Appendix I

Heritage impact statement

Gee Gee Heritage

Roads and Maritime engaged the NSW Government Architects Office (GAO) in 2015 to prepare a Statement of Heritage Impact (SOHI) and Landscape Character and Visual Impact Assessment (LCVIA) for the proposed demolition of Gee Gee Bridge. These two documents would assess heritage impacts on removing the existing Dare Truss bridge that is listed under the NSW State Heritage Register (SHR).

In early 2016, the NSW Government announced that GAO's strategic arm would be disbanded and transferred to the Department of Planning and Environment (DPE). This has resulted in GAO's authors no longer being available to amend or finalise the draft SOHI and LCVIA.

Details on the proposal have developed since the GAO submitted draft documents to Roads and Maritime. This is the result of advancing the design, including proposed heritage impact mitigation measures, administration changes and further negotiations between stakeholders.

The SOHI assesses heritage impacts of demolishing the existing bridge and includes mitigation measures to reduce the impact on the bridge's key heritage values. Roads and Maritime has amended the draft document as submitted by GAO by updating details to reflect changed circumstances.

GAO's draft LCVIA forms an important appendix to the SOHI. This document describes the landscape character and visual setting of the existing site and assesses the impact of the proposed activity. The LCVIA is therefore a key related document to the SOHI. Roads and Maritime has amended the GAO report to also reflect amendments in the SOHI.

Key amendments to the documents are outlined below:

- Changed the title of the Heritage Impact Statement to Statement of Heritage Impacts
- Changed Wakool Shire Council to Murray River Council to reflect local government area administration changes
- Corrected formatting and grammar; such as fonts, labels, text size and punctuation.
- Restructured sentences to provide clarity
- Changed road names throughout to provide accuracy and consistency
- Updated descriptions to better reflect current Roads and Maritime strategies, policies and guidelines
- Changed descriptions to remove jargon and provide clarity; and
- Removed or updated redundant or non-relevant information

GEE GEE TIMBER TRUSS BRIDGE
CUNNINYEUK

STATEMENT OF HERITAGE IMPACT

The Heritage Group
NSW Government Architect's Office
Prepared for Roads and Maritime Services

August 2015

DFSI Report No: 15025

NSW GOVERNMENT | Public Works
Government Architect's Office

GEE GEE TIMBER TRUSS BRIDGE
CUNNINYEUK
STATEMENT OF HERITAGE IMPACT

David Mason, Heritage Specialist

The Heritage Group, Government Architect's Office

NSW Department of Finance, Services & Innovation

2-24 Rawson Place

Sydney NSW 2000

david.mason@finance.nsw.gov.au

Phone: 9372 8418

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1. INTRODUCTION & BACKGROUND

1.1 PURPOSE

NSW Roads and Maritime Services (Roads and Maritime) proposes to demolish the Gee Gee Crossing timber truss bridge in order to provide a new bridge over the Wakool River suitable for High Mass Vehicle transport needs in line with the NSW Bridges for the Bush Program. The rationale for replacement of the bridge and the consultation process informing the final decision were set out in the Roads and Maritime *Timber Truss Bridge Conservation Strategy - Submission Report & Revised Conservation Strategy,* endorsed in 2012 by the NSW Heritage Council. The Gee Gee Bridge is one of 22 timber truss bridges scheduled for progressive replacement in line with the objectives defined in the Strategy.

In accordance with the Strategy, Roads and Maritime requires a consultant with extensive experience in non-Aboriginal cultural heritage assessment to prepare a Statement of Heritage Impact (SOHI) which addresses the proposed development impact on an identified heritage item or items.

This SOHI is required as part of the consent process under Part 5 of the *Environmental Planning and Assessment Act 1979*, for activities needing approval under NSW legislation. The proposed works impact on the Gee Gee Crossing timber truss bridge as a heritage listed item in the Wakool Shire Local Environmental Plan (under the EP&A Act 1979) and in the Roads and Maritime Heritage & Conservation Register (under s170 of the *NSW Heritage Act 1977*). This SOHI addresses heritage impacts of the demolition following NSW Heritage Branch guidelines for heritage impact assessment and in line with the Australia ICOMOS *Burra Charter* process.

1.2 BACKGROUND INFORMATION

The following background information has been used to prepare this SOHI. In brackets are shown the abbreviations used in the text:

Road and Maritime, Roads and Maritime Heritage & Conservation Register, 1999 ('s170 Register')
Wakool Shire Council, *Local Environmental Plan, 2013*('Wakool LEP')
http://www.legislation.nsw.gov.au/view/inforce/epi+655+2013+cd+0+N

NSW Heritage Office, *State Agency Heritage Guide: Management of Heritage Assets by NSW Government Agencies*, 2005
http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/StateAgencyHeritageGuide.pdf

Roads and Maritime, *Timber Truss Bridge Conservation Strategy - Submissions Report and Revised Conservation Strategy*, Roads and Maritime Services, August 2012 (ISBN 978-1-922194-17-6) ('Roads and Maritime Strategy 2012')

Roads and Maritime, *Timber Truss Road Bridges: a strategic approach to conservation*, July 2011, ISBN 978-1-921899-49-2 ('Roads and Maritime Strategy 2011')
Heritage Council of NSW, *Timber Truss Road Bridges of NSW: Review of Roads & Traffic Authority's Proposed Approach to Conservation*, July 2011 ('Heritage Council 2011')

McMillan, Britton & Kell Pty, *Timber Truss Bridges: Study of Relative Heritage Significance of All Timber Truss Bridges in NSW*, for RTA, 1998 ('MBK 1998')

Roads and Maritime, MPRC Presentation Document *Gee Gee Bridge Replacement* (v.1, 11 Apr 2015)

In addition to this background information, searches have been made of the NSW State Heritage Register (SHR) and other statutory and non-statutory heritage inventories. Other historical records and technical documents referred to are mentioned as footnotes in the report. Unless otherwise stated, photographs in this report are by GAO.
The flood relief bridge at the site is not part of the State Heritage Register listing and is not considerred in this SOHI. In 2010 the Roads and Maritime Service commissioned a study of heritage significance of a group of pre-1950 and LEP listed Roads and Maritime controlled bridges. The flood relief bridge is considerred in the report and is found to have no heritage signifigance.

1.3 METHODOLOGY & REPORT STRUCTURE

The site was physically inspected by David Mason, Heritage Specialist and Natalie Pelleri, Landscape Architect from the NSW Government Architect's Office (GAO) on 21 July 2015. This SOHI report has been prepared in accordance with the NSW Heritage Branch Guidelines and Australia ICOMOS Charter for Places of Cultural Significance 2013 (Burra Charter). Sections 2 and 3 draw on detailed analysis of existing background documentation (as described in 1.2), searches of relevant heritage inventories and local authority Standard Instruments, reviews of other historical and contextual literature, and site-based investigation. Section 5 draws on information supplied by Roads and Maritime and/or its design consultants. The structure of the report broadly follows the guidelines provided by Roads and Maritime on preparation of Statement of Heritage Impacts for its infrastructure portfolio.

This report assesses heritage impacts against an approach to strategic heritage management that, though generally supported by the NSW Heritage Council, has departed somewhat from Burra Charter convention. This report acknowledges the notion of "relative significance" in regard to the Gee Gee Bridge in the light of the Roads and Maritime Strategy 2011.

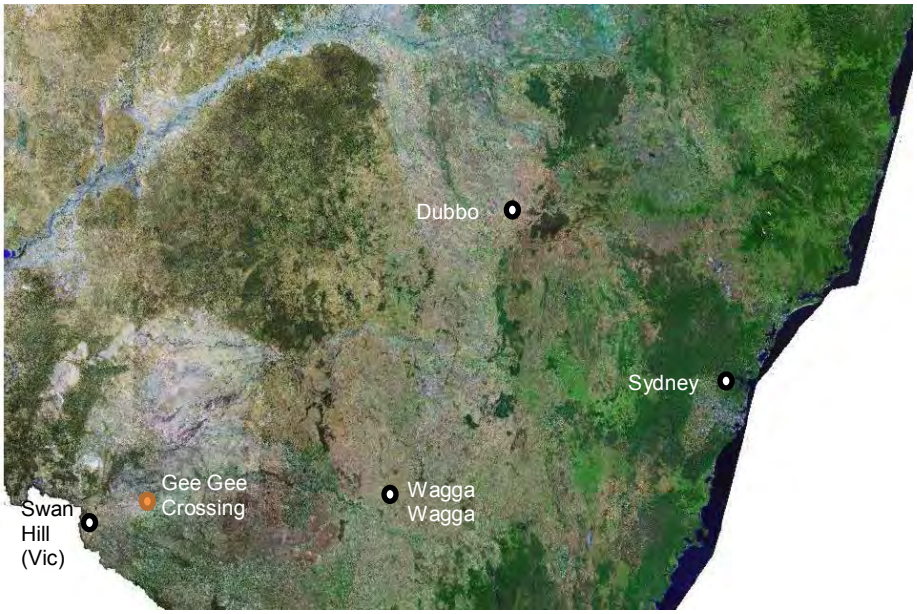


Figure 1.1
Location of Gee Gee Crossing in NSW
Source: *http://www.maps.six.nsw.gov.au*, viewed 23 July 2015

Figure 1.2

Site of Gee Gee Crossing, Noorong Road (Source: http://www.maps.six.nsw.gov.au, viewed 23 July 2015)

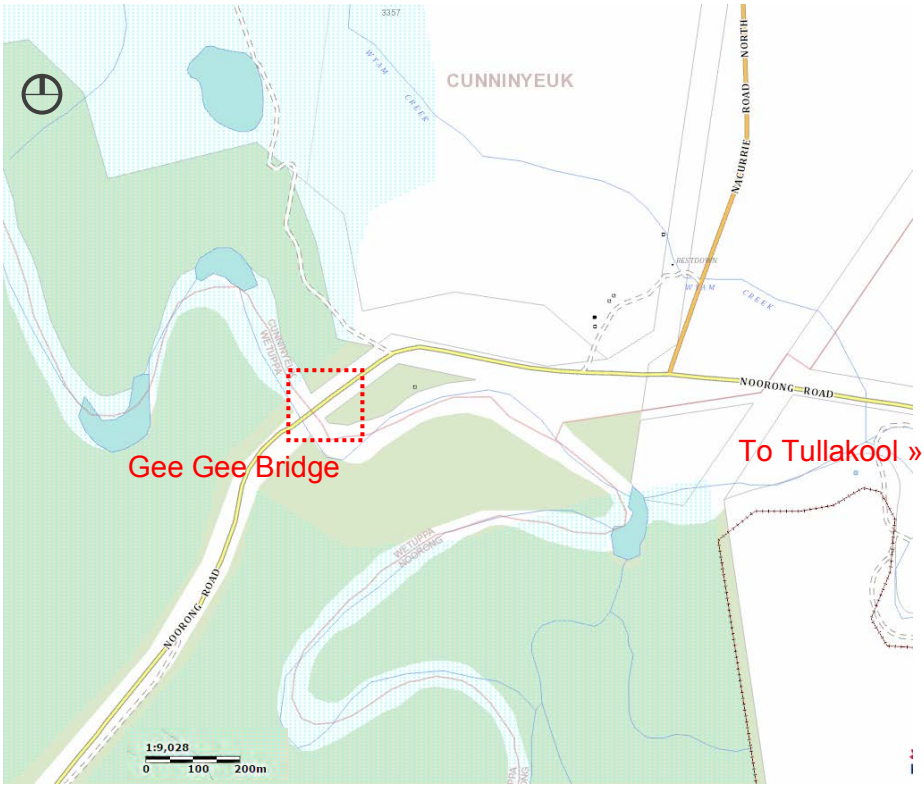


Figure 1.3

Aerial view (Source: http://www.maps.six.nsw.gov.au, viewed 23 July 2015)

1.4 EXCLUSIONS

This report does not address in detail the significance of, or impact of the proposal in terms of, "natural heritage" (riverine landscape, flora and fauna, forest), including on the National Parks & Wildlife Service Red Gum forest reserves on either side of the bridge corridor. However, these issues do form part of the broader picture and biodiversity mitigation and remediation should be handled by approved and established Roads and Maritime procedures mindful of the recommendations in Section 7.0 below

1.5 TERMS AND ABBREVIATIONS

DECCW	Department of Environment Climate Change & Water
EP&A Act	Environmental Planning & Assessment Act 1979
GAO	The Government Architect's Office within the NSW Department of Finance.
ICOMOS	International Council on Monuments and Sites
LEP	Local Environmental Plan
LGA	Local Government Area
m	metres
mm	millimetres
NPWS	National Parks & Wildlife Service
PAD	Potential Archaeological Deposit
PWD	NSW Public Works Department
RMS	NSW Roads and Maritime Services
RTA	NSW Roads and Traffic Authority (pre 2011)
s.170 Register	A register of heritage assets owned, occupied or controlled by a State agency, prepared in accordance with section 170 of the Heritage Act
SHI	NSW State Heritage Inventory
SHR	NSW State Heritage Register
SOHI	Statement of Heritage Impact

1.6 AUTHORSHIP

This report was written by David Mason, Heritage Specialist, NSW Government Architects Office (GAO) and reviewed by Mary Knaggs, Senior Heritage Architect (GAO). The author thanks Alan Pottie, Bridge Maintenance Manager (Roads and Maritime WaggaWagga) who led the site inspection and briefed GAO on project aims and engineering details, and Ian Berger (Roads and Maritime Sydney) who provided background information on the bridge.

2. LEGISLATIVE REQUIREMENTS

2.1 HERITAGE LISTINGS

2.1.1 STATUTORY LISTINGS

The Gee Gee Bridge is a State listed heritage item on the State Heritage Register (SHR). This means demolition or unsympathetic alteration requires notification to or approval by the Heritage Council of NSW. Note that the northern flood relief bridge is not included in the curtilage of the State heritage item (Figure 2.1).

The bridge is a heritage item of local significance listed in Schedule 5 of the Wakool Shire Council LEP 2013. Statutory procedures for disposal or alteration are governed by the requirements of the *NSW Heritage Act 1977* in respect of heritage items of local significance.

The Gee Gee Bridge is listed in the Roads and Maritime Heritage & Conservation Register. Section 170 of the *NSW Heritage Act 1977* requires State Agencies to maintain a Heritage and Conservation Register. The implications of the Section 170 listing are set out below and in the Heritage Council's *State Agency Heritage Guide*.

Table 1: Statutory Listings

Listing	Instrument	Level of Significance	Description	Details
State Heritage Register (SHR)	*Heritage Act 1977*	State	Road Bridge	Listing No. 01469
s.170 State Agency Heritage Register (RMS Heritage & Conservation Register)	*Heritage Act 1977* (Section 170)	State	NSW Dare truss bridge	Heritage Register No. 4300138
Wakool Shire Local Environmental Plan 2013	*Environmental Planning & Assessment Act 1979*	Local	Nacurrie Road North adjacent to Lot 50, DP 756533	Item No. I3

2.2.2. NON STATUTORY LISTINGS

The Gee Gee Bridge is not listed in the following non-statutory registers:

Australian Heritage Database;

National Trust Register.

2.2 HERITAGE CONTROLS

2.2.1 NSW HERITAGE ACT 1977

Approvals in respect of State listing

Section 57 of the *NSW Heritage Act 1977* stipulates that when listing on the State Heritage Register applies to a place, building, work, relic, moveable object, precinct, or land, a person must not do any of the following things except in pursuance of an approval granted by the approval body (NSW Heritage Council):

(a) demolish the building or work,

(b) damage or despoil the place, precinct or land, or any part of the place, precinct or land,

(c) move, damage or destroy the relic or moveable object,

(d) excavate any land for the purpose of exposing or moving the relic,

(e) carry out any development in relation to the land on which the building, work or relic is situated, the land that comprises the place, or land within the precinct,

(f) alter the building, work, relic or moveable object,

(g) display any notice or advertisement on the place, building, work, relic, moveable object or land, or in the precinct,

(h) damage or destroy any tree or other vegetation on or remove any tree or other vegetation from the place, precinct or land.

Division 3 of the Act provides statutory procedures for applications for approval.

State Agency obligations under Section 170

Section 170A(2) of the *NSW Heritage Act 1977* requires that State agencies manage items on their heritage and conservation registers with due diligence in accordance with the principles approved by the Minister, on the advice of the Heritage Council.

State agencies should establish and keep a heritage and conservation register, which lists and identifies all heritage assets owned or controlled by the agency in accordance with section 170. In accordance with section 170(6) of the *NSW Heritage Act*, the Heritage Council directs State agencies to submit heritage and conservation registers for endorsement.

Each State agency is to develop a heritage asset management strategy to implement the State-Owned Heritage Management Principles and Heritage Asset Management Guidelines. The heritage asset management strategy should seek to assist in the conservation of the agency's heritage assets and should include a strategy for the management and conservation of heritage assets with no apparent economic re-use options.

Roads and Maritime has addressed these obligations through its *Timber Truss Bridge Conservation Strategy* (Roads and Maritime Strategy 2011). The Roads and Maritime has committed to undertake environmental assessment of each of the bridges scheduled for removal, including identification of measures to mitigate the heritage impact.

2.2.2. ENVIRONMENTAL PLANNNING & ASSESSMENT ACT 1979

Under the EP&A Act development consent is required for any of the following:

(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):

(i) a heritage item,

(ii) an Aboriginal object,

(iii) a building, work, relic or tree within a heritage conservation area,

(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

(d) disturbing or excavating an Aboriginal place of heritage significance,

(e) erecting a building on land:

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance

The duties (in respect of any 'activity' as defined in Section 110 of the Act) of a determining authority to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment are set out in Section 111 of the EP&A Act. Determining authorities must obtain and consider an environmental impact statement in respect of the activity as set out in Part 5 of the EP&A Act.

2.2.3 STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007

SEPP (Infrastructure) 2007 provides the regulatory framework for effective delivery of infrastructure across the State. Section 14 of the SEPP (Infrastructure) requires consultation with local councils where development will have impacts on local heritage. The clause applies to development carried out by or on behalf of a public authority if the development:

(a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and

(b) is development that this Policy provides may be carried out without consent.

SEPP (Infrastructure) requires that 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

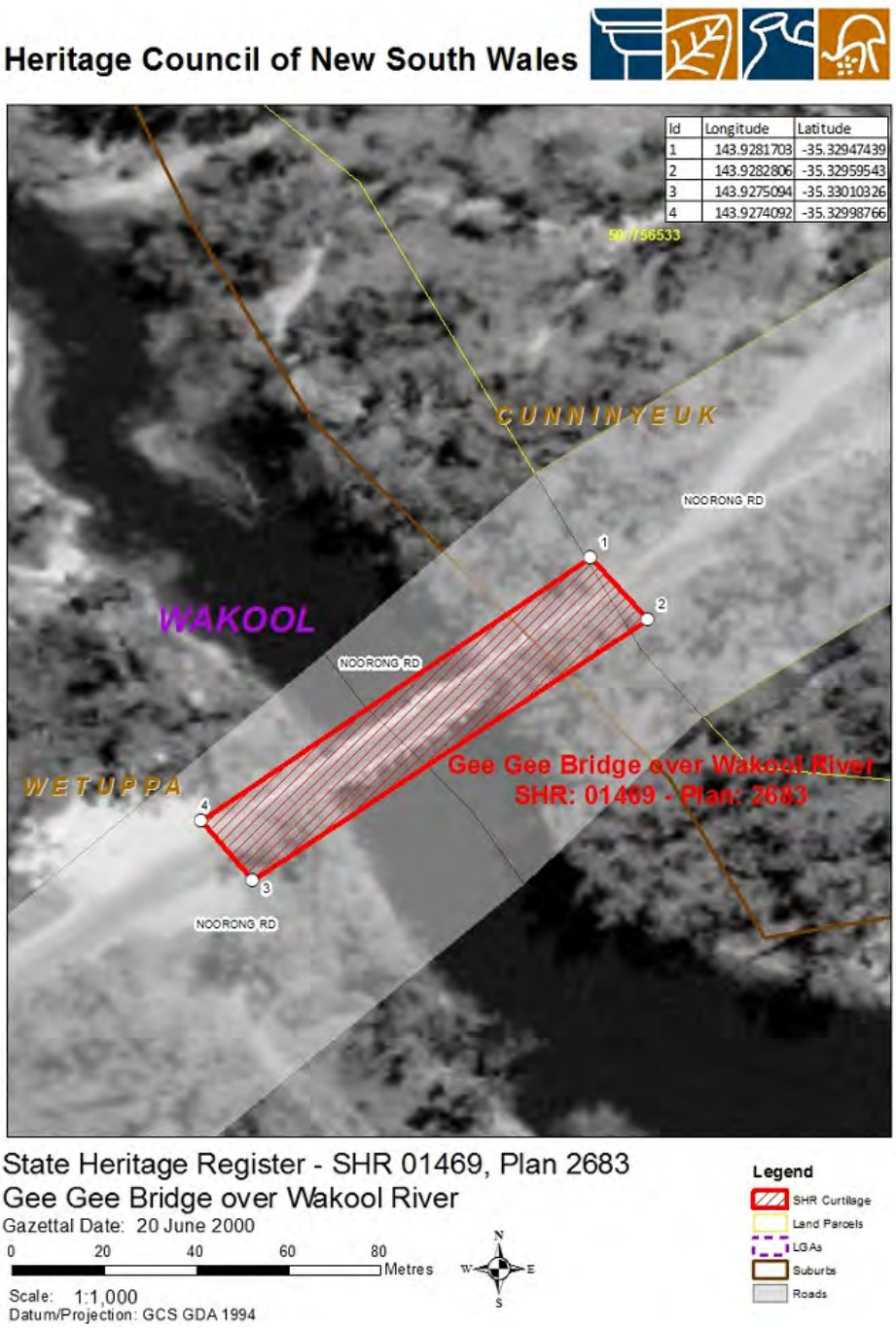
(b) given written notice of the intention to carry out the development, with a copy of the assessment, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located, and

(c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.

Figure 2.1

Curtilage Map, NSW Heritage Register

(Source: State Heritage Register)



2.3 ARCHAEOLOGY

2.3.1 ABORIGINAL HERITAGE

A Basic AHIMS search revealed no Aboriginal sites in the locality of the bridge (See Figure 2.2). A *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) Stage 1

investigation was completed by Roads and Maritime in August 2014. The PACHCI is a four step due diligence and consultation process that is applied to all projects, regardless of scale or size, in line with DECCW Due Diligence reporting requirements. It is reported by Roads and Maritime that under this process any impact to Aboriginal Cultural Heritage is currently considered unlikely. As a precaution, PACHICI Stage 2 was conducted focussing on a potential mound to the north of the project. A PACHCI Stage 3 is not required.

Figure 2.2

AHIMS Basic Search results

(Source: AHIMS Web Service, searched 24 July 2015)

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

3. DESCRIPTION & HISTORY

3.1 GENERAL ANALYSIS

3.1.1 SETTING AND DESCRIPTION

The Gee Gee Bridge (map coordinates -35.329866, 143.927656) is approximately 30km due east of Swan Hill (Vic.) and is in the Murray River LGA. The bridge is situated on Noorong Road and it spans the Wakool River which forms the boundary between Cunninyeuk and Wetuppa local government districts in Murray River Shire. The existing bridge and road corridor is bordered on both sides by National Park-managed land, part of the Noorong Forest River Red Gum wetlands reserve (Niemur and Wetuppa Precincts), in the Murray Valley National Park. The proposed new bridge has been designed to fit within the current roads corridor on the line of an existing service track and to minimise any National Park encroachment. Land to be acquired on the northern approach is currently owned by National Park but is leased. National Parks have agreed in principle to a land swap with the residual road corridor. The bridge carries a 5.5m roadway. It consists of a single Dare truss span over the river. It has five approach spans, three on the north and two on the south. Each approach stands on timber trestles. There is a 90 meter long flood relief bridge to the north of the main bridge and a 60 metre earth abutment in between. The roadway falls approximatley one metre in height between the flood relief bridge and the main bridge. The main bridge is 72.5 metres long. The curtilage of the Gee Gee Bridge is restricted to the bridge itself and the land immediately surrounding the abutments. The flood relief bridge and the connecting earth mound are not curtilage of the SHR listed bridge.

3.1.2 TIMBER TRUSS BRIDGES IN NSW

Timber truss bridges were used extensively throughout NSW from 1860 through to 1936 and five different truss types were developed over that period. Of the 407 timber truss road bridges originally built, most have been replaced with new structures on the same or similar alignments. Remaining bridges are heavily affected by modern road and traffic requirements which, in the longer term, will require substantial upgrading of these bridges or replacing with a new bridge.[1]

Prior to the bridges being built, river crossings were often dangerous in times of rain. This caused bulk freight movement to be prohibitively expensive for most agricultural and mining produce. Only the high priced wool clip of the time was able to carry the costs and inconvenience imposed by the generally inadequate river crossings that often existed prior to the bridges being built (MBK 1998).

Timber truss bridges were preferred by the Public Works Department from the mid-19th to the early 20th century because they were relatively cheap to construct, and used mostly local materials. The financially troubled governments of the day applied pressure to the Public Works Department to produce as much road and bridge work for as little cost as possible, using local materials. This condition effectively prohibited the use of iron and steel. Before the construction of the steel works at Newcastle in the early 20th century, these members had to be imported from England.

[1] Material for this section of the report is taken from Roads and Maritime Strategy 2012

3.1.3 TRUSS DESIGN

The evolution of timber truss road bridges in New South Wales from 1860 to 1905 saw a change from traditional, virtually non-scientific, British and European structures to scientifically engineered structures based on developments in America. Early timber Queen Post truss bridges favoured by the PWD from 1860 to 1886 (known as the Old PWD truss) were first improved on a large scale by John A MacDonald; PWD Engineer for Bridges from 1889 to 1893. The MacDonald truss was easier to build and maintain and could carry loads significantly greater than the Old PWD designs, in order to provide some allowance for future increases in vehicle loads.

In 1893 Percy Allan introduced his new design based on the American Howe truss. The Allan truss featured a much simpler arrangement of triangulations and incorporated many improvements and innovations that made this truss a more cost-effective structure than its predecessors. It was claimed the Allan Truss could carry 50% more load but with 20% less material.

The next major innovation was the introduction of the Pratt type of truss, with vertical posts and diagonal tension members. The pioneer of this variant in NSW was Ernest De Burgh.

3.1.4 DARE TRUSS

In 1903 engineer Harvey Dare was in charge of highway bridge design. Dare claimed to have worked on a number of De Burgh Truss bridges around 1900 but in 1903 he returned to the Howe-type truss as used by Allan. He substituted a pair of steel members for the timber lower chord and redesigned the lower chord joints to eliminate the pins of the De Burgh truss. Dare's simplified, composite variant of the Allan truss proved the most cost-effective timber truss yet seen in NSW. The Dare truss bridges proved to have the highest survival rate of timber truss bridges in NSW. The first Dare truss bridge, completed in 1905, spanned the MacDonald River at Bendemeer and is still used as a footbridge.

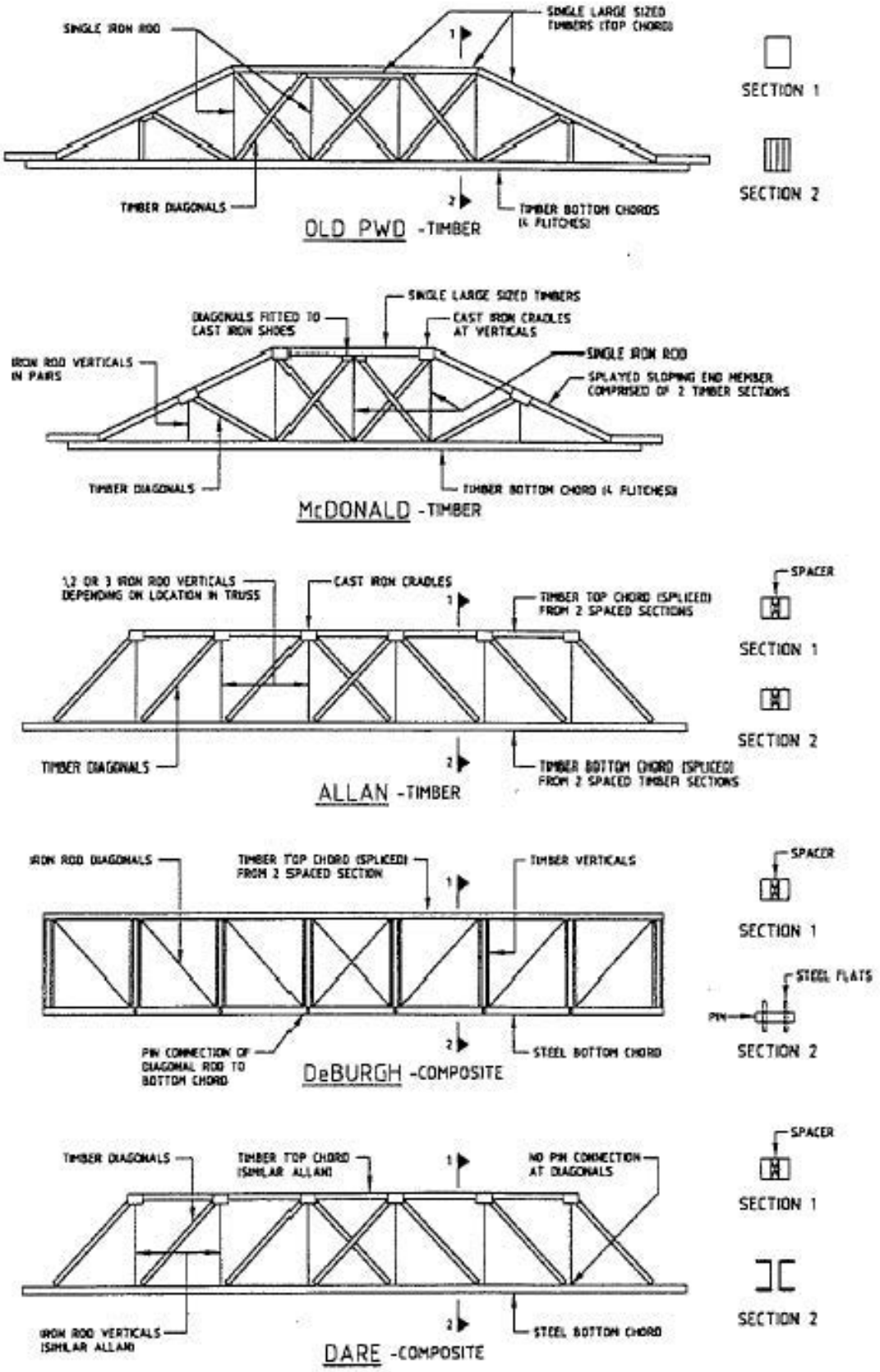


Figure 3.2

Comparison of main truss types in NSW

(Source: MBK, 1998).

