BATHURST REGIONAL COUNCIL

Bridges Conservation Management Plan

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October 2010

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HERITAGE BRIDGE MANAGEMENT IN THE BATHURST REGION

Figure 1: Rocket Street steel half through steel truss bridge

DATE

This study was carried out over a period of seven months with the first field day on 18th March 2010 and the last on the 31st August 2010. There were 10 field days in all. The report was completed in October 2010.

METHOD

The method used in this study is based on the Australia ICOMOS 1988 Charter for the Conservation of Cultural Significance (The Burra Charter); Conservation Management Guidelines and Heritage Assessment by the NSW Heritage Office and Department of Planning 1996 and Austroads Guide to Heritage Bridge Management, published in 2001 by Austroads Inc. (ISBN 0 85588 588 2).

Principals for assessing significance, recommended listings and developing guidelines for management of these heritage assets are contained within these documents.

AUTHORS

The authors of this report are Barbara Hickson, Heritage Advisor and Architect, and Nicholas Murphy, Senior Strategic Planner with Bathurst Regional Council. Barbara has extensive experience in the Bathurst Region, in heritage studies and reviews and in the development of Conservation Management Plans.

ACKNOWLEDGEMENT

Many people assisted with this report but special thanks to Sinclair Croft, Senior Strategic Planner of Bathurst Regional Council for his editing and other advice.

OUTLINE

There is an increasing awareness of the value of bridges in the history and development of a region. With the local non indigenous history soon to reach 200 years in Bathurst, bridges have contributed an enormous part in that period. For the first 100 years, the type of traffic and consequently the loads on structures remained steady. In the second 100 years with the growth of motorised transport and heavier and faster vehicles, older bridges faced considerable challenges to remain relevant and be retained in their original materials.

Most have not achieved this, but some have.

Two timber truss bridges within the Local Government Area, one over the Turon River and the other over the Abercrombie River, have been strengthened and maintained and remain generally as designed, and in use, as rare examples of the engineering features of their period. Other older bridges, in stone and timber, have been able to be retained largely unchanged due to the roads they serve being very lightly trafficked, while others have been abandoned or considerably altered.

The bridge study initially aimed to make a comprehensive inventory of older road and rail bridges[1] and examples of culvert structures within the LGA to initially establish the quantity and types of bridges there are in the region. From this it was possible to make an overall judgment about future listings of bridges as heritage items. Heritage listing and retention, can incur additional costs for maintenance works are to be carried out in an appropriate manner. It was important to bear this in mind when selecting a broad range of bridge types for potential listing.

Guidelines were also developed for the management of those heritage bridge assets.

'AUSTROADS Guide to Heritage Bridge Management' provides the following process:

1. Establish and maintain an inventory of the items.

2. Regularly inspect and record the condition of the heritage items.

3. Program to undertake conservation and maintenance works.

4. Record details of works undertaken.

It is beyond the scope of this study to carry out all these processes. However the study does provide the inventory of items and offers generic guidelines or policies for the undertaking of conservation and maintenance works.

SUMMARY AND RECOMMENDATIONS

- A comprehensive inventory of older bridges and a range of culverts were completed recording 161 assets.

- Of these assets thirteen were already listed items in the Bathurst Regional Council LGA.

- A further twelve bridge assets are recommended to be listed as part of this study process.

- The listed items will properly represent the historic development of road and rail bridge structures in the region.

- The study revealed a history of bridges through their physical remains.

- In compiling the inventory, inspections revealed a number of defects. These defects should be repaired as time and funding permits.

[1] Excluding some of the most recent RTA bridges

- Overall conservation management guidelines for the conservation, repair and maintenance of heritage bridge structures has been prepared and included in this document.

- Special additional management strategies such as salvaging of materials, interpretation and recording are recommended.

- Recommendations are made for the repair and maintenance of heritage bridge assets.

- A bridge heritage assets record of inspections and maintenance should be developed and maintained for all listed bridges.

- Review the proposed and existing listed bridges, especially their statements of significance and curtilage and complete SHI data sheets where they currently do not exist.

A PICTORIAL OVERVIEW OF BRIDGES IN THE BATHURST REGION

Figure 2: F10 Concrete and steel bridge

An analysis of the physical remains of the bridges in the Bathurst Region allowed for the following illustrative history based on the various types of bridges.

Bathurst Regional Council's Heritage Advisor was commissioned in 2010 to undertake a study of historical bridges within the Bathurst Region. The study investigated all types of bridge structures within the region which varied considerably and consisted of a large quantity. The findings of the study provide physical evidence of development of the region and also the evolution of engineering bridge building technologies through the range, style, types and materials used.

This study of bridges includes:

brick bridges

culverts and pipes

footbridges

steel and concrete bridges

steel truss bridges

stone and steel beam bridges

stone bridges

timber bridges

timber truss bridges

TIMBER BRIDGES

Timber bridges are rarely the subject of books about bridges due to their simplicity when compared with the more impressive timber truss structures but they are much more numerous. By 1900 it is estimated that there were about 4000 timber beam road bridges and about 400 timber truss road bridges in NSW.

Timber bridges, made from logs of wood, are probably the oldest bridge construction method used and are generally the cheapest and easiest method based on available materials. They have a limited lifespan and are also limited in the distance they can physically span. However spans of up to 10 metres do exist in the Bathurst region.

The first bridge most likely built in the region was built by William Cox across the Campbell River as part of his 1815 Road to Bathurst. Its location is not known but there is a painting of it by JW Lewin, a colonial artist and naturalist, as depicted in **Figure 3** below.

Figure 3: The first bridge in the Bathurst Region. Artist JW Lewin

Examples of simply supported single span timber bridges are not uncommon in Bathurst. Thirteen (13) were recorded in this study. However a number of these are no longer in use, while others have been converted to culverts. Some of the best examples span up to around 8 metres over wet and dry water ways.

The timber bridge in **Figure 4** below is on the Red Hill Road leading to the Upper Turon which is now only lightly trafficked. The bridge, picturesquely positioned over a dry creek, is an excellent example of the bush craft and local materials used in such a structure. It spans almost 8.2 metres and features timber slab abutments, locally gathered dry stone wing walls and timber railings. The bridge possibly dates back to the late Victorian period.

Figure 4: F97 Single span bridge on Red Hill Road

Other good examples of the same timber craftsmanship were located on the field trips. The excellent workmanship in this group of bridges has enabled them to last a considerable period. They are probably all around 100 years of age or more. The same craftsman carpenter was almost certainly the principal builder in each case and he left his mark on the bridges in the way he shaped and constructed the approach posts to each of these constructions.

There are at least five excellent intact examples including Brewongle School Bridge (F72) a single span bridge, Carrs Creek Bridge (F22), Stony Creek (F83) and Penders Creek (F96) having two spans and Eusdale Creek (F85), a four span bridge.

The Carr's Creek Bridge (F22) a two span timber bridge, serves to illustrate many of the principal features, though the end span posts are missing.

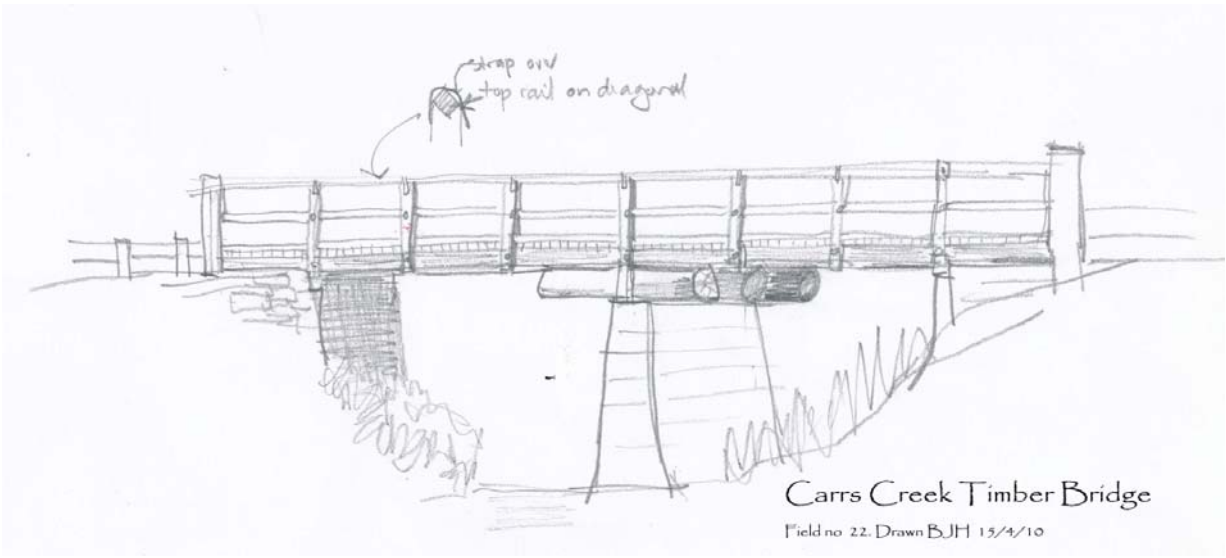


Figure 5: F22 Sketch of Carr's Creek Bridge

When single spans could not suffice, multiple spans were introduced to break up the total distance. Two good examples of simple log bridges of multiple spans in Bathurst are the Coles Bridge (F117), over the Turon River which is 53 metres long and divided into 5 spans,

and the low level crossing timber bridge over Winburndale Rivulet (F127) which is 27 metres long and divided into just spans.

Figure 6: F127 Winburndale Rivulet low level crossing timber bridge

Figure 7: F117 Coles low level bridge over the Turon River

Towards the end of the 19th Century the use of steel as a structural component became more popular locally. A number of the bridges that used steel beams in lieu of timber give the appearance of simple timber structures from road level but are evident when viewed from beneath. Steel beams and sometimes railway track line are used as the main support for the road deck. Examples in the inventory with this construction method include a timber bridge on Schumachers Road (F30) and McGeorges Creek Bridge (F39).

Figure 8: F30 Schumacher's Road, a timber and steel bridge

Figure 9: F30 Bolt detail below the bridge

TIMBER TRUSS BRIDGES

In December 1852 the colonial government appointed a Select Committee to report on a number of items including the Western Road from Parramatta to Bathurst, with a surveyor to reside at Hartley.

Soon after the Department of Public Works came into being in 1858 and from this issued a period of standardised and notable truss bridge designs for road traffic. 'Linking a Nation' by Dr. Robert Lea of the University of Western Sydney points out the value of this particular bridge type in his chapter on 'Linking a Nation':

> *A total of 422 timber truss road bridges were built in New South Wales between 1860 and 1936, a wealth of such bridges unparalleled elsewhere on the planet. Of these 82*

survive. They fall into five basic types, from the Old Public Works Department design, based in English precedents, through the local developments each named after NSW Public Works Department (PWD) engineers. In chronological order these are McDonald, Allan, De Burgh and Dare trusses. Indeed it is remarkable that NSWPWD engineers of this period have timber truss designs named after them, internationally recognised as such. The work of PWD engineers in developing timber road bridges was aided by Professor William Henry Warren, who had come to Sydney as an engineer in 1881 and in 1884 became the first Challis Professor of Engineering at the University of Sydney. He worked and wrote extensively on timber bridge construction, giving a solid academic and theoretical base to the practical task of spanning the colony's all too numerous rivers and creeks economically and enduringly. John Whitton and E. O. Moriarty, the PWD engineers in charge of railways and harbours respectively, also designed some truly remarkable timber structures, so there was in Sydney an expertise in timber engineering of a depth which matched the natural resources of the forests of New South Wales. Bennett and Whitton were inclined to be conservative and favoured British over American bridge-building technology, although not in too doctrinaire a way: after all the Shoalhaven road bridge and Hawkesbury railway bridge - both distinctively American designs - were built under their direction. Both retired in 1890, with enormous achievements to their credit, but their successors unquestionably were more innovative and adventurous.

Of the five main timber truss designs that were constructed in the 19th Century in NSW; the old public works style (1860-1886), the Macdonald (1886- 1893) , the Allan (1839-1929), the De Burgh (1899 – 1905) and Dare (1903- 1936), only the Allan Truss bridge style remains in the Bathurst region. The two timber truss bridges remaining in the Bathurst Region are over the Abercrombie River (F12), near the Abercrombie Caves, and over the Turon River at Wallaby Rocks near Sofala (F114).

However there were once many more constructed in the region as shown in the old Evans Bridge register, as listed below. Most of the timber truss bridges were single or double span in the 'Public Works' style.

1. The Dunkeld Bridge on the Main Road over the Evans Plains Creek (1892) now the Mitchell Highway.

2. The first Denison Bridge (1856) between Bathurst and Kelso.

3. Hereford Bridge over the Evans Plains Creek on the Blayney Road, (1870) now the Midwestern Highway.

4. The first Rankin's Bridge (1873), replaced in 1920 with a double span Allan type truss and again in 1998 with a concrete bridge, between Bathurst and Eglinton.

5. The bridge over Vale Creek at Mildura on Cow Flat Road (1884).

6. Southall's Bridge over the Winburndale Rivulet on the Duramana Road (1886).

7. Bridge over Vale Creek at Gorman's Hill (1878).

8. Bridge over Clear Creek at Caloola (1877).

9. Bridge over Campbell's River at The Lagoon (1893).

10. Bridge over Clear Creek at Peel (1877).

11. Bridge over Winburndale near Peel (1873).

A typical example is Herefords Bridge illustrated on folio 19 of the Evans Bridge Register as shown below in **Figure 10**.

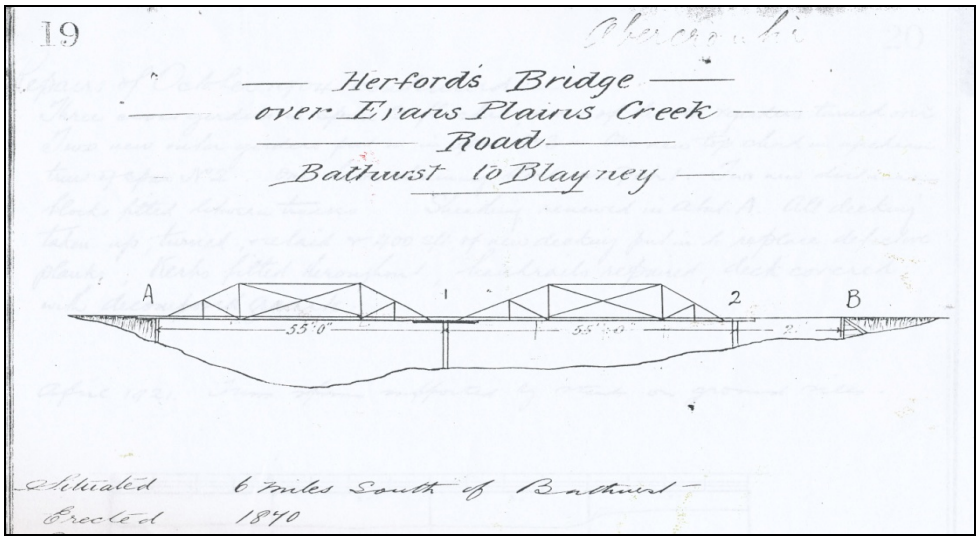


Figure 10: Folio 19 of the Evans Shire Bridge Register

The Allan Truss was an improvement on earlier trusses. The important improvements given in the RTA Timber Bridge Manual are as follows:

- Smaller section timber components.
- Spaced timber top chord and diagonals.
- Laminated bottom chords.
- Vertical steel bar tension members.
- Cast iron shoes.
- Cast iron sway braces.

As can be seen by the diagrams in **Figure 11** below, there were less members as the cross diagonal chord was only included in one direction, except at the centre.

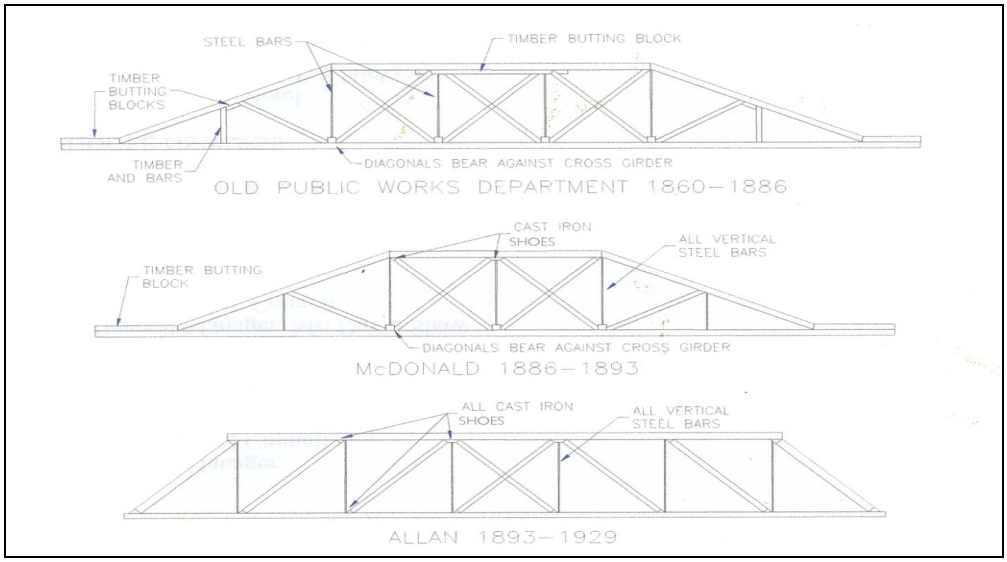


Figure 11: RTA truss diagrams

Perhaps it was these improvements that led to its longevity. Nevertheless the two remaining examples of timber truss bridges in the Bathurst region are now quite rare.

Figure 12: F12 Abercrombie River Timber Allan Truss Bridge

Figure 13: F114 Turon River Timber Allan Truss Bridge at Wallaby Rocks

STONE BRIDGES

The first 'permanent' bridges in the colony of NSW were stone bridges, so it is not surprising that the oldest bridges in the Bathurst region are also stone bridges. The first stone bridges used convict labour and the style of construction was fairly typical of the bridges constructed since Roman times.

The Bathurst Region contains a good share of examples with at least 13 stone arch bridges recorded in this study, all built in the mid to late Victorian era. Much of the NSW bridge stone masonry was inspired by Scotsman David Lennox. He was Sub-Inspector of Bridges from 1832 for the colony and did a great deal to further the use of stone bridges in NSW. He was first employed by surveyor Thomas L Mitchell 'to plan the stone bridges, making the centering arches and to carry out such work by directing and instructing common labourers." Lennox had previously worked for 17 years in Britain on public works and so brought with him a good grounding in stone construction. With the cessation of transportation and convict labour, it became necessary to look to cheaper alternatives for bridges where the materials were available locally and the labour, less skilled. In this way timber structures became the main bridge construction materials of the Victorian era, though often still with stone abutments.

However the stone arch bridges that were built in the region are generally of particular beauty, albeit sometimes spoilt by poor repairs and later additions of Armco handrails. Small spans and simple semi circular arches are general characteristics. Being of British or European style, the side walls of the bridge often rose up to form a balustrade. This feature probably once existed on most of the Bathurst bridges but today just a few examples remain. The stonemason's 'signature' style on the two bridges in **Figure 14 and Figure 15** below is a bull-nosed stone capping course, rotating to the road level at the ends of the balustrade. The joints are tuck-pointed and expressed, or raised and struck to give a similar effect. Significant examples of stone bridges in the Bathurst Region are at Brewongle constructed in sandstone (F75) and at Kellosheil, constructed in granite (F130). They both have a rotating balustrade and have other matching characteristics such as the key stone at the top on the semicircular arch.

Figure 14: F75 Brewongle stone arch bridge

Figure 15: F130 Kellosheil stone arch bridge

The Brewongle bridge was probably built by public works, possibly in conjunction with the rail work that was occurring at that time. Its quality dimensioned stones must have been brought to the area especially for the purpose. Cross braced with tie rods and with deep weep holes for drainage, its overall detail suggest a public works design. The granite stone for the Kellosheil Bridge is more likely to have been won locally. It would be more difficult to work, but is a very durable stone.

Figure 16: F130 detail of a rotating balustrade

Figure 17: Disused Bridle Track stone bridge

On The Bridle Track two more exemplar bridges of this style remain. They too have raised stone wall balustrades with rotating ends but much more rustic in character having been constructed from local stone which appears to be a type of slaty, sedimentary, stone very prevalent in the rocky landscape. These are not a true arch bridge either and their simple single span is supported by timbers in the round. Probably the local stone being so varied in shape precluded it being used for such an accurate masonry structure as an arch.

Another four good stone arched bridges are located along the Hill End Road between Sofala and Hill End. Three of these bridges are dated with engraved stones, being 1887, Jan 1888, and 1890 travelling from Sofala towards Hill End. They are stone arched bridges with joints raised, struck and expressed. There is some physical evidence that each originally had stone balustrades that rose above the road level, but which are now generally missing or partially retained below existing built up road levels. These bridges are difficult to see from the road. The best opportunity to view the bridges is from within their associated water courses looking directly onto the side elevations.

