

Review of bridges to be retained under the Timber Truss Bridge Conservation Strategy

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Executive Summary

Roads and Maritime manages most of the remaining timber truss road bridges (TTBs) in NSW. These bridges have high individual and collective heritage significance, being globally unique in their technological development and as a record of NSW's non-Aboriginal settlement history.

In 2010, Roads and Maritime prepared Timber Truss Road Bridges – A Strategic Approach to Conservation (the Strategy). After public consultation it was endorsed by the Heritage Council of NSW in August 2012. The Strategy identified a representative population of 26 TTBs from 48 that would be kept as part of the road network as integral to their survival and cultural significance. Roads and Maritime committed to retaining and conserving these bridges, and upgrading them where necessary to allow them to continue to operate.

While the Strategy remains essential to Roads and Maritime balancing its legislative role and compliance with the Heritage Act, experience gained over the past five years requires that consideration needs to be given to re-assessing the best mix of bridges for retention to achieve a representative sample that functions as part of the road network.

Roads and Maritime is proposing an amended list for the consideration of the NSW Heritage Council for adoption within the strategy. Of the 26 bridges to be retained under the 2012 TTB Strategy, seven are unable to be modified to meet community and network needs while retaining their heritage value, and it is proposed to remove them. Eight other bridges have been found to be more viable and it is proposed to add them to the list of bridges to be retained under the TTB Strategy, giving an updated number of 27 bridges to be retained. This involves the transfer of two bridges which are currently owned by councils to Roads and Maritime management. Local council bridges were excluded from the original strategy, and many have subsequently been replaced. Roads and Maritime recognises that they need to be included in order to maintain the representativeness of the conserved bridge population.

It is not proposed to otherwise alter the Strategy, which has allowed Roads and Maritime to manage a critical conflict between its road network and heritage conservation obligations.

The Overarching Conservation Management Plan (OCMP) (endorsed in February 2018), which guides the conservation and management of all bridges to be retained under the TTB Strategy, states that the list of bridges subject to the TTB Strategy will be reviewed within 12 months of the endorsement of the OCMP. This document sets out the rationale and results of the review of the list of bridges to be retained under the TTB Strategy. Details of each bridge included in the review and a summary of the works required on them are contained in Attachment A: Replacement and Upgrade Works Summary. The indicative five year schedule of works is included at Attachment B and maps showing the geographical location of the bridges in the original list and the bridge locations following review of the list are contained in Attachment C. Thirty year upgrade and replacement costings are included at Attachment D.

Table 1: Overview of changes proposed to the 2012 Strategy retention list

2012 Strategy bridges to be retained. No change proposed	2012 Strategy bridges to be replaced. No change proposed	2012 Strategy bridges proposed to no longer be retained	Additional bridges proposed to be retained
Barham ⁺	Barrington	Carrathool ⁺	Abercrombie [@]
Beryl [@]	Coonamit ⁺	Cobram ⁺	Beckers ⁺
Briner [@]	Korns Crossing	Colemans ⁺	Bulga ⁺
Clarence Town ⁺	Vacy	Paytens	Cooreei ⁺
Dunmore ⁺	Replaced / In progress	Rawsonville	Crankies Plains ⁺
Galston ⁺	Holman	Swan Hill ⁺	Gillies ^{*@}
Hinton ⁺	Mungindi	Warroo	Junction, Rouchel Brook ^{*@}
Junction ⁺ , Tumut	Gundaroo		Tooleybuc ⁺
McKanes ⁺	Gee Gee		
Middle Falbrook ⁺	Lansdowne		
Monkerai ⁺	Sportsmans Creek		
Morpeth ⁺	Tabulam		
New Buildings ⁺	Five Day Creek		
Rossi ⁺	Boonanga		
Scabbing Flat [@]	Charleyong		
St Albans ⁺	Crookwell		
Victoria ⁺	Thornes		
Wallaby Rocks ⁺			
Wee Jasper ⁺			

Table 1 – Overview of the changes proposed to the 2012 Strategy retention list
(+ currently SHR listed; @ proposed to be added to SHR; * council-owned bridge).

As with the original strategy, the proposed retention list directs conservation effort to retaining those bridges which are under the least pressure for upgrading and intensification of use, and are therefore more likely to remain operable in their current configuration.

Under the review, all bridges for retention are able to be sympathetically upgraded and strengthened to accommodate network safety and operational needs, and constraints to the freight network posed by the original list have been removed.

Heritage Benefits:

- The total number of bridges to be retained is increased from 26 to 27.
- All retained bridges not already on the SHR will be nominated for inclusion, where before five were to remain unlisted due to uncertainty regarding future freight needs. The total number of bridges to be listed on the SHR would be increased from 21 under the original Strategy to 27.
- Fewer bridges are required to be delisted from the SHR (ten were to be de-listed under the original list, as opposed to nine in the reviewed list. Five of these have already been delisted since the approval of the original strategy).
- The representativeness of the overall conserved population of TTBs is improved relative to the 2012 TTB strategy.
- Bridges which demonstrate unique details found nowhere else are added to the list to be retained, so that the representativeness of the retained population is enhanced by the review.
- Given their much higher rate of attrition, the two council-owned bridges identified for retention are the only council-owned bridges likely to survive.
- Bridges on the updated list can be managed with a continuing operational role and use in the life of communities, which enables them to demonstrate their significance to a far greater extent than bridges which have been bypassed by new crossings.

Heritage negatives.

- There will be a minor reduction in the geographical spread of the bridges.

Operational benefits

Bridge Removals:

- **Rawsonville Bridge** requires T44 (general access vehicles including eg semi-trailers, buses, truck and dog combinations) and up to higher mass limit (HML) B-Double vehicle capacity to meet current and predicted future network requirements for agricultural purposes. The current bridge is too narrow for wide modern agricultural equipment used in the local area. The original timber trestle pier located on the edge of the waterway has been damaged by scour, requiring considerable works to stabilise the bank including visually intrusive sheet piling. Construction of a new concrete bridge rather than retaining the current width and load deficient timber bridge would allow network and community requirements to be met.
- **Carrathool Bridge** is one lane and narrow at the liftspan, posing a significant limitation on local agricultural operations which require frequent crossing with over-size agricultural machinery, and is unable to carry HML road trains. Local Council has obtained funding to construct a new concrete bridge particularly to service the community and network needs of over-width agricultural equipment, two lane HML traffic, pedestrians and cyclists, as well as addressing the 110km long detour required when the bridge is closed for maintenance works. Carrathool Bridge will therefore become non-operational, similar to Cobram, by the end of 2019 when the new bridge is opened to traffic.
- **Cobram Bridge** is not operable and cannot be made operable as a number of spans on the NSW end have been removed and a staircase has been provided for pedestrian access. A new concrete bridge with full pedestrian facilities has been built adjacent to this bridge. The lift span is not effectively operable as the new concrete bridge is no higher than the timber bridge deck.
- **Colemans Bridge** currently supports high traffic volumes, two-way traffic and has a roundabout at one end of the bridge on a busy intersection, resulting in frequent near misses. Additionally it is load restricted to only one truck on the bridge at a time. Deterioration necessitates some urgent works. A traffic study is currently being undertaken with Lismore Council to assess future network needs with a high likelihood that a new bridge will be built to meet network and safety requirements.
- **Paytens Bridge** requires T44 and up to HML B-Double vehicle capacity to meet current and predicted future network requirements for agricultural purposes. The current bridge is too narrow for wide modern agricultural equipment used in the local area. The original timber trestle pier located in the waterway has been replaced with a visually intrusive, poorly designed steel pier, and one of the timber bottom chords recently broke under a heavy load. Construction of a new concrete bridge rather than retaining the current width and load deficient timber bridge would allow network and community requirements to be met.
- **Swan Hill Bridge** requires two lanes to cater for traffic volumes, over-mass and over-dimension traffic. The presence of the liftspan makes it unable to be widened to meet requirements. It is currently under temporary support due to cracks found in the cast-iron piers. When the original strategy was developed an out of town bypass was in planning, with Swan Hill Bridge to serve as an in-town connection only. Subsequent assessment has identified that the only suitable location for a crossing is at the present location.

All stakeholders (and the Strategy) acknowledge the need for a new concrete bridge, and no financially viable options for adaptive re-use have been found. A new concrete bridge would be two lane, have capacity for wide and HML vehicles and have full pedestrian and cyclist facilities to support community and network requirements. Therefore, Swan Hill Bridge will be non-operational.

- **Warroo Bridge** requires T44 and up to HML B-Triple vehicle capacity to meet current and predicted future network requirements for agricultural purposes. The current bridge is too narrow for wide modern agricultural equipment used in the local area and is frequently damaged by wide loads. The waterway has moved and widened at this location meaning the truss span is not

long enough for the width of the river and is in the wrong location. Considerable modification would be required in order to accommodate the waterway movement. Construction of a new concrete bridge rather than retaining the current width and load deficient timber bridge would allow network and community requirements to be met.

Operational negatives

- Roads and Maritime will take on responsibility for two local council bridges for which it otherwise has no statutory obligation.
- Hunter region will have disproportionate asset management responsibility for the largest suite of bridges in the state, retaining and replacing fewer bridges than any other region except for Sydney.

