



New England Highway bypass of Muswellbrook

Chapter 6.8 Non-Aboriginal heritage

Transport for NSW | October 2021

6.8 Non-Aboriginal heritage

6.8.1 Methodology

The non-Aboriginal heritage assessment was undertaken in accordance with the documents *Assessing Heritage Significance* (NSW Heritage Office, 2001) and *Statements of Heritage Impact* (NSW Heritage Office, 2002). It included both desktop research and archaeological field survey.

Desktop Research

Heritage database searches were conducted on 20 May 2020 to identify heritage items located within or in proximity to the construction footprint. The following registers were reviewed during the search:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- NSW State Heritage Register
- NSW Section 170 Heritage and Conservation Registers (S170 Registers)
- Muswellbrook LEP 2009
- Register of the National Estate (non-statutory).

In addition to the heritage register searches, the desktop assessment also included background research into the historical development of the construction footprint using historical plans, aerials, photographs, newspapers and other primary and secondary historical sources, as relevant. This research was used to determine the historic context of the construction footprint and identify any potential for additional heritage items to be present within or adjacent to the construction footprint.

Field Survey

An archaeological field survey of the construction footprint was undertaken over one day on 23 July 2020 by AECOM archaeologist Dr Darran Jordan. The survey was conducted on foot, with a linear transect walked across all accessible sections of the construction footprint.

Data was recorded using a handheld differential GPS unit. All known and newly identified historic sites and items observed during the survey were recorded and comprehensively photographed.

Review of Potential Impacts to Items of Heritage Significance

Results from the desktop research and field survey components of the assessment were utilised to identify the curtilages of heritage items within the vicinity of the proposed works and identify the heritage significance of each item. Following this, the assessment determined whether the proposed works would result in direct or indirect impacts to the identified significance of non-Aboriginal heritage.

A Heritage Assessment and Statement of Heritage Impact (SoHI) was prepared for the old coal rail spur bridge which crosses Muscle Creek (refer to Appendix M).

6.8.2 Existing environment

History

The Hunter region was first explored by Europeans in 1797, when Lieutenant John Shortland discovered coal at the mouth of the Hunter River. Subsequent explorations, such as the overland journeys of Chief Constable John Howe and Benjamin Singleton, pushed further into the Lower Hunter Valley, and the area around present-day Muswellbrook was reached in 1820. From 1822, assistant Colonial surveyor, Henry

Dangar and his successor George Boyle White, were tasked with surveying and reserving the vast plains within the region, opening the way for free selection and settlement. By 1825, the major estates of Merton, Pickering, St. Heliers and Overton had been granted (Turner, 1995).

In 1833, surveyor Robert Dixon drafted a plan for a village reserve at the junction of Muscle Creek and the Hunter River. The reserve, formed with a rectilinear grid of mostly half acre allotments, was gazetted as the town of 'Musclebrook', (eventually given the revised spelling Muswellbrook). The first lots were sold in 1834, with the construction of houses following soon after. The town grew steadily, in part due to its central location along the main road between the other emerging towns of Merton and Invermeil (Scone). A private subdivision, named Forbestown, was opened to the south of Muscle Creek and in 1848, Forbestown was incorporated into the town of Muswellbrook as 'South Muswellbrook' (Turner, 1995). Muswellbrook continued to develop, with influxes in population growth attributed to the discovery of gold in the Hunter and Bathurst regions in the 1850s and the completion of the Great Northern Railway to Muswellbrook in 1869. The main road passing through Muswellbrook developed into the Great Northern Road, which was gazetted as part of State Highway 9 in August 1928 and renamed the New England Highway in 1933.

Early in its history, the principal industries in Muswellbrook were agricultural, including the grazing of cattle and sheep, breeding horses, growing wheat, flour milling and the early production of wine. By the 1900s, following improvements in irrigation and refrigeration technologies, a number of dairies were established in the region, particularly concentrated on the alluvial flats and terraces between Scone, Gundy and Muswellbrook as a result of the higher quality pasture lands. After WWI, many of the larger rural estates were subdivided into smaller farms and dairying replaced with wheat and wool as the main rural industry. This continued into the 1970s.

The greatest impact, both economically and geographically, however, resulted from the development of the power and mining industries in the area. Coal was discovered in the Muswellbrook district in the 1860s, with a small seam uncovered to the south during the construction of the rail line (Jo McDonald Cultural Heritage Management Pty Ltd, 1999). Mining began in earnest with the formation of the Muswellbrook Coal Company Ltd (MCC) and the discovery of the Greta Coal Measures in 1907. No.1 Colliery began operations shortly after. In 1933, MCC merged with St Heliers Coal Company Ltd and established the No. 2 Colliery. Following the depression in the 1930s, the coal industry faced a downturn throughout NSW. Despite this, MCC opened a third colliery in 1944 on the public Common, which would become the largest open cut coal mine in Australia for a time. From the 1950s, coal mined from Muswellbrook was a growing export that was used in nearby power stations, such as the Liddell Power Station and a smaller station along McCullys Gap Road (Turner, 1995).

Desktop research results

Searches of relevant historic heritage registers and lists, both statutory and non-statutory, were conducted on 20 May 2020 to identify previously recorded historic heritage items within and 200 metres from the construction footprint. The search identified one item with a curtilage immediately adjacent to the construction footprint. Although the curtilage was immediately adjacent, the buildings associated with the listing were about 1.3 kilometres away. This item (St Heliers) had two listings associated with the same item, one on the Muswellbrook LEP 2009 and the other on the Corrective Services NSW S170 Heritage Conservation Register. Another listing, for the Muswellbrook Brick Works (former), was identified as being 130 metres to the east of the construction footprint. Search results are provided below in Table 6-42 with item locations shown on Figure 6-25.