3.1.5 GEE GEE CROSSING

The earliest crossing at Gee Gee may have been constructed some time during the mid or late 19th century. The crossing would have served Cunninyeuk Station, a large sheep station between the Wakool and Niemur Rivers, which when put up for sale in 1906 was a 29,000 acre property in the Moulamein district "on the Deniliquin-Swan Hill stock route"[2]. It is possible the crossing was a natural ford, or at best a 'corduroy' type crossing of logs laid over long stringers spanning the creek (a similar one was used at the Coonamit Ferry on the Wakool in the early 20th century)[3]. The Gee Gee crossing appears to have been located a little way upstream of the current bridge.

The Minister for Railways was advised by the supervising surveyor that the "Gee Gee Crossing" would be a suitable place for a railway bridge over the Wakool as part of the proposed railway from Goon Crossing on the Murray to Balranald (*Riverina Recorder* 8 June 1921). In 1926 Wakool Shire Council deliberated the Public Works proposal for:

> National Works – Coonamit lift bridge and Gee Gee Crossing bridge. Two bridges over rivers and creeks to serve Gonn Railway line to Stony Crossing in various places provided the Shire Council of Wakool finds one third of the estimated cost of £10,000'…"

To which Council objected, minuting

> "that [the] clerk [should] point out the absurdity of a lift span bridge at Coonamit , that the council are of opinion such a construction would be waste of public money. That our engineer report on the estimated costs, as shown by department's letter" (*Riverina Recorder 29 September 1926,* p.4).

One assumes the Gee Gee Crossing railway bridge proposal was also rejected since the railway could not be built without both crossings. However the need for road networks across the district was growing. One assumes the road to Swan Hill was already a functioning stock route and a tender was received in May 1928 for "Erection of composite truss bridge" the lowest bid being that of "A. C. Burdett, £5918". (*SMH 9 May 1928* p. 11). The need reflects the increasing importance of routes in the Moulamein district as travelling stock reserves (TSR). One source has shown the growth in value of the wool industry between 1900 and 1940 with only slight interruption during the depression. This author remarked on the absence of stock transport in the rural economy and the role of drovers well into the 20th century, the importance of sale yards in Moulamein after opening of the railway from Barnes to Balranald, and the growing dependency on road transport into the 1930s [4]. Fig. 3.3, the 1915 map, appears to show already a road pegged on the line of the present Nacurrie and Noorong road (Fig. 3.4).

The Gee Gee Bridge was apparently begun in 1928. Newspaper reports indicate the relief bridge over the flood channels was added later. The Wakool Shire Council contacted the Department of Public Works shortly after the main bridge was completed, to advise that:

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[2] *Australian Town and Country Journal* 19 September 1906 p.3

[3] *Swan Hill Guardian* 7 December 1914 p.2

[4] W J Hastie T*he Story of Moulamein 1851-1951,* Shire Council of Wakool, 1951.

" the (completed) section… would be quite useless when the river is at its normal height owing to the two shallower channels between the completed section and the northern bank of the river"[5]

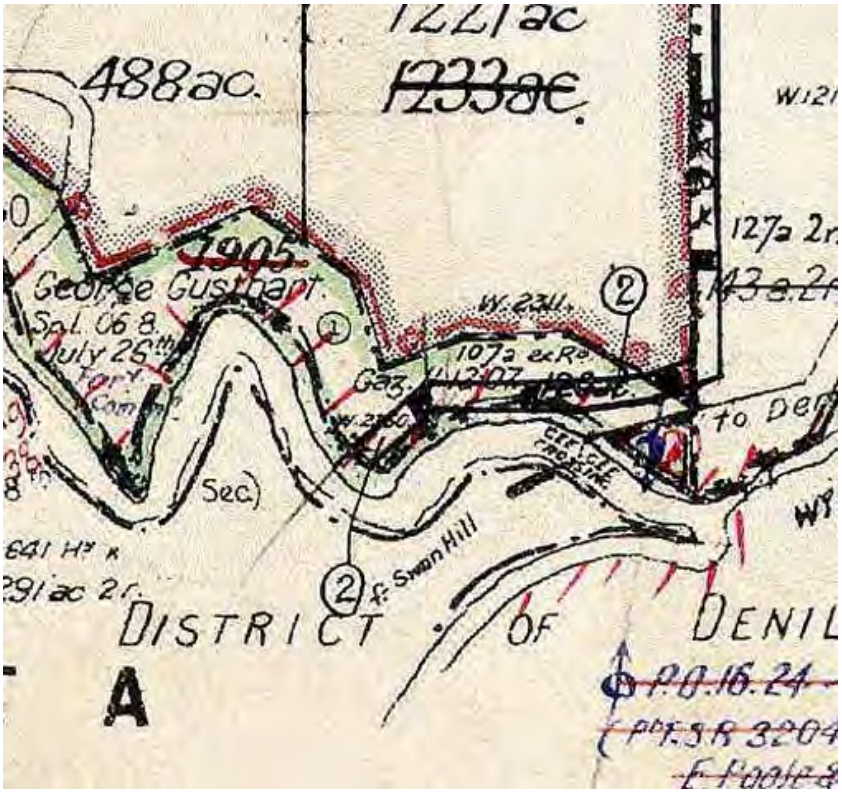
This work experienced delays and contractual issues of one kind or another. An additional timber beam flood relief bridge was eventually constructed in 1933 for the sum of £2341.[6] Formations (i.e. northern and southern earthworks) were finished in 1934 or possibly early 1935 (See e.g. *Riverina Recorder* 29 Sept 1934 p.4)

Figure 4.1, probably taken in the 1940s or 1950s, shows the bridge in fairly robust condition at a time when droving traffic predominated

Figure 3.3

Detail from Map of the Parish of Cunninyeuk, Department of Lands, 1915 showing the Gee Gee crossing (lack of a defined structure may imply that the ford was a rudimentary crossing)

(Source: NSW Land & Property Information http://images.maps.nsw.gov.au/pixel.htm)



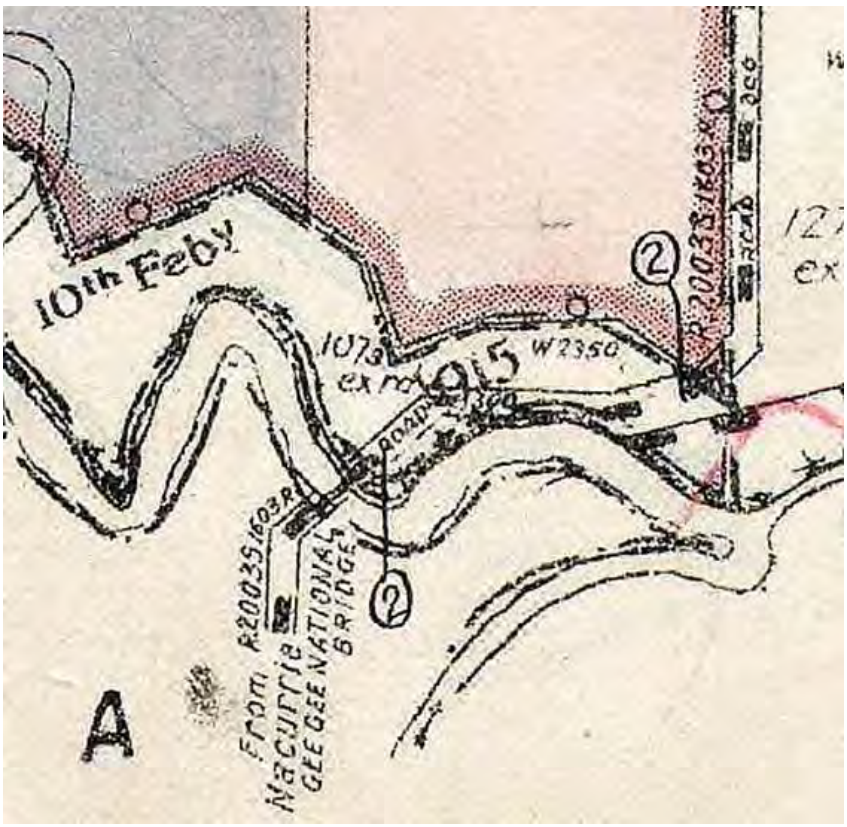
[5] RTA File 469.66, cited in Statement of Heritage Impact for Gee Gee Bridge by Austral GHD, extract provided by Roads and Maritime Services .

[6] Ibid

Figure 3.4

Detail from Map of the Parish of Cunninyeuk, Dept of Lands 1938, showing the 'National Bridge'

(Source: NSW Land & Property Information http://images.maps.nsw.gov.au/pixel.htm)



3.2 SITE INVESTIGATION & FABRIC ANALYSIS

3.2.1 CONDITION

Roads and Maritime undertook routine inspection and the entire bridge is rated as poor in accordance with the bridge health index. This overall rating resulted from the poor condition of the timber tresstles (Appendix E). The bridge deck is in good condition, having been replaced in the early 2000s. The Dare trusses have been substantially rebuilt with timber principals, top chords and bracing largely replaced. Trusses on the approach spans have been strengthened in the 1990s with new timber uprights, cross-bracing (both timber and steel I-section), and steel cross-beams and replacement stringers under the deck. The bottom chord of the truss appears to be original but has been later paired with parallel steel strengtheners under the outer ends of the floor beams along both sides of the main span. Steel shoes and hangers and some other fixings and parts of the handrail may be original, but the guardrail and posts are in poor condition.

The condition of the timber trestles under the relief bridge is poor with almost all trestles having been either substantially rebuilt, doubled or strengthened with semi-permanent steel or timber props and cross bracing. The deck of the flood relief bridge has a concrete overlay. The facing to the main abutments at both ends of the main bridge and at the ends of the relief bridge has been renewed in timber.

Figure 3.5 (Left)

Trestles, approach span, looking from the north bank

(Source: GAO 2015)

Figure 3.6 (Right)

Approach span, from the south bank showing tomming of the piers.

(Source: GAO 2015)

Figure 3.7

Bridge deck and stringers, southern approach span

(Source: GAO 2015)

Figure 3.8

Main span and Dare truss, looking east

(Source: GAO 2015).

Figure 3.9

Abutment and replacement cross beam, northern approach section

(Source: GAO 2015).

Figure 3.10

Road deck and guardrail

(Source: GAO 2015).

Figure 3.11

Part of the northern relief bridge looking north

(Source: GAO 2015).

Figure 3.12

Underside of the relief bridge

(Source: GAO 2015)

Figure 3.13

Abutment, relief bridge

(Source: GAO 2015)

4. HERITAGE SIGNIFICANCE

Table 3: Listing summary

State Heritage Register	Statutory, State significance	Listed
S 170 State Agency Heritage Inventory (RMS Heritage & Conservation Register)	Statutory	Listed
Wakool Shire Local Environmental Plan 2013	Statutory	Listed

4.1 STATE HERITAGE REGISTER

4.1.1 Statement of Significance

The Statement of Significance referenced from the State Heritage Register, is reproduced below.

> *The Gee Gee bridge is a Dare type timber truss bridge, and was completed in 1929. In 1998 it was in good condition. As a timber truss road bridge, it has many associational links with important historical events, trends, and people, including the expansion of the road network and economic activity throughout NSW, and Harvey Dare, the designer of this type of truss. Dare trusses were fifth in the five stage design evolution of NSW timber truss road bridges. They were similar to Allan trusses, but contain improvements which make them stronger and easier to maintain. This engineering enhancement represents a significant evolution of the design of timber truss bridges, and gives Dare trusses some technical significance. In 1998 there were 27 surviving Dare trusses in NSW of the 40 built, and 82 timber truss road bridges survive from the over 400 built. The Gee Gee bridge is a representative example of Dare timber truss road bridges, and is assessed as being State significant, primarily on the basis of its technical and historical significance.*
>
> *Date significance updated: 13 Sep 05*

4.2 ROADS and MARITIME SERVICES RESEARCH INTO 'RELATIVE SIGNIFICANCE'

Prior to creation of the SHR, a study of the relative significance of timber bridges in NSW was produced for Roads and Maritime by McMillan, Britton & Kell (MBK 1998) in 1998. This study provided a relative ranking of significance of 82 timber truss

bridges in NSW (of which 58 were under Roads and Maritime control).
They were ranked in one of the following categories:

- National Heritage Significance
- State Heritage Significance
- Regional Heritage Significance
- Local Heritage Significance.

In the MBK study Gee Gee Bridge was ranked 37 out of 82, and identified as a State significant bridge. Upon establishment of the State Heritage Register in 1999, these categories were compressed into State and Local categories only, with 29 bridges under RTA control categorised as State significant. There were six Dare Truss bridges; including Gee Gee Bridge.

Dare trusses were regarded in 1998 as less significant than Allan trusses (being more numerous and of lesser technical significance). The MBK report recommended updating of relative significance whenever a timber truss bridge is lost because losses impact on the rankings of what remains. Bulga, Coonamit, Coorei, Gee Gee, and Sportsmans Creek are Dare Truss bridges that are scheduled for replacement under the Strategy. Howlong is already lost and Briner will be upgraded by Roads and Maritime from 'Local' to 'State' significant as part of the strategy.

Figure 4.1

Gee Gee bridge, 1940s

(Source: Roads and Maritime Services The same photograph was reproduced in W J Hastie T*he Story of Moulamein 1851-1951*)

4.3 ASSESSMENT OF HERITAGE SIGNIFICANCE

State Heritage Register

The following aspects of significance assessed against the State Heritage Criteria used in NSW are extracted from the SHR record for the Gee Gee Timber Bridge. The SHR record is suplemented by further consideration of significance.

SHR Criteria a) [Associative significance]	Through the bridge's association with the expansion of the NSW road network, its ability to demonstrate historically important concepts such as the gradual acceptance of NSW people of American design ideas, and its association with Harvey Dare, it has historical significance.
SHR Criteria c) [Aesthetic significance]	The bridge exhibits the technical excellence of its design, as all of the structural detail is clearly visible. In the context of its landscape it is visually attractive. As such, the bridge has a small amount of aesthetic significance.
SHR Criteria d) [Social significance]	Timber truss bridges are prominent to road travellers, and NSW has in the past been referred to as the "timber truss bridge state". Through this, the complete set of bridges gain some social significance, as they could be said to be held in reasonable esteem by many travellers in NSW. The Gee Gee Crossing generally has social significance locally for its association with farming, roads and travelling stock reserves in the Wakool Shire district.
SHR Criteria e) [Research potential]	The bridge has technical significance because it is a Dare truss, is representative of some major technical developments that were made in timber truss design by the Public Works Department.
SHR Criteria f) [Rarity]	Rare - In 2011 there were 18 surviving Dare trusses in NSW of the 44 built and 62 timber truss road bridges survive from the over 400 built.
SHR Criteria g) [Representativeness]	Representative of Dare truss bridges.
Integrity/Intactness:	Intact, but timber piers have been strengthened by additional piles. The bridge was extensively repaired and strengthened on the northern approach and throughout.

Roads and Maritime Timber Bridge Strategy – Research, assessment and sampling

On the basis of the MBK 1998 Report, in 2002, the Roads and Maritime released the 'Timber Bridge Management Strategy'. This proposed that the Roads and Maritime would, in the longer term, retain the 29 SHR-listed timber truss bridges under its control and replace the remaining timber truss bridges as operational needs dictated. This study further analysed the relative significance of all timber truss bridges under Roads and Maritime control.

The . ℕ𝔸ŘƎŜ {ΰℕ𝐼·ΰŜƎë *нлмм* applied a four-step assessment process to identify a portfolio of bridges that best met long term conservation and infrastructure service needs

1. Operability test
2. Sensitivity analysis
3. Representative sampling
4. Balancing analysis.

The process was intended to consider operational risks from traffic loads and trends. It was also designed to verify that a representative sample of the population was captured in terms of inherent variations in the population and the heritage significance of the bridges both

collectively and individually. Through this process, the following findings were made:

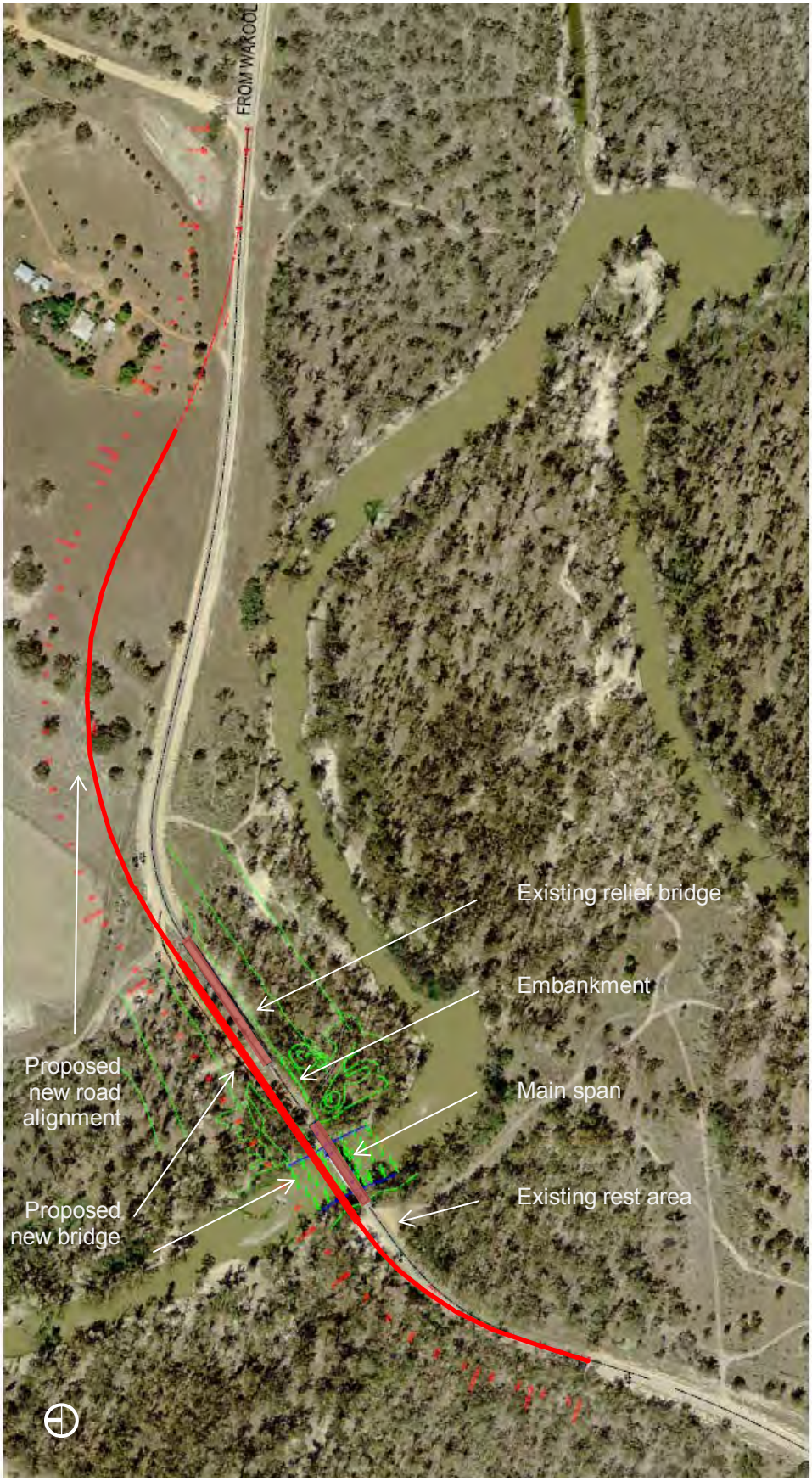
- Operability: ten bridges (Swan Hill, Barham, Tooleybuc, Boonanga, Coonamit, Mungindi, Gee Gee, Rawsonville, Warroo and Carrathool) are already subject to critical exposure from narrow width as they were being used by large multi-combination trucks.
- Sensitivity: Gee Gee Bridge was found to have a relatively low heritage sensitivity grading by comparison with its relatively high operability constraints
- Representative Sampling: Gee Gee is a single span bridge and a Dare truss, therefore it belongs to a category of bridges that was fairly well represented in the total population at the time of assessment.
- Balancing Analysis: Gee Gee belongs to a group of 18 bridges that are incapable of achieving the routes' service needs after capital upgrade, and to a group of 36 bridges that would remain subject to substantial operational risks after upgrade

Gee Gee Bridge was deemed to be a bridge of lesser heritage value with no outstanding characteristics. It is of low visibility in the overall population, unsuitable for upgrading for service needs, and likely to remain at risk after capital investment to repair or upgrade. Its conservation would not substantially strengthen the representative sample.

Limitations of Roads and Maritime Assessment of Significance

Research in the *w2l·Řă l·yŘ a l·ЏĹńΥŜ ¢ΛΥōŜЏ .ЏŘƎŜ /2ŷāŜЏØl·ŭΛ2y {ŭЏl·ŭŜƎè*, as described above, provides new statistical and conservation planning analysis. The approach used, in the words of the Heritage Council of NSW Strategy Review, was a "positive step towards a workable approach to conservation and management of the heritage significant timber truss bridges", however the Heritage Council also noted "a significant departure from the Burra Charter". The Strategy did not apply the State Heritage Criteria to re-assess significance of those bridges extrapolated in representative sampling.

The impact of removal needs to be considered in the context of the Heritage values associated with development of road infrastructure in Wakool shire in the early 20th century, the cultural and social significance of the crossing, and the historic values associated with local land-use as well as the strict relationship between operability and significance.



.

Figure 5.1

New Road Bridge – Recommended Option

(Source:,Roads and Maritime Services)

5. PROPOSAL

5.1 REPLACEMENT ROAD BRIDGE PROPOSAL

In October 2012 the NSW Government committed to improving road and freight productivity by replacing or upgrading bridges over the next five years at 17 key locations in regional NSW. The NSW Government has made a commitment of $145 million.

The Bridges for the Bush initiative will enhance freight and productivity in regional NSW. It is an investiment in critical infrastructure to remove a number of significant freight pinch points or bottlenecks on the state road network and to improve safety and reliability of some of the old bridge structures.

The primary objectives of the Gee Gee Bridge replacement are to:

- Improve traffic efficiency and increase freight vehicle capacity by providing a two lane concrete bridge to support Higher Mass Limit (HML) and oversized vehicles.
- Provide road infrastructure that supports the NSW and Victorian regional economies by improved connectivity to goods and services
- Improve safety by re-aligning the approaches to the proposed bridge and providing a bridge that meets current safety standards.

Roads and Maritime issued a media release in March 2015 and no comments were received.

The 'Recommended Option' involves a long approach over the flood-plain on the north bank which follows an existing service track next to the current bridge. The main span across the river will be approximately 10m downstream of the current bridge. The bridge deck will be approximately in line with the road surface on the intermediate embankment (See Fig. 5.1). The new bridge would be a 9 metre wide, two lane concrete structure to cater for farm machinery and B doubles with heavy loads. Land to be acquired on the northern approach is currently owned by the National Parks and Wildlife Service but is leased. National Parks have agreed, in principle, to a land swap for the residual road corridor.

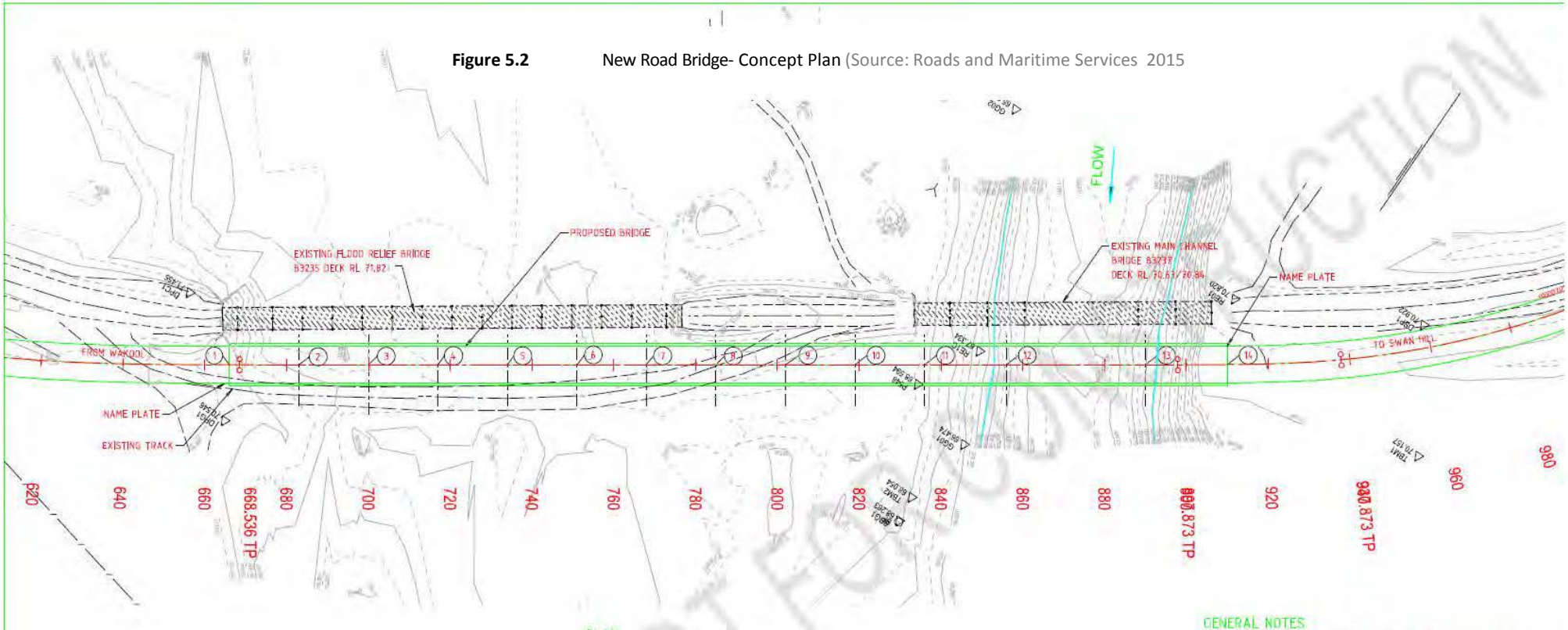
5.2 EXISTING TIMBER TRUSS BRIDGE

Roads and Maritime intends to de-list the existing bridge from the SHR. Following delisting Roads and Maritime would seek approval to demolish the existing timber truss bridge. Demoltion of the old bridge would happen after the new bridge is built and maintenance will continue on the old bridge until removed.

The option of retaining some elements either in-situ or ex-situ has been described and recommendations are provided in Section 7.0. A separate Landscape Character and Visual Impact Assessment was prepared by GAO for this project. Details of landscape works and remediation will be developed in accordance with Roads and Maritime biodiversity management guidelines and in consultation with council and stakeholders.

The background rationale for removing the bridge has been set out in the Roads and Maritime Strategy 2011, and the Roads and Maritime Strategy 2012. Roads and Maritime commitments under the Strategy require an application to demolish to be accompanied by a SOHI in which the reasons for removal and to what extent the bridge can no longer be used in its existing form, are set out. Other commitments made by the Roads and Maritime through the Strategy (notably for reporting, mitigation and interpretation) will be implemented as part of the project.

Figure 5.2 New Road Bridge- Concept Plan (Source: Roads and Maritime Services 2015



PLAN

		CHAINAGE ALONG MC00 (m)	EASTING	NORTHING
1	ABUTMENT A	666.000	766298.668	6086575.618
2	PIER 1	683.000	766284.626	6086566.035
3	PIER 2	700.000	766270.584	6086556.453
4	PIER 3	717.000	766256.542	6086546.870
5	PIER 4	734.000	766242.501	6086537.287
6	PIER 5	751.000	766228.459	6086527.705
7	PIER 6	768.000	766214.417	6086518.122
8	PIER 7	785.000	766200.375	6086508.539
9	PIER 8	802.000	766186.333	6086498.957
10	PIER 9	819.000	766172.292	6086489.374
11	PIER 10	836.000	766158.250	6086479.791
12	PIER 11	856.000	766141.730	6086468.517
13	PIER 12	890.000	766113.646	6086449.352
14	ABUTMENT B	910.000	766097.146	6086438.050

LOCALITY PLAN

THE BRIDGE SITE IS APPROXIMATELY

GENERAL NOTES

SCALE 0 10 20 30m 10 5 OR AS SHOWN.

DIMENSIONS ARE IN MILLIMETRES.
CHAINAGES AND REDUCED LEVELS ARE IN METRES.
REDUCED LEVELS ARE RELATED TO AHD.
THE BRIDGEWORKS DO NOT INCLUDE ANY WORK IN APPROACHES.
TP DENOTES TANGENT POINT.
CL DENOTES CONTRACT LEVEL.
E DENOTES EXPANSION BEARING.
F DENOTES FIXED BEARING.
R DENOTES RESTRAINED BEARING.
CONCRETE BRIDGE DECK WATERPROOFING MEMBRANE SHALL CONFORM TO RMS SPECIFICATION B344 OR BPC2005/02.
WATERPROOFING MEMBRANE SHALL BE OVERLAYED WITH 75mm THICK ASPHALT.