Figure 18: F109 Stone bridge 1887 Hill End Road

Figure 19: F110 Stone bridge 1887 Hill End Road

Another stone arch bridge over Deep Creek at The Lagoon is the tallest of the region's examples. An attractive sandstone arch, built around 1890, over Deep Creek (refer to **Figure 20**) its aesthetics have been spoilt in that the top courses have been removed and Armco railings now dominate the upper line of the bridge.

Figure 20: F52 Deep Creek stone bridge, The Lagoon

FOOTBRIDGES

Eleven footbridges were recorded as part of this study. Most are still in use today and generally serve as pedestrian access over watercourses to schools or sportsgrounds. A good example is the Trunkey Creek Primary School (F15) timber log footbridge that enables children to reach school when Trunkey Creek rises.

Figure 21: F15 Long view of Trunkey Creek Primary School Footbridge

Figure 22: F15 Detail of Trunkey Creek Primary School Footbridge

A good example of a sports bridge is at Proctor Park (F60) where an all weather crossing over Raglan Creek is afforded by a steel truss structure constructed in recent years. This bridge was originally used as part of the Sydney 2000 Olympics and later purchased by Bathurst Regional Council and placed within Proctor Park.

Figure 23: F60 Proctor Park footbridge Bathurst

Historically, foot bridges were once much more common place. Many people travelled by foot to church, school or around the gold fields. The Bathurst Region contained many examples. While there are no foot bridges from the 19th Century that are still functional,

there are a few examples of bridge ruins remaining in situ. One at Dennis Island (F129) formally enabled people to cross Queen Charlotte's Vale Creek to attend church, school and community gatherings. It would have been a very important part of communications and transport.

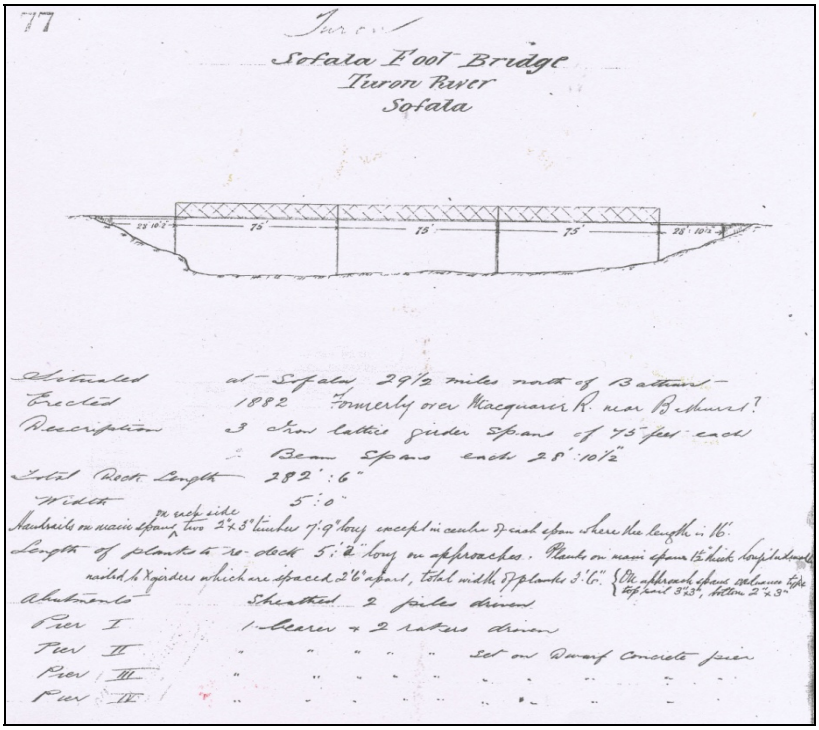
The Dennis Island footbridge was a suspension bridge relying on large ground cantilevered poles at each end. It was marked on the Parish Map of the period. There was a similar footbridge at Mountain View across the Fish River.

Probably the most well known historic footbridge in the Bathurst Region is the steel truss footbridge at Sofala, (F100). This footbridge no longer crosses the Turon River but sits along side the river on display in the Joyce Pearce Memorial Park in Denison Street, Sofala, near the Crossley Bridge.

The footbridge was first erected around 1860. The Evans Shire records say it was formerly over the Macquarie River near Bathurst, while local knowledge at Turon places it over the Fish River near O'Connell. In any case it was moved to Sofala in 1882 and was still in place when the National Trust recorded it in 1976. This is an interesting 'bailey' style steel framed bridge, engraved 'ONE', that comprising three sections or spans ,each 75 feet or 21 metres long, of lightweight steel half through trusses and overhead members bracing the structure. There are 5 outrigger trusses providing lateral stability. The spans were supported on pairs of driven timber piles set on dwarf concrete piers in the river and all the members were bolted and riveted together. The footbridge was washed away by a flood of the Turon River in 1996.

Since its reconstruction in the park in 2007-8, new timber rails, ramps and foundation supports have been added to make the footbridge accessible for visitors.

The details of the Sofala footbridge, as recorded in the Evans Shire Bridge Register, are in **Figure 24** below.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Turon

Sofala Foot Bridge
Turon River
Sofala

Abbreviated at Sofala 29½ miles north of Bathurst
Erected 1882 Formerly over Macquarie R. near Bathurst?
Description 3 iron lattice girder spans of 75 feet each
Beam spans each 25' 10½"
Total Deck Length 282' 6"
Width 5' 0"
Handrails on main spans two 2"x3" timbers 7' 9" long except in centre 9 end spans where the length is 16'
Length of planks to deck 5' 2" long on approaches. Planks on main spans 1½ thick longitudinally nailed to 4 girders which are spaced 3' 6" apart, total width of planks 5' 6". {On approach spans scantlings to be top rail 3"x3", bottom 2"x3"
Abutments Sheathed 2 piles driven
Pier I 1 bearer + 2 rakers driven
Pier II " " " " set on Dwarf Concrete piers
Pier III " " " " " " " "
Pier IV " " " " " " " "

Figure 24: Folio 70 The Sofala Footbridge from the Evans Shire Bridge Register

There are a number of other footbridges recorded in the Evans Shire Bridge Register that no longer exist. The drawings that remain tell us about their construction. Examples below are provided for the former White Rock and Saltram footbridges formerly recorded in the Bridge Register.

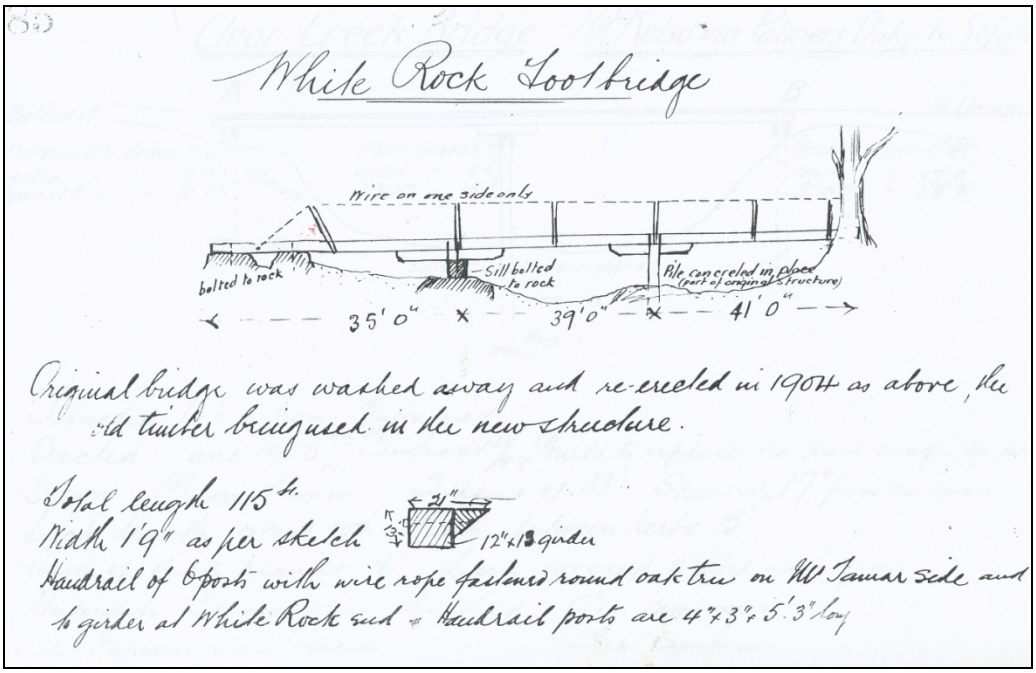


Figure 25: White Rock Footbridge (ESBR Folio 85)

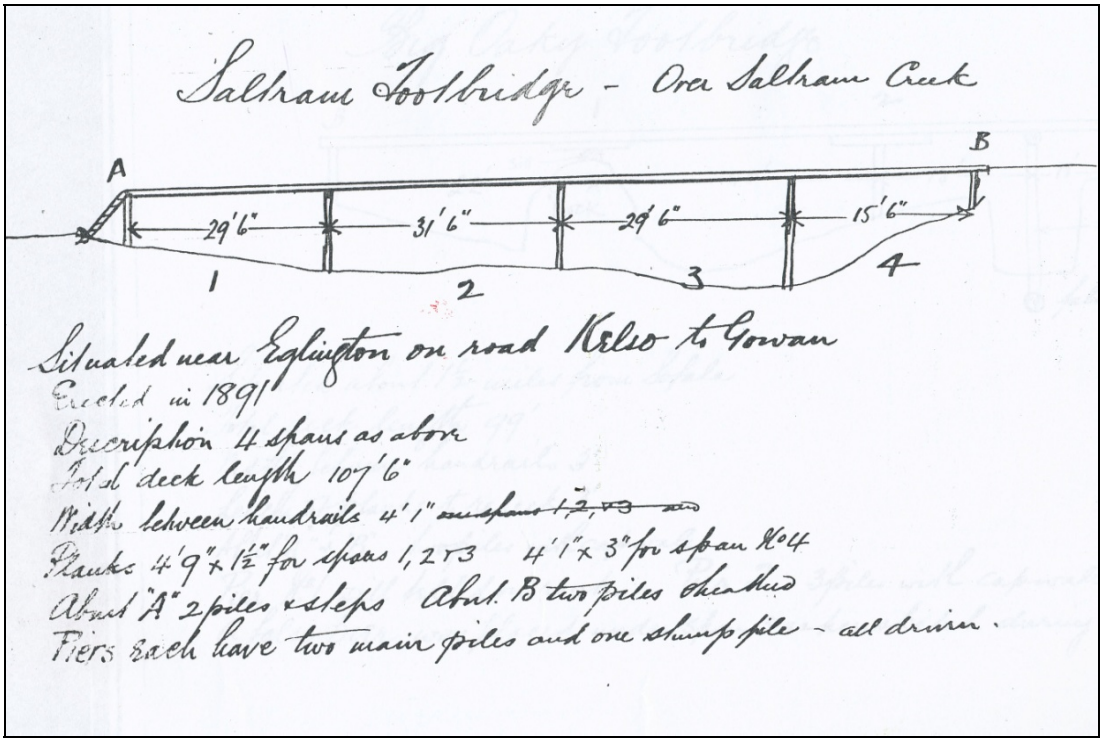


Figure 26: Saltram Footbridge, near Eglinton on the road bed between Kelso and Gowan (now Eleven Mile Drive) (ESBR 98)

Very few footbridges are listed on the NSW Heritage Branch, Department of Planning, website.

Examples on the website include one within the Holroyd City Council area, constructed in 1901 and only lasting to 1925. Other examples include reference to a series of footbridges crossing the upper reaches of Mosman Bay, though there seems to be little reference remaining today of these bridges.

BRICK BRIDGES

Some of the most spectacular bridges in the Bathurst Region are the larger brick bridges associated with the construction of the railway. Because of the topography, these bridges are rarely visible from roads. To view these structures, which cross over deep cuttings, it is normally required to move away from roads to do so.

All examples of brickwork in bridges or culverts in the Bathurst region were found to have been constructed in relation to the railways. It seems that Shire engineers did not traditionally use masonry in their projects particularly before the introduction of the railway. When the rail first came to Bathurst it brought with it an important economic boost to the community and a display of engineering structures not otherwise seen in the region.

As local historian Rob McLachlan says in his Thematic History of transport:

> *'the construction of the railway line from Sydney over the Blue Mountains to the Central West was a major engineering undertaking, probably the colony's single most significant public works project of the 19th century. It was also one of the lengthiest projects in the time taken to complete. The line, work on which commenced in the mid-1850s, only reached Bowenfels in October 1869. Built in budgeted sections, it took a further seven years for the Great Western Railway to reach Bathurst from Bowenfels in 1876. "*

Its impact on transport efficiency truly changed the status quo. Compared with road transport, rail could move people and goods quickly, efficiently and cost effectively. It was now possible to travel between Bathurst and Sydney in a matter of hours, not days. It was also now possible to transport to Sydney a wider range of agricultural products, as well as bulky quarry products.'

A number of bridges remain in the region from the initial period of rail line construction from 1870 to 1876. However some bridges had to be demolished and replaced or modified when the second line, or Duplication, as it was called, occurred. This happened between 1896 and 1922, when the double line reached Blayney. There were a number of deviations of the track involved, when sections of the original track lines were abandoned. Deviations are clearly marked on Parish Maps such as Melrose and Yetholme and the topographic maps of the same localities.

The following excerpts of Parish Maps illustrate rail deviations. Presumably the location and construction of the first rail line did not suit widening, so a second line could not be added. Therefore, an entirely new section was laid.

The Parish Map below shows the 1872-76 rail line through the Parish of Melrose and the deviation that occurred in the 1890s.

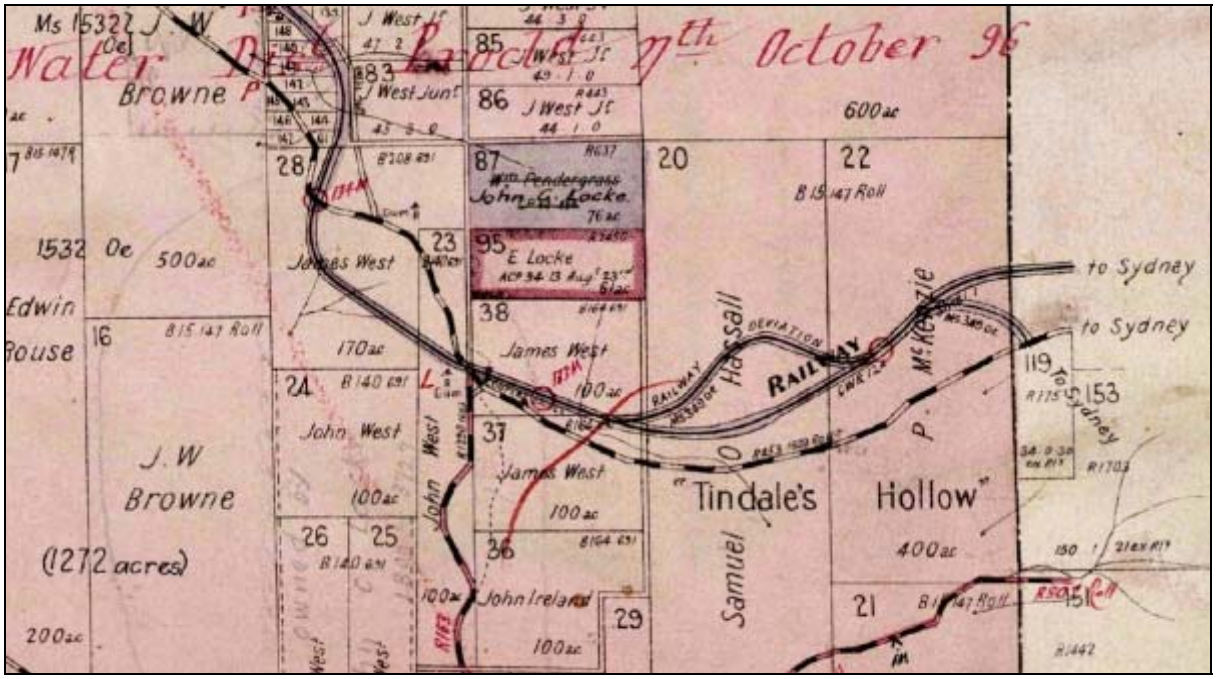


Figure 27: Part of Parish Map of Melso Edition 4, 1 December 1905 showing deviation

A little further along the line towards Sydney, in the Parish of Yetholme, near Brewongle, an even larger rail deviation is shown.

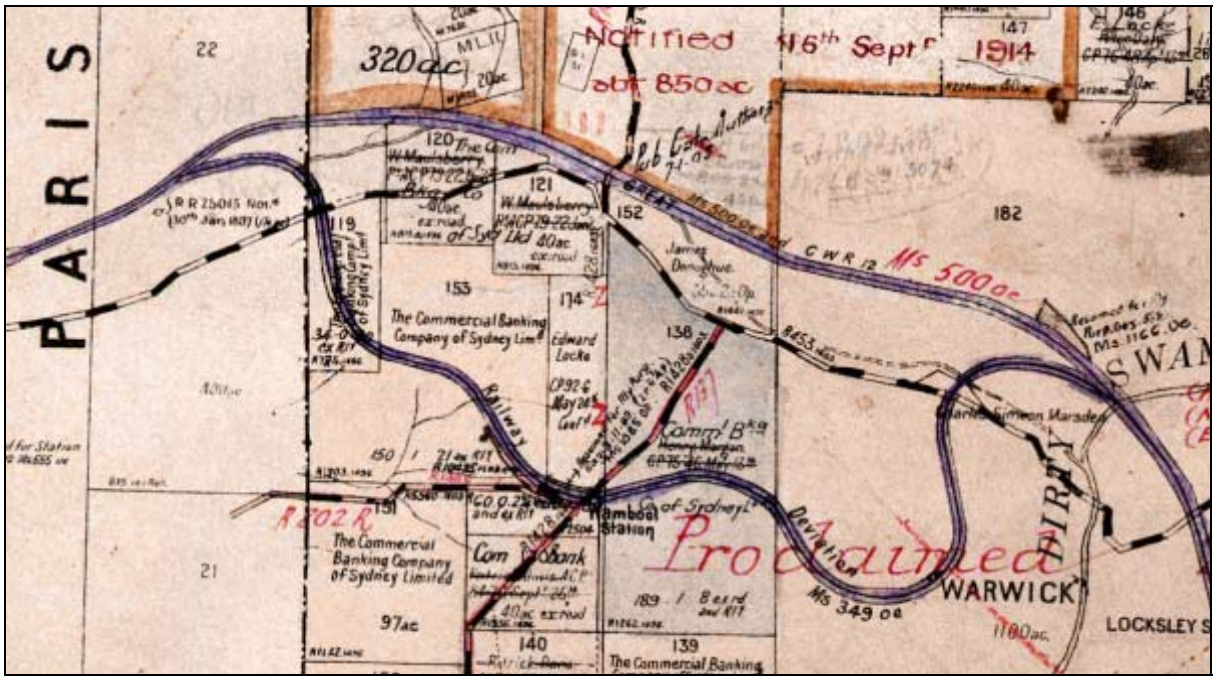


Figure 28: Part of Parish map of Yetholme Edition 4, 1908

As a result of the duplication, new bridges built over the new rail section were designed and built with engineers using modern materials to suit the period and the circumstances. Bridges that remained on the first rail line that could be widened were modified. Those that could not be widened were partially or completely demolished and replaced. The following are examples of each of these occurrences in the Bathurst Region.

- **Bridges built on the new rail section**

  These bridges were naturally more modern in concept and construction and include a number of steel truss bridges, (refer to F77 and F78 which are located over rail near Wambool).

Another example is built in brickwork, F73, and located near Brewongle. The bridge displays a long and elegant single low arch. This may be a concrete arch bridge within an otherwise brick structure, or rendered masonry. Because of the length and flatness of the arch it is not surviving well. Long horizontal cracking has appeared in the structure.

Figure 29: F73 Brewongle long single arched brick and possibly concrete bridge

- **Bridges widened or modified on the rail line.**

  These include F74, the Brewongle road bridge over rail, which is an impressive and substantial full brick triple arched structure. The bridge is constructed in face brick English Bond and fully tuck-pointed. With three arches spanning the cutting, the pair of rail lines runs through the centre arch. The brickwork is modestly decorated and the blade brick piers of the arches are tapered upwards with projecting bands of brickwork near the point where the arch springs. There are also two string courses across the bridge at road, and top of balustrade, level. Long vertical weep holes in the brick faces aid drainage. The brick balustrade, which is constructed on a slope

parallel to the road, is capped with a triple header course of shallow rectangular capping bricks which are set to fall away from the inner face.

At track level, and for a height of approximately 5.2 metres, a skin of brickwork has been removed. It is two bricks wide at the base, tapering to 1 brick or 230mm at the top. This new face was rendered over, although the upper section of nine courses has not been, indicating that this probably occurred at a later date.

