

Chapter 17

Non-Aboriginal heritage

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17 Non-Aboriginal heritage

This chapter summarises the non-Aboriginal heritage assessment carried out for the upgrade of the Great Western Highway between Blackheath and Little Hartley (the project). The full non-Aboriginal heritage assessment is provided in Appendix M (Technical report – Non-Aboriginal heritage).

17.1 Assessment approach

17.1.1 Study area

The non-Aboriginal heritage assessment study area for the project includes a 200 metre buffer around the areas of surface disturbance required for construction and the surface area above the project tunnels, as shown in Figure 17-1.

17.1.2 Literature and database review

The following archaeological and historical literature and databases were reviewed to identify known non-Aboriginal heritage items located in the vicinity of the project:

- World Heritage List
- Commonwealth Heritage List
- National Heritage List
- NSW State Heritage Register
- Section 170 Heritage and Conservation Registers
- Blue Mountains Local Environmental Plan (LEP) 2015
- Lithgow LEP 2014.

Searches of non-statutory databases were also carried out and included the Register of National Estate and the Register of the National Trust of Australia. Where relevant, conservation management plans and other heritage management documents have been used to provide additional information regarding heritage significance.

A preliminary assessment of other potential heritage items and previously unknown archaeological items that would be directly or indirectly impacted by the project was also completed using historic plans and photographs, historical newspapers and other primary and secondary historical sources along with the non-Aboriginal heritage assessments for the other Upgrade Program components.

The non-Aboriginal heritage impact assessment was carried out in accordance with the following policies and guidelines.

- Greater Blue Mountains World Heritage Area Strategic Plan (NSW National Parks and Wildlife Service, 2009)
- The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS, 2013)
- NSW Skeletal Remains: Guidelines for Management of Human Remains (Heritage NSW, 1998)
- Care agreement application form: Criteria for the assessment of excavation directors (Heritage NSW, 2011)
- NSW Heritage Manual (Heritage NSW, various)
- Assessing Heritage Significance (NSW Heritage Office, 2001).

17.1.3 Field survey

Heritage items identified as having the potential to be either directly or indirectly affected by the project were inspected during a field survey on 18 January 2022 to confirm their specific location and condition.

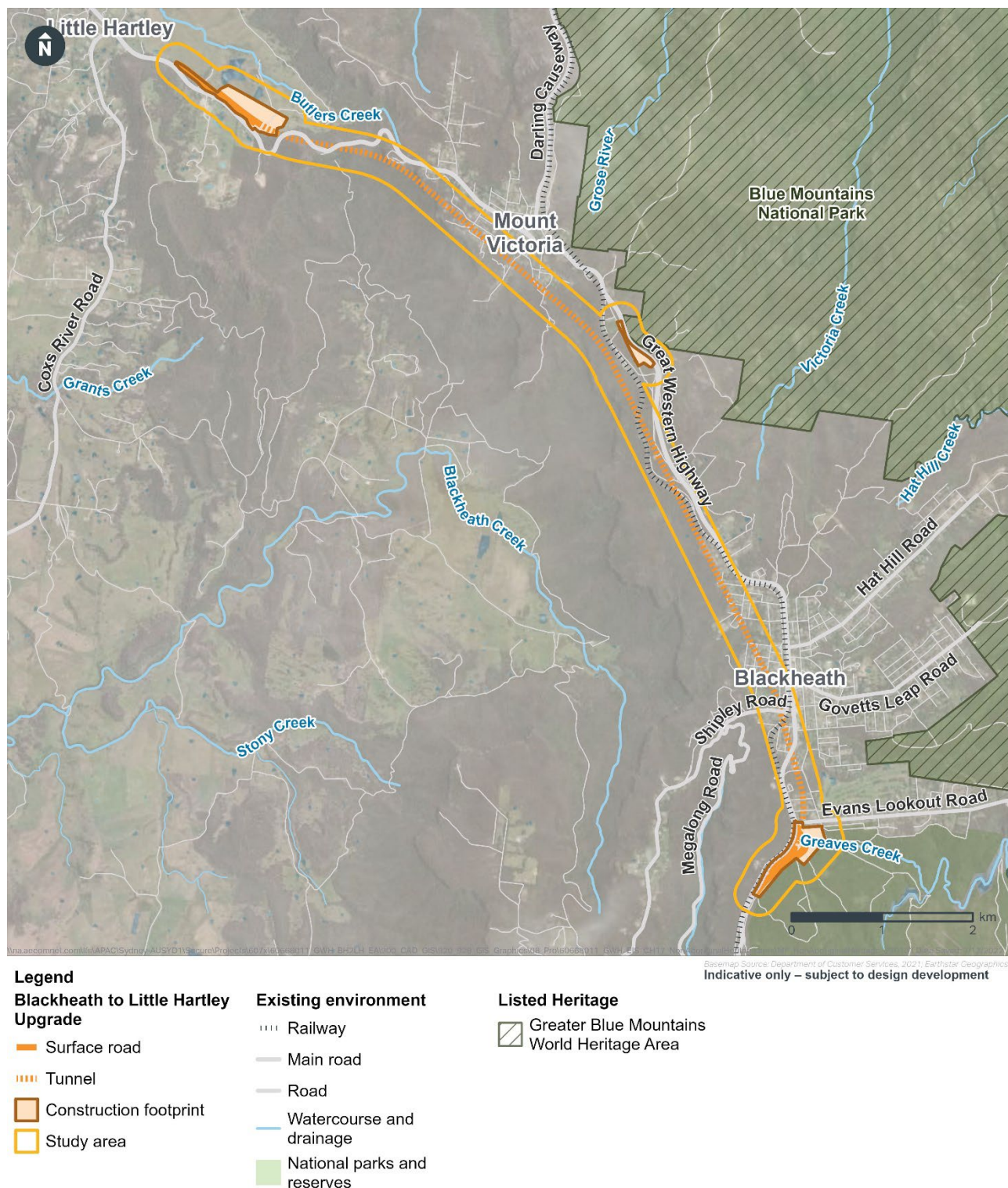


Figure 17-1 Non-Aboriginal heritage assessment study area

17.1.4 Significance assessment

Heritage items were identified as relevant to the project if they occurred within the study area and either:

- were located within the construction footprint, as shown in Figure 17-1, and may be affected by direct or indirect impacts
- were within 60 metres of the construction footprint or the outer edge of the tunnel alignment at surface level (as shown in Figure 17-1)¹.

In addition, landscape scale indirect impacts were considered for the Greater Blue Mountains World Heritage Area (World Heritage List and National Heritage List) given its significance and anticipated level of stakeholder interest.

Significance assessments for the identified heritage items are provided in Annexure B of Appendix M (Technical report – Non-Aboriginal heritage).

17.1.5 Impact assessment

Potential non-Aboriginal heritage impacts as a result of the project have been categorised as follows:

- direct impacts – resulting in physical alteration or damage, modification or demolition of that heritage item
- indirect impacts – resulting in changes to the heritage item or its surroundings as a result of the project (such as visual/landscape setting impacts, vibration and settlement impacts and changes in use, association or access to a heritage item).

The overall magnitude of impact resulting from the project has been defined as:

- major – impacts that result in a substantial permanent and/or irreversible loss of fabric of a heritage item or to its setting
- moderate – impacts that result in a partial loss of a heritage item's significant fabric or setting
- minor – impacts that are small or affect a small area, or an alteration to a minor feature or element
- negligible – impacts that do not alter or change the heritage item.

Further details of these magnitude levels are provided in Section 2.3 of Appendix M (Technical report – Non-Aboriginal heritage).

17.2 Existing environment

17.2.1 Historical context

Greater Blue Mountains Area

The Greater Blue Mountains Area consists of around one million hectares of mostly forested landscape on a sandstone plateau around 60 to 180 kilometres west of Sydney. It is listed on the World Heritage List and partly encompasses the Blue Mountains National Park.

It is an area of breathtaking views, rugged tablelands, sheer cliffs, deep, inaccessible valleys and swamps which support a rich and diverse ecosystem. The unique plants and animals that live in this natural place tell the story of Australia's antiquity, its diversity of life and its superlative beauty. This area demonstrates the evolution of Australia's unique eucalypt vegetation and its associated communities, plants and animals.

