people. If such were the case the site would be of particular significance in the region.

While the stone artefacts on the site may have accumulated over several thousands of years, it is entirely feasible for 45-4-1097 (GWH 7) to have been occupied by Aboriginal people into the historic period. Government distribution of blankets to Aboriginal people was documented at the nearby historic Hartley village, located only a few hundred metres to the south of the site across the River Lett. It is possible that intermittent Aboriginal camping at the site continued into the 1800s due to its proximity and views toward the village across the River Lett crossing, and if so the presence of organic remains would be possible given suitable conditions.

The social value of the site to Aboriginal communities is assumed to high as a tangible connection for present-day Aboriginal communities with their past. A fuller understanding of the site's social value is subject to further consultation.

The site is likely to be of moderate cultural significance for its research potential, possible historic connection to Aboriginal people camping near to government offices for subsistence supplies and blankets, and its material evidence facilitating contemporary Aboriginal heritage engagement.

The technological characteristics of artefact concentrations at 45-4-1097 (GWH 7), through excavation of an area sufficient to yield an artefact assemblage of 3,000 artefacts which is estimated to be 50 metres squared at each site subject to broadly consistent artefact densities being identified in contiguous squares

The characteristics of artefact assemblages in atypical site situation on elevated outlook areas at 45-4-1071 (GWH 8) and 45-4-1072 (GWH 9) and through excavation of 100 metre squared at each site

The technological characteristics of artefact concentrations at TBD (MHR), TBD (SBRFB), 45-4-1095 (GWH 35), 45-4-1103 (GWH 31) through excavation of an area sufficient to yield an artefact assemblage of 1000 artefacts which is estimated to be 20 metres squared at each site subject to broadly consistent artefact densities being identified in contiguous squares

The results of salvage excavation and artefact analysis will be documented in an Archaeological Salvage Excavation Report.

10.2.1 Radiometric dating

During salvage excavation, samples of organic material suitable for radiometric dating (charcoal, bone, shell, wood) will be collected for the dating of archaeological deposits. The number of samples sent for dating will be determined on the suitability of the sample and the significance of the site. Samples will be collected as follows:

- Samples will be collected using clean nitrile gloves and placed in clean plastic sample bags
- Samples will be removed to the relevant temporary keeping place and dried out to avoid fungal growth during transport
- Samples will be packaged within hard plastic cases for transport to a radiocarbon dating laboratory.

Table 10-1: Management and mitigation strategies for Aboriginal heritage

Impact	Reference	Environmental management measure	Responsibility	Timing
General and specific sites: 1) TBD (MHR) 2) TBD (SBRFB) 3) TBD (Forty Bends contact Site) 4) TBD (██████ Site) 5) 45-4-1097 (GWH 7) 6) 45-4-1072 (GWH 9) 7) 45-4-1071 (GWH 8) 8) 45-4-1103 (GWH 31) 9) TBD (GWH 20-2) 10) TBD (GWH 20-3) 11) TBD (Hartley Grange 2)	AH1	An Aboriginal Heritage Management Plan (AHMP) will be developed in consultation with the RAPs to document standard procedures for: 12) Unexpected finds procedure for the discovery of Aboriginal ancestral remains, Aboriginal objects or new Aboriginal sites consistent with RMS (2015) Standard Management Procedure Unexpected Heritage Items 13) Detailed site salvage strategy 14) Management and curation of salvaged Aboriginal objects 15) Detailed locations and installation procedures for fencing and protective coverings 16) Details of permissible activities and permissible vehicle access inside protected Aboriginal areas 17) Heritage components of induction package for construction workers and supervisors 18) Any other heritage matters addressed in Conditions of Approval for the project.	Contractor/ Transport	Finalised prior to construction
Opportunities to minimise impacts to TBD (Forty Bends Contact site)	AH2	Where feasible, detailed design will investigate options to minimise impacts to the TBD (Forty Bends Contact site)	Detailed design contractor	Detailed design
Impacts to Aboriginal heritage during construction	AH3	Construction works are closely confined to the minimum possible area required for construction activities. Haulage and other access roads should be designed and located to minimise potential disturbance of soils. Maximising the protection is particularly important in the zone within 100 m of creeks and may require covering the original cultural deposits in temporary protective barriers such as geotextile fabric and a layer of clean fill.	Construction contractor	Construction

Impact	Reference	Environmental management measure	Responsibility	Timing
All sites within project area	AH4	Temporary protective fencing of site along construction footprint boundary	Construction contractor	Prior to construction
	AH5	Salvage excavation to define western limit of artefact distribution	Project archaeologist	Prior to construction

10.3 Research questions

The results of the archaeological assessment suggest a series of research questions should be developed to guide any salvage excavations of the sites identified above. The principle questions relate to the types of information that could be gleaned from the analysis of stone tools, temporal changes within or between sites or proximity to certain resource areas or landscapes as they are encountered across the project.