Figure 30: F74 Track side detail showing brick removal to widen the space for the second rail line

Figure 31: F74 Brewongle triple arched brick bridge

- **Bridges remaining on the rail line that could not be widened.**

The brick bridge over rail on Kinghorne Falls Road (F82) is an example of a bridge which was abandoned, partially demolished and replaced. This is a strange bridge which is constructed with a light weight structure of steel to span over the rail line while the bridge structure was loaded up with brick balustrades.

Next to this bridge are the remains of the former arched brick structure with stone trim. Possibly bricks were salvaged from the demolished structure and used in the new bridge balustrade.

Figure 32: F82 A replacement bridge with steel frame and brick balustrade

Figure 33: F82 The remains of the demolished bridge, most probably an arched brick structure

- **Brick structures that were part of the abandoned rail lines.**

There are some brick structures that remain as part of the abandoned rail line. In particular brick drainage tunnels to allow for drainage under the elevated tracks remains in situ. F76 below is such an example. It formed part of the earlier rail line that was abandoned when the deviations of the mid 1890s were built near Brewongle. Presumably this high rail line on top of a levy bank structure could not be easily widened to accommodate a second track.

Figure 34: F76 Abandoned brick tunnel - drainage culvert

The scale of the drainage tunnels is quite impressive and the workmanship even more so. Examples include over Eusdale Creek on Tarana Road (F84) and a double arch bridge on Tarana Road (F86). It was possible to walk right through the tunnel of F84 as the ground surface was dry. The tunnel is 47 metres long and in excellent condition inside with all brickwork fully tuck-pointed.

Figure 35: F84 Brick tunnel

STONE AND STEEL BEAM BRIDGES

A small group of seven bridges in the Bathurst Region which were recorded as part of this study were built around the same period of the early to mid 1890s. One of the bridges over Rocks Creek F139, West Bathurst, is included in the Evans Shire Bridge Register and it serves as a general illustration for them all.

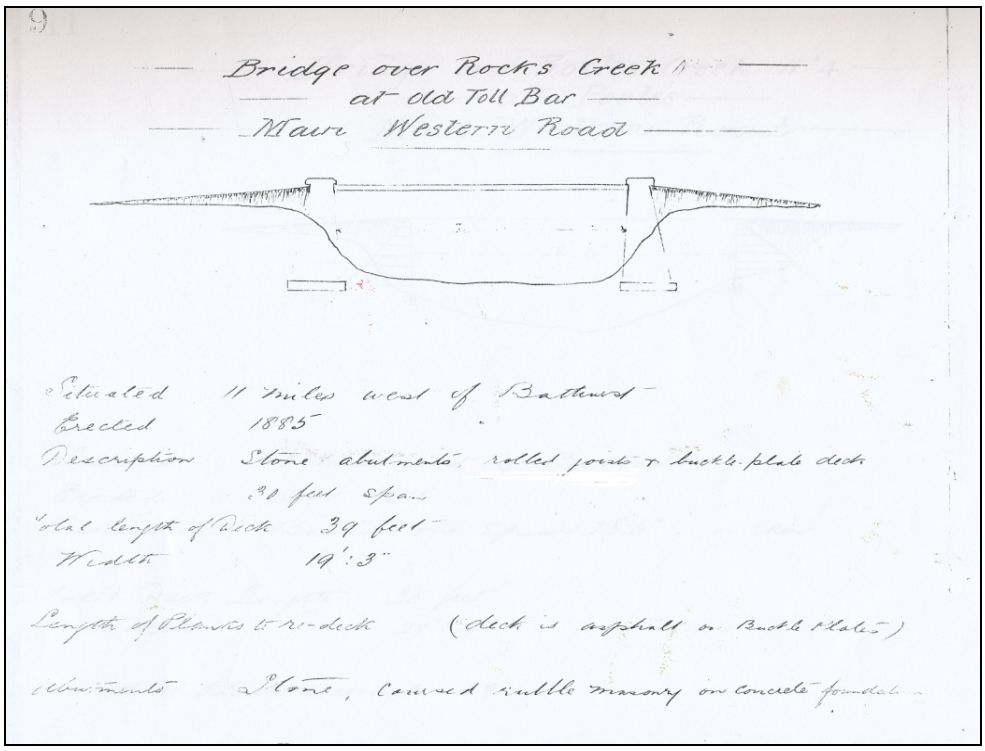


Figure 36: Folio 9 of the Evans Shire Bridge Register illustrating the bridge over Rocks Creek which is typical of this form of bridge

The above single span bridge, erected in 1885, used tapered dimensioned stone abutments with projecting caps. The span comprised steel rolled joists (an RSJ or I beam) with a buckle plate deck over. The simply supported single span achieved by this construction was 30 feet, or 9 metres long.

'Buckle plate' floors were made of iron and were an expensive, imported, material according to the RTA's book 'Bridge Types in NSW'. This was a form of decking which was 'a rigid connection between the beams and cross girders and gave a permanent smooth riding surface.' The plates were deformed in a dish shape, (pre sprung), and attached dome upwards. This was then covered with another surface, in the case of some bridges it was simply road base, or 'concrete and asphalt', as in most cases documented in the Evans Shire Bridge Register.

There are a number of similar structures described in the Evans Shire Bridge Register which most likely no longer exist. These include:

- Folio 13: The bridge over Meadows Flat Creek with iron beams, span of 23 feet: 1885.
- Folio 25: Bridge over Mutton's Gully 1884, Span of 35 feet: 1884.

- Folio 39: Bridge over Vale Creek at Russell Street Bathurst, two spans of 27 feet 6 inches: 1883.

- Folio 63: Bridge over Vale Creek at Durham Street Bathurst, two spans of 40 feet: 1883.

However, six other examples do survive in the region. They are generally of small single span construction. Examples are shown below.

Figure 37: F141 Steel and stone ridge over Jordan Creek near Bathurst Gaol

Figure 38: F141 detail

Figure 39: F51 Steel and stone bridge, Sandy Creek

Generally, the stone abutments vary in type depending on the type of local stone available. In the above case (F141) attractive bluestone was used. In other instances sandstone is the material used. The workmanship is generally consistent with the stonemason using an expressed raised mortar joint where the joint is initially flushed up, then cut or struck away to produce a raised even line of mortar. This enables the stonemason to produce an attractive, consistent, appearance even if the stones used vary considerably.

Figure 40: F51 Sandy Creek detail in sandstone

Figure 41: F141 detail in blue stone, bridge over Jordan Creek

Most of these bridges are generally in good, serviceable, condition. Some have the addition of later balustrades of Armco railings or similar. Possibly F141, near Bathurst Gaol, is the best example remaining. Its span is small, and it is in good condition and is easily accessible for viewing.

STEEL TRUSS BRIDGES

There is a small, but significant, group of only 6 steel truss bridges in the Bathurst Region. Each is an important and interesting engineering structure and has been designed by government engineers of the Railway Department of the day, (4) or by the Government (2). These are now rare structures.

A single span bolted lattice truss structure over the Queen Charlotte Vale Creek at Perthville, F49, a crossing of such commercial significance that it was designed and built by the National Government of the day and was the second of only two of its type.

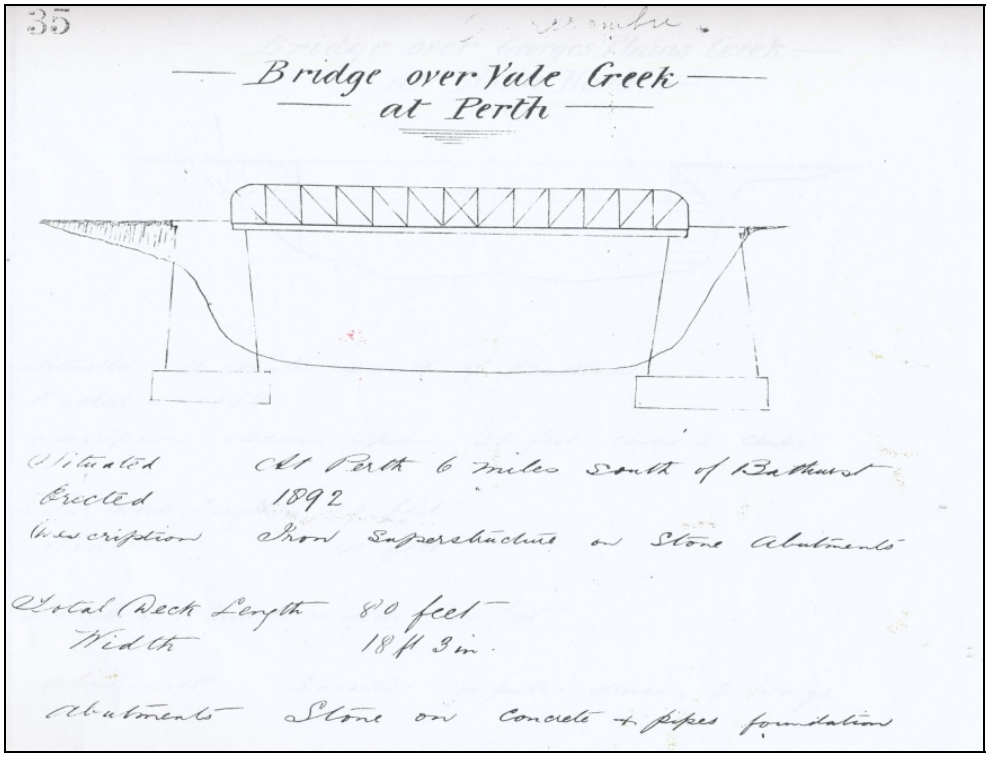
Figure 42: F49 The Queen Charlotte Vale Creek Lattice Girder Bridge at Perthville

In many ways it could be mistaken for a much more modern structure than its date of 1892. It was considered a 'state of the art' bridge of its day. Although the science was not new, the materials were. The Romans used timber lattice truss bridges over the Danube and many followed their example although it is most unlikely that they understood the science behind the structure. A Mr. Howard Carroll built the first completely engineered wrought-iron lattice truss bridge in New York in 1859. This example in Perthville is of great local significance especially as it spanned the creek in a single long span (over 28 metres) and was constructed in a relatively remote location.

The sandstone abutments are typical dimensioned sandstone blocks and projected capping used as the bridge supports. Interestingly this sandstone does not appear to be local stone, but the local bluestone, for which Perthville is well known is used in the approach walls and the retaining wall between the sandstone supports.

Figure 43: F49 This image illustrates the sandstone and blue stone abutments

This bridge is included in the Evans Shire Bridge Register with notes about its maintenance. It was scraped and repainted in 1895 using red hematite paint (Dampreys 90% oxide of iron). Its reference in the register is included in **Figure 44** below.


35

Bridge over Vale Creek
at Perth

Situated At Perth 6 miles South of Bathurst
Erected 1892
Description Iron Superstructure on Stone Abutments

Total Deck Length 80 feet
Width 18 ft 3 in.

Abutments Stone on Concrete + piles foundation

Figure 44: Folio 35 Evans Shire Bridge Register

Well known to all Bathurstians is the elegant light weight steel road bridge structure of 1888-89 at the end of Rocket Street over the Western Rail line. It comprises a half-through Schweidler iron truss, a Pratt truss design. The bridge is embellished in a Victorian tradition with folded looped balustrade, brick and sandstone abutments and Royal Crests. It is a significant bridge both historically and aesthetically and provided a most important transport link between Bathurst and the Vale region of Perthville, Georges Plains and beyond.

In ‘Linking a Nation’ Dr. Robert Lea, of the University of Western Sydney, points out the value of this particular bridge and asserts that in Australian road bridge construction in the second half of the 19th Century in NSW was remarkable.

> *‘Even the NSWGR got into the act of erecting adventurous road bridges, building a Schweidler iron truss with a single span of no less than a clear 135ft (41.2m) for a road across the railway yard at Bathurst in 1888. It is still in service. ‘*

The shaped upper chord of the trusses make the bridge unique amongst other Pratt Truss designs, with materials kept to a minimum, over a maximum single long span.

Figure 45: F59 Rocket Street Bridge

The third bridge in this group, and no less impressive, is the 1876 English steel lattice rail bridge over the Macquarie River. It is presently being replaced by a deep concrete girder bridge which may all but remove the girder bridge from view to the north.

Figure 46: F63 The steel lattice girder rail bridge over the Macquarie River with a new concrete bridge under construction in the foreground (image 7 May 2010)

While not unique, it is one of only 11 such rail truss structures in NSW[2]. The whole group of this style of truss bridge is generally under threat as they are progressively replaced by bridges suitable for today's faster and longer trains. In its location over the Macquarie River the Bathurst lattice bridge offered a special aesthetic addition to the river scene.

The fourth bridge in this section is probably the most well known to all in Bathurst and is the Denison Bridge over the Macquarie River. Until 1992 the main entrance into Bathurst by road from Sydney was over this bridge, when it was then replaced by the long concrete Evans Bridge. Since then it has become a pedestrian bridge and occasionally used for "BRE&D on the Bridge" an annual event where local produce and wine is showcased through a lunch and dinner. In March 2007 on St. Patrick's Day up to 500 people shared a meal on this historic bridge.

The Denison Bridge is an imposing three-span wrought iron bridge built in 1870 spanning the Macquarie River and well placed, because of its open curtilage, for excellent views both to and from the bridge. This makes the bridge a prominent local landmark. It was the fifth metal truss bridge built in Australia and perhaps the second oldest remaining in NSW.

The bridge's advanced design was a major engineering achievement at the time and represented the maximum achievable in span with the river section divided into three spans, supported on large round concrete piers or pylons. The approach spans are more primitive with timber slab abutments and timber supports of large trestle frames which are cross braced.

[2] National Trust.

Figure 47: F64 the Denison Bridge

Figure 48: F64 The timber under structure of the Denison Bridge

The Denison Bridge is associated with three important colonial engineers including William Christopher Bennett, (Commissioner and Engineer for Roads), Gustavus Alphonse Morrell, (Assistant Engineer and designer), and Peter Nicol Russell, (P N Russell & Co), the builder.

The final two steel truss bridges in the region are over the rail line in the Wambool area, F77 and F78. These are interesting components in the second stage of rail transport in the Bathurst Region. The bridges were constructed when the second rail line or duplication occurred in about 1898.

Figure 49: F77 Steel truss railway bridge over the new dual track line in 1898

Their construction is also of interest as they are constructed of six (6) light weight trusses made up of rail line. Rail line was used in diverse situations such as fencing, simple bridges and building foundations, but this use is truly an ‘in house’ railway solution and shows the diversity and usefulness of the rail line steel section. Presumably there were economic benefits to the rail department in using their own materials.

Figure 50: Detail of the 'rail line' steel sections used in the construction of the bridge (F77), using simple king post trusses

CONCRETE BRIDGES

In the Bathurst Region concrete bridges consist of a diverse range of bridges that cover a long time period from around 1930 to the present. Based on the physical evidence of the existing bridges there were a number of historic stages in their development generally as follows:

1. Un-reinforced concrete, and bush concrete, used in conjunction with other materials.

2. Early reinforced concrete bridges, constructed in situ 1930-40.

3. Middle 20th century period reinforced concrete bridges with some in situ and some prefabricated elements, notably handrails, 1950-60s.

4. Steel beam and concrete bridges, late 1960s and 70s.

5. Concrete bridges involving prefabricated elements such as pre-stressed beams, 1980 to present.

Concrete was initially used in conjunction with other materials. Generally this was un-reinforced and used for example to line the floor of bridges to prevent erosion and assist extending the life of bridges.

Figure 51: Sandy Creek, Ryans Road (F51) Under this stone and steel bridge 'bush' concrete material was used to seal the floor

Concrete came into its own in the Bathurst Region in the 1930s as an excellent material for bridges when Public Works and the Main Roads Board, and later the Dept of Main Roads, commenced using reinforced concrete in-situ as a primary bridge construction material.

Through reinforcement of the concrete a composite system was developed where beams, piers and slabs worked together in sharing the load. The steel was placed where it was most needed, where the load forces were highest, using the materials effectively and efficiently.

The first true continuous reinforced concrete bridge was Fuller Bridge at Lane Cove completed in 1918. Each section between piers spanned over 9 metres.

The Main Roads Board (MRB) came into being in NSW in 1924 when the Main Roads Act was passed. Their appointment was for a period of seven years until 1932. Initially the Board consisted of two engineers and a president. They were an advisory Broad whose job was to assist and encourage local authorities to maintain and construct their roads and bridges. However when acute employment problems occurred with the advent of the Great Depression of 1929 it was an opportunity for the MRB to take control of some projects directly. New plant, methods and materials could be implemented as a result. The Board also served as a training ground for young engineers who worked with the MRB initially and with experience and qualification later worked for country shire authorities taking their skills and knowledge of new materials with them.

The MRB engineers were initially all stationed in Sydney, but in 1928 it was decided that some decentralisation was needed to enable the department to keep more in touch with outlying projects[3]. Parkes was established as the centre for the Central West division.

[3] Newell, H. H (1938), Road engineering and its development in Australia 1788-1938, Dept. of Main Roads, N.S.W, [Sydney]. Hugh Newell worked at Bathurst as a supervising engineer from 1912 to 1915. This is where the names Newell Place, Kelso and the Newell Highway came from. For additional information refer to S. Croft's 'Origins of the Bathurst Street Names'

Bridge construction was usually the subject of tenders and so administration requirements were handled in the field.

The construction and maintenance of such important main roads and bridges encouraged engineers to consider new methods and materials in a revolution of road design. Road loads were greatly increasing as trucks became larger and faster. The important roads to the nation were the roads which would carry produce from the country to city markets at a time where produce was far more perishable than it is today because of older technologies.

One of the most significant concrete bridges in Bathurst is located in Lee Street, now an industrial area in Kelso. This road was then a ‘main road’ of Bathurst. This reinforced concrete bridge (F128) was constructed by the MRB in 1930.

The bridge still retains the plaque on its end post. This feature of affixing plaques to end posts was carried out for many decades by the MRB and later the DMR but unfortunately very few remain in place today.

Figure 52: F128 Lee Street concrete bridge

Figure 53: F128 Lee Street bridge end post with plaque

Another detail of this bridge, the white painted steel pipe handrails with their flanged post bases and ball joints between members, were easily assembled in situ. End posts were invariably stout rectangular concrete posts. The pipe balustrades serve as a visual guide to other reinforced concrete bridges of the 1930s and 1940s period.

Figure 54: F128 Detail of pipe handrails

Two small concrete bridges of the same period are located near Wattle Flat and Limekilns.

In 1932, with a change in government, three transport commissioners were set up to administer railways, road transport and tramways, and main roads. The Department of Main Roads led the way in making decisions about which roads constituted main or through roads, and the proper maintenance of these through continuous patrolling and inspections. Better equipment, improved methods and materials for construction subsequently resulted. Examples include the advent and improvement of bituminous materials, spreading and spraying, and motorised plant such as road graders and tractors.

From 1932 to the end of the Great Depression, car registration grew rapidly. The annual rate was 48% growth when the population was only growing at 4%[4]. Roads had to be safer and allow cars to move more efficiently. This was a boom period for concrete bridge construction.

Another bridge constructed in this important period was the 'cement' bridge over Stony Creek on The Bridle Track (F150). It again displays the white pipe handrails of the first concrete bridge in Bathurst. It was most likely constructed in the mid 1930s providing labour opportunities during the Depression period.

Figure 55: F150 The cement bridge on the Bridle Track

In the study of the Bathurst to Hill End Bridle Track Rob McLachlan, local historian, notes:

> *'Turon Shire had seen an influx of unemployed men during the Depression of the 1930s, particularly onto the old goldfields around Hill End[5]. According to a Councillor on Turon Shire Council speaking in 1939, some 75% of the unemployed in the Shire at that time were present, adding to the economic difficulties of the district which gave an incentive to the Shire to obtain relief work*

[4] Historical Overview of Bridge Types in NSW. Clause 1.52

[5] See Bruce Goodwin, *Gold and People*, pp. 45-55 Mick Masson*, Surviving the Dole Years*, pp 156-160, for an informed account of this inflow of unemployed men.

funding from the State Government. Road repair work was the usual employment provided through relief work'.

Within the Bathurst Region there are another three good examples of reinforced concrete bridges of this era built over Clear Creek, Cheshire Creek and Winburndale Rivulet (F106) on the Sofala Road probably between 1935 and 1937. They each display the characteristic white painted steel pipe handrails with flanged bases and heavy set end posts, though none now bear the DMR plaque. Each also has a modified design below the road level to suit the particular locality with support columns and beams designed to offer the least resistance to the passing stream. Close examination reveals details such as the formwork style, usually timber boards or plywood sheets.

Figure 56: F106 Bridge over Winburndale Rivulet

Figure 57: F106 End post with plaque removed

Figure 58 F112 End post at Bells Creek Hill End Road

After World War II and over the next two decades the DMR designed and constructed a number of reinforced concrete bridges in the Bathurst Region for the most important main roads of the period. Examples include the bridge over Pepper's Creek at Rockley, (1956) F33, over the Bells Creek on the Hill End to Sofala road near Chesleigh, (1954) F112, and a series of bridges across the region to Georges Plains and Cow Flat Road, (1965) F48.