¹60 metres has been adopted based on the minimum working distances for vibration intensive plant and equipment, as outlined in Appendix G (Technical report – Noise and vibration)

In addition to its biodiversity values, the Greater Blue Mountains Area also contains ancient, relict species of global significance such as the recently discovered Wollemi pine (*Wollemia nobilis*) which was thought to have been extinct. The few surviving trees of this ancient species are known only from three small populations located in remote, inaccessible gorges within the Greater Blue Mountains Area.

An additional area has been nominated for inclusion on the National Heritage List, referred to as the Greater Blue Mountains Area – Additional Values. This area has been nominated for inclusion on the National Heritage List, and not the World Heritage List. For the purpose of the assessment, it has been assumed that the Greater Blue Mountains Area – Additional Values, if listed, would have identical or similar significance to the current Greater Blue Mountains Area World Heritage List and National Heritage List entries. These areas are shown in Figure 17-2 and Figure 17-5. An assessment of significance for these areas is provided in Annexure B of Appendix M (Technical report – Non-Aboriginal heritage).

Coxs Road

Coxs Road, previously known as Coxs Way, has been a key transport route since the early nineteenth century. The best known successful expedition to the Blue Mountains was undertaken by Gregory Blaxland, William Lawson and William Charles Wentworth in 1813 which was most likely achieved by following paths previously established by Aboriginal people (Jacobs & Arcadis, 2021).

This expedition led to the construction of Coxs Road between 1814 and 1815 which was the first built road through the Blue Mountains. Construction was overseen by William Cox and carried out by convicts from the Nepean River through Emu Ford, over Mount York and Mount Blaxland to Bathurst (Karskens, 1988).

In 1822 William Lawson cut a new road around four kilometres before Mount York that ended in Bathurst which was up to around 16 kilometres shorter than the original Coxs Way. This new route continued to be used until at least 1827. In 1827 another route between Coxs Road and Lawsons Long Alley (a descent off Mount York built in 1824) was built descending from Mount York along a ridge. Work on the road started in 1829 which became known as Lockyers Road (after the man overseeing the work).

Mitchells Road/the Western Road/Great Western Highway

While Coxs Road was a key transport route for settlers, many found the descent at Coxs Pass difficult and dangerous. Further, with the increase of traffic, the road began to deteriorate, therefore making it more dangerous. To overcome this, explorer and surveyor Major Thomas Mitchell set about improving roads including establishing the Western Road as one of the earliest routes from Emu Ford (now Emu Plains) to Bathurst. The current Great Western Highway largely follows Mitchell's route.

Victoria Pass

Construction for a route that avoided Mount Blaxland and descended Mount York not far from Coxs Pass began construction in 1829. The route required extensive engineering, including considerable cutting and filling and heavy masonry retaining walls, side drains and culverts. This road became known as Lockyers Road.

During construction of Lockyers Road, it was determined that the large descent at Mount York could be avoided by spanning the deep gorge at Mount Victoria which would bypass Mount York altogether. Construction on Lockyers Road was halted and construction on the new pass, now known as Victoria Pass, began in the early 1830s. Numerous upgrades and realignment works were undertaken for Victoria Pass and by 1862, the whole section had been cut to the present alignment of the highway with little of the original Coxs Road in use.

Stockades

Coxs Western Road, Lockyers Road, Mitchells Western Road and Victoria Pass were all built using convict labour, which required accommodation for both the convicts and their military guards. Numerous stockades were built along the alignment of these roads to accommodate the convict labour. Two of these sites intersect with the study area, including the Blackheath stockade which is a registered heritage item and archaeological site on the Blue Mountains LEP, and Mount Victoria stockade which although it is not a registered item, is considered to be of potential State heritage significance (see Table 17-3). In general, few stockade sites have been archaeologically investigated to a great degree.

Blackheath

During settlers first crossing of the Blue Mountains in 1813, many were thought to have camped on land that is now part of the village of Blackheath. In 1823, Coxs Road passed through Blackheath. The precise route of that road appears to deviate each side of the existing Great Western Highway. The first known building in Blackheath appears to have been the Scotch Thistle Inn which was opened in 1831 and was described as being a substantial single-storey stone structure.

The Blackheath Stockade was constructed in 1844. Following the closure of the Blackheath Stockade in 1849, settlement did not begin in the Blackheath area until the coming of the railway, which reached Blackheath in 1868. Land began to be sold in 1879, with subdivisions following from the late nineteenth/early twentieth centuries. By the early 20th century, tourists from Sydney began coming to Blackheath.

Mount Victoria

Mount Victoria was originally marked as One Tree Hill in 1813. Most references to the area in the early 1830s include Mount Vittoria and Vittoria Pass. By the 1840s, the area began to be called Mount Victoria, although both Vittoria and Victoria were used interchangeably in official documentation.

The earliest buildings in Mount Victoria were the Toll House and Welcome Inn. The Toll House was constructed in 1849 to collect tolls from road users, which became an increasingly important source of revenue for the development and maintenance of major road systems. The Toll House still exists however the formerly adjacent buildings (the Welcome Inn and store) are now an archaeological site within the curtilage of Karawatha House.

Little Hartley

Many of the early buildings along the Great Western Highway at Little Hartley were constructed in around 1860 and served as inns to provide refreshments to travellers and their animals, either before or after traversing Victoria Pass.

Historic inns

Construction of Coxs Road and other roads through the Blue Mountains spurred development in the area in the form of inns and accommodation for travellers along the route westbound towards Bathurst. The establishment of townships often followed the development of these inns, including at Blackheath, Mount Victoria and Little Hartley.

Little Hartley was formed around popular travellers' inns such as the Golden Fleece Inn at the foot of Mount York, the Royal Garter Inn (currently known as Billesdene Grange) located adjacent to the Little Hartley Heritage Conservation Area, and Joseph Collits Inn which became Edward Field's Hotel (Transport for NSW, 2021c). However, development at Little Hartley was more sprawling in nature along the Great Western Highway rather than clustered.

17.2.2 Heritage items and conservation areas

The listed heritage items located within the study area are presented in Section 3.2 of Appendix M (Technical report – Non-Aboriginal heritage) and are shown in Figure 17-2 to Figure 17-8. The listed heritage items within 60 metres of the construction footprint and tunnel alignment are presented in Table 17-1. Of these, four items would be directly or indirectly impacted by the project. Assessment of the potential project impacts on these four items, in addition to the areas of potential archaeology identified in Section 17.2.3, is provided in Section 17.3.

Table 17-1 Statutory listings within 60 metres of the construction footprint and/ or tunnel alignment

Heritage item, address	Heritage list and identifier	Relevant project component	Within construction footprint ¹	Impacted by the project
Greater Blue Mountains Area Katoomba, NSW	World Heritage List	Soldiers Pinch construction footprint	✗	✗
Greater Blue Mountains Area – Additional Values Katoomba	Nominated Place – National Heritage List	Blackheath construction footprint, Soldiers Pinch construction footprint	✓	✓ (direct)
Soldiers Pinch Near Great Western Highway, Blackheath/Mount Victoria	Blue Mountains LEP, MV009	Soldiers Pinch construction footprint	✓	✓ (indirect)
Rosedale Great Western Highway, Little Hartley	Lithgow LEP, I024	Little Hartley construction footprint	✗	✓ (indirect)
Nioka 2209 Great Western Highway, Little Hartley	Lithgow LEP, I025	Little Hartley construction footprint	✗	✓ (indirect)
Blackheath Stockade and the Western Road – archaeological sites Blackheath	Blue Mountains LEP, BH034	Tunnel alignment	✗	✗
Lookout Hill Heritage Conservation Area Blackheath	Blue Mountains LEP, BH215	Tunnel alignment	✗	✗
St Mounts 1A and 3 Abbott Street and 194-196 Great Western Highway, Blackheath	Blue Mountains LEP, BH052	Tunnel alignment	✗	✗
Blackheath West Heritage Conservation Area Blackheath	Blue Mountains LEP, BH214	Tunnel alignment	✗	✗
Guinness Lodge/Evanville 1-5 Waragil Street, Blackheath	Blue Mountains LEP, BH059	Tunnel alignment	✗	✗
Tree Tops and garden 16 Clyde Avenue, Blackheath	Blue Mountains LEP BH065	Tunnel alignment	✗	✗
Ban Tigh, Brewery site and Garden 26-34 Waragil Street, Blackheath	Blue Mountains LEP BH060	Tunnel alignment	✗	✗

