Attachment 1
to
Item 3.1.4

Copy of the Thomas James Conversation Management Plan

Date of meeting: 3 August 2023
Location: Council Chambers
Time: 5:00 p.m.

THOMAS JAMES BRIDGE

CONSERVATION MANAGEMENT PLAN

FOR SHREEJI CONSULTANT

JOB NO: 22024

ISSUE A – AUGUST 2022

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Report Register

The following report register indicates the development and issue number of this report, undertaken by OCP Architects.

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Issue	Date	Purpose	Written	Approved
A	17 August 2022	Draft Issue to Client	Sarah Mannion / Rowan Day	Otto Cserhalmi

Contents

EXECUTIVE SUMMARY

This Conservation Management Plan (CMP) has been prepared for Shreeji Consultant to guide the future conservation and use of Thomas James Bridge. The preparation of this document reflects the long-term commitment of Hawkesbury City Council and Central Coast Council to the conservation of the site.

For the purposes of this document, the site will be referred to as Thomas James Bridge, noting that this encompasses stone abutments and other associated elements. The report considers background information relating to the Old Great North Road (OGNR) – a site inscribed on the UNESCO World Heritage List – as despite the bridge not currently being included within the delineated areas for local, state, or world heritage listings for the OGNR, this CMP considers it to be an integral and inseparable component of the OGNR that is substantially intact. Additionally, Thomas James Bridge is located within the world heritage buffer zone for OGNR.

This Conservation Management Plan analyses the history and surviving fabric of Thomas James Bridge, and from this analysis derives a Statement of Cultural Significance. The primary objective of this study is to guide the conservation of the significant heritage values of the site. The aim is to retain and enhance the cultural significance of the place, whilst guiding its ongoing preservation and use.

Policies have been developed that set out processes for the conservation and management of the bridge, including the management of change in ways that will best retain and protect the heritage values of the place. The policies aim to protect the significant values of the site by doing as much as necessary to facilitate conservation with as little intervention as possible.

This Conservation Management Plan generally concludes that:

- Thomas James Bridge has a high level of significance both at a local and state level, and also at a national and international level, given the existing world heritage listing for the adjacent Old Great North Road.
- The conservation guidelines from the Heritage Council, and the principles of *The Burra Charter* should inform any future decisions on the use of the site and any conservation works to it;
- The continued use and conservation of the site should encompass the conservation objectives of this plan;
- The bridge and associated elements, including stone abutments, should continue to be conserved using advice from experienced conservation professionals and appropriately qualified tradespeople;
- The historical development of the bridge should be conveyed through appropriate interpretative measures;
- Thomas James Bridge is not currently listed on any statutory heritage registers: the site warrants heritage listing in the Hawkesbury and Central Coast LEPs and on the NSW State Heritage Register, as well as inclusion within the ‘Australian Convict Sites – Old Great North Road’ world heritage listing.

1 INTRODUCTION

1.1 Background

This Conservation Management Plan for Thomas James Bridge has been commissioned by Shreeji Consultant to guide the future conservation and use of Thomas James Bridge.

This document provides current information on the history, physical fabric, heritage significance and relevant opportunities and constraints that apply to the site prior to detailing conservation policies.

Thomas James Bridge, which has been alternatively called Settlers Road Bridge, was built in 1830 as part of the Great North Road, a 250km road project to connect Sydney and the Hunter Valley. It was built using convict labour between 1826 and 1836, spanning the 250km distance between Sydney and the Hunter Valley. It was the first in a planned network of 'Great Roads', which mirrored the Great Roads of England, and aimed to facilitate colonial expansion from Sydney to the north, south and west. The 43km span of road between Wisemans Ferry and Mt Manning is the most substantial section of the Great North Road which has not been re-used, overbuilt and upgraded, due to its early abandonment for more convenient routes, and is included on the UNESCO World Heritage List, as part of the 'Australian Convict Sites' listing. This section is termed the 'Old Great North Road' (OGNR) to distinguish it from other portions of the route which have been modernised. While Thomas James Bridge sits just outside the listed nominated world heritage area of the OGNR, it was constructed as part of this program and remains substantially intact, including convict-quarried stone abutments. Additionally, Thomas James Bridge is located within the world heritage buffer zone for OGNR. For these reasons, this CMP argues that the site warrants inclusion within the OGNR world heritage listing.

At the time of writing, the condition of Thomas James Bridge and surrounds has deteriorated as a result of repeated flooding that has hit the region over the course of 2021 and 2022, which has resulted in landslips in the immediate vicinity of the bridge and its necessitated partial closure.

1.2 Aims of the Conservation Management Plan

This CMP aims to be a practical document, to guide decisions that may affect the heritage value of the place. It will form a basis for future planning and provide a standard against which to assess the heritage impact of future proposals on the bridge, the site and the vicinity. It should be used when planning any works, either temporary or permanent, that involve alterations to the surviving fabric of the place.

The primary objectives for this CMP are in accordance with the requirements of Section 38A of the *Heritage Act 1977* (NSW) in that it:

a) *identifies the state heritage significance of an item, and*

b) *sets out policies and strategies for the retention of that significance, and*

c) *is prepared in accordance with the guidelines for the preparation of conservation management plans publicly issued from time to time by the Heritage Council.*

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter*, 2013) provides the Australia-wide accepted guidelines for heritage conservation. Section 2 of the charter (Conservation and Management) states:

2.1 Places of cultural significance should be conserved;

2.2 The aim of conservation is to retain the cultural significance of a place;

2.3 Conservation is an integral part of good management of places of cultural significance;

2.4 Places of cultural significance should be safeguarded and not put at risk or left in a vulnerable state.

With consideration for the requirements of the NSW *Heritage Act, 1977* and *The Burra Charter*, 2013, this CMP adopts the following methodology:

- Review the historical and archival material relating to the site and its chronological development;
- Investigate the existing physical fabric to determine the extent and condition of original elements and the nature of any subsequent changes;
- Review the documentary, physical and comparative evidence to assess the degree of significance of the bridge and individual components;
- Provide policies for the conservation of the cultural significance of the bridge, taking into account its historical and social significance, the significant physical fabric and more recent changes. Conservation policies are to facilitate the retention of the cultural significance of the place in any future upgrades, additions, alterations, conservation works or changes of use.

1.3 Site Identification and Ownership

The subject site is located on the northern edge of the Hawkesbury River at Wisemans Ferry, 75km northwest of the Sydney CBD and 44km northeast of Windsor, as shown below in Figure 1-1. While Wisemans Creek straddles four Local Government Areas: Hornsby, The Hills, City of Hawkesbury and Central Coast; Thomas James Bridge itself is partly located within the City of Hawkesbury Local Government Area (LGA) and partly located within the Central Coast LGA. The bridge is located on an active roadway, Settlers Road, shortly before the fork of Settlers Road and the Old Great North Road. To the south of the bridge is the Hawkesbury River; to the west is the MacDonald River; to the north and east is Dharug National Park.

The primary means of access to the site is via Settlers Road, with access from the direction of Wisemans Ferry / Greater Sydney by utilising the Wisemans Ferry crossing.

Figure 1-1: Location of the site in the context of the Greater Sydney area. (Source: SIX Maps, 2022.)

Figure 1-2: Location Plan showing Thomas James Bridge and its immediate vicinity. (Source: SIX Maps, 2022.)

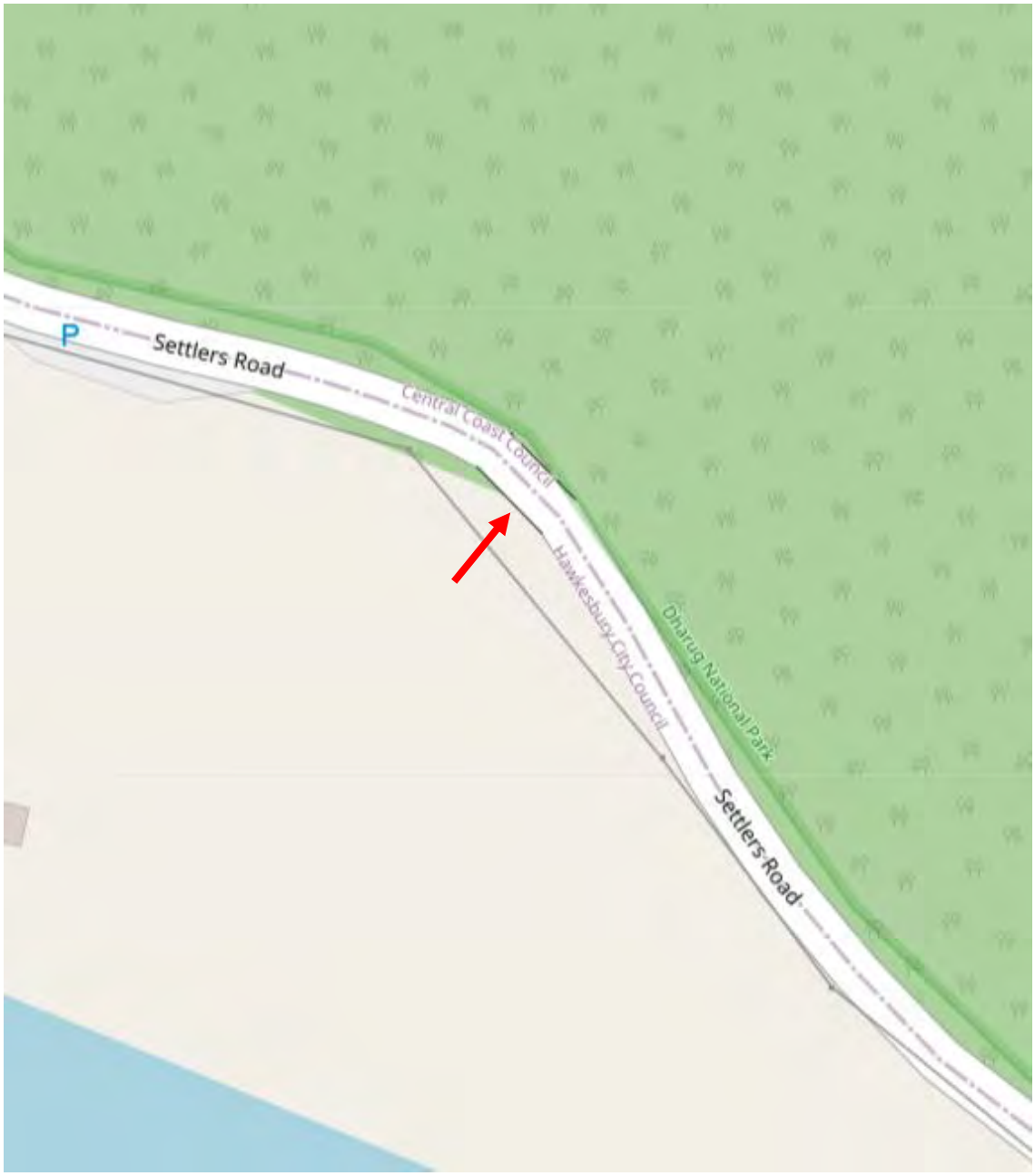


Figure 1-3: Location of Thomas James Bridge, showing the boundary of Hawkesbury and Central Coast LGAs. (Source: OpenStreetMap2022.)

1.4 Study Area

The study area for the purposes of this CMP is Thomas James Bridge and its immediate setting, including abutments, ravine, and escarpment.

Figure 1-3: Aerial photograph showing the location of Thomas James Bridge. (Source: SIX Maps, LPI, February 2022.)

1.5 Heritage Listings

1.5.1 Statutory listings

Thomas James Bridge is not currently listed on any statutory heritage registers. However, the Old Great North Road, of which Thomas James Bridge was a component at the time of construction, is listed on a number of registers, including the UNESCO World Heritage List. Additionally, Thomas James Bridge is located within the world heritage buffer zone for OGNR (see Figure 1-4). According to the UNESCO World Heritage Policy Compendium (Section 2.2.6 *Boundaries and buffer zones*):

> *For the purposes of effective protection of the nominated property, a buffer zone is an area surrounding the nominated property which has complementary legal and / or customary restrictions placed on its use and development to give an added layer of protection to the property.*

It is a finding of this CMP (see Sections 5 and 8) that Thomas James Bridge warrants heritage listing in the Hawkesbury and Central Coast LEPs and on the NSW State Heritage Register, as well as inclusion within the 'Australian Convict Sites – Old Great North Road' world heritage listing (by extending the area encompassed in the OGNR world heritage listing to include the bridge within the nominated world heritage area proper rather than within the world heritage buffer zone).

Thomas James Bridge should be considered in the context of the Great North Road, and by extension, within the context of the areas outlined as significant in the local, state and world

heritage listings for Old Great North Road. Until such time as Thomas James Bridge becomes appropriately heritage-listed (either as an individual item or as part of the listing for the Old Great North Road) as per the findings of this CMP, the same protections should be afforded the site and the same restrictions should be observed on its use and development as if the bridge were already a heritage-listed item.

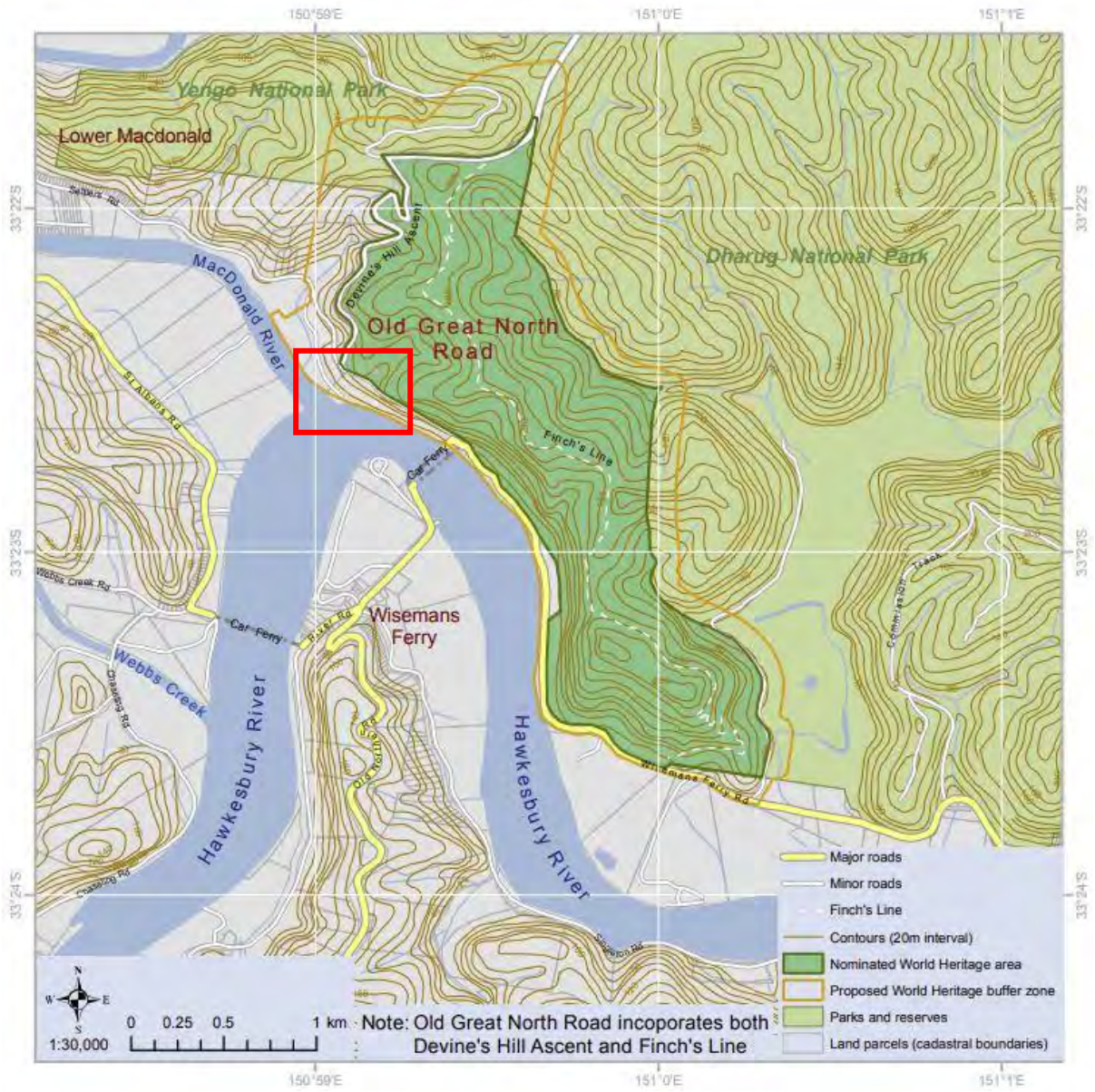


Figure 1-4: Extract from the UNESCO World Heritage List map for the Old Great North Road, showing Thomas James Bridge within the world heritage buffer zone and adjacent to the nominated world heritage area.
(Source: UNESCO World Heritage List – 'Australian Convict Sites,' accessed at https://whc.unesco.org/en/list/1306/multiple=1&unique_number=1648, July 2022.)

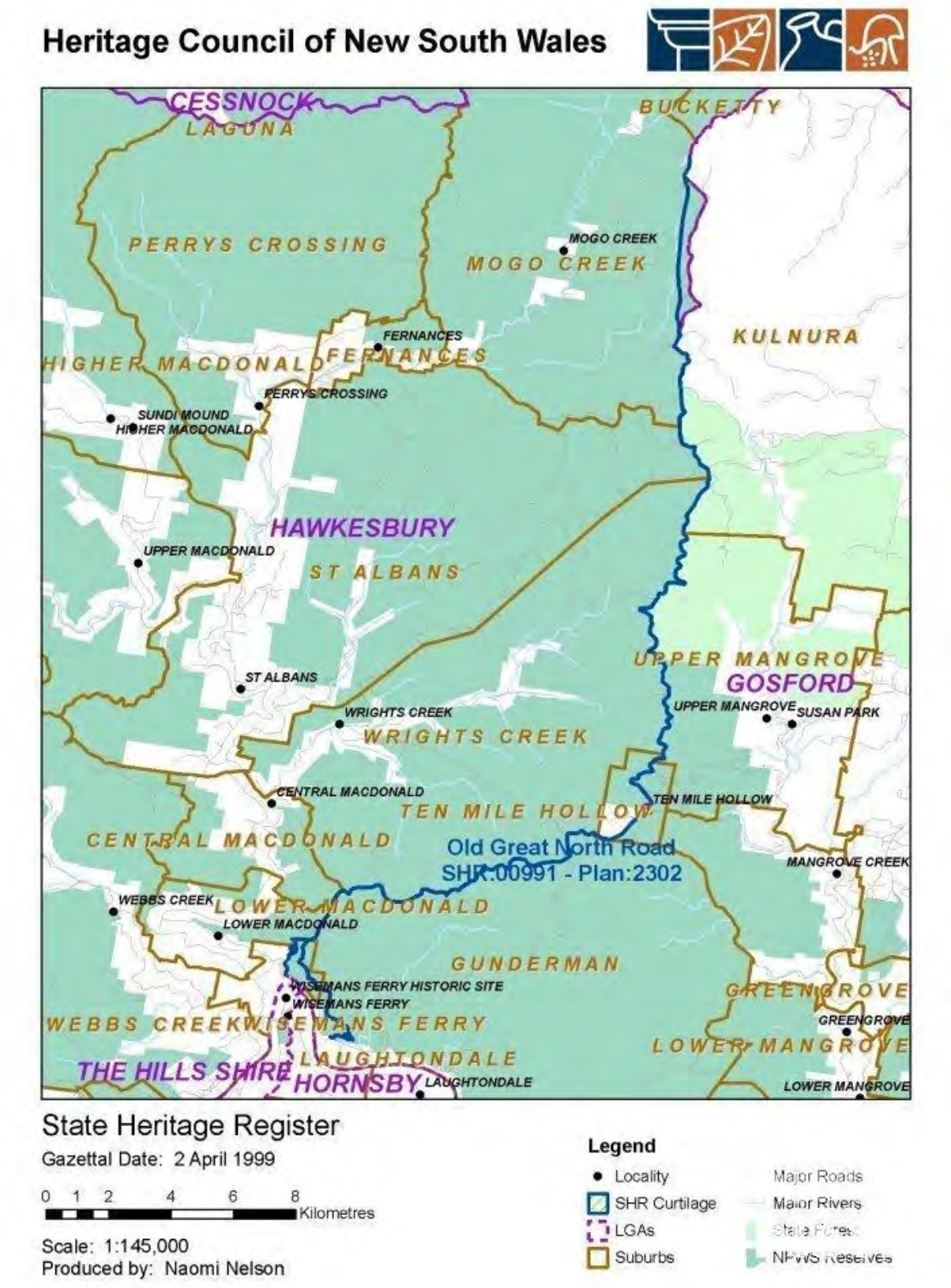


Figure 1-5: Curtilage for the state-listed *Old Great North Road, Between Devine's Hill and Mount Manning*. (Source: NSW State Heritage Inventory listing for the site, accessed at https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5051461, June 2022.)

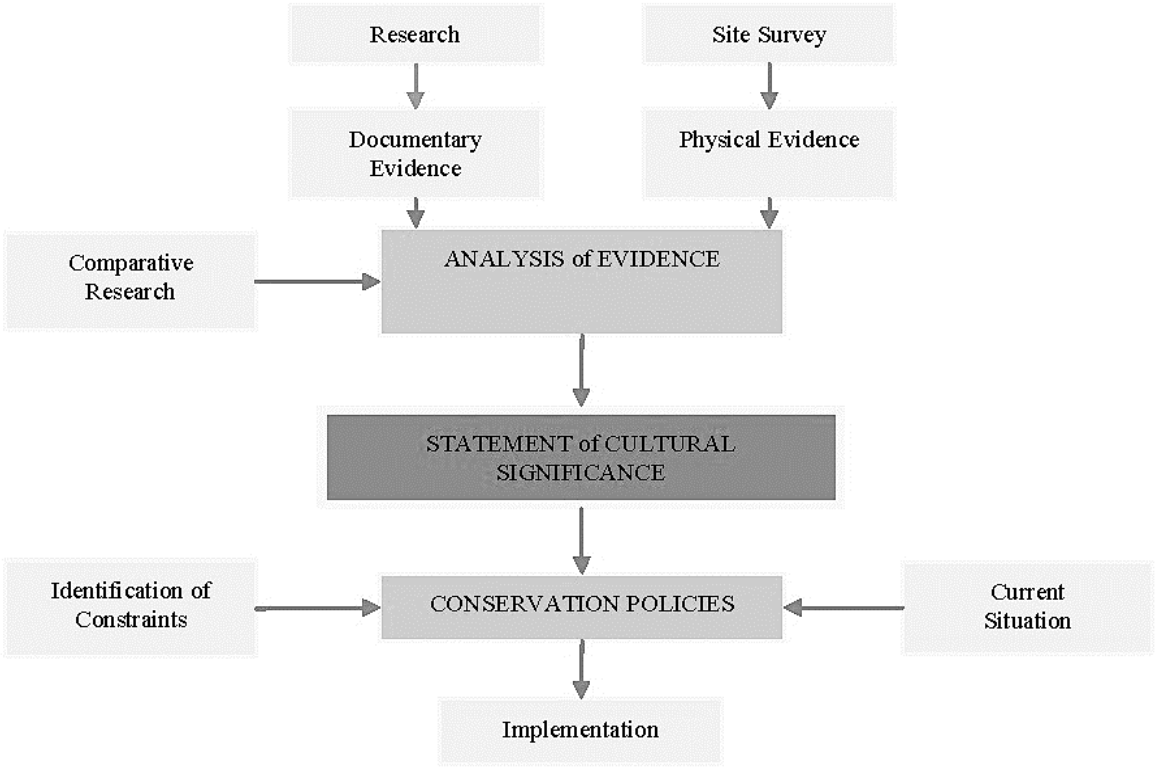
1.6 Authorship

This CMP has been prepared by OCP Architects Pty Ltd, written by Rowan Day and Geoff Stennet and reviewed by Otto Cserhalmi, Principal.