Strong common characteristics of these bridges are what appear to be prefabricated balustrades of heavy concrete posts and rails, often set upon a deep concrete kerb and wide flat end posts that occasionally still carry the DMR plaque.

Designs were heavily standardised but each still had to be modified to suit the conditions of the particular location, including the length of span, the direction of the river flow and the road line, (sometimes not at a right angle to the water course), and the depth of the river. Individual designers' stamped the bridge with their own particular choice of end post.

Figure 59: Examples of plainer end posts

Figure 60: F112 Bell Creek Bridge constructed in 1954

Figure 61: F33 Peppers Creek Bridge at Rockley constructed in 1956

Figure 62: F18 One Eye bridge over Mulgunnia Creek

For small to medium bridge spans, reinforced concrete bridges from the 20th century were the most successful construction material and are likely to remain popular into the future.

STEEL AND CONCRETE BRIDGES

For a relatively short time period, from the mid 1960s and early 1970s, composite concrete and steel bridge design dominated the engineering bridge constructions of the region. With a short construction period in the Bathurst Region of around 5 to 7 years, the bridge survey located 12 bridges of this type. Those that are clearly dated are F5, F6 and F7, constructed in 1967, and F40 constructed in 1971.

The materials and design were fairly versatile allowing some changes in span and direction. The bridge over Grove Creek, F10, is aesthetically pleasing, being an unusual curved bridge. By setting the support beams at differing pitches from span to span the bridge deck has been able to be cast in a long curve over the deep ravine, making it possible to reduce the overall height of the bridge's concrete stanchions. It is difficult to imagine a better way of achieving this particular goal.

Figure 63: F10 The graceful curve of the bridge over Grove Creek

By setting the steel beams at different pitches underneath the deck allowed the cast to be curved. The off form concrete markings are clearly visible on the stanchions and underside of the deck.

Generally, this group of bridges is all constructed in a similar way. The concrete abutments and any central pier supports or stanchions were first constructed. Then a series of steel I beams, four or more, were installed and formwork placed over them. The reinforced concrete slab or deck was then poured. The earliest of these bridges in Bathurst was probably F20 over Caloola Creek and F53 at The Lagoon over Deep Creek. The feature that makes them slightly older in appearance is their squat concrete end posts and light steel rails.

Figure 64: F20 Steel beam and concrete bridge over Caloola Creek on the Lachlan Road

One of the steel and concrete bridges is an exception to the rule. F36 is a 21.5 metre long steel and concrete bridge over the rail line. This is a single lane bridge, possibly a private bridge today, leading to an agricultural property. Steel supports or props lean back steeply to

concrete pads on the sides of the railway cutting making the design unique in the Bathurst Region.

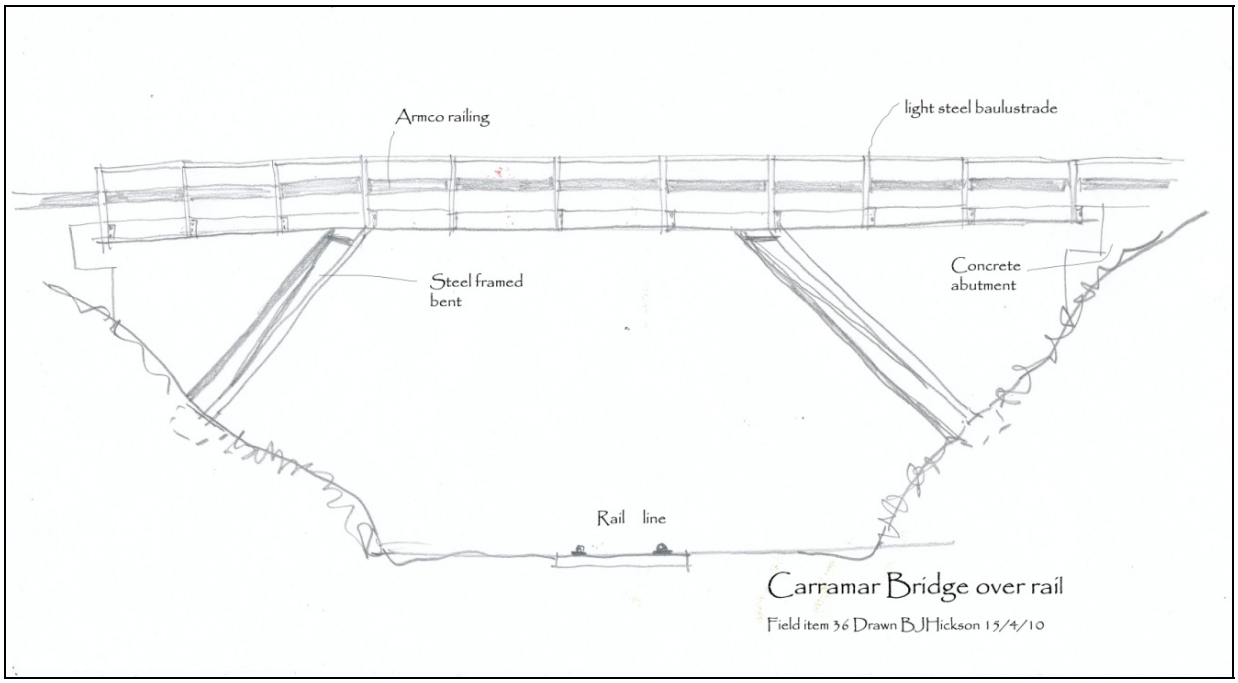


Figure 65: F36 Sketch of steel and concrete bridge over rail

Where new bridges have been constructed in recent years often remnants of former bridges have been left on site. This is, on the whole, very good practice especially where those older remains are not an encumbrance on the new structure. They serve to demonstrate the history of bridge construction and the importance of their own particular crossing.

Examples of such remnants located during the bridge survey were reasonably common.

An example includes the pre-stressed concrete bridge over the Cheshire Creek (F123) which represents a state of the art bridge constructed in minimalist, functional, concrete. A three span concrete bridge, its central supports are sets of four round columns with a cantilevered beam over. These support the integral concrete deck. Side rails consist of simple Armco railings. The span of the bridge is a long 39 metres.

Figure 66: F123 The present day pre-stressed concrete bridge over Cheshire Creek

To one side of the bridge are remnants of an earlier timber bridge circa 1880. Timber abutments and original end posts still stand on the bank, and in the creek the base of the original timber posts are still visible. This former timber bridge is listed in the Evans Shire Bridge Register, Folio 73, and was constructed c.1878-1880. It was a three span structure with a total span of 77 feet, or 23 metres.

Figure 67: F123 Original timber plan abutments and shaped timber posts from a former timber bridge at Cheshire Creek

CULVERTS AND PIPES

Box and pipe culverts make up an increasing number of water crossings and are generally an ‘off the shelf’ solution to roads over waterways, especially where the water flow is a small volume or intermittent.

A true culvert, as opposed to a bridge, is a complete structural component where walls, roof and floor are combined in one, e.g. a circular or rectangular section. They can be used as single module, or as a complete structural component where walls, roof and floor are combined in one, e.g. a circular or rectangular section. They can be used as modular elements on their own or in multiple groups.

Occasionally their construction is unusual or the combinations of pipes and culverts are used in more interesting ways. Examples include make shift pipes and arches using corrugated iron formwork and mass concrete fill such as field items F21, F46 and F57.

Figure 68: F21 A large pipe culvert formed from corrugated iron formwork and mass concrete on the Lachlan Road

Figure 69: F46 Corrugated iron formwork is used above to form up a mass concrete arch and bridge over a stream

Figure 70: F57 A more recent example of the same technology with corrugated iron formed arch bridging a stream

Some modern culverts are exceptionally large and when used in combination as a double or more, they can be placed where once an engineered bridge would have been a necessity. Exceptionally large examples include F13 a massive double pipe culvert, F28 a triple box culvert and F37 a seven unit box culvert.

Figure 71: Large culvert technology used to form a double arched bridge on main road near Trunkey Creek (F13)

Figure 72: F28 Multiple box culvert over Buck's Creek 10 metres in width and 12 metres long

Figure 73: F37 Another multiple box culvert over Evans Creek consisting of seven box openings and an overall length of 18.5 metres, where once a considerable bridge construction would have been required.

In some cases culverts are used to extend the life of older bridges where road widening is necessary. Culverts of pipes and boxes offer engineers great flexibility and easy design solutions for crossing small and intermittent streams.

THE INVENTORY

The effective management of a stock of bridges requires good first hand knowledge of the range and type of bridges in the region. To achieve this a LGA wide survey was undertaken. Its aims were to:

- Check positions and type of existing bridges and culvert structures based on Council's Central Asset ID lists, maps and Bridge Register.
- Grouping the bridges and culverts into type, construction and general age.
- Check for disused road or engineering structures in the vicinity of bridges.
- Assess the significance of the structures in relation to the development of the region, as individual structures, and those that make up part of an historic road or rail[6] system.

As the above has been completed, it is possible to make heritage recommendations for listing and the management of the heritage bridge assets.

INVENTORY SHEETS

A simple inventory sheet was developed at the outset of the study which was compatible with the State Heritage Inventory (SHI) database so that the information can be transferred to the database currently maintained by Council, if warranted. The inventory of bridge structures will ensure easy access and reference to information on these structures in the future, even if not listed. It offers the opportunity for good comparisons of the assets, which previously was not possible.

Field numbers are given as FXX. The Inventory can be consulted for further information on the particular bridge.

The bridges in the inventory have been classified into 10 different groups based on type and materials. They are:

- Timber bridges
- Timber truss bridges
- Timber and steel bridges
- Stone arch bridges
- Foot bridges
- Brick bridges
- Steel and stone bridges
- Steel truss bridges
- Concrete and steel bridges

[6] Rail bridges are currently owned and managed by the Australian Rail Track Corporation.

- Concrete bridges
- Culverts and pipes
- Miscellaneous

HERITAGE LISTING

CONSTRAINTS AND OPPORTUNITIES

Opportunities or constraints for each bridge asset, either listed or recommended to be listed can arise from its significance, from its condition or use, curtilage, from funding opportunities, statutory controls and from guiding conservation documents or other conditions, these are discussed in more detail below.

SIGNIFICANCE

One overriding constraint is that the bridge should be managed in such a way that its significance is retained. Good conservation management practices to achieve this include:

- Achieving a good understanding of the significance of the bridge asset and its context.
- Using best practices with any physical intervention necessary with the asset or the site.
- Listing the bridge, or retaining an existing listing, to achieve statutory protection.
- Having some form of interpretation so that visitors and others also understand the significance of the bridge.

BRIDGE CONDITION & USE

In making an assessment of the bridge's condition and use will include the following:

- Is the bridge in use? What conditions were it designed for and how has that changed?
- What is its general condition? Does part of the fabric need repair or replacement? Is there work required in the vicinity such as clearing of debris, weed infestations?
- Is its location a constraint? Is it lightly trafficked or not? Is this likely to change?
- Is it of interest? For example to tourists?
- Is it vulnerable to vandalism?
- If a fully upgraded bridge is needed can the listed bridge be bypassed?
- Engineering traffic standards.
- Work safe practices.

BRIDGE CURTILAGE

In considering the bridge item with respect to its setting or curtilage include the following:

- Former crossings or bridges, or parts of bridges in the vicinity.
- View to and from the bridge.

- Access to the bridge.
- Recreation or rest places near the bridge.
- Historic plantings.
- Name plates or plaques, interpretive signs.
- Other developments in the vicinity.

FUNDING

From time to time there are funding opportunities especially available for a group of items. In 2009 Federal Government funding was made available for the preservation of Stone Icons of Rylstone as part of the Jobs Fund. This work included replacing deteriorated stones and mortar to stone buildings and installing interpretative signage.

As the Bathurst Regional Council, (BRC), are the owner of most of the listed and proposed to be listed bridges as part of its Management Plan in the region, BRC should allocate additional funding for repairs and maintenance. Private owners of significant bridges, of which there are some, should access funding through the Local Heritage Fund.

A grant from the Heritage Branch, Department of Planning, could assist in the preparation of a Conservation Management Plan for the State listed bridge owned by the BRC; the Denison Bridge. Funding may also be available from the Heritage Branch for bridges of State significance through the NSW Heritage Grants program.

STATUTORY REQUIREMENTS

Statutory lists provide legal protection for heritage items. In NSW legal protection for items listed on the State Heritage Register is provided under the Heritage Act, 1977. Protection for items listed as part of Local Environment Plans is provided under the Environmental, Planning & Assessment Act 1979.

STATE LISTINGS

The existing state listed bridges within the Bathurst Region are:

- Bathurst rail bridge over Macquarie River, one of Whitton's 1870's wrought iron bridges Listing No 01025 (SHI 1080211) Field item F63.
- Bathurst Railway Station and yard group including the Rocket Street steel truss girder bridge, first used in NSW, 1888. Listing No. 01078 (SHI 1080744) Field item F59.
- Denison Bridge, an early metal truss bridge built in 1870. Listing No. 01665 (SHI 1080340) Field item F64.
- Bridge over Turon River at Wallaby Rocks. (SHI 1080669) Field item F114.

BRIDGES PROPOSED TO BE LISTED ON THE LEP AS PART OF THE CURRENT PLANNING PROPOSAL – BATHURST REGION HERITAGE:

Bridges within the Bathurst Region which were recently listed as part of the Heritage Planning Proposal are listed below.

- Abercrombie River Timber Bridge, (SHI 1080429) F12. Bathurst Regional (Interim) LEP 2005 Heritage Item I3.
- Bathurst – Kelso Railway Bridge, Macquarie River, Bathurst (SHI 1080211) F63. Bathurst Regional (Interim) LEP 2005 Heritage Item I52.
- Brewongle stone bridge (SHI 1080161) F75. Bathurst Regional (Interim) LEP 2005 Heritage Item I98.
- Brewongle Road Bridges (3) over rail, Brewongle (SHI 1080160) F73, F74 and F81. Bathurst Regional (Interim) LEP 2005 Heritage Item I99.
- Denison Bridge, Macquarie River, Bathurst (SHI 1080340) F64. Bathurst Regional (Interim) LEP 2005 Heritage Item I53.
- Hill End road stone bridges – (SHI1080655) F109, F110, F111 and F113. Bathurst Regional (Interim) LEP 2005 Heritage Item I240.
- Kellosheil Creek Stone Bridge (SHI 1080700) F130. Bathurst Regional (Interim) LEP 2005 Heritage Item I121.
- The Bridle Track, (SHI 1080616) including two stone bridges: F159 and F160, Howard's Bridge F151, the white bridge F153, the Cement Bridge F150 and others. (All road structures forming part of the Bridle Track from the cement bridge at Stony Creek to Beard Street, Hill End, will be part of the listing). Bathurst Regional (Interim) LEP 2005 Heritage Item I101.
- Timber Bridge over Turon River at Wallaby Rocks (SHI 1080669) F114. Bathurst Regional (Interim) LEP 2005 Heritage Item I239.
- Rockley Culvert bridge (SHI 1080633) F44. Bathurst Regional (Interim) LEP 2005 Heritage Item I230.
- Rocks Creek Bridge (SHI 1080731) F139. Bathurst Regional (Interim) LEP 2005 Heritage Item I265.
- Vehicular Bridge over Rail in Rocket Street (SHI 1080744) Listing No. 01078 F59. Bathurst Regional (Interim) LEP 2005 Heritage Item I249.

Some bridges may be listed by the National Trust. While this listing carries no statutory control, it serves as notice that the wider community values the item or place.

SUBSEQUENT LISTINGS PROPOSED

Many of the older bridges in the region deserve special care and maintenance. In particular full timber bridges and stone arch bridges need special attention. In this study 24 timber bridges, 14 stone bridges and a number that combine both timber and stone, were recorded. There are also steel and concrete bridges of particular interest.

For each of the bridges and culverts, an assessment of their significance has been carried out and a brief statement of significance developed (refer to individual Inventory sheets). Many have been assessed as having some significance, but not all can or should be listed.

The following bridges are recommended for local heritage listing, in addition to existing listed bridges in the region. Each of these bridges has been assessed as important based on the following.

- Rare bridges that have unusual or endangered design aspects for the region.
- Representative bridges that are good examples of an important group of bridges in the region.
- Bridges that demonstrate the evolution of bridge design or a key aspect of design or bridge construction in the region.
- Bridges that are highly creative or represent high technical achievement.

As a group, taken with the existing listed bridges in the region, they represent the development of road and rail transport in the LGA.

- **Field F10 Grove Creek concrete and steel bridge**

  Engineer's Central Asset ID No. **E1000199**

  An exceptionally aesthetic small bridge over a deep ravine where a standard design has been modified to accommodate a vertically curved roadway helping to minimise the height of the support columns. One of a small group of about 12 bridges built from 1965-72 in the region that use steel beam supports, concrete decks and off form concrete piers. The type had a short construction period. The materials were fairly versatile. Off form concrete markings are clearly visible on the abutments which were first constructed, then a series of steel I beams installed at different angles and formwork placed over them. The reinforced concrete deck was then poured.

- **Field F33 Pepper's Creek Reinforced Concrete Bridge**

  Engineer's Central Asset ID No. **E1000265**

  Good all round representative example of DMR designed reinforced concrete bridge built after WWII. Strong common characteristics of these bridges are the prefabricated balustrades of heavy concrete posts and rails often set upon a deep concrete kerb, and wide flat endposts that occasionally still carry the DMR plaque, as in this case, dated 1956.

  A standardised design but modified to suit the conditions of the situation - the length of span, the direction of the river and the road (which in this case are not at right angles) and the individual designer stamped the bridge with his own particular choice of end post. In this case a simple rectangular pillar with recessed face was used.

- **Field F36 Carramar Road bridge over rail**

  No engineering No. Possibly a private asset.

This is a 21.5 metre long steel and concrete bridge over rail. Part of a small group of about 12 bridges built from 1965-72 in the region that use steel beam supports, concrete slabs or decks and off form concrete piers. The type had a short construction period of 5-8 years. This one, however, is different from all others as it is constructed over a rail line and has unique steel stanchions.

- **Field F49 Queen Charlottes Bridge steel lattice bridge at Perthville**

  Engineer's Central Asset ID No. **E1000283**

  A single span bolted lattice truss structure over the Vale Creek at Perthville. It is an important and rare example of a single span fully bolted lattice steel bridge. This bridge was very important socially and commercially to the region where flooding has often occurred.

- **Field F52 Deep Creek stone arch bridge**

  Engineer's Central Asset ID No. **E1000180**

  An excellent example of a late Victorian single span dimensioned stone arch bridge and the tallest example in the LGA. Tall and elegantly built it has been constructed by a stonemason craftsman.

- **Field F72 Brewongle School timber bridge**

  Engineer's Central Asset ID No. **E1000090**

  On Brewongle School Road this small single span timber bridge is an intact and excellent example of the bush craft and local materials used in such a structure. It spans only 3.8 metres and features timber slab abutments, timber slab wing walls and timber railings of the late Victorian period. It is a representative example of a number of bridges apparently built by the same craftsman carpenter which includes bridges at field Nos. 22,83,85,96 and 97.

- **Field F85 Gemala timber bridge**

  Engineer's Central Asset ID No. **E1000131**

  Another timber bridge which is an intact and excellent example of the same craft and local materials. It is similar in construction to F72, except that it is multi-span. It features timber slab abutments, timber slab wing walls and timber railings of the late Victorian period. It is a good representative example of a number of bridges in the LGA apparently built by the same craftsman carpenter.

- **Field F97 Upper Turon timber bridge on Red Hill Road**

  Engineer's Central Asset ID No. **1000128**

  A third timber bridge of the same period as F72 and F85 above. This bridge has a long single span and is located on Red Hill Road leading to the Upper Turon which is now only lightly travelled. It is picturesquely positioned over a dry creek. It spans almost 8.2 metres and features timber slab abutments, locally gathered dry stone wing walls and timber railings of the late Victorian period.

- **Field F117 Coles timber bridge near Turondale**

Engineer's Central Asset ID No. **E1000139**

One of the longest low level timber crossings in the LGA and a very good example of an original timber framed low level bridge supported on corbels over short concrete beams and concrete piers with permanent, steel drum formwork. It is one of only a few of this type in the LGA. The enormous logs that support the structure and local ingenuity have contributed to the significance of this part concrete, part timber bridge. The span overall is 53 metres. It is named after an important family in the district; the Cole Family.

- **Field F128 Reinforced concrete bridge in Lee Street Kelso.**

  Engineer's Central Asset ID No. **E1000231**

  Lee Street was formerly a 'main road' of Bathurst and this bridge was possibly the first reinforced concrete bridge constructed in Bathurst. It was constructed by the Main Roads Board (forerunner to the Main Roads Dept) in 1930 during a period of labour works to relieve unemployment during the Great Depression. It still retains the original plaque on its end post, and original flanged pipe handrails. Lightly trafficked, it is generally in good and original condition.