Cost implications

- The proposal is projected to result in an overall cost saving to Roads and Maritime of approximately \$87 million over 30 years relative to the current retention list.
- The proposal is projected to result in an overall cost saving to Regional Roads Victoria of approximately \$64 million over 30 years relative to the current retention list.
- The funding which under the 2012 Strategy would have had to be spent on Cobram, a non-operational bypassed bridge, can be spent instead on an increased number of operational bridges on the network which serve useful transportation functions in communities, with consequentially more certain long term conservation.

Recommendations

1. The list of bridges in Table 7 be submitted for endorsement by the Heritage Council of NSW as the updated list of bridges to be retained under the TTB Strategy and managed under the endorsed overarching CMP.
2. The Proposal should be used as the basis for consulting with key stakeholders involved in the development of the original strategy:
 - Office of Environment and Heritage
 - National Trust of Australia (NSW)
 - Engineers Australia
 - Royal Australian Historical Society – and via it to the 400+ affiliated local historical societies in NSW

Plus others affected by the Proposal:

- Bridges to be acquired by Roads and Maritime, currently council owned: Cessnock City Council (Gillies bridge) , Upper Hunter Shire Council (Junction bridge)
 - Bridges proposed for removal from list: Regional Roads Victoria / Heritage Victoria/Murray River Crossings Forum Steering Committee /Swan Hill Rural City Council (Vic) /Murray River Council (Swan Hill bridge), Carrathool Shire Council (Carrathool bridge), Forbes Shire Council (Warroo bridge and Paytens bridge), Dubbo Council (Rawsonville bridge), Moira Council (Cobram Bridge), Lismore City Council (Colemans bridge)
 - Bridges proposed for retention: Regional Roads Victoria / Heritage Victoria/Murray River Crossings Forum Steering Committee /Swan Hill Rural City Council (Vic) /Murray River Council (Tooleybuc bridge), Snowy Monaro Council (Crankies Plains bridge), Dungog Council (Cooreei bridge), Singleton Council (Bulga bridge), Upper Lachlan Shire (Abercrombie bridge)
3. Following Heritage Council of NSW endorsement of the updated list, the two Council bridges to be retained under the updated list be acquired by Roads and Maritime and the six bridges to be retained which are not currently SHR listed be nominated for inclusion on the SHR.

1. Issue

In order to obtain in principle agreement from the Heritage Council for the demolition of 22 heritage timber truss bridges, Roads and Maritime demonstrated in the TTB Strategy that conservation of timber truss bridges is most effective when the bridges are retained as operational assets, while non-operational bridges present insurmountable conservation problems that only delayed their eventual need to be demolished for public safety. However, exceptions to this rule were made in the cases of Carrathool, Cobram and Swan Hill Bridges. These exceptions were not made primarily due to the fact that these bridges have particularly significant timber truss spans, but rather, it was because these were lift bridges with timber trusses and particularly significant metal lift spans. The three bridges were included under the TTB Strategy as bridges to be retained, although new concrete bridges would fulfil the road network needs, leaving the timber bridges effectively bypassed. The predicted cost to retain these bridges is well in excess of \$100 M within the next 10 years.

Cobram Bridge was retained in part due to the aesthetics of the lift span, but was subject to a separate environmental approval and commitments by Roads and Maritime and Regional Roads Victoria in the development of a new adjacent crossing. These existing commitments need to be recognised and maintained or separately resolved regardless of their being part of this proposal.

In the light of numerous expensive but failed attempts at adaptive reuse of timber truss bridges in the past, considerable effort has gone into seeking adaptive reuse options which may work at these locations, but no feasible or reasonable solution has been found. Recent experience with timber truss bridges in NSW (e.g. Hampden Bridge at Wagga and bridges at Glebe, Bendemeer, Five Day Creek, Thornes and Mill Creeks) has shown that bypassed timber bridges still require a comparable level of maintenance investment and safety upgrading. As these bridges revert to council ownership, this represents a major impost upon their resources and engineering capability. The consequence seen in those bridges mentioned is that they eventually fall into disrepair, usually resulting in later removal. If the bypassed bridges remain open to light vehicles and / or pedestrians (as is proposed in the Strategy), then minimum safety standards must be maintained to ensure there are no trip hazards and that pedestrian railings are sufficiently robust. There are also minimum heritage requirements for maintenance which must be met.

This report seeks to review the list of timber truss bridges to be retained in order to ensure responsible use of public money to meet customer needs while also fulfilling heritage obligations under the TTB Strategy and the Overarching Conservation Management Plan for Timber Truss Bridges.

The Proposal retains diversity of bridge truss types with representatives of all five extant types. It also provides, where possible, representatives of different truss lengths and configurations. Information on all bridges included in the review with details of truss type, location and heritage status is provided in **Table 2** below.

Table 2: Timber Truss Bridge Summary

Bridges proposed for retention

	Bridge name	Truss type	# Spans	Location	Region	Council	SHR	Road Classification
1	Abercrombie	Allan 70' & 90'	3	Abercrombie River, South of Bathurst, Goulburn Road	W	Bathurst Regional	no	State
2	Beckers	De Burgh 91'	1	Webber's Creek at Dunn's Crossing, Mount Thorley – Gresford	H	Singleton	yes	local
3	Bulga	Dare 104'	2	Wollombi Brook, Putty Road	H	Singleton	yes	State
4	Cooreei	Dare 91'	1	Williams River at Dungog, Stroud Hill Road	H	Dungog	yes	regional
5	Crankies	McDonald 75'	2	Coolumbooka River at Crankies Plains, Cathcart Road	S	Snowy Mountains Regional	yes	regional
6	Gillies	de Burgh 70'	1	Wilderness Road over Black Creek near Rothbury	H	Cessnock	no	local
7	Junction, Rouchel Brook	Dare 70	1	Rouchel Road near Upper Rouchel (near Scone)	H	Upper Hunter	no	local
8	Tooleybuc	Allan 70'	2 + lift	Murray River= at Tooleybuc, Tooleybuc Road	SW	Murray River, NSW & Swan Hill Rural City, VICTORIA	yes	State

Bridges proposed for removal

	Bridge name	Truss type	# Spans	Location	Region	Council	SHR	Road Classification
1	Carrathool	Allan 70'	2 + lift	Murrumbidgee River, Carrathool – Carrathool Road	SW	Carrathool & Murrumbidgee	yes	local
2	Cobram	de Burgh 104'	2 + lift	Murray River at Barooga, Berrigan – Cobram	SW	Berrigan, NSW & Moira: VICTORIA	yes	N/A - bypassed
3	Colemans	Dare 104'	2	Leycester Creek at Lismore, Union Street	N	Lismore	yes	local
4	Paytens	Allan 90'	2	Collets Crossing, Lachlan River near Forbes – Paytens Bridge Road	W	Forbes	no	local
5	Rawsonville	Dare 91'	2	Minore, Macquarie River, Mitchell Hwy – Rawson	W	Dubbo	no	local
6	Swan Hill	Allan 90'	2 + lift	Murray River at Swan Hill, Swan Hill Road	SW	Murray River, NSW & Swan Hill Rural City, VICTORIA	yes	regional
7	Warroo	Dare 70'	1	Lachlan River, Condobolin – Warroo	W	Forbes	no	local

Bridges for retention: no change

	Bridge name	Truss type	# Spans	Location	Region	Council	SHR	Road Classification
1	Barham	de Burgh 104'	2 + lift	Murray River at Barham, Barham – Koondrook	SW	Murray River, NSW & Gannawarra, VICTORIA	yes	regional
2	Beryl	Allan 70'	2	Wyaldra Creek, Gulgong – Spring Ridge Road	W	Mudgee	no	local
3	Briner	Dare 91'	1	Upper Coldstream River, Uimurra – Tucabia	N	Clarence Valley Council	no	local
4	Clarence Town	Old PWD 100'	2	Williams River at Clarence Town, Limeburners – Clarencetown	H	Dungog	yes	local
5	Dunmore	Allan 110'	3 + lift	Paterson River at Woodville, Woodville to Maitland	H	Maitland	yes	local
6	Galston	McDonald 65'	1	Pearce's or Tunks Creek at Galston Gorge, Asquith – Galston	Syd	Hornsby	yes	State
7	Hinton	Allan 90'	2 + lift	Patterson River, Hinton to Morpeth	H	Maitland	yes	local
8	Junction, Tumut	McDonald 75'	3	Tumut River, Brungle Rd	SW	Snowy Valleys	yes	local
9	McKanes	McDonald 90'	2	Cox River, Bowenfels to Jenolan Caves Road	W	Greater Lithgow	yes	local
10	Middle Falbrook	de Burgh 91'	2	Glennies Creek at Middle Falbrook, Rixs Creek to Falbrook	H	Singleton	yes	local
11	Monkerai	Old PWD 70'	3	Karuah River, Maitland – Buckett's Way	H	Great Lakes	yes	local
12	Morpeth	Allan 110'	3	Hunter River, East Maitland – Wallalong	H	Maitland	yes	local
13	New Buildings	Dare 91'	3	Towamba River, off the Wyndham – Cathcart Road	S	Snowy Mountains Regional	yes	local
14	Rossi	Allan 90'	3	Rossi's Crossing, Wollondilly River, Goulburn – Wheeo	S	Goulburn-Mulwaree	yes	local
15	Scabbing Flat	Dare 91'	2	Macquarie River, Geurie – Scabbing Flat	W	Wellington	no	local
16	St Albans	de Burgh 117'	2	McDonald River at St. Albans, Wisemans Ferry to Wollombi	Syd	Hawkesbury	yes	regional
17	Victoria	Allan 90'	3	Stonequarry Creek, Prince Street, Picton	S	Wollondilly	yes	local
18	Wallaby Rocks	Allan 90'	3	Turon River, Sofala – Hill End	W	Evans	yes	regional