Unless otherwise noted in the report, photographs were taken by OCP Architects Pty Ltd.

1.7 Methodology and Structure

This report follows the general methodology set out in J.S. Kerr's *The Conservation Plan* and is consistent with the guidelines set out in the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter*, 2013).



The *Executive Summary* is followed by Section 1 *Introduction* and Section 2 *History,* which provides a history of the site.

Section 3 *Description and Physical Evidence* provides an overview of the physical fabric of the complex.

Section 4 provides a *Comparative Analysis* with the historical development of other comparable bridges, highlighting similarities and differences.

Sections 5 and 6 provide an assessment and grading of the cultural significance of the place.

Section 7 discusses the *Opportunities and Constraints,* providing a basis for the development of a strategy for implementation of the *Conservation Policies*, which are in Section 8. The conservation policies provide recommendations and guidelines for general conservation and the use and management of the place.

1.8 Limitations

This report does not address Indigenous heritage significance, which can take the following forms:

- Archaeology of Indigenous pre-history;
- Post-contact history;
- Present-day associations or spiritual attachments.

1.8.1 Inspections

Inspection of the bridge to assess the condition did not involve any physical intervention or removal of fabric. Access at the time of inspection was limited by partial road closures as a result of recent flooding.

1.9 Conservation terminology

The terms place, cultural significance, fabric, maintenance, compatible use, preservation, reconstruction, restoration, adaptation and conservation used throughout this report are as defined in the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter*, 2013) Articles 1.1 to 1.17 as follows:

1.1 ***Place*** means a geographically defined area. It may include elements, objects, spaces and views. Places may have tangible and intangible dimensions.

1.2 ***Cultural Significance*** means aesthetic, historic, scientific, social or spiritual value for past,

present or future generations. *Cultural significance* is embodied in the *place* itself, its *fabric*, *setting*, *use*, *associations, meanings*, records, *related places* and *related objects*. Places may have a range of values for different individuals or groups.

1.3 ***Fabric*** means all the physical material of the *place* including elements, fixtures, contents and objects.

1.4 ***Conservation*** means all the processes of looking after a *place* so as to retain its *cultural significance.*

1.5 ***Maintenance*** means the continuous protective care of a *place*, and its setting. Maintenance is to be distinguished from repair, which involves *restoration* or *reconstruction.*

1.6 ***Preservation*** means maintaining a *place* in its existing state and retarding deterioration.

1.7 ***Restoration*** means returning a *place* to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

1.8 **Reconstruction** means returning a *place* to a known earlier state and is distinguished from *restoration* by the introduction of new material.

1.9 ***Adaptation*** means changing a *place* to suit the existing *use* or a proposed use.

1.10 ***Use*** means the functions of a *place*, including the activities and traditional and customary practices that may occur at the place or are dependent on the place.

1.11 ***Compatible use*** means a *use* which respects the *cultural significance* of a *place*. Such use involves no, or minimal, impact on *cultural significance*.

1.12 ***Setting*** means the immediate and extended environment of a *plac*e that is part of or contributes to its *cultural significance* and distinctive character.

1.13 ***Related place*** means a *place* that contributes to the *cultural significance* of another place.

1.14 ***Related object*** means an object that contributes to the *cultural significance* of a *place* but is not at the place.

1.15 ***Associations*** mean the connections that exist between people and a *place*.

1.16 ***Meanings*** denote what a *place* signifies, indicates, evokes, or expresses to people.

1.17 ***Interpretation*** means all the ways of presenting the *cultural significance* of a *place.*

1.9.1 Abbreviations

CMP	Conservation Management Plan
LEP	Local Environmental Plan
NSW	New South Wales
OGNR	Old Great North Road
SHR	State Heritage Register
SLNSW	State Library of New South Wales
SMH	Sydney Morning Herald
SRNSW	State Records, New South Wales

1.10 Acknowledgements & Sources Consulted

The assistance of Sumeer Gohil of Shreeji Consultant is gratefully acknowledged in preparing this report.

The following reports and studies were utilised or referred to during the preparation of this CMP:

- *NSW Heritage Manual*, NSW Heritage Office;
- *The Conservation Plan*, Australia ICOMOS, 7th edition 2013, by J.S. Kerr;
- Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter,* 2013);
- *Heritage Curtilages*, NSW Heritage Office and the Department of Urban Affairs and Planning, 1996;
- *Old Great North Road Dharug National Park Conservation Management Plan,* Griffin NRM, March 2005;
- *Stage 1 Conservation Plan for the Great North Road*, Siobhan Lavelle, Dr Grace Karskens and RTA Technology for the Convict Trail Project, 1999.

2 HISTORY

2.1 Pre-European Historical Context and Early Contact

2.1.1 Aboriginal history

Prior to the appropriation of their land by European settlers from 1788, Aboriginal people lived in small family or clan groups that were associated with particular territories or places. It seems that territorial boundaries were reasonably fluid, although exact details are not known.[1] Wisemans Ferry is located within the traditional lands of the Dharug Aboriginal language group, who knew the area as Woolloomoorang, and the Hawkesbury-Nepean as Dyarubbin.[2] The area may have overlapped with the traditional land of the Darkinjung, whose territory extended from the Hawkesbury River northwards about 60km to Wollombi and the Hunter River.

Aboriginal people have lived around the Hawkesbury / Dyarubbin for around 50,000 years, with their ancestors arriving millennia before the last Ice Age.[3] The Aboriginal way of life prior to European settlement was a mobile existence, travelling between camping sites relating to food resources.[4] Dwellings primarily comprised of two-sided bark structures or 'gunyahs', whilst rock shelters were utilised during more extreme weather conditions.[5]

The river was a focal point as a source of food, including fish, eels, water birds, and mussels; as well as for transport, in bark canoes. Yams, a staple food, grew along the banks of the river. On sandstone platforms the Dharug engraved images of animals and mythological figures and in the rock shelters they displayed their ochre and charcoal art. The Hawkesbury was also a source of stones for axes and pebbles for making barbs, points and scrapers.[6]

In addition to travelling and relocating for basic survival needs, Aboriginal people would also make journeys for ceremonial reasons as well as for the acquisition of raw materials for medicines, body decoration; and tool, weapon and clothing manufacture.[7] As such, traditional migration routes and pathways were well-established by the time of European colonisation, and subsequently utilised by the settlers.[8]

2.1.2 The Hawkesbury and Wisemans Ferry

European Settlement in the Hawkesbury

The Hawkesbury was the third area of European settlement in mainland Australia, after Sydney and Parramatta, and it served as an important source of food for the infant colony. The Hawkesbury River was named by Governor Phillip in 1789 and explored by an expedition two years later. Formal settlement was initiated by Lieutenant Governor Major Francis Grose to help make the colony self-

[1] Val Attenbrow, Sydney's Aboriginal Past: Investigation the archaeological and historical records (Sydney: University of New South Wales Press, 2009), 111.
[2] Grace Karskens, *People of the River: Lost worlds of early Australia*, Allen & Unwin, 2020; Dictionary of Sydney.
[3] Grace Karskens, *People of the River: Lost worlds of early Australia*, Allen & Unwin, 2020, pp. 21 – 69.
[4] Attenbrow, Sydney's Aboriginal Past, 111.
[5] Attenbrow, Sydney's Aboriginal Past, 111; Annabella Boswell, Recollections of Some Australian Blacks: Bathurst District, 1835-40 (Australia: Publisher unknown, 1890), 4.
[6] Western Sydney Libraries, A brief look at the history of the Hawkesbury, http://westernsydneylibraries.nsw.gov.au/hawkesbury/history.html#:~:text=The%20original%20inhabitants%20of%20the,transport%2C%20in%20their%20bark%20canoes.
[7] Attenbrow, Sydney's Aboriginal Past, 111; John Oxley, Journals of Two Expeditions into the Interior of NSW, undertaken by order of the British Government in the years in the years 1817-18 (London: John Murray, 1820), 360.
[8] D. Johnson, Sacred Waters: The Story of the Blue Mountains Gully Traditional Owners, (Broadway: Halstead Press, 2007), 31-32.

supporting, and the fertile soils along the river soon earned the title of 'granary of the colony'. The farms at Pitt Town Bottoms in the Hawkesbury area are Australia's oldest still under cultivation.

In 1794, Grose reported that he had "settled on the banks of the Hawkesbury twenty two settlers, who seem very much pleased with their farms. They describe the soil as particularly rich, and they inform me whatever they have planted has grown in the greatest luxuriance".[9] These farms were approximately 25 acres each, located at Pitt Reach and Wilberforce Reach.

The produce from the Hawkesbury area supplemented that of Sydney and Parramatta. Among the early settlers to take up land in the area was James Ruse, the colony's first free farmer, who sold his property at Parramatta to take up land on the Hawkesbury. In 1807, Governor Bligh established Australia's earliest model farm in the area. Bligh was generally well regarded by the small farmers of the Hawkesbury, and they were among the most aggrieved when he was overthrown in the 'Rum Rebellion' the following year.

Production in the early years centred on wheat, maize and pigs. A Government granary was erected at Green Hills (later renamed Windsor) on the south bank of the river, with produce transported by boat to the settlement at Sydney. However, severe floods in 1801, 1806 and 1809 caused great losses. Settlers subsequently moved their homes and stock to higher ground but continued to cultivate the river flats.

In 1810, Governor Macquarie named the five 'Macquarie towns': Richmond, Windsor, Pitt Town, Castlereagh and Wilberforce. While the crossing of the Blue Mountains in 1813 soon opened up large tracts of new grazing and cropping country, the Hawkesbury region remained an important source of food and continued to be the chief supplier of the colony's vegetables.

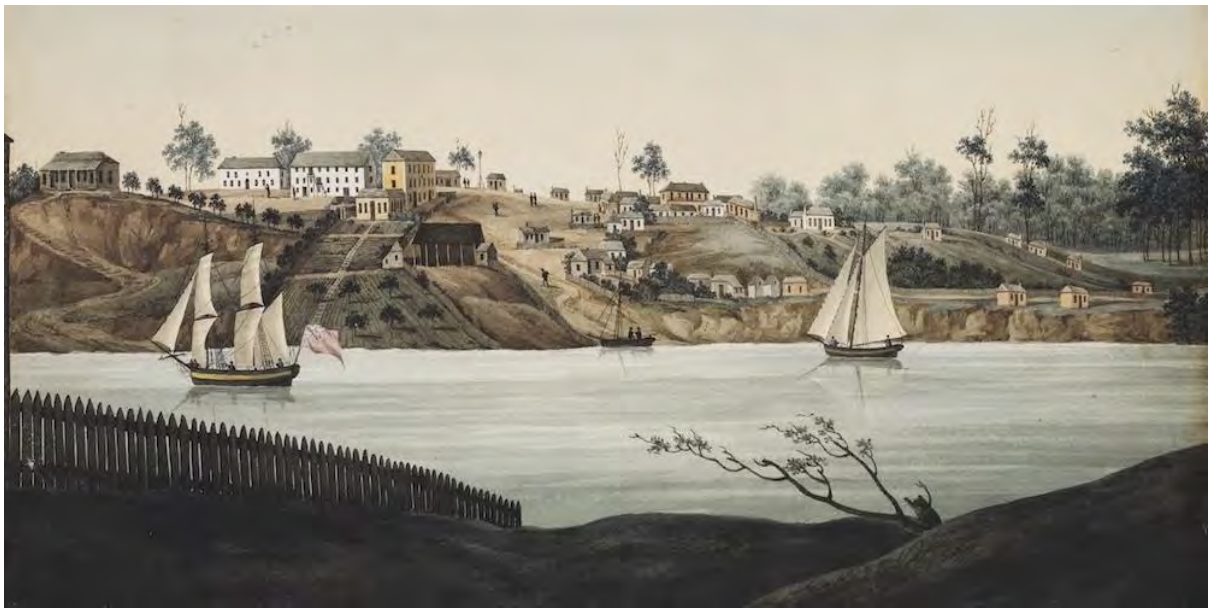


Figure 2-1: 'The settlement on the Green Hills [Windsor], Hawksburgh [Hawkesbury] River N.S.Wales, 1809, George William Evans (possibly). (Source: State Library of NSW.)

[9] Historic Records of New South Wales, Vol. 2, p.210.

Solomon Wiseman and Wisemans Ferry

Wisemans Ferry is named after the merchant Soloman Wiseman, who became known as the 'King of the Hawkesbury'. Wiseman, born in Essex in 1777, was a journeyman lighterman when convicted at the Old Bailey on 30 October 1805 of stealing over 300kg of Brazil wood from his employers. His death sentence was commuted to transportation for life, and in August 1806, he arrived in NSW aboard the *Alexander* with his wife, Jane, and two sons. In June 1810, he received a Ticket-of-Leave and in February 1812, an absolute pardon. In July 1811, the sloop *Hawkesbury Packet*, built for Wiseman, was launched at Cockle Bay; with it he entered the coastal trade and later added the sloop *Hope*. In December 1815, he was one of the merchants who petitioned Governor Lachlan Macquarie for permission to visit parts of the coast for cedar and coal to sell in Sydney; their request was refused, but during the next two years he received permission to bring cedar from Port Stephens on his own behalf and for other merchants. In July 1817, the *Hope* was wrecked at Port Stephens and two of the crew were killed by Aboriginals; two months later the *Hawkesbury Packet* was also wrecked.[10]

In August 1813, Wiseman had received a wine and spirits licence for premises in Bligh Street, Sydney. In 1817, he had agreed to sell them to Samuel Terry; after the wrecks he had to assign his property to Terry. Soon afterwards, he was granted 100 acres (40 ha) which he selected on the Hawkesbury River near Wilberforce. He then acquired the *Mary Ann*, which the Government chartered in 1821 to go to Port Macquarie. In 1823, he received a further grant of 200 acres (81 ha) near Benjamin Singleton's Mill Farm and in 1828 held 1100 acres (450 ha), acquired by grant and purchase. In 1826, he obtained a licence for his house on the road to Newcastle. The following year, he was given a lease of what became known as Wiseman's Ferry on the Hawkesbury River, on condition that Government horses and property were carried on it free of charge. The punt would soon link two stretches of the convict-built Great North Road, the land route between Sydney and the Hunter Valley to the north.

[10] 'Wiseman, Solomon (1777-1838)', Dictionary of Sydney, https://adb.anu.edu.au/biography/wiseman-solomon-2809, accessed June 2022.

Figure 2-2: Solomon Wiseman, c. 1820-1838, artist unknown. (Source: State Library of NSW.)

2.2 The Great North Road

2.2.1 Background to the Great North Road

In 1797, Lieutenant John Shortland, who had been sent in search of a number of convicts who had seized HMS *Cumberland* as she was sailing from Sydney Cove, was the first European to discover the Hunter region, approximately 170km north of Sydney. While returning, he entered what he later described as “a very fine coal river”, which he named after NSW Governor John Hunter. He returned with reports of the deep-water port and the area's abundant coal. Over the next two years, coal mined from the area was the New South Wales colony's first export. By the turn of the nineteenth century, the mouth of the Hunter River was being visited by diverse groups of men, including coal diggers, timber-cutters, and escaped convicts. Philip Gidley King, the Governor of New South Wales from 1800, decided on a more positive approach to exploit the now obvious natural resources of the Hunter Valley.

In 1801, a convict camp called King's Town (named after Governor King) was established to mine coal and cut timber. In the same year, the first shipment of coal was dispatched to Sydney. This settlement closed less than a year later.

A settlement was again attempted in 1804, as a place of secondary punishment for unruly convicts. The settlement was named Coal River and also Kingstown and then renamed Newcastle, after England's famous coal port.

Despite being well known as a fertile area, it was not until 1819 that Governor Macquarie considered opening the Hunter region to free settlement. There were two reasons for this. Firstly, since 1815 the number of free immigrants to the colony had been greatly increasing. The original settlement had expanded to fill the Cumberland Plain and new areas of settlement were needed. The lush

pastures of the Hunter Valley fulfilled this need. Secondly, with Newcastle having been a place of secondary punishment of convicts, isolation of this settlement from land access had been considered desirable. However, as some escapees had begun to find their way back overland by 1819, Macquarie decided to relocate the convicts to an alternative site. He resettled them in Port Macquarie in 1822. Subsequent free settlement in the Hunter was rapid. In 1821, there were 21 free settlers in the Hunter Valley, which by 1825 had grown to 283. Towns such as Wallis Plains (present day Maitland) and Patrick's Plains (present day Singleton) developed to serve the area as its population increased.[11]

Access to the lower end of the Hunter Valley was still by water. In 1819, the route for Howe's Track (Bulga Road) was partially located, and by April 1820, it was completely marked by blazed trees from St Patrick's Plains to Windsor. Some of the track is present-day Putty Road. This marked line was in use for transport of cattle and sheep in 1821, but was not trafficable for carts until November 1822. The track gave access to the upper end of the valley, but settlement here was not well established until the second half of the century. The route was arduous and circuitous and considered to be of little use to most of the settlers in the valley.[12]

2.2.2 Construction of the Great North Road

Given the tenuous transport links to the Hunter Valley at that time (as described in Section 2.2.1), it became apparent to the Government that there was an urgent need for better overland access to the Hunter Valley from Sydney. The Great North Road was planned to fill this need, with the added benefit of being a means to occupy the growing numbers of convicts in the colony, as well as to remove them from settled areas. In 1825, surveyor Heneage Finch was despatched to find a better route north, and his general tracing was the original line for the Great North Road.[13]

The Great North Road can be seen as a signifier of the outlooks of early colonial society. Its magnificent structures were powerful, tangible symbols of the colony's perceived place and role in the new / growing empire, unmistakeable evidence that the 'civilised state' was being attained, and a triumph over the rugged and inhospitable landscape separating the centre of Sydney from the 'garden of the colony', the Hunter Valley. The original line of the Great North Road was probably one of a web of Aboriginal tracks in this area, and it appears that people of the Darkinjung tribe may have purposely diverted the European trail-blazers to avoid particular sacred sites.[14]

The settlers of the Hunter Valley, many of whom were wealthy and well-connected, presented a petition to Governor Brisbane in April 1826 requesting that the line marked by Finch be constructed. As a result, work on the road eventually began in a modest fashion in September 1826, when two gangs – totalling 67 men – were posted north of Castle Hill. Another gang was sent up to the road in December; while in 1827, gangs were also sent to Newcastle in the north to work on the road southwards. During that year, the work north and south of Wisemans Ferry was supervised by Lieutenant Jonathon Warner. Warner was responsible for the initial construction of the approaches to the Hawkesbury, and the work of this period reflects his interest in minimising both time and effort spent on construction. Some of these early structures were improved, rebuilt or replaced by Warner's successor, Lieutenant Percy Simpson. Simpson, who described himself as having

[11] The Old Great North Road, Dharug National Park CMP, Griffin NRM, 2005, p. 2-3.
[12] The Old Great North Road, Dharug National Park CMP, Griffin NRM, 2005, p. 2-3.
[13] Great North Road Conservation Management Plan, 1999, p. 6.
[14] The Old Great North Road, Dharug National Park CMP, Griffin NRM, 2005, p. 2-4.

'knowledge of surveying and roadmaking', was appointed Assistant Surveyor at Lower Portland Head in June 1828.

Canadian-born Simpson – a lieutenant in the Royal Corsican Rangers – as well as judge-advocate and subsequently governor of the Ionian Island of Paxos, had migrated to NSW in November 1822. He had sufficient capital for a grant, cattle, convict servants and six months rations. As a relation of Major John Ovens, Simpson had immediate entrée to Governor Brisbane, who persuaded him to become commandant of an experimental agricultural settlement for 'educated convicts' in the Wellington valley, north-west of Bathurst. Simpson later described his responsibilities as unlike those of any other in the colony: as commandant, chaplain, commissary and engineer, he was paid based on his productivity rather than having a set salary.[15]

Simpson's period of superintendence of the Great North Road was marked by far more ambitious and permanent structures: 'lofty and massive side-walls' of the best quality masonry, deep cuttings and quarries, elaborate drainage systems and simple but handsome bridges on the road between Wisemans and Mt Manning, including Thomas James Bridge. It was during Simpson's period that the road was named the Great North Road and was transformed from a simple cart track to a fine and permanent avenue. Further north, around Wollombi, Heneage Finch was appointed to superintend the gangs in 1830, resolving to 'complete a road equally secure with the other part [i.e. Simpson's]'.[16]

This grander and more imposing version of the road was given impetus by the arrival of Surveyor General Major Thomas Mitchell in 1827. Mitchell took to the roads with great zeal. Believing that the best 'scientific' or 'true' roads were based, not on the paths of 'black natives', nor the tracks of the settlers, but on the straightest lines possible, Mitchell set about resurveying practically every road in the colony. In 1829, he resurveyed Finch's original 1825 traverse (much of which was an established cart track), deviating from it at many points, including Twelve (now Ten) Mile Hollow, Hungry Flat and Sampson's Pass. At these particular points, the road as constructed and surveyed by G.B. White in 1831 differed again from Mitchell's chosen line, probably because to build the route selected by Mitchell would involve too much construction, even for the numerous road gangs posted in that area.

By 1832, the substantial structures over the stony mountains, ridges and gorges were mainly complete, and the convicts who had acquired skills in their construction were shifted to other Great Roads.

[15] Australian Dictionary of Biography, 'Simpson, Percy (1789-1877)', entry by Beverley Johnson.
[16] Great North Road Conservation Management Plan, 1999, p. 7.

Figure 2-3: Howe's Road (named for John Howe), Lambton, [1887 - 1890]. (Source: The Ralph Snowball / Norm Barney Collection, University of Newcastle, Cultural Collections.)

Figure 2-4: Map by Thomas Livingstone Mitchell. (Source: The collections of the State Library of New South Wales [Illustrations from Progress in Public Works & Roads in NSW, 1827-1855, ML A 331A, Opp. P.83] (Mitchell Library).)

Figure 2-4: Wiseman's Ferry, c. 1850 (Conrad Martins). (Source: State Library of NSW.)

Figure 2-5: Old Great North Road with Wisemans Ferry in background, 1890. (Source: National Archives of Australia.)

2.3 Construction of Thomas James Bridge

Thomas James Bridge was built on the north side of the Hawkesbury River at Wisemans Ferry in 1830 by No. 25 Road Party. It is one of 8 surviving bridges on the Great North Road (of an original 22); and the oldest bridge still in use on the Australian mainland. The simple single span timber bridge deck is supported by massive stone abutments, the stone for which was quarried from the surrounding hill side and worked on site. Some large stones lying at the head of the gully show evidence of the quarrying and splitting of stones. The stone was all quarried, cut and moved into place by hand, and forms a 16.3 metre long channel along the banks of the creek.

As no plans or direct correspondence about this bridge exist, it is not known with certainty who designed it, though it is likely to have been Percy Simpson himself. Under Simpson, Thomas James was the overseer directly in charge of No. 25 Road Party, and the bridge bears his name. Thomas James was a Ticket-of-Leave overseer. He arrived in NSW in 1819, aged 24, onboard the *Recovery* with 187 other convicts, having been sentenced to life at Gloucester Assizes for an unknown crime.

By 1824, James was in the Bathurst Road Party stationed at Richmond, before being transferred to No. 25 Road Party at Wisemans Ferry. By 1830, he had obtained his Ticket-of-Leave and was the Overseer of No. 25 Road Party. By 1837, he was living at Penrith and in 1842, he obtained a Conditional Pardon.

Thomas James was obviously a skillful overseer who could inspire the convicts to produce high quality work, evident by this bridge named after him on the OGNR. No. 25 Road Party – the group that built the bridge – was responsible for some excellent work elsewhere on the road, and the bridge party that built Clares Bridge was later formed from No. 25 Road Party.

Figure 2-6: Illustration by Conrad Martens of the junction of the MacDonald and Hawkesbury Rivers. The following description is courtesy of the State Library of NSW: *Heading home in 1838, after a month-long trip to the Blue Mountains, Conrad Martens sketched the junction of the Hawkesbury and Macdonald rivers at Wisemans Ferry. The small holdings seen scattered through the valley document the early settlement around the Macdonald River. A survey in 1833–34 showed some 86 landholders in the area and by the mid-1840s the population reached a peak of more than 1000 people on about 100 small properties. Between 1838 and 1839 Martens produced at least 11 versions of this scene.* (Source: State Library of NSW, file number: FL444360.)