- **Field F134 Evans Plains timber bridge**

  Engineer's Central Asset ID No. **E1000135**

  A good example of a multi-span, generally intact, late 19th Century timber bridge and an excellent example of the bush craft and local materials used in such a structure. It spans almost 27.5 metres overall and features timber cross braced trestle style frames with corbels over and timber slab abutments which were once quite common. Its original timber balustrade is missing and a concrete slab forms the deck that would have been a timber deck originally.

- **Field F141 Steel and stone bridge**

  No Engineer's Central Asset ID No allocated by Council

  Located near Bathurst Gaol this is an excellent representative example of a small group (7) of steel and iron bridges constructed from 1883 to 1885. At that date the new materials were the RSJ or I beams, used as decking joists and combined with a steel plate deck and dressed stone abutments.

Figure 74: F134 Evans Plains timber bridge

CONSERVATION GUIDELINES

The purpose of these guidelines is to develop policies that will assist in the management of Bathurst's heritage bridge assets.

The guidelines do not replace the guidance and policies of a Conservation Management Plan (CMP) for an individual bridge if it has one, but can serve as a conservation strategy for each bridge type in the absence of a CMP.

It is not always feasible to retain bridges in use. This is because of the following:

- The processes of degradation in materials.
- The changing needs traffic numbers and loads.
- Aspects of geometry such as lane numbers and widths, head clearance, etc.
- Changing and upgrading of safety standards.

In the case of heritage listed bridges that require upgrading to meet new traffic or safety standards which cannot be achieved without considerable alteration and loss of integrity to the original bridge design and materials, the following arrangements should be considered:

- Retention of the bridge to carry services or as a foot bridge only.
- Retention of the bridge as an interpretation of the original structure.

In the case of other bridges identified in this Conservation Management Plan as being significant, but not recommended for listing, the following arrangements should be considered in relation to any works identified for those bridges:

- Retention of the bridge to carry services or as a foot bridge only.
- Retention of the bridge as an interpretation of the original structure.
- Removal of the bridge only after recording, and relocation of components for re-use where possible.

STAKEHOLDERS

There are a number of different organisations and individuals involved in the ownership and management of bridges in the Bathurst LGA. These include:

- The Bathurst Regional Council.
- The State Government when on Crown lands (eg part of the Bridle Track).
- The Roads and Traffic Authority (RTA).
- The Australian Rail Track Corporation (ARTC).
- Private owners.

Each of these groups should be consulted where their specific assets are proposed to be listed or may have management issues.

There are other organisations who may have an interest in the management of bridges, and are not the owners, who may still need to be consulted. These Include:

- The Bathurst Regional Council.
- The Heritage Branch Department of Planning.
- The National Trust.
- Local communities.
- Local tourism traders.
- Bathurst & District Historical Society.

Consultation may be necessary with the above groups. For example if State listed bridges such as the rail bridge over Macquarie River, F63, the Rocket Street steel truss girder bridge, F59, or the Denison Bridge, F64 were to be altered, then the Department of Planning's Heritage Branch must be consulted.

Local communities should be consulted when locally significant bridge assets are to be altered.

CURRENT INSPECTION AND RECORDING

Processes exist in the main for the inspection of bridges from time to time to record conditions and call for maintenance. The Bathurst Regional Council Engineering Department records and inspects many of the bridge assets in the region. ARTC as the owner of most rail bridges in the region, carry out similar inspections.

A number of brick structures in the Brewongle area are suffering movement cracks. Some are over 140 years of age and so were not designed for current loads. There is on site evidence that these cracks are being monitored by ARTC.

Figure 75: F74 Cracks on one side of the rail bridge are being monitored by ARTC

However some bridges are not obvious in terms of their ownership and management. Those that are in 'unknown' ownership can fall into disrepair without notice. In particular the maintenance of timber bridges and those with timber components, is not an easy task. Floods and severe weather take their toll.

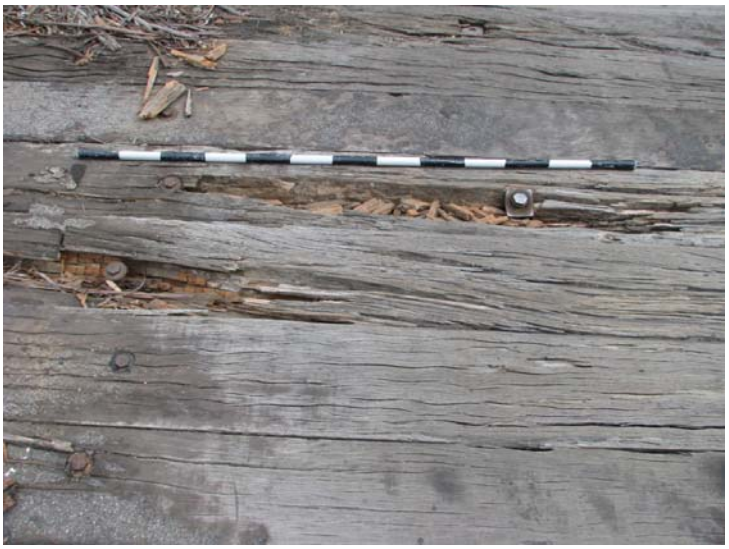


Figure 76: F83 Road deck in need of replacement above

Figure 77: F83 Two span timber bridge illustrating the signs of deterioration

The area of concern may be below the bridge as sometimes road levels are built up well above the original bridge deck.

Figure 78: F118 This steel and stone bridge is now well below road level and difficult to inspect

Where defects were noticed during the field trips, recommendations for repairs were noted on the inventory form. These defects should be inspected at the first opportunity and repairs or remedial work undertaken.

CURRENT REPAIRS

The inventory records some interesting repair features that deserve comment.

Some timber bridges have been converted from a bridge to a culvert, thus retaining much of the original fabric, but changing the structure significantly. This is an interesting solution, though it affects the aesthetics of the structure.

Figure 79: F116 Warry's Road Bridge

The above timber bridge in Hill End shown above was converted to a piped culvert when the spanning structure was determined as not structurally sound. With the alterations, a pipe culvert was inserted and the ‘space’ around it filled. The bridge is no longer in danger of collapse, but the white end wall of the pipe work is a visual distraction. It could have been screened by stone or timber walls or coloured to blend into its surrounds. In time it will colour and blend in better.

Figure 80: A typical Bridle Track small stone bridge

This small bridge shown above is located on the Bridle Track, was repaired using cement bags raising the level of the road. They were used to retain the sides of the road and are now covered with green moss and blend in quite well with the original dry stone walls. In time many alterations that are unsympathetic initially will blend in better compliment the structure they relate to.

In other examples on the Bridle Track, concrete slabs were cast over the abutments to provide a sound spanning bridge in place of former timber structure. These slabs allow the load on the bridge to be better distributed and while there is some loss of significant fabric, the replacement slabs in time will not detract from the retained historic fabric - the stone abutments. In some cases the slab can be cast slightly wider than the present bridge allowing for future road widening.

Figure 81: Cast slab over small stone bridge on the Bridle Track

GENERAL HERITAGE BRIDGE ISSUES

With the completion of this study, and the establishment of an identified subset of listed bridge assets, special resources may need to be focused on particular bridge types. This will enable the heritage significance of each bridge to be better preserved.

Listed bridges require an extra level of inspection and recording. Many are bridges of a considerable age and built of materials no longer used in modern bridge construction. A special bridge heritage assets record of inspections and maintenance should be developed and maintained. This record should be prepared as a consequence to this study.

Unlike unlisted bridges in the region listing will result in greater emphasis on:

- Retention of the bridge in use as a first option.
- Retention of the bridge, even when the bridge can no longer be used for the original purpose it was designed.
- Minimise visual changes to the bridge.
- Repairs to the bridge to be in keeping with original materials and methods when possible.
- Changes in attitude about works in the vicinity of listed assets so that they do not visually or physically detract from the listed bridge.
- Special additional management strategies such as interpretation and recording.
- Community consultation when major changes are proposed.
- Consideration of the additional documentation processes where change is involved with an item of local or State listing.
- Careful installation of services, only when necessary and with minimum material impact.

MANAGEMENT OF BATHURST'S HERITAGE BRIDGES

Individual inventories for each proposed or existing listed bridge illustrate why particular bridges are considered of significance. The statement of significance has been prepared based on the NSW heritage assessment criteria. However a more detailed assessment could be made as a first step towards listing additional bridges with the development of a specific SHI database form for each bridge.

For a State listed bridge an individual Conservation Management Plan (CMP) should be considered by the respective owners. A CMP would outline management policies and procedures for the structure. It would guide specific works in relation to the bridge and will define the curtilage of the bridge. It is not known if CMPs exist for the RTA and ARTC owned bridges in this region.

- The RTA state listed bridge is located in the inventory as F12: Abercrombie River Timber Bridge.
- The ARTC state listed bridges are Field 63: Lattice Rail bridge over the Macquarie River and F59, the Rocket Street steel truss girder bridge.

- The BRC state listed bridge is Field 64: Denison Bridge.

For locally listed bridges a generic management strategy is included as part of this study. These conservation strategies will address the various categories of construction after an overview of policy statements.

STANDARD EXEMPTIONS

The NSW Heritage Council provides a detailed list of standard exemptions for works that can proceed without approval. This list should be considered when works are proposed. Where proposed work falls into the categories of work described in the standard exemptions only notification is required.

- Standard exemptions that may be relevant to proposed works could include:
- Standard exemption 1: maintenance and cleaning.
- Standard exemption 2: repairs.
- Standard exemption 3: painting.
- Standard exemption 5: restoration.
- Standard exemption 7: minor activities with no adverse impact on heritage significance.
- Standard exemption 8: non-significant fabric.
- Standard exemption 11: temporary structures.
- Standard exemption 13: signage.
- Standard exemption 15: compliance with minimum standards and orders.
- Standard exemption 16: safety and security.

For further information regarding standard exemptions, refer to the heritage Branch guidelines at www.heritage.nsw.gov.au

Figure 82: Small Bridal Track bridge near Hill End

CONSERVATION POLICIES

For all locally listed bridge structures owned by the Bathurst Regional Council, the following conservation strategy or generic Conservation Management Plan has been developed for the implementation of work.

GENERAL PRINCIPLES

The primary purpose of this document is to guide future care and use of the bridge asset in the following areas:

- To retain significance of the bridge and its curtilage, (check the statement of significance as per the Inventory form or SHI data form). This will indicate particular characteristics that should be conserved for the future.
- To conserve the physical condition of the bridge.
- The use of the bridge as part of a transport system.
- Constraints and opportunities.
- Maintenance and ongoing care.
- Interpretation.

The Burra Charter is the guiding document on conservation. Best practice is embedded in the charter for conservation. A full reading is recommended, but the following articles are important sections with respect to the care of bridges:

Article 2: The aim of conservation is to retain the cultural significance of a place or item.

Article 3: Conservation requires a cautious approach, or 'as much as necessary, as little as possible' is a good rule to remember.

Article 4: Conservation works should utilise appropriate skills, e.g. bridge engineers, stone masons, joiners, metal workers and concreters, when needed.

Further issues that might guide works include:

- What fabric should be conserved/repaired, or reconstructed?
- What works will be cost effective? e.g. Could a bridge stone mason repair a number of bridges per year?
- What work is required in the vicinity of the bridge to retain its curtilage? e.g. weed removal, repairing nearby erosion problems, repairing bridge floors, removal of debris such as fallen trees, rocks and the like. Other items of importance within the curtilage will include former crossings or bridge components.
- Installation of services on a bridge.
- Access to places to stop safely near the bridge.

The following general policies should apply to any listed bridge.

Policies to retain significance

Policy 1: Work in a manner that will retain the significance of the bridge by managing the components that make this bridge important e.g. original fabric.

Policy 2: Assess the relative importance or significance of all the components that make up the bridge and its context so that the most significant components are retained and conserved, while those elements that detract from its significance can be changed or removed.

Policies arising from the physical condition of the bridge

Policy 3: Undertake Best practice to conserve the bridge work including conservation, reconstruction, repairs, etc.

Policy 4: Where necessary, make specific decisions regarding components such as original stone or timber abutments, timber decking, supporting piers, wing walls and balustrades.

Policy 5: Ensure that the work is carried out by a suitably qualified person(s) for the particular component in a manner that is best practice.

Policy 6: Assess the comparative value of the work to be undertaken and identify its urgency and priority.

Policy 7: If significant elements must be removed or a bridge replaced, retain evidence of their original location through photography, drawings and sketches or the retention of components in-situ.

Policies arising from the setting

Policy 8: Consider works required for the management of the curtilage of a bridge to maintain existing and significant visual and physical links, significant views and preserve its historic location.

Policies arising out of the use of the bridge for transport system or services

Policy 9: Where possible, retain the relevance of the bridge for the movement of vehicles, pedestrians and services.

Policy 10: If additional services are added to a bridge consider methods that minimise visual impact.

Policies arising from the constraints and opportunities

Policy 11: Comply with any statutory requirements that apply to the bridge.

Policy 12: Consider the requirements of the owner of the bridge.

Policy 13: Consider the requirements of other interested persons including the local community, adjoining owners, historical groups and tourists.

Policy 14: Consider work safe practices.

Policy 15: Consider value for money on work carried out and grant opportunities.

Policies for maintenance and ongoing care

Discussion: It is important to consider the ongoing care and maintenance of bridges and maintenance techniques that do not detract from significance of listed items. Initially check practices that are currently in place and ascertain tradespeople that may be available to undertake repair work[7]. How often is the work required and what works should be routine? A maintenance schedule should consider:

- Drainage and erosion.
- Vegetation and clearing of infestations of damaging weeds.
- Public risk management.
- Operational issues.

Policy 16: Make recommendations for regular maintenance including:

- Work schedules for specific bridges and their surrounds.
- Weed control and removal of unwanted plants.

Policy 17: Recommend review of all processes associated with the bridge.

Policy 18: Record and document all changes made to the bridge.

Policy 19: Consider additional research and the recording of the bridge in a SHI format.

Policies for interpretation

Discussion: 'Interpretation' includes methods employed to communicate the value and meaning of the bridge to others. The interpretation may be a combination of media and site work. Conservation work on the site and to the bridges, for example, can lead to improved visual appreciation of a bridge which is a form of interpretation. The replacement of missing fabric such as balustrade caps is an example of this. Interpretation materials can include written material, maps or images of past bridges. Interpretation may include:

- Access from nearby parking spaces.
- Interpretation panels or signs.
- Brochures – specific to a bridge, or for a group of bridges.
- Appropriate repairs and reconstructions that recover significance for a specific bridge.

Signage near a bridge could be located carefully so that it does not detract from the bridge. Do not affix new signs to the bridge where possible. Signage should include:

- The bridge name and any information of association
- Known history of the bridge.

[7] Refer to BRC Heritage Trades Director on Council's website

- Brief history of the place.

Policy 20: Make recommendations for interpretation including signage, publications, and repair bridge works.

Policy for continued use

Policy 21: Where possible allow for the continued use of the bridge as a road bridge or, if not possible, as a footbridge and/or if historically relevant, to carry services.

Figure 83: F99 Former road bridge and now retained as a footbridge in Sofala

RECOMMENDATIONS

MAINTENANCE

Where there is no material affect on the significance of a bridge, routine maintenance could include:

- Cleaning of decks and structure.
- Repairs of barriers or installation of similar barriers to original.
- Managing weeds and the stabilisation of banks and rehabilitation of the drainage path.
- The clearing of vegetation and accumulated flood debris from bridge and culvert waterways after flood events.
- The reinstatement of scour and erosion damage in waterways.
- Felling and removal of trees in the vicinity if causing damage to the structure.
- Repainting, repairs and restoration.

Refer to standard exemptions above regarding maintenance.

NEW WORK

Where new works are proposed such as widening a bridge, or the approaches, new services or the replacement of the bridge, a list of works required to be undertaken should be prepared.

For heritage items a heritage impact assessment must be prepared to determine the effect new work will have on the heritage significance of the bridge. Such proposals should be referred to the heritage section of Council for joint discussion and the approval process to minimise impact prior to preparation on new plans.

Bypassing a heritage bridge will mean a loss of an important aspect of any bridge but would be the preferred option over demolition. This may mean a new bridge is to be built within its curtilage and will have a visual and social impact. There will also be factors of public safety, continued maintenance and suitable barriers to limit vehicular access, that must be considered.

One bridge in Bathurst, The Denison Bridge over the Macquarie River (F64) was considered so significant that when it was replaced as a road bridge in 1992 by the large concrete Evans Bridge, it was allowed to continue as a foot bridge and to carry services across the Macquarie River to Kelso.

Another State listed bridge, the Lattice Rail Bridge (F63)over the Macquarie River, has also been retained and yet will soon be replaced by a new concrete bridge. While no longer visible from the north or east sides it is nevertheless a bridge of considerable significance and it is hoped that it will be made accessible in the future to pedestrians and cyclists. It is important that the bridge retain some function as it is difficult in the long term to justify expenditure on maintenance of an asset that cannot be used, seen or appreciated.

Figure 84: F63 Formwork in front of the original steel lattice bridge (20 May 2010)

New services must also be considered with respect to any additional risks posed to the bridge such as spillage of fluids or gas.

Council consent will be required for all work on heritage listed bridges except for maintenance work as listed above works that can be considered as exempt, or can be undertaken in conjunction with the State Environmental Planning Policy – Infrastructure.

OPERATIONAL ISSUES

Bridges are different from many built structures in that they are usually publicly accessible engineering structures accommodating the travelling public. There are special issues that must be considered as a result.

1. Bridge engineering

Bridges are designed to carry traffic, rail and/or in some cases pedestrians. The engineer may need to make an assessment to decide if traffic conditions are changing and what future developments may apply.

The design codes that apply to bridge structures have increasing requirements for the design loads for traffic volumes and weights. These loads were not envisaged when the region's heritage bridges were originally erected. The Austroads 'Guide to Heritage Bridge Management' states that

> *'in the later half of the 20th Century vehicle loadings increased at a rate of 10% per decade. Assessment and strengthening should consider the range of loads including vehicular loads, dynamic loads, acceleration and breaking, temperature effects, stream and wind loads and barrier design.*

The desired lane widths or numbers of vehicle lanes required may have changed. Space and access for additional bike or foot lanes may be an issue. There will be a

need to develop new strategies to deal with changing hydraulic standards, especially factors relating to flooding.

The real challenge to engineers is in making older bridges safe without an unacceptable loss of significance. There may be a need to fully review a bridge structure and as a result some bridges may require restricted loads, have additional strengthening members added to the structure or, to be adapted to a less intensive purpose or bypassed.

2. Risk management

Bridges that are available to the travelling public must function in a safe manner. The key responsibility is to provide a bridge that functions well under current traffic requirements while at the same time managing an asset with respect to its cultural significance. These two issues may be conflicting and it is important to understand the bridge's level of significance.

If it is of low significance and does not meet the operational requirements, then its retention may not be justified. If on the other hand it is of high significance, a rare bridge or a good representative example of a period or type, then management of the asset will justify retention even if strengthening of members is necessary, or the bridge must be adapted to a less intensive purpose or bypassed.

There are risk management guidelines available that may be of assistance in these cases[8].

3. Limited resources

Because Councils have limited resources and must manage a large stock of roads and bridges in their region, the proposed list of bridges recommended by this study for listing has been limited to those bridges of the highest level of significance or particularly good example of different types of structure. For example, in the case of early timber bridges there are a number of examples constructed around the same time by the same carpenters. So only a few of these bridges, although they are very similar, have been recommended for listing.

STRENGTHENING

Strengthening may require additional structural members. New members should not visually detract from the original design. The approach should be in order of preference:

1. Where possible, original fabric should be retained and additional strengthening members added.

2. Replace members with similar materials and methods.

3. Record original members then replace.

Examples found in the study included the addition of steel members to original timber structures and the casting of concrete slabs to form new decks over existing timber decks.

[8] http://www.ncsi.com.au/iso-31000.html Provides advice on the risk management standard. See attachment.

FABRIC REPAIRS

Refer to earlier clause on current repairs (page 64).

There are detailed guidelines for road engineers on inspections and testing of structures providing a much greater depth of information which is beyond the scope of this report and study. The notes below relate to visually obvious works such as painting, replacement of components, pointing up of mortar joints in masonry, re-standing damaged members. All of this type of work should be guided by the policies above. Some specific guidelines for different materials follows:

MASONRY REPAIRS

Painting

Paintings of the inside face of masonry bridge balustrades is carried out to make structures more visible and safer for night driving. There are a number of examples in the LGA. Such paint should be water soluble and not more detrimental to the masonry surface than possible. In particular the paint should be able to breath, that is allowing soluble salts to pass through the coating.

It is preferable if such paint work is limited to the extent necessary to make the structure safely seen and not covering the entire surface down to the ground. As a rule of thumb it is recommended that such paint work be limited to the area 5 or 6 brick courses above ground, or two stone courses. Paint will not extend the life of masonry.