19	Wee Jasper	Allan 90'	1	Goodradigbee River, Tumut – Yass	SW	Yass Valley	yes	regional
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Bridges for removal: no change

	Bridge name	Truss type	# Spans	Location	Region	Council	SHR	Road Classification
1	Barrington	Allan 90'	2	Barrington River, Gloucester – Wapra Road	H	Gloucester	no	regional
2	Charleyong	Allan 90'	1	Mongarlowe River, Nowra – Braidwood	S	Tallaganda	no	regional
3	Gee Gee	Dare 91'	1	Wakool River, Swan Hill to Deniliquin	SW	Murray River	De-listed	local
4	Korns Crossing	Dare 91'	1	Rous River Crystal Creek, Murwillumbah – Chillingham	N	Tweed	no	regional
5	Lansdowne	de Burgh 91'	1	Mulwaree Ponds at Goulburn	S	Goulburn-Mulwaree	no	local
6	Sportsmans	Dare 104'	2	Sportsman's Ck at Lawrence, Grafton – Maclean	N	Clarence Valley Council	no	regional
7	Tabulam	de Burgh 104'	5	Clarence River at Tabulam, Bruxner Highway	N	Kyogle	De-listed	State
8	Vacy	Allan 90'	2	Paterson River, Paterson – Gresford	H	Dungog	yes	regional
9	Coonamit	Dare 91'	2	Wakool River, Swan Hill to Moulamein	SW	Murray River	yes	regional

Since the original Strategy was implemented the following bridges have already been replaced – Boonanga, Crookwell, Five Day Creek, Gundaroo, Holmans, Mungindi and Thornes.

2. Background

The 2012 Timber Truss Bridge Conservation Strategy

Roads and Maritime manages the great majority of the remaining timber truss road bridges in NSW. Over 400 timber truss road bridges were constructed in NSW between 1855 and 1936 and the remaining bridges now represent an important part of the heritage of NSW. When the TTB Strategy was endorsed there were 65 remaining, and now there are only 51, with some no longer operating as part of the road network. They were designed to cope with a loaded wagon of around 16 tonnes, while the modern general access limit, reflected in the T44 standard is 42.5 tonnes, with much rural freight demand being far heavier than that.

In 2010, Roads and Maritime prepared the *Timber Truss Road Bridges – A Strategic Approach to Conservation* (the TTB Strategy), detailing a methodology for assessing the conservation suitability and approach to managing the (then) 48 remaining timber truss bridges managed by Roads and Maritime.

In 2011, with the support of the NSW Heritage Council, Roads and Maritime consulted the NSW community and stakeholders. The TTB Strategy was amended in response, and the final version of the TTB Strategy was endorsed by the NSW Heritage Council in August 2012. Roads and Maritime committed to conserving 26 bridges, while the remainder were to be replaced over time. Bridges were to be retained where they were better candidates for conservation, i.e. less likely to experience increased freight demand, and which as a group reflected the diversity of the broader timber truss bridge population. The list of 26 bridges that were to be retained under the endorsed TTB Strategy is given in Table 3, and includes a subset of six bridges called the “central west group” which the TTB Strategy only committed to retaining for 20 years, not necessarily beyond 2032.

Table 3: Bridges retained under the 2012 TTB Strategy (those in *italics* are the “central west group”).

Name and location of bridge	Type	SHR	Name and Location	Type	SHR
Monkerai Bridge, Karuah River	Old PWD 70'	Yes	Rossi Bridge, Wollondilly River	Allan 90'	Yes
Clarence Town Bridge, Williams	Old PWD 100'	Yes	Morpeth Bridge, Hunter River	Allan 110'	Yes
Tunks Creek, Galston Gorge	McDonald 65'	Yes	Dunmore Bridge, Paterson River	Allan 110'	Yes
Junction Bridge, Tumut River	McDonald 75'	Yes	Glennies Creek, Middle Falbrook	De burgh 91'	Yes
McKanes Bridge, Cox's River	McDonald 90'	Yes	Barham Bridge, Murray River	De burgh 104'	Yes
* <i>Beryl Bridge, Wyaldra Creek</i>	Allan 70'	No	Cobram Bridge, Murray River	De burgh 104'	Yes
Carrathool Bridge, Murrumbidgee	Allan 70'	Yes	St Albans Bridge, Macdonald River	De burgh 117'	Yes
Victoria Bridge, Stonequarry Ck	Allan 90'	Yes	* <i>Warroo Bridge, Lachlan River</i>	Dare 70'	No
* <i>Wallaby Rocks, Turon River</i>	Allan 90'	Yes	Briner Bridge, Upper Coldstream	Dare 91'	No
Hinton Bridge, Paterson River	Allan 90'	Yes	* <i>Rawsonville Bridge, Macquarie</i>	Dare 91'	No
Swan Hill Bridge, Murray River	Allan 90'	Yes	* <i>Scabbing Flat Bridge, Macquarie</i>	Dare 91'	No
* <i>Payten's Bridge, Lachlan River</i>	Allan 90'	No	New Buildings Bridge, Towamba	Dare 91'	Yes
Wee Jasper, Goodradigbee	Allan 90'	Yes	Colemans Bridge, Leycester Creek	Dare 104'	Yes

Key elements of the Strategy relevant to this Discussion paper are:

- It identified 26 bridges that Roads and Maritime committed to retaining in operation as part of the road network, assuming necessary capacity upgrading to T44 could be done. Note that Cobram Bridge was already by-passed, offline and accessible by foot only.
- Two retained bridges were to be added to the SHR. Five bridges (the 'Central West' group) were identified as state significant but not SHR-listed. This was because this area had historically been most vulnerable to changes in agricultural production and transportation.
- The retained bridges formed a permanently conserved representative sample of the original bridge population. The diversity inherent in the original population was reflected as much as possible in the bridges to be kept.
- Bridges that were on the SHR, but which were not identified to be kept, met the provision that allows delisting 'if the Minister is of the opinion that the long-term conservation of the item is not necessary' (s.38 (1)(b)), reflecting Roads and Maritime's commitment to permanent conservation of the retained sample as the alternative. Note that all applications to delist were still required to follow statutory process.
- Long-term conservation and change to individual bridges was to be managed through the conservation management planning process.

The need to revisit the conserved population

Roads and Maritime is committed to the delivery of the Timber Truss Bridge Strategy. To this end, the organisation is currently developing a program position within Roads and Maritime to ensure funding is identified and secured within the organisation over the twenty year horizon. In addition Roads and Maritime's Regional and Freight Division has recently appointed a Bridge Coordinator to coordinate and report on the TTB Program, among other bridge programs.

However, since the TTB Strategy was developed, considerable work has been done on better understanding the structural capabilities of the various different truss types and strengthening methods available which conserve heritage values while also providing adequate capacity and meeting safety standards. Because of this recent work, some bridges previously considered not-viable can now be made viable for retention with suitable heritage sympathetic strengthening works to be carried out to ensure operability. Some of these bridges have considerable heritage significance and are valued by local communities.

Being organic, all timber eventually deteriorates and its strength reduces over time, even that used in the TTBs, which traditionally employed the very best of the superb old growth timber found in NSW forests. It was standard practice to refurbish bridges by replacing every timber component in a cycle of 20-30 years. One aspect of evolving truss design was to simplify the ability to swap out individual members and to increase the contribution of metal components. A refurbishment of a timber truss bridge will replace timber to the current or original configuration, while a capacity upgrade will introduce new sympathetic materials that provide a reliable increase in load carry capacity.

In recognition of the need to revisit the list of bridges to be retained, the Overarching Conservation Management Plan for the timber truss bridges, endorsed by the NSW Heritage Council in February 2018, includes a policy that the list of bridges will be reviewed within 12 months of its endorsement. It is therefore timely and appropriate to review the list of bridges to be retained under the TTB Strategy.

The primary focus of this review has been to improve the heritage outcome of the TTB conservation program by ensuring consistency with the overarching CMP, which requires a continuing role and use of the bridges within their communities, and to ensure that the retained bridges can continue to fulfil network requirements. Meeting network requirements is central to the continuing role and use of the bridges within their communities and thus to the Roads and Maritime commitment to provide a safe and viable road network to the people of NSW. It also allows Roads and Maritime to commit the significant funding required to maintain and cyclically refurbish each bridge.

The key operational driver for the review of the list of bridges to be retained or removed is network safety. Bridges must provide safe access for all users, including pedestrians, car drivers, agricultural vehicles and freight. In order to do so, Roads and Maritime staff must ensure that sight distances, road alignments, carriageway width and structural strength allow the carriage of specialised farm machinery and/or heavy vehicles, are sufficient for community access needs and meet safety standards. These considerations have been taken into account in the TTB List Review, to ensure that the suite of bridges that is retained and managed into the future for the people of New South Wales, can safely meet these operational requirements.