3 DESCRIPTION & PHYSICAL EVIDENCE

3.1 Landscape and Setting

Thomas James Bridge is situated on the northern bank of the Hawkesbury River, at the confluence of the Macdonald and Hawkesbury Rivers. To the immediate north and east of the bridge is an escarpment that forms part of Dharug National Park. Approximately 90 metres west of the bridge, travelling along Settlers Road, is the commencement of the Old Great North Road, which is situated within the boundary of the Dharug National Park.

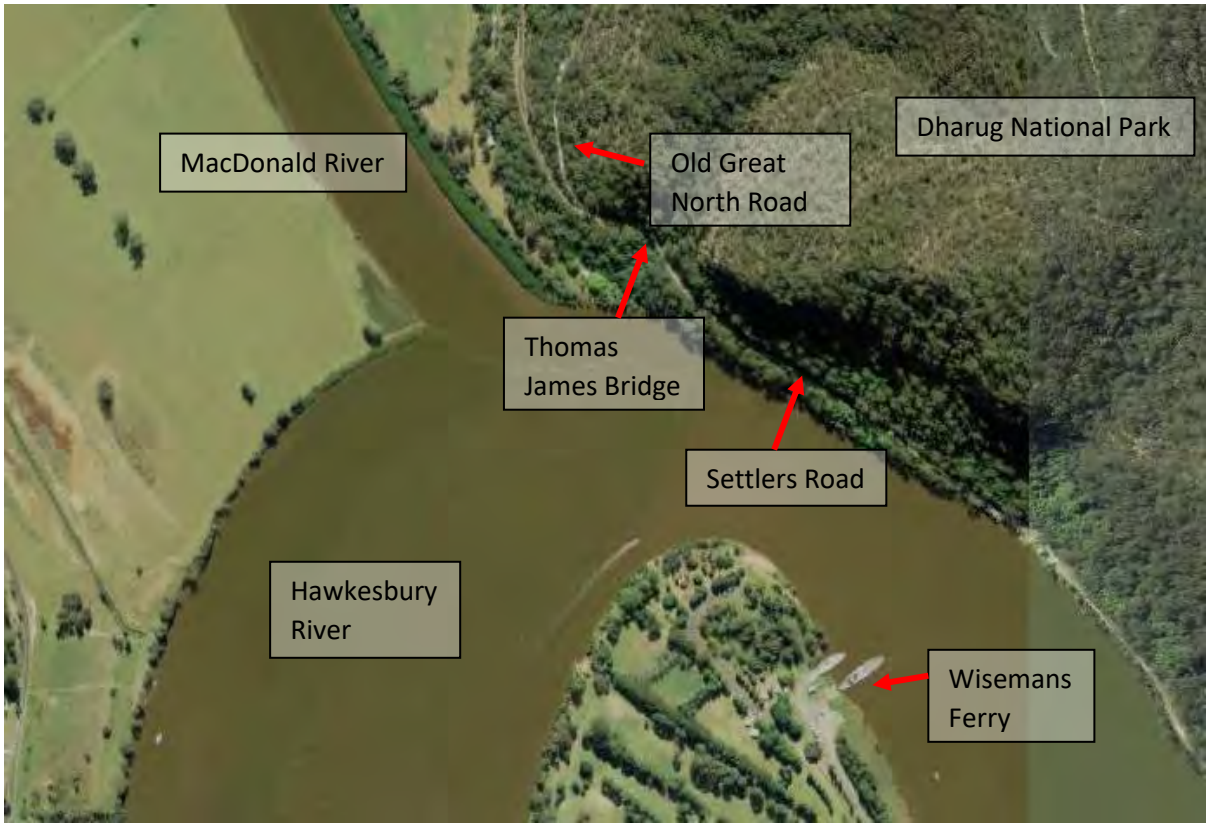


Figure 3-1: Aerial view of the broad setting, showing the junction of the MacDonald River (top) and the Hawkesbury River (bottom) with the escarpment on the right forming the western edge of Dharug National Park. (Source: SIX Maps, 2022.)

Figure 3-2: View of the escarpment to the immediate northeast of the bridge. (Source: OCP Architects, 2022.)

Figure 3-3: Left: View of the escarpment rising above Thomas James Bridge. Right: View of the entry to Old Great North Road / Dharug National Park. (Source: OCP Architects, 2022.)

Figure 3-4: Looking southwest from the bridge, with the river just visible through vegetation. (Source: OCP Architects, 2022.)

3.2 Physical Description

Thomas James Bridge is a simple single-span timber bridge deck, supported by massive stone abutments, the stone for which was quarried from the surrounding hill side and worked on-site. Some large stones lying at the head of the gully show evidence of the quarrying and splitting of stones. The stone abutments form a 16.3 metre long channel along the banks of the creek. Modern concrete headstocks help spread the load over the 1830 masonry abutments. The 6 metre high stone abutments are sloped and flared at the base. Wing walls extend from the abutments along the riverside edge of the road, supporting it for 8 metres along the northern side and 30 metres to the south.

The bridge was built with two stone culverts within the uphill side of the abutments. These culverts have flagged and walled races to catch the water tumbling down the cliff face and direct it into the main channel, thus protecting the stone work.

The timber deck is 7.7 metres wide and 5 metres long; in fact, it is set on concrete headstocks added into the tops of the older masonry abutments. The bridge was built during 1830 by No. 25 Road Party, under the broad supervision of Percy Simpson and direct supervision of Thomas James. There are two massive masonry abutments for a conduit 16.3 metres long on the banks of the creek. The stone abutments are 6 metres high, battered and flared at the base. The masonry is high class type 3b work. Very large stones are used in the foundation courses, with size decreasing towards the top.

There are modern metal guardrails extending along the riverside of the embankment, stretching from the bridge for approximately 35 metres to the southeast, and from the bridge approximately 16 metres to the northwest.

Figure 3-5: View of Thomas James Bridge prior to recent landslips caused by flooding. (Source: Wisemans Ferry Forgotten Valley.)

Figure 3-6: Western approach to the bridge, showing (right) stone abutments and modern electricity pole. (Source: OCP Architects, 2022.)

Figure 3-7: View of riverside of Thomas James Bridge, showing convict-quarried stone abutments. (Source: OCP Architects, 2022.)

Figure 3-8: Left: Eastern approach to the bridge. Right: View towards the Hawkesbury River from the eastern side of the bridge. (Source: OCP Architects, August 2022.)

Figure 3-9: View of the surface of the bridge towards the northeast. (Source: OCP Architects, August 2022.)

Figure 3-10: Views of the surface of the bridge looking east, with the collapsed section of the slope visible to right. (Source: OCP Architects, August 2022.)

Figure 3-11: Views of the timber decking to the surface of the bridge. (Source: OCP Architects, August 2022.)

Figure 3-12: View of the bridge and stone abutments on the riverside. A collapsed section of slope can be seen at top right. (Source: OCP Architects, 2022.)

Figure 3-13: View of the bridge towards the Hawkesbury River. (Source: OCP Architects, August 2022.)

Figure 3-14: View of the bridge looking northeast. (Source: OCP Architects, 2022.)

Figure 3-15: View of the bridge and the stone-lined channel underneath. (Source: OCP Architects, 2022.)

Figure 3-16: View of the bridge to Dharug National Park side, with a drainage channel visible in the face of the stonework. (Source: OCP Architects, 2022.)

Figure 3-17: View of drainage channel intake. (Source: OCP Architects, August 2022.)

Figure 3-18: Views to underside of the bridge and the stone-lined channel beneath, towards Dharug National Park. (Source: OCP Architects, August 2022.)

Figure 3-19: Views to underside of the bridge and the stone-lined channel beneath, towards the Hawkesbury River. (Source: OCP Architects, August 2022.)

Figure 3-20: Views of the convict-quarried stonework. (Source: OCP Architects, August 2022.)

Figure 3-21: Views of damaged timber elements of the bridge. (Source: OCP Architects, August 2022.)

Figure 3-22: View of an existing instance of shotcrete to the escarpment above Thomas James Bridge. (Source: OCP Architects, August 2022.)

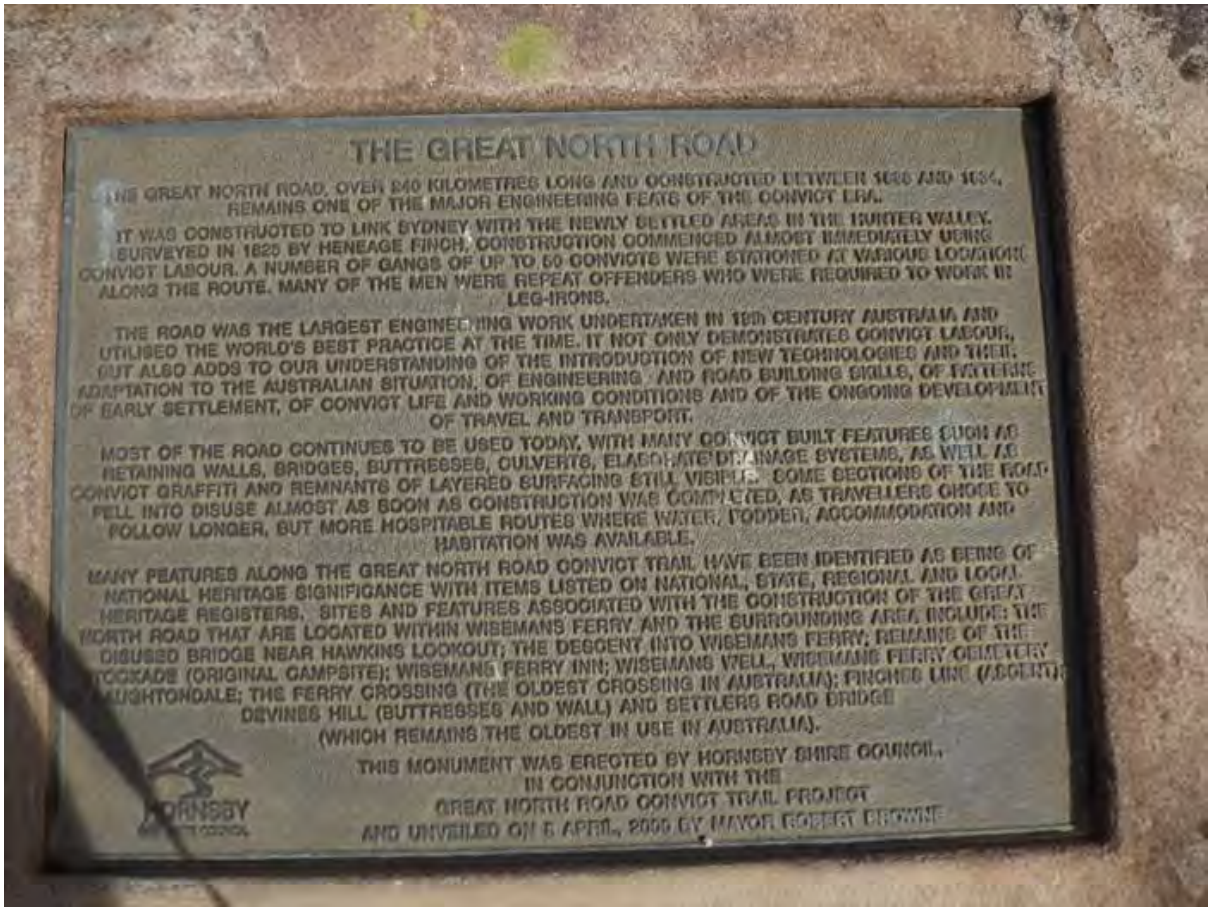


Figure 3-23: Plaque to the Great North Road beside the statue of Solomon Wiseman, across the river in Wisemans Ferry, noting the Settlers Road Bridge (an alternate name for Thomas James Bridge) as a component of the Great North Road and noting it as the oldest in-use bridge in [mainland] Australia. (Source: OCP Architects, 2022.)

Figure 3-24: Existing interpretative devices in place at Thomas James Bridge on eastern approach, with plaque embedded in stone to left of image and road sign in centre. (Source: OCP Architects, August 2022.)

Figure 3-25: Plaque to the Great North Road beside Thomas James Bridge. (Source: OCP Architects, August 2022.)

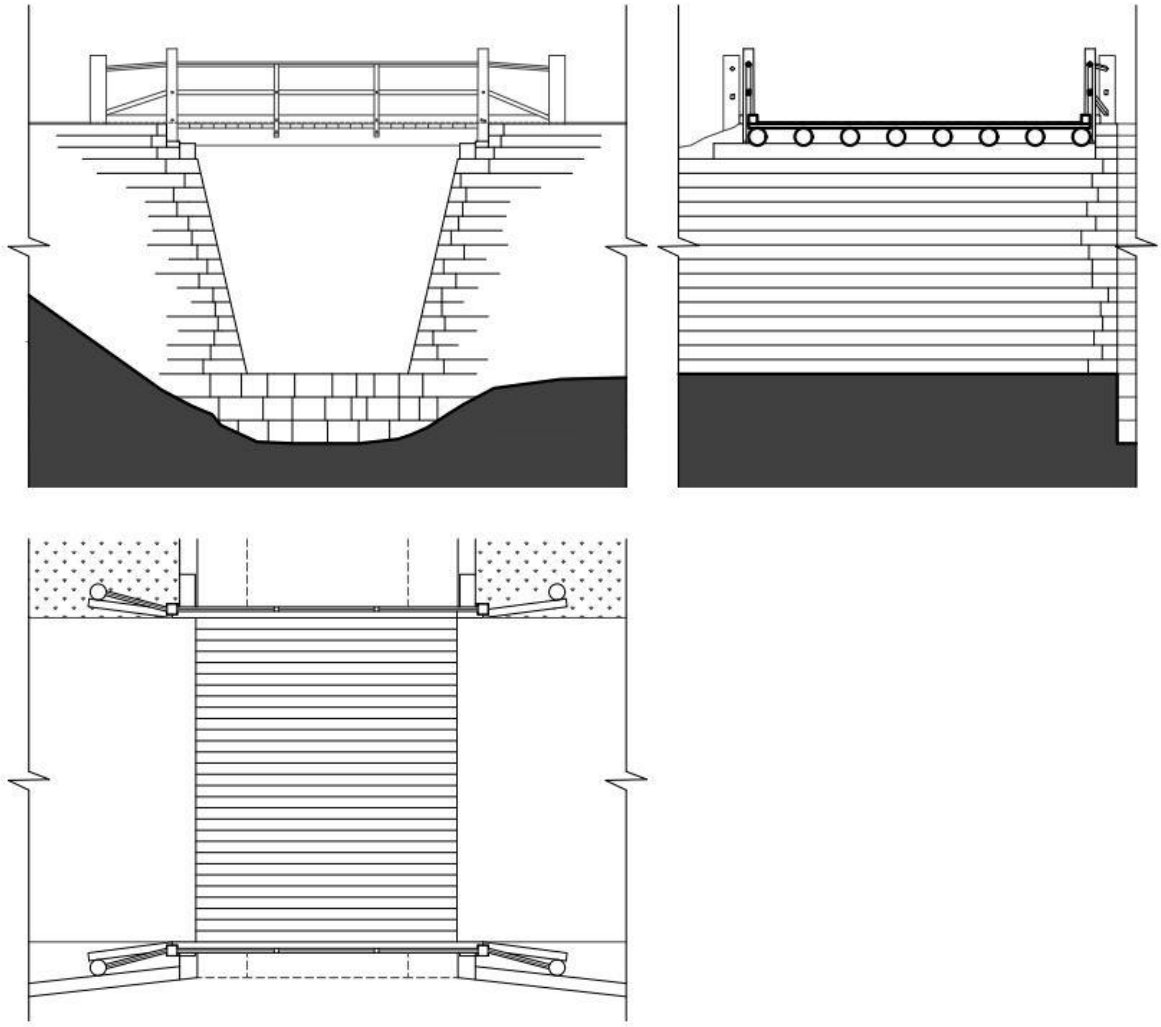


Figure 3-26: Southwest elevation, cross-section, and plan of Thomas James Bridge. (Source: OCP Architects, August 2022.)

4 COMPARATIVE ANALYSIS

This comparative analysis compares Thomas James Bridge with convict-era bridges in New South Wales. Bridges constructed prior to the 1830s were built following relatively simple forms. The majority of these were timber structures, with the occasional use of stone piers. The first bridge constructed in NSW was built in 1788: it was a simple timber bridge constructed over the Tank Stream, near what is today the intersection of George and Bridge Streets in the Central Business District of Sydney. Soon after its completion, it was washed away and needed to be replaced. The first 'permanent' bridge in NSW was this bridge's successor: a masonry and timber arch bridge with a span of 24 feet, erected in 1803. However, this was not a triumph of colonial bridge engineering, as it collapsed after only three years' service. It took a further five years for the bridge to be rebuilt in an improved form. The contractor who undertook this work received payment of 660 gallons of spirits, this being an alternative currency in the colony at the time.[17]

Other early bridges were constructed in timber; including one in Parramatta, which was built by Major Grose in 1794. This bridge was washed away in 1795 and was replaced by a second bridge; built a few years later and repaired in 1802. The Duck River Bridge between Parramatta and Sydney was completed in October 1797. This was later destroyed by fire in 1839.

Prior to the arrival of David Lennox in the colony in 1832, NSW was without expert knowledge in bridge design and construction. The earliest masonry bridge extant in NSW is the Horseshoe Bridge on Mitchell's Pass, near Lapstone. Completed in 1833, it is located on Mitchell's Pass and is part of the Great Western Road. It was David Lennox's first project following his appointment as Sub-Inspector of Roads on 1 October 1832. This bridge marked the introduction of modern bridge engineering technology in NSW, earning Lennox the description of the "first 'scientific' bridge builder in the colony".[18]

During the first 60 years of the colony, the majority of bridges were built from stone or timber, in the same manner as bridges being constructed in Britain and Europe. Stone was the bridge-building material of choice in NSW, with construction costs kept low by the use of convict labour. However, with the cessation of convict transportation in the 1840s and subsequent rise in labour costs, bridge designers were forced to explore the use of other materials in bridge construction, leading to the eventual adoption of timber as the economical alternative. The size and quantity of readily available Australian hardwoods in the 1800s allowed for the design and construction of efficient timber truss bridge designs reaching respectable spans.[19]

Lennox Bridge, Glenbrook

Lennox Bridge, Glenbrook, is the oldest stone bridge on the Australian mainland. It commands State Significance in NSW as the design of a newly arrived Scottish stone-mason, David Lennox – who was handpicked by the percipient Surveyor General Thomas Mitchell – and as the work of some twenty diligent, efficient, tightly supervised and technically able convicts. The bridge was a necessary part of the road communications between Sydney and the West for over a century and proved remarkably durable. Its historical significance is augmented by its aesthetic and technical values. The original bridge – built in a horseshoe curve – was daring, experimental and remarkably attractive; despite

[17] Bridge Types in NSW: historical overviews, RTA, 2006, p. 2.
[18] Bridge Types in NSW: historical overviews, RTA, 2006, p. 2.
[19] Bridge Types in NSW: historical overviews, RTA, 2006, p. 3.

significant restoration work in 1976, the structure has retained a high degree of its original fabric and is in good condition. The work did not detract from the aesthetic and technical values inherit in the design and fabric of the bridge. The bridge has State Significance as the oldest bridge permitting vehicle transport on a route essential to the state's development.

Figure 4-1: Lennox Bridge, Glenbrook. (Source: NSW Government.)

Lennox Bridge, Parramatta

Lennox Bridge, Parramatta, is of State Significance in NSW for historical and aesthetic reasons; for its association with its engineer David Lennox; and as a representative example of early professional engineering and manufacturing practices in NSW. The bridge – built c. 1836-1839 – was instrumental in defining and creating Parramatta's townscape. To the present day, the bridge presents one of Parramatta's key landmarks, widely appreciated in the local community. The design and fabric of the bridge are of major importance in understanding the early history of engineering in NSW. Additionally, the bridge is rare as one of the earliest bridges in New South Wales and Australia.

Figure 4-2: Lennox Bridge, Parramatta. (Source: NSW Government.)

Lennox Bridge, Lansdowne

Lennox Bridge, Lansdowne, is of State Significance as 'one of the finest examples of colonial architecture in Australia'[20] and as 'David Lennox's masterpiece of design.'[21] The bridge was built by convicts between 1834-1836 under the direction of David Lennox. Its sandstone arch has the largest span of any surviving masonry bridge in Australia. The size, appearance and durability of the bridge make it an outstanding example of colonial engineering.[22]

Figure 4-3: Lennox Bridge, Lansdowne. (Source: NSW Government.)

Other bridges on the Great North Road

Clares Bridge: Clares Bridge was built between January and September 1830 and is named after Arnold Clare, the supervisor of the convicts who built the bridge. Clares Bridge was built by men from the same No. 25 Road Party that built Thomas James Bridge.

The sandstone blocks used in the construction of Clares Bridge were quarried from an outcrop above it. Jumper marks, split rock faces, shaped stone and unsplit wedge pits remain from this work.

Large cobblestones underneath the bridge prevent its foundations from being undermined during heavy water flows.

The Convict Trail Project, a community project that began in the 1990s, completed conservation works on Clares Bridge in 2004. This included the removal of steel decking and the reconstruction of the western side of the southern abutment. There is currently no decking over the bridge.

Circuit Flat Bridge: Circuit Flat Bridge was built in 1831 – likely by the same convict bridge-building party that had constructed Thomas James Bridge and Clares Bridge – under the direct supervision of the convict-gang overseer, William Barrat. The stone buttresses and Bucketty Wall are all that remain of the bridge, with the original decking no longer extant. However, Circuit Flat Bridge remains an impressive example of colonial engineering, and is the fourth-oldest bridge in mainland Australia.

[20] 'Lansdowne Bridge,' State Heritage Register, https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5051374, accessed August 2022.
[21] State Heritage Register, 'Lansdowne Bridge.'
[22] State Heritage Register, 'Lansdowne Bridge.'

Figure 4-4: Clares Bridge.

Figure 4-5: Circuit Flat Bridge.

Comparative Analysis Conclusions

Thomas James Bridge is comparable to the David Lennox bridges in Glenbrook, Parramatta and Lansdowne due to their materiality (coursed ashlar stone masonry), as well as due to the use of convict labour in their construction. For the same reasons, Thomas James Bridge is comparable to Clares Bridge and Circuit Flat Bridge, but also because these three bridges are located along the Great North Road.

Thomas James Bridge is the oldest surviving bridge in NSW that remains in use. As a pre-Lennox bridge, it is exceedingly rare. The bridge is a physical embodiment of how colonial expansion manifested itself throughout New South Wales during the early nineteenth century through the public construction of a system of 'great roads', commencing with the Great North Road.

Unlike other bridges on the Old Great North Road, Thomas James Bridge is relatively well preserved and retains its decking and timber elements, which adds substantially to its overall significance.

5 STATEMENTS OF SIGNIFICANCE

This report adopts the methodology and terminology of *The Burra Charter* (2013), *The Conservation Plan* by J.S. Kerr (7th edition 2013) and the criteria of the NSW Heritage Council in the assessment of significance.

The NSW heritage assessment criteria provided in the NSW Heritage Manual *Assessing Heritage Significance* (NSW Heritage Office, July 2001) encompass the following four values from *The Burra Charter* (Australia ICOMOS, 2013) which are commonly accepted as generic values by Australian heritage agencies and professional consultants:

- historical significance
- aesthetic significance
- scientific significance (which includes Archaeological Significance)
- social significance (current social value)

Article 1.2 of *The Burra Charter* defines *cultural significance* as the 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations.'

Article 26.1 of *The Burra Charter* states that: 'Work on a *place* should be preceded by studies to understand the place which should include analysis of physical, documentary, oral and other evidence, drawing on appropriate knowledge, skills and disciplines.'

Once the place has been studied, the cultural significance can be assessed. The sections below evaluate the cultural significance of Thomas James Bridge by considering the documentary and physical evidence presented in the preceding sections of this report.