Heritage item, address	Heritage list and identifier	Relevant project component	Within construction footprint ¹	Impacted by the project
Osborne Cottage (site only) 52-106 Thirroul Avenue, Blackheath	Blue Mountains LEP, BH039	Tunnel alignment	✖	✖
Montana 37 Ada Road, Blackheath	Blue Mountains LEP, BH071	Tunnel alignment	✖	✖
Central Mount Victoria Heritage Conservation Area Mount Victoria	Blue Mountains LEP, MV023	Tunnel alignment	✖	✖
Mitchell's Ridge Monument Reserve Great Western Highway, Mount Victoria	Blue Mountains LEP, MV015	Tunnel alignment	✖	✖
Victoria Pass Great Western Highway, Mount Victoria	Blue Mountains LEP, MV087	Tunnel alignment	✖	✖
	Lithgow LEP, A183	Tunnel alignment	✖	
Berghofer's Pass Berghofer Drive and 2-4 Great Western Highway, Mount Victoria	Blue Mountains LEP, MY001	Tunnel alignment	✖	✖

Table note:

1. ✓ indicates the heritage item is within the construction footprint. ✖ indicates the heritage item is outside but within 60 metres of the construction footprint

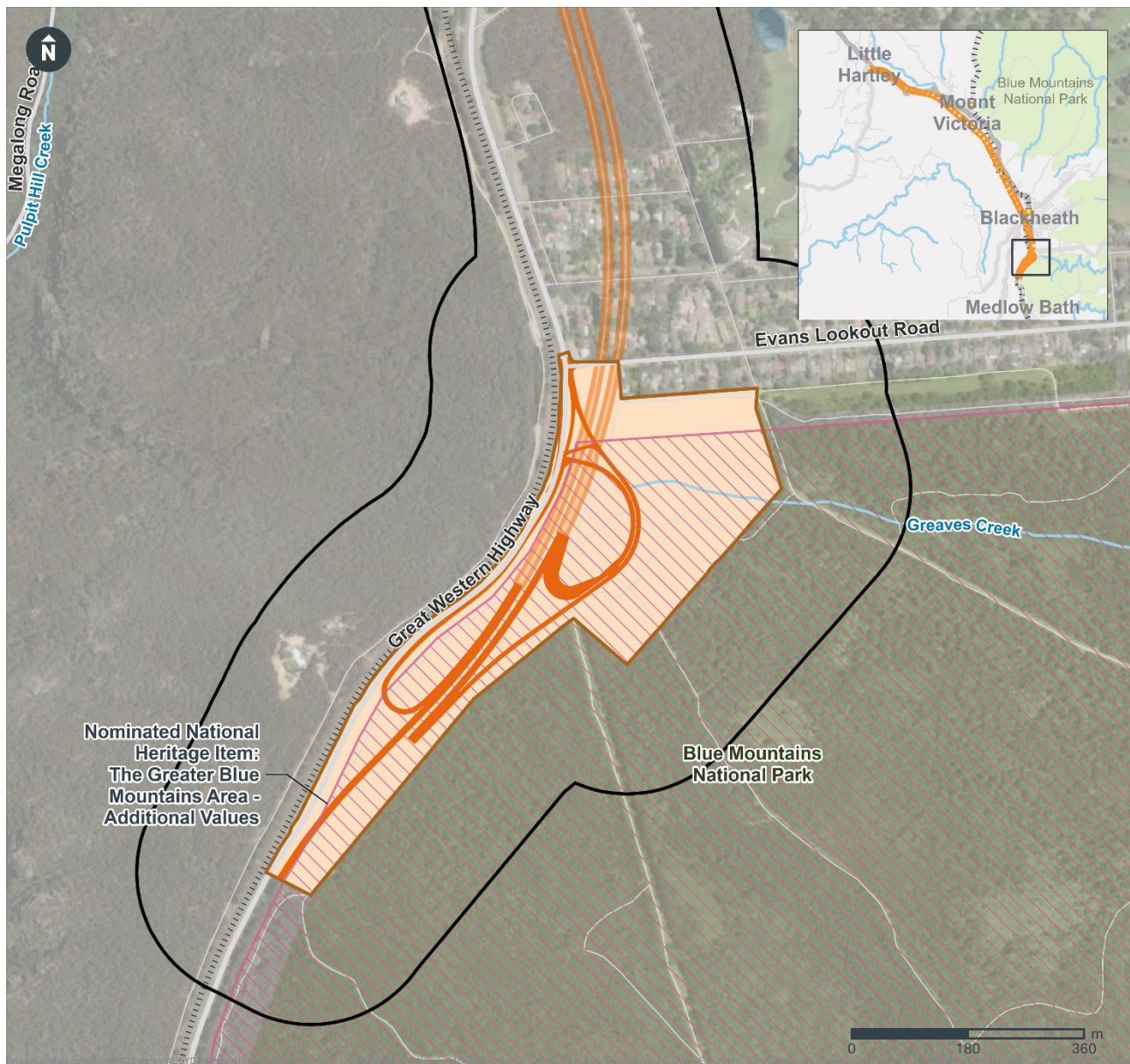
17.2.3 Archaeological potential

Four areas of archaeological potential were identified within the study area, as summarised in Table 17-2 and shown in Figure 17-3, Figure 17-7 and Figure 17-8. This includes one listed archaeological item and three areas with the potential to yield archaeological information (potential archaeological sites). Of the four areas of archaeological potential identified within the study area, two areas of archaeological potential may be directly or indirectly impacted by the project, being the Mount Victoria Stockade and Plough Inn potential archaeological sites.

Table 17-2 Archaeological potential within the study area

Site and status	Description and location	Location	Impacted by the project
Blackheath Stockade Blue Mountains LEP (BH034) <i>Known archaeological potential of local significance</i>	The Blackheath Stockade is an archaeological site that covered a large area of Blackheath adjacent to the existing Great Western Highway. The buildings associated with the stockade were located more or less on the line of the existing railway and Great Western Highway between the later Prince George Street and Govett Street, around one kilometre north of the Blackheath portal as shown in Figure 17-3. The Blackheath Stockade is a listed heritage item under the Blue Mountains LEP 2015 (BH034).		✖
Mount Victoria Stockade <i>Potential archaeological site</i>	The Mount Victoria Stockade site intersects with the Little Hartley construction footprint and is shown as the potential heritage item in Figure 17-8. Mount Victoria Stockade was constructed in the early 1830s to house convicts constructing Victoria Pass.		✓ (direct)

Site and status	Description and location	Location	Impacted by the project
<i>of State significance</i>	<p>Although disturbed, Mount Victoria Stockade has never been subject to detailed archaeological investigation. The site therefore retains the potential to yield information regarding the layout of the stockade, artefacts evidencing the use of the stockade by both convicts and the military and the site's overall use during the construction of Victoria Pass.</p> <p>The removal of some surface and subsurface material by the landowners has disturbed the site but is not thought to have been extensive enough to obscure the archaeological evidence that the site may still hold.</p>		
<p>Site of the Plough Inn</p> <p><i>Potential archaeological site of local significance</i></p>	<p>The probable location of the Plough Inn site is likely to be on the northern side of the Great Western Highway at the foot of Victoria Pass. The site intersects with the Little Hartley construction footprint, with the indicative location shown in Figure 17-8.</p> <p>The site of the Plough Inn is a potential archaeological site that was constructed in the 19th century. The potential site has previously been described as a substantial building that had been tended to with obvious care.</p> <p>The precise location of the Plough Inn is unknown. It is considered probable that Plough Inn is located opposite Rosedale, which is partially located within the construction footprint. However, it is also possible that the site may have already been destroyed by road widening of the Great Western Highway. Depending on the former inn's location, any archaeological deposits for the inn may have already been removed.</p> <p>Surface works associated with the Great Western Highway Little Hartley to Lithgow Upgrade would be carried out ahead of the project in the area identified as potentially containing archaeological remains associated with the Plough Inn. In this case, if archaeological remains do in fact exist, they are likely to be encountered during the construction of the Little Hartley to Lithgow Upgrade and would have been appropriately managed prior to ground disturbing works for the project.</p>		✓ (potential direct subject to confirmation of site location)
<p>Mitchell's Line of Road</p> <p><i>Potential archaeological site of local significance</i></p>	<p>The site is located on the southern side of the Great Western Highway, around one kilometre north-west of the Little Hartley tunnel portals, as shown in Figure 17-8.</p> <p>Two sections of Mitchell's Road were identified as once being part of Mitchell's Line of Road. While much of Mitchell's Road has been previously obscured by the existing Great Western Highway road upgrades, it is considered possible that some remnants of Mitchell's Road may be present. The site is located outside but within proximity to the construction footprint.</p>		×