An important part of meeting network requirements and the second key driver for the list review is the management of road access for heavy vehicles and freight customers through the Heavy Vehicle Access Policy Framework. The Access Policy identifies key routes and the vision for higher productivity vehicles (HPV) on those routes and surrounding networks. Assessment of these routes for access consistent with the policy, as well as assessments in response to industry requests for access, allows identification of constraints to heavy vehicle access and areas where road and bridge upgrades are most required to achieve safe, productive and sustainable access for higher productivity vehicles. Road freight networks are developed at a national rather than state or regional scale and are identified as a key economic stimulus for rural NSW.

A recent review of road freight requirements determined that of the seven bridges originally proposed for retention under the Strategy (and now proposed to be removed):

- five are on key freight routes for high productivity vehicles
- one has potential marginal value to provide greater road network connectivity on for high productivity vehicles, however suitable alternative networks are currently available
- one has no potential high productivity freight connectivity value

The review of the bridges to be retained will result in an improvement in the freight network as, of the eight bridges now proposed for retention under the list review:

- three were found to have no potential high productivity freight connectivity value;
- four were found to have potential marginal value to provide greater road network connectivity on for high productivity vehicles, however suitable alternative networks are currently available; and
- one was identified as key freight route for high productivity vehicles, however is able to be retained, strengthened and maintained for current B-Double HML access.

Thus, constraints to the freight network posed by the original list have been removed. The table below summarises the net outcome of an improved freight network under the proposed review.

Table 4: Summary Comparison of Bridge Contribution to Freight Network

2012 TTB Strategy Bridges proposed for retention	Freight Route	2018 TTB List Review Bridges proposed for retention	Freight Route
Carrathool	current HPV route	Abercrombie	no potential as freight route
Cobram	current HPV route	Beckers	no potential as freight route
Colemans	no potential as freight route	Bulga	potential HPV route with alternative available
Paytens	potential HPV route with alternative available	Cooreei	potential HPV route with alternative available
Rawsonville	current HPV route	Crankies Plains	potential HPV route with alternative available
Swan Hill	current HPV route	Gillies	potential HPV route with alternative available
Warroo	current HPV route	Junction, Rouchel Brook	no potential as freight route
		Tooleybuc	current HPV route
Freight Route Key (Red = current HPV route Amber = potential HPV route with alternative available Green = no potential as freight route)			

Under the Timber Truss Bridge List review, all bridges for retention are able to be sympathetically upgraded and strengthened to accommodate network safety and operational needs without compromising their state heritage values.

Because of these new understandings, as well as the continuing challenges and long-term risks to successfully managing the Strategy in its current form, Roads and Maritime is now approaching the NSW Heritage Council to consider updating the list of bridges to be retained.

Roads and Maritime proposes a modified list of bridges to be retained. This has been informed by the experience of Environment, Bridge Design and Asset Maintenance staff and keeps 19 of the 26 bridges identified in the 2012 Strategy unchanged, removes another seven and adds eight other bridges. The eight bridges to be added include two that are currently owned by local councils. Three of the seven bridges to be removed were identified in the 2012 Strategy as being vulnerable to changes in agricultural production and transportation and were not SHR listed.

Disadvantages of retaining non-operational timber truss bridges

Proposals to replace TTBS often meet with the suggestion to keep the older bridge as a cycleway or separate pedestrian bridge. Roads and Maritime's experience in this regard indicates that this does not achieve an acceptable conservation outcome. The *Roads Act* 1993 allows Roads and Maritime to direct funds towards classified roads only, which would be towards the new bridge rather than the conserved older structure, which has to be maintained by its local government owner. Because deterioration of timber truss bridges is due to natural processes like rot, termite attack and corrosion, the rate of deterioration does not decrease if the bridge is bypassed, but it actually tends to increase. Timbers require replacement before deterioration affects the safety and heritage significance of the bridge, and replacement of timber is a complex and expensive process due to the cost of materials, the substantial temporary support systems required when removing old timbers, as well as the constantly increasing legislative controls around work health and safety and environmental concerns. Timber truss bridge maintenance is a highly specialised skill found almost exclusively within Roads and Maritime. As a result, the actual costs of keeping a bridge safe, maintained and usable by pedestrians remain significant and outside the capacity of local government. Less traffic does not defer the longer term cyclical refurbishment cost, which cannot be borne by Roads and Maritime.

Under the original strategy Cobram bridge was retained beside a new concrete bridge crossing over the Murray River and the NSW abutment and timber approach spans have been removed and replaced with steps. The bridge was retained in this configuration as a result of an earlier planning approval condition, prior to the Strategy being developed but its conservation was considered to assist in improving the representativeness of the overall population. However, developments since 2012 would see two other bridges – Carrathool and Swan Hill - also being duplicated. Roads and Maritime committed to keeping Carrathool, but its bascule span made it inappropriate for large agricultural machinery to pass, and the truss would not carry HML road trains. The local council successfully sought grant funding to build a new bridge which will be open to traffic in late 2019. As Carrathool bridge is on a local road, Roads and Maritime cannot prevent the council's action to effectively close the bridge to through traffic once the new bridge is built downstream. At Swan Hill

the timber bridge was to be retained as an adaptive re-use with a new bridge proposed upstream of the existing bridge. Subsequent planning has determined that the community preferred route is where the bridge crossing currently exists. This would result in a new bridge built on the alignment of the timber bridge

The predicted cost to retain the three duplicated and non-trafficked bridges - Carrathool, Cobram and Swan Hill - into the future is in excess of \$100 M.

In each case while the bridges would retain heritage significance as structures they would no longer be trafficable, and would also impose considerable ongoing maintenance costs to their local councils, in excess of their organisational capacity. As infrastructure, the loss of functionality has to be seen as a critical loss of heritage value.

Two of the three non-operational bridges (Cobram and Swan Hill) cross the Murray River. These crossings are managed and maintained by Roads and Maritime and funded equally by Roads and Maritime and Regional Roads Victoria under the Murray River Crossings Agreement 2001, also known as the Moiety Agreement. When new bridges are constructed, the existing timber bridges are no longer required, and so funding for their conservation may be difficult to obtain, given the cost is high, the benefit limited, and funding would have to be obtained by business cases approved by two separate governments.

The retention of the existing timber bridge at Swan Hill limits options for the location of the new concrete bridge (required to meet network needs), thereby considerably disadvantaging the Swan Hill community and putting other heritage items and areas of importance to the community at risk.

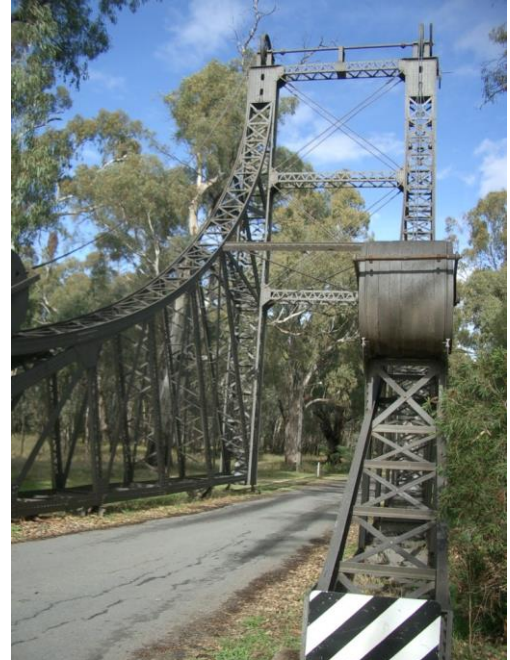


Figure 1: Darlington Point Lift Span

The contribution of these three bridges in maintaining the diversity of the overall TTB population was also an integral part of the argument for their retention. The re-assessment of the retention list allows other bridges to be brought into the sample and maintain a comparable mix of different bridge forms that still provide the needed range of variation found in the original population.

Lift spans in timber truss bridges

In the TTB Strategy, Roads and Maritime argued that conservation of timber truss bridges is most effective when the bridges are retained as operational assets. However, exceptions to this rule were made in the cases of Carrathool, Cobram and Swan Hill bridges. These exceptions were not made primarily due to the fact that these bridges have particularly significant timber truss spans, but rather, it was because these bridges have particularly significant metal lift spans, and reflected the strong regional tradition of river traffic in the late 19th and early 20th centuries. There are four other operational timber truss bridges with lift spans remaining in NSW, at Hinton, Dunmore, Barham and Tooleybuc.

It is the lift spans in the South Western bridges which make them unable to meet current or future customer needs. The lift spans are the narrowest sections of the bridge, thereby making the provision of two lanes of traffic impractical and also limiting the ability of these structures to carry wide agricultural machinery. While there are no proven successful options for conserving non-operational timber spans, there are numerous possible conservation options for non-operational metal lift spans. One example is the relocation of part of the Darlington Point bridge lift span to provide a very impressive entranceway to the local caravan park (Figure 1). The Darlington Point bridge was a de Burgh type timber truss bridge with lift span replaced in the late 1970s.

The handover of significant original metal lift spans to local community groups or Councils after they have been removed from the bridge and relocated with good signage to explain the original function

and significance would be likely to ensure that parts are conserved into the future without unreasonable financial burdens.

Any removal of a bridge would require a full consideration of the heritage impacts and work to be done with stakeholders and local communities to identify different forms of interpretation that would mitigate the loss.