ISSUE	DATE	REVISION	PREP	CHECK	AUT

LOCAL ROAD — WAKOOL SHIRE COUNCIL

BRIDGE OVER WAKOOL RIVER
AT 36.4KM EAST OF SWAN HILL
(GEE GEE BRIDGE)

CONCEPT SKETCH OPTION 2 - SHEET A

Transport Roads & Maritime Services

PREPARED BY
BRIDGE AND STRUCTURAL ENGINEERING BRANC
110 GEORGE STREET PARRAMATTA NSW 2150
PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055
CLIENT:

PREPARED	CHECKED	SKETCH No
DESIGN		KD1051CS2
DRAWING Y. CHEN 7.12.14		BRIDGE NUMBER
M.BENNETT		ISSUE STATUS:

6. HERITAGE IMPACT ASSESSMENT

6.1 INTRODUCTION

This heritage impact statement is primarily concerned with heritage impacts of the development on the values of the Gee Gee timber truss bridge as a heritage item listed on the State Heritage Register. Heritage values described in the entry on the Roads and Maritime s.170 Register and the Wakool Shire LEP 2013 Schedule 5 mirror those of the SHR.

6.2 BACKGROUND JUSTIFICATION

The Strategy 2011 established which of the bridges under Roads and Maritime control were operationally unsuitable to modern road infrastructure demands. The Strategy outlined the options for operationally unsuitable bridges are as follows:

- Transfer(ral) to local government
- Adaptive reuse (mainly by construction of a duplicate bridge and reorganisation of road users to better match the existing bridge's service capacity)
- Relocation (generally unfavoured)
- Retention of a redundant structure
- Demolition and replacement after archival recording and establishment of interpretation capability.

Roads and Maritime proposed that 25 of the current (2011) 48 bridges be conserved, with 23 to be divested including 12 on the State Heritage Register. As part of this proposal, it was recommended that Briner, Cobram and Landsdowne be listed on the State Heritage Register.

The Strategy, including the divestment of a number of timber truss bridges included in the s.170 Register subject to consultation (which includes Gee Gee Bridge) was reviewed by the Heritage Council of New South Wales (Heritage Council 2011). Though it had some reservations regarding the assessment methodology, some proposals regarding the retention and conservation of 2 lift bridges and 1 bascule bridge, and some recommendations to nominate five other timber truss bridges to the SHR (but not Gee Gee) the Heritage Council Timber Truss Bridges Committee:

> *Acknowledge(d) the inherent conflicts between the RTA's obligations to manage its heritage assets and its need to provide for the increasing transport loads using the State's network*

and recommended Heritage Council endorsement of the Strategy.

The assessment of alternative options for all bridges proposed for removal in the Strategy was undertaken by Roads and Maritime through consultation among 223 stakeholders state-wide between 18 July and 26 August 2011. Unlike many of the MBK higher "ranked" bridges scheduled for removal in the Strategy, Gee Gee Bridge, because of its remoteness and low visibility, attracted only one submission (Wakool Council) which supported removal.

The Strategy incorporates a set of implementation guidelines and milestones[8]. These were established in consultation with the NSW Heritage Council and clearly outline the agency's implementation objectives. These guidelines include a number of measures to which the Roads and Maritime has committed and which collectively mitigate the heritage impacts arising from the Strategy across the portfolio as a whole. Among these measures, Roads and Maritime has pledged to:

- Report to the NSW Heritage Council on progress of the strategy every two years from 2014
- develop Conservation Management Statements for each of the five truss types represented by the Roads and Maritime bridge portfolio
- prepare a Movable Span Bridges Study of its 26 movable span bridges
- prepare a heritage interpretation strategy that will apply to both retained bridges and sites of divested bridges to establish means of capturing and sharing information about the significance of the places concerned (a comprehensive book on timber truss bridges in NSW, and site specific interventions such as signboards, markers and other initiatives developed in tandem with heritage stakeholders).

6.3 IMPACTS ON THE GEE GEE BRIDGE AS A HERITAGE ITEM

Demolition of the Gee Gee Bridge will self-evidently have a significant heritage impact on the item itself and on the overall profile of Dare truss bridges in NSW. However, as stated above, Roads and Maritime, through the Strategy and with the endorsement of the Heritage Council, is undertaking a broad range of actions in mitigation of this impact. The key mitigations are set out in Table 4.

Attention is however drawn to the attrition of timber truss bridges (especially Dare bridges) that has occurred since 1998. The loss rate of Dare Truss bridges since 1998 is of some concern in regard to Criterion F (Rarity) of the State Heritage Criteria (See Section 4.3. above).

[8] Roads and Maritime Services *Implementation of the Roads and Maritime Timber Truss Bridge Conservation Strategy*, version 26 November 2013

Table 4: Heritage Impact Assessment

Aspect of Significance	Level of Significance	Heritage Impact of Proposal	Mitigation Factors[9]
Association with the expansion of the NSW road network Historically important acceptance of American bridge design ideas. Association with Harvey Dare Association with stock farming and transport in the Wakool Shire district Social visibility Contribution to group value (Criteria A & D)	Local/State	Adverse impact Irreparable loss of the bridge Impact on context of Gee Gee crossing as historical agricultural transit route	6 other Roads and Maritime Dare truss bridges in NSW to be retained (and 5 non-Roads and Maritime) including Briner bridge (to be upgraded to State Heritage Register) Historical-contextual interpretation (Timber Truss Bridges book; local signboards and heritage markers) Photographic archival recording and measured drawings
Technical quality of design Landscape significance (Criterion C)	Local	Adverse impact	Photographic archival recording and measured drawings Interpretation (Timber Truss Bridges book; local signboards and heritage markers) Benefits for natural landscape and environment through wetlands regeneration
Representative of major technical developments in timber truss design (Criteria E & F)	Local	Moderate impact Offset by Roads and Maritime retention strategy	Photographic archival recording and measured drawings 6 other Roads and Maritime Dare truss bridges (and 5 non-Roads and Maritime) in the State to be retained including Briner bridge (to be upgraded to State Heritage Register)
Rarity - in 2011 there were 18 surviving Dare trusses in NSW of the 44 built (Criterion F)	Local/State	Adverse If implemented in full the number of surviving NSW Dare Truss bridges will reduce to 11 (6 Roads and Maritime and 5 other)	Updating of the Roads and Maritime s170 Register Biennial reporting to the Heritage Council of NSW on the progress of the Strategy and its associated conservation actions
Significance in demonstrating the principal characteristics of a class of	Local	Adverse. Offset by Roads and Maritime retention	Photographic archival recording and measured drawings

[9] This assessment assumes no fabric will be retained in-situ or ex-situ. But see Recommendations Section 7.0

NSW's cultural or natural places (Representativeness) (Criterion G)		strategy	6 other Roads and Maritime Dare truss bridges (and 5 others) in the State to be retained including Briner bridge (to be upgraded to State Heritage Register)

7. CONCLUSION & RECOMMENDATIONS

7.1 CONCLUSIONS

As with similar reports produced by GAO for Roads and Maritime as part of the Strategy's due diligence commitments, this section discusses mitigation strategies for improved heritage outcomes, as well as recommendations for maintaining alignment with the overall aims of the Timber Truss Bridge Conservation Strategy as the implementation of that Strategy evolves.

Gee Gee Bridge was identified for removal in the early phases of strategic development (Roads and Maritime Strategy 2011 & 2012). It has earlier been remarked that Heritage Council endorsement has been obtained for the Strategy as a whole. The Strategy includes a number of mitigation measures as standard. Roads and Maritime has not yet committed to implement specific measures to mitigate the heritage impacts of removal of Gee Gee Bridge but has stated its openness to consider a range of measures to comply with the Strategy. It is beyond the scope of this report to propose detailed steps, but some recommendations are given in Section 7.2.

One of the principles of the Strategy is the commitment to study alternative options for relocation, retention and adaptive re-use. Little information has been provided by Roads and Maritime in this regard. This is because Gee Gee is a remote item, relatively low in the significance rankings, with a small stakeholder community. It is also in poor condition with little original timber fabric surviving. Though situated in a National Park/bushland reserve, the area attracts few visitors and has no facilities. This makes adaptive re-use of the structure challenging.

This SOHI determines that the replacement of the Gee Gee Bridge will detrementally impact on heritage significance of the heritage item. However this report is satisfied that:

- Long-term operability of the bridge has been shown to be untenable. The bridge has been scheduled for replacement since the early stage of the Strategy and infrastructure needs have not changed in regard to the bridge
- It is apparent from a site inspection and discussion with Roads and Maritime that adaptive re-use opportunities are few and local community engagement is very limited. Roads and Maritime has demonstrated that the 'Transfer' and 'Adaptive Re-use' options have been investigated and have so far produced no viable solutions. Roads and Maritme and Wakool Shire Council have indentified practicable heritage impact mitgation measures
- The bridge has been extensively re-inforced and the majority of its original timbers already replaced. The cost of upkeep will increase over time as the quantity of original fabric further diminishes
- The Roads and Maritime Timber Truss Bridge Conservation Strategy has charted positive long term strategic goals for timber truss bridges in NSW and is being followed through in accordance with commitments made to the Heritage Council

- Roads and Maritime has archival recording of the bridge. This has been conducted in accordance with the NSW Heritage Branch guidelines *How to Prepare Archival Records of Heritage Items*
- Roads and Maritime is willing to develop appropriate interpretation strategies to set the cultural, pastoral and natural history of the bridge and crossing in context, and when implemented this will mitigate some of the loss
- Roads and Maritime is engaged in updating its s.170 Register to reflect changes to the bridge portfolio and to monitor heritage safeguards for its other timber truss bridges
- Roads and Maritime has a set of safeguards to ensure biodiversity gains are optimised after any new construction. The setting at Gee Gee is such that these safeguards can be conscientiously applied to the site of the old road after the blacktop and bridge superstructure are removed either wholly or partly.
- A *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) Stage 1 and 2 investigation was completed by Roads and Maritime in August 2014 and it is reported that impacts to Aboriginal heritage are considered unlikely.

As with previous SOHI reports for the Roads and Maritime Strategy, this report takes a balanced view of the need to divest an agreed number of assets from the timber bridge portfolio. The standard mitigations used in the Strategy, combined with other site-specific mitigations, provide measures that reduce the adverse impact of removal. This report considers the issue in the strategic context rather than in isolation.

Roads and Maritime can further reduce impacts if they implement a number of additional considerations.

7.2 PROJECT RECOMMENDATIONS

The following recommendations are made to assist Roads and Maritime and the approving authority in managing the next stage and final outcomes of the proposal:

1. This report recommends that Roads and Maritime has grounds to proceed with an application to NSW Heritage Division for delisting of the bridge from the State Heritage Register.
2. It is a statutory requirement under Section 170(A)(1) of the Heritage Act 1977 that Roads and Maritime Services provide written notice to the NSW Heritage Council not less than 14 days prior to the commencement of transferral or demolition work of any items listed on an s.170 register.
3. Though Marray River Shire is managing the new bridge project, under Section 14 of the SEPP (Infrastructure) Roads and Maritime should provide written notice of the intention to carry out the proposed removal works, with a copy of this SoHI to the Wakool Shire Council.
4. A strategy for the revegetation of the existing road corridor will be developed as part of a wider approach to mitigate the loss of heritage values through demolition. There will be a concerted approach to remediation of the

river environment. This will combine regeneration based on NPWS land management recommendations with cultural heritage mitgation measures (interpretation, in situ fabric retention), that maintain cultural and landscape value of the site. The strategy used for the new bridge will be an important consideration. Murray River Council should be guided by Roads and Maritime, NPWS and stakeholders in appropriate and sympathetic remediation for the new bridge, and the strategy used should be integrated with landscape planning for the old bridge and road. Appendix C to this report, *Gee Gee Bridge over Wakool River Landscape Character and Visual Impact Assessment*, provides a basis for developing a strategy for revegetation and some guidelines on how the landscaping of the area could be handled to combine interpretation, natural landscape regeneration, viewpoint, sightline and possibly trestle fragments close to the water line.

5. Access should be provided to the site of the old bridge, with a viewing point and parking area, on the southern side to make use of sightlines of the original bridge. On-site interpretation following Roads and Maritime *Timber Bridge Interpretation Guidelines* (in development) should be developed. Other on-site interpretation components should be determined at an early stage for incorporation into design briefs and consultations. The scale, materials and design details of the interpretation should be discreet and sympathetic to the natural setting in line with the Roads and Maritime interpretation principles being developed. The site does not lend itself to public river-bank access and a balustrade (e.g. across the line of the current road) is necessary.

6. Interpretation generally should not only focus on the bridge but should explore the local historical issues connected with agricultural transport and traveling stock routes. These, and the network of rivers in Wakool and the Murray downs, form an interconnected cultural landscape integral to the local geography, ecology and natural history of the district. In this respect, the interpretation strategy for Gee Gee crossing should be seen as part and parcel of a wider, planned approach that links all timber truss bridges in the area (including Coonamit, Barham, Swan Hill and Tooleybuc). This will improve the quality of mitigation for the proposed loss of three of the group. Roads and Maritime could take an active part in developing and commemorating this heritage, e.g. through local history exhibitions or digital resources, perhaps in partnership with local agencies or organisations.

7. Options for retention or re-use of timber and/or steel elements of the bridge in situ should be explored. The poor condition of older elements may limit their re-assembly value. This approach may involve one or all of the following:

    i. Sections of salvaged timber used in the construction of the barrier and/or other small structures (shelter, bench or path) on site. Component design should be sensitive, done by a suitably experienced landscape design or landscape art adviser/organisation, in line with the guidelines being developed by Roads and Maritime.

ii. Retention of the earthwork in between the two timber bridge section, on the north bank, complete with its timber piles and sheeting, to be visible from the south bank rest area.

iii. Larger components, such as a trestle on one or both banks, retained in situ. Such elements would not be subject to maintenance. They should not be listed the State Heritage Inventory and should be permitted to return to their natural state by decay. Such an approach would need to be endorsed by riverine stakeholders including National parks & Wildlife and Murray River Council, and subject to adequate risk assessment. The option of retaining stumps of timber trestles, for example, as ruined features within an impressive natural forest environment, has aesthetic merit and some value as mitigation provided risks to public and the river ecosystem are minimal.

8. In situ retention of remnant elements is preferable to relocation. Options for relocation of some parts of the bridge to Moulamein after demolition, to provide a feature in a park, street or indoor public space, may be explored with Murray River Council and other local stakeholders. Such an approach needs to balance the risks of diminishing the connection of remnant fabric to its setting, and maintenance requirements, with the gains of having components placed in a more visible location, with some interpretation. The condition of the bridge does not appear to lend itself to large scale reassembly, e.g. of a truss. However, appropriate consultation should be undertaken and documented as part of the initial design phase prior to a de-listing application with reference to the Roads and Maritime *Interpretation Guidelines*.

9. In the unlikely event of any archaeological remains being discovered, works should cease and the Roads and Maritime Unexpected Finds Procedure be implemented.

10. Other standard mitigation measures including archival photography, research for the Timber Bridges Book, and salvage and stockpile of timber for re-use in line with the RMS *Recycling of Timber Bridges* policy should be fully implemented.

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8. REFERENCES

Australia ICOMOS*, Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (Burra Charter) 2013

W J Hastie *The Story of Moulamein 1851-1951,* Shire Council of Wakool, April 1951

Heritage Branch, NSW Department of Planning *Assessing Heritage Significance,* (n.d.)

Heritage Branch, NSW Department of Planning *Statements of Heritage Impact,* (n.d.)

McMillan, Britton & Kell Pty Ltd. *Historical Overview of Bridge Types n NSW: Study of the Relative Significance of Timber Truss Road Bridges in NSW,* Volume 1 & Appendices, for Roads & Traffic Authority NSW, December 1998

APPENDIX A
Gee Gee Bridge over Wakool River
SHR Record (2005)

Office of Environment & Heritage

Gee Gee Bridge over Wakool River

Item details

Name of Item: Gee Gee Bridge over Wakool River
Type of item: Built
Group/Collection: Transport - Land
Category: Road Bridge
Location: Lat: -35.3298213435 Long: 143.9277945539
Primary address: Main Road 94, Swan Hill (East), NSW 2710
Local govt. area: Wakool

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Main Road 94	Swan Hill (East)	Wakool			Primary Address
Murrabit-Moulamein Road	Swan Hill (East)	Wakool			Alternate Address
Nacurrie Road North	Swan Hill (East)	Wakool			Alternate Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Roads and Maritime Services	State Government	

Statement of significance:

The Gee Gee bridge is a Dare type timber truss bridge, and was completed in 1929. In 1998 it was in good condition. As a timber truss road bridge, it has many associational links with important historical events, trends, and people, including the expansion of the road network and economic activity throughout NSW, and Harvey Dare, the designer of this type of truss. Dare trusses were fifth in the five stage design evolution of NSW timber truss road bridges. They were similar to Allan trusses, but contain improvements which make them stronger and easier to maintain. This engineering enhancement represents a significant evolution of the design of timber truss bridges, and gives Dare trusses some technical significance. In 1998 there were 27 surviving Dare trusses in NSW of the 40 built, and 82 timber truss road bridges survive from the over 400 built. The Gee Gee bridge is a representative example of Dare timber truss road bridges, and is assessed as being State significant, primarily on the basis of its technical and historical significance.

Date significance updated: 13 Sep 05

Note: There are incomplete details for a number of items listed in NSW. The Heritage Branch intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Designer/Maker: Harvey Dare

Construction years: 1929-1929

Physical description: Gee Gee Bridge is a Dare type timber truss road bridge. It has a single timber truss span of 27.7m (91ft). There are 3 timber approach spans at one end and 2 at the other giving the bridge an overall length of 72.5m (238ft).

The super structure is supported by timber trestles and provides a dual lane carriage way with a minimum width of 5.5m. A timber post and rail guard rail extends the full length of the bridge.

In the 1990's strengthening of the timber trestles took place.

Physical condition and/or Archaeological potential: Good

Date condition updated: 03 Jun 05

Modifications and dates: 1990's - Strengthening of timber trestles

Current use: Road bridge

Former use: Road bridge

History

Historical notes: Timber truss road bridges have played a significant role in the expansion and improvement of the NSW road network. Prior to the bridges being built, river crossings were often dangerous in times of rain, which caused bulk freight movement to be prohibitively expensive for most agricultural and mining produce. Only the high priced wool clip of the time was able to carry the costs and inconvenience imposed by the generally inadequate river crossings that often existed prior to the trusses construction.
Timber truss bridges were preferred by the Public Works Department from the mid 19th to the early 20th century because they were relatively cheap to construct, and used mostly local materials. The financially troubled governments of the day applied pressure to the Public Works Department to produce as much road and bridge work for as little cost as possible, using local materials. This condition effectively prohibited the use of iron and steel, as these, prior to the construction of the steel works at Newcastle in the early 20th century, had to be imported from England.

Harvey Dare, the designer of Dare truss and other bridges, was a leading engineer in the Public Works Department, and a prominent figure in early 20th century NSW.

Timber truss bridges, and timber bridges generally were so common that NSW was known to travellers as the 'timber bridge state'.

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	(none)-

Assessment of significance

SHR Criteria b) [Associative significance]	Through the bridge's association with the expansion of the NSW road network, its ability to demonstrate historically important concepts such as the gradual acceptance of NSW people of American design ideas, and its association with Harvey Dare, it has historical significance.
SHR Criteria c) [Aesthetic significance]	The bridge exhibits the technical excellence of its design, as all of the structural detail is clearly visible. In the context of its landscape it is visually attractive. As such, the bridge has a small amount of aesthetic significance.
SHR Criteria d) [Social significance]	Timber truss bridges are prominent to road travellers, and NSW has in the past been referred to as the "timber truss bridge state". Through this, the complete set of bridges gain some social significance, as they could be said to be held in reasonable esteem by many travellers in NSW.
SHR Criteria e) [Research potential]	The bridge has technical significance because it is a Dare truss, is representative of some major technical developments that were made in timber truss design by the Public Works Department.
SHR Criteria f) [Rarity]	Rare - In 1998 there were 27 surviving Dare trusses in NSW of the 40 built, and 82 timber truss road bridges survive from the over 400 built.
SHR Criteria g) [Representativeness]	Representative of Dare truss bridges.
Integrity/Intactness:	Intact, but timber piers have been strengthened by additional piles.
Assessment criteria:	Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Procedures /Exemptions

Section of act	Description	Title	Comments	Action date
57(2)	Exemption to allow work	Standard Exemptions	SCHEDULE OF STANDARD EXEMPTIONS HERITAGE ACT 1977 Notice of Order Under Section 57 (2) of the Heritage Act 1977 I, the Minister for Planning, pursuant to subsection 57(2) of the Heritage Act 1977, on the recommendation of the Heritage Council of New South Wales, do by this Order: 1. revoke the Schedule of Exemptions to subsection 57(1) of the Heritage Act made under subsection 57(2) and published in the Government Gazette on 22 February 2008; and 2. grant standard exemptions from subsection 57(1) of the Heritage Act 1977, described in the Schedule attached. FRANK SARTOR Minister for Planning Sydney, 11 July 2008 To view the schedule click on the Standard Exemptions for Works Requiring Heritage Council Approval link below.	Sep 5 2008

Standard exemptions for works requiring Heritage Council approval

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		01469	20 Jun 00	-	-
Heritage Act - s.170 NSW State agency heritage register	Roads & Traffic				

References, Internet links & Images

Type	Author	Year	Title	Internet Links
Tourism		2007	Gee Gee Bridge over Wakool River	View detail
Tourism	Attraction Homepage	2007	Gee Gee Bridge over Wakool River	View detail

Note: Internet links may be to web pages, documents or images.



(Click on thumbnail for full size image and image details)

Data source

The information for this entry comes from the following source:

Name: Heritage Office

Database number: 5051371

Return to previous page

Appendix B
Wakool Shire LEP, 2013
(Clause 5.10 Heritage Conservation)

New South Wales Consolidated Regulations

WAKOOL LOCAL ENVIRONMENTAL PLAN 2013 - REG 5.10

Heritage conservation

5.10 Heritage conservation

Note : Heritage items (if any) are listed and described in Schedule 5. Heritage conservation areas (if any) are shown on the *Heritage Map* as well as being described in Schedule 5.

(1) Objectives The objectives of this clause are as follows:

(a) to conserve the environmental heritage of Wakool,

(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

(c) to conserve archaeological sites,

(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) Requirement for consent Development consent is required for any of the following:

(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):

(i) a heritage item,

(ii) an Aboriginal object,

(iii) a building, work, relic or tree within a heritage conservation area,

(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

(d) disturbing or excavating an Aboriginal place of heritage significance,

(e) erecting a building on land:

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,

(f) subdividing land:

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

(3) When consent not required However, development consent under this clause is not required if:

(a) the applicant has notified the consent authority of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development:

(i) is of a minor nature or is for the maintenance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or archaeological site or a building, work, relic, tree or place within the heritage conservation area, and

(ii) would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, or

(b) the development is in a cemetery or burial ground and the proposed development:

(i) is the creation of a new grave or monument, or excavation or disturbance of land for the purpose of conserving or repairing monuments or grave markers, and

(ii) would not cause disturbance to human remains, relics, Aboriginal objects in the form of grave goods, or to an Aboriginal place of heritage significance, or

(c) the development is limited to the removal of a tree or other vegetation that the Council is satisfied is a risk to human life or property, or

(d) the development is exempt development.

(4) Effect of proposed development on heritage significance The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subclause applies regardless of whether a heritage management document is prepared under subclause (5) or a heritage conservation management plan is submitted under subclause (6).

(5) Heritage assessment The consent authority may, before granting consent to any development:

(a) on land on which a heritage item is located, or

(b) on land that is within a heritage conservation area, or

(c) on land that is within the vicinity of land referred to in paragraph (a) or (b),

require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

(6) Heritage conservation management plans The consent authority may require, after considering the heritage significance of a heritage item and the extent of change proposed to it, the submission of a heritage conservation management plan before granting consent under this clause.

(7) Archaeological sites The consent authority must, before granting consent under this clause to the carrying out of development on an archaeological site (other than land listed on the State Heritage Register or to which an interim heritage order under the *Heritage Act 1977* applies):

(a) notify the Heritage Council of its intention to grant consent, and

(b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.

(8) Aboriginal places of heritage significance The consent authority must, before granting consent under this clause to the carrying out of development in an Aboriginal place of heritage significance:

(a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and

(b) notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.

(9) Demolition of nominated State heritage items The consent authority must, before granting consent under this clause for the demolition of a nominated State heritage item:

(a) notify the Heritage Council about the application, and

(b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.

(10) Conservation incentives The consent authority may grant consent to development for any purpose of a building that is a heritage item or of the land on which such a building is erected, or for any purpose on an Aboriginal place of heritage significance, even though development for that purpose would otherwise not be allowed by this Plan, if the consent authority is satisfied that:

(a) the conservation of the heritage item or Aboriginal place of heritage significance is facilitated by the granting of consent, and

(b) the proposed development is in accordance with a heritage management document that has been approved by the consent authority, and

(c) the consent to the proposed development would require that all necessary conservation work identified in the heritage management document is carried out, and

(d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance, and

(e) the proposed development would not have any significant adverse effect on the amenity of the surrounding area.

Appendix C

Gee Gee Bridge over Wakool River: Landscape Character & Visual Impact Assessment, GAO report for Roads and Maritime Services, August 2015

GEE GEE BRIDGE OVER WAKOOL RIVER

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

PREPARED FOR ROADS AND MARITIME SERVICES AUGUST 2015

NSW GOVERNMENT | Public Works
Government Architect's Office

GEE GEE BRIDGE OVER THE WAKOOL RIVER

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

Barbara Schaffer, Principal Landscape Architect

Government Architect's Office, NSW Public Works

Office of Finance, Services and Innovation

McKell Building, Level 19, 2-24 Rawson Place, Sydney, 2000
T: 61 2 9372 8428 E: barbara.schaffer@finance.nsw.gov.au

F: 61 2 9372 8487 www.govarch.commerce.nsw.gov.au

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1. INTRODUCTION

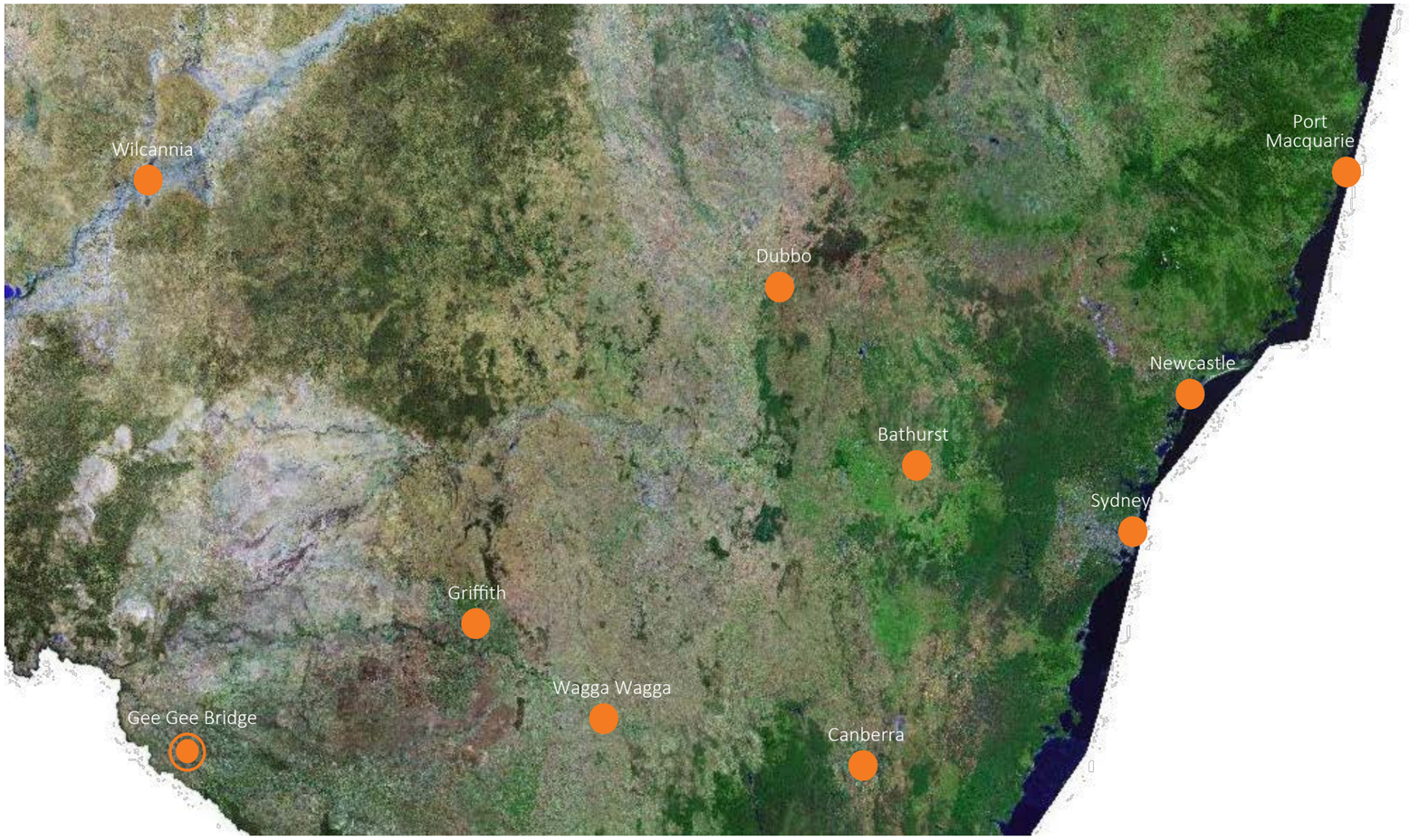

Figure 1 NSW State context
Source: SIX Viewer, 2015

1.1 PROJECT OVERVIEW

Roads and Maritime Services (Roads and Maritime) is proposing to demolish the existing heritage listed timber truss bridge and flood releif bridge at the Gee Gee crossing over the Wakool River, in the state's south west.

The Gee Gee Bridge is located along Noorong Road, between the towns of Swan Hill and Deniliquin. It is approximately 630km from Sydney and 310km from Melbourne. No towns are located adjacent to the bridge.

The proposal is to replace the current bridges with a single structure. The project is part of the Roads and Maritime 'NSW Bridges for the Bush' program. It also responds to the NSW Freight and Ports strategy which acknowledges the need for High Mass Limit transport access throughout the region.