The assessment criteria used in this CMP to develop the Statement of Significance conform to those set by the NSW Heritage Council for nomination of items as either Local or State Heritage Significance. These categories are:

- Historic Significance (Criterion A & B)
- Aesthetic Significance (Criterion C)
- Social Significance (Criterion D)
- Scientific or Technical Significance (including Archaeological Significance – Criterion E).
- Rarity and Representativeness Significance (Criterion F & G)

Assessment of Significance for Thomas James Bridge

Criterion A - Historical Evolution

An item is important in the course, or pattern, of NSW's cultural or natural history (State Significance); OR

An item is important in the course, or pattern, of the local area's cultural or natural history (Local Significance).

Constructed as part of the Great North Road, Thomas James Bridge has high individual historic significance as the earliest surviving in-use bridge in mainland Australia. Though Thomas James Bridge is not currently heritage-listed – despite it sitting metres outside the delineated areas of both

state and international heritage listings and being included within the world heritage buffer zone for OGNR – it should be seen as having collective significance alongside and within the Old Great North Road.

The Great North Road was the first road to be constructed north of the Hawkesbury, and its scale and expense symbolised the imperial ambitions of the colony; as well as being an important expression of the convict system. Thomas James Bridge is a rare example of the Great North Road that both remains substantially intact, and continues to be used by the public.

Thomas James Bridge satisfies Criterion A at a STATE level.

Criterion B - Historical Associations

An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (State Significance); OR

An item has strong or special association with the life or works of a person, or group of persons, of importance in the cultural or natural history of the local area (Local Significance).

Thomas James Bridge is associated with Percy Simpson – surveyor, engineer and administrator – who was instrumental in the design and oversight of the Great North Road. Surveyor General Major Thomas Mitchell has an indirect association with the bridge for his early surveying work on the scheme. It is associated with Governor Ralph Darling, who established the convict road gang system with the aim of providing the infrastructure for what he saw as more bureaucratically competent governance.

The bridge bears the name of the then Ticket-of-Leave convict, Thomas James, which highlights the bridge's strong association with convicts and the convict system more broadly. Convict labour built the bridge, and included the quarrying of the stones for the abutments. This convict association is recognised, by extension, in the world heritage listing of the Old Great North Road as one of 11 internationally significant Australian convict sites, with the nominated world heritage area of this listing terminating just metres from the bridge – despite the bridge being built as part of the same scheme by the same convicts under the same supervision, and despite remaining substantially intact.

Thomas James Bridge satisfies Criterion B at a STATE level.

Criterion C - Aesthetic Values

An item is important in demonstrating aesthetic characteristics and / or a high degree of creative or technical achievement in NSW (State Significance); OR

An item is important in demonstrating aesthetic characteristics and / or a high degree of creative or technical achievement in the local area (Local Significance).

Thomas James Bridge has aesthetic significance as a fine example of a pre-Lennox colonial NSW bridge, with imposing convict-quarried stone abutments. It contributes to the rugged and picturesque wider aesthetic setting of the area, as a stone and timber structure that is in keeping with the Old Great North Road more generally.

Thomas James Bridge satisfies Criterion C at a STATE level.

Criterion D - Social Values

An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons (State Significance); OR

An item has strong or special association with a particular community or cultural group in the area for social, cultural or spiritual reasons (Local Significance).

The bridge contributes to the community's sense of place, as both a symbolic historical link to the area's colonial and convict history, and a functional link between Wisemans Ferry, Greater Sydney, and communities further north.

Thomas James Bridge satisfies Criterion D at a LOCAL level.

Criterion E - Technical Values

An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (State Significance); OR

An item has potential to yield information that will contribute to an understanding of the area's cultural or natural history (Local Significance).

Thomas James Bridge and associated elements physically demonstrate the work patterns, skills and organisation of convict work gangs. This evidence is unavailable in documentary sources and has been essential in changing our views of work gangs. It has technological value in that it demonstrates the standards and practice of bridge engineering in the colony during the 'Great Roads' period of the late 1820s and 1830s.

The surviving bridges on the Great North Road are the oldest known on the Australian mainland and constitute an excellent collection of evidence about bridge-building in NSW before the appointment of the first scientific bridge builder, David Lennox, in 1832. Each bridge of this pre-1832 period is different in scale and construction, but all are stone conduit bridges which would have had timber decks built from girders and slabs.

Thomas James Bridge satisfies Criterion E at a STATE level.

Criterion F - Rarity

An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (State Significance); OR

An item possesses uncommon, rare or endangered aspects of the area's cultural or natural history (Local Significance).

Thomas James Bridge is one of 8 surviving bridges on the Great North Road (of an original 22). Thomas James Bridge is the oldest of this collection, and the oldest bridge still in use on the Australian mainland, possessing an exceptional rarity.

Thomas James Bridge satisfies Criterion F at a STATE level.

Criterion G - Representativeness

An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments (State Significance); OR

An item is important in demonstrating the principal characteristics of a class of the area's cultural or natural places or cultural or natural environments (Local Significance).

The bridges of the Great North Road collectively form an extremely significant group of bridges that demonstrate a development from simple stone conduit structures – such as Thomas James Bridge – to highly sophisticated forms and designs – such as those evident at Clares and Circuit Flat bridges.

The surviving bridges on the Great North Road are the oldest known on the Australian mainland and constitute an excellent collection of evidence about bridge-building in NSW before the appointment of the first scientific bridge builder, David Lennox, in 1832. Each bridge of this pre-1832 period is different in scale and construction, but all are stone conduit bridges which would have had timber decks built from girders and slabs. Thomas James Bridge should be seen as an important component of this collection.

Thomas James Bridge satisfies Criterion G at a STATE level.

5.1 Summary Statement of Cultural Significance

Thomas James Bridge is of High Significance, both at a local and state level, in terms of its historical evolution and associations; its aesthetic, social and technical values; and its rarity and representativeness. It is also of High Significance at a national and international level by association; as an element of the Great North Road, which is encompassed in the world heritage listing for the OGNR.

As the most substantially intact of a series of important bridges built as part of the Great North Road between around 1826-1832, Thomas James Bridge is historically significant as the earliest surviving in-use bridge in mainland Australia. The Great North Road is historically significant for its role in connecting the Hunter Valley to Sydney, and as the first road to be constructed north of the Hawkesbury River. As an element of the Great North Road, Thomas James Bridge is significant as a physical remnant of early nineteenth-century colonial history in the present-day New South Wales landscape.

Thomas James Bridge is of High Significance in terms of its physical attributes – including the quality, craftsmanship and durability of its original masonry components. These contribute to the aesthetic value of the bridge itself – as well as to the overall aesthetic impact of the bridge on its setting. Additionally, the bridge's construction demonstrates the standards and practices of colonial bridge engineering in NSW during the 1820s-1830s.

A key contributor to the significance of Thomas James Bridge is its continuous historical use as a bridge on a public roadway since it was originally built; a use that spans over 190 years – from 1830 until the present day. Thomas James Bridge continues to perform as a functional social and transportation link between Wisemans Ferry, Greater Sydney and communities further north, and contributes to a sense of community.

Thomas James Bridge is notable for its rarity and comparative degree of intactness: it is the oldest of 8 surviving bridges on the Great North Road (of an original 22), and – unlike other bridges on the Great North Road – Thomas James Bridge is relatively well preserved and retains the original form of

its decking and timber elements. A number of the other bridges on the Great North Road – including Clares and Circuit Flat bridges – no longer have timber decking and are no longer in use.

Thomas James Bridge is of High Significance for its association with notable historical figures such as Percy Simpson (surveyor, engineer and administrator), Surveyor General Thomas Mitchell, Governor Ralph Darling (founder of the convict road gang system) and Thomas James (Ticket-of-Leave convict and overseer). Thomas James Bridge is also significant for its association with the use of convict labour, and as a physical demonstration of the skills of convict work gangs; in particular, that of No. 25 Road Party – men from which were responsible for work elsewhere along the Great North Road.

6 GRADING OF SIGNIFICANCE

The following section determines a level of significance for the individual elements of Thomas James Bridge, as the various components may contribute differently to the overall heritage value. To determine levels of significance, the terms Exceptional, High, Moderate, Little and Intrusive are used. A list of elements and features of the bridge are ranked individually and form the basis for determining policies for the protection of significant fabric and spaces. These gradings of significance are based upon the established criteria set down in the NSW Heritage Manual, *Assessing heritage significance*, 2001 – accessible below:

https://www.heritage.nsw.gov.au/assets/Uploads/a-z-publications/a-c/Assessing-Heritage-Significance.pdf

The gradings of significance reflect the contribution that each element makes to the overall significance of the item (or the degree to which the significance of the item would be diminished if the component were removed or altered).

The grading or ranking of significance of the elements of Thomas James Bridge has been assessed in terms of the following aspects of significance:

- Original or early construction (relative age)
- Original / early architectural / aesthetic quality
- Ability to demonstrate a rare quality, craft of construction process
- Integrity and degree of intactness of physical fabric
- Extent and quality of subsequent alterations / additions

In accordance with procedures recommended in *The Conservation Plan*, the significance of the various elements of the bridge have been assessed in accordance with the criteria listed above. The elements and fabric which contribute to the overall significance of the bridge have been analysed, and these are graded according to the level of their contribution.

The term interpretation or interpretability is used to convey the ability to explain the meaning of the place, and of making the significance of the place understood, or more meaningful. The term is also used when a component is of slight or no significance, meaning that a component: is difficult to interpret or it is not possible to interpret it; doesn't have an important function; or is often subject to alteration, detracting from its significance and / or that of significant fabric.

Grading of Significance Table

GRADING	DESCRIPTION OF GRADING	STATUS
Exceptional	Rare or outstanding element directly contributing to an item's (the site's) Local and State Significance. Unusually high degree of undisturbed fabric or attributes that embody heritage significance. Loss or alteration of the element, or incompatible works to it or in its vicinity, would greatly diminish its heritage value. Has a high degree of interpretability.	Fulfils criteria for local or state listing. Elements and fabric that embody / demonstrate significance values must be preserved. Preserve, restore and reconstruct in accordance with *The Burra Charter*. If adaptation is necessary for the continued use of the item, minimise changes, and do not remove or obscure significant fabric. Design changes so that they are reversible.
High	High degree of original or early fabric. Demonstrates a key element of the items' (site's) significance. Alterations do not detract from significance. Can be easily interpreted and understood, providing information about the changing patterns of use of the place. Existing disturbance and evidence of change does not detract from the individual or contributory significance of the element. Loss or unsympathetic further disturbance or change of the element or in its vicinity would diminish significance.	Fulfils criteria for local or state listing. Elements and fabric that embody / demonstrate significance values should be preserved. Preserve, restore and reconstruct in accordance with *The Burra Charter*. If adaptation is necessary for the continued use of the item, minimise changes and do not remove or obscure significant fabric. Design changes so that they are reversible. In this case, the condition of some of the elements will affect the feasibility of conserving them.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item (the site). It is possible to interpret the element. Loss or unsympathetic further disturbance or change is likely to diminish heritage significance.	Fulfils criteria for local or state listing. Aim to retain most of the significant fabric. Conservation of the overall form and configuration is desirable. Some of these items are already substantially altered and can accommodate further major changes. Compatible new construction can be added, and fabric may be removed in part as necessary to accommodate new uses. If adaptation is necessary, more changes can be made than would be possible for fabric of State Significance, but the same principles apply. Wherever possible, additions should be designed to be reversible. Retention may depend on issues other than heritage value, such as financial viability.

GRADING	DESCRIPTION OF GRADING	STATUS
Little	Alterations may detract from significance and may be difficult to interpret. Loss or unsympathetic disturbance may diminish individual heritage significance but would not diminish the overall significance of the place. Includes modifications where, although they indicate the changes in use over time, the actual fabric is not significant.	Does not fulfil criteria for local or state listing. Fabric of little significance may be retained, modified or removed as required for the future use of the place, provided that its removal causes no damage to more significant fabric. In cases where the fabric is neutral and the configuration is significant, the fabric should be retained until replacement is required.
Intrusive	Elements that, in their present form, damage the item's heritage significance. This category includes visually intrusive fabric, which obscures the reading of the significant uses and periods of development.	Does not fulfil criteria for local or state listing. Remove or alter intrusive fabric to reduce the adverse impact when the opportunity arises, whilst minimising damage to adjacent fabric of significance.

6.1.1 Levels of significance of items and components

Thomas James Bridge was inspected by OCP Architects in June 2022. Inspection was visual only and was limited in some areas of the site which were not fully accessible.

The following table attributes levels of significance to individual elements of the bridge and site. It is important to note that the level of significance of some individual elements will vary from the overall level of significance of the item.

ELEMENT	LEVEL OF SIGNIFICANCE	COMMENTS / CONDITION
Stone abutments	Exceptional. Original.	Landslip at far eastern end has seen localised collapse, and there are areas of erosion. However, the abutments retain their integrity overall.
Round timber girders	Exceptional. Possibly original. Retain original form and contribute to the bridge's significance.	Fair.
Transverse timber decking	High.	Fair.
Longitudinal sheeting	High. May have been replaced in part but element likely retains	Fair.

ELEMENT	LEVEL OF SIGNIFICANCE	COMMENTS / CONDITION
	original form. Contributes to the bridge's significance.	
Timber posts and railing	Moderate. Likely replaced whilst retaining original form.	Fair.
Metal guardrails	Intrusive.	Good.

7 OPPORTUNITIES AND CONSTRAINTS

This section outlines major matters involved in the preparation of conservation policies for Thomas James Bridge. It considers issues arising from the significance of the site and its physical condition, as well as the constraints arising from heritage conservation methodology, such as *The Burra Charter* (Australia ICOMOS, 2013). This section identifies the statutory and non-statutory heritage listings for the site and other statutory requirements; and describes the constraints and opportunities arising from them.

7.1 Implications of Heritage Significance

As described in the Statement of Cultural Significance, Thomas James Bridge is of significance in terms of its historical evolution and associations; its aesthetic, social and technical values; and its rarity and representativeness at a state level. The significance of the place is best demonstrated when the place is actively conserved and maintained.

The site should be managed and conserved to maintain the significant values established in the Statement of Cultural Significance and the assessment of elements of significance in Sections 5 and 6 of this document. Any future works, including alterations or additions, should be guided by these gradings of significance and should follow the recommended treatment for each of the various levels of significance. The original form and fabric of the bridge and associated elements are of highest significance and should be retained insofar as possible. Where opportunities arise to remove identified intrusive elements and to reinstate removed original elements, they should be pursued.

7.2 Implications of Physical Fabric

7.2.1 Use of the place

Buildings and structures are generally best conserved if they are maintained and used for the purpose for which they were built. Thomas James Bridge continues to be used as a functional road bridge on Settlers Road (which also provides access to the Old Great North Road). This is positive and contributes to the significance of the bridge. However, this also presents a particular challenge; specifically, to ensure that the bridge continues to be capable of safely carrying the loads required of it in relation to modern road standards, while minimising alterations to significant fabric and maintaining the overall heritage significance of the bridge.

7.2.2 The curtilage

Thomas James Bridge should be considered in the context of the Great North Road, and by extension, within the context of the areas outlined as significant in the local, state and world heritage listings for Old Great North Road.

In terms of the area covered by the state heritage listing for the Great North Road, the road is over 240km in extent, and is listed as two separate items on the NSW State Heritage Register.

In terms of the world heritage listing for Old Great North Road, Thomas James Bridge is located within the world heritage buffer zone and immediately adjacent to the nominated world heritage area for OGNR.

7.2.3 Condition and intactness of fabric

Generally, Thomas James Bridge is in fair condition: however, there are particular elements that require urgent corrective maintenance. Some considerations to be taken into account in this respect are detailed below:

- Due to the lack of consistent maintenance, it is recommended that a Costed Maintenance Plan be developed and implemented.
- 'Catch up' repairs and maintenance works are required for the ongoing safety and usability of the bridge.
- All maintenance, repairs, upgrades and potential changes to the bridge should consider its heritage values and significant fabric. This includes salvaging and reusing any extant fabric where possible and minimizing fixings to extant heritage fabric.
- Any new fabric introduced must be compatible with the original or early materials.
- It is recommended that permanent solutions are found for corrective maintenance requirements, rather than temporary solutions.
- Safety standards arising from hazards and risks should be implemented with consideration for significant fabric and heritage values.
- There has been deterioration to the stone abutments, particularly on the riverside, where there has been a partial collapse from a landslip.

7.3 Owner's Requirements

The site is owned and managed by Hawkesbury City Council and Central Coast Council, who are responsible for the bridge, including responsibility for issues relating to safety, maintenance, accessibility, ongoing use and conservation works. The table below includes owner's requirements, constraints and opportunities.

REQUIREMENTS	CONSTRAINTS	OPPORTUNITIES
The site is currently an operational road bridge used by public vehicular traffic.	The current condition of the site necessitates conservation and structural works in order to ensure ongoing safe usability.	Income to be generated from ongoing uses and activation of site.
Access.	Access is currently limited, with only small parts of the site accessible to the public.	Regular open days could yield opportunities for community involvement and appreciation.
Maintenance.	Although the site and structure are largely intact, there is a need for more regular maintenance, particularly to address slope stability. These additional maintenance works will need to be funded and managed appropriately.	Timber elements of the bridge appear in generally fair condition from a visual inspection: however, the stone abutments – particularly on the riverside – have been affected by landslips and require remediation. A regular maintenance schedule will assist in maintaining the site.

Interpretation.	There are some minimal interpretation measures in place at the site, including a plaque embedded in stone on the eastern side of the bridge, with text entitled 'The Convict Trail – The Great North Road,' and a road sign with the name and date of the bridge.	Further permanent interpretation measures could be added for greater effect. Community and stakeholder consultation could assist in interpretation ideas and in generating interest for the site.
Restoration / reconstruction.	Some intrusive elements are currently extant at the site (e.g, metal guardrails).	Where opportunities arise to remove identified intrusive elements and to reinstate removed original elements, they should be pursued, as this would enhance the heritage significance of the site.

7.3.1 Access

Access

Settlers Road, including Thomas James Bridge, can be reached by car ferry crossing (over the Hawkesbury River) from the direction of Wisemans Ferry / Greater Sydney. Thomas James Bridge is currently an operational bridge that is used by public vehicular traffic. Due to the physical constraints of the site, access by foot is limited.

7.3.2 Interpretation

Currently, the site contains some minimal permanent devices for the interpretation of the site and its significance or history, consisting of a plaque and a road sign (refer to table above). There is an opportunity to introduce further permanent interpretative signage at the site, to capture its significance in terms of its historical evolution and associations; its aesthetic, social and technical values; and its rarity and representativeness. This could include historic images, plans and drawings, as well as information on the bridge's construction date, style and changes to it over time. Interpretation panels are an excellent way to easily communicate the history of a site with visitors and users. It is recommended and encouraged that further permanent interpretation devices be utilised at Thomas James Bridge site. An Interpretation Strategy, and then a more detailed Interpretation Plan, should be developed for the site. Interpretation devices should also be utilised to help users understand any major changes (including the removal of original fabric) that may have been made to the bridge over time. An interpretative site map of the OGNR at the site would be an excellent tool in expressing the connection between Thomas James Bridge and other bridges along the OGNR.

Undertaking the above measures would reinforce the relationship between Thomas James Bridge and the OGNR and would allow for its interpretation to be captured on-site, making its interpretation accessible to users of and visitors to the bridge.

7.4 Heritage Management Framework

Thomas James Bridge is not currently listed on any statutory heritage registers: it is a finding of this CMP that the site warrants heritage listing in the Hawkesbury and Central Coast LEPs and on the NSW State Heritage Register, as well as inclusion within the 'Australian Convict Sites – Old Great North Road' world heritage listing.

Thomas James Bridge should be considered in the context of the Great North Road, and by extension, within the context of the areas outlined as significant in the local, state and world heritage listings for Old Great North Road. Until such time as Thomas James Bridge becomes appropriately heritage-listed (either as an individual item or as part of the listing for the Old Great North Road) as per the findings of this CMP, the same protections should be afforded the site and the same restrictions should be observed on its use and development as if the bridge were already a heritage-listed item.

The information that follows in this section applies to items listed on the SHR: given the recommendation that Thomas James Bridge should be heritage-listed, it is assumed that the following legislation also currently applies in relation to the site.

The key statutory controls for the development of Thomas James Bridge (given that it is not currently listed on any statutory heritage registers) are:

- *UNESCO World Heritage Convention 1972* – Thomas James Bridge itself is not directly subject to the convention: however, as an item located within the world heritage buffer zone for OGNR, it has 'complementary legal and / or customary restrictions placed on its use and development'[23] in order to protect the OGNR world heritage site. Additionally, it is a finding of this CMP that Thomas James Bridge should be included within the boundary of the nominated world heritage area for OGNR – as such, it should be assumed that the UNESCO World Heritage Convention applies.
- *Heritage Act 1977* (NSW) – Thomas James Bridge itself is not listed on the State Heritage Register: however, the extent of the Great North Road (the route on which the Thomas James Bridge is located) is listed on the SHR as two separate items:
    - 'Great North Road, between Mt Manning and Wollombi' (SHR No. 01789)
    - 'Old Great North Road, between Devine's and Wollombi' (SHR No. 00991) (this section of the road contains Thomas James Bridge).
- *Environmental Planning and Assessment Act 1979*, which includes the following Environmental Planning Instruments:
    - State Environmental Planning Policy (Infrastructure)
    - Hawkesbury Local Environmental Plan 2012 (HLEP 2012) (statutory) – Thomas James Bridge itself is not listed as a heritage item in the Hawkesbury LEP: however, it is a finding of this CMP that the bridge should be included in the LEP.
    - Central Coast Local Environmental Plan 2022 (CCLEP 2022) (statutory) – Thomas James Bridge itself is not listed as a heritage item in the Central Coast LEP: however, it is a finding of this CMP that the bridge should be included in the LEP.
    - Hawkesbury Development Control Plan 2002 (HDCP 2002) (non-statutory).
    - Central Coast Development Control Plan 2022 (CCDCP 2022) (non-statutory).

[23] '2.2.6 – Boundaries and buffer zones,' UNESCO World Heritage Policy Compendium, https://whc.unesco.org/en/compendium/action=list&id_faq_themes=1528#:~:text=%E2%80%9CFor%20the%20purposes%20of%20effective,of%20protection%20to%20the%20property., accessed August 2022.

The relevant Acts, Regulations and Statutory Environmental Planning Instruments can be sourced from the Legislation NSW website:

https://www.legislation.nsw.gov.au/#/

As Development Control Plans are not statutory environmental planning instruments, it is not possible to source them on the Legislation NSW website.

The Hawkesbury Development Control Plan 2002 can be obtained from the Hawkesbury City Council website – accessible below:

https://www.hawkesbury.nsw.gov.au/plan-and-build/planning-policies/development-control-plan

The Central Coast Development Control Plan 2022 can be obtained from the Central Coast Council website – accessible below:

https://www.centralcoast.nsw.gov.au/development-control-plan-dcp

7.4.1 Heritage Act (NSW)

The State Heritage Register

Items on the State Heritage Register (SHR) are those items that have been identified as being of particular importance to the people of New South Wales. The State Heritage Inventory includes items identified both by local councils in their individual LEPs and State Government agencies in their Section 170 Registers.

Under the *Heritage Act 1977*, any development proposal or works to a building or structure, including in-ground disturbance of possible archaeological relics, requires the consent of the Heritage Council of NSW unless the works proposed are covered by the Heritage Council Standard Exemptions, or agency-specific exemptions provided in accordance with a NSW Government Gazette. Advertising requirements under the *Heritage Act 1977* also ensure that community consultation occurs prior to determination of an application.