Additional potentially operable timber truss bridges

Timber truss bridges cared for by local Councils were not included in the original TTB Strategy because such bridges sat outside Roads and Maritime's operational parameters defined by the *Roads Act 1993*, and their retention was not considered to be reliably resourced so that they could be permanently conserved. After five years, the total number of timber truss bridges on the road network owned by local Councils is only five, reduced from fifteen when the Strategy was written, confirming the assessment of their vulnerability.

In reconsidering the conceptual basis of the Strategy, Roads and Maritime considers that there is now an important heritage benefit to be derived from ensuring that two particular council-owned bridges are included in the Strategy (see Figure 3). Failure to intervene would likely see all of the remaining five in council ownership replaced within a decade for more cost-effective modern concrete bridges. These bridges would be transferred to Roads and Maritime ownership using Section 150 of the *Roads Act 1993* which provides for the transfer of a public road (state, regional and local) from one roads authority to another with the consent of both. Once agreement is achieved with the council, a ministerial brief would be prepared to lodge the appropriate order in the Government Gazette.



Figure 3: Council managed Timber Truss Bridges proposed to be transferred to Roads and Maritime (left: Gillies Bridge, right : Junction Bridge)

One of these Council bridges is a unique example of a particular truss span configuration which is not otherwise present in the Roads and Maritime collection, and one Council bridge is a far better example of a truss span configuration than the comparable Roads and Maritime bridge. The proposed transfer of ownership of two local council bridges to Roads and Maritime represents an opportunity to rescue them from likely demolition in the near future.

3. Review of list of timber truss bridges to be retained

The TTB Strategy was written to ensure that a representative population of bridges reflecting the variety of historical forms that existed would continue to serve their original function as purposely designed infrastructure in the communities where they were built. Their reason for being, and the core of their heritage significance is that they were designed to be used in an evolving road network, and the Strategy was written to allow that purpose to continue to ensure their survival.

An early step in the Strategy was to determine operability – whether the bridge could continue to serve its function given its location in the road network and the likely future traffic demands placed on it. Experience to that time was that TTBs could not be strengthened or approved to carry high mass

loads (HML) loads. This was guided by the advice of Roads and Maritime's Chief Bridge Engineer who gave a very general and high level assessment of the capacity of the population of timber truss bridges, but without any detailed analysis of the different truss types and the different span configurations within truss types.

Since that time, considerable work has been done on better understanding the structural capabilities of the various different truss types and various strengthening methods available which conserve heritage values while also providing adequate capacity and safety. Of two recently upgraded de Burgh truss bridges, Glennies Creek bridge has been approved to carry HML, and a submission for HML approval is currently in train for Barham bridge.

Because of this recent work, some bridges previously considered unviable can now be made viable for retention with suitable heritage sympathetic strengthening works to be carried out to ensure operability. Some of these bridges have considerable heritage significance and are valued by local communities.

There are eight bridges not listed for retention in the TTB Strategy which are potentially operable (Table 4).

Table 4: Potentially operable bridges to be reconsidered for retention and upgrading

Name and location of bridge	Type	SHR	Comment
Tooleybuc Bridge, Murray River	Allan 70' & lift	Yes	Timber truss with lift span on Murray River
Crankies Plains, Coolumbooka River	McDonald 75'	Yes	Rare and valued example of McDonald truss
Cooreei Bridge, Williams River	Dare 91'	Yes	Rare, important early example of Dare truss
Bulga Bridge, Wollombi Brook	Dare 104'	Yes	Picturesque bridge in vicinity of town
Abercrombie River, Tuena	Allan 70' & 90'	No	Spectacular, historical and unique Allan truss
Gillies Bridge, Black Creek, Cessnock	De Burgh 70'	No	Unique bridge, under local Council care
Junction Bridge, Rouchel Brook	Dare 70'	No	Best 70' Dare, under local Council care
Beckers Bridge, Webbers Creek	De Burgh 91'	Yes	Unique form of casting in anchor blocks

While keeping the intent of the TTB Strategy, it is now possible to review the list of bridges to be retained and those to be replaced to ensure that the best possible representative population of NSW timber truss road bridges is conserved into the future in a way which is financially viable and meets community needs.

Criteria for assessing whether or not a bridge should be viable and therefore retained are (in this order):

- Operability: Can the bridge meet network and community needs for the crossing (capacity and width for large or heavy vehicles, number of lanes for traffic volumes, pedestrian facilities if in a built-up area)? If this is not able to be met, then the bridge should not be listed for retention.
- Technical rarity: How many of this truss type at this span length will remain (each truss type was designed in multiple standard span lengths with details and dimensions of the design differing depending upon span length, some truss types (especially Allan trusses and Dare trusses) also had changes in design details from early to later examples which are important to represent)?
- Technical representativeness: Is this bridge a good example of its type?
- Non-technical representativeness: Does this bridge add to the chronological or geographical spread, configuration of spans, near towns or remote, etc.?
- Extent to which local or regional communities have expressed the value of the historic bridge to them in any community consultations which have occurred to date (particularly under the 2012 TTB Strategy).
- Financial viability: Does the benefit of retaining the timber bridge outweigh the additional cost (if any) involved in upgrading and retaining the timber bridge rather than constructing a new bridge?

Of the 26 bridges listed to be retained in the TTB Strategy, 19 continue to be good candidates for retention, and will be viable provided that necessary refurbishment and capacity upgrade works are

approved and carried out. A conservation management plan (CMP) will be written for each of these bridges to ensure heritage significance is retained or enhanced.

The other seven bridges of the 26 listed to be retained in the TTB Strategy have now been found to be problematic after additional investigation. Three of these bridges were always acknowledged to be potentially problematic and were listed under the “central west group” and were not to be listed on the State Heritage Register.

It is therefore proposed to remove the seven bridges (four of which are on the SHR) which are not viable and to add the eight bridges (five of which are on the SHR) which have now been found to be viable. This gives a total number of 27 bridges to be retained under the TTB Strategy on the updated list and increases the number of bridges on the SHR.

Table 5: Recommended revision of bridges to be retained under the TTB Strategy (*italics* = “central west group”).

Bridges to be added to the list	SHR	Bridges to be removed from the list	SHR
Crankies Plains, Coolumbooka River	Yes	Carrathool Bridge, Murrumbidgee River	Yes
Beckers Bridge, Webbers Creek	Yes	Swan Hill Bridge, Murray River	Yes
Cooreei Bridge, Williams River	Yes	Cobram Bridge, Murray River	Yes
Bulga Bridge, Wollombi Brook	Yes	Colemans Bridge, Leycester Creek	Yes
Abercrombie Bridge, Abercrombie River	No	<i>Warroo Bridge, Lachlan River</i>	No
Gillies Bridge, Black Creek, Cessnock	No	<i>Rawsonville Bridge, Macquarie River</i>	No
Junction Bridge, Rouchel Brook	No	<i>Paytens, Lachlan River</i>	No
Tooleybuc Bridge, Murray River	Yes		

There is opportunity to add bridges to the SHR, since two of the unlisted bridges in the “central west group” (Beryl and Scabbing Flat) can now be upgraded to meet future requirements with an increased level of confidence, and four additional bridges, not currently listed on the SHR (one is listed on the S170 Register, one is listed on an LEP and one is not listed on any statutory or non-statutory heritage register) have been found to be viable, provided that necessary works are carried out and meet the criteria for nomination to the SHR.

4. Detailed Assessment

A detailed assessment against the above criteria of each of the bridges to be either added to or removed from the list is given on the following pages. Mitigation measures have been recommended where appropriate for bridges to be removed from the list to ensure that unique features are not lost.

Cobram and Carrathool Bridges

Two bridges - Cobram and Carrathool - do not meet the primary criterion for operability. There are no other equivalent timber truss bridges remaining which are feasible to retain in their place although Barham bridge (already to be retained under the 2012 TTB Strategy) is almost identical to Cobram bridge and also crosses the Murray River.

Carrathool Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable, local Council has obtained funding to construct a new concrete bridge to service the needs of over-width agricultural equipment and to address the long detour when the bridge is unusable.	✗
Technical rarity	Four 70' Allan trusses remain, 3 of this type of bascule span remain (the other two of this type have timber beam approach spans, no trusses).	?
Technical representativeness	The 70' truss spans are not a good example of their type as their significance is overshadowed by the very impressive bascule span.	?

Carrathool Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Non-technical representativeness	Only remaining timber truss bridge on the Murrumbidgee, only remaining timber truss bridge including this type of bascule moveable span.	✓
Community sentiment	In the TTB Strategy, 18 submissions were received, 9 for removal and replacement, 2 for building a new bridge while keeping the old. More recently, funding has been obtained by the local community and a new bridge is to be built.	?
Financial viability	Cost to retain is approximately \$40 M over the next 30 years with no benefit to the road network, being maintained as a dead end crossing of the river.	✗
Recommendation	Carrathool bridge should be replaced. The bascule and tower spans are of exceptional significance and should be appropriately interpreted and conserved in the vicinity of the bridge or community.	

Cobram bridge was retained in part due to the aesthetics of the lift span by Roads and Maritime and Regional Roads Victoria when a new adjacent crossing was built. Keeping the bridge was a condition of approval. Regional Roads Victoria has raised concerns with funding future conservation works on the bridge, for which it is required to provide half under the border crossing moiety arrangement, with other priorities in the region and only step access onto the retained road deck. Removal of Cobram would require a separate approval process involving both NSW and Victorian planning departments and road agencies. Cobram has also recently been included on the SHR and would now need to undergo a delisting process. These existing commitments need to be recognised and maintained or separately resolved regardless of their being part of the revision of bridges to be retained/removed under the Strategy.