An archaeological survey was subsequently undertaken to ground-truth known items and identify and record any additional heritage items located in proximity to the construction footprint. In addition to the historic items identified in historic registers (Table 6-42), one additional item (Rail bridge) was identified during the field survey, as shown on Figure 6-25.

Descriptions of all items identified during the register searches and recorded during the survey are presented in the following subsections, including details of their heritage significance.

Table 6-42: Registered historic sites within 200 metres of the construction footprint

Item	Item ID	Listing	Significance	Proximity to construction footprint
St Heliers	I113	Muswellbrook LEP 2009	Local	0 metres east (immediately adjacent)
St Heliers Correctional Centre <ul style="list-style-type: none"> • Admin & Outbuildings • Officers Accommodation • Stables 	n/a	Corrective Services NSW S170 Heritage Conservation Register	Local	c.1.3 kilometres east
Muswellbrook Brick Works (former)	I112	Muswellbrook LEP 2009	Local	c.130 metres east
Old Coal Rail Spur Bridge, embankment and culverts	N/A	N/A	Local	0 metres (direct intersect)

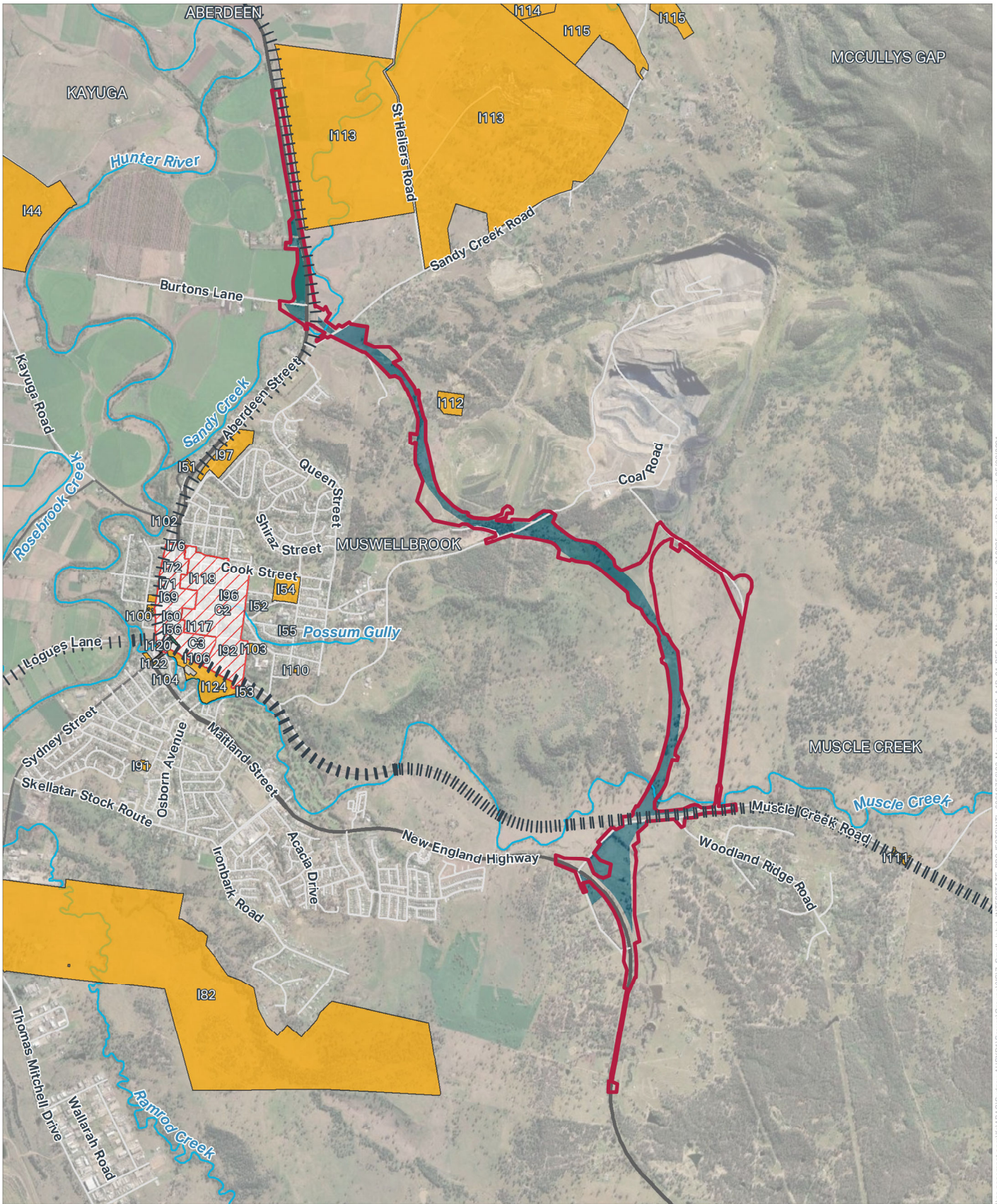
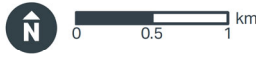


FIGURE 6-25: NON-ABORIGINAL HERITAGE ITEMS IN PROXIMITY TO THE CONSTRUCTION FOOTPRINT

- Legend
- Construction footprint
 - Proposed road corridor
 - State Road
 - Regional Road
 - Local Road
 - Railway
 - Conservation Area - General
 - Item - General
 - Item - Landscape
 - Watercourse



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St Heliers

The item 'St Heliers' (I113) is listed on the Muswellbrook LEP 2009 as containing local significance. The same item is listed on the Corrective Services NSW S170 Heritage Conservation Register under the name 'St Heliers Correctional Centre' and contains additional listings for separate elements within the complex, including the 'Admin & Outbuildings', 'Officers Accommodation' and 'Stables'.