Minimum Standards of Maintenance and Repair

The *Heritage Act 1977* also requires that owners of state heritage listed items maintain the items they own at a minimum standard of maintenance and repair (Section 118 of the *NSW Heritage Act 1977*, Minimum Standards of Maintenance and Repair). For details, refer to the NSW Heritage Council publication, *Minimum Standards of Maintenance and Repair*, 1999, below:

https://www.heritage.nsw.gov.au/assets/Uploads/a-z-publications/m-o/Minimum-Standards-of-Maintenance-and-Repair.pdf

The regulations of the *Heritage Act 1977* may impose minimum standards with respect to the maintenance and repair of a building, work or relic that is listed or within a precinct that is listed on the State Heritage Register, but those standards can only relate to the following matters:

(a) the protection of the building, work or relic from damage or deterioration due to weather (including such matters as the weatherproofing of roof, doors and windows);

(b) the prevention of damage to or destruction of the building, work or relic by fire, including having adequate protection measures in place for the item;
(c) security (including fencing and surveillance measures to prevent vandalism);
(d) essential maintenance and repair (being maintenance and repair necessary to prevent serious or irreparable damage or deterioration).

Approvals Process

When a place is listed on the State Heritage Register or affected by an interim heritage order, the approval of the Heritage Council of NSW is required for most forms of work, including excavation. The Heritage Council works to ensure that any changes, including additions or new buildings, on the site do not detract from the heritage significance of the place. Approval is sought through submission of a Section 60 application form to the Heritage Council, along with the proposed works documentation, a Statement of Heritage Impact, the conservation management plan and an application fee.

While Thomas James Bridge is not yet listed as a heritage item, any proposed development on the site should nonetheless include a Statement of Heritage Impact as part of any development application. Development applications are to be lodged with Hawkesbury City Council / Central Coast Council, which are the determining authorities.

7.4.2 National Parks and Wildlife Act NSW (1974)

In addition to other environmental and land management matters, the *National Parks and Wildlife Act 1974* also includes provisions that apply to Aboriginal sites and objects. If Aboriginal cultural material is found during excavation activity, the National Parks and Wildlife Service must be informed under section 91 and excavation would then require a permit issued under section 90 of the *National Parks and Wildlife Act 1974*.

A basic search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 16 August 2022 (Client ID. 708889) and no Aboriginal sites or places were found to be recorded.

7.4.3 Environmental Planning and Assessment Act 1979

State Environmental Planning Policy (Infrastructure)

State Environmental Planning Policy (Infrastructure) 2007 assists the NSW Government, local councils and the communities they support by simplifying the process for providing infrastructure, including schools, hospitals, roads, railways, emergency services, water supply and electricity delivery.

The Infrastructure SEPP outlines the planning rules for development relating to infrastructure, including:

- Where such development can be undertaken;

- What type of infrastructure development can be approved by a public authority under Part 5 of the Environmental Planning and Assessment Act (EP&A Act) following an environmental assessment (known as 'development without consent');
- What type of development can be approved by the relevant local council, Minister for Planning or Department of Planning under Part 4 of the EP&A Act (known as 'development with consent');
- What type of development is exempt or complying development;
- The relationship of other statutory planning instruments to the Infrastructure SEPP.

In aiming to improve regulatory certainty and efficiency for State infrastructure development types, the policy includes specific planning provisions and development controls for 25 types of infrastructure works or facilities, including roads and traffic, road infrastructure facilities, and waterway or foreshore management activities.

Division 1 - Consultation

In accordance with Division 1 Consultation, Councils should be consulted on a number of matters, including development with impacts on local heritage (Clause 14), which has been included below for reference.

> 14 Consultation with councils—development with impacts on local heritage
>
> (1) This clause applies to development carried out by or on behalf of a public authority if the development:
>
> (a) is likely to affect the heritage significance of a local heritage item, or of a heritage conservation area, that is not also a State heritage item, in a way that is more than minor or inconsequential, and
> (b) is development that this Policy provides may be carried out without consent.
>
> (2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this clause applies unless the authority or the person has:
>
> (a) had an assessment of the impact prepared, and
> (b) given written notice of the intention to carry out the development, with a copy of the assessment and a scope of works, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located, and
> (c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.

Division 17 – Roads and traffic

Subdivision 1 – Road infrastructure facilities

Provisions for development relating to road infrastructure projects are specifically addressed in Division 17 of the Infrastructure SEPP. Clause 96 of Division 17 of the Infrastructure SEPP provides an outline of development that is permitted with consent:

> (1) Development for the purpose of a road or road infrastructure facilities (other than development referred to in clause 94 (1) or 95) may be carried out by any person with

consent on land within a special area within the meaning of the *Sydney Water Catchment Management Act 1998*.

(2) Development for any of the following purposes may be carried out by any person with consent on land in a prescribed zone:
   (a) transitway parking stations,
   (b) bus depots,
   (c) permanent road maintenance depots and associated infrastructure (such as garages, fuel sheds, tool houses, storage yards and workers' amenities).

A comprehensive review of the relevant clauses of SEPP (Infrastructure) 2007 should be undertaken in conjunction with any development proposal for the site.

Division 25 – Waterway or foreshore management activities

Provisions for development relating to waterway or foreshore management activities are specifically addressed in Division 25 of the Infrastructure SEPP. Clause 129 of Division 25 of the Infrastructure SEPP provides an outline of development that is permitted without consent:

(a) Development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land.
(b) In this clause, a reference to development for the purpose of waterway or foreshore management activities includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities:
   (a) construction works,
   (b) routine maintenance works,
   (c) emergency works, including works required as a result of flooding, storms or coastal erosion,
   (d) environmental management works.
(c) Development for the purpose of temporary works for or associated with drought relief may be carried out by or on behalf of a public authority without consent, but only if the development is:
   (a) carried out on land publicly identified by the Minister for Primary Industries as being in drought, and
   (b) removed, and the area rehabilitated, within 4 months after the date on which the area is no longer so identified.

Hawkesbury Local Environmental Plan 2012

Development within the Hawkesbury Local Government Area is currently controlled by the Hawkesbury Local Environmental Plan 2012 (HLEP 2012). The bridge partially falls within the Hawkesbury LGA, and under the HLEP 2012, the bridge is zoned as E4 Environmental Living.

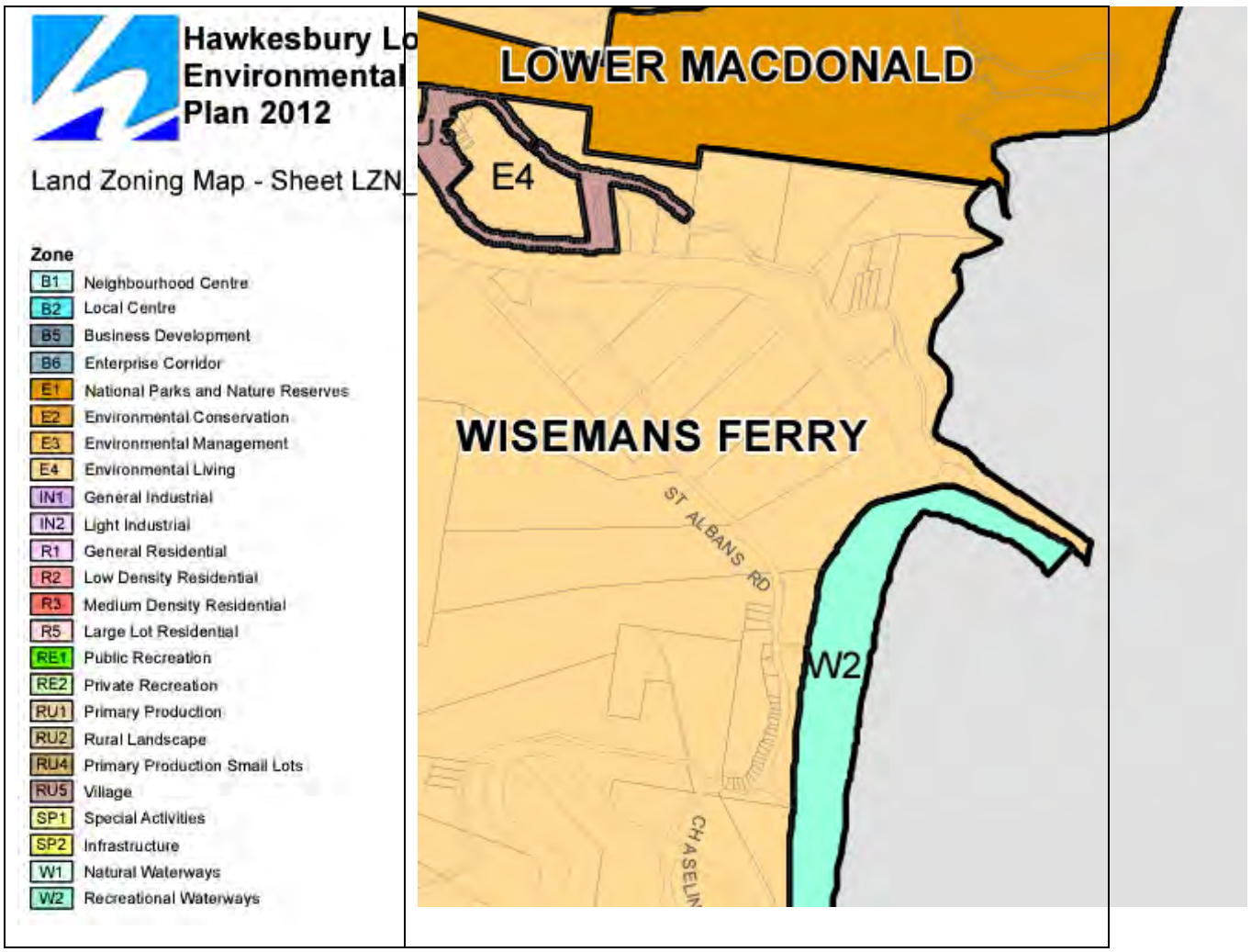


Figure 7-1: Excerpt from Hawkesbury LEP 2012 Land Zoning Map, showing the area zoned as E4 Environmental Living, adjacent to W2 Recreational Waterways. (Source: Hawkesbury LEP 2012, accessed from Legislation NSW website.)

Central Coast Local Environmental Plan 2022

Development within the Central Coast Local Government Area is currently controlled by the Central Coast Local Environmental Plan 2022 (CCLEP 2022). The bridge partially falls within the area of the Central Coast LGA, that is covered by the CCLEP 2022, under which it is zoned as C4 Environmental Living.

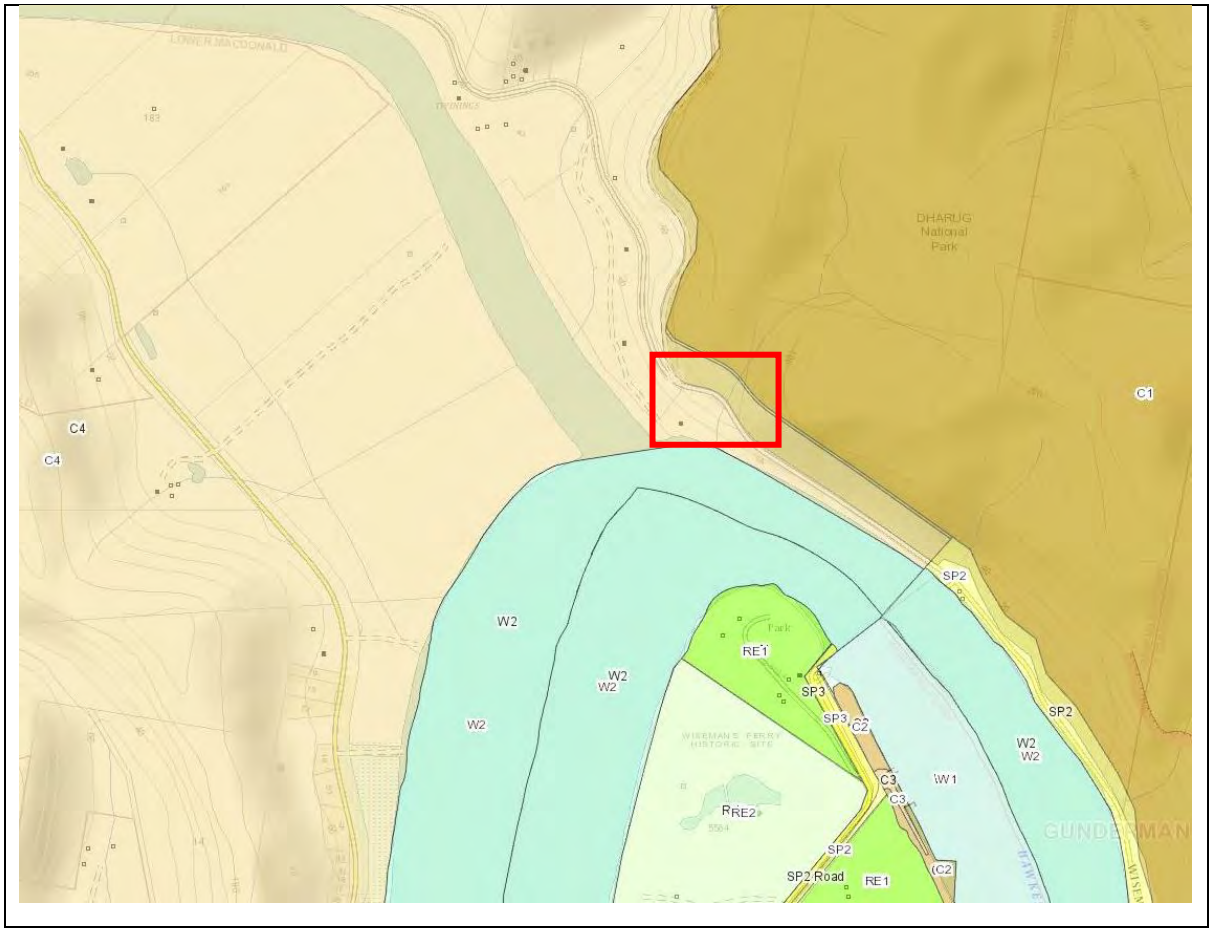


Figure 7-2: Excerpt from Central Coast LEP 2022 Land Zoning Map, showing the location of Thomas James Bridge within the area zoned as C4 Environmental Living, adjacent to W2 Recreational Waterways and SP2 Infrastructure. (Source: https://www.planningportal.nsw.gov.au/spatialviewerhistoric/#/find-a-property/address, accessed August 2022.)

The provisions of the C4 Environmental Living land zone are as follows:

1 Objectives of zone

- To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.
- To ensure that residential development does not have an adverse effect on those values.
- To allow additional land uses that will not have an adverse impact on those values.

2 Permitted without consent

Home occupations.

3 Permitted with consent

Animal boarding or training establishments; Bed and breakfast accommodation; Bee keeping; Centre-based child care facilities; Community facilities; Dual occupancies; Dwelling houses; Ecotourist facilities; Educational establishments; Emergency services facilities; Environmental facilities; Environmental protection works; Farm buildings; Flood mitigation works; Group homes; Homebased child care; Home businesses; Home industries; Home occupations (sex services); Information and education facilities; Oyster aquaculture; Pond-based aquaculture; Recreation areas; Research stations; Respite day care centres; Roads; Roadside stalls; Secondary dwellings; Sewage reticulation systems; Signage; Tank-based aquaculture; Veterinary hospitals; Water recycling facilities; Water supply systems.

4 Prohibited

Industries; Local distribution premises; Service stations; Warehouse or distribution centres; Any other development not specified in item 2 or 3.

Whilst the above provisions allow for a range of development types in the C4 Environmental Living zone, there are a number of other considerations which affect the development potential of the Thomas James Bridge site, including the various statutory heritage listings of areas adjacent to the site, and the historical use of the site as a public roadway.

NSW Legislation Schedule 5 *Environmental Heritage* lists the heritage items identified within the Hawkesbury City Council and Central Coast Council areas and protected under their respective LEPs.

There is one listing under Schedule 5 *Environmental Heritage* of Hawkesbury LEP 2012 that relates to the study area, including:

Item name	Address	Significance	Item no.
Old Great North Road	Old Great North Road between Devines Hill and Mount Manning	State	I00991

There are two separate listings under Schedule 5 *Environmental Heritage* of Central Coast LEP 2022 that relates to the study area, including:

Item name	Address	Significance	Item no.
Roadworks known as Finch's Ascent	From Roses Creek to The Great North Road	Local	I58
Roadworks	The Great North Road (between Hawkesbury River, Devine's Hill, Mount Manning and Kulnura)	State	I65

The local heritage listings that apply to the site do not include the entire study area, which is defined by the SHR listing curtilage for areas adjacent to the site.

Section 5.10 *Heritage Conservation* is the primary clause for protection of heritage items under both Hawkesbury LEP 2012 and Central Coast LEP 2022. The clause provides the mandatory objectives for heritage conservation, the criteria for when development consent is and is not required, the effect

on heritage significance, the process of heritage impact assessment, the preparation of heritage conservation management plans, the management of archaeological sites and places of Aboriginal heritage significance.

Clause 10 *Conservation incentives* of Section 5.10 provides development incentives for the conservation of a heritage item. This clause allows for the use of a heritage item for a prohibited land use under this instrument, where it can be demonstrated that the conservation of the item is facilitated by such consent, the use has been undertaken in accordance with an approved heritage management document (such as this Conservation Management Plan), all conservation works required in the relevant heritage management document are to be undertaken, and the proposed use would not adversely affect the heritage significance of the item or its setting or have an adverse impact on the surrounding area.

Hawkesbury Development Control Plan 2002 (HDCP 2002)

The purpose of the Hawkesbury Development Control Plan 2002 (HDCP 2002) is to provide more detailed provisions to guide development, consistent with the provisions of HLEP 2012.

Chapter 10 *Heritage Conservation* of Part C *General Guidelines* states the following:

> 10.2 *Objectives*
>
> The primary objectives of this Chapter are:
>
> (a) To promote and protect the Hawkesbury area's natural and cultural heritage as a valuable resource that must be conserved for future generations.
> (b) To consider the potential heritage significance of all properties identified in the LEP Heritage Map and other applications as a matter to be taken into account in the assessment of DAs affecting those properties.
> (c) To integrate conservation and management issues into the planning and development control process.
> (d) To ensure that any development with respect to a heritage site is undertaken in a manner that is sympathetic to, and does not detract from the identified significance of the site.
> (e) To encourage innovative approaches to the conservation of Hawkesbury area's and heritage sites and to provide incentives for good management practice.

Central Coast Development Control Plan 2022 (CCDCP 2022)

The purpose of the Central Coast Development Control Plan 2022 (CCDCP 2022) is to provide more detailed provisions to guide development, consistent with the provisions of CCLEP 2022.

Chapter 3.6 *Heritage Conservation* of Part 3 *Environmental Controls* states the following:

> 3.6.1.2 *Objectives of this Chapter*
>
> The objectives of the plan are to:
>
> (a) Conserve heritage items and Heritage Conservation Areas.
> (b) Ensure that significant items and places retain their important character, fabric and setting.

(c) Establish a framework for detailed heritage and conservation planning for the Central Coast.
(d) Ensure that Aboriginal Cultural Heritage and archaeology are taken into due consideration during the development process.
(e) Promote new development that is sympathetic to the identified heritage significance.
(f) Maximise the retention of heritage items, Heritage Conservation Areas and contributory items.
(g) Provide controls for encouraging contemporary design sympathetic with the identified heritage significance.
(h) Enable appropriate and expert consideration to be given by Applicants and Council for development relating to heritage assets.
(i) Provide incentives for owners of properties that are listed as individual heritage items or located in a Heritage Conservation Area.
(j) Facilitate the implementation of the objectives and provisions relating to heritage conservation which are contained within Central Coast LEP 2022.

7.5 National Construction Code of Australia and Access Requirements

The National Construction Code (NCC), incorporating the Building Code of Australia (BCA), is a national set of building regulations with some state-specific variations. The performance requirements of the BCA are mandatory, although the introductory sections of the Code make clear that not all requirements will apply to a given case. The Code also includes 'deemed-to-satisfy' requirements which are accepted as meeting the performance requirements. However, the Code also makes provision for alternative solutions to meet the performance requirements, subject to satisfactory verification.

Under the Environmental Planning and Assessment (EP&A) Regulation 2000, all new building work must be carried out in accordance with the Building Code of Australia. In the case of an existing building, there is generally no requirement to comply with the BCA unless works are being carried out. However, where works (in particular alterations or additions) are proposed to the place, the building will need to comply on completion with the relevant [performance] requirements of the Building Code of Australia (EP&A Regulation Clause 145).

In certain circumstances, exemption can be obtained from the requirements of the BCA under Clause 187 of the EP&A Regulation. In most cases there will be an acceptable alternative solution to satisfy the performance requirements of the BCA: therefore, applications for exemption are sought comparatively rarely. If such an application is contemplated, it should be sought at development application stage.

7.6 Application of *The Burra Charter*

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance, known as *The Burra Charter*, 2013, is widely accepted in Australia as the underlying methodology by which all works to sites and buildings, which have been identified as having National, State and / or Local Significance, are undertaken.

Because Thomas James Bridge has identified cultural significance, procedures for managing changes and activities at the site should be in accordance with the recognised conservation methodology of *The Burra Charter*.

PRINCIPLES OF *THE BURRA CHARTER*

In dealing with the built fabric, the conservation principles of *The Burra Charter* should be adopted. The relevant principles are established in the Articles of *The Burra Charter* as follows:

Cautious approach (Article 3)

All conservation work should be based on a respect for the original fabric, should involve the minimum interference to the existing fabric and should not distort the evidence provided by the fabric.

Knowledge, skills and techniques (Article 4)

Conservation should make use of all the knowledge, skills and disciplines which can contribute to the study and care of the place.

Traditional techniques and materials are preferred for the conservation of significant fabric, although the use of modern techniques and materials may be appropriate in some circumstances.

Location (Article 9)

A building or work should remain in its historical location.

Contents (Article 10)

Contents, fixtures and objects contributing to the cultural significance of a place should be retained at that place.

Change (Article 15)

The contribution of all periods to the place must be respected, unless what is removed is of little cultural significance and the fabric which is to be revealed is of much greater cultural significance.

Removed significant fabric should be reinstated when circumstances permit.

Adaptation (Article 21)

Adaptation is acceptable where it does not substantially detract from the cultural significance of the place and involves minimal change to significant fabric.

New Work (Article 22)

New work may be acceptable where it does not distort or obscure the significance.

New work should be readily identifiable as such on close inspection.

Use and Conserving Use (Article 7 and Article 23)

Where the use of a place is of cultural significance, it should be retained, and a place should have a compatible use.

Modifying or reinstating a significant use may be appropriate and a preferred form of conservation.

Managing Change (Article 27)

Existing fabric, use, associations and meaning should be recorded before disturbance occurs.

Disturbance of Fabric (Article 28)

Only minimal disturbance of fabric may occur in order to provide the evidence needed for the making of decisions on the conservation of the place.

Responsibility for Decisions (Article 29)

The decision-making procedure and individuals responsible for policy decisions should be identified.

Direction, Supervision and Implementation (Article 30)

Appropriate direction and supervision should be maintained at all stages of the work.

Records (Article 32)

A record should be kept of new evidence and future decisions and made publicly available.

Removed Fabric (Article 33)

Removed significant fabric should be catalogued and protected in accordance with its cultural significance. Where possible it should be stored on site.

The Burra Charter notes that all aspects of cultural significance should be respected. If a place includes fabric, uses, associations or meanings from different periods or different aspects of cultural significance, then emphasising or interpreting one period or aspect at the expense of another can only be justified if removed or diminished fabric is of slight cultural significance, and that which is interpreted is of much greater cultural significance.

In adopting the conservation principles of *The Burra Charter*, the overall architectural design should be considered of paramount importance.

8 CONSERVATION POLICIES

This section contains conservation policies, which are to be applied to Thomas James Bridge. The overarching aim of the policies and associated strategies is to assist with the conservation and management of the site, as well as managing change in ways that will best retain and protect its heritage values. The conservation policies provide a set of guidelines to inform the ongoing conservation of the place and also to ensure that any proposed future works to the bridge, including to its various elements, are undertaken in a manner that will respect the cultural significance of the place.

Decisions about future work, including repair, conservation, maintenance works or alterations and additions on the site, should take into consideration the significance of the place as a whole, as well as that of the separate parts. The conservation policies are intended to assist and guide site owners, site managers, consultants, contractors and occupants through the processes of conserving, repairing, maintaining and using the site, and are intended to manage change so that it does not adversely impact on the significance of the place.