Legend

Blackheath to Little Hartley Upgrade	Existing environment	Listed Heritage
 Surface road	 Railway	 Nominated national heritage item
 Tunnel	 Main road	
 Construction footprint	 Road	
 Study area	 Watercourse and drainage	
	 National parks and reserves	

Indicative only – subject to design development

Figure 17-2 Non-Aboriginal heritage items around Blackheath – map 1

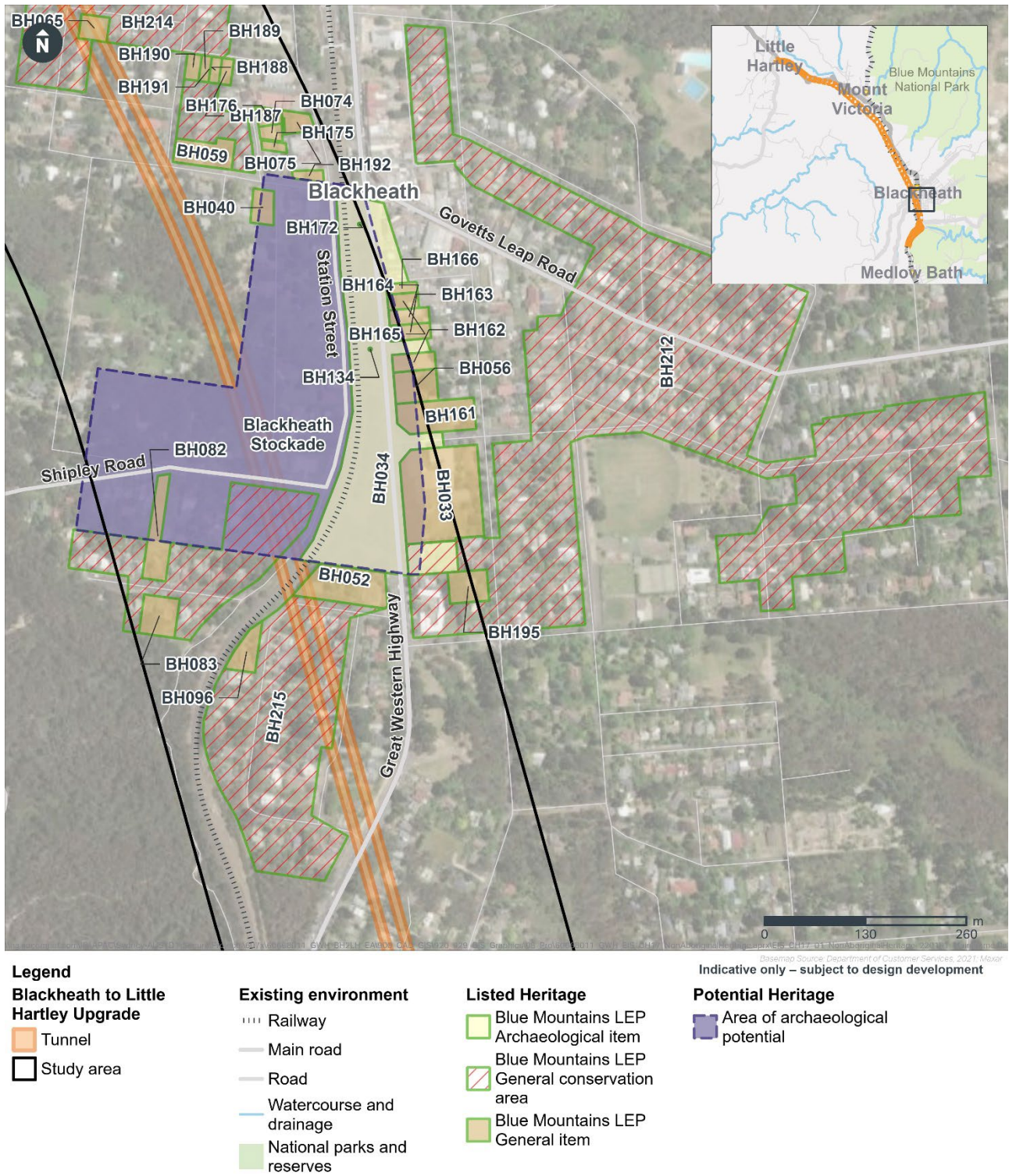


Figure 17-3 Non-Aboriginal heritage items around Blackheath – map 2

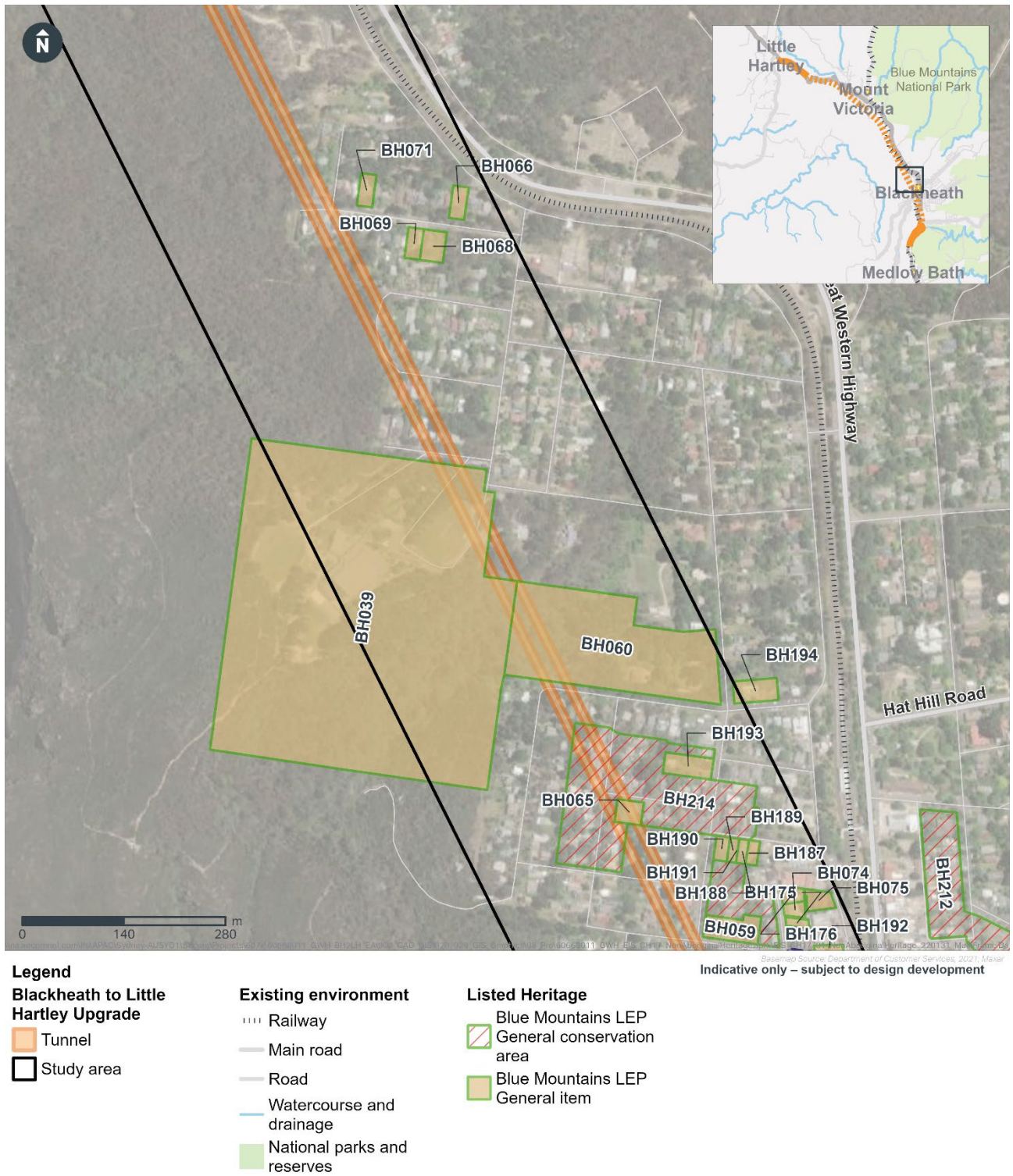


Figure 17-4 Non-Aboriginal heritage items around Blackheath – map 3

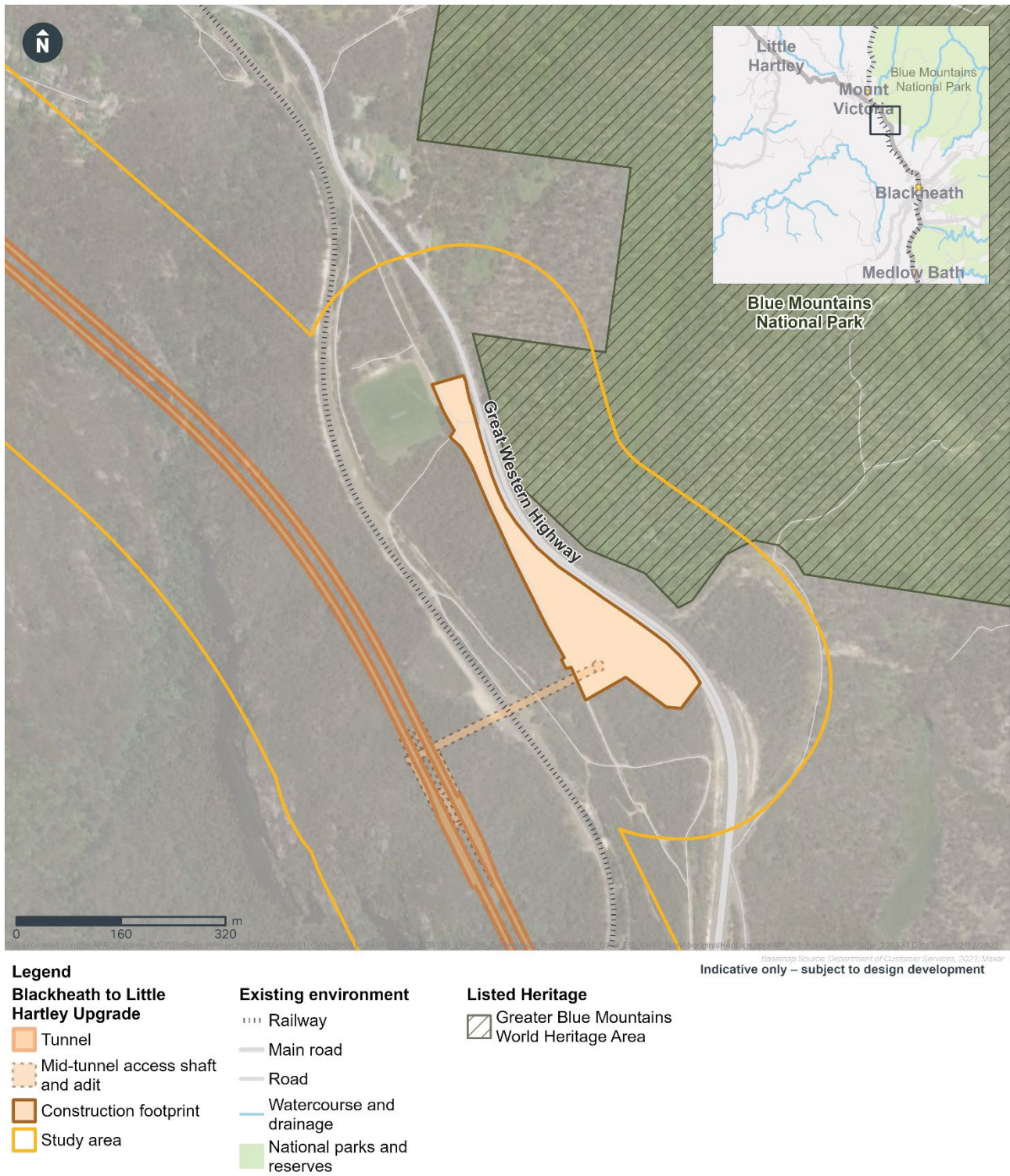