Cobram Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable, new concrete bridge built 2006 has full facilities for two lanes of vehicles and designated pedestrian / cyclist facilities.	✗
Technical rarity	Three 104' de Burgh trusses remain, 3 of this type of lift span remain (the other two are timber truss bridges to be retained, Hinton Bridge is quite different to Cobram, but Barham Bridge is almost identical).	✗
Technical representativeness	The truss spans are not a good example of their type as they are without a function, and cannot demonstrate the strength of the original design or materials. The lift span is not a good example because it cannot be made operational (new low level concrete bridge directly adjacent).	✗
Non-technical representativeness	Barham Bridge is almost identical, and also crosses the Murray River.	✗
Community sentiment	In the TTB Strategy, no submissions were received for this bridge. This may reflect the diminishing value the community puts on the bridge which is no longer an integral part of the life of the community.	?
Financial viability	Cost to retain is approximately \$40 M over the next 30 years with no benefit to the road network. Retention as a non-operational structure only.	✗
Recommendation	Cobram bridge should be removed. The lift span is significant and should be appropriately interpreted and conserved.	

Swan Hill and Tooleybuc Bridges

Swan Hill bridge does not meet the primary criterion for operability, but there is an equivalent timber truss bridge remaining which is feasible to retain in its place (Tooleybuc). Tooleybuc bridge has been assessed as having similar heritage significance to the bridge at Swan Hill, both containing two Allan Truss spans and a similar lift span. Both are listed on the State Heritage Register (SHR) as well as the Roads and Maritime S170 register, and both were assessed to be of National significance in the 1998 MBK study of relative significance.

Swan Hill Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable and cannot be made operable, currently under temporary support due to extensive deterioration. New concrete bridge required to service agricultural and community crossing needs: two lane two way heavy vehicle access (higher mass limits as this is an important interstate route with heavier vehicles than would be allowed on most bridges)/ pedestrian access/ / access for wide agricultural vehicles	✗
Technical rarity	Fourteen 90' Allan trusses remain, 4 of this type of lift span remain, Swan Hill being the first (two are timber truss bridges to be retained, one is a timber truss bridge to be replaced, and one is not a timber truss bridge).	✓
Technical representativeness	The 90' truss spans are not a good example of their type due to considerable modifications and extensive deterioration, the lift span is an important example of its type as it is the first of its type.	✓
Non-technical representativeness	There are other timber truss bridges and lift span bridges across the Murray and within the vicinity, there are other Allan trusses with lift spans	?
Community sentiment	In the TTB Strategy, 4 submissions were received, with all 4 for replacement. The best alignment for a new bridge is on the alignment of the existing bridge. If a new bridge were to be constructed alongside the existing, it would cause considerable inconvenience due to destruction of local amenities, heritage water tank and traffic problems.	✗
Financial viability	Cost to retain is approximately \$40 M over the next 30 years with no benefit to the road network, retention either non-operational or with limited pedestrian capacity.	✗
Recommendation	Swan Hill bridge should be replaced. The operational lift span is of exceptional significance and should be appropriately interpreted and conserved in the vicinity of the bridge or community.	

Tooleybuc Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but would require future upgrading (including upgrades and possible substantial modifications to the lift span) to meet HML as it is on an important freight route.	✓
Technical rarity	Four 70' Allan trusses remain, 4 of this type of lift span remain.	✓
Technical representativeness	The 70' truss spans are not a good example of their type due to considerable modifications and extensive deterioration, but future conservation works may enable restoration of some original detailing and aesthetic, the lift span is a good example of its type.	✓
Non-technical representativeness	There are other timber truss bridges and lift span bridges across the Murray and there are other Allan trusses with lift spans	?

Tooleybuc Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Community sentiment	In the TTB Strategy, one submission was received for replacement with Wakool Shire submitting that Tooleybuc was inadequate to meet escalating heavy traffic requirements and that the load restrictions at Tooleybuc presented an impediment to growth of agriculture and industry in the shire. However, the local community do celebrate the history of the bridge and the crossing, with considerable effort going into heritage interpretation, preservation and maintenance in the vicinity of the bridge.	?
Financial viability	Cost to retain is approximately \$35 M over the next 30 years which is considerably less expensive than the high level concrete bridge currently proposed as the replacement for this crossing.	✓
Recommendation	Tooleybuc bridge should be retained. The bridge should be upgraded to HML capacity with appropriate heritage sympathetic upgrade techniques.	

There are another four bridges in the list of bridges to be retained under the TTB Strategy, where their long term operability is uncertain, and there are better examples of those truss types which could be retained in their place, Warroo, Paytens, Rawsonville and Colemans. Given the historical and more recent rate of demolition of timber truss bridges, it is timely to review the list of bridges to be retained now, before the alternative bridges are inevitably replaced.

Warroo and Junction Bridges

It is proposed to swap Warroo bridge with Junction bridge (Rouchel Brook) as a better example of a 70' Dare truss. Neither Warroo bridge nor Junction bridge is currently listed on the SHR. However, Junction bridge meets at least five of the seven criteria for State significance, and is eligible to be added to the SHR. Warroo bridge would require substantial modification if it were to be retained due to movements of the waterway as well as the need for wide agricultural vehicles to be able to use the crossing.

Warroo Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable, frequent damage from over-width vehicles, the bridge is required to carry 62.5 tonne B-Doubles to meet current network needs, and it is expected that within 20 years, the bridge will be required to carry 113.0 tonne B-Triples and so included in "central west group".	✗
Technical rarity	Three 70' Dare trusses remain and the other two are at risk, being managed by local Councils with load limits due to deteriorated condition. One is already programmed to be replaced, the other is at risk and likely to be replaced within five years unless Roads and Maritime intervenes.	✓
Technical representativeness	The 70' Dare truss is not a good example of its type because the waterway has moved and widened, meaning the 70' span is no longer long enough for the river, considerable modification, including widening carriageway for community needs and reconfiguration of spans including relocation of truss span would be required if this bridge were retained.	✗
Non-technical representativeness	Warroo bridge does not add to the representativeness of the population due to chronological spread, configuration of spans, or collection of remote bridges, as all these aspects are relatively common. It does add a little to the geographical spread as bridges in the Parkes / Forbes area are all being replaced, but an excellent example of a Dare truss remains in Western Region north of Warroo (Scabbing Flat bridge).	✗

Warroo Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Community sentiment	In the TTB Strategy, no submissions were received for this bridge. Community consultation which has occurred as part of the capacity upgrade project development for this bridge has highlighted the community's frustration at the narrowness of the existing crossing.	✗
Financial viability	Cost to retain is approximately \$30 M over the next 30 years whereas cost to replace with modern concrete bridge is less than \$10 M. The retained bridge would not meet community needs into the future.	✗
Recommendation	Warroo bridge should be removed and replaced with a new bridge. Junction bridge over Rouchel Brook should be acquired from Upper Hunter Shire Council to retain as a 70' Dare truss.	

Junction Bridge (Rouchel Brook)	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but currently under a 12 tonne load limit due to deterioration, could be made safe and operable with a standard upgrade.	✓
Technical rarity	Three 70' Dare trusses remain with two including this one at risk, being managed by local Councils with load limits due to deteriorated condition. One is already programmed to be replaced, this one is at risk and likely to be replaced within five years unless Roads and Maritime intervenes.	✓
Technical representativeness	Excellent example of a 70' Dare truss with original concrete piers.	✓
Non-technical representativeness	A beautiful bridge in a beautiful setting (although current heavy vehicle detour detracts, setting can be restored after bridge is repaired).	✓
Community sentiment	In the TTB Strategy, this bridge was not considered and so there is no information within Roads and Maritime regarding community sentiment.	?
Financial viability	Cost over the next 30 years to acquire, upgrade and retain is \$ 15 M. This is similar to the cost to retain Warroo Bridge, and is a far better outcome for the both the local communities and the local Councils.	✓
Recommendation	Junction bridge over Rouchel Brook should be acquired from Upper Hunter Shire Council to retain as a 70' Dare truss. The bridge should be repaired and upgraded to T44 with appropriate heritage sympathetic upgrade techniques.	

Paytens and Abercrombie Bridges

It is proposed to swap Paytens with Abercrombie bridge as a better example of a multi-span Allan truss. Neither Paytens nor Abercrombie bridge are currently listed on the SHR. Abercrombie bridge meets at least five of the seven criteria for State significance, and would be eligible to be added to the SHR. Paytens bridge has had a number of intrusive modifications and is frequently damaged by overloaded or overwidth vehicles, and so would require very substantial modifications to allow future operability.