The item listing refers to the homestead built by Malcolm Campbell, founder of Campbells Stores, on a portion of the St Heliers estate. St Heliers was originally granted to Colonel Henry Dumaresq in 1826; however, nothing but plantings remain of the original Dumaresq homestead, which was located to the north east of the Campbell home. The main Campbell home, built between 1895 and 1900, was designed by Pender of Maitland architects, and comprises a single-storey brick and stucco structure featuring design elements of Victorian and Federation periods. The homestead is located on a rise overlooking the surrounding landscape, and includes later additions to the main house, outbuildings, a carriage loop and cultural plantings.

Following its initial grant, St Heliers was used for agricultural purposes and contained vineyards and orchards. In 1945, the current site was bought by the NSW State Government, and the homestead and surrounding grounds were converted into a Child Welfare facility used to house and train delinquent boys. The site was bought by the NSW Corrective Services Department in 1988 to be used as a minimum-security prison, after which developments included restoration of the main house for use as an administration building and construction of new facilities to the east.

St Heliers has been identified as being of local significance for all heritage significance criteria. This significance is largely tied to its historical development, associations with prominent individuals, their social connections and the building's architecture. While the LEP 2009 curtilage of the item extends across the entire cadastral boundary of the lot (and lies adjacent to the construction footprint to the east of the New England Highway), descriptions and maps provided in the LEP 2009 and S170 listings indicate that the item predominately comprises of the main Campbell home and the structures and landscape features immediately surrounding it. The visual curtilage of St Heliers is defined in the Hunter Regional Study (Walker, 1980) as extending from the main house to the base of the hill on the western side. The physical and visual curtilages as described in the study and listings are therefore some 1.3 kilometres to the east of the construction footprint.

While it is possible that the land immediately adjacent to the eastern boundary of the construction footprint may have contained outbuildings and structures, such as sheds, stables and fencing, associated with the pastoral and/or agricultural use of St Heliers, there is no information currently available regarding any such works or improvements.



Source: Heritage NSW, 2020

Figure 6-26: St Heliers homestead (undated image)

Statement of Significance

“Although not the original St. Heliers homestead, historically this home is nevertheless of significance to the region because of its representing the locational choice of the region's most successful 19th century retailer; the home was built for Malcolm Campbell. Aesthetically it is also regionally significant as it was designed by eminent Maitland Architects and features design elements of both the Victorian and Federation periods, finely detailed and of a scale unusual in the region. Its current regional social significance relates to its ownership by the Department of Corrective Services. Scientifically it is of regional significance for its potential to reveal information which could contribute to an understanding of the lifestyle of the prominent businessman of the late 19th century, to the spatial and particular needs of child welfare institutions and also to those of current owners” (Heritage NSW, 2020).

“St. Heliers Correctional Centre is historically significant as part of a large pastoral estate granted to Henry Dumaresq in 1825. It is also important for its associations with the expansion of pastoralism and associated settlement across NSW after the Napoleonic Wars, and the commercial development of the Muswellbrook and Upper Hunter areas. The site contains fabric relating to its mid-late 19th century pastoral use, in particular an impressive homestead constructed in 1895-1900 for Malcolm Campbell, designed by Pender of Maitland. It is likely that the site may contain archaeological evidence of its earliest European occupation, dating from 1825. St Heliers Correctional Centre has associative significance for its links to Henry Dumaresq, secretary to Ralph Darling (Governor of NSW, 1825-1831), commissioner of the Australian Agricultural Co, and pastoralist, as well as containing a fine example of the work of Pender of Maitland. St Heliers Correctional Centre is aesthetically significant as an attractive rural site with a number of well-sited buildings, particularly the impressive Pender homestead. At a local level, St Heliers Correctional Centre is socially significant for its role in law and order in the local area, as well as being an important local employer since the mid 20th century” (Heritage NSW, 2020).

Assessment of Significance

The assessment of significance is from this item’s listing on the NSW State Heritage Register (Heritage NSW, 2020).

Criterion	Assessment
SHR Criteria a) Historical significance	<p>Historically significant to the region because of its representation of the local choice of the region's most successful 19th century retailer: Malcolm Campbell.</p> <p>St. Heliers Correctional Centre is historically significant as part of a large pastoral estate granted to Henry Dumaresq in 1825. It is also important for its associations with the expansion of pastoralism and associated settlement across NSW after the Napoleonic Wars, and the commercial development of the Muswellbrook and Upper Hunter areas. From 1945 - 1986, St. Heliers was used as a rural training institution, initially for delinquent boys and later state wards. Since 1989, the site has been used as a minimum-security prison.</p> <p>The site contains fabric relating to its mid-late 19th century pastoral use, in particular an impressive homestead constructed in 1895-1900 for Malcolm Campbell, designed by Pender of Maitland.</p>
SHR Criteria b) Associative significance	<p>St Heliers Correctional Centre has associative significance for its links to Henry Dumaresq, secretary to Ralph Darling (Governor of NSW, 1825-1831), commissioner of the Australian Agricultural Co, and pastoralist, as well as containing a fine example of the work of Pender of Maitland, a house designed for Malcolm Campbell and constructed in 1895-1900.</p>
SHR Criteria c) Aesthetic significance	<p>Aesthetically significant as it has been designed by eminent Maitland Architects and features design elements of both Victorian and Federation periods.</p> <p>St Heliers Correctional Centre is aesthetically significant as a rural site with a number of well-sited buildings, particularly the impressive homestead constructed in 1895-1900 for Malcolm Campbell, designed by Pender of Maitland, located on a rise overlooking the surrounding landscape.</p>
SHR Criteria d) Social significance	<p>Social significance relates to the ownership by the Department of Corrective Services.</p> <p>At a local level, St Heliers Correctional Centre is socially significant for its role in law and order in the local area, as well as being an important local employer since the mid 20th century, when the site was used for detention of juvenile boys, training of state wards and as a minimum security prison.</p>
SHR Criteria e) Research potential	<p>Scientifically of regional significance for its potential to reveal information which could contribute to an understanding of the lifestyle of the prominent businessmen of the late 19th century.</p> <p>St Heliers Correctional Centre has research potential regarding information on the first stages of development on the site from the mid 1820s.</p>
Rarity/Intactness	<p>St Heliers Correctional Centre has a moderate degree of intactness.</p>

