Allan truss bridges

**Period of construction:** 1894 to 1929  
**Similar to American Howe Truss design**  
**Number built in NSW:** 105  
**Number remaining:** Twenty of which 10 listed on State Heritage Register. An additional eight are controlled by local government.

**Advantages of design**

In 1893 Percy Allan introduced his new design based on the American Howe truss. It was not, however, a composite truss as foreshadowed by McDonald because only the verticals were iron rods while the bottom chord, despite being a tension member, was still all timber. The new truss featured a much simpler arrangement of triangulations and incorporated many improvements and innovations, derived from his design and practical experience, which made this truss a more cost-effective structure than its predecessors.

**Defining features of design**

- All timber members were assembled from relatively smaller and shorter sizes, spliced at regular intervals for the top and bottom chords, laid parallel in pairs but held apart by spacer timber blocks. This allowed rainwater to fall through, gave easy access for painting and increased the buckling strengths of the compression members.

- External iron clamps at the joints meant that the vertical rods could be placed within the space between the top and bottom chord timbers or outside these members. One, two or three vertical rods could be accommodated depending on the magnitude of the shear force at the member.

- Cast-iron shoes at all joints ensured proper truss action and a good transfer of member forces at the joints.

- Any member could be renewed without temporary staging from below and without taking the bridge out of service.

- These above are improvements in the details of construction and maintenance, but Allan's real innovation was the concept of building two parallel half trusses and bolting them together to form a complete truss, one on each side of the deck. Member replacements in effect only involved half members, making repairs easier and quicker, and yet enough of the structural integrity of the truss was retained to keep the spans in use.

**Figure 1**  
Schematic design of an Allan truss (derived from MBK 1998)
Allan truss – number of spans (105 built)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
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<td>23</td>
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<td>2</td>
<td>0</td>
<td>0</td>
<td>?</td>
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</tbody>
</table>

*Pyrmont Bridge is a deck truss with 12 spans. It is not included in the totals.

**Allan Truss sub types**

During the lengthy period of construction there is considerable evidence of evolutionary development. These developments were limited to a relatively small number of examples. Three (pending clarification of concrete deck – see comment below) distinct sub-types can be identified within the class.

- **Type 1 – overhead braced**

Six examples were built. Three remain, two under RTA control (Morpeth Bridge and Dunmore Bridge). Technically they represented the high watermark of timber bridge construction in Australia. The top braces enabled the construction of 156 foot spans on the Macleay River Bridge, the greatest ever achieved.
• **Type 2 – ‘standard’ type**

As they were the most numerous timber truss produced they were also used in more configurations with lift spans.

Allan Truss with vertical lift span: five examples built, four remaining. All of these are under RTA control (Swan Hill Bridge, Tooleybuc Bridge, Hinton Bridge and Dunmore Bridge). Of these only the first two are operational. The fifth, Murwillumbah Bridge, was demolished in 1968.

Allan Truss with bascule lift span: one example built, one remaining under RTA control (Carrathool Bridge).

• **Type 3 – deck truss type**

A single example built: Pyrmont Bridge over Darling Harbour (managed by Sydney Harbour Foreshore Authority).

• **Type 4 – concrete deck type**

A single example built: Mill Creek Bridge on Main Road 225 (managed by Gosford City Council).

### Allan truss bridges and their future operability

<table>
<thead>
<tr>
<th>Operational bridges</th>
<th>Bridge</th>
<th>Construction date</th>
<th>Number of trusses</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Morpeth</td>
<td>1898</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rossi</td>
<td>1899</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dunmore</td>
<td>1899</td>
<td>3+lift</td>
<td></td>
</tr>
<tr>
<td>Hinton</td>
<td>1901</td>
<td>2+lift</td>
<td></td>
</tr>
<tr>
<td>Wee Jasper</td>
<td>1896</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Paytns</td>
<td>1926</td>
<td>2</td>
<td></td>
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<tr>
<td>Carrathool</td>
<td>1922</td>
<td>2+lift</td>
<td></td>
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<tr>
<td>Beryl</td>
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<table>
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<th>Bridge</th>
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</thead>
<tbody>
<tr>
<td>Swan Hill</td>
<td>1896</td>
<td>2+lift</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Operationally unsuitable bridges</th>
<th>Bridge</th>
<th>Construction date</th>
<th>Number of trusses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wallaby Rocks</td>
<td>1897</td>
<td>3</td>
<td></td>
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<tr>
<td>Vacy</td>
<td>1898</td>
<td>2</td>
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<td>Abercrombie</td>
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<td>3</td>
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<td>Tooleybuc</td>
<td>1925</td>
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<td>Gundaroo</td>
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<td>Charleyong</td>
<td>1901</td>
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<tr>
<td>Thorns</td>
<td>1920</td>
<td>1</td>
<td></td>
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<tr>
<td>Boonanga</td>
<td>1928</td>
<td>1</td>
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Standard modifications required to bring Allan truss bridge up to within a reasonable level of risk using the T44 Standard

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches (113 mm – 150 mm).
- Replacement of timber planking with structurally appropriate heritage sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacement of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

Approach spans
- Replacement of approach span decks with timber concrete composite decks.

Substructure
- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage-sympathetic design and material.

Railing
- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and material for the entire length of the bridge.
Wee Jasper Bridge

Description

<table>
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<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>RR 278</th>
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<tr>
<td>Number of spans</td>
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<td>Location</td>
<td>Wee Jasper</td>
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<tr>
<td>Sub-type</td>
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<tr>
<td>Built</td>
<td>1896</td>
<td>RTA bridge number</td>
<td>6633</td>
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<td>Assessed significance(MBK)</td>
<td>State</td>
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<td>SHR listed</td>
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</tr>
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</table>

Wee Jasper Bridge is a single-span Allan truss bridge on the Tumut-Yass Road, crossing the Goodradigbee River. It is the oldest surviving Allan truss bridge in NSW. It is located about 30 kilometres from Wee Jasper and away from any local community. It is in a picturesque and accessible setting. Remnants of an earlier crossing can still be discerned at the site.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (i.e., within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent).