Figure 17-5 Non-Aboriginal heritage items around Soldiers Pinch

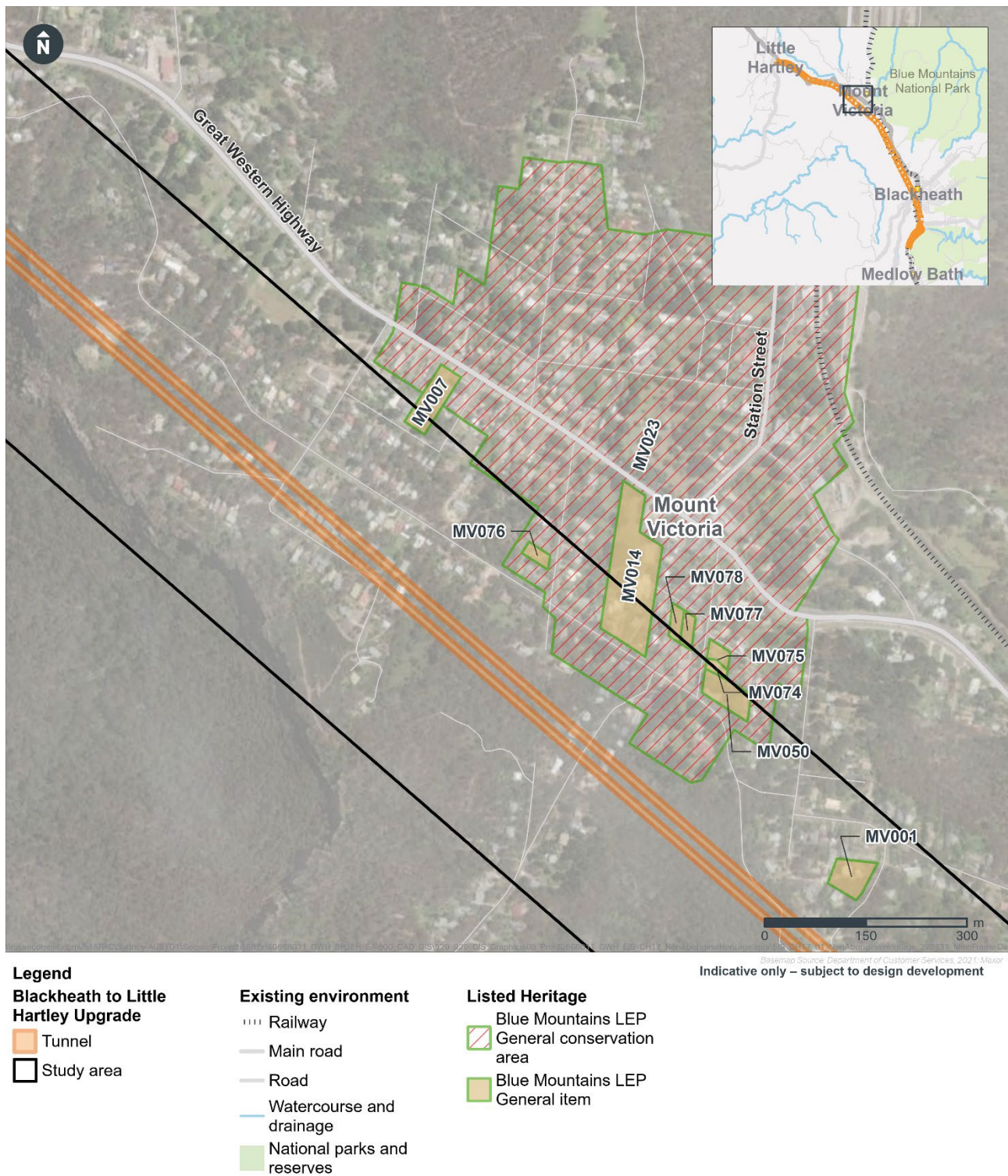


Figure 17-6 Non-Aboriginal heritage items around Mount Victoria – map 1

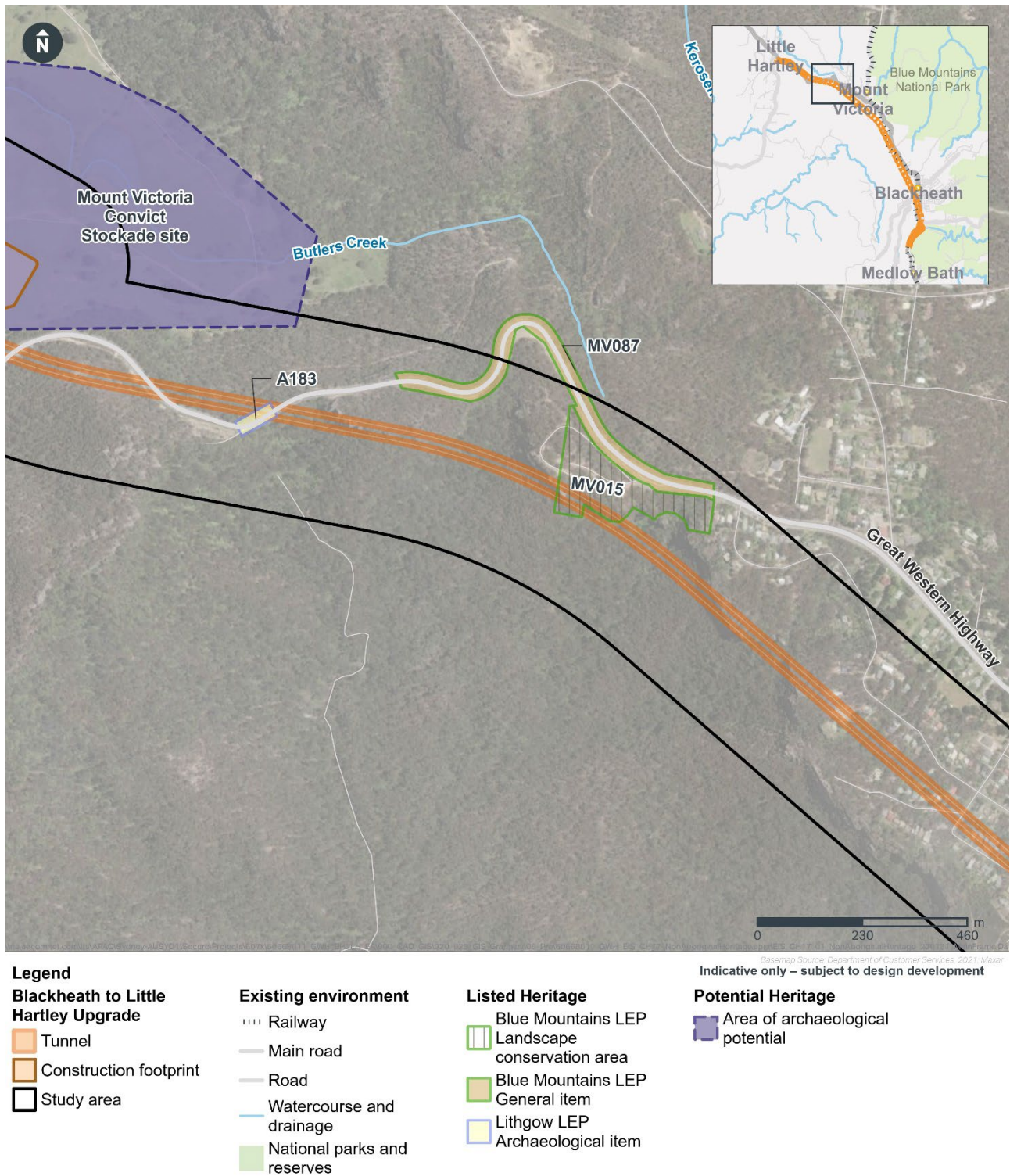


Figure 17-7 Non-Aboriginal heritage items around Mount Victoria – map 2

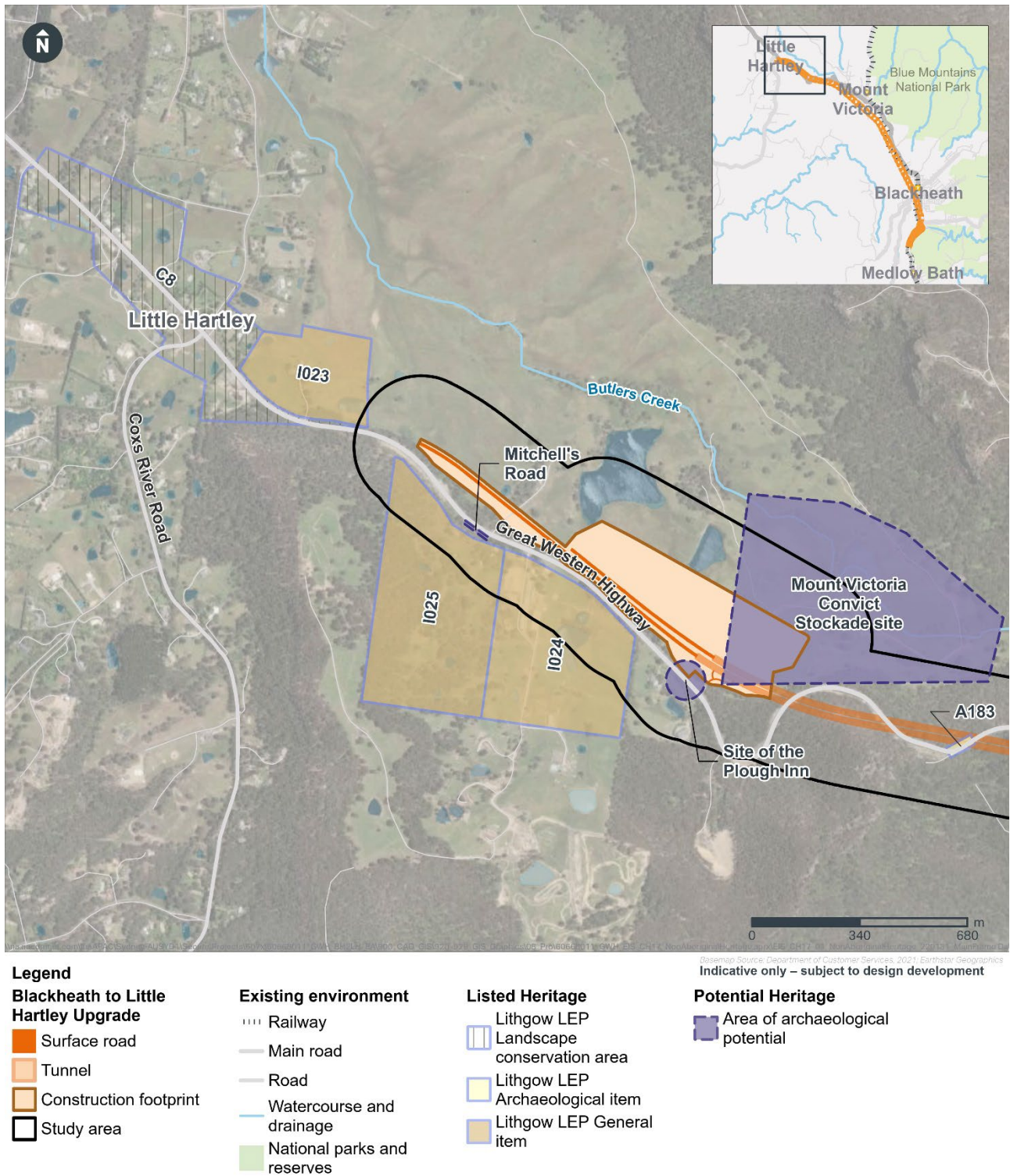


Figure 17-8 Non-Aboriginal heritage items around Little Hartley

17.3 Potential impacts

The project has the potential to impact on non-Aboriginal heritage through:

- direct impacts during construction to heritage items and areas of archaeological potential within the construction footprint
- indirect impacts during construction for heritage items and areas of archaeological potential in proximity to the construction footprint or tunnelling activities
- indirect impacts during operation.

The following sections provide a summary of the design refinements adopted to minimise potential non-Aboriginal heritage impacts, as well as the potential direct and indirect impacts of the project on non-Aboriginal heritage. Further discussion of potential impacts is provided in Appendix M (Technical report – Non-Aboriginal heritage). Mitigation measures to manage the potential impacts are outlined in Section 17.4.