Muswellbrook Brick Works

The item 'Muswellbrook Brick Works' is listed on the Muswellbrook LEP 2009 as having local significance. The LEP 2009 curtilage of the item comprises a plot of land about 2.6 ha located on Coal Road, about 130 metres from the construction footprint at its closest point.

The Brick Works were approved for demolition by Muswellbrook Council in 2009 to allow for the expansion of the Muswellbrook Coal Mine. A letter from Muswellbrook Shire Council dated 16 December 2009 appended to a previous assessment (AECOM, 2010) indicates that the site was to be recorded by the Local Historical Society prior to its demolition. The LEP 2009 listing has not been updated to reflect the demolition of the item.

The Brick Works were thought to have been established in 1949 by Muswellbrook Industries to exploit clay deposits located at the Muswellbrook Coal Company's open cut mine. The Brick Works were a small, traditional coal fired operation, supplying bricks locally and to Newcastle. At the time of its original listing, the Brick Works were still in operation and were being restored for use in the production of bricks for heritage buildings. The site was described as comprising of a series of buildings, including a portable fibre office, a press shed, three brick downdraught brick kilns and one updraught brick kiln. The site also contained several brick hand-presses made in England in the 1860s.

The LEP listing indicates that the Brick Works contain significance for the almost continuous use of the site since its opening, its ability to represent traditional coal fired brick work operations, and its potential to reveal information about brick making techniques in the Upper Hunter Valley. The 1996 Muswellbrook Heritage Study (EJE, 1996) indicates that the Brick Works contain regional [sic] historic and scientific significance and local aesthetic significance. As the site has now been demolished, this significance may no longer be applicable. Archaeological remains could still be present depending on the nature of impacts undertaken at this site since its demolition.



Source: Muswellbrook Shire Council, 2020

Figure 6-27: Muswellbrook Brick Works 21 February 1995

Statement of Significance

“A working example of downdraft brick kilns using traditional coal firing methods for the production of dry pressed bricks. In almost continuous use over a forty five year period, it is of regional historic significance in type, and is of similar scientific significance for its potential to reveal information about brickmaking methods in the Upper Hunter area over the past century” (Heritage NSW, 2020).

Assessment of Significance

The below assessment of significance is from this item's 1996 listing on the Muswellbrook Heritage Study Inventory (Muswellbrook Shire Council, 2020).

Criterion	Assessment
SHR Criteria a) Historical significance	The item meets this criterion as representative on a regional level
SHR Criteria c) Aesthetic significance	The item meets this criterion as representative on a local level
SHR Criteria e) Research potential	The item meets this criterion as representative on a regional level

Old Coal Rail Spur Bridge – Muscle Creek

An old coal rail spur bridge is located within the construction footprint on Lot 101, DP1148216, crossing Muscle Creek at a point approximately 100 metres from Muscle Creek Road. This item has not been listed on any heritage registers. The old coal rail spur bridge is associated with the Muswellbrook Coal Mine. Reference to early maps of the Parish of Rowan indicate that the bridge was built between 1942 and 1968, most likely in association with the establishment of the Open Cut mine in 1944. Although this bridge is not listed as a heritage item, other bridges in the surrounding region have been listed for their heritage values, the closest two being Kayuga Bridge and Stone Bridge. Stone Bridge (also known as Grass Tree Road Bridge) is located on Muscle Creek Road, Muswellbrook, outside the construction footprint, about two kilometres to the southeast of the old coal rail spur bridge. Stone Bridge is listed on the Muswellbrook LEP 2009 due to its significance for the opening up of Muswellbrook in the 1870s to rail transport and for the rarity of its design. Similarly, Kayuga Bridge (located outside the construction footprint, about 5.3 kilometres to the north-west of the old coal rail spur bridge) is listed on the Muswellbrook LEP 2009 due to its significance relating to the emerging town of Muswellbrook in the late 19th century, and its rare iron bridge design. The listing of other bridges in the vicinity supports the possibility that this bridge may also have heritage values.

As the bridge is not a listed heritage item, no statement of significance or assessment of significance have previously been undertaken for it. This item is discussed further below in relation to the survey findings.

Areas of Archaeological Potential

Background research identified a number of areas that have previously been identified as having archaeological potential (i.e., the potential to contain historical deposits in subsurface contexts). Each of these areas are summarised below in relation to the construction footprint and are shown on Figure 6-28 as numbers 1 to 5:

1. Muswellbrook Electric Power Co. (1923)
2. No. 1 Colliery
3. The Common (1888)
4. No. 2 Colliery
5. First Open Cut Mine (1944).