Roads and Maritime is currently preparing the design for the new bridge. This bridge will be located adjacent to the existing bridge. The approach roads will be altered to cater for an increase in speed limit to the bridge.

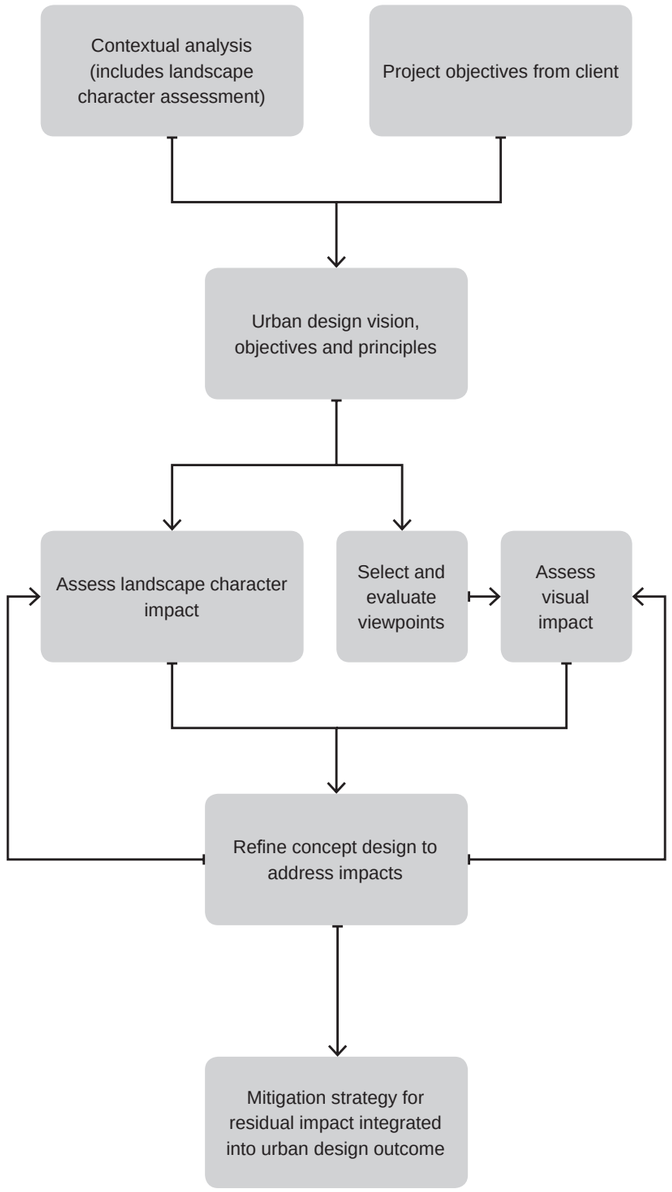

Figure 2 Chart showing the relationship of the Landscape Character and Visual Impact Assessment to the overall project development

Source: Roads and Maritime, 2013

1.2 PURPOSE AND METHODOLOGY

The Environmental Planning and Assessment Act (1979) requires that Roads and Maritime completes a Review of Environmental Factors (REF) for the proposal to replace the existing Gee Gee bridge and flood releif bridge. The NSW Government Architect's Office (GAO) has been engaged to prepare a landscape character and visual impact assessment for inclusion in the REF.

The purpose of this landscape character and visual impact assessment is to provide a critical analysis of the proposed visual impacts of the new bridge. It measures and reports on how well the design fits into its surrounding context.

This assessment seeks to inform the concept design of the proposal. It also seeks to inform a range of stakeholders about the landscape character and visual impact of the proposal and what mitigation strategies can be implemented to reduce these impacts.

The landscape character and visual impact of the proposal is defined based on an analysis of the sensitivity and magnitude of the proposal on the area, as per the Roads and Maritime *Environment Impact Assessment Practice Note Guideline for Landscape Character and Visual Impact Assessment* (2013).

The methodology used to complete this study was:

1. Visit to the site to inspect the area
2. Review background documentation for the project
3. Prepare the landscape character assessment using the Roads and Maritime methodology
4. Prepare the visual impact assessment using the Roads and Maritime methodology
5. Collaborate with the project team including Heritage Architect, Project Manager, Planner and Engineers to finalise the assessment, and provide advice regarding the design of the new bridge and any landscape design issues impacting on the demolition and interpretation of the existing heritage listed bridge structure

2. THE PROPOSAL

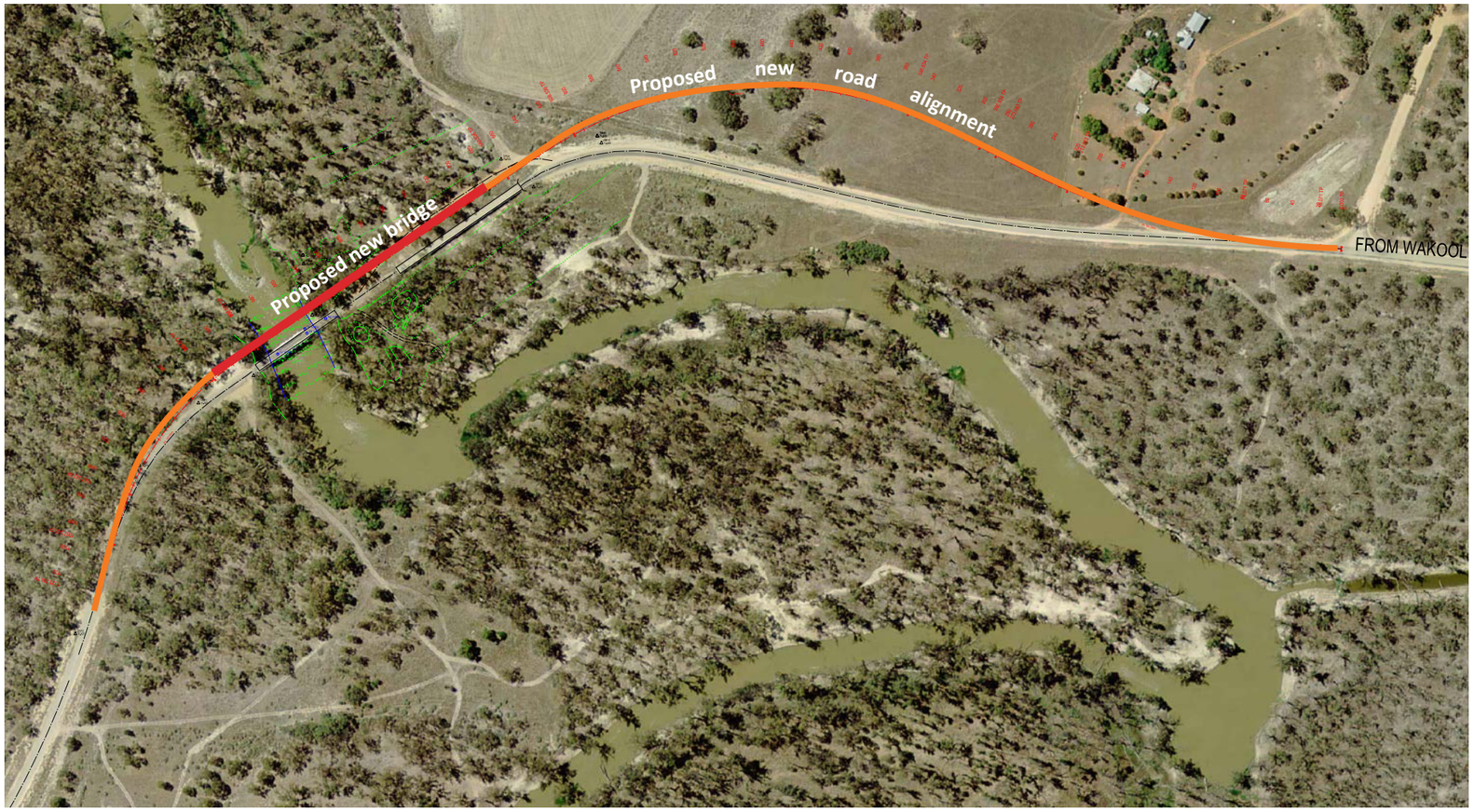

Figure 3 Concept plan showing location of proposed new bridge and road approaches

Source: Roads and Maritime, 2015

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2.1 THE PROPOSAL

Roads and Maritime is proposing to demolish the existing heritage listed timber truss bridge over the Wakool River, as well as the existing flood relief bridge, and replace them with a single structure.

The new bridge is a straight bridge to be located adjacent to the existing bridge, approximately 10m to the north-west. The bridge will allow two way traffic. It will also accommodate an increased load limit in accordance with network upgrading priorities throughout the region.

The decision to proceed with a straight bridge rather than a curved bridge was the result of a number of factors. A straight bridge is a less complex structure, enables the existing bridge to remain operational during construction of the new bridge and has limited impact on adjacent National Park.

The existing bridge corridor runs through the Murray Valley National Park and the proposed new alignment of the bridge is designed to remain within this road corridor where possible. An existing service track is located alongside the bridge on the northern side of the river, and the majority of the proposed bridge alignment is within this already disturbed area.

The northern bridge approach is proposed to be reconfigured to accommodate an increase in speed limit to 80km/hour. This will result in intrusion of the road corridor through the National Park land. This land is owned by National Parks but is leased. National Parks have agreed in principle to do a land swap with Roads and Maritime for the residual road corridor land.

3. CONTEXTUAL ANALYSIS

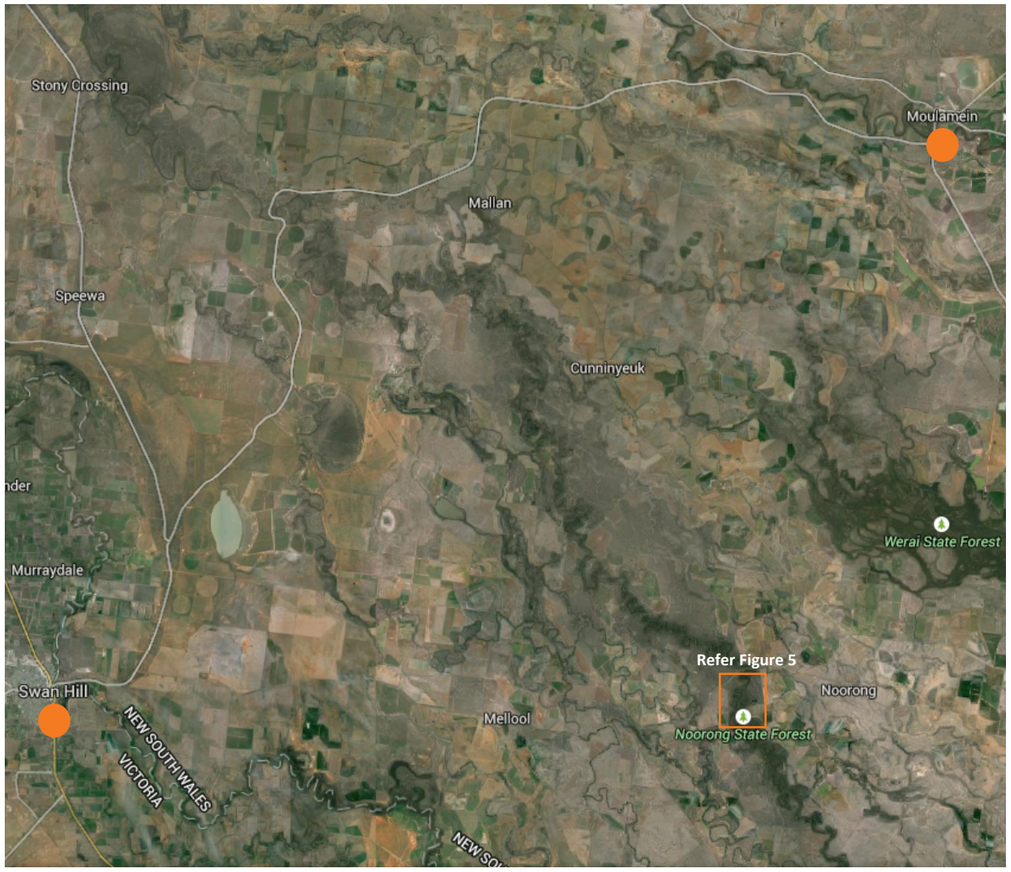

Figure 4 Regional Context
Source: Google Maps, 2015

Figure 5 Local Context
Source: Google Maps, 2015

3.1 THE LOCALITY

The Gee Gee Bridge is located on the Noorong Road, between the towns of Swan Hill, in Victoria, and Deniliquin, in New South Wales. It is approximately 630km from Sydney and 310km from Melbourne.

The study area is located in the Murray River Council. The Council LGA is a predominately agricultural region. Crops including canola and lucerne are grown in the region. Land is also used for sheep and cattle grazing.

No towns are located adjacent to the bridge. The closest major town is Swan Hill in Victoria, about 45 minutes drive away.

The existing bridge corridor is bordered on both sides by the Murray Valley National Park. The river is occasionally used for fishing by local residents. A cluster of buildings at the start of the northern approach road are the only buildings in the area. The agricultural character of the star picket and steel wire fencing typify the property boundaries.

3.2 ROAD CONTEXT

Noorong Road is a local road that provides a connection between the towns of Swan Hill, in Victoria, and Deniliquin, in New South Wales. The road leading to the bridge approaches is a sealed bitumen road, two lanes wide.

Nacurrie Road north is an unsealed road leading north towards Moulamein from Noorong Road. This is the only other public road in the vicinity of the study area.

Noorong Road is used for local traffic, as well heavy vehicles travelling between states. The road is also used to transport farming equipment and stock. Current traffic over the existing bridge is around 160-200 vehicles per day (Roads and Maritime 2015). About a quarter of these vehicles are heavy vehicles.

The current bridge is not strong or wide enough to accommodate freight trucks or modern farming equipment. It only allows B-Doubles at a semi-trailer loading (42 tonnes). It is also a restriction to higher mass limit (HML) freight vehicle movements which limits traffic movement throughout the region. The replacement of the bridge provides an opportunity to widen the bridge, allowing equipment to be transported more easily along the local road network and freight truck movement.

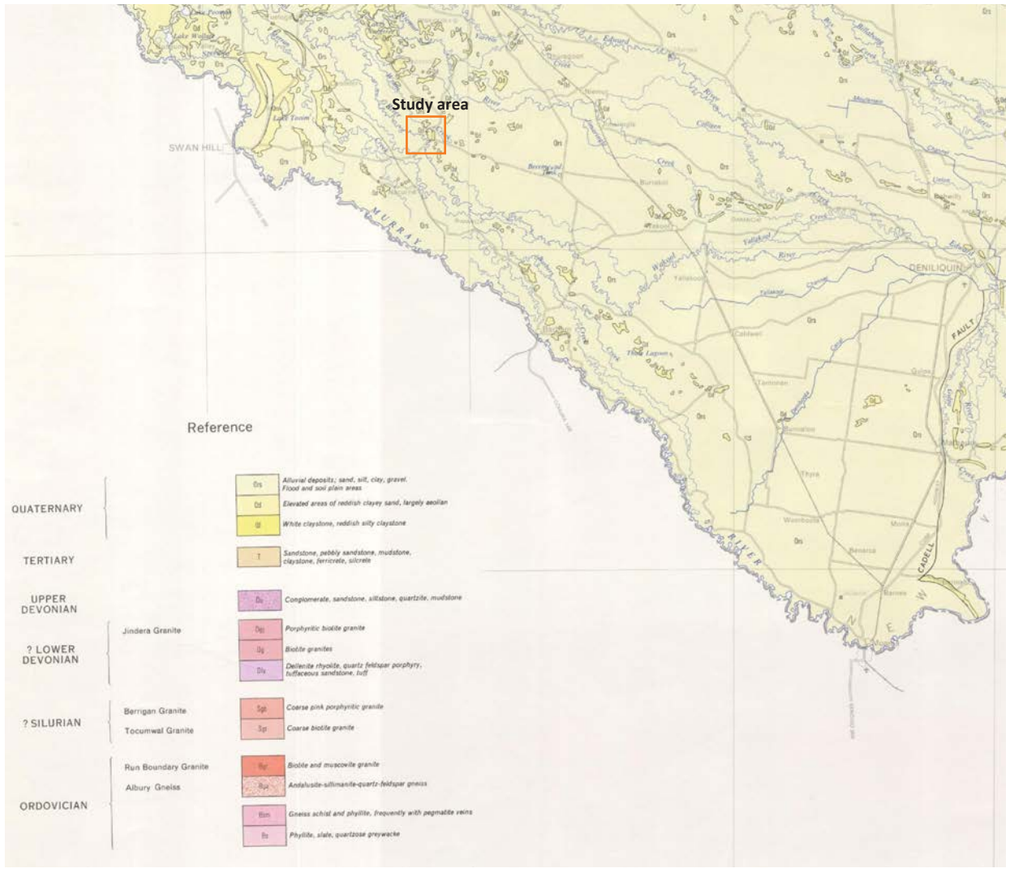

Figure 6 Urana 1:500 000 Geological Map

Source: Geological Survey of New South Wales, 1972

Figure 7 The Wakool Riverbank and low water level

Source: GAO, 2015

Figure 8 Banking along the eastern bridge approach

Source: GAO, 2015

Figure 9 Banking along the western bridge approach

Source: GAO, 2015

3.3 LANDFORM AND TOPOGRAPHY

The study area is located along the Wakool River. The Wakool River is one of the major anabranches of the Murray River. The river meanders throughout the surrounding landscape. The Wakool River system is comprised of a highly braided mix of rivers, creeks and wetlands and provides habitat for a wide range of flora and fauna species in the area. The river is a mix of lengths of shallow, dry and pooling areas.

The river meanders through the flat landscape. It twists and turns as it flows towards the Murray River. The water level falls and rises with the seasons, floods and water allocations upstream. At the time of the site visit, the river was approximately 1 metre lower than its usual height (see Figure 7).

The landform adjacent to the bridge rises steeply from the river bank. At the bridge crossing, the bank on the northern side of the river is generally more gentle than on the southern side of the river. The land immediately behind the river banks is uneven and varied.

Moving away from the river, the land is generally flat. Localised banking has been undertaken to the bridge approach roads. The land extending away from the river is very flat, and is subject to flooding (see figure 10).

The 1:500 000 Geological Map shows the study area is underlaid by quaternary alluvial deposits of sand, silt, clay and gravel. The area is part of the flood and soil plains that extend across south western New South Wales. Localised deposits of white claystone and reddish silty claystone are located to the north of the study area.

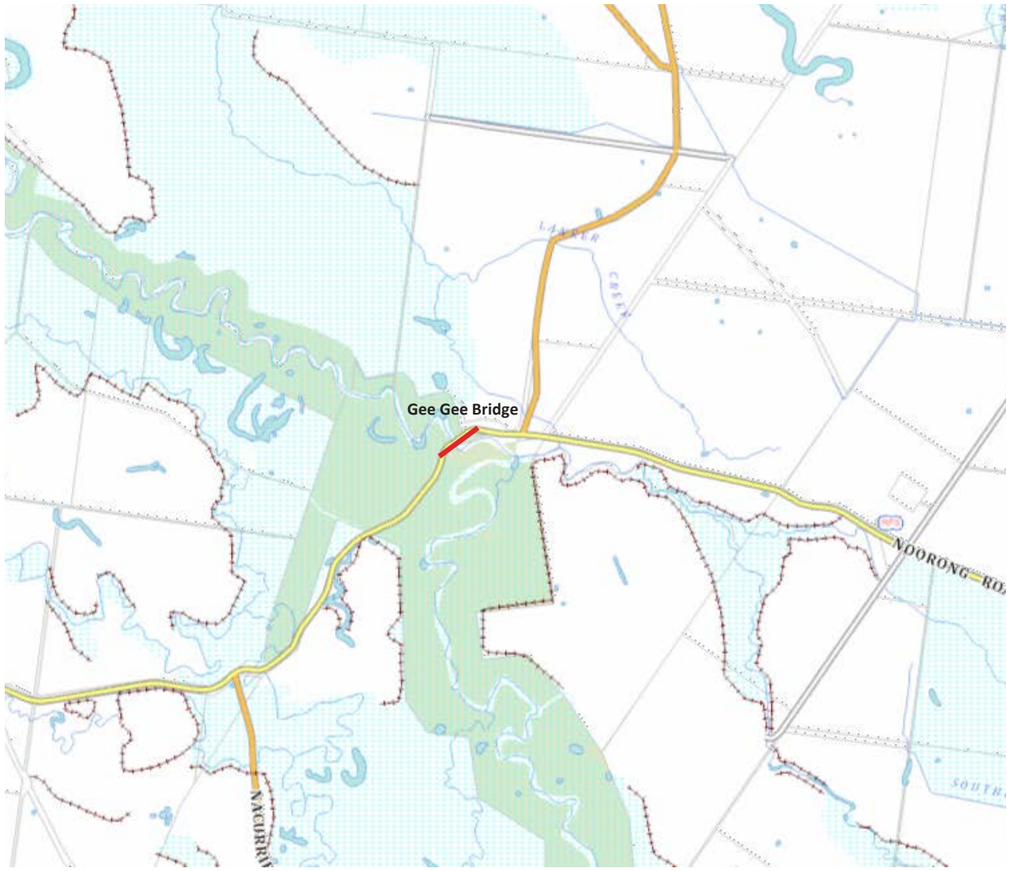

Figure 10 Map showing the extent of National Park and Flood Prone land in the study area

Source: SIX Maps, 2015

Figures 11 , 12 and 13 Vegetation within the study area

Source: GAO, 2015

3.4 VEGETATION

The Murray Valley National Park is located on either side of the river. The land was part of the Noorong State Forest before it was recently handed to the National Parks and Wildlife Service.

The study area consists of agricultural land and River Red Gum forests and woodland.

River Red Gums (***Eucalyptus camaldulensis***) grow along the banks of the Wakool River. The species forms a continuous forest along each side of the river bank. The trees are growing to a height of approximately 20 metres. The forest floor is generally very sparse, with little vegetation growing (see Figure 12).

Eucalyptus camaldulensis is an iconic and important species of the Murray-Darling catchment, both ecologically and economically (CSIRO, 2004). They are a good source of timber for construction and play an important role in the ecological functioning of the river. River Red Gums grow on riverine sites, in locations with either permanent or seasonal water.

Adjacent to the flood releif bridge, a clearing has already been made through the River Red Gum Forest. It is proposed that the majority of the new bridge alignment be located in this existing service track, to reduce the amount of vegetation clearing required.

River Red Gum Forest extends onto the flat floodplains adjacent the River. Young to mature River Red Gums and Block Box (Eucalyptus largiflorens*)* are sparsely scattered. Understory vegetation is sparse.

Moving away from the river, agricultural land dominates the landscape. Flat to very gently rolling hills and grassy fields extend across the landscape, broken up by stands of remnant trees dotted throughout. Crops grown in the area include wheat, lucerne and canola.

A cluster of trees is located in the vicinity of the structures and house in the north-eastern of the study area. This screens the residence from the adjacent roads.

Figure 14 The Bridge - single Dare Truss and southern approach span

Source: GAO, 2015

Figure 15 The northern-eastern bridge approach

Source: GAO, 2015

Figure 16 The view looking north-east from the south-western end of the bridge

Source: GAO, 2015

3.5 GEE GEE BRIDGE AND HERITAGE

Construction of the bridge at Gee Gee began in 1928. The bridge is 5.5m wide and consists of a single 'Dare Truss' span over the river. Three approach spans on the south and two on the north are constructed on timber trestles. A 90m long flood relief bridge was constructed north of the main bridge in 1934. A 60m earth abutment spans between this bridge and the Truss bridge.

Timber truss bridges were used widely throughout New South Wales from 1860 to 1936. Five different types of truss' were developed over that time, 'Dare truss' being one of them.

The Gee Gee Bridge is listed as a heritage item in the Wakool Shire Local Environmental Plan, in the Roads and Maritime Heritage and Conservation register and on the State Heritage Register.

The bridge is one of 22 timber truss bridges scheduled for progressive replacement in line with the ***Timber Truss Bridge Conservation Strategy - Submission Report and Revised Conservation Strategy*** (Roads and Maritime, 2012).

The bridge is currently in poor condition, with many original parts of the bridge having been replaced over the years. The ***Gee Gee Crossing Timber Truss Bridge - {ůĺ·ůŜϒŜyů 2₮ Heritage Impactă*** (GAO, July 2015) contains more detailed information about the heritage significance of the bridge.

4. LANDSCAPE CHARACTER ASSESSMENT

Sensitivity	Magnitude			
	High	Moderate	Low	Negligible
High	High Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Figure 17 Landscape character and visual impact grading matrix

Source: Roads and Maritime 2013

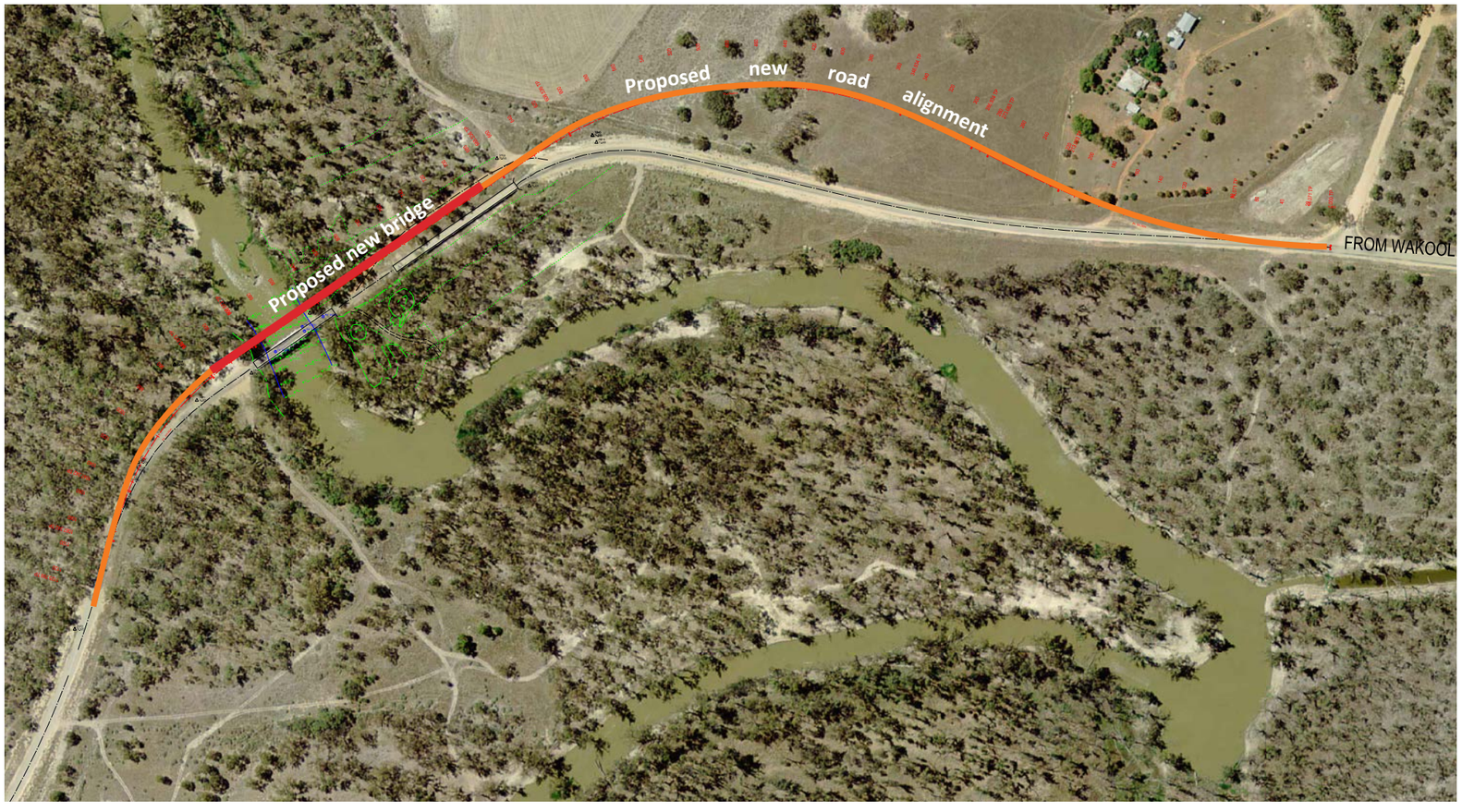

Figure 18 Study Area

Source: Base plan Roads and Maritime, 2015

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4.1 METHODOLOGY

This Landscape Character Assessment has been carried out in accordance with the Roads and Maritime ***EIA Guideline for Landscape Character and Visual Impact Assessment*** (2013).

As a starting point, the existing landscape character of the area has been reviewed and analysed (refer Section 3).

This has been followed by identification of the landscape character zones within the study area and an assessment of the impacts on the character of each zone. This assessment includes grading of the sensitivity of the landscape character of each zone and of the magnitude of the impacts on each zone. Sensitivity refers to 'the qualities of an area and the inherent capability of the area to absorb change caused by the proposal.' (Roads and Maritime, 2013). Magnitude refers to 'the measurement of the scale, form and character of a development proposal when compared to the existing condition.' (Roads and Maritime, 2013).