Figure 85: F73 Typical painted bridge balustrade. This bridge is a rail overpass bridge in Brewongle

Pointing up

With many of the masonry structures the mortar joints, especially those in contact with the ground, require re-pointing. Refer to the NSW Heritage Information Series Guidelines for Salt attach and Rising Damp, which is available on line at www.heritage.nsw.gov.au

Re-point masonry as follows:

1. With a traditional mortar in keeping with the original components and proportions.

2. Strike, rake or flush the joint to match the original joints.

Replacement of fabric

With brick bridges, if part of the bridge fabric has deteriorated through cracking, dislocation, rising damp and spalling or through a collision, the brickwork should be repaired using matching materials, or as close to a match as possible. Fallen bricks can be cleaned and reused. Alternately second hand bricks of the period should be obtained.

In the study area most brickwork was sound. One portion of brickwork at the end of a balustrade had fallen and been disregarded. Cracking brickwork may need to be strapped or shored up. It is worth noting that all brick bridges in the LGA belong to ARTC and so are their responsibility.

With stone bridges, of which there are a number of significant examples, if part of the fabric has deteriorated through cracking, dislocation, rising damp and spalling or through a collision, the stone work should be repaired or replaced using matching material. Sandstone, Granite and a slaty stone have been used in the LGA and new stone should be of the same type. Fallen stones can be cut, cleaned and reused.

Steel Repairs

Painting

Repainting previously painted surfaces of any steel work should be carried out with high performance protective coatings sympathetic to the original colour scheme for the bridge or bridges of the period where this is known or can be ascertained. Paint will extend the life of a steel bridge or steel components by helping it resist corrosion.

Figure 86: F59 Corroding steel balustrade on the Rocket Street bridge

Replacement of fabric

If steel bridges must be structurally upgraded, existing steel members should be retained if possible and additional fabric added. This may not always be possible and in that case engineers will have to make decisions, in consultation with heritage advisers that will enable upgrades of structures while minimising loss of aesthetic significance. This may mean working with a similar configuration of steel work, whilst using higher grade materials.

For example the timber and steel bridge over the Turon River at Wallaby Rocks, F144, has been significantly upgraded. Some timber members such as handrails have been replaced with steel sections of a similar shape and geometry to the original. Additional steel straps have been added and the whole bridge re-painted. There has been some loss of original materials and of integrity. However on balance the result is a bridge visually similar to the original and retaining most of the original design intent, yet able to support modern traffic loads.

Figure 87: F144 Details of timber and steel work of the bridge over the Turon River

Timber Repairs

Painting

Timber bridges are also painted white to increase visibility. At the same time paint can extend the life of the bridge. Painting should be limited to previously painted surfaces, but the value of painting timber to extending its life could provide mitigating circumstances to extending the paint process.

Replacement and repair of timber

Where it is necessary to repair or replace timber components due to damage such as cracking, rot, infestations or structural failure, replace timber sections with matching profile and species. If possible retain sound sections and splice new section in.

As there are a number of timber bridges in the LGA of similar manufacture, if any are lost through demolition, sound timber components should be salvaged for repairs to others.

The RTA Timber Bridge manual 2008 provides detailed guidelines on inspection and testing of timber structures, maintenance and remedial repairs and should be consulted.

Figure 88: F72 Timber bridge in Brewongle

Recapping posts

Most timber posts were originally capped with galvanised iron sheet, cut, bent, strapped and clouted into place. These caps prolonged the life of the posts and where they are missing they should be replaced in similar fashion.

Soil build-up

Remove soil build-up or other debris over or against decking, kerbs and other timbers. Such build up will promote rot and infestations. Check that the deck is properly draining.

CONCRETE REPAIRS

Concrete was initially believed to be a maintenance free material. However it is now known that this is the case and physical damage may occur due to harmful environmental conditions, deficient materials and methods used initially and through physical damage such as collisions and vandalism. Concrete repair is a specialist area and it is an area where knowledge is still developing. The NSW Heritage Branch publication 'The investigation and repair of Historic Concrete' should be consulted as a first step. Patch repairs are the most common treatment for repair and various repair mixes and methods of coating are available.

RECORDING

To understand what works have been carried out on heritage bridges, new works and repairs should be recorded. This can be done in terms of written notes, drawings or sketches and photographs.

Records are important as a subsequent historical record of the bridge. Regular maintenance and repair records provide a guide for the future needs of the asset. It can also be seen in this document how valuable the Evans Shire Bridge Register was as an historical document.

Additional methods may be needed if it is seen that the structure is deteriorating. For example if cracking, monitoring of cracks is then required.

If consideration is given to the change of ownership of a heritage bridge, then a full and comprehensive record should be prepared. This record should be transferred to any new owner so they can maintain the record.

If adaptation of use will result, then care must be taken in consideration of what additional works are required as part of that adaptation, and how will the bridge significance will be affected.

DEMOLITION, SALVAGE AND RECORDING

In the event of approved demolition of a heritage bridge a Statement of Heritage Impact (SoHI) and a photographic record will be required at a minimum. Refer to the NSW Heritage Information Series Guidelines for Photographic Recording of Heritage Items, and a Statement of Heritage Impact which are available on line at www.heritage.nsw.gov.au. Bathurst Regional Council also has photographic guidelines available on its website.

If demolition occurs, parts of the bridge may be salvaged for similarly constructed bridges. As mentioned earlier in the case of timber bridges in the LGA there are a number of bridges of the same construction. Only three timber bridges are recommended for listing as being good representative examples of this group of six bridges. Fields F72 Brewongle School Road timber bridge, F85 Gemala Timber bridge and F97 Upper Turon timber bridge, Red Hill Road are recommended for listing. A further three similar bridges in the LGA were built by the same carpenter craftsman. These are recorded in fields F22 (double span), F83 (double span), and F96 (double span). While not recommended for heritage listing they are none the less important and significant timber bridges of the Victorian era. If they were to be demolished at some point in the future, parts of their fabric may well serve as replacement fabric for the remaining listed timber bridges.

Figure 89: F85 Timber bridge post detail typical of six bridges in the LGA

DEFINITIONS

Refer to The Burra Charter.

ATTACHMENTS

1. Bibliography
2. Thematic history of Transport by Robin McLachlan
3. Risk Management Standard
4. Burra Charter

ATTACHMENT 1 BIBLIOGRAPHY

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ATTACHMENT 2: PART 20 OF THE THEMATIC HISTORY OF BATHURST BY ROBIN MCLACHLAN (MARCH 2007)

20. Transport

The Bathurst road was bad when I was here before, but now there is no word that I should like to use that would the least express its state. (Rachel Henning, letter 19th May 1861)

Transport can be defined as the ways and means by which people carry themselves and their goods. In short, transport is how people travel. In the case of the Bathurst region, the history of transport is largely about road, rail and air travel. However, long before the arrival of European settlers, the Wiradjuri as part of their nomadic culture had established a complex network of pathways or foot tracks. Local pathways linked with others that were part of extended trading routes. The first official roads built by European settlers were constructed to handle wagons requiring easy gradients and linked points of importance to European settlers, and therefore may well have ignored existing trails. However, it is possible that some of the early unofficial tracks in the district, especially those developed by pastoralists for droving, were surveyed with the assistance of Wiradjuri knowledge and may indeed have followed Wiradjuri pathways. It also seems likely that those roads that followed watercourses may have coincided with Wiradjuri trails. The subject of early roads and tracks having a Wiradjuri heritage warrants further research.

20.1 Roads

The history of roads in the Bathurst Regional Council area is closely tied to the establishment of Bathurst as a primary centre beyond the Blue Mountains. It is very much a case of 'All Roads lead to Bathurst'. It is an interesting, if not unique, feature of the area's settlement history that the construction of the road preceded settlement. The more common pattern in British colonial history is for the building of the road to follow the first wave of settlement, utilising the rough track established by the pioneers.

The first road to Bathurst was constructed by William Cox and convict workers across the Blue Mountains and onto Bathurst over a period of six months between July 1814 and January 1815, and was begun only months after Surveyor George Evans explored the Bathurst Plains. Known as Cox's Road, the twelve foot-wide road descended to the Vale of Clwydd below Mount York, then continued westward to Sidmouth Valley. It reached O'Connell Plains along the line of present-day Carlwood Road. At a point approximately two kilometres south of the village of O'Connell, Cox's Road entered the Bathurst Regional Council area, roughly along the line of the present-day O'Connell Plains Road. Keeping to the south of the Fish River, and not crossing that river, the road crossed the Campbells River at some point to the north of the bridge at The Lagoon, possibly on 'Riverview'. The road then followed the river's course northwards to its confluence with the Fish River, where the two rivers form the Macquarie River. Following the Macquarie River the road continued onto Bathurst, without crossing the river. (The general line of the road follows approximately the present-day Lagoon and Gormans Hill roads.) Cox's Road terminated in Bathurst on the south (west) bank of the river at the foot of William Street. (Information on the likely route of Cox's Road provided by Kevin Boole, Bathurst & District Branch of the National Trust. An 1827 map provided in T Barker, A History of Bathurst (1992), Vol. 1, p.26, provides further advice on the road's route, suggesting the road may have crossed Campbells River twice.)

Within a decade or so of its construction, Cox's Road was rivaled as the preferred route from the mountains by other roads, including unofficial deviations, offering either easier or shorter routes. Locally, these changes were mainly to do with fording the river to the east of Bathurst and approaching the settled area over more easily travelled country, a practice encouraged by the establishment of William Lawson's pastoral property at 'Macquarie' in mid

1815. The changes in route also reflect the growth of free settlement around Kelso and the distribution of early land grants along the east or north sides of the rivers. In effect, as settlement gathered pace not all travellers were headed for the government base at Bathurst. The crossing at White Rock quickly became a popular route. A new official route was surveyed in 1823 which crossed the Fish River at O'Connell and, following the line of the present day Bathurst-O'Connell road, entered Bathurst via Kelso, thus requiring a crossing of the Macquarie River at journey's end for those continuing on to the Bathurst settlement. This more direct route from O'Connell to Bathurst quickly became the preferred road and appears to have been incorporated into Major Edmund Lockyer's 1829 road. Cox's Road via the Lagoon was soon referred to as the 'Old Bathurst Road'.

A lasting and more significant change in the road to Bathurst came in 1830 with the building of an entirely new road under Major Mitchell's direction. Mitchell's survey brought his road, named the Great Western Road, into the BRC area through Meadow Flat, Brown's Hill and down onto the Bathurst Plains and then into Kelso. Perhaps of greater significance for Bathurst than the line of the road's entry into the settlement was Mitchell's use of Victoria Pass in place of Mount York, a dangerously steep pass for those descending in loaded wagons. Mount York was equally too steep for loaded wagons to ascend easily. Mitchell's Great Western Road (now Highway) proved to be the most efficacious route, quickly eclipsing the roads pioneered by Cox and Lockyer. Mitchell's road continues to provide the main road access between the Bathurst region and the Blue Mountains and Sydney. There have been, of course, some changes in the actual line of the road, but sections of the original road can be followed running parallel to the modern highway in the vicinity of Walang. 'Green Swamp Inn' at Walang, built in the 1830s, sits alongside such a section. (See below, a toll bar existed nearby in the 1870s, adding to the heritage significance of this road section.)

It may be useful to reflect briefly on both the rejection of William Cox's pioneering road and the long-term impact his road had on the subsequent development of Bathurst. Cox followed a route that terminated his road on the left or southern side of the Macquarie River - and it was at that point of termination that he also fixed the site for the new settlement of Bathurst, a decision endorsed by Governor Macquarie a few months later. It may have been in the better interests of the settlers, however, if both the road and the settlement had been made on the north side of the river. Early free settlement began on that side of the river and, as Mitchell established, the better road from the mountains came from that direction. Marooned on the south side of the river, Bathurst soon found itself in desperate need of a bridge and otherwise disadvantaged from time to time, as for example in the delay in bringing the rail service across the river from Kelso to Bathurst. If Cox had found a route along the north side of the river and had sited the proposed government settlement accordingly, much would be different in the details of Bathurst City's subsequent history. His road - a different Cox's Road - would also perhaps still be in use.

The convict-built roads to Bathurst, constructed between 1814-1830, were major undertakings in road construction in early colonial Australia. In ways both practical and metaphorical, they opened the way to inland settlement and development. These early roads also contributed to Bathurst's establishment as a centre for government and commerce, as well as a place of road junctions. Bathurst provided the hub for roads radiating into the country beyond, thereby facilitating pastoral settlement and communication with other early settlements in the Central West.

These early roads leading on from Bathurst often began as tracks guided by the natural features of the country, for example following ridge lines, and sometimes came about from the private efforts of pastoralists and other travellers, perhaps following in the footsteps of explorers and surveyors - or Wiradjuri guides. Tracks became roads, of a sort, as people used the more popular routes ever more frequently. In discussing early roads, one employs

the term 'road' very loosely and indeed this is so until late in the 19th century, if not into the 20th century. Their condition was usually deplorable for want of maintenance and it was not uncommon for travellers to deviate from the line of the road to find firmer ground not churned up by previous wagons or stock.

The first major road to be built from Bathurst was that leading westward to the government settlement at Wellington, established in 1823. The road was constructed along a line surveyed by John Oxley in 1817 and 1818. Originally known as Simpson's Line, after the first commandant at Wellington, and later as the Orange Road, it follows closely the route of the present-day Mitchell Highway (so named in 1936). This road, for which Bathurst is a terminus, played a crucial role in opening up the country west of the Macquarie River. The road to Wellington was a government initiative and convict built, as was the Limekilns Road, built by 1827 to access limestone deposits.

Other roads were less official in their origin. As settlement advanced, some of these rough tracks gained official acknowledgement as roads, and were duly surveyed and gazetted as public roads - and work undertaken on them by the colonial government. To the north, what began as a cattle track in the 1830s followed generally a line close to the present-day road to Wattle Flat via Winburndale Rivulet and Mount Wiagdon, and then to the present-day village of Sofala. Here it crossed the Turon and continued northwest to join the Mudgee Road at Tabrabucca Swamp. To the west of this track was another early track leading to Mudgee via Duramana and Millah Murrah, following approximately the present-day Turondale Road. A markedly better road system developed in the area of Campbells River and Queen Charlotte's Vale, largely because of the greater pastoral activity there. The establishment of Rockley, a crossroads settlement, was an outcome. An early road to the Lachlan Valley (Cowra) area of settlement went south from Bathurst through present-day Perthville and across Fitzgerald's Valley. Another road to the Lachlan went via Campbells River and Dunn's Plains (near Rockley). The main road to the Lachlan Valley today, the Mid Western Highway via Evans Plains and King's Plains, was proclaimed in 1928, but follows the line of a surveyed road dating from at least 1861. ('Mid Western Highway' Historical Roads of NSW (1958), p.14). Other early tracks in the south of the BRC area, and now largely forgotten, include the line surveyed by Charles Throsby in 1819 from Bong Bong, together with Meehan's Road (named after Surveyor James Meehan) between Bathurst and Lake (Lagoon) Burra Burra. A myriad of lesser roads and tracks connected to individual properties or provided shortcuts and links to other main routes. For example, Gilmour Street began as a track to William Cox's grant at 'Hereford'. Some of the area's roads are, or were, also Travelling Stock Routes and, in some cases, the movement of stock was the initial reason for the road, as for example the Bathurst to Sofala road. The stock reserves provided on these roads, together with the extra wide road allowance, has benefited the survival of local flora.

The needs of government and pastoral settlement decided the routes of roads in the first decades of settlement. After 1851, such decisions were determined by discoveries of gold. Interestingly, the early road pattern served the needs of the gold rush remarkably well, for example the road to Sofala took diggers to the very centre of a rich find. The gold rush though led to important new road construction - and the improvement of old roads (most notably the Great Western). The Bridle Track road from Duramana to Hill End, with its impressive stone embankments and terrifying cliff face sections, was built in consequence of the gold discoveries in the Hill End and Tambaroora area. The original bridle track, remnants of which can still be seen alongside the present-day road, may have its origins in a track made by the Suttor family in the mid-1840s to access their pastoral holdings on the Hill End plateau. The Bridle Track route to Hill End was replaced in the 1880s by a better road connection via Monkey Hill and Sofala. The gold discoveries in the Trunkey Creek area led to the building of the road from Bathurst to Tuena and Goulburn, probably in the 1860s. This

gold rush era road now provides the main road connection to the BRC's southern boundary along the Abercrombie River.

Roads were in a very real sense the arteries of the region, for along them flowed people and goods, the lifeblood of commerce. However, until the gold rush, roads would have seen relatively little traffic given the sparse population of the area and the distances to be travelled. Wool would have been the main outward road freight, carried along by slow moving bullock teams. The amount of traffic increased dramatically with the gold rush. Inns - ever more with the gold rush - were positioned along the roads at regular intervals, as well as in the settlements, to serve the needs of the traveller and his animals, a necessary arrangement given the relatively short distances that could be travelled before the use of motor vehicles. A journey that might take us three or four hours in a car today could easily take three or four days by very fast coach. A heavily laden wagon might with good luck travel 15 or 20 kilometres in a day. Mrs Elizabeth Hawkins' journey from Sydney to Bathurst in 1822 - with her children and all her worldly possessions - took eighteen days. A wool laden bullock wagon of the 1840s might take four weeks to reach Sydney from the BRC area. To serve such 'staged' travel, dozens, if not hundreds, of inns or hotels, often with blacksmith and animal forage nearby, once operated in the region. They varied considerably in quality, with some offering a quality service and others being little more than shanties. Their importance can be seen in the many accounts, often highly detailed, provided by travellers. (See, for example, G Mackaness, Fourteen Journeys over the Blue Mountains of New South Wales, 1813-1841 (1965))

While there are still licensed hotels dating from this period in some of the larger villages, no roadside hotels remain from the many that would have once existed. Some have survived as private residences; others exist only as ruined sites. Their disappearance was due to a combination of lost trade that came with the motor vehicle and restrictions in licencing. From the mid-20th century, an American innovation, the motel, offered a new style of accommodation. Local folklore claims that the Bathurst Motor Inn (originally the American Motel, then Sunset Motel) on Durham Street was the first such motel built in Australia. (Date of construction not found.) At least one traditional inn responded to the challenge, the Kelso Hotel added a motel wing and survived. The motor vehicle also led to the development of other roadside services. The petrol station and the motor garage replaced the blacksmith, or, in some cases, the blacksmith evolved to meet this new demand. Garages replaced stables and coach houses or were altered for this new purpose.

Before the introduction of motor vehicles and the railway, however, the horse and the bullock provided the most common means of long distance transport. Bicycles were used from the late 19th century, particularly by itinerant agricultural workers such as shearers. For those too poor to travel otherwise, shoe leather was sometimes the only means of transport. Stables, carriage houses and blacksmiths are to be found on many properties and in villages in the area, a reminder of this era of saddle, carriage and horseshoe. For most people, travel between the area's settlements, or further afield to Sydney, meant travel by public coach. A coach service was operating between Sydney and Bathurst as early as 1824, undertaking the journey in four to five days. The gold rush led to an increased demand for coaches.

The most significant development locally in consequence of that demand was the establishment by James Rutherford in 1862 of Cobb & Co. in Bathurst, a firm which came to dominate the coaching scene. Cobb & Co. brought not only a coach service to the area - and beyond - but the firm also established its coach factory in Bathurst and operated horse-breeding properties in the wider area. (A restored Cobb & Co. coach is on display in the Bathurst Visitor Information Centre.) Cobb & Co. was an innovative company. Its American coach design, using leather springs for example, offered a more comfortable ride compared with those of British design. Its horses were bred to run fast but short stages (average 16

km) and were harnessed in a characteristic five-horse team arrangement. A network of roadside inns and changing stations provided staging posts for the rapid changing of teams. The Royal Hotel at Sofala, with the coach booking office now part of the bar, was part of this network. Along the Mitchell Highway at Vittoria, the Beekeeper's Inn, known locally as the 'halfway' house, also provided a coach change station. Cobb & Co. offers an interesting example of technology transfer with its American coach design, as well as a case study of an early integrated business managed on an American model, voracious in competition with smaller local competitors. When viewed from that perspective, one can perhaps see Cobb & Co. as a harbinger of economic regimes to come, including globalisation. (A useful history of Cobb & Co. can be found in Diane de St. Hilaire Simmonds, Cobb & Co. Heritage Trail Bathurst to Bourke (1999). Rachel Henning in her letter of 19th May 1861 provides a colourful description of her journey from Sydney, part of which was with Cobb & Co.)