Muswellbrook Shire Heritage Study

The Muswellbrook Shire Heritage Study (the Study) (EJE, 1996) listed 18 'Archaeologically-sensitive areas' within Muswellbrook to be included within its Conservation Management Recommendations. The Heritage

Study was undertaken to inform the preparation of the Muswellbrook LEP 2009; however, these areas of archaeological sensitivity were not included within the LEP.

The Study did not ascribe levels of significance to these archaeologically sensitive areas or provide any information as to the curtilages or likely materials present within them. For this assessment, the general locations of these areas have been indicated to determine their proximity to the construction footprint.

The construction footprint is located within or adjacent to archaeologically sensitive areas associated with the power station, the public Common and Muswellbrook mines (numbers 1 to 5 above). Considerations of the land use and potential archaeology associated with these areas are described in the following subsections.

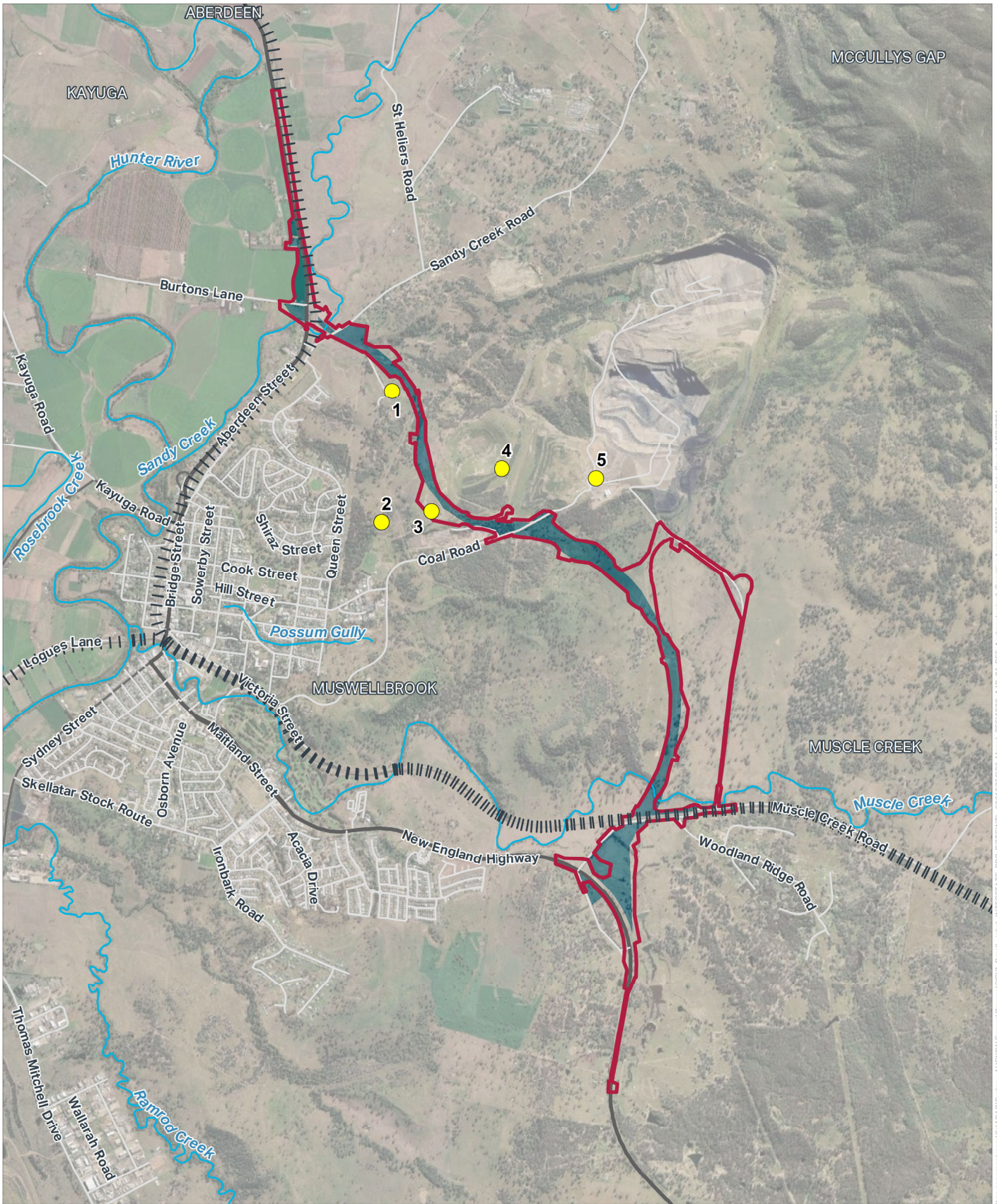


FIGURE 6-28: GENERAL LOCATIONS OF ARCHAEOLOGICALLY-SENSITIVE AREAS IN PROXIMITY TO THE CONSTRUCTION FOOTPRINT, AS LISTED IN THE 1996 MUSWELLBROOK SHIRE HERITAGE STUDY (EJE, 1996)



Legend

- Construction footprint
- Proposed road corridor
- Archeologically - sensitive area
- State Road
- Regional Road
- Local Road
- Railway
- ~ Watercourse



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Muswellbrook Electric Power Co. (1923) (Area 1)

The 1996 Heritage Study inventory listing for the Muswellbrook Brick Works includes a map and a sketch that shows infrastructure associated with a disused power station located in proximity to the construction footprint. This power station could represent the location of the 'Muswellbrook Electric Power Co. (1923)' shown in the 1996 Heritage Study. Current aerial images indicate that the 'Power Substation' noted on the map is located partially within the construction footprint.