Due to their durability and abundance throughout cultural deposits, stone tools are most often the principle evidence that informs analysis of past modes of behaviour and subsequently provide the greatest opportunity to delve deeper into archaeological analysis. The following key research question concentrated on the stone tool evidence that was revealed during test excavations:

- 1) Are there any variations in stone tool typologies across the different landscape regions, between sites or within sites?

The results of the archaeological assessment cast light on the types of questions that could be asked of the stone tool analysis during further salvage excavation including the following:

- a) Are there variations in cortex percentages on stone tools at sites on 45-4-1097 (GWH 7)?
- b) Are these changes related to material types?
- c) If so, what do these variations suggest?
- d) Does previous research in the region inform on these results?
- e) Are there variations in the tool typology, density and distribution across sites in the project area and are these comparable to other sites in the broader region or variations in the Australian Small Tool Tradition / late Holocene assemblages?
- f) Is there evidence for intra-site temporal changes in tool typology?
- g) How does this inform on cultural changes in adaptations to the local environment?

A further key research question was posed that relates to temporal changes evidenced in sites as follows:

- 4) What is the chronology of the sites identified in the detailed investigation area and are there variations in stone tool typologies across time?

A further key research question was posed that attempts to explain site characteristics that are related to resource availability as follows:

- 5) Are there variations in site usage that relate to proximity to resource areas or water sources?
 - a) Is there archaeological evidence (hearths, oven mounds) to suggest the area adjacent to the creeks were used for camping?

This led to a further subset of questions being posed as follows:

- a) Are there correlations between the intensity of site usage and distance to ephemeral and permanent water sources?
- b) Is there evidence for site use being seasonal, permanent or opportunistic?
- c) Can the evidence contribute information not available from any other source, location or environmental setting?

10.4 Aboriginal Heritage Management Plan

An AHMP would be developed in consultation with the RAPs as part of the construction environmental management plan (CEMP) for the project. The AHMP would document:

- Unexpected finds procedure for the discovery of Aboriginal ancestral remains, Aboriginal objects or new Aboriginal sites consistent with RMS (2015) Standard Management Procedure Unexpected Heritage Items
- Detailed site salvage strategy
- Management, location and curation of salvaged Aboriginal objects
- Detailed locations and installation procedures for fencing and protective coverings
- Heritage components of induction package for construction workers and supervisors
- Any other heritage matters addressed in Conditions of Approval for the project.

The Aboriginal Heritage Management Plan would be prepared prior to the commencement of any works that impact on the existing ground surface, including temporary roading, fencing and vegetation clearance works.

10.4.1 Residual impacts

It has been conservatively assumed that all of the land surfaces within the construction footprint would be impacted to the degree that none of the original soils or any identified Aboriginal objects (including those Aboriginal objects within complete Aboriginal sites or parts of Aboriginal sites falling within the construction footprint) would be retained. As a result, and despite the effective implementation of the environmental management measures discussed above, the residual impacts would be effectively the same as the initial impact.

10.5 Conclusion

All of the Aboriginal sites in the construction footprint, including the three areas identified to be of high cultural and archaeological significance, would be significantly impacted by the project. This report outlines management measures for Aboriginal sites that may be impacted by the project, including protective measures to ensure that sites on the periphery of the construction footprint are not inadvertently impacted. These measures include protective fencing for fifteen sites, salvage collection for seven sites and salvage excavations for nine sites to mitigate the irreversible loss of cultural value and scientific content.

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Appendix A. Cultural Values Assessment: Cox Innal Ridgeway Report

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Appendix B. Aboriginal community consultation

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Appendix C. Archaeological assessment report

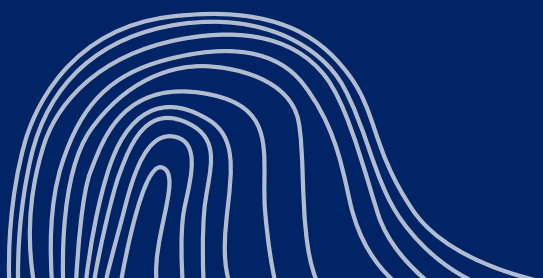
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Appendix D. Archaeological methodology

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Annexure B. AHIMS Extensive Search Results

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