Paytens Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable, frequent damage from over-width vehicles, the bridge is required to carry 62.5 tonne B-Doubles to meet current network needs. Paytens Bridge was included in "central west group".	✗

Paytens Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Technical rarity	Fourteen 90' Allan trusses remain.	✗
Technical representativeness	Intrusive steel pier has replaced original timber pier in waterway, modifications to bottom chords have been required due to failures.	✗
Non-technical representativeness	Paytens Bridge (1926) contributes to the chronological spread of Allan truss bridges, being the 2 nd latest remaining timber truss bridge. The next latest viable Allan truss bridge to be constructed is Abercrombie Bridge (1919). However, later viable Dare trusses (1929 and 1930) still remain.	✓
Community sentiment	In the Strategy, 3 submissions were received, with 2 for replacement. Cannot be upgraded to meet community needs (very heavy trucks and wide agricultural vehicles) without substantial modification.	✗
Financial viability	Cost to retain is approximately \$51.5 M over the next 30 years whereas cost to replace with modern concrete bridge is approximately \$10 M. The retained bridge would not meet community needs into the future.	✗
Recommendation	Paytens bridge should be removed and Abercrombie bridge retained as a superior example of a 90' Allan truss.	

Abercrombie Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but would require future upgrading to meet HML. The bridge is required to carry up to 45.5 tonne semi-trailers. The route is not open to B-Doubles or wide agricultural vehicles due to the poor road alignment both sides of the bridge, which is not expected to change.	✓
Technical rarity	Four 70' Allan trusses and fourteen 90' Allan trusses remain. This bridge is unique as the only remaining example of a timber truss bridge with differing truss span lengths, having two 70' spans and a single central 90' Allan truss span. It is also significant having masonry piers reused (and added to in height) from a previous Old PWD truss bridge.	✓
Technical representativeness	Abercrombie Bridge is an excellent example of its type, with very intact masonry piers and no irreversible modifications made to truss spans.	✓
Non-technical representativeness	A beautiful bridge in a spectacular setting which is valued by the region. Some previous works detract from significance (eg unsympathetic traffic barriers and some experimental forms of strengthening) but these can be rectified in future restoration and upgrade works to achieve HML. Bridge also adds to geographical spread of timber truss bridge population, being the only remaining timber truss bridge between Bathurst and Goulburn.	✓
Community sentiment	In the TTB Strategy, 4 submissions were received, with all 4 for retention due to rarity of style and historical association of the bridge with the region.	✓
Financial viability	Cost to retain is approximately \$35 M over the next 30 years whereas cost to replace with modern concrete bridge is approximately \$15 M. The financial investment of \$20 M is warranted at this location because of the significance of the heritage bridge both as part of the retained population throughout the State and because of its value to the regional community.	✓
Recommendation	Abercrombie bridge should be retained. The bridge should be upgraded to HML capacity with appropriate heritage sympathetic upgrade techniques.	

Colemans and Bulga Bridges

It is proposed to swap Colemans bridge with Bulga bridge as a better example of a 104' Dare truss. Both Colemans bridge and Bulga bridge have two 104' Dare truss spans and are listed on the SHR. These two bridges are effectively the last remaining 104' Dare trusses. Another local Council-owned Dare truss bridge at Bendemeer is currently restricted to use as a pedestrian crossing, but this has been dependent on continued active community support and funding, which may only defer its eventual replacement. The future operability of Colemans bridge is uncertain due to considerable traffic congestion in the area and is currently subject of a traffic study.

Colemans Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	The future operability of Colemans bridge is uncertain at this time. The bridge is operating as a two lane bridge within the large town of Lismore, and the numerous scrapes and dents in the guardrail along the bridge indicate problems due to the narrowness of the bridge. A nearby railway bridge currently limits the sizes of vehicles which are physically able to access the bridge, but this railway bridge is no longer operating and may be removed in the future. This would allow access on to Colemans bridge by heavy vehicles, thereby putting the road bridge at risk as it is not sufficiently strong to take two lanes of heavy vehicles. The location of the bridge is highly congested with a busy intersection at one end of the bridge where most of the accidents appear to occur. Colemans bridge is one of four bridges in the vicinity, all of which are at capacity (high traffic volumes). Roads and Maritime is funding a two year traffic study to determine what the future needs of Lismore are with regard to bridges.	?
Technical rarity	Four 104' Dare trusses remain (two of which have been bypassed). Colemans bridge is a rare remaining example of Dare trusses constructed on an iron pier which previously carried Old PWD trusses.	✓
Technical representativeness	This bridge is not a good example of its type due to numerous modifications. The introduction of metal strengthening of primary truss members and the covering of timbers with metal flashing means that the timber is not clearly visible and the original slenderness is obscured. Due to its location in a low socio-economic part of town, the bridge suffers from graffiti and other anti-social behaviours in the vicinity of the bridge.	✗
Non-technical representativeness	Colemans bridge contributes to the geographical spread of timber truss bridges, with less remaining in Northern Region than any other region. While Colemans bridge is in a large town, it does not provide a gateway to the town in the way that some of the other timber truss bridges do.	✓
Community sentiment	In the TTB Strategy, no submissions were received for this bridge. No recent community consultation has brought forth any views from the community as to whether or not this bridge is valued beyond its utility.	?
Financial viability	Cost to retain is approximately \$30 M over the next 30 years and the cost to replace with modern concrete bridge is approximately \$40 M. The retained bridge may not meet community needs into the future.	?
Recommendation	Further investigation should be carried out to determine the future operability of Colemans bridge and whether or not it is economical to retain. Bulga bridge should be retained as a superior example of a two span 104' Dare truss.	

Bulga Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but would require future upgrading for heavy vehicles and some minor widening to accommodate two lanes of traffic.	✓
Technical rarity	Four 104' Dare trusses remain (two of which have been bypassed).	✓
Technical representativeness	The bridge is a good example of its type.	✓
Non-technical representativeness	Bulga bridge is on the edge of the town of Bulga, and so adds to the representative population of timber truss bridges in or near towns.	✓
Community sentiment	In the TTB Strategy, one submission was received and it was for retention, pointing to the heritage significance and local use of the bridge.	✓
Financial viability	Cost to retain is approximately \$45 M over the next 30 years whereas cost to replace with modern concrete bridge is approximately \$50 M.	✓
Recommendation	Bulga bridge should be retained. The bridge should be upgraded as necessary with appropriate heritage sympathetic upgrade techniques.	

Rawsonville and Cooreei Bridges

It is proposed to swap Rawsonville bridge with Cooreei bridge as a better example of a 91' Dare truss. Rawsonville bridge has two 91' Dare truss spans, whereas Cooreei has one 91' Dare truss span. However, whereas Rawsonville is not on the SHR, Cooreei bridge is listed on the SHR. Cooreei bridge is an important example of an early Dare truss. The design details of the Dare truss connections changed over time and Cooreei bridge is one of only two remaining bridges which demonstrate the early design details. The other bridge has been bypassed and is not operable.

Rawsonville Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is not operable. As predicted in the 2012 Strategy, network needs have considerably increased in the region in the past five years, with a greater need for heavy and wide vehicles to use this route, and also increased traffic volumes.	✗
Technical rarity	Eight 91' Dare trusses remain, including three which have two truss spans.	✗
Technical representativeness	The bridge is a good example of its type.	✓
Non-technical representativeness	Rawsonville bridge does not add to the representativeness of the population due to chronological spread, configuration of spans, or collection of remote bridges, as all these aspects are relatively common. It does add a little to the geographical spread as bridges in the Parkes / Forbes area are all being replaced, but an excellent example of a very similar two span Dare truss remains in Western Region within close proximity (Scabbing Flat Bridge).	✗
Community sentiment	In the TTB Strategy, no submissions were received for this bridge. Considerable community feedback has been provided when crews have been doing maintenance works, and the feedback is requesting a new concrete bridge to meet network needs for heavy and wide and increased numbers of vehicles.	✗
Financial viability	Cost to retain is approximately \$37 M over the next 30 years and cost to replace with a modern concrete bridge is approximately \$14 M.	✗
Recommendation	Rawsonville bridge should be removed and Cooreei bridge retained as a superior example of a 91' Dare truss.	

Cooreei Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but will require future upgrading for heavy vehicles.	✓
Technical rarity	Although eight 91' Dare trusses remain, only 2 early (pre-1908) Dare trusses remain which demonstrate the early design details of the cast iron shoes and connections to the primary timber truss members.	✓
Technical representativeness	The bridge is an excellent example of its type.	✓
Non-technical representativeness	Cooreei bridge is on the edge of the town of Dungog, and so adds to the representative population of timber truss bridges in or near towns.	✓
Community sentiment	In the TTB Strategy, 7 submissions were received with 4 being for retention. The 3 submissions for replacement due to the bridge being an "impediment to development", but capacity and durability upgrades can meet future community needs. The submissions for retention noted the importance of the historical bridge to the historical town of Dungog.	✓
Financial viability	Cost to retain is approximately \$50 M over the next 30 years and cost to replace with a modern concrete bridge is also approximately \$50 M.	✓
Recommendation	Cooreei bridge should be retained. The bridge should be upgraded as necessary with appropriate heritage sympathetic upgrade techniques.	

Three additional bridges are proposed to be added to the list of bridges to be retained under the TTB Strategy because they are important to the timber truss bridge population and / or to local communities, Crankies Plains, Gillies and Beckers.

Crankies Plains

Crankies Plains bridge is the second last remaining 75' McDonald truss bridge in the State and it is highly valued by the local community of Bombala. The bridge is listed on the SHR, S170 and LEP.