Archaeology potentially associated with the power station and substation would include remnant machinery, chimneys and electrical infrastructure.

No. 1 Colliery (Area 2)

The mine sites identified in the 1996 Heritage Study that are located in proximity to the construction footprint include the No. 1 Colliery, which began operations after 1907. Archaeology potentially associated with the colliery could include remnant and current machinery, mine entrances and exits, roads and rail lines used to transport materials, water and power supplies, amenities and processing areas. Greater impacts to surface conditions from historic and recent mining activity are anticipated to have occurred reducing the potential for remnant deposits in this area.

The Common (1888) (Area 3)

In 1888, a c.410 hectare rectangular area of land to the east of the town of Muswellbrook was reserved as the 'Permanent Common'. It is likely that this area was originally used for grazing stock or town gardens. By 1907, the Common was used for other activities, such as mining, as indicated in an early news article from *The Maitland Weekly Mercury*, dated Saturday 20 July 1907. Early and subsequent Parish maps document the subdivision and use of this area, with uses and improvements within the construction footprint including a night soil deposit area, a rifle range, a mine site, a power station, easements for electrical supply and roads.

The construction footprint has the potential to expose archaeological resources associated with these land uses, although areas where open cut mining has occurred are unlikely to retain evidence of former uses. While the area may contain the potential for the type of archaeology listed above, this material is likely to be in poor condition and be of limited research value.

No. 2 Colliery (Area 4)

The mine sites identified in the 1996 Heritage Study that are located in proximity to the construction footprint include the No. 2 Colliery, established in 1933. Archaeology potentially associated with the colliery could include remnant and current machinery, mine entrances and exits, roads and rail lines used to transport materials, water and power supplies, amenities and processing areas. Greater impacts to surface conditions from historic and recent mining activity are anticipated to have occurred reducing the potential for remnant deposits in this area.

First Open Cut Mine (1944) (Area 5) – Coal Road

The mine sites identified in the 1996 Heritage Study that are located in proximity to the construction footprint include the Open Cut Mine, opened in 1944. Archaeology potentially associated with the Open Cut could include remnant and current machinery, mine entrances and exits, roads and rail lines used to transport materials, water and power supplies, amenities and processing areas. In the intervening period, historic and recent mining activity would have given rise to further impacts to surface conditions reducing the potential for remnant deposits in this area.

Additional Areas

In addition to the above areas of archaeological potential, other relics or subsurface archaeology may be present within the construction footprint relating to the pastoral and agricultural use of the landscape. Where the construction footprint crosses properties that have retained their pastoral/agricultural land use

since their first European occupancy, these areas have the potential to contain features such as fences, dams, irrigation systems, culverts, roads, outbuildings (such as sheds and stables), sheep and cattle dips, artificial contour banks, furrow lines and remnant vegetation (e.g., orchards). Domestic areas within pastoral/agricultural properties may also contain remains of buildings or foundations, cultural plantings, water pipelines and electrical supply systems.

With reference to parish maps and current aeriels, a large portion of the construction footprint is verified as crossing through land that has retained its early pastoral/agricultural use. While these areas may contain the potential for the type of archaeology listed above, this material is likely to be in poor condition and be of limited research value.

Archaeological field survey

A pedestrian archaeological field survey was undertaken on 23 July 2020, consisting of one linear transect walked along the centre line of the construction footprint across all accessible sections. A 700 metre section of the construction footprint on MCC land was not able to be accessed as mining works were in progress and a section of the Main North railway line corridor was similarly not traversed at the time of the survey. However, no historic constraints were visible in these areas when viewed from outside the 700 metre study area. The remaining construction footprint was walked in full.

Ground surface visibility was generally good across the construction footprint, but some sections did have dense vegetation obscuring visibility during the inspection. The areas of densest vegetation were adjacent to the road corridor at the southern end of the construction footprint, and adjacent to the rail corridor at the northern end of the construction footprint. Generally, the majority of the construction footprint consisted of cleared grasslands with sufficient visibility to discern the presence of historical items.

Features associated with agricultural land use were noted across the construction footprint, including fences, dams, tracks/roads, cleared and ploughed areas, tanks, animal enclosures, troughs, houses and sheds (see Plate 1 to Plate 7). In one instance a tree had been modified for use as part of a fence and gate enclosure (see Plate 8). While each of these features provided evidence of land use across the area, they were all determined to be evidence of contemporary use rather than elements of historical significance. No heritage constraints were identified in relation to these items.



Plate 1: Abandoned house fenced due to asbestos (photo AECOM)



Plate 2: Concrete tank (photo AECOM)



Plate 3: Animal enclosure (photo AECOM)



Plate 4: Dilapidated timber and metal shed (photo AECOM)



Plate 5: Concrete trough (photo AECOM)



Plate 6: Dam (photo AECOM)



Plate 7: Water tank (photo AECOM)



Plate 8: Tree modified to be part of fenced enclosure with gate (photo AECOM)

St Heliers

The survey did not identify any physical fabric associated with St Heliers in the section of its curtilage immediately adjacent to the construction footprint at its northern end (Plate 9). Although the construction footprint is adjacent to its curtilage, the features that are listed as contributing to the item's heritage significance (the 1895-1900 constructed homestead for Malcolm Campbell, other "well-sited" buildings and

potential archaeological deposits associated with these structures) are not visible from the road, and are likely to be contained within the curtilage associated with the heritage item. As such no direct impacts were identified (the construction footprint is adjacent to but outside the registered curtilage of this item) and no indirect visual impacts were identified.