The first known motor vehicle on the area's roads was a homemade steam car in 1893. In 1900, the Thomson Steam Car (now in the Melbourne Museum) was brought by rail to Bathurst from Sydney for exhibition at the annual Bathurst Show. The owner, Herbert Thomson, drove the car back to Melbourne from Bathurst, the first long distance motor trip in Australia, a journey of 790 kilometres over ten days at an average speed of 14km/hr. (The vehicle is on display in the Melbourne Museum.) Within a few years, an increasing number of petrol motor vehicles made their way, if slowly, over the mountains. The first Bathurst owned vehicle was very likely that of Dr Tom Machattie, which arrived in 1904 after a temporary abandonment owing to impassably deep mud on the Great Western Road at Meadow Flat. The concurrence of deep mud and an ever-increasing public enthusiasm for motor vehicles was not an acceptable arrangement. The motor vehicle required improved, all-weather roads. (Further information on early motoring in the area can be found in Chris Morgan, 'The 1909 Brush Motor Car,' Newsletter of the Bathurst District Historical Society, No.67, January-April 2005. The Brush Motor Car, the earliest existing locally owned motor vehicle, is on display at Bathurst Visitors Information Centre.)

The administration of roads presents a complex history. Gazetted roads, as opposed to informal tracks, were public works and the colonial government's responsibility to fund, build and maintain. The raising of funds for road maintenance was sometimes done through tollgates, or toll bars, on the road. One such toll bar operated in the 1870s in Kelso on the Sydney Road (Great Western Road), possibly at the corner of Gilmour Street. (A McRae and C Churches, Kelso Village (2001), Book I, pp137-140) Other toll bars operated around the same time at the Rocks on the Mitchell Highway, near the bridge discussed below in this entry, and on the Great Western Road near 'Green Swamp Inn' (Walang). The government office charged with the task of public works evolved in 1859 into the Public Works Department. In 1906, the responsibility for the maintenance of country roads passed to the newly created Shires. Main roads, such as the Great Western Road and the Orange Road/Mitchell Highway, remained under the control of the Public Works Department. Other main or trunk roads included - in the north - the roads to Sofala via Wattle Flat, Hill End (as far as Monkey Hill), and Limekilns (until 1923). In the south, trunk roads went from Bathurst to Rockley and to Trunkey Creek, with the Trunkey Creek road continuing on to the Abercrombie River, via Newbridge (until 1928) and Caloola (from 1928). Roads within Bathurst, and also within Hill End until 1908, had become a local responsibility earlier when municipal status was acquired.

With the increasing use of roads by motorised traffic and the accompanying community expectation of better roads, main road responsibility was passed in 1925 to the Main Roads Board, a new government department solely concerned with roads. It evolved into the Department of Main Roads in 1932 and more recently into the RTA. From 1925, in general and not always uniformly or with immediacy because of depression and war, there began a process of improving main roads. This included the paving of the Great Western and Mitchell highways (excluding near Vittoria) by 1938 and the Mid Western Highway to Cowra

by 1960. A similar programme of improving other trunk roads and local roads followed. The relatively recent improvement of the area's internal network of roads, particularly their sealing, has had a significant impact by reducing isolation and making the services of Bathurst more accessible. Writing in the early 1980s, Eve Buscombe (Wattle Flat Goldfields (1983)) noted the then recent improvements on the 'Mount Wyagdon' (Mount Wiagdon) section of their road to Bathurst, together with the final sealing of the road. These improvements, she wrote are 'bound to change the nature of life on the Wattle Flat plateau which has been relatively isolated for the past decades that the motor car has been king.'

It is worth observing that not a great deal has changed in the routes of the area's main roads in the past 150 years, making many of the BRC's roads of some historic interest. Roads have waxed and waned in relative importance and sections of roads have been re-routed, but little has been added to the area's road network since the late 19th century. The main east-west roads, namely the precursors of the Great Western and Mitchell highways, were surveyed and built by the 1830s. Around that time, other roads and tracks ran north and south, the lines of many of which would be recognisable to a modern traveller. By the end of the first decade or so of the gold rush, other major roads in the area were in place and much of the present-day road network was largely established.

It is also worth noting that this road network has sometimes laid the base for a subsequent physical impact of some lasting significance, particularly within settlements. For example, the entry of the Great Western Road into Bathurst allowed for a straggling ribbon development through the village of Kelso. The Great Western Road, in effect, became its defacto high street, thereby denying Kelso any real centre. By contrast in Bathurst, the decision to follow Durham and Stewart streets as the connecting roads to the Mitchell and Mid Western highways on the city's southern outskirts has helped both to create and preserve a compact – and heritage rich - city centre. But this has happened at the expense of creating an uneasy mix of commercial and residential use of these two streets. The present-day ribbon layout of Wattle Flat along the Bathurst-Sofala (north-south) road reflects the increased use of that road to Sofala during the gold rush era. The east-west road from Limekilns became the less travelled road, and thus the less desirable location for Wattle Flat's shops and inns.

While much of the early road network has been built over with road improvements, it is still possible to find sections of old roads revealing early road building methods. For example, an abandoned section of the early dirt road between Wattle Flat and Sofala, possibly improved with the gold rush, shows the use of logs set transversely into the roadbed to resist erosion. No substantiated remnants of Cox's Road have been identified to date in the BRC area. However, its general line can be followed and archaeological evidence of the road may still exist, although the possibility is remote that such evidence can be identified unequivocally as such. Unsealed sections of the early Lachlan Valley road from Dunn's Plains/Rockley, signposted as 'Old Lachlan Road', together with another early road signposted as 'Old Trunk Road', are still in use. The two roads to Hill End are still essentially late 19th century road in their design and construction.

(Historical details on roads have been drawn largely from the entry on Communications in Volume 1 of the Evans Shire Heritage Study, 1987; T Barker, 'The Roads of the Region' in Volume I of Goldney and Bowie, A Report to the Australian Heritage Commission, 1987; and, T Barker, A History of Bathurst (1992) Vol 1. Information on the wider history of roads in NSW can be found in R Broomham, Vital Connections: A History of NSW Roads from 1788 (2001).) T Barker,

20.2 Road bridges

In an area with many watercourses, the bridge is an essential part of road construction. The absence of a bridge over the Macquarie at Bathurst was a major problem, made worse by the re-routing of the Sydney road to the north of the river. Until late 1855, the river was crossed - and Bathurst reached - either by fording or by ferry (after 1832, approximately along the line of the Evans Bridge). Bathurst was frequently isolated by flooding or high water, a situation that interfered with its administrative role. With the discovery of gold in 1851 along the Turon, merchants on the 'wrong' side of the Macquarie found the absence of an easy crossing a cause of lost business. Government administrators equally found the river increased their isolation from where their services were needed. A bridge was finally provided after 40 years of settlement and only after considerable local lobbying. A five arch laminated timber arch bridge, 380 feet long and 31 feet wide, was completed in 1855 and opened on 1st January 1856 by Governor Denison, after whom the bridge was named. On 13th January a second bridge, privately built, was opened downstream near the newly established village of Eglinton. The village and the bridge were the initiatives of George Ranken, after whom the bridge was named. (A crude - gravity defying - drawing of Ranken's Bridge is held by the Bathurst District Historical Society.) The opening of these two bridges, particularly the Denison Bridge, were significant events in the area's history. Both bridges were destroyed in the space of an hour in the June 1867 flood, their loss a major blow to residents and travellers alike.

The replacement bridge, completed in 1870 and also named the Denison Bridge, is a bridge of historic importance. It is a wrought iron truss bridge using an American design, the Pratt truss, and, according to the Institute of Engineers, Australia (Historic Engineering Marker, 1995), was the first Pratt truss bridge in New South Wales. This use of an American design, over a British design, represented a major departure from previous practice by the colonial government. Its construction as a metal truss bridge, rather than as a timber or stone bridge, was also innovative. The 1870 Denison Bridge is the second oldest metal truss bridge in NSW and the fifth oldest in Australia. (NSW Heritage Media Release, 23rd May 2003) The bridge was built entirely, or at least almost so, from iron produced and fabricated in the colony, thus helping to establish a benchmark in the colony's industrial capabilities. The Denison Bridge was decommissioned in 1992 and replaced by the Evans Bridge, a concrete span structure, which is located approximately on the site of the first Denison Bridge.

Another historic road bridge crossing of the river within Bathurst can be found at the ‘George Street Falls’. The date of the first bridge built here is not known with certainty, but there have been at least three bridges at this site. The present-day concrete span bridge replaced a timber beam bridge built in the early 1930s at the suggestion of Robert Edgell. Edgell sought a new bridge capable of taking trucks carrying cut asparagus to his factory, finding the existing bridge old and unsafe. Further down the river, the Edgell's company built another vehicular beam bridge, presumably at a later date, linking agricultural land on the north bank with farming operations on the south bank and via Esrom Street with the cannery. Known locally today as the 'Simplot Bridge', this bridge is a private bridge and is still in use by Simplot. The Simplot Bridge may possibly have a connection with Robert Gordon Edgell, who prior to his agricultural career was involved in bridge design work.

Since 1855, there have been at least eleven vehicular bridges built across the Macquarie River along the Bathurst/Kelso to Eglinton stretch. Five remain, the oldest being the 1870 Denison Bridge. These bridges reflect both the growth of Bathurst as a community and its role as a gateway to the inland of New South Wales. There is as well a metaphorical meaning to these bridges in that the Macquarie River marked the official frontier in the first decade of settlement.

There are, or have been, many other historically important road bridges in the BRC area, including numerous humble timber span bridges, a number of stone bridges and some impressive timber arch bridges. To list or review all such bridges is not within the purpose of this study. The bridges along the Sofala to Hill End road do though warrant mention. Still in use, they include several well-constructed stone arch bridges over creeks near Sofala and a timber Allan truss bridge, built circa 1897, over the Turon at Wallaby Rocks. Not only are these bridges quality examples of their type, but their presence on this road offers evidence of its past importance in providing efficient communication with a once significant gold mining centre. The timber truss bridge over the Turon, together with a similar bridge over the Abercrombie, are both NSW Public Works Department designed bridges dating from a time when that department had an international standing in the design and construction of timber truss bridges. On the Mitchell Highway, a rolled steel joist (beam) and buckle plate bridge over Rocks Creek (near the 'Old Toll Bar'), built in 1885 and now by-passed, offers an interesting comparison with the more recent concrete bridges on that highway.

Footbridges over streams were once more common than is the case today. Although now in a damaged condition and no longer in use, the remnants of the Sofala footbridge, an iron lattice girder bridge, is an unusual example of such a bridge, and one with considerable social history. The bridge was originally erected over the Fish River at O'Connell around 1870 and brought to Sofala in 1882, following the opening of a road bridge at O'Connell. The footbridge remained in use at Sofala until demolished in 1986 by a flood. A photograph of a pedestrian swing bridge over the Macquarie (1928) is given in J Buchan, Freemantle via Bathurst (2001), p.179. (See also his discussion on the building of the Freemantle road bridge in 1930.)

(Further information, including photographs, on rural road bridges in the BRC area can be found in Volume I of the Evans Shire Council Heritage Study, 1987. Historical and technical information on some 45 historical road and footbridges, including demolished and decommissioned bridges, throughout the BRC area can be found in the Bridge Register Bathurst, a manuscript document held by the BRC. T Barker, A History of Bathurst (1992 & 1998), Vols 1 & 2 offers detailed information on Bathurst's bridges. An information sheet, ‘Bridging the Macquarie’, prepared in 2006 by R McLachlan is available from the BRC.)

20.3 Rail

The construction of the railway line from Sydney over the Blue Mountains to the Central West was a major engineering undertaking, probably the colony's single most significant public works project of the 19th century. It was also one of the lengthiest projects in the time taken to complete. The line, work on which commenced in the mid-1850s, only reached Bowenfels in October 1869. While other communities, such as Mudgee and Molong, had to lobby and petition for a railway line, there seems never to have been any doubt that the main line would include Bathurst. The issue was when this would happen. Built in budgeted sections, it took a further seven years for the Great Western Railway to reach Bathurst from Bowenfels. Temporary terminal stations (railheads) were established progressively at Locksley in April 1872, Brewongle (Macquarie Plains) in July 1872, Raglan in March 1873, Kelso in February 1875 and Bathurst in April 1876. In November 1876, the line reached Blayney, via stations at Perthville (Perth), Georges Plains and Wimbledon (Fitzgerald's Platform). The stagecoach network, principally that of Cobb & Co., linked with the terminals, progressively moving westward as the line extended. Although the existence of a temporary terminal station was brief, it offered the host settlement lucrative opportunities in providing services for travellers and freight. This could be the cause of community friction, as it was between Kelso and Bathurst, when Kelso business interests lobbied to delay the extension of the line across the Macquarie River to Bathurst.

Generally speaking, the coming of the railway had an impact on the area's settlements. In the case of Raglan, the two years of serving as a terminus was sufficient to establish it as a permanent village. A railway station in a village brought business and provided improved mail and freight services. The securing of a village station was often the outcome of keen lobbying and petitioning. The failure of the railway to pass through a settlement was a serious blow to its future viability, a factor that needs to be considered when looking at the history of Rockley, for example. Villages in more rugged areas, such as Sofala as well as Hill End, were never serious contenders for a railway connection. For Bathurst, the arrival of the railway was an important benchmark in its history. Bathurst gained major railway workshops for maintenance of engines and carriages and with this a significant influx of industrial workers, impacting on the class structure of the town - and its culture with the formation of a brass band by the railway workers. Railway workers and their families formed a socially and politically distinctive cohort in Bathurst until at least the 1970s.

But, it was in its impact on transport efficiency that the railway truly changed the status quo. Compared with road transport, rail could move people and goods quickly, efficiently and cost effectively. It was now possible to travel between Bathurst and Sydney in a matter of hours, not days. It was also now possible to transport to Sydney a wider range of agricultural products, as well as bulky quarry products. Improved transport saw the development of new industries in the BRC area, notably fruit and vegetable growing. Some industries, however, did not benefit from the rail link. Bathurst's flourmills found in time that the market in Sydney was not for their milled flour but was more for the inland's wheat for milling by Sydney mills. Bathurst manufacturers discovered that the rail brought goods from outside rival manufacturers into what had once been a market effectively closed to outside competition. The rail link was of importance during wartime, as evident in the ordnance depot sheds along Lloyds Road with their spur lines. The siting of the Bathurst stock saleyards in the 1880s also required easy access to the rail line.

The appearance of motor transport in the early 20th century, as discussed above, did not have much initial impact on the predominant role of the railway. Instead, for a time the railway contributed to a relative decline in the importance of road transport. The re-emergence of roads came only with improvements in both motor vehicles and roads, from about the middle of the century. Since then, the railway has steadily declined in its overall importance - so much so that the passenger rail service has now become largely a motor bus service.

Although the railway is diminished in importance today, its arrival was a seminal moment in the area's history. This importance, understood and acknowledged by the people of that time, is reflected in the public ceremony presided over by the Governor, Sir Hercules Robinson, to open the Bathurst Railway Station in April 1876. Railway stations and staff accommodation, including the many decommissioned village stations, are reminders of the earlier pre-eminent role of the railway. The most significant artifact of the railway era is, of course, the railway line itself, including its bridges. There are a number of impressive overbridges along the eastern part of the line, as well as evidence of the re-routing of the line to achieve an easier gradient. The wrought iron lattice girder bridge across the Macquarie, built in 1876 and of British design, is the oldest example of its type still in use on the NSW Railway system. Plans were made to replace this bridge in 1912 over concerns for its safety. Concrete piers were constructed alongside the 1876 bridge but no further progress was made on building a replacement. Despite these safety concerns, the bridge continued in use and it is only now, in 2007, that action is being taken to complete the replacement bridge. The Rocket Street road bridge, built in 1888-89, is an American Pratt truss bridge with an impressive span of 41.2 metres. These two bridges provide valuable insights into late 19th century railway engineering. Bathurst's railway history can as well make the unique claim of an association with Ben Chifley, unquestionably Australia's most famous

locomotive driver. The locomotive (No. 5112) associated with his career on the railway is owned by the BRC, having been allocated to Bathurst City Council in 1972.

Within Bathurst, Keppel Street went from being one of Bathurst's least commercial streets to one of some pre-eminence following the locating of the railway station at its foot in 1876. Two hotels (including the Victoria Hotel) were built to greet travellers on their arrival – and farewell them on their departure. Fine buildings with shops and eateries led on to Machattie Park and the 'old' city centre. Bathurst has never had since such an elegant gateway. Keppel Street remains largely intact and offers today a superb example of how a street was purposely developed to accommodate a major change in transportation services.

(See T Barker, A History of Bathurst (1998), Vol 2, pp177-190 for a detailed account of the area's early rail history. Further information, including photographs, on rail bridges in the BRC area can be found in Volume I of the Evans Shire Council Heritage Study, 1987.)

ATTACHMENT 3: RISK MANAGEMENT STANDARD.

http://www.ncsi.com.au/iso-31000.html provides advice on the Risk Management Standard.

AS/NZS ISO 31000-2009 Risk Management – Principles and Guidelines replaces AS/NZS 4360-2004 Risk Management as the leading resource available to Australian directors, top level executives and others responsible for managing an organisation's risks and achieving objectives. AS/NZS ISO 31000 is a direct adoption of the new International Standard, which is based significantly on the 2004 edition of the Australian/New Zealand Risk Management Standard.

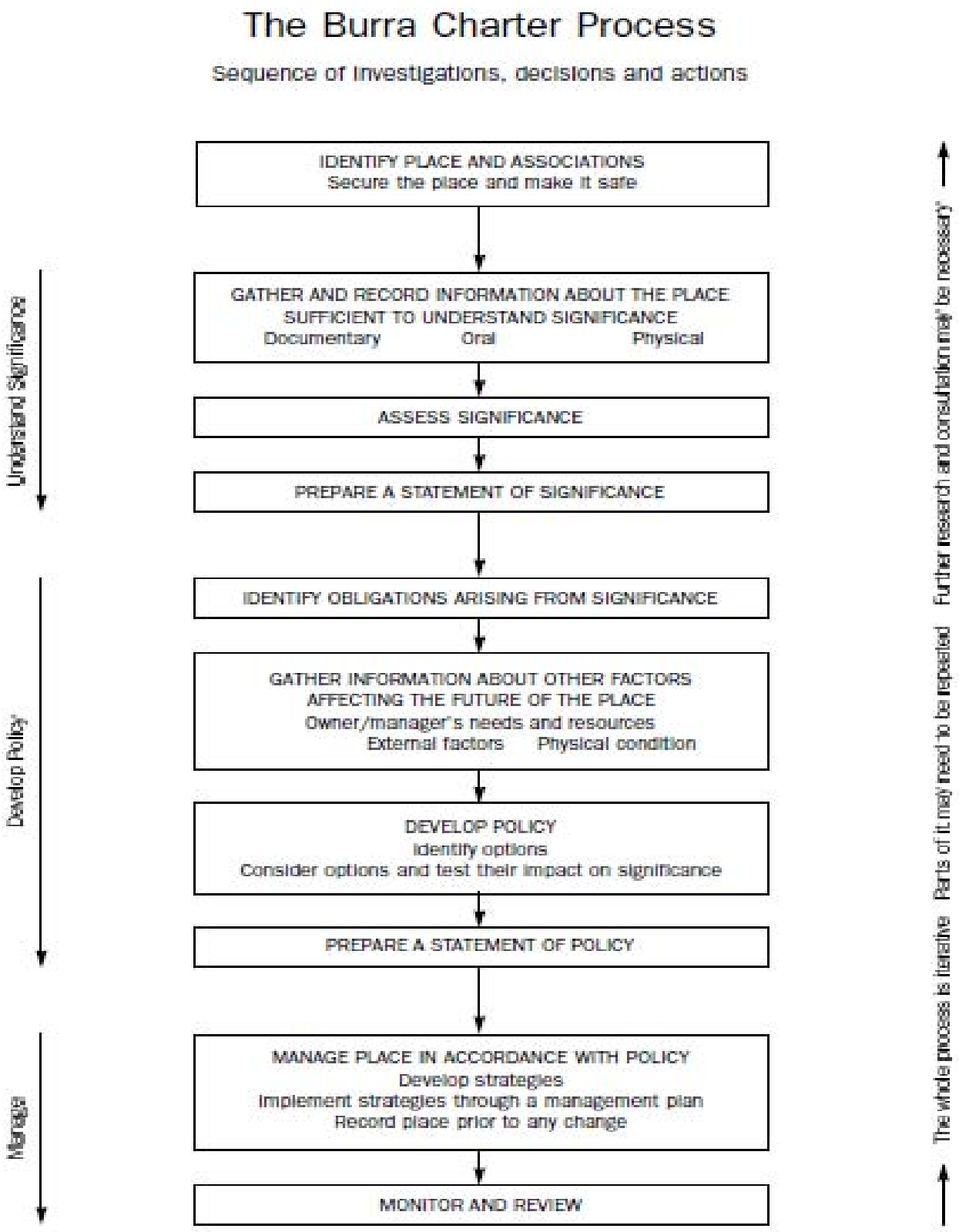
Risk Management is an iterative process consisting of steps that, when undertaken in sequence, enable continuous improvement in decision-making and facilitate continuous improvement in performance.

Although the concept of risk is often interpreted in terms of hazards or negative impacts, this Standard is concerned with risk as exposure to the consequences of uncertainty, or potential deviations from what is planned or expected. The process described here applies to the management of both potential gains and potential losses. Organizations that manage risk effectively and efficiently are more likely to achieve their objectives and do so at lower overall cost.