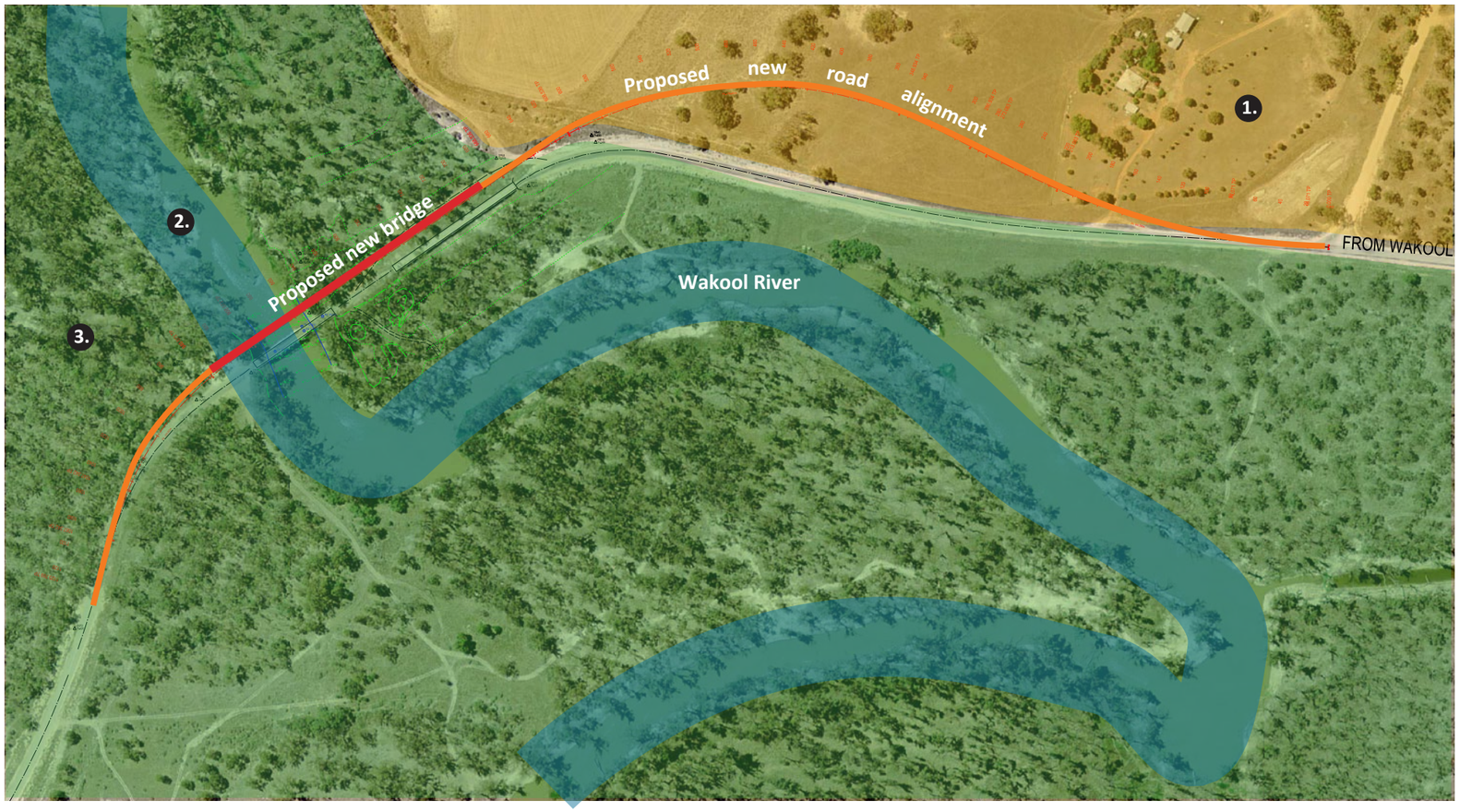


Figure 19 Landscape Character Zones
Source: Base plan Roads and Maritime 2015

4.2 LANDSCAPE CHARACTER ZONES

Three of landscape character zones were identified in the study area. These zones each have a distinct character and have similar spatial qualities which differentiate them from other zones.

The landscape character zones identified as part of this assessment are:

- Agriculture including house and associated structures
- **2.** Wakool River and river banks
- **3.** River Red Gum Forest

1. Landscape Character Zone 1

Figure 20 Agriculture including house and associated structures Source: GAO, 2015

2. Landscape Character Zone 2

Figure 21 Wakool River and river banks Source: GAO, 2015

3. Landscape Character Zone 3

Figure 22 River Red Gum Forest Source: GAO, 2015

4.3 LANDSCAPE CHARACTER IMPACT

The impact of the proposal on each of the zones has been assessed as per the table below.

Measurement of Impact

Zone	Sensitivity	Magnitude	Overall Level of Impact	Comments
1	Low	Moderate	Low-moderate	The relocation of the bridge approach road will bisect the agricultural land and be located closer to the existing house and associated structures.
2	Moderate	Moderate	Moderate	Construction of the new bridge will require the removal of a number of trees and careful consideration of erosion control to the river banks. The design of the bridge could make a positive contribution to the landscape character of the zone. Levels of the bridge approaches will require careful consideration to ensure that the road doesn't become dominant in the landscape and that fill batters are minimised.
3	Moderate	Low	Moderate-Low	The majority of the new bridge in this zone will be located along an existing service road on the north side of the River. Clearing of the forest will also be required on the southern side of the river. Levels of the bridge approaches will require careful consideration to ensure that the road doesn't become dominant in the landscape and that fill batters are minimised.

5. VISUAL IMPACT ASSESSMENT

Sensitivity	Magnitude				
	High	Moderate	Low	Negligible
High	High Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Figure 23 Landscape character and visual impact grading matrix

Source: Roads and Maritime 2013

5.1 METHODOLOGY

This visual impact assessment has been carried out in accordance with the Roads and Maritime ***EIA Guideline for Landscape Character and Visual Impact Assessment*** (2013).

As a starting point, the visual impact of the proposal has been assessed based on the view shed analysis and the key viewpoints. The extent of the area from which the proposal will be visible has been defined through a Visual Envelope Map (VEM).

Key existing viewpoints were defined and rated as to their sensitivity to change by the proposal, using the grading matrix outlined in the Roads and Maritime ***EIA Guideline for Landscape Character and Visual Impact Assessment*** (Figure 22). This matrix defines the categories on which the assessment has been based. Sensitivity was assessed in relation to the quality of the view and the sensitivity to the proposed change.

The level of visual impact on each view was then determined through assessment of the magnitude of visual change in the landscape and its proximity to viewers, as well as the sensitivity.

Combining the rating of the sensitivity and the magnitude of the visual impact has given an overall assessment of the impact on each viewpoint.

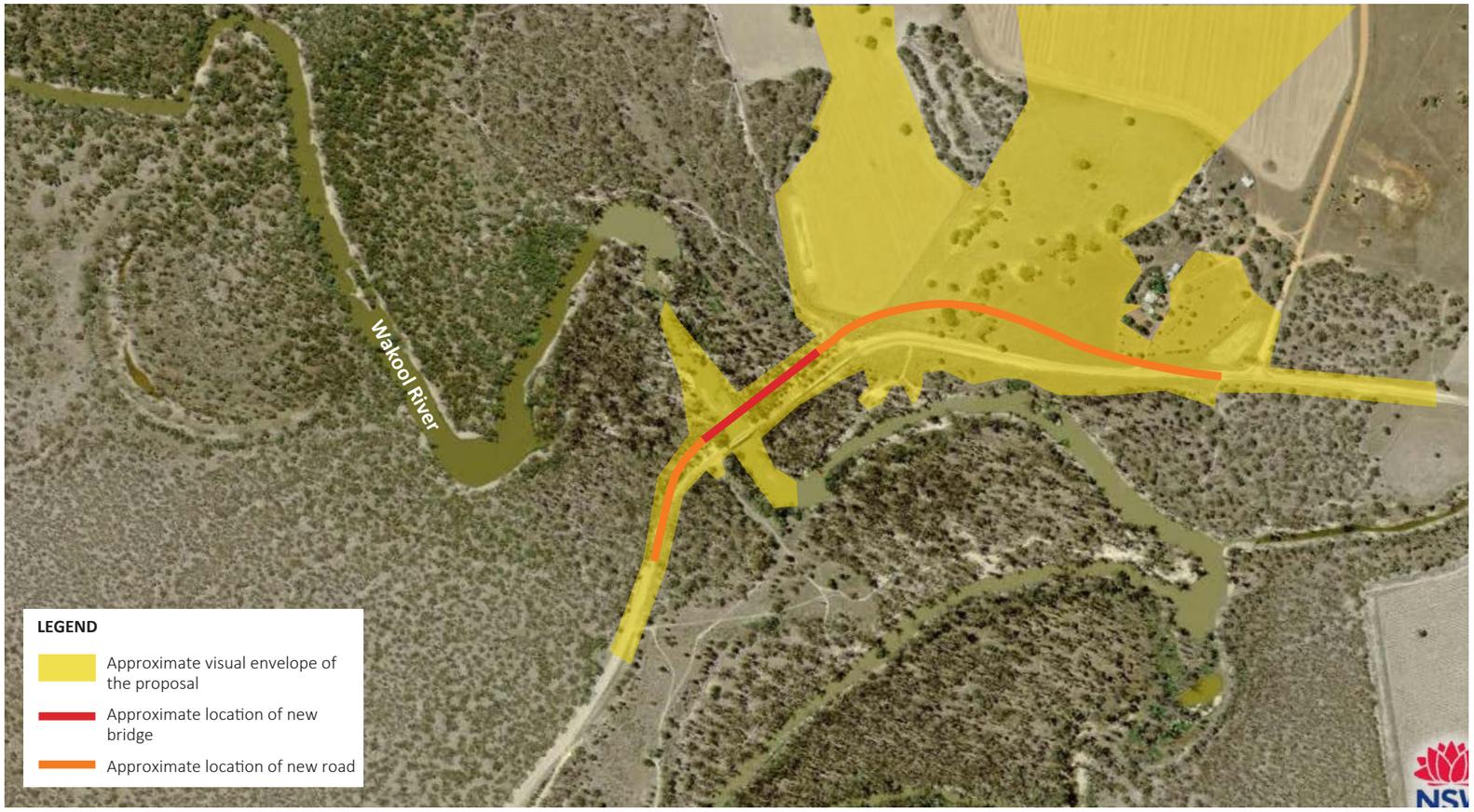


Figure 24 Visual Envelope Map

Source: SIX Maps 2015

5.2 VIEWSHED ANALYSIS

The land gently slopes down to the Wakool River on either side of the river. The banks of the river are sloped more steeply. Immediately adjacent to the bridge, the steepest banks are located on the southern side of the river. Localised mounding underneath the existing bridge approach roads result in the road level being higher than the surrounding levels. The vegetation along the river is dominant and the Red Gum Forest hinders views across the landscape. As a result of this vegetation and the layout of the road, views of the existing bridge are limited.

The visual envelope map is shown in Figure 24. This map illustrates the extent of the area from which the proposal will be visible.

As the bridge is not located in or adjacent to a town, the viewing points for the new bridge are from Noorong Road, as well as the river.

The viewing points for the new road approaches are from the existing road, the surrounding agricultural land and national parks land (where not obscured.. The agricultral land is flat to gently sloping towards the river so views extend across the landscape in these areas. Scattered trees break up the long vistas.

There is a cluster of buildings, including a single house, that is located to the north of the new road at the eastern end. This house is screened by vegetation which limits views to and from the road.

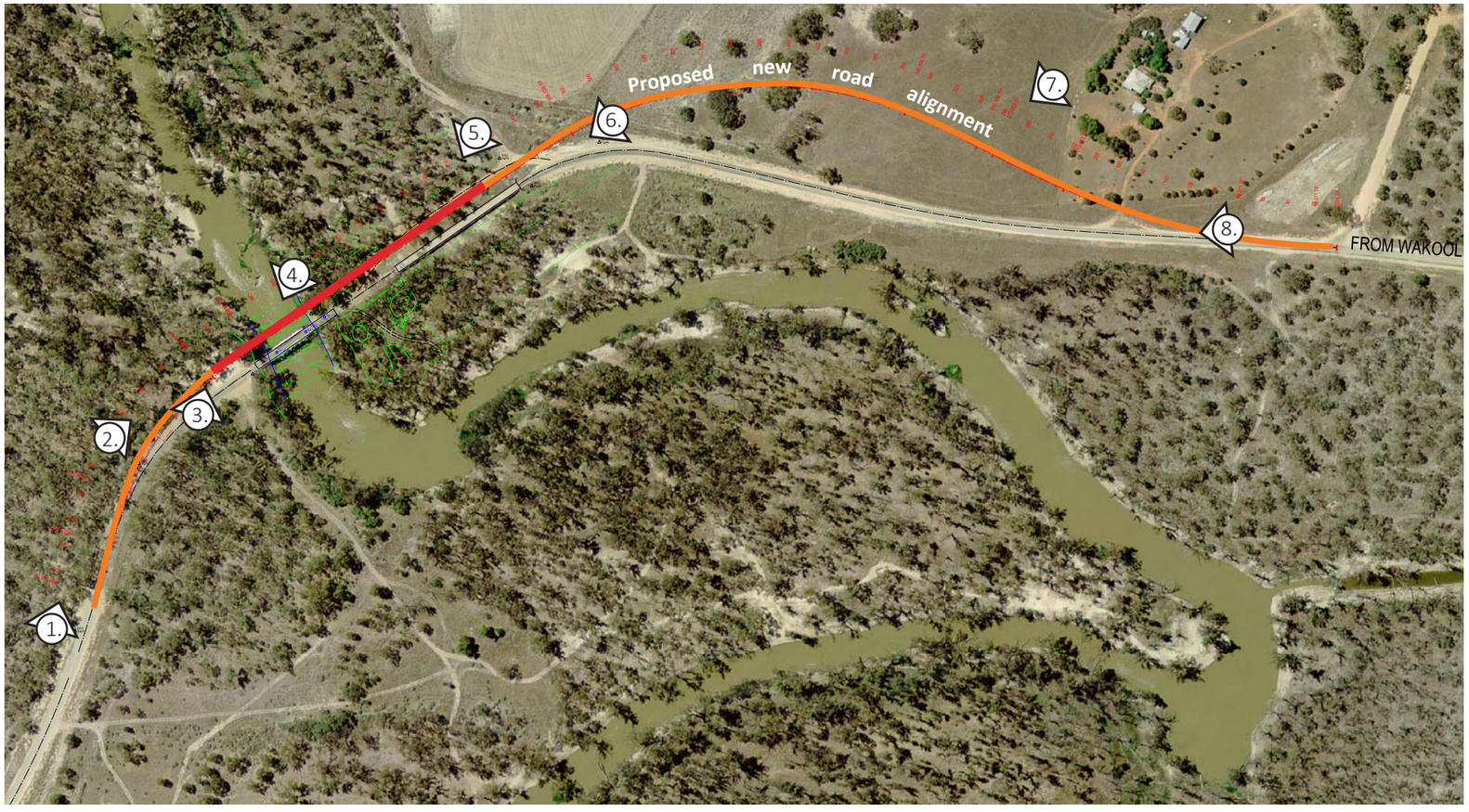


Figure 25 Key viewpoints
Source: Base plan Roads and Maritime, 2015

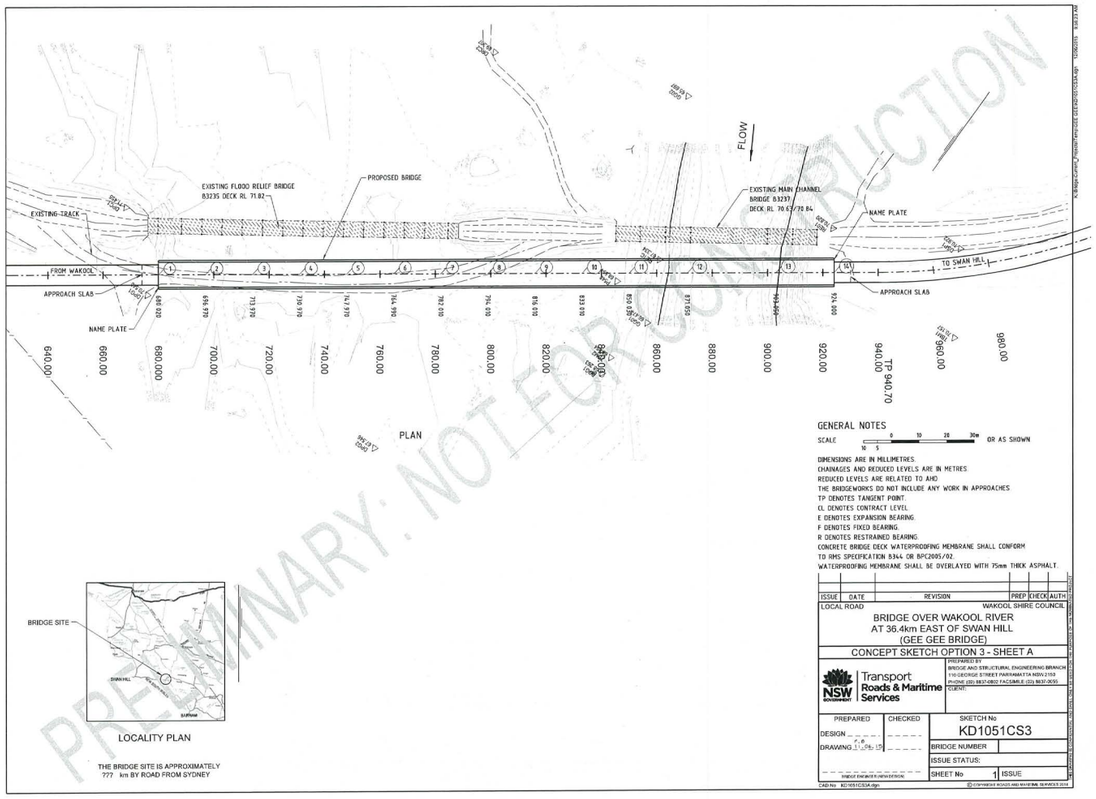
5.3 IMPACT ASSESSMENT: VIEWPOINTS AND SENSITIVITY

Key viewpoints (as shown on Figure 25) have been identified following a site visit and from the viewshed analysis mapping.

The visual impact assessment determines the sensitivity of each key view point to the proposal, as shown in the table below.

Viewpoint description and sensitivity

View point	Description of setting	Sensitivity	Comments
1	Start of new road leading to south-western approach to the bridge	Negligible	Determined by minor realignment of road through Red Gum Forest setting
2	View at curve to south-western approach to the bridge	Moderate	Determined by Red Gum Forest and alignment of bridge approach road. Loss of some River Red Gums and forest.
3	View from top of river bank	High	Determined by Red Gum Forest, alignment of bridge and approach road, removal of existing bridge and abutments, and method of erosion control applied to the river banks
4	View from top of river bank	High	Determined by Red Gum Forest, alignment of bridge and approach road, removal of existing bridge and abutments and method of erosion control applied to the river banks
5	View from junction of existing road and service road to start of bridge from northern side of river	Moderate	Determined by location of new bridge, River Red Gum Forest and existing service road
6	View at curve of road to start of bridge	Low	Determined by location of approach road
7	View to new bridge approach road from rural dwelling - field	Moderate	Determined by location of approach road through existing field
8	View from the start of the new bridge approach road	Moderate	Determined by location of approach road through existing field



LOCALITY PLAN

THE BRIDGE SITE IS APPROXIMATELY 777 km BY ROAD FROM SYDNEY

GENERAL NOTES

SCALE 0 10 20 30m OR AS SHOWN

DIMENSIONS ARE IN MILLIMETRES.
CHAINAGES AND REDUCED LEVELS ARE IN METRES.
REDUCED LEVELS ARE RELATED TO AHD
THE BRIDGEWORKS DO NOT INCLUDE ANY WORK IN APPROACHES
TP DENOTES TANGENT POINT.
CL DENOTES CONTRACT LEVEL
E DENOTES EXPANSION BEARING.
F DENOTES FIXED BEARING.
R DENOTES RESTRAINED BEARING.
CONCRETE BRIDGE DECK WATERPROOFING MEMBRANE SHALL CONFORM TO RMS SPECIFICATION 8344 OR BPC2005/02.
WATERPROOFING MEMBRANE SHALL BE OVERLAYED WITH 75mm THICK ASPHALT.

ISSUE	DATE	REVISION	PREP	CHECK	AUTH

LOCAL ROAD — WAKOOL SHIRE COUNCIL

BRIDGE OVER WAKOOL RIVER
AT 36.4km EAST OF SWAN HILL
(GEE GEE BRIDGE)

CONCEPT SKETCH OPTION 3 - SHEET A

Transport Roads & Maritime Services

PREPARED BY: BRIDGE AND STRUCTURAL ENGINEERING BRANCH, 110 GEORGE STREET PARRAMATTA NSW 2150, PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055

CLIENT:

PREPARED	CHECKED
DESIGN	
DRAWING P.G. 17/06/15	
BRIDGE ENGINEER (INTERESTING)	

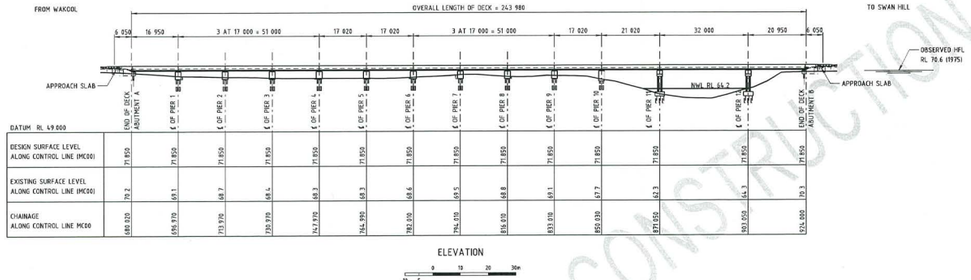
SKETCH No KD1051CS3

BRIDGE NUMBER

ISSUE STATUS:

SHEET No 1 ISSUE

CAD No KD1051CS3A.dgn



ELEVATION

0 10 20 30m
10 5

ISSUE	DATE	REVISION	PREP	CHECK	AUTH

LOCAL ROAD — WAKOOL SHIRE COUNCIL

BRIDGE OVER WAKOOL RIVER
AT 36.4km EAST OF SWAN HILL
(GEE GEE BRIDGE)

CONCEPT SKETCH OPTION 3 - SHEET B

Transport Roads & Maritime Services

PREPARED BY: BRIDGE AND STRUCTURAL ENGINEERING BRANCH, 110 GEORGE STREET PARRAMATTA NSW 2150, PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055

CLIENT:

PREPARED	CHECKED
DESIGN	
DRAWING P.G. 17/06/15	
BRIDGE ENGINEER (INTERESTING)	

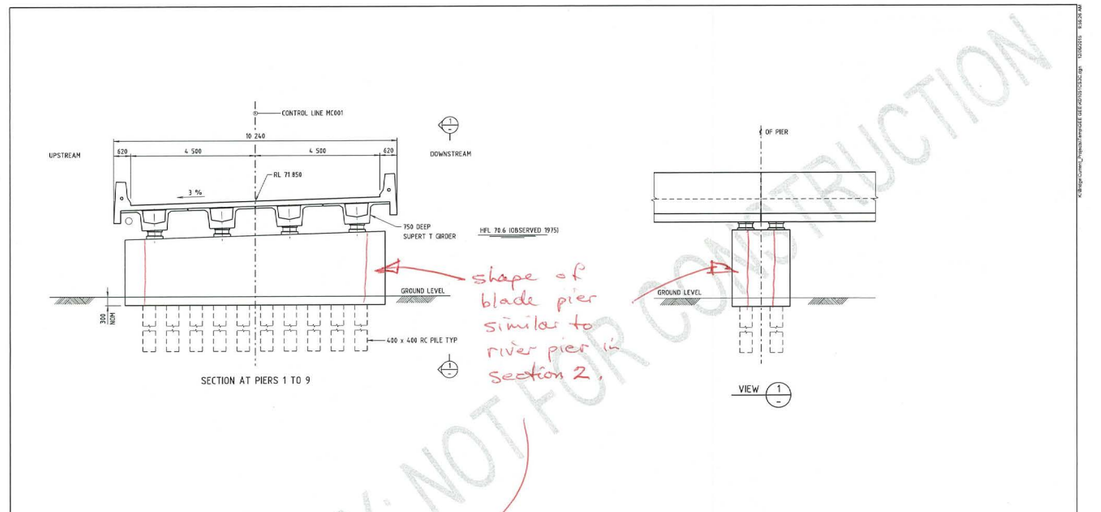
SKETCH No KD1051CS3

BRIDGE NUMBER

ISSUE STATUS:

SHEET No 2 ISSUE

CAD No KD1051CS3B.dgn



GENERAL NOTES

SCALE 0 1 000 2 000 3 000mm
1 000 500

ISSUE	DATE	REVISION	PREP	CHECK	AUTH

LOCAL ROAD — WAKOOL SHIRE COUNCIL

BRIDGE OVER WAKOOL RIVER
AT 36.4km EAST OF SWAN HILL
(GEE GEE BRIDGE)

CONCEPT SKETCH OPTION 2 - SHEET C

Transport Roads & Maritime Services

PREPARED BY: BRIDGE AND STRUCTURAL ENGINEERING BRANCH, 110 GEORGE STREET PARRAMATTA NSW 2150, PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055

CLIENT:

PREPARED	CHECKED
DESIGN	
DRAWING P.G. 17/06/15	
BRIDGE ENGINEER (INTERESTING)	

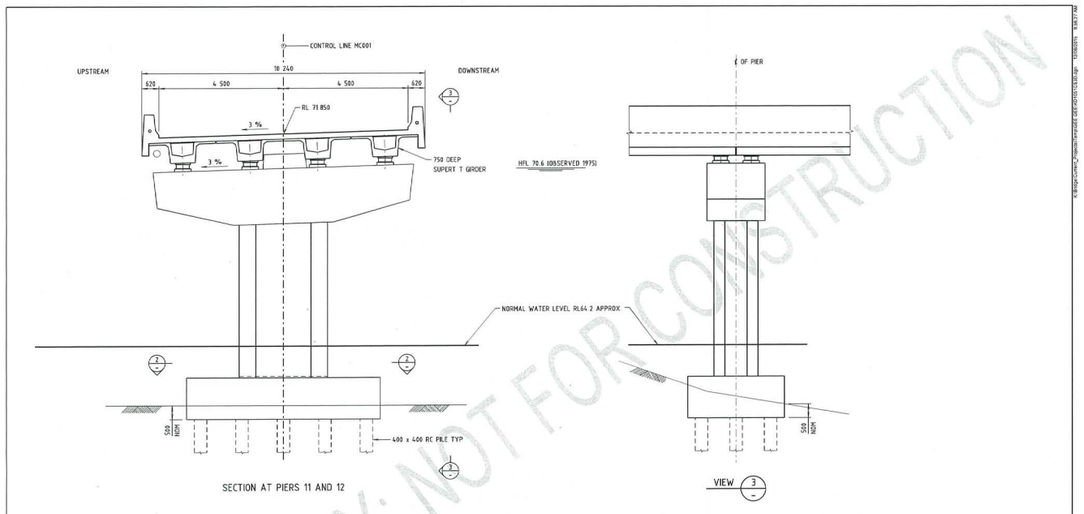
SKETCH No KD1051CS3

BRIDGE NUMBER

ISSUE STATUS:

SHEET No 3 ISSUE

CAD No KD1051CS3C.dgn



GENERAL NOTES

SCALE 0 1 000 2 000 3 000mm
1 000 500

ISSUE	DATE	REVISION	PREP	CHECK	AUTH

LOCAL ROAD — WAKOOL SHIRE COUNCIL

BRIDGE OVER WAKOOL RIVER
AT 36.4km EAST OF SWAN HILL
(GEE GEE BRIDGE)

CONCEPT SKETCH OPTION 2 - SHEET D

Transport Roads & Maritime Services

PREPARED BY: BRIDGE AND STRUCTURAL ENGINEERING BRANCH, 110 GEORGE STREET PARRAMATTA NSW 2150, PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055

CLIENT:

PREPARED	CHECKED
DESIGN	
DRAWING P.G. 17/06/15	
BRIDGE ENGINEER (INTERESTING)	

SKETCH No KD1051CS3

BRIDGE NUMBER

ISSUE STATUS:

SHEET No 4 ISSUE

CAD No KD1051CS3D.dgn

Figure 26 Current Concept Design Plans

Source: Roads and Maritime, 2015

5.3 IMPACT ASSESSMENT: VIEWPOINTS AND SENSITIVITY (CONT.)

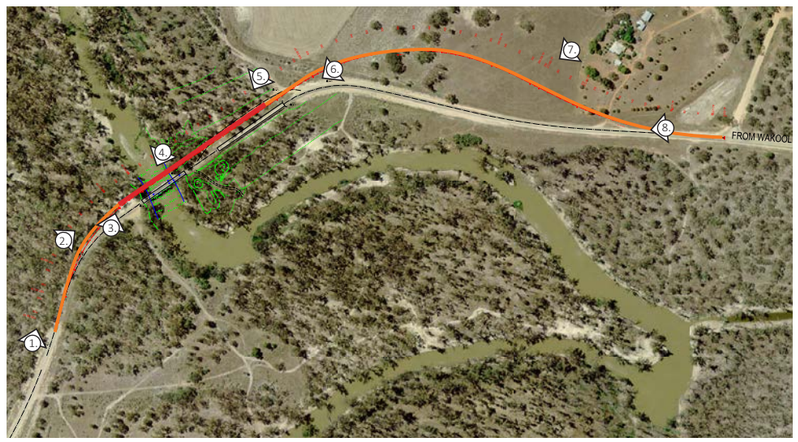
Images of the selected key viewpoints

View 1 : Start of new road leading to south-western approach to the bridge

View 2 : South-western approach to the bridge

View 3 : View from top of southern side of river bank

View 4 : View from top of northern side of river bank



Images of the selected key viewpoints

View 5 : View from junction of existing road and service road to start of bridge from northern side of river

View 6 : View at curve of road to start of bridge

View 7 : View to new bridge approach road from rural dwelling - field

View 8 : View from the start of the new bridge approach road

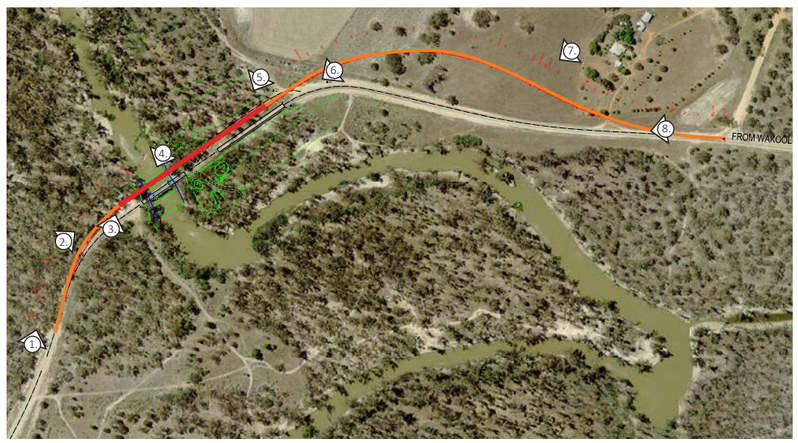


Figure 27 Key viewpoints
Source: Base map Roads and Maritime, 2015

5.4 VISUAL IMPACT ASSESSMENT

View point	Visual Sensitivity	Magnitude of visual effect	Resultant rating of visual impact	Comments
1	Negligible	Negligible	Negligible	
2	Moderate	Moderate	Moderate	The visual impact will be moderate due to clearing of trees and regrading required for the new bridge approach road
3	High	Moderate	Moderate - High	The visual impact will be moderate-high due to clearing of trees on the river bank, removal of the existing bridge and construction of new bridge
4	High	Moderate	Moderate - High	The visual impact will be moderate-high due to clearing of trees on the river bank, removal of the existing bridge and construction of new bridge
5	Moderate	Moderate	Moderate	The visual impact will be moderate due to clearing of trees and construction of the new bridge
6	Low	Low	Low	The visual impact will be low as the new bridge alignment is utilising the existing service track
7	Moderate	Moderate	Moderate	The visual impact will be moderate from this viewpoint as the road will be relocated closer to the existing property.
8	Moderate	Moderate	Moderate	The visual impact will be moderate due to the road relocation and flat, sparsely treed landscape which provides long vistas over the area

6. DISCUSSION

6.1 RECOMMENDATIONS

Assessing the impact of the proposal at the chosen viewpoints reveals that there are a range of visual impacts on the landscape, rated from 'negligible to high', should no mitigation of the impacts be undertaken.