17.3.1 Avoidance and minimisation of impacts

The project has been designed to minimise impacts on non-Aboriginal heritage in the following ways:

- selection of the project over other strategic alternatives such as upgrading the existing railway line or Bells Line of Road (refer to Section 3.3) which would have greater direct impacts on the Greater Blue Mountains World Heritage Area
- a tunnel option between Blackheath and Little Hartley instead of two shorter tunnels substantially minimises surface impacts, including through Blackheath town centre where there are multiple heritage listed items located along the Great Western Highway that may have been impacted by surface road widening
- the tunnel option allows the majority of the operational project infrastructure to be located underground minimising potential indirect visual impacts to the Greater Blue Mountains World Heritage Area
- the tunnel alignment has been designed to avoid traversing underneath the Greater Blue Mountains World Heritage Area
- by excavating from Little Hartley to Blackheath, the size of the Blackheath construction footprint has been minimised, limiting the extent of impacts to the Greater Blue Mountains Area (Additional Values) nomination for the National Heritage List
- the water supply pipeline between the Little Hartley construction footprint and Lithgow would be located wholly within existing and/or new road reserves and the indicative alignment has been designed to avoid impacts to non-Aboriginal heritage
- proposals for landscape design and revegetation that would be peer reviewed through the NSW State Design Review Panel, including the Government Architect.

Further detail on efforts to avoid and minimise potential environmental impacts is described in Chapter 3 (Project alternatives and options).

17.3.2 Direct impacts during construction

Table 17-3 provides an assessment of the listed heritage items and areas of archaeological potential within the study area that may be subject to potential direct impacts during construction.

Further detail relating to the potential direct impacts during construction is provided in Section 4.1 of Appendix M (Technical report – Non-Aboriginal heritage).

The Greater Blue Mountains Area (World Heritage List and National Heritage List) would not be directly affected by construction. All construction work for the project would take place outside the World Heritage curtilage. Further assessment of this item including consideration against the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Department of

the Environment, Water, Heritage and the Arts, 2013) is included in Chapter 4, Annexure A and Annexure B of Appendix M (Technical report – Non-Aboriginal heritage).

Table 17-3 Potential direct impacts on heritage items during construction

Item, listing ID and significance	Potential direct impact	Magnitude
<p>Greater Blue Mountains Area – Additional Values</p> <p><i>Unlisted, nominated for the National Heritage List (NHL)</i></p>	<p>The Blackheath construction footprint and north-eastern portion of the Soldiers Pinch construction footprint are located within the curtilage of this item (see Figure 17-2 and Figure 17-5). Although not yet included on the National Heritage List, it is nominated because it is considered to have nationally significant natural and cultural values.</p> <p>Vegetation clearance, construction site establishment and construction of project elements associated with the project would result in a direct impact to the item's curtilage.</p> <p>While the majority of the Blackheath construction footprint would be located within the nominated item, this area has been previously cleared and used for housing and recreational purposes from early in the 20th century.</p> <p>Biodiversity values related to the nominated heritage item include high condition native vegetation, which has been assessed in Chapter 12 (Biodiversity). Given the areas near the project are known and predicted to support native vegetation, the biodiversity impact assessment concluded that these direct impacts to threatened species would be minor.</p> <p>Further discussion of impacts to this nominated heritage item is provided in Section 4.1 of Appendix M (Technical report – Non-Aboriginal heritage).</p>	<p>Minor</p>
	<p>At Soldiers Pinch, the north-eastern portion of the construction footprint would be within the item, which would directly impact the perimeter of the nominated site through native vegetation clearance and presence of construction site components. The previous alignment of the Great Western Highway in 2002 (further north) and the route of the existing Great Western Highway has spatially disconnected this vegetation from the rest of the nominated item.</p> <p>Biodiversity values related to the nominated heritage item include high condition native vegetation, which has been assessed in Chapter 12 (Biodiversity). For the same reason as above, the biodiversity impact assessment concluded that these direct impacts to threatened species would be minor.</p> <p>The Soldiers Pinch construction footprint has previously been used as a stockpiling area since 2002. Given the relatively small area impacted, the previous vegetation disturbance, and the current use of the area as a construction site, the impact of the project on the nominated item would be minor.</p>	<p>Minor</p>

Item, listing ID and significance	Potential direct impact	Magnitude
<p>Soldiers Pinch</p> <p>Blue Mountains LEP (MV009)</p> <p><i>Local significance</i></p>	<p>The Soldiers Pinch construction footprint is located within the curtilage of this item (see Figure 17-5), which was a historical road and rail route that passed through the area in 1814.</p> <p>Previous and ongoing development has likely resulted in the disturbance of the item, with little diagnostic or significant physical evidence remaining of the previous roads.</p> <p>The condition of the south-eastern section of the Soldiers Pinch construction footprint is highly disturbed and currently used as a construction site. Given its current condition and use, it is considered unlikely that the 1814 alignment has survived previous impacts. Therefore, the potential direct impact is likely to be negligible. However, given the historical significance of Coxs Road, as detailed in Section 17.2.1, a detailed survey should be carried out prior to commencement of ground-disturbing works, as per the mitigation measures detailed in Section 17.4.</p>	Negligible
<p>Mount Victoria Stockade</p> <p><i>Potential archaeological site of State significance</i></p>	<p>Part of the Little Hartley construction footprint encroaches into the indicative curtilage of this site (see Figure 17-8). Although the site is not a listed archaeological item and is not recorded on either the State Heritage Register or the Lithgow LEP, its heritage significance has consistently been assessed as being of State heritage significance in previous archaeological assessments since its identification in the 1990s.</p> <p>As noted in Section 17.2.1 little archaeological work has been undertaken on stockade sites, making it difficult to determine the potential significance of impacts to the item. Reliance is therefore placed on previous observations made by other researchers regarding archaeological potential and the physical extent of the site. As the site is potentially of State heritage significance, it is recommended that refinement of the design of the surface works and operational infrastructure be carried out to avoid impacting this site, or that a full archaeological assessment of the portion of the site is to be completed prior to any ground disturbing works that would take place in this location, as per the mitigation measures detailed in Section 17.4.</p>	Moderate
<p>Site of the Plough Inn</p> <p><i>Potential archaeological site of local significance</i></p>	<p>Given the modification of the landscape and previous development over the past century, the precise location of the Plough Inn is not certain including whether any archaeological remains have survived. As detailed in Section 17.2.3, if archaeological remains do in fact exist, they are likely to be encountered during the construction of the Little Hartley to Lithgow Upgrade and would have been appropriately managed prior to ground disturbing works for the project. Notwithstanding, given the uncertainty around the precise location of the Plough Inn site, construction work in this area would be managed through unexpected heritage items protocols, as per the mitigation measures detailed in Section 17.4. The potential impact to any archaeological remains, if they exist, would therefore be major.</p>	Major

17.3.3 Indirect impacts

Indirect visual impacts during construction

Potential visual impacts to heritage items and conservation areas during construction would be temporary. At both the Blackheath and Little Hartley construction footprints, construction activities associated with adjacent Great Western Highway Upgrade Program components would have already introduced construction works and associated visual and landscape changes.

At Blackheath, the relevant heritage item that may be affected by visual impacts during construction is the unlisted but nominated Greater Blue Mountains Area (Additional Values) site. While the visual impacts associated with the Blackheath construction footprint would be a major change, the visual heritage value of this item is mainly limited to associated deep gorges/ canyons and associated forest cover. There are no gorges/ canyons within the Blackheath construction footprint or within the visual catchment around it. Therefore, although the Blackheath construction footprint would be visible from parts of the nominated site, it would not have an indirect visual impact on the nominated values of the heritage item.

At Soldiers Pinch, the relevant heritage items that may be affected by visual impacts during construction of the project include the Soldiers Pinch heritage item (Blue Mountains LEP, MV001) and part of the unlisted but nominated Greater Blue Mountains Area (Additional Values) site. As noted above, due to the absence of gorges and canyons and the previously disturbed nature of the construction footprint, the project would not pose any indirect visual impacts on the heritage significance of the Greater Blue Mountains Area (Additional Values) site during construction. The Soldiers Pinch heritage item comprises historical road alignments and associated infrastructure and does not rely on its setting for its significance.

At Little Hartley, heritage items in proximity to the project and potentially within minimum working distances for cosmetic damage from vibration would include Nioka (Lithgow LEP, I025) and Rosedale (Lithgow LEP, I024). Heritage buildings associated with the Nioka listing would be located around 70 to 80 metres away from the construction footprint. Vegetation would also screen the property from the Little Hartley construction footprint. Heritage buildings associated with the Rosedale listing would be slightly closer (60 to 70 metres away) and given its elevation and uninterrupted views would be highly sensitive to visual change. The landscape and visual assessment provided in Chapter 18 (Landscape and visual) has assessed this magnitude of visual impact to be moderate. Opportunities would be investigated to provide early visual screening of Rosedale from the Little Hartley construction footprint and construction activities. Measures to minimise potential visual impacts to heritage items during construction are detailed in Section 17.4 and Chapter 18 (Landscape and visual).