In 2004 a Section 60 approval was granted for the following works:

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Installation of additional sway braces to provide lateral support for the truss at each panel point and prevent compression buckling.

These upgrading works were completed in 2005. The current bridge therefore partially complies with the expected operability standard for long-term future road network planning, although future upgrading works will be required.
Wee Jasper Bridge is listed on the State Heritage Register. It was ranked 21st in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Wee Jasper Bridge**

Wee Jasper Bridge meets operability requirements, given its location on the road network and recent upgrading to within a reasonable level of risks using the T44 Standard. Future strengthening and modification will be required to maintain this operability standard as the bridge ages.

**Proposed future conservation works**

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

**Truss span**
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacements of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

**Approach spans**
- Replacement of approach span decks with timber concrete composite decks.

**Substructure**
- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage-sympathetic design and material.

**Railing**
- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

**Conservation outcomes**

The retention of this structure would ensure that the oldest surviving example of an Allan truss bridge in NSW is conserved. Conservation would be achieved by maintenance and necessary upgrades to the structure to offset material deterioration. Wee Jasper Bridge is one of nine Allan truss bridges and one of two single-span Allan truss bridges in the operable RTA timber truss bridge portfolio.
Swan Hill Bridge

Description

<table>
<thead>
<tr>
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<tr>
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<td>Swan Hill</td>
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<td>Sub-type</td>
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<td>State</td>
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Swan Hill is one of a group of Murray River crossing bridges that featured lift spans. It is located between Swan Hill and Moulamein, providing an integral component of recreational, social and community activities. The lift span provides a direct link to the period when paddle steamers used the river as the main artery in the region, and there was considerable conflict between the NSW and Victorian colonies over free versus protected borders and competition to attract trade.

Although there are a number of other lift-span Allan truss bridges (Dunmore and Hinton are inoperable), Swan Hill, Tooleybuc and Carrathool retain lift spans still capable of lifting for vessels.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements. Construction of a new bridge is being investigated to provide a response to the capacity requirement. An adaptive reuse for the existing bridge may be feasible.

Although the bridge was upgraded in 2000 to within a reasonable level of risks using the T44 Standard this still falls short of the required load capacity.
These works were undertaken prior to the listing of Swan Hill Bridge on the State Heritage Register and no Section 60 approval was required. The works were:

**Truss span**
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Replacements of all timber cross girders with steel cross girders where appropriate.

Furthermore, a modern walkway has been added to the bridge, which is not sympathetic to the heritage structure.

A Section 60 was approved for the upgrade of the lift span deck following damage by a vehicle in 2006.

A ‘Standard Exemption: Minor Works’ was approved in 2008/9 for the replacement of pier web members, grit blasting and upgrading of the cast iron piers supporting the lift towers.

Swan Hill Bridge is listed on the State Heritage Register. It was ranked 8th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Swan Hill Bridge**

Its urban context means that Swan Hill is one of the very few locations in NSW where adaptive reuse for local pedestrian/cyclist or light motorised traffic may be feasible. Current works at Cobram Bridge serve to illustrate how such adaptive reuse can be achieved. The current unsympathetic walkway at Swan Hill would then not be required and could be removed to reduce its impact on the significance of the bridge.

**Proposed future conservation works**

**Mitigation of impacts**
- Archival recording of the bridge.
- Remove recent walkway.
- Interpret the bridge through signage and development of a pedestrian circuit.

The following works would be needed if the bridge can be preserved in use:

**Railing**
- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and material for the entire length of the bridge.

**Conservation outcomes**

The conservation outcome is to be reviewed based on the successful identification of a new link on a new alignment that would bypass this bridge.
Wallaby Rocks Bridge

Description

| Truss type | All | Road | RR 216 |
| Number of spans | 3 | Location | Turon River |
| Sub-type | Standard | RTA region | Western |
| Built | 1897 | RTA bridge number | 1185 |
| Assessed significance (MBK) | State | Local government | Bathurst Regional |
| SHR listed | SHR 01458 | Daily traffic [AADT] | 100 |

Wallaby Rocks Bridge is a three-span Allan truss bridge, built in 1897. It crosses the Turon River on the historic route from Sofala to Hill End in the central western goldfields. The bridge has iron piers, which are unusual but not rare in the bridge portfolio.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Wallaby Rocks Bridge was upgraded in 2008 to within a reasonable level of risk using the T44 Standard, although this still falls short of the required load capacity. The Section 60 approval granted in 2006 included the following works:

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches (113-150 mm).
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacements of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.
Approach spans

- Replacement of approach span decks with structurally appropriate heritage-sympathetic decking.

Wallaby Rocks Bridge is listed on the State Heritage Register. It was ranked 26th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Wallaby Rocks Bridge**

Due to the route requirements, the load limit for Wallaby Rocks Bridge exceeds 42.5 tonnes and as a result it would be duplicated in accordance with network upgrading priorities. Despite recent upgrading to within a reasonable level of risks using the T44 Standard the bridge cannot meet these load limits. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result the bridge cannot be retained in use within the RTA's timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

**Proposed future conservation works**

Mitigation of impacts

- Archival recording of the bridge.
- Interpretation of the bridge crossing integrated with other interpretation on the route or in Hill End and Sofala.
- Salvage of the timbers for use in other bridge rehabilitation works.

**Conservation outcomes**

There are nine operable Allan truss bridges including three three-span bridges.

Wallaby Rocks Bridge does not bear any unique or outstanding design characteristics that cannot be viewed at other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection. Iron piers in association with Allan trusses will be retained at Hinton, Dunmore, Morpeth and Carrathool bridges.
Victoria Bridge, Picton

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
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<tbody>
<tr>
<td>Number of spans</td>
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<td>Location</td>
<td>Picton</td>
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<tr>
<td>Sub-type</td>
<td>Standard</td>
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<td>Southern</td>
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<tr>
<td>Built</td>
<td>1897</td>
<td>RTA bridge number</td>
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<tr>
<td>Assessed significance(MBK)</td>
<td>State</td>
<td>Local government</td>
<td>Wollondilly Shire</td>
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<td>SHR listed</td>
<td>SHR 01484</td>
<td>Daily traffic [AADT]</td>
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</table>

Victoria Bridge is a three-span Allan truss bridge at Picton. Because of its location within the township and close to Sydney, it is one of the better-known timber truss bridges. It has a strong visual appeal due to its visibility within the townscape.