The policies are accompanied by a background outlining the reasoning behind each policy and, where relevant, are followed by strategies for their implementation. Broadly, the policies are structured to address:

(1) Obligations of management, ownership and recording change.
(2) Conservation of the existing fabric and setting.
(3) Changes to the fabric and upgrading in the context of its ongoing use and possible new development.
(4) Related issues, including interpretation and moveable heritage.

The table below outlines the order of the policies:

8.1 Best Practice Heritage Management

Background, Opportunities & Challenges

Thomas James Bridge is an extremely significant site, built by convicts, and is the oldest in-use bridge on mainland Australia. It must be protected in accordance with current best practice.

It is important that all significant physical fabric and spaces are appropriately conserved and managed in accordance with recognised conservation methodology. The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter*, 2013) has been widely accepted across Australia as the underlying methodology by which all works to heritage buildings and sites are undertaken. The definitions and terms of *The Burra Charter* are explained in Section 1.9 of this CMP.

The long-term conservation of the significant elements of the bridge requires the implementation of both management and conservation strategies to provide for the retention and enhancement of their cultural significance. The aims and polices of this CMP must be disseminated through, and implemented by, the owners and managers of the site.

Policy 1 – Retention of Thomas James Bridge

In addition to its current functioning as a publicly-used bridge, Thomas James Bridge should be conserved and managed as an important reminder of its significance as a component of the original Great North Road. The owners and managers of the site should ensure that the heritage significance of the site guides future decisions.

Policy 2 – Retention of Significance

The Statement of Significance for Thomas James Bridge contained in this CMP (Section 5) must be adopted as the basis for its heritage management. All decisions must consider and seek to retain the values identified in the Statement of Significance.

Strategies / Guidelines

- The Conservation Management Plan has endeavoured to identify why Thomas James Bridge is significant. The Statement of Cultural Significance (refer to Section 5) and the significance assessment of individual elements within the site (refer to Section 6) must be used to guide future planning and work, in conjunction with the policies in this CMP.

- Prepare Statements of Heritage Impact when changes are proposed to the use or fabric of the place to assess the impact of work in the context of its identified cultural significance.

Policy 3 – Heritage Listing

It is a finding of this CMP that Thomas James Bridge warrants listing in the Hawkesbury and Central Coast LEPs as local heritage items. The bridge also warrants listing on the NSW State Heritage Register, either as an individual item or as part of the listing for the Old Great North Road. The comparative analysis with other sites undertaken as part of the above-recommended Conservation Management Plan, and consequent revised assessment of significance, should be used as a basis for this. Thomas James Bridge is also worthy of inclusion within the 'Australian Convict Sites – Old Great North Road' UNESCO world heritage listing, of which the Old Great North Road is one of eleven elements.

Thomas James Bridge should be considered in the context of the Great North Road, and by extension, within the context of the areas outlined as significant in the local, state and world heritage listings for Old Great North Road. Until such time as Thomas James Bridge becomes appropriately heritage-listed (either as an individual item or as part of the listing for the Old Great North Road) as per the findings of this CMP, the same protections should be afforded the site and the same restrictions should be observed on its use and development as if the bridge were already a heritage-listed item.

Policy 4 – Further Research

In the medium- to long-term, and as the opportunity arises, the owner should engage suitably qualified and experienced heritage consultants to carry out further research, which might include:

- ***Social and oral history;***
- ***Archaeology;***
- ***Aboriginal cultural heritage.***

Strategies / Guidelines

- Research into the social and oral history of Thomas James Bridge may contribute to a broader understanding of the history of the bridge, the local area and use of the bridge by the local community.
- The CMP should be made available to the local community to encourage community interest and engagement. A repository of historical photographs of local residents could be built up from the records of local residents. Community involvement through may be facilitated by the local library, local council newsletters, or local radio stations.

Policy 5 – Best Conservation Practice

Ensure that the conservation, maintenance and any development of the site and its components (including moveable objects) is undertaken in accordance with current conservation and planning methodologies.

Strategies / Guidelines

- Ensure the conservation of the place, using all the processes for care of the place outlined in this CMP, including its maintenance, preservation, restoration, adaptation and interpretation, in order to retain the cultural significance embodied in the fabric, use and associations. Refer to the Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (*The Burra Charter*, *2013*).
- Change may be necessary to retain cultural significance, but it is undesirable where it reduces cultural significance. The amount of change to a place and its use should be guided by the cultural significance of the place and its appropriate interpretation (Article 15.1 of *The Burra Charter*).

The conservation of the site can be best achieved by:

- The implementation of a regular maintenance program.
- The conservation of the bridge, and associated elements.
- The strict control of change and development within the site with regard to its significance.
- The minimisation of intervention to significant fabric in order to minimise the loss of cultural significance. Where greater intervention is required, it should occur in areas of lower significance. Intrusive elements should be removed.
- The prevention of the demolition of items (apart from actions required to ensure public safety) before details of conservation works have been determined.
- The continued retention of the original use of the bridge (as part of a functioning public roadway).

Policy 6 – This Conservation Management Plan

This Conservation Management Plan (CMP) should be formally adopted by the site owners and managers as a basis for the future management of the site, so that works being considered on-site may be undertaken in accordance with its recommendations.

Policy 7 – Updating this Conservation Management Plan

The CMP should be reviewed and updated at regular intervals, taking account of changes in legislation, new information and proposed changes in use or management beyond what is addressed in this CMP.

Strategies / Guidelines

This CMP must be formally reviewed at regular intervals, especially if major work is proposed. Appropriate professional advice must be obtained to assist in reviewing and / or amending specific polices when required.

- Update the CMP every five years unless more frequent reviews are made necessary by proposed changes to the place. Hawkesbury City Council and Central Coast Council are responsible for the updating of the CMP and the review must be done by a qualified and suitably experienced heritage consultant.
- Use the most recently updated CMP as a reference when planning any future work.

Policy 8 – Access to this Conservation Management Plan

All parties responsible for management of Thomas James Bridge must have access to this CMP.

Strategies / Guidelines

The CMP should be made available and distributed to:

- Transport for NSW, Hawkesbury City Council and Central Coast Council, in particular those staff responsible for the day-to-day management and planning of Thomas James Bridge.
- Future owners and managers.
- The Convict Trail Project.
- Hawkesbury and Central Coast Public Libraries.
- NSW Heritage Council.

Policy 9 – Heritage Management Structure

The owners / managers responsible for Thomas James Bridge must implement a heritage management structure that:

- ***integrates heritage conservation with the overall management of the site;***
- ***provides for the long-term conservation of the significant fabric;***
- ***disseminates the intention, aims and policies of this CMP to all those responsible for the maintenance of the site; and***
- ***outlines responsibilities at each staff level, including commercial tenants.***

Strategies / Guidelines

Conservation management should be pursued as a regular and ongoing responsibility to promote a balance between functionality and the conservation of cultural significance. The management structure for the site should address:

- integration of conservation in the overall management of the site by providing for its long-term effective and consistent conservation;
- disseminating the aims and intentions of this CMP to appropriate officers and outlining the responsibilities to relevant parties for its implementation;
- maintaining the integrity of the character of the site;
- assessing the impact of any new development proposal on the identified heritage significance of the place.

8.2 Documenting Change

Background, Opportunities & Challenges

Archival records, as well as the systematic recording of work, are valuable resources to support and ensure the proper overall management of heritage sites. They record the environment, aesthetics, technical skills and customs associated with the creation and use of heritage items before they are altered, removed or lost either by development, incremental change or deterioration. Well-managed records enhance the understanding of a heritage item, its significance and the impact of change as part of the conservation and management process.

Ongoing recording should be undertaken and the records, including copies of consultant reports, must be retained. Recording must be undertaken by suitably qualified and experienced heritage professionals. The reasoning behind the selection of a particular conservation approach and the methodology and the scope of each major conservation project should also be recorded – for example in heritage impact assessments – and archived so that it can form the basis for future decisions.

Policy 10 – Maintaining Records

For any future works, continue to acquire, collate, maintain and archive drawings, schedules of works, photographs and professional reports, including a record of the reasoning behind particular works.

Policy 11 – Recording in Conjunction with Major Work

Detailed recording, including photographic records and measured drawings in accordance with NSW Heritage Council guidelines, should be undertaken by a suitably qualified and experienced heritage professional before, during and after any major work. Maintain records of as-built drawings following the implementation of any work.

Policy 12 – Recording of Maintenance and Change

Undertake detailed recording of the site components, fabric and features in accordance with NSW Heritage Council guidelines before, during and after any works for maintenance and change to fabric – for example, in order to repair the structure or to reveal aspects of the bridge's significance.

Strategies / Guidelines

- Implement photographic recording before, during and after any changes to the fabric.
- All changes to significant fabric must be recorded in accordance with the guidelines issued by the Heritage Council – the Photographic Recording of Heritage Items Using Film or Digital Capture 2006:

  https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Heritage/photographic-recording-of-heritage-items-using-film-or-digital-capture.pdf

- Recording of maintenance and repair works must be undertaken in accordance with The Maintenance Series Information Sheet 1.2 *Documenting maintenance and repair works*, by the NSW Heritage Council:

  https://www.environment.nsw.gov.au/research-and-publications/publications-search/documenting-maintenance-and-repair-works-information-sheet-1-2

- On completion of any future works, records should be provided by those undertaking the works to Hawkesbury City Council and Central Coast Council for archival inclusion.

8.3 Skills and Experience

Background, Opportunities & Challenges

The skills, experience and creative approaches required in the context of a conservation project are quite different to those that are applied to the design and construction of new structures. *The Burra Charter* encourages the use of skilled and appropriate professional direction and supervision from a range of disciplines for conservation activities.

In the planning, design, and execution of any changes to significant elements and features that are greater than day-to-day maintenance and cleaning, it is important to involve specialists and contractors who have experience in heritage projects, methods and materials. Expertise should be sought early, rather than after a proposal has been developed. Heritage specialists can assist in the application of the policies contained in this CMP and to develop more detailed, proposal-specific heritage conservation strategies. Depending on the nature of the work, heritage expertise can be sought from a heritage architect, archaeologist, structural engineer and building contractor with previous experience working on heritage sites.

Policy 13 – Early Advice

Ensure that appropriate heritage professionals are involved at an early stage for any major works to Thomas James Bridge, including to address specific heritage opportunities and constraints for works prior to design work commencing, and ensure their continuing involvement throughout the project.

Policy 14 – Appropriate Expertise and Skills

Skilled conservation professionals – for example architects, engineers, builders and archaeologists – must be engaged to advise on, document and implement conservation and upgrading works, and proposals for future work to Thomas James Bridge.

Work on significant heritage fabric must be carried out by tradespeople or professionals with demonstrated skills and experience in heritage building work.

Policy 15 – Traditional Construction

For any work on traditionally constructed parts of the site, use traditional methods of construction, maintenance and repair.

Policy 16 – Briefing

Brief all persons working at the site, including contractors and tradespeople, on the significance of the place and the need for care in undertaking works relating to significant heritage fabric – for example, via the preparation of a brief custodian document. This information should be provided as part of the site induction.

Strategies / Guidelines

- All conservation work undertaken at Thomas James Bridge must be in consultation with a qualified and experienced heritage architect acting within the guidelines of this CMP;
- The owners and managers of the site should ensure that appropriately skilled specialists with proven experience in heritage conservation works are selected to carry out works on elements of the site which are of Exceptional, High or Moderate heritage value;
- There are a range of broad trade skills available in the region which may be suitable for carrying out general conservation and maintenance works to the bridge and associated elements at the site. However, there may be particular instances where local trades need to be augmented with specialised trades from outside the locality or region;
- Specialists should work in conjunction with local trades to assist in the dissemination of heritage best practice techniques;
- Prior to the letting of any reasonable size conservation projects, the owner – in conjunction with advice from consultant heritage specialists – should check the relevant skills available.

Policy 17 – Conservation Actions Schedule

Prior to undertaking any conservation, maintenance or upgrading works to any significant fabric, a Conservation Actions Schedule must be prepared by a suitably qualified and experienced heritage architect.

Strategies / Guidelines

The schedule should be a succinct document that:

- identifies more detailed investigations to be undertaken in the area of proposed works with reference to the assessment of cultural significance;
- records and assesses documentary and physical evidence;
- determines applicable conservation policies;
- sets out a comprehensive schedule of conservation actions based upon the conservation policies.

The purpose of these additional investigations would be to:

- assist in the determination of the impact of future works, in particular on objects, elements or spaces of Exceptional and High and Moderate Significance;
- assess the suitability of conservation works, including an assessment of the impact of detailed alterations (in relation to significant fabric) and the removal of additions (which may or may not reveal or deface significant fabric).
- assist any proposed conservation works, including detail of fabric / finishes used, etc.

8.4 Ownership and Approvals

Background, Opportunities & Challenges

Thomas James Bridge has always been in public ownership and is now jointly owned by Hawkesbury City Council and Central Coast Councils. There can be benefits from long-term public ownership and

management associated with a consistent and holistic approach to conservation of fabric and built forms.

Where public ownership is no longer feasible, responsibility for caring for the heritage values of the site must be passed to the new owner. If a change in ownership is not well managed, the conservation of the site can be threatened by pressure for unsuitable changes to the site.

Prior to granting consent to any proposal for work to the site, the owner and manager should be satisfied that adverse heritage impacts associated with such a proposal are minimised, which may be demonstrated by the preparation of a heritage impact assessment and adequate documentation of the proposed works.

As Thomas James Bridge is adjacent to items listed on the NSW State Heritage Register, and as heritage listing is recommended for the bridge, the approval of the NSW Heritage Council should be sought prior to most forms of work commencing. This should include the proposed works documentation, a statement of heritage impact, the conservation management plan and an application fee.

Policy 18 – Total Asset Management Guidelines

The site should be managed in accordance with the NSW Treasury Total Asset Management Guidelines.

Policy 19 – Ownership

If the site passes from public ownership or if its use changes, appropriate heritage covenants and / or a heritage conservation agreement (or other appropriate arrangements) must be placed on land titles where there are identified heritage assets in perpetuity to ensure the adequate maintenance of the heritage assets and the provision of public access to the site, where appropriate.

Policy 20 – Compliance with this CMP under Change of Ownership

Compliance with this CMP must be included as part of any future contract for sale or other ownership or control agreement affecting Thomas James Bridge; address any non-compliance as a material breach.

Strategies / Guidelines

As Thomas James Bridge is owned by Hawkesbury City Council and Central Coast Council, the site should be managed in accordance with the Hawkesbury City Council Resourcing Strategy 2013-2023, Part 4 Asset Management, and the Central Coast Council Resourcing Strategy, Asset Management 2018-2028, and the NSW Treasury Total Asset Management Guidelines. The Guidelines advise that the sustainable management of heritage items should be treated by an agency as part of its core business. It also points out that problems and costs attributed with the use of heritage items are mostly due to backlog maintenance and past neglect rather than poor performance of the asset.

https://www.treasury.nsw.gov.au/sites/default/files/2019-11/TTIP19-07%20NSW%20Asset%20Management%20Policy%20-%20Master%20Approved_31%20October%202019.pdf

Refer to NSW Heritage Council State-Owned Heritage Management Principles:

https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Heritage/local-government-heritage-guidelines.pdf

The consent of the owner is required prior to lodging an application for works. This part of the process is separate from approving the works, and the landowners' consent to lodge an application does not present the approval to actually undertake the works. Prior to granting consent to a proposal, the landowner and manager should be satisfied that adverse heritage impacts associated with the proposal are minimised, which may be demonstrated by the preparation of a heritage impact assessment and adequate documentation of the proposed works.

Where public ownership is no longer feasible, responsibility for caring for the heritage values of the site will be passed to the new owner/s. Under the *NSW Heritage Act, 1977* a heritage conservation agreement could be established, which is a joint agreement between landholders and the Minister for the Environment that provides permanent protection for the special features of a place. The area under the agreement is registered on the title of the land, ensuring that, if the land is sold, the agreement and management requirements remain in place.

Policy 21 – Authority Consultation

For major development proposals, major technological change and overall site masterplans, consultation with appropriate authorities should be undertaken early during the design development stage so that any stakeholders' concerns, including those of heritage stakeholders, can be addressed.

Policy 22 – Statutory Approvals

Works must not be undertaken to the site, including to individual elements, of Thomas James Bridge without the required statutory approvals. It is the responsibility of proponents of work to obtain the relevant approvals prior to undertaking works.

Strategies / Guidelines

Thomas James Bridge is immediately adjacent to sites listed on the State NSW Heritage Register and heritage listing has been recommended for the site: as such, the approval of the NSW Heritage Council or its delegate should be sought for most forms of work. Approval should be sought through submission of a Section 60 application form to the Heritage Council, along with the proposed works documentation, a statement of heritage impact, the conservation management plan and an application fee.

There are provisions for exemptions under S57(2) of the *Heritage Act, 1977* which enable certain works to be carried out without the requirement of approval from the NSW Heritage Council. These exemptions include minor repair and maintenance works and painting to an approved colour scheme. However, some of the exemptions still require notification to the Heritage Council of NSW. Where notification is required, an Exemption Notification Form must be completed, with sufficient

detail provided to determine whether the proposed works meet the standard exemption guidelines. For details of the Standard Exemptions, refer to the NSW Heritage Council publication *Standard Exemptions for Works Requiring Heritage Council Approval* 2009:

https://www.heritage.nsw.gov.au/applications/state-heritage-items/standard-exemptions/

Depending on the nature of the works, the approval of Hawkesbury City Council and Central Coast Council may also be required:

- Refer to State Environmental Planning Policy (Infrastructure) SEPP 2007: https://www.legislation.nsw.gov.au/#/view/EPI/2007/641
- Refer to the Hawkesbury Local Environmental Plan 2012: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2012-0470
- Refer to the Central Coast Local Environmental Plan 2022: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2022-0308
- Refer to the Hawkesbury Development Control Plan 2002: https://www.hawkesbury.nsw.gov.au/plan-and-build/planning-policies/development-control-plan
- Refer to the Central Coast Development Control Plan 2022: https://www.centralcoast.nsw.gov.au/development-control-plan-dcp

8.5 Gradings of Significance and Changes to Fabric

Background, Opportunities & Challenges

The gradings of significance reflect the contribution that each element makes to the overall significance of the item (or the degree to which the significance of the item would be diminished if the component were removed or altered). Any future proposals for change to the bridge, including for conservation or new work, must be undertaken with consideration for the graded levels of significance in this CMP.

Policy 23 – Retention of Significant Fabric

Extant fabric of the bridge and associated elements must be retained and conserved in accordance with the Grading of Significance Table in Section 6 of this CMP. The implementation of change must be designed to retain significant elements and minimise the removal of significant fabric.

Policy 24 – Elements of Exceptional Significance

Elements of Exceptional Significance are rare or outstanding elements that directly contribute to the place's overall heritage significance. These elements must not be obstructed by new works, structures or services and they must be clearly visible and interpreted as part of any new works. Where elements of Exceptional Significance have been damaged, they should be repaired with sympathetic materials in preference to replacement.

Policy 25 – Elements of High Significance

Elements of High Significance have a high degree of original fabric and demonstrate key aspects of the place's overall heritage significance. These elements must not be obstructed by new works, structures or services and they must be clearly visible and interpreted as part of any new works. Where elements of High Significance have been damaged, they should be repaired with sympathetic materials in preference to replacement.

Policy 26 – Elements of Moderate Significance

Elements of Moderate Significance contribute to the place's overall heritage significance and may have been altered or modified. Minor change is acceptable so long as it does not adversely affect the overall significance of the place, its values, or fabric of Exceptional or High Significance.

Policy 27 – Elements of Little Significance

Elements of Little significance do not substantially add to the significance of the place in a positive way: neither do they detract from its overall significance. Elements of Little Significance may have been substantially altered or modified, or may reflect non-significant phases of development. Changes are acceptable so long as they do not adversely affect values and fabric of Exceptional, High or Moderate Significance.

Policy 28 – Intrusive Fabric

Opportunities should be taken to remove fabric that has been identified as being Intrusive, as this fabric detracts from the heritage significance of the place.

Policy 29 – Changes to Fabric

Where change or removal of fabric is necessary – for example to facilitate repair or maintenance – it should preferably be undertaken to fabric of Moderate or lesser significance. Removal of significant fabric should only occur where it allows for the conservation of fabric of greater cultural significance, or is essential for the conservation and / or ongoing use of the place as a whole.

Policy 30 – Salvage and Reuse

Fabric of Exceptional Significance must be retained in-situ. If fabric of High Significance must be removed during alterations and additions to the bridge, it must be carefully removed and salvaged for reuse. A record must be kept of removed / relocated material.

Strategies / Guidelines

- New work must be guided by the gradings of significance (refer to Section 6 above), with new work localised in areas of lesser significance.

- Fabric and elements of Thomas James Bridge that have been assessed to be of Exceptional and High Significance must be conserved. This includes stone abutments and timber elements.
- The retention of items of Moderate Significance is desirable, although it is noted that there is greater scope for their modification. Items of Little Significance may be retained or removed as required. Intrusive items should, eventually, be removed. The recommended treatment is as shown in the grading of significance table in Section 6.
- Statements of Heritage Impact must be prepared to assess proposed changes to the site. New work must be guided by the gradings of significance (refer to Section 6).

8.6 Conservation of Significant Fabric and Elements

Background, Opportunities & Challenges

Article 3 of *The Burra Charter* indicates that conservation is based on a respect for the existing fabric of a place and should therefore involve the least possible physical intervention, in order not to distort the evidence provided by the fabric. Maximising the survival of original fabric is important in order to retain the authenticity and integrity of the significant fabric of Thomas James Bridge. The retention of original fabric should be the first preference in any work.

Thomas James Bridge should be retained and conserved. The bridge is reasonably intact, and retains original fabric and character that it is possible to interpret, regardless of changes that have occurred. The following are general policies outlining principles for conservation works, including those to be carried out as part of any future upgrade works.

Policy 31 – Character

Retain and conserve Thomas James Bridge and associated elements, including the stone abutments round timber girders, transverse timber decking, longitudinal sheeting, and timber posts and railing. Conserve the overall form of the bridge generally, and retain the bridge's aesthetic character.

Policy 32 – Conservation and Upgrading Work

Conservation work and adaptation with appropriate sensitive upgrading work can be undertaken where it enhances public appreciation and does not detract from, or impact on, the identified significance of the bridge and associated elements. Such works include:

- removal of intrusive additions and finishes to the bridge which detract from its cultural significance;
- re-instatement of the original presentation of the site, in consultation with a suitably qualified and experienced heritage architect;
- alterations to areas of lesser heritage significance.

Policy 33 – Modification of Original Fabric

Modification of original and early fabric is only acceptable where modification is determined in consultation with an experienced heritage architect.

Policy 34 – Building Fabric of Thomas James Bridge

Retain and conserve fabric of Exceptional, High and Moderate Significance, including:

- stone abutments.
- round timber girders.
- transverse timber decking.
- longitudinal sheeting.
- timber posts and railing.
- any other associated elements that may be discovered at the site in the future that are of Exceptional, High or Moderate Significance.

Strategies / Guidelines

- Implement cleaning, repairs and maintenance works to ensure the long-term conservation of significant fabric.
- Prioritise conservation actions according to conservation needs. Address unstable fabric or deterioration which endangers significant fabric first.
- If existing significant fabric has to be removed – for example in order to repair a structure, or to reveal aspects of a building's significance – it must be recorded before any intervention is to take place and, if applicable, a sample should be retained on site.

8.7 Curtilage, Views and Setting

Background, Opportunities & Challenges

The current SHR curtilage for the Old Great North Road listing incorporates the section of the road between Devine's Hill and Mount Manning. It does not extend to Thomas James Bridge. Consideration should be given to include Thomas James Bridge in the listed curtilage for OGNR, as it contributes to the overall significance of the OGNR and this should be recognised.

Policy 35 – Extension of OGNR curtilage

The existing SHR curtilage of the Old Great North Road should be extended to incorporate Thomas James Bridge.