Plate 9: View north towards the St Heliers curtilage from the construction footprint (photo AECOM)

Muswellbrook Brick Works

The survey also verified that the construction footprint is outside the curtilage of the Muswellbrook Brick Works, which is about 130 metres to the east of the construction footprint (Plate 10). No direct impacts were identified and, as the brickworks area was not visible from the construction footprint, there would be no indirect visual impacts to this item.



Plate 10: General view east towards the Muswellbrook Brick Works from the construction footprint (photo AECOM)

Old coal rail spur bridge

The old coal rail spur bridge was identified as being part of a linked assemblage of heritage features, all associated with the Muswellbrook Coal Mine. It is likely that all these features were built after the establishment of the Open Cut mine in 1944 as a transport corridor to link the coal mine to the Great Northern Railway. The features included the bridge itself, consisting of concrete earth embankments either side of the river supporting a timber bridge on three timber trestles, one based on the northern bank of the river, the other two mounted on concrete whalings within the channel of Muscle Creek. The bridge design, including the timber trestles, appears to be of a standard rail design used in NSW from the 1860s through to the 1930s. The timber trestles include five timber piers, three under the bridge and two raked at the ends, with long cross beams and whalings present at the top and bottom of the trestle. The deck rests on deck beams and headstocks that are attached to the timber trestles.

The rails formerly on the deck of the bridge have been removed, but some metal plates remain.

Beneath the bridge on the northern bank building refuse was noted, predominantly comprised of broken brick, suggesting a brick structure may have previously been associated with the railway and bridge but has since been demolished. This may have been associated with the bridge abutment wall or similar retaining wall used to stop erosion to the approaches of the bridge. A concrete base to the north of the bridge is also suggestive of a past structure associated with the railway in this area. In addition to these features, a raised linear earth embankment extends in a northern direction from the bridge towards the coal mine. The embankment has remnant pieces of railway material (metal and wood) on top of it, but the rails that it would have supported have been removed. This may have been a former siding, however, its proximity to the bridge, and water source, also suggest it may have been used as a former water topping up point for steam engines. Further north along the linear embankment two culverts were identified draining water beneath it. Both culverts were small in size. The one closest to the bridge (850 metres north of it) was comprised of wood, metal and stone. Rough hewn and in a dilapidated state, it still functioned to drain water as

evidenced during the survey. The culvert furthest from the bridge (1.3 kilometres to the north of the bridge) was composed of concrete and remained in a fair condition. The earth embankment continued north, but as it passed beyond the bounds of the construction footprint it was not investigated further.

The entirety of all these features (the bridge, embankment, culverts, concrete base and remnants of demolition/removal) all constitute parts of one heritage item (refer Plate 11 to Plate 20). The NSW heritage theme of economy for developing local, regional and national economies, both for mining activities and transport, is applicable, indicating local heritage significance values may be appropriate for this item. A SoHI prepared for this item is in Appendix M.



Plate 11: View south across bridge (photo AECOM)



Plate 12: View south-east towards bridge (photo AECOM)



Plate 13: View south from beneath bridge (photo AECOM)



Plate 14: View north at concrete base (photo AECOM)



Plate 15: Rubble beneath bridge (photo AECOM)



Plate 16: View north along embankment (photo AECOM)



Plate 17: View east at culvert 1 (850 metres north of bridge) (photo AECOM)



Plate 18: View west at culvert 1 (850 metres north of bridge) (photo AECOM)



Plate 19: View east at culvert 2 (1.3 kilometres from bridge) (photo AECOM)



Plate 20: View through culvert 2 (1.3 kilometres from bridge) (photo AECOM)

Areas of archaeological potential

The areas previously identified as having potential archaeological sensitivity in the 1996 Muswellbrook Shire Heritage Study were assessed during the survey for surface signs of archaeology and any surrounding context indicative of historical values with research potential. The two areas that were within or in close proximity to the construction footprint (The Common (1888) and the Muswellbrook Electric Power

Co. (1923)), did not demonstrate evidence of intact historical subsurface deposits in the sections inspected for this assessment. Ground surfaces in these areas had been subject to vegetation clearance, track grading and erosion. There were no surface expressions of artefacts or relics and no indications of intact deposits with research potential. The archaeological sensitive areas associated with the Mine Sites (No. 1 Colliery, No. 2 Colliery, First Open Cut Mine (1944)) were both highly disturbed and beyond the bounds of the construction footprint. It is considered unlikely that intact subsurface deposits with heritage significance and research potential would be present in these sections of the construction footprint.

6.8.3 Potential impacts

The NSW Heritage Division uses standardised terms to define impact to heritage items. The terms and their definitions are provided in Table 6-43.

Table 6-43: Heritage impact terms and conditions

Impact term	Definition
Major negative impact	Substantially affects fabric or values of state significance
Moderate negative impact	Irreversible loss of fabric or values of local significance; minor impact on State significance
Minor negative impact	Reversible loss of local significance fabric or where mitigation retrieves some value of significance; loss of fabric not of significance but which supports or buffers local significance values
Negligible or no impact	Does not affect heritage values either negatively or positively
Minor positive impact	Enhances access to, understanding or conservation of fabric or values of local significance
Major positive impact	Enhances access to, understanding or conservation of fabric or values of State significance

Construction

It is anticipated that direct impacts during construction would include ground disturbance activities, while indirect impacts may include vibration or ground settlement generated by construction activity. Visual impacts may also arise.

St Heliers

No visual impacts were identified in relation to the St Heliers listing, given the buffer of existing landscape between the proposed road corridor and the buildings.