Plaques with an ‘Historic Engineering Work’ marker by the Institute of Engineers Australia, it features the tallest timber trestle piers in NSW.

Analysis of heritage and operational factors

Service requirements: The bridge services a residential area near Picton Station. There are load restrictions on the route which mean that the bridge does not require performance to accommodate current regulatory limits.

A ‘Standard Exemption: Minor Works’ was approved in 2007 for the reinforcement and reconstruction of the masonry lined embankments which underwent partial collapse after flood damage resulting in the temporary closure of the bridge.

Victoria Bridge is listed on the State Heritage Register. It was ranked 17th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

The bridge spans a steep river valley and is particularly picturesque. It illustrates the fine lines of the truss design particularly well, shown to good effect in the original white colour scheme. There
are opportunities for interpretation at viewing locations. The masonry lined embankments add interest to the structure which links to contemporary structures in the historic township of Picton, enabling it to be meaningfully read and appreciated as part of a cultural landscape, in addition to being associated with a broader history of settlement.

**Conservation strategy – Victoria Bridge**

Victoria Bridge is located in an area where there is a load restriction on heavy vehicle traffic greater than 5 tonnes. Therefore it does not require the range of modifications that would apply to other operable bridges would bring them up to within a reasonable level of risks using the T44 Standard. This will allow the bridge to be maintained using traditional bridge construction methods (ie there will be no requirement to introduce Stress laminated timber (SLT) decking or other modern materials).

**Proposed future conservation works**

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

**Railing**

- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

**Conservation outcomes**

Victoria Bridge would be conserved as a ‘pristine’ bridge (ie it would not require the introduction of methods required for upgrading to within a reasonable level of risks using the T44 Standard).

The retention of this structure would ensure that the surviving Allan truss bridge closest to Sydney is conserved. It would further ensure that a three-span example remained, mitigating the potential loss of Wallaby Rocks Bridge.
Morpeth Bridge

Description

<table>
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<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>East Maitland-Wallalong (MR 102)</th>
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<tbody>
<tr>
<td>Number of spans</td>
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<td>Sub-type</td>
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<td>Built</td>
<td>1898</td>
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<td>SHR listed</td>
<td>SHR 01476</td>
<td>Daily traffic [AADT]</td>
<td>6050</td>
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</table>

Morpeth Bridge is located on the edge of the historic riverside town of Morpeth. Its three overhead-braced Allan truss spans on iron piers are currently being conserved. The bridge forms a prominent gateway into the town, being visible from the township itself, and directly ties into the town’s river transport history.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (ie within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent). Construction of the Third Hunter Crossing is expected to alleviate the heavy vehicle demand.

In 2005 following damage to the truss bottom chords and partial closure of the bridge, a Section 60 approval was granted for the following:

- Installation of steel laminates on the inside faces of the new timber bottom chord members.

An additional Section 60 approval was granted in 2008 for the following works:

Truss span
- Increase in thickness of second diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacements of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

**Approach spans**
- Replacement of approach span decks with timber concrete composite decks.

**Substructure**
- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage sympathetic design and material.

A further ‘Standard Exemption: Minor Works’ approval was granted in 2009 for the reconfiguration of concrete Abutment A and replacement of handrails.

These upgrading works are due for completion in June 2011. The current bridge therefore meets the expected operability standard for long-term future road network planning.

Morpeth Bridge is listed on the State Heritage Register. It was ranked 2nd in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test. It is also included in the Morpeth town conservation area.

### Conservation strategy – Morpeth Bridge

Morpeth Bridge is currently being conserved and upgraded to meet within a reasonable level of risks using the T44 Standard.

#### Proposed future conservation works

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

#### Railing

- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

#### Conservation outcomes

As a result of the current works approved by the Heritage Council of NSW, the bridge will require minimal maintenance for next five to seven years, assuming typical traffic conditions (ie no over-mass vehicles) and no flood damage. The conservation work will have minimised the risks of a number of typical failure points for Allan truss bridges including bottom chords, cross girders and second diagonals in trusses. As a result, the maintenance costs for the structure will be considerably reduced.

The conservation work will allow for the retention in use of the bridge identified by the MBK study as the second most significant in the RTA’s collection. The work will have tested and formulated a range of techniques that are applicable to other timber truss bridges, and continued the process of developing a repertoire of skills and solutions that are of general applicability to the RTA’s timber truss bridge portfolio.

The retention of this structure (along with Dunmore Bridge) would ensure that two of the Overhead braced sub-type Allan truss bridges of the five built are actively conserved. Two have been replaced and one (Hampden Bridge) has been transferred to Wagga City Council.
## Vacy Bridge

![Image of Vacy Bridge](image)

### Description

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<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
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<td>Sub-type</td>
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<td>State</td>
<td>Local government</td>
<td>Dungog Shire</td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01483</td>
<td>Daily traffic [AADT]</td>
<td>1291</td>
</tr>
</tbody>
</table>

Vacy Bridge is located on the Paterson-Gresford Road near the village of Vacy. The bridge is part of a group of 16 bridges in the Hunter Valley constructed before 1905. The bridge is of a standard two-span configuration and does not have any unique features.

### Analysis of heritage and operational factors

**Service requirements:** The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

In 2005 following damage to the truss bottom chords and partial closure of the bridge, a Section 60 approval was granted for the following:
- Installation of steel laminates on the inside faces of the new timber bottom chord members.

This alteration is only one of several required, to allow for a reasonable level of risk. Using the T44 Standard, the bridge still falls short of the required load capacity.

Vacy Bridge is listed on the State Heritage Register. It was ranked 29th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
The bridge is in a steep V-shaped valley that is flood prone. The bridge is a high risk for flood damage and could not therefore be guaranteed as a conserved structure.