A range of options should be considered to mitigate the impacts of the proposal. These can be summarised as a series of recommendations:

- Minimise the removal of vegetation
- Protect vegetation adjacent to the work adequately during construction. Measures such as tree protection fencing should be put in place to protect trees.
- Prepare a revegetation strategy for the riverbanks and forest to mitigate the impact from the proposal.
- Revegetate river banks to mitigate the 'moderate-high' impacts to the river banks
- Carefully consider erosion control measures required to stabilise the riverbanks to ensure that they are sympathetic with the surrounding natural context.
- Minimise levels and fill batters to bridge approaches where possible
- Retain the extensive views over the flat landscape and ensure the road is not a dominant element in the landscape setting. Review the levels set for the new approach roads and minimise grading where possible.
- Capitalise on the opportunity for interpretation of the original bridge structure and the history associated with it.
- In line with the Statement of Heritage Impact prepared for this project, provide access to the site of the old bridge. The bridge abutment on the southern side of the existing bridge and adjacent clearing can be retained. This can be designed to provide road users the chance to stop, enjoy the riverside location, read some interpretive signage and learn about the history of timber truss bridges in the local area and throughout New South Wales.
- Explore options for the re-use of timber or steel elements from the bridge, either on site, in interpretation, or off site in local towns such as Moulamein.
- Maintain informal access to the river and riverbank

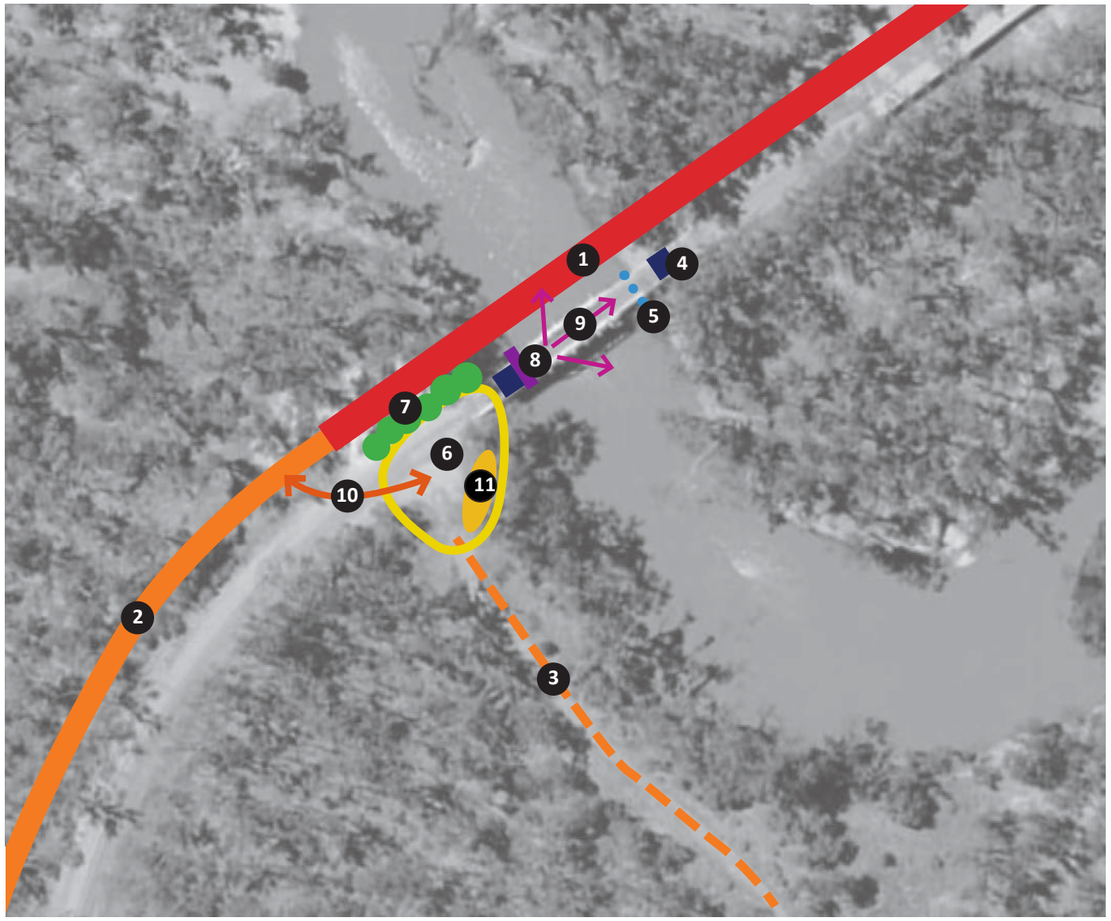
6.2 REVEGETATION

Revegetation is an important part of the mitigation of visual and landscape character impacts on this site. As the project bisects the Murray Valley National Park, revegetation should be undertaken to mitgate some of the impacts.

As such, further guidelines are provided below to guide the development of a comprehensive revegetation strategy:

- Revegetation should be undertaken to riverbanks, existing road corridor and location of existing road that will be removed as part of the work.
- Revegetation should be undertaken in collaboration with local stakeholders including Landcare groups, Aboriginal Land Council, National Parks and Wildlife Service and the Murray River Council.
- Reference should be made to the Roads and Maritime ***Guideline for Biodiversity Offsets*** (2011) which outlines the requirements for offsets to zones affected by loss of habitat and ecological communities.
- Species selected for re-vegetation should be part of the River Red Gum Forest and Wetlands communities which are currently present. They include
    - River Red Gum and Black Box
    - a mix of sedges, rushes and reeds including *Eleocharis, Juncus, Cyperus and Cynodon dactylon and Phragmites australis*
    - River Cooba *(Acacia stenophylla)*
- where possible use seeds or plants sourced locally

Figures 28 and 29 Revegetation activities



LEGEND

1. Approximate location of new bridge
2. Approximate location of new road
3. Existing track
4. Existing bridge abutment
5. Existing trestle
6. Proposed Rest Area
7. Informal planting to provide screening from road
8. Viewpoint. Interpretation panels fixed to bridge abutment
9. Views
10. Vehicular Circulation
11. Vehicle parking

Figure 28 Rest Area preliminary concept sketch design

Source: SIX Maps, 2015

6.3 VIEWING / REST AREA

The following design principles are a guide for the development of the proposed viewing / rest area to the south of the Wakool River. The *Gee Gee Timber Truss Bridge Cunninyeuk Statement of Heritage Impact* (GAO, 2015) also provides complementary recommendations for the area.

Viewing / Rest Area Design Principles

- Consider retaining the bridge abutment as a viewing point and opportunity to display interpretation
- Provide access to the site of the old bridge
- Provide opportunity to stop and view the site of the old bridge.
- Provide provision for vehicle parking (cars, campervans etc).
- Provide interpretation elements in line with the Roads and Maritime *Timber Bridge*

  *Interpretation Guideline*s, to illustrate the history of the bridge and local historic issues connected with agricultural transport and travelling stock routes. The scale, materials and design of the interpretation should respond to the context.
- Re-use materials from the bridge where possible, for items such as seating, signage, shelters, balustrades, paths and wheelstops.
- Ensure vehicle turning movements permit access to and from Noorong Road safely
- Provide safe and clear pedestrian routes

7. REFERENCES

3D projects, 2014, ***Timber Truss Bridges Draft Heritage Interpretation Strategy***

CSIRO, 2004, Taxon Attribute Profiles Eucalyptus camaldulensis, <http://www.cpbr.gov.au/cpbr/WfHC/Eucalyptus-camaldulensis/>, accessed 11 August 2015

Google Maps, 2015, <https://www.google.com.au/maps>, accessed 9 August 2015

NSW Government Architect's Office, 2015, Gee Gee Timber Truss Bridge Cunninyeuk Statement of Heritage Impact

NSW Office of Land and Property Information, 2015, SIX Maps, <www.six.nsw.gov.au>, accessed 10 August 2015

NSW Department of Transport Roads and Maritime Services, 2013, ***Environmental Impact Assessment Practice Note Guideline for Landscape Character and Visual Impact Assessment***,

NSW Department of Transport Roads and Maritime Services, 2011, ***EPBC Act Strategic Assessment - Strategic Assessment Report Appendix C Guideline for Biodiversity Offsets (under review)***

NSW Department of Transport Roads and Maritime Services, 2015, ***MPRC presentation document Gee Gee Bridge Replacement***

Offenburg A.C., 1972, ***Urana 1:500 000 Geological Map***, 1st edition, Geological Survey of New South Wales, Sydney

Public Works
Government Architect's Office

www.govarch.commerce.nsw.gov.au

Appendix D

Heritage Significance of Pre-1950 and LEP Listed Bridges, Worley Parsons report for Roads and Maritime Services, April 2010

WorleyParsons
resources & energy

Sue Rosen & Associates
HAAH
Heritage Assessment And History

STUDY OF HERITAGE SIGNIFICANCE OF A GROUP OF PRE-1950 AND LEP LISTED RTA CONTROLLED BRIDGES IN NSW

Roads and Traffic Authority of NSW

RTA

Captain Cook Bridge [RTA Bridge No 118] 1965

PROJECT NUMBER: 301015-00310

DOCUMENT NUMBER: 00310/001

REV	DESCRIPTION	PREPARED BY	REVIEWED BY	APPROVED BY	DATE
0	Final report	Sid French Emma Dortins Rosemary Kerr Julia Kensy	Sue Rosen		27/4/2010

WorleyParsons
ABN 98 001 279 813
Level 11, 141 Walker St North Sydney NSW 2060
PO Box 1812 North Sydney NSW 2059
Telephone: 02 8923 6800
Facsimile: 02 8923 6801

Heritage Assessment And History
ABN 42 053 393 598
14 Crown Street Epping NSW 2121
Telephone: 02 9876 1655
Facsimile: 02 9869 3818

Heritage Significance of Pre-1950 and LEP Listed Bridges

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EXECUTIVE SUMMARY

This heritage report on a group of 34 bridges comprising a varied set built prior to 1950 plus some bridges identified elsewhere in LEPs, has been prepared by WorleyParsons (WP) in association with Heritage Assessment And History (HAAH) and fulfils a brief commissioned by the RTA's Environment Branch. The brief is the last of a series of investigations to cover the full set of pre-1950 bridges under RTA control which is being undertaken by the Branch as part of the RTA's obligations to assess and manage its inventory of heritage assets.

The study group comprises a set of 34 bridges under RTA control that may be summarised as:

- reinforced concrete built prior to 1950– 13
- steel main spans built prior to 1950 – 15
- timber built prior to 1950 – 2
- prestressed concrete – 2
- Brick arch – 1
- Stone arch – 1

The objectives incorporated in the brief are summarised as follows:

1. Assessment of each individual bridge against each of the significance criteria as defined by the NSW Heritage Office, including a rating of each bridge as being either of State Significance, Local Significance or No Significance.
2. Preparation of a statement of heritage significance for each bridge.
3. Provide summary information on the significant features leading to the assessments
4. Provide a report compiling this information along with photographs and electronic data suitable for entry of information on each bridge into the RTA's Heritage and Conservation Register.

A list of bridges grouped according to their rating as being of State, Local or No Significance, is provided below. In brief, 5 bridges were ranked as having State Significance. Another 17 individual bridges were ranked as having Local Significance. The remaining 12 bridges were ranked as having No Significance.

TABLE E1 TABLE OF BRIDGES, COLLECTED BY SIGNIFICANCE

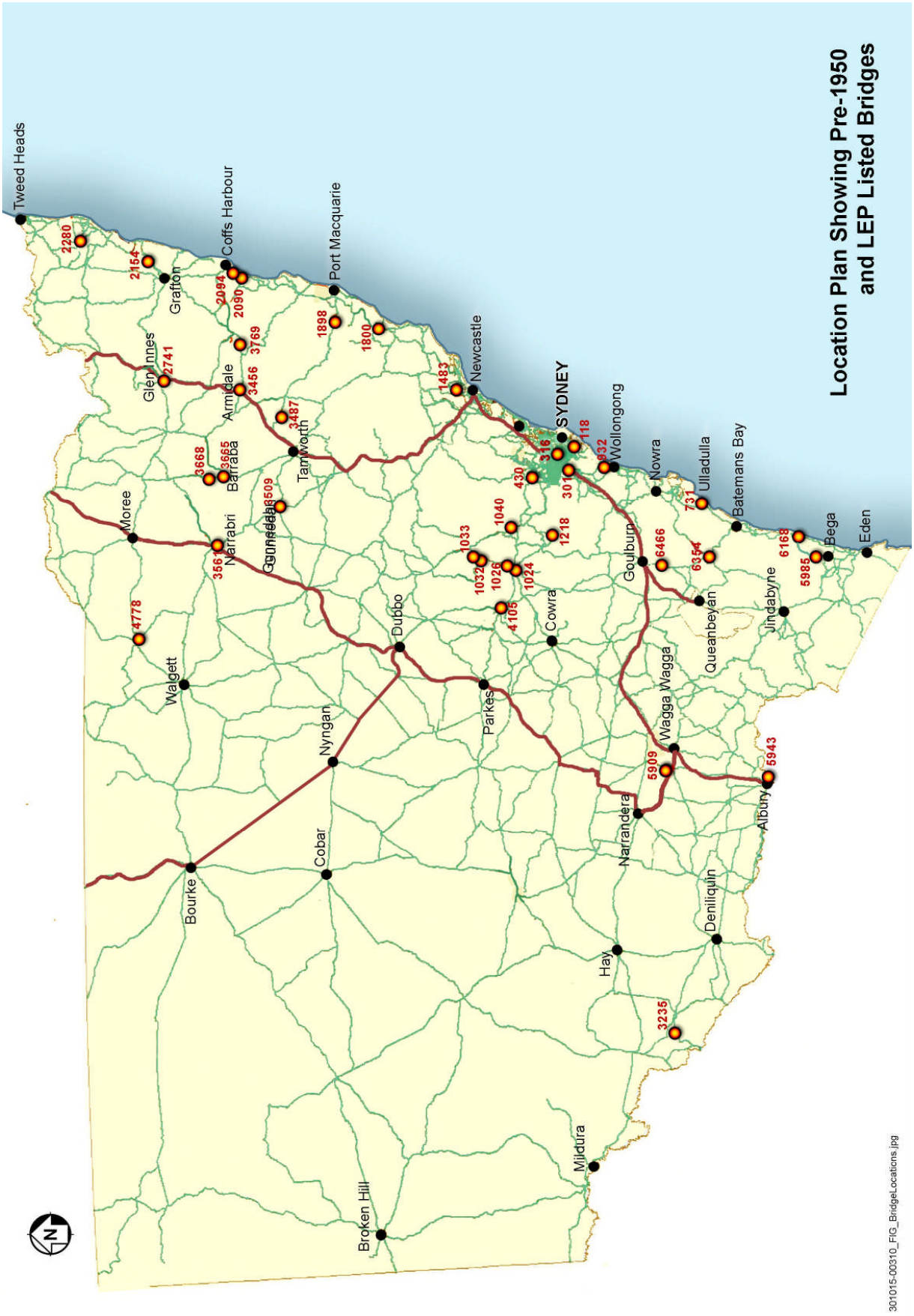
RTA No	SHI No	Description	Year Built
		State Significance	
316	4305081	Duck Creek Bridge	1838
1218	4305054	Arch Bridge Jenolan Caves	1896
3665	4305062	Manilla River Bridge	1937
1483	4305071	Fitzgerald Bridge	1965
118	4305084	Captain Cook Bridge	1965

RTA No	SHI No	Description	Year Built
		Local Significance	
6168	4305075	Wallaga Lake Bridge	1894
3456	4305066	Railway Bridge Armidale	1918
2090	4305061	Bellingen River Bridge	1934
1898	4305063	Thone River Bridge	1935
2154	4305069	Mororo Bridge	1935
4778	4305072	Grawin Creek Bridge	1935
5985	4305077	Brogo River Bridge	1936
3561	4305073	Narrabri Creek Bridge	1937
1800	4305070	Martin Bridge	1940
5909	4305079	Murrumbidgee River Bridge	1940
3769	4305068	Sandy Creek Bridge	1940
3509	4305067	Railway Bridge Gunnedah	1941
5943	4305078	Murray River Island Bridge	1941
1026	4305051	Winburndale Rivulet Bridge	1948
1032	4305052	Four Mile Creek Bridge	1948
1033	4305053	Flaggy Creek Bridge	1948
6466	4305056	Inveralochy Bridge	1949
		No Significance	
301	4305082	Water Supply Channel	1930
1024	4305055	Boundary Bridge	1930
6354	4305057	Monkittee Pond Road	1931
3235	4305080	Gee Gee Bridge (North Approach)	1934
3487	4305065	Woolbrook Bridge	1937
932	4305074	Bellambi Creek Bridge	1940
430	4305083	Red Bank Creek Bridge	1945
2280	4305058	Lagoon Creek Bridge	1948
2741	4305064	Farracabaad Creek Bridge	1948
3668	4305059	Cobbadah Creek Bridge	1948
2094	4305060	Pine Creek Bridge	1949
731	4305076	Millards Creek Bridge	1949

1. INTRODUCTION

1.1. General

WorleyParsons, in association with Heritage Assessment And History, was awarded a brief in late 2007 to study and report on the historical significance of a group of 34 RTA-controlled bridges, being those bridges built prior to 1950 but not covered in previous studies, plus some bridges named in Local Environment Plans as of potential significance. The locations of the bridges are shown on the map overleaf. The current brief is the final study in a series which have covered all pre-1950 RTA bridge structures in NSW.


Location Plan Showing Pre-1950 and LEP Listed Bridges
Tweed Heads
Coffs Harbour
Port Macquarie
Newcastle
SYDNEY
Wollongong
Nowra
Ulladulla
Batemans Bay
Bega
Eden
Grafton
Glen Innes
Armidale
Tamworth
Barraba
Moree
Narrabri
Gunnedah
Dubbo
Cowra
Goulburn
Queanbeyan
Jindabyne
Walgett
Nyngan
Parkes
Wagga Wagga
Albury
Narrandera
Deniliquin
Hay
Cobar
Bourke
Mildura
Broken Hill
2280
2154
2094
2090
1898
1800
3769
2741
3456
1483
3487
3668
3665
3509
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301
731
1040
1218
1033
1032
1026
1024
4105
6466
6354
6168
5985
4778
3561
5909
6943
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1.2. Scope of the Brief

The objective of the heritage assessment program currently being carried out by the RTA's Environment Branch is to provide decision-makers within the RTA with the necessary heritage and technical information on its bridge inventory to facilitate the appropriate management of these assets into the future.

To execute this task, the bridges which potentially have heritage value were generally divided into groups based on type and materials of construction. This current study group addresses bridges which were omitted from these previous studies for various reasons, plus bridges built between 1948 and 1950, plus some bridges noted in Local Environment Plans. The set thus does not have a uniform style, but within the group are subsets which have much in common. The reporting attempts to utilise these groupings to make maximum value of this for placing the structures in context.

The tasks incorporated in the execution of the brief are summarised as follows:

1. Assess each of the bridges in accordance with heritage assessment criteria established by the NSW Heritage Office. In particular, provide a ranking of State, Local or No Significance, using all seven significance criteria viz:

a) Historical Significance

b) Historical Association Significance

c) Aesthetic Significance

d) Social Significance

e) Technical/Research Significance

f) Rarity

g) Representativeness

2. Prepare a statement of heritage significance for each bridge, noting particular features contributing to this.

3. Provide a ranking of the bridges in order of heritage significance.

5. Provide data in a form suitable for the entry of bridges into the RTA's Heritage and Conservation Register (S.170 Register).

The results of the study were to be prepared in the form of a report which incorporated the assessments, the heritage register inputs and a photographic record in black and white. Where information gathered during the course of the study differed from information held in the BIS (Bridge Inventory System), this was to be supplied for entry into the database.

1.3. Methodology

The following methodological sequence was followed:

The heritage assessment was initiated by accessing extant RTA construction and general files for each bridge, and surveying heritage listings for the bridges on Local, State and Federal heritage registers as well as those of the National Trust and the Institution of Engineers. Secondly, local histories for the relevant regions and general historical works on roads and bridges were accessed. Drawing on the resources of the Royal Australian Historical Society, letters were sent to historical

societies in the locality of all bridges. The Local Studies or Reference Libraries for each area were also consulted. These enquiries elicited a range of information, from extracts from local historical works through newspaper clippings to direct recollections by people with knowledge of the bridges in question.

These sources were analysed and historic context reports sufficient to address the heritage significance criteria for each bridge were prepared. Equipped with these reports the field work was undertaken as a joint engineering-history-heritage assessment exercise. Gaps in knowledge were identified at this preliminary assessment stage and additional historical research was undertaken prior to the final joint assessment process undertaken in Sydney.

After the assessment of significance using the criteria of the NSW Heritage Office and a comparison of the heritage values of each bridge they were ranked according to their overall significance.

1.3.1. Assessment Criteria

Under the criteria of the NSW Heritage Council:

To be assessed for listing on the State Heritage Register an item will, in the opinion of the Heritage Council, meet more than one of the following criteria:

a) *an item is important in the course, or pattern, of NSW's cultural or natural history;*
b) *an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;*
c) *an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;*
d) *an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;*
e) *an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history;*
f) *an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history;*
g) *an item is important in demonstrating the principal characteristics of a class of NSW's*
   - cultural or natural places; or
   - cultural or natural environments.

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register. An item needs to be considered significant under more than one criterion for it to be significant, but an item's degree of significance is not related to the number of criteria under which it is considered to be significant.

The bridges have also been assessed in regard to their Local Significance. The criteria for Local Significance are essentially the same as those for State Significance except that issues of rarity etc are considered in the context of the local region rather than the state as a whole. While *local region* is not defined, it refers to the general locality and may imply a loose definition of the Local Government Area and at times a geographical area within say, "10 or 20 kms", the range reflecting the density of development and some subjective sense of what people living in the area would consider as "local".

1.4. Structure of the Report

The complete response to the brief consists of the following components:

- The written report. This document describes the work done, the methodology used, and provides a general historical context report. The report summarises the findings in the form of a tabulation of the bridges, listed according to their heritage assessments and grouped into categories of State, Local and No Significance. Also delivered is a composite tabulation of all the concrete road bridges assessed by WP and HAAH over the last four years. At the end of the report is the complete set of Heritage Inventory Forms for the subject bridges.
- An album containing the photographic documentation of the bridges using archival quality black and white prints is presented as an appendix. Negatives and proof sheets are also included in the album.
- The database of the Heritage Inventory is supplied electronically for loading onto the RTA's Heritage and Conservation Register
- Electronic versions of the report, the inventory and full size files of all digital colour photographs are supplied on CD.

1.5. Study Team

The study has been carried out as a collaborative project between WorleyParsons Ltd (WP) and Heritage Assessment And History (HAAH). The project manager was Dr Sid French of WorleyParsons (WP) and he also performed the role of engineering assessor, inspecting all bridges, taking colour and black and white photographs and preparing the technical descriptions. Historical research and analysis was supervised by Dr Sue Rosen, and undertaken by Emma Dortins, Julia Kensy and Rosemary Kerr, all of HAAH. Each attended the bridge sites for which they had prepared histories and, in consultation with Sid French, were primarily responsible for the heritage assessment component. Final ranking of the bridges was again a collaborative effort with the aim of drawing on the skills of the entire study team.

1.6. Acknowledgements

The considerable assistance provided by Rachel McMullen in the execution of the brief is acknowledged. She assisted in locating files and also coordinated the search for additional information sources which assisted in the assessment of several of the individual bridges. Staff at the RTA Archives facilitated access to the RTA bridge files.

It is also necessary to thank the Royal Australian Historical Society who undertook-mail out on our behalf and the numerous historical societies and local and regional libraries who responded to us with valuable local information on the bridges in their areas. As the bridges ranged from major to modest, their task in locating information of use was made the more difficult.

2. HISTORY OF BRIDGES AND BRIDGE TYPES IN NSW

Given the nature of this study, which collected concrete beam bridges built mainly in the 1930s and 40s, but added some of various types missed from other studies and also added some later bridges referenced in LEPs, there is no historical narrative pertaining to these bridges as a group. Rather, the reader is referred to the previous studies completed for the RTA which give an historical background to the various bridge styles and forms. In particular, the several forms contained in this study are largely summarised in the report "Study of the Heritage Significance of a Group of RTA Controlled Bridges and Ferries in NSW" by HAAH and BRW in October 2004. Also, the history of reinforced concrete bridges is best taken from the most recent report focussing on those bridges: "Heritage Significance of NSW Pre-1948 Concrete Beam Bridges (Northern, Hunter and Western Regions), by BRW and HAAH, July 2006 and as amended in March 2010. The history of the latter period of the current study, from 1948 to 1965, is typically not represented in those reports, but is well recorded in RTA (and DMR) publications of the era, such as "The Roadmakers", published by the DMR in 1976.

3. BRIDGES IN CURRENT STUDY

3.1. Bridge Classification System

The RTA Bridge Information System (BIS) classification for each item is adopted, and thus each bridge is classified according to the material and design of its main spans. Some items incorporate a variety of materials in their construction. For example, Mororo Bridge has a plate web girder as its lift span, but through truss spans either side of that, and with steel beam approach spans. It is classified as STRUS because the trusses are of longer span than the girder lift span. Timber beam bridges which have had some timber beams replaced with steel, such as Gee Gee Bridge (North approach), are still regarded as TMISC.

Table of Abbreviations used in BIS to denote Bridge Types

Code	Description
CBEAM	Reinforced Concrete Beam
CCULP	Precast Concrete Culvert
CULV	Reinforced Concrete Culvert
CSLAB	Reinforced Concrete Slab
FERRY	Cable Ferry
MARCH	Masonry Arch
PARCH	Prestressed Concrete Arch

PCABL	Prestressed Cable
PPLNK	Prestressed Concrete Plank
SBEAM	Steel Beam
SGIRD	Steel Girder
STRUS	Steel Truss
TMISC	Timber Miscellaneous

3.2. Timber Bridges

Bridge No.	Description	Year Built	Item Type
6168	Wallaga Lake Bridge	1894	Timber beam bridge
3235	Gee Gee Bridge (North Approach)	1934	Timber beam with non-composite concrete deck

An overview of timber bridges in NSW and their significance has been provided by two studies undertaken for the RTA in 1998 and 2000.[1]

In the current study, the Wallaga Lake Bridge, built in 1894, is interesting in that it is an example of the timber bridge form prior to updates to headstock detailing implemented in the Public Works Department in 1895. Inevitably it has been extensively modified during its life, with numerous new piles driven at some piers to replace deteriorated timber. However, it remains an iconic structure in the landscape and continues to service traffic on this coastal route.

The Gee Gee Bridge (Northern Approach) is another timber bridge which has undergone significant repairs and modifications, including a concrete deck. This has given it a renewed life, improving the traffic performance and providing some protection to the timber structure beneath.

[1] Cardno MBK, *Study of Relative Significance of RTA Controlled Timber Beam Road Bridges in NSW*, 2000; McMillan Britton and Kell Pty Ltd, *Study of Relative Heritage Significance of all Timber Truss Road Bridges in NSW*, 1998.

Wallaga Lake Bridge with up to 14 piles in some piers, representing 116 years of maintenance

Gee Gee North Approach Bridge with concrete deck over timber, on heavily upgraded timber piers.

3.3. Masonry Arch Bridges

Bridge No.	Description	Year Built	Item Type
316	Duck Creek Bridge	1838	Masonry (Brick) Arch
1218	Arch Bridge, Jenolan Caves	1896	Masonry Arch

There are two masonry arches identified in the study group. The first bridge, Duck Creek Bridge [RTA Bridge No. 316] is on what has, since the earliest days of the colony, been Sydney's busiest road, Parramatta Road. Originally designed by Lennox to be of stone, this bridge was (at least above springing level) ultimately constructed in 1838 from local bricks and is possibly the oldest surviving brick arch bridge in Australia. It was completed less than 6 years after Lennox arrived in Australia, and followed stone arched bridges at Lapstone Hill and Landsdowne. The second structure, Arch Bridge [RTA Bridge No. 1218], was constructed of limestone in 1896 and provides access to the entrance to Jenolan Caves. Its design was by well known bridge designer Ernest de Burgh of the New South Wales Department of Public Works. By that era, masonry arches were considered expensive, and this bridge would have been detailed in stone primarily to blend into the tourist environment of the Grand Arch.