Policy 36 – Local Government and State Government agencies should coordinate to ensure a consistent approach to the curtilage of the site.

Local Government and State Government agencies should coordinate to ensure a consistent approach to the curtilage of the site.

Policy 37 – Retain Significant Views

Significant identified views to and from the site are to be retained, as they contribute to the wider setting of the place. Transport for NSW should liaise with Hawkesbury City Council and Central Coast Council to review the planning controls for the surrounding area (such as height controls, setbacks and landscaping) to ensure that key view lines are considered in the assessment of any nearby development applications.

While some former elements in the setting have been removed and there have been some alterations arising from changing operational requirements, the setting remains substantially intact. Any new development on the site should be subject to controls to ensure that it is compatible with the important visual and heritage qualities of the site and surrounding areas.

Policy 38 – Setting

Liaise with Hawkesbury City Council and Central Coast Council to ensure that any development within the setting of Thomas James Bridge and the Old Great North Road is sympathetic to its heritage values.

8.8 Adaptation, Alterations and Additions

Background, Opportunities & Challenges

Uses for Thomas James Bridge shall be guided by the policies outlined in this CMP, the conservation guidelines from the Heritage Council, and the principles of *The Burra Charter.*

The site has been used as a functioning road bridge for the entirety of its history. While some modifications have been made, the overall original form and design intent is easily interpreted.

New work to the bridge must be sympathetic to the appearance and character of the extant significant fabric. Where it is necessary to reconstruct fabric that is missing or damaged beyond repair, the new work must be distinguishable on close inspection. Where other changes are proposed that do not relate to the restoration or reconstruction of historic fabric, a contemporary aesthetic that is sympathetic to the historic detailing is acceptable.

The following strategies and guidelines are designed to assist in managing the significant heritage values of the place, accepting that change is inevitable with most occupied and functioning heritage sites. Proposed changes should always be carefully considered in the context of the significance of the place and the potential for any changes to impact on that significance.

Policy 39 – Understanding Place

When undertaking new development works or upgrade works, develop place-specific solutions which minimise the heritage impact. The level of change must be derived from an understanding of the relationship between the bridge and its site, the historic use and cultural significance of the bridge, and in accordance with the Statement of Significance in Section 5 and gradings of significance of individual items and spaces in Section 6.

Policy 40 – Alterations to Significant Fabric

Alterations to the significant fabric of the bridge generally should not occur unless they are of an essential and minor nature. Generally, modifications to fabric of Exceptional or High Significance should aim to reinstate elements that have been modified. (Refer also to Policy 29.)

The following alterations to significant fabric are acceptable:

- ***Removal of additions of Little or Intrusive Significance, or additions which obscure the original presentation and form of the bridge.***

Policy 41 – New Reconstruction Work

New reconstruction work (involving the addition of new material) should be distinguishable from existing fabric on close inspection. New work should not be visually dominant over adjacent significant fabric.

Policy 42 – Heritage Expertise for New Work

The design of alterations to the bridge should respect its historic form and detailing and must be designed in consultation with a suitably qualified heritage architect.

Policy 43 – New Work to be Complementary

New work must not be visually dominant over adjacent significant fabric. The introduction of new elements should occur using a combination of heritage and design skills.

Policy 44 – New Work to be Reversible

New work should be designed and detailed so that it is reversible and can be removed without adverse heritage impact on significant fabric.

Strategies / Guidelines

- Generally, proposed changes that impact on heritage significance should only be considered if:
    - They allow for the recovery of areas or elements of greater significance;
    - Care is taken to minimise the adverse effect on heritage significance and effort is made to negate the impact and enhance significance in some other way;
    - The change helps to maintain the use or security / protection of the significant elements.
- New work should be guided by the gradings of significance (refer to Section 6) and should generally be localised in areas of lesser significance.
- Additions to the bridge are not considered to be appropriate.
- Engage with suitably qualified heritage specialists and the NSW Heritage Council or its delegate at the preliminary planning stages for any new work on the site in accordance with the policies in Sections 8.3 and 8.4).

- New development should be planned with consideration for archaeological potential (refer to the policies in Section 8.12).

8.9 Maintenance and Repair

Background, Opportunities & Challenges

Regular maintenance and repair are an important factor in the conservation process. Scientific and physical investigation is required to assess the condition of the bridge and associated elements and to determine appropriate conservation methods that should be documented. Maintaining original finishes forms an essential part of conservation maintenance for significant fabric and can extend its service life.

The condition of Thomas James Bridge and surrounds has deteriorated as a result of repeated flooding that has hit the region over the course of 2021 and 2022, which has resulted in landslips in the immediate vicinity of the bridge and its necessitated partial closure.

Policy 45 – Continuing Maintenance

Conserve significant fabric of the place by preservation, stabilisation and continuing maintenance.

Policy 46 – Minimum Standards of Maintenance and Repair

Ensure that significant elements of Thomas James Bridge are managed in accordance with the* Minimum Standards of Maintenance & Repair *and that all significant assets identified in this CMP are integrated into asset routine / major periodic maintenance planning programs.

Policy 47 – Costed Maintenance Plan

A 20 year Costed Maintenance Plan should be prepared for the significant elements of Thomas James Bridge to provide a basis for its regular maintenance and repair. The Maintenance Plan should facilitate the forward planning and allocation of funding for maintenance works, including the identification of urgent works based on thorough condition assessment.

The Maintenance Plan should also outline what items are to be inspected, at what intervals they are to be inspected at, who is responsible for each aspect of the program and recommendations for timely repair when required. It should incorporate condition and restoration advice from a number of specialist consultants and tradespeople with experience in heritage restoration.

Policy 48 – Periodic Inspections

Conduct periodic inspections of the bridge and associated elements and provide a brief periodic audit of the condition of the structure, in order to be able to check the progress of maintenance works and to assist in longer-term maintenance planning.

Inspections should be carried out by a team of skilled conservation consultants to be led by a heritage architect.

Policy 49 – Approach to Maintenance

Maintenance of fabric must be undertaken in accordance with the following:

- ***Regular inspections and maintenance should be carried out by persons with demonstrated skills and experience in heritage building work and with an understanding of the heritage value of Thomas James Bridge.***
- ***Repair elements in need of urgent attention.***
- ***Repair as required, rather than replace, significant fabric disturbed during maintenance works. It is better to retain and patch / repair existing fabric if it can function in-situ, rather than to replicate original material.***
- ***Repair fabric with compatible materials.***
- ***Do not apply anti-graffiti or water repellent coatings unless researched and recommended by a suitably qualified and experienced heritage architect.***

Policy 50 – Funding Maintenance

There should be a commitment to adequate and ongoing financial resources to provide for corrective maintenance as required and for the long-term preventative maintenance of Thomas James Bridge.

Policy 51 – Drainage

Drainage measures at and adjacent to the site, including to the escarpment, should be reviewed, and a plan for the area should be compiled. It should address recent flooding at the site and should include measures that mitigate the risk of further flooding and subsequent landslips at the site in the future.

Policy 52 – Shotcrete and slope stability

Existing measures to provide greater slope stability in the immediate vicinity of the bridge include examples of visually-intrusive applications of shotcrete. While this is generally not encouraged from a heritage perspective, where it must be undertaken appropriate measures should be implemented to reduce its visual impact.

Roads & Maritime Services (now incorporated into Transport for NSW) have produced guidelines for improving the appearance of shotcrete in NSW. Some examples from the guidelines are reproduced below. They show that not just the colour but also the texture of shotcrete finish can be important in blending it unobtrusively. Analysis of the local environment should inform the selection of the colour of the shotcrete, with a tinting appropriate to the surrounding environment approved by a heritage consultant. Further, there are now several precedents in NSW for shotcrete to be finished with vegetation, which can involve regular or irregular spacing in the shotcrete. Example images are included below. Similarly, the visual impact of other measures such as rockfall mesh can be minimised , where it must be introduced for safety reasons, including appropriate tinting.

Figure 8-1: Example of shotcrete application with an unobtrusive outcome – in this case (on the M2 upgrade) using 'cat's claw' technique to provide a texture and an oxide applied to the concrete to match sandstone. (Source: RMS Shotcrete Design Guideline.)

Figure 8-2: Example of shotcrete application with a textured finish designed to make less obtrusive. (Source: RMS Shotcrete Design Guideline.)

Figure 8-3: Embankment stabilised with shotcrete but finished with vegetation. In this case the vegetation is not yet mature. (Source: Sydney Trains.)

Figure 8-4: Embankment stabilised with shotcrete but finished with vegetation. In this case, the vegetation is not yet mature. (Source: Sydney Trains.)

Policy 53 – Urgent Works

Carry out urgent works that are necessary for the protection of significant fabric whenever they are identified, such as in response to landslips.

8.10 Painting

Background, Opportunities & Challenges

Regular painting forms an essential part of maintenance for a number of building materials – especially timberwork – and can extend their service life. The timber posts and rails of Thomas James Bridge are currently painted white: however, decking, supports and stone elements are unpainted.

Policy 54 – Colour Schemes

Any paint colour scheme that is selected for the bridge should be based upon documentary and physical evidence of past paint schemes, or otherwise on a historically appropriate paint colour scheme. Selection of an appropriate colour scheme for significant fabric should be carried out by a suitably qualified heritage specialist.

Policy 55 – Unpainted Surfaces

Existing unpainted surfaces originally intended to be left unpainted (such as the stone abutments) should remain unpainted.

Policy 56 – Existing Painted Surfaces

Exposed surfaces that have previously been painted and that were originally intended for painting should be regularly repainted.

Strategies / Guidelines

- When undertaking cyclical painting works, seek to introduce historically appropriate colour schemes for significant fabric that has previously been painted and that was originally intended for painting. Undertake research into original and subsequent colour schemes as the opportunity arises.
- Do not paint surfaces that were not originally intended to be painted.

Policy 57 – Protective Coatings

Do not apply anti-graffiti or water repellent coatings unless researched and recommended by a suitably qualified and experienced heritage architect.

8.11 Safety

Background, Opportunities & Challenges

With the recent occurrence of landslips and the partial collapse of sections of the slope at the site due to flooding, making the bridge safe for those seeking to use it – while still maintaining its cultural significance – has become a priority.

Policy 58 – Make Safe Works

Carry out essential make safe works to the areas of the site that are in poor condition (particularly areas affected by recent landslips / flooding) to avoid harm to members of the public.

Temporary protective barriers currently in place at the bridge (ensuring its partial closure) are unsympathetic to its heritage value and should be removed once a more permanent and sympathetic solution to the current flood damage at the site (and possible future occurrences of such damage) has been implemented (refer to Policy 51).

8.12 Archaeology

Background, Opportunities & Challenges

Archaeological resources have the potential to contribute to our understanding of a place, its historical development and its cultural significance.

When relics are discovered, Heritage NSW must be notified. This applies to all land in NSW.

A 'relic' means any deposits, artefact, object or material evidence that:

- relates to the settlement of the area that comprises NSW, not being Aboriginal settlement.
- is of Local or State Significance.

Policy 59 – Ground Disturbing Work

Ensure that archaeological advice is sought at the planning stages of any excavation work / groundworks on the site. Ensure that the appropriate approval or exemption is obtained prior to work commencing in any areas requiring archaeological monitoring and / or archaeological excavation.

Policy 60 – Obligations of Contractors

Suitable clauses must be included in all contractor and subcontractor contracts to ensure that on-site personnel are aware of their obligations and requirements in relation to the archaeological provisions of the Heritage Act 1977. Contractors and subcontractors' contracts must also specify obligations which need to be met relating to the National Parks and Wildlife Service Act 1974 relating to Aboriginal 'objects' or relics.

Policy 61 – Unexpected Finds

Should any unexpected archaeological deposits or relics be uncovered during excavation works:

1. ***That are not identified and considered in the supporting documents for a section 140 or section 60 approval, OR***
2. ***Where no permit, approval or exception is in place,***

work must cease in the affected area(s) and the Heritage Council of NSW must be notified via the Heritage Management System (HMS).

Works must stop and a suitably qualified and experienced archaeologist must be engaged to assess the finds. Depending on the results of the assessment, additional approvals may be required before works can recommence on site.

Policy 62 – Major Excavation

If planning any major ground-disturbing works, a detailed archaeological and Aboriginal cultural heritage assessment which assesses the archaeological potential of the site should be prepared by suitably qualified archaeological and Aboriginal cultural heritage specialists.

Policy 63 – Conservation In-Situ

The primary option for State Significant archaeological relics is retention in-situ, unless otherwise approved by the NSW Heritage Council.

Strategies / Guidelines

Avoiding impact on the archaeological resource is best achieved by avoiding ground disturbance wherever possible – for example, by reusing existing service trenches when in-ground services are to be renewed or upgraded.

Where works are proposed to be carried out in close proximity to known or probable archaeological relics which can be retained in-situ, strategies must be put in place to ensure that construction work and / or heavy machinery does not disturb or damage those relics. Conservation in-situ may be achieved by covering the relics over in a manner which does not impact on them or by conserving them as exposed archaeology.

Note: The provisions of the *Heritage Act 1977* relating to the protection of archaeological resources apply to all archaeological resources, regardless of whether or not the archaeological potential of the site has previously been identified.

8.13 Interpretation

Background, Opportunities & Challenges

Interpretation is an essential part of the conservation process. *The Burra Charter* advises that the cultural significance of many places is not readily apparent and should be explained by interpretation. Interpretation should enhance understanding and enjoyment and be culturally

appropriate. Interpretation includes all the ways of presenting the cultural significance of the place, and may include an array of techniques and media – from the treatment of the fabric (repair and conservation work) and presenting explanatory material on and off the site, to organising activities.

The association of Thomas James Bridge with the Great North Road is fundamental to the understanding of its historical significance. The history of the site and the heritage values that make the place significant are worth interpreting to visitors and to the general public: therefore, an interpretation strategy should be prepared for the site.

An interpretation strategy provides an outline of the policies and strategies for interpreting a place in order to communicate its significance. The strategy should identify key themes, storylines and audiences and provide recommendations for interpretation media. Interpretation media are the tools, techniques and technologies used to convey the interpretation to an audience. A developed interpretation plan, detailing specific interpretation proposals, may be developed subsequent to the interpretation strategy.

Policy 64 – Interpretation Strategy / Interpretation Plan

An Interpretation Strategy / Interpretation Plan for Thomas James Bridge should be prepared by an experienced heritage interpretation specialist, and it should subsequently be implemented following approval by the relevant authorities.

Policy 65 – Community Consultation

Ensure that interpretation is undertaken in consultation with the local community and interested heritage groups, such as convict interest groups.

Policy 66 – Funding

Obtain and allocate the funding necessary for interpretation.

Policy 67 – Review of Interpretation

The interpretative media and strategy that is implemented in the future should be reviewed at ten-year intervals as a maximum, as part of the management and maintenance of the site and precinct. This should include checks for the condition of / vandalism to interpretation media, the upgrade of interpretative content and the possible revision of locations of interpretation media, etc. A funding mechanism should be developed over time to provide for the ongoing maintenance and upgrade of interpretative media.

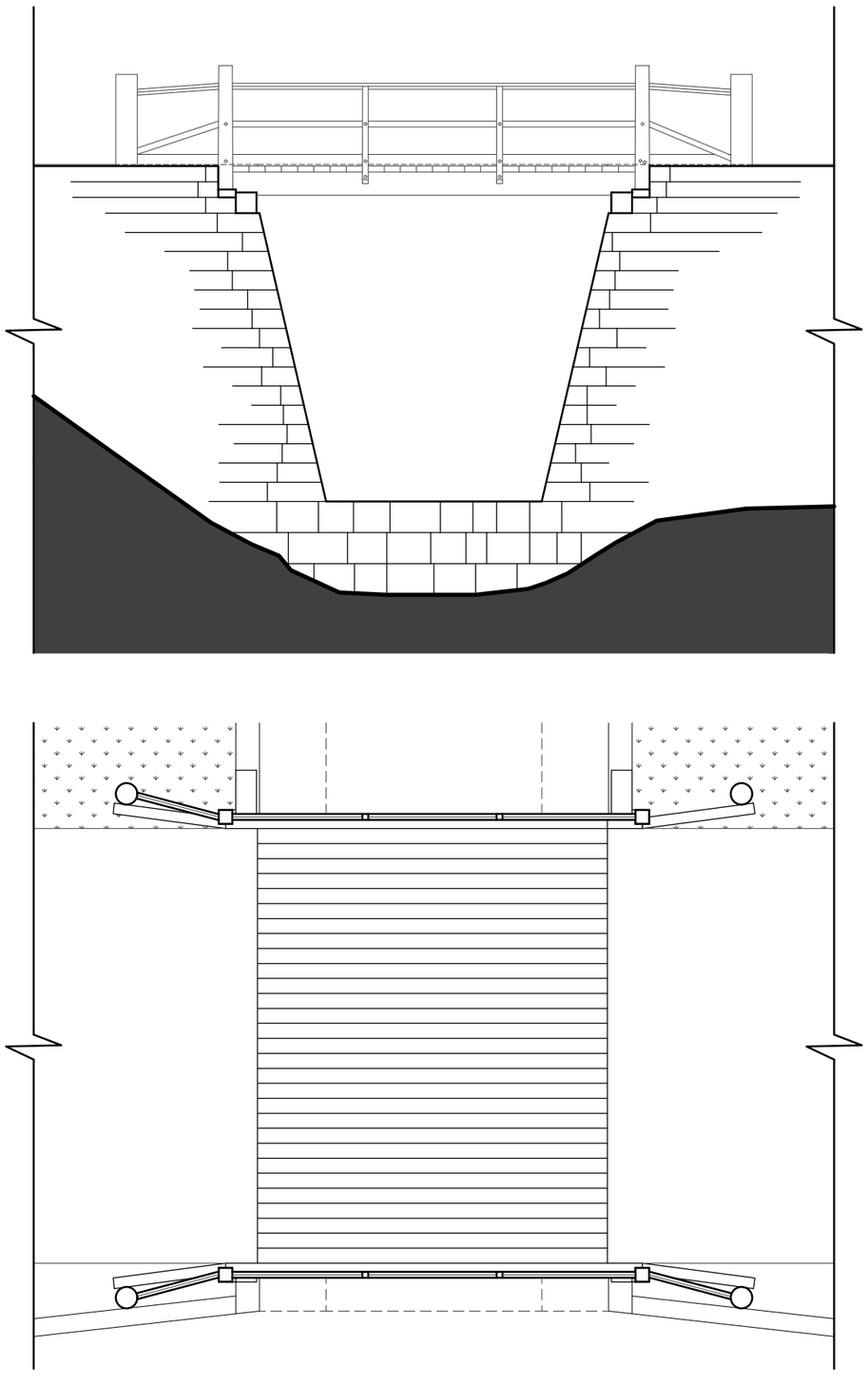
Policy 68 – Coordination with OGNR Interpretation

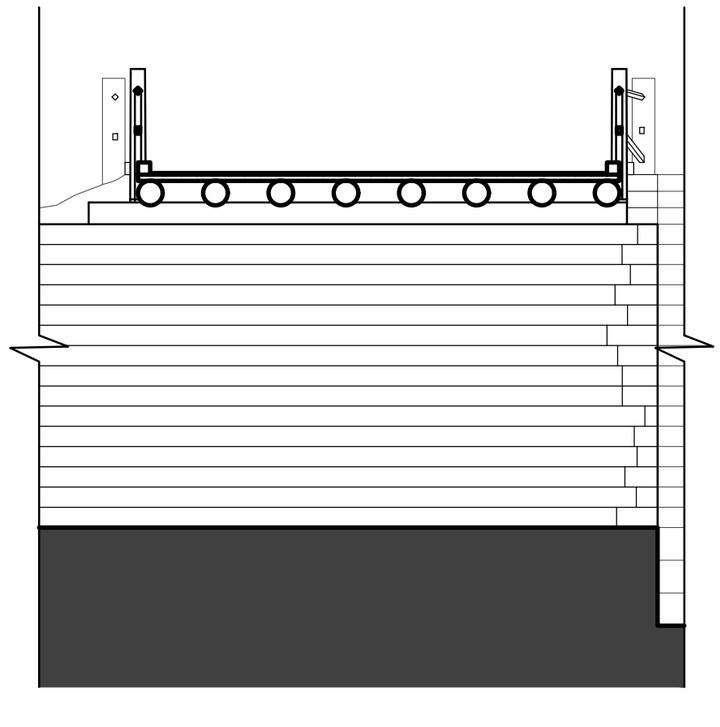
As Thomas James Bridge should be seen as an important element of the Old Great North Road, in addition to being significant in its own right, the interpretative media and strategy that is implemented in the future should take into account any existing interpretative measures within the OGNR to ensure as consistent an approach as possible.

Strategies / Guidelines

- Measures to appropriately interpret the major aspects of the significance of the place must be incorporated into any conservation and development proposals, taking account of the site as a whole.
- Methods of interpretation include the conservation and display of original features and fabric; the reconstruction of missing or damaged elements based on documentary and / or physical evidence; the introduction of interpretative devices such as discreet labelling; the use of historic photographs; and the preservation of evidence of original finishes and fabric, etc. Where changes are proposed, measures should be incorporated to show the location, character and / or role of removed or altered elements, where appropriate.
- There should be an ongoing commitment to make financial resources available for the interpretation of the site.

APPENDIX A: DRAWINGS





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TN

CLIENT
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PROJECT
THOMAS JAMES BRIDGE

TITLE
ELEVATION, SECTION AND PLAN

SCALE	DRAWN/CHECKED	DRAWING NO.
1:100 @ A3	SM/OCP	100
PROJECT NO. 22024	REVISION 1	

APPENDIX B: SHOTCRETE DESIGN GUIDELINE

Transport
Roads & Maritime
Services

NSW GOVERNMENT

Shotcrete design guideline

Design guideline to improve the appearance of shotcrete in NSW

March 2016

Contents

Acknowledgements

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The information in this document is current as at March 2016.

Foreword

This was the third guideline published under the Beyond the Pavement initiative. It accompanies *Bridge Aesthetics,* the *Noise Wall Design Guideline* and the *Landscape Guideline* and addresses the issue of the visual impact of shotcrete.

The document has been updated to reflect lessons learned in cutting stabilisation over the past decade.

While shotcrete is a useful and cost effective means of stabilising or supporting cuttings if not designed well it can be particularly unsightly. It can obscure the underlying natural geology and prevent revegetation, both aspects of a road journey that customers find interesting and comforting. In terms of maintenance and long term stabilisation it would be better if the need for its use could be avoided by securing enough land to lay back cuttings to a stable gradient.

This document recommends the best way to avoid the need for shotcrete is to consider the ramifications of the vertical and horizontal alignment very early on in the route selection and concept design stages.

However this is a practical document and it is recognised that in certain situations there are sound reasons for shotcrete use. For these cases a number of measures are provided to minimise its extent and improve its appearance all with the aim to make the application as unobtrusive as possible.

To achieve these goals it is important that a balanced approach be adopted mindful of the practical benefits of shotcrete as well as the potential visual impacts.

I commend this document to development and project managers and their geotechnical and urban design advisors.

Peter Duncan
Chief Executive
Roads and Maritime Services NSW

March 2016

Image The Cudgen Road tunnel **Cover image** Pacific Highway, Yelgan to Chinderah Project

1. Introduction

Although shotcrete is cost effective, when used in its natural, untreated state, it is visually intrusive, particularly in highly sensitive urban or rural areas.

Due to this there is often a call to restrict the use of shotcrete. However, this is not possible as it is a valuable engineering technique, useful for stabilising and providing structural support for problematic slopes.

If considered at the outset of a project, in the route selection and concept design stages, designers and engineers can agree on a common goal to avoid the need for shotcrete slope stabilisation for visual as well as cost and maintenance reasons.

Therefore this document addresses the need to consider unstable slopes early on in the road development process and sets down a strategy and recommendations to avoid or minimise the eventual need for shotcrete. However it also recognises that there will be circumstances where shotcrete is required and addresses the real practical problem of what is an acceptable appearance.