**Conservation strategy – Vacy Bridge**

Due to the route requirements the load limit for Vacy Bridge exceeds 42.5 tonnes and as a result it would be duplicated in accordance with network upgrading priorities. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result the bridge cannot be retained in use within the RTA's timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

**Proposed future conservation works**

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge crossing.
- Salvage of the timbers for use in other bridge rehabilitation works.

**Conservation outcomes**

There are nine operable Allan trusses including three two-span bridges.

Vacy Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA's timber truss bridge collection.
Dunmore Bridge

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Woodville – Maitland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>3 + lift span</td>
<td>Location</td>
<td>Dunmore</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Overhead braced</td>
<td>RTA region</td>
<td>Hunter</td>
</tr>
<tr>
<td>Built</td>
<td>1899</td>
<td>RTA bridge number</td>
<td>1683</td>
</tr>
<tr>
<td>Assessed</td>
<td>State</td>
<td>Local government</td>
<td>Maitland City</td>
</tr>
<tr>
<td>significance(MBK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01467</td>
<td>Daily traffic [AADT]</td>
<td>2713</td>
</tr>
</tbody>
</table>

Dunmore Bridge is a substantial overhead-braced Allan truss bridge, with three spans and a lift span. It was ranked as most significant of all remaining timber truss bridges in the study undertaken by MBK in 1998. The lift span of the bridge has not been operative for 60 years.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (ie within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent). Construction of the Third Hunter Crossing is expected to alleviate the heavy vehicle demand.

A Section 60 approval was granted in 2003 for the following works:

Lift span
- Upgrade in decking system and partial redesign of Warren truss supporting lift span.

An additional Section 60 approval was granted in 2009 for the following works:

Truss span
- Increase in thickness of second diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
• Replacements of primary timber cross girders with steel cross girders where appropriate.
• Installation of weather protection barrier on top chord member of truss.

Approach spans
• Replacement of approach span decks with timber concrete composite decks.

Substructure
• Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
• Replacement of existing timber piers and abutments with modern heritage-sympathetic design and material.

Railing
• Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

These upgrading works will be completed in 2011/12. The current bridge therefore meets the expected operability standard for long-term future road network planning.

Dunmore Bridge is listed on the State Heritage Register. It was ranked 1st in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

Conservation strategy – Dunmore Bridge

Dunmore Bridge would be upgraded to meet within a reasonable level of risks using the T44 Standard commencing 2010 or when bridge repair crews become available.

Proposed future conservation works

• Routine and periodic maintenance using existing forms of fabric.
• Interpretation of the bridge.

Conservation outcomes

As a result of the works approved by the Heritage Council of NSW the bridge will be upgraded to within a reasonable level of risks using the T44 Standard. The conservation work will have minimised the risks of a number of typical failure points for Allan truss bridges, including bottom chords, cross girders and second diagonals in trusses. Through the high cost of this extensive upgrade it is expected that the maintenance costs for the structure will be considerably reduced.

The bridge services the small village of Woodville, which retains some of its original riverside focus. The bridge can thus be meaningfully read and appreciated as part of a cultural landscape.

The conservation work will allow for the retention in use of the bridge identified by the MBK study as the most significant in the RTA’s collection. The work will have tested and formulated a range of techniques that are applicable to other timber truss bridges, and continued the process of developing a repertoire of skills and solutions that are of general applicability to the RTA’s timber truss bridge portfolio.

The retention of this structure (along with Morpeth Bridge) would ensure that two of the five overhead-braced Allan truss bridges built are actively conserved. Two have been replaced, and one (Hampden Bridge) has been transferred to Wagga City Council.
Rossi Bridge

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Goulburn - Wheeo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>3</td>
<td>Location</td>
<td>Goulburn</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Southern</td>
</tr>
<tr>
<td>Built</td>
<td>1899</td>
<td>RTA bridge number</td>
<td>6678</td>
</tr>
<tr>
<td>Assessed</td>
<td>State</td>
<td>Local government</td>
<td>Goulburn-</td>
</tr>
<tr>
<td>significance(MBK)</td>
<td></td>
<td></td>
<td>Mulwaree Council</td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01479</td>
<td>Daily traffic [AADT]</td>
<td>200</td>
</tr>
</tbody>
</table>

Rossi Bridge is located on the edge of Goulburn and the crossing relates to the historical development of the township. It is a three-span Allan truss bridge on the Goulburn-Wheeo Road, over the Wollondilly River. It sits on piers that were built for an Old Public Works Department type truss bridge built in 1867. Replacement of the timber superstructure was relatively easier than erecting new piers as the trusses could be resized to fit and were light enough to be supported.

Analysis of heritage and operational factors

Service requirements: There are load restrictions on the route which mean that the bridge does not require performance to within a reasonable level of risks using the T44 Standard. The road is currently limited to a 15 tonne load limit.

In 2007 a Section 60 approval was granted for the following works:

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.

Rossi Bridge is listed on the State Heritage Register. It was ranked 13th in the 1998 MBK timber truss bridge study which assessed the significance of surviving bridges.
Conservation strategy – Rossi Bridge

Rossi Bridge is located in an area where there is a load restriction on heavy vehicle traffic greater than 15 tonnes. Therefore it does not require the range of modifications that would apply to other operable bridges to bring them up to within a reasonable level of risk using the T44 Standard. This will allow the bridge to be maintained using traditional bridge construction methods (ie there will be no requirement to introduce stress laminated timber [SLT] decking or other modern materials).

Future conservation works

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

Railing
- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and material for the entire length of the bridge.

Conservation outcomes

The retention of Rossi Bridge would result in two three-span Allan truss configurations being retained of the 16 built. Rossi has significance as part of a recognised historic landscape on the margins of Goulburn and demonstrates the reuse of piers from earlier structures.