Arch Bridge at Jenolan Caves, 1896

Early photograph of Duck Creek Bridge, 1838

3.4. Metal Bridges

Bridge No.	Description	Year Built	Item Type
3456	Railway Line Bridge, Armidale	1918	Steel beam
1024	Boundary Bridge	1930	Steel beam
6354	Monkittee Pond Bridge	1931	Steel beam
2090	Bellingen River Bridge	1934	Steel truss
1898	Thone River Bridge	1935	Steel truss
2154	Mororo Bridge	1935	Steel trusses; steel girder lift span
4778	Grawin Bridge	1935	Steel truss
5985	Brogo River Bridge	1936	Steel girder
3665	Manilla River Bridge	1937	Steel truss
1800	Martin Bridge	1940	Steel trusses; steel girder lift span
932	Bellambi Creek Bridge	1940	Steel beam
5909	Mundowy Bridge	1940	Steel truss
5943	Murray River Island Bridge	1941	Steel beam
430	Red Bank Creek Bridge	1945	Steel beam
3509	Railway Bridge, Gunnedah	1955	Steel beam

The term metal is used to encompass bridges of both iron and steel construction. An overview history of metal bridges in NSW is supplied by the *Study of Heritage Significance of Pre-1930 RTA Controlled*

Metal Road Bridges in NSW, undertaken for the RTA in 2001.[2] In the current study group there are no wrought iron structures, but the steel bridges include superstructures of simple beams, welded girders and through trusses. The 8 steel beam bridges typically have relatively short spans which suit the strength properties of the rolled steel members. Two of these bridges are over railway lines, with one (at Armidale) having unusual deck detailing wherein the concrete deck is supported on brick arches which sit on the bottom flanges of the steel beams. The steel girder bridge at Brogo River has longer spans which are facilitated by the deeper beams which can be made by fabricating beams from stiffened steel plate. The remaining 6 bridges have through trusses as their longest spans, with either steel beam or reinforced concrete beam approach spans. Two bridges in the group are former lift span bridges, where the lift span was of steel girder design.

The detailing of the various bridges tell of the evolution of truss design over the period, moving from riveted construction to shop welded components which are bolted on site. The Manilla River Bridge was the first (and only) truss bridge to use in-situ welding.

Red Bank Creek Bridge with steel beams visible. Cable stayed footbridge is to left

Railway Bridge at Armidale with brick arched deck support on steel beams (near bricks are soot stained from steam engines)

[2] Cardno MBK, *Study of Heritage Significance of Pre-1930 RTA Controlled Metal Road Bridges in NSW*, February 2001.

Steel girders of Brogo River Bridge.

Through trusses and plate web girder of former lift span, Martin Bridge, Taree

3.5. Reinforced Concrete Bridges

Bridge No.	Description	Year Built	Item Type
301	Water Supply Channel Bridge	1930	Reinforced Concrete Beam Bridge
3487	Wookbrook Bridge	1937	Reinforced Concrete Slab Bridge
3561	Narrabri Creek Bridge	1937	Reinforced Concrete Beam and Prestressed concrete Plank Bridge
3769	Sandy Creek Bridge	1940	Reinforced Concrete Beam Bridge
1026	Winburndale Rivulet Bridge	1948	Reinforced Concrete Beam Bridge
1032	Four Mile Creek Bridge	1948	Reinforced Concrete Beam Bridge
1033	Flaggy Creek Bridge	1948	Reinforced Concrete Beam Bridge
2280	Lagoon Creek Bridge	1948	Reinforced Concrete Beam Bridge
3668	Cobbadah Creek Bridge	1948	Reinforced Concrete Beam Bridge
2741	Furracabad Creek Bridge	1948	Reinforced Concrete Slab Bridge
6466	Inveralochy Bridge	1949	Reinforced Concrete Beam Bridge
731	Millards Creek Bridge	1949	Reinforced Concrete Beam Bridge

Bridge No.	Description	Year Built	Item Type
2094	Pine Creek Bridge	1949	Reinforced Concrete Beam / Steel Beam Bridge
1483	Fitzgerald Bridge	1965	Prestressed Concrete Bridge
118	Captain Cook Bridge	1965	Prestressed Concrete Box Girder

An overview of reinforced concrete bridges is provided in "Heritage Significance of NSW Pre-1948 Concrete Beam Bridges (Northern, Hunter and Western Regions), BRW and HAAH July 2006.

The predominant form of this group is the reinforced concrete beam bridge, of which there are 12. They are the most common and perhaps the most durable of the bridge types constructed during their era, with the majority still extant, albeit with widenings or upgraded handrail systems in most cases. Replacement of these bridges has typically been only as a result of need to realign the roadway, or to widen the crossing in a manner incompatible with the existing structure. There are two slab bridge decks in the group, arguably a subset of the previous set of bridges, suited to small and/or repetitious spans.

The outlier pair in the study group are two prestressed concrete bridges coming from the 1960s. Fitzgerald Bridge and Captain Cook Bridge are representative of the emergence of this form of concrete as suited to the most major structures due to its ability to utilize concrete efficiently, allowing it to cover large spans and to deliver superior aesthetic outcomes.

Furracabad Bridge showing flat slab reinforced concrete superstructure

Winburndale Rivulet Bridge displaying aesthetics of curved camber and strong skew

Captain Cook Bridge with elegant eliptically curved box girder soffits and slender piers

Fitzgerald Bridge with its unusual splayed piers and prestresssed concrete beam deck

4. GENERAL DISCUSSION OF THE BRIDGES IN THE STUDY

As evidenced by the above summary tables, the 34 items in the study group comprise representatives of the four main materials used in New South Wales bridges, namely timber, masonry, steel and concrete. Of these, timber bridges are becoming the most scarce due to the difficulties of ongoing maintenance and the limited load capacities for which they were originally designed. Despite this, the bridges in the study continue to serve the traffic using their roads, and particularly in the case of Wallaga Lake Bridge, contribute to the local identity of the area. The masonry arch bridge is a particularly durable form of bridge, with load capacity typically not a governing issue for the life or utility of the structure.

The steel beam, girder and truss bridges in this study cover most of the styles commonly used in New South Wales, ranging from Lagoon Creek Bridge, a simple beam bridge, through to Martin Bridge over the Manning River at Taree, a major crossing with former opening capability. In the middle of this range is Brogo River Bridge with substantial spans of steel girder and composite deck construction.

As expected, the most numerous bridge style in the study was the concrete bridge. These range from simple slab bridges through numerous beam bridges to two prestressed concrete bridges, each of which is very significant.

In accessing data on the bridges, the large range in age, size, complexity and prominence of the items resulted in some items being covered by several RTA Bridge Files, referred to in a wide range of local histories, documented in technical papers and being well known by the local and wider community, while others had no associated RTA files extant and were virtually unknown to secondary sources and the community alike. Thus, for several items the information came in a veritable deluge, while we scratched for a historical and social context for others.

A number of the items that form the study group were nominated for further assessment by the suite of regional and sub-regional Phase 1 studies of potential heritage items carried out for the RTA in 2001-2004. The studies were primarily desktop studies and the items were identified as items of potential significance using a range of rationales. Some were identified because of their listing on a local government Local Environment Plan, others through community consultation, through the research and writing of the thematic history which informed each study, or simply identified from RTA asset lists because the item was 50 years or older and therefore classed as a “relic” under the NSW Heritage Act (amended 1999). Several of the studies did not clearly state their rationale for nomination of items.

5. HERITAGE ASSESSMENT AND STATEMENT OF SIGNIFICANCE

5.1. Introduction

Heritage significance is the term used to describe the special values of places, objects and structures identified as demonstrating important aspects of our cultural and natural heritage. Under the auspices of the NSW Heritage Act a formalised assessment process for determining significance has been devised by the NSW Heritage Office, endorsed by the NSW Heritage Council and outlined in the *NSW Heritage Manual.* Under this methodology an item can be assessed as being of State or Local significance. That is, an item may be important to the entire state of NSW or, important only to a smaller group, community, or a local place. If an item or place is of local significance the government body responsible for implementing the statutory regulations for protection of its heritage values is the Local Government Authority, at the State level the NSW Heritage Office is the responsible power. Fundamental to the assessment process is the application of the evaluation criteria to places, objects and structures of potential importance. These are:

a) an item is important in the course, or pattern, of NSW's cultural or natural history.

b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history.

c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW

d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.

e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.

f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history.

g) an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments.

If a place, item or structure meets one or more of these criteria, it is considered to be culturally significant. An item can not be excluded on the grounds that items with similar characteristics have already been identified and listed.

5.2. Listing and Statutory Requirements

In NSW there are two types of statutory listings, the heritage schedule of a Local Government Area's Local Environmental Plan (LEP) and the State Heritage Register, a register of places and items of particular importance to the people of NSW. The State Heritage Inventory is a data base of all heritage items in NSW whether of state or local significance. In addition, all government agencies have a statutory requirement to develop a Heritage and Conservation Register under Section 170 of the NSW Heritage Act to assist with the identification, maintenance, conservation and management of heritage items under their ownership or control. This may include items of state or local significance listed on a council's LEP or on the State Heritage Register. It may also include items included on non statutory lists such as the National Trust Register or the Register of the National Estate as well as items not listed on any other register.

Once included in the Section 170 register an item is subject to the provisions for care and maintenance required under the NSW Heritage Act based on its determined level of significance. Management obligations for state government agencies are outlined in Section 170(A) of the Heritage Act. The recommended heritage asset strategic planning process is outlined in the State Government's *Total Asset Manual* and includes separate guidelines on Heritage Asset Management and Sustainable Development.

5.3. The Heritage Assessment Process

The assessments presented in this report are based on the significance criteria listed above and were undertaken in conformance with the methodologies prescribed in the NSW Heritage Manual. The process involves a qualitative assessment of each bridge on an individual basis against significance criteria a - e, (historical, historical association, aesthetic/technical, social, and scientific) and an assessment of each bridge in the context of the study group and other knowledge of existing bridges for criteria f and g, (representativeness and rarity). Under NSW legislation all bridges listed as being significant because they meet the specified thresholds require the same level of protection when intervention in the site is being considered. The management of that item should be guided by the reason for its listing, for example a bridge that is significant for its aesthetic values would be managed to protect its distinctive design features and their place in the surrounding landscape i.e., the features that reflect its culturally significant values, and thus preserve its cultural significance. A bridge that is significant for its historical associations, such as the bridge over Duck Creek (RTA Bridge No.316) might be managed differently, for example particularly addressing the long-term integrity of the core brickwork of the structure, and potentially minimising the presence of utilities and the like which detract from its ability to be seen and appreciated for the historic structure it is. If any intervention in the site of a heritage listed bridge becomes necessary, an assessment of the impacts of that intervention on the significant qualities of the structure must be undertaken.

5.4. Heritage Significance of the Study Group

The study group is so diverse that it is not possible to make a coherent statement of the significance of the group as a whole. The individual assessments of the items, utilizing the State themes, against the seven criteria for significance, found a number of items to have significance under several or all of the criteria, and many to be significant under two or three criteria. Of the 34 items in the study group, five were found to be of State Significance and a further seventeen to have Local Significance. The remaining twelve were assessed as having no significance.

The range of ways in which the items were found to be significant under the seven criteria reflects the diversity of the items themselves. Below, a short explanation of each criterion is provided, drawn from the Heritage Office guideline *Assessing Heritage Significance*, 2001, and one or more examples provided of the way in which an item or items in the study group were assessed as having significance under that criterion. Again, the examples below cannot provide a guide of any kind to the study group overall, because of its diversity, but rather a taste of the richness and variety to be found within the group.

a) 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 and natural history** (local significance)

A structure, object or place is of historic significance if it shows evidence of a significant human activity, whether this be an historic event, or past customs, cultural practices, philosophies or systems of government. Items that demonstrate overlays of the continual pattern of human use and occupation or show the continuity of an historical process or activity are also of historic significance. If a structure, object or place has a sufficiently strong association with a significant human activity or historic phase, it has historic significance regardless of the intactness of the item.

The bridges in the study group have historic significance for a variety of reasons. As discussed above (Section 2.5.2), all the bridges in the study group have some role as components of public road infrastructure, whether as a bridge hard fought for by the community, or as part of a government sponsored upgrade of a Main Road or State Highway, and therefore are associated with the historic theme of Transport. In many cases it has been judged that the bridge itself does not have historic significance as it is such a small component of the larger historical process or pattern and is not, in itself, able to demonstrate the relevant historical processes. However, in the case of Duck Creek for example, the current bridge is the current manifestation of a crossing at the site which has been active since the earliest years of the colony of New South Wales. The current bridge replaced previous bridges, and has itself been widened to accommodate the changing needs of the users of Parramatta Road.

A number of bridges in the study group are significant because they contribute to an understanding of other historic themes within the State or local area, such as Defence, Agriculture, Pastoralism, Industry, and Towns and Suburbs.

The historic significance of a large number of the bridges in the study was contributed to by association with other items nearby. Many of the bridges in the study group replaced timber bridges, and remnants of those bridges, such as piles and abutments, enhance the historic significance of the current bridge and its site. The placement of each bridge in its line of road and its interaction with the waterway over which it provides a crossing and the surrounding landscape are also important for an understanding of its historic significance. Part of their significance is the dialogue with the landscape and adjacent structures. It is important in all such cases that the management of the bridge concerned should make reference to the historical significance of surrounding structures and vice versa.

A number of the items in the study group crossed major waterways on major transport routes, and have had a significant part to play in the social and economic development of important regions in the State, spreading from the Queensland border to the Victorian border. This is typified by the Martin Bridge at Taree, which despite no longer being on the Pacific Highway, nevertheless still carries high traffic levels and supports the local community.

b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (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)

A structure, object or place is significant under this criterion if it shows evidence of a significant human occupation or is associated with a significant event, or an identifiable person or group of persons, of importance in NSW's cultural or natural history.

Three of the bridges in the study had significance under this criterion. Duck Creek is associated with Lennox, the earliest skilled bridge artisan in the colony. The Arch Bridge at Jenolan Cave was designed by De Burgh and the similarity of detailing between the two bridges is striking. The two more recent prestressed concrete bridges, Captain Cook Bridge and Fitzgerald Bridge are associated with John Holland of John Holland Construction. Design notables associated with these bridges were Albert Freid and Harry Trueman respectively, whilst both structures owe much to the pioneering work of the Frenchman, Eugene Freyssinet in development of prestressing technology. Of course, the Captain Cook Bridge also ties to its namesake who landed nearby in Botany Bay in 1770.

c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in N.S.W (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)

Items which satisfy this criterion demonstrate, or are associated with, creative or technical innovation or achievement. They may be an early example of a type of structure, showing formative development, or a culmination of a particular style or type of structure, or have a particular ability to articulate aspects of the culture of an era group or locality through their form or style. Items having landmark qualities or being aesthetically distinctive have aesthetic significance.

As a class of items designed, constructed and modified with utility in mind, the technical and aesthetic significance of bridges to a large extent go hand in hand. All of the bridges in the study group exhibit a visually recognisable form due to their design and nature of their construction process. In some instances, however, the inner beams have simpler form than the outer beams, omitting the curved or tapered haunches, and reverting to a subordinate role, thus recognising the importance given by their designers to the final aesthetic form of their structures. Whilst the largest structures such as Captain Cook Bride and Fitzgerald Bridge are clearly of great aesthetic appeal, many of the smaller bridges are also aesthetically pleasing in their setting in the landscape.

The second area addressed under this criterion is technical significance. Here again the largest bridges utilised stepout technology, but more modest structures such as the truss bridge over the Manilla River also embodied a technological jump, using field welding to form the steel truss rather than the traditional system of field riveting.

A considerable number of the bridges in the study group were built to a much more standard design, but nevertheless have aesthetic and technical significance through their ability to convey the philosophies and technologies of their era through their physical form. As discussed above, these bridges were commonly designed with an eye to aesthetic considerations; many still sit well within their surroundings and enhance the natural and built environments of which they form a part.

d) 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)

An item is of significance under this criterion if it is esteemed by an identifiable community for its cultural values or contributes to that community's sense of identity or sense of place.

Many of the subject bridges were fairly modest structures on minor waterways and only seven of the study group were found to have any strong or special association with a particular community or cultural group within the limited scope of this study. The bridge over Wallaga Lake is strongly linked to the local community's sense of self, substantiated by their enthusiastic support of centenary celebrations for the bridge in 1994. Other bridges such as Narrabri Creek Bridge are inextricably linked with their communities, in that case providing the link connecting two parts of the town of Narrabri. The Murray River Island Bridge is somewhat different in that the bridge was constructed as part of wartime necessity to provide access for military purposes.

e) 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)

An item is significant under this criterion if it has the potential to yield new or further substantial scientific or archaeological information, is an important benchmark or reference site or type, or provides evidence of past human cultures that is unavailable elsewhere.

All the bridges in the study group have a limited capacity to contribute both to the understanding of the evolution of bridge design and the development of the route they are situated on, although in most cases the potential was considered too limited for the bridges to have significance under this category. One exception is the Duck Creek Bridge which has potential to yield information regarding early use of brickwork for bridge construction.

Many of the bridge sites retain evidence of either the construction of the current bridge (in the form of piles or footing timbering), or previous crossings (timber piles, abutments etc), and thus allow a careful observer the opportunity to read the history of the site. Adjacent to Manilla River Bridge, for example, is one abutment from the previous crossing. The other abutment was washed away in a flood soon after the new bridge was opened, its absence requiring remediation to prevent the new structure from also becoming vulnerable to flood flows. Interestingly, a weir immediately upstream of the bridge has been sliced open to allow fish to navigate the river, indicative of the changing community priorities in the area.

f) 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)

An item is significant under this criterion if it is the only example of its type, shows unusually accurate evidence of a significant human activity, or demonstrates designs or

techniques of exceptional interest. An item has rarity value if it demonstrates a process, custom or other human activity that is in danger of being lost.

Six of the bridgees in the study were assessed as having rarity values. These range from the geometric uniquenes of the piers of the Fitzgerald Bridge to the age-related rarity of the Walaga Lake Bridge and the technical rarity of the Manilla River Bridge with its welded truss joints.

g) **an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments** (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)

An item is significant under this criterion if it is a fine or outstanding example of its type, has the principal characteristics of an important class or group of items, or has attributes typical of a way of life, philosophy, custom, significant process or activity. An item is also significant under this criterion if it is a significant variation to a class of items or is part of a group which collectively illustrates a representative type.

Representative significance contributed to the overall significance of twelve of the bridges that we recommend for heritage listing, as they are capable of demonstrating the key structural, aesthetic and historic characteristics of their bridge form within their local area. One group, on Main Road 54 near Bathurst, including Winburndale Creek Bridge, Four Mile Creek Bridge and Flaggy Creek Bridge, add to a previously identified representative set of beam bridges on that road. Wallaga Lake Bridge, on the other hand, is representative of a vanishing form of bridge as the predations of time and increasing traffic make long term retention of such structures increasingly difficult.

5.5. Final Ranking:

The following table summarises the final ranking of the bridges in the study group, showing also their year of construction.

TABLE 5.5.1 TABLE OF BRIDGES, COLLECTED BY RANKING

RTA No	SHI No	Description	Year Built
		State Significance	
316	4305081	Duck Creek Bridge	1838
1218	4305054	Arch Bridge Jenolan Caves	1896
3665	4305062	Manilla River Bridge	1937
1483	4305071	Fitzgerald Bridge	1965
118	4305084	Captain Cook Bridge	1965
		Local Significance	
6168	4305075	Wallaga Lake Bridge	1894
3456	4305066	Railway Bridge Armidale	1918
2090	4305061	Bellingen River Bridge	1934
1898	4305063	Thone River Bridge	1935
2154	4305069	Mororo Bridge	1935
4778	4305072	Grawin Creek Bridge	1935
5985	4305077	Brogo River Bridge	1936
3561	4305073	Narrabri Creek Bridge	1937
1800	4305070	Martin Bridge	1940
5909	4305079	Murrumbidgee River Bridge	1940
3769	4305068	Sandy Creek Bridge	1940
3509	4305067	Railway Bridge Gunnedah	1941
5943	4305078	Murray River Island Bridge	1941
1026	4305051	Winburndale Rivulet Bridge	1948
1032	4305052	Four Mile Creek Bridge	1948
1033	4305053	Flaggy Creek Bridge	1948
6466	4305056	Inveralochy Bridge	1949
		No Significance	
301	4305082	Water Supply Channel	1930
1024	4305055	Boundary Bridge	1930
6354	4305057	Monkittee Pond Road	1931
3235	4305080	Gee Gee Bridge (North Approach)	1934
3487	4305065	Woolbrook Bridge	1937
932	4305074	Bellambi Creek Bridge	1940

RTA No	SHI No	Description	Year Built
430	4305083	Red Bank Creek Bridge	1945
2280	4305058	Lagoon Creek Bridge	1948
2741	4305064	Farracabaad Creek Bridge	1948
3668	4305059	Cobbadah Creek Bridge	1948
2094	4305060	Pine Creek Bridge	1949
731	4305076	Millards Creek Bridge	1949

5.6. Internal Sorting

The following tabulation has been prepared to assist the RTA in the management of those bridges we have recommended as having heritage significance. Based on the tenet that an item is best managed by considering the reason(s) for its listing and endeavouring to preserve the features of the item which embody and express that significance, we have developed a list which aims to draw out the criteria under which each bridge has been listed, and therefore which aspects of a bridge's character need to be particularly considered if intervention is contemplated. From this table it becomes apparent that some bridges are significant under a number of criteria and others only one. The table below groups the bridges within the categories of State and Local Significance in clusters denoting the number of criteria under which they are listed and then their chronological order of construction. As heritage assessment is a qualitative rather than quantitative assessment, the asterisk denotes that the item meets the threshold under the criteria. It must be noted, however, that under the NSW Heritage Act an item that has reached the significance threshold under a number of the criteria is not defined as being more significant than an item that has reached the threshold under only one criterion.

TABLE 5.6.1 TABLE OF SIGNIFICANT BRIDGES SHOWING RELEVANT CRITERIA

RTA No	SHI No	Description	Year Built	a - historical	b- Historical Assoc.	c - aesthetic	d - social	e - research	f- rarity	g - representative
		State Significance								
316	4305081	Duck Creek Bridge	1838	☻	☻	☻		☻	☻	
1218	4305054	Arch Bridge Jenolan Caves	1896	☻	☻	☻				
3665	4305062	Manilla River Bridge	1937	☻		☻			☻	☻
1483	4305071	Fitzgerald Bridge	1965			☻			☻	
118	4305084	Captain Cook Bridge	1965	☻	☻	☻			☻	☻
		Local Significance								
6168	4305075	Wallaga Lake Bridge	1894	☻		☻	☻		☻	☻
3456	4305066	Railway Bridge Armidale	1918	☻		☻				☻
2090	4305061	Bellingen River Bridge	1934	☻		☻		☻		☻
1898	4305063	Thone River Bridge	1935			☻				☻
2154	4305069	Mororo Bridge	1935	☻			☻			
4778	4305072	Grawin Creek Bridge	1935	☻			☻			☻
5985	4305077	Brogo River Bridge	1936	☻		☻				
3561	4305073	Narrabri Creek Bridge	1937	☻		☻	☻			
3769	4305068	Sandy Creek Bridge	1940			☻				☻
1800	4305070	Martin Bridge	1940	☻		☻	☻			
5909	4305079	Mundowy Bridge	1940	☻						☻
3509	4305067	Railway Bridge Gunnedah	1941	☻			☻			
5943	4305078	Murray River Island Bridge	1941	☻			☻			
1026	4305051	Winburndale Rivulet Bridge	1948	☻		☻				☻
1032	4305052	Four Mile Creek Bridge	1948	☻						☻
1033	4305053	Flaggy Creek Bridge	1948	☻						☻
6466	4305056	Inveralochy Bridge	1949	☻		☻			☻	

☻ indicates assessed as significant

6. SUMMARY OF ALL REINFORCED CONCRETE BEAM BRIDGES STUDIED IN THIS AND PREVIOUS INVESTIGATIONS

For the purposes of completeness, given that this study adds to the inventory of RTA beam bridges studied previously by WP and HAAH, data from this study (shown in table as Study 4) has been compiled with that from previous studies by the same team[3][4][5][6] and is presented below. The scope of the table is all extant reinforced concrete beam bridges on RTA roads and built prior to 1950. Additionally there are seven bridges built in the period 1950 to 1955 which were included in the studies for various reasons and are tabulated here for reference.

Following this table, Table 6.2 presents a summary of key features of all the bridges, grouped by number of spans.

[3] Study of Heritage Significance of Pre-1948 RTA Controlled Concrete Slab and Arch Bridges in NSW by BRW and HAAH, Feb 2004 (Shown in table as Study 1)

[4] Study of the Heritage Significance of a Group of RTA Controlled Bridges and Ferries in NSW, by HAAH and BRW, Oct 2004 (Shown in table as B & F)

[5] Study of Heritage Significance of Pre-1948 RTA Controlled Concrete Beam Road Bridges (Sydney, South West and Southern Regions) by BRW and HAAH, Jan 2005 (Shown in table as Study 2)

[6] Study of Heritage Significance of Pre-1948 RTA Controlled Concrete Beam Road Bridges (Northern, Hunter and Western Regions) by BRW and HAAH, July 2006, as revised 2010 (Shown in table as Study 3)

TABLE 6.1 TABLE OF CONCRETE BEAM BRIDGES, COLLECTED BY SIGNIFICANCE AND DATE

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
		State Significance							
2258	4306085	Mummulgum Creek Bridge	1915/1938	3	AC	DC	NH	State	Study 3
1782	4306067	Graham Bridge	1916	7	AS	DS	NH	State	Study 3
105	4309576	Fullers Bridge, Lane Cove River, Lane Cove West	1918	6	ACT	DC	CH	State	Study 2
415	4309589	Hawkesbury River Bridge, Windsor	1874/c1920	11	AS	DS	NH	State	Study 2
5584	4309619	Kirbys Bridge, Howlong	1926	1	AC	DC	TH	State	Study 2
1030	4306059	Crossley Bridge	1930	4	AS	DS	TH	State	Study 3
6474	4309645	Bowning Creek, Bowning	1880?/1930	2	AS	DS	NH	State	Study 2
6401	4309639	Tuena River Bridge	1930	4	AS	DS	NH	State	Study 2
4052	4306113	Belubula River Bridge	1932	1	AC	DC	TH	State	Study 3
6427	4309642	Burrangong Creek Bridge, Young	1932	3	AS	DS	CH	State	Study 2
4062	4306116	Grubbenbun Creek Bridge	1933	1	AC	DC	CH	State	Study 3
6028	4309634	Bemboka River Bridge, Morans Crossing	1937	5	AS	DC	CH	State	Study 2
102	4309575	Sheas Creek Bridge, St Peters	1937	5	ACT	DC	CH	State	Study 2
140	4309577	Lane Cove River Nthbound Bridge, Epping Road	1939	4	ACT	DC	CH	State	Study 2
1011	4306056	Rocks Creek Bridge (3)	1940	1	AS	DS	TH	State	Study 3
790	4309608	Yellow Rock Creek Bridge, Albion Park	1885?/1940	3	AS	DC	NH	State	Study 2
152	4309580	Woronora River Bridge	1941	5	AS	DC	CH	State	Study 2
148	4309503	Middle Creek No 3, Narrabeen Lakes	1943	5	AS	DS	NH	State	Study 1
3656	4306111	Manilla River Bridge	1943	6	AS	DC	CH	State	Study 3
		Local Significance							
689	4309595	Duck Creek Bridge, Brown Mountain	1927	3	ACT	DC	TH	Local	Study 2
2706	4306094	Severn River Bridge	1927	3	AS	DS	NH	Local	Study 3
4286	4306123	Camp Street Bridge	1928	9	AS	DS	NH	Local	Study 3

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
307	4309583	Haslams Creek Bridge, Lidcombe	1928	1	AC	DC	CH	Local	Study 2
711	4309517	Abernethys Creek, Bomaderry	1929	3	ACT	DC	TH	Local	Study 1
5986	4309632	Alsops Creek Bridge, Brogo	1929	4	AS	DS	NH	Local	Study 2
6070	4309635	Native Dog Creek Bridge	1929	3	AS	DC	TH	Local	Study 2
881	4309612	Stapletons Bridge, Albion Park	1929	1	ACT	DC	TH	Local	Study 2
723	4309598	Wandandian Creek Bridge	1929	6	ACT	DS	TH	Local	Study 2
2585	4306092	Federation Bridge	1930	5	ACT	DS	NH	Local	Study 3
823	4309611	Kings Falls Bridge, Appin	1930	3	AC	DC	TH	Local	Study 2
4317	4306126	Mandagery Creek Bridge	1930	6	AS	DS	NH	Local	Study 3
4061	4306115	Mandurama Creek Bridge	1932	2	AC	DC	TH	Local	Study 3
1803	4309522	Dawsons River, Cundletown	1933	6	AS	DS	NH	Local	Study 1
5541	4309618	Mirool Creek, Ardlethan	1933	3	AS	DC	CH	Local	Study 2
6677	4309648	Mummel Bridge, Mummel	1933	5	AC	DC+DS	CH	Local	Study 2
6483	4309647	Demondrille Creek Bridge, Harden	1934	3	AC	DC	CH	Local	Study 2
2183	4306081	Brunswick River Bridge	1934	7	AC	DC	TH	Local	Study 3
2945	4306100	Halls Creek Bridge (1)	1934	4	AS	DS	TH	Local	Study 3
329	4309584	South Creek Eastbound, St Marys	1934	5	AS	DS	CH	Local	Study 2
1654	4306066	Bellbird Creek Bridge	1935	1	AC	DC	NH	Local	Study 3
704	4309596	Broughton Creek Bridge, Broughton	1935	2	AC	DS	CH	Local	Study 2
1027	4306057	Clear Creek Bridge	1935	3	AC	DC	TH	Local	Study 3
3637	4306110	Collaroy Bridge	1935	5	AS	DS	NH	Local	Study 3
374	4309587	Devlins Creek Bridge, Beecroft Road, Epping	1935	1	AC	DC	TH	Local	Study 2
5981	4309630	Dignams Creek Bridge, Cobargo	1935	5	AS	DS	CH	Local	Study 2
5975	4309628	Victoria Creek Bridge	1935	1	AC	DC	TH	Local	Study 2
6012	4309633	Wonboyn River Bridge	1935	3	AC	DC	TH	Local	Study 2
1028	4306058	Cheshire Creek Bridge	1936	3	AS	DS	NH	Local	Study 3
738	4309604	Cockwhy Creek Bridge	1936	3	AS	DS	CH	Local	Study 2
2542	4310591	Oyster Channel	1936	9	AC	DC+DS	NH	Local	RTA