Indirect ground settlement impacts during construction

A ground settlement impact assessment was carried out for the project. Several heritage items were included in the identified zone of influence; however all impacts were considered negligible (damage category 0) or slight (damage category 2) (based on Mair et al (1996) and Rankin (1988) damage categorisation). Further detail on the ground settlement assessment, including measures to minimise potential ground settlement impacts, is provided in Chapter 13 (Groundwater and geology).

Indirect visual impacts during operation

Table 17-4 provides an assessment of the listed heritage items within the study area that may be subject to potential indirect visual impacts as a result of the project. Mitigation measures to manage potential operational visual impacts to heritage items are outlined in Section 17.4.

The project may result in potential indirect visual impacts to heritage items from the addition of the tunnel portals, the Blackheath operational ancillary facility, ventilation outlets (if this design option is used), urban design initiatives, and/or utilities connections/substations and landscaping. Given the bulk and scale of the operational ancillary facilities proposed at Little Hartley, no additional indirect impacts to the items below are anticipated by the ventilation design option. Further

discussion of ventilation design options and landscape and visual impacts is provided in Section 18.4.2 of Chapter 18 (Landscape and visual).

Table 17-4 Potential indirect visual impacts on heritage items

Item, listing ID and significance	Potential indirect visual impact during construction	Magnitude
<p>Greater Blue Mountains Area (Additional Values)</p> <p><i>Unlisted, nominated for the National Heritage List (NHL)</i></p>	<p>At a variety of viewpoints at Blackheath, the magnitude of change and sensitivity of the visual receiver would be high (except if a portal emissions design option is chosen, whereby impacts would be lower), as noted in Chapter 18 (Landscape and visual). However, it is unlikely that this visual impact would translate to a material effect on heritage values given the nominated values of this item do not include a visual setting, with the exception of deep gorges/canyons and associated forest cover, none of which are present within the visual catchment of the Blackheath operational facilities.</p>	Negligible
<p>Rosedale</p> <p>Lithgow LEP 2014 (I024)</p> <p><i>Local significance</i></p>	<p>Rosedale is a locally listed heritage item fronting the Great Western Highway in Little Hartley. The item is set within the Butlers Creek Valley landscape character zone (LCZ3), which was assessed as potentially incurring a high to moderate adverse impact (see Chapter 18 (Landscape and visual)). The heritage item would likely be visually impacted by elevated project elements including mainline carriageways, operational ancillary facilities and tunnel portals proposed at Little Hartley, which would be prominent visual features in the existing open, pastoral landscape.</p> <p>The potential to use vegetation screenings to reduce the visual impact of the project at Rosedale, including opportunities to retain existing mature trees, would serve to screen the operational infrastructure from the views of the heritage item. Measures to minimise the visual impacts on heritage items, including use of vegetation screening, are provided in Section 17.4.</p>	Moderate
<p>Nioka</p> <p>Lithgow LEP 2014 (I025)</p> <p><i>Local significance</i></p>	<p>Nioka is a locally listed heritage item set back from the Great Western Highway at Little Hartley. The item is set within the Butlers Creek Valley landscape character zone (LCZ3), which was assessed potentially incurring a high to moderate adverse impact (see Chapter 18 (Landscape and visual)).</p> <p>The heritage item is screened from the Great Western Highway by mature vegetation along its north-east and south-west elevations. Therefore, the introduction of operational infrastructure at Little Hartley is unlikely to visually impact the heritage item. Measures to minimise the visual impacts on heritage items, including use of vegetation screening, are provided in Section 17.4.</p>	Negligible

17.4 Environmental mitigation measures

17.4.1 Performance outcomes

Performance outcomes for the project in relation to non-Aboriginal heritage are listed in Table 17-5 and identify measurable performance-based standards for environmental management.

Table 17-5 Non-Aboriginal 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 of long term protection, conservation and management of the heritage significance items of environmental heritage value. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage value.	Avoid direct and avoid or minimise any indirect impacts to the World Heritage listed Greater Blue Mountains Area.	Construction
	Avoid or minimise direct and indirect impacts to existing heritage items listed on statutory heritage lists and registers. Where a direct or indirect impact cannot be avoided, develop mitigation and management measures reflecting the long term protection, conservation and management of the affected heritage item.	Design and Construction
	Where disturbance of known and suspected areas of potential archaeological significance cannot be avoided, carry out investigations of the areas of potential archaeological significance in accordance with applicable guidelines, prior to disturbance and minimise the extent of disturbance.	Design and Construction

17.4.2 Mitigation measures

Mitigation measures to avoid, minimise or manage potential non-Aboriginal heritage impacts as a result of the project are detailed in Table 17-6. A full list of environmental mitigation measures for the project is provided in Appendix R (Compilation of environmental mitigation measures).

Table 17-6 Environmental mitigation measures – non-Aboriginal heritage

ID	Mitigation measure	Timing
NAH1	The Construction Environmental Management Plan (CEMP) for the project will include measures applicable to the Soldiers Pinch construction site to minimise the risk of accidents and incidents impacting on the nearby Greater Blue Mountains World Heritage Area. The CEMP will also include provision for construction workers at the Soldiers Pinch construction site to be made aware of the location and significance of the World Heritage Area as part of site inductions and environmental awareness training.	Construction
NAH2	Opportunities to minimise the extent of native vegetation clearing within the footprint of the Greater Blue Mountains Area (Additional Values) National Heritage List nomination will be considered during further design development (refer to environmental mitigation measure B4). In areas where clearing native vegetation cannot be avoided, locally endemic native species will be used in landscaping to reflect the ecological heritage values in the nomination (refer to environmental mitigation measure LV2).	Design

ID	Mitigation measure	Timing
NAH3	If unexpected items of potential non-Aboriginal heritage significance are discovered during construction of the project, all relevant activities in the vicinity will cease in the vicinity of the find and the Unexpected Heritage Items Procedure (Transport for NSW, 2022d) will be followed.	Construction
NAH4	A detailed archaeological survey will be carried out by a suitably qualified archaeologist within those parts of the Mount Victoria Stockade site and the potential Plough Inn site that would be directly affected by construction of the project, and which have not been previously disturbed/ surveyed by the Little Hartley to Lithgow Upgrade project. The detailed archaeological survey will be carried out prior to ground disturbance by the project, and will assess site features, potential for archaeological deposits, significance and proposed management measures.	Design
NAH5	The potential for construction activities to impact remaining sections of Cox's Road (1814) within the Soldiers Pinch construction site that have not been previously disturbed will be investigated as part of further design development. If construction activities at Soldiers Pinch are likely to affect remaining sections of Coxs Road, a detailed archaeological survey will be carried out to map those remaining sections prior to the commencement of ground disturbing works.	Design
NAH6	Construction planning for the project will aim to avoid the use of vibration intensive plant and equipment within the minimum separation distances from the Rosedale homestead, for that plant and equipment (refer to measure NV8). Where minimum separation distances cannot be achieved: <ul style="list-style-type: none"> a condition/ dilapidation survey of the Rosedale homestead will be completed prior to and at the completion of the relevant construction works vibration monitoring will be carried out at the Rosedale homestead during the relevant construction works. 	Design
NAH7	The project will be designed and constructed so that tunnelling does not exceed the structural damage criteria (peak particle velocity) for structures that are particularly sensitive to vibration and have intrinsic value, as detailed in German standard <i>DIN 4150-3: 1992-02 Vibration in Buildings – Part 3: Effects on Structures</i> , at any heritage building/ structure (refer to environmental mitigation measure GW5).	Design and construction
NAH8	Opportunities to retain existing mature vegetation within and along the Great Western Highway corridor at Little Hartley will be considered in coordination with the Little Hartley to Lithgow Upgrade project. If existing mature vegetation cannot be retained, alternative vegetation screening measures will be identified and implemented, such as landscaping associated with the project and/ or the Little Hartley to Lithgow Upgrade project, or plantings on the Rosedale property in consultation and with the agreement of the property owner and will be in keeping with the existing cultural values of heritage items surrounding the project.	Design