Rossi has the potential to be maintained using traditional methods, and may be able to minimise the use of modern upgrading technologies.
Charleyong Bridge over the Mongarlowe River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Nerriga Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>1</td>
<td>Location</td>
<td>Mongarlowe</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Southern</td>
</tr>
<tr>
<td>Built</td>
<td>1901</td>
<td>RTA bridge number</td>
<td>6506</td>
</tr>
<tr>
<td>Assessed significance (MBK)</td>
<td>Local</td>
<td>Local government</td>
<td>Palerang Council</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>270</td>
</tr>
</tbody>
</table>

Charleyong Bridge is a single-span Allan truss bridge. It is part of a group centred on Goulburn, although this bridge is 10 kilometres from the town and on a smaller road.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Charleyong Bridge is not listed on the State Heritage Register. It was ranked 67th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

Conservation strategy – Charleyong Bridge

Due to the route requirements the load limit for Charleyong Bridge exceeds 42.5 tonnes and as a result it would be duplicated in accordance with network upgrading priorities. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA's timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

Recent conservation works
- Cyclic maintenance in 2003.
Proposed future conservation works

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge crossing.
- Salvage of the timbers for use in other bridge rehabilitation works.
- Remove from the RTA’s Section 170 register when replacement is required.

Conservation outcomes

Charleyong Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection. Nine Allan truss bridges are operable. Wee Jasper is a similar single-span Allan truss bridge that will be retained.
Hinton Bridge

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Hinton - Morpeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2 + lift span</td>
<td>Location</td>
<td>Hinton</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Hunter</td>
</tr>
<tr>
<td>Built</td>
<td>1901</td>
<td>RTA bridge number</td>
<td>1482</td>
</tr>
<tr>
<td>Assessed</td>
<td>State</td>
<td>Local government</td>
<td>Maitland City</td>
</tr>
<tr>
<td>significance(MBK)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01470</td>
<td>Daily traffic [AADT]</td>
<td>3620</td>
</tr>
</tbody>
</table>

Hinton Bridge was upgraded in 2006 to within a reasonable level of risks using the T44 Standard. It trialled a range of solutions that allowed the bridge to be upgraded to the Standard while retaining its recognised heritage significance. The sympathetic manner in which the bridge was altered was recognised by the Institute of Engineers Australia who awarded the RTA with the Colin Crisp Award in 2006.

The lift span of the bridge has not been operative for 60 years.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (ie within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent). Construction of the Third Hunter Crossing is expected to alleviate the heavy vehicle demand.

A Section 60 approval was granted in 2004 for the following works:

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with a stress laminated timber (SLT) decking system.
- Installation of additional sway braces to provide lateral support for the truss at each panel point and prevent compression buckling.
- Replacement of all timber cross girders with steel cross girders.
Approach spans
- Replacement of approach span decks with timber concrete composite decks.

An additional Section 60 approval was granted in 2006 for the following works:

Lift span
- Upgrade in decking system and partial redesign of Warren truss supporting lift span.

Hinton Bridge is listed on the State Heritage Register. It was ranked 11th in the 1998 MBK timber truss bridge study which assessed the significance of surviving bridges.

Hinton Bridge is one of only two standard sub-type Allan truss bridges to be built with a lift span outside the Murray River. The lift span reflects the extent of the Hunter River trade and its economic importance prior to the river's siltation.

Conservation strategy – Hinton Bridge

Hinton Bridge was be upgraded to meet within a reasonable level of risks using the T44 Standard in 2007.

Proposed future conservation works
- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

Conservation outcomes

As a result of the works approved by the Heritage Council of NSW the bridge will be upgraded to within a reasonable level of risks using the T44 Standard. The conservation work will minimise the risks of a number of typical failure points for Allan truss bridges including bottom chords, cross girders and second diagonals in trusses. Through the high cost of this extensive upgrade it is expected that the maintenance costs for the structure will be considerably reduced.

The upgrading works tested and formulated a range of techniques that have subsequently been used on other timber truss bridges and continued the process of developing a repertoire of skills and solutions that are of general applicability to the RTA’s timber truss bridge portfolio.

The retention of Hinton Bridge would leave either two [along with Dunmore] or possibly three [if Swan Hill Bridge is retained] standard Allan truss and lift span combinations available as part of the RTA’s heritage portfolio. Carrathool has a bascule lift span.

The retention of Hinton Bridge, with Morpeth and Dunmore and other less prominent bridges, provides a strong visual reminder of the role of the Hunter and Paterson rivers in stimulating the economy of the Hunter Valley during the late 19th and early 20th centuries.
Abercrombie Bridge

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>SR 54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td>Tuena</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTA region</td>
<td>Western</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built</td>
<td>1919</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTA bridge number</td>
<td>1015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessed significance(MBK)</td>
<td>Local</td>
<td>Local government</td>
<td>Bathurst Regional</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>165</td>
</tr>
</tbody>
</table>

The local granite masonry piers and abutments are incorporated from the previous 1879 Old Public Works Department (Old PWD) truss bridge at the crossing.

The bridge is close to Bathurst on State Road 54 and was extensively upgraded to within a reasonable level of risk using the T44 Standard in 2004. The upgrading works will minimise future maintenance for perhaps 20 years, although this has been deemed insufficient for its long term network utility. These works do not serve to diminish the archaeological value or unique truss configuration.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Abercrombie Bridge was upgraded in 2005 to within a reasonable level of risks using the T44 Standard, though this still falls short of the required load capacity. These works included:

- Reinforcement of bottom chord with steel laminates in 2004.
- Installation of additional sway braces to provide lateral support for the truss at each panel point and prevent compression buckling in 2004.
- Replacement of timber deck on truss spans and approach spans with a stress laminated timber (SLT) decking system in 2005.
- Replacement of all timber cross girders with steel cross girders in 2005.
Abercrombie Bridge is not listed on the State Heritage Register. It was ranked 59th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Abercrombie Bridge**

Due to the route load limit requirements for Abercrombie Bridge it would be duplicated in accordance with network upgrading priorities. As a result, the bridge cannot be retained in use within the RTA’s timber truss bridge portfolio. If required to be retained as an orphan structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

**Proposed future conservation works**

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge crossing.
- Salvage of the timbers for use in other bridge rehabilitation works.
- Remove from RTA S170 Register when replacement required.

**Conservation outcomes**

There are nine operable Allan trusses including four three-span bridges.

The Abercrombie Bridge is unique among surviving truss bridges, due to its irregular truss sizes. The central truss span is 27.4 metres (90 feet) in length while the two external spans are 21.6 metres (71 feet). This composition was primarily used amongst Old PWD truss designs and its adoption by the later bridge on the modified Old PWD bridge piers demonstrates this otherwise lost characteristic.