Crankies Plains Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but will require future upgrading for heavy vehicles.	✓
Technical rarity	Only two 75' McDonald truss bridges remain.	✓
Technical representativeness	The bridge is a good example of its type.	✓
Non-technical representativeness	The bridge adds to geographical spread of timber truss bridge population, being one of the two most southern timber truss bridges in New South Wales, and the only remaining timber truss bridge near Bombala.	✓
Community sentiment	In the TTB Strategy, 12 submissions were received, with 9 being for retention, and another requesting a new concrete bridge as well as the retention of the existing timber bridge. The bridge is highly valued by the local community, since it is the last timber truss bridge an area which has historically had a large number of timber truss bridges in close proximity.	✓
Financial viability	Cost to retain is approximately \$35 M over the next 30 years and cost to replace with modern concrete bridge is approximately \$20 M. The financial investment of \$15 M is warranted at this location because of the rarity of McDonald trusses and the high esteem with which this bridge is held locally.	✓

Crankies Plains Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Recommendation	Crankies Plains bridge should be retained. The bridge should be upgraded as necessary with appropriate heritage sympathetic upgrade techniques.	

Gillies Bridge

Gillies bridge is a unique example of 70' de Burgh truss and is currently managed by the local Council.

Gillies Bridge, Black Creek	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but currently under a 15 tonne load limit due to deterioration, could be made safe and operable with a standard upgrade. Conservation Management Plan prepared for Cessnock Council.	✓
Technical rarity	Unique as the last remaining 70' de Burgh truss.	✓
Technical representativeness	The bridge is an excellent example of its type.	✓
Non-technical representativeness	Gillies bridge (1902) contributes to the chronological spread of de Burgh truss bridges, being the earliest remaining operable de Burgh truss.	✓
Community sentiment	Esteemed by the local community, the bridge adds to the community's sense of identity because of its historical and aesthetic value.	✓
Financial viability	Cost over the next 30 years to acquire, upgrade and retain is \$ 15 M. The financial investment is warranted at this location because of the significance of the heritage bridge both as part of the retained population throughout the State and because of its value to the regional community.	✓
Recommendation	Gillies bridge should be acquired from Cessnock City Council, and should be upgraded to T44 with appropriate heritage sympathetic upgrade techniques.	

Beckers Bridge

Beckers bridge is a good example of a 91' De Burgh truss with unique casting detail in anchor blocks.

Beckers Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Operability	Bridge is operable, but would require future upgrading for heavy vehicles. The road alignment on the approaches has been the cause of numerous traffic incidents and so some form of traffic calming would need to be introduced to ensure that vehicles approach the bridge at a safe speed. Modifications would also be required to alleviate the flooding issues experienced at the bridge.	✓
Technical rarity	Three 91' de Burgh trusses remain. This bridge is unique as the only remaining example of a timber truss bridge with an early de Burgh truss casting detail in the anchor blocks, superseded in later designs.	✓

Beckers Bridge	Assessment against criteria	Rating ✓ = meets criterion ✗ = does not meet criterion ? = partially meets criterion or further info required
Technical representativeness	Beckers bridge is a good example of its type.	✓
Non-technical representativeness	Beckers bridge contributes to the chronological spread of de Burgh truss bridges, showing early design detailing of the anchor blocks.	✓
Community sentiment	In the TTB Strategy, 2 submissions were received, both for retention.	✓
Financial viability	Cost to retain is approximately \$25 M over the next 30 years and the cost to replace with modern concrete bridge is approximately \$20 M. The financial investment of \$5 M is warranted at this location because of the significance of the heritage bridge both as part of the retained population throughout the State and because of its value to the regional community.	✓
Recommendation	Beckers bridge should be retained. The bridge and approaches should be upgraded as necessary with appropriate heritage sympathetic upgrade techniques for safety, strength and flood immunity.	

5. Summary and Recommendations

The list of retained bridges included in the 2012 Timber Truss Bridge Conservation Strategy has been reviewed. Experience gained in conservation approaches since the Strategy was endorsed by the Heritage Council and emerging changes in rural freight networks have required that Roads and Maritime reflect on what combination of bridges will best continue to meet its obligations to care for these items of recognised state heritage significance as well as ensuring the continued operability of the NSW road network. A detailed re-assessment of the remaining timber truss road bridges, including those owned by local councils which had been excluded in the original Strategy has been presented, with the intention of making a more representative permanent sample of bridges, which are those at least risk of attrition by road network demands.

The effect of the revision would be:

- The total number of bridges to be retained is increased from 26 to 27.
- The total number of SHR delistings required is reduced by one.
- Bridges which demonstrate unique details found nowhere else are added to the list to be retained, so that the representativeness of the retained population is enhanced by the review.
- Bridges on the updated list can be managed with a continuing role and use in the life of communities, which enables them to demonstrate their significance to a far greater extent than bridges which have been bypassed by new crossings and which enables them to be conserved in line with the endorsed overarching CMP.
- The 'Central west' group of bridges whose future status was left unresolved are now managed with three to be replaced, three to be retained and added to the SHR.

It is therefore recommended that:

1. The list of bridges in Table 7 below be submitted for endorsement by the Heritage Council of NSW as the updated list of bridges to be retained under the TTB Strategy and managed under the endorsed overarching CMP.
2. The Proposal should be used as the basis for consulting with key stakeholders involved in the development of the original strategy:

- Office of Environment and Heritage
- National Trust of Australia (NSW)
- Engineers Australia
- Royal Australian Historical Society – and via it to the 400+ affiliated local historical societies in NSW

Plus others affected by the proposal:

- Bridges to be acquired by Roads and Maritime, currently council owned: Cessnock City Council (Gillies bridge) / Upper Hunter Shire Council (Junction bridge)
 - Bridges proposed for removal from list: Regional Roads Victoria / Heritage Victoria/Murray River Crossings Forum Steering Committee /Swan Hill Rural City Council (Vic) /Murray River Council (Swan Hill bridge), Carrathool Shire Council (Carrathool bridge) , Forbes Shire Council (Warroo bridge and Paytens bridge), Dubbo Council (Rawsonville bridge), Moira Council (Cobram Bridge), Lismore City Council (Colemans bridge)
 - Bridges proposed for retention: Regional Roads Victoria / Heritage Victoria/Murray River Crossings Forum Steering Committee /Swan Hill Rural City Council (Vic) /Murray River Council (Tooleybuc bridge), Snowy Monaro Council (Crankies Plains bridge), Dungog Council (Cooreei bridge), Singleton Council (Bulga bridge), Upper Lachlan Shire (Abercrombie bridge)
3. Following Heritage Council of NSW endorsement of the updated list, the two Council bridges to be retained under the updated list be acquired by Roads and Maritime and the six bridges to be retained which are not currently SHR listed be nominated for inclusion on the SHR.

Table 7: Recommended list of the 27 bridges to be retained under the TTB Strategy as a result of this review (SHR status is current as at 1 April 2019).

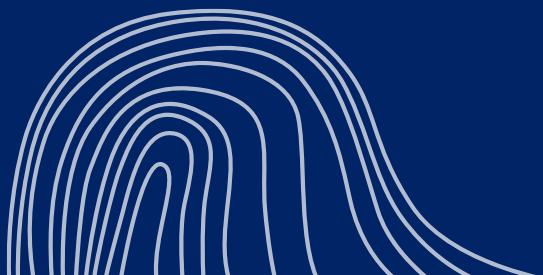
Name and location of bridge	Type	SHR	Name and Location	Type	SHR
Monkerai Bridge, Karuah River	Old PWD 70'	Yes	Morpeth Bridge, Hunter River	Allan 110'	Yes
Clarence Town Bridge, Williams	Old PWD 100'	Yes	Dunmore Bridge, Paterson River	Allan 110'	Yes
Tunks Creek, Galston Gorge	McDonald 65'	Yes	Gillies Bridge, Black Creek	De Burgh 70'	No
Junction Bridge, Tumut River	McDonald 75'	Yes	Glennies Creek, Middle Falbrook	De burgh 91'	Yes
Crankies Plains, Coolumbooka	McDonald 75'	Yes	Beckers Bridge, Webbers Creek	De Burgh 91'	Yes
McKanes Bridge, Cox's River	McDonald 90'	Yes	Barham Bridge, Murray River	De burgh 104'	Yes
Abercrombie River, Tuena	Allan 70' & 90'	No	St Albans Bridge, Macdonald River	De burgh 117'	Yes
Tooleybuc Bridge, Murray River	Allan 70'	Yes	Junction Bridge, Rouchel Brook	Dare 70'	No
Beryl Bridge, Wyaldra Creek	Allan 70'	No	Cooreei Bridge, Williams River	Dare 91'	Yes
Victoria Bridge, Stonequarry Ck	Allan 90'	Yes	Briner Bridge, Upper Coldstream	Dare 91'	No
Wallaby Rocks, Turon River	Allan 90'	Yes	Scabbing Flat Bridge, Macquarie	Dare 91'	No
Hinton Bridge, Paterson River	Allan 90'	Yes	New Buildings Bridge, Towamba	Dare 91'	Yes
Rossi Bridge, Wollondilly River	Allan 90'	Yes	Bulga Bridge, Wollombi Brook	Dare 104'	Yes
Wee Jasper, Goodradigbee	Allan 90'	Yes			

Attachment A: Replacement and Upgrade Works Summary

Attachment B: Five Year Schedule of Works

Attachment C: Maps showing bridge locations

Attachment D: Timber Truss Bridge List Review replacement and upgrade costings



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