No direct or indirect impacts to St Heliers are considered likely during the construction of the proposal. The LEP curtilage is adjacent to the construction footprint; however, descriptions of significance represented in the LEP and S170 listings indicate that the S170 curtilage (comprising the main Campbell homestead and the grounds to the base of the hill) are a more appropriate curtilage for this item. The St Heliers Correctional Centre including the Campbell homestead are located at least 1.3 kilometres from the construction footprint. As a consequence, the physical fabric elements of the item are located well outside the construction footprint and would not be impacted.

Muswellbrook Brick Works Site

No visual impacts were identified in relation to the Muswellbrook Brick Works site, as the majority of the site is not visible from the construction footprint due to distance, intervening landform and vegetation.

No direct or indirect impacts to the Muswellbrook Brick Works site are considered likely during the construction of the proposal. The LEP curtilage of the Muswellbrook Brick Works site is located about 130 metres from the construction footprint at its closest point. The Muswellbrook Brick Works item has also been demolished following the expansion of the Muswellbrook Coal Mine.

Old coal rail spur bridge

The proposal is not expected to have any direct impact on the old coal rail spur bridge. The bypass would be located greater than 50 metres to the west of the bridge's location. The proposal would directly impact on a separate concrete culvert rail bridge located approximately 200 metres to the south of the former old coal rail spur bridge. The culvert bridge has been assessed as having no heritage significance, and direct impacts to this bridge are considered to be acceptable.

There is the potential for indirect impacts from activities causing vibrations to the old coal rail spur bridge over Muscle Creek. The use of heavy machinery for the construction of the proposal may have the potential to cause vibrations that could affect the structural stability of the bridge. The potential for this to occur is considered low, as the bypass and associated embankment would be located approximately 60 metres from the bridge. Potential for vibration impact may be expected if additional heavy machinery works were to occur in closer proximity to the bridge. This would include any requirement for services, service roads, stockpiles, or if any associated construction occurs for landscaping works in this area. An exclusion zone around the location of the bridge would minimise the risk associated with potential vibration impacts. Service roads would be located outside the exclusion zone.

The bridge is also not considered to be a landscape feature as it is obscured from view by the trees lining Muscle Creek. Also, views to the bridge from the surrounding roads is limited, at best. The construction of the new bypass is not expected to visually dominate the heritage item, as the item would still be contained within its current setting.

There is also the potential for indirect impacts to occur to two other culverts located 850 metres and 1.3 kilometres to the north of the old rail spur bridge. Both of these culverts have been assessed as having no heritage significance. If vibration impacts were to occur to these two items, the impact would be considered acceptable.

Areas of Archaeological Potential

It is considered unlikely that potential archaeological deposits containing intact, in situ historic relics with research potential, would be impacted by the proposed works.

Operation

During operation impacts may include alterations to the visual landscape character, increased noise, increased vibration and a reduction in air quality.

St Heliers

No direct or indirect impacts to St Heliers are considered likely during the operation of the proposal as there is sufficient buffer of unaffected landscape around the buildings to maintain existing views and vistas. These features are not visible from the road and if any parts of the road can be viewed from the property, it is unlikely these views would alter the existing visible landscape in a way that would impact upon the existing heritage significance. The operation of the proposal is not anticipated to affect the existing significance of this site.

Muswellbrook Brick Works

No direct or indirect impacts to the Muswellbrook Brick Works site are considered likely during the operation of the proposal.

Old Coal Rail Spur Bridge

No direct or indirect impacts to old coal rail spur Bbridge are considered likely during the operation of the proposal.

Impact summary

Consideration of impacts associated with construction and operation activities in relation to the identified historical sites in proximity to the construction footprint are summarised in Table 6-44.

Table 6-44: Impact summary for historic sites

Impact	St Heliers	Muswellbrook Brick Works	Old Coal Rail Spur Bridge	Archaeological potential
Major negative	None	None	None	None
Moderate negative	None	None	None	None
Minor negative	None	None	None	None
Negligible or no impact	No direct or indirect impacts are proposed within the curtilage of St Heliers	No direct or indirect impacts are proposed within the curtilage of Muswellbrook Brick Works site	The proposal is not expected to have any direct impact on the old coal rail spur bridge over Muscle Creek	No areas of likely archaeological potential were identified within the construction footprint during the survey
Minor positive	None	None	None	None
Major positive	None	None	None	None

6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal Heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. The NAHMP will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage	Construction contractor	Pre-construction	Additional safeguard
Non-Aboriginal heritage	The <i>Standard Management Procedure - Unexpected Heritage Items</i> (Transport for NSW, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin	Construction contractor	During construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<p>are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied</p>			
<p>Non-Aboriginal heritage</p>	<p>Two buffer zones will be set up around the old coal rail spur bridge over Muscle Creek and its associated elements, including:</p> <ul style="list-style-type: none"> • a 25 metre radius exclusion zone that is made known to all workers operating near the site • a 50 metre radius limited works area <p>All those operating within the area will be made aware of the existence of the heritage items and that they are not to be disturbed</p> <p>An archival recording of the former bridge, to be carried out on the bridge prior to the commencement of works, will be considered in consultation with the landowner, MCC. This recording will record, in detail, the bridge and all fabric associated with it. This recording will also be used as a baseline assessment that will allow for a comparison of the bridge and specific elements before and after construction works</p> <p>Vibration monitoring will be undertaken within close proximity of the bridge. This is to record any actual vibration that is encountered in the vicinity of the bridge from construction. This monitoring will be done in conjunction with a visual inspection of the bridge to assess any potential vibration impacts. This monitoring will be added to the CEMP for the proposal</p>	<p>Construction contractor</p>	<p>During construction</p>	<p>Additional safeguard</p>