Apart from the truss dimensions it does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection.

Of the four three-span Allan trusses identified for retention, Rossi Bridge also retains substantial masonry piers from an earlier Old PWD bridge. Victoria Bridge, and possibly Rossi, are operable to be maintained using traditional bridge methods where possible, minimising the introduction of modern techniques. This is considered to mitigate the potential loss of Abercrombie Bridge.
Thornes Bridge over the Mulwaree River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Goulburn-Batemans Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>1</td>
<td>Location</td>
<td>Goulburn</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Southern</td>
</tr>
<tr>
<td>Built</td>
<td>1920</td>
<td>RTA bridge number</td>
<td>6463</td>
</tr>
<tr>
<td>Assessed significance (MBK)</td>
<td>Local</td>
<td>Local government</td>
<td>Goulburn-Mulwaree</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>Nil (bypassed)</td>
</tr>
</tbody>
</table>

Thornes Bridge is a single-span Allan truss bridge of standard form. It replaced an earlier Old PWD Bridge on the same site. Unlike Abercrombie and Rossi bridges, the piers were not reused so there is now no evidence of the former structure. It is located on the margins of Goulburn over the Mulwaree River.

The bridge has been closed to traffic since 2004 when a new concrete bridge was built immediately adjacent.

Analysis of heritage and operational factors

**Service requirements:** The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard.

Thornes Bridge has been bypassed with the construction of a new bridge. It is currently out of service and is receiving basic maintenance.

Thornes Bridge is not listed on the State Heritage Register. It was ranked 56th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
Conservation strategy – Thornes Bridge

Due to the route load limit requirements, Thornes Bridge has been duplicated in accordance with network upgrading priorities. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA’s timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

Recent conservation works
• Since 2004 condition of timbers on bridge has been monitored closely.

Proposed future conservation works

Mitigation of impacts
• Archival recording of the bridge.
• Interpretation of the bridge.
• Salvage of the timbers for use in other bridge rehabilitation works.
• Remove from the RTA’s Section 170 register when replacement required.

Conservation outcomes

Thornes Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its duplication has not resulted in a loss of the representativeness of the RTA’s timber truss bridge collection.

Nine Allan truss bridges are operable. Wee Jasper is a similar single-span Allan truss bridge that will be retained.
Barrington Bridge over the Barrington River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Gloucester-Wapra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2</td>
<td>Location</td>
<td>Gloucester</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Hunter</td>
</tr>
<tr>
<td>Built</td>
<td>1920</td>
<td>RTA bridge number</td>
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<tr>
<td>Assessed significance(MBK)</td>
<td>Regional</td>
<td>Local government</td>
<td>Gloucester Shire</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>1265</td>
</tr>
</tbody>
</table>

Barrington Bridge is a two-span standard Allan truss bridge, crossing the Barrington River. It replaced a McDonald truss bridge at the same location. It is one of 15 bridges in the Hunter Valley, which also include landmark bridges such as Morpeth, Hinton and Dunmore. It is not associated with any population centre and is remote compared to other Hunter Valley bridges.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Barrington Bridge was partially upgraded in 1999. This work included:
- Attachment of cables to support bottom chords. This was a method used from the 1990s onwards and has since been proven to be of little structural benefit.

Barrington Bridge is not listed on the State Heritage Register. It was ranked 50th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
Conservation strategy – Barrington Bridge

Due to the route requirements, the load limit for Barrington Bridge exceeds 42.5 tonnes and as a result it will be duplicated in accordance with network upgrading priorities. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA’s timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

Proposed future conservation works

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge.
- Salvage of the timbers for use in other bridge rehabilitation works.
- Remove from RTA’s Section 170 register when replacement is required.

Conservation outcomes

Barrington Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection. Nine Allan truss bridges are operable. Paytens Bridge is a similar two-span Allan truss bridge.
Gundaroo Bridge over the Yass River

**Description**

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Quenbeyan-Crookwell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>1</td>
<td>Location</td>
<td>Gundaroo</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>South-west</td>
</tr>
<tr>
<td>Built</td>
<td>1920</td>
<td>RTA bridge number</td>
<td>6380</td>
</tr>
<tr>
<td>Assessed significance (MBK)</td>
<td>Local</td>
<td>Local government</td>
<td>Yass Valley</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>Nil – bridge closed</td>
</tr>
</tbody>
</table>

Gundaroo Bridge is a single-span Allan truss. Located one kilometre from the historic Gundaroo township, the bridge has been closed and an adjacent replacement bridge has been completed.

**Analysis of heritage and operational factors**

**Service requirements:** The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard.

Stabilisation works were conducted at the bridge in 2002. This work included:
- Abutments propped due to instability.

Gundaroo Bridge has been recently bypassed with the construction of a new bridge. It is now out of service.

Gundaroo Bridge is not listed on the State Heritage Register. It was ranked 62nd in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Gundaroo Bridge**

The route load limit requirements for Gundaroo Bridge exceed 42.5 tonnes and as a result it has been duplicated in accordance with network upgrading priorities. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA’s timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.
A replacement bridge has been completed close to it on a different alignment which means that it is currently retained. No future use for the bridge has been identified.

**Proposed future conservation works**

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge crossing integrated with other interpretation on the route or in town.
- Salvage of the timbers for use in other bridge rehabilitation works.
- Remove from the RTA’s Section 170 register when replacement is required.

**Conservation outcomes**

Gundaroo Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection.

The removal of this structure would leave two single-span Allan truss bridges (Wee Jasper and Beryl Bridge) remaining within the representative sample. Single-span examples were the most numerous Allan truss span configurations built, with 48 recorded.
Carrathool Bridge over the Murrumbidgee River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Carrathool-Sturt Hwy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2 + bascule lift</td>
<td>Location</td>
<td>Carrathool</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>South-west</td>
</tr>
<tr>
<td>Built</td>
<td>1922</td>
<td>RTA bridge number</td>
<td>3248</td>
</tr>
<tr>
<td>Assessed</td>
<td>State</td>
<td>Local government</td>
<td>Murrumbidgee Shire</td>
</tr>
<tr>
<td>significance(MBK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01460</td>
<td>Daily traffic [AADT]</td>
<td>500</td>
</tr>
</tbody>
</table>

Carrathool Bridge is a two-span Allan truss with an additional lift span. Unlike other lift-span bridges in the RTA’s collection, this bridge features a bascule lift-span set adjacent to one bank rather than centrally positioned between other truss spans.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (ie within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent).