The objective of this Standard is to provide guidance to enable public, private or community enterprises, groups and individuals to achieve:

- a more confident and rigorous basis for decision-making and planning;
- better identification of opportunities and threats;
- gaining value from uncertainty and variability;
- pro-active rather than re-active management;
- more effective allocation and use of resources;
- improved incident management and reduction in loss and the cost of risk, including commercial insurance premiums;
- improved stakeholder confidence and trust;
- improved compliance with relevant legislation; and
- better corporate governance.

ATTACHMENT 4: THE BURRA CHARTER



Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 1	No ID	Unnamed	0	Curragh Road	Copperhannia	11	Bathurst Regional Council	
F 2	No ID	Unnamed	0	Curragh Road	Copperhannia	11	Bathurst Regional Council	
F 3	No ID	Unnamed	0	Curragh Road	Copperhannia	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 4	E100097	Unnamed	213	Curragh Road	Copperhannia	1	Bathurst Regional Council	
F 5	E1000122	Unnamed	896	Curragh Road	Abercrombie River	9	Bathurst Regional Council	
F 6	E1000125	Unnamed	903	Curragh Road	Copperhannia	9	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 7	E1000129	Unnamed	919	Curragh Road	Copperhannia	9	Bathurst Regional Council	
F 8	E1000036	Unnamed	1057	Curragh Road	Copperhannia	11	Bathurst Regional Council	
F 9	No ID	Unnamed	Near 1352	Curragh Road	Copperhannia	11	Bathurst Regional Council	No Image

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 10	E1000072	Grove Creek Bridge	2216	Bald Ridge Road	Abercrombie River	9	Bathurst Regional Council	
F 11	No ID	Unnamed	Near Falls Road	Bald Ridge Road	Abercrombie River	11	Bathurst Regional Council	
F 12	No ID	Abercrombie River Bridge	6833	Goulburn Road	Abercrombie River	2	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 13	No ID	Belmore Bridge	8437	Goulburn Road	Trunkey Creek	11	Roads and Maritime Service	
F 14	No ID	Unnamed	4	Lloyd Street	Trunkey Creek	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 15	E1010011	Trunkey Creek Footbridge	8	Carlyle Street	Trunkey Creek	5	Bathurst Regional Council	
F 16	E2400485	Unnamed	5612	Trunkey Road	Trunkey Creek	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 17	E1000099	Unnamed	376	Grove Creek Road	Trunkey Road	11	Bathurst Regional Council	
F 18	E1000221	One Eye Bridge	5332	Trunkey Road	Trunkey Creek	10	Bathurst Regional Council	
F 19	E1000029	Unnamed	75	Caloola Road	Caloola	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 20	E1000053	Unnamed	1491	Lachlan Road	Caloola	9	Bathurst Regional Council	
F 21	E1000131	Unnamed	1297	Lachlan Road	Caloola	11	Bathurst Regional Council	
F 22	E1000045	Carrs Creek Bridge	1285	Lachlan Road	Caloola	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 23	E1000121	Unnamed	875	Lachlan Road	Caloola	11	Bathurst Regional Council	
F 24	No ID	Unnamed	Within Lot 8 DP 727027	Lachlan Road	Caloola	1	Private	
F 25	No ID	Unnamed	Near 678	Lachlan Road	Caloola	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 26	No ID	Nr 3398	3515	Trunkey Road	Caloola	11	Roads and Maritime Service	
F 27	E1000216	Ferndale Creek Bridge	3614	Trunkey Road	Caloola	11	Roads and Maritime Service	
F 28	E1000218	Bucks Creek	4210	Trunkey Road	Arkell	11	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 29	No ID	Unnamed	451	Redbank Road	Triangle Flat	11	Bathurst Regional Council	
F 30	E1000114	Unnamed	77	Schumachers Road	Triangle Flat	3	Bathurst Regional Council	
F 31	E1000005	Triangle Creek	1180	Triangle Flat Road	Triangle Flat	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 32	No ID	Unnamed	Near Lot 76 DP 1124426	Triangle Flat Road	Triangle Flat	11	Bathurst Regional Council	
F 33	E1000204	Peppers Creek Bridge	2436	Rockley Road	Rockley	11	Bathurst Regional Council	
F 34	E1000124	Native Home Bridge	9	Wimbledon Road	Georges Plains	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 35	No ID	Green Creek Crossing	256.294	Main Western Railway Private road	Georges Plains	6	Australian Rail Track Corporation	
F 36	No ID	Main Western Railway	259.853	Private road	Georges Plains	9	Australian Rail Track Corporation	
F 37	E1000107	Evans Plains Creek	508	Bathampton Road	Bathampton	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 38	E1000215	McGeorges Creek Bridge	2837	Trunkey Road	Caloola	10	Roads and Maritime Service	
F 39	E1000061	McGeorges Creek	180	Elmswood Road	Caloola	3	Bathurst Regional Council	
F 40	E1000077	Dunns Plains Bridge over Peppers Creek	255	Lachlan Road	Rockley	9	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 41	E1000058	Campbells River Bridge	175	Dog Rocks Road	Rockley	9	Bathurst Regional Council	
F 42	E1000113	Triangle Creek Bridge	767	Burraga Road	Rockley	10	Bathurst Regional Council	
F 43	E1000300	Low Level Bridge	5	East Street	Rockley	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 44	No ID	Unnamed Heritage item I230, BR(I)LEP 2005)	0 Near Lot 1 DP 1135272	Rockley Road	Rockley	4	Bathurst Regional Council	
F 45	E1000201	Bath Creek	1190	Rockley Road	Fosters Valley	12	Bathurst Regional Council	
F 46	E1000110	Unnamed	640	Cow Flat Road	Cow Flat	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 47	E1000051	Mildura Bridge	142	Cow Flat Road	Cow Flat	9	Bathurst Regional Council	
F 48	E1000213	Georges Plains Creek Bridge	1383	Trunkey Road	Georges Plains	10	Bathurst Regional Council	
F 49	E1000222	Truss Bridge	5	Rockley Road	Perthville	8	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 50	No ID	Footbridge	55	Rockley Road	Perthville	5	Bathurst Regional Council	
F 51	E1000102	Sandy Creek	413	Ryans Road	Lagoon	7	Bathurst Regional Council	
F 52	E1000079	Deep Creek	265	Ryans Road	The Lagoon	4	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 53	E1000128	Deep Creek	910	Lagoon Road	The Lagoon	9	Bathurst Regional Council	
F 54	E1000041	Davy's Bridge	1208	Lagoon Road	The Lagoon	10	Bathurst Regional Council	
F 55	E1000044	Unnamed	1280	Lagoon Road	The Lagoon	4	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 56	E1000034	Kables Bridge	10	Lagoon Road	Orton Park	10	Bathurst Regional Council	
F 57	E1000097	Unnamed	35	Lloyds Road	Gormans Hill	11	Bathurst Regional Council	
F 58	No ID	Unnamed	277	Vale Road	South Bathurst	5	Bathurst Regional Council	

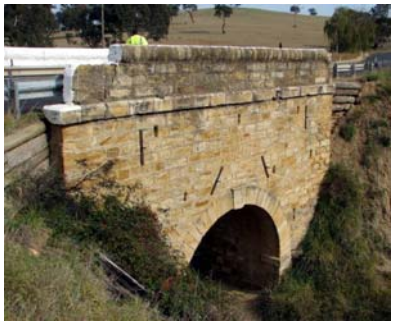
Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 59	No ID	240.681	0	Rocket Street	South Bathurst	8	Australian Rail Track Corporation	
F 60	E1010002	Proctor Park Bridge	0	Alpha Street	Bathurst	5	Bathurst Regional Council	
F 61	E1000094	Torpy's Bridge	34	Russell Street	Gormans Hill	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 62	No ID	Russell St Underpass	86	Russell Street	Bathurst	6	Australian Rail Track Corporation	
F 63	No ID	Lattice bridge	0	Bryant Street	Bathurst	8	Australian Rail Track Corporation	
F 64	E1010009	Denison Bridge	0	Bridge Street	Bathurst	8	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 65	No ID	Evans Bridge	0	Kendall Avenue	Bathurst	10	Roads and Maritime Service	
F 66	No ID	Rail Bridge 236.870	110	Littleborne Street	Kelso	10	Australian Rail Track Corporation	
F 67	E1000198	Saltwater Creek Bridge	3431	O'Connell Road	Brewongle	10	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 68	E1000049	Saltwater Creek Bridge	139	Tarana Road	Brewongle	1	Bathurst Regional Council	
F 69	E1000189	Unnamed	64	Armitage Road	Kelso	12	Bathurst Regional Council	
F 70	E1000105	Saltwater Creek Bridge 2	483	Brewongle Lane	Brewongle	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 71	No ID	Unnamed	Near 17 Station Street	Tarana Road	Brewongle	11	Bathurst Regional Council	
F 72	E1000116	Brewongle School Bridge	8	Brewongle School Road	Brewongle	1	Bathurst Regional Council	
F 73	No ID	Rail Bridge 223.697	658	Tarana Road	Brewongle	6	Australian Rail Track Corporation	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 74	No ID	Rail Bridge 222.629	774	Tarana Road	Brewongle	6	Australian Rail Track Corporation	
F 75	E1000127	Unnamed	908	Tarana Road	O'Connell	4	Bathurst Regional Council	
F 76	No ID	Unnamed	908	Tarana Road	O'Connell	6	Australian Rail Track Corporation	

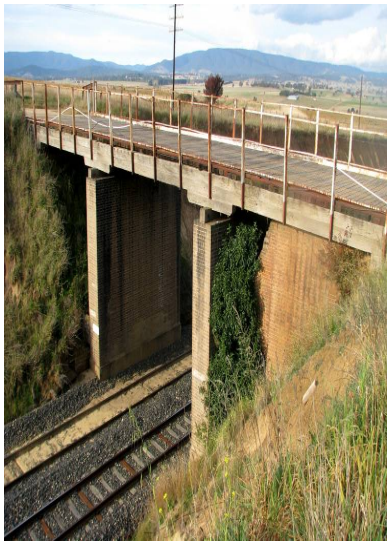
Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 77	No ID	Rail Bridge 219.857	1038	Tarana Road	Wambool	8	Australian Rail Track Corporation	
F 78	No ID	Rail Bridge 218.225	418	Wambool Road	Wambool	8	Australian Rail Track Corporation	
F 79	No ID	Rail Underpass 215.317	1292	Tarana Road	Wambool	6	Australian Rail Track Corporation	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 80	E1000048	Frying Pan Creek	1367	Tarana Road	Locksley	9	Bathurst Regional Council	
F 81	No ID	Rail Bridge 214.223	1415	Tarana Road	Locksley	6	Australian Rail Track Corporation	

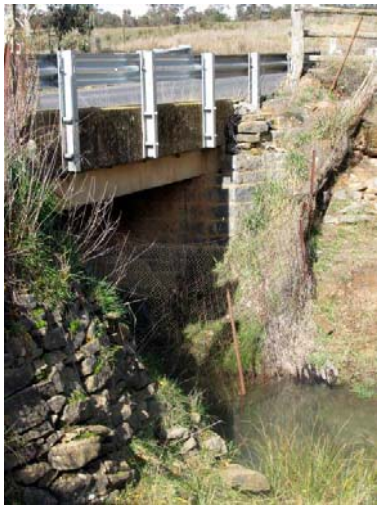
Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 82	No ID	Rail Bridge 210.387	5	Kinghorne Falls Road	Locksley	6	Australian Rail Track Corporation	
F 83	E1000065	Stony Creek	2000	Tarana Road	Gemalla	1	Bathurst Regional Council	
F 84	No ID	Eusdale Creek	2305	Tarana Road	Gemalla	6	Australian Rail Track Corporation	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 85	E1000131	Eusdale Creek	2305	Tarana Road	Gemalla	1	Bathurst Regional Council	
F 86	No ID	Double arch bridge	0	Tarana Road		6	Australian Rail Track Corporation	
F 87	No ID	Rail Bridge 204.528	2356	Tarana Road	Tarana	6	Australian Rail Track Corporation	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 88	E1000074	Porters Lane Bridge	24	Porters Lane	Yetholme	1	Bathurst Regional Council	
F 89	E1000096	Unnamed	35	Broken Bridge Road	Yetholme	1	Bathurst Regional Council	

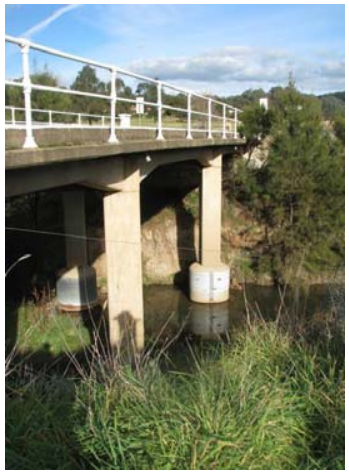
Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 90	No ID	Rail Bridge 232.113	86 (Near Durham Court)	Harris Road	Raglan	6	Australian Rail Track Corporation	
F 91	E1000115	Winburndale Rivulet	794	Limekilns Road	Yarras	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 92	E1000050	Clear Creek	1411	Limekilns Road	Clear Creek	10	Bathurst Regional Council	
F 93	E1000095	Bread and Butter Creek	343	Pymonts Lane	Clear Creek	11	Bathurst Regional Council	
F 94	E1000060	Dempsey's Creek	1792	Limekilns Road	Clear Creek	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 95	E1000076	Diamond Creek	2460	Limekilns Road	Limekilns	10	Bathurst Regional Council	
F 96	E1000080	Pender's Creek	2673	Limekilns Road	Limekilns	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 97	No ID	Benedict Creek	1316	Red Hill Road	Upper Turon	1	Lithgow City Council	
F 98	E1000078	Ration Point Timber Bridge Big Oaky Creek	261	Upper Turon Road	Sofala	1	Bathurst Regional Council	
F 99	E1010016	Unnamed	Near Lot 1 DP 1074221	Hargraves Street	Sofala	5	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 100	7704031	Sofala Steel footbridge	0	Denison Street	Sofala	5	Bathurst Regional Council	
F 101	E1000101	Solitary Creek	3824	Limekilns Road	Wattle Flat	7	Bathurst Regional Council	
F 102	E1000210	Engine Creek	2983	Sofala Road	Wiagdon	11	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 103	E1000209	Pennyweight Creek	2790	Sofala Road	Wiagdon	10	Roads and Maritime Service	
F 104	E1000207	Clear Creek	1626	Sofala Road	Peel	10	Roads and Maritime Service	
F 105	E1000054	Clear Creek	152	Rivulet Road	Peel	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 106	E1000206	Winburndale Rivulet	1275	Sofala Road	Peel	10	Roads and Maritime Service	
F 107	E1000117	Gordon Edgell Bridge	8	Hereford Street	Kelso	10	Bathurst Regional Council	
F 108	E1000189	Spring Creek Bridge	51	Hill End Road	Sofala	10	Bathurst Regional Council / Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 109	E1000190	Unnamed	100	Hill End Road	Sofala	4	Bathurst Regional Council / Roads and Maritime Service	
F 110	E1000191	Stone arch bridge	173	Hill End Road	Sofala	4	Bathurst Regional Council / Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 111	E1000192	Stone arch bridge	200	Hill End Road	Sofala	4	Bathurst Regional Council	
F 112	E1000194	Bells Creek	323	Hill End Road	Sofala	10	Bathurst Regional Council / Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 113	E1000195	Stone arch bridge	420	Hill End Road	Sofala	4	Bathurst Regional Council	
F 114	E1000223	Wallaby Rocks Bridge Turon River	458	Hill End Road	Crudine	2	Roads and Maritime Service	
F 115	E1000140	Hill End Creek	4	Warrys Road	Hill End	1	National Parks and Wildlife Service / Crown	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 116	E1000118	Specimen Gully	80	Warrys Road	Hill End	1	National Parks and Wildlife Service / Crown	
F 117	E1000190	Cole's Bridge Turon River	3142	Turondale Road	Turondale	1	Bathurst Regional Council	
F 118	E1000086	Tainteen Bridge	2934	Turondale Road	Turondale	7	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 119	E1000064	Oaky Creek	1970	Turondale Road	Turondale	7	Bathurst Regional Council	
F 120	E1000062	Oaky Creek Bridge	1855	Turondale Road	Turondale	1	Bathurst Regional Council	
F 121	No ID	Dry Creek bridge	1735 (Within Lot 26 DP 755785)	Turondale Road	Millah Murrah	4	Private	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 122	E1000055	Millah Murrah Creek	1538	Turondale Road	Millah Murrah	10	Bathurst Regional Council	
F 123	E1000126	Cheshire Creek Bridge	908	Turondale Road	Duramana	7 & 10	Bathurst Regional Council	
F 124	E1000119	Harold Cranston bridge	820	Turondale Road	Duramana	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 125	No ID	Disused bridge	0	Rivulet Road	Duramana	1	Private	
F 126	E1000109	Unnamed	589	Rivulet Road	Duramana	7	Bathurst Regional Council	
F 127	E1000103	Winburndale Rivulet	426	Rivulet road	Peel	1	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 128	E1000098	Raglan Creek	35	Lee Street	Kelso	10	Bathurst Regional Council	
F 129	No ID	Dennis Island footbridge	0	Cow Flat Road	Cow Flat	5	Private	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 130	E1000052	Kelloshiel Bridge	145	Freemantle Road	Eglinton	4	Bathurst Regional Council	
F 131	E1000123	Kings Creek Bridge	848	Freemantle Road	Mt Rankin	9	Bathurst Regional Council	
F 132	E1000106	Macquarie River	2080	Freemantle Road	Milkers Flat	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 133	E1000087	Rankens Bridge	304	Eglinton Road	Eglinton	10	Bathurst Regional Council	
F 134	E1000111	Evans Plains Creek	667	Ophir Road	Dunkeld	1	Bathurst Regional Council	
F 135	E1000001	Unnamed	1017	Ophir road	Rock Forest	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 136	E1000009	Mooney Swamp Creek	1511	Ophir Road	Rock Forest	11	Bathurst Regional Council	
F 137	E1000063	Oaky Creek	1930	Ophir Road	Rock Forest	10	Bathurst Regional Council	
F 138	E1000069	Swallows Creek Bridge	2110	Ophir Road	Rock Forest	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 139	No ID	The Rocks Creek	0	Mitchell Hwy	The Rocks	7	Bathurst Regional Council	
F 140	E1000120	Unnamed	87	Dunkeld Road	Dunkeld	4	Bathurst Regional Council	
F 141	No ID	Bluestone bridge near Bathurst gaol	0	Mitchell Hwy	West Bathurst	7	Roads and Maritime Service	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 142	E1010007	Footbridge near Bathurst gaol	0	Mitchell Hwy	West Bathurst	5	Bathurst Regional Council	
F 143	E1010003	Concrete footbridge	164	Bradwardine Road	West Bathurst	5	Bathurst Regional Council	
F 144	No ID	Jordan Creek drains	255	Morrissett Street	Bathurst	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 145	No ID	Jordan Creek Drains	0	Durham Street	Bathurst	10	Bathurst Regional Council / Roads and Maritime Service	
F 146	E1000089	Unnamed	310	Havannah Street	South Bathurst	11	Bathurst Regional Council	
F 147	E1000035	Hawthornden Creek	104	Bant Street	South Bathurst	10	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 148	E1010004	Learmonth Park	Near Stockland Drive	Sydney Road	Kelso	5	Bathurst Regional Council	
F 149	E1010005	Learmonth Park	Near Asset ID 00365012	Sydney Road	Kelso	5	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 150	E1000040	Stony Creek	1167	The Bridle Track	Duramana	10	Bathurst Regional Council	
F 151	E1000056	Howards Bridge over Winburndale Rivulet	1553	Bridle Track	Duramana	1	Bathurst Regional Council	
F 152	No ID	Unnamed	0	Bridle Track	Bruinbun	12	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 153	E1000081	Bruinbin Reserve Bridge	2721	Bridle Track	Bruinbun	1	Bathurst Regional Council	
F 154	No ID	Unnamed	0	Bridle Track	Bruinbun	12	Bathurst Regional Council	
F 155	E1000093	Unnamed	3183 (Near Black gate reserve Wicketts Creek)	Bridle Track	Bruinbun	12	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 156	E1000226	Unnamed	3244	Bridle Track	Bruinbun	11	Bathurst Regional Council	
F 157	No ID	Unnamed	0	Bridle Track	Bruinbun	11	Bathurst Regional Council	
F 158	No ID	Unnamed	0	Bridle Track	Bruinbun	11	Bathurst Regional Council	

Field Number	Asset Number	Bridge Name	Chainage	Street Name	Suburb	Group Name & Number	Ownership	Photo
F 159	No ID	Unnamed	0	Bridle Track	Bruinbun	4	Bathurst Regional Council	
F 160	No ID	Unnamed	0	Bridle Track	Bruinbun	4	Bathurst Regional Council	
F 161	No ID	Unnamed	0	Bridle Track	Bruinbun	4	Bathurst Regional Council