Ideally, if space were unlimited and unstable slopes able to begraded out, shotcrete could be avoided on our road corridors. This would be desirable because stabilised slopes are an expensive ongoing maintenance burden, shotcrete or any other stabilisation technique doesn't last forever, it adds to the extent of impermeable surfacing in the road corridor, it precludes vegetation cover and when untreated and used in large expanses is unsightly.

Yet in reality, there are many factors that can result in the use of shotcrete. For example space is limited, as is money, and steep cuttings are often unavoidable. Also geotechnical knowledge is, by its nature, not perfect until the cutting is exposed. Shotcrete, although not initially required, may become essential. Furthermore, in the case of existing roads, shotcrete may be the only technique available to road maintenance teams.

Consequently, for many reasons, shotcrete is a fairly common element of our roads and its appearance and visual impact needs to be considered in the concept or detail design stages of a project's development.

Shotcrete is not a surprise... we are aware that it will be needed and an allowance for an application is usually made, however we don't know where it will be needed.

1.1. The use of shotcrete

Very simply shotcrete is the term used for spraying concrete and mortar onto a surface at high velocity. It was invented in 1907 and patented as Gunite. Its popularity grew rapidly from 1912 to the 1930s and during this time the term shotcrete was coined following the introduction of aggregate mixtures.

During the 1970s silica fume was introduced to shotcrete and it became viable as an underground mining support. Today shotcrete has become a very useful material due to its high strength, durability, low permeability, good bond, limitless shape possibilities and ease of handling in areas of difficult access. It also requires no formwork, is highly cost effective and is particularly useful where land space is limited.

Shotcrete is a treatment applied to batter surfaces, usually for one of two reasons:

1. To protect a surface which, left untreated, would fret and erode (or is already doing so). Such surfaces may be localised or comprise anything up to the entire batter, depending on the circumstances.
2. To provide structural support for otherwise sound rock which is being undermined by erosion or which is unstable (due to defect orientations or degree of fracturing).

The two functions may be combined in many cases.

The circumstances of its use may arise either as part of the original construction or as remediation of existing batters. The distinction is important. New work should allow substantial control over geotechnical design, and hence preconstruction decisions about batter slopes and how they will be stabilised and maintained. Treatment should be planned and preventative, rather than remedial, although some surprises may occur. For existing slopes, you have what you have and the treatment is almost always remedial. While the possible options may be similar, the constraints on their use (including costs) are different.

There should always be a clear purpose for the use of any engineering measure and shotcrete is no exception. It must be understood in terms of its intended function(s) and comparisons made with alternatives which could replace it.

It is not practical to dismiss the use of shotcrete due to its appearance. The science of rock durability is very complex and there are few experts in Australia who could predict with a great degree of accuracy the durability of all types of rock after exposure. Judicious use of shotcrete to ensure the stability of the batter (or slope) and the safety of road users is inevitable when considering the extent of our road network.

Nevertheless shotcrete is sometimes used in excess and applied when not always needed. Project managers and their teams need to apply control to the applications so that it is applied with precision and mindful of visual impacts.

Shotcrete application.

A crumbly shale band, which if higher up the cutting would need to be stabilised.

1.2. The appearance of shotcrete

Research into the subject of shotcrete appearance prompted a practical response from a member of the American Shotcrete Association.

Shotcrete can vary in appearance from very rough in the natural as-shot (unfinished) condition, to moderately rough (although plane) in the "rodded" condition, to as smooth as cast-in-place concrete with appropriate finishing. Very pleasing appearances can be produced with architectural shotcretes with a wide range of different types of finished surfaces."

Clearly, shotcrete like any other material, needs to be designed. Yet unlike many other substances, its raw state is particularly unsightly and there is little or no functional benefit to justify improving its appearance.

More specifically when used in large expanses:

- It can cover up a natural rock or rocky finish.
- It generally precludes the establishment of vegetation.
- In its raw 'as shot' state. It is formless and has no structured appearance unlike a mesh system, concrete wall or gabion wall.
- It is generally monochromatic its blandness particularly highlighted in highly valued landscapes.

The photographs following illustrate just a few examples of the intrusive nature of shotcrete.

The M2 was one of the earliest privately financed projects. Few outcomes were defined regarding finished surfaces to cuttings and walls and the shotcrete applications consequently proved most cost effective to the road consortium. The shotcrete is particularly unsightly exacerbated by the scale of the application.

Clearly shotcrete, like any other material, needs to be designed.

The M2 Upgrade project used a range of techniques in the design of the shotcrete applications. In this image a ‘cats claw’ technique was used to provide a texture and an oxide applied to the concrete to match the sandstone. The outcome is unobtrusive.

2. Strategy

The best strategy in dealing with shotcrete structural solution in terms of cost, safety, appearance and environment, is to adopt the hierarchy of:

2.1. Avoidance

Avoidance refers to the objective of avoiding or minimising the need for any form of slope stabilisation right from the start of the road development process.

2.2. Minimisation

Minimisation refers to the objective of minimising the extent and visibility of shotcrete.

2.3. Improve appearance

Improve appearance refers to the objective of designing the finish of the shotcrete application so that it is as unobtrusive as possible.

The following section sets down objectives and principles to guide the adoption of this strategy.

The aim is to achieve a more balanced approach to the use of shotcrete so that design quality and road user enjoyment is considered as well as cost and safety.

3. Avoiding or minimising the need for shotcrete

3.1. Objective

The need for the use of shotcrete or any other batter stabilisation technique should be avoided. Besides being particularly unsightly, relative to an untreated safe slope shotcrete is costly and high maintenance. It is better to have designed the cutting so that stabilisation is not needed.

The best time to avoid or reduce the need for shotcrete is in the route selection and refinement process. The best way to avoid the need for shotcrete is to allocate sufficient space for the road and the cuttings.

Liaison with geotechnical experts in the route selection stages will assist in defining the space needed for the road corridor by advising on appropriate cutting slopes.

3.2. Principles

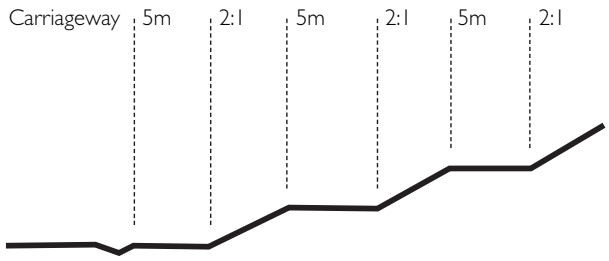
3.2.1. Obtain sufficient land

The need for shotcrete can be eliminated through purchase of sufficient land so that batters can be laid back to a stable grade. Where adjacent land is highly valuable or threatened habitat, discussions should be held with stakeholders to consider the relative merits of the land needed versus the costs (financial and aesthetic) of the shotcrete application.

3.2.2. Avoid over steep cutting faces

The need for batter treatment arises when cutting faces are over steep for the combination of rock types, fracturing and weathering patterns intersected. Ensure that the stability and treatment consequences of steepening cutting faces is given appropriate consideration at the route selection and concept design stages.

Where there is limited geotechnical information it is preferable to nominate flatter rather than steeper batters. Design for optimal not maximum slopes, then if there is a change in shape or a slope stability issue, shotcrete may still not be necessary. In most situations, slopes flatter than 2(H):1(V) with 5m benches and setbacks from carriageways will provide a stable cutting as well as allow space for seeded vegetation to establish.



A Stable cutting profile, however vegetation is hard to establish on 2:1 slopes and shallower gradients are preferred.

A vegetated 2(H):1(V) cutting on the Pacific Highway at Bonville providing a long term outcome.

3.2.3. Provide space for cuttings

Obtaining sufficient space between the road and rock cutting is by far the best way to avoid the need for shotcrete. Every metre gained has a significant impact on the risks posed by an unstable cutting. It also allows planting to develop to help catch debris, improve the appearance of the road corridor and break up the expanse of concrete.

3.2.4. Explore other sources of fill if required

In occasional situations cuttings are deepened to balance additional fill requirements by steepening cutting faces rather than by widening the cutting footprint. In these circumstances consider borrowing material from other locations.

Two cuttings on Hume Highway, one with a setback and limited shotcrete (left), the other adjacent to the road requiring significant shotcrete coverage.

3.2.5. Explore alternative stabilisation techniques

Where potential shotcrete stabilisation needs are identified explore alternative solutions such as:

- Reduce face heights and steepen slopes to reduce erosion.
- Shotcrete application on the bench top only, to minimise water penetration and ongoing erosion.
- Rock bolting (where possible rock bolt heads should not be covered with shotcrete).
- Mesh netting or use of bolted rock mesh coloured matt black.
- Fencing at key locations on the benches and base of slopes to catch loose material.
- Soft fall areas at the base of slopes to contain loose material.
- Locally won rock gravity walls (e.g. Woronora bridge project).
- Retaining walls or precast panels over stabilised cuttings, to be considered in urban areas with high land value and high quality finishes needed.
- Slopes stabilised by rock mattresses or stone.

3.2.6. Be judicious in the use of shotcrete

Consider the costs and benefits of the 'do nothing' option. If there is sufficient space, allowing the slope to weather and erode safely may be the best option in the long run.

3.2.7. Specify pre splitting

Specify excavation methods that minimise the risk of creating unstable slopes (e.g. Oak Flats interchange where rock was ripped rather than pre split).

Prepare specifications and manage contracts such that the risk of blasting damage to pre-split faces is minimised (refer Earthworks Spec. R44, Clause 4.5.2).

3.2.8. Consider covering shotcrete

In certain highly sensitive rural and urban situations and around bridges the environmental impact assessment (Scope of Works in a design and construct situation) should specify that there should be no visible shotcrete applications.

Untreated cutting on Hume Highway.

Concrete panel covering pile retaining wall and shotcrete on the Pacific Highway at Banora Point.

Obtaining sufficient space between the road and rock cutting is by far the best way to avoid the need for shotcrete.

4. Minimising the extent of shotcrete

4.1. Objective

If the use of shotcrete cannot be avoided then efforts should be undertaken to minimise its extent or screen it.

4.2. Principles

4.2.1. Precision design

Aesthetically it is far better (and more cost effective) to apply shotcrete precisely to unstable sections of cuttings than to apply a blanket covering.

In order to achieve this the shotcrete application should be planned and designed in advance so as to minimise visual impact as well as stabilise the slope. This planning need not be time consuming if the right expertise is employed and could be based upon photographs of the emerging cutting.

4.2.2. Progressive stabilisation

Stabilisation treatments (including shotcrete) should be applied progressively with excavation rather than left to the end. This tends to minimise usage which is a cost saving and satisfies both geotechnical and urban design objectives. (R44, Clause 4.2.1 has a hold point at each bench level for this purpose.)

4.2.3. Relationship with surrounding rock

Finish or extend the application of shotcrete up to distinct edges, natural joints or changes in the face of the cutting.

Shotcrete applications extend neatly to the edge of a change in the rock surface and coloured to match existing rock can look quite unobtrusive and visually acceptable. (Southern Freeway M1.)

Two cuttings with similar stability problems. Precision design and progressive stabilisation can minimise the extent of shotcrete (Hume Highway).

Shotcrete application carefully minimised on the M1 north of Sydney. Image: Spackman Mossop

4.2.4. Masking

Shotcrete should be controlled and applied only where required and masked off for other areas, for example in soft rock seams.

A neat sharp edge, especially if it coincides with a change in the rock texture or a fracture line, is generally more appropriate than bleeding the shotcrete out or allowing overspray. However it should be accepted that feathering the shotcrete may be required in order to achieve a good bond with the rock.

4.2.5. Screening

Planting should be used to help screen the shotcrete application.

A neat sharp edge, especially if it coincides with a change in the rock texture or a fracture line, is generally more appropriate.

5. Improving the appearance of shotcrete

5.1. Objective

All shotcrete applications visible from the road or surrounding public areas must be designed so that the application is as unobtrusive as possible in the local context. Consider the production of trial sections to assess appearance before final shotcrete applications are commenced.

5.2. Principles

5.2.1. Colour

The colour of the shotcrete can either be one of the most successful ways to minimise its intrusiveness or conversely the best way to make it stand out starkly against the rocky or vegetated background. Colour must be carefully considered and inspired by the natural local rock.

Achieving colour matches with adjacent rock; creating a consistent colour; and delivering a satisfactory colour outcome is extremely difficult

Achieving colour matches with adjacent rock; creating a consistent colour; and delivering a satisfactory colour outcome is extremely difficult. There are no hard and fast rules however the following principles should be considered:

- Darker shotcrete tends to be less intrusive than light shotcrete but avoid dark shotcrete on light rock or light shotcrete on dark rock.
- It is important to get a feel for the overall colour and tone effect of the cutting. Picking out one particular colour and tone can be unsuccessful if it doesn't represent the overall impression.
- With monochromatic rock, coloured concrete can be a very successful way to hide the application.
- If the shotcrete is covering all exposed rock then there is little point in aiming to achieve a colour match, better to select an unobtrusive colour that fits the local context.
- Attempting to achieve colour blends in shotcrete is rarely successful.
- If the shotcrete application is formed into a formal geometric (wall) shape then colouring concrete to achieve a natural look is not appropriate.
- Time always changes the colour of both rock and shotcrete, through water staining, air particles, exhaust emissions, vegetation growth and weathering.

A dark earthy red/grey/brown colour helps recede the shotcrete into the rock of the lower half of the cutting on the Pacific Highway near Taree.

A sandstone yellow colour renders this application on the M1 unobtrusive.

Excellent colour match on this cutting on the Hume Highway renders the shotcrete practically invisible. Colour matching works best where the rock is monochromatic.

Painting

In some situations a painted finish is possible, to match up with the surrounding rock.

The context of the cutting and the local landscape should be carefully considered as painting can often draw attention to the shotcrete and can sometimes look false. Painting also weathers and loses its effect.

Rock sculpting and painting can help blend the shotcrete with the rock, but care must be taken that it does not appear artificial.

A sandstone yellow colour renders this application on the M1 unobtrusive.

5.2.2. Texture and sculpting

The texture of the shotcrete is almost as important as colour and has been often overlooked in shotcrete applications.

Rock is often characterised by a collection of planar surfaces which is quite different to the granular amorphous finish of shotcrete.

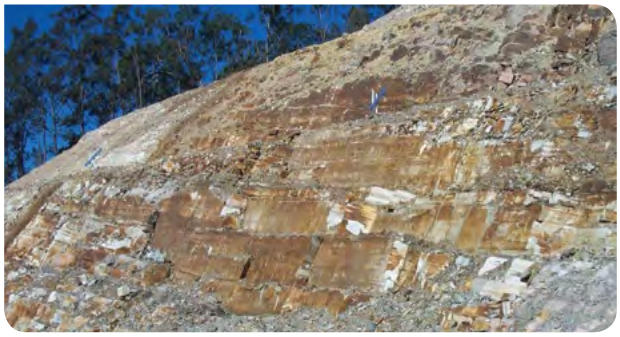
The ways in which a texture can be applied to shotcrete needs to be explored however the following are some possibilities.

- Trowelling the shotcrete to a smooth but irregular pattern to match natural planes in rock.
- Forming the shotcrete to a smooth but formal shape to create the impression of a purposeful element such as a retaining wall.
- Stamping the shotcrete with timber boards or moulds.
- Leaving an exposed aggregate finish to provide natural colour and some texture.
- Rock sculpting.

When shotcrete is applied in small scale and prominent situations, consider sculpting the surface of the shotcrete so that its appearance is similar to the surrounding rock.

The success of this technique is heavily dependant on the skill of the artisan and the context of the area. Great care needs to be taken to avoid an artificial or kitsch appearance.

A formal element in the landscape can be more acceptable than a formless finish such as untreated shotcrete.



The natural jointing of rock often creates a texture which is angular and planar rather than amorphous, so unformed shotcrete does not complement this well and has a poor appearance (picture above).

A rock type finish on the southern approaches to the Spit Bridge, Sydney.

Avoid sculpting obviously man made shapes into rock.

Sculpting shotcrete requires craftsmanship. The objective must be to make the wall unobtrusive, not to try and replicate a rock finish. A few joint lines cut in deftly as the shotcrete is applied is one way to achieve this.

5.2.3. Stone pitching

In some sensitive situations stone pitching may be appropriate. It obscures the underlying concrete and provides a natural rock finish.

5.2.4. Rock mattresses

An expensive but visually satisfactory way to cover shotcrete on shallower cuttings is through the placement of gabion mattresses filled with locally won stone. On shallow slopes it should be considered as an alternative to shotcrete.

5.2.5. Framing

Visually containing the shotcrete coverage through planting and gabions or concrete retaining walls can also be successful.

However the need to control the shotcrete application in terms of colour, texture and consistency is still important.

Materials and characteristics of new elements were carefully designed to fit with the local area, and two service roads were constructed for safer access to properties.

Rock filled mattresses placed over shotcrete application, Great Western Highway at Linden.

The Pacific Highway Cudgen Road tunnel allows the wooded ridge line and wildlife corridor to cross the road and extend down to the edge of the Tweed River. Native planting and seeding is provided to revegetate the edges of the portal. Use of gabion facing is suitable for the natural context.

6. Design process

The guidelines in this document can be summarised in the following 10 steps, which apply from route selection right through to detail design.

Space for road corridor	1	Consider impact of road alignment on cuttings and their stability. Ensure adequate space for road corridor.
Set back	2	Maximise set back distance of base of cutting from carriageway.
Lay back	3	Lay back cuttings to a maximum slope of 2(H):1(V).
Alternatives	4	Consider alternative stabilisation treatments.
Precision	5	Analyse cutting faces and design applications so that shotcrete is restricted only to the seams, faults and areas that require stabilisation.
Progressive stabilisation	6	Ensure treatment is applied as early after the face is exposed as possible.
Cover	7	Consider covering over shotcrete in sensitive areas.
Colour	8	Consider the colour and brightness of the concrete. Specify the production of trial sections, ensure consistency.
Form and texture	9	Consider the form of the application and the texture of the finish. Specify the production of trial sections.
Vegetation	10	Consider vegetation as screening.

7. Appendix: The geotechnical aspects of shotcrete use

The geotechnical aspects of shotcrete use

Shotcrete is not an end in itself. It is a treatment applied to batter surfaces, usually for one of two reasons:

1. To protect a surface which, left untreated, would fret and erode (or is already doing so). Such surfaces may be localised or comprise anything up to the entire batter, depending on the circumstances.
2. To provide structural support for otherwise sound rock which is being undermined by erosion or which is kinematically unstable (due to defect orientations or degree of fracturing).

The two functions may be combined in many cases.

The circumstances of its use may arise either as part of the original construction or as remediation of existing batters. The distinction is important. New work should allow substantial control over geotechnical design, and hence pre-construction decisions about batter slopes and how they will be stabilised and maintained. Treatment should be planned and preventative, rather than remedial, although some surprises may occur. For existing slopes, you have what you have and the treatment is almost always remedial. While the possible options may be similar, the constraints on their use (including costs) are different.

The technical basis for using shotcrete

There should always be a clear purpose for the use of any engineering measure and shotcrete is no exception. It must be understood in terms of its intended function(s) and comparisons made with alternatives which could replace it.

Surface protection

This will normally be to cover erodible soils, or rock which is erodible or unsound e.g. a fretting surface. The batter would normally be steep (ie 1:1 or steeper). Flatter batters would usually be better treated by other methods. The surface to be treated may be a well-defined strip (or strips) with different properties from the surrounding rock (e.g. shear zones as at Jugiong, shale lenses in sandstone), or it may form a large part, even all, of the batter (e.g. shales, siltstones, tuffs, some sandstones). Adverse consequences from the erosion of the surface are undercutting of more competent areas of rock and the supply of the eroded material into the stormwater drainage. In some cases, unsound rock is also an acid sulphate problem.

Differential erosion of the batter gives rise to stability problems which will normally get worse with time. More uniform erosion or fretting is normally less of a threat to stability (unless the batter was too steep to begin with) but produces pollution problems which may not be acceptable

The need for surface protection should normally be capable of anticipation at the design stage, although occasionally a rock will show a delayed response to exposure. In some cases, quite detailed assessments can be made. In others, the circumstances requiring protection can be understood and anticipated, but the detail of specific locations will have to wait until the batter is exposed. This will almost always be the case where there is complex geology. Commonly, the situation is intermediate between these extremes.

Structural support

Shotcrete in this application will form part of a structural system, intended to support the batter, which will often include other components (e.g. chainwire or steel mesh, rock bolts, dowels or rock anchors). The shotcrete may be fibre reinforced. The key difference is that the shotcrete will be required to resist, or transfer, loads. It may also have an essential surface protection function in conjunction with the structural function (e.g. in soil nailing). Fibre reinforced shotcrete (FRSC) is an essential component in most modern tunnel support systems.

Shotcrete may also be applied to rock surfaces to prevent sound rock material falling out, particularly where it may land directly in traffic (e.g. above tunnel portals and where steep cuttings are constructed next to narrow shoulders).

Again, the need for this should be capable of being anticipated, with varying degrees of precision as far as locations are concerned.

Construction damage

Large scale uses of shotcrete may result due to the batter condition being different from the condition expected before tender. This often has to do with damage caused by construction processes, particularly blasting. Less commonly, design changes are forced by stability issues which were not recognised before construction. In some cases, delay in applying stabilisation measures has also necessitated an increase in quantities.

Typical problems are:

- Fracturing and loosening of a face due to poor blasting practice (has happened even where the batters are presplit) usually the result of pressure to keep excavation costs down, or to keep production rates up. On a big job, the latter may make the subsequent extra treatment economically viable for the contractor, even if he has to pay for it.
- Damage to the upper part (usually 1-1.5 m) of the batter – typically "lifted" by blasting, combined with a need to maintain minimum bench widths for access purposes.
- Delay in applying treatment, allowing erosion of weaker materials and opening of fractures due to stress relief, weather effects and vibration etc from excavation deeper in the cut.

Design changes

Usually batter steepening, often to accommodate a need for extra width at formation level (for paving, commonly) or a realisation that a batter has been designed over-steep, or is not performing as anticipated. Better design practice can alleviate this, to a point. However, many of the worst examples of extensive, ugly (and what should have been unnecessary) shotcrete applications come from this cause. Once it has happened, it is difficult to avoid the consequences.

There are also cases where over steep batters have been designed before construction and with the intention of stabilising them, due to footprint restrictions.

Contractual aspects

Effective contract administration requires that shotcrete quantities be anticipated and included in the schedule of rates. There would normally be a fixed quantity and then an additional provisional quantity to cover changes which are decided once the batters are exposed. Good practice would set these so that all of the fixed quantity and part of the provisional quantity is used.

Some thought also needs to be given to the unit of payment (m^2 or m^3). There are arguments for and against both of these – which is better depends on the specifics of the job and the circumstances of application.

Some of the recommended construction requirements have been part of the earthworks spec for many years (e.g. presplitting or line drilling for batters 1:1 or steeper which require blasting for excavation). Others have been introduced in the most recent revision (e.g. requirements for progressive installation of stabilisation treatments).

It is again emphasised that shotcrete use should be capable of anticipation. That depends firstly on there being enough information to allow a reasonably accurate geotechnical model to be formed, secondly on that modelling actually being done and thirdly on its implications being properly incorporated into the design and specification. Unanticipated shotcrete use is far more commonly due to the second and especially the third of these.

What needs to be avoided is a philosophy which says:

- Minimise the footprint by keeping batters as steep as possible."We can always engineer our way through any difficulties."
- Only consider defect-related mechanisms in determining batters and prospective treatments.
- Do not consider long term performance and maintenance requirements.
- Defer treatment as far as possible during the contract (or worse, do it separately after completion) to avoid any delay to earthworks construction.

Remediation of existing batters

The principles in this are similar to those involving new construction, but the circumstances are different. Remediation always involves a batter which is showing evidence of problems, and the purpose is to stop them getting worse (and usually, to improve things). However, because the face to be treated is visible and the treatment is necessarily closely specified, quantities and locations can be detailed, as can any finish requirements.

The downside is that work is usually carried out under traffic and there may be an urgency associated with public safety. WH&S requirements may also limit the use of alternatives and of finishing treatments. A further constraint is that regrading may be difficult or impossible, forcing the design solution towards stabilisation measures.

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