Carrathool Bridge was partially upgraded in 2000/01. This work included:
- Reinforcement of lift span deck strengthening.
- Complete truss reconstruction following damage by a ‘High Mass Vehicle’ in 2002.

In 2006 a ‘Standard Exemption: Minor Works’ was approved for the following:
- Replacement of timber piles below ground with steel and/or concrete piles and caps with streamlined sills on four approach span piers.

Carrathool Bridge is listed on the State Heritage Register. It was ranked 25th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
It is the last remaining RTA timber truss bridge across the Murrumbidgee River and the only bascule-lift bridge in the RTA timber truss bridge collection. While timber truss/lift span configurations represent only three per cent of the total built, their construction marked a substantial public investment (typically they cost twice as much as an equivalent bridge without lift span) and thus they embody characteristics of social history (river trade) not evident in other timber truss bridges.

**Conservation strategy – Carrathool Bridge**

Carrathool Bridge can be upgraded to meet operability requirements, given its location on the road network. Future strengthening and modification will be required to maintain this operability standard as the bridge ages.

**Proposed future conservation works**

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.

**Truss span**

- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Installation of additional sway braces to provide lateral support for the truss at each panel point and prevent compression buckling.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacement of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

**Approach spans**

- Replacement of approach span decks with timber concrete composite decks.

**Substructure**

- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage-sympathetic design and material.

**Railing**

- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

**Conservation outcomes**

The retention of this structure, along with Paytens Bridge and Swan Hill Bridge, would leave three standard two-span Allan truss configurations within the RTA’s heritage portfolio.

The unique feature of Carrathool Bridge is its bascule lift span with a curved path counterweight. This lift mechanism was adapted for use in NSW by Harvey Dare and was limited to five examples. Carrathool Bridge was the last of these to be built and is the only surviving example featuring timber truss spans. Two other curved path counterweight lift-span bridges are retained on the RTA’s Section 170 register: Coraki Bridge and McFarlane’s Bridge (however, they do not feature timber truss spans).
Its location over the Murrumbidgee River would ensure that the previous high concentration of timber truss bridges over this waterway continues to be represented.
Tooleybuc Bridge over the Murray River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Balranald-Swan Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2 + lift span</td>
<td>Location</td>
<td>Tooleybuc</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>South-west</td>
</tr>
<tr>
<td>Built</td>
<td>1925</td>
<td>RTA bridge number</td>
<td>3244</td>
</tr>
<tr>
<td>Assessed significance(MBK)</td>
<td>State</td>
<td>Local government</td>
<td>Shire of Wakool</td>
</tr>
<tr>
<td>SHR listed</td>
<td>SHR 01482</td>
<td>Daily traffic [AADT]</td>
<td>1550</td>
</tr>
</tbody>
</table>

Tooleybuc Bridge is a two-span Allan truss bridge with a central lift span to allow river vessels to pass beneath the roadway. The bridge is relatively remote from civic centres compared to other Murray River crossings and as such does not have the same social, gateway or visual landmark significance between NSW and Victoria.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Tooleybuc Bridge has been partially upgraded in the past. This work included:

- Installation of concrete sills at base of central cast-iron piers for improved stability in 2002/03.
Tooleybuc Bridge is listed on the State Heritage Register. It was ranked 12th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

**Conservation strategy – Tooleybuc Bridge**

Due to the load limit route requirements for Tooleybuc Bridge it will be duplicated in accordance with network upgrading priorities. The bridge cannot meet these load limits without complete replacement of the structure. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA's timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

**Proposed future conservation works**

Mitigation of impacts

- Archival recording of the bridge.
- Interpretation of the bridge crossing.
- Salvage of the timbers for use in other bridge rehabilitation works.

**Conservation outcomes**

Tooleybuc Bridge does not bear any unique or outstanding design characteristics that cannot be viewed in other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection. Nine Allan truss bridges are operable. Dunmore and Hinton Bridge are similar two- or three-span Allan truss bridges with lift spans. Hinton Bridge was built a quarter of a century earlier than Tooleybuc and was considered to be more innovative at that time. Swan Hill Bridge is also under investigation for adaptive reuse and retains the same features as Tooleybuc.
Paytens Bridge over the Lachlan River

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Forbes-Paytens Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2</td>
<td>Location</td>
<td>Eugowra</td>
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<tr>
<td>Sub-type</td>
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<td>RTA region</td>
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<tr>
<td>Built</td>
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<td>RTA bridge number</td>
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<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>150</td>
</tr>
</tbody>
</table>

Paytens Bridge is a standard two-span Allan timber truss bridge. It retains no notable or unusual features of the Allan timber truss type or the timber bridge population more generally.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (i.e., within a reasonable level of risk using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent). However, the emergence of, and widespread access for multi-combination trucks on the western slopes and plains places some degree of uncertainty on the future operability of this bridge.

Paytens Bridge has been partially upgraded in the past. This work included:

Paytens Bridge is not listed on the State Heritage Register. It was ranked 75th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
Conservation strategy – Paytens Bridge

Paytens Bridge can be upgraded to meet operability requirements, given its location on the road network. Future strengthening and modification will be required to maintain this operability standard as the bridge ages.

Proposed future conservation works

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.
- Reinstate central pier that is more sympathetic to original design.
- Nomination to the State Heritage Register.

Truss span
- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacements of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

Approach spans
- Replacement of approach span decks with timber concrete composite decks.

Substructure
- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage-sympathetic design and materials.