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
6201	4309636	Diggers Creek, Jindabyne	1937	1	AC	DC	CH	Local	Study 2
2095	4306073	Reedys Creek Bridge	1937	1	AC	DC	TH	Local	Study 3
3561	4305073	Narrabri Creek Bridge	1937	15	AS	DS	NH	Local	Study 4
740	4309518	Higgins Creek, Nowra	1938	6	ACT	DC	CH	Local	Study 1
185	4309581	Iron Cove Creek, Ramsey Rd, Five Dock	1938	1	AS	DS	NH	Local	Study 2
1815	4306068	Stoney Creek Bridge	1938	1	AC	DC	CH	Local	Study 3
1373	4306064	Throsby Creek Storm Water Channel	1938	2	AS	DS	NH	Local	Study 3
3087	4306104	Yarrawa Bridge	1938	5	ACT	DS	NH	Local	Study 3
388	4309508	Cattai Creek, Castle Hill	1939	1	AC	DC	TH	Local	Study 1
3412	4306106	Swamp Creek Bridge	1939	3	AC	DC	TH	Local	Study 3
480	4309592	Terrys Creek Bridge, Epping Rd, Epping	1939	1	AC	DC	CH	Local	Study 2
2759	4306096	Warialda Creek Bridge	1939	6	AS	DC	CH	Local	Study 3
187	4309582	Bardwell Creek Bridge, Bexley North	1940	3	AC	DC	CH	Local	Study 2
6244	4309637	Boxers Creek Bridge, Goulburn	1940	3	AC	DC	TH	Local	Study 2
5978	4309629	Couria Creek Bridge	1940	3	AC	DC	CH	Local	Study 2
1820	4306069	Herons Creek Bridge	1940	2	AC	DC	CH	Local	Study 3
6400	4309560	Limestone Creek, Tuena	1940	1	AS	DS	NH	Local	Study 1
4119	4306119	Molong Creek Bridge	1940	3	AC	DC	CH	None	Study 3
1031	4306060	Two Mile Creek Bridge	1940	2	AC	DC	TH	Local	Study 3
5816	4309624	Vokins Creek, Tumbarumba	1940	2	AS	DS	NH	Local	Study 2
5522	4309548	Yanco Creek, Narrandera	1940	7	AS	DS	NH	Local	Study 1
3769	4305073	Sandy Creek Bridge	1940	1	AC	DC	TH	Local	Study 4
6480	4309646	Balgalal Creek, Binalong	1941	1	AC	DC	CH	Local	Study 2
5686	4309621	Bells Bridge over Munderoo Creek, Tumbarumba	1941	2	AS	DS	NH	Local	Study 2
6440	4309644	Cootamundry Creek, Cootamundra	1941	1	AC	DC	TH	Local	Study 2
730	4309600	Croobyar Creek Bridge	1941	3	AS	DC	CH	Local	Study 2
500	4309593	Harris Creek Bridge, Hammondville	1941	2	AS	DS	NH	Local	Study 2
6399	4309638	Kangaloolah Creek Bridge, Binda	1941	3	AC	DS	TH	Local	Study 2

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
5812	4309623	Mannus Creek Bridge, Tumbarumba	1941	3	AC	DC	TH	Local	Study 2
5684	4309620	Munderoo Creek, Jingellic	1941	3	AS	DS	NH	Local	Study 2
5514	4309617	Poisoned Walerhole Creek, Narranderra	1941	5	AS	DS	NH	Local	Study 2
5508	4309616	Bullenbong Creek Bridge, Wagga Wagga	1942	3	AS	DS	NH	Local	Study 2
4571	4306128	Mandagery Creek Bridge	1942	3	AS	DS	NH	Local	Study 3
146	4309578	Middle Creek Bridge No. 1, Oxford Falls	1942	1	AC	DC	CH	Local	Study 2
147	4309579	Middle Creek Bridge No. 2, Narrabeen	1942	4	ACT	DC+DS	NH	Local	Study 2
3427	4306107	Burkes Bridge Loders Gully Creek	1943	1	AC	DC	TH	Local	Study 3
3408	4306105	Quirindi Creek Bridge	1943	3	AC	DC	TH	Local	Study 3
2277	4306091	Springvale Bridge	1943	3	AS	DC	CH	Local	Study 3
2946	4306101	Dinoga Bridge	1944	2	AC	DC	CH	Local	Study 3
2757	4306095	RTA Bridge No.2757 (Unnamed creek)	1944	1	AC	DC	TH	Local	Study 3
1072	4306062	Wyaldra Creek Bridge	1944	3	AS	DC	CH	Local	Study 3
408	4309588	Cattai Creek Bridge, Cattai	1946	3	AS	DC	CH	Local	Study 2
1066	4306061	Macdonalds Creek Bridge	1946	4	AC	DC	CH	Local	Study 3
1372	4305020	Styx Creek, Tighes Hill	1946	3	AC	DC	CS+NH	Local	B&F
431	4309591	Little Wheeney Creek, Kurrajong	1947	2	AC	DS	CH	Local	Study 2
6421	4309641	Murringo Creek, Young	1947	3	AC	DS	TH	Local	Study 2
1026	4305051	Winburndale Rivulet Bridge	1948	3	AS	DC	CH	Local	Study 4
1032	4305052	Four Mile Creek Bridge	1948	2	AC	DS	TH	Local	Study 4
1033	4305053	Flaggy Creek Bridge	1948	2	AS	DS	NH	Local	Study 4
6466	4305056	Inveralochy Bridge	1949	4	AS	DC	CH	Local	Study 4
293	4305003	Cabramatta Creek, Cabramatta	1951	4	AC	DS	CS	Local	B&F
79	4309574	Prouts Bridge, Canterbury	1951	5	AS	DS	NH	Local	Study 2
28	4306052	Skidmores Bridge	1953	1	AS	DS	NH	Local	Study 3
56	4305004	Narrabeen Lake Bridge	1954	6	AS	DS	NH	Local	B&F

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
		Local Significance - Bruxner Highway Group							
2255	4306083	Rileys Creek Bridge	1937	1	AC	DC	CH	State - SH16	Study 3
2257	4306084	Reids Creek Bridge	1938	1	AC	DC	CH	State - SH16	Study 3
2253	4306082	Black Gully Bridge	1939	4	AS	DS	NH	State - SH16	Study 3
2263	4306089	Tabulam Rivulet Bridge	1939	3	AC	DC	CH	State - SH16	Study 3
2265	4306090	Captains Creek Bridge	1940	1	AC	DC	TH	State - SH16	Study 3
2259	4306086	Deep Creek Bridge (1)	1940	2	AC	DS	TH	State - SH16	Study 3
2261	4306087	Deep Creek Bridge (2)	1940	1	AC	DC	CH	State - SH16	Study 3
		No Significance							
357	4309585	Stormwater Channel Bridge, Granville Park	1927	1	AC	DC	NH	None	Study 2
55	4309573	Dee Why Lagoon Bridge, Dee Why	1929	1	AS	DC	NH	None	Study 2
1626	4306065	Chinamans Hollow Bridge	1930	3	ACT	DC	TH	None	Study 3
41	4309571	Iron Cove Bridge, Gt Western Highway, Five Dock	1930	1	AS	DC	NH	None	Study 2
5691	4309622	Jacksons Bridge, Tumbarumba	1930	2	AS	DS	NH	None	Study 2
1846	4306071	Ravenswood Bridge	1930	3	AC	DC	TH	None	Study 3
301	4305082	Water Supply Channel Bridge	1930	3	ACT	DC	CH	None	Study 4
1354	4306063	Bangalow Creek Bridge	1931	2	AS	DS	NH	None	Study 3
4060	4306114	Coombing Creek Bridge	1933	2	AS	DS	NH	None	Study 3
1010	4306055	Rocks Creek Bridge (2)	1934	2	AC	DC	CH	None	Study 3
3537	4306109	Wallumburrawang Creek Bridge	1934	2	AC	DS	TH	None	Study 3
678	4309594	Byarong Creek Bridge, Figtree	1935	2	AS	DS	NH	None	Study 2
4312	4306125	Boree Creek Bridge	1935	3	AC	DC	CH	None	Study 3
1843	4306070	Smiths Creek Bridge	1935	3	AC	DC	CH	None	Study 3
370	4309586	Terrys Creek Bridge, Blaxland Rd, Epping	1935	1	AC	DC	TH	None	Study 2
2777	4306099	Mia Mia Creek	1936	3	AS	DS	NH	None	Study 3
5952	4309626	Mogo Creek Bridge, Mogo	1936	3	AS	DS	NH	None	Study 2
2947	4306102	Halls Creek Bridge (2)	1936	3	AC	DC	TH	None	Study 3

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
742	4309607	Backhouse Creek Bridge	1937	1	AC	DC	CH	None	Study 2
725	4309599	Conjola Creek Bridge, Conjola	1937	3	AS	DS	CH	None	Study 2
739	4309605	Hapgood Creek Bridge	1937	1	AC	DC	TH	None	Study 2
2703	4306093	Hogues Creek Bridge	1937	3	AC	DC	CH	None	Study 3
2957	4306103	Kellys Gully Creek Bridge	1937	4	AS	DC	CH	None	Study 3
741	4309606	Middle Creek Bridge	1937	1	AC	DC	TH	None	Study 2
2776	4306098	Slaughterhouse Creek Bridge	1937	2	AC	DS	TH	None	Study 3
737	4309603	Stephens Creek Bridge	1937	1	AC	DC	TH	None	Study 2
2139	4306077	Alipou Creek Bridge	1938	2	AS	DS	NH	None	Study 3
4104	4306118	Gosling Creek Bridge	1938	7	AS	DC	NH	None	Study 3
2140	4306078	Musk Valley Creek Bridge	1938	2	AS	DS	NH	None	Study 3
4085	4306117	Brundah Creek Bridge	1939	5	AS	DS	NH	None	Study 3
5957	4309627	Dooga Creek Bridge	1939	1	AC	DC	CH	None	Study 2
4230	4306121	Fiddlers Creek Bridge	1939	2	AS	DS	NH	None	Study 3
4234	4306122	Mountain Creek Bridge	1939	1	AC	DC	TH	None	Study 3
1009	4306054	Rocks Creek Bridge (1)	1939	2	AC	DS	TH	None	Study 3
3445	4306108	Rocky Gully Creek	1939	2	AC	DS	CH	None	Study 3
5982	4309631	Sams Creek Bridge	1939	2	AC	DS	CH	None	Study 2
388	4309508	Cattai Creek Bridge	1939	1	AC	DC	TH	None	Study 1
4131	4306120	Blathery Creek Bridge	1940	3	AC	DC	TH	None	Study 3
4309	4306124	Boree Creek Bridge	1940	2	AC	DS	TH	None	Study 3
4562	4306127	Boree Creek Bridge	1940	3	AC	DC	CH	None	Study 3
722	4309597	Condies Creek Bridge	1940	3	AS	DS	NH	None	Study 2
2133	4306076	Halfway Creek Bridge	1940	3	AS	DS	NH	None	Study 3
6404	4309640	Kangiara Creek Bridge, Yass	1940	3	AC	DC	CH	None	Study 2
734	4309601	Lemon Tree Creek Bridge	1940	2	AS	DS	NH	None	Study 2
2105	4306074	Newports Creek Bridge	1940	2	AC	DS	CH	None	Study 3
735	4309602	Termeil Creek Bridge	1940	2	AC	DS	CH	None	Study 2

RTA No	SHI No	Description	Year Built	Spans	Abutment Continuity	Deck Continuity	Soffit	Sig	Study
792	4309609	Tongarra Creek Bridge	1940	2	AC	DS	CH	None	Study 2
2163	4306079	McDonalds Creek Bridge	1941	1	AC	DC	NH	None	Study 3
416	4309590	Buttsworth Creek Bridge, Wilberforce	1942	3	AS	DS	NH	None	Study 2
5951	4309625	Deep Creek Bridge	1942	1	AC	DC	CH	None	Study 2
999	4306053	Boyd Creek Bridge	1944	1	AC	DC	TH	None	Study 3
5497	4309614	Tarcutta Creek Bridge, Tarcutta	1944	4	AS	DS	NH	None	Study 2
1865	4306072	Allgomera Creek Bridge	1946	4	AS	DS	NH	None	Study 3
2106	4306075	Coffs Creek Bridge	1947	3	AS	DS	NH	None	Study 3
793	4309610	Macquarie Rivulet Bridge	1947	2	AC	DS	CH	None	Study 2
2280	4305058	Lagoon Creek Bridge	1948	3	AS	DS	NH	Local	Study 4
3668	4305059	Cobbadah Creek Bridge	1948	4	AS	DC	CH	Local	Study 4
2094	4305060	Pine Creek Bridge	1949	5	AS	DS	NH	Local	Study 4
731	4305076	Millards Creek Bridge	1949	2	AS	DS	NH	Local	Study 4
498	4305032	Keys Parade, Bankstown	1950	4	AS	DS	NH	None	B&F
2170	4306138	Fishery Creek Bridge	1955	5	ACT	DS	NH	None	Study 3
2171	4306080	North Creek Canal Bridge	1955	5	ACT	DS	NH	None	Study 3

Of the bridges included in the summary above, the structural forms, broken down by number of spans, can be summarised as follows:

TABLE 6.2 DISTRIBUTION OF STRUCTURAL FEATURES

STRUCTURAL FEATURE			SPANS									
Abutment Continuity	**Deck Continuity**	**Soffit Style**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10+**	**TOTAL**
AC	DC	TH	18	2	10				1			31
AC	DC	CH	13	3	10	1						27
AC	DC	NH	3		1							4
AS	DC	NH	2		1				1			4
AS	DS	NH	3	15	11	6	6	3	2	1	2	49
ACT	DC	TH	1		3							4
AS	DS	TH	1	5		2						8
AS	DS	CH		8	6	1						15
AC	DS	TH		1	3		2					6
AC	DC	CS			2							2
AS	DC	TH			1							1
ACT	H	NH				1						1
AS	DC	CH			1	3	2	2				8
ACT	DC	CH			1	1	1	2				5
AC	H	CH					1					1
ACT	DS	NH					4					4
ACT	DS	TH						1				1
AC	H	NH								1		1
			41	34	50	15	16	8	4	2	2	172

Legend

Feature	Styles	Feature	Styles	Feature	Styles
Continuity of Deck with Abutments	Continuous with abutments – AC	**Deck continuity**	Deck simply supported – DS	**Line of Beam Soffits**	Tapered haunches – TH
	Simply supported at abutments – AS		Deck continuous – DC		Curved haunches – CH
	Cantilever approaches – ACT		Hybrid combination – H		No haunch – NH

7. CONCLUSION

The study has examined the bridges in the group, assessed and then generated a ranking table which categorises them as of State, Local or No Heritage Significance. The complete heritage inventory set for the bridges has been created in electronic form as well as being included as hard copy in this report, allowing it to contribute to the publicly accessible database of the heritage inventory of the State. Assessments were carried out under the criteria of the State Heritage Council, and employing the recognised methodologies for assessment. We have aimed to provide a careful and clear articulation of the assessment process and findings in general and a clear guide to the significance of each of the bridges in the individual inventory forms.

The final tabulation, of all beam bridges studied, makes this a useful summation of reinforced concrete beam bridges in New South Wales up to 1950.

8. GLOSSARY OF TERMS

The engineering profession reflects the approach of all professions wherein common words are redefined for particular uses, often having only slight linkage to their common meaning. Used in this report are the following terms:

- **Bending moment**: When a beam (such as the deck of a bridge) is loaded by its own weight and that of traffic, the effect at the centre of the span is to cause the bottom of the beam to stretch at the bottom and compress at the top. The engineer calculates a value for this, which is referred to as bending moment. In concrete slabs the compressive force is resisted by the concrete, and steel is provided to resist the tension.
- **Bent**: A set of piles connected at the top by a headstock to form a pier is referred to as a pile bent.
- **Camber**: This refers to a slight arched shape. Thus the road surface typically has a camber to assist rain runoff. Many bridges have a camber along the bridge, giving a slight crown at the centre which is generally thought to improve appearance.
- **Corbel**: This is an outstand typically detailed to support some part of the structure above, either permanently or during construction.
- **Crossfall and Superelevation**: These are terms used where a road is on a curve such that the slope is towards the centre of the curve to improve stability of vehicles. As curves become tighter, higher superelevations are specified.
- **Haunch**: A deeper section or support area. Where the bending in a beam is sufficient to require increased depth, it is “haunched down” to achieve this. Thus a haunch in the current context is a tapered or curved deepening of the deck beams.
- **Reverse bending moment**: Also known as “hogging moment”, is the reverse of the above and typically occurs in bridge decks which are continuous over the piers where downward loads on the spans tend to stretch the top of the deck and compress the bottom.
- **Shear**: There is a tendency for the beam mentioned above to break by diagonal cracking next to the support and drop downwards. This effect is referred to as shear. It can be resisted by a combination of the concrete and steel. It was the fashion in bridges of the period of the study to provide steel bars which bent up at a 45 degree angle from the bottom of the slab to the top across the zones of high shear i.e. perpendicular to the cracks.
- **Soffit**: The underside of a bridge deck, beam or headstock.
- **Trestle**: A set of raked and/or vertical piles with associated framing which form a bridge pier.

APPENDIX 1 INVENTORY SHEETS

VOLUME 2 PHOTOS PROOF SHEETS AND NEGATIVES

Appendix E

Roads and Maritime Bridge Condition Assessment

BRIDGE INSPECTION REPORT -Level 2- PAGE 1 of 12 -- General Information

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Roadloc: 4690201,0010,A1,0.000
Directorate: CND COUNTRY OPERATIONS DIRECTORATE
Region: 758 SOUTH WEST REGION
LGA: 469 WAKOOL
Federal Elec.:
State Elec.:
Complex or Unusual: Yes

Longitude: 143.92744
Latitude: -35.33004
Overall Length: 72.54
Overall Width MIN: 6.70
Overall Width MAX:
Construction Drawings No.: 0
Inspected by: R.M.S.
Maintained by: R.M.S.

Span From	Span To	Span Length (m)	Culvert Height (m)	Span Material	Span Type	Year Completed
1		8.53		T	BEAM	1929
2	3	9.14		T	BEAM	1929
4		27.73		X	TRUS	1929
5		9.14		T	BEAM	1929
6		8.53		T	BEAM	1929

Inspection Equipment

Boat, Dinghy, Pontoon, Barge and boom

Scaffolding

Other Equipment

Comments

Truck, tractor, alternator drill

Risk Register

Process/Hazard	Location
Communication	
Driving RTA Vehicle	
Fence: - Electric, Fauna, Barbed	
Fatigue and Working Hours	
Lone Worker	
Manual Handling	
Incorrect use of PPE	
Site Access and Egress	

Inspection Details

Level of Inspection: Level 2
Inspection Date: 19-NOV-2013
Inspection Type: Normal
Proposed Date of Next Inspection: NOV-2015
Temp (C): 25
Weather: Sunny
Inspector's Given Name: STEPHEN
Surname: EVERETT
Engineer's Given Name: SYED
Surname: NOWMANI

BRIDGE INSPECTION REPORT -Level 2- PAGE 2 of 12 -- Condition Rating of Elements

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Inspection Date: 19-NOV-2013 **Inspector's Given Name:** STEPHEN **Surname:** EVERETT

Element Code	Element Description	Env.	Total Qty	Units	Est. Qty (or % of Total Qty) in Cond. State 1	2	3	4	5	Element Health Rating	Element Cond. Index	ECI Change
MAPP	Approach Carriageway	L	2	ea	0	2	0	0	XXXX	GOOD	+67.0	-33.0
MGCL	General Cleaning	L	6	ea	0	6	0	0	XXXX	GOOD	+67.0	-33.0
MWWY	Waterway	L	1	ea	1	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
PBGI	Protective Coating - Beam / Girder (Load Bearing)	L	212	m2	212	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
PDBR	Protective Coating - Diaphragm/Bracing/Secondary Member	L	44	m2	44	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
PPIL	Protective Coating - Pile (including steel cased concrete pile or caisson)	L	19	m2	19	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
RPNT	Railing Paint Work	L	144	m	0	72	72	0	XXXX	GOOD	+50.0	-50.0
RTIM	Timber Railing	L	144	m	144	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
SBGI	Steel - Beam / Girder (Load Bearing)	L	212	m2	212	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
SDBR	Steel - Diaphragm / Bracing / Secondary Member	L	44	m2	44	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
SPIL	Steel - Pile	L	19	m2	19	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TASG	Timber-Abutment Sheeting / Gravel Board	L	20	m2	15	0	0	5	XXXX	POOR	+75.0	+0.0
TBJB	Timber Truss-Butting Block / Jacking Block	L	4	ea	2	2	0	0	XXXX	GOOD	+83.5	+0.0
TCHS	Timber-Capwales / Headstock / Sill	L	12	ea	6	6	0	0	XXXX	GOOD	+83.5	+0.0
TCOR	Timber-Corbel	L	23	ea	13	9	1	0	XXXX	FAIR	+84.2	+0.0
TDBO	Timber-Deck Bolts	L	6	ea	6	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TGCG	Timber-Girder / Cross Girder	L	25	ea	9	11	0	5	XXXX	POOR	+65.5	+0.0
TLSH	Timber-Longitudinal Sheeting / Decking	L	400	m2	400	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TPCH	Timber Truss-Principal / Top Chord / Bottom Chord	L	6	ea	5	1	0	0	XXXX	GOOD	+94.5	-5.5
TPIL	Timber-Pile	L	37	ea	22	5	1	9	XXXX	POOR	+69.4	+0.0
TPRS	Timber-Protective System	L	80	m	80	0	0	0	XXXX	AS-BUILT	+100.0	+0.0

BRIDGE INSPECTION REPORT -Level 2- PAGE 3 of 12 -- Condition Rating of Elements

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Inspection Date: 19-NOV-2013 **Inspector's Given Name:** STEPHEN **Surname:** EVERETT

Element Code	Element Description	Env.	Total Qty	Units	Est. Qty (or % of Total Qty) in Cond. State 1	2	3	4	5	Element Health Rating	Element Cond. Index	ECI Change
TPTT	Timber Truss-Paintwork	L	56	m	55	1	0	0	XXXX	GOOD	+99.4	-0.6
TSBC	Timber Truss-Bottom Chord (Steel)	L	2	ea	2	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TSBR	Timber Truss-Brace / Undertrussing	L	26	ea	26	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TSHO	Timber Truss-Metal Shoe	L	32	ea	32	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TSTT	Timber Truss-Strut	L	12	ea	12	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TTCG	Timber Truss-Cross Girder	L	10	ea	7	3	0	0	XXXX	GOOD	+90.1	+0.0
TTDK	Timber-Transverse Deck Plank	L	421	m2	421	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TTIE	Timber Truss-Tie (Steel, Wrought Iron)	L	12	ea	12	0	0	0	XXXX	AS-BUILT	+100.0	+0.0
TWBR	Timber-Wale / Brace	L	10	ea	5	4	1	0	XXXX	FAIR	+80.1	+0.0

BRIDGE INSPECTION REPORT -Level 2- PAGE 4 of 12 -- Required Maintenance Actions

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Inspection Date: 19-NOV-2013 **Inspector's Given Name:** STEPHEN **Surname:** EVERETT

Elem Code	Env	MMS Act.No.	MMS Activity Description	Inspector's Comments on RequiredActions and Locations on Structure	Est. Qty	Units	Date for Completion	RMA ID Work Order No	Prob (a)	Cons (b)	Activity Inaction Risk
MAPP	L	202.00	M9 Surface Correction Repair [Bridge approaches]	Both approaches are low and uneven they require levelling and resurfacing	60	m2	NOV-2015	99517	2	2	Medium
MAPP	L	600.00	M9 Delineators (per structure)	Straighten leaning delinator signs at the southern end of the bridge.	1	each	NOV-2015	99516	1	2	Low
MGCL	L	480.03	M480 Sweep bridge deck and tunnel roadway	Sweep deck along kerb lines both sides	6	Each	NOV-2015	99518	2	2	Medium
MWWY	L	301.00	M9 Tree and/or Bush Control	Trim the trees overhanging the bridge.	1	each	NOV-2015	99521	2	2	Medium
RPNT	L	747.00	Repaint / Galvanise Traffic Barrier / Railings (non-Timber)	Repaint the timber railing and kerbs	144	m2	NOV-2015	99519	2	2	Medium
RTIM	L	600.00	M9 Delineators (per structure)	Replace all the damaged reflectors across the bridge	1	each	NOV-2015	99520	2	2	Medium
TASG	L	763.01	M762 Replace Abutment Sheeting / Gravel Board (TASG)	Replace rotten back sheeting at abutment A	5	m2	NOV-2015	99523	3	3	Medium
TCOR	L	762.04	M762 Replace Corbel (TCOR)	Replace corbels in condition 3 that were found in the 2011 testbore inspection	1	Each	NOV-2015	99524	2	2	Medium

Note: If a required maintenance action is not carried out, the codes for the(a) probability of safety or structural problem due to inaction : 1 - Rare 2 - Could 3 - Might 4 - Will 5 - Expected(b) consequence of inaction : 1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Catastrophic

BRIDGE INSPECTION REPORT -Level 2- PAGE 5 of 12 -- Required Maintenance Actions

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Inspection Date: 19-NOV-2013 **Inspector's Given Name:** STEPHEN **Surname:** EVERETT

Elem Code	Env	MMS Act.No.	MMS Activity Description	Inspector's Comments on RequiredActions and Locations on Structure	Est. Qty	Units	Date for Completion	RMA ID Work Order No	Prob (a)	Cons (b)	Activity Inaction Risk
TGCG	L	762.01	M762 Replace Girder / Cross Girder (TGCG)	Replace the girders in the approach span that are in condition 4 as per 2011 testbore inspection.	5	Each	NOV-2015	99525	3	3	Medium
TPCH	L	710.00	M700 Timber Element Maintenance, Minor	One of the principles has been struck by a wide load taking a gouge out of the timber. Repaint element and monitor	1	Structur	NOV-2015	99522	1	1	Low
TPIL	L	762.03	M762 Replace / Splice Pile (TPIL)	Replace all the piles that are in condition 3 and 4 as per 2011 testbore inspection report	10	Each	NOV-2015	99526	3	3	Medium
TWBR	L	762.05	M762 Replace Wale / Brace (TWBR)	Replace cross bracing at peir 5	1	Each	NOV-2015	99527	2	2	Medium

Note: If a required maintenance action is not carried out, the codes for the(a) probability of safety or structural problem due to inaction : 1 - Rare 2 - Could 3 - Might 4 - Will 5 - Expected(b) consequence of inaction : 1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Catastrophic

BRIDGE INSPECTION REPORT -Level 2- PAGE 6 of 12 -- Inspection Comment

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Inspection Date: 19-NOV-2013 **Inspector's Given Name:** STEPHEN **Surname:** EVERETT

Inspector's Comments: Attend to all listed RMA's.

Inspector's Signature: _____ **Date:** _____

Maintenance Manager's Comments:

Maintenance Manager's Signature: _____ **Date:** _____

Attachments :

BRIDGE INSPECTION REPORT -Level 2- PAGE 7 of 12 --

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

3237_104.JPG

Inspection details: 19-NOV-2013 SE (N); Railing Paint Work; LOW; Repaint / Galvanise Traffic Barrier / Railings (non-Timber)

BRIDGE INSPECTION REPORT -Level 2- PAGE 8 of 12 --

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

3237_105.JPG

Inspection details: 19-NOV-2013 SE (N); Timber Railing; LOW; M9 Delineators (per structure)

BRIDGE INSPECTION REPORT -Level 2- PAGE 9 of 12 --

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

3237_106.JPG

Inspection details: 19-NOV-2013 SE (N); Timber Truss-Principal / Top Chord / Bottom Chord; LOW; M700 Timber Element Maintenance, Minor

BRIDGE INSPECTION REPORT -Level 2- PAGE 10 of 12 --

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

3237_107.JPG

Inspection details: 19-NOV-2013 SE (N); Approach Carriageway; LOW; M9 Surface Correction Repair [Bridge approaches]

BRIDGE INSPECTION REPORT -Level 2- PAGE 11 of 12 --

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

3237_108.JPG

Inspection details: 19-NOV-2013 SE (N); Waterway; LOW; M9 Tree and/or Bush Control

BRIGE INSPECTION REPORT -- PAGE 12 of 12 -- Risk Register Control

Bridge No: 3237 **Description:** TIMBER TRUSS BRIDGE WAKOOL RIVER 36.4 KM E SWAN HILL

Bridge Name: GEE GEE BRIDGE

Risk ID	Risk Code	Process/Hazard	Location	Possible Controls	Comments
10167	COM	Communication		Mobile, RFS Support Staff	
8631	DRV	Driving RTA Vehicle		Follow RTA Safe Driving Policy	
2373	FEF	Fence: - Electric, Fauna, Barbed		Install gates, avoid electric fences	
8638	FWH	Fatigue and Working Hours		Frequent Drink / Rest Breaks	
2374	LWRK	Lone Worker		Contact base, PLB, be familiar with policy	
8632	MHL	Manual Handling		Training, Mechanical Aids	
8633	PPE	Incorrect use of PPE		Use correctly, Training	
8634	SAE	Site Access and Egress		Use and note best entry and exit points, Stairs where available	
2375	SST	Snakes, Spiders, Ticks, Leeches etc		Situational awareness. Long pants, good boots, repellant	
2376	STS	Steep Slopes		Use best entry point, EWP, scaffolds etc	
8636	USTH	Uneven Surfaces & Trip Hazards		Access Routes Kept Clear	
8635	UVR	UV Radiation		Long Sleeves, Hat, Sunscreen	
8637	WNT	Working near Traffic		Flashing Lights, Hi-vis Garments, Be observant, Traffic spotter	