Railing
- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

Conservation outcomes

Two other two-span Allan trusses (Vacy Bridge and Barrington Bridge) are inoperable. Beryl Bridge is another two-span Allan truss bridge that is operable. There are also three other truss/lift span combinations proposed for retention (including Carrathool Bridge and Hinton Bridge), making a total group of four of this two-span form. Swan Hill Bridge is being investigated for adaptive reuse.

The bridge lacks the structural integrity of Vacy or Barrington Bridge through the replacement in 2000 of its central timber trestle pier with a steel pier that is of obvious modern design.

Its location near to Forbes would ensure that the previous concentration of bridges in the region continues to be represented.
Beryl Bridge over Wyalda Creek

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Gulgong-Wyalda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>2</td>
<td>Location</td>
<td>Gulgong</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Western</td>
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<tr>
<td>Built</td>
<td>1927</td>
<td>RTA bridge number</td>
<td>1304</td>
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<tr>
<td>Assessed significance (MBK)</td>
<td>Regional</td>
<td>Local government</td>
<td>Mid-West Regional</td>
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<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>100</td>
</tr>
</tbody>
</table>

Beryl Bridge is a two-span Allan truss bridge of standard form built in 1927.

Analysis of heritage and operational factors

Service requirements: The bridge is required to meet the current regulatory limits for general access trucks (ie within a reasonable level of risks using the T44 Standard which is the design standard for bridges carrying a 42.5 tonne semi-trailer or equivalent). However, the emergence of, and widespread access for multi-combination trucks on the western slopes and plains places some degree of uncertainty on the future operability of this bridge.

Beryl Bridge is not listed on the State Heritage Register. It was ranked 57th in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.

It is the last remaining timber truss bridge from a group of 10 within the Mudgee-Gulgong area. It is more than 10 kilometres from a town.
**Conservation strategy – Beryl Bridge**

The RTA proposes to retain Beryl Bridge in the RTA’s timber truss bridge portfolio as it can be upgraded to meet operability requirements, given its location on the road network. Future strengthening and modification will be required to maintain this operability standard as the bridge ages.

**Proposed future conservation works**

- Routine and periodic maintenance using existing forms of fabric.
- Interpretation of the bridge.
- Reinstate central pier that is more sympathetic to original design.
- Nomination to the State Heritage Register.

**Truss span**

- Installation of steel laminates on the inside faces of the new timber bottom chord members.
- Increase in thickness of second and third diagonal members from 4.5 inches to 6 inches.
- Replacement of timber planking with structurally appropriate heritage-sympathetic decking.
- Installation of additional steel sway braces to provide lateral support for the truss at each panel point to prevent compression buckling of top chord member of the truss.
- Replacements of primary timber cross girders with steel cross girders where appropriate.
- Installation of weather protection barrier on top chord member of truss.

**Approach spans**

- Replacement of approach span decks with timber concrete composite decks.

**Substructure**

- Replacement of timber piles below ground with steel and/or reinforced concrete piles and pile caps forming the sill for the piers.
- Replacement of existing timber piers and abutments with modern heritage-sympathetic design and material.

**Railing**

- Replacement with structurally and dimensionally appropriate heritage-sympathetic design and materials for the entire length of the bridge.

**Conservation outcomes**

Two other two-span Allan trusses (Vacy Bridge and Barrington Bridge) are inoperable. Paytens Bridge is another two-span Allan truss bridge that is operable. There are also three other truss/lift span combinations proposed for retention (including Carrathool Bridge and Hinton Bridge), making a total group of four of this two-span form. Swan Hill Bridge is being investigated for adaptive reuse.

Its location near to Gulgong/Mudgee would ensure that the previous high concentration of 10 timber truss bridges in the region continues to be represented.
Boonanga Bridge

Description

<table>
<thead>
<tr>
<th>Truss type</th>
<th>Allan</th>
<th>Road</th>
<th>Moree-Boomi Road (MR 232)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spans</td>
<td>1</td>
<td>Location</td>
<td>Boomi (North)</td>
</tr>
<tr>
<td>Sub-type</td>
<td>Standard</td>
<td>RTA region</td>
<td>Western</td>
</tr>
<tr>
<td>Built</td>
<td>1928</td>
<td>RTA bridge number</td>
<td>3071</td>
</tr>
<tr>
<td>Assessed significance(MBK)</td>
<td>Local</td>
<td>Local government</td>
<td>Moree Plains Shire</td>
</tr>
<tr>
<td>SHR listed</td>
<td>No</td>
<td>Daily traffic [AADT]</td>
<td>105</td>
</tr>
</tbody>
</table>

Boonanga Bridge is a single-span Allan truss bridge on the NSW-Queensland border. It is located on an unsealed road more than 30 kilometres from a population centre and is not identified with any community.

Analysis of heritage and operational factors

Service requirements: The route on which the bridge is situated is required to meet the emerging regulatory limits well in excess of the T44 Standard. The bridge cannot be upgraded to achieve the required standard and therefore will need to be eventually replaced with a modern bridge in order to meet capacity requirements.

Boonanga Bridge is not listed on the State Heritage Register. It was ranked 72nd in the 1998 MBK timber truss bridge study and this is recognised in the timber truss bridge conservation strategy sensitivity test.
Conservation strategy – Boonanga Bridge

Due to the load limit route requirements for Boonanga Bridge it will be removed and replaced in accordance with network upgrading priorities. The bridge cannot meet these load limits without complete replacement of the structure. It does not have any unique characteristics that are not represented elsewhere among retained bridges. As a result, the bridge cannot be retained in use within the RTA’s timber truss bridge portfolio. If required to be retained as a redundant structure it would attract minimum resources to support due diligence requirements and its existing fabric would be retained.

Proposed future conservation works

Mitigation of impacts
- Archival recording of the bridge.
- Interpretation of the bridge crossing.
- Salvage of the timbers for use in other bridge rehabilitation works.
- Remove from the RTA’s Section 170 register when replacement required.

Conservation outcomes

Boonanga Bridge does not bear any unique or outstanding design characteristics that cannot be viewed at other Allan truss bridges, meaning its removal and replacement would not result in a loss of the representativeness of the RTA’s timber truss bridge collection. Nine Allan truss bridges are operable. Wee Jasper and Beryl Bridges exhibit the same features and significantly pre-date Boonanga.